November 2014

Conservation Matters

THE TEXAS LAND, WATER AND WILDLIFE CONNECTION

Coming soon: An all new txH2O

What does land conservation actually entail? How does land management impact water supplies? Why should urban Texans care about how rural land is taken care of?

These are not simple questions, but the upcoming issue of *txH$_2$O* will tackle all of this and more. The magazine is published by the Texas Water Resources Institute (TWRI) twice a year, and digital subscriptions are free.

To make sure you don't miss out on this issue, subscribe to the magazine by visiting twri.tamu.edu/publications/subscribe and signing up. Follow TWRI on Facebook, Twitter and Instagram to keep up with *txH$_2$O* and all the latest water research and education news.

TWRI requests graduate student research proposals

The Texas Water Resources Institute (TWRI) announces a request for research proposals from graduate students for its 2015–2016 grant program. Funded through the U.S. Geological Survey, this program is aimed at funding water resources-related research conducted by graduate students at Texas universities. TWRI anticipates funding two graduate research enhancement grants of up to $5,000.

Proposed research can deal with a wide range of water resources topics. However, priority will be given to research addressing the science, technology, policy or socio-economics of implementation of state water plan water management strategies, including: agricultural and urban water conservation; development of new surface and groundwater sources; desalination; reuse; aquifer storage and recovery; addressing major water quality impairments in Texas, including bacteria, dissolved oxygen and mercury; impacts of endangered species listings on water management in the state; oil and gas industry water use, reuse, and reclamation or disposal of produced water; and impacts of climate variability and drought on water resources and adaptation measures. Proposals on other water-related concerns will also be considered.

Research proposals are due by 5 p.m. on **Dec. 12**. For further information visit twri.tamu.edu/what-we-do/education/scholarships/usgs or contact **Danielle Kalisek** at dmkalisek@tamu.edu.

IRNR part of TAMU team receiving $1.4 million grant for woodland encroachment research

Examining the human factors influencing the encroachment of woodlands into grasslands is the focus of a $1.4 million grant awarded to a team led by **Dr. Bradford Wilcox**, Texas A&M AgriLife Research ecologist and professor in the Department of Ecosystem Science and Management at Texas A&M University.

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“Slowing the Expansion of Woodlands and Increasing the Resilience of Grasslands in the Southern Great Plains” is a three-year project funded by the National Science Foundation.

Joining Wilcox from Texas A&M will be principal investigators **Dr. Urs Kreuter**, AgriLife Research rangeland scientist also in the Department of Ecosystem Science and Management, and **Dr. Andrew Birt**, AgriLife Research entomologist in the Texas A&M Knowledge Engineering Lab. **Brian Hays**, Texas A&M Institute of Renewable Natural Resources associate director, will coordinate the outreach aspect of the project.

Other principal investigators are **Dr. Michael Sorice**, Virginia Tech University; **Dr. Willem van Leeuwen** and **Dr. Steve Archer**, University of Arizona; and **Dr. Chris Zou** and **Dr. Sam Fuhlendorf**, Oklahoma State University.

Wilcox explained that the project came about because large areas of the central and western United States have seen woody plants spreading into grasslands used mainly for raising livestock. These grasslands have substantially changed in recent decades and now face a host of contemporary threats, he said.

Previous research implicated change in climate and grazing pressure as factors contributing to this encroachment, Wilcox said. This project will extend that work to include research on the effects of governmental policies and social attitudes toward the use of fire to keep grasslands open, as well as grassland to woodland conversion’s impacts on ecological services and economics.

Researchers will compare three regions with contrasting degrees of woody plant encroachment in Kansas, Oklahoma and Texas to test the hypothesis that changes between grasslands and woodlands are driven by interactions between fire and grazing regimes constrained by policy and culture.

Land cover change fundamentally alters biological diversity, biogeochemical cycles and land surface-atmosphere interactions, thus threatening the sustainability of commercial livestock production systems that are the foundation of rural economies, Wilcox said.

“Maintaining remnant grasslands and restoring degraded grasslands for people who depend on them will require a new paradigm for woody plant encroachment: one that views this phenomenon as a complex social-ecological system within which coupled biophysical, social and cultural processes operate and dynamically interact,” he said.

Wilcox said a variety of ecological and socio-economic facets have been studied independently but not researched as interdependent components at regional scales, as this project will do.

“Guided by our conceptual woody plant encroachment social-ecological framework, we have identified important knowledge gaps in our understanding of this ongoing event and designed a research program to fill those gaps,” he said.

“Our research results, along with existing knowledge about the systems, will be incorporated into a quantitative modeling framework that will enable us to dynamically link human decision-making with ecosystem response.”

To test their hypothesis, Wilcox said the researchers will develop a dynamic, repetitive and evolving agent-based model to analyze factors influencing land managers’ decision-making with respect to using prescribed fire as a management tool.

The model also will forecast changes in regional woody plant cover and ecosystem carbon mass under different scenarios of fire use; project the effects of change between grasslands and woodlands on portfolios of ecosystem services, including forage production, groundwater recharge, stream flow and carbon sequestration; and translate changes in ecosystem services into economic metrics, he said.

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Wilcox said when the study is complete, they will be able to provide for the first time a regionwide assessment of woody plants coverage and estimates of how fast the transition from grassland is proceeding — information that will be critical for the formulation of policy and coordinated action.

“We will have a new understanding of how woody plant encroachment affects regional-scale water and carbon budgets; and we will have an improved understanding of how burn associations provide a catalyst for collective action by private land managers to restore and/or maintain grasslands.”

Additionally, he said, the team will provide new modeling approaches that link social processes with biophysical ones, thereby enabling scientists to understand feedbacks and threshold responses and to anticipate behavior.

“This realistic scenario analysis built on such information will give us the ability to educate policymakers as they seek to deal with woody plant encroachment,” Wilcox said.

Read the original AgriLife Today news release for more information.

Meet a scientist: Gretchen Miller

Groundwater researcher and engineer **Dr. Gretchen Miller** wants to know how to balance the water resources needs of people, the economy and the planet.

“Engineers are really well-placed to promote sustainable water use, which is the central theme of my research on groundwater and ecohydrology,” said Miller, an assistant professor in the Zachry Department of Civil Engineering at Texas A&M University.

“I’ve been interested in water resources since being a teenager, because I was always interested in the quality of the environment and environmental concerns,” she said.

Growing up in St. Louis, where the Mississippi and Missouri rivers meet, Miller recalled the impact the Great Flood of 1993 had on her attitude toward water. “It was my first exposure to water as something very important,” she said. This concern, coupled with her interest in engineering and the environment, fueled her desire to study groundwater.

Miller earned her bachelor’s and master’s degrees in geological engineering at the University of Missouri at Rolla. “It’s a rare major,” she said. “But I got to do exactly what I wanted — I got to work on groundwater.” She then received her doctorate in civil and environmental engineering from the University of California at Berkley.

Today Miller is working on improving how certain processes are treated in existing groundwater availability models. “The problem is that the scale that we use and the things we model with it aren’t conducive to some of the new questions we want to ask,” she said.

Specifically, Miller wants the computer models to include information on how the atmosphere and vegetation interact with groundwater. This will create a more accurate representation of the ecosystem as a whole and will lead to more responsible management decisions, she said.

Miller is also exploring groundwater storage in the layer just above the water table, known as the vadose zone. Because Texas’ peak water demands are often out of sync with the peak water supply, water is often stored in reservoirs. The problem with reservoirs is that water loss often occurs due to evaporation, she said. Using the vadose zone for water storage means there would be virtually no water loss due to evaporation, she said.

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Currently, Miller is also focused on improving Earth system models, which are frequently used to model climate change. In particular, Miller and her students are trying to better understand the role of plants in the broader water cycle. “Contributing our knowledge of plants’ groundwater use and groundwater flow in general has been one of the more exciting things we’re working on because it has a direct connection to one of the biggest issues of our time.”

Dr. Gretchen Miller

In addition to her work in the U.S., Miller has also worked on modeling in Costa Rica, where the climate is generally wet though often fluctuating. “They have the same questions there about what’s going to happen over the next 50 years as the planet warms up,” she said. “And the tropics are a ground-zero for changes in climate.”

In addition to her research, Miller teaches several engineering courses to undergraduate and graduate students. She teaches a water resources engineering course and a fluid mechanics course, which she described as “physics applied to water and air.”

Miller also teaches a groundwater hydrology and engineering class that was offered to undergraduates for the first time this year. “I feel like I can really tailor it to the students, and we can stop if they have questions and answer those as they come up, rather than having a big lecture class,” she said. “I’ve really enjoyed teaching that one.”

For more information on Miller's work, visit her research website.

How much water does the U.S. use?

According to a new study published by the U.S. Geological Survey (USGS), about 355,000 million gallons per day (Mgal/d) of water was withdrawn for use in the United States in 2010. National water use declined by 13 percent from 2005 to 2010.

The report, “Estimated use of water in the United States in 2010,” is the 13th in a series of USGS reports published every five years since 1950.

According to the report, fresh surface water withdrawals (230,000 Mgal/d) were almost 15 percent less than in 2005, and fresh groundwater withdrawals (76,000 Mgal/d) were about 4 percent less than in 2005. Saline surface water withdrawals were 45,000 Mgal/d, or 24 percent less than in 2005, and saline groundwater withdrawals in 2010, mostly used for mining, were 3,290 Mgal/d.

As in 2005, water withdrawals in four states — California, Texas, Idaho and Florida — accounted for more than one-quarter of all fresh and saline water withdrawn in the United States in 2010, the report found. In Texas, about 45 percent of withdrawals were for thermoelectric power, and 28 percent was for irrigation.

According to USGS, estimates of withdrawals enable not only the depiction of trends in total water use among different geographic areas, categories of use and sources but also understanding of how future water demands will be met while maintaining adequate water quality and quantities for humans and ecosystems.

Read the abstract and full report for more information. The entire series of five-year national water-use estimate reports is available at water.usgs.gov/watuse/50years.html.

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Texas Water Development Board adopts SWIFT rules

In 2013, Texas voters approved the creation of the State Water Implementation Fund for Texas (SWIFT). Introduced by the 83rd Texas Legislature during the 2013 legislative session, SWIFT enabled a one-time investment of $2 billion from the state's Economic Stabilization Fund, also known as the Rainy Day Fund, to provide low-cost loans for water projects in Texas. Additionally, the legislature called for at least 20 percent of SWIFT to be reserved for conservation and reuse projects and at least 10 percent to be reserved for rural and agricultural projects.

On **Nov. 6**, the Texas Water Development Board (TWDB) adopted a set of rules for implementing SWIFT. The rules will determine how eligible projects will be prioritized for funding. TWDB now invites public water providers to submit an abridged application as the first step to receiving funding from SWIFT.

"Due to the vision of the legislature and Texans' overwhelming approval of the creation of this critical fund, today was a historic step for Texas," said TWDB Chairman **Carlos Rubinstein**, of the **Nov. 6** meeting. "Now, SWIFT will ensure enhanced financing will be available to fund projects that our state needs to continue to grow and thrive."

The abridged application is due to TWDB by **Feb. 3, 2015**.

"The passage of Senate Bill 1 in 1997 provided the bottoms-up approach to state water planning that has become a model for other states," said TWDB board member **Bech Bruun**. "The adoption of final rules for SWIFT signifies a move toward implementation, while still giving deference to the vital involvement of regional water planning groups."

Read the full TWDB article for more information and application details.

Free soil testing available to Lower Rio Grande Valley producers

The Texas A&M AgriLife Extension Service in the Lower Rio Grande Valley is offering its annual soil testing campaign through February, according to AgriLife Extension personnel.

“We’re encouraging all commercial agricultural producers in Hidalgo, Cameron and Willacy counties to take part in this free soil testing campaign to help the environment and their bottom lines,” said **Ashley Gregory**, Texas Water Resources Institute Extension assistant in Weslaco. “This will be the 14th year in a row we’re offering this service, and it’s been hugely successful.”

The campaign began **Oct. 1** and runs through **Feb. 28, 2015**, she said.

“The soil testing campaign first began here in 2001 and has been funded by various sources,” Gregory said. “Since 2008 the campaign has been paid by the Arroyo Colorado Watershed Partnership, made possible by funding from a Clean Water Act grant provided by the Texas State Soil and Water Conservation Board, the U.S. Environmental Protection Agency and administered through the Texas Water Resources Institute.”

The annual soil testing campaign has been instrumental in reducing excess nutrients entering the Arroyo Colorado, and “it’s a service we hope to continue providing,” she said.

Agricultural producers can pick up soil sample bags and forms from AgriLife Extension offices in Willacy and Hidalgo counties and the Texas A&M AgriLife Research and Extension Center in Weslaco, 2415 E. U.S. Highway 83 in Weslaco, according to **Brad Cowan**, AgriLife Extension agent for agricultural and natural resources in Hidalgo County.

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Producers in Cameron County are asked to pick up sample bags and forms at the U.S. Department of Agriculture's Farm Service Agency office at 2315 W. Expressway 83 in San Benito.

"The samples can then be dropped off at the Willacy and Hidalgo county AgriLife Extension offices for shipping to the laboratory at Texas A&M University in College Station, all at no cost to producers," he said. "Results will be mailed directly to producers."

Cameron County producers can return their samples to the Farm Service Agency office in San Benito.

For more information about the Arroyo Colorado watershed, visit arroyocolorado.org. For more information about the soil testing program, contact the AgriLife Extension county office in Hidalgo, Cameron or Willacy counties.

Read the full AgriLife Today news release for more information.

Urban Riparian Symposium coming to Austin in February

The Texas Water Resources Institute (TWRI), Texas Riparian Association and the city of Austin are hosting an Urban Riparian Symposium **Feb. 11–13, 2015**, at the Palmer Events Center in Austin.

Workshops are scheduled for 1-5 p.m. on **Feb. 11**, and the symposium will be from 9 a.m.-6 p.m. on **Feb. 12** and from 8:30 a.m. -5:30 p.m. **Feb. 13**. Attendees can sign up for one of two separate night walks hosted by Austin Water Utility on Feb. 11.

Early registration is $75 and due by **Dec. 1**. After **Dec. 1**, registration is $110.

Nikki Dictson, TWRI Extension program specialist, said the symposium will provide an opportunity for natural resource professionals to share ideas, discuss management and policy issues and lessons learned in urban riparian and stream planning and design, construction and evaluation.

"Riparian areas, or vegetative buffers along streams, are complex ecosystems that include the land, plants, animals and network of streams within them," she said.

Dictson said these areas perform a number of ecological functions such as modulating streamflow, storing water, removing harmful pollutants from water, moderating water temperatures and providing habitat for aquatic and terrestrial plants and animals.

"Simply put, the health of riparian ecosystems is critical to stream health, flows and water quality," she said.

The city of Austin has invited **Dr. Peter M. Groffman**, a microbial ecologist with the Cary Institute of Ecosystem Studies in New York, to be the symposium's keynote speaker. Groffman's research focuses on the role of microorganisms in ecosystem function. Much of his work has looked at riparian areas and what urbanization does to soil and hydrology, Dictson said.

"Scientists and practitioners are encouraged to attend to share experiences, network with colleagues and become involved in shaping the future of urban riparian issues in Texas," she said.

To register for the workshops and symposium, or for more information, visit texasriparian.org or contact Dictson at n-dictson@tamu.edu.

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New Panhandle wildlife management area approved

The Texas Parks and Wildlife Commission has approved acceptance of a land donation to create the new 14,037-acre Yoakum Dunes Wildlife Management Area (WMA) in Cochran, Terry and Yoakum counties, near Lubbock. The WMA will provide a refuge for the threatened lesser prairie chicken and other native grassland birds and wildlife, according to the Texas Parks and Wildlife Department (TPWD).

It's the first new WMA in Texas since the 2006 donation of the McGillivray and Leona McKie Muse WMA in Brown County.

Acquisition of land for the WMA was made possible through a partnership between The Nature Conservancy of Texas, The Conservation Fund and Concho Resources, Inc., an oil and gas company operating in the Permian Basin of Texas and New Mexico that donated $400,000 to The Conservation Fund towards land acquisitions for the WMA, according to TPWD. The donation leveraged $1.2 million in federal Wildlife and Sport Fish Restoration Program funds.

"Conserving the lesser-prairie chicken all comes down to habitat, and the new Yoakum Dunes Wildlife Management Area will provide vital breeding and nesting habitat for the species in a critically important part of its range" said **Ross Melinchuk**, TPWD deputy executive director for natural resources. "It would not have been possible without federal wildlife grant funds and support from private partners."

In coming years the agency plans to offer public recreational use of the WMA, including hunting, birding and other compatible recreation. However, decisions about what degree and how much of the WMA may be open to the public won't be possible until after on-site resources are fully assessed, according to TPWD.

Once the new WMA is created after the land transfer, TPWD will eventually create a Yoakum Dunes WMA web page with more information for the public. In the meantime, questions about the new WMA or landowner assistance for wildlife conservation can be addressed to the Panhandle/High Plains Wildlife District of the TPWD Wildlife Division.

Read the full TPWD news release for more information.

AgriLife Research study: Drought-tolerant corn taps deeper soil profile

As water challenges for corn production on the Texas High Plains continue, Texas A&M AgriLife Research scientists are evaluating recent drought-tolerant hybrids from major seed companies.

Dr. Qingwu Xue, AgriLife Research crop stress physiologist, and his assistant research scientist, **Dr. Baozhen Hao**, are wrapping up a two-year study on "Water Use and Grain Yield in Drought-Tolerant Corn in the Texas High Plains."

They presented their information at the recent American Society of Agronomy - Crop Science Society of America - Soil Science Society of America international meeting in Long Beach, California.

The study was funded in part by Texas A&M AgriLife Research Cropping System Program, Pioneer Hybrids International and the U.S. Department of Agriculture – Ogallala Aquifer Program. Other team members are **Thomas Marek**, AgriLife Research irrigation engineer; **Dr. Wenwei Xu**, AgriLife Research corn breeder; and **Dr. Ed Bynum**, AgriLife Extension entomologist.

Xue said little information is known about the difference in water use between drought-tolerant and conventio

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“We wanted to know why the drought-tolerant hybrids perform well under drought conditions,” he said.

“In this study, we compared two hybrids from Pioneer. One is 33D49, a very popular conventional hybrid in the Texas High Plains that does not have the drought-tolerant trait, and AQUAmax P1151 HR, also from Pioneer but with the drought-tolerant trait and in the market since 2012. This hybrid is gaining popularity in the north part of the Texas High Plains.”

The objective of their study was to compare the two corn hybrids’ water use and grain yield performance at three irrigation levels — 100 percent, 75 percent and 50 percent evapotranspiration requirement, Hao said. The same two hybrids with different drought tolerance were planted in both years.

Measurements included soil water content, soil water extraction, seasonal evapotranspiration, water-use efficiency, biomass and grain yield, he said. Xue and Hao said when averaged across the two years and water regimes, P1151HR showed higher grain yield, water-use efficiency and biomass yield, and slightly lower seasonal evapotranspiration as compared to 33D49.

“What we found was there was no difference in total evapotranspiration between the two hybrids, so they required a similar amount of water to produce corn. However, at the 50 percent evapotranspiration level, the drought-tolerant corn had a tendency to access more water from the deeper soil profile.

“What we also found was in the AQUAmax hybrids, the yield was generally 10 to 15 percent higher than the traditional hybrid, especially in drought conditions such as the 50 percent evapotranspiration level. That’s a huge yield benefit under drought conditions,” Xue said.

What this means is that the new AQUAmax hybrid has higher yield and higher water-use efficiency — up to 20 percent, he said.

Read the full AgriLife Today news release for more information.

Public comments invited on USDA Conservation Stewardship Program interim rule

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Texas is seeking public comments on changes to the Conservation Stewardship Program (CSP) interim final rule. USDA published the interim final rule, which contains the statutory changes to CSP, in the *Federal Register*. The rule will be open for public comments through **Jan. 5, 2015**.

Interested individuals can submit public comments on the interim final rule via regulations.gov. Public comments will be used to finalize the interim final rule, and a final rule will be published afterwards, according to the USDA.

“As conservation leaders, farmers and ranchers in Texas will be pleased by the program changes,” said NRCS State Conservationist **Salvador Salinas**. “These changes will increase the level of stewardship needed to address critical resource concerns on working agricultural lands and enable them to deliver more conservation benefits.”

The interim final rule is used to implement CSP. This program helps agricultural producers maintain and improve their existing conservation systems and adopt additional conservation activities to address priority resources concerns. Participants earn CSP payments for conservation performance — the higher the performance, the higher the payment.

Congress changed CSP in the 2014 Farm Bill, and NRCS, the agency that administers CSP, incorporated those changes into this interim rule. These changes are designed to improve the competitive nature of the program, includin

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bar for the quality of projects enrolled and increasing the number of priority resource concerns to be addressed during the term of the CSP contract.

As one of USDA's largest conservation programs for working agricultural lands, more than 64 million acres have been enrolled in the program nationwide since its launch in 2009. NRCS in Texas has enrolled approximately 300,000 acres.

For more information, read about CSP in Texas or read the full NRCS Texas news release.

Natural Resources Training Courses

Texas Riparian and Stream Ecosystem Workshop – Pedernales River Watershed	Dec. 5
Introduction to ArcGIS 10	Jan. 20-21, 2015
Introduction to ArcGIS 10	March 11-12, 2015
Introduction to ArcGIS 10	May 12-13, 2015

New IRNR and TWRI publications

Water Quality at Caddo Lake, Center for Invasive Species Eradication: Final Report, **L. Gregory, A. Knutson, E. Edgerton, A. Mukherjee, P. Baumann, M. Masser, K. Wagner**, TR-468, 2014.

Preventing Water Quality Contamination through the Texas Well Owners Network (TWON): Final Report, **D. Boellstorff, D. Gholson, D. Kalisek, J. Smith, R. Gerlich, K. Wagner, M. McFarland, S. Mukhta**r, TR-463, 2014.

Texas Well Owner Network, **D. Gholson, L. Lee**, EM-118, 2014.