Watershed CONSERVATION

Texas Watersheds

Conservation news from headwaters to coast

WINTER 2013 NEWSLETTER

TEXAS PARKS & WILDLIFE

In this issue

Freshwater Coastal Prairie Wetland Restoration—

Case Study: Sheldon Lake State Park

BY MARISSA SIPOCZ, WETLAND PROGRAM MANAGER
TEXAS COASTAL WATERSHED PROGRAM
TEXAS AGRILIFE EXTENSION SERVICE/TEXAS SEA GRANT

Freshwater coastal prairie wetlands once covered large expanses of the Houston-Galveston landscape. A complex wetland matrix of mima mounds (low, flattened, domelike features) and low wetland basins known as prairie potholes provided important ecological services including habitat, flood control and water cleansing. Many of these areas were land leveled for agricultural and development purposes, erasing these features from the coastal landscape. Over 50 years, agricultural development and use altered the land surface and subsurface to an extreme degree—removing natural features, mixing soils, and creating a hard-packed, almost-impenetrable clay pan, while burying the natural wetland basins with soils scraped from neighboring mima mounds and surrounding high areas.

Successful restoration of these landscapes can be a difficult process at best. It requires identifying the true boundaries of the original basins, which are only distinguished by the soil signatures present in older aerial photographs and by matching key landscape features in current photography (Figure 1, on page 2).

New Methodology, Old Material

The wetland restoration project at Sheldon Lake State Park involved new planning and development methods combined with traditional restoration techniques. Most

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Wetland Restoration Team working with Eagle Scout Troop 505 to restore coastal prairie wetlands in Phase I, which is completely vegetated after five years.

FALL 2003 **SUMMER 2008**

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Freshwater Coastal Prairie Wetland Restoration

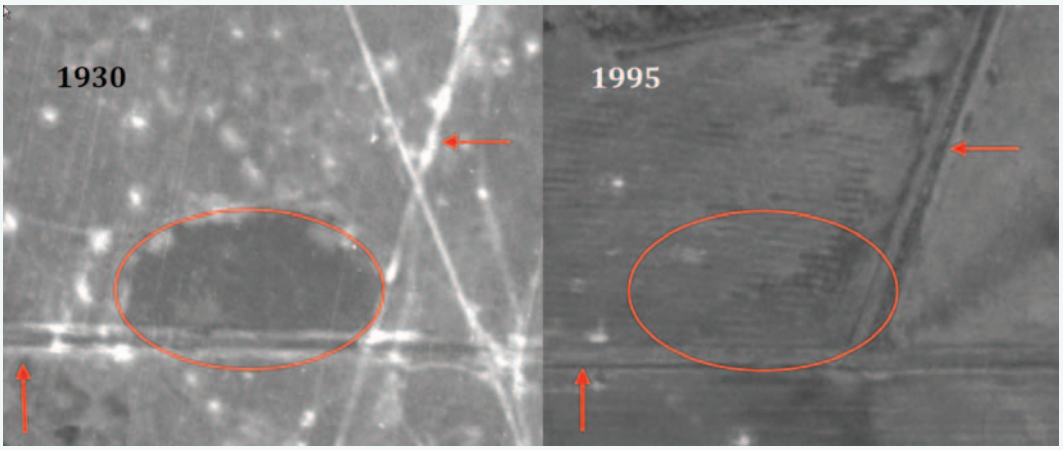

Figure 1. Comparative pictures to identify common features (e.g. arrows mark the irrigation canal and the original farm road). The 1995 photo demonstrates the difficulty in finding the original wetland boundaries which are clear in the 1930 photo.

restoration projects involve the creation of new wetland basins within the project site without regard to past wetland locations. This project changed that process to an investigation of the landscape history.

This method was first created and tested by Texas Parks and Wildlife Department Natural Resource Coordinator, Andrew Sipocz, at Sheldon Lake State Park as part of the master plan goal of restoring former agriculture fields to pre-settlement conditions. To start, several key mapping materials were collected and/or digitized: 1920 1-foot contour-interval topographic map, 1930 aerial photographs, and digitized 1994 and 1995 color infrared photographs. Further, the Natural Resource Coordinator identified a consistent mima mound signature, distinguished upland brush from wetland brush, and determined both shallow and deep inundation photo signatures.

Photo signatures of old mima mounds, the main irrigation canal, and pipelines were used to corroborate the alignment of the photographs. Once the common features between the photographs were identified, less obvious, but important wetland boundaries were located on the modern map using the 1930s original photograph taken before the land was leveled. Using GIS technology, the boundaries were mapped onto the 1995 color-infrared photograph (Figure 2).

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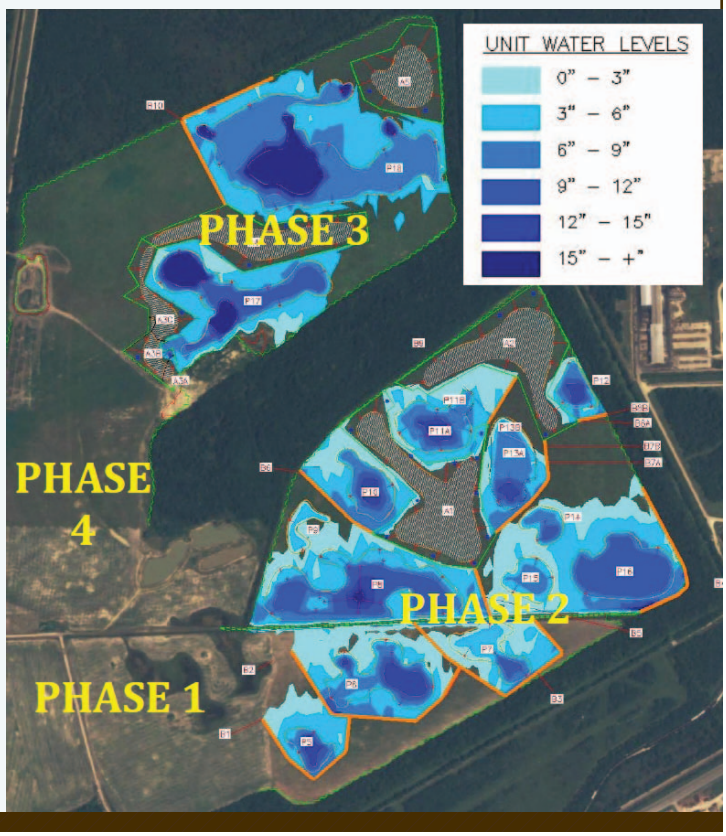

Figure 2. Each of the six colors represents a different water depth zone which corresponds to a micro-habitat zone. The shallowest zone (0 to 6 inches) reflects vegetation which is emergent and hydrophytic and may be found both in wetlands and open prairie. Whereas the deepest blue section designates the deep pools of open water and floating and/or submerged strictly aquatic vegetation.

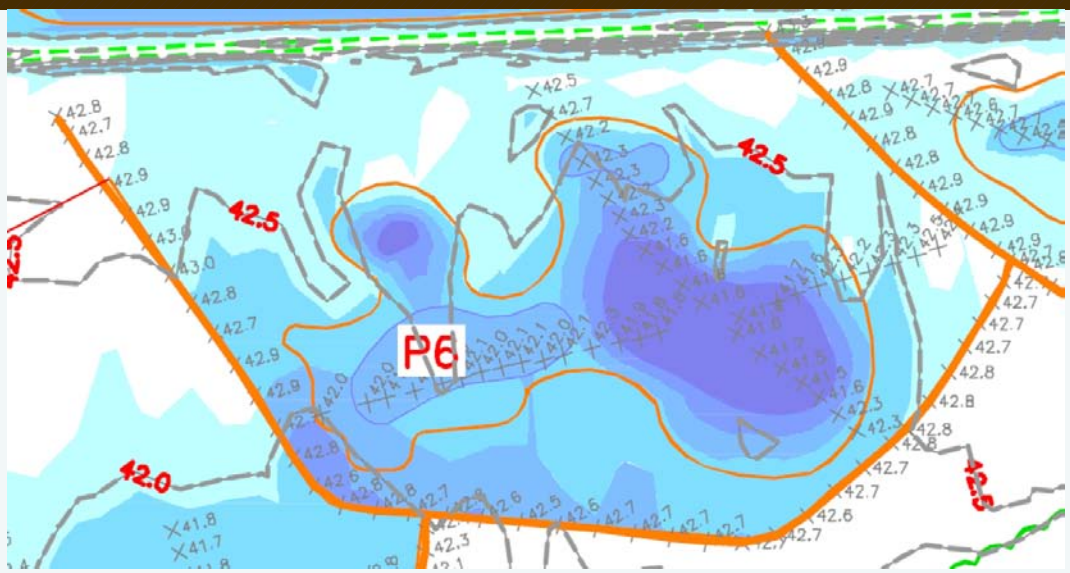

Figure 3. Close-up of the excavation and berm boundaries for Pond 6, Phase 2.

The process of identifying the high mima mounds (lighter white circular marks as shown in Figure 1) and the depressional areas was the most tedious portion of the planning and development phase. The pothole outlines were then overlaid onto georectified maps to define the wetland boundaries for this restoration project. The precise outlines for the basins could then be drawn onto these georectified maps.

Further, several proposed wetland sites were ground-truthed using soil cores to verify that the methodology accurately defined the potential historical wetland site locations. Soil cores were carefully examined to determine the depth of the original soil horizons, and excavation depths planned accordingly (Figure 3). With verification complete, the georectified maps were then translated into engineering (construction) documents, with accurate excavation depths that varied across each pothole (Figures 2 and 3). The ponds were excavated according to these plans and subsequently planted with local native wetland plants.

Our Native Communities

All of the plant material for this project was collected from a four-county region (Harris, Galveston, Brazoria, and Chambers) approximately 50 miles or less from the state park. This collection methodology maintains the genetic integrity of the plant stock placed in the restoration site. In other words, it ensures that only plants adapted for local soil, hydrology, and regional conditions are introduced to the site. This precaution increases the overall success rate of the restoration effort as survival potential is higher.

Plant collection began up to one year in advance of construction. Plants were propagated and maintained onsite at the park in shallow, raised artificial grow-out ponds. The extended collection time allowed for collection of seasonally available desirable species. For instance, southern blue flag (*Iris virginica*) is available and actively growing in December and January and unavailable in the summer months, compared to thin-scaled sedge (*Carex hyalinolepis*), which is most available in later summer. Additionally, the extended collection period allowed the plants to recover from transplant shock. Ideally, plant material was collected such that it had sufficient time to propagate at least 2- to 4-fold, thereby decreasing the overall amount collected from wild populations. Plants were installed as densely as feasible, and species with the capacity to recover and self-propagate in a short time period were selected, including arrowhead (*Sagittaria platyphylla*) and southern cutgrass (*Leersia hexandra*) (Figure 4).

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*Figure 4. Arrowhead (*Sagittaria platyphylla*) is a showy local native plant.*

Presidio River Rangers: Adventures in Learning

BY JENNIFER MANDEL BURATTI
PHOTOS COURTESY OF THE PRESIDIO RIVER RANGERS

The Presidio River Rangers are a group of Presidio High School students who are interested in environmental topics, outdoor activities, and helping to preserve our resources for future generations.

There are two sponsors, Mrs. Melody Crowder and Mrs. Pat Sims. Mrs. Crowder is the current Environmental Systems and AP Environmental Science teacher at Presidio High School. Mrs. Sims is a retired teacher who previously held those teaching positions. The sponsors work together in setting up activities such as geocaching, nature walks, camping and of course water quality testing.

Mrs. Sims is a citizen water quality monitoring trainer with the Texas Stream Team and has been working to certify Presidio High School students in water quality testing.

"We are fortunate to have the support of many different agencies and our school district," said Mrs. Crowder. "As school budgets get tighter each year we would not be able to purchase supplies and fund our expeditions if it were not for the support of organizations like The Texas Stream Team and Texas Parks and Wildlife."

Other supporters include Texas Science Technology Engineering and Math (T-STEM), Texas Tech University at Junction, and Texas State University in San Marcos.

The Chihuahuan Desert Research Institute provided the Rangers with tents and cook stoves this past summer for camping. "We are so grateful for the help we have received and could not function at the level we do without them," declared Mrs. Crowder.

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The Presidio River Rangers put their new skills to work after a long trip to the coast.

Students from Presidio ISD perform water quality monitoring on the Rio Grande.

"We did an eight-day tour of Texas. The route took us from Presidio to Corpus Christi," stated Mrs. Crowder. "The students did water quality testing along the way in order to make comparisons between different bodies of water."

Student rangers tested for temperature, pH, turbidity, conductivity, dissolved oxygen, and benthic macroinvertebrates. Other activities conducted during the trip included bird watching, learning how to set up camp, and cooking.

The latest Presidio River Rangers project is working with Texas Parks and Wildlife to get some baseline water quality data from several springs at Big Bend Ranch State Park. "We would also like to work with Rio Grande Mining Company on a project," said Mrs. Crowder. Additionally, the next summer trip is in the planning stages at this time.

Most of the water quality monitoring is conducted in the Rio Grande in Presidio County. The group is very careful, and Mrs. Sims expressed her confidence in working on the border. She shared with Texas Stream Team staff many fun stories and described the Rangers good relationships with border patrol agents.

The most rewarding knowledge of such high school programs is learning how these adventures shape the future of students' lives. One of the students who was on the 2012 summer trip graduated last year and is now at Sul Ross University studying to be a biology teacher.

To follow the adventures of the Rangers, check out their blog (phsriverrangers.blogspot.com) or Facebook page (Presidio ISD – River rangers: www.facebook.com/pages/Presidio-ISD-River-Rangers/293956820718849?ref=ts&fref=ts).

Mrs. Crowder's parting advice was, "Do not leave food open in your tent!"

Environmental Flows in Texas

BY JOHN BOTROS AND KEVIN MAYES, TPWD RIVER STUDIES PROGRAM
PHOTO COURTESY OF CLINT ROBERTSON

"Save water for wildlife!" That's the talk around the office lately. Humans use water, store it, drink it, divert it, and build communities and economies upon it. Birds, mammals, plants, fish, turtles, bugs, mussels, and any other flora and fauna living in the state of Texas drink water, and many swim in it, live in it, and thrive in it.

So we've got a potential conflict. How can water be saved for wildlife? There's no bank account in which to deposit water and withdraw it at a more convenient time to benefit fish and wildlife.

Households and industries can "save water" by using efficient infrastructure, fixtures, and appliances and by modifying behavior. Conservation techniques from the mundane to the highly creative abound (see the "Water on the Web" at the bottom of page 8). Farmers have long carried the conservation mantle, knowing the true value of water and that it's too precious to waste.

In the end, how much water needs to be "saved" for wildlife and to maintain the natural heritage of Texas, including its rivers, springs, wetlands, estuaries, and lakes? How much water is needed to maintain habitat and water quality for the famous runs of white bass, monster fish such as alligator gar and catfish, as well as the many minnows, mussels, and mayflies that form the food base for dynamic river ecosystems? How much freshwater inflows do our bays and estuaries need to support crab, shrimp, red drum, and speckled trout? These are all seemingly simple but daunting questions and fortunately, scientists, engineers and stakeholders have been working together in earnest to try to answer them.

A little history lesson

Texas surface water is owned by the state, and the Texas Commission on Environmental Quality (TCEQ) grants water right permits to withdraw, store, and use surface water for

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The Sabine River, upstream of Highway 190

beneficial uses such as municipal, industrial, and agricultural. Water right permits are based on a prior appropriation system (first in time, first in right) and are typically granted in perpetuity. Senior rights are older ones that can make "calls" for water during times of shortage. Junior rights may have to curtail or cease diversion or storage until senior rights have been satisfied. Exempt from the prior appropriation system are the rights of property owners along streams to divert water for domestic (in the home or garden) or livestock use or for non-commercial fish and wildlife management.

In some river basins, permits have been issued for all (and in some cases more than all) of the water that would be present in the stream during dry periods. In essence, if all water rights were fully used, those rivers and streams would go dry during a drought. Currently, many existing water rights are not fully used, but that likely will change as Texas' population and demand for water grows or as climate change delivers droughts worse than historically experienced.

The "saving" of water for fish and wildlife was not a consideration in water rights permitting until 1985, when a series of laws required TCEQ to consider the impacts of projects on fish and wildlife. Prior to 1985, more than 90% of the available surface water had already been permitted for consumptive uses. Since 1985, environmental flow protection has occurred by use of special conditions in water right permits developed on a case-by-case basis. Generally, these special conditions restrict diversions of water to times when minimum streamflows are present to sustain fish and wildlife.

Sound science for healthy Texas rivers

To obtain the science and data necessary to answer the questions of how much water to save, the Texas Legislature passed Senate Bill 2 in 2001 directing TCEQ, Texas Parks and Wildlife Department, and Texas Water Development Board (TWDB) to develop and maintain an instream flow program. The three agencies formed the Texas Instream Flow Program (TIFP) to conduct scientific studies to determine instream flows that support a sound ecological environment. Studies were identified based upon the river segments (shown in map on page 8) where the greatest need for scientific information existed relative to water permitting, planning, and fish and wildlife conservation needs. TIFP studies assess how streamflow affects river characteristics, such as: aquatic life and habitat, temperature and dissolved oxygen needs, stream channel formation, and relationships between rivers and surrounding habitat. Stakeholders are invited to participate in the planning of each study and in the identification of study goals and objectives.

The TIFP is partnering with the Brazos River Authority to conduct the instream flow study (IFS) on the Middle and Lower Brazos River, which is on pace to be completed by 2015. While targeted studies continue in the Lower San

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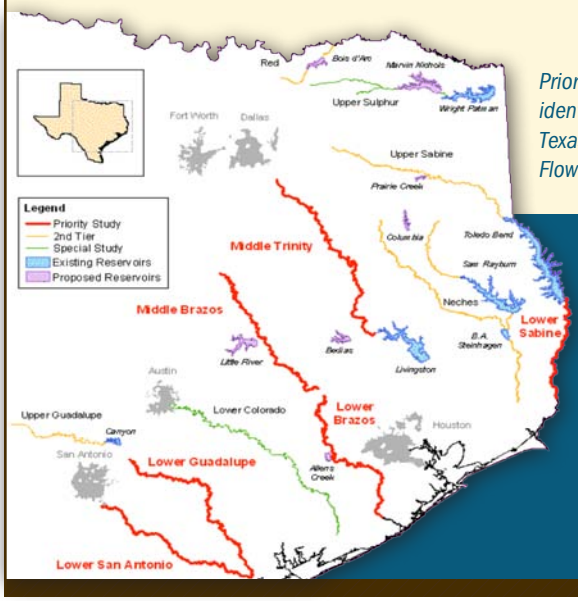
Antonio River, preliminary results and recommendations are available at the website of the San Antonio River Authority, the TIFP partner for this study. Planning efforts for the Lower Guadalupe River and the Middle Trinity River studies were initiated recently with the respective river authorities, and public stakeholder meetings are being planned for early 2013. These four studies are on track to meet a December 2016 deadline. Study results will be used as best available science for water policies and to guide state agencies in managing and conserving rivers.

Putting science into policy

After years of making fish and wildlife protection decisions on a water right by water right basis, many water professionals sought regulatory changes to provide more certainty in permitting and a more comprehensive approach to natural resource conservation. In 2007, after extensive efforts from water development and environmental communities, the Texas legislature passed Senate Bill 3 which sets out a new approach to "allocate" water for environmental flow needs while balancing human needs. Through TCEQ rule-making, environmental flow standards are adopted to protect environmental flows in future water rights permitting. Further, in basins where unappropriated water is available, TCEQ is directed to establish environmental set-asides that preserve an amount of water to meet environmental flow standards and that would not be subject to permitting for other uses.

This new approach was supported by participation from several statewide and bay-basin stakeholder and advisory groups, including the Environmental Flow Advisory Group (a statewide body consisting of legislators, a commissioner from both TCEQ and the Texas Parks and Wildlife Commission, and a TWDB board member) and the Science Advisory Committee, which provides scientific oversight and perspective to the statewide body and to bay-basin committees.



Priority studies identified by the Texas Instream Flow Program

The Bay-Basin Area Stakeholder Committees (BBASCs) are distinct stakeholder committees set up within specific bay-basin geographic areas (for example, a stakeholder committee was formed to address the Sabine and Neches rivers and Sabine Lake, the bay that the two rivers feed). BBASC members represent different water interest groups, including municipal, industrial, agricultural, environmental, commercial and recreational fishing interests. Senate Bill 3 directs the BBASCs to operate on a consensus basis to develop environmental flow regime recommendations that "balance" science-based ecological needs and human water needs. To help the stakeholders evaluate the science-based information, each BBASC group appoints a Bay-Basin Expert Science Team (BBEST). Experts in hydrology, biology, water quality, modeling, bay ecosystems, etc. work together for one year to recommend flow regimes to support an ecologically sound environment in rivers and bays using the best available science. BBEST recommendations are to be made without considering human needs for water.

Ultimately, the BBASC recommendations are considered by TCEQ in a rule-making process that adopts environmental flow standards that are then applied to future water rights. The BBASCs also prepare work plans that describe adaptive management activities and identify additional data, studies and monitoring activities needed to validate and refine environmental flow standards in the future. For maps and more information on the Texas Environmental Flows Process see "Water on the Web" below.

Meeting the challenge

Texas watersheds contribute flows to more than 191,000 miles of rivers and streams and hundreds of man-made lakes. These waters support a vast array of fish and wildlife as they flow to the Gulf of Mexico and offer important ecosystem services and recreational opportunities that people rely on. "Saving" water for wildlife while "developing" enough water to support human water demands is a huge challenge, but environmental flow legislation has set the stage for advances in science and sound policy decisions to increase dialogue, spread awareness, and promote balance.

WATER ON THE WEB

Texas: The State of Water
www.texasthestateofwater.org

Water Conservation Advisory Council
www.savetexaswater.org

Texas Instream Flow Program
www.twdb.state.tx.us/surfacewater/flows/instream/index.asp

Texas Environmental Flows Process
www.tceq.texas.gov/permitting/water_rights/eflows

After Dredging the San Marcos River to Remove an Invasive Plant Species, Geomorphic Monitoring Continues

BY ROY KLEINSASSER, TPWD RIVER STUDIES PROGRAM

Likely introduced from discarded aquarium contents, the exotic plant Beckett's water trumpet (*Cryptocoryne beckettii*) became established in the upper San Marcos River in the mid 1990s. Native to Sri Lanka, water trumpet in the San Marcos expanded quickly, with the plant becoming common from the confluence with the Blanco River upstream for about 3 kilometers.

A stand of Cryptocoryne *in the San Marcos River, prior to removal.*

© David E. Lemke

The circumstance caused concern among state and federal resource agencies given that the spring-fed river provides habitat for several threatened and endangered species, including Texas wild-rice (*Zizania texana*), fountain darter (*Etheostoma fonticola*), Comal Springs riffle beetle (*Heterelmis comalensis*), Texas blind salamander (*Eurycea rathbuni*), and San Marcos salamander (*Eurycea nana*).

In response, the US Fish and Wildlife Service (USFWS) looked at several methods of plant removal and eradication, finally settling on the use of a bottom dredge. Trial efforts were initiated in 2002 and a commercial dredging company was employed in 2006.

Given the potential to remove significant amounts of sediment and upset the geomorphic processes (the physical forces that shape the river) in the upper San Marcos River, the Texas Parks and Wildlife Department (TPWD) set up a long-term geomorphic monitoring program that included pre-dredge, immediate post-dredge, and annual follow up surveys through 2011. Dr. Paul Hudson from the University of Texas was contracted as the principal investigator, supported by students and TPWD River Studies Program personnel.

Geomorphic monitoring work included repeated surveys of 26 channel cross-sections, 15 within the dredged reach and 11 located upstream and downstream of the dredged area. In addition, longitudinal river profiles, sediment analyses, and bank erosion measurements were taken.

After six years of monitoring, analyses suggest that dredging did not initiate accelerated adjustment of the channel, according to Dr. Hudson's report *Geomorphic monitoring of the upper San Marcos River, Texas to assess channel adjustment in response to removal of an invasive exotic water plant,* Cryptocoryne beckettii. However, he recommends continued, limited monitoring in view of the minor channel adjustment that occurred and in consideration of changes that may be imposed on the system in the future. River Studies personnel will be conducting another round of cross section monitoring this winter.

The plant removal project appears to have been successful in eradicating the plant from the dredged area of the upper San Marcos River. The USFWS has continued monitoring for the plant's occurrence and removing any remnants. The two most recent surveys revealed two occurrences of single water trumpet plants. There have been reports, however, downstream from the Blanco River confluence, which will warrant further monitoring.

The Big Lift: Major Milestone of Habitat Restoration Is Achieved at Spring Lake

BY STEVE BOLES, TPWD RIVER STUDIES PROGRAM
PHOTOS COURTESY OF TPWD AND TEXAS STATE UNIVERSITY

Spring Lake is located at the edge of the Edwards Plateau in central Texas and is the headwaters of the San Marcos River, which extends for 68.2 miles to its confluence with the Guadalupe River.

The spring that forms the lake and feeds the river is the second largest spring system in Texas. Archeological studies indicate the area around the spring has been continuously inhabited for over 12,000 years, likely because of the dependable and plentiful water supply it provided in a relatively arid region of the world.

In the late 1800s Spring Lake was impounded to provide power for operating a gristmill and later an ice house. In 1928 the Rogers family built a hotel at the site and in 1946 the first glass bottom boat was introduced to let visitors view the spring openings, fish, and other aquatic organisms in the crystal clear waters. This marked the beginning of one of the most successful theme parks in the state, called Aquarena Springs. In 1951 the first of two underwater theaters was built. The first was destroyed by a flood in 1970, and a second was built as a replacement. These were huge steel structures built to resemble submarines. After visitors boarded the submarine, it was then lowered into the water where they were treated to an underwater show viewed through 3-inch-thick Plexiglas windows.

Above: After years of planning, the famed but deteriorating theater was finally extracted from the lake.

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In 1994 Texas State University bought the amusement park from the Rogers family. Working with the United States Army Corps of Engineers (USACE) the university developed a plan to restore the former theme park to a more natural state. Restoration activities included removal of structures associated with the former theme park, grassland restoration, removal of exotic vegetation, and establishment of a vegetated buffer zone between Spring Lake and the adjacent golf course. After years of planning the restoration project commenced in 2011. Restoration was progressing on schedule until it came time to remove the underwater submarine theater.

The largest land-based crane in the southern United States was required to lift the one million pound submarine from the lake.

The submarine was estimated to weigh in at 270 tons, and a large 360-ton lift capacity crane was brought in for the job. Despite the crane's size, the submarine didn't budge. The submarine's weight also broke the lifting straps, so a second 360-ton crane was brought in and together, the two cranes were able to lift the structure only one foot before each exceeded its lifting capacity.

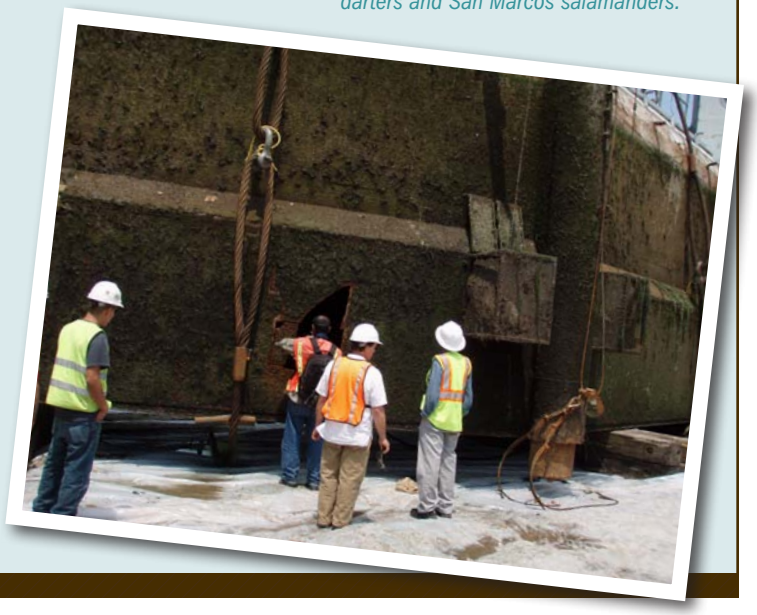
The engineers discovered that the submarine had been filled with concrete for ballast and the weight was recalculated at 370 tons. This was a job for a big crane and they found one—apparently the largest land-based crane in the southern United States with a lifting capacity of 1,800 tons. It took 100 tractor trailer rigs to haul it to the restoration site and several weeks to assemble it and prepare for the lift. Core samples of the soil were taken to make sure that the ground would support the weight of the crane.

On May 24, 2012, the super crane was ready for the big lift. Three-inch steel cable lifting straps were placed around the submarine theater by divers. The lift started around 10:30 a.m. Progress was slow and steady as water had to be drained from the submarine after each one-foot of lift. At 11:10 a.m. the submarine cleared the water line. Suddenly everything came to a halt (a USACE safety measure) as the crane reached 75% of its lifting capacity based on the current amount of counter weights in place. The submarine weighed in at 500 tons (1,000,000 lbs). So for the next hour, additional counter weights were added to reduce it below the 75% capacity lifting limit.

The submarine was finally lifted out of the water and swung over to a waiting crew of young aquatic biologists led by Dr. Tim Bonner from the Department of Biology, Texas State University. Their job was to inspect the algal mats covering the sides of the submarine and rescue any endangered fountain darters (*Etheostoma fonticola*) and San Marcos salamanders (*Eurycea nana*) that may have been trapped during the lift.

The remaining restoration work at Spring Lake is now progressing again as planned. In all, 22 acres of lake habitat, 10 acres of peninsula flood plain and nine acres of riparian habitat will be restored. Interpretive trails will also be constructed through the restoration area for use by the public, and the popular glass bottom boat rides in Spring Lake will remain. While the restoration has changed Spring Lake, it will likely remain a popular destination for visitors, not for its theme park, but to demonstrate that healthy aquatic ecosystems provide benefits which are fundamental to our social and economic health.

Biologists inspect the submarine for endangered fountain darters and San Marcos salamanders.



Technology Upgrade Boosts Education Offerings and Watershed Research at Meadows Center

BY RUDOLPH ROSEN, PH.D., RESEARCH PROFESSOR
MEADOWS CENTER FOR WATER AND THE ENVIRONMENT

Researchers and educators at the Meadows Center for Water and the Environment at Texas State University are developing new ways to connect students with water. Use of mobile technology in outdoor education and technology enhancements at Meadows' Aquarena Center and Discovery Hall are part of a research effort in outdoor experiential education that focuses on the unique environment of the San Marcos Springs.

An Aquarena Center aquarist readies a new state-of-the-art aquatic species exhibit in Discovery Hall.

For students and other visitors to the center, this includes experiencing an entire watershed: a wetlands, lake, headwaters river, hill-top sinkholes, ponds, upland nature trails and of course, the springs themselves. The center's famous glass bottom boats allow visitors an unforgettable experience in watershed education as they peer into the crystal clear water and observe the springs' unique aquatic life. Supporting this experience are new technology-driven enhancements now being used outdoors and in Discovery Hall.

The new "exhibits" have been specially designed for experimentation, evaluation, and research into educational value and cost options for technology enhancement of education. The center is a test bed for development and use of new technology in water education and its full-scale application at the Aquarena Center and elsewhere. Described below are a few of the new education opportunities in store for students, teachers and others who visit Aquarena Center.

Recently installed in the center were four education kiosks featuring interactive screens. These can be found in an aquarium room containing live exhibits of endangered species and other life found in the San Marcos Springs. Student and faculty researchers may place educational materials onto the kiosks to test student learning. Kiosks were specifically designed to be low cost and simple to program, allowing education researchers to concentrate on developing and evaluating educational content, as opposed to becoming computer application programmers (or requiring costly expert assistance).

In addition to the kiosks, an interactive discovery table was designed and installed. The table features a bank of six large interactive screens, each programmable to operate in unison or separately to deliver a diverse menu of educational multimedia content.

A multimedia display wall was designed to allow large-scale presentations of live-streamed video from the springs or elsewhere. In addition to live-streamed displays and sound, the display wall can show up to 10 videos or live video feeds simultaneously, display and interact with up to 10 websites, play surround sound audio, and serve as a giant projection board for any graphic, word or spreadsheet application. The wall can run automatically showing multimedia content continuously or be operated interactively by an educator.

In addition to the new technology enhancements, the entire Aquarena Center is now blanketed with high capacity Wi-Fi. New apps for mobile devices will soon allow for educational content to be downloaded to visitors' mobile pads and smart phones. Included are interactive guides to species commonly found in the local watershed, a nature hunt educational game using interactive Google maps, videos and photographs of the springs

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Watersheds anchor first ever STEM Corps education

Aquarena Center is the site of a new, first in the nation, STEM (Science, Technology, Engineering and Math) education program for Job Corps students. Each Tuesday and Wednesday afternoon 20 students from the nation's largest Job Corps training center, the Gary Job Corps in San Marcos, travel to the campus of Texas State University and the Meadows Center for Water and the Environment where they receive instruction on environmental and water science, use of mobile technology and math based around the theme of watersheds, and employment in water-related industries.

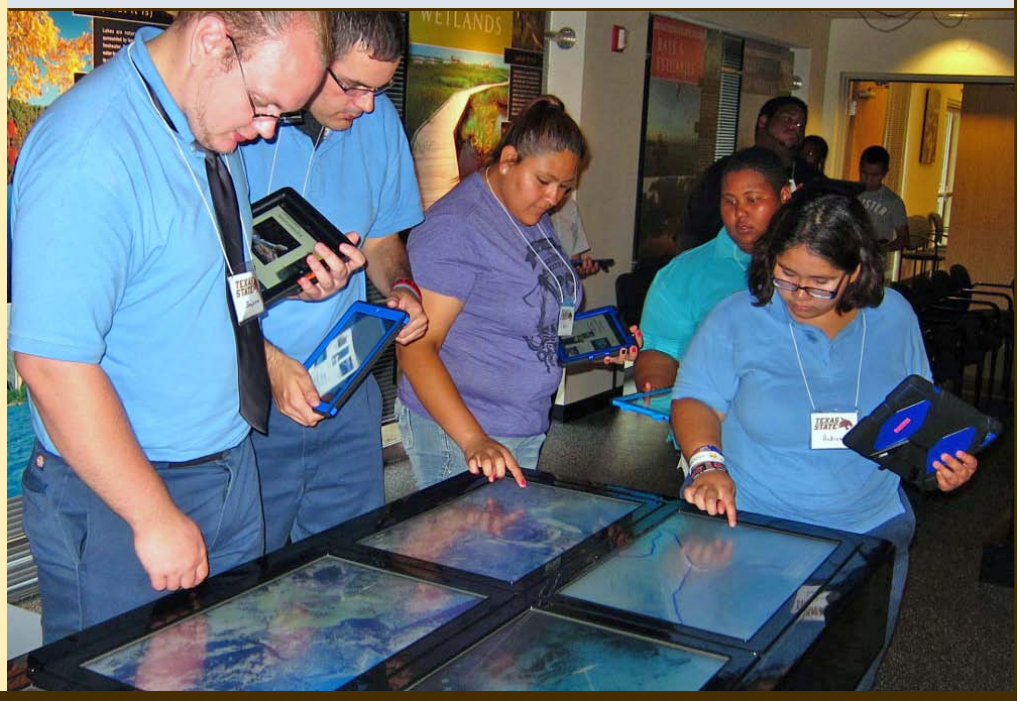
STEM Corps is a joint project of the Meadows Center, Gilbert M. Grosvenor Center for Geographic Education, and H2O (Headwaters to Ocean).

and species, and a Quick Response Code (QR) reader allowing new content to be fed into visitor's mobile devices as add-ons to the already extensive educational offerings at the springs.

Technology upgrades at Aquarena Center and other enhancements are an outgrowth of H2O, an inquiry-based STEM environmental educational experience (see sidebar) that uses advanced digital interactive learning opportunities designed around the theme of "Headwaters to Ocean" as well as outdoor education opportunities designed to complement and leverage existing programs. Features include innovative curricula, materials, and delivery methods that will use emerging web-based and mobile technologies coupled with time-tested hands-on in-the-watershed experience for participants. H2O is funded by a grant from the Ewing Halsell Foundation. Partners include the Meadows Center and the Harte Research Institute for Gulf of Mexico Studies.

Above: A new iPad and iPhone App for use in outdoor watershed education is being built for Aquarena Center by developers at Texas State University. The new App includes an outdoor geocaching game and an identification guide to the common fish, birds and animals that inhabit the San Marcos springs, wetlands, and adjacent watershed.

Below: Students learn about watersheds using Aquarena Center's new interactive discovery table.



TO LEARN MORE

Meadows Center for Water and the Environment: www.meadowscenter.txstate.edu

Aquarena Center: www.aquarena.txstate.edu

H2O: www.water-texas.org

Harte Research Institute for Gulf of Mexico Studies: www.harteresearchinstitute.org

Gilbert M. Grosvenor Center for Geographic Education: www.geo.txstate.edu/grosvenor/

Proactive Healthy Watershed Protection Planning for the Upper Llano River

BY EMILY SELDOMRIDGE, RESEARCH ASSOCIATE
TEXAS TECH UNIVERSITY – LLANO RIVER FIELD STATION

The Llano River, a clear spring-fed perennial river and major tributary of the Colorado River, is a true gem of the Texas Hill Country.

The Upper Llano River, which includes the North and South Llano rivers, along with the springs that feed it, supports several important ecological communities and provides constant critical flows downstream to the Llano and Colorado rivers, Lake LBJ and other Highland Lakes, especially during times of drought. During dry periods, the Llano River provides about 75% of the flows to the Highland Lakes, the major water supply for the City of Austin and other downstream water users along the Colorado River to the Gulf of Mexico[1]. Threats to the watershed including aquifer withdrawals, invasive species encroachment, land fragmentation, and loss of riparian habitat have prompted the development of the Upper Llano Watershed Protection Plan (WPP).

The WPP is a proactive, local stakeholder-driven plan to protect the flowing waters of the Upper Llano and prevent future water quality impairments. This effort encourages a proactive approach to preserve the economic and ecological benefits provided by the

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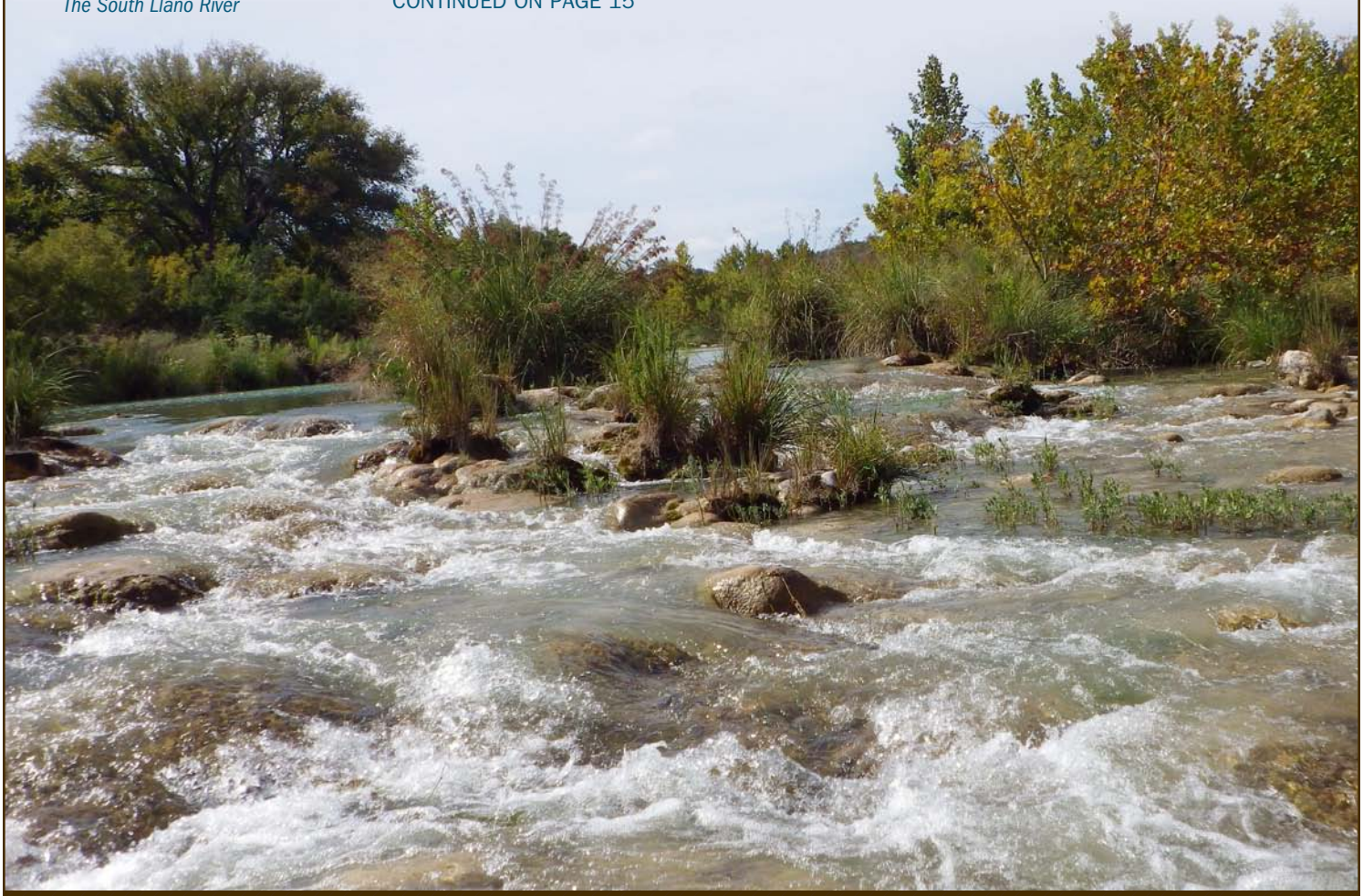
The South Llano River



watershed. The Upper Llano River WPP effort is being led by the Texas Tech University Llano River Field Station (TTU-LRFS), Texas Water Resources Institute (TWRI), the South Llano Watershed Alliance (SLWA) and other key stakeholders. The SLWA is a 501(c)(3) non-governmental organization of landowners and interested stakeholders whose mission is to preserve and enhance the South Llano River and adjoining watersheds by encouraging land and water stewardship through collaboration, education, and community participation.

TTU-LRFS and TWRI are working with the SLWA and others to address the complexity of the watershed through an integrated assessment of landscape conditions, biotic conditions, chemical/physical parameters, and critical watershed functional attributes. The WPP will also identify land use and cover; water needs and potential needs; water yields from implementation of best management practices (BMP); invasive hydrophyte control and impacts; watershed education components (including programs for K-12 and adult education); wildlife concerns and compatibility to the project; economics of BMPs; landowner interest/cooperation; types of treatment measures needed/recommended; and an implementation schedule. We hope the finalized plan will serve as a national model for proactive healthy watershed planning. Funding for the Upper Llano River WPP is through a federal Clean Water Act Section 319(h) grant from the U.S. Environmental Protection Agency and the Texas State Soil and Water Conservation Board.

Texas Parks and Wildlife Department has targeted the Llano River Watershed with the complementary Landowner Incentive Program. This program aids private, non-federal landowners to enact good conservation practices on their lands for the benefit of healthy terrestrial and aquatic ecosystems. Through such partnerships and holistic management, we hope to protect and conserve the Upper Llano River Watershed and its springs and rivers for future generations.

More information on the EPA Healthy Watersheds Initiative can be found at:
http://water.epa.gov/polwaste/nps/watershed/index.cfm

More information pertaining to the development of the Upper Llano River WPP can be found on the SLWA website at: http://southllano.org/projects/upper-llano-watershed-protection

[1] Broad, T. 2012. The Headwaters of the Llano River: A characterization and comparison of the rivers, springs and watersheds of the North and South Llano Rivers, 36 p.

MASTER NATURALIST PROGRAM *Seeks Applicants*

Several chapters of the Texas Master Naturalist program are conducting 2013 winter/spring training classes for volunteers wanting to learn about natural resource management and conservation.

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 Master Naturalist chapters offering volunteer training this winter and spring are listed with contact information. Enrollment is limited in most chapters. Some registration deadlines are fast approaching so contact a chapter near you to see if seating is still available.

SEE COURSE LISTINGS ON PAGE 20

TPWD Announces Launch of Texas Whooper Watch Program

BY LEE ANN LINAM, TPWD WILDLIFE DIVERSITY PROGRAM
PHOTO COURTESY OF THERESA BAYOUD

Texas Whooper Watch (www.tpwd.state.tx/whoopingcranes/) is a new volunteer monitoring program that is a part of Texas Parks and Wildlife Department's Texas Nature Trackers program. Texas Whooper Watch is being developed to keep track of an ever-expanding population of whooping cranes (*Grus americana*).

Since beginning their slow recovery from a low of 16 birds in the 1940s, whoopers have, with few exceptions, always wintered on the Texas coast in and near Aransas National Wildlife Refuge. However, in the winter of 2011-12, several groups of whooping cranes expanded their wintering areas to include areas north and south of Aransas and even some inland sites in Central Texas—patterns that surprised crane biologists. The goals of Texas Whooper Watch are to recruit the public to help discover more about where whooping cranes stop in migration, to detect unusual wintering locations, and to train a group of volunteers who can study habitat use and behavior at migratory stops and wintering areas. The project is especially timely, as conventional survey methods employed by the U.S. Fish and Wildlife Service are unable to keep track of whoopers in areas outside the traditional wintering grounds.

This year biologists expect about 300 whooping cranes to arrive in Texas. According to surveys on the nesting grounds in Wood Buffalo Park in northwestern Canada, the flock may contain as many as 34 chicks.

Whoopers usually follow a migratory path through North and Central Texas that includes cities such as Wichita Falls, Fort Worth, Waco, Austin, and Victoria. During migration they often pause overnight to use wetlands for roosting and agricultural fields for feeding, but

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These whooping cranes were spotted at Granger Lake, a non-traditional wintering location for the species.

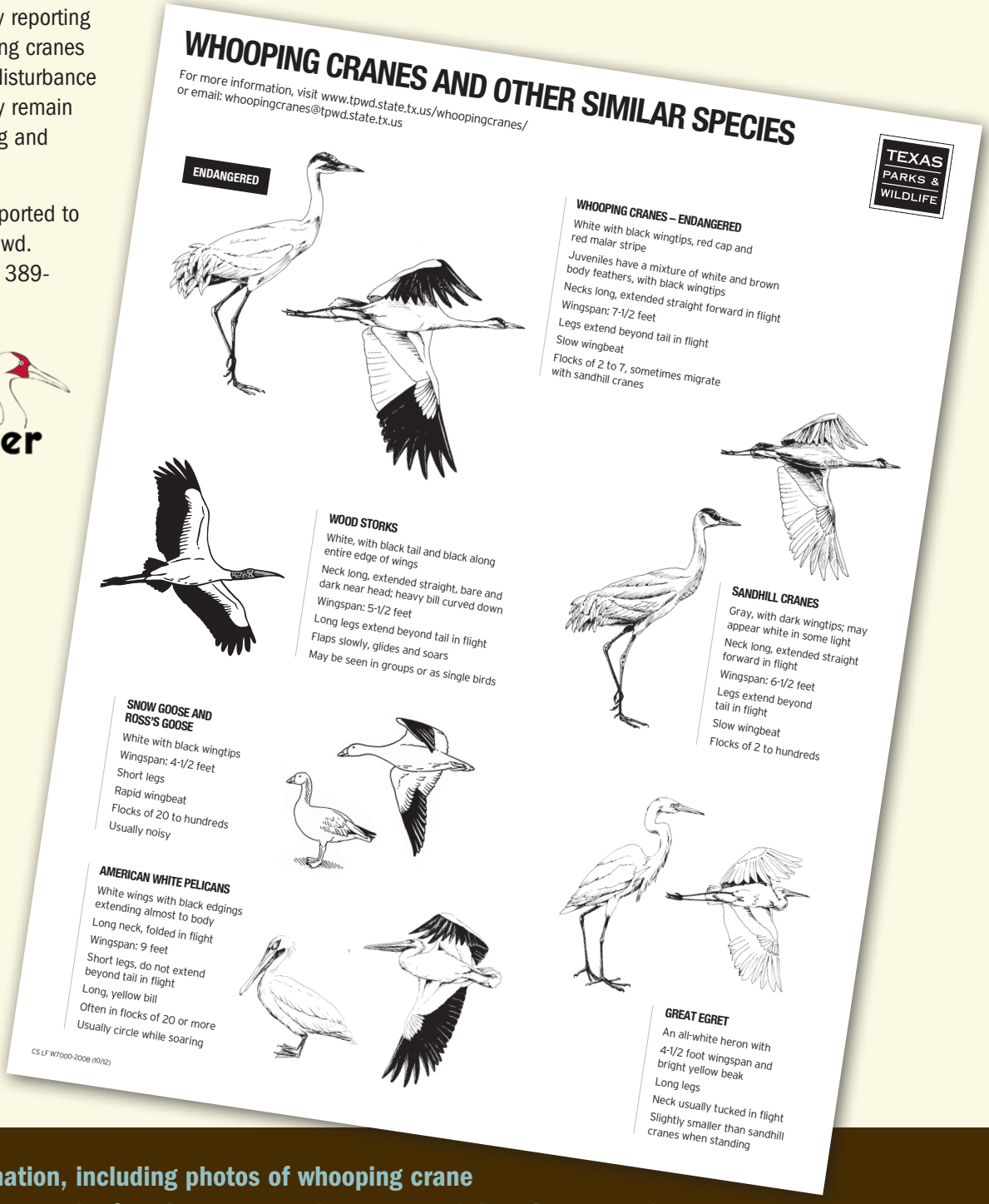
seldom remain more than one night. They nearly always migrate in small groups of less than six to eight birds, but they may be seen roosting and feeding with large flocks of the smaller sandhill crane. They are the tallest birds in North America, standing nearly five feet tall. They are solid white in color except for black wing-tips that are visible only in flight. They fly with necks and legs outstretched.

Citizens can help by reporting sightings of whooping cranes and by preventing disturbance of cranes when they remain overnight at roosting and feeding locations.

Sightings can be reported to whoopingcranes@tpwd.state.tx.us or (512) 389-TXWW (8999).

TEXAS Whooper WATCH

Observers are asked especially to note whether the cranes have colored leg bands. Volunteers interested in attending training sessions to become "Whooper Watchers" in order to collect more detailed data may also contact TPWD at the email address and phone number provided.



Additional information, including photos of whooping crane look-alike species, can be found at www.tpwd.state.tx.us/whoopingcranes/ and at www.whoopingcrane.com/report-a-sighting/

CONTINUED FROM PAGE 3

Freshwater Coastal Prairie Wetland Restoration

This provided additional protection against the establishment of undesirable noxious weeds, such as alligator weed (*Alternanthera philoxeroides*) or cattail (*Typha* spp.) which can present a long-term problem once established.

Another equally important consideration for the planting plan was seasonal impacts from wildlife. Migratory waterfowl can present a problem for establishing vegetation, as the birds are likely to consume the young plant sprigs. Planting began early in the season (February) once migratory birds were off-site. Feral hogs present a more difficult issue and local eradication is likely the only solution.

Labor and Education

The planting phases of the restoration project at Sheldon Lake State Park were managed and completed by the Wetland Restoration Team, a collaborative effort between the local Texas Master Naturalist volunteers, Texas AgriLife Extension Service, and Texas Sea Grant. Throughout the planting process at Sheldon Lake State Park, the Wetland Restoration Team mentors worked with volunteer groups and students. This was an opportunity for Team members to engage eager volunteers and educate them about the function and importance of wetlands, specifically the diminishing coastal prairie pothole wetland matrix.

Six Years Later

Vegetation monitoring, conducted quarterly for six years post-construction, showed the most varied succession of species within the shallowest zone. This zone was originally planted with five major species; currently the wetlands sustain a minimum of ten to fifteen species seasonally. The remaining deeper zones, which are fully vegetated, provide sustainable waterfowl/water bird habitat as well as a barrier to invasive plant species.

The Sipocz-Sheldon method of re-excavating and restoring intact buried wetlands has proven to be a success, such that Phases 2 and 3 are currently in progress with additional work projected for Phase 4 (Figure 2).

The Wetland Restoration and Education Program and the Wetland Restoration Team are programmatic efforts of Texas AgriLife Extension Service and Texas Sea Grant, additionally supported by: U.S. Environmental Protection Agency, Texas State Soil and Water Conservation Board, Texas Parks and Wildlife Department, and Texas Master Naturalist program.

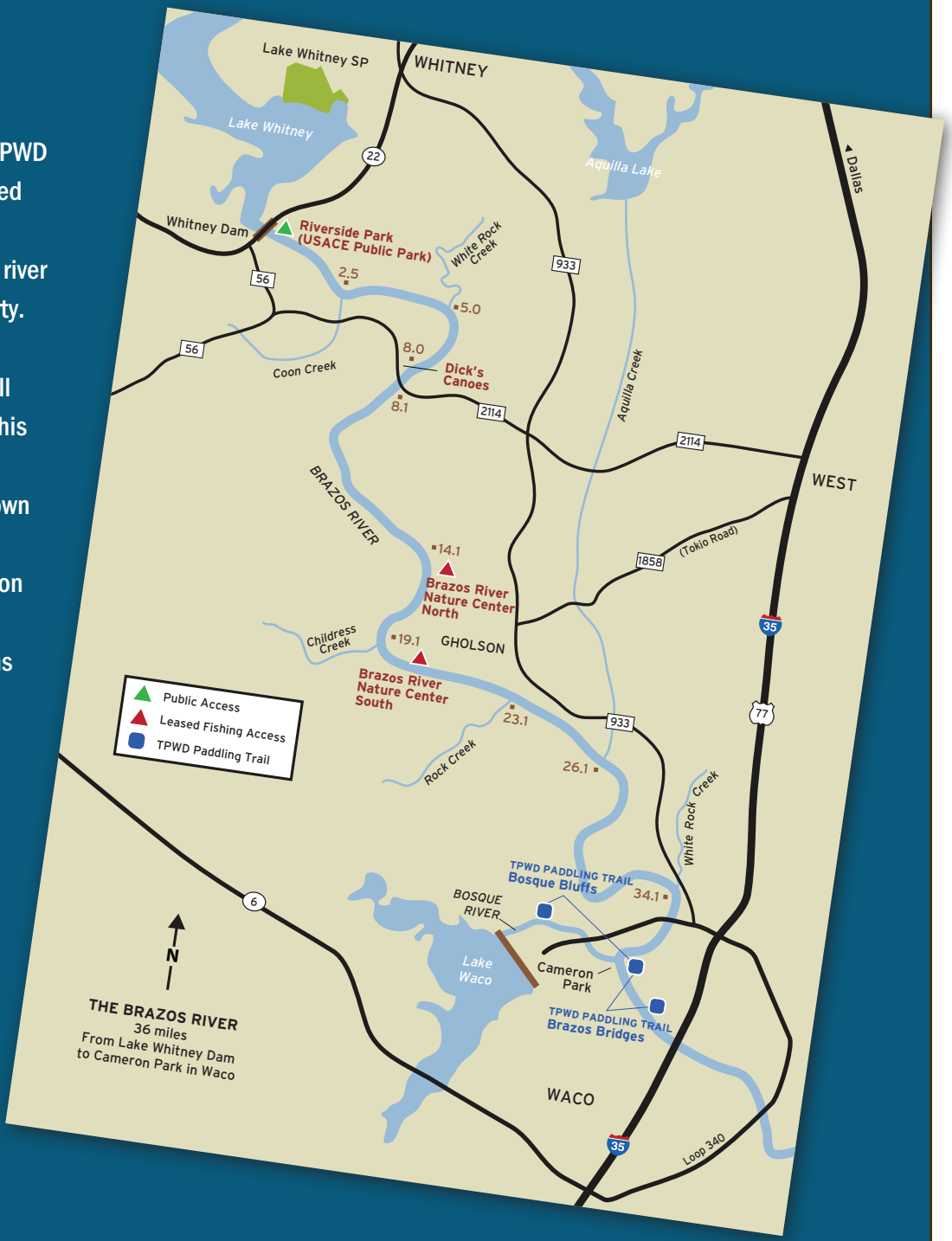
Winter 2010, Phase 2 Pond

New Leased Fishing Access Areas Initiated by TPWD

With funding from the U.S. Department of Agriculture's Voluntary Public Access and Habitat Incentive Program, TPWD recently initiated a new leased access program designed to build partnerships that offer river access across private property.

Several new fishing areas will open to the public through this program in 2013, including locations on the Brazos (shown here), Colorado, Guadalupe, and Neches rivers. In addition to providing recreational opportunities, these locations will serve as demonstration areas, promoting land management practices that contribute to healthy fish and wildlife habitats.

Visit the link below for directions, maps, details and any limitations on the use of individual sites.



www.tpwd.state.tx.us/fishboat/fish/recreational/rivers/

ETCETERA

WANT TO GET ON THE MAILING LIST?

Send your name and email address to beth.bendik@tpwd.state.tx.us to be notified via email when a new edition is posted online.

HAVE AN ARTICLE YOU'D LIKE TO SUBMIT?

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.state.tx.us

* 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.

Texas Parks and Wildlife Department conservation staff is responsible for soliciting and editing articles in this newsletter. Inclusion of an article in this newsletter does not imply TPWD's endorsement of a particular project or individual management method. Methods used depend on the specific goals of the project.

MASTER NATURALIST *Courses*

Belton—Central Texas Chapter. Registration deadline is March 15, 2013. Registration forms can be found on the website. Orientation will be March 26, 2013, 7-8:30 p.m. at the Bell County Extension Office, 1605 N. Main, Belton, TX. Classes begin April 6, 2013 at different sites in Bell County. Last training day is June 8, 2013. No class limit. For information, please contact Mary Ann Everett, (254) 773-9576, everett.maryann4@gmail.com or Zoe Rascoe, (254) 913-1013, trascoe@hot.rr.com. http://txmn.org/centraltexas/join-ctmn/

Galveston Bay area—Galveston Bay Area Chapter. Classes begin February 28, 2013 and end May 16, 2013, meeting each Thursday from 9:00 a.m. to 3:30 p.m. at different locations. Classes consist of morning lecture and afternoon sessions in the field and focus on the birds, plants, fish, oysters, marshes, beaches and prairies of the Galveston Bay area. Participants trawl the bay, bird at Audubon's Bolivar Peninsula preserves, explore the beautiful Armand Bayou prairie and seine in the Gulf of Mexico. We accept the first 20 paid registrations received. To receive an application packet for our next class, contact Julie Massey, Texas Cooperative Extension, Galveston County at (281) 309-5063, jmassey@ag.tamu.edu. The program cost of $140 includes all materials and fees. www.gbamasternaturalist.org.

Wichita Falls—Rolling Plains Chapter. Classes begin March 19, 2013 and end May 4, 2013. Registration is due by March 12. Classes will meet Tuesday and Thursday nights with Saturday field trips. For information, contact Robert Mauk, (940) 766-2383, robert.mauk@tpwd.state.tx.us. Guests are welcome at the monthly meetings, 7 p.m. on the first Tuesday of each month at River Bend Nature Center, 2200 Third Street, Wichita Falls. http://txmn.org/rollingplains.

The Woodlands—Heartwood Chapter. Classes begin March 16, 2013. Classes are generally at the Texas Forest Service classroom building on FM 1488, north of The Woodlands, but move around to several locations during the session. There are typically two classes a month, all on Saturdays, through July. Final dates will be announced soon, along with availability of a 2013 registration application. Dues are $150 for the session. For more information, please contact Teri MacArthur, teri.macarthur@mctx.org, (281) 364-4225 between 9 a.m. and 5 p.m., Monday through Saturday. More information will be posted soon. www.heartwoodtmn.org

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. Complete information about the Texas Master Naturalist program is available at: http://txmn.org.

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You may view this publication through the TPWD website, as well as other newsletters created by the department. Please visit **www.tpwd.state.tx.us/newsletters/** for more information.

FOR MORE INFORMATION

All inquiries: Texas Parks and Wildlife Department, 4200 Smith School Rd., Austin, TX 78744, telephone (800) 792-1112 toll free, or (512) 389-4800 or visit our website for detailed information about TPWD programs:

www.tpwd.state.tx.us