

# Inland Fisheries Annual Report 2022



Conserving freshwater fisheries resources and providing the best possible public fishing opportunities



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# **INLAND FISHERIES ANNUAL REPORT 2022**



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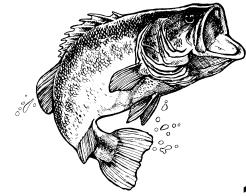
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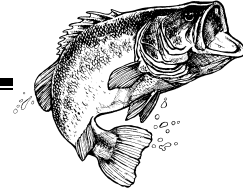
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# INLAND FISHERIES OVERVIEW

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## Mission

To provide the best possible fishing opportunities while protecting and enhancing freshwater aquatic resources.

## Scope

The Inland Fisheries Division is responsible for the management and conservation of freshwater fisheries resources in approximately 1,100 public impoundments and over 191,000 miles of rivers and streams, together totaling 1.7 million acres. These freshwater fisheries resources are used by 1.78 million anglers ages 16 and over, whose fishing activities result in at least \$1.7 billion in trip and equipment expenditures annually and support 13,000 Texas jobs.

## Agency Goals

Texas Parks and Wildlife Department's Land and Water Resources Conservation and Recreation Plan (2015) established four primary goals to direct the agency's divisions regarding the state's conservation and recreation needs.

- Practice, encourage, and enable science-based stewardship of natural and cultural resources
- Increase access to and participation in the outdoors
- Educate, inform, and engage citizens in the support of conservation and recreation
- Employ efficient, sustainable, and sound business practices

## Division Goals

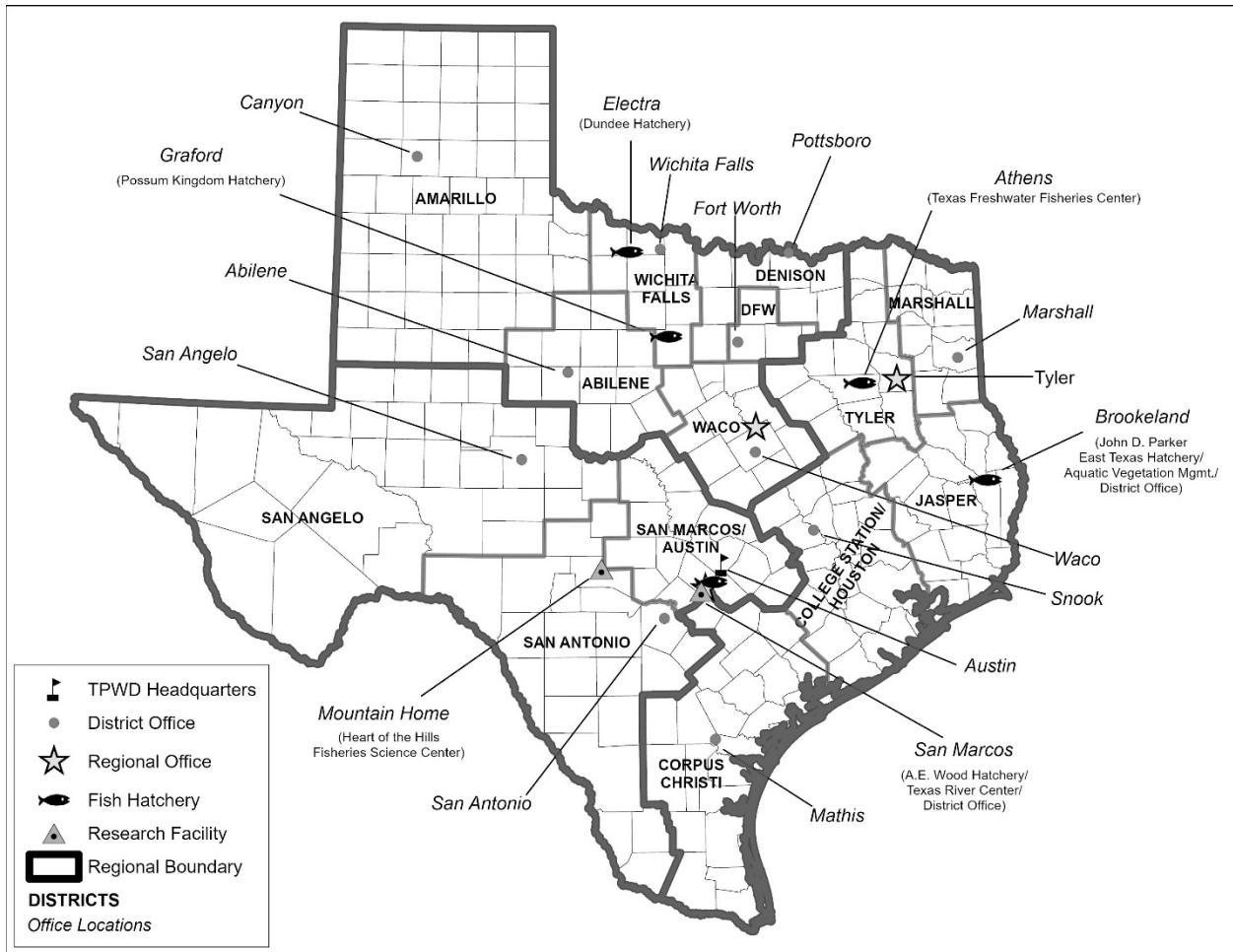
Division goals were developed to address major issues facing freshwater fisheries resources of Texas.

- Maintain or restore appropriate conditions to support healthy aquatic ecosystems
- Maintain quality fish communities for recreation and ecological health and value
- Maintain or increase constituent satisfaction, participation, or stewardship
- Employ efficient and sustainable business practices in fisheries management

## Staff

Inland Fisheries has 208 positions assigned to management and conservation, hatcheries (including outreach and analytical services), science and policy, and administrative programs. For details, see Appendix – Organization Charts.

## Facilities



## Contact Information

Inland Fisheries Division • Texas Parks and Wildlife Department  
 4200 Smith School Road • Austin, Texas 78744  
 (800) 792-1112 or (512) 389-4444 • [www.tpwd.texas.gov](http://www.tpwd.texas.gov)

## Funding and Allocation

In FY22, \$20,079,252 was budgeted for Inland Fisheries (not including fringe benefits or capital construction). Federal grants through the Sport Fish Restoration Program reimbursed the Department \$8,968,086 on eligible Inland Fisheries activities.

Detail Internal Category Code	Strategy	Aquatic Invasive 0014	Freshwater Fish Stamp 0917	Sand & Gravel 0924	Freshwater Fishing Licenses 0930	Federal Sportfish Restoration 0931	Emoluments 0932	Bass Plate 3047	Rivers Plate 3050	Total
Base-Operating	A.2.1.		175,000	75,000	3,649,272	5,719,040				9,618,312
		3,066,900				500,000				3,566,900
	A.2.2.		1,300,000		2,377,856	2,749,046				6,426,902
<b>Total-Base</b>		<b>3,066,900</b>	<b>1,475,000</b>	<b>75,000</b>	<b>6,027,128</b>	<b>8,968,086</b>				<b>19,612,114</b>
Capital-Equipment	A.2.1.	15,500			77,000					92,500
	A.2.2.				169,788					169,788
Capital-Transportation	A.2.1.	112,000								112,000
<b>Total—Capital</b>		<b>127,500</b>			<b>246,788</b>					<b>374,288</b>
Supplemental-Emoluments	A.2.2.						27,000			27,000
Supplemental-Bass Plate	A.2.1.							38,950		38,950
Supplemental-Rivers Plate	A.2.1.								26,900	26,900
<b>Total—Supplemental</b>							<b>27,000</b>	<b>38,950</b>	<b>26,900</b>	<b>92,850</b>
<b>Grand total</b>		<b>3,194,400</b>	<b>1,475,000</b>	<b>75,000</b>	<b>6,273,916</b>	<b>8,968,086</b>	<b>27,000</b>	<b>38,950</b>	<b>26,900</b>	<b>20,079,252</b>



# WHAT WE DO

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## Fisheries Administration

The Administrative function of the Inland Fisheries Division occurs primarily at Texas Parks and Wildlife Department (TPWD) headquarters in Austin. The administrative staff provides critical leadership, strategic and operational planning, fiscal oversight, and administrative and managerial support to field offices that carry out the Division mission. The Inland Fisheries Division seeks to maximize collaborative efforts among its work groups to accomplish projects and to achieve the larger goals of the Division. These efforts, at least in part, are due to the close coordination of a small group of leaders who direct Division activities in the areas of fisheries management, aquatic resources conservation, permitting and consultations, fish production and stocking, fisheries research, analytical services, policies and procedures, regulations, and outreach.

## Fish Hatcheries and Analytical Services

The Division's Fish Hatcheries Branch operates, maintains, and periodically upgrades five freshwater fish hatcheries to produce high-quality fish for stocking in Texas public waters. Hatcheries serve as an important component of Inland Fisheries resource management. Fish stocking is one of several essential tools used to protect, manage and enhance statewide fisheries resources as well as achieve specific fisheries resource objectives. Stocked fish must meet specific requirements including number, size, genetic integrity, disease-free status, and time of stocking. Hatchery-stocked fish are used to start new fish populations, supplement existing fish populations, restore depleted or threatened populations, provide fish in small urban lakes, enhance population genetics and performance, take advantage of improved habitat, and increase angler opportunities and success. Also, hatchery personnel are involved in outreach programs and agency-sponsored fishing events as well as providing educational hatchery tours to the public and students.



Analytical Services performs scientific analyses in water quality, fish pathology, and fish genetics in support of ongoing monitoring, routine fish health inspections, disease diagnosis and treatment, program evaluation, and cooperative research.



## Fisheries Management and Conservation

The Fisheries Management and Conservation Branch monitors sport fish populations, fish habitats, and angler utilization in Texas rivers and lakes and recommends harvest regulations, fish stockings, fish habitat improvements, and other actions to sustain high-quality fishing experiences. Additionally, the Branch monitors status and trends of Texas' 191 species of native freshwater fish, 52 species of native freshwater mussels, 54 species of native crayfish, and other freshwater taxa and implements actions to conserve the state's freshwater biodiversity. Branch teams accomplish these activities through cooperation with angling organizations, local communities and municipalities, the fishing industry, property owners, river and lake authorities, other natural resources agencies, river conservancies, watershed alliances, and others. Examples include the restoration, enhancement, and preservation of habitats in watersheds, springs, creeks, rivers, and lakes, as well as the management of aquatic invasive plants in lakes (e.g., giant salvinia, water hyacinth) and riverscapes (e.g., giant reed, saltcedar, elephant ear). The Branch also works with partners to improve and expand fishing, paddling, and boating opportunities through delivery of programs such as Texas Paddling Trails, River Access and Conservation Areas, Habitat and Angler Access Program, Neighborhood Fishin', and the Guadalupe Bass Restoration Initiative. Branch teams assemble science-based and data-driven plans to guide and evaluate effectiveness in achieving fisheries management and conservation goals. Branch teams operate from three regional offices (Waco, Tyler, San Marcos), 14 district offices (Canyon, Wichita Falls, Abilene, Denison, Dallas-Fort Worth, Waco, San Angelo, San Antonio, Austin-San Marcos, Tyler, Marshall, Jasper, College Station-Houston, and Corpus Christi), the Texas River Center (located in San Marcos), the Heart of the Hills Fisheries Science Center (located in Mountain Home), and the Aquatic Habitat Enhancement Program office (located in Brookeland).



## Fisheries Science and Policy



The Fisheries Science and Policy Branch develops, shares, and uses the best available science to inform policy, regulations, and programs that support the conservation and management of freshwater fisheries resources. The Branch coordinates Division-wide efforts to develop proposals for fishing regulation and exotic species rules changes, obtain public input on changes, and communicate proposals to the Parks and Wildlife Commission. Aquatic natural resource conservation efforts include consultations and technical guidance on development projects/permits, statewide permitting, coordinating responses to fish kills and pollution events, and investigating, restoring, and recovering damages to natural resources. The Branch coordinates aquatic invasive species policy and regulations as well as the agency's Aquatic Invasive Species Working Group, which leads efforts on prevention, management, and research. The Branch also furnishes data expertise for Division and Agency-wide assessments and disseminates general information to the public regarding fishing, access to public aquatic resources, and aquatic resource conservation.

The Heart of the Hills Fisheries Science Center in Mountain Home provides leadership, support, and coordination for Division research activities. They conduct intensive research investigations and give scientific guidance and support in the form of experimental design, statistical analyses, and literature, and develop science-based position papers that inform critical aquatic resource-related issues.



## Texas Freshwater Fisheries Center

The Texas Freshwater Fisheries Center (TFFC), located in Athens, is a multipurpose facility that strives to provide engagement experiences to the public that represent the breadth of the activities of the Inland Fisheries Division. TFFC serves as a working fish hatchery that produces millions of fish each year to meet the stocking needs of fisheries managers. TFFC also serves as headquarters for the Toyota ShareLunker program and is home to the Texas Freshwater Fishing Hall of Fame. More than 30,000 people typically visit the center annually; at least 14,000 of those are youth ages 12 and under. The visitor center opens to individuals and families six days a week in spring and summer, and five days a week in fall and winter. In addition, TFFC provides high quality, intensive, hands-on outdoor and science educational experiences for K-12 students and educators. Special events are held throughout the year to encourage and enhance constituent participation. These activities result in connections to aquatic resources in Texas, awareness of Inland Fisheries Division efforts, and positive fishing experiences.



# CHARTING A COURSE FOR THE FUTURE

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## Strategic Planning and Reorganization

Throughout its history, the Inland Fisheries Division has continually adapted, refocused, and retooled its programs to build and maintain the necessary capacity to confront challenges and deliver generational outcomes for freshwater fisheries resources and Texas anglers. The Division routinely develops science-based solutions that are cost-effective, scalable, and transferrable. Past successes were realized through constant innovation, continuous improvements, and the desire to maintain relevancy.

The Inland Fisheries Division remains committed to excellence and innovation, and to continually adapt and refine our strategies, approaches, and techniques to achieve increased efficiencies and effectiveness. Toward these desired outcomes, the Inland Fisheries Division Director, Budget Manager, branch chiefs, program directors, and regional directors performed an organizational assessment and strategic planning process during state fiscal years 2020–2021, which included: (1) completion of an inventory of Division functions and activities, (2) selection of Division activities considered priorities for increased programmatic growth and expansion, (3) selection of Division activities considered priorities for increased internal collaboration among Division programs and teams, (4) identification of a unified set of Division strategic priorities, and (5) identification of opportunities for increased efficiencies, effectiveness, and capacity to deliver strategic priorities through realignment of the Division organizational structure.

This planning process was previewed during the plenary session of the 2019 Inland Fisheries Division Staff Meeting (August 2019, San Antonio) and officially launched at an in-person workshop held in Bandera in February 2020. With the onset of the COVID-19 pandemic in March 2020, the planning team shifted to a series of recurring virtual meetings held via Microsoft Teams during spring–summer 2020. Progress updates, including review of the inventory of Division functions and activities and the newly identified set of unified strategic priorities, were shared with Division staff at monthly branch meetings held during summer and fall 2020 and at the 2020 Inland Fisheries Division Town Hall (October 2020, held via Microsoft Teams). Proposed changes to the Division’s organizational structure were reviewed with affected programs and teams during spring–summer 2021 and then presented to the entire Division at a Division Town Hall held in June 2021. Additional follow up coordination meetings were held with affected programs and teams during July 2021 to support the transition to a new Division organizational structure effective state fiscal year 2022.

The planning process culminated in the development of a unified set of strategic priorities, a succession plan that repurposed multiple vacancies, and changes to the Division’s organizational structure, including realignment and integration of multiple branches, programs, and teams (see updated Division organizational charts included in this report). These changes are intended to: (1) facilitate a more integrated, holistic, and unified approach to the management and conservation of freshwater fisheries resources, (2) increase capacity to advance Division priorities, (3) enhance efficiencies and effectiveness in delivery of Division programs and services (to benefit internal and external customers), (4) alleviate inequities in managerial and administrative responsibilities among regional and program directors, and (5) clarify roles for the Inland Fisheries Division’s senior management team including clarity for Division representation in interactions with TPWD agency and division leaders, external agencies, and stakeholders.

Major changes resulting from the organizational assessment, strategic planning, and succession planning process are summarized below.

- The Habitat Conservation Branch Chief and the Fisheries Management and Research Chief roles were combined into a Deputy Division Director position responsible for direction and oversight of the Division's fisheries management and conservation functions, including three regions, 14 district offices, Aquatic Habitat Enhancement Team, Rivers Program, Native Fish Conservation Coordinator, and Freshwater Mussel Conservation Coordinator
- The Chief of Fisheries Management and Research vacancy was repurposed into the position of Regulations and Policy Coordinator (to fulfill some of the roles historically played by the Chief of Information and Regulations)
- The Chief of Information and Regulations position was repurposed into the role of Chief of Science and Policy, now responsible for providing direction and oversight of statewide support functions including research, statistics, data management, regulatory permitting and consultations, regulations, and policies; similarly, the Staff Services Officer for the Information and Regulations Branch transitioned to Staff Services Officer for the Science and Policy Branch
- Regional grouping of the 14 district fisheries offices shifted from two regions to a three-region structure (see map included earlier in this report), with equitable allocation of staffing and programmatic responsibilities shared among regions
- The River Studies Program Director transitioned into a role as one of three Regional Directors for Fisheries Management and Conservation, and the River Studies Program Staff Services Officer transitioned into a role as one of three Regional Staff Services Officers
- A Research Analyst/GIS Coordinator was transferred from TPWD HQ to the regional office in San Marcos, providing technical support capacity for the region that existed in the other two regions
- The River Studies Program, Watershed Conservation Team, and River Access and Conservation Areas Program were merged to form the Division's Rivers Program, which will collaborate with the 14 districts and other internal and external cooperators to manage and conserve freshwater fisheries resources in rivers statewide
- A Rivers Program Leader was appointed, and vacancies were repurposed to fill the positions of River Studies Team Leader and Watershed Conservation Team Leader within the Rivers Program
- The Angler Recognition Program Coordinator vacancy was transferred from TPWD HQ to the Texas Freshwater Fisheries Center (TFFC), where the position integrated with and now supports other Division R3 programs, including the ShareLunker Program, Get Outside events, and TFFC exhibits
- The Division Budget Manager now supervises the Federal Aid Coordinator, Division Purchasing Coordinator, and Division Contracting Coordinator



## Inland Fisheries Emphasis Areas

During the strategic planning process described above, Inland Fisheries identified the following four areas considered priorities for increased programmatic growth and expansion. Investments made by the Division in these four areas during 2022 are summarized below.

### **(1) Increase the scope and scale of fish habitat improvements including in-water structural habitat improvements and watershed and riparian best management practices.**

Fish populations and quality angling opportunities depend upon healthy aquatic habitats. Texas fisheries face a litany of habitat-related challenges including sedimentation, loss of vegetation and coarse woody structure, water regime changes, nutrient loading, and invasive species. Inland Fisheries staffs cooperate with local partners to design and implement aquatic habitat restoration, enhancement, and protection projects. In 2022, the Division launched the Habitat and Angler Access Program, a grant program designed to restore and enhance freshwater fish habitats and improve and expand bank and shoreline-based angler access on public creeks, rivers, ponds, and lakes throughout the state. During the 2022–2023 grant cycle, 19 projects were supported, the majority of which included a habitat improvement component (see Appendix – Projects Supported by the Habitat and Angler Access Program). The Division also acquired a 30-ft long habitat barge in 2022, which will be used to deploy structural habitat improvements in Texas lakes. Inland Fisheries also continued to guide revenues available through sell of the largemouth bass and Texas rivers-themed conservation license plates to support aquatic habitat improvements in public waterways. Other investments made by the Division to improve aquatic habitats are described in the key accomplishments section below, such as efforts to manage aquatic vegetation and riparian invasive plants.

### **(2) Broaden and diversify our constituency through increased investments in urban fisheries management, engagement of river anglers, shoreline-based access improvements, and implementation of R3 initiatives.**

Texas is the fastest-growing state in the USA with many new Texans having diverse backgrounds. Inland Fisheries must engage these new citizens for TPWD to continue to maintain the high quality of aquatic resources in the state. In response to increases in the number and diversity of new Texans, TPWD assembled a R3 (Recruitment, Retention, and Reactivation) Plan. Division responsibilities for implementation of the TPWD R3 plan include creating new and diverse fishing opportunities, making aquatic resources more accessible to new user groups, and creating more innovative outreach and educational programs that build upon those offered at the Texas Freshwater Fisheries Center (see description above). Combining the programs with innovative public engagement campaigns and strategies should increase participation in outdoor recreation and assist in the accomplishments of the R3 Plan goals. Ongoing Division programs such as Neighborhood Fishin' and Diversified Community Angling are expected to result in new and improved fishing opportunities in major urban areas. The Texas Paddling Trails Program, River Access and Conservation Areas Program, Habitat and Angler Access Program (see Appendix – Projects Supported by the Habitat and Angler Access Program), and Conservation License Plate Program continue to improve public access to rivers and lakes and make aquatic resources more available to all outdoor users.

### **(3) Conserve Species of Greatest Conservation Need**

Texas hosts 191 species of native freshwater fish, 54 species of crayfish, and 52 species of freshwater mussels, of which 89 fish, 12 crayfish, and 17 mussel species are currently listed as Species of Greatest Conservation Need (SGCN). Inland Fisheries performs ecological research, conservation planning and assessments, species propagation, biological surveys and monitoring, habitat restoration, habitat protection, and other actions to ensure the continued ability of native freshwater taxa “to perpetuate themselves” (Texas Parks & Wildlife Code, §§ 67.001–67.0041, Nongame Species). Such actions are prioritized by the Division for freshwater fish, mussels, and benthic invertebrates including crayfish recognized within the Texas State Wildlife Action Plan as SGCN. Status as a SGCN is afforded to species with low or declining populations in need of conservation action, including species at risk due to threats to their life history needs or habitats; species considered rare due to few, small or declining populations, abundance, or distribution; and species with declining trends in their habitats and populations. Conservation actions performed to conserve SGCN help avoid further imperilment, loss, and extinction of native species and reduce the need for their listing as threatened or endangered. During 2022, over 75% of freshwater fish and mussel species listed as SGCN in Texas received conservation investments by the Division to recover, restore, or preserve their populations. This included investments in delivery of more than 40 research projects supported through the State Wildlife Grants Program and other funding sources (see Appendix – Active Research Studies).

### **(4) Enhance fish hatchery production capabilities to achieve fisheries management goals.**

Enhancement of fish hatchery production capabilities has focused on four primary areas: facility improvements, enhancing Florida largemouth bass broodstock, support for the Neighborhood Fishin’ Program, and the need for consistent striped bass and hybrid striped bass production.

Two capital construction projects at the Dundee Fish Hatchery, Effluent Pump Back and Ozone Disinfection System, will help control toxic golden algae in the hatchery source water and allow the facility to remain in operation during drought cycles that would normally require the hatchery to cease operations.

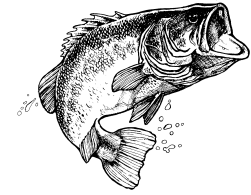
In 2018, a plan and process were developed to transition all hatchery Florida largemouth bass broodstock to ShareLunker offspring. In 2022, all Florida largemouth bass produced and stocked were a result of this effort and all Florida largemouth bass fingerlings stocked were 2nd generation descendants of a Legacy Class (13+ pounds) ShareLunker. To designate the uniqueness of the fish, they are referred to as “Lone Star Bass” by the Division.

To help control escalating cost of commercially purchased fish, in-house production of advanced-sized channel catfish was increased to fully support the needs of the Neighborhood Fishin’ Program.

In response to decreased availability of wild-sourced striped bass broodstock, work continues to refine and expand hatchery capabilities to hold and manipulate captive striped bass broodstock as well as develop the techniques and expertise to produce Sunshine bass (white bass females x striped bass male) as a viable hybrid striped bass alternative to reduce the need and dependence for striped bass females.

# KEY ACCOMPLISHMENTS

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## Monitoring, Management Plans, and Permits

**Reservoir Surveys** — Inland Fisheries staffs conducted 276 surveys of fish populations, habitat, vegetation, water quality, angler access, and angler use on 139 reservoirs covering 1,139,997 surface acres of water. These led to the production of 41 comprehensive reservoir fisheries management plans designed to improve freshwater fishing opportunities.

**River Surveys** — Inland Fisheries staffs conducted 76 surveys to assess the status of fish communities, freshwater mussels, benthic invertebrates, aquatic and riparian habitats, invasive species distribution, and recreational access and use in selected rivers throughout the state. Surveys took place on mainstem reaches and tributaries of Barons Creek, and the Brazos, California Creek, Colorado, Devils, Lavaca, Llano, Rio Grande, Sabine, and Trinity rivers. Surveys were used to inform river recreation, public access, sport fish management, and conservation activities and included invasive species control, riparian invasive species control, riparian vegetation recolonization, water management guidance, fish and freshwater mussel species distribution, aquatic life use assessments, angler creel surveys, and game and non-game fish population monitoring. Focal fishes included Guadalupe Bass, Alligator Gar, American Eel, Devils River Minnow, Blue Sucker, Channel Catfish, Largemouth Bass, Smallmouth Bass, Smallmouth Buffalo, White Bass, and imperiled West Texas fishes.



**Fish Health Investigations** — During FY22, activities conducted by the Analytical Services Laboratory in San Marcos (and collaborating laboratories) included the following:

- A total of 33 fish health cases analyzing approximately 1,913 fish samples for state hatchery fish health inspections for quality control/assurance, fish disease outbreak investigations in state waters and TPWD hatcheries, pathogen monitoring efforts, etc.
- A total of 195 water samples were processed for invasive Dreissenid mussels (zebra and quagga mussels) to detect microscopic larvae and/or environmental DNA (eDNA).
- A total of 155 samples were analyzed for golden alga toxicity and presence in public water bodies.
- Completed 28 genetics projects with 1,868 samples.

**Permits** — The division issued 29 permits authorizing introduction of fish into public waters to enhance fishing opportunities. Introduction permits were also issued for aquatic plant restoration (4) and for relocation of aquatic resources to minimize impacts of projects that temporarily disturbed aquatic habitats (93).

Forty-seven permits were issued for commercial harvest of nongame fishes from public fresh waters.

One permit was issued for Broodstock collection for Redfish.



A total of 1,358 permits (including renewals) authorizing possession of prohibited exotic fish, shellfish or aquatic plants were issued for the purpose of:

- Invasive plant management (2)
- Fish/shrimp aquaculture (38)
- Pond Stocking Sales (20)
- Stocking Triploid Grass Carp (1,244)
- Culture of water spinach as a food source (36)
- Research (6)
- Zoological display (11)
- Biological Control Production (1)

Twenty-one requests to stock tilapia in private ponds in the Conservation Zone in FY22 were reviewed and 10 of those requests were approved.

## Program Planning

**Urban Fisheries Management Action Plan** — In support of the TPWD R3 Plan, the Inland Fisheries Division is tasked with developing and enhancing a diverse set of fishing opportunities based on resources available and needs and wants of anglers in major urban areas. The Inland Fisheries Division is also tasked with developing innovative public engagement strategies to inform and seek input from constituents on new or improved fishing opportunities. During 2022, the Division undertook a program evaluation and strategic planning to advance urban fisheries initiatives that help achieve goals outlined in the R3 Plan.

Top needs and priorities identified included development of a sound and easy-to-follow fishing regulation for smaller public waterbodies statewide, as well as development of an easily accessible and navigable webpage to inform constituents about fishing opportunities, improving the reach and efficiency of programs such as the Neighborhood Fishin' Program. Development of an urban fishing inventory of fishing opportunities in major urban areas of the state, such as the Dallas-Fort Worth, Houston, Austin, and San Antonio metropolitan areas, was also identified as a top priority.

**Statewide Largemouth Bass Management Action Plan** — Strategic planning was performed in 2022 to examine challenges and identify future actions and priorities for largemouth bass management in Texas. The need was identified to revise stocking criteria for Lone Star Bass to increase emphasis on stocking reservoirs that have demonstrated consistent trophy fish production. Needed changes were also identified to stocking criteria and timing related to littoral habitat and recruitment dynamics. Increased use of largemouth bass stockings in small urban impoundments was recommended as a strategy to diversify angling opportunity. It was deemed important to explore opportunities to manipulate reservoir water levels as a fish habitat enhancement strategy, which would necessitate collaboration with controlling authorities, water rights holders, and water planning groups. Development of a hydrilla position paper was also initiated to help standardize considerations for management of this species in relation to our important largemouth bass fisheries. To increase awareness and participation, it was recommended that angler creel surveys be modified to include questions addressing the Toyota ShareLunker Program. These actions were deemed priorities to implement in 2023, if not already in progress.

**Angler Creel Program Action Plan** — Programmatic review and strategic planning for the Division’s angler creel program was performed in 2022. This included review of current processes, capabilities, procedures, trainings, and programs. Division biologists were surveyed on their opinions regarding multiple facets of the creel program, and coordination occurred with creel administrators in state fisheries programs from around the U.S. to examine how other agencies manage and utilize their respective creel programs. A list of 17 specific action items were identified to improve the Division’s creel program. These address topics such as program staffing and administration, training, development of protocols for creels performed on streams and community fishing lakes, development of protocols for passive gears and trailer counts, and creel data access.

## Applied Management and Conservation Actions

**Invasive Mussel Monitoring and Prevention** — Inland Fisheries and partners continued to seek to prevent and monitor for the introduction and spread of invasive zebra and quagga mussels in Texas lakes through a large-scale collaborative effort led by TPWD. Collaboration on monitoring efforts and partner financial support for outreach efforts helps to significantly expand the reach of these initiatives and maximize capacity.



- Forty-three water bodies are being monitored for early detection of zebra and quagga mussels and 28 for population monitoring
- Sampling involves a combination of environmental DNA analysis, plankton sampling, settlement samplers, and shoreline surveys
- At year’s end, 30 water bodies across six river basins were fully infested with zebra mussels, having established populations, and this invasive species had been found multiple times in four additional water bodies
- There were no new detections of zebra mussels in Texas waters in FY22
- Quagga mussels were detected for the first time in Texas in Lake Amistad, when larvae were found in plankton samples; no adult mussels have been found to date
- TPWD and partners continue to implement the ‘Protect the Lakes You Love’ public outreach campaign to seek to slow the spread of aquatic invasive species

**Invasive Carp** — Inland Fisheries and partners continued to evaluate the current status and population demographics of invasive Bighead and Silver carp in the Lower Red River Basin to contribute to implementation of the Arkansas-Red-White subbasin invasive carp management plan and national objectives. Prevention was also central to efforts related to invasive carp, through both implementation of new regulations and strategic, targeted outreach.

- TPWD, in collaboration with the Oklahoma Department of Wildlife Conservation and Arkansas Game and Fish Commission, oversaw completion by Auburn University and Texas Tech researchers of the second year of the first invasive bigheaded carp population assessment in the Lower Red River Basin
- Nearly \$1M in funding was approved to complete a third year of this study and conduct a two-year telemetry study to better understand the population and assess recruitment
- Invasive Bighead and Silver carp were found in all Texas tributaries of the Red River except for the Sulphur River
- Regulation changes were enacted to prevent the spread of these species from Red River tributaries via inadvertent bait transfer
- Targeted outreach emails to local licensed anglers were used to aid in preventing new introductions



**Aquatic Vegetation Control** — Inland Fisheries and partners continued to manage giant salvinia and water hyacinth throughout Texas’ reservoirs and river systems. TPWD’s Inland Fisheries’ integrated pest management (IPM) plan was greatly expanded in late 2015 (FY16) as a result of record funding provided by the State Legislature. The IPM plan included installing floating booms, conducting herbicide treatments, and releasing biocontrol agents as well as employing an effective giant salvinia outreach campaign.

#### Herbicide treatments by TPWD and partners

- Treated 14,762 acres of giant salvinia in FY22 and nearly 110,000 acres of giant salvinia since the beginning of FY16.
- Treated 3,447 acres of water hyacinth in FY22 and nearly 14,500 acres of water hyacinth have been treated with herbicides since FY16.
- Treated 170 acres of hydrilla, 95 acres at Lake Conroe, and the remaining 75 acres focusing on public boat ramps, public fishing piers, and public swim beaches.



#### Mechanical treatments

- Floating booms
  - Containment at lakes Athens, Houston County, and Raven
  - Create weevil rearing sites at lakes Raven, Caddo, and Naconiche

## Bio-control agent introductions

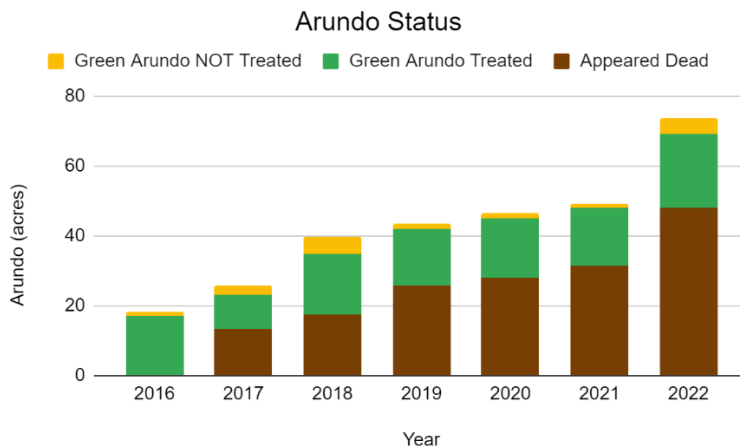
- Giant salvinia weevils
  - TPWD released nearly 353,600 adult, giant salvinia weevils in Texas' public waters in FY22 and a total of nearly 2,233,600 adult, giant salvinia weevils since FY16.
  - Self-sustaining populations are present in lakes Toledo Bend, Raven, Sheldon, Naconiche, and Nacogdoches.
  - Weevils are currently the only control methodology used at Lake Nacogdoches.



**Riparian Invasive Species** — A variety of projects are underway to manage non-native, invasive plants that grow along the banks of Texas rivers and streams. When left unchecked, these invaders often crowd out native plants and may alter the aquatic food webs on which native fish depend. Some of the worst offenders can also alter channel geomorphology, reduce stream flow, alter soil chemistry, worsen flooding, increase wildfire risk, and harbor other nonnatives such as feral hogs.

## Healthy Creeks Initiative to Manage Arundo

- The Healthy Creeks Initiative has been treating infestations of Arundo (a.k.a. giant reed) in headwater rivers and streams of the Hill Country since 2015.
- Currently, 390 landowner partners are enrolled in the program along 225 river miles of the Blanco, Guadalupe, Llano, Medina, and Pedernales rivers.
- In FY22, a record 74 acres of Arundo were surveyed, about 2/3 of which appeared dead. More Arundo was treated (21 acres) than in any prior year.
- Efforts to reduce the prevalence of Arundo and restore native riparian plant communities are expected to benefit Guadalupe Bass and other native fish species.



### Nueces River Authority's "Pull Kill Plant" Project

- Supported control of Arundo in the Nueces River and its tributaries through cost-share agreements for this project, now in its 13th year.
- The Nueces River Authority conducted surveys on over 113 river-miles of the Nueces, Frio, Dry Frio, Sabinal, and Leona rivers and Turkey Creek. This represented 256 landowners, and 5.8 acres of Arundo treated.

### Llano River Elephant Ear Control

- Since 2010, the Division has worked with partners and volunteers to treat elephant ear plants on the upper Llano River. About 50 river miles are currently under management, with infestations steadily decreasing.
- In Fall 2021, 28.9 river miles of the South Llano and main stem Llano rivers were surveyed. About half the reaches had no elephant ear plants, despite having them in the previous survey.

### Colorado Bend State Park Elephant Ear Control

- At Gorman Creek, dramatic reductions in the area and density of elephant ear plants have been documented since treatments began in 2017 along with native plant community recovery.
- The initial infestation covered more than 30,000 sq ft. Less than 1,000 sq ft remained in fall of 2021 when treatment occurred.

### Lower Colorado River at Texas River School Arundo and Elephant Ear Control

- Elephant ear and Arundo were treated at the Texas River School site in FY22. The area covered by both species was much reduced, and native wild rice plants now cover much of the riverbanks.

### San Felipe Creek Arundo

- In 2022, the Nueces River Authority engaged with Del Rio city staff, citizen groups, and landowners to treat more than 10 acres of Arundo along 5 river miles of San Felipe Creek on the properties of 22 landowners.

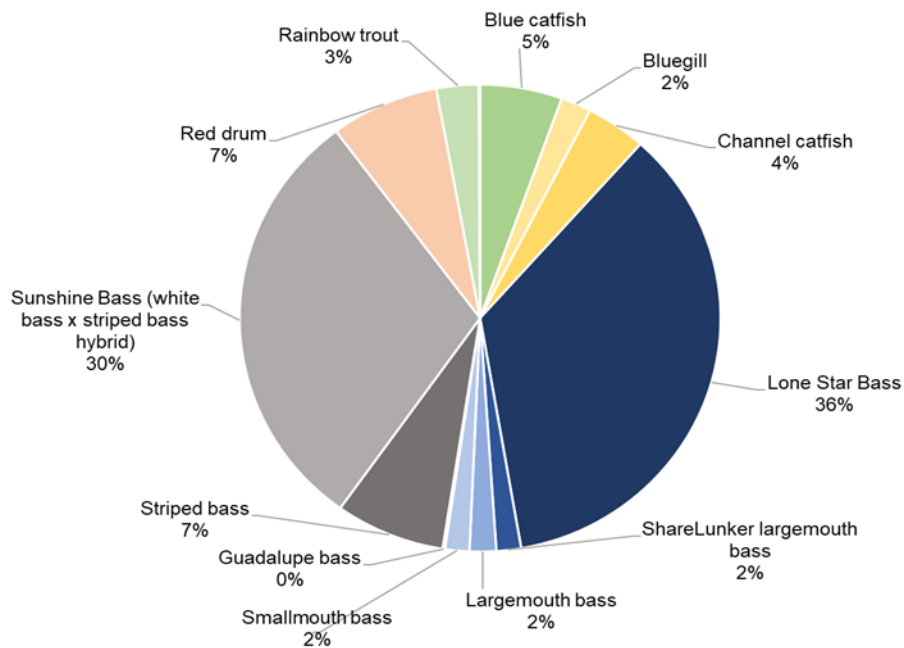
### Saltcedar

- To date, efforts to manage saltcedar at a watershed scale in the Upper Brazos River basin have achieved over 20,000 acres treated in critical habitat for imperiled fishes negatively impacted by saltcedar. The project is a partnership with the U.S. Fish and Wildlife Service and other agencies, private landowners, and researchers, and eight sites have been established for research and monitoring.

**Hatcheries and Stocking** — Hatcheries are an important component of Inland Fisheries resource management. Fish stocking is utilized as one of several essential tools to protect, manage and enhance statewide fisheries resources as well as achieve specific fisheries resource objectives. Stocked fish must meet specific stocking requirements including number, size, genetic integrity, disease-free status and time of stocking. Hatchery stocked fish are used to start new fish populations, supplement existing fish populations, restore depleted or threatened populations, provide fish in small urban lakes, enhance population genetics and performance, take advantage of improved habitat and increase angler opportunities and success. Hatchery personnel are involved at public engagement programs and agency sponsored fishing events as well as providing educational hatchery tours to the general public and students of all ages.

A total of 13.1 million fingerlings were produced and stocked in public water. Species stocked included largemouth bass, Guadalupe bass, striped bass and hybrid striped bass, channel catfish, smallmouth bass, bluegill sunfish, rainbow trout and red drum. Rainbow trout are acquired from a commercial producer and red drum are produced by the Coastal Fisheries Division. A portion of the advanced channel catfish fingerlings (12"-14") stocked in support of the Neighborhood Fishin' Program are acquired from a commercial producer. Most of the fingerlings stocked were largemouth bass (41%) or either striped bass or hybrid striped bass (38%) which collectively comprise approximately 79% of the total number of fingerlings stocked. Hatchery staff drove more than 337,253 miles during more than 1,165 stocking trips to distribute the fish to more than 425 water bodies throughout Texas.

**Fingerlings Stocked**



Hatchery production of striped bass and hybrid striped bass met or exceeded stocking requests. The conversion in 2022 of Florida bass brood stock to second generation offspring of Legacy Class (13+ pounds) ShareLunker's was complete. To distinguish the genetically unique fish from other Florida largemouth bass stocked since 1972, the fingerlings are called "Lone Star Bass." In total, 4.8 million Lone Star Bass fingerlings were stocked in 2022.

**Regulation Updates** — The following regulation changes were adopted by the Texas Parks and Wildlife Commission to improve angling opportunities and protect fisheries resources.

#### Reservoir Boundaries

Upstream reservoir boundaries were delineated for lakes Sam Rayburn and Texoma to differentiate between the inflowing river and reservoir where exceptions to statewide daily bag, possession and length limits are in place.

#### Bag, Possession, and Length Limits

- Bois d'Arc Lake (Fannin County) – Implemented largemouth bass harvest regulations for soon to be opened Bois d'Arc Lake to establish a 16-inch maximum size limit and exceptions for temporary possession of 24-inch or greater bass as potential ShareLunkers.
- Lake Texoma (Cooke and Grayson counties) – Modified harvest regulations for walleye to eliminate special exceptions to statewide daily bag, possession, and length limits for walleye and returned to statewide regulations (daily bag: 5 [only 2 can be less than 16 inches] Minimum length: None).
- Lake Texoma, Red River, and tributaries (Cooke, Grayson, Fannin, Lamar, Red River, and Bowie counties) – Modified harvest regulations for alligator gar to expand the harvest closure during the month of May to ensure reciprocity with Oklahoma harvest regulations.
- Coletto Creek Reservoir (Goliad and Victoria counties) and Fairfield Lake (Freestone County) – Modified harvest regulations for red drum for to eliminate special exceptions to statewide daily bag, possession, and length limits and return to statewide regulations (daily bag: 3 Minimum length: 20 inches Maximum length: 28 inches).
- Clarified the species information for striped bass to remove references to white bass and/or subspecies to represent the intent of the rules more accurately and to apply to only striped bass and their hybrids.
- Restored the intended largemouth bass exceptions (daily bag: 5, Maximum length: 16 inches, and allowance for temporary possession of largemouth bass 24 inches or greater for weighing for submission to the ShareLunker program) previously adopted by the Commission for 9 water bodies. An administrative error in publication of rules in 2020 inadvertently resulted in incorrect largemouth bass harvest regulations.

#### Special Provisions to Prevent the Spread of Exotic Aquatic Species

Red River Tributaries – Modified regulations for prevention of transfer of invasive carp as bait to add tributaries of the Red River in Grayson, Fannin, Lamar, Red River, and Bowie counties to the list of designated waters from which nongame fish cannot be transported live.

#### Exotic Harmful or Potentially Harmful Fish, Shellfish, and Aquatic Plants

- Clarified the period of validity of permits to 18 months for stocking triploid grass carp in private ponds, lawful transfer for these fish with any change in ownership of a property, and harvest of stocked triploid grass carp from public waters.
- Clarified that permits for zoological display of controlled exotic species may be issued to bona fide educational facilities and not to commercial facilities.



## State Aquatic Vegetation Plan

- Created a definition for floating aquatic vegetation – A plant species that occurs on the surface of a lake or pond without attachment by roots to the soil at the bottom of the waterbody or free-floating mats of fragments of ordinarily rooted species of vegetation that have become dislodged through natural processes such as flooding.
- Created an exception from the treatment proposal requirement based on the floating aquatic vegetation definition to allow waterfront landowners to physically remove floating aquatic plants from public water adjacent to their property provided compliance with transport and disposal requirements for exotic species. The exception would not extend to individuals for hire or using mechanical harvesters.

## Memorandum of Understanding (MOU) with the Texas Commission on Environmental Quality (TCEQ)

- Adopted by reference the provisions of 30 Texas Administrative Code (TAC) §7.103, relating to a MOU between TPWD and TCEQ, which outlines interagency coordination procedures for regulation of aquaculture.

# Research Highlights

## Summary

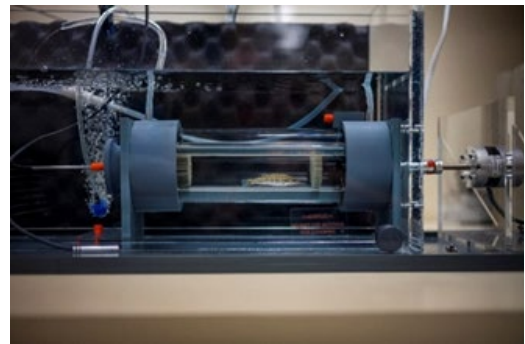
- Initiated, conducted, or completed 42 internal and 67 collaborative applied research studies to inform management and conservation actions (see Appendix –Active Research Studies)
- Authored 14 scientific articles that were published in twelve different peer-reviewed journals (see Appendix – Scientific Publications and Reports)
- Contributed to 49 scientific presentations given at nine professional conferences

## Highlighted Projects

**Habitat use and movement of Largemouth Bass at Toledo Bend and Lake Fork reservoirs** – Little is known about Largemouth Bass movements or the effects of fishing pressure on catchability in larger reservoirs like Toledo Bend and Lake Fork where fish can move considerable distances. Using biotelemetry, this study is examining seasonal habitat use, movement, and home range of Largemouth Bass and exploring effects of boat noise and angling activity on fish behavior. Preliminary results reflect relatively small home ranges with movement, depth, and distance to shoreline varying by season, and indicate that boat noise and angling affect fish behavior. Results will be used to increase understanding of Largemouth Bass behavior, guide habitat management and enhancement, inform anglers, and potentially increase fishing success.



**Assessing the swimming performance of Species of Greatest Conservation Need fishes of the Guadalupe River to inform stream crossing design and barrier prioritization** – High water velocities can act as barriers to fish passage, even within a spatially continuous flow path. Such barriers can restrict movements and migration of fish and impede the completion of life history components such as spawning migrations and access to nursery habitats. The study assessed swimming performance of four Species of Greatest Conservation Need found in the Guadalupe River



basin to inform stream crossing design and barrier removal prioritizations. Results from this study are currently being used in the permitting and consultation process to evaluate proposed stream crossings in the Edwards Plateau ecoregion of Texas.

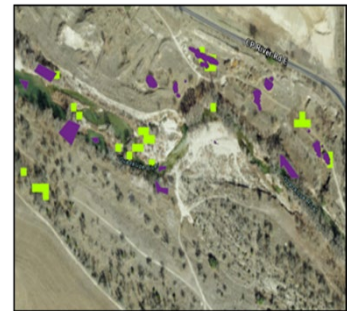
**Gap sampling within the Texas Native Fish Conservation Areas Network** – Since 2013, the Inland Fisheries River Studies Team has been collaborating with the University of Texas to conduct bioassessments of rivers and streams adjacent to State Parks and Wildlife Management Areas. This initiative supports management of these properties, informs recreational initiatives, and guides future research and conservation efforts through TPWD’s Native Fish Conservation Area initiative. Bioassessment reports include fish, benthic macroinvertebrate, freshwater mussel, riparian, and instream habitat data, as well as recommendations for improving conditions for aquatic and riparian species and recreational use. To date, 14 bioassessments have been completed and over 90,000 individuals comprised of more than 165 species of fish have been collected across 388 sites in Texas.

**Assessing ammonia toxicity of Texas unionid mussels** – Freshwater mussels are a highly imperiled group of organisms and water pollution is one of the major threats to their persistence in Texas rivers. Early live history stages of freshwater mussels are known to be highly sensitive to ammonia, yet ammonia toxicity of freshwater mussels in Texas has not been examined. Working with researchers at Texas State University and U.S. Fish and Wildlife Service – San Marcos Aquatic Resources Center, the goal of this study is to examine the median lethal concentrations of ammonia for mussel larvae (glochidia) and juvenile mussels of several state-listed (Texas Pigtoe, Texas Fatmucket, Guadalupe Fatmucket) and common species (Pimpleback, Yellow Sandshell) in Texas to help inform wastewater effluent limits on ammonia in Texas.



**Using remote sensing to map *Arundo donax* populations in Native Fish Conservation Areas throughout Texas to better understand causal factors of invasion and set management priorities** –

Giant reed (*Arundo donax*) is a highly problematic invader of river and creek shorelines with significant impacts on both riparian and aquatic habitats and efforts to manage this species are ongoing in the Hill Country. This study is developing and testing the use of remote sensing technology to identify infested areas and areas where infestation is increasing. It will also examine landscape factors influencing infestations and identify areas at high risk of impacts. This technology will be applied to Native Fish Conservation Areas across the state to aid in prioritizing areas for future control efforts.



## Outreach

### Texas Freshwater Fisheries Center

- Texas Freshwater Fisheries Center (TFFC) is the Inland Fisheries Division's primary outreach and education facility. In 2022, TFFC provided facility tours, workshops, aquatic education classes, and other special events. TFFC is home to the statewide Toyota ShareLunker Program, Texas Division of the Fish Art Contest, Angler Recognition Program, and Texas Freshwater Fishing Hall of Fame.
- TFFC visitation included 31,965 people from 136 Texas counties, 43 states and 2 foreign countries. TFFC provided hands-on fishing for 22,221 visitors, with 672 receiving First Fish Awards. A total of 13,403 people toured the hatchery ponds via 445 guided tram trips.
- In 2022, TFFC visitation surpassed 1-million total visitors since opening in 1996.

### Fish Art Contest

- The Fish Art Contest is organized by the national non-profit Wildlife Forever. The Texas Division is sponsored by Gulf States Toyota. The contest is designed to foster youth interest in fish, fisheries, and fishing. The program encourages K-12 students to submit original artwork of any fish and an essay or poem (grades 4-12) about the participant's fish entry, its habitat, or efforts to conserve it.
- In 2022, 243 entries from grades K-12 were submitted. All entries received certificates. The top 10 contestants in each of four grade divisions were recognized. The top 3 in each category had their work put on display as part of the Fish-Art exhibit at TFFC.
- First-place winners in each of the four age groups advanced to the national level and competed against winners from other states. One Texas winner was announced as a national place winner by Wildlife Forever. Jackson White's largemouth bass won third place in the nation for the K through 3rd grade category.
- TFFC staff participated in the selection of Wildlife Forever's "Richard M. Hart National Educator of the Year" award selection. The teacher is recognized as part of the Fish-Art exhibit at TFFC.
- A 2022 calendar was published highlighting the top three entries in each of the four grade categories from 2021.

### Toyota ShareLunker Program

- The Toyota ShareLunker Program partners with anglers year-round (January 1 – December 31) to collect catch and genetic data on bass 8 pounds or 24 inches and larger, and to collect bass 13 pounds and larger during our ShareLunker collection season (January – March) for selective breeding.
- Through August of the 2022 season, 419 entries from 80 lakes across the state were approved into the program. Of those entries: 286 were Lunker Class (8+ lbs.), 104 Elite Class (10+ lbs.), 5 Legend Class (13+ lbs.), 24 Legacy Class (13+ lbs. and donated for spawning).

- The 2022 collection season (January through March) was the busiest since 1995 when 27 were loaned to the program. This season pushed the program total Legacy Class collection to 632.
  - Nine different water bodies produced Legacy class ShareLunkers in 2022.
  - Lake Daniel became the 75th public water to contribute a Legacy-class ShareLunker.
  - Four entries were new lake records (Lake Daniel (Twice), Eagle Mountain, O.H. Ivie).
  - The new O.H. Ivie waterbody record was set at 17.06 pounds, was the biggest in 30 years, and is the 7th largest largemouth bass ever verified in Texas (private or public).
  - Four fish made the Texas Top 50 biggest largemouth bass of all-time list.
  - For the third season in a row, an angler submitted two entries (Back-to-back seasons from O.H. Ivie, and 2020 from Alan Henry).
  - Two anglers submitted a catch in back-to-back seasons.
  - Two ShareLunkers were submitted in the same day three times this season.
  - One angler (Josh Jones) became the first to contribute a fourth ShareLunker to the program.
  - Five entries were greater than 15 pounds, including three over 16 pounds.
- The 2022 season continued the ShareLunker Response Team whose goal was to get Legacy Class lunkers more quickly and efficiently in the care and transportation of Inland Fisheries staff. Efforts of this team were successful. Anglers were provided faster service and the fish received better care quicker. Ultimately the quicker better fish health care led to survival of 100% of Legacy class lunkers.
- Hatchery staff successfully collected spawns from the Legacy Class lunkers loaned to the program this season. Hatchery staff produced and stocked 217,155 fingerlings from the selective breeding of the Legacy Class bass. A portion of the fingerlings were stocked into each of the reservoirs that loaned a Legacy Class fish.
- The Toyota ShareLunker Program continued to garner tremendous public interest.
  - More than 60,000 anglers are signed up for ShareLunker email updates.
  - More than 42,500 visit occurred to the ShareLunker website.
  - ShareLunker Facebook page has more than 31,000 followers.
  - A digital ad campaign resulted in 31,000 ad clicks, created 1,745,000 impressions, and pushed app downloads to 24,000+.
  - Nearly 400 news articles, radio, tv, and online videos were created resulting in a reach of more than 988 million.

### **Texas Freshwater Fishing Hall of Fame**

- The Texas Freshwater Fishing (TFF) Hall of Fame was established in 1997 with a mission is to “recognize and honor those who have made a lasting contribution to freshwater fishing in Texas, and to foster a sense of appreciation, awareness and participation in the sport of fishing.”

- The TFF Hall of Fame exhibit at TFFC was relocated within TFFC, expanded, and remodeled in 2022. The new exhibit highlights the most recent inductee, spotlights an existing member, recognizes the selection committee, includes a new updated TFF Hall of Fame logo.
- In 2022, the TFF Hall of Fame selected professional angler Gary Klein of Mingus as the 37th member to be inducted.

### **Angler Recognition Program**

- The Angler Recognition Program (ARP) maintains state record lists for public and private waters and water body records for all public lakes, rivers, and bays. Junior Anglers) compete in a separate division. The program issues certificates for several types of angler achievements.
- In this period, a total of 643 applications were received, with Big Fish Awards (273), Water Body Record (257), and Junior Water Body Record (120) being the most submitted application categories.

### **Popular Articles and Social Media**

- A total of 195 media coordination efforts, supporting press releases and popular articles, were conducted with TV, radio, news, and outdoor-related media outlets, regarding aquatic natural resource conservation, fisheries management, and recreational fishing opportunities.
- Inland Fisheries produced 1,045 social media posts for Division Facebook and Instagram accounts garnering a reach of 6.5 million.
- A total of 51 TPWD news releases were produced in coordination with Communications Division staff, showcasing Inland Fisheries activities with each being distributed to nearly 4,000 media member contacts.

### **Events**

- Inland Fisheries led 312 outreach events engaging 26,096 people that included youth and family fishing events and presentations to civic and conservation organizations.
- TPWD “Get Outside” events are cross-divisional efforts to provide outdoor education and activities at key major events for the general public across Texas. Inland Fisheries developed displays and materials and participated in all Get Outside events including the Texas State Fair, Ducks Unlimited Expo, Poteet Strawberry Festival, Mayfest, Baytown Nurture Nature Festival, and Austin Powwow.
- The Toyota ShareLunker Program outreach exhibit includes the Toyota Tundra ShareLunker collection truck and display trailer. This exhibit participated in major events that included the BASS Elite at Lake Fork, Texas High School Bass Association State Championship, Ducks Unlimited Expo, and World’s Fishing Fair at Bass Pro Shops in Springfield Missouri.
- TFFC Special Events and educational activities were developed and implemented to provide opportunities for the public to engage at all levels of experience and interest. These included kid’s outdoor adventure camps, fly-fishing education classes, hunter’s safety education, boater safety, mentored waterfowl education, 4-H Sportfishing education, Game Warden Memorial, Fishing’s Fools Day and Spawning Run, Fish Tag Friendly event on Free Fishing Day, Library Day, Sunfish Showdown mentored fishing tournament on National Hunting Fishing Day, Halloween at the Hatchery, Veteran’s Day event, Ethelsgiving, and Merit-Badge University.

## Infrastructure Enhancements

Construction and renovation efforts continued at several facilities (table below) including the Possum Kingdom and Dundee Fish hatcheries, A.E. Wood Fish Hatchery, Texas Freshwater Fisheries Center and Corpus Christi District Office in Mathis. In response to the growing threat of zebra mussels, work continued on the microfiltration facility at the Possum Kingdom Hatchery. Project completion has experienced complications and delays and is not yet fully operational. The ozone disinfection system and effluent pump back projects at Dundee were awarded in late 2021. Work on the effluent pump system is expected to be completed in early 2023. Progress on the ozone system has been delayed due to material and equipment supply chain issues related to the ozone generator that is being manufactured and shipped from overseas. Construction of the new district fisheries office in Mathis was awarded in late 2021. The project will construct new office, maintenance, and storage space on available property at Lake Corpus Christi State Park in Mathis and is expected to be completed in early 2023. Two additional projects, pond liner replacement at A.E. Wood and renovations to the exhibits at TFFC, are under design.



## Inland Fisheries Capital Projects

Inland Fisheries Capital Projects	Project Phase	Budgeted	Encumbered or Expended	Expected Completion
Micro-filtration at the Possum Kingdom Fish Hatchery	Testing		\$2,448,810.45	Winter - 22
Pump back system at the Dundee Fish Hatchery	Construction		\$2,764,229.65	January-23
Ozone Disinfection system at the Dundee Fish Hatchery	Construction		\$5,257,189.20	March-23
Corpus Christi District Fisheries Office Replacement (Mathis)	Construction		\$3,522,744.94	March-23
Pond liners at the A.E. Wood Fish Hatchery	Design	\$3,858,411.00		Spring - 23
Exhibit Improvements at the Texas Freshwater Fisheries Center (TPWF)	Design	\$4,000,000.00		Fall - 24



## Agency-wide Collaboration

**Deepwater Horizon** — During 2022, the Deepwater Horizon Oil Spill Texas Trustee Implementation Group (TIG) planned for and implemented restoration projects across the state. A few highlights are described here. On the upper Texas coast, construction began to restore approximately 17 miles of gulf-facing shoreline which would help protect fragile marshes behind the beach dunes. In Galveston Bay, construction of a bird island rookery island was completed, and dredged material was beneficially used to increase elevation and restore Pierce marsh. On the lower Texas coast, a pilot channel connecting the Brownsville Ship Channel to the Bahia Grande was widened to reduce salinities and improve habitat for fish and wildlife.

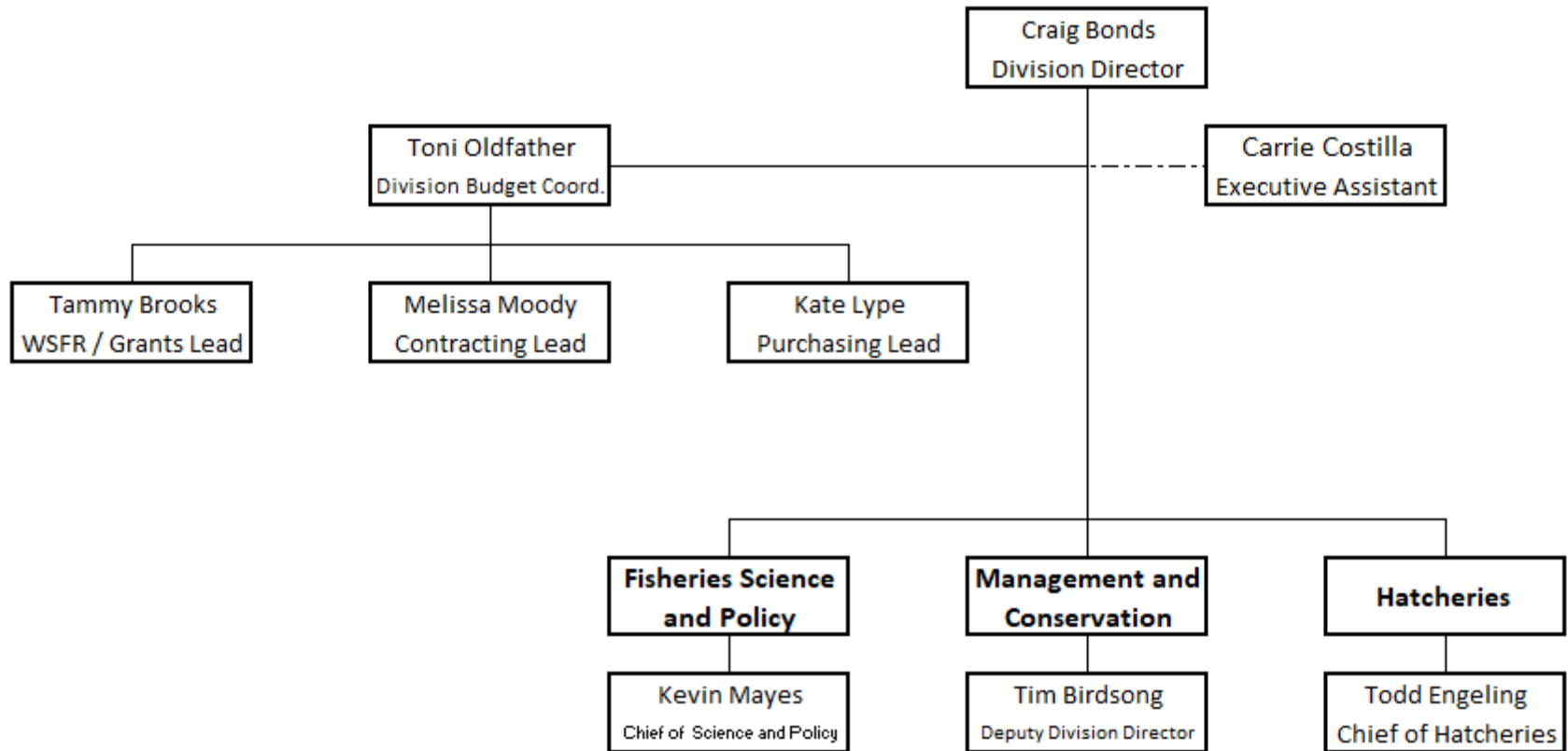
Additionally, the TIG finalized a restoration plan to restore for injuries within the following restoration types: wetlands, coastal, and nearshore habitats; nutrient reduction; oysters; sea turtles; and birds. Thirteen preferred alternatives were selected for implementation for an approximate cost of \$39 million.

**Preparing to Expand the Scope and Scale of Fish Conservation through the Recovering America's Wildlife Act** — The Recovering America's Wildlife Act, federal legislation repeatedly filed for consideration by U.S. Congress, has the potential to provide an unprecedented level of financial investment nationally in the conservation of SGCN, a status generally afforded to at-risk species in need of conservation intervention. Congress currently requires each U.S. state and territory to assemble and routinely update State Wildlife Action Plans (SWAPs), which emphasize actions necessary to conserve SGCN and prevent the need for their listing as threatened or endangered under the U.S. Endangered Species Act. Current federal funding for implementation of SWAPs is primarily provided through the State Wildlife Grants Program, which allocates approximately \$50 million annually. In Texas alone, estimated annual funding needed to effectively implement the SWAP is \$132 million (including \$6.2 million annually to conserve the 106 species of freshwater fish and mussels recognized as SGCN). In 2021, the Recovering America's Wildlife Act was again introduced into the 117<sup>th</sup> U.S. Congress as a strategy to address this funding shortfall by dedicating \$1.3 billion annually to implement SWAPs (\$57.4 million annually in Texas). In support of fish conservation efforts in Texas, this funding would help fill critical research needs, expand monitoring programs, restore or enhance degraded habitats, restore connectivity in fragmented rivers and other natural landscapes, preserve intact habitats through conservation easements, propagate and repatriate fish populations, and deliver a multitude of other actions necessary to restore and preserve fish SGCN. To prepare for possible passage of the Act, the Inland Fisheries Division cooperated with the TPWD Wildlife Division, Coastal Fisheries Division, Law Enforcement Division, and others to assemble lists of priority projects and a short-term investment strategy for Texas. Although the Act ultimately failed to pass before the end of the 117<sup>th</sup> U.S. Congress, it is anticipated that the Act will be reintroduced again in the 118<sup>th</sup> U.S. Congress, at which time the investment strategy assembled by TPWD will likely be revisited, updated, and refined.

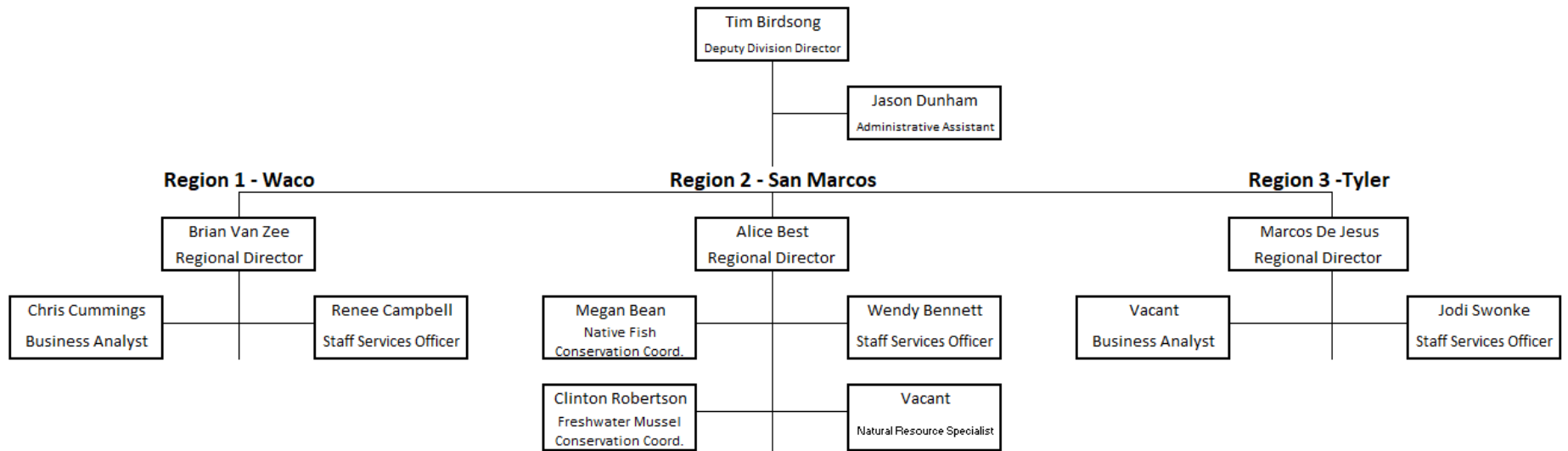
# **APPENDIX**

# Organization Charts

## Inland Fisheries Administration

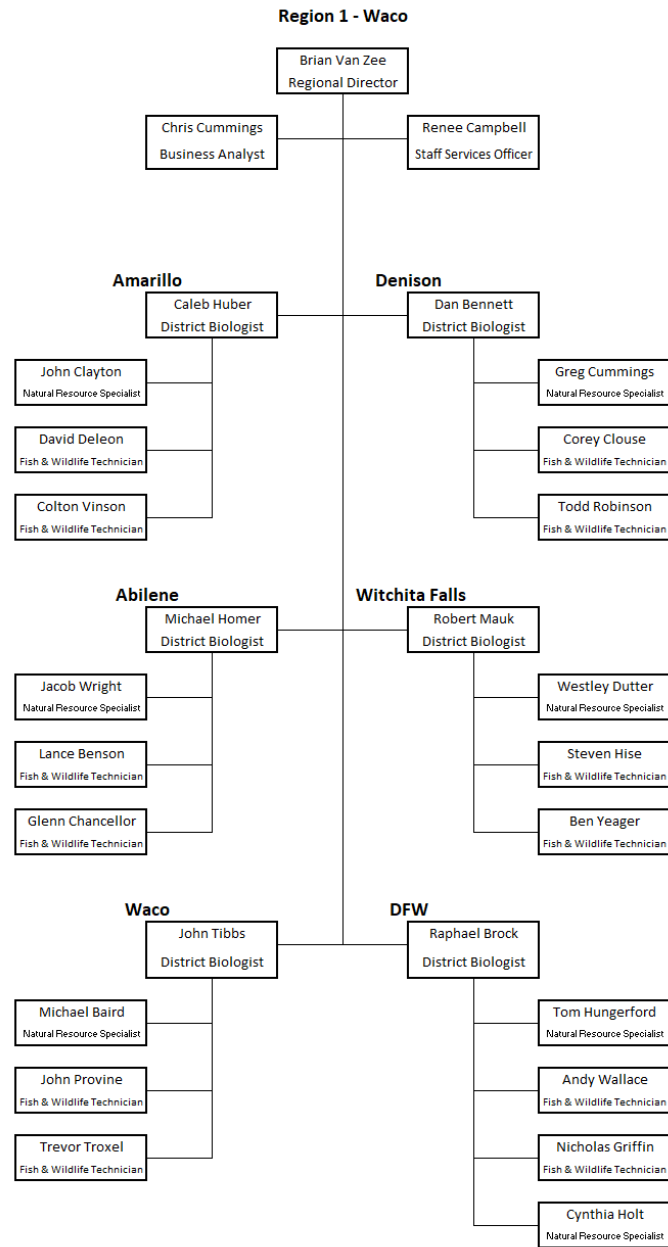


# Management and Conservation

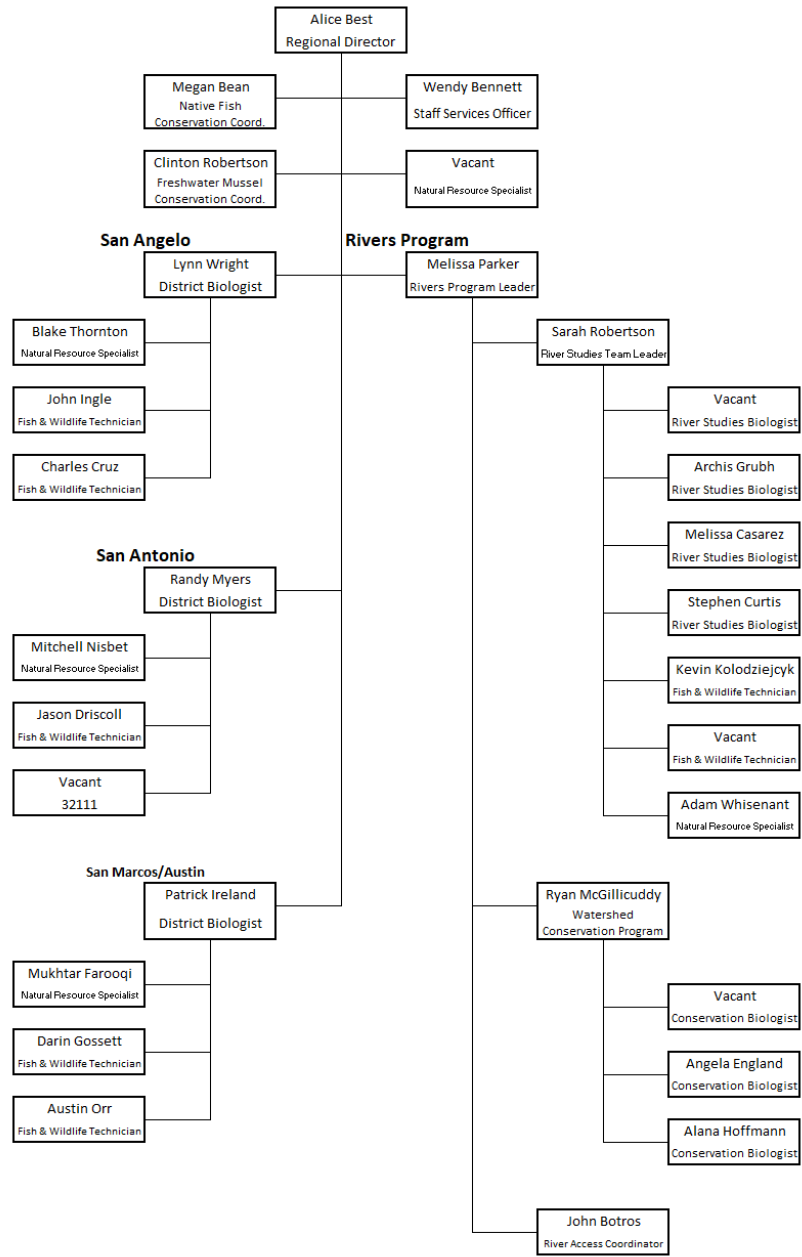


Regional district office staff listed on the following three pages.

# Management and Conservation-Region 1

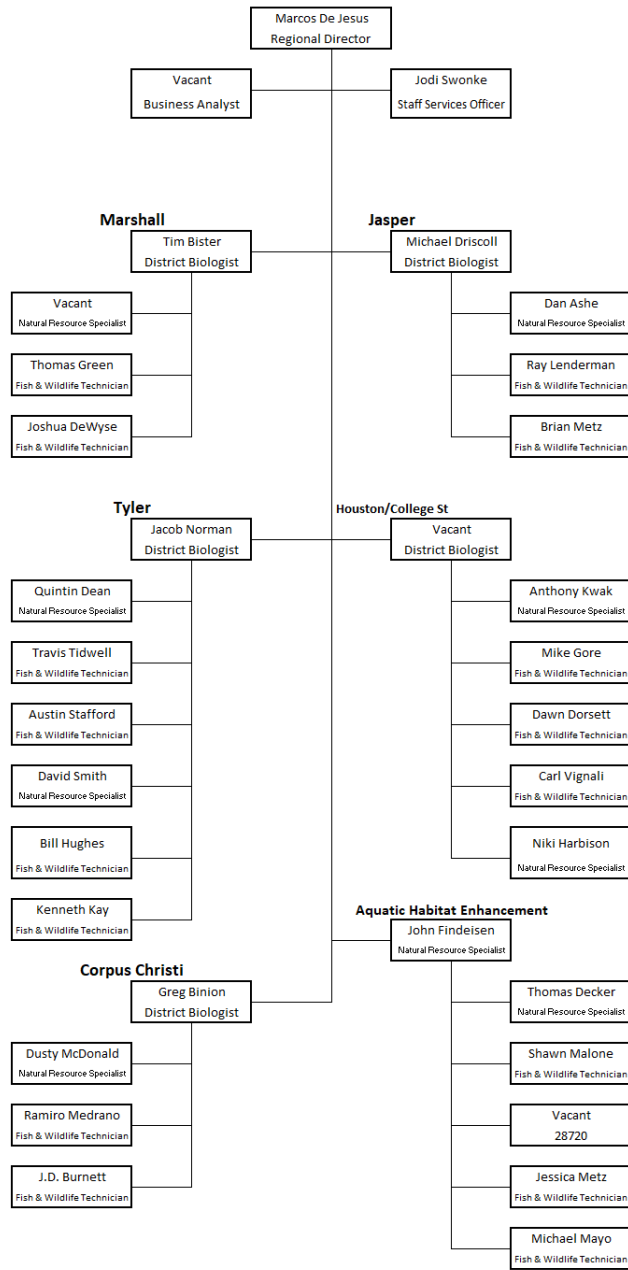


# Management and Conservation-Region 2

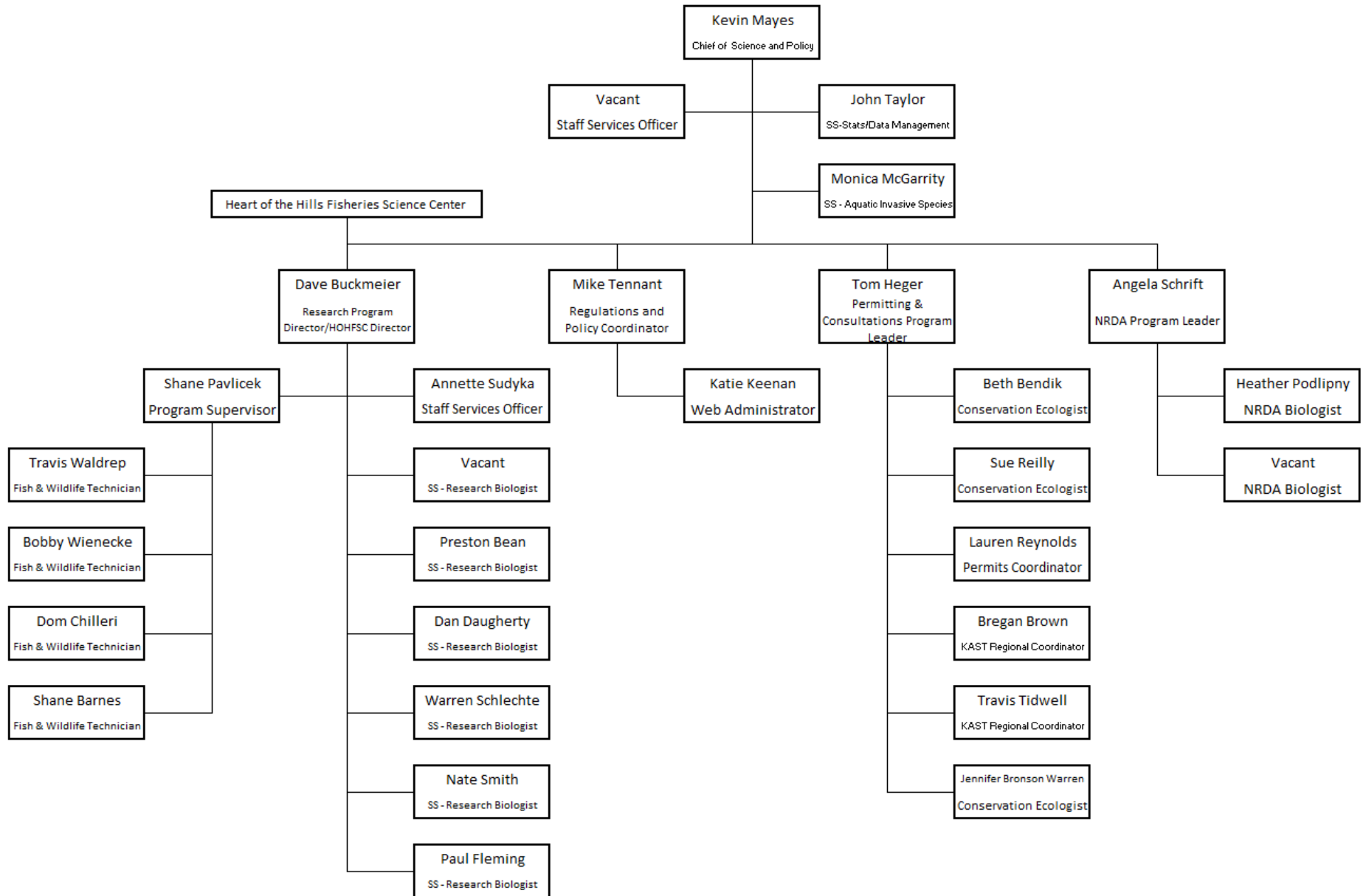




# Management and Conservation-Region 3



# Fisheries Science and Policy



# Hatcheries

Todd Engeling  
Chief of Hatcheries

## Region 1 Hatcheries - San Marcos

## Region 2 Hatcheries - Possum Kingdom

Carl Kittel  
Hatchery Program Director

Melissa Schmidt  
Staff Services Officer

Neil Pugliese  
Hatchery Program Director

### A. E. Wood Fish Hatchery

### John D. Parker East Texas Fish Hatchery

### Texas Freshwater Fisheries Center

### Dundee Fish Hatchery

### Possum Kingdom Fish Hatchery

Mike Matthews  
Hatchery Manager

Reese Sparrow  
Hatchery Manager

Tony Owens  
Hatchery Manager

Brandon Early  
Hatchery Manager

Ryan Rogers  
Hatchery Manager

Hugh Glenewinkel  
Natural Resource Specialist

Trey Kunz  
Fish & Wildlife Technician

Kris Dowd  
Fish & Wildlife Technician

Nichole Carpenter-Pack  
Fish & Wildlife Technician

Andrew Roig  
Fish & Wildlife Technician

Josh Porter  
Fish & Wildlife Technician

Zach Zemanek  
Natural Resource Specialist

Ty Moorhead  
Fish & Wildlife Technician

John Powell III  
Fish & Wildlife Technician

Anthony Brindza  
Fish & Wildlife Technician

Jeremy Gillert  
Natural Resource Specialist

Shane Carter  
Fish & Wildlife Technician

Lynn Blumen  
Fish & Wildlife Technician

Cody Ray  
Fish & Wildlife Technician

Garrick Wood  
Natural Resource Specialist

Cody Talley  
Fish & Wildlife Technician

Vacant  
Fish & Wildlife Technician

Kristin Holbert  
Fish & Wildlife Technician

Heather Genuise  
Fish & Wildlife Technician

Sam De Los Santos  
Fish & Wildlife Technician

Brian LaLonde  
Fish & Wildlife Technician

Courtney Thompson  
Natural Resource Specialist

Vacant  
Fish & Wildlife Technician

Shane Griffin  
Fish & Wildlife Technician

Wesley Reinert  
Fish & Wildlife Technician

Zachary Hurst  
Fish & Wildlife Technician

Vacant  
Fish & Wildlife Technician

Stephanie Carter  
Fish & Wildlife Technician

David Prangnell  
Natural Resource Specialist

Colton Brown  
Fish & Wildlife Technician

Ryan Fontana  
Fish & Wildlife Technician

Bryan Norris  
Fish & Wildlife Technician

Vacant  
Fish & Wildlife Technician

Brandy Thompson  
Natural Resource Specialist

Vacant  
Fish & Wildlife Technician

Mathew Dove  
Fish & Wildlife Technician

Cody Stites  
Fish & Wildlife Technician

Shylee Balla  
Fish & Wildlife Technician

Donovan Patterson  
Natural Resource Specialist

Derek Reeder  
Fish & Wildlife Technician

Elizabeth Foster  
Fish & Wildlife Technician

Jordan Harris  
Fish & Wildlife Technician

Marissa Ferguson  
Fish & Wildlife Technician

Hunter Hrnclrik  
Maintenance Specialist

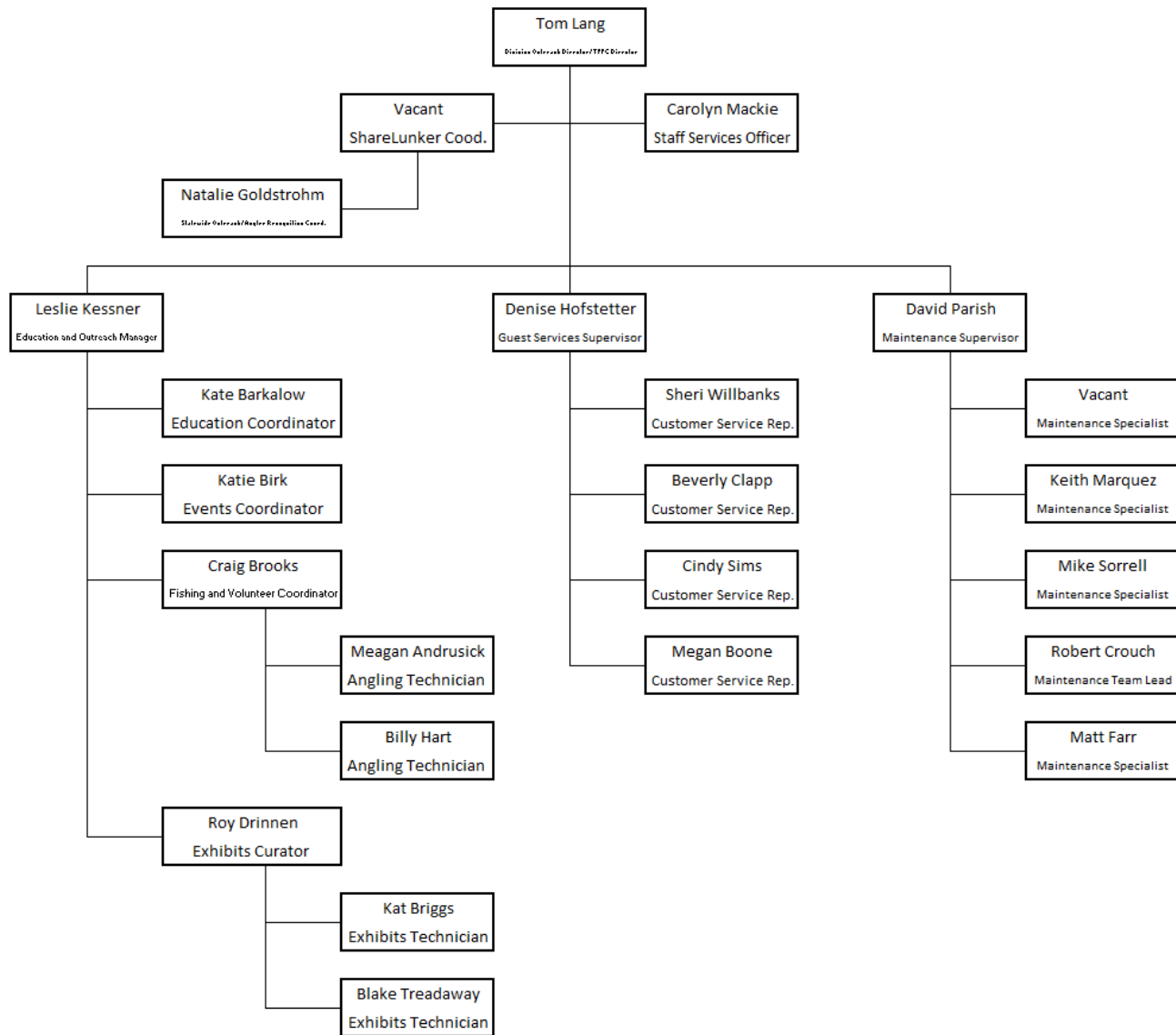
Jimmy Pippins  
Maintenance Specialist

Zachary Freer  
Maintenance Supervisor

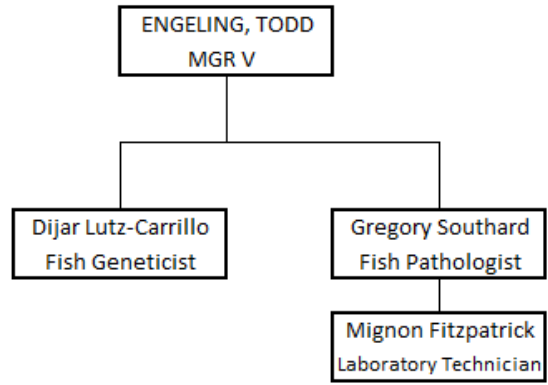
David Stephens  
Maintenance Specialist

Michael Kane  
Maintenance Supervisor

# Texas Freshwater Fisheries Center



# Analytical Services



# Stocking Reports

## Inland Fisheries Hatchery Stockings

Species	Adult	Fingerling	Fry	Total
Blue catfish		746,130		746,130
Bluegill	1,616	275,393		277,009
Channel catfish	1,395	550,371		551,766
Flathead catfish	100			100
Florida largemouth bass	416			416
Guadalupe bass		21,629		21,629
Largemouth bass	238	241,285	523,679	765,202
Lone Star Bass		4,820,647	382,081	5,202,728
Paddlefish		10,700		10,700
Rainbow trout	383,904	1,243		385,147
Red drum		987,582		987,582
ShareLunker largemouth bass	1,627	223,895		225,522
Smallmouth bass	343	221,198	11,250	232,791
Striped bass	267	998,029	424,714	1,423,010
Sunshine Bass (white bass x striped bass hybrid)		4,042,333	8,136,859	12,179,192
Threadfin shad	24,950			24,950
Triploid grass carp	1,057			1,057
Walleye			4,519,600	4,519,600
White bass	101			101
<b>Totals</b>	<b>416,014</b>	<b>13,140,435</b>	<b>13,998,183</b>	<b>27,554,632</b>



## Projects Supported by the Habitat and Angler Access Program

- *Angler Access Improvements on the Nueces River at Cooksey Park* – The project involves construction of an ADA-compliant fishing access ramp with railings and expansion of shoreline fishing access areas at Cooksey Park on the Nueces River near the City of Uvalde.
- *Angler Access Improvements on the Colorado River at the Texas River School's River Camp* – The project will provide parking area improvements including lighting, parking lot, and the installation of a floating dock at the Texas River School River Camp.
- *Bandera Angler Park on the Medina River* – This project will create three concrete fishing pads, parking, and a gravel road in the park. One of the pads will be ADA-accessible and include rails and rod holders. The clearing of targeted fishing access points will be conducted along with the establishment of grow zones between the points. The project includes the construction of improved access trails, improved parking areas, and installation of an information kiosk at the Bandera City Park on the Medina River.
- *Central Texas Streams Riparian Reforestation Program* – The project will restore riverscapes and improve stream habitat conditions in Central Texas creeks and rivers through the planting of 50,000 riparian trees.
- *City of Early Town Center Pond Fish Habitat Establishment and Shoreline Stabilization* – This project involves the renovation and expansion of an existing pond through dredging, addition of structural habitat, vegetation plantings, placement of fish attractors, and addition of a diffuse aeration system.
- *City of Early Town Center Fishing Piers* – This project involves construction of two fishing piers with seating, lighting, and ADA-compliant access.
- *Fish Habitat and Angler Access Improvements at Old Hidalgo Pump House Channel* – This project involves installation of a T-head fishing pier, an additional fishing dock, placement of fish habitat structures, and addition of a diffuse aeration system at the Old Hidalgo Pump House Channel in the City of Hidalgo in the Rio Grande Valley.
- *Fish Habitat Improvements at Resoft Park in Brazoria County* – This project will enhance fish habitat through native aquatic vegetation plantings in the community fishing lake at Resoft Park located within the City of Alvin. The improvements will help restore habitat that has been degraded by erosion and invasive species.
- *Lady Bird Lake Habitat and Access Improvements* – This project will stabilize eroded banks, control invasive riparian vegetation, and improve angler access along shoreline segments at three sites on Lady Bird Lake in the City of Austin.
- *Lake Dunlap Habitat Improvements* – This project will restore fisheries through shoreline and structural habitat lake-wide to pre-existing lake habitat conditions. In May of 2019, the dam gate structure failed, which led to the dewatering of the lake. The lake will be refilled over the next two years, creating a prime opportunity to implement in-lake structural habitat enhancement.
- *Lake Fork Fish Habitat Enhancement* – This project will enhance fish habitat at Lake Fork by establishing native vegetation such as waterwillow and eelgrass. In addition, 10 floating grass planters will be constructed to create new and expand existing areas of fish habitat for the popular largemouth bass fishery.
- *Lake Lewisville Kayak Angler Access* – This project will create an ADA-accessible kayak launch at Cottonwood Park in the City of Little Elm.
- *Lake Wichita Kayak Launch* – This project will create an ADA-accessible kayak launch to expand paddling access on Lake Wichita.
- *Lake Murvaul Native Plant Restoration* – This project will expand native vegetation to improve the aquatic plant community and mitigate losses of native vegetation from invasive exotic plant control efforts.

- *Neighborhood Fishin' Program Shoreline Habitat and Fishing Access in the Houston Area* – This project involves construction of fishing boardwalks, native aquatic vegetative habitat enhancement, and structural habitat improvements. Signage will provide visitors with information about the importance of riparian and aquatic vegetative habitat, fish species, and how to fish.
- *Neighborhood Fishin' Program Water Quality Improvements in the Dallas/Ft. Worth Area* – This project will install aeration systems to improve water quality at urban waterbodies located in the cities of Mesquite, Duncanville, and Fort Worth.
- *Riparian Restoration & Bank Stabilization on the Paluxy River in Dinosaur Valley State Park* – This project will improve riparian habitat, address bank erosion, and increase fishing access to the Paluxy River near Dinosaur Valley State Park.
- *Riparian Restoration at San Felipe Creek* – This project involves construction of a swale to intercept and filter stormwater runoff, planting of native vegetation to restore the stream corridor, and access improvements for paddling and angling.
- *Small Craft and Shoreline Access on Middle Bosque on Lake Waco* – This project will improve shoreline access, install small craft ramps, and expand parking capacity on the Middle Bosque on Lake Waco.

# Active Research Studies

## INTERNAL RESEARCH (FUNDED WITH SPORT FISH RESTORATION OR STATE FUNDING)

- Spatial patterns of Guadalupe Bass x Spotted Bass hybridization in Texas rivers. Preston Bean, Dijar Lutz-Carrillo, Nate Smith, and Paul Fleming.
- Trajectory of habitat and fish assemblages in the Llano River watershed following a large-scale flood. Preston Bean.
- Customer segmentation: identifying markets where fisheries marketing may be effective. Kris Bodine, Paul Fleming, Warren Schlechte, and John Taylor.
- Abundance and movement of juvenile and adult Guadalupe Bass in headwater streams on the Edwards Plateau. Nate Smith and Paul Fleming.
- Use of fine-scale population abundance and genetic data to inform Guadalupe Bass restoration stocking. Nate Smith, Paul Fleming, and Dijar Lutz-Carrillo.
- Spatial distribution and habitat association of fishes at the river-reservoir ecosystem scale. Paul Fleming, Dave Buckmeier, Nate Smith, Archis Grubh, Sarah Robertson, and Michael Homer.
- Inland and coastal Alligator Gar: do differences warrant local-scale management? Dan Daugherty, Paul Fleming, Michael Baird, and Clint Robertson.
- Angling-induced dynamics of fish use of artificial structures. Dan Daugherty, Michael Homer, Preston Bean, Caleb Huber, Mark Mitchell (WL) and Ryan Reitz (WL).
- *Morone* fry early feed utilization and feed transitions. Neil Pugliese, Mike Matthews, Reese Sparrow, and Ryan Rogers.
- *Morone* fry deformities as related to maternal stress. Mike Matthews, David Prangnell, and Hugh Glenewinkel.
- YY male carp broodstock development – feminization protocol for carp. Carl Kittel and Mike Matthews.
- Effects of spawning structure on Smallmouth Bass spawn success in raceways and fry production. Reese Sparrow and Zachary Zemanek.
- Use of ozonated water for Phase 1 Striped Bass production: effect of two pond filling strategies on pond production performance. Ryan Rogers.
- Comparison of egg size and volume from wild caught and F1 domestic Striped Bass broodstock. Ryan Rogers and Courtney Thompson.
- Comparison of inorganic and organic fertilizing strategies for use with filtered and sterilized production pond water. Courtney Thompson and Ryan Rogers.
- Effects of feeding regimes on the proximate composition and condition indices of Koi used as forage. Donovan Patterson and David Prangnell.
- Comparison of early growth rates of Florida Bass fry compared to ShareLunker offspring fry. Elizabeth Foster and Donovan Patterson.
- Impact of forage feeding rate on Florida Bass broodfish spawning. Donovan Patterson, Carl Kittel and Delbert Gatlin (TAMU).
- Effects of selected oxidants on *Prymnesium parvum* cell density and toxicity. Greg Southard.
- ShareLunker and Florida Bass genetic research. Dijar Lutz-Carrillo.
- Population structure and hybridization in Headwater Catfish. Dijar Lutz-Carrillo, Megan Bean, Josh Perkin and Stephanie Parker (TAMU).
- Population structure and hybridization in west Texas *Gambusia* and *Cyprinodon* species. Dijar Lutz-Carrillo and Megan Bean.
- Sequencing of the Florida Bass genome. Dijar Lutz-Carrillo.
- Identifying native lineages of Largemouth Bass in Texas. Dijar Lutz-Carrillo.

- Evaluation of hybrid Striped Bass stocking rates, relative abundance, and angler distribution in Texas reservoirs. Lynn Wright and Tim Bister.
- Evaluation of growth and survival of standard hatchery produced and selectively bred Florida Largemouth Bass: implications for stocking success and efficiency. Greg Binion and Muhktar Farooqi.
- Blue and Channel Catfish growth, mortality, and gill net selectivity in Texas reservoirs. Lynn Wright, Michael Homer, John Tibbs, Greg Binion, Greg Cummings, and Quintin Dean.
- Developing partnerships strategically to influence fishing participation. Tom Lang.
- Effects of PVC cube habitat structures on angling success in an urban reservoir. Cynthia Holt and Kris Bodine.
- Population assessment of the Alligator Gar in the lower Brazos River, Texas. Michael Baird.
- Evaluation of the utility of self-reported creel survey data using smartphone technology. Natalie Goldstrohm and John Clayton.
- Comparison of recruitment, growth, and catch of Palmetto Bass and Sunshine Bass fingerlings in Texas. Michael Homer Jr., Robert Mauk, John Tibbs, and Rafe Brock.
- Stocking sub-adult northern Largemouth Bass in a power plant reservoir. Randy Myers.
- Depressurization illness in tournament-caught Largemouth Bass at Amistad Reservoir and comparison of treatment methods. Randy Myers.
- Evaluation of ghost-fishing of abandoned trotlines in a Texas reservoir. Dusty McDonald.
- Comparison of catfish harvest between anglers using active and passive angling gears in a Texas reservoir. Greg Binion.
- Economics and characteristics of large (>200) fishing tournaments at Lake Fork Reservoir. Dan Bennett, Jake Norman, Kevin Storey, and Todd Driscoll.
- Recruitment success of fry-stocked hybrid Striped Bass in Texas reservoirs. Jake Norman.
- Habitat use and movement of Largemouth Bass at Toledo Bend and Lake Fork Reservoirs. Todd Driscoll and Jake Norman.
- Assessing the impact of forward-facing sonar (FFS) utilizing creel data within Texas reservoirs. David Smith, Jake Norman, and Dan Bennett.
- Methodology development of using camera traps for *Cyprinodon* monitoring. Robert Mollenhauer, Megan Bean, Dominik Chilleri, Preston Bean, Josh Perkin (TAMU), and Matt Acre (USGS).
- Assessment of impacts to mussel community structure from a new wastewater discharge in the Sabine River. Clint Robertson and Adam Whisenant.

#### **Funded with USFWS State Wildlife Grant**

- Assessing the fishery and economic value of a restored Guadalupe Bass population. Jeff Hutchinson (UTSA), Randy Myers, Mitch Nisbet, and Gordon Linam.
- Assessing the restored Guadalupe Bass population in the Mission Reach, San Antonio. Matt Troia (UTSA), Randy Myers, Mitch Nisbet, and Gordon Linam.
- Alligator Gar population connectivity and habitat use in the Trinity River National Wildlife Refuge. David Hoehinghaus and Wesley Homan (UNT), Nate Smith, Dan Ashe, and Clint Robertson.
- Multiscale thermal vulnerability for fishes in urbanizing, spring-influenced streams of central Texas. Matt Troia and Nick Loveland (UTSA), Marty Kelly (CF), David Young, Warren Schlechte, and Nate Smith.
- Evaluating resilience and vulnerability of fish assemblage structure to intermittent flow. Jane Rogosch (TTU/USGS), Cienna Hanson (TTU), Nate Smith, and Clint Robertson.
- Identifying environmental flow thresholds for fish species and communities in Texas. Ryan McManamay and Ryan King (Baylor), Ryan Smith (TNC), Kevin Mayes, David Young, and Preston Bean.

- Distribution, abundance, and current status of Llano River Carpsucker. Josh Perkin, Gary Voelker, Kevin Conway, and Hayden Roberts (TAMU), Henry Bart (Tulane), and Preston Bean.
- Assessing the swimming performance of Species of Greatest Conservation Need fishes of the Guadalupe River to inform stream crossing design and barrier prioritization. Ed Mager and Cameron Emadi (UNT), and Preston Bean.
- Developing and validating bioenergetics models for Guadalupe Bass. Matthew Troia (UTSA), Preston Bean, and Mitch Nisbet.
- Lateral movements and tributary habitat uses of Alligator Gar in the Middle Brazos River. Josh Perkin and Hayden Roberts (TAMU), Matt Acre (USGS), and Dan Daugherty.
- Surveys for Ephemeroptera, Plecoptera, and Trichoptera Species of Greatest Conservation Need. Lance Williams, Marsha Williams, Matthew Greenwold, and Alexander Beemer (UT Tyler), and Archis Grubh.
- Risk assessment and conservation of five narrowly endemic crayfish in eastern Texas. Christopher Taylor and Dusty Swedberg (Illinois Natural History Survey), and Archis Grubh.
- Evaluation of population persistence for *Popenaias popeii*, Texas Hornshell, in the Devils River. Charles Randklev (TAMU Natural Resource Institute) and Clint Robertson.
- Host fish use, reproduction, and propagation potential of two East Texas threatened mussel species. Charles Randklev (TAMU Natural Resource Institute) and Clint Robertson.
- Developing conservation action decision support tool from the NatureServe Rank Calculator. Charles Randklev (TAMU Natural Resource Institute) and Clint Robertson.
- Mussel age validation. Charles Randklev (TAMU Natural Resource Institute) and Clint Robertson.
- Examining the conservation status of freshwater mussels in Texas. Charles Randklev (TAMU Natural Resource Institute) and Clint Robertson.
- Examining trematode infestations at mussel biodiversity hotspots throughout the state. Charles Randklev (TAMU Natural Resource Institute) and Clint Robertson.
- Population genomics in imperiled mussels and their hosts in the Guadalupe River. Mark Kirkpatrick and Chase Smith (UT), and Clint Robertson.
- Conservation status and life history of imperiled fish species East Texas streams. Carmen Montaña-Schalk (SFASU), Bjorn Schmidt (TAMU Commerce), Stephen Curtis, and Kevin Mayes.
- Gap sampling within the Texas Native Fish Conservation Areas Network. Dean Hendrickson and Adam Cohen (UT), Melissa Casarez, Sarah Robertson, and Stephen Curtis.
- American Eel: Utilizing modern techniques to assess conservation status in Texas. Dean Hendrickson (UT), Stephen Curtis, and Melissa Casarez.
- Extensive field effort using a novel gear type to detect recruitment of American Eel (*Anguilla rostrata*) in Texas. George Guillen (UHCL), Jenny Oakley (UHCL), and Stephen Curtis.
- American eel ramp network. George Guillen (UHCL) and Stephen Curtis.
- Assessment and prioritization of barriers in the Upper Guadalupe River upstream from Canyon Reservoir, Texas – a pilot project. Kimberly Meitzen (TXST), Jessica Graham (SARP), Kathleen Hoenke (SARP), and Stephen Curtis.
- Assessment of *Gila pandora* in Little Aguja Creek (Davis Mountains), Texas. Scott Collins (TTU), Jane Rogosch (TTU/USGS), and Megan Bean.
- Implementing conservation delivery and developing conservation networks for Species of Greatest Conservation Need in the Chihuahuan Desert. Jeff Bennett (Rio Grande Joint Venture) and Megan Bean.
- Population genetic structure of five Species of Greatest Conservation Need in the Pecos and Devils Rivers. Kevin Conway (TAMU), David Portnoy (TAMU Corpus Christi), and Megan Bean.
- Distribution and species distribution modeling of Headwater Catfish. Josh Perkin (TAMU) and Megan Bean.

- Temporal trajectories and landscape correlates for stream fish community change in central and west Texas. Josh Perkin (TAMU) and Megan Bean.
- Distance sampling and species distribution modeling of Conchos Pupfish. Josh Perkin (TAMU) and Megan Bean.
- Food habitats of Species of Greatest Conservation Need fishes to inform habitat assessment and restoration in the Red River Basin. Scott Collins (TTU), Jane Rogosch (TTU/USGS), Bart Durham (Lubbock Christian), and Sarah Robertson.
- Hydrologic monitoring of priority habitats in the Devils River. Jon Paul Pierre (UT Bureau of Economic Geology) and Sarah Robertson.
- Airborne Lidar bathymetry survey and aquatic habitat evaluation for Devils River Minnow and Texas Hornshell Mussel in the Devils River. Brian Hunt (UT Bureau of Economic Geology) and Sarah Robertson.
- Cypress paired-watershed efflow refinement – Caddo Cypress Riparian Stewardship. Tom Hayes (TCS) and Kevin Mayes.
- Assessing ammonia toxicity of Texas unionid mussels. Astrid Schwalb (TXST), Somerley Swarm (USFWS), Lee Gudgell (GBRA), and Clint Robertson.
- Riparian productivity in three Texas river basins. Tom Hayes (Texas Conservation Service) and Kevin Mayes.

#### **Funded with USFWS Sport Fish Restoration**

- Use of lapsed-angler focus groups to inform R3 efforts. Sherry Matthews Group, Kris Bodine, Paul Fleming, Warren Schlechte, John Taylor, Dan Daugherty, Zack Thomas (CF), and TPWD Communications.
- Survey of anglers in Texas that recruited during the COVID pandemic. Sherry Matthews Group, Warren Schlechte, John Taylor, Kris Bodine, Dan Daugherty, Zack Thomas (CF), and TPWD Communications.
- Dimensions of diversity in urban fisheries: examining habitat, fish, and anglers to inform the management of Texas Community Fishing Lakes. Scott Collins and Travis Ausec (TTU), Warren Schlechte, Rafe Brock, Caleb Huber, and Preston Bean.
- Economic impacts of Lake Texoma recreational fishing. Rebekka Dudensing (TAMU AgriLife), Andrew Ropicki (UFL/Florida Sea Grant), Dan Bennett, and Matt Mauck (ODWC).

#### **Funded with State Aquatic Invasive Species**

- Assessing abundance, sex ratio, and space use by suckermouth armored catfish to enhance control efforts. Josh Perkin (TAMU), Thomas Heard, (TXST Meadows Center), Dan Daugherty, and Monica McGarrity.
- Near real-time detection and monitoring of invasive mussel species in Texas waterways. Greg Hamerly and Ryan McManamay (Baylor), and Monica McGarrity.
- Assessing the population dynamics and body condition of zebra mussels within and between two Texas water bodies with different population trajectories: Lakes Belton and Stillhouse Hollow. Jason Locklin (Temple College), Brian Van Zee, and Monica McGarrity.
- Using remote sensing to map *Arundo donax* populations in Native Fish Conservation Areas throughout Texas to better understand causal factors of invasion and set management priorities. Jason Martina (TXST) and Monica McGarrity.
- Assessing pathways of introduction of non-native fishes (Sheepshead Minnow: *Cyprinodon variegatus* and Gulf Killifish: *Fundulus grandis*) in Texas streams. Carmen Montaña-Schalk (SFASU), Joshua Perkin (TAMU), Kevin Mayes, and Monica McGarrity.



- Evaluating the suppression of *Hydrilla verticillata* by manual removal and planting native aquatic plants. Jeffrey Hutchinson (UTSA), Sarah Haas, and Monica McGarrity.
- Growth, survival, and reproductive success of zebra mussels. Michael Misamore (TCU), Sarah Haas, and Monica McGarrity.
- Impact of zebra mussels on unionid mussels, population dynamics and limiting factors for growth and survival. Astrid Schwalb (TXST) and Monica McGarrity.
- Monitoring of hydrologic effects of saltcedar control in the upper Brazos River Basin, Texas. Tyson McKinney, Tara Bongiovanni, Jon Paul Pierre, and Michael Young (UT Bureau of Economic Geology), Kevin Mayes, and Monica McGarrity.
- Assessment of passive revegetation of upper Brazos River Basin saltcedar management sites. Tom Hayes (Texas Conservation Science) and Monica McGarrity.
- Geomorphic characteristics of the upper Brazos River in response to invasive saltcedar management. Kimberly Meitzen (TXST), Kevin Mayes, and Monica McGarrity.

### **Miscellaneous Funding**

- Distribution and population demographics of invasive carp in the lower Red River Basin. Shannon Brewer (Auburn), Scott Collins (TTU), and Monica McGarrity. Funding – USFWS Invasive Carp
- Zebra mussel monitoring in Texas water bodies. Astrid Schwalb (TXST), and Monica McGarrity. Funding – USFWS ANS Management Plan Implementation
- Population structure of Pecos Pupfish. Joanna Hatt (NMDFG) and Megan Bean. Funding – New Mexico Department of Game and Fish
- Conservation of Diamond Y Preserve and management of aquatic resources. Ryan Smith (TNC) and Megan Bean. Funding – National Fish and Wildlife Foundation.
- Examining OTC uptake and visible staining in calcified structures of fishes. Derek Crane (CCU), Meredith Pfennig (CCU), Nate Smith, and Dave Buckmeier. Funding – Coastal Carolina University
- Hydraulic connectivity to riverine habitats in the Colorado and Lavaca basins. Tom Hayes (Texas Conservation Science), Dan Daugherty, and Kevin Mayes. Funding – Texas Water Development Board



## Scientific Publications and Reports

- Anderson, J., D. McDonald, E. Getz, R. Weixelman, F. Grubbs, and J. Ferguson. 2022. Distribution, maturity, age and growth of Gray Snapper (*Lutjanus griseus*) in the Northwestern Gulf of Mexico. *Gulf and Caribbean Research* 33:14-27.
- Best, A., J. S. Perkin, A. K. Pinion, H. Binkley, and K. W. Conway. 2022. First record of the Gangetic Swamp Eel, *Ophichthys cuchia* (Hamilton, 1822) (Teleostei:Synbranchidae), from Texas (USA) based on museum vouchered material, and confirmation of a second established non-native population in the USA. *Check List* 18:475-482. doi.org/10.15560/18.3.475
- de Moulpied, M., C. H. Smith, C. R. Robertson, N. A. Johnson, R. Lopez, and C. R. Randklev. 2022. Biogeography of freshwater mussels (Bivalvia: Unionidae) in Texas and implications on conservation biology. *Diversity and Distributions* 28(7):1458-1474. doi.org/10.1111/ddi.13555
- Goldsmith, A., J. M. Khan, C. R. Robertson, R. Lopez, and C. R. Randklev. 2022. Using upper thermal limits of *Lampsilis bracteata* (Texas Fatmucket) from the North Llano and San Saba rivers, Texas to inform water management practices in the Edwards Plateau. *Aquatic Conservation: Marine and Freshwater Ecosystems* 32(1):85-97. doi.org/10.1002/aqc.3749
- Kiser, A. H., J. M. Khan, C. R. Robertson, R. Lopez, and C. R. Randklev. 2021. The effect of flow and mussel species traits on the occurrence of rare mussels: a case study within selected rivers of the West Gulf Coastal Plain. *Aquatic Conservation: Marine and Freshwater Ecosystems* 32(1):98-111. doi.org/10.1002/aqc.3747
- McDonald, D. L., D. E. Ashe, and J. W. Schlechte. 2022. Diel (24 Hour) monitoring of fish cut bait and catch on freshwater trotlines. Texas Parks and Wildlife Department, Management Data Series 302, Austin.
- McDonald, D. L., J. W. Schlechte, D. A. Patterson, G. R. Binion and A. Boyles. 2022. Ghost-fishing by abandoned trotlines in a simulated and actual reservoir. *North American Journal of Fisheries Management* 42:839-848. doi.org/10.1002/nafm.10770
- Nguyen, E., J. S. Perkin, R. Smith, K. B. Mayes, and J. Trungale. 2021. Characteristics of the natural flow regime paradigm explain occurrence of imperiled Great Plains fishes. *Ecosphere* 12(9):e03669. doi.org/10.1002/ecs2.3669
- Pease, A., J. Pease, P. Bean, and T. Grabowski. 2022. Endemic Guadalupe bass *Micropterus treculii* are supported by isotopically distinct resources in tributary versus mainstem river food webs. *River Research and Applications* 38:1654-1659. doi.org/10.1002/rra.4015
- Pegg, M. A., D. L. Buckmeier, M. J. Hamel, and J. D. Koch. 2022. Creating a digital repository of calcified structures from known-age fishes, a century in the making. *Fisheries* 47:357-360. doi.org/10.1002/fsh.10773
- Smith, D. R., S. R. Midway, R. H. Caffey, J. M. Penn. 2022. Economic values of potential regulation changes for the Southern Flounder fishery in Louisiana. *Marine and Coastal Fisheries* 14(2):1-16. doi.org/10.1002/mcf2.10195
- Smith, D. R., M. A. Dance, J. West, S. R. Midway. 2021. Spatiotemporal variability of fishery-dependent indices in the declining Louisiana Southern Flounder fishery. *North American Journal of Fisheries Management* 41(6):1826-1837. doi.org/10.1002/nafm.10701
- Smith, N. G., D. L. Buckmeier, B. P. Fleming, A. R. Grubh, M. D. Homer, and S. M. Robertson. 2022. Spatial variability in the fish assemblage of a large Texas river-reservoir ecosystem with implications for managing fish in regulated rivers. *North American Journal of Fisheries Management*. doi.org/10.1002/nafm.10804
- Taylor, C. M., and K. B. Mayes. 2022. Impact of hydrologic alteration of Brazos River pelagophilic minnows. *Transactions of the American Fisheries Society* 151:474-486. doi.org/10.1002/tafs.10363

# Work with Other Organizations

## Program Contracts and Agreements

AMERICAN BIRD CONSERVANCY	Implementing Conservation Delivery and Developing Conservation Networks for Species of Greatest Conservation Need in the Chihuahuan Desert	\$21,682.69
AMERICAN FISHERIES SOCIETY	The Hutton Junior Fisheries Biology Program	\$10,000.00
ANDREW H SANSOM	Hershey Ranch - Bush Management, Enclosures, and Erosion Control under the WL Landowner Incentive Program (LIP)	\$10,857.55
ANGELINA-NACOGDOCHES COUNTIES WCID # 1	Control of giant salvinia <i>Salvinia molesta</i> and other aquatic or riparian plant species in Lake Striker	\$25,000.00
AUBURN UNIVERSITY	Evaluating the spatial and temporal distribution and ecology of Bighead and Silver Carp and native fishes of the Lower Red River basin	\$183,260.49
BAYLOR UNIVERSITY	Identifying environmental flow thresholds for fish species and communities in Texas	\$49,473.00
BAYLOR UNIVERSITY	Near real-time detection and monitoring of mussel species in Texas waterways	\$49,987.00
BRAZORIA COUNTY	Resoft County Park Shoreline Habitat Improvement	\$6,000.00
BRAZOS RIVER NATURE CENTER	Angler and Boater Access to the Brazos River	\$12,000.00
CHARLOTTE NADINE HOPSON	Angler and Boating Access to the Llano River	\$9,000.00
CHS CAMPING LLC	Angler lease access for the Guadalupe River at Camp Huaco Springs	\$2,600.00
CITY OF BANDERA	Bandera Angler Park	\$10,000.00
CITY OF HIDALGO	Old Hidalgo Pump House Channel Angler Access and Habitat Improvement Project	\$43,500.00
CITY OF WICHITA FALLS	Lake Wichita Kayak Launch for Shoreline and Bank Angler Access	\$31,500.00
COUNTY OF UVALDE	Cooksey Park Angler Access	\$30,000.00
CYPRESS VALLEY NAVIGATION DISTRICT	Boat lane maintenance and boater access on Caddo Lake and Big Cypress Bayou	\$35,000.00
FISHING'S FUTURE	George H.W. Bush Vamos A Pescar	\$10,000.00
GUADALUPE-BLANCO RIVER AUTHORITY	Control of water hyacinth <i>Eichhornia crassipes</i> and other aquatic or riparian plant species in the Guadalupe River & its tributaries	\$20,000.00
HILL COUNTRY ALLIANCE	Restoration, Landowner Outreach, and Community Engagement for Control of Arundo and Stewardship of Hill Country Rivers	\$51,975.00

JACK C MCCRARY	Angler and Boating Access on the Brazos River	\$6,000.00
JEAN S WEINKAUF DBA DICK'S CANOES	Angler Access to the Brazos River	\$10,260.68
JOANA LAAKE DBA PETE'S PECAN PATCH	Leasing Access by Anglers to the Llano River	\$9,000.00
KINGSLAND SLAB GROUP LLC	Angler and Boating Access to the Llano River	\$6,000.00
LAVACA-NAVIDAD RIVER AUTHORITY	Control of water hyacinth, <i>Eichhornia crassipes</i> , giant Salvinia, <i>Salvinia molesta</i> , and other invasive aquatic or riparian plant species in Lake Texana and its tributaries	\$51,975.00
LLANO RIVER WATERSHED ALLIANCE	Landowner and Community Engagement in Control of Giant Reed ( <i>Arundo donax</i> ) in the Upper Llano River Watershed, Fall 2021-Summer 2022	\$10,000.00
LOWER NECHES VALLEY AUTHORITY	Control of water hyacinth <i>Eichornia crassipes</i> , giant salvinia, <i>Salvinia molesta</i> , and crested floating heart, <i>Nymphoides hydrophylla</i> , on Sam Rayburn and B.A. Steinhagen (Dam B) reservoirs	\$150,000.00
M GLEN COLEMAN	Lease access for anglers and boaters on the South Llano River	\$8,250.00
MISSION PRESBYTERY DBA JOHN KNOX RANCH	Leasing Access by Anglers to the Blanco River	\$22,540.00
NOL DEAR	Lease access for anglers and boaters on the South Llano River	\$9,900.00
NUECES RIVER AUTHORITY	Project Arundo Control & Restoration, Pull. Kill. Plant. Sabinal, Frio and Dry Frio, Leona and Nueces Rivers and Turkey Creek	\$54,089.86
NUECES RIVER AUTHORITY	Project Arundo Control & Restoration, Pull. Kill. Plant. San Felipe Creek	\$41,607.10
PATSY L SPENCER DBA SHADY GROVE CAM	Angler and Boating Access to the San Marcos River	\$9,000.00
RANDY LEIFESTE	Angler and Boating Access to the Llano River	\$9,000.00
RICHARD BAYNE DBA BRAZOS OUTDOOR CENTER	Angler and Boater Access to the Brazos River	\$8,250.00
SAM HOUSTON STATE UNIVERSITY	The Texasinvasive.org Program	\$33,950.00
SANDRA J HIGHTOWNER	Angler and Boating Access to the Colorado River	\$9,000.00
SCOTT MAYES	Angler and Boating Access to the Llano River	\$12,000.00
SHINE & ASSOCIATES INC	Expert Services in connection with litigation in State of Texas v. Kenneth Berry, et al. in the 452nd Judicial District Court of Edwards County, Texas, Cause Number 4232.	\$10,000.00
SKYLINE RANCH DBA ED C DANIEL RANCH	River Access for Anglers on the Devils River in Val Verde County	\$24,000.00

TEXAS A&M AGRILIFE RESEARCH	Alligator Gar Lateral Movements and Habitat Uses in the Lower Brazos River	\$99,640.00
TEXAS A&M AGRILIFE RESEARCH	Measuring and Predicting Movement Ecology for Imperiled Great Plains Fishes in Texas	\$18,883.00
TEXAS A&M AGRILIFE RESEARCH	Assessing abundance, sex ratio, and space use by suckermouth armored catfish to enhance control efforts	\$30,345.00
TEXAS A&M AGRILIFE RESEARCH	Distribution, abundance, and current status of Llano River Carpsucker ( <i>Carpionodes</i> sp. cf. <i>carpio</i> )	\$22,202.00
TEXAS A&M AGRILIFE RESEARCH	Examining trematode prevalence at mussel biodiversity hotspots throughout the state	\$125.00
TEXAS A&M AGRILIFE RESEARCH	Examining the conservation status of freshwater mussels in Texas	\$40,447.00
TEXAS A&M AGRILIFE RESEARCH	Assessing the phylogenetic relationships and species boundaries of the genus <i>Truncilla</i> (Family: Unionidae) in Texas	\$32,036.99
TEXAS A&M AGRILIFE RESEARCH	Host fish use, reproduction, and propagation potential of two East Texas threatened mussel species	\$10,730.00
TEXAS A&M AGRILIFE RESEARCH	Ecological forecasting and conservation contingency planning for imperiled Great Plains fishes in Texas	\$33,449.04
TEXAS A&M UNIVERSITY-CORPUS CHRISTI (RTI)	Conservation Genomics of Pecos Pupfish ( <i>Cyprinodon pecosensis</i> )	\$23,700.00
TEXAS A&M UNIVERSITY-CORPUS CHRISTI (RTI)	Conservation genomic assessment of imperiled freshwater fishes endemic to the Pecos and Devils Rivers	\$72,068.00
TEXAS CONSERVATION SCIENCE, INC.	Riparian Productivity in Three Texas River Basins	\$11,275.17
TEXAS CONSERVATION SCIENCE, INC.	Cypress Basin Riparian Productivity and Environmental Flow Management: Trend Analysis and Paired-Watershed Assessment	\$21,938.39
TEXAS CONSERVATION SCIENCE, INC.	Hydraulic connectivity to riverine habitats in the Colorado and Lavaca basins	\$35,568.14
TEXAS CONSERVATION SCIENCE, INC.	Assessment of Passive Revegetation of Upper Brazos River Basin Saltcedar Management Sites	\$38,231.88
TEXAS STATE UNIVERSITY - SAN MARCOS	Using remote sensing to map <i>Arundo donax</i> populations in Native Fish Conservation Areas throughout Texas to better understand casual factors of invasion & set management priorities	\$48,663.00
TEXAS STATE UNIVERSITY - SAN MARCOS	Texas State University Salt Cedar Management	\$28,160.00
TEXAS STATE UNIVERSITY - SAN MARCOS	Assessing ammonia toxicity of Texas unionid mussels	\$37,872.00

TEXAS STATE UNIVERSITY - SAN MARCOS; #54	Zebra Mussel Monitoring in Texas Water Bodies	\$67,310.00
TEXAS TECH UNIVERSITY (RTI)	Evaluating resilience and vulnerability of fish assemblage structure to intermittent flow	\$32,518.00
TEXAS TECH UNIVERSITY (RTI)	Dimensions of diversity in urban fisheries: Examining habitat, fish, and anglers to inform the management of Texas Community Fishing Lakes	\$50,009.00
TEXAS TECH UNIVERSITY (RTI)	Ecology of Devils River Minnow <i>Dionda diaboli</i> in an invaded stream-riparia ecosystem	\$44,372.00
TEXAS TECH UNIVERSITY (RTI)	Population assessment of Asian carp ( <i>Hypophthalmichthys spp.</i> ) in the Sulphur River, Texas	\$54,225.00
THE CHAUTAUQUA FOUNDATION INC	Angler Access Project on the Colorado River	\$41,000.00
THE CHAUTAUQUA FOUNDATION INC	Angler and Boating Access to the Colorado River	\$6,000.00
TOWN LAKE TRAIL FOUNDATION DBA THE TRAIL	Longhorn Shores / Lady Bird Lake Habitat Improvement	\$20,800.00
TREEFOLKS INC	Central Texas Floodplain Reforestation Program	\$6,800.00
TRINITY RIVER AUTHORITY OF TEXAS	Control of giant salvinia, water hyacinth & other aquatic or riparian plant species in Lake Livingston & its tributaries	\$25,000.00
UNIVERSITY OF HOUSTON CLEAR LAKE (RTI); #62	Utilizing eDNA and Plankton Sampling to Monitor American Eel Recruitment in Texas	\$70,243.00
UNIVERSITY OF HOUSTON CLEAR LAKE (RTI); #62	Establishing a Network of Eel Ramps to Monitor Recruitment of Glass and Elver American Eel	\$49,285.00
UNIVERSITY OF NORTH TEXAS (RTI)	Assessing Swimming Performance to Inform Stream Crossing Design & Barrier Prioritization	\$12,340.00
UNIVERSITY OF NORTH TEXAS (RTI)	Alligator Gar Population Connectivity and Habitat Use in the Trinity River National Wildlife Refuge	\$38,469.41
UNIVERSITY OF TEXAS AT AUSTIN	Population genomics in imperiled mussels and their hosts in the Guadalupe River	\$33,333.00
UNIVERSITY OF TEXAS AT AUSTIN	Hydrologic Monitoring of Priority Habitats in the Devils River	\$28,151.91
UNIVERSITY OF TEXAS AT SAN ANTONIO	Assessing acute and chronic thermal sensitivity and exposure of spring-associated fishes	\$99,305.00
UNIVERSITY OF TEXAS RIO GRANDE VALLEY; #67	Fish Assemblages of the Rio Grande between Eagles Pass and Laredo, Texas	\$54,941.00
W T WAGGONER ESTATE INC	Dundee Fish Hatchery Easement on Waggoner Estate	\$13,125.00
WALTA PIPPEN COOKE	Leasing Access by Anglers to the Sabine River	\$6,000.00

WILLIAM D O'HARA DBA BILL  
O'HARA LAND SURVEYOR

Expert Services in connection with litigation in State  
of Texas v. Kenneth Berry, et al. in the 452nd  
Judicial District Court of Edwards County, Texas,  
Cause Number 4232.

\$10,000.00

## Grants and Donations — Incoming Funds

<b>Donor</b>	<b>Program</b>	<b>Amount</b>
Guadalupe River Trout Unlimited	Trout Intern/River Habitat	\$9,500
Memorial Donation	Freshwater Fishing	\$50
Texas Parks and Wildlife Foundation	Guadalupe Bass Conservation	\$500
Texas Parks and Wildlife Foundation	Neighborhood Fishin' Program	\$344,500
Texas Parks and Wildlife Foundation	Toyota Share Lunger Program	\$100,000
Sabine River Authority	Mussel Research	\$50,000
Sabine River Authority	Lake Fork/Toledo Bend Vegetation	\$130,000
Backcountry Hunters and Anglers	Hutton Scholar	\$4,000
U.S. Fish and Wildlife Service	State Wildlife Grant	\$723,818
U.S. Fish and Wildlife Service	Endangered Species	\$206,564
U.S. Fish and Wildlife Service	Aquatic Nuisance Species	\$99,233



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