Watershed CONSERVATION

Texas Watersheds

Conservation news from headwaters to coast

SUMMER 2012 NEWSLETTER

TEXAS PARKS & WILDLIFE

In this issue

Texas Drought Offers a Rare Fish Conservation Opportunity

BY STEPHAN MAGNELIA, FISHERIES BIOLOGIST, TPWD – RIVER STUDIES PROGRAM. PHOTOS COURTESY OF STEPHAN MAGNELIA

Very few positive things can be said about the record drought and heat that gripped Texas during summer 2011. Agriculture suffered, lawns died, streams and rivers dried up, wildfires burned, and even the hardiest species of trees and native plants perished. The drought did however provide a rare opportunity for fish conservation on the Blanco River near Blanco, Texas, which has the potential to re-introduce the state fish back into a river where it no longer exists.

The headwaters of the Blanco River bubble up from springs in the hills roughly 16 miles west of the city of Blanco, eventually flowing into the San Marcos River just east of the city of San Marcos. Historically this classic Hill Country river was home to a good population of the Texas state fish, the Guadalupe bass. This endemic black bass species occurs nowhere else in the world except in Central Texas, with most of the populations located in small Hill Country streams within the Edwards Plateau ecoregion. This species evolved in small streams and is popular with anglers, who often refer to them as “Texas trout.”

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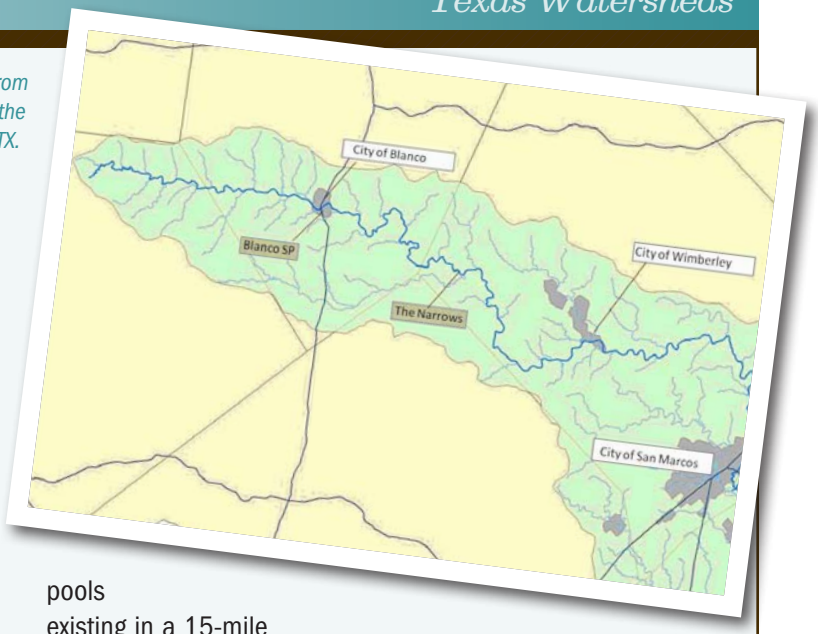
The Blanco River just below Blanco State Park in summer 2011. The riverbed in many places was dry due to historic drought conditions.



Map of the Blanco River watershed from the headwaters to its confluence with the San Marcos River near San Marcos, TX.

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Texas Drought Offers a Rare Opportunity ...

Unfortunately, the stocking of smallmouth bass in the 1970s and 1980s in the Blanco River and other Hill Country streams had unintended consequences. While stocked smallmouth bass were well suited to the rocky stream habitat of the Texas Hill Country, they also hybridized with endemic Guadalupe bass. Soon it was difficult to tell one species from the other and extinction of Guadalupe bass became a real possibility. Smallmouth bass stockings were discontinued, but in many streams, restoration of genetically pure Guadalupe bass populations was thought to be nearly impossible. A recent study by Texas State University looked at the genetic integrity of Guadalupe bass throughout their range and found no pure Guadalupe bass in the Blanco River. It was thought removing smallmouth bass and hybrids would likely be impossible and the Guadalupe bass population in the Blanco River would be lost forever. Then came the drought of 2011. Opportunity knocked, and a plan came together which provided some hope for reintroduction of the species in at least a portion of the river.

The drought of 2011 was so severe that much of the Blanco River was dry, with only a limited number of small pools existing in a 15-mile reach of river between Blanco State Park and The Narrows (a series of drops in the river that form a natural physical barrier limiting upstream movement of fishes). Fish that survived the drought were confined to these pools and it was thought smallmouth bass and hybridized Guadalupe bass might be effectively removed. If these were removed, pure Guadalupe bass could be re-introduced and a population might be re-established in at least a portion of the river. One unknown that threatened initiation of the project was that the 16-mile reach of river upstream of Blanco State Park to the headwaters harbored a series of small impoundments. These impoundments retained large amounts of water even during the severe drought. If these impoundments contained smallmouth or hybridized Guadalupe bass, it was thought re-introduction efforts would be futile as these fish could easily move downstream into the restoration area below the park.

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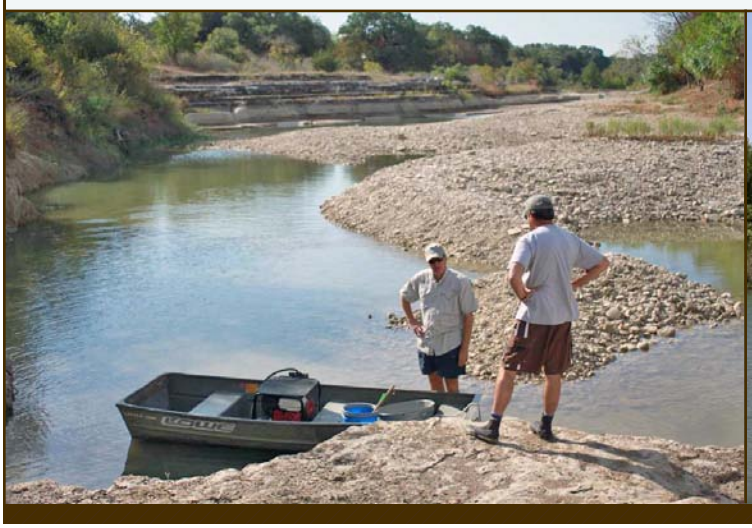
TPWD staff prepare to barge electrofish a small pool on the Blanco River in summer 2011.



The same pool in spring 2012 after rains returned to Central Texas. Photo courtesy of Rachael Ranft, Texas Nature Conservancy.

TPWD staff backpack electrofish a small pool remaining in the almost dry riverbed of the Blanco River in summer 2011. Surprisingly, these small pools often harbored large numbers of fish.

In summer 2011 Texas Parks and Wildlife (TPWD) and Texas Nature Conservancy staffs contacted landowners in the river above Blanco State Park and began the process of sampling upstream impoundments to look specifically for smallmouth and hybridized Guadalupe bass. A genetic analysis of individuals captured in the impoundments by the A.E. Wood State Fish Hatchery Analytical Lab found neither. Work then began on removing smallmouth bass in the isolated pools downstream of Blanco State Park to The Narrows. Georeferenced aerial imagery of the remaining pools was first collected using the Texas State River Systems Institute unmanned aerial vehicle (UAV). The imagery was extremely useful as it ensured all remaining water could be accounted for, and plans for efficiently accessing the pools from private property or road crossings could be made.

Crews from the Texas State University Aquatic Biology Department, Texas Tech University Department of Natural Resources Management, TPWD River Studies Program, TPWD Watershed Conservation Program, TPWD San Marcos Fisheries Management Office and the Texas Nature Conservancy then used a combination of seining and electrofishing gear to remove smallmouth bass and Guadalupe bass hybrids. Approximately 40 pools identified by the UAV were sampled and a relatively small number (26) of smallmouth bass and hybrids were identified and removed. Large numbers of other species of fish taking refuge in the pools were collected and released, which likely meant seining and electrofishing were effective removal techniques.

Rains returned to most of Texas in spring 2012 and the Blanco River is once again flowing. The isolated pools of summer 2011 are once again connected. In May 2012, 103,000 pure Guadalupe bass produced by the TPWD A.E. Wood State Fish Hatchery in San Marcos were stocked into the Blanco River at sites within the restoration area. Monitoring the success of those stockings and additional stockings of pure Guadalupe bass are planned with the long-term goal of establishing a self-sustaining, pure Guadalupe bass population in the upper 31 miles of the river.

While the drought of 2011 is something we likely want to forget, it did bring about a rare opportunity for fish conservation. Hopefully efforts put forth by collaborators on this project will be successful in bringing the state fish of Texas back to at least a portion of the Blanco River.

The Oasis Pipeline Fire: Recovery Through Partnerships

BY SCOTT RICHARDSON, SOUTH LLANO WATERSHED ALLIANCE
PHOTOS COURTESY OF SCOTT RICHARDSON

Around 2:00 p.m. on April 26, 2011, about 12 miles southwest of Junction, Texas, a fire ignited in the South Llano River watershed. It is believed a lightning strike from a few days prior sparked the fire.

Severe drought conditions, a heavy fuel load of Ashe juniper, and a 20+ mph southwest wind soon turned it into a fast moving wildfire moving northeast, threatening the town of Junction. Several local volunteer fire departments, the Texas Forest Service, and fire fighting aircraft battled the fire into the night and next morning.

Thanks to a change in wind and the efforts of fire fighters, the head of the fire slowed and was somewhat contained on the second day. However, a shifting north wind turned the fire's southern boundary into a southward moving head fire, reaching the banks of the South Llano River and even jumping it in a few places. Luckily, this advance was contained by the end of the day. Then on the third day, another strong south wind began to push the northern boundary north toward I-10. After moving in three directions over a four-day period, the fire was finally contained. It left nearly 9,000 acres scorched, with 1,500 of those acres being on steep slopes.

A year before the wildfire, the Texas Parks and Wildlife Department had begun a partnership with the South Llano Watershed Alliance, a citizen's group organized in January 2009. TPWD had chosen to implement the Guadalupe Bass Restoration Initiative (an effort to address the conservation of the state fish of Texas) on the South and North Llano rivers, partially because of the existence of the SLWA, which represented the stakeholders of the two watersheds.

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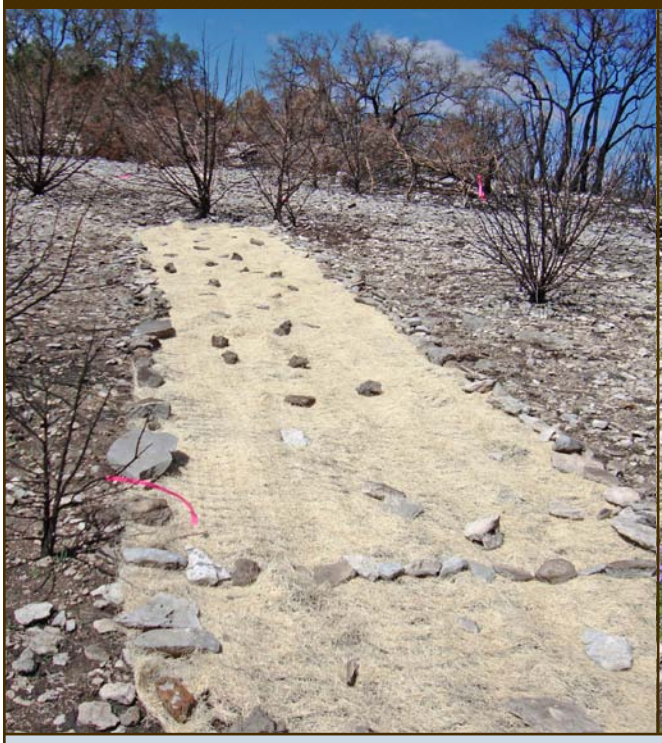
Agency experts tour the scorched land in July 2011.



A straw mat was placed on a hillside and seeded in order to slow erosion, trap sediment, and re-establish vegetation.

Six months later the seeded mat showed great results.

Shortly after the smoke had settled from the Oasis Fire, TPWD personnel and SLWA members began to realize the threat those 9,000 acres of scorched land posed to the habitat of the Guadalupe bass as well as the overall health of the watershed. Huge swaths of vegetation had been scorched off of the landscape, and large deposits of ash and soil lay unanchored and ready to wash into the rivers and creeks of the watershed with the next rain, potentially smothering aquatic habitats and causing the loss of valuable topsoil. The question was "What should be done?"

To answer this question TPWD invited representatives from various state agencies and private consultants to a meeting held on July 27, two months after the fire. Approximately 30 experts met at the Texas Tech University Llano River Field Station at Junction and spent the morning touring the destruction caused by the wildfire. Very little evidence of viable seeds or roots were found within what looked like a sterilized environment, void of any vegetation. The group spent the afternoon back at the Field Station discussing what had been observed and trying to come up with solutions to mitigate fire impacts to the land and to speed recovery. There was a consensus that no precedent existed for the wildfires of 2011 in Texas, that the emphasis should be to do no harm, and that there was a critical need to get vegetation back on the land as soon as possible, especially on the steep slopes.

Steve Nelle, a biologist with the Natural Resources Conservation Service, suggested enlisting impacted landowners as part of an experiment in recovery by providing them with a specifically formulated seed mix for scorched land, having them seed small plots, and then observing and recording the results. To implement such a plan an informational workshop would be held for impacted landowners. At that time they would be given enough seed mix to create their own experimental plots and would also learn simple practices to reduce erosion, prevent deer browsing on seedling re-growth, and other techniques to enhance revegetation. TPWD offered to provide the funding if the SLWA would facilitate and coordinate the workshop.

As the agency and private experts began to work together to formulate a scorched land seed mix, SLWA and TPWD began to coordinate with other partners and set a date of November 12 for a workshop at the Llano River Field Station. The other partners involved would include the

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Participants of the November 2011 workshop toured several fire recovery demonstration sites, including these slash and straw terraces meant to slow erosion.

On a follow up field trip in May 2012, NRCS biologist Steve Nelle points out evidence of recovery behind the terraces.

NRCS, Texas Forest Service, Llano River Field Station TTU at Junction, Native American Seed, and the Upper Llanos Soil and Water Conservation District. The workshop would consist of a morning indoor session where experts representing each of the partners would cover specific topics related to the recovery of the scorched land. The afternoon session would consist of a field trip to representative sites of the Oasis Fire where demonstrations for erosion control, exclosures, and seedlings had been put in place. At the end of the day all participants would be given a pound of the scorched land seed mix for their experimental plots.

Over 70 impacted and interested landowners attended the November 12 workshop learning best management practices (as well as what not to do), and also how they could participate as citizen scientists in a recovery experiment on their land. The workshop was such a success that participants began to ask for a follow up workshop to see the results of how their neighbor's lands were recovering. To address this request, SLWA and their partners facilitated a field trip on May 19, 2012 to the demonstration field sites. No one expected to see recovered land but all were pleased with the recovery that was evident. Forbs and grasses from the scorched land seed mix were visible. Most promising was the observation of perennial grasses coming back from the roots. Full restoration will take years, but it was encouraging to see that recovery was enhanced where simple restoration practices were implemented.

Our watersheds are a partnership of people, land, plants, wildlife, and water. The health of those watersheds is determined by how those partners work together. Whether recovering from wildfires, droughts, or just keeping the watersheds healthy, partnerships work.

To learn more about the South Llano Watershed Alliance go to http://southllano.org

After the Fire: Protecting Your Property from Soil Erosion

BY CHUCK COUP, TEXAS FOREST SERVICE
PHOTOS COURTESY OF CHUCK COUP

2011 was one of the worst wildfire seasons in Texas history, due in large part to the severe drought that took hold across the state. Over 30,500 fires burned nearly 4 million acres last year resulting in extensive impacts to the environment.

However, many people may not be aware that the environmental effects of a wildfire go far beyond burnt trees. One important consequence is the increased potential for severe soil erosion and accelerated water runoff due to the lack of vegetation and ground cover to stabilize the soil. This aspect of a wildfire can result in severe and widespread impacts on aquatic resources.

The trees, shrubs, grasses, and ground cover that comprise a healthy forest all function to keep soil in place on the land. The forest canopy intercepts raindrops and reduces their impact on the soil. Rain that makes it through the canopy is intercepted by the litter layer that covers the forest floor. Together, the canopy and litter layer (fallen leaves, needles, sticks, and bark) protect the soil by preventing raindrops from detaching soil particles.

Without this protection, detached soil particles can wash down denuded slopes, enter stream channels, reduce water quality, and alter or degrade aquatic habitat. In addition to protecting soil from the impact force of raindrops, the litter layer functions to help the soil absorb rainwater. In the absence of trees and forest litter, rain is more likely to hit the soil

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Without vegetation to anchor top soil, many creeks filled with sediment as soil eroded from denuded slopes following the Bastrop fires.

These erosion control mats were used to keep valuable top soil in place following the Bastrop fires.

surface and run off than infiltrate into the soil, reducing groundwater recharge and increasing sediment loads delivered to nearby surface water bodies.

Erosion robs land of its soil and its ability to grow trees. Losing nutrient-rich topsoil diminishes productivity and hinders the re-establishment of natural vegetation in burned-over areas following a fire. Soil and ash eroding off the land can wash into surface water bodies like ponds, wetlands, creeks and rivers, causing negative impacts on water quality and aquatic habitat that can span from hours to years. Severe erosion can result in tremendous environmental and economic consequences by filling reservoirs and reducing their water storage capacity, deteriorating water quality, increasing treatment costs for drinking water, destroying aquatic ecosystems, and reducing biodiversity.

Fortunately, there are a number of practical measures landowners can take to mitigate soil erosion caused by wildfire and to prevent sedimentation of ponds, creeks, streams, wetlands, and other surface water bodies.

Contour felling uses materials available on site to help slow runoff.

The Texas Forest Service has developed several documents aimed at helping landowners and resource professionals working directly with those impacted by wildfire. They include:

- A pamphlet to help landowners assess the need for erosion control and identify management options
- A technical guide with short-term best management practices for protecting soil and water resources immediately following a fire
- A soil erosion control practice guide for implementing various erosion control techniques

These guides are available on the "publications" page of the Texas Forest Service Water Resources website, **http://txforestservice.tamu.edu/water**.

Texas Forest Service Water Resources Blog

Texas Forest Service's Water Resources Program has a new blog where you can keep updated on what is going on with the program and read articles related to forestry Best Management Practices and other water resources related issues and events. Join us at http://tfswater.blogspot.com, and find a wealth of information all in one spot!

The Rio Grande Tributaries: Habitat Restoration in the Big Bend Region

BY MEGAN G. BEAN, WATERSHED ECOLOGIST, TPWD – WATERSHED CONSERVATION PROGRAM
PHOTOS COURTESY OF MEGAN G. BEAN

The Big Bend region has recently become the focus of several exciting conservation initiatives. Because large portions of Rio Grande tributary watersheds are privately owned, building partnerships between private landowners and conservation organizations is a critical component to restoring and conserving aquatic habitat in the region.

Two of the many aquatic habitat projects in the Big Bend region are in the Terlingua and Alamito Creek watersheds. These tributary watersheds are important spawning and refuge areas for imperiled fishes, including the federally listed Rio Grande silvery minnow (*Hybognathus amarus*).

The silvery minnow was once one of the most abundant and widespread native fishes in the Rio Grande and Pecos rivers. More recently, until reintroductions began in Big Bend, the fish had been confined to about seven percent of its historic range. Decline of the silvery minnow has been attributed to flow modifications, stream channelization, decreasing water quality, and interactions with non-native species. Projects that improve instream habitat, water quantity, and water quality in the Terlingua and Alamito Creek watersheds will contribute to persistence of Rio Grande silvery minnow and other imperiled fish species in the Big Bend region.

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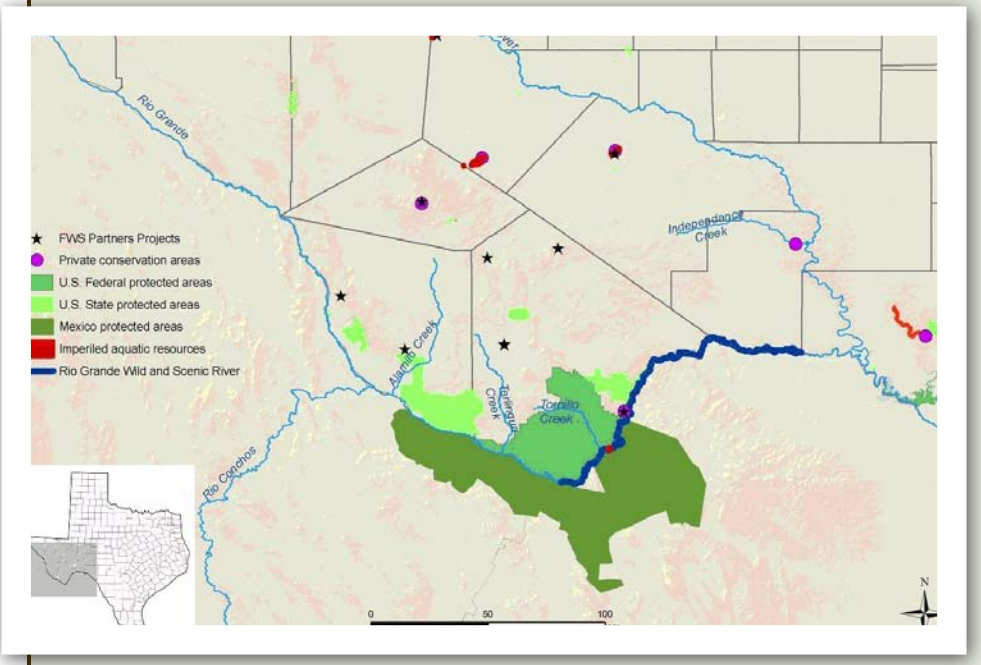
Restoration efforts aim to re-establish perennial flows in Alamito Creek.



The Alamito Creek restoration project is one of Desert Fish Habitat Partnership's 2012 priorities (see sidebar for more information on recent major partnerships and national recognition). Alamito Creek Preserve (The Preserve) contains a 3.5-mile section of scenic Alamito Creek that historically flowed much of the year. Perennial (i.e. year-round) pools in this reach support populations of endemic fishes, amphibians, aquatic invertebrates, and a healthy riparian habitat. The Preserve would like to restore natural, perennial creek flow by removing large areas of encroaching mesquite, which dominate upland vegetation in the watershed and are partially responsible for lowering the water table in an already arid habitat. Native grasses will be replanted to slow the rate of re-encroachment and provide increased water quality via runoff catchment and erosion control. Feral hogs are abundant in The Preserve; their wallowing and rooting impacts water quality in perennial pools critical to the endemic aquatic species of Alamito Creek. The Trans Pecos Water and Land Trust will begin a feral hog removal program that will partner with a hunter safety program sponsored by TPWD.

In addition, another important aquatic habitat restoration project is occurring in the Terlingua Creek watershed. A large portion of a 276,000-acre ranch was deferred from grazing to restore native grasslands and riparian areas. Removal of mesquite, creosote bush, etc. and re-establishment of native grasslands has increased spring recharge, improved instream and riparian habitat, and benefited endemic fish species.

Conservation efforts and projects in the Big Bend region offer opportunities to restore and preserve critical habitats for aquatic species. Fishes within this region exhibit remarkable adaptation to a harsh environment and climate, yet

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Locally Driven Conservation Efforts Receive National Recognition

The National Fish Habitat Partnership (NFHP; www.fishhabitat.org) is a coalition of regionally based partnerships focused on conserving and restoring fish habitats. Each year, NFHP recognizes ten rivers, watersheds, or other aquatic features nominated by a regional partnership as Waters to Watch in recognition of ongoing collaborative coalitions, conservation and restoration projects, and preservation of aquatic habitats. The Rio Grande tributaries in Texas were nominated by the Desert Fish Habitat Partnership (DFHP) and were selected as one of NFHP's 2012 Waters to Watch. The Desert Fish Habitat Partnership conserves native desert fish by protecting, restoring, and enhancing their habitats in cooperation with state and tribal fish and wildlife agencies, federal resource agencies, research and private organizations, and engaged individuals.

The Big Bend region of the Rio Grande is the centerpiece of an emerging bi-national system of lands dedicated to conservation. In May 2009, United States Secretary of the Interior Ken Salazar and Mexican Minister of Environment and Natural Resources Juan Elvira Quesada announced their commitment to strengthen cross-border conservation efforts in the Big Bend region. This presents a unique opportunity to unify Department of Interior agencies and

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Locally Driven, continued ...

other federal, state, and local partners to lead strategic conservation planning, design, and implementation at broad, bi-national scales. Over 40 bi-national conservation partners have been working to conserve three million acres of lands on both sides of the U.S./ Mexico border within the greater Big Bend ecosystem.

The Rio Grande watershed was also recently recognized as one of two important conservation areas in Texas by the America's Great Outdoors Initiative (AGO; www.americasgreatoutdoors.gov). The AGO Initiative seeks to promote the protection of our natural and cultural heritage through community involvement and awareness. Emphasis is placed on empowering local partners and communities to develop conservation and restoration initiatives to promote the protection and recreational enjoyment of our natural resources.

rely on a delicate balance of limited natural resources and are thus extremely vulnerable to drought and human stressors. As Texas suffers through a period of exceptional drought, the persistence of aquatic habitats is severely threatened. Threats to habitats in this region are exacerbated by decreasing water availability from surface and groundwater withdrawals, encroachment of non-native species, and land use practices. Collaborative conservation projects in the region will restore habitats to a more functional form and increase their resilience to natural and anthropogenic changes, reducing stress on our native fish populations.

TPWD has partnered with the Alamito Creek Preserve to restore stretches of the creek suffering from erosion, mesquite encroachment, and feral hog damage.

PRIVATE LANDS PARTNERSHIP/ FUNDING OPPORTUNITIES:

The Texas Landowner Incentive Program (LIP) is a collaborative effort between TPWD Wildlife and Inland Fisheries divisions to meet the needs of private, non-federal landowners wishing to enact good conservation practices on their lands for the benefit of healthy terrestrial and aquatic ecosystems. LIP focuses on projects aimed at creating, restoring, protecting and enhancing habitat for migratory birds and species of greatest conservation need throughout the state. We seek projects that positively impact watersheds by reducing soil erosion, restoring and enhancing native vegetation, and restoring proper functioning of rivers, creeks and other riparian areas. To learn more about this opportunity go to www.tpwd.state.tx.us/lip , or contact your local TPWD biologist (your local biologist can be found by going to the TPWD LIP webpage or by calling 1 (800) 792-1112).

Why All the Fuss About Mussels?

BY CLINT ROBERTSON, AQUATIC BIOLOGIST, TPWD – RIVER STUDIES PROGRAM
PHOTOS COURTESY OF CLINT ROBERTSON

Over the past year, mussels have received a lot of attention in Texas. This recent attention has nothing to do with their distinctive names such as the Rio Grande monkeyface, Texas pimpleback, Texas pigtoe, or the wartyback, but because of recent state and federal listings.

In January 2010, the Texas Parks and Wildlife Department added 15 mussel species to the state threatened species list (see next page), and the United States Fish and Wildlife Service added five of these as candidate species under the Endangered Species Act in October 2011. Though much of this attention has been tied to potential controversy (e.g., the effects of the potential federal listing on landowner rights and economic development in the state), it would be better focused on the importance of mussels to the health of our river and stream ecosystems.

Although North America has the highest freshwater mussel diversity in the world, freshwater mussels are also one of the most imperiled groups of organisms. In the U.S. and Canada alone, there are roughly 341 species of freshwater mussels, with around 61% of these species being classified as extinct (31 species) or imperiled[1]. In Texas, there are 51 species of freshwater mussels[2], 35 (68%) of which are classified as either extinct (e.g., Rio Grande monkeyface), or have a state conservation ranking of vulnerable/imperiled/critically imperiled. The reasons for their decline are many, but contributing factors are their sensitivity to impaired water quality, habitat degradation, and instream flow modification. Mussels are important bio-indicators given their sensitivity to these types of adverse impacts and serve as important gauges of the health of entire river ecosystems. Also, being relatively immobile, they are particularly susceptible to poor water quality and habitat alterations as they simply cannot get up and move to a better location.

Above: State threatened smooth pimpleback (Quadrula houstonensis). *This species only occurs in the Brazos and Colorado river basins.*

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Another cause for their decline is their unique and complex reproductive strategy, which relies upon a fish host to complete their life cycles. Larval mussels, called glochidia, are the parasitic stage in the mussel life cycle. Each mussel species has specific fish hosts that can successfully transform the parasitic glochidia into juvenile mussels (glochidia can infect other non-host fish but will fail to transform into juvenile mussels and die). The construction of dams on the majority of our nation's rivers has prevented the migration of many fish. With these barriers to migration, mussels upstream that rely on these fish species cannot successfully reproduce and eventually go extinct. Alterations in fish communities due to water quality impairments and habitat alteration have also contributed to the decline of successful mussel reproduction. So if a mussel has acceptable water quality, can encounter a specific fish host to infect with its glochidia, the glochida can successfully transform into a juvenile and drop off the fish, and the juvenile and adult mussels have suitable habitat (consisting of a specific range of water depth, current velocity, and substrate) in which they can survive, often called a mussel bed, then the life cycle of the species goes on. Life's not easy being a mussel!

In Texas, increased demand for water has caused concern over the continued survival of mussels, as well as the health of our river ecosystems. Increases in water demands exacerbate drought conditions like we experienced in summer 2011, and will likely experience more frequently in the future. Less water in our rivers and streams results in higher water temperatures, lower dissolved oxygen concentrations, and less dilution of pollutants, all of which can be stressful and potentially lethal to mussels and many other aquatic organisms.

*State threatened Texas fatmucket (*Lampsilis bracteata*). This species is currently only found in the upper Colorado River basin.*

*State threatened golden orb (*Quadrula aurea*). This species is distributed throughout the Central Texas river basins—(Guadalupe, San Antonio, Nueces, etc.).*

To balance the water needs of people, mussels, and other aquatic organisms, mussel research (known as malacology) has recently increased across the state. Our understanding of the distribution/abundance and even basic mussel life history requirements (reproduction, feeding, habitat preferences, etc.) is poor for most Texas and North American species. Researchers from University of North Texas, Texas A&M Institute of Renewable Natural Resources, and University of Texas–Tyler have been working to help us better understand Texas mussels[2]. TPWD is currently funding and participating in mussel research projects related to the habitat requirements of the state listed golden orb (*Quadrula aurea*) in the San Antonio and Guadalupe rivers, as well as the distribution, abundance, and habitat requirements of mussels in the lower Brazos and Sabine rivers. Once we gain a better basic understanding of Texas mussels we can use that information to better balance water needs in our Texas rivers and streams.

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1 NatureServe.org

2 More information on current Texas mussels and mussel research can be found on the Texas Mussel group webpage (www.texasmussels.wordpress.com)

Threatened Mussels of Texas

False spike *Quadrula mitchelli*

Golden orb* *Quadrula aurea*

Louisina pigtoe *Pleurobema riddellii*

Mexican fawnsfoot *Truncilla cognata*

Salina mucket *Potamilus metnecktayi*

Sandbank pocketbook *Lampsilis satura*

Smooth pimpleback* *Quadrula houstonensis*

Southern hickorynut *Obovaria jacksoniana*

Texas fatmucket* *Lampsilis bracteata*

Texas fawnsfoot* *Truncilla macrodon*

Texas heelsplitter *Potamilus amphichaenus*

Texas hornshell* *Popenaias popeii*

Texas pigtoe *Fusconaia askewi*

Texas pimpleback* *Quadrula petrina*

Triangle pigtoe *Fusconaia lananensis*

* USFWS CANDIDATE SPECIES

Larval Fish Go With the Flow

GORDON LINAM, AQUATIC BIOLOGIST, TPWD – RIVER STUDIES PROGRAM

Newly hatched fish about the size of rice grains are being collected from the San Antonio River as part of a collaborative project (funded by the Natural Resources Conservation Service) between Texas State University and the Texas Parks and Wildlife Department.

A recently completed report containing interim flow recommendations for the San Antonio River identified several research projects that would contribute to our understanding of the ecological health of aquatic and riparian communities and their relationship to flow. One of these projects is to conduct life history research specifically directed at identifying flow and habitat needs for spawning and recruitment of a number of target fish species. Some of these species are being targeted because of their declining population (pugnose minnow), others because of their reliance upon flowing water (darters and burrhead chub).

Rivers are not static water bodies with invariable flow patterns. Instead, in their natural state, they are dynamic systems comprised of multiple flows ranging from subsistence during periods of drought to overbanking flows after periods of heavy rainfall. Each flow rate carries significant importance to maintaining the integrity of the river system. For instance, reproductive success in many fish species is related to high flow pulse. One goal of the larval fish study is to identify what level of flow pulse improves reproductive success for a variety of fishes.

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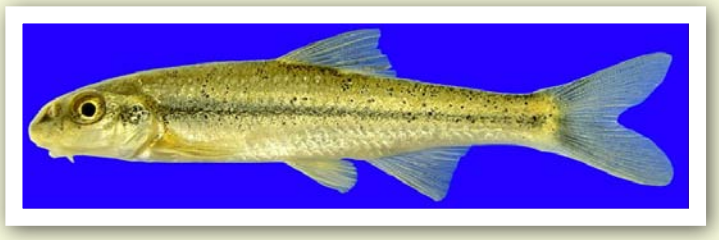
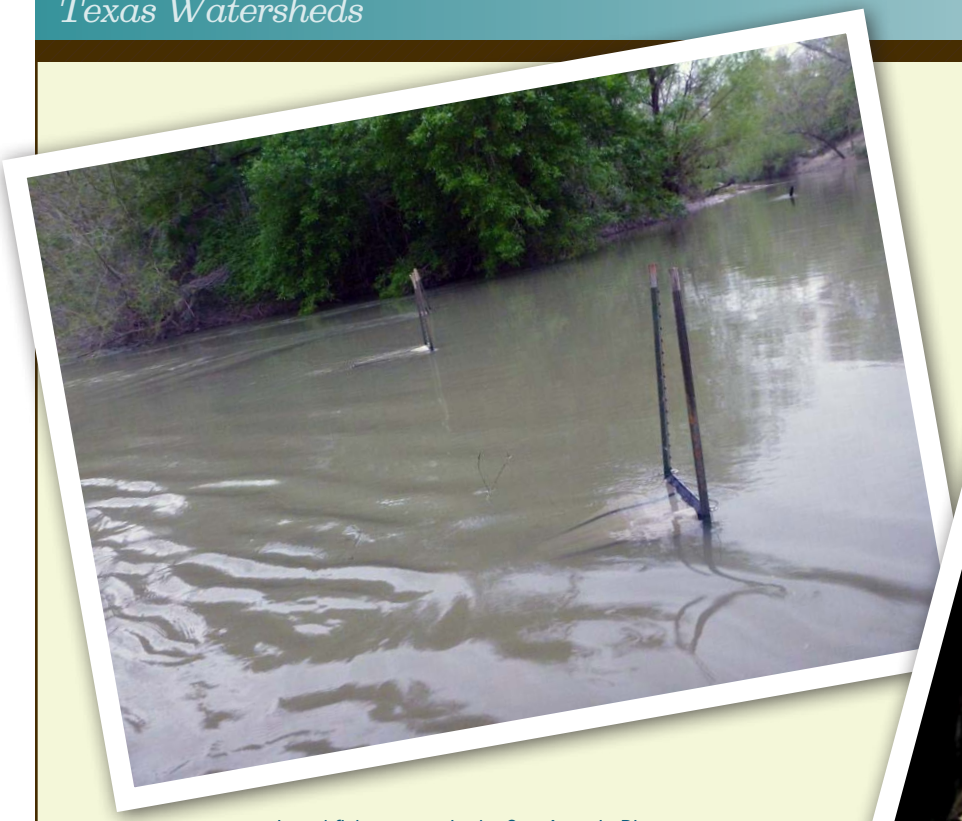
River darter (Percina shumardi). *Courtesy of Chad Thomas, Texas State University.*

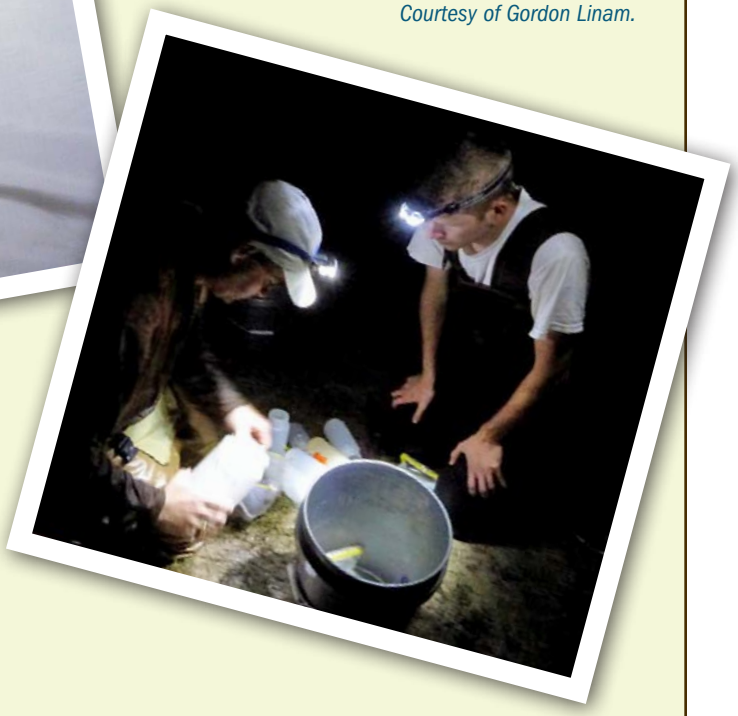
Pugnose minnow (Opsopoeodus emiliae). *Courtesy of Chad Thomas, Texas State University.*



Burrhead chub (Machrybopsis marconis). *Courtesy of Chad Thomas, Texas State University.*



Larval fish nets set in the San Antonio River near Goliad. Courtesy of Gordon Linam.



Processing larval fish samples on the bank of the San Antonio River. Courtesy of Gordon Linam.

There is a wide range of reproductive strategies within the fish community. Not all species build and guard nests. Some, such as the burrhead chub, broadcast thousands of eggs into the water column, relying upon the current to carry the next generation to maturation. Since larval fish are very susceptible to predation, they tend to hide out during daylight hours and like teenagers, become more active at night. This dictates that those of us working on them don headlamps and plan for late nights on the river.

A typical field sampling event begins about one to two hours before sunset, prior to the larvae catching the current and heading downstream. Drift nets are attached to metal fence posts driven into several locations across the river channel. Distance from the net to shore is measured and substrate is described. Nets are left in place for two hour intervals. Two to three sets are performed each night for a total of four to six hours of passive collecting. A flow measurement is taken at the mouth of each net at the start and end of each set so that researchers can calculate the volume of water filtered through the net. Dissolved oxygen, water temperature, pH, conductivity, and depth are also measured at these times.

In addition to letting the river flow bring the fish to us, we also do some active collecting as well. Backwater habitats as well as areas with slower flow are sampled with fine mesh seines. Flow, depth, substrate, and the other water quality related data mentioned above are recorded following each seine haul.

By collecting associated flow, habitat, and water quality data with each seine haul and drift net sample, researchers hope to distinguish subtle differences in habitat and flow needs for each of the target species. This information will support ongoing efforts to determine flow conditions necessary to support a sound ecological environment in the San Antonio River as well as provide information critical for monitoring and adaptive management.

The Mighty Mayfly

BY DR. ARCHIS GRUBH, TPWD – RIVER STUDIES PROGRAM

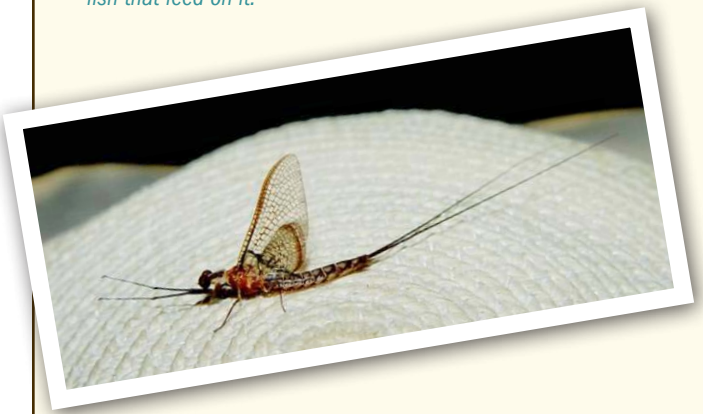
The mayfly order of aquatic invertebrates has more than 2,000 different species that live in most parts of the world. Along with it being a good source of food for fish and other aquatic organisms, the mayfly is also an "ecological indicator" of water quality.

Since the mayfly spends most of its life in the water during the nymph stage, in some cases for more than a year, the quality of water and habitats available are crucial for its survival. With declining water quality mayfly abundance and species diversity is altered and often reduced.

Streams and rivers are polluted by point sources (such as industrial effluents or sewage treatment plants) and non-point sources (such as surface water runoff from streets and parking lots that contain oils and other pollutants from vehicles). This can cause high nutrient loading which can result in tremendous growths of algae. Once the algae are matured, they die and decompose. Aerobic bacteria use up oxygen while decomposing algae. Mayflies die in this anoxic environment because of their low tolerance to drops in oxygen levels. Additionally, the mayfly nymphs are sensitive to sediment pollution, as their gills are in constant contact with the sediments where the pollutants accumulate. So in the long run, clean, unpolluted water that is generally well oxygenated is of utmost importance for the proper development of the aquatic stages of the mayfly.

Finding mayflies isn't an arduous task; the key is to look for them in the habitats where they usually occur. Mayflies can be found on the undersurface of a rock picked up from a flowing stream, or even just by digging up some of the leaf litter collected on the stream bed. Distinguishing mayflies from other common macroinvertebrates such as stonefly or damselfly may be a task to an inexperienced eye, but a magnifying glass, a dipnet, and a basic macroinvertebrate guide can help reveal a potpourri of these critters in a stream. The tails on the last abdominal segment in a damselfly larva are actually gill filaments, and are leaf like. The mayfly nymph has two or three long filamentous tails (depending on the species), gill filaments along most of the abdominal segments, and has one claw at the tip of its legs. Stonefly larvae look similar to mayfly larvae, except that their gill filaments are typically located in armpits (where legs join the thorax); in some cases gill filaments are on the first few abdominal segments, but never further down. Additionally, a stonefly larva has two claws at the tip of each leg.

The mayfly life cycle: The lifecycle of the mayfly starts with the eggs developing on the streambed, sometimes undergoing diapause (delay in development), waiting for the right temperature conditions for hatching. After hatching, the nymphs feed on detritus and decaying organic matter, and molt several times throughout their development. Next, the nymphs come to surface during their "hatch" (molting) to the adult stage. When the adult emerges out of the larval shell, it is quite helpless as it can neither swim nor fly. This stage is called the dun, or 'subimago,' and is quite vulnerable to feeding fish.



Burrowing mayfly, Hexagenia, *is an indicator of polluted waters. It is also ecologically important as it forms a trophic link between detrital litter energy resources to the fish that feed on it.*

CONTINUED ON PAGE 17

The duns seek shelter on shoreline vegetation where the body empties itself of water and the wings dry and stiffen. The dun once again molts before its final stage called the 'imago,' where the adults start flying in mating clouds. Huge clouds of mayfly hatch are observed typically during dusk or early dawn. After mating, the females deposit their eggs; some fly up and down the water surface depositing eggs. Some species of the Baetid family actually crawl underwater and lay rows of eggs on the stream bed. Regardless of their strategy, in the end they fall from exhaustion into the river and fish feed on them as they float helplessly downstream. Fly anglers try to imitate one of these stages and "match the hatch," as well as replicate the actual nymph or movement pattern in the water.

The mayfly spends much of its life in the aquatic nymph stage. Different mayfly taxa are categorized in various habit guilds based on the mesohabitat types they are found in. They are known as swimmers, crawlers, burrowers, or clingers. *Isonychia* and some *Baetidae* species are 'swimmers' and are found in habitats such as slow flowing pools, faster riffles, and runs, and also seek refuge under rocks. They dart through the water column like little fish using their tails. For a fly fisherman, it would make sense to fish with a sinking (wet) fly pulled aggressively in swift moving waters. 'Crawlers' such as *Caenids*, *Tricorythids* and *Ephemerellids* (commonly called Hendricksons and Sulphurs by fly anglers) can be found on streambeds with faster flowing waters. With strong legs, they attach themselves on the underside of rocks. There are several species in the 'crawler' guild, and they can be imitated as dead dry flies drifting on the surface or just below it. 'Burrowers' such as *Hexagenia* (commonly called green and brown drakes by fly anglers) are found in holes, under leaf litter in the river, and/or in soft silty substrates. This genus typically has longer filamentous gills which provide a larger surface area for oxygen uptake. 'Clingers' such as *Heptageniids* and some species of *Baetidae* are found in faster flowing, oxygenated waters and live under rocks; their flat bodies help them cling without being washed away. Using wet flies slowly rising to the top, or dry flies will make an excellent imitation of this group.

In conclusion, even the most basic knowledge of entomology can be useful for a fly angler as well as being an indicator of the health of your watershed. Knowing the stages of the insect hatch and the typical places to look for different species can give you some clues to the health of the river. Inspecting the macroinvertebrates that have attached themselves to the underside of streambed rocks is a good way to match the hatch, determine what mayfly families are present, and tell you a little bit about the water quality and habitat conditions in your river and stream.

MASTER NATURALIST PROGRAM *Seeks Applicants*

Several chapters of the Texas Master Naturalist program are conducting 2012 summer and fall training classes for volunteers wanting to learn about natural resource and conservation management.

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, ecoregions 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 advanced training in areas of personal interest.

Texas Master Naturalist chapters offering volunteer training this summer and fall 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

Emergency Zebra Mussels Order Signed

TPWD PRESS RELEASE

Texas Parks and Wildlife Department Executive Director Carter Smith has signed an emergency order adding Lake Ray Roberts and Lake Lewisville to the list of water bodies under special regulations intended to control the spread of zebra mussels.

Smith's action comes following the discovery in mid-July that the destructive invasive species had been found in Lake Ray Roberts, north of Denton.

The Texas Parks and Wildlife Commission earlier this year amended TPWD's regulations to require that boats operated on Lake Texoma and Lake Lavon be drained (including live wells and bilges) before they leave those water bodies. Taking this precaution is crucial in efforts to slow the spread of this species, since contaminated boats are one of the primary ways this happens. Draining water from boats prevents the spread of a microscopic form of the zebra mussel called a veliger, which is invisible to the naked eye.

The emergency rule does allow a person to travel on a public roadway via the most direct route to another access point located on the same body of water without draining water from their boat. The emergency action would extend the applicability of the current regulation to all impounded and tributary waters of the Elm Fork of the Trinity River above the Lake Lewisville dam including Lakes Ray Roberts and Lewisville.

The zebra mussel is a small, non-native mussel originally found in Eurasia. It has spread throughout Europe, where it is considered to be a major environmental and industrial menace. The animal appeared in North America in the late 1980s and within 10 years had colonized in all five Great Lakes and the Mississippi, Tennessee, Hudson, and Ohio river basins. Since then, they have spread to additional lakes and river systems, including in North Texas.

Zebra mussels live and feed in many different aquatic habitats, breed prolifically, and cannot be controlled by natural predators. Adult zebra mussels colonize all types of living and non-living surfaces including boats, water-intake pipes, buoys, docks, piers, plants, and slow moving animals such as native clams, crayfish, and turtles. The U.S. Fish and Wildlife Service estimates the potential economic impact of zebra mussels to be in the billions of dollars.

Under authority granted by the Legislature, emergency rules can be adopted if the commission or the executive director finds that there is an immediate danger to a species authorized to be regulated by the department. This emergency rule will continue for no more than 120 days from the date this notice is filed with the Texas Register. TPWD will be preparing a non-emergency rule for consideration by the commission that would go into effect when the emergency rule expires.

For more information on zebra mussels and how to clean, drain and dry a boat, visit www.texasinvasives.org.

INVASIVE SPECIES HIDE HERE.

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DO YOUR PART TO STOP THE SPREAD OF INVASIVE SPECIES!

1. **CLEAN** your boat, trailer and gear by removing all plants, animals and foreign objects.
2. **DRAIN** all water from the boat, including the motor, bilge, livewells and bait buckets.
3. **DRY** the boat and trailer for a week or more before entering another waterbody.
   If unable to let it dry for a week, wash it with a high-pressure washer and hot (140-degree), soapy water.

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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*

Austin—Capital Area Chapter. Training will begin in January 2013 and run through the middle of April 2013, but registration opens on August 1, 2012 with a class limit of 30 students. For more information and training application, please contact Christine Powell, (512) 863-8250, xtinepowell@verizon.net. Chapter website: http://camn.org/

Corinth—Elm Fork Chapter. Training begins Tuesday, September 4, 2012, and will end on Tuesday, November 13, 2012. Classes will meet on Tuesdays at the Global Spheres Center, 7801 Stemmons Freeway, Corinth, TX 76201. Registration is due by Friday, August 17, 2012, with a class limit of 20 students. Entrance fee is $150.00. For more information and training application, please contact Van Elliott, P.O. Box 270998, Flower Mound, TX 75027, (972)539-4350, velliott2105@msn.com. Chapter website: http://txmn.org/elmfork/

Houston—Gulf Coast Chapter. Training begins August 25, 2012 and will end October 30, 2012. Class is limited to approximately 25 students. Orientation is on a Saturday and classes are Tuesday evenings with field trips (5) on Saturdays. Schedule is pending, so this information is subject to change. For more information and a training application, please contact Pam Cook, pam.cook@txgcmn.org. Chapter website: www.txgcmn.org

Rosenberg—Coastal Prairie Chapter: Fort Bend and Waller counties. Training begins on September 8, 2012 and will end on October 25, 2012. Registration is due by September 5, 2012 with a class limit of 25 students. Cost is $150.00. Classes will meet from 9 a.m. to 3:30 p.m. for 8 weeks (3 Saturdays and 5 Thursdays). For more information and training application, please contact Doug Simons (832) 588-8431 (cell) or dougsimons@yahoo.com. Chapter website: www.coastalprairie.org

San Antonio—Alamo Area Chapter. Training begins on September 6, 2012 and ends on November 8, 2012 with graduation. Presentations are on Thursday afternoons from 12:30 p.m. to 4:30 p.m.. There are 4 morning field trips including graduation. Application deadline is August 21, 2012. Training will take place at the Texas AgriLife Building, 3355 Cherry Ridge, Room 208, San Antonio, TX 78248. For more information and training application, contact Pamela Ball, pball12@satx.rr.com, (210) 842-7967. Chapter website: www.txmn.org/alamo

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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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