



2018 ANNUAL REPORT

Guadalupe Bass Restoration Initiative

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Pedernales River at Pedernales Falls State Park

CONSERVATION NEEDS

The rocky, spring-fed rivers of the Texas Hill Country are ecologically diverse, hosting 54 species of native freshwater fishes, including the official state fish of Texas, Guadalupe Bass. Of those species, Guadalupe Bass is one of 15 currently considered imperiled and identified by Texas Parks and Wildlife Department (TPWD) as a Species of Greatest Conservation Need. Guadalupe Bass is also a popular sport fish. The economic value of fishing in Hill Country rivers was recently estimated to be \$71 million over a 16-month period, with nearly half of anglers who fished the region specifically targeting Guadalupe Bass.

The primary threats to the long-term persistence of Guadalupe Bass are hybridization with non-native Smallmouth Bass and habitat degradation. Guadalupe Bass populations are inextricably linked to natural river flow patterns, functional riparian zones, instream connectivity, and instream structural habitat features characteristic of pristine, unaltered rivers of the Hill Country. Extirpation of Guadalupe Bass has been documented in Hill Country rivers where fish habitats have been altered due to construction of dams, water withdrawals, and changes in watershed land uses.

Hill Country rivers face a variety of conservation challenges, many of which stem from their location within one of the fastest growing regions of the state. The Texas Hill Country added roughly 700,000 people between 2000 and 2010, and the population is projected to increase more than 50% to over 7.3 million people by 2060. Increased water demands associated with this burgeoning population will be met primarily by surface and groundwater withdrawals, which will undoubtedly impact the region's spring-fed rivers. Furthermore, urbanization and other land use changes associated with this population growth have the potential to directly alter natural land cover, degrading watershed conditions and further threatening the long-term health and resiliency of Hill Country rivers. Coordinated, watershed-scale conservation intervention is urgently needed to ensure that Hill Country rivers and Guadalupe Bass are preserved for future generations.

SUMMARY OF CONSERVATION ACTIONS

1991-2018

In 1991, TPWD assembled ***Guidelines for the Management of Guadalupe Bass***, which represented the initial range-wide conservation plan for the species and served to launch the Guadalupe Bass Restoration Initiative (GBRI). An updated, range-wide conservation plan was finalized in 2017 (see next page for additional details). From 1991-2018, an extensive list of conservation successes were implemented by TPWD and partners through the GBRI, including:

- Partnered with the Southeast Aquatic Resources Partnership, National Fish and Wildlife Foundation, other state fish and wildlife agencies, angler organizations, and university researchers to establish the Native Black Bass Initiative, a \$30M conservation campaign (2010-2019) to restore endemic basses, including Guadalupe Bass, in rivers of the southern USA
- With support from the Native Black Bass Initiative, partners implemented watershed-scale conservation to restore and preserve habitats for Guadalupe Bass in the Llano, Pedernales, and Blanco river watersheds
- Repatriated Guadalupe Bass to the upper reaches of the Blanco River following removal of Smallmouth Bass and hybrids
- Reintroduced Guadalupe Bass to the Mission Reach of the San Antonio River
- Achieved genetic restoration of the South Llano River Guadalupe Bass population through stocking of more than 700,000 genetically pure Guadalupe Bass
- Established refuge populations of genetically pure Guadalupe Bass in the Sabinal River and other areas of the Nueces River basin
- Stocked nearly one million Guadalupe Bass in the namesake Guadalupe River to prevent extirpation due to hybridization with Smallmouth Bass
- Conducted applied research to fill data and information gaps and refine conservation strategies for Guadalupe Bass, including studies that examined the extent of hybridization with Smallmouth Bass throughout the Hill Country; flow-recruitment relationships; landscape-scale habitat associations; movement; population dynamics; population status in priority rivers; and economic value of Guadalupe Bass fisheries



Guadalupe Bass fingerlings produced at the
A.E. Wood State Fish Hatchery

THE PLAN AHEAD

In 2017, TPWD assembled ***Guadalupe Bass Conservation Plan: A Ten-Year Plan for Restoring and Preserving the State Fish of Texas (2017-2026)***, which serves as the current, range-wide conservation plan for the species and as the strategic plan for the GBRI.

Objectives outlined in the updated plan consist of the following:

1. Maintain seven to 10 self-sustaining Guadalupe Bass populations as defined by the following criteria:
 - A. Hybridization rate between Guadalupe Bass and Smallmouth Bass remains less than one percent
 - B. The proportion of the genome attributable to Smallmouth Bass remains less than 10 percent
 - C. Pure Smallmouth Bass are absent in the sub-basin or within the stream reach with barriers to movement of Smallmouth Bass into the reach
 - D. Natural recruitment is adequate to maintain a population size that supports recreational fishing opportunities (population-specific as determined by monitoring efforts)
2. Restore native Guadalupe Bass populations to the extent that listing as a Species of Greatest Conservation Need is no longer warranted



Guadalupe Bass collected from the Pedernales River

Furthermore, the updated range-wide conservation plan identifies specific actions to protect non-hybrid populations, restore hybrid populations, and preserve and enhance angling opportunities. The plan also identifies supporting implementation strategies, including partnership development, public outreach, research, invasive species management, habitat restoration and preservation, and landowner technical guidance on watershed best management practices.

The purpose of this 2018 annual report is to share updates on the status of the GBRI and summarize progress and next steps in implementation of strategies and actions identified in the updated range-wide conservation plan. Accomplishments of the GBRI during state fiscal year 2018 (September 1, 2017 – August 31, 2018) are summarized herein.

GBRI ACCOMPLISHMENTS IN 2018

Partnerships and Conservation Funding - During state fiscal year (FY) 2018, TPWD continued to cooperate with state and federal agencies, universities, river authorities, non-governmental organizations, local communities, angler clubs, and landowners to implement the GBRI (see list of partners and supporters on the back page). This included collaboration with the Hill Country Conservancy and other local and regional conservation organizations on a competitive grant proposal to the U.S. Department of Agriculture's Regional Conservation Partnership Program. Cooperators were awarded a \$5,150,000 grant that will support habitat restoration (primarily restoration of spring, instream and riparian habitats) and protection (i.e., riparian conservation easements) over the next three years (2019-2021) in GBRI priority sub-basins including the lower Colorado, Pedernales, Llano, and Blanco rivers.

Public Outreach - During FY2018, the GBRI was featured in numerous blogs, newsletters, and magazine articles, including the following:

- “Progress in Restoring and Preserving the State Fish of Texas: Reflecting on 25 Years of Guadalupe Bass Conservation” in The Texas Line and Leader – Newsletter of the Texas Council of Fly Fishers International (Fall 2017 Issue; see article at: <http://texascounciliff.com/wp-content/uploads/2017/10/TxCncl-IFFF-Newsletter-Fall-2017.pdf>)
- “Progress in Restoring and Preserving the State Fish of Texas: Reflecting on 25 Years of Guadalupe Bass Conservation” in The Leader – Newsletter of the Dallas Fly Fishers (October 2017; see article at: <http://nebula.wsimg.com/e28c4c7bec2fc75059b1e0c80db69e54?AccessKeyId=53673BE53B021BDE32F7&disposition=0&alloworigin=1>)
- “State Fish of Texas Restored to the South Llano River” in the TPWD Inside Track Blog (November 2017; see article at: <https://wildnet.tpwd.state.tx.us/insidetrack-blog/state-fish-of-texas-restored-to-the-south-llano-river>)
- “Guadalupe Bass – A Conservation Success Story” in The Fishing Wire (January 2018; see article at: <http://www.thefishingwire.com/features/0ed87e3b-900b-4d0d-b6c5-e36bae1da336>)

- “Guadalupe Bass: A State Wildlife Action Plan Success Story” – a Policy News article published by the American Fisheries Society (February 2018; see article at: <https://fisheries.org/2018/02/policy-success-story-the-guadalupe-bass/>)
- “Restoring the Guadalupe Bass: The State of Texas’ State Fish has Improved from Dire to Hopeful” in the TPW Magazine (March 2018; see article at: https://tpwmagazine.com/archive/2018/mar/ed_3_bass/index.phtml)
- “Guadalupe Bass Back Story” in the Bassmaster Blog (May 2018; see article at: <https://www.bassmaster.com/news/guadalupe-bass-back-story>)

Research - During FY2018, TPWD continued to conduct research and collaborate with Texas universities to address critical science needs for conservation of Guadalupe Bass. Outcomes included:

- Dijar Lutz-Carrillo (TPWD Geneticist) and coauthors published a study in *Transactions of the American Fisheries Society* titled “Hybridization and Genetic Structure in Phenotypic Spotted Bass in Texas,” which confirmed the utility of specific genetic markers in discriminating between Spotted Bass and Guadalupe Bass
- Jessica Pease (recent TTU Doctoral Graduate) and coauthors published a TPWD-funded study in the journal *Ecology and Evolution* titled “Changing Environmental Gradients Over Forty Years Alter Ecomorphological Variation in Guadalupe Bass *Micropterus treculii* throughout a River Basin”; the study contributed to understanding of the adaptive capabilities of Guadalupe Bass populations in response to changes in watershed conditions and flows

Guadalupe Bass Conservation Outcomes by River Sub-Basin

San Antonio River

- In partnership with San Antonio River Authority, continued monitoring of Guadalupe Bass repatriation efforts in the Mission Reach of the San Antonio River (see article on page 11 of the summer 2018 issue of the San Antonio River Authority newsletter, *River Reach*: https://www.sara-tx.org/wp-content/uploads/2018/07/newsletter_summer2018.pdf)

Guadalupe Bass Conservation Outcomes by River Sub-Basin (Continued)

Llano River

- Through stocking of more than 700,000 genetically pure Guadalupe Bass fingerlings (over seven years), achieved the Guadalupe Bass genetic restoration target for the South Llano River in FY2018
- In partnership with Bass Pro Shops and the Llano River Watershed Alliance, launched the South Llano River GBRI prize giveaway to celebrate restoration of the South Llano River population; see TPWD media releases from October 2017 (<https://tpwd.texas.gov/newsmedia/releases/?req=20171018b>) and May 2018 (<https://tpwd.texas.gov/newsmedia/releases/?req=20180503a>), and the project web page: <https://www.llanoriver.org/guadalupe-bass>
- In partnership with the Llano River Watershed Alliance, secured a multi-year (2018-2020) State Wildlife Grant (\$100,000) to support continued restoration of spring, riparian and instream habitats
- In partnership with the Llano River Watershed Alliance and the Texas Tech University Llano River Field Station, implemented elephant ear control (ninth year) on 52 miles of the Llano River and tributaries
- Completed mapping of Arundo, an invasive riparian plant, at the South Llano River State Park; Arundo treatment and revegetation of native riparian plants are planned for FY2019

Upper Colorado River

- Through the Texas Farm and Ranch Lands Conservation Program (TFRLCP), cooperated with the Texas Agricultural Land Trust to purchase a 1,368-acre conservation easement that will preserve riparian habitats along the upper Colorado River in Coleman County

Lower Colorado River

- A TTU study was completed examining relationships among river flows, recruitment and growth of Guadalupe Bass; results of the study are expected to inform water management decisions throughout the Colorado River basin, including the Llano, Pedernales and San Saba rivers

- Through efforts led by All Water Guides, river stewardship projects were completed (e.g., LoCo Trash Bash) that increased public awareness of the ecological and recreational value of the river

Gorman Creek

Collaborated with the Colorado Bend State Park to control elephant ear at Gorman Falls; active restoration of riparian habitats and installation of conservation demonstration signage are planned for FY2019

Nueces River

- In partnership with the Nueces River Authority and 129 cooperating riparian landowners, implemented Arundo control (eighth year) on 72 miles of the Nueces River and tributaries

San Gabriel River

- Completed surveys and genetic assessments to fill data gaps on the status and distribution of Guadalupe Bass; results indicate that the San Gabriel River represents a natural zone of hybridization between Guadalupe Bass and Spotted Bass (and a transition zone from the range of Spotted Bass in the eastern portion of the state and the range of Guadalupe Bass in central Texas)
- Additional surveys and genetic assessments are planned for FY2019 in search of genetically-pure Guadalupe Bass in the headwaters reaches of the San Gabriel River and tributaries

Frio River

- Through the TFRLCP, cooperated with The Nature Conservancy to purchase a 1,640-acre conservation easement that will preserve riparian habitats and tributary streams
- In partnership with the Nueces River Authority and 38 riparian landowners, continued the fourth year of Arundo control

Sabinal River

- In partnership with the Nueces River Authority and 35 cooperating landowners, implemented the seventh year of Arundo control
- Through the TFRLCP, cooperated with The Nature Conservancy to purchase a 716-acre conservation easement to preserve tributary streams and riparian habitats

Guadalupe Bass Conservation Outcomes by River Sub-Basin (Continued)

Pedernales River

- In partnership with Hill Country Alliance, cooperated with 94 riparian landowners to manage Arundo in tributaries of the Pedernales River
- In partnership with Hill Country Alliance, completed a five-year habitat restoration project in the Pedernales River watershed that accomplished the following outcomes
 - ▶ 9,032 acres of private lands (16 ranches along 10.4 miles of river) received onsite technical guidance from TPWD on watershed best management practices
 - ▶ 993 acres of spring, stream, riparian, and grassland restoration projects were completed in cooperation with partnering landowners
 - ▶ 15 riparian workshops, four grazing management workshops, and three conservation easement workshops were organized and instructed for approximately 1,075 cooperating landowners

Blanco River

- Steve Magnelia (TPWD River Studies Program Director) and coauthors had a manuscript accepted for publication in the forthcoming American Fisheries Society book, *Managing Centrarchid Fisheries*; the manuscript is titled "Restoration of Guadalupe Bass (*Micropterus treculii*) in the Blanco River, Texas: A Case Study in the Opportunistic Use of Drought as a Fisheries Management Tool"
- Collaborated with The Nature Conservancy and 109 landowners to control Arundo on the Blanco River; > 3 acres were reseeded with native vegetation
- Completed a three-year habitat restoration project that accomplished the following outcomes
 - ▶ Distributed 3,300 trees to support restoration of 350 acres of riparian habitats along the Blanco River
 - ▶ Instructed 13 riparian restoration workshops, attended by approximately 544 Blanco River stakeholders
 - ▶ Distributed 15,000 riparian sedges and grasses to cooperating landowners to stabilize flood-damaged river banks

- ▶ Provided technical guidance on restoration best management practices to 67 riparian landowners
- ▶ In partnership with the University of Texas at Austin, published a riparian habitat restoration manual for landowners titled [*Blanco River Restoration Design Guidelines*](#)

Guadalupe River

- Collaborated with the Upper Guadalupe River Authority and 38 riparian landowners to control Arundo
- Paul Fleming and Nate Smith (TPWD researchers) had a manuscript accepted for publication in a forthcoming American Fisheries Society Book titled *Managing Centrarchid Fisheries*; the manuscript focuses on the Guadalupe River, and is titled "Spatial Distribution and Hybridization Levels in Guadalupe Bass Five Years after Remedial Stocking"
- A TPWD Guadalupe Bass and Largemouth Bass mark/recapture study continued in the upper Guadalupe River; objectives include estimating fish abundance and density as well as assessing the effects of instream barriers on Guadalupe Bass movement
 - ▶ Through FY2018, more than 3,000 Guadalupe Bass and 3,400 Largemouth Bass have been tagged, with over 850 recaptures
 - ▶ Densities of Guadalupe Bass (≥ 100 mm) ranged from 38 to 151 fish per river km among the four major stream segments; Largemouth Bass (≥ 100 mm) densities ranged from 106 to 190 fish per river km
 - ▶ Further analyses of fish density data at finer spatial scales (i.e. individual stream fragments separated by barriers) are ongoing and scheduled to be completed in FY2019

Medina River

- Collaborated with the Bandera County River Authority and Groundwater District and 43 riparian landowners to control Arundo

Lampasas River

- Completed a genetic assessment of Guadalupe Bass, which identified extensive hybridization with Smallmouth Bass and Spotted Bass

THANK YOU TO OUR PARTNERS AND SUPPORTERS

All Water Guides

Bandera County River Authority and Groundwater District

Bass Pro Shops

City of Fredericksburg

Favrot Fund

Hill Country Alliance

Hill Country Conservancy

Living Waters Fly Fishing

Llano River Watershed Alliance

Lower Colorado River Authority

National Fish and Wildlife Foundation

National Fish Habitat Partnership

Nueces River Authority

San Antonio River Authority

Southeast Aquatic Resources Partnership

Texas Agricultural Land Trust

Texas Council of Fly Fishers International (*and member clubs*)

Texas Parks and Wildlife Foundation

Texas State University

Texas Tech University

The Nature Conservancy

U.S. Fish and Wildlife Service Partners for Fish and Wildlife Program

U.S. Geological Survey Texas Cooperative Fish and Wildlife Research Unit

University of Texas at Austin

Upper Guadalupe River Authority

And especially the numerous Texas Hill Country landowners whose support and cooperation makes the GBRI possible!

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Guadalupe Bass caught by an angler who participated in the South Llano River GBRI Prize Giveaway, supported by Bass Pro Shops and the Llano River Watershed Alliance



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