Watershed CONSERVATION

Texas Watersheds

Conservation news from headwaters to coast

SPRING 2014 NEWSLETTER

TEXAS PARKS & WILDLIFE

In this issue

Nocturnal Musicians of the Southern High Plains

BY RASIKA RAMESH

Spring rains bring with it a deafening musical cacophony — an unmistakable orchestral fracas that can be heard miles away in the otherwise still night. Frogs and toads congregate in large numbers in and around ephemeral pools where love-struck males advertise raucously for lovelorn females.

The night air reverberates with loud bleats, buzzes, jackhammers, croaks, and low-pitched kisses. After just a few days the nights become dramatically quieter. This explosive breeding pattern is characteristic of amphibians adapted to arid environments such as the Southern High Plains, where water availability is highly unpredictable.

Amphibians are water-dependent organisms, and use aquatic habitats to breed, lay eggs, and metamorphose. Over the course of 360 million years amphibians have evolved with several additional adaptations that allow them to inhabit arid environments, such as rapid breeding, hastened larval development, and burrowing behavior.

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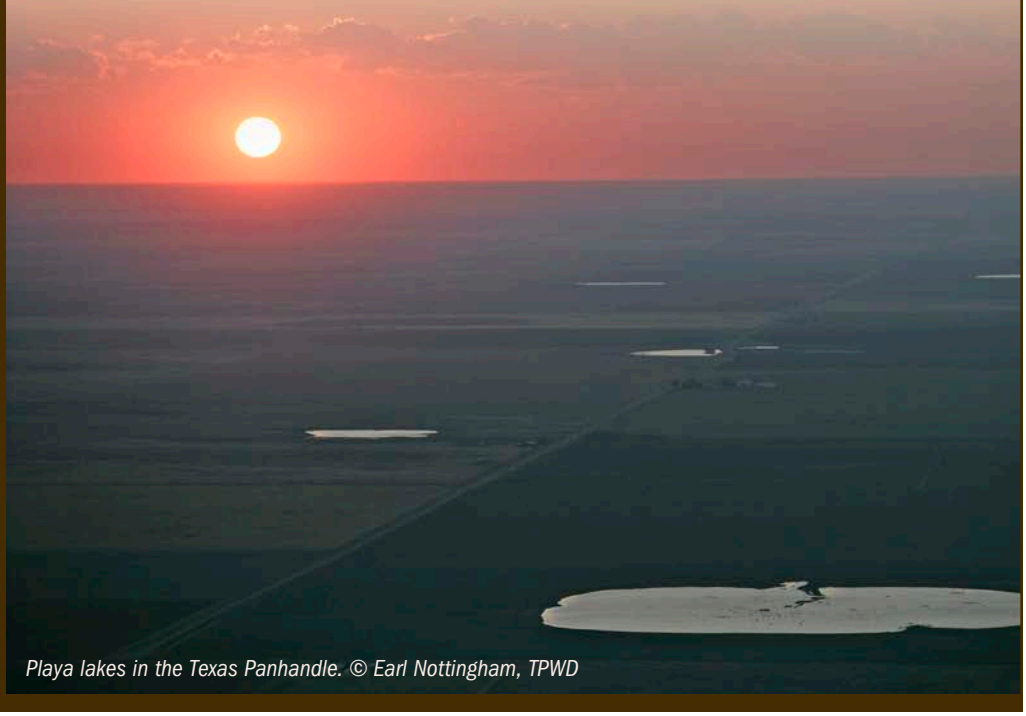

Playa lakes in the Texas Panhandle. © Earl Nottingham, TPWD

A calling Texas toad (Anaxyrus speciosus). Photo courtesy of Rasika Ramesh.

A Great Plains narrow-mouthed toad (Gastrophryne olivacea). Photo courtesy of Rasika Ramesh.

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Nocturnal Musicians of the Southern High Plains

In the Southern High Plains, spread broadly over west Texas and northeast New Mexico, climate is highly erratic and rain events typically occur as isolated evening thunderstorms. In the absence of permanent rivers or streams water availability is unreliable, leaving these plains "high and dry." Instead water accumulates in tens of thousands of shallow ephemeral wetlands, or "playas." There are nearly 20,000 playas in West Texas alone. Recharged primarily through precipitation and surface run-off, playa wetlands are umbilical to the functioning of this prairie ecosystem and support a wide array of floral and faunal biodiversity in this otherwise arid landscape. Amphibians of this region are highly dependent on playa wetlands and well adapted to the region's wet-dry cycles.

The playa hydroperiod, or the length of time the playa wetland holds water, is an important variable influencing amphibian distribution and mediates predator-prey interactions and inter/intra-specific competition. The barred tiger salamander (*Ambystoma tigrinum mavortium*), the only salamander species of the region, migrates to the playas and breeds following rain events in late-winter/early spring. They prefer longer hydroperiods to accommodate slower rates of larval development, which can last over three months. Sometimes larvae establish neotenic populations, i.e., attain reproductive maturity while retaining their aquatic larval features such as gills and tail fins well into adulthood. This allows the salamanders to remain in the breeding pond and escape inhospitable terrestrial environments as much as possible.

On the other hand spadefoot toads such as the Couch's spadefoot (*Scaphiopus couchii*), New Mexico spadefoot (*Spea multiplicata*), and Plains spadefoot (*Spea bombifrons*) have notoriously short larval periods, as little as a week, and can effectively utilize playa wetlands with very short hydroperiods. Their tadpoles develop into omnivores and cannibalistic carnivores based on levels of environmental stress, the latter of which grow and develop at a faster rate. True toads such as the Great Plains toad (*Anaxyrus cognatus*) and Texas toad (*Anaxyrus speciosus*) metamorphose within a couple of months, while other species such as the Plains leopard frog (*Lithobates blairi*), spotted chorus frog (*Pseudacris clarkii*), and Great Plains narrow-mouthed toad (*Gastrophryne olivacea*) take slightly longer. In contrast, amphibians in other areas of the country with generous and predictable rainfall patterns can choose to breed anytime of the year and larvae may take several months to metamorphose.

When playas dry up amphibians remain dormant in the close vicinity, hibernating during winter months or aestivating in the hot, dry months. Under favorable conditions dispersal, foraging, and other activities are usually dominant within a short radius from the playa, thus making amphibians sensitive to structural and functional changes to the playa wetland and its terrestrial surroundings.

Human activities have greatly altered the prairie grasslands of the Southern High Plains through agriculture, ranching, energy development, and urban expansion. Researchers have observed interesting trends in studies comparing cropland and grassland playas in the Southern High Plains. Cropland playas have larger sediment accumulation, shorter hydroperiods, and are associated with lower amphibian body sizes, reduced immune function, and lower densities of longer larval period species such as tiger salamanders. Loss of playa wetlands through increased sediment accumulation decreases playa density and increases inter-playa distance. Amphibians thus have to disperse larger distances to reach breeding pools. At present only 0.2 percent of playa wetlands are presumed to be 'intact' or free from any wetland or watershed modification, and over 50 percent have been rendered ecologically functionless.

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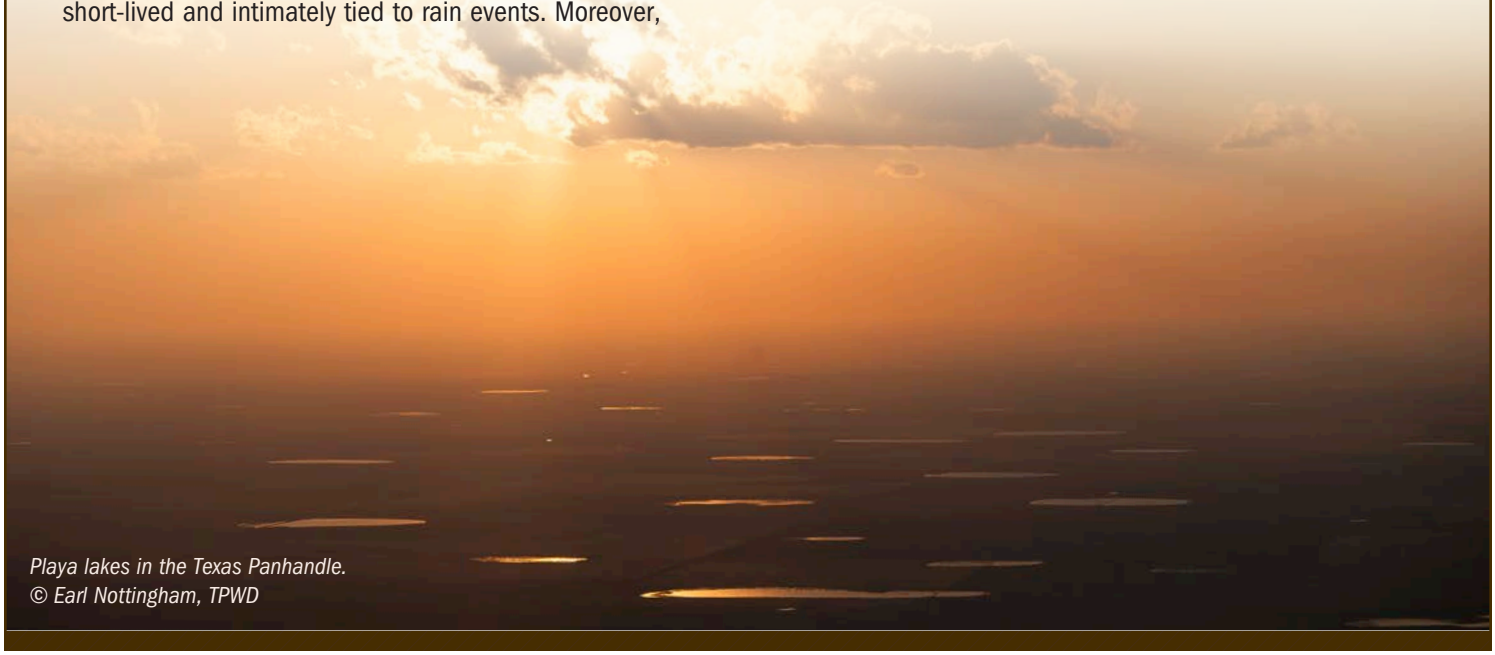
In Lubbock, the Hub City of the Plains, the sheer density of playa wetlands has allowed them to be used (and modified) extensively for flood control and drainage. Playa wetlands have also been excavated, filled-in, moved over, or converted to parks for other uses typical of urban environments such as the construction of roads and buildings, agriculture, recreation, and aesthetics. Like urban wetlands elsewhere, playa wetlands suffer from hydroperiod, sedimentation, and vegetation regime alterations, and water quality degradation through run-off of chemical fertilizers, pesticides, heavy metals, and road salts. Many of these, at least those in town, are heavily stocked with fish which are important predators of amphibian larvae and capable of eliminating certain tadpole species. Additionally, roads and paved surfaces fragment upland habitat, impede amphibian dispersal, and expose them to the risk of desiccation and traffic-related mortality.

A recent two-year study jointly undertaken by the Griffis-Kyle and Perry labs at Texas Tech University explored associations between amphibian occurrence and habitat and landscape characteristics in Lubbock's drought-afflicted urban setting. They documented seven of the thirteen species distributed in the Southern High Plains, mostly in wetlands subject to relatively lesser modification and with substantial vegetation both within and surrounding the wetland. Amphibians rarely occurred in the heart of the city where urban development is intense, save for the occasional introduced species. These trends parallel those of similar studies done in urban areas elsewhere and in other regions (cropland, grassland) of the Southern High Plains.

Monitoring amphibians poses an enormous challenge particularly in arid regions where their emergence is short-lived and intimately tied to rain events. Moreover, large amphibian numbers observed during the burst of breeding frenzy with rainfall may deceptively signal larger population sizes. Research also suggests a considerable lag-time between land use change and amphibian population responses. While studies in the Southern High Plains haven't statistically indicated large declines, global trends strongly imply that such an outcome may very well be in order; amphibians currently represent the fastest declining vertebrate group, and land use change has been one of the main implicated factors. The unpredictability of water resources combined with an already arid climate and the eminent danger of prolonged droughts may prove catastrophic to native amphibian populations.

Recognizing the need for immediate mitigation measures to promote the health of urban wetlands in Lubbock, the Department of Natural Resources Management at Texas Tech University is actively coordinating with local residential communities to promote community stewardship of urban wetlands and aid restoration efforts. Some popular measures considered are establishment of native vegetation buffers as well as emergent vegetation to serve multiple purposes of water quality and biodiversity enhancement, as well as increasing breeding-habitat suitability for native amphibians. Further management options should focus on maintaining wetlands with a range of hydroperiods to allow persistence of native amphibian diversity.

With time and effort, let us hope to hear the deafening music of the night — replete with the croaks, buzzes, bleats, jackhammers, and kisses of our endemic amphibians — resonating both within and outside urban centers of the Southern High Plains.



Playa lakes in the Texas Panhandle.
© Earl Nottingham, TPWD

Texas White Bass, Other Fisheries Threatened by Drought

BY LARRY HODGE

Puxatawney Phil may herald the onset of spring for folks in the Northeast, but for Texans there is another signal: the beginning of the annual white bass run upstream from reservoirs into rivers.

You'll know when the white bass run is on by the pink blooms on redbud trees and the cars and trucks lining the roadsides at river crossings. When the redbuds bloom the white bass run, and anglers flock to rivers above reservoirs to harvest their share of the bounty. At Lake Buchanan, for example, Texas Parks and Wildlife Department (TPWD) surveys show that the white bass run accounted for about half the lake's total directed fishing effort in spring 2011, and almost all of that was in the river upstream of the reservoir.

The generous 25-fish per day limit on white bass makes them an important food item for many anglers, but there's an economic impact on the community as well. At Lake Buchanan, anglers spent about $2.5 million on white bass fishing trips between March and May 2011, and nearly $1 million of that came from anglers from outside the area.

What draws people to riverbanks on chilly spring days is more than the chance to catch fish. The white bass run is an annual tradition for many Texans. It's a sign of renewal and

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An angler with his catch of white bass on the Colorado River above Lake Buchanan. © Earl Nottingham, TPWD

hope, an opportunity for an outing with family or friends, a source of treasured memories about the big one that didn't get away. It's a perfect example of the adage that when we go fishing, it's not just fish we seek.

Drought conditions threaten the Texas white bass fishery in a number of ways. If a reservoir drops so low that connection to the river is lost, the fish won't be able to swim upstream where they are more vulnerable to angling. Water access for both boaters and bank anglers may be reduced or lost. More importantly, the fish may not be able to spawn, reducing the numbers of fish available. If drought conditions continue for years, the white bass fishery may decline to the point anglers lose interest. This can result in a significant loss to local economies.

"Many Texas reservoirs, including several in Central Texas, currently provide excellent white bass runs," said Dave Terre, chief of management and research for TPWD's Inland Fisheries Division. "Changing climate and increased water demands increase the chance that we will lose the connection between rivers and reservoirs necessary to sustain white bass populations unless we take this important fishery into account when making decisions about water management and reservoir operations."

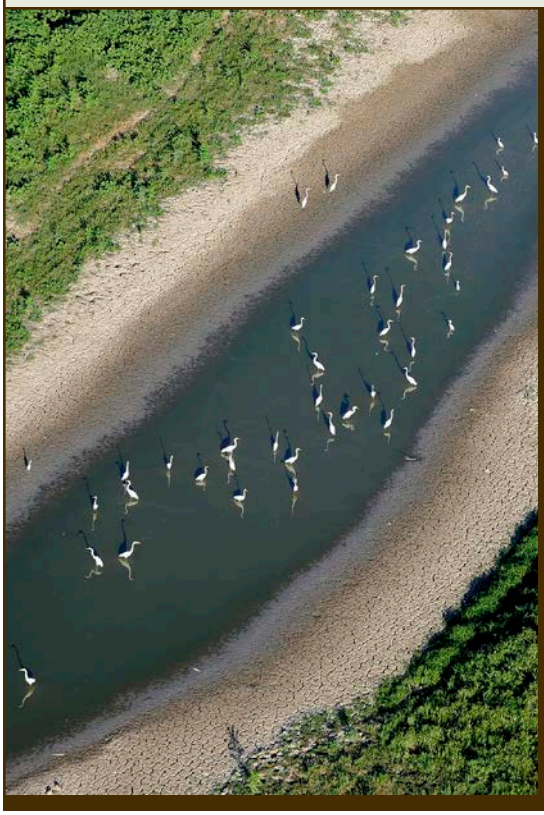
Terre also pointed out that the connections between rivers and reservoirs are important not just for white bass but also for a number of other species, including catfish and non-game species.

"We stand to lose these important fisheries if connectivity is not maintained," he said. "As our reservoirs get older and suffer from siltation and degradation of fish habitat, drought conditions will exacerbate the problem. Unfortunately there is no easy or quick fix. Solving these problems will take cooperation between the agencies managing the reservoirs and the fisheries with support from the public. Water could be managed in such a way as to maintain connectivity. Physical improvements could be made in river-to-reservoir transition zones. Watershed management practices could be used to decrease siltation rates. And water conservation measures are always helpful in maintaining reservoir levels."

Texas is part of a national movement to address the multiple problems facing reservoirs. The Reservoir Fisheries Habitat Partnership and the Friends of Reservoirs Foundation were established to coordinate efforts, generate public support and facilitate funding.

"TPWD has launched studies to demonstrate the importance of maintaining river-to-reservoir transition zones from biological, recreational and economic standpoints," Terre said. "We are working with the public, other agencies and grass-roots partners who support fish habitat improvements in our reservoir systems."

For more information on the issues facing reservoirs and how you can help, visit www.waterhabitatlife.org.



Lake Travis at extremely low levels in 2011 . © Chase A. Fountain, TPWD

Drought Survival Kit

The drought continues to grip Texas, and it's taking a toll on everything from wildlife to water bills. TPWD created the Drought Survival Kit, a website designed to tell the public how to "Help Wildlife, Save Your Yard, Cut Your Water Bill." The website offers practical tips and suggestions on ways of supporting and coping with nature. The Drought Survival Kit can be found at www.texasthestateofwater.org and the main page also links to *Texas Parks & Wildlife* magazine water resource special issues from the past 10 years. It also showcases online video documentaries TPWD has produced in partnership with Texas PBS stations. The documentary *Gulf of Mexico: America's Sea* can be seen in its entirety on the website. You can also find information on hosting videos screenings in your community using the Texas State of Water Video Screening Toolkit.

Watershed Workshops: Helping Landowners Conserve our State's Treasured Riparian and Aquatic Habitats

MELISSA PARKER, TPWD WATERSHED CONSERVATION PROGRAM

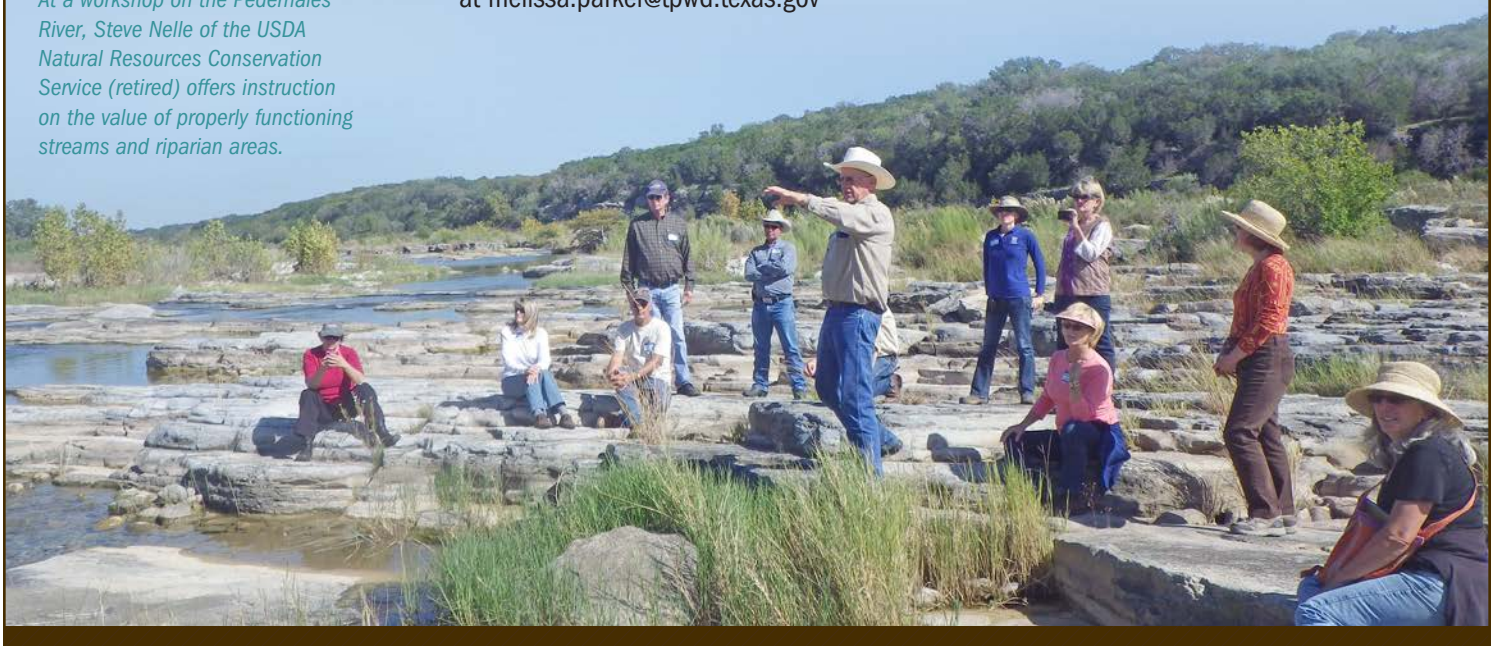
Texas Parks and Wildlife Department (TPWD) has been conducting watershed workshops for riparian landowner groups to increase the awareness of proper watershed and riparian management and improve the overall function and sustainability of rivers and streams. By targeting key riparian landowners these groups can then work together to initiate watershed management practices on a broader scale that can have positive effects on the given stream and its associated riparian area.

Because healthy riparian systems typically have high biodiversity and biological productivity and provide biological linkages between aquatic and terrestrial environments, workshops targeting riparian landowners can provide many valuable benefits to these habitats. In addition to providing habitat for fish and wildlife, healthy riparian systems also dissipate floodwater energy, help to maintain base flows, stabilize streambanks, provide temperature buffering, and improve water quality by assimilating pollutants and nutrients.

The TPWD Watershed Workshops are modeled after the highly successful Riparian Workshops organized by the Nueces River Authority for the Nueces River Basin but have been expanded to include offering technical guidance to landowners who want assistance implementing concepts learned during the workshops. Additionally, the TPWD workshops include special topics of interest to participants. For example, if landowners have questions about sand and gravel mining, permitting, threatened and endangered species in their watershed, or other particular needs related to their region, modules have been developed that can be inserted into the workshops to cover these topics.

The Watershed Workshop format is similar to new workshops being conducted by the Texas AgriLife/Texas A&M Water Resources Institute (see accompanying article on page 7) in that there is a morning classroom setting in which participants learn about rivers and streams, riparian areas and plants, hydrology/fluvial processes, and how streams respond to changes on the landscape. An afternoon field trip is conducted to demonstrate the concepts learned in the morning classroom setting and to identify riparian vegetation and landscape features. By the end of these workshops, participants have obtained a sound understanding of just how important proper watershed and riparian management is to the overall function and sustainability of rivers and streams.

For more information on TPWD Watershed Workshops please contact the author at melissa.parker@tpwd.texas.gov



At a workshop on the Pedernales River, Steve Nelle of the USDA Natural Resources Conservation Service (retired) offers instruction on the value of properly functioning streams and riparian areas.

The Texas Riparian and Stream Ecosystem Education Program:

A New Initiative of the Texas Water Resources Institute

The Texas Water Resources Institute has recently launched a Texas Riparian and Stream Ecosystem Education Program to build a network of informed Texas citizens working to improve and protect local riparian and stream ecosystems.

The State of Texas has more than 200,000 miles of rivers and streams that, along with closely associated floodplain and upland areas, comprise corridors of great economic, social, cultural, and environmental value. These riparian corridors are complex ecosystems that include the land, plants, animals, and streams.

Staff from the Institute as well as from numerous state and federal agencies and other organizations are collaborating to conduct educational workshops around the state about the nature and function of stream and riparian zones. Streams and riparian zones reflect the sum of impacts of natural and man-induced disturbances of drainage areas or watersheds. Properly functioning riparian areas provide important buffer zones that are highly prized for providing benefits including forage, recreational value, fish and wildlife habitat, water supply, filtering of debris and pollution that improves water quality, cultural and historical value, and economic uses.

Nikki Dictson, Texas Water Resources Institute project manager and coordinator for the program, said by attending these workshops, landowners and other citizens will have a better understanding of how streams function, the benefits of healthy riparian corridors along streams, and how to improve their management of riparian and stream ecosystems.

"Riparian education programs such as our new program lead to informed landowners and [a] public that will be more inclined to use the practices learned at the workshops," Dictson said. "Proper management, protection, and restoration of these vital areas directly influence water quality and quantity as well as stabilize stream banks and improve fish and aquatic habitats and communities among other things." This project will create this synergy and build off of these successful local programs to establish a mechanism to deliver riparian education in high priority watersheds.

Allen Berthold of the Texas Water Resources Institute gives a morning presentation at the Lavaca River Watershed Workshop in Hallettsville, TX. Participants venture to the field for an afternoon session to observe the concepts they have learned.

Improved management will also provide tremendous ecosystem benefits and direct economic benefits to communities, she said.

The program is funded through a Clean Water Act grant provided by the Texas State Soil and Water Conservation Board and U.S. Environmental Protection Agency. Support is also provided by other state agencies, including the Texas Parks and Wildlife Department. More information can be found at **http://texasriparian.org/**.

UPCOMING WORKSHOPS

San Bernard River Watershed, Wharton, TX March 18, 2014

Arroyo Colorado Watershed, Weslaco, TX April 24, 2014

The San Marcos Watershed Initiative – A WPP Process

MEADOWS CENTER FOR WATER AND THE ENVIRONMENT

The Meadows Center for Water and the Environment at Texas State University is developing a Watershed Protection Plan for the Upper San Marcos River. The three-year project is called the San Marcos Watershed Initiative and will result in a plan to identify and mitigate problem areas that affect the health of this unique water body.

A Watershed Protection Plan (WPP) is a Clean Water Act 319(h)-funded project based on the collaborated efforts of volunteer stakeholders from the community to identify places of concern and how to proactively tackle future issues in water quality with a growing population.

The project area includes the watersheds of Sink Creek, Sessom Creek, Purgatory Creek, and Willow Springs Creek which flow into the main stem of the San Marcos River, and ends at the confluence of the Blanco River southeast of San Marcos, Texas. Artesian springs from the Edwards Aquifer emerge into Spring Lake through hundreds of openings, creating one of the most productive spring-fed systems in Texas and forming the headwaters of the Upper San Marcos River. The river is home to several endangered species, including the Texas blind salamander (*Eurycea rathbuni*), fountain darter (*Etheostoma fonticola*), and Texas wild rice (*Zizania texana*).

The City of San Marcos was listed in 2013 as the fastest growing city in the United States, and the whole watershed is within the rapidly growing Austin-San Antonio corridor. Land use analyses show either major shifts from forests to grasslands or

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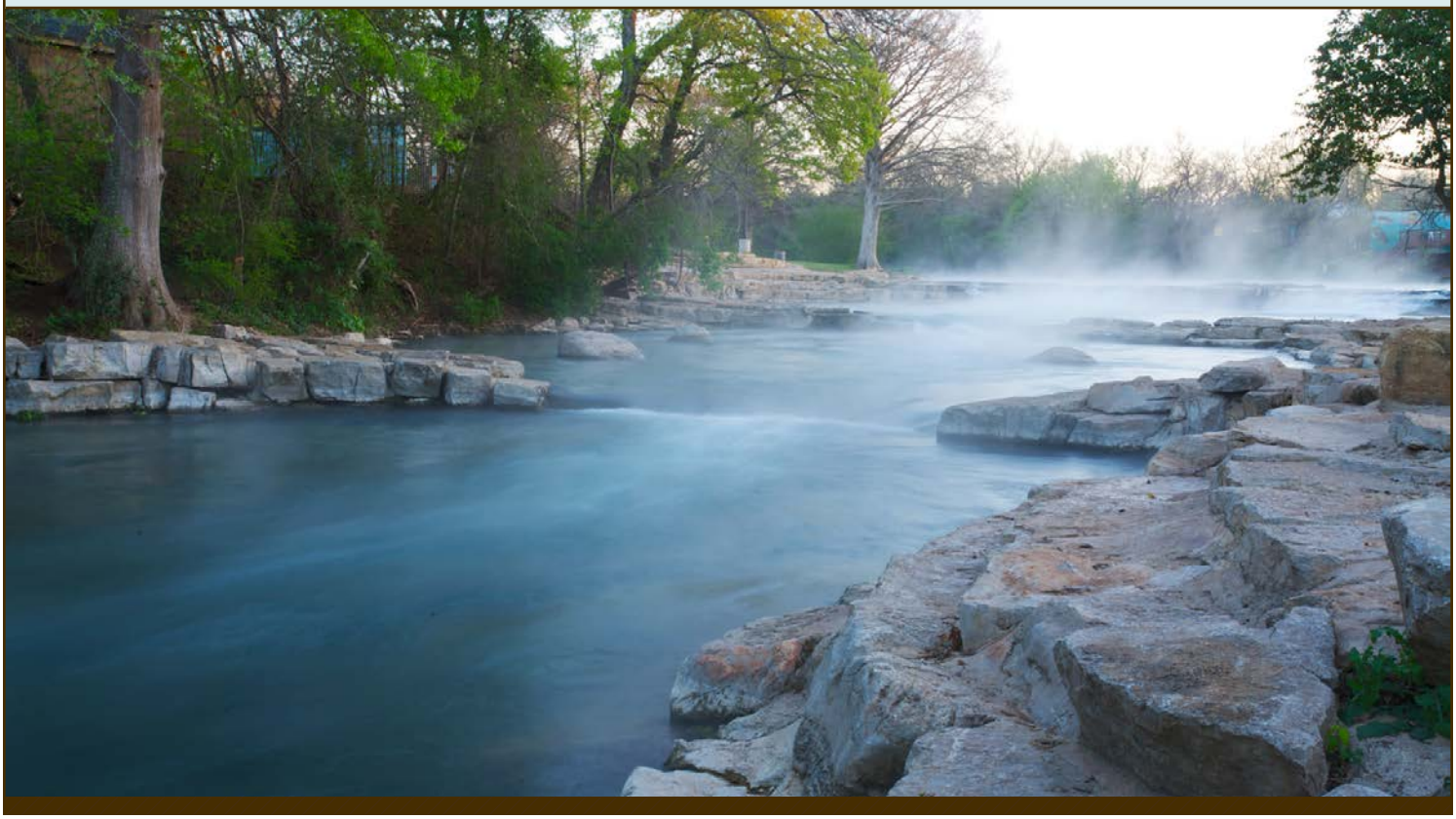

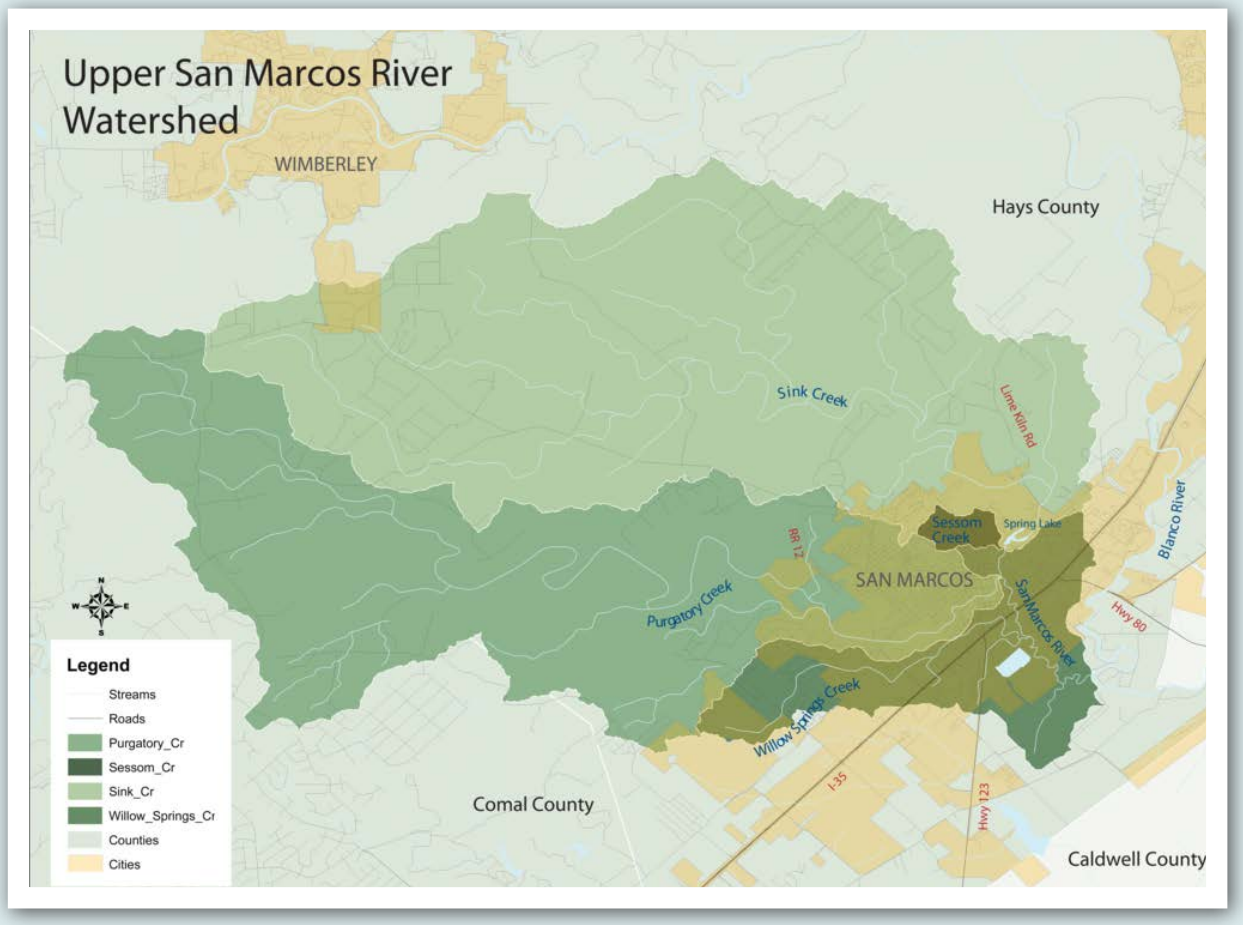

increased urbanization. The Upper San Marcos water quality is currently listed with the state environmental agency as impaired for elevated total dissolved solids (TDS). Coupled with decreasing stream flow from lowering aquifer levels, runoff from increased human development causes a concentration of sediment and other pollutants which threatens water quality. Without a comprehensive approach by citizen stakeholders to protect the San Marcos River, water quality could be compromised.

The San Marcos Watershed Initiative involves community stakeholders in partnership with The Meadows Center for Water and the Environment to protect and restore water quality in the river, lake, and creeks. The three-year process emphasizes developing a comprehensive WPP that will incorporate and leverage various related environmental protection activities, including efforts by the City of San Marcos, Hays County, Texas State University, and the Edwards Aquifer Authority.

The stakeholder process includes a decision making body referred to as the Core Committee and subcommittee groups that focus on important topics in the watershed including: Culture, Parks and Land, Water Quality and Quantity, Economics and Development, Agriculture, Data and Information, and Education and Outreach. Coupling scientific data with resident knowledge, the stakeholders will identify and prioritize both water quality concerns and solutions to mitigate them, ensuring the local support needed for a successful WPP.

For more information please visit http://smwatershedinitiative.org/

Charting a Course to Vibrant Coastal Marshes: The Salt Bayou Watershed Restoration Plan

BY JIM SUTHERLIN AND MICHAEL REZSUTEK, PHD.
TPWD UPPER COAST WETLAND ECOSYSTEM PROJECT

At over 60,000 acres, the Salt Bayou Watershed is the largest contiguous coastal marsh complex in Texas. The watershed is comprised of marshes that are internationally recognized for their continental importance to wintering waterfowl and a myriad of other migratory birds, and their conservation is given high priority.

These Western Gulf Coast marshes are in the southeast corner of Jefferson County. Presently, the watershed is bounded by the Sabine Neches Waterway (SNWW) to the east, the Gulf Intracoastal Waterway (GIWW) to the north, and the Gulf of Mexico to the south. The watershed is part of the Chenier Plain marsh ecosystem, one characterized by a series of sand ridges interspersed in coastal fresh, intermediate, and brackish marsh from about High Island, Texas across to Vermilion Bay, Louisiana.

Significant changes in the hydrology of the watershed had occurred by the early 1930s. Before industrialization, the Salt Bayou watershed received freshwater from overland flows originating in Jefferson and parts of adjacent Chambers counties. It was then that the GIWW was dredged and severed flows of freshwater into the lower portion of the watershed. Oil and gas development created a latticework of roads, canals, and levees that allowed salt water to move deeper into the salt-sensitive marshes, stressing plant communities. In 1977, the Texas Parks and Wildlife Department (TPWD) and the USDA Soil Conservation Service partnered on a project to connect Keith Lake and the Salt Bayou Watershed to the deep-water SNWW in Jefferson County to improve marine fishery access and sport fishing in the waters and marshes of Sea Rim State Park.

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The Keith Lake Fish Pass was constructed in 1977 to connect Keith Lake (pictured on right) to the Sabine Neches Waterway. This and other habitat alterations and hydrologic changes in the Salt Bayou Watershed have resulted in the loss of productive marsh systems.

Keith Lake Fish Pass looking west from the Sabine Neches Waterway toward Keith Lake. The Salt Bayou Watershed Restoration Plan outlines wetland loss issues and proposes solutions for restoring diverse habitats.

Today, the former fresh and intermediate marshes suffer from decreasing plant health and land loss, which can be attributed to hydrologic manipulation (navigation channels, small access canals and levees, railroads, highways, drainage, mineral development, etc.), tropical storms, hurricanes, loss of the beach ridge along the Gulf of Mexico, and drought. These habitat alterations have resulted in ongoing land loss as well as decreased plant health and diversity. When plants and their roots die, there is nothing left to hold soils in place, and in many cases soil is washed away converting productive marsh systems into open water. These losses were clearly evident shortly after completion of the Keith Lake Fish Pass in 1977, prompting TPWD and USFWS to develop the Salt Bayou Joint Water Management Plan in 1990. By 1995 this plan led to some improvements within the Salt Bayou Watershed.

After the water management plan was completed, areas of new and continuing marsh loss within the watershed gave indication that other issues needed to be addressed. Since 1999, Jefferson County has led a team of interagency managers and scientists known as the Salt Bayou Workgroup to discuss pertinent issues pertaining to the sustainability of the Salt Bayou Watershed. Through the group's efforts, new and potential changes to hydrology in the watershed have been identified, its hydrology has been modeled, and migration of marine organisms into and out of the system has been modeled. Efforts also documented the loss of surface elevation and conversion of marsh to open water as a result of erosion of organic surface soils, as well as the potential impacts of sea level change. Threats to the ecosystem identified by the workgroup involve plans to deepen the SNWW, continual erosion of over 26 miles of beach and beach ridge west of Sabine Pass to High Island, and erosion of the banks of the GIWW that threatens to allow sea waters of the GIWW to intrude into adjacent fresh, intermediate, and brackish marshes.

In May of 2013, the interagency work group completed and released the Salt Bayou Watershed Restoration Plan. This document outlines wetland loss issues within the watershed and offers solutions to retain marine access and to restore and/or maintain the wetland plant diversity and functions that characterize the watershed while improving waterfowl habitats. These solutions are expected to enhance wetland plant community diversity, retain marine organism access, and provide long term improvement to waterfowl habitat. Anyone interested in reviewing the plan can find it linked to the TPWD web page for the J.D. Murphree Wildlife Management Area (www.tpwd.texas.gov/huntwild/hunt/wma/find_a_wma/list/?id=40).

Jim Sutherlin is the TPWD Wildlife Region 4 Project Leader for the Upper Coast Wetland Ecosystem Project, and Michael Rezsutek is the Wetland and Waterfowl Specialist on the same Project. They can be contacted at jim.sutherlin@tpwd.texas.gov and michael.rezsutek@tpwd.texas.gov.

ETCETERA

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If you would like to submit an article or announcement concerning watershed-related activities, initiatives, or workshops* for the next issue, please email the editor at: ryan.mcgillicuddy@tpwd.texas.gov

* Please note that the newsletter cannot include announcements of for-fee seminars or workshops for which Texas Parks and Wildlife Department is not a sponsor.

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MASTER NATURALIST *Info*

The Texas Master Naturalist program, with 44 chapters located across the state, aims to develop a corps of well-informed citizen volunteers who educate their communities about the management of natural resources. The main qualification needed to become a Certified Texas Master Naturalist is an interest in learning and playing an active part in conservation. Volunteers will receive a minimum of 40 hours training from educators and specialists from places such as universities, natural resource agencies, nature centers, and museums. Training topics include interpretation and management of natural resources, ecological concepts, eco-regions in Texas, and natural systems management. Volunteers are expected to give 40 hours of service a year in community education, demonstration, and habitat enhancement projects. They are also expected to pursue a minimum of eight hours of advance training in areas of personal interest.

Texas Parks and Wildlife Department and Texas AgriLife Extension co-sponsor the Texas Master Naturalist Program. For more information about existing chapters or forming a new chapter contact Michelle Haggerty, Texas Master Naturalist Program Coordinator, 309 Sidney Baker South, Kerrville, TX 78028. Call (830) 896-2504 or email: mhaggerty@ag.tamu.edu.

Executive Director
Carter P. Smith

Editors
Beth Bendik
Ryan McGillicuddy

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