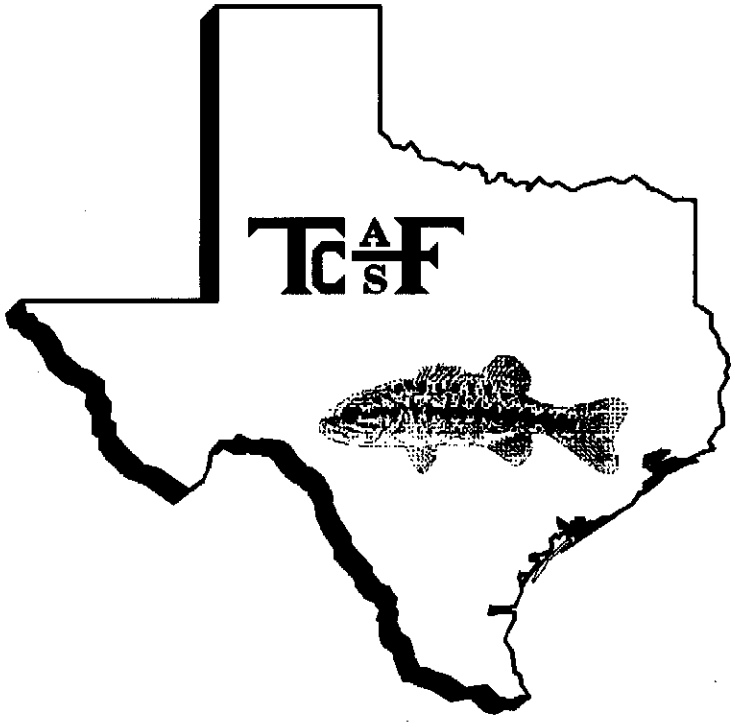
ANNUAL PROCEEDINGS
of the
TEXAS CHAPTER

AMERICAN FISHERIES SOCIETY



Junction, Texas

17 - 19 January 2008

Volume 30

TEXAS CHAPTER

AMERICAN FISHERIES SOCIETY

The Texas Chapter of the American Fisheries Society was organized in 1975. Its objectives are those of the parent Society – conservation, development and wise use of recreational and commercial fisheries, promotion of all branches of fisheries science and practice, and exchange and dissemination of knowledge about fishes, fisheries, and related subjects. A principal goal is to encourage the exchange of information among members of the Society residing within Texas. The Chapter holds at least one meeting annually at a time and place designated by the Executive Committee.

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Persons interested in the Texas Chapter and its objectives are eligible for membership and should apply to:

Texas Chapter, American Fisheries Society
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ANNUAL PROCEEDINGS OF THE TEXAS CHAPTER AMERICAN FISHERIES SOCIETY

Annual Meeting
17-19 January 2008
Junction, Texas

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Abstracts of Posters Presented at the Annual Meeting but not Published in the Proceedings

PAST TEXAS CHAPTER PRESIDENTS AND MEETING LOCATIONS

Date	President	Location
1976		College Station
1976	Ed Bonn	Lake Brownwood
1977	Jim Davis	San Antonio
1978	Bill Rutledge	San Marcos
1979	Bobby Whiteside	College Station
1980	Richard Noble	Arlington
1981	Charles Inman	Austin
1982	Gary Valentine	Kerrville
1983	Don Steinbach	Lake Texohoma, OK
1984	Gary Matlock	Port Aransas
1985	Maury Ferguson	Junction
1986	Brian Murphy	San Marcos
1987	Joe Tomasso	Kerrville
1988	Dick Luebke	Abilene
1989	Mac McCune	San Antonio
1990	Bobby Farquhar	Lake Texohoma, OK
1991	Gene McCarty	Galveston
1992	Bill Provine	Kerrville
1993	Barbara Gregg	Port Aransas
1994	Loraine Fries	Lake Travis
1995	Pat Huston	College Station
1996	Mark Webb	Pottsboro
1998	Katherine Ramos	Athens
1999	John Prentice	Corpus Christi
2000	Paul Hammerschmidt	Bossier City, LA
2001	Charles Munger	San Marcos
2002	Gordon Linam	Junction
2003	Gene Wilde	Galveston
2004	Gary Garrett	College Station
2005	Fran Gelwick	Grapevine
2006	Dave Terre	San Antonio
2007	Debbie Wade	Lake Jackson
2008	Art Morris	Junction
2009	Tim Bonner	

TEXAS CHAPTER AWARDS RECIPIENTS

1977 Fish Culture - Don Steinbach (TAMU)
Fisheries Management - Edward Bonn (TPWD)
Fisheries Administration - David Pritchard (TPWD)
Fisheries Research - John Prentice and Richard Clark (TPWD)

1978 Fish Culture - Pat Hutson (TPWD)
Fisheries Education - Clark Hubbs (UT)
Fisheries Research - Clark Hubbs (UT)
Special Recognition - Edward Lyles (USFWS)

1979 Fish Culture - Robert Stickney (TAMU)
Fisheries Education - Richard Noble (TAMU)
Fisheries Management - Gary Valentine (SCS)
Fisheries Research - Phil Durocher (TPWD)
Special Recognition - Charles Inman (TPWD)

1980 None

1981 Fish Culture - Billy White (TPWD)
Fisheries Education - Bobby Whiteside (TXSTATE)
Fisheries Management - Steve Smith (TUGC)
Fisheries Research - Al Green (TPWD)
Special Recognition - Jim Davis (TAMU)

1982 Fish Culture - Roger McCabe (TPWD)
Fisheries Research - Clell Guest (TPWD)
Special Recognition - Bob Hofstetter (TPWD)

1983 Special Recognition - Robert Kemp (TPWD)

1984 None

1985 Fisheries Education - Donald Wohlschlag (UTMSI)
Fisheries Research - Connie Arnold (UTMSI)

1986 Fisheries Management - Billy Higginbotham (TAES)
Fisheries Research - Robert Colura (TPWD)

1987 Fish Culture - Kerry Graves (USFWS)
Special Recognition - The Sportsmen's Club of Texas
Best Presentation - Kerry Graves (USFWS)

1988 Honorable Mention (culture) - Loraine Fries (TPWD)
Fisheries Research - Gary Garrett (TPWD)
Special Recognition - Kirk Strawn (TAMU)
Best Presentation - Joe Fries (USFWS)
Honorable Mention (presentation) - Catherine Dryden (TAMU)

1989 Fish Culture - Robert Vega (TPWD)
Fisheries Management - Joe Kraai (TPWD)
Fisheries Administration - Gary Matlock (TPWD)
Fisheries Research - Roy Kleinsasser and Gordon Linam (TPWD)
Honorable Mention (research) - Bob Edwards (UTPA)
Best Presentation - Robert Smith (TAMU)

1990 Fish Culture - Glen Alexander and David Campbell (TPWD)
Fisheries Management - Dave Terre (TPWD)
Fisheries Administration - Gene McCarty (TPWD)
Best Presentation - Joe Kraai (TPWD)
Scholarships - Tommy Bates (TAMU:1989), Michael Brice (TTU)

1991 Fish Culture - Jake Isaac (TPWD)
Fisheries Management - Mark Webb (TPWD)
Fisheries Administration - Pat Hutson (TPWD)
Fisheries Research - Ronnie Pitman (TPWD)
Special Recognition - The Wetland Habitat Alliance of Texas
Best Presentation - Mark Stacell (TPWD)
Scholarships - Jim Tolan (TAMUCC), Michelle Badough (TXSTATE)

1992 Fish Culture - Camilo Chavez (TPWD)
Fisheries Education - Brian Murphy (TAMU)
Fisheries Management - Ken Sellers (TPWD)
Fisheries Research - Bob Colura (TPWD)
Special Recognition - Bobby Farquhar, Andy Sansom, and Rudy Rosen (TPWD)
Best Presentation - Maurice Muoneke (TPWD)

1993 Fisheries Management - Bruce Hysmith (TPWD)
Special Recognition - Joe Martin and Steve Gutreuter (TPWD)
Best Presentation - Jay Rooker (UTMSI)
Scholarships -Erica Schlickeisen (TXSTATE), Brian Blackwell and Nancy McFarlen (TAMU)

1994 Fish Culture - Ted Engelhardt (TPWD)
Fisheries Management - Steve Magnelia (TPWD)
Fisheries Administration - Dick Luebke (TPWD)
Special Recognition - Bob Howells (TPWD)
Best Presentation - Travis Kelsey (TXSTATE)
Scholarships - Kathyrn Cauble (TXSTATE), Howard Elder and Kim Jefferson (TAMU)

1995 Fish Culture - Robert Adami (TPWD)
Fisheries Education - Bill Neill (TAMU)
Fisheries Management - Spencer Dumont (TPWD)
Fisheries Administration - Roger McCabe (TPWD)
Fisheries Research - Maurice Muoneke (TPWD)
Special Recognition - Tom Heffernan and Robin Reichers (TPWD) S. Ken Johnson (TAMU)
Best Presentation (s) - Robert Weller (TTU), Robert D. Doyle (ACE)
Scholarships - Jay Rooker (UTMSI), Robert Weller (TTU), Gil Rosenthal (UT), John Findiesen and Karen
Quinonez (TXSTATE)

1996 Fisheries Education - Billy Higginbothan (TAMU)
Fisheries Management - Gary Garrett (TPWD)
Fisheries Administration - Gene McCarty (TPWD)
Fisheries Research - Ivonne Blandon (TPWD)
Special Recognition - Reeves County Water Improvement Board

Best Presentation (s) - Craig Paukert (OSU), Gene Guilliland (ODWC)
Scholarships - Chad Thomas (TXSTATE), Anna-Claire Fernandez (UTMSI), Kenneth Ostrand (TTU), Dawn Lee Johnson
Technical Support - Jimmy Gonzales (TPWD)
Honorable Mention (technical support) - Eric Young (TPWD)

1997/8 Fish Culture - Tom Dorzak (TPWD)
Fisheries Education - Robert Ditton (TAMU)
Special Recognition - Fred Janssen, Chris Cummings, Dan Lewis, Dan Strickland, and Gary Graham (TPWD), Jim Davis (TAMU)
Best Presentation (s) -Timothy Bonner (TTU) and Gene Wilde (TTU)
Scholarships - Tony Baker and Allison Anderson (TAMU), Patrick Rice (TAMU-Galveston), Laurie Dries (UT)

1999 Fisheries Administration - Lorraine Fries (TPWD)
Special Recognition - Pat Hutson (TPWD, retired)
Best Presentation (s) - Gene R. Wilde and Kenneth G. Ostrand (TTU)
Scholarships - Scott Hollingsworth and William Granberry (TTU), Brian Bohnsack and Michael Morgan (TAMU)

2000 Fisheries Research - Gene R. Wilde (TTU)
Best Presentation - J. Warren Schlechte, coauthors - Richard Luebke, and T.O. Smith (TPWD)
Best Student Presentation - Scott Hollingsworth, coauthors - Kevin L. Pope and Gene R. Wilde (TTU)
Special Recognition - Emily Harber, Joe L.Hernandez, Robert W. Wienecke, and John Moczygemba (TPWD), Joe N. Fries (USFWS)
Scholarships - Mandy Cunningham and Calub Shavlik (TTU), Laurieanne Lancaster(SHSU)

2001 Fisheries Administration - Ken Kurzawski (TPWD)
Fisheries Education - Kevin Pope (TTU)
Fisheries Management - Brian Van Zee (TPWD)
Fisheries Research - Reynaldo Patino (TTU)
Fisheries Student - Timothy Bonner (TTU)
Technical Support - David DeLeon (TPWD)
Special Recognition - Rhandy Helton, Rosie Roegner, and Walter D. Dalquest (TPWD)
Best Presentation – Jason Turner, coauthors – Jay Rooker and Graham Worthy (TAMUG), and Scott Holt (UTMSI)
Scholarships, Undergraduate - Mandy Cunningham, and Cody Winfrey (TTU)
Scholarship, Graduate - Abrey Arrington (TAMU), and Laurianne Dent (SHSU)

2002 Fisheries Administration – Leroy Kleinsasser (TPWD)
Fisheries Management – Gordon Linam (TPWD)
Special Recognition – Raymond Mathews, Jr. (TWDB), Austin Bass Club of the Deaf
Best Presentation – Jay Rooker, coauthors – Bert Geary, Richard Kraus, and David Secor (TAMUG)
Best Student Presentation – J. P. Turner, coauthor – Jay Rooker (TAMUG)
Best Poster Presentation – Michael Lowe, Gregory Stunz, and Thomas Minello (NMFS)
Scholarships, Undergraduate – Felix Martinez, Jr. (TTU), Stuart Willis (TAMU)
Scholarships, Graduate – Mathew Chumchal (TCU), Michael Morgan (TAMU)

2003 Fisheries Culture – Dennis Smith (TPWD)
Fisheries Education – Gene Wilde (TTU)
Fisheries Student – Christine Burgess (TAMU)
Special Recognition – Larry McEachron (TPWD)
Best Presentation – Gregory Stunz (TAMUCC), coauthors Thomas Minello and Phillip Levin (NMFS)
Best Student Presentation – Monte Brown, coauthors Felix Martinez Jr., Kevin Pope, and Gene Wilde (TTU)

Best Poster Presentation – Suraida Nanez-James (TAMUG) and Thomas Minello (NMFS)

2004 Fisheries Culture - Lisa Griggs (TPWD)
Fisheries Education - Timothy Bonner (TXSTATE)
Fisheries Research - Dave Buckmeier (TPWD)
Fisheries Student - Casey Williams (TXSTATE)
Special Recognition - Deborah Wade (TPWD)
Best Presentation - Richard Kraus and David Secor (TAMUG)
Best Student Presentation - Tracy Leavy, coauthor Timothy Bonner (TXSTATE)
Best Poster Presentation - Brian Scott and Gary Aron (TXSTATE)

2005 Fisheries Administration – Roger McCabe (TPWD)
Fisheries Management – Todd Driscoll (TPWD)
Fisheries Student – Bart Durham (TTU)
Special Recognition – Jimmie Green (TPWD) and Kirk Green
Special Recognition – The Patsy B. Hollandsworth Family Foundation
Best Presentation – Gregory Stunz (TAMUCC), and coauthors Jay Rooker (TAMUG), Joan Holt and Scott
Holt (UT)
Best Student Presentation – Julie Hulbert, and coauthors Timothy Bonner and David Pendagrass (TXSTATE), and Joe Fries (National Fish Hatchery – San Marcos)
Best Poster Presentation – Michael Baird (TPWD)
Scholarships, Undergraduate – Brian Bartram (TAMUCC), John Putegnat (TAMU)
Scholarships, Graduate – Megan Fencil (UTMSI), Casey Williams (TXSTATE)

2006 Fisheries Education – Kevin Pope (TTU)
Fisheries Management – Dave Terre (TPWD)
Fisheries Research – Loraine Fries (TPWD)
Technical Support – Todd Robinson (TPWD)
Special Recognition – Bruce Hysmith (TPWD)
Special Recognition – Joan Glass (TPWD)
Best Presentation - Richard Kraus and David Secor (TAMUG)
Best Student Presentation - Tracy Leavy, coauthor Timothy Bonner (TXSTATE)
Best Poster Presentation - Brian Scott and Gary Aron (TXSTATE)
Scholarships, Undergraduate – Chris Arredondo (TAMUCC), Josh Perkin (TXSTATE)
Scholarships, Graduate – Bart Dunham (TTU), Casey Williams (TXSTATE)

2007 Fisheries Administration – Larry McKinney (TPWD)
Fisheries Culture – Gary Garrett (TPWD)
Fisheries Management – Charlie Munger (TPWD)
Fisheries Research – Gary Garrett (TPWD) and Bob Edwards (UTPA)
Fisheries Student – Chris Chizinski (TTU)
Honorable Mention (Fisheries Student) – Brad Littrell (TXSTATE)
Technical Support – Reynaldo Cardona (TPWD)
Special Recognition – Robert Howells (TPWD)
Special Recognition – Fred Janssen (TPWD)
Special Recognition – Craig Scofield (TPWD)
Special Recognition – Sandy Henry (Science Spectrum, Lubbock)
Best Presentation – Craig Bonds, coauthors John Taylor and Jeremy Leitz (TPWD)
Best Student Presentation – Matthew Chumchal (OU), coauthors Michael Slattery, Ray Drenner, Matthew Drenner and Leo Newland (TCU)
Best Poster Presentation – Richard Ott and Timothy Bister (TPWD)
Scholarships, Graduate (M.S.) – Brian Bartram (Baylor)
Scholarships, Graduate (PhD.) – John Froeschke (TAMUCC)
Clark Hubbs Student Research Award – Katrina Cohen (TXSTATE)

2008 Fisheries Administration – Lance Robinson (TPWD)
Fisheries Culture –
Fisheries Management –
Fisheries Education – Andre M. Landry, Ph. D. (TAMUG)
Fisheries Research – Bart Durham (TTU)
Fisheries Student – Preston Bean (TXSTATE)
Honorable Mention – Zachary Shattuck (TXSTATE)
Technical Support – Corey Clouse (TPWD)
Special Recognition – Chad Thomas (TXSTATE)
Best Presentation – Matthew Chumchal (TCU)
Best Student Presentation – Rodney Gamez (TAMUCC)
Best Poster Presentation – James Tolan (TPWD)
Scholarships, Undergraduate – JoHanna Weston (UD)
Scholarships, Graduate (M.S.) – Megan Bean (TXSTATE)
Scholarships, Graduate (PhD.) – Preston Bean (TXSTATE)
Clark Hubbs Student Research Award – Katherine Anne Roach (TAMU)

Abbreviations:

ACE – Army Corps of Engineers
NMFS – National Marine Fisheries Service
ODWC – Oklahoma Department of Wildlife Conservation
OSU – Oklahoma State University
SCS – Soil Conservation Service
SHSU – San Houston State University
TAES – Texas Agricultural Extension Service
TAMU – Texas A&M University – College Station
TAMUG – Texas A &M University - Galveston
TAMUCC – Texas A&M University – Corpus Christi
TCU – Texas Christian University
TPWD – Texas Parks and Wildlife Department
TTU – Texas Tech University
TUGC – Texas Utilities Generating Company
TXSTATE – Texas State University – San Marcos
UD – University of Dallas
USFW – U.S. Fish and Wildlife Service
UT – University of Texas – Austin
UTMSI – University of Texas Marine Science Institute
UTPA – University of Texas – Pan American

TECHNICAL SESSION ABSTRACTS

Unmanned Autonomous Vehicles: Emerging Cost Effective Technologies for Fisheries Research and Management

Thomas B. Hardy *(Utah Center of Water Resources Research, Utah State University, UMC 8200, Logan, Utah 84322-4110, hardy@engineering.usu.edu)*

Unmanned Autonomous Vehicles (UAVs) capable of obtaining high resolution imagery (0.5 meter resolution) including FLIR have been developed at the Utah Water Research Laboratory for use in mapping a wide array of systems including land use, riparian, and aquatic habitats. The UAVs are GPS enabled, can store data or transmit via RF in real time is desired and can be also be configured to include sensors such as ozone for air quality monitoring. The systems are battery operated, weigh less than 3 pounds, and are expected to cost on the order of $3,000 to $5000 per UAV depending on the sensor package. The current platforms are capable of covering over 30 miles of flight lines using existing battery technology. Research is currently underway to expand the functionality of the UAVs to include the use of printable antennae arrays for inclusion on the wing surface to allow radio tracking of fish in river systems or wildlife. The UAV platforms are integrated with flight planning software, as well as software for automatically stitching the imagery into mosaics that are georectified. Mosaiced and georectified imagery from the system is available within a few hours or day depending on the volume of imagery collected.

Juvenile Tarpon Distribution in Texas Estuaries 1975 - 2006

Artussee D. Morris (*Texas Parks and Wildlife Department, Coastal Fisheries Division, NRC Bldg., Suite 2500, 6300 Ocean Dr., Unit 5845, Corpus Christi, Texas, 78412-5845, art.morris@tpwd.state.tx.us*)
Fernando Martinez-Andrade (*Texas Parks and Wildlife Department, Coastal Fisheries Division, NRC Bldg., Suite 2500, 6300 Ocean Dr., Unit 5845, Corpus Christi, Texas, 78412-5845, Fernando.Martinez-Andrade@tpwd.state.tx.us*)

Tarpon (*Megalops atlanticus*) were collected by the Texas Parks and Wildlife Department along the coast of Texas from 1975 to 2006 using four different fishing gears. Data analysis indicates some marked temporal and spatial trends as well as some other distinctive trends related to environmental parameters at time of capture, which were also recorded and presented here. A total of 240 tarpon were caught almost exclusively with gill nets over this period of time; 88% of them were caught only from September to November and most catches were observed along the lower coast of Texas with the lower Laguna Madre having the most (66), followed by Aransas Bay (40), the upper Laguna Madre (37), and Corpus Christi Bay (31). In contrast, only one tarpon has ever occurred in Sabine Lake, a mostly freshwater system on the border with Louisiana. Tarpon caught in gill nets ranged in length from 237 to 1,082 mm; however, 90% ranged from 500 to 1,000 mm. A Length-Weight relationship was also developed through linear regression on 88 individuals and resulted in a good fit (r^2=0.79), weights ranged from 1,280 to 11,113 g. Temperature ranged from 13 to 33° C, although captures peaked when water temperatures were 24 – 26 °C indicating a preference for warm temperatures. Salinity ranged from 0 to 62 ppt with a preference for salinities around 30 - 35 ppt. Dissolved oxygen ranged from 0.1 to 21 mg/l with most individuals being caught at 7 – 9 mg/l. Turbidity ranged from 1 to 370 NTU, with most individuals (71%) being caught at ≤ 30 NTU. These data support other studies regarding migrations and might be useful for fisheries managers and scientists in general, although more studies are recommended.

Mercury Concentrations of Three Species of Non-game Fish from Caddo Lake, Texas

Matt M. Chumchal *(Biology Department, Texas Christian University, 2800 S. University Dr., Fort Worth, TX, 76129, m.m.chumchal@tcu.edu)*
Ray. W. Drenner *(Biology Department, Texas Christian University, 2800 S. University Dr., Fort Worth, TX, 76129, r.drenner@tcu.edu)*
K. David Hambright *(The University of Oklahoma Biological Station, HC 71, Box 205, Kingston, OK, 73439-9738, dhambright@ou.edu)*

Previous studies examining factors that regulate mercury contamination of fish have focused almost exclusively on game fish. We conducted a survey of mercury contamination in three species of planktivorous fish, brook silverside (*Labidesthes sicculus*), threadfin shad (*Dorosoma petenense*) and gizzard shad (*Dorosoma cepedianum*), from Caddo Lake, Texas and identified species-specific differences in mercury contamination. Brook silversides had the highest concentration of mercury followed by threadfin and gizzard shad. We also examined trophic position (determined using $\delta^{15}N$), growth rate, and horizontal food web position (determined using $\delta^{13}C$) of planktivorous fish as factors that could have led to species-specific differences in mercury contamination. Similar to previous studies that focused on Caddo Lake game fish such as largemouth bass (*Micropterus salmoides*), we found a strong relationship between trophic position and mercury concentration in Caddo Lake planktivores. Species-specific differences in growth rate and horizontal food web position could not explain differences in mercury concentrations between planktivorous fish. Although the planktivorous fish species examined in this study have substantially lower mercury concentrations than Caddo Lake game fish, the mercury concentrations of both groups of fish are strongly affected by trophic position.

An Extant Population of Headwater Catfish, *Ictalurus lupus*, in a Western Gulf Slope Drainage

Preston T. Bean (*Texas State University – San Marcos, Department of Biology, Freeman Aquatic Biology Building, 601 University Drive, San Marcos, Texas 78666, preston.bean@txstate.edu)*
Timothy H. Bonner (*Texas State University – San Marcos, Department of Biology, Freeman Aquatic Biology Building, 601 University Drive, San Marcos, Texas 78666, tbonner@txstate.edu)*
Jacob T. Jackson (*Texas State University – San Marcos, Department of Biology, Freeman Aquatic Biology Building, 601 University Drive, San Marcos, Texas 78666, jj1161@txstate.edu)*
Michael. R. J. Forstner (*Texas State University – San Marcos, Department of Biology, Freeman Aquatic Biology Building, 601 University Drive, San Marcos, Texas 78666, mf@txstate.edu)*

The headwater catfish, *Ictalurus lupus*, occurs in Texas in tributaries of the Pecos River and Rio Grande. It is also native to the Western Gulf Slope drainages from the Nueces River to the Colorado River but has been considered extirpated from these drainages since the early 1970's. Six ictalurid catfish preliminarily identified as *Ictalurus lupus* were collected from the Frio River in Real County, Texas, in June of 2007. A multivariate technique for distinguishing between *I. lupus* and *I. punctatus* was used to confirm identification based on caudal peduncle depth, mouth width, pectoral spine length, and number of anal fin rays. Identification based on this multivariate technique indicates that *I. lupus* is present within the Frio River. Although all of the individuals collected from the Frio River displayed the distinct speckled coloration characteristic of *I. lupus*, some individuals were only weakly supported as *I. lupus*. Comparisons of the cytochrome *b* region of the mitochondrial genome between Frio River individuals and known populations of *I. lupus* and *I. punctatus* are underway to genetically examine and confirm the relationships among these catfish. This report of *I. lupus* in the Frio River is an important update to its current distribution and provides knowledge of an additional population for conservation and management strategies as *I. lupus* has declined throughout much of its historical range.

Spatio-temporal Differences and Cohabitation of Sand Seatrout (*Cynoscion arenarius*) and Silver Seatrout (*C. nothus*) Throughout Texas Bays and Immediate Gulf

Dusty McDonald (*Texas Parks and Wildlife Department, Perry R. Bass MFRS, HC 02, Box 385, Palacios, Texas, 77465, dusty.mcdonald@tpwd.state.tx.us)*
Joel Anderson (*Texas Parks and Wildlife Department, Perry R. Bass MFRS, HC 02, Box 385, Palacios, Texas, 77465, joel.anderson@tpwd.state.tx.us)*
Josh Harper (*Texas Parks and Wildlife Department, Palacios Field Station, Palacios, Texas, 77465, joshua.harper@tpwd.state.tx.us)*
Britt Bumguardner (*Texas Parks and Wildlife Department, Perry R. Bass MFRS, HC 02, Box 385, Palacios, Texas, 77465, britt.bumguardner@tpwd.state.tx.us)*

Sand seatrout (*Cynoscion arenarius*) and silver seatrout (*C. nothus*) although commonly grouped as "white trout" during commercial surveys and foodfish sales have very different life histories and habitats. Here we investigate 20 years of data, obtained by Texas Parks and Wildlife-Coastal Fisheries Resource Monitoring Program, in order to determine spatio-temporal differences throughout Texas' coastline and offshore waters (up to nine miles offshore). Gears, included in this study, comprised of bag seines along bay shorelines, bay trawls and offshore trawls, each specific to a selected offshore area or bay. Investigations determined species abundance by location (Gulf or Bay), specific offshore area or major bay area and season. Seasonal interactions were also examined for both species by examining trawl data inshore and offshore of Galveston Bay, Texas' largest bay system.

Development of the Upper Brazos River Basin: Effects of Existing and Proposed Reservoirs on Native Fish Abundance

Bart W. Durham *(Department of Biological Sciences, Texas Tech University, MS 43131, Lubbock, Texas 79409, bart.durham@ttu.edu)*
Gene R. Wilde *(Department of Biological Sciences, Texas Tech University, MS 43131, Lubbock, Texas 79409, gene.wilde@ttu.edu)*

We studied the population structure and reproductive biology of the imperiled smalleye shiner *Notropis buccula* to obtain parameter estimates required for construction of an age-structured population dynamics model. We included stream discharge as a driving variable and modeled age-0 survival as a function of that variable. We compared the observed abundance of smalleye shiner to abundance predicted by the discharge model and with two null parameterizations of the model. The discharge-related model received the greatest support from catch data and indicated that a discharge of 6.43 $m^3 \cdot s^{-1}$ is necessary for maintenance of smalleye shiner populations in the upper Brazos River drainage. We used our model to assess the effects of an existing reservoir, Lake Alan Henry, and a proposed reservoir on abundance of smalleye shiner. Our model indicates that the reduction in mean summer discharge (approximately 14%) due to Lake Alan Henry has resulted in a modest decrease in smalleye shiner abundance since its impoundment. However, our model predicts that the proposed reservoir will reduce the current abundance of smalleye shiner by about 85% and, in the long term, is likely to cause its extirpation from the impacted area.

Seagrass Inventory for Christmas Bay

Leslie Williams *(Texas Parks and Wildlife Department, 1502 FM 517 East, Dickinson, Texas, 77539, leslie.williams@tpwd.state.tx.us)*

Seagrass in Galveston Bay had almost entirely disappeared by the late 1970s due to dredge-and fill activities, boat traffic, subsidence, erosion, storms, and wastewater discharges. Due to the extensive seagrass habitat present, Christmas Bay had been a priority conservation site for state resource management programs. In 1998 Texas Parks and Wildlife conducted a mapping project to determine the status of seagrass in Christmas and Drum Bay. Aerial photographs were taken December 1998, groundtruthed in 1999 and photointerpreted in ArcView. Total seagrass coverage for Christmas and Drum Bay in 1999 was 424 acres of mixed shoalgrass and clovergrass beds with 31.2 of those acres in Drum Bay and 1.6 acres of turtlegrass in Christmas Bay. This study

was repeated in 2005 to determine whether changes in acreage, patchiness, distribution or species composition had occurred. Aerial photographs were taken December 2005 and groundtruthed late 2006. Water quality parameters and three 4-inch core samples were taken during groundtruthing to determine seagrass species present at 92 GPS points from the previous study. The ArcView maps were compared to the 1998 results to determine seagrass trends. Total seagrass coverage was 436.6 acres of mixed shoalgrass and clovergrass beds with 2.8 acres of turtlegrass in Christmas Bay and 32.1 acres of shoalgrass only in Drum Bay. However, visual observations determined there was clovergrass present between groundtruthing sites in Drum Bay. Widgeongrass was not observed at any 2006 groundtruthing point nor was it observed visually elsewhere; water quality data was too limited to determine if seasonal changes caused the absence of widgeongrass. Turtlegrass patches increased in number and the acreage almost doubled. Seagrass in Christmas and Drum Bay appear to be slightly increasing. However some differences in seagrass acreage may be explained by different observers using GIS or environmental conditions during the aerial flight or groundtruthing surveys.

Distribution and Diet of Larval and Juvenile Fishes in the Rio Grande, Texas

Dennis T. Runyan *(Texas State University – San Marcos, Department of Biology, Freeman Aquatic Biology Building, 601 University Drive, San Marcos, Texas 78666, dr1171@txstate.edu)*
Timothy H. Bonner *(Texas State University – San Marcos, Department of Biology, Freeman Aquatic Biology Building, 601 University Drive, San Marcos, Texas 78666, tbonner@txstate.edu)*

Fishes of the Rio Grande in the Big Bend region of Texas represent an imperiled fauna because of direct anthropogenic alterations and continued growth of municipalities upstream. Fish species once populous are now extirpated and several are now extinct as a product of habitat modification. The larval and juvenile fish assemblage was assessed by sampling discrete geomorphic units at three mainstem Rio Grande sites and two tributary sites in Big Bend National Park. *Cyprinella lutrensis* comprised 75% of the overall assemblage followed by *Notropis braytoni* (14%), *Carpiodes carpio* (5%), and *Gambusia affinis* (3%). Specific habitat associations were determined that suggest at least 12 fish species found therein utilized slackwater habitats (i.e., backwaters) predominantly. Fishes were not evenly distributed among sites, geomorphic units, or chronologically, and Canonical Correspondence Analysis explained 21% ($P = 0.044$) of the total variation. Variance partitioning to assess pure effects of first order interactions explained all but 2% of the total variation. Stomach content analysis of fishes indicated opportunistic feeding of Diptera and other aquatic insects. No chronological difference in diet was found among time periods using Analysis of Similarity (R: 0.096, P = 0.13).

Preliminary Evaluation of the Texas Night-time Flounder Gig Fishery

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Southern flounder are the target of important recreational and commercial fisheries along the Texas coast, with average annual landings of almost 200,000 lbs and over 185,000 lbs southern flounder, respectively, from 1993-2003. In addition to being targeted by rod-and-reel anglers, a substantial night-time recreational gig fishery also exists for southern flounder. Texas Parks and Wildlife Department routinely monitors recreational sport-boat anglers during daylight hours, but no current estimates of night-time southern flounder harvest or fishing effort exist. Data collected from October-December 2007 were used to document southern flounder gigging effort along the Texas coast. Counts of flounder-gig fishermen at selected wade-bank sites were collected during the period just after sunset when gig fishermen were believed to be active. Counts of boat trailers at selected sport-boat access sites were also collected during this period. Pre-launch interviews were conducted at selected boat-access sites to determine the percentage of boaters intending to gig flounder. Preliminary results indicate that the majority of gigging activity occurs from Matagorda Bay south to Corpus Christi Bay, and that boat-access site pressure is substantially higher than wade-bank site pressure. Data collected during fall of 2007 will be used to determine proportional site pressure for possible further sampling of the fishery during fall 2008.

A Review of the Study of Heat Shock Proteins in Fishes and Their Potential Use for Understanding Physiological Tolerance

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Heat shock proteins (HSPs) or stress proteins are a family of proteins that aid in folding, assembly, and translocation of proteins under stressful biotic and abiotic conditions. The expression of HSPs has been identified in almost every organism studied to date. The presence of HSPs is easily detectable at the amino acid sequence level making them a reliable indicator of stress. In fishes, HSPs have been used to detect stressors such as pathogens, environmental contaminates, and heat and cold stresses. Here we review applications of HSPs to the study of heat stress in fishes and how they have been used to help understand physiological tolerance of fishes exposed to extreme heat stress. In addition, we identify critical gaps in our understanding of the function of HSPs in fishes. For example, the function and limitations of HSPs in different species and different organ tissues is not clearly understood. As anthropogenic activities and global climate change continue to alter thermal regimes of aquatic ecosystems, understanding the function and specific limitations of HSPs may help identify conditions that are likely to result in heat-induced mortality events.

Feed Level and Stocking Density Comparisons of Juvenile Spotted Seatrout *Cynoscion nebulosus* Reared in Brackishwater Ponds

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A factorial growth trail study was conducted with early-juvenile spotted seatrout *Cynoscion nebulosus* in which the primary source of nutrition, natural productivity, was supplemented with a commercial marine finfish production feed. Newly hatched fry (2 mm TL) were directly stocked into 0.20-ha outdoor ponds at densities ranging from 500-1,000,000 fish ha^{-1} and offered feed at static feeding rates ranging from 0.7 – 3.0 kg dry feed day^{-1}. Results from 29-day pond trails indicated classical log-linear increase in total length (TL) of fish. No significant differences were shown in levels of physico-chemical factors or phytoplankton and zooplankton counts among treatments. In high-stocking density ponds, a linear relationship was observed between fish TL and sample day. Fish stocked at the lowest density and fed the highest feed rate achieved the highest survival (95%) and TL (30 mm). Fish stocked at the highest density and fed the lowest feeding rate achieved the lowest survival (1%) and highest TL (42 mm). Stomach analysis indicated cannibalism in fish stocked at the highest density and fed the lowest feeding rate. In most cases, TL stabilized near the end of each growth trial. No significant differences in physico-chemical factors (e.g. temperature, dissolved oxygen, salinity and pH, etc.) were evident, indicating that differences in TL were attributable either to feed input or biomass density per se, and not the derivative effects of treatments on abiotic environment. Log transformation of TL data indicated a rate of growth substantially higher than that of red drum, a well-accepted regionally-cultured species, and indicates good overall potential of spotted seatrout for commercial aquaculture production. The purpose of this research was to evaluate the growth and survival of juvenile spotted seatrout reared in earthen ponds provided a natural forage base and supplemented with commercial feed and to determine the effect of stocking density and pond environmental factors on growth and survival. Results suggests that spotted seatrout can achieve acceptable growth and survival in aquaculture ponds.

Size Bias and Efficiency of Catfish Sampling Gears

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Although many gears are used to collect catfishes, few have been evaluated for size bias. We used mark-recapture to directly estimate size bias of tandem hoop-net series for collecting channel catfish *Ictalurus punctatus* and low-frequency DC electrofishing for collecting blue catfish *I. furcatus* and flathead catfish *Pylodictis olivaris*. To examine spatial and temporal variability, size bias was estimated in river and reservoir habitat during June, July, and September 2005 ($N = 6$). Over the course of study, about 30,000 blue catfish, 12,000 channel catfish, and 450 flathead catfish were collected. Hoop nets collected channel catfish ≥ 250 mm total length in proportion to their abundance. Likewise, blue catfish ≥ 250 mm were fully recruited to low-frequency DC electrofishing. Flathead catfish ≥ 150 mm appeared to be fully recruited to low-frequency DC electrofishing, although sample sizes of fish ≥ 500 mm were too small to examine bias. The size at which fish recruited to the gear was not affected by habitat (i.e., river and reservoir) or month sampled for any gear or species. Although large numbers of blue catfish were collected with low-frequency electrofishing, overall recapture rates (our measure of capture efficiency) were frequently < 1% per 2 h of electrofishing. Electrofishing capture efficiency also varied; recapture rates were greater in river habitat and highest in July and September. Such variation may limit the use of electrofishing data when estimating relative abundance (i.e. CPUE). Although some limitations were noted, the combination of tandem hoop-net series and low-frequency DC electrofishing can provide accurate size structure data for adult catfish populations from river and reservoir habitat.

Assessment of a Recreational Fishery in North Eastern Mexico

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La Juventud reservoir in Marin, Nuevo Leon, Mexico, receives water from land under intense production of crops and food animals, and from municipal wastewater treatment. As the recreational fishery developed in popularity, management issues developed around water quality, human health, and options for the fishery. Our part of this study included fish surveys in fall of 2006 and 2007 using boat electrofishing, gill nets and bag seines. Length frequency distributions, size structure indices, and relative weight indices commonly applied to North American fisheries were used to assess size structure, fishing quality, and condition of largemouth bass. Furthermore, growth, age structure and mortality were investigated with otolith annuli counts. Results depict a recreational fishery composed predominantly of juvenile and smaller sizes (sub-stock, stock) less than two years old, and few large size (quality, memorable, trophy) and older fish (five to seven years). The mean relative weight index (Wr) for stock and quality length categories fell below the optimal range (95-105), indicating thinner fish, and growth rates of largemouth bass at La Juventud were slow relative to Texas fish and an estimate of largemouth bass total instantaneous mortality was 0.732 ($p < 0.05$; $r^2=0.965$). The scarcity of largemouth bass from larger size classes and older age groups may be due to harvest of fish below the minimum length limit. Additionally, an assessment of prey availability and food use is warranted by deficient relative weight values.

Environmental Influences on Stream Fish Assemblage Structure in the Brazos and Trinity River Basins

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The influence of local and regional-scale environmental variables on patterns of fish diversity in streams within the Brazos and Trinity River basins was investigated. Species abundance and a suite of environmental

variables currently used for habitat quality indices were measured in 26 streams. Species richness was lowest in communities dominated by widespread species such as *Gambusia affinis*, while 15-20 species co-occurred in the most diverse stream sites. Geographic proximity did not appear to strongly influence community structure within the region, suggesting that local-scale environmental variables may be more important. Preliminary analyses showed that variables associated with habitat diversity and anthropogenic habitat alteration had the greatest influence on fish assemblage structure. A better understanding of how habitat characteristics shape stream fish assemblages in this region will aid in the development of improved habitat assessment techniques and more accurate predictions of how fish communities will respond to human-induced environmental change.

Conservation Implications of Elasticity Patterns in Great Plains Cyprinids

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We compiled estimates of age-specific fecundity and survival rates for 20 species of Great Plains cyprinids. These estimates were used to develop life-history models for each species. We used elasticity analysis to examine the proportional effect of changes in age-specific fecundity and survival rates on population growth rates. With one exception, changes in age-0 survival and age-1 fecundity had the greatest effect on population growth rates and accounted for 40 to 91% of the proportional change in population growth rate. Most of these fish are, in effect, annual species and this has important conservation consequences. These species will respond quickly to conditions that promote or inhibit early survival and thus are expected to respond to management efforts directed at young fish. Past research has emphasized the habitat needs, particularly of adults, of these species. Our results suggest this emphasis may have been misplaced.

Patterns in Fish and Macroinvertebrate Distributions in the Upper Laguna Madre: Seine Catches from 1985 to 2004

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The Laguna Madre is one of a few hypersaline lagoons in the world. Despite harsh conditions, the upper Laguna Madre (ULM) is a highly productive ecosystem and a popular sportfishing area, especially for spotted seatrout and red drum. It is also the most important Texas bay for commercial fishing of black drum. TPWD's Coastal Fisheries division began conducting routine monitoring of coastal fishery resources in 1977 to guide management. The goal of the present study was to improve understanding of spatio-temporal trends in relative abundance of selected fish and macro-invertebrate species in the upper Laguna Madre. We used TPWD's bag-seine and water-quality data from the years 1985-2004 to examine variation in species' relative abundances and relationships to several environmental factors (e.g., water temperature, salinity, dissolved oxygen, turbidity, day length, change in day-length, season, year and location). We hypothesized that one or more of these variables, alone or in combination, is related to spatial and temporal trends in community composition. Canonical correspondence analysis (CCA), a form of direct gradient analysis, indicated a significant relationship between abundances of the most common species and tested environmental variables, accounting for about 14% of the total variation. There were differences in the distribution of species among season and location. ULM1, ULM2, and ULM3 (three regions of ULM proper) had similar species assemblages but shared almost no species with Cayo, Baffin and Alazan, all secondary bays of ULM. Fall, winter and spring had almost entirely different species assemblages. Spring and summer had many species in common. The year 1990 was very different from other years, possibly indicating the effects of a severe freeze the previous year.

Recovery of Fishes Affected by the Martin County Coal Slurry Release, Martin County, KY

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In October 2000 an estimated 300,000,000 gallons of coal slurry were released into two adjacent watersheds, Coldwater Fork and Wolf Creek, in Martin County, Kentucky. Approximately 20 river miles within the two watersheds were considered void of life. Monitoring stations (3 control and 5 disturbed sites) were sampled annually for fishes in October from 2000 – 2005. A non-metric multidimensional scaling (NMS) ordination indicated considerable differences between control and disturbed site assemblages, but a recovery gradient was evident with progression through time. Box plots indicated that species richness recovered to the level of control streams by 2003, but species composition was considerably different than that of the controls. Overall, the streams have returned to their prior condition but disturbance legacy is the ultimate limiting factor for these systems.

Evaluation of Regulatory Protection of Seagrasses in the Redfish Bay State Scientific Area

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In the 1990s, it was recognized that propeller scars left by boaters were causing significant damage to seagrass beds in the Redfish Bay State Scientific Area (RBSSA) located in Aransas and Corpus Christi Bays. Initial efforts to address the problem through education, outreach, and the establishment of voluntary no-prop zones, were largely unsuccessful. In May 2006, a regulation went into effect which prohibits the uprooting of seagrasses by submerged propellers within the RBSSA. As part of an effort to evaluate the efficacy of the new regulation, baseline data were collected along 35 randomly-selected 100 m transects in the RBSSA from August-September in 2005. In 2006, sampling criteria were refined, resulting in 15 of the original transects being dropped from the sampling frame while 15 new transects were added. These 35 transects were sampled from August-October in 2006 and 2007. The total number of propeller scars on each transect was recorded, and qualitative as well as quantitative information was collected on each scar. In 2007, the locations along transects of scars detected in 2006 were re-examined to evaluate scar recovery. Following enactment of the regulation, significantly fewer scars were observed ($p<0.0001$). Both the total number of scars, and the mean number of scars per transect were reduced by 69%. In addition, prop scars in the area appear to recover at a much more rapid rate than what has been reported in the literature. Of 97 scars observed in 2006, 91 were considered recovered by 2007.

Cumulative Watershed Effects of Forest Logging on Headwater Stream Ecosystems

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Cumulative watershed effects of timber harvest alter stream habitats and influence benthic species richness and abundance. By comparing watersheds with different forest covers, we investigated the impacts of past forest practices associating with cumulative watershed effects on streams ecosystems in Chilliwack River basin. We found characteristic differences of stream habitats that were related to past forestry operation. Stream reaches

in well-mature forests had coarser substrate than that in young-growth forests that were impacted by recent forest practices. A diagram of two principal components separated reference sites in well-mature forests from recently impacted sites. Using a modeling technique - partial least squares projection to latent structures (PLS), we examined the relationship between multiple environmental variables and ecological responses of benthic communities. Predictive PLS models were developed based on environmental variables at reference stream reaches. Through PLS modeling and field-survey data analyzing, we found that reference reaches with high benthic species richness and high relative abundance were characterized by low volume of large woody debris, less FPOM and CPOM accumulated on substrate. A significant impact of past forestry practices was detected on both species richness and relative abundance of benthic invertebrates at the test stream sites that were disturbed by recent forest operations. Species richness and the relative abundance of benthos at the test sites were significantly lower than the PLS model expected. The overall biomass of invertebrate communities at recently disturbed sites was significantly lower than that at the reference sites. The results provide evidence for the importance of past forest practices associating with cumulative watershed effects in influencing habitat alteration and determining present-day stream biodiversity. This study suggests that the predictive model approach combining with intensive field observation has potential strength on assessment of cumulative watershed effect for forest biodiversity conservation and ecosystem management.

Characterization of Genetic Structure and Levels of Variation in Wild and Captive Populations of Devils River Minnow

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We conducted the first population genetic analysis of Devils River minnow *Dionda diaboli* to address elements of the Recovery Plan for the species. Our goals were to determine whether there was geographic variation in the genetic structure of the species, to assess levels of variation, and to determine whether captive-bred stocks were genetically representative of source populations. We used six microsatellite markers to genotype 314 tissue samples from five sites in the Rio Grande basin, Texas, and two captive-bred stocks from San Marcos National Fish Hatchery and Technology Center. We found three population subdivisions that were significantly different from one another: the Devils River basin, San Felipe Creek, and Pinto Creek. We found no significant differences among samples from different sites within the Devils River basin. The sample from Pinto Creek had a very low level of genetic variation relative to samples from the Devils River basin and San Felipe Creek. However, there were no indications that Pinto Creek experienced a severe population bottleneck in the recent past, or that the level of inbreeding was significant. We found that the captive-bred stocks were representative of the wild populations as assessed by allele frequency distributions and levels of variation.

POSTER SESSION ABSTRACTS

Is Dissolved Oxygen Concentration a Major Determinant of Overall Ecosystem Health in Texas Tidal Streams?

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The purpose of this study was to develop a standardized methodology, which relies heavily on multivariate ordination techniques, to assess ecosystem health within the tidally influenced portions of coastal streams. Three streams were sampled twice seasonally (during spring, summer and fall only) for two years in order to characterize their chemical (physiochemical profiles; short term 24 hour datasonde deployments; long term physiochemical profiles; water and sediment samples); physical (instream flow); and biological (vertebrate

and invertebrate nekton sampled with bag seines, trawls and gill nets; benthic macroinvertebrates/infauna; and aquatic insects) components of ecosystem health. Multiple sampling stations on each stream encompassed the transitional character of each reach from the freshwater of the river to the saltwater of the bay. Two of the three streams used for this study are currently not meeting their dissolved oxygen criteria. Based on the results of this study, dissolved oxygen concentration does not appear to be a major determinant of overall ecosystem health in tidal systems. While salinity-mediated differences within most of the ecosystem health components were prevalent within each stream, no universal biocriteria for Tidal Streams could be developed that would have applicability over large spatial scales.

Development of a Database for Evaluation of Historical Trends in Fish Communities of the Trinity River, Texas

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During 2007 we initiated a multi-year project funded by the Trinity River Authority and Clear Rivers Program to evaluate trends in Trinity River fish populations and communities. Our goal during the first year of the project was to develop a comprehensive database that could be used to evaluate historical trends in fish communities in the Trinity River. During the first year of this project we combined and analyzed existing government and published data sets in Trinity River fish populations. An Access® OBDC compliant database and EndNote® annotated bibliography were created. After extensive review of academic, government and published literature we were able to identify a total of 88 references including 68 government publications, 15 Journal articles and 5 dissertations and theses. All major university libraries in Texas were searched. Extensive interviews with regional and headquarter biologists from both the TCEQ and TPWD were conducted. All 88 publications were scanned into PDF format files. The database contains location and time of collection, gear used, effort, species collected or observed, catch or catch per unit effort, and numbers of species/taxa. Due to a variety of formats used in water quality data collection or lack of collection in some instances, water quality data was not included at this time. Future revisions will include this information if available. This database and annotated bibliography will facilitate future studies of Trinity River fish communities. Future revisions are likely as new studies are published and/or past reports discovered and located.

Characterization of White Trout (*Cynoscion spp.*) in Galveston Bay Using Morphology, Microsatellites, and Mitochondrial DNA Markers

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The evolutionary associations between closely related fish species, both contemporary and historical, are frequently assessed using molecular markers, such as Microsatellites. Here, the presence and variability of microsatellite loci in two closely related species of marine fishes, sand seatrout *Cynoscion arenarius* and silver seatrout *C. nothus*, are explored using heterologous primers from red drum *Sciaenops ocellatus*. Data from these loci are used in conjunction with morphological characters and mitochondrial DNA haplotypes to explore the extent of genetic exchange between species in offshore Galveston Bay, TX. Despite seasonal overlap in distribution, low genetic divergence at microsatellite loci and similar life history parameters of *C. arenarius* and *C. nothus*, all three data sets indicated that hybridization between these species does not occur, and that historical

admixture in Galveston Bay following divergence between these species was unlikely. The genetic markers employed herein will be useful in future studies in the genus *Cynoscion*.

Texas Freeze Simulation and Winter Mortality for Cobia (*Rachycentron canadum*)

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Spawning and raising of migratory species for foodfish and stocking purposes has increased in interest. One threat of pond-raising migratory species, which *in situ* have the ability to evade temperature extremes, is a pond freeze. We simulated a potential Texas freeze to determine lethal cold temperatures for pond-raised juvenile cobia *Rachycentron canadum*. After acclimating juveniles to 20.0°C, temperature was decreased 0.33°C per hour, (Texas freeze rates have been reported at 0.25 °C). The first fish showing signs of loss of equilibrium occurred at 12.4°C and 50% of experimental individuals lost equilibrium by 12.1±0.35°C. Loss of respiratory movement first occurred at 9.9°C and the median lethal temperature was at 9.6±0.26°C. Results of this study indicate that pond housed cobia juveniles require a temperature >13° C.

Stream Fish Assemblages in an Urbanizing Watershed

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Carter Creek is a third-order stream located in the Brazos River drainage. It runs through urban and agricultural lands along the eastern edge of Bryan and College Station, TX and receives secondary treated wastewater at three locations. Fish samples were taken from three different sites in 2007 and compared based on the habitat sampled, location relative to the wastewater discharges and also compared to collections in 1998 and 2003-2005. Riffles and runs produced small, shallow-bodied fish. Deep-bodied and larger fish were found in the pools where the current was greatly reduced, and these sites supported a local recreational and food fishery for channel catfish, largemouth bass, hybrid white x striped and white bass. Preliminary analysis indicates that ten species made up 95% of all fish collected across all years, and among these were five native cyprinids (blacktail shiner, red shiner, Mississippi silvery minnow, bullhead minnow, and pugnose minnow), seven invertivores (including longear sunfish and blackstripe topminnow), three omnivores, five tolerant (including Western mosquitofish and bluegill), and one intolerant species (mimic shiner). Across all years, mimic shiner was only collected upstream from the most upstream water treatment plant, but dusky darter, another intolerant but less abundant species, was collected at two sites downstream from treatment plants.

Community-level Response to Freshwater Inflows: Do We Need a Different Measuring Stick?

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This study investigated the potential control of freshwater inflow on the fisheries community composition within the eight major estuaries in Texas. The Texas Parks and Wildlife Department uses various fishery-independent gears systematically (via a stratified, random sampling of nearshore communities) to monitor the relative abundance and size of finfish and shellfish in coastal waters. Bag seines are used to monitor population trends, and it is thought that the juvenile and sub-adult classes collected with this gear are the life-stages most directly affected by freshwater inflow. Monthly samples (20 per month from each bay system, from 1991 to 2006)

were analyzed with nonparametric multivariate techniques to relate inflow conditions (drought, normal flow, floods) to bay-wide community composition. Analysis of Similarity (388 unique taxa and 3,592,434 individuals) revealed that community composition maintained a significant seasonal signal (winter, spring, summer, and fall collections were internally coherent across the different estuaries), but failed to reveal any significant 'freshwater inflow' signal (community compositions was similar across the inflow conditions within each estuary). This study shows that while freshwater inflow is important in maintaining the underlying "conditions" of each Bay (community compositions were significantly different between bays), the fisheries themselves were not immediately responsive to inflow events.

Changes in Native Aquatic Vegetation and Associated Fish and Macroinvertebrate Assemblages Following Addition of Triploid Grass Carp to Manage *Hydrilla verticillata* in Lake Conroe, Texas

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Since 2004, a resurgence in the infestation of the aquatic plant hydrilla (*Hydrilla verticillata*) has occurred in Lake Conroe, a 20,000 acre reservoir located in Walker and Montgomery counties, TX. To reduce the coverage of the exotic plant, a total of 86,000 triploid grass carp (*Ctenopharynogodon idella*) was stocked from 2006 to 2007. We are studying the native vegetation and the associated fish and macroinvertebrates present before and after the feeding activities of these stocked grass carp. Areas of native vegetation surveyed by TPWD were mapped on 64th acre grids using ARCVIEW software. Ten fixed sampling stations were randomly selected from the grid map along with three additional stations in areas representing restoration of native vegetation by TPWD. Initial collections in the early fall of 2007 at each site included data for fish, macroinvertebrates, and water chemistry parameters. These data collections will be repeated at these sites in late summer of 2008. We will compare relationships among changes documented in these variables across this time period. In addition, relationships among data for fish diets and habitat variables will be evaluated for largemouth bass, redear sunfish, longear sunfish, and bluegill collected at these sampling stations.

Routine Biological Monitoring of the South Llano River near Junction, Texas

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The Lower Colorado River Authority has sampled fish, benthic macroinvertebrates, stream habitat, and water quality on the South Llano River near Junction, TX since 2000. The river has experienced several major flood events that have reshaped the channel and bank within the study reach. Twenty-nine fish species and a total of 12,576 individuals have been collected, of which 9,311 were native cyprinids. Five species of intolerant fish are routinely collected. The river supports a relatively stable fish population, although there appears to be a decline in the abundance of *Etheostoma lepidum*. From a water quality perspective, the river has high clarity, transparency, and dissolved oxygen concentration; and low bacteria, nutrient, and salt content.

Changes in the Lake Conroe Fishery and Watershed Land Use 1986-2005

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Lake Conroe near Conroe, TX has been a closely watched reservoir since the initial stocking of grass carp in the early 1980's. Increasing urbanization has changed the watershed dramatically from its original farmland in the 1970's. Historic data collected by Texas Parks and Wildlife, the San Jacinto River Authority, and other government agencies will be used to evaluate relationships among urbanization, changes in water quality, and fish assemblage composition. Preliminary trends in the TPWD fish data from 1986 to 2005 are analyzed and presented.

Fish Assemblages and Diversity in High-desert Wadeable Streams, Nevada, USA

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Twenty-three wadeable streams in the Great Basin of high-desert Nevada were sampled by backpack electrofisher in conjunction with EPA Ecological and Monitoring Assessment Program (EMAP) protocol. More than 1700 individual fish were captured with the large majority released. Fifteen species from six families were collected with two native species, speckled dace and redside shiner, accounting for more than 78% of total individuals. Introduced salmonids accounted for more than 91% of total salmonids sampled. Fish abundance ranged from 0 to 318 with a mean of 80.29 ± 25.24 (mean ± SE), and greatest abundance at South Fork Owyhee River. Species richness and Shannon-Wiener diversity index ranged from 0 to 6 (mean: 2.29 ± 0.48) and 0 to 1.33 (mean: 0.56 ± 0.14) respectively, and greatest richness at Steamboat Creek. The correlation coefficient (r^2) for fish abundances and Shannon diversity index with stream order were 0.808 and 0.609 respectively. The correlation coefficient for species richness with stream order and wetted width were 0.752 and 0.557 respectively. Higher order streams typically had increased species richness and diversity indices. The assemblages of these streams were sometimes characterized by warmwater nonnative fishes. Cool temperature and clear water streams were typical of salmonids, and dominated by the nonnative brown, introduced from Europe and Western Asia, and brook trout, endemic to northeastern North America. Introduced salmonids impacted the historical legacy of more than one-half of these streams. Bull and cutthroat trout were not equipped against the severe competition from brown, brook and rainbow stockings occurring as early as the 1870s. The causes for the decline of native fish fauna in Nevada include; unsustainable water management practices, introduction of nonnative species for recreation, and accelerating habitat loss.

Spatiotemporal Patterns of Fish and Macroinvertebrates in the Pedernales River, Texas, USA

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The Pedernales River is a dynamic and unique hydrological feature of the Edwards Plateau. The habitat-faunal relationships within this system are poorly understood and the need for long-term data is necessary. Fish and macroinvertebrates are excellent indicators in biological assessment and by describing the essential spatial and temporal patterns of these fauna within the Pedernales River Basin, with regard to habitat and assemblage structure, important linkages to similar systems can be laid. Through quarterly sampling of 5 main-stem sites and 4 tributary sites spaced throughout the basin, fish were collected, identified, and enumerated. Macroinvertebrates were collected and preserved for later subsampling using the USGS National Water Quality Assessment Program and EPA Rapid Bioassessment protocols to a fixed organism count of 300 ± 20%. Habitat data of current velocity,

substrate, cover, and area were taken at all sampling locations for each site's most dominant geomorphic units with additional water quality measurements lumped for each site as a whole. Data were analyzed using both univariate and multivariate analyses of analysis of variance, canonical correspondence analysis, and principal component analysis. Applying these collected data, it is hoped that further understanding of the habitat relationships between aquatic fauna and their surroundings will be gained through better resolution in the environmental characterization and the assessment of community composition, of and in, the Pedernales River basin. Also it is hoped that these findings will contribute to previous sampling efforts for parallel analysis with other river systems within central Texas.

Errata

In the 2007 Annual Proceedings of the Texas Chapter American Fisheries Society, the professional affiliation of the President–Elect, Tim Bonner, was erroneously listed as the Texas Parks and Wildlife Department. The correct affiliation is Texas State University – San Marcos.

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