

INLAND FISHERIES ANNUAL REPORT 2017



IMPROVING THE QUALITY OF FISHING



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Executive Director

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INLAND FISHERIES ANNUAL REPORT 2017



TEXAS PARKS AND WILDLIFE DEPARTMENT

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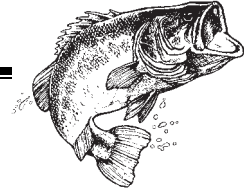
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INLAND FISHERIES OVERVIEW



Mission

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

Scope

The Inland Fisheries Division is responsible for managing the fishery resources in approximately 1,100 public impoundments and about 191,000 miles of rivers and streams together totaling 1.7 million acres. These resources are used by 1.8 million anglers, whose fishing activities result in at least \$960 million in trip and equipment expenditures.

Agency Goals

Texas Parks and Wildlife Department's Land and Water Resources Conservation and Recreation Plan (2015) establishes four primary goals to direct the agency's division operating plans and decisions 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

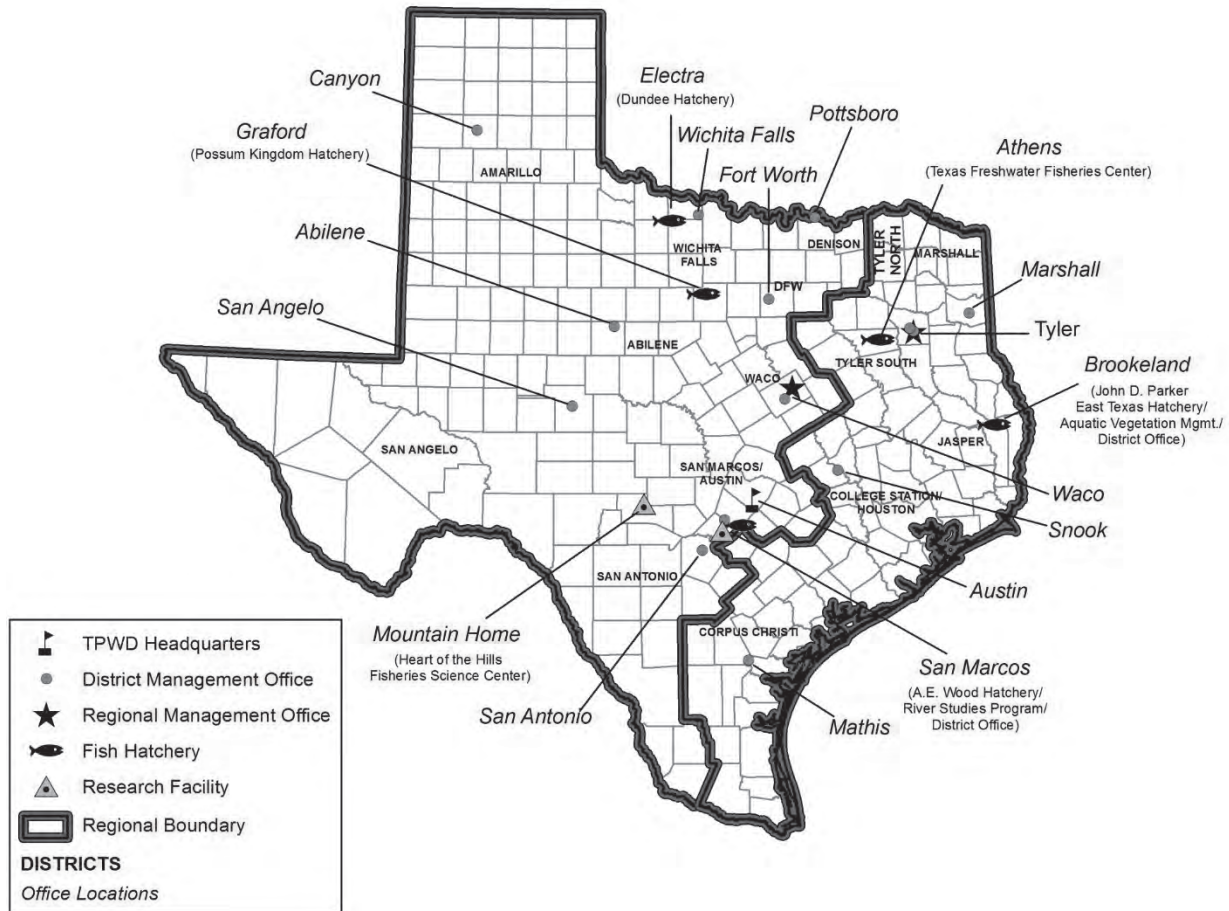
The division goals were developed to address the major issues facing the freshwater fisheries resources of Texas.

- 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 213.5 positions assigned to management, hatchery, research, outreach, habitat, analytical services, and administrative branches. 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

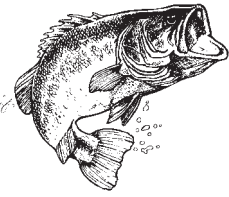
Funding and Allocation

In FY17, \$20,295,223 was budgeted for Inland Fisheries (not including fringe benefits or capital construction). Federal Aid grants are expected to reimburse the Department \$8,979,227 on eligible Inland Fisheries activities. The allocation of Federal Aid monies was \$2,479,384 for Fish Hatchery and Laboratory facilities and \$6,499,843 for Management and Research, Habitat, Outreach, and Administrative services.

FY17 Budget by Program

Administration	\$1,882,712
Management and Research	\$5,927,562
Hatcheries and Laboratory	\$5,932,948
Habitat/Aquatic Invasive Species	\$5,454,381
Outreach/Texas Freshwater Fisheries Center	\$1,097,620
Total FY17 w/o fringe	\$20,295,223

WHAT WE DO



Administration

The administrative function of the Inland Fisheries Division occurs at Texas Parks and Wildlife Department headquarters in Austin. The administrative staff provides critical leadership, management of budgets and grants, and managerial support to a number of field offices that work to carry out the mission of the division, largely outside the walls of headquarters. The Inland Fisheries Division seeks to maximize collaborative efforts between 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 activities of staff in the areas of fisheries management and research, hatcheries, habitat conservation, information and regulations, analytical services, and Texas Freshwater Fisheries Center (outreach).



Habitat Conservation

Healthy fish populations and quality freshwater fishing opportunities depend upon healthy aquatic habitats in Texas creeks, rivers, and reservoirs. The Inland Fisheries Division's Habitat Conservation Branch cooperates with local, state and federal agencies, private landowners, local communities, river authorities, fishing clubs, watershed alliances, and other non-governmental organizations to design, plan, and conduct aquatic habitat restoration, enhancement, and

protection projects. Examples include restoration and protection of natural river flows by protecting springs or augmenting reservoir dam releases; management of reservoir water levels to maximize the availability of fish spawning and nursery habitats; restoration and protection of riparian buffers along creeks and rivers; cleanup and recovery of habitats negatively affected by oil spills and other pollution; and management of aquatic invasive plants. The Habitat Conservation Branch also monitors the status and trends of the diversity of Texas freshwater fishes, mussels, and other aquatic species, and develops and implements conservation plans to preserve the state's freshwater biodiversity. Another area of emphasis for the branch is improving angler access to bank, wade, and kayak fishing opportunities on Texas rivers through the Texas Paddling Trails Program and the River Access and Conservation Areas Program.

Fisheries Management and Research

The division's fisheries management program assesses fish communities, fish habitat, angler access, and angler use of public water resources. Sampling activities performed by this group are guided through scientifically accepted procedures that ensure a high degree of data quality, integrity, and validity for statistically analyzing trends and making sound fisheries management decisions. This team develops fisheries management plans for individual water bodies, develops the statewide fish stocking plan, recommends changes to harvest regulations, implements habitat improvement projects, assists with treatment of aquatic invasive species, conducts public outreach, manages our urban fishing programs, and performs research to evaluate and improve fisheries management strategies. Staff members provide assistance and information to the general public, fishing-related industries, water-controlling authorities, local governments, angling groups, civic groups, property owners, media, universities, and other natural resource agencies. Work teams are located at two regional offices and 16 district offices statewide.



The Inland Fisheries research program at the Heart of the Hills Fisheries Science Center in Mountain Home provides leadership, support, and coordination for all research activities supported by the division. The program also provides intensive research investigations, literature reviews, statistical analyses, staff training, and science-based position papers that inform decision makers on critical aquatic resource-related issues or problems.

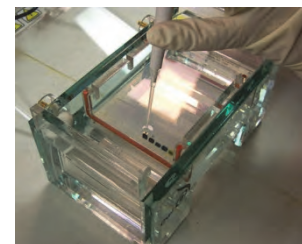


Hatcheries

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, TPWD hatcheries play a significant role in public education. Hatchery personnel are involved in outreach programs and agency-sponsored fishing events as well as providing educational hatchery tours to the general public and students of all ages.

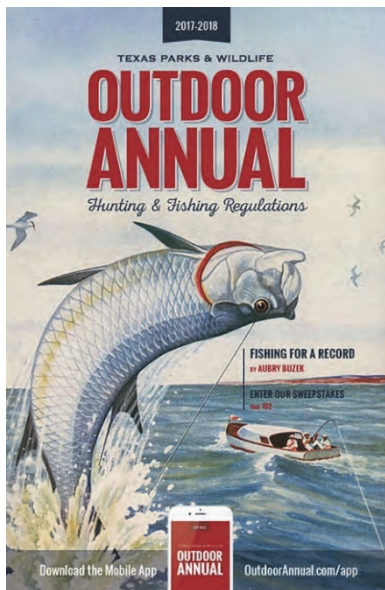
Analytical Services

Analytical laboratories serve a unique function within Inland Fisheries by providing state-of-the-science analyses in water quality, fish pathology, and genetics. Analytical Services conducts a variety of chemical analyses in support of divisional, interdivisional, and interagency programs. Analyses are routinely performed for the Kills and Spills Team, Law Enforcement Division's Environmental Crime Unit, and in support of research conducted by Inland



Fisheries staff. The collective expertise of the Analytical Services staff allows customized analyses aimed at meeting the changing needs of the department and the state.

The Fish Health and Genetics Laboratory provides specialized expertise in fish health and genetics and in support of hatchery discharge permits. In-house expertise facilitates timely and efficient response to emerging and ongoing concerns. Fish health expertise imparts an ability to focus on specific pathogens of interest. Genetics expertise and equipment are used to facilitate management and advance scientific knowledge of important sport fish including Largemouth Bass, Striped Bass, and catfishes, along with species of concern such as Guadalupe Bass and the Pecos River Pupfish. In the case of fish kill investigations, the lab may work to analyze both biological and chemical agents of concern.



Information and Regulations

The Information and Regulations group works closely with the Fisheries Management and Research branch to develop fishing regulation change proposals, obtain public input on the changes, and communicate the proposals to the Texas Parks and Wildlife Commission. Staff members also provide administrative support to division staff based in Austin and furnish expertise for division-wide and agency-wide assessments of relevant data. This group coordinates the issue of Triploid Grass Carp permits and handles the freshwater fishing web pages, river access information including Texas Paddling Trails, Angler Recognition, and general information for the public. Staff are located at TPWD headquarters in Austin.

Texas Freshwater Fisheries Center

The Texas Freshwater Fisheries Center (TFFC) in Athens is a multipurpose facility that provides educational experiences to the public while producing millions of fish annually to meet the stocking needs of fisheries managers. TFFC also serves as headquarters for the Toyota ShareLunker program. Around 40,000 people visit the center annually; over 16,000 of those are youth aged 12 and under. The visitor center opens six days a week to individuals and families. 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, information about Inland Fisheries management and hatchery work, and great fishing experiences.



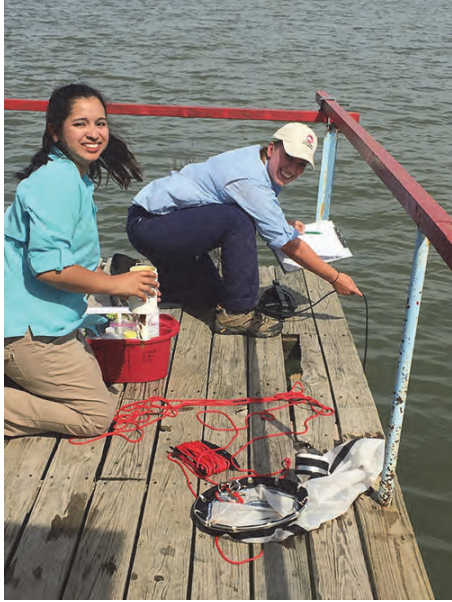
KEY ACCOMPLISHMENTS



Expanded Effort to Manage Aquatic Invasive Species

The 84th Legislature provided \$6.3 million, authorized through Legislative Rider 34, to address statewide management of aquatic invasive species in 2016-2017. With this record appropriation, TPWD and partners have stepped up the war on aquatic invasive species. A multi-divisional Aquatic Invasive Species Working Group, led and coordinated by Inland Fisheries, developed plans to make the most effective use of these available dollars and achieve results that would encourage legislative support for these investments in the future. New and expanded partnerships with universities, river authorities, municipal water districts, non-profits, and others allowed the department to leverage existing personnel, equipment, and other resources to deliver projects quickly and efficiently. Here are some highlights:

- **58 rivers and lakes** were managed to control infestations of aquatic invasive plants
- **880,011 giant salvinia weevils** were produced and stocked in East Texas lakes to control giant salvinia
- **35,064 acres of giant salvinia** were treated with herbicides on East Texas lakes including 7,491 acres at Toledo Bend Reservoir, 8,203 acres at Sam Rayburn Reservoir, and 13,555 acres at Caddo Lake
- **6 rapid response** events successfully contained introductions of giant salvinia at Lake Fork, Falcon Lake, Brandy Branch, and Martin Creek reservoirs
- **380 landowners** and numerous other local community partners cooperated to manage Arundo along 128 miles of Hill Country rivers
- **6,700 acres of saltcedar** were treated along 178 miles of the upper Brazos River to restore habitats for wildlife, including game birds and endangered fishes
- **25 miles of river** were monitored and treated along the Llano River and tributaries to control invasive elephant ear
- **56 high-risk lakes** were monitored to aid in early detection of zebra mussels
- **80 marinas** were visited as part of an outreach program to promote zebra mussel prevention strategies and encourage active partnership in monitoring efforts
- **1,960 boats** were inspected at 57 boat ramps on lakes infested or at high risk for zebra mussels
- **575,000 registered boaters** received “Clean, Drain and Dry” outreach and prevention materials
- **313 million targeted impressions** to Texas boaters were made through radio, online, print, and outdoor advertising as part of the giant salvinia and zebra mussel public awareness campaigns



Zebra Mussel Monitoring & Prevention — TPWD and a growing number of partners continue to intensively monitor water bodies at risk for zebra mussel infestation and those where zebra mussels were recently detected, using a combination of shoreline surveys, settlement samplers, plankton sampling, and DNA analysis. At year's end, 11 Texas lakes across five river basins were classified as infested, meaning the lake has an established, reproducing population. Zebra mussels or their larvae had been found more than once in six other lakes and in rivers downstream of infested waters. As a precaution against further spread of this pest, TPWD and partners continued a targeted outreach campaign encouraging boaters to Clean, Drain and Dry and Protect the Lakes You Love.

Aquatic Vegetation Control – TPWD and partners continued to fight giant salvinia with herbicides, giant salvinia weevils, and a multi-pronged outreach effort in targeted areas of the state. An additional weevil rearing facility was brought online in Karnack, near Caddo Lake. Also, herbicide treatments were applied to 6,059 acres of water hyacinth. Partnerships composed of agencies, landowners, and non-government organizations worked to manage invasions of Arundo, saltcedar, and elephant ear in five riversheds.



Research Updates — Endocide research at Stephen F. Austin State University has identified chemical compounds in giant salvinia that are toxic to the plants themselves in concentrated doses. Laboratory and field trials of the most promising endocides were conducted in FY 2017, with encouraging results. That research was supported by TPWD, which also worked with other universities to study “boom-and-bust” cycles in zebra mussel populations and what conditions favor downstream spread from infested waters. In the area of invasive fishes, TPWD partnered with Texas Tech University (TTU) to use electrofishing surveys and cutting-edge “eDNA” analysis to study where Asian carp are present and where they might be able to thrive in Texas. Results showed that bighead carp are present but rare, and do not appear to have spread beyond areas where preventive regulations are in effect. TPWD also worked with TTU to review available science on invasive tilapia species and partnered with SWCA Environmental Consultants and Texas A&M University to study armored catfish reproduction and growth in Landa Lake (Comal River). Results of these studies may help refine control efforts to make the best use of limited time and resources.



Monitoring, Management Plans and Permits

Reservoir Surveys — Staff conducted 334 surveys of fish populations, habitat, water quality, and angler use on 164 reservoirs covering 1,333,378 surface acres of water. These led to the production of 44 comprehensive management plans designed to improve freshwater fishing opportunities.

River Surveys — Staff conducted 51 surveys to assess the status of fish communities, freshwater mussels, benthic invertebrates, aquatic and riparian habitats, and recreational use in selected rivers. Sites included mainstem reaches and tributaries of the Nueces, Guadalupe, Colorado, Concho, Big Cypress, Red, Brazos, Sabine, Rio Grande, Llano, Little Blanco, Frio, Pecos, Devils, and Trinity rivers. Focal species included Guadalupe Bass, Alligator Gar, American Eel, Blue Sucker, Devils River Minnow, Sharpnose and Smalleye Shiner, and White Bass. Survey results

helped inform a variety of river recreation and other public access improvements, along with conservation projects including riparian invasive species control, riparian vegetation recolonization, water management decisions, fish and freshwater mussel species distribution modeling, aquatic life use assessments, restoration of Guadalupe Bass populations, and other native fish conservation efforts.

Fish Health Investigations — A.E. Wood and collaborating laboratories investigated 33 fish health cases, analyzing approximately 1,913 fish. A total of 147 samples were processed for zebra mussel larvae or DNA and 118 samples were analyzed for *Prymnesium parvum* (golden alga) toxicity and presence in public lakes. In addition, the laboratories completed 12 genetics projects with 2,105 samples.

Permits — The division issued 43 permits authorizing private partners to introduce fish into public waters to enhance fishing opportunities and 64 permits for commercial harvest of nongame fishes from public waters. Introduction permits were also issued for aquatic plant restoration (8) and for relocation of aquatic resources (97) to minimize impacts of projects that temporarily disturbed aquatic habitats. Staff issued 210 permits (including renewals) authorizing possession of prohibited exotic fish, shellfish, or aquatic plants for the purpose of invasive plant management (31), fish/shrimp aquaculture (95), culture of water spinach as a food source (58), research (15), and zoological display (11). Staff issued 1,090 permits to stock Triploid Grass Carp for biological control of nuisance vegetation, authorizing a total of 32,148 fish. In addition, sand and gravel permits for disturbing or taking sedimentary material within navigable streams were issued for pipeline/utility line crossings (22), road crossings (3), and channel stabilization (3).

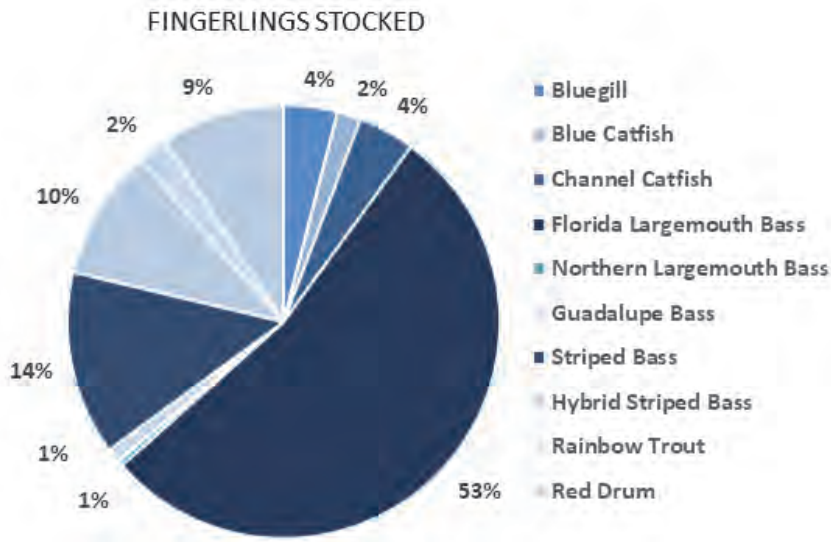
Applied Management and Conservation Actions

Lake Wichita Revitalization Project - An ongoing effort that began in 2013 focused on returning our state's third oldest reservoir to a quality outdoor recreational venue. Several key project milestones occurred in 2017. In March, President Theodore Roosevelt's great-grandson, Theodore Roosevelt IV, delivered a full endorsement speech at an event in Wichita Falls with more than 400 in attendance. The project received its 3,300th donation, and grants and private donation combined totals surpassed \$3.8 million. The most significant milestone to date was reached in August when the U.S. Army Corps of Engineers issued a permit enabling the project work to occur once adequate funding is raised. Plans include enhancing watershed, wetland, and in-lake habitat (including excavating 7 million cubic-yards of sediment) and expanding public recreational amenities. Partners in this effort include TPWD, City of Wichita Falls, Lakeside City, Wichita Falls Area Community Foundation, and Lake Wichita Chapter of Friends of Reservoirs.



New Texas Rivers Conservation Plate – In April 2017, Inland Fisheries helped launch the Texas Rivers themed vehicle license plate. Art work features a cypress-lined Hill Country river cascading over limestone boulders. The river gently carries a kayaker downstream while an angler wades in the river and casts into a yellow sunset. The plate sells for \$30, with \$22 going directly to projects that restore and preserve fish, wildlife, and their habitats in Texas rivers and that expand access to river fishing and paddling opportunities. As a source of non-federal matching funds, plate revenues will be used by Inland Fisheries

to meet the cost-share requirements of various federal and private grant programs that support river conservation. With an anticipated leveraging ratio of 1:4, Inland Fisheries expects that each Texas Rivers conservation license plate purchased will generate more than \$100 annually for river conservation projects. For more information, see www.conservationplate.org/texas-rivers.phtml



Hatcheries and Stocking - A total of 13.8 million fingerlings were produced and stocked in public water. Species stocked included Largemouth Bass, Guadalupe Bass, Striped and Hybrid Striped Bass, Channel Catfish, Blue Catfish, Smallmouth Bass, Bluegill, Walleye, Rainbow Trout and Red Drum. The majority of the fingerlings stocked were Largemouth Bass (54%) and Striped or Hybrid Striped Bass (24%). Trout are acquired from a commercial producer and

Red Drum are produced by the Coastal Fisheries Division. Also, a portion of the advanced Channel Catfish fingerlings (12 to 14 inches) stocked in support of the Neighborhood Fishin' Program are acquired from a commercial producer. Hatchery staff drove more than 156,780 miles on more than 939 stocking trips to distribute the fish to more than 322 water bodies.

Regulation Updates – Staff recommended several changes in regulations to improve angling opportunities and protect fisheries resources. The following changes were adopted by the Texas Parks and Wildlife Commission.

- Implemented catch-and-release only regulations for Largemouth Bass and sunfish on Bedford Boys Ranch Lake (Tarrant County).
- Implemented a catch-and-release only regulation for Largemouth and Smallmouth Bass on sections of the Devils River (Val Verde County). The regulation is in effect from the State Highway 163 bridge (Baker's Crossing) downstream to the confluence of Big Satan Creek Canyon and includes all Devils River tributaries within this section.
- Added Alabama Bass (name changed from spotted bass) to the list of game fishes, and updated existing regulations (statewide and Alan Henry Reservoir) that include this species.
- The collection of Gizzard and Threadfin Shad from public water for use as bait now requires a \$60 permit for the possession or sale of nongame fish if the container capacity used to transport the shad exceeds 82 quarts.

Additional Proposed Updates - The Inland Fisheries team examined the effectiveness of the state's special Largemouth Bass harvest regulations and began phasing out three regulations: the 14-to-18 and 14-to-24-inch slot limits and the 16-inch minimum length limit. Changes have been proposed on 18 reservoirs for 2018-19. The goal of this review was to make our fishing regulations less more easily understood and enforceable, without sacrificing the quality of fishing that Texas anglers have come to expect.

Increased Access to Public Waters



Leased River Fishing Access – The Division continued to maintain 18 leased fishing access sites that offer bank, wade, and kayak fishing on more than 170 miles of 10 rivers. River access sites were located on the Brazos, Colorado, Devils, Guadalupe, Llano, Neches, Nueces, Sabine, San Marcos, and South Llano rivers. These public-private partnerships with cooperating landowners have led to substantial economic benefits to local communities. Using angler counts and recently published data on river fishing

trip expenditures, we calculated lease-specific returns on investment ranging from 10:1 and 19:1 at three access sites on the Guadalupe River. The estimated annual economic benefit to local communities from improved access at the three sites was \$380,081. By extrapolating those economic benefits across all 18 leased access sites, we estimate that the leases generated upwards of \$2.4 million in annual economic benefit to local communities in 2017. Service projects at leased access sites were conducted in partnership with the Texas Council of Fly Fishers International, Texas River School, Keep Texas Beautiful, Devils River Conservancy, Llano River Watershed Alliance, Hill Country Alliance, and other local organizations. These projects included trash cleanup, invasive plant removal, planting of native trees, and hosting of river stewardship workshops for landowners and local communities.

New Paddling Trails — This year saw the opening of two new inland Paddling Trails: one in the recently restored Mission Reach of the San Antonio River, and one along the south shore of Lake Grapevine.

Outreach

Tournament Outreach - TPWD took advantage of three major bass tournaments to promote Texas fishing opportunities and agency programs. The Geico Bassmasters Classic, fished at Lake Conroe, had daily weigh-ins and an Outdoor Expo at Minute Maid Park/Herman Brown Convention Center in Houston. We supported fish care operations, youth outreach, and an information booth. The event drew 115,000 spectators; the second most in B.A.S.S. history. We also supported the inaugural Toyota Bassmaster Texas Fest (TBTF) at Sam Rayburn Reservoir; replacing a decade-long series of events called the Toyota Texas Bass Classic (2007-2016). At the TBTF, 109 professional anglers showcased our “catch-weigh-immediate release” tournament format and we received a \$250,000 donation to support Neighborhood Fishin’ and other programs. Support was also provided to a Major League Fishing (MLF) championship event held on Naconiche, Nacogdoches, Jacksonville, and Kurth reservoirs in Southeast Texas. This event demonstrated the utility of the catch-weigh-release format on lakes managed with special harvest regulations. All three events had significant online/social media exposure and television reach.



State-Fish Art Contest – Texas Freshwater Fisheries Center hosts the Texas division of this contest, which is sponsored by the national non-profit Wildlife Forever. In 2017, we had 860 entries from grades K-12, more than any other state. First, second, and third place winners received scholarships and have their artwork displayed annually at TFFC and the Sheffield Education Center in Austin, Texas. The top 10 contestants in each of four grade divisions were recognized with an awards ceremony, luncheon, fishing gear, and a day at TFFC.

Sharing the Great Outdoors – Texas Freshwater Fisheries Center is our division’s primary outreach and education center. Open to the public for 310 days in FY17, the Center provided a high-quality experience including facility tours, workshops, and aquatic education classes. Visitors included 38,885 people from 152 Texas counties, 48 states, and nine foreign countries. TFFC provided hands-on fishing for 28,293 visitors, with 293 receiving First Fish Awards. A total of 15,839 people toured the hatchery ponds via guided tram. The Center also provided support materials for teachers, students, and the general public.

Working with Schools – TFFC facilitated the annual Wetland Adventure, a three-day event involving more than 100 Stephen F. Austin State University School of Education preservice teachers and hundreds of regional school students. TFFC also provided its annual STAAR Academy for eighth-grade students of Eustace ISD, offering intensive science education classes to target school-identified weaknesses in standardized tests.

Social Media — Inland Fisheries staff worked closely with the Communications Division, using multiple media platforms to expand our engagement with the public. Forty social media posts from the College Station-Houston fisheries management district reached an estimated 1.5 million people and generated 20,000 comments and reactions. Facebook videos of bass spawning at Texas Freshwater Fisheries Center attracted a great deal of interest, more than doubling the number of fans that “liked” the page during the year. The Waco fisheries management district also saw more than a 100% increase in Facebook fans, and several other teams within the division expanded their use of interactive communication channels to share information and engage constituents.

Target Audiences — Inland Fisheries staff led 310 outreach events designed to reach youth under 17, minorities, women, and physically challenged individuals. A total of 28,391 people participated in these events. For details on the various audiences, see Appendix – Outreach Events.



Infrastructure Enhancements

Hatchery Renovations - Construction and renovation efforts continued at several facilities including the Possum Kingdom Fish Hatchery, Texas Freshwater Fisheries Center (TFFC), and A.E. Wood Fish Hatchery. The water supply storage reservoir and production wells at TFFC were completed. That project is expected to provide greater operational flexibility as well as a secure source of water free of potential pathogens and nuisance aquatic species. Renovation of the existing

incubation facilities at the A.E. Wood Fish Hatchery and upgrades to climate control systems at three hatcheries continued to progress and are expected to be complete in 2018.

Dundee Hatchery Back in Business - After a five-year shutdown due to persistent drought conditions, four additional staff have been put in place to help bring the Dundee hatchery back to full operation. The ozone disinfection project scheduled in 2012 has been re-opened; the design was reviewed and finalized, and the project is scheduled for construction 2018. Also, design of an effluent collection and pump-back system that will allow the hatchery to operate during drought conditions was initiated. Construction of that project is scheduled for 2019.

Agency-wide Collaboration

Hurricane Harvey made landfall in Texas in August. Our Division stood ready to support an agency-wide effort to help fellow employees and the public in a time of need. Team members in Brookeland and College Station assisted with search and rescue efforts in Southeast Texas. They rescued 33 people and assisted with five welfare checks and two body recovery missions. Team members were also involved in three power line surveys and power line electrical switch work. These activities took place over multiple days under harsh environmental and living conditions. Meanwhile, headquarters staff served on the agency's Incident Management Team, a communications and assets management hub designed to protect the health and safety of staff, volunteers, and guests; protect agency assets from storm damage; offer shelter to evacuees; assess damage to TPWD facilities; and gather data on staff who were personally affected by the disaster. Two employees within the division suffered losses of personal property. Conversations were later initiated on how Inland Fisheries could play a larger support role in future incidents of this type.



Recruiting, Retention and Reactivation - Inland Fisheries staff are participating in an interdivisional team that is evaluating TPWD's recruitment, retention, and reactivation (R3) efforts. It's part of a national effort to create new participants in outdoor activities and increase participation rates of current/lapsed outdoor recreationists. For our division, the primary focus is anglers, and ultimately, fishing licenses. These efforts also feed into the Recreational Boating and Fishing Foundation's 60 in 60 campaign, which aims to increase license sales from 46 million to 60 million in 60 months. Work accomplished so far has focused on assessing angler/hunter R3 efforts and mapping those efforts using the Outdoor Recreation Adoption Model. The goal of the mapping is to identify gaps, redundancies, and partner opportunities (linking one program to another) in our agency's outreach efforts.

Recovering America's Wildlife Act – The Recovering America's Wildlife Act (H.R. 4647), under consideration by U.S. Congress, has the potential to provide a substantial and unprecedented level of financial investment in the restoration and conservation of at-risk species in Texas and nationally. Passage of the Recovering America's Wildlife Act would provide more than \$63 million annually for conservation of Texas Species of Greatest Conservation Need. This funding would help fill critical research needs, establish monitoring programs, restore or enhance degraded habitats, restore connectivity in fragmented rivers and other natural landscapes, preserve intact habitats through conservation easements, manage invasive species, propagate and repatriate fish and wildlife populations, and deliver a multitude of other actions necessary to restore and preserve focal species and their habitats. In anticipation of the passage of the Recovering America's Wildlife Act, TPWD formed a multidivisional committee tasked with assembling strategies for leveraging and investing these resources to maximize their impact. These strategies are outlined in a report entitled "Sustaining Our State's Diverse Fish and Wildlife Resources: Conservation Delivery through the Recovering America's Wildlife Act."

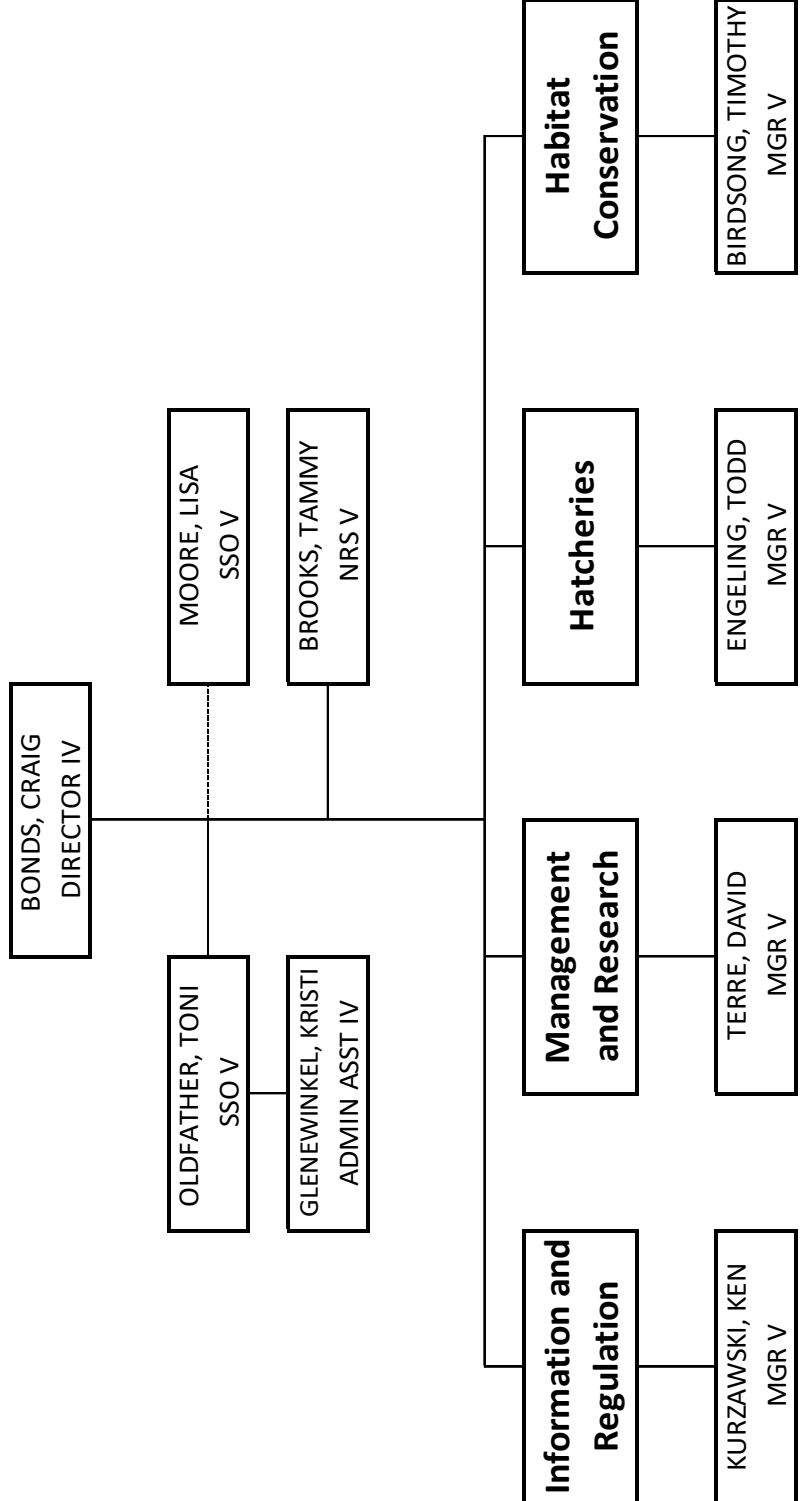
APPENDIX

Organization Charts

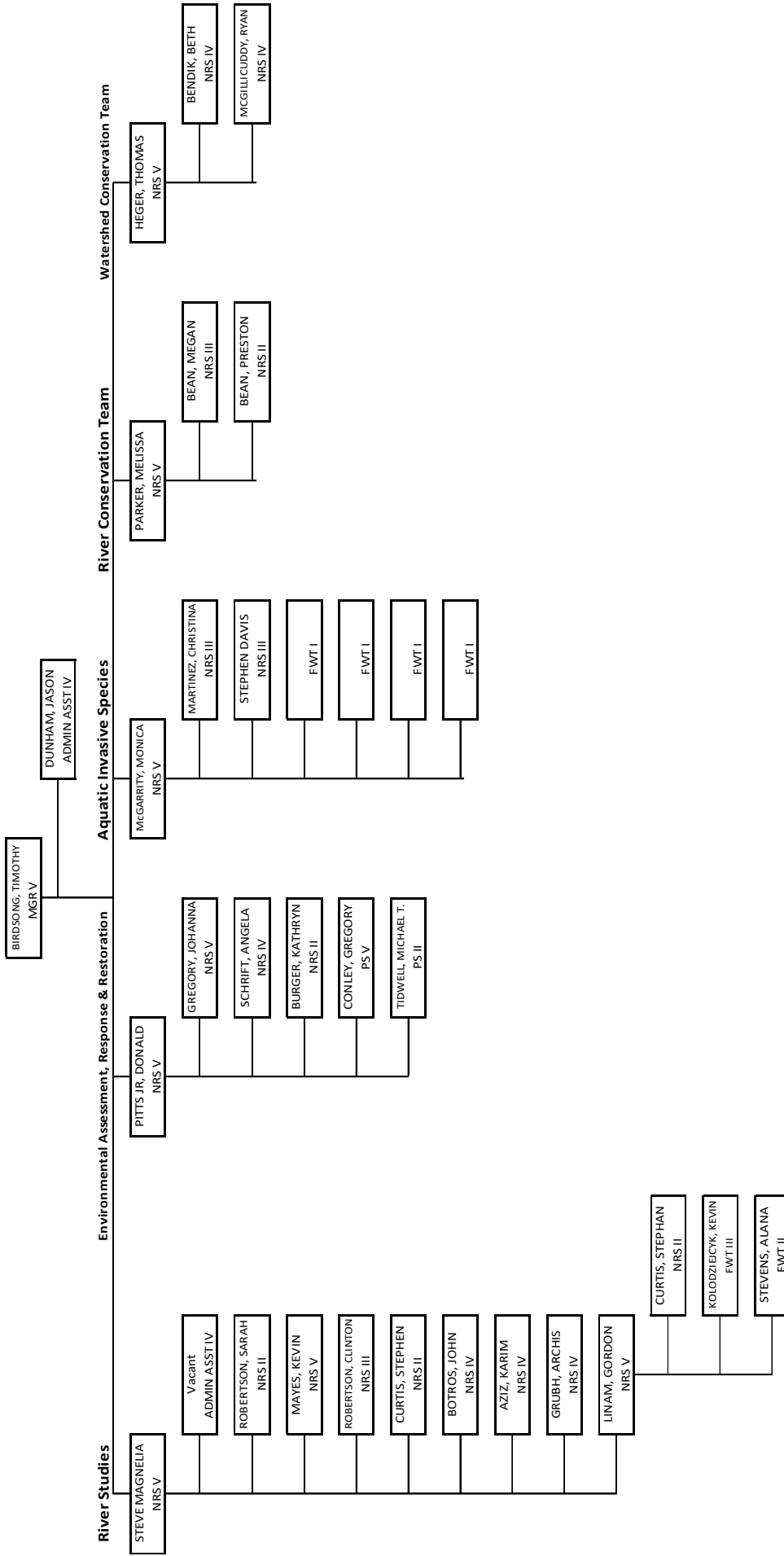
Legend

Abbreviation	Job Title
ADMIN ASST	Administrative Assistant
FWT	Fish and Wildlife Tech
MAINT SUPER	Maintenance Supervisor
MGR	Manager
NRS	Natural Resources Specialist
PS	Program Specialist
SSO	Staff Services Officer
WEB ADMIN	Web Administrator

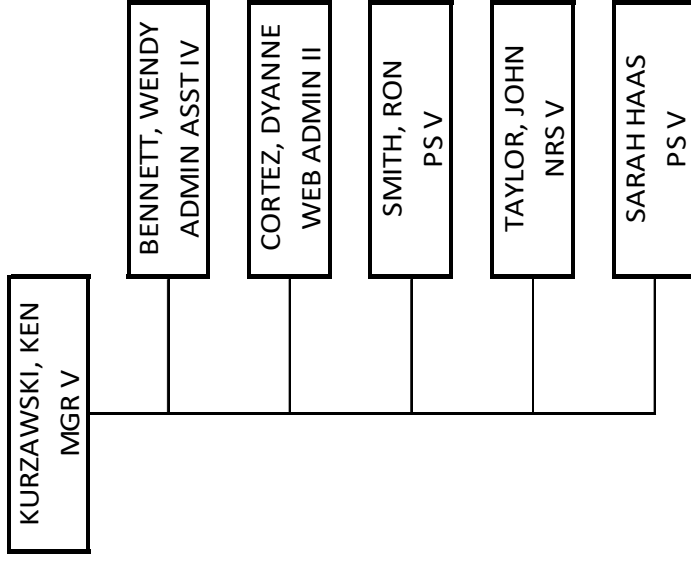
Inland Fisheries Administration



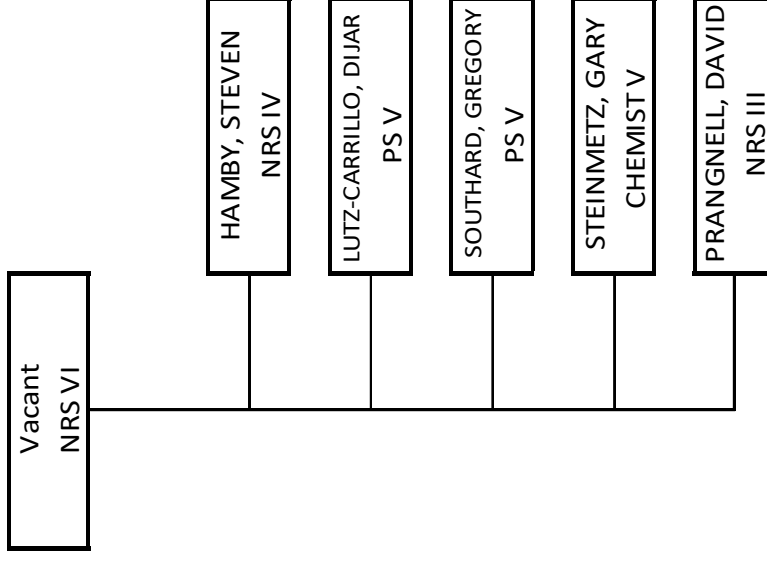
Habitat Conservation



Information and Regulations



Analytical Services



Stocking Reports

Inland Fisheries Hatchery Stockings

Species	Adult	Fingerling	Fry	Total
Blue Catfish		248,767		248,767
Bluegill	1,088	566,031		567,119
Channel Catfish	17,482	612,770		630,252
Florida Largemouth Bass	282	7,509,939	1,025,917	8,536,138
Guadalupe Bass		148,014		148,014
Largemouth Bass	1,290	60,963		62,253
Palmetto Bass (striped x white bass hybrid)		1,195,945	9,115,823	10,311,768
Rainbow Trout	333,691			333,691
Red Drum		1,303,338		1,303,338
Smallmouth Bass		39,463		39,463
Striped Bass		1,933,004	3,427,628	5,360,632
Sunshine Bass (white x striped bass hybrid)		171,710	465,500	637,210
Walleye			5,105,992	5,105,992
Grand Total	353,833	13,789,944	19,140,860	33,284,637

Research and Special Projects

Research works to improve the efficiency and effectiveness of division operations and programs. This year progress was made on 49 studies that focused on:

Increasing hatchery production and improving fish production protocols (7 studies)

Highlights:

- Increasing production of Guadalupe Bass for restoration efforts
- Developing best practices for spawning Smallmouth Bass
- Fish disease control in Channel Catfish rearing ponds

Managing and understanding the ecology of river fishes (12 studies)

Highlights:

- Assessing population and recruitment dynamics of Alligator Gar
- Modeling the effects of harvest on Alligator Gar populations
- Assessing Guadalupe Bass population densities and movements in central Texas rivers
- Determining spatial variability in hybridization of Guadalupe Bass

Largemouth bass genetics and management (8 studies)

Highlights:

- Comparing growth of ShareLunker offspring and other Florida Largemouth Bass
- Economic value of large fishing tournaments at Lake Fork
- Genetic assessment of relatedness among ShareLunker program entries

Catfish management (4 studies)

Highlights:

- Identifying effective catfish regulations to achieve fishery objectives

Aquatic invasive species management or control (4 studies)

Highlights:

- Identifying treatments for preventing zebra mussel transfers during fish transport
- Evaluating treatments for controlling golden alga blooms and toxicity

Fish habitat improvement (5 studies)

Highlights:

- Assessing fish use and biological productivity of various aquatic plant species
- Using fish attractors to enhance aquatic habitat

Development and validation of new techniques (5 studies)

Highlights:

- Using low cost side-scan sonar technology for identifying fish
- Validating age estimation procedures
- Development of an indirect method for estimating size-specific exploitation

Recruiting anglers, urban fisheries, and other studies (4 studies)

Highlights:

- Developing partnerships and identifying marketing strategies to recruit anglers
- Evaluating success of fry-stocked hybrid Striped Bass

Publications and Presentations

Scientific Publications and Reports

- Bennett, D. L., K. A. Bodine, J. W. Schlechte, R. A. Ott, J. D. Norman. 2017. Fishing practices and motivations of hand fishers in Texas. *Journal of the Southeastern Association of Fish and Wildlife Agencies* 4:1-7.
- Bodine, K. A., J. W. Schlechte, R. A. Ott, D. L. Bennett, and J. D. Norman. 2016. Estimating exploitation and modeling the effects of hand fishing on a Flathead Catfish population in East Texas. *North American Journal of Fisheries Management* 36:1416-1424.
- Bohn, S., B. R. Kreiser, D. J. Daugherty, and K. A. Bodine. 2017. Natural hybridization of Lepisosteids: implications for managing the Alligator Gar. *North American Journal of Fisheries Management* 37:405-413.
- Buckmeier, D. L., N. G. Smith, D. J. Daugherty, and D. L. Bennett. 2017. Reproductive ecology of Alligator Gar: identification of environmental drivers of recruitment success. *Journal of the Southeastern Association of Fish and Wildlife Agencies* 4:8-17.
- Buckmeier, D. L., R. Snow, N. G. Smith, and C. Porter. 2017. Are age estimates for Longnose Gar and Spotted Gar Accurate? An evaluation of sagittal otoliths, pectoral fin rays, and branchiostegal rays. *Transactions of the American Fisheries Society*. DOI: 10.1080/00028487.2017.1320306
- Daugherty, D. J., K. L. Pangle, W. Karel, F. Baker, C. R. Robertson, D. L. Buckmeier, N. G. Smith, and N. Boyd. 2017. Population structure of Alligator Gar in a Gulf Coast river: insights from otolith microchemistry and genetic analyses. *North American Journal of Fisheries Management* 37:337-348.
- Daugherty, D. J., J. W. Schlechte, and D. L. McDonald. 2017. Alligator Gar in Texas coastal bays: long-term trends and environmental influences. *Transactions of the American Fisheries Society*. DOI: 10.1080/00028487.2017.1348986
- Guillen, G. J., and S. G. Curtis. 2015 (Published 2017). Establishment of the Bluefin Killifish (*Lucania goodei*) in Urban Streams of Texas. *General Notes in Texas Journal of Science* 67(2): 79-84.
- Haas, S. E., W. Dillon, H. Cushman, N. Rank, D. M. Rizzo, and R. K. Meentemeyer. 2016. Effects of individual, community and landscape drivers on the dynamics of a wildland forest epidemic. *Ecology* 97: 649-660.
- Haas, S. E., M. K. Reeves, A. E. Pinkney, and P. T. J. Johnson. 2017. Continental-extent patterns in amphibian malformations linked to parasites, chemical contaminants, and their interactions. *Global Change Biology*. DOI: 10.1111/gcb.13908
- Hunt, K., and C. R. Parker. 2017. A social and economic study of the Lake Fork Reservoir recreational fishery. Technical report prepared for TPWD, Mississippi State University, 50 pages.

McDonald, D. L., J. W. Schlechte, and D. J. Daugherty. 2017. Comparison of two biometric methods for nonlethal sex determination of Alligator Gar. Transactions of the American Fisheries Society. DOI: 10.1080/00028487.2017.1370014

Olsen, Z., J. Anderson, and D. McDonald. 2016. Morphological and molecular variation among populations of tidewater (*Menidia peninsulae*) and Inland (*M. beryllina*) Silversides: insight into drivers of adaptation and speciation of silverside fishes. Environmental Biology of Fishes 99:857-871.

Smith, N. G., D. J. Daugherty, J. W. Schlechte, and D. L. Buckmeier. 2017. Modeling the responses of Alligator Gar populations to harvest under various length-based regulations: Implications for conservation and management. Transactions of the American Fisheries Society. DOI: 10.1080/00028487.2017.1341853

Popular Articles

Sixty-one popular articles were written and published by Inland Fisheries staff in 11 different publications. Popular articles were produced by Dyanne Cortez (6), and six Inland Fisheries management district offices: Abilene (27), Jasper (12), San Angelo (11), College Station/Houston (3), Tyler South (1), and the aquatic habitat enhancement team (1). More than 150 press releases on aquatic natural resources, fisheries management, and recreational fishing opportunities were provided to TV, radio, news, and outdoor-related media outlets by management district offices and habitat conservation teams.

Technical Presentations

A total of 50 presentations were given by staff as author or co-author, at 16 professional meetings or conferences. Venues included:

- American Fisheries Society, annual meeting, Tampa, FL
- Southern Division American Fisheries Society, annual meeting, Oklahoma City, OK
- Texas Chapter American Fisheries Society Annual Meeting, Corpus Christi, TX
- Southeastern Association of Fish and Wildlife Agencies, annual meeting, Baton Rouge, LA
- Joint Meeting of Ichthyologists and Herpetologists, Austin, TX
- River Rally, Grand Rapids, MI
- Urban Riparian Symposium, Houston, TX
- Restore America's Estuaries Summit, New Orleans, LA
- Freshwater Mollusk Conservation Society Symposium, Cleveland, OH
- Instream Flow Council Biennial Meeting, State College, PA

- West Texas Water Symposium, Alpine, TX
- USFWS Central Texas Mussels Species Status Assessment Expert Workshop. Austin, TX
- Texas Aquatic Plant Management Society, Boerne, TX
- Marina Association of Texas, Galveston, TX
- Tamarisk Coalition Conference, Fort Collins, CO
- Gulf and South Atlantic Regional Panel of the Aquatic Nuisance Species Task Force, Lafayette, LA

Outreach Events

Inland Fisheries staff members were event leaders at 310 outreach events for targeted user groups (youth under 17, minorities, women, and physically challenged) in which 28,391 individuals participated.

	Youth 17 & under	Adults	Total
Males (1)	10,089	4,044	14,133
Females (2)	9,715	4,543	14,258
Minorities	7,561	1,843	9,404
Physically Challenged	356	77	433
Total (1+2)	19,804	8,587	28,391

Work with Other Organizations

Program Contracts and Agreements — Outgoing Awards

Angelina and Nacogdoches Counties Water Control and Improvement District	Lake Striker Salvinia Control	\$ 20,000.00
Brazos River Nature Center	Leased Angler Access to the Brazos River	\$ 36,000.00
Caddo Biocontrol Alliance	Biological Control of Giant Salvinia	\$ 20,000.00
Camp Huaco Springs	Public Leased Access to the Guadalupe River Trout Fishery	\$ 2,600.00
Central Michigan University	Alligator Gar in Texas' Coastal Zone: Setting the Scale for Management of Populations and Habitats	\$ 4,985.25
Chautauqua Foundation	Leased Angler Access to the Lower Colorado River at the Texas River School River Camp	\$ 12,000.00
Coastal Water Authority	Control of Water Hyacinth and Hydrilla on Lake Houston and its Tributaries	\$ 25,000.00
Cypress Valley Navigation District	Boat Lane Maintenance and Boater Access on Caddo Lake and Big Cypress Bayou	\$ 30,500.00
Devils River Conservancy	Community-Based Restoration Within the Devils River Access and Conservation Area	\$ 31,450.00
Dick's Canoes	Public Leased Access to the Brazos River	\$ 31,450.00
Environmental Conservation Alliance	Riparian Productivity Along the Middle Trinity River	\$ 75,535.00
Environmental Conservation Alliance	Riparian Productivity along the Middle Trinity River and Refinement of Riparian Productivity versus Flow Relationships for Texas Rivers	\$ 63,010.06
Guadalupe Blanco River Authority	Control of Water Hyacinth, Hydrilla, and Other Aquatic or Riparian Plant Species in the Guadalupe River, Guadalupe River Reservoirs, Lower Guadalupe River, and Guadalupe River Tributaries	\$ 80,000.00
Hill Country Alliance	Private Landowner Incentive-Based Watershed Conservation in the Edwards Plateau Ecoregion Coordinating Implementation of the Aquatic Resources Conservation Objectives of the Texas Conservation Action Plan	\$150,000.00

John Cooke II	Public Leased Access to the Sabine River at FM 1794, Beckville	\$ 21,500.00
Karrie Lera McKeown	Public Leased Access to the Colorado River at 203 Hidden Shores Loop, Smithville	\$ 31,458.00
Keep Texas Beautiful	Organization and Implementation of Litter Clean-up at TPWD River Access and Conservation Area Sites	\$ 61,654.00
Kingsland Slab Group, LLC	River Access Lease Agreement	\$ 23,500.00
Kona Coast Ventures	Public Leased Access to the Guadalupe River Trout Fishery at Whitewater Sports	\$ 5,000.00
Lavaca-Navidad River Authority	Control of Water Hyacinth, Hydrilla, Giant Salvinia, and Other Invasive Aquatic or Riparian Plant Species in Lake Texana and its Tributaries	\$ 75,000.00
Lower Neches Valley Authority	Vegetation Management on B.S. Steinhagen Reservoir and Sam Rayburn Reservoir	\$500,000.00
Mississippi State University	Bass Study	\$ 19,007.00
Mountain Breeze Campground	Public Leased Access to the Guadalupe River Trout Fishery	\$ 4,615.00
Nol Dear	Public Leased Access to the South Llano River at KC 150	\$ 22,500.00
Nueces River Authority	Creative Design and Printing of the "Troubleshooting Invasives Pocket Guide"	\$ 47,344.00
Nueces River Authority	Project 23: Upper Nueces River	\$ 50,000.00
River Valley Campground (Rio Raft)	Public Leased Access to the Guadalupe River Trout Fishery	\$ 4,615.00
Sandra Hightower	Public Leased Access to the Colorado River at 750 Hwy FM 2571, Smithville	\$ 34,631.88
Southeast Aquatic Resources Partnership	Assessment and Prioritization of Barriers in the Upper Guadalupe River Upstream from Canyon Reservoir: A Pilot Project	\$ 74,998.00
Skyline Ranch	Public Leased Access to the Devils River in Val Verde County	\$ 32,000.00
Stephen F. Austin University	Control of Giant Salvinia with an Endocide	\$ 89,567.00
Texas A&M University, AgriLife Research	Host Fish Use of Three Rare Central Texas Mussel Species	\$207,361.00
Texas A&M University, AgriLife Research	Landa Lake Armored Catfish Processing	\$ 5,775.00

Texas A&M University, AgriLife Research	Lower Guadalupe Nutrient Exchange	\$ 70,794.42
Texas A&M University, AgriLife Research	Native Aquatic Vegetation Restoration and Effects on Fish and Wildlife Communities in Texas Reservoirs	\$155,240.80
Texas A&M University, AgriLife Research	Trinity River Mussel Survey	\$ 65,000.00
Texas Conservation Science	Riparian Productivity in the Brazos, Guadalupe, and Trinity River Basins	\$ 50,000.00
Texas State University	Analytical Services Genetics Student Worker Laboratory Assistant	\$ 29,996.16
Texas State University	Assessment and Modeling of Environmental Flows to Support Riparian Areas, Native Fishes, and Unionid Mussels	\$ 83,839.00
Texas State University	Dispersal and Migration of Freshwater Mussels	\$ 95,840.00
Texas State University	Dispersal of Zebra Mussels Downstream of an Invaded Reservoir and Assessing the Risk of Dreissenid Mussel invasion into Lakes of Texas	\$ 73,027.00
Texas State University	Guadalupe Benthics	\$ 26,000.00
Texas State University	Lower Guadalupe Inundation Analysis	\$104,205.58
Texas State University	The Impact of Environmental Contaminants on Texas Unionid Mussels in the Guadalupe Basin	\$ 81,915.00
Texas Tech University	Assessing the Risk of Dreissenid Mussel Invasion in Texas Based on Lake Physical Characteristics and Potential for Downstream Dispersal	\$ 24,443.00
Texas Tech University	Assessment and Monitoring of TPWD Public River Access Leases to Guide Sustainable Management	\$249,651.00
Texas Tech University	Environmental DNA-based Range Delineation of Invasive Bigheaded Carp in Texas	\$ 69,415.00
Texas Tech University	Recruitment Dynamics and Reproductive Ecology of Blue Sucker in Texas	\$166,157.00
Texas Tech University	Towards a Better Understanding of Blue Suckers: Validation of Age Determination Methods and Establishing the Influence of Temperature on Aerobic Scope and Swimming Performance	\$131,874.00
Thomas A. Goynes	Public Leased Access to the San Marcos River	\$ 36,000.00

Trout Unlimited	Feasibility Study for Native Fish Establishment in West Texas Streams, including Potential Re-Establishment of Rio Grande Cutthroat Trout in Guadalupe Mountains National Park	\$ 26,225.00
University of Alabama	Impacts of Zebra Mussels on Reservoir Water Quality: Spatio-temporal Patterns	\$ 48,213.00
University of North Texas	Experimental Determination of Host Suitability for Six State-Threatened Mussel Species	\$ 74,189.00
University of So. Mississippi	Relevance of River-Reservoir Interface Backwaters to Floodplain-Adapted Fish Communities	\$ 16,980.00
University of Texas Arlington	An Ongoing Study of Zebra Mussel Population Dynamics in Infested Texas Water Bodies	\$ 36,653.47
University of Texas Austin	Age, Growth, and Environmental Exposure Histories of Threatened Freshwater Mussels	\$ 31,601.00
University of Texas Austin	Blanco River Restoration Educational Materials Workshop	\$ 28,030.00
University of Texas Austin	Conserving Texas Biodiversity: Status, Trends and Conservation Planning for Fishes of Greatest Conservation Need	\$833,553.00
University of Texas Austin- Bureau of Economic Geology	Monitoring Hydrologic Effects of Salt Cedar Control in the Upper Brazos River Basin, Texas	\$280,907.88
University of Texas Austin- Bureau of Economic Geology	Surface Water/Groundwater Interactions in the Upper Brazos River Basin in Texas and Quantitative Relationship to Smalleye and Sharpnose Shiner Reproductive Success	\$ 99,935.00
University of Texas Rio Grande Valley	Impacts of Hydrologic Alteration on Imperiled Brazos River Vertebrates	\$ 51,405.00
University of Texas Tyler	Demographic Data for Two State-Threatened Mussels in the Neches River	\$ 15,489.00
William H. Haley, III	Public Leased Access to the Nueces River at 12317 Figueroa St., Corpus Christi	\$ 29,500.00

Grants and Donations — Incoming Funds

Texas Parks and Wildlife Foundation	Toyota ShareLunker Program Operations	\$70,000
Water Oriented Recreation District	Comal County Habitat Improvements	\$500
Guadalupe River Trout Unlimited	Student Intern	\$7,000
Nell F. Bailey Charitable Trust	Neighborhood Fishin' Program	\$2,000



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