

# tx : H<sub>2</sub>O

*A Publication of the Texas Water Resources Institute* Summer 2012

**TEXAS DROUGHT RECOVERY**  
*are we there yet?*

Texas AgriLife Research  
Texas AgriLife Extension Service  
Texas A&M University College of Agriculture and Life Sciences





*Working to make  
every drop count*

Throughout most of Texas, land and water systems are focusing on recovering from a historic drought. This issue of *txH<sub>2</sub>O* spotlights that recovery. The state's water security, that is, the steps that need to be taken to ensure that Texas has adequate water supplies during future droughts, is discussed. Water systems, large and small, are meeting new challenges.

When considering the impact to Texas' farms, ranches and forestlands, the idea of drought recovery is not simply getting more rain. Farmers' new outlook might include less available water for irrigation. Rangeland managers might wait several years for native perennial grasses to recover. Wildlife habitats are heavily affected by native vegetation die-off. Communities like Bastrop are finding that recovery from wildfire means long-term efforts for revegetation and new perspectives on prescribed fire. Another topic of discussion is one of the most challenging questions for water managers in Texas: How is enough water kept in the state's rivers and streams to maintain statewide fish and wildlife resources?

Texas will respond to the drought in a way that makes sense for Texas. But the lessons of Australia and Israel can provide valuable information. Both countries have recently experienced severe multiyear drought and established a national imperative to create water-efficient economies. Both now have flourishing industries and businesses because of their response to drought.

If Texans approach this right, drought recovery in Texas will also include a drought response that leaves the state better off during the next drought. As always, a combination of science, policy and management will make the difference.

Neal Wilkins\*

\*As of August 1, 2012, Dr. Roel Lopez will assume director duties of the Texas Water Resources Institute and Texas A&M Institute of Renewable Natural Resources. Dr. Neal Wilkins has been appointed president and chief executive officer of the East Wildlife Foundation.

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Country road, muddy with tire tracks  
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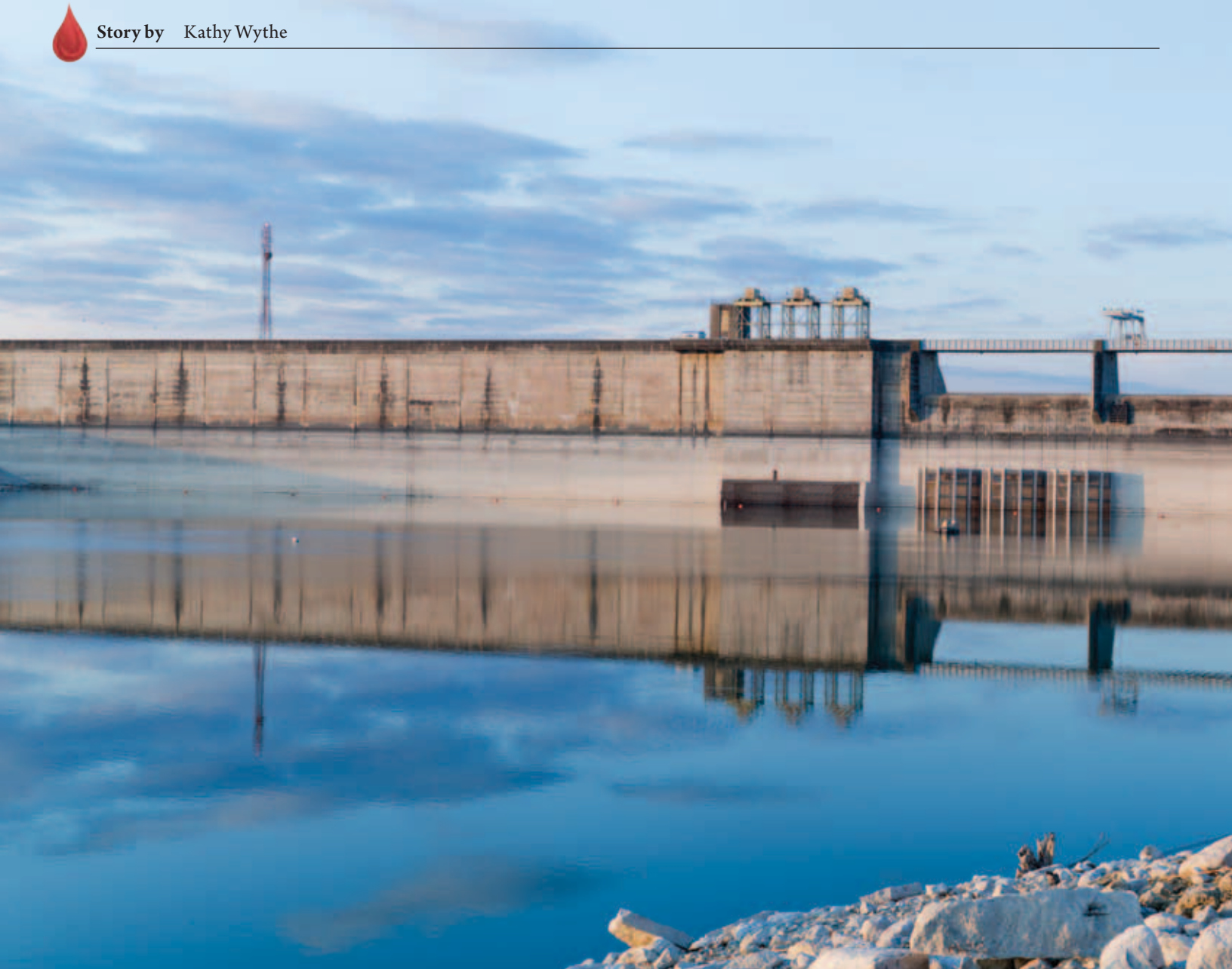
# Volume 7, number 2, Summer 2012

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- 2 | **Securing Texas water**  
*Experts call for additional planning, policies, expanding “new” water*
- 5 | **Committee looks to integrate research into drought planning**
- 6 | **Community water systems recovering from the drought**  
*Lessons learned; plans made*
- 10 | **A little rain doesn’t fix it**  
*Farmers and ranchers remain cautious as drought continues*
- 15 | **Pushing the reset button on Texas rangelands**  
*Recovering from drought requires patience, knowledge*
- 19 | **Running the rivers**  
*Scientists say 2011 drought showed importance of environmental flows regulations*
- 22 | **Long road to recovery**  
*Bastrop team develops plan to restore Lost Pines region*
- 26 | **Question & Answer with Heather Harward**  
*H<sub>2</sub>O<sub>4</sub>TEXAS Coalition promotes state water plan implementation*
- 28 | **Water Conservation and Technology Center, director to focus on statewide water issues**
- 29 | **Briefs**

**txH<sub>2</sub>O** is published three times a year by the Texas Water Resources Institute (TWRI), which is part of Texas AgriLife Research, the Texas AgriLife Extension Service and the Texas A&M University College of Agriculture and Life Sciences. TWRI is funded in part by the U.S. Geological Survey and authorized by the Water Resources Research Act. To subscribe to txH<sub>2</sub>O or New Waves, TWRI’s monthly e-mail newsletter, visit [twri.tamu.edu](http://twri.tamu.edu). Follow us on Twitter at [Twitter.com/TxWRI](https://twitter.com/TxWRI).



The backside of Mansfield Dam on Lake Travis clearly shows the effect of drought with the water level low enough to expose turbine intakes.  
©Jeff Gardner; iStockPhoto.

With the 2011 drought exposing the strengths and weaknesses in Texas' water supply systems and the accompanying planning and policies, water security has become a buzzword in Texas water resources circles. The need to move forward in research, planning and policy and to diversify the state's water supplies were the common threads at the Texas Water Summit, organized by The Academy of Medicine, Engineering and Science of Texas, in May.

Many expressed a *carpe diem* theme of "let's not waste this drought" to make critical changes.

Dr. Ron Kaiser, professor and chair of the Texas A&M University Water Program, said the state should not waste a bad drought but instead use this opportunity to make substantial changes to water policy. He cited major changes made to water planning regulations after previous droughts,

including methods of integrating different water laws into a prior appropriations system after the 1950s drought of record and Senate Bill 1 in the 1990s, which instituted the current state water planning process.

He predicted that the state will experience more urgency in moving water between river basins and greater need to consolidate groundwater districts.

"Texas will struggle to find solutions to integrate surface and groundwater management," he added.

While many agreed that the state's water planning has advanced since the drought of record, the recent drought has exposed areas in which the state needs to improve.

Dr. Todd Votteler, executive manager of science, intergovernmental relations and policy for the Guadalupe-Blanco River Authority, said the state no longer has the surplus water it had from



# SECURING TEXAS WATER

*Experts call for additional planning, policies, expanding “new” water*



the reservoirs built after the drought of record. “(Building those reservoirs) created this cushion, which peaked in the early 1970s and is now gone,” Votteler said.

Texas has the same amount of surface water storage capacity per capita available now that it had in 1953, he said.

Although the current state water plan calls for more than \$53 billion in water management strategies and projects to meet the needs of the projected population in 2060, state funding for those improvements, in light of other pressing funding concerns, will probably not happen in the next session, the experts said.

Votteler noted that there is no financing mechanism to fund these strategies and projects. “And the prospects for that (financing) happening in the next legislative session are not good since it has started to rain,” he said.

Dr. Robert Mace, Texas Water Development Board deputy executive administrator for water science and conservation, said cost is the biggest obstacle in getting the water plan funded. “It’s expensive, and the challenge is convincing rate payers and politicians that it is worth the cost.”

Dr. David Maidment, professor and associate director of the Center for Integrated Earth System Science at the University of Texas at Austin, said the state needs to improve its ability to predict water supplies in the near future.

He believes building a real-time information system for water in Texas can help project what will happen six to 18 months into the future. He is working with a Drought Technology Steering Committee, a group of Texas University researchers and water agency staff, “to move forward with the best insight and understanding of what the future conditions are going to be,” he said. “We need to





think about developing more specific measures to quantify drought.” (See related story on page 5.)

Developing “new” water was touted at the May summit as critical to meeting the state’s demand.

Advanced water conservation, or using the existing water resources more efficiently, “constitutes a large part of where we think our future water supply is going to come from,” Mace said.

According to Dr. Michael Hightower of Sandia National Laboratories in Albuquerque, NM, desalination use is growing by 10 percent a year and water reuse by 15 percent in the United States. That diversification is important, he said, because the country is “stressing its surface water and groundwater sources.”

Although cost is a hindrance to desalination, he said, that cost is decreasing while the cost of fresh water production is increasing.

Robert Puente, San Antonio Water System (SAWS) president and chief executive officer, said San Antonio has diversified its water supplies by recycling treated wastewater, using aquifer storage and recovery, and planning desalination of brackish water. The water system successfully used that model from 1984 to 2009.

“We have 67 percent more customers and use zero percent more water,” he said. “If we had not had water conservation, we would need an additional 121,000 acre-feet to deliver water to those customers.”

Ed Archuleta, El Paso Water Utilities president and chief executive officer, said its Kay Bailey Hutchison Desalination Plant can produce 27.5

million gallons of water a day and increases fresh water production for El Paso by 25 percent. The agency also uses reclaimed water, about 2.1 billion gallons a year, for watering its golf courses and other uses.

Archuleta said El Paso saves 231 billion gallons of water from conservation and reclaimed water.

Dr. Ellen McDonald, principal of Alan Plummer Associates Inc., pointed to the Colorado River Municipal Water District’s plans to build a direct water reuse plant in Big Spring as an example of what Texas needs to do.

The Big Spring project will be “one of three direct reuse projects in the world,” McDonald said. “Texas is really on the forefront with this project.”

McDonald said water reuse, or the beneficial use of treated wastewater, “is not the answer to everything but can play an important role” in future water supplies.

Other countries that have faced severe water shortages, such as Australia and Israel, have diversified their supplies, and this kind of diversification is essential for Texas, Mace said. “Just like you diversify your financial portfolio, you want your water portfolio diversified.”

According to Ralph Eberts of Black and Veatch, Australia is a good example for Texas. He said the Australian state of Queensland came close to running out of water in 2007 with only 15 percent of its total water capacity remaining. The government aggressively attacked its problem by building three advanced wastewater treatment plants, implementing water restrictions tied to percent of water capacity in its storage sources, building desalination plants and building a massive pipeline system to interconnect all the water supplies.

“The biggest drama that has been played out in the world of water in the last 10 years is Australia,” he said. “They truly experienced drought beyond anything they ever dealt with before.”

For more information go to: [twri.tamu.edu/publications/txh2o/](http://twri.tamu.edu/publications/txh2o/).



Dr. Ron Kaiser, professor and chair of the Texas A&M University Water Program, speaks to Texas Water Summit attendees in May about water law in Texas. Photo courtesy of The Academy of Medicine, Engineering and Science of Texas.







# COMMITTEE LOOKS TO INTEGRATE RESEARCH INTO DROUGHT PLANNING

A group of Texas university professors and agency staff has formed a Drought Technology Steering Committee to better understand how university research-based information can help in understanding and facing drought in Texas.

According to Dr. David Maidment, professor and associate director of the Center for Integrated Earth System Science at the University of Texas, since Senate Bill 1 in 1997, which followed the last severe drought in 1996, the state has made an effort to develop a secure infrastructure for long-term water planning. The current drought, however, has exposed the state's vulnerability in coping with near-term decision-making, he said.

"What the drought has revealed is that critical issues are now 10 days or weeks or months away rather than 10 years away," he said.

The state needs a better ability to "see ahead" for at least a few months more than it currently has to determine what and when water shortages may occur and the ability to make statistical projections for longer periods, he said.

"We don't have a synthesized situational awareness of the current condition of our water system statewide," Maidment said. "We need to be able to see ahead six to 18 months for rational decision-making."

"What we are trying to do in the drought technology steering committee," he said, "is bring the best data and models and science that we can and to interact with our state government water leaders and other water stakeholders so we can move forward with the best insight and understanding of what the future conditions are going to be."

The Lower Colorado River Authority is an example of making decisions based on simulation models of what could happen, he said. Based on its simulations, the river authority decided not to release water for rice irrigation this year.


In conjunction with the committee, Dr. John Nielsen-Gammon, state

climatologist and professor in Texas A&M University's Department of Atmospheric Sciences, conducts weekly Texas Drought Monitor Coordination conference calls. During these calls, information about drought and its effects are discussed, and changes to the U.S. Drought Monitor that would more accurately reflect drought conditions are recommended.

Maidment said he would like to see a Texas Water and Climate Model developed that integrates weather and climate models to continually trace the volume and movement of water throughout the state. Tracking and qualifying soil water movement and streamflow; changes in water storage systems; and land surface features such as soil type, land cover and green vegetation fraction could be integrated in the model. Texas A&M's contribution in the development of such a model is very important, especially the aspects dealing with soil, vegetation and agriculture, he added.

"I am concerned if we are ever faced with a sustained year-to-year drought," Maidment said. "Although we can't change the physical circumstances that we are faced with, we can change how we react to those (circumstances)."

Agency members of the steering committee are Brenner Brown, Texas Water Development Board, chairman; Kathy Alexander, Texas Commission on Environmental Quality; Mike Bewley, Texas Department of Emergency Management; and David Bradsby, Texas Parks and Wildlife Department. University of Texas members are Maidment, Dr. Jay Banner, Dr. Cedric David, Dr. Danny Reible, Dr. Michael Webber, Dr. Gordon Wells, Dr. Zong-Liang Yang and Dr. Michael Young. Texas A&M members are Nielsen-Gammon and Dr. Binayak Mohanty. Texas Tech University is represented by Dr. Ken Rainwater.

More information can be found on the committee's website at [texasdroughtinfo.org/](http://texasdroughtinfo.org/). 

A partial skeleton in the hot Texas desert. iStockPhoto. © Clint Spencer.





# COMMUNITY WATER SYSTEMS RECOVERING FROM THE DROUGHT

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LESSONS LEARNED;  
PLANS MADE



**I**n December 2011, the Central Texas community of Groesbeck received an unexpected and unappreciated Christmas present: The small town of about 4,300 was about three weeks away from running out of water.

With the entire state experiencing exceptional or extreme drought for most of 2011, Groesbeck stood out as a warning to other Texas communities about what they could experience if or when the next drought of record hits the state.

### Just how bad was it?

Farmers, cities, water suppliers and state agencies wrestled with the driest one-year drought in Texas' recorded history. Reservoir levels dropped, aquifers declined, wells went dry.

Satellite imaging conducted by NASA showed that the state lost more than 100 cubic kilometers of water storage, equivalent to filling Lake Travis 70 times.

As of January 2012, officials from 1,010 water systems were asking customers to restrict water use, with 647 systems implementing mandatory water restrictions.

At one point, 23 water systems were on the Texas Commission on Environmental Quality (TCEQ) list of high priority water systems that had 180 days or less of water.

TCEQ received 15 senior water rights calls, resulting in curtailment of about 1,200 junior water rights because not enough water was available for both senior and junior water rights holders. Under the current Texas law, senior water rights holders, based on the date of the permit, have priority over junior rights holders, who obtained rights to the water at a later date.

Communities like Groesbeck that have a single source of water—which is the majority of public water systems in Texas—suffered the most.

### Orchestrating relief

In July 2011, Gov. Rick Perry issued an emergency disaster proclamation for the drought, giving state agencies some flexibility in expediting drought-related actions. The Texas Legislature also gave TCEQ more flexibility in managing water rights.

State agencies pulled together to provide technical assistance and help communities through the drought. TCEQ took the lead in orchestrating these efforts.

According to Linda Brookins, director of TCEQ's Water Supply Division, the agency formed an in-house drought workgroup that met weekly to discuss the drought and ways to respond to it. TCEQ, the Texas Department of

Emergency Management (TDEM) and the Texas Water Development Board (TWDB) formed the Emergency Drinking Water Task Force to work with other state partners to develop the Emergency Drinking Water Contingency Annex. This annex is a supplement to the State of Texas Drought Preparedness Plan and details management and response for public water systems with 180 days or less of water supplies.

That coordination with other state agencies, Brookins said, was critical in helping communities deal with the drought. "It worked, and it worked really well for us this year," she said.

Once TCEQ staff realized that some communities were within 180 days of depleting their water sources, they began working with these water systems. Each system was assigned a project manager who kept in close contact with the water system staff through weekly calls to discuss ways to fund new infrastructure, raise rates or convert a private water system to a water supply corporation, she said.

"Several systems put us on notice when other options were not available to them anymore because they were so close to running out of water," Brookins said. "In some cases we had to get very creative in working with them on how to prevent them from running out of water.

"In one case we took some of our equipment out to a town and taught them how to do stream measurements to measure their stream flow to determine how much time they had left in their reservoir," she said.

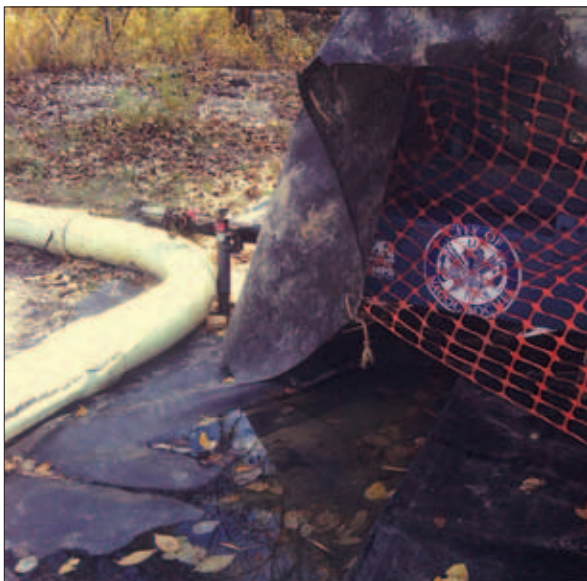
"A lot of counseling went on about their drought contingency plans and moving to higher stages for conservation and making water last longer," Brookins said. Public water systems must have drought contingency plans in case of drought or similar water shortages.

Groesbeck was an example of the level of involvement and creativity the agency had in helping community water systems—especially those on the 180-day watch list.

Agency staff helped identify trucks to haul water to the community, coordinated with other state agencies to obtain priority status in grant or loan funds for Groesbeck, helped borrow a water pump from the city of Nacogdoches and located two quarries upstream that could provide water, Brookins said.

Coordinating with the Texas Department of Transportation, TCEQ was able to get easements to lay a temporary water line for Groesbeck approved within a day, she said. ➡

An East Texas water supply reservoir was so low that water was unable to be withdrawn using the normal intake structure. Photo courtesy of Texas Commission on Environmental Quality.



As each community resolved its problems, Brookins said, the agency moved it off the 180-day list. “If we identified a new source of water and the community confirmed it got it and it was in place and working, we moved the community to a watch list,” she said, “and we continued to watch in case we needed to move the community back to the 180-day list.” Communities that secured additional water supplies were moved to a success list.

TWDB provided communities with information on the state and federal grant and loan programs available to build water storage infrastructures and helped them find additional water sources, such as brackish water, and improve existing water supplies, such as lowering water pumps in their surface water intakes, according to Darrell Nichols, project lead of the TWDB Project Oversight Division.

For example, Nichols said, the board worked with the Texas Department of Agriculture (TDA) and U.S. Department of Agriculture’s Rural Development to assist the West Texas city of Robert Lee in getting funds to obtain water from an adjacent community. With those funds Robert Lee was able to construct a 12-mile pipeline to Bronte.

In November 2011, Texas voters approved Proposition 2 that allows TWDB to issue up to \$6 billion in general obligation bonds at any one point in time to help communities address infrastructure needs. This ability further expanded the board’s arsenal of funding programs.

In addition, TWDB was able to provide direct technical assistance about groundwater to water suppliers, said Dr. Robert Mace, TWDB’s deputy executive administrator for water science and conservation. With its groundwater monitoring network and thousands of measurements of well levels, Mace said the agency can help communities troubleshoot their systems. “If they are having problems with their well, they might think the

aquifer has dried up,” he said, “but we can look at our database and see the aquifer has not dried up; it might be something wrong with the mechanics of the well or the hole itself.”

During the 2011 drought, many communities that were relying on surface water asked TWDB for help in looking for alternative supplies of water, Mace said. “We can go into our database and let them know what the odds are of them being able to drill a well locally,” he said. “We did quite a bit of that last year.”

### Preparing for the next one

With the attention the 2011 drought brought to communities’ water needs, agencies examined steps that needed to be taken if the drought continued through 2012 or for the next inevitable drought.

Texas Lt. Gov. David Dewhurst asked the Senate Natural Resources Committee to study aspects of water supply issues in Texas, including impediments to implementing the state water plan, alternatives to using surface water or groundwater to generate electricity and extraction of fuels and recommendations on the groundwater management. Texas House Speaker Joe Straus gave similar charges to the House Committee on Natural Resources.

The committees will issue these reports immediately before the next legislative session, which begins in January 2013.

TCEQ, TDEM, TDA, TWDB and the Texas Water Infrastructure Coordinating Committee teamed up to hold workshops in the spring and early summer of 2012 to help water utility operators plan for emergency water shortages.

Charlie Adams, technical specialist for TCEQ’s Small Business and Local Government Assistance Program in the Beaumont region, conducted many of the workshops. He urged water system operators to look at their drought contingency plans to see if

(left photo) The Texas Commission on Environmental Quality staff helped Groesbeck borrow a water pump from the city of Nacogdoches. Photo courtesy of Texas Commission on Environmental Quality.

(right photo) By early 2011, O. C. Fisher Reservoir in West Texas was nearly dry from the extreme drought. Photo courtesy of Upper Colorado River Authority.





the triggers for restricting water use made sense in light of increases in population and last summer's brutal heat, according to an article in the spring issue of TCEQ's publication, *Natural Outlook*. He challenged operators to review their emergency plans to identify well drillers, alternative sources of water and possible interconnections.

"We encouraged people (at the workshops) to still conserve and to anticipate that we might have another summer like we did last year," Brookins said.

In many cities outdoor water restrictions continued into the spring and summer of 2012.

One water supplier with foresight to plan for the next drought and look for new supplies is the Colorado River Municipal Water District, Brookins said. The district is working on a project to interconnect West Texas communities by drilling 21 wells in a new field.

"They are really designing a regionalization system where they are going to pump water from reservoirs as well as use this groundwater," she said.

### Ensuring future water supplies

"Our water supplies are not where they were last year, so we might have a much harder drought this summer than we did this past summer because our water supplies have not recovered in many locations in the state," Brookins said. "I still have systems struggling even though we have had rain."

Although each regional planning area of the state water plan has strategies to meet its future water needs, implementation of these projects requires money—money that many communities do not have or want to spend.

Strategies in the state water plan include implementing water conservation programs, developing new groundwater or surface water supplies and building water reuse or desalination plants.

Mace said implementing those strategies ultimately falls on the local water providers. "To implement water plan funding is a key issue, but there needs to be a local charge to make it happen," he said. "The state creates incentives and opportunities and information, but ultimately local water providers have to step up and ensure reliability and security of water supplies. The key is not to wait until there is a problem."

Both Nichols and Mace encouraged communities to use problems discovered during the 2011 drought to evaluate and plan for the next ones.

"I do think last summer was a wake-up call for communities, particularly for those communities with a single source of supply," Nichols said. "Every community needs to reevaluate its drought contingency plan to ensure it is adequate to address the continued drought, and if there is anything it needs to do, now is the time to do that planning and secure that funding so that it can do the construction because it is very difficult to do those things overnight."

Mace urged communities "to take a look at what happened last year, which was the fiercest one-year drought on record, and also think about the drought of record, picturing five years of drought with the sixth year of drought similar to the year we had last year. The point is the drought of record was a lot worse than last year."

"We have seen droughts far worse from a water supplies perspective than we saw last year, so water suppliers should always keep that in the front of their minds when they are thinking of their water supplies," Mace said. "All it takes is one Texas community to struggle with its water supplies to reflect poorly on Texas as a whole."

More information can be found at TCEQ's drought Web page [tceq.texas.gov/response/drought](http://tceq.texas.gov/response/drought) and TWDB's drought Web page [twdb.state.tx.us/DATA/drought/](http://twdb.state.tx.us/DATA/drought/). 💧

The sump box on an intake structure at an East Texas water system shows how low the water levels were during the 2011 drought. The normal water level is approximately three-fourths up the ladder to the right of the box. Photo courtesy of Texas Commission on Environmental Quality.



A close-up, low-angle shot of a lush green field, likely a pasture or a young crop field. The grass is tall and dense, with individual blades clearly visible. In the background, a line of trees with bare branches is visible against a pale, overcast sky. The overall tone is somber and contemplative.

# A little rain doesn't fix it

Farmers and ranchers remain cautious as drought continues





Rains in the Brazos Valley early in 2012 helped this grass green up, but more rains are needed now to help warm-season grasses. Photo by Danielle Kalisek.

This might sound like a broken record, but it still rings true: Last year's drought was historic—the worst one-year drought in Texas' history. Though recent rains in some parts of the state have helped ease the pressure, farmers and ranchers remain cautious, remembering the pain of last year as they prepare for the future.

"If you look at what the climatologists are saying, the La Niña event expired around the end of April, and we are back to a neutral pattern," said Dr. Larry Redmon, Texas AgriLife Extension Service forage specialist in the Department of Soil and Crop Sciences at Texas A&M University. "We hope that means we should have better growing season moisture this year than last year, but we started out with a huge soil moisture deficit."

Dr. Travis Miller, AgriLife Extension program leader for soil and crop sciences at Texas A&M, said rains during the spring significantly improved the soil moisture throughout Central and North Texas, but a mixture of different conditions exist in other parts of the state, with much of South Texas, West Texas and the High Plains still very dry with little to no soil moisture.

"We had a record wet February in Brazos County, so it was a bizarre turn of events going from a really dry year last year to being really wet," Redmon said. "Consistent warm temperatures are helping our warm season grasses grow, and from a moisture standpoint, things are looking a lot better than they were last year."

Dr. Dana Porter, AgriLife Extension agricultural engineering specialist in water management at Lubbock, said her area of the High Plains started the planting season dry. "Despite localized rainfall, soil moisture is low in much of the area. Careful planning and irrigation management are warranted, especially where irrigation capacities are limited."

Growers typically count on rainfall, and irrigation is meant to be supplemental, but last year there was very little rainfall in the High Plains, Porter said. "They've had some rain in the state, but we're not out of the drought yet."

She also cautioned that although many people are tempted to believe the drought is over when rains do come, the soil is still very dry, and conditions still need to improve. "We got so far behind that we have

a lot of catching up to do," Porter said. "There are a lot of people out there still hurting because of the lack of water."

Such variations in rain and climate, along with the \$7.62 billion of agricultural losses in 2011 plus crop, hay and livestock losses, leave the question: What is the outlook for agricultural crops, forage and livestock this year?

### Agricultural outlook

"It's not clear what kind of season we're going to have," Miller said. "I would say almost universally our ag producers and ranchers are going to be a little conservative this year, and they have a reason to be conservative. Folks lost an awful lot of money in 2011 and don't want to repeat that again this coming year."

The biggest concerns growers have, Miller said, are deciding whether to invest in the inputs—such as fertilizer and labor—required to plant crops and/or how much to invest with the little bit of moisture available. With a more conservative approach, he said, fewer acres of certain crops and more acres of other crops may be planted because of current moisture levels.

"Clearly I think we're going to see fewer acres of corn, and we had very few acres of soybeans last year anyway," Miller said. "We have a pretty good wheat crop in the ground; out on the eastern side of the state we're really in good shape, and the wheat crop looks pretty good. I think overall we'll see more sorghum and more cotton."

Porter said in the future many growers will be paying attention to refinements on irrigation management. Many growers are already using low-pressure center pivots, such as LEPA and LESA, and subsurface drip irrigation is still expanding in acreage.

"The key is not only using efficient irrigation systems but also managing them well," Porter said. "I can manage a good system poorly and get poor results, so refinements on managing those systems are equally important."

"A lot of irrigation information, fact sheets and other resources on drought management are available through AgriLife Extension, so this is a teachable moment for us." ⇨



## Forage outlook

The drought took a toll on pastures, leaving most ranchers without any hay to cut and bare spots in the forage for livestock.

"A lot of our pastures, specifically hay meadows, were probably destroyed last year because of the drought," Redmon said. "With bermudagrass, for example, if you have one variety, it may recover and spread to bare areas pretty rapidly if it's fertilized properly. Other varieties may be very slow to heal up—it may take years, or it may be such that people have to reestablish."

The outlook for hay production depends on where the hay meadow is located, what varieties are established and how well they have been managed, he said.

"If they were managed well—fertilized appropriately—a lot of those plants may have survived, and recovery would be more rapid and more complete than in other places where we may have a history of not fertilizing appropriately," Redmon said. "The moisture part of it looks pretty good. How much of a crop was destroyed is site-to-site specific."

Hay production will probably still not be as good this year as it was in years past because of destruction of some of these plants, he said. In addition, the high price of fertilizer hinders some ranchers. Fertilizer costs continue to be high due to global competition, the cost of fuel for transporting it and the cost of labor to spread it.

"A lot of people who have forages that need to be fertilized are actually backing off on fertilizing because of the price," Redmon said. "So that's not going to encourage a rapid recovery, and it's not going to help these plants if we get into another drought because they're already stressed. If we continue to mistreat them, the recovery of those plants, even with good moisture, is going to be very slow if not non-existent."

With all of these challenges stacked up against forage supplies, it's clear there is still a long road ahead.

"It could take this entire growing season to recover, given adequate moisture and fertility on the introduced side," Redmon said.

Even with good moisture native grasses could take the rest of this year and maybe even next year to recover, he said, because many of those native grasses were killed, and recovery for them takes longer.

"Native forages are very tolerant of heat, drought and cold, but when they are destroyed it usually takes a longer time for them to recover," Redmon said.

## Livestock outlook

Last year in the extreme drought period, trucks with cattle trailers were lined up for blocks around auction barns all over the state as ranchers sold off their cattle at record-high prices for a drought period. Since then the liquidation has leveled off, but ranchers—those who are still in the cattle business—are maintaining reduced herds.

Both Dr. Bruce Carpenter, AgriLife Extension livestock specialist at Fort Stockton, and Stan Bevers, AgriLife Extension economist in management at Vernon, said cow numbers nationwide are lower than they have been in many years.

"It is safe to say that in most places that have not had rain, like where I live in West Texas, we're pretty much out of the livestock business," Carpenter said. "There are a few people hanging on and feeding them still, but I think the big liquidation has already taken place."

The drought not only contributed to liquidation, but so did the high amounts the cattle sold for at the auction barn. "I'm not sure we've ever been through a drought when the cattle prices were as high as they were," Carpenter said.

Bevers explained that demand for ground beef increased while beef cow numbers were limited prior to the drought. Culled females are the primary source for ground beef.

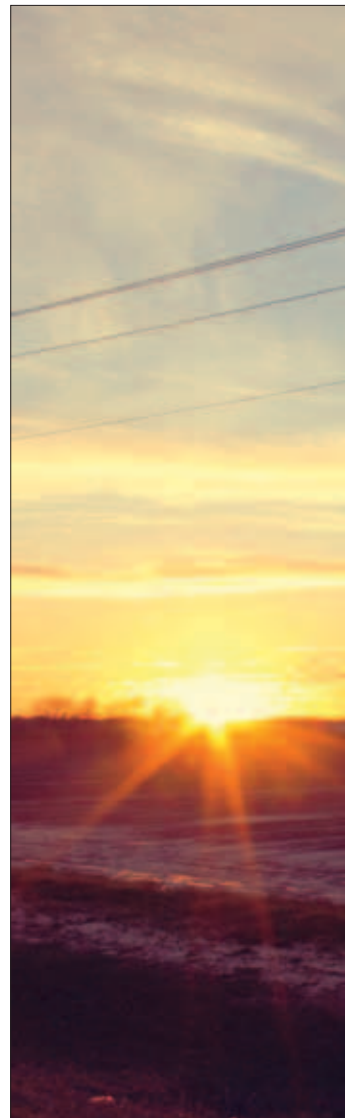
"During 2011, the United States liquidated roughly 1 million cows, with 600,000 of those mama cows coming from Texas," Bevers said. "With that many cattle being sold, it may seem that a lot of cows and beef were put on the market, immediately increasing supply; however, demand was exceptionally high for ground beef, which in turn caused cattle prices to be so high at the auction barns."

Destocking has been occurring for a long time now and not just because of drought. In 1975 the United States had about 45 million beef cows, he said. By Jan. 1, 2012, the nation had just under 30 million cows.

"In a 35- to 40-year period we've lost approximately 15 million head of beef cows in this country," Bevers said. "So this was going on long before the drought happened; the drought only accelerated it."

In 2012, about 34 million calves, including dairy calves, will be available for beef production or as replacement females, he said, which really is not that many calves.

Considering this large and continued decrease in the livestock population, rebuilding cattle herds might be difficult to imagine.







The sun sets over farmland on FM 60 between College Station and Snook as farmers hope for a better growing season this year than last. Photo by Danielle Kalisek.

“We will build the cow herd back; the question is, how big will we build it back? It won’t be back to the 45 million we once had in 1975,” Bevers said. “What’s a good number? Probably 32 (million) to 33 million head of cows is a good number. Now that can’t happen overnight.”

Cattle have a long production year until weaning time if the rancher decides to keep the calves, he explained. However, prices for calves are ranging from \$700 to \$850 a head, whereas in the past prices ranged from \$300 to \$400 per head, so some ranchers may want to take the cash now instead of waiting about 2.5 years for the replacement heifer to have a calf.

### **Restocking**

Ranchers trying to decide whether to restock cattle have a lot to consider.

“If costs of buying cattle are high, and you have a high cost of production, then there’s that consideration,” Carpenter said.

Much of Texas’ rangeland is being shifted into other uses, he said, such as urbanization and hunting operations.

“There are a lot of things that go into the equation on why we aren’t restocking when it does rain,” Carpenter said.

In areas that received more rainfall and where grasses are green, some ranchers may be considering restocking. However, AgriLife Extension experts do not encourage ranchers to restock severely drought-damaged pastures until enough rain falls and grasses have time to recover.

Carpenter said pasture conditions in many areas can be deceptive because the perennial forages were taken down very low, and in some cases 100 percent of the “green grass” in pastures is annual ryegrass and clover. “That’s great for right now, but if it doesn’t rain later in the year we may be almost right back where we started.”

Redmon agreed. “We see all this green, and we keep getting rain, and people think they’ll stop feeding hay. Hay is expensive and ranchers don’t ➡



have very much, and they think they'll let the cattle out there to fend for themselves. But there's not a lot out there to let them fend for. So we don't want to quit feeding too soon."

Ranchers should still be wary of restocking, he warned.

"I would be very, very hesitant about trying to rebuild the cow herd," Redmon said. "If you go back to what the climatologists have told us about the pattern we're in, this pattern may actually persist for several more years. Just because we get rain now should not suggest that we need to start restocking those cattle herds.

"We really need to take a 'wait-and-see' attitude and think about having more drought management built into the overall management plan as just part of routine business."

The key is maintaining a reduced stocking rate, Redmon said. Pastures have a lot of bare ground right now, and those holes need to be filled in with good coverage and good growth before ranchers start to think about bringing in more cattle, he added. "Then I would still be looking at long-term forecasts, trying to determine what the outlook is: What are they saying? Are we still in this pattern? Will it be dry this year or next year? To chase the weather with your stocking rate is financially disastrous."


There is one potentially positive result from reducing cattle herds, the experts added.

"I always say one silver lining is: If you didn't like the cow herd you had before, after the drought you've got a chance to put it back together the way you want it to be," Carpenter said.

When conditions improve and time for restocking comes, Carpenter recommended ranchers be cautious when transporting cattle either into or out of Texas. He said they should have a good herd health program in place and work with a veterinarian on any new arrivals.

"There are some diseases that traditional vaccines and traditional fixes don't work quite as well as we'd hope," he said. "Often we talk about a period of quarantine on new arrivals; we put them in pasture away from other cattle to make sure the vaccine has time to work."

Many challenges persist as drought conditions continue into 2012, the experts said, and farmers and ranchers should err on the side of caution as they manage water resources, crops and livestock.

Porter said this drought and its impact on so much of Texas agriculture should serve as a reminder. "We need to be careful how we manage all of it, even in the good years. Maybe this should get our attention that we need to manage our water resources better all the time, not just when we're in drought." 

February rains refilled and almost overflowed once-empty stock tanks in the Burleson County area as well as other areas throughout the state. Photo by Danielle Kalisek.







# Pushing the reset button on Texas Rangelands

*Recovering from drought requires patience, knowledge*





Driving on Interstate-10 through West Texas past Sonora and on to Fort Stockton, travelers see patches of normally evergreen junipers turned brown and brittle from the unforgiving drought of 2011.

Dr. Charles “Butch” Taylor, superintendent of the Texas AgriLife Research Center in Sonora, said he has only seen juniper die two times in his 41 years at the center. “In 2000 and this past drought,” he said. “I have never seen as much juniper brown out like I have seen this year.”

Recovering this drought-damaged rangeland in West Texas and other parts of Texas will take patience and knowledge, according to experts.

### Drought-ravaged rangelands

For one rangeland expert, the 2011 drought may have brought more damage than ever before.

Dr. Ron Sosebee, professor emeritus with Texas Tech University’s Department of Natural Resources Management, predicted in an October 2011 *Drought in Texas* article that this drought on rangeland was “worse than it’s ever been.”

“I maintain that the drought of the 1950s impacted our rangeland vegetation enough that following the 1950s, the rangelands were never like they were prior to then,” he said, “and I suggest that following this drought we won’t be like we were prior to the time it occurred.”

Will Hatler, Texas AgriLife Extension Service program specialist in the Department of Ecosystem Science and Management at Texas A&M University, said: “The degree to which rangelands were negatively impacted by this drought largely depends on how they were managed prior to and throughout the drought.”

Throughout Texas, many ranchers sold or greatly reduced their livestock herds during 2011. According to some reports, more than 600,000 cattle were sold that year.

Hatler, based in Stephenville, said ranchers sold or reduced their livestock not only because of the lack of water but also because selling or reducing their herds helped protect their land.

“Failure to properly cull livestock herds during drought results in overgrazing and, consequently, significant plant death,” Hatler said.

These rangeland experts are concerned most about the death of warm-season perennial grasses. Taylor said these grasses determine a major portion of the rangeland’s carrying capacity, or the number of livestock a rancher can run on the range.

Based on his visual estimate, Taylor said the Sonora area probably lost 50 percent of these grasses from the 2011 drought. “It will take a while for that to recover,” he said. “It won’t happen overnight. It needs a couple of good years in a row of good growing season precipitation.”

The drought not only possibly killed the grasses and other vegetation, but the record-breaking wildfire season, blamed partially on the drought, also potentially damaged the rangeland.

“Many thousands of acres of rangeland (in Texas) were burned by wildfire last year which, combined with overgrazing before and/or during the drought, could have a devastating effect on plant communities for years,” Hatler said.

Dr. Alyson McDonald, AgriLife Extension range management program specialist in Texas A&M’s Department of Ecosystem Science and Management, said some burned areas that received rain after the fires are recovering, but other burned areas that did not have rain are not improving.

“Landowners are concerned about what is coming back,” she said. “And they are also concerned about soil loss. If they lose anymore top soil, there will be a major reduction in potential.”

The loss of grasses and other vegetation from drought and wildfires can trigger serious erosion.

“The symptoms of developing erosion are sometimes subtle,” Hatler said, “and the ability to recognize these symptoms is the first step in mitigation. Bare ground is the most obvious indicator, but other signs landowners should look for are pedestaled plants, small rills or gullies, litter dams and exposed plant roots.”

### Road to recovery

The rangeland experts advised land managers to be cautious and patient when working to recover their drought-ravaged rangelands.

“Rangeland managers are taught to keep in mind that the next drought is always around the corner and to plan accordingly during average rainfall years,” Hatler said. “Proper grazing management prior to drought helps ensure that plant food reserves remain intact in dry years, minimizing loss of valuable forage.”

Taylor recommended that ranchers conservatively restock their livestock. “They should match up the number of animals with the amount of forage they are producing,” he said. “They need to be lightly stocked for at least two to three years following this drought to allow for the grasses to recover and come back into production.”

Recovering drought-damaged rangeland throughout Texas will take patience and knowledge by rangeland managers.

Photo courtesy of A.K. McDonald, Texas AgriLife Extension Service.



Hatler agreed.

"Aside from rainfall, resting drought-damaged rangelands is critical to the recovery process," he said. "Some areas of the state have received some decent rainfall over the winter, which initiated regrowth of grasses and forbs this spring. This may entice landowners into overestimating the health of the plant community and, in turn, encourage them to restock livestock herds.

"While spring green-up of forages will be a positive development, applying grazing pressure on recovering plants will only impede long-term recovery," he added. "Landowners should adopt a 'wait and see' attitude at this point."

Because warm-season perennial grasses took a large hit, McDonald said the biggest challenge will be determining how severely the drought and wildfires have impacted these grasses.

McDonald said wildfires often burn very quickly and burn spottily so there can be islands of unburned areas that provide a seed source and slowly expand to revegetate the burned areas. If the burned areas get summer rains, the grass that survived will green up rapidly.

"If that (the green up of the grasses) doesn't happen, then we'll begin to get a better picture (of their survival)," she said. "If it doesn't rain, we won't know."

Normally McDonald would not be that concerned about the fires' effect on the grasses, but last year some areas of West Texas, including Jeff Davis and Andrews counties, burned in April and did not receive the normal amount of rain in the summer.

"If we had gotten the rain in June, July and August, we would have been okay," McDonald said. "Wildfires do not create long-term damage as long as it rains in the next growing season. But we had gone a whole year without rain.

"Previous studies have shown if it rains immediately after burn, the response (of grasses) is quick," she said. "If it doesn't rain, it could take up to three years to recover."

Reseeding, while an option for recovery, is expensive and risky, McDonald said. At workshops throughout West Texas, she asks land managers to be patient and cautions them against widespread reseeding right now. "If we go another growing season without rain, there will need to be strategic reseeding, where it will have quickest and best response," she said.

Taylor said management plans are necessary to improve the health of these grasses.

"Ranchers need to monitor their rangeland and make sure the grasses are recovering," he said.

"They need monitoring systems, for example photo-points, use ratings, plant reproduction and density estimates and trend analysis to quantify that the grasses are recovering."

"If recovering plants are not allowed to produce seed and reproduce vegetatively, natural recovery of the plant population as a whole will be impeded," Hatler said.

Numbers and palatability of toxic plants may increase during the drought, and ranchers should routinely inspect pastures and control these plants to avoid livestock injury, Hatler said.

He recommended deferring grazing in areas where erosion is found and avoid any mechanical brush control treatments, such as root plowing and chaining that disturb the soil.

McDonald said maintaining forage residue—or keeping some type of plant cover on the land—is an important tool for rangeland management, particularly during and after drought. Forage residue can anchor the top soil and prevent erosion by increasing water infiltration and reducing runoff. Managers should have some standing crops and some litter on the ground to provide protection for plant and soil surface, she added.

"I tell ranchers the best way to prepare for a drought is forage residue; the best way to recover from a drought is forage residue," she said. "If their rangeland is in better condition, recovery will begin much sooner than their neighbor who has no standing crop, little plant litter, lots of bare ground."

### Fireproofing the land

Since having healthy rangeland before drought helps the land recover more quickly after drought, the experts said a beneficial management component before and after droughts is prescribed fires. This controlled application of fire to the naturally occurring build-up of underbrush can also lessen the impact of wildfires that might occur during drought, the experts said.

Dr. Roel Lopez, associate director of the Texas A&M Institute of Renewable Natural Resources, said that fire is a natural occurrence for rangelands, and grasses and other vegetation are well-adapted to fire. Fire keeps certain ecosystems in check. "Without that form of disturbance, grasslands would eventually turn into brushlands," he said.

Fire, followed by the necessary rain, also keeps grassland healthy and fertilizes the land by releasing nitrogen back into the soil.

"The benefits of fire have long been recognized," he said.

"Fire is to rangeland what rain is to a rainforest," Lopez said. "Historically and naturally, wildfires





were the mechanism to reset the succession of plant communities. Fire kills the wood vegetation and resets the succession process where new grasses can grow.”

Lopez said prescribed fires can be used to ‘fireproof’ the landscape. “Prescribed fire minimizes the amount of fuel in the area that is likely to burn during wildfires,” he said. “With prescribed fires, you can actually control what the end result might be. The use of prescribed fires is keeping that essential element in the system without the associated safety issues that come with naturally occurring wild fires.”

Taylor agreed that prescribed fire is very necessary to part of the overall management strategy.

“It needs to be implemented on regular basis to maintain proper balance of grasses and forbs, increase biodiversity and improve habitat for domestic and wildlife,” he said. “In fact, in my opinion, if they (land managers) do not use fire, they have the potential of the rangeland becoming dysfunctional.”

Lopez said new grasses that grow after prescribed fires are beneficial for wildlife and livestock. “It’s like having a fresh salad as compared to an old salad.”

“Ranchers need to look at fire as a long-term management tool,” Taylor said. “And they need to decide its goals and objectives and use fire to reach those goals and objectives.”


Managing the recovery of rangelands is not easy, Taylor said, because managers not only have to integrate ecological and conservation principles but also have to consider the economics of restocking or not restocking. And because of finances, they have a tendency to want to restock quickly.

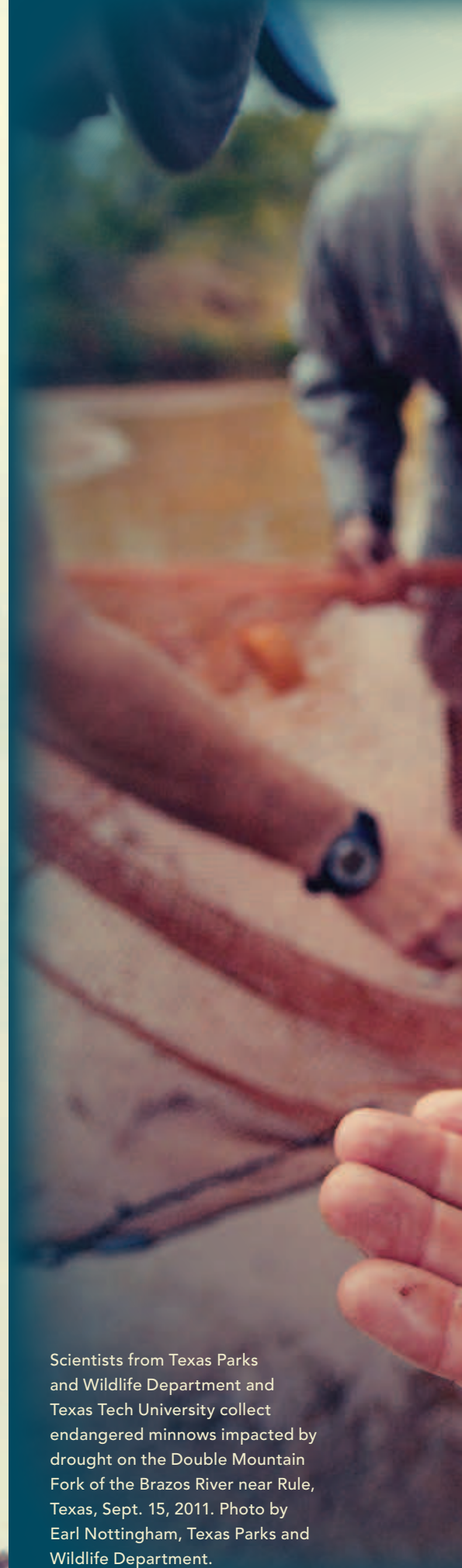
“If they make the wrong assumption and assume we are coming out of the drought and buy a lot of livestock and then we are still in the drought, they are going have to sell off livestock right back,” he said. “That is not good for their financial situation but also not good for their landscape or their vegetation.

“We need to understand that drought is a natural occurrence in Texas and has been happening for tens of thousands of years,” Taylor said. “Wet years are the exception.”

As far as the brown junipers dotting the West Texas landscape, will those eventually turn green or are they dead? Both Taylor and McDonald said it is too early to tell.

“It may be that the plants are sacrificing their leaves as a water conservation strategy and will leaf out again when conditions are favorable,” McDonald said. “They may survive.”

For additional drought management information, visit *txH<sub>2</sub>O* online at: [twri.tamu.edu/publications/txh2o/](http://twri.tamu.edu/publications/txh2o/). 



Scientists from Texas Parks and Wildlife Department and Texas Tech University collect endangered minnows impacted by drought on the Double Mountain Fork of the Brazos River near Rule, Texas, Sept. 15, 2011. Photo by Earl Nottingham, Texas Parks and Wildlife Department.





# Running the rivers

## *Scientists say 2011 drought showed importance of environmental flows regulations*

Carrying water so precious it has been called liquid gold, the 23 major rivers in Texas flow past pastures and cities, factories and suburbs. These waters have endured the wettest and driest of years, but experts say the rivers' biggest stresses now come from the multitude of demands from industries, municipalities, agriculture, environment and wildlife.

A scorching combination of abnormally low rainfall and abnormally high temperatures made the record-breaking drought of 2011 especially taxing on the state's surface water supplies. Water managers saw some rivers significantly slow, while others dwindled down to puddles.

A decade before, the Texas Legislature set out to improve the regulation of these highly sought-after water supplies and enlisted both the expertise of scientists and the know-how of local stakeholders. Betting on a potentially contentious process that would require consensus, the state officials' goal was to develop new surface water environmental flow regulations that ensured Texas rivers were managed both to meet the needs of the state's residents and to maintain sound ecosystems and habitat for wildlife.

The Texas Instream Flow Program, mandated in 2001 through Senate Bill 2 (SB 2), directed state agencies to conduct scientific studies determining how much water should flow in each river or stream to ensure a healthy environment. The Environmental Flows Program, outlined in Senate Bill 3 (SB 3) and passed in 2007, created a process for the state to establish environmental flow standards using the best available science for its river basin and bay systems.

After years of input from stakeholders and research by scientists, the first phase of the environmental flows process is now nearing completion, which will entail the Texas Commission on Environmental Quality (TCEQ) releasing environmental flow standards for each of the 13 river basins mandated in the program. The state is required to revisit the standards every 10 years and revise them if necessary, taking an adaptive management approach that will take into account new research as it becomes available.

### **Navigating the Texas "water wars"**

Before SB 3, TCEQ already had the authority to protect the environment when new water rights were issued, said Kellye Rila, director of TCEQ's Water Availability Division. ➡



However, TCEQ could only place special conditions on individual water rights, said Cindy Loeffler, Texas Parks and Wildlife Department (TPWD) Water Resources Branch chief. “This led to a piece-meal approach that wasn’t very protective,” she said. “SB 3 is a comprehensive approach that applies to entire river basins and receiving estuaries.”

“Under Senate Bill 3’s Environmental Flows Program, this is done through a stakeholder process,” Rila said.

Determining and maintaining the balance between ecological and human needs has not been easy, and hundreds of stakeholders and scientists have participated in the process.

“The Instream Flow Program was my entry point into the Texas water wars,” said Dr. Kirk Winemiller, a Regents Professor in the Department of Wildlife and Fisheries Sciences at Texas A&M University.

Winemiller has studied river systems ecology all over the world, but when it comes to collisions of policy and science affecting ecosystems, in Texas he’s an expert.

At a seminar on the Texas A&M campus earlier this year, Winemiller discussed the Instream and Environmental Flows Programs.

“Prior to 1985 (when instream flows first became regulated), environmental needs were not officially considered in Texas water planning, and as a result many streams and rivers in Texas have been over-allocated,” Winemiller said. “Both of these programs are all about future water. The burden of environmental protection falls on future water rights because already-established rights cannot be changed.”

TPWD was also charged with implementing both SB 2 and SB 3, and Loeffler is responsible for the implementation of SB 3.

“Many rivers and streams are fully appropriated—if everyone were to use their water rights, there may not be water left in the river—and SB 3 only applies to new or amended water rights,” Loeffler said. “SB 3 directs stakeholder committees

to identify strategies to make up the difference between environmental flow standards and what is actually in the river, such as voluntary dedication of existing water rights to protect instream flows, increasing conservation or using return flows.”

Winemiller has served on science advisory teams for both programs and observed the complexities involved, not only with competing interests reaching consensus, but also with determining the specific, science-based water allocations that will keep a river healthy.

“The question of how much water does a river or stream need, or what is the minimum amount that we can allocate for the environment, turns out to be a really difficult question to answer; it’s easy to ask but difficult to answer,” Winemiller said.

“And these are complicated processes—there are so many stakeholders involved, and fresh water has actual dollar value. I don’t know if I’d call it liquid gold, but it’s valuable.”

### When the rivers came to a halt

For much of 2011, that “liquid gold” wasn’t exactly flowing.

“It’s definitely ironic that a severe drought started in the middle of the Environmental Flows Program,” Winemiller said during a later interview.

The state on the whole received an average of 11 inches of rain in the previous year, as of Oct. 1, 2011—about 16 inches less than normal. Rainfall totals for 2011 in West Texas were comparable to those typical of the world’s desert regions, according to the Texas Comptroller of Public Accounts’ 2011 drought report. Soaring evaporation rates exacerbated the plight of already ailing rivers and reservoirs.

During such extreme drought, Rila said, streamflow for the environment or permitted water rights is very limited.

Decreased freshwater inflows to bays and estuaries also had clear repercussions.

“Impacts to estuaries due to low freshwater inflows—such as red tide, harmful algal blooms—

The Brazos River near Seymour, in August 2011 was completely dry. Photo courtesy of the Brazos River Authority.





led to the closure of the commercial oyster season,” Loeffler said. “It was a rare occurrence to see that many impacts on fish and wildlife—it really indicated how bad the drought was.”

When river segments run dry during prolonged periods of drought, threatened and endangered species can disappear, Winemiller said.

Endangered minnows in the upper Brazos River were one such example. By September 2011, some parts of the river had been reduced to isolated pools of water or were completely dry. Scientists from TPWD and Texas Tech University rescued two potentially endangered species of minnows—sharpnose shiner and smalleye shiner.

“Historically, these two fish occurred throughout the Brazos down to and below College Station,” TPWD Aquatic Biologist Kevin Mayes said at the time. “But like other prairie minnows of the Great Plains, their habitat—turbid rivers with shifting sands—has been altered by reservoir construction.”

Scientists had long been concerned about the minnows, which are found only in the Brazos River. TPWD had contingency plans to collect some of the minnows if conditions became extreme. When flows at all of the stream gages above Possum Kingdom Lake began reading zero, TPWD moved the minnows to a state fish hatchery.

Winemiller said that these species normally live a year or two and do not spawn in captivity. Fortunately, before the last pools of water vanished, winter rainfall re-established flows in most segments in the upper Brazos.

Because of TPWD’s efforts, the minnows still have a fighting chance. TPWD staff harvested the pond at Possum Kingdom Fish Hatchery on May 29, 2012, and stocked more than 700 healthy sharpnose and smalleye shiners into the lower Brazos River, where they hoped the fish would find the river suitable for spawning, Mayes said.

### What the drought taught Texas

Protecting threatened and endangered species is linked to determining proper subsistence flows,

or the minimum flow at which a healthy river or stream environment can be maintained, Winemiller said, and a healthy river flow regime must include a variety of flows. The Environmental Flows Program requires each basin’s committees to identify subsistence flows, base flows, high flow pulses and overbanking flow pulses.

“This past year, we got a good look at the actual subsistence flows in many of the river basins, and some of them fell below subsistence flow targets at points,” Winemiller said. “Without proper subsistence flows in the future, there is a real possibility of more and more Texas species facing extinction.”

One of the only benefits of the 2011 drought was the increase in public interest and participation in water conservation and planning.

“After seeing rivers and streams running dry or running at very low levels (last) summer, more people are getting informed and involved in these issues,” Loeffler said.

While public awareness of water issues did grow during the drought, Winemiller said, the average person does not know that the SB 2 and SB 3 programs exist or will have direct effects on the rivers Texans use and enjoy.

“My observation during the 2011 drought was that, in many cases, we are not providing for environmental flows at present,” Winemiller said.

“Texas’ environmental flows programs (SB 2 and SB 3) are important steps towards protecting Texas rivers, streams, bays and estuaries for future generations,” Loeffler said. “As the state’s population grows and water demands increase, we all need to do our part to strike a balance that includes dependable water supplies and a sound ecological environment for Texas.”

“Last summer highlighted the fact that, yes, we need this now.”

For more information, visit [twri.tamu.edu/publications/txh2o/](http://twri.tamu.edu/publications/txh2o/). 

*Some information from TPWD news releases.*





# LONG ROAD TO RECOVERY

*Bastrop team develops  
plan to restore Lost Pines region*





The fire could be seen  
raging in Bastrop  
County during the  
weekend of Sept. 4,  
2011. Photo by Chase  
A. Fountain, Texas  
Parks and Wildlife  
Department.





**S**weeping fires engulfed the Bastrop Lost Pines ecoregion the weekend of Sept. 4, 2011. In total, 34,000 acres and 1,691 homes were burned in a fire the Lost Pines Recovery Team described as “catastrophic.”

Although the team is sure that recovery from this fire will be long, they are optimistic their efforts will succeed.

Formed in response to the Bastrop fire, the Lost Pines Recovery Team consists of local, state and federal experts on the ecoregion in the Lost Pines area. With their comprehensive knowledge base, the recovery team has developed a plan to help Bastrop recover from the September fire.

“In terms of the recovery, the Lost Pines Recovery Team put together a five-year plan that includes erosion control, reseeding, replanting and hazardous fuels management,” said Roxanne Hernandez, habitat conservation plan coordinator for the Houston toad.

The team plans to address erosion control and a portion of the reseeding during this year and next. Seedling planting also will start next year and continue for four to five years, she said.

### Nature brings challenges

Erosion has proven to be one of the most difficult challenges to recovery. Initially, the fire caused much fertile soil to erode. Hernandez said until vegetation grows to provide ground cover, erosion will continue. Newly planted pine tree seedlings will also wash out so herbaceous vegetation should be planted before seedlings are, she added.

“When I heard the forecast today and the possibility of more than 4 inches of rain overnight, I thought, ‘Oh boy, here we go again,’” she said. “When we had the rain last month, we had water flowing over roads where water never flowed before.”

Flooding and erosion have been so severe that culverts and roads have been washed out, Hernandez said.

The timeline for getting herbaceous vegetation in the area is not yet clear. The first opportunity to make a dent in the problem ended with the warm season planting time in mid-May, and the team did not see as much growth as they wanted, said Daniel Lewis, a state forester with the Texas Forest Service.

Additional challenges to the pine trees’ recovery come from ips engraver beetles, which attack stressed trees, Lewis said.

“Bastrop trees were already severely stressed by drought before the fire,” he said, “and now the trees have suffered additional stress as a result of the fire. This additional stress on the pines has caused an increase in beetle attacks on surviving trees, leading

to additional losses. The challenge this creates is that with very little surviving pines, there will be little chance for natural regeneration, where no adult pines survive to produce the seed.”

The area still faces the potential for another fire, the experts said. At this point, no light fire fuels exist in the area to carry a fire. However, ample heavy fire fuels are present, and as trees fall and grass begins to return, the amounts of both light and heavy fuels will increase, making the location prime for another fire. Therefore, reduction of fire fuels is important in the recovery plan, Lewis said.

### Helping landowners

Because 75 percent of the burned area in Bastrop is privately owned by a large number of individual owners, Lewis said, the task of recovery is not as easy as it would be with state or federally owned land.

“Recognizing that it’s going to take a whole community to make this happen, the Lost Pines Recovery Team is going to be asking landowners to work with us and allow us to help them in the way of technical assistance and, to the degree that we can, financial assistance,” Hernandez said.

In the coming months, the county will request a Right of Entry with landowners. These legal agreements give landowners the opportunity to work with the recovery team.

In addition to individual landowners, the team also needs involvement from the community.

“We saw a lot of people supporting each other from the start of the fire, and we still see that now. I think we’re going to continue to see that,” Hernandez said.

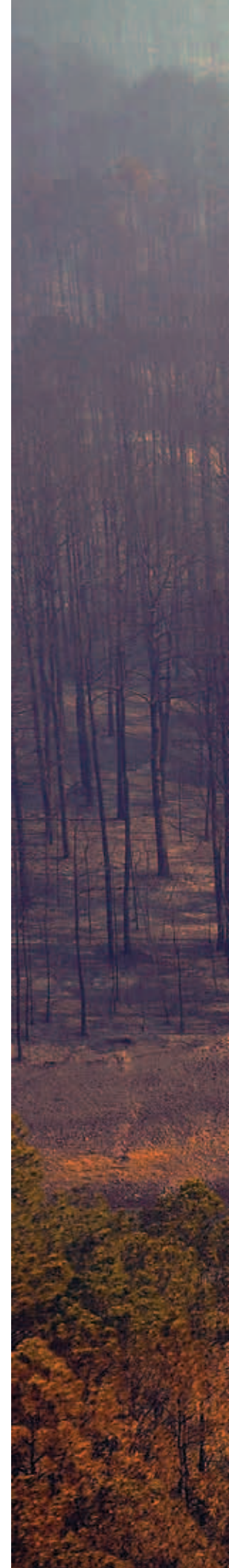
The process of training volunteers brings more complications. Hundreds of volunteers are needed to help with the recovery, and dozens or even hundreds of projects could be occurring simultaneously, Hernandez said. All these projects will require some degree of volunteer training, which makes recovery a difficult task.

Even as people are offering assistance now, the recovery process will need help from volunteers for many years.

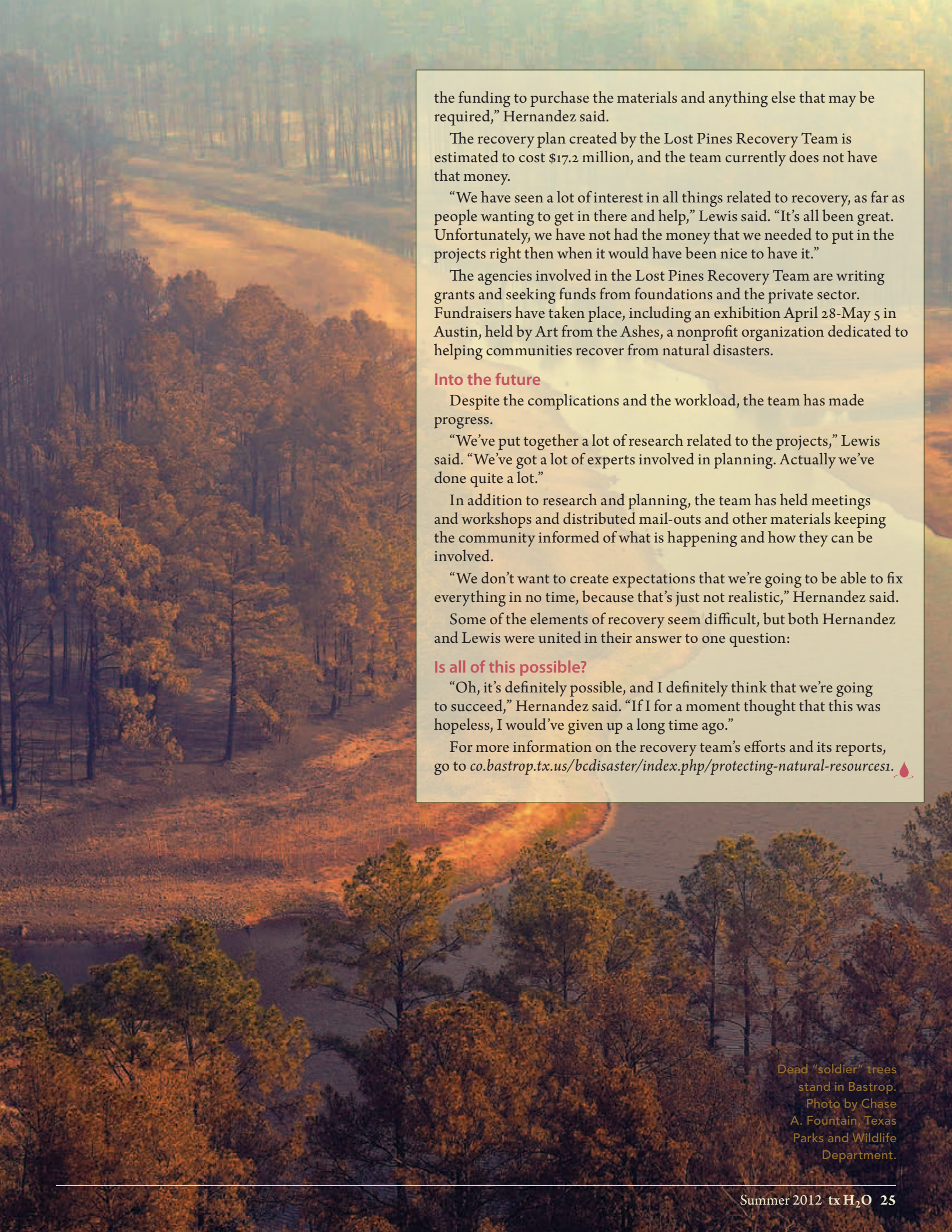
“We’re all having to build this up,” Lewis said, “and I think one of the challenges will be, the further we get past the date of the fire, the more this event fades in people’s minds unless they are living right there in the footprint.”

### Finding funding

“I am less concerned about our ability to harness volunteer resources and organize those to implement projects than I am about finding







the funding to purchase the materials and anything else that may be required,” Hernandez said.

The recovery plan created by the Lost Pines Recovery Team is estimated to cost \$17.2 million, and the team currently does not have that money.

“We have seen a lot of interest in all things related to recovery, as far as people wanting to get in there and help,” Lewis said. “It’s all been great. Unfortunately, we have not had the money that we needed to put in the projects right then when it would have been nice to have it.”

The agencies involved in the Lost Pines Recovery Team are writing grants and seeking funds from foundations and the private sector. Fundraisers have taken place, including an exhibition April 28-May 5 in Austin, held by Art from the Ashes, a nonprofit organization dedicated to helping communities recover from natural disasters.

### Into the future

Despite the complications and the workload, the team has made progress.

“We’ve put together a lot of research related to the projects,” Lewis said. “We’ve got a lot of experts involved in planning. Actually we’ve done quite a lot.”

In addition to research and planning, the team has held meetings and workshops and distributed mail-outs and other materials keeping the community informed of what is happening and how they can be involved.

“We don’t want to create expectations that we’re going to be able to fix everything in no time, because that’s just not realistic,” Hernandez said.

Some of the elements of recovery seem difficult, but both Hernandez and Lewis were united in their answer to one question:

### Is all of this possible?

“Oh, it’s definitely possible, and I definitely think that we’re going to succeed,” Hernandez said. “If I for a moment thought that this was hopeless, I would’ve given up a long time ago.”

For more information on the recovery team’s efforts and its reports, go to [co.bastrop.tx.us/bcdisaster/index.php/protecting-natural-resources1](http://co.bastrop.tx.us/bcdisaster/index.php/protecting-natural-resources1). 🌲

Dead “soldier” trees  
stand in Bastrop.  
Photo by Chase  
A. Fountain, Texas  
Parks and Wildlife  
Department.





# Question & Answer with Heather Harward

*H<sub>2</sub>O<sub>4</sub>TEXAS Coalition promotes state water plan implementation*

The 2012 *State Water Plan: Water for Texas* was delivered to the governor by the Texas Water Development Board (TWDB) in January 2012. The report conveys a somber message: In drought conditions, Texas does not have enough water, according to a press release on the TWDB website. The state water planning process ensures the state's water resources are reviewed regularly, and the process ends with the development of a state water plan every five years. The state water plan addresses the water supply challenges Texas faces by identifying potential water shortages and recommending strategies to create additional supplies, according to the TWDB release.

A relatively new nonprofit organization, the H<sub>2</sub>O<sub>4</sub>TEXAS Coalition, focuses on raising awareness of the importance of implementing the plan to ensure adequate water supplies in the future. We talked with the executive director of H<sub>2</sub>O<sub>4</sub>TEXAS, Heather Harward, to learn more about H<sub>2</sub>O<sub>4</sub>TEXAS' goals, mission, plan and how it came about.

*Q: First, tell me about H<sub>2</sub>O<sub>4</sub>TEXAS. When was it established? How do you hope to accomplish your purpose?*

A: It was established in July of 2010. We are a diverse coalition of partners interested in full implementation of the Texas state water plan. Through that diverse partnership, we educate Texans statewide about the state water plan because in many cases folks don't know that we have a state water plan that's the envy of the nation, nor do they understand the consequences of not implementing the plan. Texas' water planning process serves as a model for other states, but without implementation, it's only a plan.

We are conducting a statewide public education and awareness campaign hoping to invigorate

Texans at the grassroots and get them energized about the plan's implementation. In order to achieve full implementation, we ultimately need to come up with a dedicated source of revenue—a difficult measure to advance, as all revenue measures are difficult to achieve. Our diverse partnership will help us accomplish that goal.

*Q: What is the mission of H<sub>2</sub>O<sub>4</sub>TEXAS?*

A: It's important to recognize that our mission is focused, like a laser. We're not trying to get bogged down in all water policy issues because that ends up fracturing a coalition like ours. What we've learned over time is that the one water policy issue uniting us is the state water plan. What we're trying to do, in a very focused manner, is achieve full implementation of the plan by establishing a dedicated source of revenue. The beauty of the coalition is that we're bringing all these different stakeholder points of view together to try to come up with a revenue source that will be acceptable to a broad collection of constituencies. To achieve full implementation of the plan, we need to get Texans energized about the state water plan and calling for implementation. Having the backing of Texans is important to a Legislature that will ultimately make the decision.

*Q: How many partners are currently involved?*

A: We have about 65 partners, and we're growing. We have both public and private partners; we have water suppliers as well as water customers.

*Q: How long have you been involved with H<sub>2</sub>O<sub>4</sub>TEXAS, and what is your role?*

A: I'm the executive director, and I've been involved since the coalition's inception. I'm the only full-time employee, although we do have a number of partners who help on a contract basis.



# H<sub>2</sub>O<sub>4</sub>TEXAS.org



I am involved with everything from the daily operations, fundraising, public outreach and education to our communication delivery system, which includes a number of tools ranging from the website to social media, traditional media and stakeholder outreach, including educating decision-makers at both the state and local levels.

*Q: I understand H2O4TEXAS is a 501c3. What is that and how is it advantageous?*

A: Yes, it's a 501c3 nonprofit corporation, which is also referred to as a charitable organization. That means that contributions are tax-exempt. From a business perspective, the nonprofit model has been appealing, especially during a struggling economy; it's a good investment. From a policy perspective, the IRS' requirements for a 501c3 nonprofit fit our mission because we must be and are an education-based entity.

*Q: What has H2O4TEXAS done to this point?*

A: First and foremost, I couldn't be more proud of the group of partners that we have. Diversity was our number one goal from the beginning because we knew from the history of this issue that getting something done would take the perspective and constituencies of entities from all sectors of Texas' economy, including the industries that are considered economic drivers, water users and those public entities that provide water. It's going to take all of us working together in order to accomplish this goal.

Since our establishment, we have proven ourselves to be the go-to entity when people have questions on implementation of the plan. We get calls from decision-makers and media outlets around the state asking for our position on various issues related to the water plan.

One of the most exciting developments is the broadening of our membership base to include institutions of higher education. Texas A&M University and the Texas Water Resources Institute have led the way by helping us reach out to other institutions of higher education. That kind of expansion is exciting because it will provide new resources and expertise that we didn't have before. Texas A&M has been the leader in that regard, and we're grateful for their help.

*Q: What are future goals of H2O4TEXAS?*

A: Our immediate focus right now is our subcommittee on revenue, which is looking at collecting data and doing research on possible revenue streams. We're using the expertise of the coalition

to look at some revenue solutions and come up with some suggestions that we believe would be the most viable.

Among our areas of research are the water-energy nexus, or the interconnectivity and interdependence of water and energy. You need water to produce energy, and water cannot be cleaned and delivered without energy. So first we're looking at that and trying to expand the dataset, and then we are addressing that subject on a more micro-level, looking at the water-energy nexus to see if there are any potential solutions for revenue within that concept.

Our ability to get Texans to listen to our educational efforts is obviously improved when we're feeling the repercussions of drought, so that will continue to be part of our educational campaign leading up to the next legislative session, which begins in January of 2013.

*Q: What are some ways you communicate the message?*

A: The first thing we've been trying to capitalize on and continuously develop is electronic communication and social media. Because we were a new organization with limited resources, we've done as much as we can through electronic communication—e-mails, Internet and so on. We've also worked closely with traditional media, where we find a lot of Texas journalists and thought leaders who understand the issue and want to help.

We would like to have the ability to spread our message through print, radio and television advertising, and that is part of our 2012 plan and beyond, as long as the resources are there, and our fundraising efforts continue on that front.

Grassroots communications have been our most effective tool to date, in my opinion, and our partners have done a great job helping us get the word out.

*Q: What take-home message would you like to relay to the public regarding water and the Texas state water plan?*

A: The Texas state water plan is the envy of the nation, and our plan provides an opportunity to ensure that our most basic need—water—is available and affordable now and in the future. Without an adequate supply of clean, affordable water, public health and our economy break down within days. We need water to ensure continued economic growth and prosperity. We must, must make implementation of the plan our number one priority for the great State of Texas. 💧



# WATER CONSERVATION & TECHNOLOGY CENTER

— Securing Our Water Future —



Dr. Calvin Finch, new director of the Water Conservation and Technology Center.

## Water Conservation and Technology Center, director to focus on statewide water issues

The newly established Water Conservation and Technology Center (WCTC) in San Antonio will accelerate development, testing and adopting of new and innovative technologies to help solve water problems and meet water supply needs for Texas.

Dr. Calvin Finch, formerly with the San Antonio Water System (SAWS), is the center's director.

Texas AgriLife Research, the Texas AgriLife Extension Service, the Texas Engineering Experiment Station and Texas A&M University–San Antonio are collaborating on developing the center. The center is administered by the Texas Water Resources Institute, in partnership with the Texas Center for Applied Technology (TCAT).

"As the 2011 drought has shown, the urgency and importance of water conservation and technology advancement cannot be underestimated or ignored," said Finch, who has been involved in Texas water conservation for 22 years. "Applied research and education are an essential part of Texas making the state water plan a reality.

"With the creation of the Water Conservation and Technology Center, the Texas A&M System is stepping forward to play a leadership role in addressing the challenges of having adequate future water supplies for Texas."

Cindy Wall, TCAT's executive director, said the center will target its work on four high priority efforts: water conservation, water reuse, groundwater desalination, and energy development and water use.

"The center will establish a team of scientists, engineers and water professionals dedicated to applied research and development, testing and validation, technology transfer, and training and extension education in these four areas," Wall said.

The center will work with industry, state and federal agencies, municipalities, trade associations and other research institutions to undertake projects and develop solutions within these four areas.

Initially co-located with TCAT at the South Presa Campus, the center will move to the new Texas A&M–San Antonio campus in the future.

Finch comes to the center from SAWS, where he held several positions, including director of regional initiatives and special programs, director of water resources and director of conservation. He was responsible for obtaining the water resources necessary for meeting the needs of San Antonio, a community of 1.2 million people that is growing at the rate of 3 percent per year.

He also directed the system's water conservation education and rebate programs, including the Community Challenge Program that enlisted nonprofits to annually convert 25,000 high water use toilets to high efficiency toilets. He served as SAWS's representative on the Edwards Aquifer Recovery Implementation Program that recently completed a habitat conservation plan to manage water use from the Edwards Aquifer and protect the endangered species at the Comal and San Marcos Springs. 💧





## TCEQ honors partnership

The Texas Water Resources Institute was recently selected as the winner of the Texas Environmental Excellence Award in the civic/community category for its Arroyo Colorado Watershed Partnership.

Presented annually by the Governor of Texas and the Texas Commission on Environmental Quality (TCEQ), the awards spotlight the state's highest achievements in environmental preservation and protection.

"This award is definitely an honor for the institute, but the real credit goes to the farmers and other project participants who have made this partnership such a success," said Dr. Neal Wilkins, the institute's director.

Jaime Flores, an institute program coordinator and watershed coordinator for the Arroyo Colorado Watershed Protection Plan (WPP) Implementation project, said the partnership is composed of more than 700 people representing federal, state and private organizations, agricultural producers and other interested individuals concerned with identified water quality problems in the Lower Rio Grande Valley's Arroyo Colorado. The partnership published its WPP in 2007, one of the first watershed protection plans in the state, he said.

"Through multiple projects and the cooperation of many stakeholders, the institute and partnership have achieved 75 percent of the goals set forth in the plan," Flores said. "University scientists and city officials are working alongside farmers and schoolchildren to monitor, clean-up and educate others about the Arroyo."



The Arroyo Colorado Watershed Partnership (ACWP) received a Texas Environmental Excellence Award. Pictured from left to right: Tony Reisinger, Texas Sea Grant coastal and marine resources agent; Carlos Rubinstein, TCEQ commissioner; Allen Berthold, TWRI project manager; Dr. Bryan Shaw, TCEQ chairman; Gov. Rick Perry; Zak Covar, TCEQ executive director; Dr. Kevin Wagner, TWRI associate director; Jaime Flores, ACWP watershed coordinator; Dr. Jude Benavides, ACWP steering committee chair and the University of Texas-Brownsville assistant professor; and Toby Baker, TCEQ commissioner. Photo courtesy of TCEQ.

The institute began coordinating the Arroyo Colorado program in 2007, working closely with the partnership, TCEQ, Texas State Soil and Water Conservation Board and the Texas General Land Office to implement practices to improve water quality, according to Allen Berthold, an institute project manager.



The Military Sustainability Program received a 2012 Superior Service Award in the team category. Pete Gibbs, Texas AgriLife Extension Service associate director for state programs (far left), and Ed Smith, AgriLife Extension director (far right), present the award to Texas A&M Institute of Renewable Natural Resources team members Todd Snelgrove, AgriLife Extension program specialist; Brian Hays, AgriLife Extension program specialist; and Roel Lopez, the institute's associate director. Other team members (not pictured) are Bill Ross, natural resources policy consultant with Brooks, Pierce, McLendon, Humphrey and Lenord, LLP, and Justin Tatum, program specialist with the Texas Watershed Management Foundation.

## INRR wins 2012 Superior Service Award

The Texas A&M Institute of Renewable Natural Resources recently received the Texas AgriLife Extension Service's 2012 Superior Service Award in the team category for its Military Sustainability Program.

The annual Superior Service Awards recognize AgriLife Extension faculty and staff members who provide outstanding performance in Extension education or service to the organization.

"Although relatively new, the Military Sustainability Program has accomplished much through the innovation and diligence of each of its team members," said Dr. Neal Wilkins, the institute's director. "Each member has used his expertise to help develop numerous programs that ensure military readiness while also protecting natural resources."

"Military readiness ensures our troops are ready for combat and is dependent on the ability for the military to test and train on its land," Roel Lopez said.

"This program supports the military's training mission through improving land management practices, training military natural resource professionals and developing regional partnerships," Lopez said.

The program is a collaborative effort of the institute with federal natural resource agencies, state agencies, private landowner groups and the U.S. Department of Defense, he said.

Texas AgriLife Extension Service



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