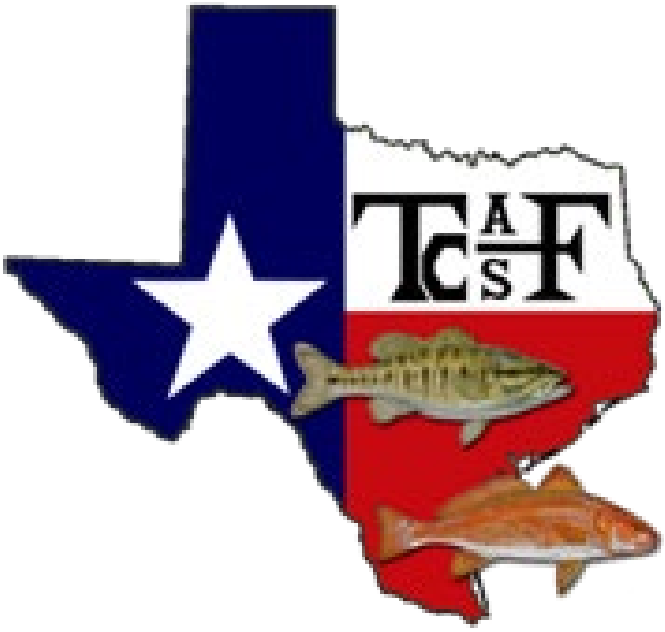
ANNUAL PROCEEDINGS
of the
TEXAS CHAPTER

AMERICAN FISHERIES SOCIETY



Corpus Christi, Texas

19-21 January 2017

Volume 39

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.

MEMBERSHIP

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

Texas Chapter, American Fisheries Society
Secretary-Treasurer
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78744

Annual membership dues are $12 for Active Members and $5 for Student Members.

ANNUAL PROCEEDINGS OF THE TEXAS CHAPTER AMERICAN FISHERIES SOCIETY

Annual Meeting
19-21 January 2017
Corpus Christi, Texas

2017-2018 Officers

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2017

Published by:
Texas Chapter, American Fisheries Society
c/o Texas Parks & Wildlife Department
4200 Smith School Rd
Austin, Texas 78744

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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 Texoma, 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 Texoma, 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	Fort Worth
2010	Brian Van Zee	Athens
2011	Ken Kurzawski	San Marcos
2012	Craig Bonds	Galveston
2013	George Guillen	Conroe
2014	Richard Ott	Pottsboro
2015	Bruce Hysmith	Tyler
2016	Kevin Storey	Kerrville
2017	David Buzan	Corpus Christi

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 (Ph.D.) – John Froeschke (TAMUCC)

2008 Fisheries Administration – Lance Robinson (TPWD)
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 (Ph.D.) – Preston Bean (TXSTATE)

2009 Fisheries Administration – Phil Durocher (TPWD)
Fisheries Education – Michael Masser (TAMU)
Fisheries Research – Ray Drenner (TCU)
Fisheries Student – Joshuah Perkin (TXSTATE)
Honorable Mention –
Fisheries Management – John Moczygemba (TPWD)
Technical Support – Mike Gore (TPWD)
Special Recognition –
Best Professional Presentation – Ray Drenner (TCU)
Best Student Presentation – Ted Valenti (BAYLOR)
Best Professional Poster Presentation – Pat Bohannon (TPWD)
Best Student Poster Presentation – Brianne Kiester (TCU)
Scholarships, Undergraduate – Michelle Parmley (TXSTATE); Nicholas Bertrand (TXSTATE)
Scholarships, Graduate (M.S.) – Joshuah Perkin (TXSTATE)
Scholarships, Graduate (Ph.D.) – Bridgette Froeschke (TAMUCC)
Clark Hubbs Research Award – Ben Labay (TXSTATE)

2010 Fisheries Administration – Mike Ray (TPWD)
Fisheries Research – Aaron Barkoh (TPWD)
Fisheries Culture – Hugh Glenewinkel (TPWD)
Fisheries Student – Ben Labay (TXSTATE)
Fisheries Management – Richard Ott (TPWD)
Special Recognition – Mandy Scott (TPWD)
Best Professional Presentation – Michael Tobler (TAMU)
Best Student Presentation – Ben Labay (TXSTATE)
Best Professional Poster Presentation – Mike Stahl (TPWD)
Best Student Poster Presentation – Ben Labay (TXSTATE)
Scholarships, Undergraduate – Jake Wimberly
Scholarships, Graduate (M.S.) – Laura Bivins
Scholarships, Graduate (Ph.D.) – Gabriella Ahmadia
Clark Hubbs Research Award – Seiji Miyazono (TTU)

2011 Fisheries Administration – Art Morris (TPWD)
Fisheries Education – Fran Gelwick (TAMU)
Fisheries Culture – Juan Martinez (TPWD)
Fisheries Research – Kristy Kollaus (TXSTATE)
Fisheries Student – Katie Roach (TAMU)
Fisheries Management – Dan Bennett (TPWD)
Technical Support – Danny Lewis (TPWD)
Special Recognition – Craig Bonds (TPWD)
Special Recognition – Carl Kittel (TPWD)
Special Recognition – Brian Van Zee (TPWD)

Best Professional Presentation – David Buckmeier (TPWD)
Best Student Presentation – Sandra Bibiana Correa (TAMU)
Best Professional Poster Presentation – Rae Deaton (SEU)
Best Student Poster Presentation – Jacob Wadlington (TCU)
Scholarships, Undergraduate – Nathan Frey
Scholarships, Undergraduate – Mark Thomas
Scholarships, Graduate (M.S.) – Niki Ragan
Scholarships, Graduate (Ph.D.) – John Mohan
Scholarships, Graduate (Ph.D.) – Judson Curtis
Clark Hubbs Research Award – Carmen G. Montana (TAMU)

2012 Fisheries Administration – Craig Bonds (TPWD)
Fisheries Culture – Chris Thibodeaux (TPWD)
Fisheries Research – Kirk Winemiller (TAMU)
Fisheries Student – Carmen G. Montana (TAMU)
Technical Support – Robert "Bobby" Wienecke (TPWD)
Special Recognition – Seven Coves Bass Club
Special Recognition – TTU-Department of Biology: Gene Wilde, Aaron Urbanczyk, Doug Knabe
Special Recognition – TPWD-River Studies: Kevin Mayes, Clint Robertson, Kevin Kolodzjcyk
Special Recognition – TPWD-Hatcheries: Dale Lyon, Carl Kittel, Daniel Field, Greg Polk
Special Recognition – Kevin Mayes (TPWD)
Best Professional Presentation – Brad Littrell (BIO-WEST)
Best Student Presentation – William Smith (TAMU)
Best Professional Poster Presentation – Raelynn Deaton (SEU)
Best Student Poster Presentation – Dan Fitzgerald (TAMU)
Scholarships, Undergraduate – Ruben Palacios (TAMUCC)
Scholarships, Graduate (M.S.) – Karen Drumhiller (TAMUCC)
Scholarships, Graduate (Ph.D.) – Larissa Kitchens (TAMUG)
Harry Tennyson Scholarship – William Smith (TAMU)
Harry Tennyson Scholarship – Matt VanLandeghem (TTU)
Clark Hubbs Research Award – Steven Curtis (TXSTATE)

2013 Fisheries Administration – Brenda Bowling (TPWD)
Fisheries Administration – Tim Birdsong (TPWD)
Fisheries Education – George Guillen (UHCL)
Fisheries Culture – Jennifer Butler (TPWD)
Fisheries Student – Rebecca Pizano (TAMU)
Fisheries Management – Mark Webb (TPWD)
Technical Support – Bill Hughes (TPWD)
Special Recognition – Randy Rushin (Water Monitoring Solutions)
Special Recognition – East Texas Woods and Waters Foundation
Special Recognition – Kirk Winemiller (TAMU)
Special Recognition – Loraine and Joe Fries (TPWD, USFWS)
Best Professional Presentation – Ashley Oliver (Halff and Associates)
Best Student Presentation – Tiffany Hedrick-Hopper (TTU)
Best Professional Poster Presentation – Kevin Mayes (TPWD), Brenda Bowling (TPWD)
Best Student Poster Presentation – Niki Ragan (SHSU)
Scholarships, Undergraduate – Lindsey Carey (TAMU)
Scholarships, Graduate (M.S.) – Virginia Eaton (TXSTATE)
Scholarships, Graduate (Ph.D.) – Alin Gonzales (TAMUCC)
Harry Tennyson Scholarship – Melissa Giresi (TAMU)
Harry Tennyson Scholarship – Michael Dance (TAMUG)
Clark Hubbs Research Award – Daniel Fitzgerald (TAMU)

2014 Fisheries Administration – Dave Terre (TPWD)
Fisheries Education – Reynaldo Patiño (TTU, USGS)

Fisheries Culture – Possum Kingdom Fish Hatchery Team (TPWD)
Fisheries Research – Warren Schlechte (TPWD)
Fisheries Student – Tony Rodger (TAMU)
Fisheries Management – Brad Littrell (BIO-WEST)
Technical Support – Patsy Berry (TPWD)
Special Recognition – Fishes of Texas Team (UT Texas Natural History Collections)
Special Recognition – Gary Garrett (TPWD)
Special Recognition – Todd Driscoll (TPWD)
Best Professional Presentation – Joshua Perkin (Kansas State University)
Best Student Presentation – Kole Kubicek (TAMU)
Best Professional Poster Presentation – Bryan Legare (TPWD)
Best Student Poster Presentation – Jessica Pease (TTU)
Scholarships, Undergraduate – Crystal Purcell (University of Dallas)
Scholarships, Undergraduate – Takona Tipton (TAMU)
Scholarships, Graduate (M.S.) – Jessica East (TTU)
Scholarships, Graduate (Ph.D.) – Landes Randall (TAMU)
Harry Tennyson Scholarship – Maelle Comic (TAMUG)
Harry Tennyson Scholarship – Lisa Havel (UTMSI)
Clark Hubbs Research Award – Jessica East (TTU)

2015 Fisheries Education – Dan Roelke (TAMU)
Fisheries Culture – Deborah Wade (TPWD)
Fisheries Research – Dan Daugherty (TPWD)
Fisheries Research, Honorable Mention – Tim Grabowski (USGS, TTU)
Fisheries Student – Jessica East (TTU)
Fisheries Student, Honorable Mention – Erin Bertram (UTT)
Fisheries Management – Marcos De Jesus (TPWD)
Technical Support – Karim Aziz (TPWD)
Special Recognition – Jimmie Green
Special Recognition – John Taylor (TPWD)
Special Recognition – Bass Brigade – Texas Brigade
Best Professional Presentation – B.P. Fleming, Dan Daugherty, Nate Smith (TPWD)
Best Student Presentation – D. Symonds (UTT)
Best Professional Poster Presentation – Gene Wilde (TTU)
Best Student Poster Presentation – Meriel LeSueur (TCU)
Scholarships, Graduate (M.S.) – Matthew Acre (TTU)
Scholarships, Graduate (M.S.) – Quentin Hall (TAMUCC)
Scholarships, Graduate (M.S.) – Danielle Macedo (TAMU
Scholarships, Graduate (Ph.D.) – Jenny Oakley (TAMU)
Harry Tennyson Scholarship – Erica Knowles (WTAMU)
Harry Tennyson Scholarship – Kenneth Zachary (TAMU)
Clark Hubbs Research Award – Aaron Urbanczyk (TTU)

2016 Fisheries Administration – Carl Kittel (TPWD)
Fisheries Education – Frances Gelwick (TAMU)
Fisheries Research – Tim Grabowski (USGS, TTU)
Fisheries Research, Honorable Mention – Gerald Kurten (TPWD)
Fisheries Student – Harlan Nichols (TXSTATE)
Fisheries Student, Honorable Mention – Eric Tsakiris (TAMU)
Fisheries Student, Honorable Mention – Greg Cummings (TPWD)
Fisheries Student, Honorable Mention – Dave Ruppel (TXSTATE)
Special Recognition – Greg Conley (TPWD)
Special Recognition – Jennifer Pollack (TAMUCC)
Special Recognition – Zoe Ann Stinchcomb (TPWD)
Certificate of Appreciation – Michele Nations (TPWD)
Best Student Presentation – Thomas TinHan (TAMUG)

Best Professional Presentation – Matthew Chumchal (TCU)
Best Student Poster Presentation – Amanda Pinion (TAMU)
Best Professional Poster Presentation – Matthew Chumchal (TCU)
Scholarships, Graduate (M.S.) – Kaylan Dance (TAMUG)
Scholarships, Graduate (M.S.) – Matthew Dzaugis (UT)
Scholarships, Graduate (M.S.) – Caroline Arantes (TAMU
Scholarships, Graduate (Ph.D.) – Thomas TinHan (TAMUG)
Harry Tennyson Scholarship – Gunnar Nystrom (TCU)
Harry Tennyson Scholarship – Jeffrey Plumlee (TAMUG)
Clark Hubbs Research Award – Ryan Vazquez (TTU)

2017 Fisheries Administration – Thomas Lang (TPWD)
Fisheries Culture – Donovan Patterson (TPWD)
Fisheries Education – Matthew Chumchal (TCU)
Fisheries Management – John Tibbs (TPWD)
Fisheries Research – Timothy Bonner (TXSTATE)
Fisheries Student – Matthew Acre (TTU)
Special Recognition – Abe Moore (TPWD)
Special Recognition – TPWD Inland Fisheries Data Analysis and Data Administration Group
Special Recognition – Randi Wayland
Special Recognition – Patsy B. Hollandsworth Family Foundation
Special Recognition – Sportsman's Club of Fort Worth
Best Student Presentation – Thomas TinHan (TAMUG)
Best Professional Presentation – Matthew Chumchal (TCU)
Best Student Poster Presentation – Amanda Pinion (TAMU)
Best Professional Poster Presentation – Matthew Chumchal (TCU)
Scholarships, Undergraduate (B.S.) – Taylor Cubbage (TAMUG)
Scholarships, Graduate (M.S.) – Hailey Boeck (TAMUCC)
Scholarships, Graduate (M.S.) – Elizabeth Hunt (TAMUCC)
Scholarships, Graduate (Ph.D.) – Cody Craig (TXSTATE)
Scholarships, Graduate (Ph.D.) – Kesley Gipson (TAMUCC)
Scholarships, Graduate (Ph.D.) – Friedrick Keppeler (TAMU)
Harry Tennyson Scholarship (Ph.D.) – Matthew Acre (TTU)
Harry Tennyson Scholarship (M.S.) – Ethan Getz (UTRGV)
Harry Tennyson Scholarship (M.S.) – Jennifer Morton (TAMU)
Harry Tennyson Scholarship (M.S.) – Erin Reed (UTMSI)
Clark Hubbs Research Award – Matthew Acre (TTU)

Abbreviations:

ACE – Army Corps of Engineers
BAYLOR – Baylor University
NMFS – National Marine Fisheries Service
ODWC – Oklahoma Department of Wildlife Conservation
OSU – Oklahoma State University
SCS – Soil Conservation Service
SEU – St. Edwards University
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
TCEQ – Texas Commission on Environmental Quality
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
UHCL – University of Houston – Clear Lake
USFWS – U.S. Fish and Wildlife Service
USGS – U.S. Geological Survey
UT – University of Texas – Austin
UTMSI – University of Texas Marine Science Institute
UTPA – University of Texas – Pan American
UTRGV – University of Texas – Rio Grande Valley
UTT – University of Texas – Tyler
WTAMU – West Texas A &M University

TECHNICAL SESSION ABSTRACTS

Reproductive life history and host fish selection in *Fusconaia mitchelli* (False Spike), *Quadrula aurea* (Golden Orb), and *Quadrula petrina* (Texas Pimpleback)

Jack Dudding *(Texas A&M University, Department of Wildlife and Fisheries Sciences, Texas A&M Agrilife Research, Institute of Renewable Natural Resources; 804-874-3492; jdudding6@tamu.edu*)
Charles Randklev (*Texas A&M Agrilife Research, Institute of Renewable Natural Resources)*

Freshwater unionid mussels are amongst the most imperiled species in North America. *Fusconaia mitchelli* (false spike) and *Quadrula petrina* (Texas pimpleback) are rare mussel species endemic to central Texas rivers and both are likely to become listed under the Endangered Species Act. Currently, little is known about the life history and reproductive biology of these species, which is likely to hamper conservation efforts for both species. To address these knowledge gaps, my proposed thesis research will examine early reproductive life history and host fish associations for *F. mitchelli* and *Q. petrina* in the lower Guadalupe River, which harbors significant populations for each species. I plan to monitor the gametogenic cycle throughout the year for both species to quantify seasonal timing of gamete production, spawning, and brooding. Fecundity will be assessed via gill excision and related to size and age to determine if fecundity is age/size dependent and whether there is evidence of reproductive senescence. Age of maturation and growth rates will be determined by shell thin-sectioning. Host fish associations and glochidia selectivity will be determined through laboratory host fish trials. Congeners of *F. mitchelli* in *Fusconaia* typically utilize cyprinid fishes as primary hosts, while congeners of *Q. petrina* in the pustulosa group of *Quadrula* primarily use ictalurid fishes as hosts. The ecological importance of hosts identified in the laboratory will be determined by: calculating the relative abundance of laboratory identified hosts in and around mussel habitat; determining glochidia infestation rates in situ; and prevalence of natural host infestation.

Rapid quantitative assessment to identify imperiled fishes

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Methodologies for identifying imperiled fishes range from relatively quick and cost-effective expert opinions to thorough and time-consuming quantitative Species Status Assessments (SSA). Expert opinions are common at the regional level (e.g., State Wildlife Action Plans), and Species Status Assessments are used to inform decisions at the national level (i.e., Endangered Species Act). These methodologies have value for their intended purposes, but they also have limitations: expert opinions might be biased towards some species over others (e.g., only fishes or fish communities of interest to the expert), and SSA are time consuming and feasible for only a few targeted species. The purpose of this study was to develop a repeatable, quantitative methodology that is quick and cost-effective for use at the regional level. The demonstrated methodology incorporated metrics consistent with the concepts of redundancy, resiliency, and representation used in SSA: the number of independent drainages and reaches with vouchered specimen occurrence (redundancy), relative abundances by reach (resiliency), and qualitative measure of commonality (representation). Information on known imperiled fishes and common fishes of the Edwards Plateau and Trans-Pecos regions of Texas was used initially to assess the methodology's ability to score and rank fishes using weights generated by the metrics. Ranking of fishes within Edwards Plateau and Trans-Pecos can be used by others to identify and quantify fish imperilment, as defined regionally, and the methodology likely can be easily applied elsewhere for a quantified assessment using a common language of fish imperilment.

Movements and demographics of Blue Sucker in the lower Colorado River, Texas

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Alteration of flow regime, e.g., timing, duration, flashiness, and magnitude of discharge, has serious implications to fluvial specialists inhabiting large rivers that have evolved flow-dependent life histories. Blue Sucker *Cycleptus elongatus*, is one such species that is considered vulnerable throughout its range due to its habitat requirements and life-history traits. However, the relationships between stream discharge and habitat use and recruitment in Blue Sucker have not been thoroughly examined, particularly in the southern portions of its range. The primary objectives of this research were to assess effects of varied streamflow levels, regulated by water releases from upstream reservoirs, on Blue Sucker movement, habitat use, and recruitment in the lower Colorado River downstream of Austin, Texas. Radio telemetry was used to characterize movement of Blue Sucker in response to river discharge changes. Results suggest large scale movements are related to season and flow regime prior to a relocation event. Furthermore, home range and minimum displacement are correlated with riffle density. Additionally, fin-ray sections (n = 58) taken from specimens during mark-recapture efforts were used to estimate age, and associate relative year-class strength with historical flow regimes. Preliminary results suggest the population in the lower Colorado River has had limited recruitment, and stronger cohorts appear to be associated with years with higher discharge. This work will provide critical information regarding conservation and protection of Blue Sucker in Texas and inform water management policy decisions affecting the lower Colorado River with implications to instream flows and freshwater inflows to coastal bays and estuaries.

Comparison of two biometric methods for determining sex of Alligator Gar

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McDonald et al. (2013) proposed a morphometry-based method for non-lethal sex determination of the Alligator Gar *Atractosteus spatula*. Their technique correctly assigned sex to 93% of males and 72% of females, but failed to identify sex for 32% of fish collected from a Texas coastal population. The authors noted that the technique was primarily developed using immature fish from a single population, and as such, recommended further validation and refinement of the technique using fish from a broad range of sizes and systems. Therefore, we tested the McDonald et al. (2013) technique using 149 fish (standard length range, 707 to 1,920 mm) collected from seven Texas populations. Sex identification using the technique of McDonald et al. (2013) improved for both sexes (98.6% of males and 86.1% of females), attributable to the inclusion of large, reproductively mature fish in the sample. However, sex still could not be determined for 28.8% of fish. Therefore, we explored the use of a cross-validated discriminant function analysis (DA), using the morphometric ratios developed by McDonald et al. (2013), to improve our ability to assign sex to sampled fish. The DA facilitated probability-based assignments of 100% of fish sampled with 94.4% accuracy for males and 71.0% accuracy for females. A logistic regression based on the success of the DA suggested fish >1100mm in SL are easier to identify using the morphometric ratios (≥92% accuracy; females [97.8%], males [88.5%]), likely because the changes in body shape are associated with sexual maturity. Due to the ability for the DA to assign sexes to 100% of sampled fish with high accuracy (84 – 88%) for Alligator Gar of all sizes and improved accuracy for mature fish, we recommend its use over the original SBR method for predicting sex in Alligator Gar.

Residency and movement of Spotted Seatrout *Cynoscion nebulosus* on a restored oyster reef

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Oyster reefs are highly productive systems that play an important role in the function and stability of estuarine ecosystems. However, degradation of valuable oyster reef habitat due to anthropogenic activities necessitates restoration and monitoring efforts. Despite the importance of oyster reefs, the functional role of these habitats for population persistence of estuarine teleosts is unclear. This study combined novel, non-lethal natural tracers of feeding ecology with acoustic tagging technology to examine spatial and temporal patterns of habitat use of spotted seatrout *Cynoscion nebulosus* on Half Moon Reef (HMR), a recently restored oyster reef in Matagorda Bay, Texas. Fifty-nine spotted seatrout (405 ± 26 mm Total Length) were captured at Half Moon Reef, surgically implanted with acoustic transmitters, and monitored by an array of underwater listening stations from 31 July 2015 to 18 August 2016. Highly variable patterns of residence on the reef (range: present 1-90% of days at liberty) were explained by fish size, with the largest fish displaying increased residency on Half Moon Reef. Carbon and nitrogen stable isotope analysis of scales collected from tagged fish also suggested dietary specialization in larger, more resident individuals, in contrast to the wider dietary breadth of smaller, less resident fish. The combined natural and acoustic tagging approach suggested that Half Moon Reef may function as primary habitat for larger, harvest-size spotted seatrout and secondary habitat for smaller individuals.

Modeling the responses of Alligator Gar populations to harvest: implications for conservation and management

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Despite increased interest in managing Alligator Gar fisheries, population responses to harvest are poorly understood. We developed an age structured dynamic pool model in R to model the effects of various exploitation scenarios. The base model was parameterized based on measured life history characteristics and fishery metrics for Alligator Gar in Texas; 50-year longevity, total annual mortality of 8.5%, and 3% exploitation. Recruitment was set to mimic observed annual variation in year class strength in Texas populations where recruitment is highly correlated with flood periodicity. Alligator Gar growth was modeled using composite length at age data (n = 344) from several Texas populations fit to a power curve (Total Length (mm) = 10.64 + 759.21*Age0.28) representing non-asymptotic growth. We used simulation modeling to 1) quantify the effects of various levels of exploitation on spawning stock abundance, longevity, and size structure and 2) evaluate the influence of length-based fishing regulations on population abundances and size structure of Alligator Gar populations. Our results quantify tradeoffs between harvest and trophy potential and identify potential regulation options for particular management objectives.

Effects of stocking density and feed rate on the growth of hatchery-reared juvenile Spotted Seatrout, *Cynoscion nebulosus*

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The spotted seatrout, *Cynoscion nebulosus*, is a highly sought-after recreational fish in the Gulf of Mexico. Fisheries managers in Texas use stock enhancement as one of the management tools to protect the fishery. Hatchery production of juvenile spotted seatrout has been successful in Texas; however, to increase post-release survival it is thought that the size of fish upon release should be increased from 35 mm to > 40 mm total length. To address this question, a baseline study on the effects of stocking density and feed rate on juvenile fish was investigated. Spotted seatrout were stocked into indoor 44-L aquaria at 10, 20, and 30 fish/tank (equivalent to 0.226, 0.453, and 0.680 fish/L) and fed at rates of 3, 6, or 10% biomass per day. In order to evaluate variation in population performance, two trials were conducted (Trials 1 and 2). Mean initial wet weights of fish in treatments for Trial 1 were 0.91±0.13 g (stocking density of 0.020 kg/m3) and 0.82±0.12 g (stocking density of 0.019 kg/m3) for Trial 2. Mean final weight was 5.51±1.43 g for Trial 1 (30-day duration) and 4.952±1.386 g for Trial 2 (27 day duration). Survival of fish at the highest stocking density significantly ($P<0.05$) increased with increased feed rate. Fish at the lowest stocking density showed significantly ($P<0.05$) higher whole-body protein content when fed the high feed rate. Fish fed at higher feeding rates had significantly ($P<0.05$) higher specific growth rate and, Fulton's condition factor (K), as well as whole-body energy, but reduced whole-body ash content. Treatment combinations of low stocking density and high feed rate resulted in highest survival and weight gain. The results of this study show that there is potential to rear spotted seatrout to larger sizes (> 40 mm) under hatchery conditions.

Enhanced production of Red Snapper (*Lutjanus campechanus*) at a newly constructed artificial reef in the western Gulf of Mexico

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Artificial reefs are commonly created to enhance marine fish populations; however, many studies evaluating their effects on these populations have been hindered by a lack of pre-construction data from existing natural habitats. We present findings from a before-after control-impact study designed to assess the impacts of a new artificial reef on fish populations in the western Gulf of Mexico. Vertical lines and fish traps were used to sample the reef site and a paired control site with natural substrates for one year prior to and two years after reef construction. Prior to reef construction and over bare substrates in general, infrequent catches of sea catfish and small coastal shark species were observed. With the exception of early juvenile Gray Triggerfish and Red Snapper, which were observed during the summer, the control site displayed a distinct lack of reef fish. In contrast, frequency of occurrence and abundance of several reef species increased at the reef site following addition of structured habitat. Most notably, we documented dramatic increases in Red Snapper and Gray Triggerfish abundance. Red Snapper were in good condition and growing quickly while at the reef site. Distinct cohorts of Red Snapper could be followed through time suggesting site fidelity, and few fish older than age-2 were captured showing limited migration of larger fish from other areas. Given that the new artificial reef supported high densities of juvenile Red Snapper that appeared to be growing quickly and were no longer exposed to shrimp trawl mortality, the reef clearly enhanced the export of juveniles (i.e., production) to the adult population. Our study highlights the potential benefits of nearshore artificial reefs to species like Red Snapper; however, future studies

should investigate the relative roles of emigration and fishing mortality to better understand the effects of artificial reefs on reef fish population dynamics.

GoMexSI: Progress toward a valuable resource for fisheries managers, marine ecologists, and educators in Texas

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Much attention has been devoted to the measurement and cataloguing of biodiversity throughout the world, in the Gulf of Mexico, and Texas over the past 30 to 50 years. However, the systematic recording and cataloguing of species interactions, or biostructure, has received far less attention. Nevertheless, it is this biostructure that defines and governs the flow of energy through the ecosystem. The Gulf of Mexico Species Interaction (GoMexSI) database and web application (gomexsi.tamucc.edu), is striving to rectify this situation in the Gulf of Mexico and Texas. Collecting, extracting, and archiving data from published and un-published resources and data contributors, we now have trophic interaction data for fishes from 122 sources, with a total of 83,854 interactions from 1,940 unique interactors. Currently we are assembling diet and habitat data in the Gulf of Mexico proper, and its estuaries from about 1100 references for a variety of taxa to include sea and shore birds, marine mammals, sea turtles, crustaceans, and others. Beyond trophic interactions we will include parasitic, amensal, commensal, and mutualistic relationships and stable isotope data. Much of the fish diet data for Texas are quite old. A current CMP project is helping us to catalogue nearly all that data, and a recent MARFIN project has allowed us to collect new diet data from more than 1,500 fish stomachs from the Texas continental shelf. The data are beginning to provide value to Gulf fisheries modelers using Ecopath, Atlantis or OSMOSE, which require large amounts of highly resolved diet data. Marine ecologists have begun to use the data to understand the network of relationships among fishes for the development of ecosystem based approaches to management of fisheries. We are currently exploring, through teacher workshops, mechanisms to make the data more accessible and useful to teachers and students in middle and high schools.

Managing commercial harvest of Eastern Oysters (*Crassostrea virginica*) in Texas – applying a 2-metric stoplight approach in Copano Bay, Texas

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In 2012, the Texas Parks and Wildlife Department (TPWD) and the commercial oyster industry formed a cooperative workgroup to develop guidelines and sampling protocols to determine if public oyster reefs were being overworked during the commercial oyster harvest season. The relative percentage of undersized oysters was evaluated, and determined to be limited in functionality. Subsequently, market oyster catch rates were combined with percent undersized oysters in a "stoplight" three tiered approach to evaluate whether or not an area could support commercial oyster harvest. During 2014, extensive sampling of oyster reefs in Copano Bay, Texas was initiated after TPWD received reports of high percentages of illegal undersized oysters in sacks of commercially harvested oysters. Based on results from this sampling, Copano Bay was closed to oyster harvest in April, 2014, and remained closed for an extended period. Despite the closure, continued sampling of Copano Bay did not show the mean percentage of undersized oysters was improving as expected. Between April, 2014 and January, 2016 the percentage of undersized oysters increased from 70.2% to 74.0%. These results caused biologists and oyster industry workgroup members to question the effectiveness of managing by this single metric. We hypothesized the high spat recruitment from the summer of 2014, and subsequent recruitment of these juvenile oysters into the 26-50mm and 51-76mm categories, was driving the increase in the percentage of undersized oysters. However, since sampling during January, 2016 showed market oyster catch rates in the "good" threshold level at 1277/h, Copano Bay re-opened to oyster harvest in February, 2016 despite the high number of undersized oysters. This allowed commercial oyster boats to harvest an estimated 60,720 sacks during 33 days, with an ex-vessel value of over $2.17M. Consequently, we believe applying the stoplight approach with two metrics allows for improved management of the oyster fishery in Texas.

Distribution, abundance, and life history of the Prairie Chub

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Prairie Chub *Macrhybopsis australis* is endemic to the upper Red River drainage and listed as species of greatest conservation need in Texas and Oklahoma. Listed threats include anthropogenic alterations to river connectivity, water quality, and water quantity. However, little is known about Prairie Chub life history and how the ecology and biology of the Prairie Chub are specifically linked to anthropogenic alterations. Objectives of this study were to quantify occurrence, abundance, and habitat associations of the fish community within drainages of the upper Red River and describe food habitats, reproduction, life history information, and longitudinal movement of Prairie Chub within Pease and Wichita rivers. Range wide surveys were conducted in Fall and Winter of 2015 and Summer of 2016. Monthly samples at five sites on the Pease and Wichita rivers were taken in 2016. Preliminary results indicate that the Prairie Chub is a benthic invertivore with a protracted spawning season (May through September) and a life span of two years. Insights from this study can be used to assess risks associated with current and future anthropogenic alterations within the basin.

The Medina Roundnose Minnow (*Dionda nigrotaeniata*): an assessment of its rangewide status and initial study of its ecology in a hill country stream

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The Medina roundnose minnow (*Dionda nigrotaeniata*) was recently split out from the Guadalupe roundnose minnow, which formerly ranged from the Medina to Colorado River basins, and is endemic to the Medina River basin. Recent surveys found the minnow to be absent from much of its former habitat in the upper Medina basin (including its type locality) and located it only in Love Creek on The Nature Conservancy's Love Creek Preserve. We recently initiated work to evaluate the population status of the Medina roundnose minnow on the preserve as well as to evaluate its rangewide status. The study is also evaluating potential impacts from two primary threats to the Love Creek population: historical land use in the Love Creek watershed and effects of drought and groundwater pumping on springflow. The objectives of the study are to: 1) determine the distribution of roundnose minnow and other fishes in Love Creek and its tributaries on the preserve, 2) determine the extent of flowing water at various hydrologic conditions to determine how springflow and associated baseflow respond to rainfall and drought, 3) determine the impact of legacy land use on Love Creek and evaluate the potential need for habitat restoration, and 4) to look for additional populations of the minnow in the upper Medina River basin. The Medina roundnose minnow population in Love Creek appears to be strong, even through the drought of 2011-2012. This paper presents monitoring data from 2011-2016 and comment on the distribution of the fish throughout the preserve relative to zones of springflow input and how these respond to drought. It also presents updates on surveys throughout the Medina basin and comment on populations that have been located in three additional streams, two of which are also on the Love Creek Preserve.

Morphometrics as a descriptor of potential hybridization between the Prairie Chub (*Macrohybopsis australis*) and Shoal Chub (*M. hyostoma*)

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Hybrid zones form when genetically divergent taxa meet and reproduce in nature. Such hybridization is common in freshwater fishes, cyprinids in particular. The degree to which hybridization is occurring in many

species of conservation concern is unknown and is of interest to conservation managers. Oftentimes, when two species hybridize that have morphological differences, a unique morphotype can be produced exhibiting intermediate or extreme body forms. We utilized geometric morphology to determine if hybridization is occurring in *Macrhybopsis hyostoma* and *M. australis* in the Red River and several tributaries. Overall, there was significant morphological differences between the two species. Significant differences were also found among sites; however, a majority of the differences were driven by species designations, although a few pairwise site comparisons were significantly different within species, indicating variation in the morphotypes within species. In multivariate space, there is incomplete separation between species, yet some overlap is present which could indicate hybridization. Principal Components analysis revealed that the main drivers of the differences in PC1 axis with regards to species included shallow back and a cone shaped nose for *M. australis* and a curved back, with a short, curved nose for *M. hyostoma*. For PC2, a more anterior eye and pelvic fin was associated with *M. australis* and a more posterior eye and pelvic fin were associated with *M. hyostoma*. These results reveal no clear indication of hybridization, yet because there is incomplete separation and overlap on the PCA, hybridization cannot be ruled out either. Future work includes genetic assessments to confirm or refute hybridization and introgression. If hybridization is found, this morphometric analysis will aid in identification of pure species and hybrids.

Capture stress and post-release survival of Blacktip Sharks (*Carcharhinus limbatus*) in the Gulf of Mexico recreational fishery

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Large predatory sharks play important roles in maintaining healthy ecosystems through top-down controls. Sharks are susceptible to high fishing mortality and vulnerable to overexploitation due to their life history characteristics such as slow growth and late age at maturity. The blacktip shark (BTS) is an important recreational species targeted along the coast of Texas and throughout the northern Gulf of Mexico. Despite the importance of BTS populations, estimates of capture mortality and post-release survival are needed for accurate stock assessments. This study aims to 1) quantify physiological stress levels associated with recreational hook and line capture using blood chemistry (i.e. lactate, glucose, pH, pCO2) and 2) estimate post-release survival of large adult BTS using pop-up satellite archival transmitting (PSAT) tags. Blacktip sharks were caught with recreational charter fishermen (n=35, Fork Length range 60-143 cm) in TX, LA, MS and FL using conventional tackle. Fight times ranged from 1 to 18 min (mean ± SD: 6.9 ± 4.7 min) and were strongly correlated to lactate levels in the blood (r2=0.55). Additional blood chemistry parameters will be assessed to link capture stress level to survival. PSAT tags were deployed on 16 individuals; however, 8 tags have communicated with satellites, suggesting premature release or post-release mortality. Four PSAT tags that were deployed and released have been recovered, offering high resolution profiles of temperature, depth, and light level data that can be used to determine BTS survival or mortality.

Hydroelectric dams in the tropics: impending threats to biodiversity and fisheries

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Extensive development of hydropower has contributed to electrical grids of North America and Europe for nearly a century, with significant impacts to aquatic ecosystems and biodiversity. Most river basins in North America are heavily dammed, and environmental impacts are now well understood. Hydroelectric dams have been constructed throughout the Paraná Basin in Brazil, with severe impacts to fish stocks and ecosystem dynamics. Until recently, the great river basins of the tropics have largely escaped hydropower development, but this situation is changing rapidly. The Mekong and Amazon basins already have hundreds of dams, with dozens currently under construction and hundreds more planned. Relatively few dams have been constructed in the Congo Basin, however many are planned. The Amazon, Congo and Mekong contain about one third of all freshwater fish

species, and support inland fisheries that are critical for the food security of millions of people in developing countries. If new dam construction in other tropical river basins is considered, then well over half the world's freshwater fishes could be at risk. In the past, environmental impact assessments have been too limited in scope, too short in duration, and too frequently conducted after hydroelectric projects have already been approved. To protect biodiversity and fisheries, environmental impact assessments need to include regional analyses of hydrology, fluvial connectivity, patterns of aquatic species diversity and endemism, nutrient and sediment dynamics, and how all of these affect fisheries productivity. Climate change projections also must be taken into account. Without regional planning, hydroelectric dam construction will progressively erode biodiversity, fisheries and other fluvial ecosystem services in the tropics.

Reducing discard mortality in the northwestern Gulf of Mexico Red Snapper fishery

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Discard mortality in Red Snapper (*Lutjanus campechanus*) may be one impediment towards a rapid stock recovery for this economically important Gulf of Mexico fishery. Red Snapper are highly susceptible to pressure-related injuries (i.e., barotrauma) that compromise survival after catch-and-release. Barotrauma intensity and subsequent mortality is affected by many variables, with the most important being capture depth. To determine the relationship between capture depth, barotrauma impairment intensity, and post-release survival, we tagged Red Snapper with ultrasonic acoustic transmitters to estimate catch-and-release mortality. 300 fish were released at five incremental depths ranging from 30 to 70 m, and of those 300, 15 were tagged at each depth. The number of visible barotrauma symptoms was recorded and converted into an impairment score to compare with survival. Twenty Red Snapper from each depth treatment were released at 1/3 depth, 2/3 depth, or the bottom using two different rapid recompression devices, the SeaQualizer™ and the Blacktip Catch & Release Recompression Tool™. GoPro cameras were used to observe release behavior and predict survival rates. Estimates from this study can be integrated into stock assessment models to achieve better calculations of overall mortality and inform managers on effective release methods to maximize survival in discarded Red Snapper.

Uses of American Water-willow (*Justicia americana*) by reservoir fishes and invertebrates in Lake Conroe, Texas

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Water-willow (*Justicia americana*) is popular in fish habitat improvement projects because of its ease of establishment and relative resistance to herbivory by grass carp (*Ctenopharyngodon idella*). However, the response by the lentic fish community to water-willow establishment has not been well documented. This study uses 9.32-m^2 plots of water-willow established by Texas Parks and Wildlife Department in Lake Conroe, Montgomery County, Texas. Three replicates were randomly selected for each category of plant patch diameter within the plot (bare substrate, small, medium, and large) in each of four consecutive seasons. Plots were block netted then electrofished exhaustively to capture fish inside the block net. A 0.5-m diameter plankton net was used to simultaneously collect representative samples for macroinvertebrates in the water column and on plant stems and to calculate patch stem density. A 3.8-liter benthic sediment sample was collected where the plant stems were removed. Macroinvertebrates and fish were identified to the lowest practical taxon to determine assemblage structure. Fish were identified to species, weighed to the nearest gram, and total length was measured to the nearest mm and stomach contents were examined. Fish size composition, relative weight (*Wr*), and stomach contents were compared for each species across water-willow stand categories and season. Results show that biodiversity and total abundances of both fish and macroinvertebrates within water-willow sites was greater than in unvegetated control sites. Water-willow patch size and stem density had little impact on sport fish *Wr* and length-frequency distributions.

Determining thermal tolerances of freshwater mussels in Texas

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Freshwater mussels are among the most imperiled groups of aquatic organisms in North America largely due to anthropogenic impacts, such as altered temperature regimes. Detailed knowledge on lethal temperatures for freshwater mussels has been limited to only 14 species, which is less than 5% of the species known to occur in North America, and nothing is known about thermal tolerances of Texas mussel species. This lack of information is problematic because climate change coupled with increasing human water demand is expected to increase the frequency and intensity of droughts in Texas, which may negatively impact threatened mussel populations. To determine the effects of elevated water temperature on Texas mussels, we tested the upper thermal temperature tolerances of three freshwater mussel species (*Fusconaia mitchelli*, *Cyrtonaias tampicoensis*, and *Amblema plicata*). Behavioral response and survival were monitored for mussels acclimated to 3 temperatures (23, 27, or 30°C) across a range of experimental temperatures (26°C-45°C) during acute 96-h laboratory experiments. Preliminary results indicate that *F. mitchelli* and *C. tampicoensis* have lower LT50s (the temperature that causes mortality in 50% of the population) and thus are more thermally sensitive, while *A. plicata* is more thermally tolerant. These results indicate that *F. mitchelli* and *C. tampicoensis* might be at risk from elevated water temperatures, especially during drought. To mitigate the impact, agencies responsible for managing freshwater resources should consider thermal tolerances of mussels when making and implementing environmental flow recommendations. Managing environmental flows will involve an adaptive framework that considers both current and future thermal regimes as well as physiological tolerances of threatened species to meet both human and ecosystem needs.

Tracking Atlantic Tarpon with scale chemistry

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The use of scales as a non-lethal alternative to otoliths for reconstructing migration and dietary histories of mobile fishes is gaining popularity across the world and in numerous taxa. However, the complexity of scale growth geometry is an important determinant for the potential utility of sequential analyses of both inorganic (e.g. strontium and barium concentrations) and organic (e.g. carbon and nitrogen isotope ratios) proxies. We present results investigating both types of proxies in scales of a highly migratory euryhaline predator, the Atlantic tarpon, *Megalops atlanticus*. This species supports a valuable recreational fishing industry within the Gulf of Mexico and is currently listed as vulnerable under the International Union for the Conservation of Nature (IUCN). There is thus an urgent need to understand essential habitat requirements for this species using non-lethal techniques. Consistency in both organic and inorganic proxies among multiple non-regenerated scales from the same individual indicated these proxies provide reliable information about movements across salinity gradients and associated trophic shifts across different life history stages. Stable isotope and trace element results together indicate that trans-haline migratory behavior is facultative and highly variable among individuals, with some but not all fish transiting estuarine gradients into oligohaline waters. Trans-haline migrations were also associated with ontogenetic trophic shifts, as indicated by progressive shifts in dietary isotope signatures concordant with marine migrations. Our findings highlight novel opportunities to use scales as non-lethal alternative to monitor fish migrations across chemical gradients in species where sequential sub-sampling is made possible by scale architecture.

Relationships between climate, growth, and fisheries production in a commercially exploited marine fish from the Gulf of California

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Climate variability can affect fish populations and fisheries production in numerous ways, including inducing measurable fluctuations in fish recruitment, growth, condition, and fisheries production. Unfortunately, linkages between climate, fish populations, and fisheries is poorly understood for most exploited species, which hinders effective management. The purpose of this study is to use the Gulf Corvina (*Cynoscion othonopterus*), a heavily exploited marine fish in the Gulf of California, Mexico, as a model to investigate the relationship between the Multivariate ENSO Index (MEI) and three parameters: adult fish condition, fish growth rate, and fisheries production. Fish condition is assessed using annual variations in length to weight ratios in relation to MEI using both a linear and exponential model. Fish growth rate is measured using otolith growth- increment chronologies. Lastly, annual catch data is compared to MEI to assess relationships between climate and fisheries production. Results indicate that fish condition, fish growth rate and fisheries production are enhanced during El Niño conditions. Specifically, we found a significant positive linear relationship between the annual average of MEI and fish condition. Growth rate during juvenile and adult years showed a positive relationship with MEI during months January-June. Likewise, climatic conditions during the birth year showed a positive relationship with fisheries production at the peak age of capture five years later. These results suggest that relationships between these parameters can be used in predictive manner to adjust harvest limits based on climate variability and also highlights a positive relationship between a intensely fished fishery and changing climate.

TPWD's East Bay oyster restoration project: results and lessons learned

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The Galveston Bay Ecosystem has historically been Texas' largest producer of oysters. However, even before Hurricane Ike's impact in 2008, oyster production in Galveston Bay, as measured by Texas Parks and Wildlife Department's (TPWD) fishery-independent dredge sampling program, had fallen well below the 30 year average. To address this problem, TPWD received a grant from the Texas General Land Office's (GLO) Coastal Impacts Assessment Program (CIAP) in 2013 to restore a minimum of 130 acres of oyster reef habitat in East Galveston Bay. The restoration project, a partnership with Coastal Conservation Association Texas (CCA), ensued in summer 2014. Due to additional funding acquired from various sources, a total of about 186 acres were ultimately restored using traditional cultch planting methods. This is a record for oyster restoration acreage in Texas. The restoration sites were closed to commercial oyster harvest for 2 years to allow time for oysters to colonize the sites and reach harvestable size. The sites were sampled post-restoration for oyster abundance and fish utilization using a variety of methods. Oyster density was measured with patent tongs and diver quadrats, while acoustic fish density was measured with a Biosonics DTX digital echo sounder. Both patent tongs and diver quadrats indicated oyster density measurements greater than 100 oysters per square meter, well over the success criteria of 10 per square meter. For the acoustic fish density, a success threshold of $S_v > -56$ (volume backscatter in units of dB) was determined from published literature. This threshold was exceeded at all restoration sites. The project also funded an oyster ecology educational module that was presented to over 1,500 3rd grade students, a side scan sonar survey of West Galveston Bay oyster reefs and an engineering study of alternative approaches to oyster restoration.

Is low-profile worthwhile? Investigating the effect of low-profile artificial reef patch size on juvenile fish recruitment

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Low-profile artificial reefs may be beneficial to supplement fisheries by providing simple hard-bottom substrate for reef fish species at various life stages. The purpose of this study is to determine the optimal size of low-profile patch reef in the recruitment juvenile reef fish in the Western Gulf of Mexico. Standard cinder blocks were deployed at the Port Mansfield Reef (PS-1047) at a depth of 21 m away from any hard structure. Blocks were arranged in eight arrays with replicates of: single block, two blocks, four blocks, and 16 blocks at 25-m spacing. Arrays were surveyed visually by SCUBA divers. Initial surveys have revealed recruitment of a diverse assemblage of juvenile reef fish arriving at the arrays containing 31 species including: *Lutjanus campechanus*, *Hyporthodus nigritus*, *Lutjanus griseus*, *Pomacanthus paru*, *Pareques umbrosus*. Abundance, community diversity, and fish size were highest at the largest patch size and a linear increase in abundance and diversity was observed with increasing patch size. Juvenile *Lutjanus campechanus* have been observed across all replicates with recruitment of post-settlement individuals as small as 8 mm, indicating that low profile structures may offer adequate shelter for a range of fish sizes. These results suggest that deployment of low-profile structures near existing artificial reefs may be an effective tool to increase juvenile recruitment aiding in fisheries production.

Retention of visual implant elastomer (VIE) tags in two species of Great Plains minnows

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Visible implant elastomer (VIE) tags are a surgical plastic that is injected subcutaneously into transparent tissues of animals for the purpose of identification. This method provides a means to identify fish readily without affecting survival or inhibiting growth. VIE can be used to identify individual fish in the field for experimental purposes such as migration and may provide useful estimates of individual survival. Few laboratory studies have assessed retention rates of VIE tags in cyprinid species. Laboratory retention studies are important for assessing whether VIE tags are a viable technique for certain species. Retention rates, effectiveness of tagging location, and tagging-related mortality vary across species and size of fishes. I used VIE to tag juveniles of two Great Plains species, Plains Minnow (*Hybognathus placitus*) and Smalleye Shiner (*Notropis buccula*). No research has evaluated the use of VIE tags on these species. VIE tags were injected into 540 juveniles of each species to assess long-term (180-day post tagging) survival of tagged fishes. Three areas were chosen for tagging to identify the most effective tagging location. Differences in survival and retention in different size classes also was assessed. In Plains Minnow, retention rate was 92.7% with a 10.7% mortality rate and in Smalleye Shiner there was a 94.8% retention rate, with a 3.5% mortality rate. As aridity and temperature shifts in the world become more prominent, the decline of many riverine fishes is going to become more prevalent. VIE tagging will provide useful data to be used for implementing proper management and conservation goals for these imperiled Great Plains cyprinids.

Effectiveness of removals of the invasive Lionfish: how many dives are needed to deplete a reef?

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The invasion of the red lionfish (*Pterois volitans/miles*) into the Atlantic and subsequently Caribbean and Gulf of Mexico from the Indo-Pacific has had devastating consequences on the native fish community. The

invasion has led to declines in overall biomass and recruitment of native fishes and has tipped some communities from coral to algal dominated habitats. Human interventions, in the form of culling, are becoming common to reduce lionfish numbers and mitigate the negative effects associated with the invasion. While total eradication of lionfish in the invaded range appears unlikely, local-scale removal efforts have been shown to reduce lionfish abundances and drive beneficial changes in the local native fish community biomass. Given that managers are generally faced with limited resources to allocate to removal efforts, it is necessary to develop techniques to ensure maximal effect of removals without wasted resources of time and money. Previous research has identified location specific lionfish density thresholds needed to limit their negative impacts on the native population. Here we set out to develop a method managers can implement in new or ongoing management strategies to quantify the time needed to reach target thresholds of lionfish density. The technique presented here could be adopted by managers when determining how to allocate effort, accounting for site specific differences in effort requirements.

Upstream passage plan for American Eel *Anguilla rostrata* at Toledo Bend Hydropower Dam, Texas-Louisiana, Sabine River, Gulf of Mexico

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American Eel Anguilla rostrata is a catadromous fish that spawns in the Sargasso Sea, migrates to coastal and freshwater habitats of North, Central, and South America to grow and mature, then migrates back to the ocean to spawn. Concerns regarding the status of American Eel exist throughout the species' range due to measured and anecdotal declines in abundance and distribution. The species' decline is attributed to many factors, including unsustainable harvest, pollution, migration barriers, disease, and changing oceanic conditions associated with climate change. In 2014, the Federal Energy Regulatory Commission issued a license to the Sabine River Authority for the continued operation of the Toledo Bend Hydropower Dam on the Sabine River, Texas and Louisiana. Included in this license is a condition to pass American Eel upstream of the dam. This presentation will review the upstream passage plan at Toledo Bend; provide background information on the development and goals of the plan; provide a description of the upstream passage devices that will be utilized; and outline operational details and measures of success. A brief review of other passage projects that could support American Eel migration in the Gulf of Mexico will be provided.

Giant Reed extract suppresses golden alga growth – a potential strategy involving the processing of one harmful invasive to control the growth of another

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Golden alga (*Prymnesium parvum*) is an invasive species found in brackish inland waters of the USA and elsewhere around the world. It produces toxins capable of killing fishes and other aquatic organisms. Its ecological impacts have been severe, particularly in Texas. Progress towards the development of control tools and strategies, however, is limited. Previous studies found that allelochemicals derived from aquatic plants reduce the growth of certain harmful algae. For example, cyanobacterial growth is inhibited by methanolic extracts of giant reed (*Arundo donax*), an invasive and widely distributed riparian plant in the USA that is also found in Texas. This study determined if giant reed extracts are toxic to golden alga. Two methanolic fractions, C (neutral) and F (acidic), were prepared and tested at various concentrations in cultures. Inoculum sizes included low (100 cells/ml) and high (10000 cells/ml) values and dependent variables were specific growth rate (μ, day^{-1}) and maximum cell

abundance (cells/ml). Fraction F had no effect on μ regardless of concentration or inoculum size. Fraction C at 0.01 g/L had no effect on μ at either inoculum size but completely suppressed growth at 0.05 and 0.15 g/L. At the latter concentrations of fraction C, cell abundance in cultures inoculated with 10000 cells/ml declined to < ~450 cells/ml by day 3 and was undetectable by day 6, indicating high allelopathic potency of this fraction. These observations suggest that giant reed extract could become an effective tool to suppress early growth of golden alga and to quickly disrupt active blooms. In an environmental context, the processing of one harmful invasive species to control the growth of another also is an appealing strategy.

Phylogenetic relationships between the members of the genus *Notropis* (Family Cyprinidae)

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Notropis is an ecologically diverse genus in the family Cyprinidae. The genus is speciose with over 91 species found from Mexico to Canada. Currently, there is not a complete phylogeny for the genus. Therefore, I propose to use data available on GenBank to perform the most complete phylogenetic analysis on the genus *Notropis*. I accumulated many different mitochondrial and nuclear sequences and performed phylogenetic analyses using neighbor joining, maximum likelihood, and Bayesian analyses. The gene trees show very different evolutionary relationships for the species in the genus *Notropis*. Many of the groupings within the phylogeny, however, aligned with many of the smaller published phylogenies of *Notropis*. More sequence data are needed to gain a better understanding for the members of *Notropis*.

Utilizing accelerometer telemetry tags to compare Red Snapper (*Lutjanus campechanus*) behavior on artificial and natural reefs

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Oil platforms and ships are popular artificial reef materials in the Gulf of Mexico. Many important reef fishes such as red snapper (*Lutjanus campechanus*) utilize these reefs and the structure they provide. However, uncertainties remain as to whether or not artificial reefs serve as suitable substitutes for natural reefs and which reef structure types provide the best habitat for fish. In this study, we are analyzing activity budgets and habitat preferences of red snapper over natural and artificial reefs using three-axis accelerometer telemetry tags. Overall dynamic body acceleration (ODBA) is being used to estimate energy expenditure of red snapper on three reef types: submerged ships, oil platforms, and naturally occurring relic coral reefs. Fish were surgically implanted at depth to reduce the stress of barotrauma and are being passively monitored via moored data loggers at each tagging location. Preliminary results suggest a variety of residency times on all reef types. In addition, red snapper are utilizing the reefs differently depending on the time of day, with individuals moving away from structures at dusk. Considerable movement in some fish has been recorded between reef sites. These results suggest that submerged ships and oil platforms may be as preferential to red snapper as natural reefs in the same area. Further investigation on activity levels using ODBA will determine whether energetic expenditure of red snapper is equivalent on these reef types.

Effects of environmental hypoxia on physiological, molecular, and epigenomic responses in a marine fish, Atlantic Croaker

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Knowledge of the effects of environmental exposure to hypoxia on critical physiological functions is essential for accurate predictions of its chronic impacts on aquatic organism. Marked disruption of reproductive and endocrine functions was observed in Atlantic croaker collected from the hypoxic region in the northern Gulf of Mexico. Recent research has shown that growth and its physiological upregulation is also impaired in hypoxia-exposed marine fish. Expression of IGFBP, a growth inhibitory protein, and HIF-1α, an oxygen-sensitive transcription factor, were upregulated in croaker tissues collected from hypoxic environments. Preliminary field and laboratory studies indicate that hypoxia exposure also causes epigenetic modifications, including increases in global DNA methylation in croaker. Epigenetic modifications can be passed to offspring and persist in future generations no longer exposed to environmental stressor. Collectively, the results indicate that environmental hypoxia exposure disrupts major physiological functions in marine teleost species critical for maintenance of fish population.

Are age estimates from Longnose Gar and Spotted Gar sagittal otoliths, pectoral fin rays, and branchiostegal rays accurate?

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We evaluated the accuracy and precision of age estimates from ground sagittal otoliths, sectioned pectoral fin rays, and whole branchiostegal rays of Longnose Gar *Lepisosteus osseus* and Spotted Gar *Lepisosteus oculatus* using time-stamped fish marked with oxytetracycline. The presence of time stamps and the ability to correctly identify post time-stamp annuli varied greatly among calcified structures and species. For Longnose Gar and Spotted Gar, we identified time stamps in 67-92% of the otoliths, 44-61% of the pectoral fin rays, and 0% of the branchiostegal rays. For both species, annual increment periodicity could only be validated in ground sagittal otoliths through age 10 (i.e., accuracy was $\geq$ 80%). For fish > age 10, accuracy declined to about 60% with most errors underestimating the number of post time-stamp annuli by one year. Ages derived from sectioned pectoral fin rays consistently underestimated the number of post time-stamp annuli because oxytetracycline marks were generally associated with the outer edge of the bone. Overall accuracy of age estimates from pectoral fin rays was only 14% for Longnose Gar and 23% for Spotted Gar. Although the lack of timestamps in branchiostegal rays prevented formal evaluation, ages derived from this structure were substantially less than those derived from otoliths. Precision among readers was low for all structures and both species. Percent agreement ranged from 40-66% and coefficients of variation ranged from 7-13%. Low precision reflected the difficulties experienced in estimating age for these species. We recommend that future efforts attempt to refine or develop alternate preparation procedures for otoliths to increase the visibility of annuli. Until a more reliable method is identified, age estimates derived from otoliths for these species should be used with caution; we do not recommend estimating age from pectoral fin rays or branchiostegal rays.

Influence of water temperature on feeding competition of spring-associated and riverine-associated fishes of the Edwards Plateau

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Fish communities are known to segregate along water temperature gradients attributed to temperature-mediated physiological processes that affect species fitness. In the Edwards Plateau, community segregation between spring fishes that are associated with stenothermal springs (23°C) and riverine fishes that are associated with eurythermal streams have been documented, however, the mechanisms contributing to community segregation are unknown. The purpose of this study is to test temperature-mediated species fitness through direct feeding competition between a closely related spring fish species (*Gambusia geiseri*) and riverine fish species (*Gambusia affinis*) in an attempt to describe mechanisms underlying community segregation. Consumption of first food item and number food items were used to quantify competitive fitness at a stenothermal spring temperature (23°C) and a eurythermal stream temperature (30°C). Multiple replications at each temperature within a laboratory setting indicated *G. geiseri* had a greater number of first feeds and consumed more food items at spring temperatures (23ºC) than *G. affinis*, whereas, *G. affinis* had a greater number of first feeds and consumed a more food items at non-spring temperatures (30ºC). Results support species segregation is maintained by temperature-mediated fitness adaptations in spring complexes.

Degradation and temporal effectiveness of Ashe Juniper (*Juniperus ashei*) used as fish habitat in a Texas reservoir

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Ashe juniper (*Juniperus ashei*) tree brush piles, used as fish habitat, were evaluated in Canyon Lake, Texas to determine their longevity and temporal effectiveness to attract fish. Texas Parks and Wildlife Department and partners replenish these fish habitat structures in order to maintain their ability to hold fish and improve angler catch rates. Understanding their longevity and effectiveness over time, will help managers coordinate labor-intensive refurbishing events efficiently. Fifteen sites were examined by a team of SCUBA divers in 2014 and 2015. The complexity of fish attractors degraded over time ($P \leq 0.05$), characterized by the loss of small branches, increased interstitial spaces, and decrease of periphyton coverage. Attractor effectiveness, characterized by associated fish counts, was correlated to degradation. A negative trend between the number of fish recorded and the age of the brush pile revealed lower numbers of game fish (>50% decrease) observed in structures 3 and 4 years of age, while total fish counts decreased to nearly zero at 4 years. These data suggest that Ashe juniper tree fish attractors in Canyon Lake be replenished by every fourth year to maintain their effectiveness in holding fish and potentially improve angler catch rates.

Population characterization of *Balistes capriscus* on northwestern Gulf of Mexico artificial reefs

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Artificial reefs provide essential fisheries habitat in the face of global coral reef decline. *Balistes capriscus* Gmeling, 1789 the Gray Triggerfish is a critically understudied member of the artificial reef community whose age, growth and reproductive status is poorly understood in the Northern Western Gulf of Mexico. In order

to characterize the population that utilizes these structures the morphometric, age, and reproductive status of individuals will be assessed across four different sites off the coast of Brownsville, Texas quarterly from January 2016 to January 2017. Initial data indicates a 1:1 sex ratio, and increased length (Port Isabel $FL_{\bar{x}}$ = 297.23 mm ± 5.86, Port Mansfield $FL_{\bar{x}}$ = 321.43 mm ± 4.98, Liberty Ships & Platforms $FL_{\bar{x}}$ = 335.23 mm ± 7.82) and weight (Port Isabel = 0.676 kg ± 0.04, Port Mansfield = 0.79 kg ± 0.033, Liberty Ships & Platforms = 0.931 kg ± 0.056) as sites move offshore, however no individuals have been found at the Texas Clipper Reef. A specific life history provides insight into regional reproductive fitness, sex ratio, and age composition. This foundational study will provide vital population parameters for potential future utilization and management in both the commercial and recreational sectors, particularly as the latent fishing pressure for *B. capriscus* may increase as an alternative food source for some of the already exploited resources (*i.e.* snappers, groupers).

Evaluation of fish and invertebrate assemblages associated with Torpedograss (*Panicum repens*) in Lake Conroe, Texas

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Torpedograss (*Panicum repens*) is a non-indigenous perennial species of rhizomatous graminaceous grass that currently persists along the majority of the vegetated shoreline of Lake Conroe, Montgomery County, Texas. For this study, invertebrate and fish assemblages associated with varying densities of torpedograss were studied seasonally from fall 2015 through summer 2016. Fish assemblages were sampled through the use of exhaustive electrofishing within blocknetted areas containing torpedograss. Invertebrates were sampled using a drop sampler, which was used to collect standardized samples of invertebrates from the water column, torpedograss vegetation, and benthos. Diet composition of piscivorous and insectivorous fishes were also observed. Kolmogorov-Smirnov tests for length frequency showed significant differences for largemouth bass and western mosquitofish based on seasonality. An invertebrate CCA showed that torpedograss density and weight had the strongest positive correlation (pseudo-F = 25.9, p-value = 0.002) to taxa composition and densities, representing 43.6% of explained variation. The most common invertebrate taxa found within fish diets were also the most common taxa found within torpedograss patches, and chironomid larvae consistently had the highest frequency of occurrence and prey-specific abundance in bluegill, largemouth bass, and golden topminnows. A fish RDA showed that torpedograss density and weight had the strongest positive correlation (pseudo-F = 5.1, p-value = 0.002) to fish taxa composition and densities, representing 61.8% of explained variation. Stable isotope analysis supports the use of torpedograss as a foraging location, as the δ13C (‰) values for the largemouth bass, bluegill, and western mosquitofish were all similar, and correlated to the δ13C (‰) value of the invertebrates and periphyton tested. These findings provide insight into the fish and invertebrate communities that are utilizing torpedograss as habitat and a potential foraging location. As such, management, rather than eradication, of torpedograss may be preferable when making fisheries management decisions.

Native fish conservation areas in the Chihuauan Desert of Texas

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Texas Parks and Wildlife Department, in partnership with University of Texas Fishes of Texas Project and Siglo Group, has developed a statewide network of focal watersheds that represents a set of native fish “strongholds”. In the Chihuahuan Desert region of Texas six Native Fish Conservation Areas in the Rio Grande, Pecos and Devils rivers were delineated and 39 focal fish species were identified as priorities for conservation. This was accomplished using a spatial prioritization analysis that identifies focal areas for conservation based on

species distribution models for priority fish taxa. An Advisory Council of experts in the region has also been developed and they will be tasked with identifying priority conservation, restoration, monitoring and research actions for preservation of native fishes, their habitats and other aquatic resources in these watersheds. In addition, this collaboration will help to catalyze cooperation, collaboration and leveraging of technical and financial resources among local, state and federal natural resource management agencies, universities, NGOs and other local partners that contribute to conservation in the Chihuahuan NFCAs.

Fish assemblage structure and associations on a spring flow gradient within the upper Nueces drainage basin

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Spring complexes of the Edwards Plateau region of Texas exist along gradients of natural abiotic variation and anthropogenic degradation that contribute to spatial differences among fish communities. The Nueces River drainage basin is contained in relatively sparsely populated southwestern extent of the Edwards Plateau in Texas and represents an understudied basin within the western gulf slope drainage. The purpose of this study is to document temporal changes in the fish community of the Nueces River based on a combination of historical collections and reference conditions, as well as describe habitat associations and spatial trends of the fish community. All available habitats were sampled within 12 sites of the upper Nueces, Sabinal, and Frio rivers three times from June 2015 to April 2016. Results indicate the fish community within the Nueces River is meeting historical and reference conditions with few exceptions. Fish communities within the basin were segregated by habitats, and segregation of spring fish and river fish communities were apparent based on spring flow discharge. Nueces River segregation of fish communities in relation to spring discharge provides further support of spring complexes of the Edwards Plateau acting as evolutionary refugia. Spring fish community persistence in perpetuity will depend on persistence of spring flows.

POSTER SESSION ABSTRACTS

The ratio of organic to inorganic nitrogen affects the growth of ichthyotoxic golden alga

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Golden alga (*Prymnesium parvum*) is a globally distributed toxigenic harmful alga. In inland waters is typically found in brackish ecosystems. While nitrogen (N) is an essential general nutrient, the relative importance of the organic (N_O) and inorganic (N_I) fractions to golden alga growth is uncertain. N_I at relatively high concentrations is toxic to golden alga and a field study of the Colorado River reported seasonal declines in golden alga abundance as levels of N_I increased. Recently, a study of the Pecos River reported that, in addition to a negative association with N_I, golden alga abundance is also positively associated with N_O. Thus, laboratory and field observations have provided convincing evidence that N_I can have a negative influence on golden alga growth but data for N_O are insufficient for proper evaluation. The objective of this study is to experimentally characterize the influence of N_O (urea) and N_I (sodium nitrate) on golden alga growth. Different molar ratios of N_O to N_I were tested for their effects on specific growth rate (μ, day^{-1}) and maximum cell density (cells/ml) while keeping total N constant (880 μM) – 0%:100%, 25%:75%, 50%:50%, 75%:25% and 100%:0% (N_O:N_I). Cultures were inoculated at 100 cells/ml and other conditions were standard (5 psu, 22°C, 36 μM total phosphorous). Specific growth rate was not affected by changes in initial N_O:N_I ratio. Maximum cell densities, however, seem to have increased gradually with increasing relative content of N_O up to 75%, followed by a precipitous decline at 100%. In conclusion, while golden alga can grow in cultures containing exclusively N_O or N_I, optimal growth occurs when both are present and N_O is the predominant fraction. These observations are consistent with field observations and provide context for a better understanding of the association between N and golden alga growth.

Current status of Bluehead Shiner (*Pteronotropis hubbsi*) in Texas

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We documented the historical distribution of Bluehead Shiner (*Pteronotropis hubbsi*) in Texas based on museum records. From this museum survey, *P. hubbsi* was documented from 17 historical localities in Texas. To document the current status of *P. hubbsi* in the state, we resampled the 17 historical localities as well as 17 new localities (34 localities total) during Spring and Summer 2016. *Pteronotropis hubbsi* was collected from two of the 34 localities during the 2016 fish surveys. Because we collected over 13,000 fish and 64 different species, we believe our sampling efficiency across localities was sufficient to document the presence of rare taxa, including *P. hubbsi*, within a locality. Thus, we argue that this current survey reflects the status of this species in the state, which would suggest that *P. hubbsi* distribution has decreased over the last 50 years in Texas. In addition to fish collections, we also measured a suite of habitat parameters at each sample locality. *Ptereonotropis hubbsi* was always collected in lentic systems (no flow), with sand, clay and detrital substrates. These localities also had significant submerged and emergent aquatic vegetation. This may suggest habitat modification due to flow alteration has affected *P. hubbsi* in Texas.

An assessment of fish vulnerability to climate change

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Cyclic shifts in Pleistocene-Holocene climates are associated with freshwater fish expansions and homogenization during glacial humid climates while radiation and extirpation occurs during interglacial arid climates within southern Great Plains and Gulf Slope drainages of North America. Purposes of this study were to quantify life-history attributes of Central Plains fishes (i.e., prairie stream and desert fishes) and use attributes as a mathematical filter to identify fishes in eastern and more humid gulf slope drainages that 1) are susceptible to future climate change, either natural or human-accelerated, and 2) are likely to persist under future climate change models, serving as stocks for subsequent glacial expansions. Preliminary results suggest that notable life-history attributes shared among arid-associated fishes include relatively small body size, you age of sexual maturation, short lifespan, and broadcast spawning of eggs. Forecasting into eastern drainages (i.e., Sabine and Calcasieu rivers), we identified 31 fishes among a total of 88 fishes that share life-history attributes with arid-associate fishes. Our model can assist with prioritizing vulnerable fishes within eastern drainages for future conservation action, but also prioritizing current conservation action for fishes that share similar arid-associated traits to ensure that future stocks are secured from current anthropogenic threats (e.g., alterations in instream habitats, water quality and water quantity).

Validation of environmental flow standards

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Validation of environmental flow standards by quantifying predicted biotic responses is necessary for refining flow standards and the theory of natural flow paradigm. Currently, most Texas rivers are managed under established environmental flow standards. The purpose of our study is to validate instream flow standards implemented on the Lower Brazos, Guadalupe, and San Antonio rivers. Study objectives were to investigate macroinvertebrate and fish assemblages and to assess ecological responses to instream flow tiers (e.g., subsistence, base, 1 per season, 1 per year). Fourteen sites associated with USGS gaging stations were visited over a period of sixteen months with visits classified into flow tiers based on the preceding fifteen days. Riffle and run habitats were sampled for swift water specialists and diet (gut fullness) and condition factor (HSI) was investigated. Fish and macroinvertebrate indices were tested among basin, season and flow tier. Relative abundance of slack water fish and occurrence of fluvial fish differed among flow tiers, whereas relative abundance of fluvial fishes differed in run habitats among flow tiers. This insight will contribute to understanding ecological responses to the current implemented flow recommendations to maintain a sound ecological environment. However, biotic responses of environmental flow tiers for other aquatic vertebrates (i.e., reptiles and amphibians), birds, and riparian mammals are lacking and would provide a more holistic view for environmental flow management.

Validation of daily growth increments in otoliths of young-of-year Guadalupe Bass

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We evaluated daily growth formation in otoliths of age-0 Guadalupe Bass, *Micropterus treculli*, with known hatch dates (n=80). Fish were sampled from hatchery at 7-d intervals for nine weeks. Accuracy in ring count was compared with both known age and number of rings past a tetracycline mark compared with number of days elapsed since marking. Accuracy between two independent readers and between two otolith preparation techniques was also evaluated. The preparation techniques utilized in this study were traverse section and whole otolith polish using 40 grit followed by 500 grit sandpaper. Results of this study provide evidence that daily growth increments are a reliable source of age information for young-of-year Guadalupe Bass and validate use of whole otolith polish as the most reliable method.

Morphological variation among reproductive tactics in the Comanche Springs pupfish, *Cyprinodon elegans*

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Many species of animals use alternative reproductive tactics in order to maximize their reproductive success. In particular, fishes utilize tactics that are associated with specific behaviors, morphologies, and colors. Male pupfishes (genus *Cyprinodon*) express three reproductive tactics to increase fitness: satellite, sneaker, and territorial. The largest males in a population aggressively defend territories and express breeding coloration, whereas smaller satellite males also express breeding coloration, but range over a larger area and do not actively defend. Sneaker males have been described as 'female mimics' due to a female-like drab coloration and behavioral difference wherein they frequently enter and exit breeding areas. Despite the morphological resemblance between sneaker males and females, a field study of the Comanche Spring pupfish (*Cyprinodon elegans*) found that territorial males can discriminate between females and 'female mimics' and direct more aggression to sneaker males. We use geometric morphometrics to statistically quantify body shape differences between females and males that express different reproductive tactics in the Comanche Springs pupfish. If sneaker males differ from females in body shape, this may facilitate recognition of sneaker males by territorial males. Alternatively, if sneaker males are more similar to females than territorial males in body shape, then other cues or behaviors may be used by territorial males to identify sneakers. Our results quantify morphological variation within a species, and may identify mechanisms that allow sneaker males to increase reproductive success.

Drainage basin keys for inland fishes of Texas

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Dichotomous keys have long been used as a tool to determine the identity of organisms in the natural world. Other fish dichotomous keys in the state of Texas thoroughly identify unique characteristics for fresh and saltwater species found within the state. However, the zoogeography of fishes in Texas is not uniform, and much confusion between identification of similar or closely related species can be prevented by knowing drainage basin

constraints of species distributions. The purpose of this project was to develop a major drainage basin-specific dichotomous key for the inland fishes of Texas. Known distributions, including range expansions, for each inland fish were found using museum records and published literature. We identified and included over 170 species and divided the revised key between the Red River, Sabine and Neches Rivers, Trinity and San Jacinto Rivers, Brazos River, Colorado River, Guadalupe and San Antonio Rivers, Nueces River, and Rio Grande. Anticipated publication date is Summer 2017.

Identifying the most efficient host fish for the Texas Fatmucket (*Lampsilis bracteata*) for captive breeding

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Freshwater mussels are one of the most imperiled groups of organisms in North America. Declines have been attributed to habitat destruction and alteration, construction of dams, pollution, and introduction of invasive species. Texas is home to sixteen mussel species that are state-listed as threatened and are in need of conservation efforts. Captive breeding has been widely used as a conservation measure in order to augment declining populations and to reintroduce mussels to areas where they have gone locally extinct. In order to effectively propagate a species in captivity it is important to identify the most efficient host fish. However, little is known about host fish of threatened mussel species in Texas. The purpose of this study was to determine the most efficient host fish species for the Texas Fatmucket (*Lampsilis bracteata*) by comparing transformation rates of mussel larvae (glochidia) into juvenile mussels on different fish species with host fish inoculations in the laboratory. Of the nine fish species inoculated with Lampsilis bracteata glochidia, four species exhibited glochidia encystment (Green Sunfish *Lepomis cyanellus*, White Crappie *Pomoxis annularis*, Largemouth Bass *Micropterus salmoides*, and Greenthroat Darter *Etheostoma lepidum*) and two species produced juvenile mussels (*Lepomis cyanellus* and *Micropterus salmoides*). *Micropterus salmoides* produced the greatest number of juvenile mussels and is likely the most compatible host fish based on this preliminary study. Further study of mussel-host fish relationships in Central Texas are needed.

Quantifying Alligator Gar (*Atractosteus spatula*) spawning habitat on the lower Trinity River, Texas

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The ability to determine alligator gar (*Atractosteus spatula*) habitat depends on the ability to find alligator gar populations. Unfortunately, alligator gar are difficult or sometimes impossible to find in many of their native ranges. Texas is a notable exception, as many alligator gar populations are well within healthy limits and compared to other river systems, the Lower Trinity River carries a healthy population of alligator gar. The health of the species in Texas has facilitated sufficient research into alligator gar habitats and life histories to advance the scope of research in Texas. These studies, combined with studies done elsewhere, have provided enough information for the construction of an alligator gar habitat suitability model for the Lower Trinity River aimed at quantifying spawning habitat. Stage-specific floodplain inundation was modeled using HEC-RAS and a high resolution lidar digital terrain model. Inundation was modeled just downstream from Lake Livingston to Moss Bluff, Texas, and included six dates that corresponded to Landsat 8 satellite overpass dates between May 2016 and August 2016. The inundation models were combined with Landsat-derived land surface temperature and Texas Ecological Mapping System vegetation classes to obtain stage-specific potential spawning habitat. These spatial data layers will help guide focused field efforts to survey gar during the spawning season.

Potential effects of climate change on fish-mediated nutrient dynamics in a small coastal plains stream

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The unprecedented rate of global warming is an inevitable outcome of anthropogenic CO_2 release into the atmosphere and complex climatic feedbacks. In ectotherms, increasing global temperature will increase metabolic rates, which will enhance the energy demands of individuals and should accelerate resource acquisition. Population size and fish biomass were measured seasonally in a small second order stream over a ten-year period to examine seasonal variation in these parameters. We then examined effects of increased temperature on nitrogen excretion in the five most abundant fish in this stream system. These fishes represent three functional feeding guilds common to many temperate stream ecosystems. We developed temperature dependent nitrogen excretion rate models for these fished and applied these models to daily average temperatures in the stream. We then simulated climate warming (+1, +2, & +3C) to examine potential effects of climate change on fish-mediated nutrient dynamics in a southern temperate stream ecosystem. We found that global warming may increase nutrient cycling and nutrient flux in within aquatic ecosystems; however, these effects appear to be seasonally dependent. For example, effects of warming were greatest in autumn when fish abundance and biomass is greatest.

Comparing the ichthyoplanktonic food web near three coastal inlets in the Texas Coastal Bend

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Simon Geist

Recruitment success and strength of fish stocks depends on survival rates during the early life history stages. One important factor is the availability of food in terms of quality and quantity throughout these larval stages to provide sufficient energy and allow for fast development of body function and somatic growth. Understanding food web interactions is an important component to defining essential fish habitat needs during the larval stage, which is important for future development of models used in an ecosystem based fisheries management. Many estuarine fish and invertebrate species in Texas possess a life cycle in which spawning occurs in coastal Gulf of Mexico (GoM) waters and offspring (eggs, larvae, and/or juveniles) return through coastal inlets into the estuarine nursery habitats. In the Coastal Bend, the three major inlets allowing for inflow of larvae are Cedar Bayou, Port Aransas, and Packery Channel. For my M.S. research project, I will investigate the feeding ecology of selected fish species and their food web interaction near these three coastal inlets. Snapshot sampling episodes during fall, winter, and spring will allow for a spatial comparison of larval assemblages and the associated food web during the different spawning seasons. Ichthyoplankton net catches will be analyzed for species composition and density. For information on prey availability, parallel zooplankton catches will be taken to determine biomass and size-class composition. Larval diet will be determined for selected species through gut content analysis, and food web interactions will additionally be investigated via δ13C and δ15N stable isotope analysis of fish larvae and potential prey items.

Shared morphologies of spring-associated fishes of the Edwards Plateau

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Animal morphology is a result of phylogenetic constraints and environmental pressures. Abiotic factors, such as current velocity and turbidity, are attributed to variation in stream fish morphologies. In the Edwards

Plateau, several fishes are associated with and might be adapted to the spring complexes. The purpose of this study was to compare morphometric trends of closely related spring and non-spring associated fishes in an effort to test for commonalities among spring fish morphologies. We predicted that shared morphometric trends would be widespread among spring fishes. Geometric landmarks were used to compare body shape between three spring and non-spring species pairs. All species pairs had different geometric morphologies. Drivers of morphometric differences on principal component axes are attributed to head size and angle, back roundness, and fin locations. Consistencies in body shape morphologies were found in at least two spring associated species. Ecomorphometric trends suggest selection pressure towards certain morphologies within spring complexes and support certain species evolved within evolutionary refugia of the Edwards Plateau.

Comparative effects of high & low quality allochthonous input on stream food webs

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The study of conservation biology has primarily focused on the rapid decline of biodiversity over the past few centuries. Invasive species seem to be the most impactful on species at the community level. Native to eastern Asia, the Chinese tallow tree (*Triadica sebifera* or *Sapium sebifera*) has negatively affected local organisms since its large-scale introduction in the early 1900s for wax-based products and herbal medicine. Previous studies regarding tallow leaves in freshwater bodies of water have typically focused on ephemeral ponds where leached tannins are essentially recycled and the contents are maintained. We intend to focus on a stream ecosystem where the movement of water allows us to maximize leaching and truly test the quality of tallow leaves as a food source. We will expose flowing mesocosms to Chinese tallow leaves versus the leaves of a native tree: the American Sycamore tree (*Platanus occidentalis*). We would expect microbial respiration, fish growth, and invertebrate density to be hindered by the presence of a poor food quality. However, with the temporal variable associated with leaf decomposition, we would likely observe overall production to be more complex. The response variable data can be combined and scaled to represent total stream production compared to time. Sycamore leaves will decompose much slower than tallow leaves. Therefore, the response from the tallow treatments will likely be catalyzed and peak much faster than the sycamore treatments. We would then say tallow leaves are a pulse subsidy on stream ecosystems.

Investigating sister species pairs in two fish genera as they relate to the biogeography of the northern Gulf of Mexico

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Vicariance zones created by disruptive geological, climatic, or ecological events can create barriers to gene flow and facilitate allopatric speciation. When these barriers are no longer in place, sister species can come back into contact and may experience hybridization, creating a suture zone. Barriers to gene flow and dispersal in the marine environment are less apparent than in freshwater or terrestrial systems, making these zones harder to delineate. In the northern Gulf of Mexico (GOM), lies a hypothesized suture zone despite no obvious historical barriers. This area is roughly centered on Mobile Bay (~88°W) where at least 15 putative sister taxa meet, with some evidence of hybridization. By using the enrichment of ultra-conserved DNA elements and next-generation sequencing, this study aims to generate a robust phylogenetic hypothesis for two genera with putative sister taxa distributed on either side of the hypothesized suture zone, *Ogcocephalus* batfishes and *Spheroides* pufferfishes. Resolving phylogenetic relationships within each genus will provide the necessary context to test the hypothesis that each pair of species are indeed sister taxa experiencing introgression in this zone. If genealogical concordance between these taxa is present, this study will provide additional support for a shared historic biogeographic event in the northern GOM.

Dynamics of an artisanal fishery in Río Dulce National Park, Guatemala

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Fisheries in developing countries are small, artisanal, and generally their value is underestimated. Understanding trends and composition of these fisheries is essential to assess their value and develop sustainable management strategies. Our objective was to understand the artisanal fishery within a protected area in Guatemala and its economic relevance. Río Dulce National Park is about 80 km^2. Fishing is one of the most important economic activities for 19 local Ladin-Mayan communities. Creel surveys were conducted along transects during nine months. Creel survey results indicated that 90% of the fishers were male, with most between 30-40 years of age. The fishery was dominated by 11 fish and crab species. Traps, gillnets, cast nets, hook and line, harpoons, and seines were the main fishing gears, with crab traps (46%) and hook and line (27%) being most important. Less fishing took place on weekends because many people had complementary sources of income involving tourism, small trade, construction, agriculture or private property surveillance. Fishing effort peaked during two periods – the Easter holiday period and the beginning of the rainy season. The Río Dulce National Park fishery produces and annual catch of 53–70 tons. Given the characteristics of this fishery, it is unlikely that centralized, top-down management strategies would be effective for sustaining catches. Community-based management could be effective, especially if local fishers are involved in research and monitoring.

Diversity of benthic macroinvertebrate communities at tributary confluences of the Pecos River

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Tributary streams offer basal resources for aquatic food webs and unique habitats to taxa that differ from the mainstem of the river. Because of this, many stream tributaries are known to be biological “hot spots” for species diversity, making them important for river conservation strategies. This is especially true for rivers in arid regions where resources are limited, and anthropogenic influences are often great. The Pecos River flows from New Mexico through Texas and offers an ideal study system to investigate diversity in stream tributary junctions across both natural and impacted conditions. In this study, we explored the effects of tributary confluences on the diversity of benthic macroinvertebrate assemblages across four sites that encompass a range of habitat conditions. Across sites, we found an increase in macroinvertebrate diversity both at and below the tributary confluence. This difference was most pronounced for the Independence Creek and Black River sites where coarse substrates and riffle habitats supported relatively high diversity. Total phosphorous decreased below tributary confluences except for the Independence Creek confluence, where levels were too low to be detected. The Taiban Creek confluence had the highest levels of phosphorous, followed by the Black River and Rio Hondo confluences. These findings support other studies showing that tributary confluences effect in-stream habitat characteristics and macroinvertebrate diversity in rivers.

Aging swordfish using otolith chemistry

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Highly migratory fishes are ecologically and economically important for the nation and accurate fish ages are important metrics needed to assess fish stock dynamics. Unfortunately, aging methods in these highly migratory fish are often difficult to perform. Because of this, alternative methods for aging should be considered to explore new and more efficient techniques. One potential alternative aging method is otolith chemistry provided there are annual oscillations in chemical signatures across growth increments. Otolith chemistry has been highly successful in tracking migration over environmental gradients for diadromous fish. Because the pelagic environment is stable with minimal elemental gradients compared to estuarine systems, seasonal physiological

effects on otolith chemistry might allow age to be inferred in migratory pelagic fishes whose otolith increments are difficult to decipher. This project focused on using elemental compositions of swordfish (*Xiphias gladius*) otoliths obtained from the Gulf of Maine by preforming transects across the otoliths for the complete life history using laser ablation ICP-MS. The elements that were looked at were magnesium, manganese, potassium, strontium, and barium. Using these elements, oscillations were compared to the age of the individual obtained from otolith increments to see if there was agreement between both aging methods. Because of the relatively homogenous elemental makeup of the pelagic environment, physiologically induced oscillations would be easier to see and potentially predict age.

Effects of the Rincon Bayou pipeline on salinity in the upper Nueces Delta

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The Nueces Estuary once was a productive mash ecosystem receiving water from the Nueces River by way of an overflow channel in the upper delta at Rincon Bayou. The construction of the Choke Canyon Reservoir and Wesley Seale Dam in the Nueces River Basin reduced natural flows, allowing for water to bypass the estuary and flow straight into the Nueces Bay. The reduction of inflow created a non-functioning reverse estuary (higher salinities upstream, lower downstream). The State of Texas has implemented legislation to maintain ecological health and productivity of living marine resources in bays and estuaries requiring impounded water to be passed-thru as Environmental Flows. In response, the City of Corpus Christi constructed a pump station and pipeline to deliver water from the Nueces River to the upper delta at Rincon Bayou. Pumped inflows transitioned the marsh into a positive estuary (lower salinities upstream increasing downstream towards the bay). Pumping has restored ecological function to the Nueces Estuary by increasing inflow and decreasing salinity, but causes a disturbed environment by creating extreme fluctuations in a very short time period. Immediately after pumping commences depth increases and salinity fluctuates from hypersaline to fresh at the pumping outfall. When pumping ceases depth decreases and salinity fluctuates from fresh to hypersaline until the next pumping event. The primary source of inflow into the Nueces Estuary is from pumping, thus salinity and depth can be controlled by direct management actions. The current strategy is to pump when reservoir water levels meet certain capacities that trigger pass-thru requirements. This often occurs during rainfall and flooding events, which has been shown to make drought condition more severe and increase the magnitude of natural flooding events. The purpose of this study was to evaluate what has happened to salinity and depth in Rincon Bayou since pumping began.

Is there a relationship between fish cannibalism and latitude or species richness?

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Cannibalism has been commonly observed in fish from northern and alpine regions and less frequently reported for subtropical and tropical fish in more diverse communities. Assuming all else being equal, cannibalism should be more common in communities with lower species richness because the probability of encountering conspecific versus heterospecific prey would be higher. A global dataset was compiled to determine if cannibalism occurrence is associated with species richness and latitude. Cannibalism occurrence, local species richness and latitude were recorded for 4100 populations of 2314 teleost fish species. Relationships between cannibalism, species richness and latitude were evaluated using generalized linear mixed models. Fish richness was an important predictor of cannibalism, with occurrences more frequently reported for assemblages containing fewer species. Cannibalism was positively related with latitude for both marine and freshwater ecosystems in the Northern Hemisphere, but not in the Southern Hemisphere. The regression slope for the relationship was steeper for freshwater than marine fishes. In general, cannibalism is more frequent in communities with lower species richness, and the relationship between cannibalism and latitude is stronger in the Northern Hemisphere. In the Southern Hemisphere, weaker latitudinal gradients of fish species richness may account for the weak relationship

between cannibalism and latitude. Cannibalism may be more common in freshwater than marine systems because freshwater habitats tend to be smaller and more closed to dispersal. Cannibalism should have greatest potential to influence fish population dynamics in freshwater systems at high northern latitudes.

The importance of low-salinity habitats for Red Drum

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Most red drum assessments focus on the estuary, with little to no sampling in freshwater rivers. We seek to 1) address the importance of freshwater habitat to red drum (*Sciaenops ocellatus*) by characterizing the proportion of the population that migrates into freshwater, 2) quantify when, how often, and how long these migrations occur, and 3) determine if seasonal temperature and diet preferences are underlying drivers of freshwater migration. Red drum will be sampled using gill nets from the Corpus Christi Bay and with hook and line from contributing freshwater rivers. Analysis of otoliths, stable isotopes, and lipid composition will aid in understanding seasonal patterns of habitat use in order to assist in future Fisheries Management Plans and Essential Fish Habitat designation.

Testing the effect of increasing crab trap escape ring size

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In recent years, a significant decline in landings and a decrease in size of mature blue crabs, *Callinectes sapidus,* has driven fishery managers to consider raising the minimum legal size limit to a 5 ½-inch carapace width for commercial and recreational harvest. This would increase the spawning capabilities of the current population. A substantial proportion of crab catches are made using baited crab traps that are fitted with 2 ⅜-inch escape rings designed to retain crabs greater than five inches. To retain crabs greater than 5 ½ inches, the size of the escape rings must be adjusted. A current project to test the ideal size of escape ring size is ongoing. Blue crabs were caught and carapace width and length were recorded; data was analyzed using a linear regression that allowed for accurate assessments in deriving escapement parameters. The study itself uncovered some interesting observations in crab behavior showing that crabs make a deliberate effort to escape traps once retained. The study was novel in that crab behavior and ring size were the driving factors in testing ring size escapement.

Impacts of Deepwater Horizon crude oil exposure on the swimming performance of juvenile and young adult Mahi-Mahi (*Coryphaena hippurus*)

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The timing and location of the 2010 Deepwater Horizon (DWH) incident within the Gulf of Mexico pelagic zone likely resulted in exposure of commercially and ecologically important fish species such as mahi-mahi (*Coryphaena hippurus*) to sub-lethal concentrations of polycyclic aromatic hydrocarbons (PAHs), the primary toxic components within crude oil. Such top trophic level active fish have high aerobic metabolic capacity to support prey capture and migratory abilities needed for survival and reproduction in the pelagic

environment. To investigate any impacts the DWH incident may have had on the physiology of pelagic fish species, mahi-mahi were selected as a study organism and acutely exposed to water accommodated fractions (WAFs) of DWH crude oil as: (1) embryos/larvae that were subsequently raised to the juvenile stage in clean water, (2) juveniles directly or (3) young adults. Results of whole-animal and cardiac-level physiological responses to sub-lethal exposures will be presented including effects on critical swimming speed (U_{crit}), aerobic scope and cost of transport using an incremental swimming velocity test. In addition, *in situ* measures of subadult cardiac function including heart rate, stroke volume and cardiac output will be presented. Significant effects on swimming performance were observed at concentrations ranging from 1.2 – 30 µg/L total PAHs depending on life stage exposure, well below some concentrations measured during the active spill phase which ranged as high as 240 µg/L total PAHs. Interestingly, physiological measurements investigating the underlying causes for the reductions in swimming performance indicate potentially different mechanisms of toxicity affecting swimming performance at different life stages of mahi-mahi.

An overview of biological monitoring on Texas artificial reefs

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The Texas Artificial Reef Program is managed by the Texas Parks and Wildlife Department (TPWD). To date the Texas Artificial Reef Program has 76 permitted reef sites, including 38 placed in the General Permit Area found in High Island. Materials range from donated petroleum platforms, vessels, fly-ash blocks, concrete culverts, reef balls, pyramids, and other materials of opportunity. Additionally, reef sites vary from 33 to over 300 ft in water depth with the majority in water at least 98 ft deep. Due to the variety in depth, material, and water clarity, a range of biological monitoring techniques must be utilized. The initial biological sampling technique involved roving diver surveys, which are still a major part of the current sampling protocols. However, additional methodologies including video camera surveys, utilization of parallel lasers for length estimates, decompression diving allowing for deep-water fish surveys, and vertical longline sampling have been incorporated in recent years. Roughly 560 diver surveys have occurred from 2011 through the summer of 2014. This increased effort and varying survey techniques since the initial survey in 1993, provides a better understanding of the species compositions and abundance at the Texas rigs-to-reefs structures.

Quantification of Alligator Gar recruitment dynamics using a river-stage specific floodplain inundation model

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Alligator Gar, *Atractosteus spatula*, is an iconic species native to lowland floodplain river systems where they play an important role as top predators and by linking landscapes through their movement. Disruption of river-floodplain connectivity is implicated in declining populations of Alligator Gar across much of its range. Successful management and conservation of Alligator Gar populations will be aided by an understanding of the relationship between flow and recruitment, particularly the availability and suitability of off-channel habitats utilized by this species for reproduction. With support from the Gulf Coast Prairie Landscape Conservation Cooperative, our team is currently working on identifying potential Alligator Gar spawning areas in floodplain reaches of the lower Trinity River and relate the amount and quality of floodplain habitat during the spawning season to Alligator Gar year-class strength. This presentation summarizes our study objectives, including modeling floodplain inundation, habitat suitability, and the relationship between floodplain inundation attributes and recruitment success. Emphasis is placed on successes and challenges from field work during 2016, including surveys for YOY Alligator Gar and drone flights to validate extent of inundation, and forthcoming efforts our team will undertake in 2017.

Spatio-temporal trends of Alligator Gar *Atractosteus spatula* in Texas's bays and estuaries

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Though historically considered a nuisance species, there is now a growing recreational fishery for the euryhaline alligator gar *Atractosteus spatula* in the rivers and lakes of Texas. Until recently, fisheries managers have devoted little research to the ecology and life history of this species, particularly regarding their use of brackish and saline habitats. The Texas Parks and Wildlife Coastal Fisheries Division routinely encounters alligator gar during their gill net sampling and creel survey programs in environments with salinities as high as 55 ppt. For this study, we analyzed thirty years of fishery independent and fishery dependent data to assess the spatio-temporal trends of gar abundance within Texas's bays and estuaries. As expected, we detected significant changes of abundance in response to fluctuating salinities driven by periods of drought and decreased freshwater inflows. The strength of these patterns varied across both the large-scale extents of entire bay systems and smaller-scale extents based on proximity to sources of freshwater inflow. The results of this study, in addition to other studies conducted on freshwater habitat use and seasonal movement of gar, can be utilized to help assess Texas's alligator gar populations and evaluate potential strategies for management.

Freshwater fisheries in the Usumacinta River Basin

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The Usumacinta basin with 7,727,390 hectares is shared among three countries, Guatemala 56.36%, Mexico 43.6% and Belize 0.04%. It is the most diverse River in Nuclear Central America. We identify at least 64 species related to fisheries with, 41 species that are commercially used in local trade (64%) and 23 species that are locally consumed in small-scale fisheries (34%). Sports fishing is based mainly in Centropomidae (2 species) and Megalopidae (1 species), which are highly migratory species that are found in almost every river in the basin, but highly sought by sports fishermen. Native species comprise most of those fisheries (87.5%), and only 8 species are non-native species. Because of our limited knowledge at the basin scale, there is a mismatch in fisheries management that are usually taken at local level, based mostly on local habitat conditions. This difficulty in exacerbated by the complex tri-national basin situation. Moreover, threats like invasive species (Loricariids and Cyprinids) with its negative effects are distributed in the whole watershed. This study highlights the importance of the commercial and local fisheries at different local scales; however, the river is used for recreation, tourism, and transportation. Moreover, the Usumacinta provides ecosystems services that are more valuable for the area in the medium a long-term well-being of the Mesoamerican area.

Introducing the Geist early life history lab at Texas A&M University, Corpus Christi

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The Early Life History Lab is a new research lab in the Department of Life Sciences at Texas A&M University Corpus Christi (TAMUCC). It is led by Dr. Simon Geist, who joined TAMUCC as Assistant Professor

for Marine Fisheries in Fall 2015. Research focus is on increasing the understanding of processes and underlying mechanisms affecting the survival of larval and early juvenile stages of finfish and other fisheries resources, which is important to draw conclusions of future recruitment success and strength of fish populations. Addressed questions range from understanding spatio-temporal distribution of early life history stages and community composition of larval assemblages in relation to environmental parameters, over investigating larval health and performance parameters in the field, to studying associations in the planktonic food web. In addition to these field based approaches, we are also planning to work on testing ecological and eco-physiological hypothesis under controlled experimental conditions in collaboration with the Texas Parks and Wildlife CCA Marine Development Center and Texas A&M Agrilife Extension located in Flour Bluff, Corpus Christi. Initiated research projects on larval communities in local bays and estuaries, focus on species composition, larval feeding ecology, the planktonic food web and the role of microplastic and zooplankton composition along the salinity gradient in Corpus Christi Bay and coastal inlets in the Texas Coastal Bend region. The Geist Lab is equipped with state of the art light microscopy instrumentation paired with high resolution camera systems for species identification, gut content, and daily growth rate analyses. A Zooscan system is available for screening and identification of Meso- and Makroplankton taxonomic groups and size classes. Determination of nutritional condition (RNA/DNA ratio), protein quantity and enzymatic activities is available through a microplate reader. Stable isotope, fatty acid and molecular analyses are possible through collaboration with core and research labs at TAMUCC.

The effects of the Texas drought of record on Bonnethead Shark, *Sphyrna tiburo*, abundances

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Since 1975, Texas Parks and Wildlife Department (TPWD) has utilized gill nets as a means to manage coastal fisheries along the Texas coast. Throughout the years, mean populations of bonnethead sharks, *Sphyrna tiburo*, were being caught with little variance. However, in 2012 TPWD gill net data indicated a profusion of bonnethead sampled. This trend continued through 2014. This change in bonnethead abundance may be a result of changes in environmental conditions potentially triggered by the drought of record. We investigated direct environmental conditions and forage assemblages associated with the drought to determine their role in bonnethead abundances.

Elops saurus abundance trends along the Texas Gulf Coast

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Elops saurus, commonly known as ladyfish, are widely distributed in the Atlantic Ocean and the Gulf of Mexico. Although, not a targeted species among commercial or recreational fisherman, they historically have been used as bait and fish meal for animal feed. Texas Parks and Wildlife Department gillnet data shows an increase in abundance beginning in 2001 and ongoing to 2014. This rise in population appears unrelated to environmental factors. However, gear regulation changes, such as, bycatch regulation devices (BRD) and License Buy Back programs within the commercial shrimping industry may provide an explanation of the trend.

Habitat associations of juvenile Rio Grande Blue Sucker in the Trans-Pecos region of the Rio Grande

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Blue Sucker *Cycleptus elongatus* is a state-listed threatened species in Texas and is considered vulnerable throughout its range. Once considered a single, wide-ranging species, blue suckers are now recognized as a complex of closely related, but genetically and morphologically distinct species within the genus *Cycleptus*, including an undescribed species within the Rio Grande Basin. Numerous factors are likely driving the decline of Blue Suckers in Texas, including flow alteration, water quality degradation, habitat fragmentation, and changing land use patterns; but it is not clear how these factors interact to influence the abundance and distribution of blue suckers. We examined relationships between the abundance of juvenile Rio Grande Blue Sucker (RGBS), *Cycleptus* sp. cf. *elongatus*, and various abiotic variables in the Trans-Pecos region of the Rio Grande in Texas in April, May, and June 2016 using open *N*-mixture modeling. Pool area was the most important covariate for juvenile RGBS initial abundance. As pool area increased, the initial abundance of juvenile RGBS increased. We captured the greatest numbers in April likely because their survivorship decreased throughout the spring, and they grew larger and became less vulnerable to seining. Our preliminary results suggest that recruitment and apparent survival probability are not correlated with habitat. The lack of relationships might be due to the limited number of sampling occasions in the preliminary data set. We will continue sampling in 2017-2018.

Evaluating the factors associated with the spatial and seasonal distribution of spawning female Blue Crabs (*Callinectes sapidus* Rathburn) in the coastal waters of Texas

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Abundance of the Blue Crab *Callinectes sapidus* Rathburn in Texas has declined over the last 30 years. Recent studies have demonstrated declining size-at-maturity of females, and a shift in sex ratios away from females, implying that negative trends in abundance may be linked to declines in female spawning stock and a reduction in spawning biomass. Efforts to reverse declines in abundance may thus be focused towards protecting spawning females; however, little is known about either the temporal or spatial distribution of spawning females in Texas. This study used fishery-independent data from the Texas Parks and Wildlife (TPWD) routine monitoring dataset to elicit the spatial and temporal distribution of post-copulatory Blue Crabs (or, "sponge" crabs). Sponge crab presence/absence was modeled in inshore and offshore areas of Texas using boosted regression trees (BRTs) with predictor variables salinity, water temperature, dissolved oxygen, and distance from the nearest offshore corridor (Gulf passes). The BRT method was used to model sponge crab distribution in two different eras: "pre-decline" (1984-1987) and "post-decline" (2006-2016). The variables predicting presence/absence in both eras

were remarkably consistent in both variance explained and direction. Sponge crab presence was highest around Gulf passes but was also influenced by temperatures > 15°C, salinity between 20 – 30 ppt, and dissolved oxygen > 5 mg/mL. Although not included directly in the BRT, trawl sampling suggested that most sponge crabs occurred in depths of 1 – 5 m, which contrasts with a study from Chesapeake Bay suggesting that sponge crabs use areas > 13 m depth. These data help to resolve the seasonal/spatial habitat parameters generally required by post-copulatory female Blue Crabs and could potentially be used in management efforts to protect spawning females.

Population size and dispersion patterns of Bluehead Shiner within Iron Ore Lake and Pruitt Lake, Texas

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We estimated population size and individual dispersion patterns of *Pteronotropis hubbsi* (Bluehead Shiner) in two Texas populations. Population size was estimated using the sample plot method. Each locality was divided into 10-12 sample plots and sampled exhaustively by seine. All fish were identified and counted per sample plot, and habitat parameters were measured at each sample plot. Fish density and habitat was then mapped across the entire locality based on the sample plot estimates. Within each locality, we found the *P. hubbsi* population to fit a clumped dispersion model. Density was greatest at a single point and decreased with distance from that epicenter. We found that this dispersion pattern mirrored variation in habitat across the locality. Regardless of amount of aquatic vegetation, fish density was greatest where substrate was composed of sand and clay, and fish were absent from plots with detrital and silt substrates. This may suggest specific habitat requirements for *P. hubbsi* and explain the rarity of the species throughout its range.

Fish assemblages structure across a habitat gradient in the Big Cypress drainage, Texas

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We sampled fish assemblages and habitat parameters from 34 localities in the Big Cypress drainage. These localities spanned the longitudinal gradient of the drainage (upstream to downstream). We collected over 13,000 fish representing 65 unique species from these localities. Abundance across localities ranged from 93 to 727 individuals, and richness (number of unique species) ranged from 5 to 27. On average, abundance and richness was two times greater in upstream localities than in downstream localities. Fishes that dominated assemblages in the upstream localities included several catfish species, several species of shiners that are stream specialists, a sucker, and several small darter species. The downstream localities had assemblages that were dominated by shad, two large darter species, and two minnows that are large river specialists. We saw a clear longitudinal gradient in habitat from the upstream to the downstream-most localities. Upstream localities had greater flow, substrates with greater amounts of clay and sand, and greater emergent vegetation. Downstream localities had lower flow, substrates with more detritus, and greater abundance of floating vegetation. We speculate that a range of life history and natural history traits among fishes in this drainage drive the strong abiotic-biotic association.

Monitoring biological response to Arundo (*Arundo donax*) management in the upper Pedernales watershed

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Arundo (*Arundo donax*) is a non-native, cane-like perennial grass that grows prolifically along riparian stream corridors in the southern United States. Invasion of non-native vegetation such as Arundo can negatively influence systems by replacing native riparian plant communities that stabilize banks, degrading the quality of fish and wildlife habitat, and reducing nutrient inputs that regulate the structure and function of instream communities. Barons Creek is primarily an urban stream in the upper Pedernales watershed with a moderate degree of intact native riparian vegetation but an ever-increasing number of large, monoculture stands of Arundo. In an effort to control the spread of this invasive species, more than 13 acres of Arundo on 65 private properties was treated with herbicide between Aug – Oct 2016. The primary goal of this study is to understand the short and long-term effects of invasive Arundo management efforts on aquatic communities as native riparian restoration occurs. Fish and benthic macroinvertebrate communities were sampled pre-, immediately post- (3-4 days), and post- (6 weeks) treatment of Arundo at three sites in Barons Creek – an upstream non-treated control site (N = 1) and downstream treated sites (N = 2). Indices of Biological Integrity and descriptive community metrics were assessed among and within sites for fish and invertebrates at all three time points and aquatic macroinvertebrate communities were compared between reaches with native vegetation versus Arundo stands prior to treatment. Preliminary results suggest little to no influence of aquatic herbicide treatment on fish or macroinvertebrate communities across sites or treatment phases. However, native vegetation stands possessed higher macroinvertebrate species richness on average than Arundo stands, suggesting that Arundo management may positively impact the aquatic community. Understanding the response of biological communities to aquatic herbicide treatment will be of direct value to natural resource managers engaged in partnership efforts to control Arundo on private lands to support healthy stream conservation.

Influence of freshwater inflow on the distribution of Atlantic Rangia and Water Celery within the Trinity River delta, Galveston Bay

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The estuarine brackish water clam *Rangia cuneata* (Atlantic Rangia) and the oligohaline *Vallisneria americana* (water celery) have been recommended as potential indicator species for evaluation of the effects of freshwater inflows on Texas estuarine ecosystems. However, due to biased historical monitoring methodology reliable data is lacking which limits the ability of managers to develop quantitative relationships between freshwater inflow and population viability of these species. Our study attempted to develop functional relationships between these species and freshwater inflow within the Trinity River delta. The objectives of our study were to: 1) describe the geographic distribution of the Atlantic Rangia and water celery within the study area and 2) examine the relationship between freshwater inflow and the distribution of these two species. Multiple sites were monitored during January to February 2016 for the presence of Atlantic Rangia, and January-February and August -October 2016 for the presence of water celery using multiple field methods. In addition, we reviewed historical data collected by recent investigations and historical collections by agency monitoring programs. Due to differences with past sampling methodology it was difficult to discern quantitative patterns in species distribution attributable to river discharge; however, it is clear that the Rangia meat index (percentage total weight) increased from former drought levels in 2011 to 2014 reported by other investigators. The occurrence of water celery had

also increased from historical drought (high salinity) periods. The increase in freshwater inflow and resulting lower salinities during 2015-2016 reduced stressful conditions that existed during the drought years of 2011-2014. The success of future attempts to conserve or restore these species and associated benthic communities will be strongly dependent on maintaining appropriate freshwater inflow regimes.

Texas Blue Crab fishery management – past, present, and future

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Blue Crab have been an important Texas fishery, with documented commercial landings dating back to 1880. Management measures dating back to 1980 include minimum size limits, trap limits and gear specifications, time limits and areal closures. House Bill 2542 in 1997 created the Crab License Management program, with provisions for a new commercial crab fishing license, limited entry provisions, and a voluntary buyback program. A closed season to trap fishing was initiated in 2002 and has continued annually since then. Associated with this closure there has been an Abandoned Crab Trap Removal Program, in which over 32,000 traps have been removed from Texas' coastal waters in 15 years. A Texas fishery management plan (FMP) was published in 1992, and Gulf of Mexico-wide FMPs were published in 1990, 2001, and 2015, with input from Texas Parks & Wildlife Department (TPWD) staff. Blue Crab stock assessments were completed in 2007 (Texas) and in 2013 (Gulf of Mexico, Gulf Data, Assessment, and Review 01). Current trends in fishery-dependent and fishery-independent data were reviewed, and future management options to improve stock status were discussed.

A multifaceted approach to combating Zebra Mussel invasions in Texas

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Zebra mussels are highly invasive, freshwater bivalve mollusks known for significant economic and ecological impacts as a result of their ability to form dense colonies that encrust boat hulls and motors, damage docks and marinas, clog raw water intakes, and affect the trophic structure of native plankton and fish communities. Although introduced to the U.S. in the late 1980's, zebra mussels were first discovered in Texas in 2009 at Lake Texoma and have since infested eight lakes in north-central Texas and been detected in seven others. Texas Parks and Wildlife Department (TPWD) and partners employ a multifaceted approach to combat the spread of this invasive species—outreach, monitoring, and research. In addition to a partner-funded, public outreach campaign, TPWD staff/interns work diligently to inform the public about prevention practices and help prevent potentially contaminated boats from entering uninfested water bodies. TPWD also coordinates and participates in monitoring of 56 water bodies for early detection and assessment of infestation status. TPWD and partners fund research on population trends, potential for downstream dispersal, and invasion risk. Results of one such collaborative research study suggests there may be hope for Texas' currently infested lakes and could have major implications for management of aquatic ecosystems and infrastructure impacted by this invasive species.

Effects of pH and salinity on juvenile hatchery reared Red Drum (*Scianops ocellatus*)

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Climate change with concomitant ocean acidification presents a problem to coastal ecosystems, including estuaries. It is well-documented that fish growth, development, and survival are dependent on environmental

factors such as temperature and salinity. Considering the economic and recreational importance of red drum (*Sciaenops ocellatus*), it is important to understand both acute and long-term effects of environmental change on juveniles released into native waters as part of stock enhancement programs. Experiments were designed to compare survival, growth and body composition of juvenile red drum grown under different salinity and pH treatments. Research was conducted in a closed recirculating system with juvenile red drum (42±9.9 mm) randomly stocked at a density of 13 fish/tank and fed daily to satiation (~6% body weight). Fish were subjected to salinity treatments of 40 or 30 and a pH of either7.5, 8.1, 8.5, or 9.0 (n = 8 replicates per treatment). Each trial was conducted for 14 days. Results show that at a salinity of 40, there was a significant difference between survival of the juvenile red drum at pH 7.5 and 9.0 ($p=0.03$). Survival was not significant between pH levels at salinity of 30. Results indicated pH had no significant effect on specific growth rate (SGR, $p \geq 0.05$); however, increased salinity significantly decreased growth ($p< 0.05$), and there was a significant interaction between pH and salinity. At 40 the whole body ash increased as pH increased ($p=0.003$). Whole body energy was not significantly affected by pH ($p \geq 0.05$); but increased salinity caused a significant decrease in energy retention ($p < 0.05$), and there was no significant interaction between pH and salinity affecting energy retention. These results indicate that salinity is a more critical factor to consider than pH when engaging in stock enhancement efforts, especially at high salinity.

Biological profile for Tripletail in the Gulf of Mexico and the Western Central Atlantic

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The Gulf States Marine Fisheries Commission's Tripletail Technical Task Force (TTF) recently completed a species profile for tripletail in the Gulf of Mexico and the Western Central Atlantic. The TTF was composed of representatives of the five Gulf States and Georgia. Tripletail (*Lobotes surinamensis*) are pelagic fish found throughout tropical and subtropical regions of the world's oceans. They occur in a wide variety of color patterns, both as juveniles and adults. In our area, tripletail appear to move based on prevailing water temperatures. Seasonal movement has been confirmed through tagging studies. Tripletail are rarely found in high densities in the Gulf of Mexico and are rather ephemeral in their occurrence, which is not conducive to supporting a large dedicated recreational or commercial fishery. All five of the Gulf States and Georgia have commercial and recreational harvest regulations for tripletail; however, most of those regulations apply to state waters and there are no federal restrictions on tripletail in the Exclusive Economic Zone (EEZ). Seafood dealers are importing tripletail to the United States from fisheries in South and Central America.

Reproductive isolation and hybridization between the Red River Pupfish and Sheepshead Minnow

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Reproductive isolation is often due to processes involving sexual selection, such as preferences for mating with conspecifics. When historically allopatric species come into secondary contact with each other due to

introductions, there may be little or no reproductive isolation and hybridization may occur because mating traits are indistinguishable or the heterospecific individual has preferred characteristics. We examined the role of sexual selection in behavioral reproductive isolation between endemic populations of the Red River pupfish (*Cyprinodon rubrofluviatilis*) and the recently introduced sheepshead minnow (*C. variegatus*) and evaluate hybridization and introgression between the species. In lab based behavioral trials, no conspecific or heterosecific preferences were expressed by females of either species, and males of both species won evenly in dominance fights. A lack of intra- and inter-sexual selection between the two species may be facilitating ongoing hybridization in this system. We also conduced genetic analysis using microsatellite markers of five parental and four putative hybrid populations to identify hybrid individuals in wild populations and determine the impact of *C. variegatus* in the Brazos River. Preliminary data show that alleles unique to *C. variegatus* are present in putative hybrids collected from multiple locations in the Brazos River from 2013-2015. However, samples collected from the Wichita River and Red River do not possess these unique alleles. This suggests that *C. variegatus* and cryptic hybrids are present in some, but not all of the range of *C. rubrofluviatilis*. Additional sampling and genetic analysis is needed to understand the full impact that *C. variegatus* has had on populations of *C. rubrofluviatilis* and if conservation efforts are needed to protect the loss of *C. rubrofluviatilis* genetic integrity.

Acknowledgments

The contributions of the abstract authors and the Editorial Committee towards the preparation of these Proceedings are gratefully acknowledged.

The Texas Chapter is appreciative to the many contributors who donated goods, money, and services for auction and raffle during the 2017 meeting in Corpus Christi, Texas.

CITATION:

Author(s). 2017. Title. Pages ____ *in* Daugherty, D. and A. Pease, editors. Annual Proceedings of the Texas Chapter, American Fisheries Society, Volume 39. Texas Chapter, American Fisheries Society, Austin, Texas.

ISSN 1060-2224