ANNUAL PROCEEDINGS
of the
TEXAS CHAPTER

AMERICAN FISHERIES SOCIETY

College Station, Texas

25-27 January 2018

Volume 40

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
25-27 January 2018
College Station, Texas

2018-2019 Officers

Randy Rushin, President
Water Monitoring Solutions, Inc.

Michael Homer, President-Elect
Texas Parks and Wildlife Department

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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
2018	Randy Rushin	College Station

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 – Matthew Acre (TTU)
Best Professional Presentation – Dave Buckmeier (TPWD)
Best Student Poster Presentation – Ashley Seagroves (TXSTATE)
Best Professional Poster Presentation – Ed Mager (UNT)
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)

2018 Fisheries Administration – Spencer Dumont (TPWD)
Fisheries Management – Alice Best (TPWD)
Fisheries Management – Niki Ragan-Harbison (TPWD)
Fisheries Technical Support – Carl Vignali (TPWD)
Fisheries Student – Luke Bower (TAMU)
Special Recognition – Dakus Geeslin (TPWD)
Special Recognition – Mike Morgan (TPWD)
Special Recognition – Paul Fleming (TPWD)
Special Recognition – Inland Fisheries AHE Team (TPWD)
Special Recognition – Sarah Robertson (TPWD)
Special Recognition – Inland Fisheries Division's Watershed Conservation Program (TPWD)
Best Student Presentation – Brittany Harried (UNT)
Best Professional Presentation – Joshua Perkin (TAMU)
Best Student Poster Presentation – Emily Richardson (TTU)
Best Professional Poster Presentation – Melissa Casarez (UT)
Scholarships, Undergraduate (B.S.) – Loicka Baille (TAMUG)
Scholarships, Undergraduate (B.S.) – Elaine Chen (Rice)
Scholarships, Graduate (M.S.) – Louisa Torrance (TAMUCC)

Scholarships, Graduate (Ph.D.) – Yasmin Quintana Morales (TAMU)
Scholarships, Graduate (Ph.D.) – Travis Richards (TAMUG)
Scholarships, Graduate (Ph.D.) – Andria Salas (UT)
Harry Tennyson Scholarship (M.S.) – Jacob Wright (TTU)
Harry Tennyson Scholarship (M.S.) – Derek Bolser (UTMSI)
Harry Tennyson Scholarship (M.S.) – Michelle Bromschwig (TAMUCC)
Harry Tennyson Scholarship (M.S.) – Tyler Steube (TAMUCC)
Clark Hubbs Research Award – Amanda Pinion (TAMU)

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
UNT – University of North Texas
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

Why the American Fisheries Society is the professional home for you

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Becoming involved in the American Fisheries Society (AFS) is a critical step in a person's development as a fisheries professional. There is a difference between membership in the Society and membership in a state chapter only. Where the units work on a local or expertise level, the Society encompasses the entire breadth of the issues and levels of the organization and offers substantial additional membership benefits. Only with a Society membership can you receive Fisheries magazine each month, have free access to all the journals (new this year!), receive discounts on AFS books and Annual Meeting registration, and more. Joining AFS pays huge professional dividends to both professionals and students alike. The AFS empowers all its members to develop professional competencies and cultivate relationships with scientists, managers, biologists, and policy makers throughout the world. Through AFS, you can contribute meaningfully to the advancement of the Society and the fisheries profession, gain access to additional education opportunities, establish and expand your professional network, gain leadership experience, acquire skills for employment and professional achievement, promote fisheries conservation, and have fun! The path from fisheries student to professional is an exciting journey. But navigating this journey is no easy task. All TCAFS members should avail themselves of the diverse resources offered by AFS membership that will help them to live their professional dreams.

Production of greater quantities of female Southern Flounder for stock enhancement

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Gender determination of Southern flounder is subject to internal factors but is also subject to modification by external factors (temperature). Temperature changes of a single degree during the period of sexual differentiation can result in much larger percentages of males. This skewed sex ratio leads to limited successes in Southern flounder production for stock enhancement as males grow slowly. To resolve this bottleneck, we evaluated the effects of UV irradiation of sperm followed by exposure to either pressure or temperature shock to suppress meiotic division and create heterozygous meiotic diploid offspring. The meiogynogenic juveniles can then be sex-reversed to become functional males by rearing at high temperatures or feeding methyltestosterone during the period of sex determination. The resulting XX functional males can then be spawned with normal females to produce 100% genetically female offspring. Creation of meiogynogens is only necessary one time, as when new XX functional male broodstock are needed, all-female progeny from the original meiogynogens can simply be sex-reversed using temperature or feeds containing hormones. Two controls and two experimental treatments were evaluated to assess gamete quality, fertilization rate, embryo development, hatch rate, and total larvae produced. Control 1 served as the 'normal' control with untreated milt and eggs, while control 2 served as an irradiated control to ensure irradiated sperm could not result in embryo production. Treatment 1 utilized irradiated milt followed by hydrostatic pressure shock, while treatment 2 utilized 4°C cold shock to induce meiogynogenesis. While both experimental treatments resulted in the production of meiogynogens, the 8,500 psi hydrostatic pressure shock yielded greater hatch rates and total larvae produced from the same spawns. Creation of meiogynogenic Southern flounder larvae currently appears to be a viable method to improve production for this species.

State of the state: aquatic invasive vegetation

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Aquatic Invasive Species are a threat to all of Texas' reservoirs, rivers, and streams. The Texas Parks and Wildlife Department estimated the management of Texas' most problematic aquatic invasive species would require $45 million annually. The 84th Legislature provided TPWD with $6.3 million for statewide management of aquatic invasive species. This record funding allowed the Inland Fisheries Division's Aquatic Habitat Enhancement Team to greatly increase the scope and scale of management of aquatic invasive vegetation over the 2016-2017 biennium. Giant salvinia and water hyacinth are the two biggest threats to boating and fishing access in the state of Texas. Additionally, both species are capable of negatively altering aquatic ecosystems and can spread rapidly. TPWD implemented its Integrated Pest Management Plan to control and manage both of these species. Chemical, biological, and mechanical techniques were used to battle large infestations of giant salvinia and water hyacinth throughout the state. During the biennium, over 41,000 acres of giant salvinia and water hyacinth were treated with herbicides, over 850,000 giant salvinia weevils were released into Texas' reservoirs, and several rapid response events prohibited introductions of giant salvinia from becoming established in reservoirs. Education of aquatic invasive vegetation was a necessary component of the IPM Plan too. Anglers, duck hunters, and boaters educated about the harmful effects of aquatic invasive vegetation are less likely to contribute to the spread of giant salvinia and water hyacinth to new reservoirs.

The plight of the Rio Grande Shiner, *Notropis jemezanus*, in the lower Rio Grande along the Texas/Mexico border

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The Rio Grande Shiner (*Notropis jemezanus*) is endemic to the Rio Grande drainage of the southwestern United States and Mexico. It has been extirpated from the main stem of the Rio Grande in New Mexico and exhibits a fragmented range in the upper Pecos River in New Mexico and the main stem of the Rio Grande along the Texas/Mexico border. We provide an overview of US museum holdings for *N. jemezanus* and report on recent sampling efforts for this species along the main stem Rio Grande from the Big Bend region downstream to Laredo. Examination of museum voucher specimens indicates that records of *N. jemezanus* from the lower Pecos River and Devils River in Texas are based on misidentifications of *Notropis megalops*. Recent field efforts by our group throughout the Rio Grande along the TX/Mexico border have produced only four individuals of *N. jemezanus*. The Rio Grande Shiner is now extremely rare, and we predict that the future of this species will be bleak without immediate conservation intervention.

Upper thermal limits 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 tolerances of three freshwater mussel species (*Fusconaia mitchelli*, *Quadrula petrina*, 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 *Q. petrina* 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 *Q. petrina* 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.

Loiterers, leavers, and leptokurtosis: synthesizing movement ecology of Guadalupe Bass *Micropterus treculii*

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Fish movement and dispersal are critical for individual survival, (meta)population regulation, and community dynamics. Movement of stream fishes was initially regarded as largely restricted, with most individuals remaining within 50 m of stream during their lifetime. Later movement studies revealed two components to populations: a more abundant stationary component (loiterers) and a less abundant mobile component (leavers) with little indication of individuals changing their behavioral strategy. This 'restricted movement paradigm' (RMP) has experienced considerable refinement since its initial inception, but its basic principles have not been tested in Guadalupe Bass (*Micropterus treculii*). We assembled Guadalupe Bass radio telemetry data from the Pedernales, South Llano, and Colorado Rivers of Texas to test the RMP. We developed models for movement expected under the RMP using fish size, caudal fin aspect ratio, stream size, and time since tagging within the R Statistical Package 'fishmove', and then compared these expectations with observed field data. Results revealed a consistent pattern of leptokurtosis, i.e., a distribution of movement distances characterized by a high peak representing loiterers and long tails representing leavers. We also found RMP-modelled predictions matched field observations across 67% (12/18), 78% (14/18), and 75% (12/16) of tracking sessions in the Pedernales, South Llano, and Colorado Rivers, respectively. Mismatches between expected and observed movement distances occurred during winter months and near the end of tracking studies when fish moved less than expected. When framed within the broader context of movement of other studied stream fishes, Guadalupe Bass are intermediate dispersers and comparable to other centrarchid fishes. Our findings have implications to Guadalupe Bass conservation and management, particularly in predicting the movement of stocked fish, assessing the potential for interactions with congeners, and evaluating the colonization potential of restored habitats.

Discrimination of Snowy Grouper otolith chemical signatures from Gulf of Mexico and Western Atlantic Ocean

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In the Gulf of Mexico and western Atlantic Ocean, Snowy Grouper (*Hyporthodus niveatus*) are valuable components of the recreational and commercial deepwater fisheries in both the western Atlantic Ocean and Gulf of Mexico. Despite the ecological and economic importance of the species, relatively little is known about the population structure of Snowy Grouper and recent stock assessments indicate that stocks are overfished (western Atlantic) and/or data deficient (Gulf of Mexico). The population structure of Snowy Grouper was assessed with otolith chemistry using archived otolith samples from four regions (south Atlantic, northwestern, northcentral and northeastern Gulf of Mexico) collected over two years (2012 – 2013). Lifetime element:Ca ratios (Li:Ca, Mg:Ca, Mn:Ca, Sr:Ca, Ba:Ca) were quantified from the core to the edge along the sulcus with laser ablation inductively

coupled plasma mass spectrometry. Results indicated that otolith chemistry varied regionally for Snowy Grouper, implying that discrete stocks may exist in U.S. waters with limited exchange of individuals inhabiting the different regions investigated. This species is currently managed as a single stock, and our results suggest that the current approach may need to be altered. To determine the stock structure and population connectivity of Snowy Grouper, future otolith chemistry analyses on additional years, in conjunction with genetic approaches, are needed.

Evaluating the efficacy of mussel relocation in Texas with in-situ field studies

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The Texas Department of Transportation (TxDOT) is responsible for mitigating impacts to natural resources at road and bridge construction sites. For freshwater mussels, environmental assessments are conducted to determine whether state or federally protected species occur within the project area. If mussels are found, they are often translocated to another location to minimize impacts resulting from construction activities. However, translocation has historically had poor success due to limited guidance and little understanding of factors influencing mussel population performance. In Texas, the results of recent translocation studies have been mixed, as survivorship is high if strict protocols are used, while growth and biochemical markers indicate potential impacts. These studies suggest that additional research is needed to better understand how translocation affects not only survivorship but also sublethal factors such as growth, reproduction and biochemical responses. Thus, the objective of this study is to determine the effects of translocation on multiple biological endpoints for several rare and common mussel species. Using reciprocal transplant experimentation, we tested if population performance traits, including survival probability, shell growth, body condition, gamete production, and biochemical markers, including glycogen, lipids, and proteins, were affected by translocation in one threatened species (Trinity pigtoe, *Fusconaia chunii*) and one common species (western pimpleback, *Cyclonaias mortoni*) of freshwater mussel within the East Fork of the Trinity, Texas. This study is ongoing, though to date we have found that survivorship appears to be high and effects to population and biochemical endpoints are minimal subsequently one month following translocation.

Consumptive demand of non-native Gulf Killifish *Fundulus grandis* in the Lower Pecos River estimated using bioenergetics simulations

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The lower Pecos River is a system that has a history of severe water quality degradation which puts many native fish species at risk of extirpation. With the establishment of non-native Gulf killifish (*Fundulus grandis*), native fish species in the system potentially face an additional threat in an already stressed environment. In the lower Pecos, Gulf killifish have been shown to consume very high proportions of fish prey, and they appear to consume more fish in this invaded inland system compared to native, coastal habitats. Utilizing bioenergetics modeling, we estimated the energy demands of Gulf killifish from the Pecos River based on estimated annual growth and known dietary resource use, and we predicted the biomass (the number of prey fish) an average individual consumes annually. Our initial results show that Gulf killifish are assimilating approximately 16.5g of biomass as they mature into their second year of life, and this growth is supported by consuming approximately 284g of fish prey annually, ranging from 0.2g to 1.5g daily and with an average of 0.8g per day. Their high consumptive demands could be placing additional pressure on native fish populations in the system, and predation by Gulf Killifish potentially threatens the remaining Pecos Pupfish in Texas. Our predictions from the bioenergetics modeling could give fisheries managers a better understanding of potential trophic interactions

threatening Pecos Pupfish populations, allowing for more informed decisions regarding their conservation. As Gulf Killifish have invaded multiple inland systems, a better understanding of their trophic ecology is critical.

Developmental osteology of the Tadpole Madtom, *Noturus gyrinus*

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The skeleton of catfishes (Siluriformes) is characterized by several autapomorphies, including extreme modifications of certain elements (i.e. pectoral-fin spine) and the presence of several bones that are currently presumed to be the result of fusion (i.e. the parieto-supraoccipital). Despite the vast number of anatomical investigations of the adult skeleton in catfishes, comprehensive information of early development remains scarce. This is particularly surprising given the number of species that are currently being cultured. A detailed study of the development of the catfish skeleton has the potential to resolve several long-standing homology issues relating to the skeleton in this group (e.g., is the parieto-supraoccipital the result of fusion or is the parietal absent?). As a first step towards a better understanding of the skeletal system of catfishes, we document the development of the entire skeleton in *Noturus gyrinus*, the Tadpole Madtom. Our investigation is based on 153 cleared and double stained individuals (5.4-26.4 mm NL/SL) which were examined and scored for the presence/absence of 136 bones. The first bones to develop were the cleithrum, maxilla and opercle (5.4 mm NL) and the last to appear was hypobranchial 2 (14.1 mm SL). Based on this data, we compiled a sequence of ossification for *N. gyrinus* and make general comparisons to the ossification sequences currently available for other teleost fishes (*Salminus brasilensis*, *Barbus holotaenia*, and *Sciaenops ocellatus*).

Veni vidi vici: how many Lionfish came to conquer the Atlantic?

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While likely too late, given current technology, to eradicate the Indo-Pacific red lionfish (Pterois volitans) from the invaded range in the western Atlantic Ocean efforts informed by the lionfish invasion can be taken to prevent subsequent invasions. One unclear aspect of the invasion is how many initial colonists were needed at the outset to lead to the numbers and diversity of lionfish being observed in the invaded range. It is well-established that at least ten lionfish were initially introduced. That estimate is based solely on the number of maternally inherited mitochondrial haplotypes present and is not an assessment of the true number of colonists. To estimate the number of lionfish that were introduced, we used a population genetic model of the mitochondrial control region in concert with a demographic life-history model to simulate the invasion from the Indo-Pacific given the observed source population diversity. To ensure a conservative estimate was modeled the invasion was viewed as a single introduction event, as opposed to more complex scenarios with several introductions which would result in a larger required number of colonists. Assuming a balanced sex-ratio and no reductions in fecundity due to Allee effects our results indicate 118 (54-514, 95% HPD) lionfish initially colonized the Atlantic. Incorporating the likely Allee effects experienced by the founding population leads to increased estimates of the number of colonists required to spur the invasion. These results suggest that rather than an introduction by a single individual or small group of individuals the invasion was caused by a systemic failure of the marine ornamental aquarium industry, likely at all levels, from individual aquarists to distributors and wholesalers. Efforts to prevent future invasions need to focus on education of the costs of animal dumping, providing options for humane disposal of unwanted animals, and sufficient penalties for releasing animals.

Influence of environmental factors and spatial processes on fish metacommunities in the Bita River, Colombia

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Understanding the processes driving patterns of species distribution and diversity has been one of the main objectives of community ecology. Recently, there has been growing recognition that local environmental conditions are not the only factor structuring ecological communities. Larger-scale spatial variation and dispersal also have major influences on community dynamics. The aim of our study was to evaluate the relative importance of local environmental factors versus large-scale spatial variation on fish assemblage structure along the longitudinal fluvial gradient of the Bita River, a major Orinoco tributary in the Colombian Eastern Plains. Using seine nets and gill nets, fishes were surveyed at 34 sites throughout the basin during the low water period in January and March 2016. These surveys yielded 25,928 fish specimens representing 201 species, 39 families and 10 orders. Twenty-seven environmental variables were recorded at each site. Asymmetric eigenvector maps (AEM) were used to model spatial variables. In order to understand spatial variation in local assemblage composition and its relationship with the environmental and spatial variables, two approaches were employed. First, we applied the elements of metacommunity structure (EMS) framework (coherence, species turnover, and boundary clumping), followed by a variation decomposition analysis that allowed us to classify the metacommunity to one of four metacommunity paradigms. EMS showed that fish species distribution along the fluvial gradient revealed Clementsian structure with groups of species replacing other groups along the longitudinal gradient. These replacements were mainly due to heterogeneity in environmental conditions, especially related to habitat structure. Approximately, 20% of the variation in local assemblage structure was modeled by the combined influence of environmental and spatial variables, 7% by a pure environmental component, and 4.6% by a pure spatial component. Based on these results, we infer that both species sorting and mass effects dominate fish metacommunity dynamics in this system.

Mercury risk to piscivorous Great Blue Herons in the South-Central United States

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Methyl mercury (MeHg) is a toxic heavy metal that has contaminated all aquatic food webs and can pose a risk to aquatic predators. Mercury (Hg) is emitted primarily from anthropogenic sources into the atmosphere and may be deposited into waterbodies where it can be methylated. Methyl mercury biomagnifies in aquatic food webs and becomes highly concentrated in fish. Here we present the first study to estimate the health risk to piscivorous birds from consuming MeHg-contaminated fish in the south-central United States. We examined the effect of bird age and bird diet on the risk to piscivorous Great Blue Herons (*Ardea herodias*) consuming MeHg-contaminated fish in ecoregions with different levels of Hg deposition. We used data from the Mercury Deposition Network and National Landcover Database to calculate average wet atmospheric Hg deposition in 14 ecoregions of the south-central U.S. Following USEPA guidelines, we calculated MeHg adverse effect exposure thresholds for both nestling and adult Great Blue Herons with diets composed of of 60% and 100% fish. We used MeHg concentrations in 12.5 cm total length bluegill (*Lepomis macrochirus*) as a proxy of MeHg concentrations in prey fish consumed by Great Blue Herons. We used the National Descriptive Model for Mercury in Fish to estimate the whole-body Hg concentrations of bluegill at 728 sampling sites across the study area. We assessed risk by comparing the estimated MeHg concentrations in bluegill to Great Blue Heron exposure thresholds. The average MeHg concentrations of bluegill in ecoregions exceeded the exposure thresholds for both nestling and adult Great Blue Herons with diets of 100% fish in ecoregions with intermediate to high Hg deposition. Our results indicate

that the health of Great Blue Herons in the south-central U.S. may be at risk from consuming MeHg-contaminated fish.

Effects of melanocortin hormones on the electric organ discharge of two weakly electric fishes

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Gymnotiform fishes are a diverse and widely distributed order of Neotropical fish frequently studied for their ability to generate and detect electric fields. These nocturnal fish use electrolocation as a means of navigating and foraging in dark, turbid waters. The waveforms and frequencies of their electric organ discharges (EODs) have species specific properties, allowing them to signal and identify conspecifics during social interactions. We examined one mechanism regulated by adrenocorticotropic hormone (ACTH) through which some species increase the amplitude of their EOD in response to circadian rhythms and social stimuli. This is particularly interesting because amplitude changes involve the regulation of sodium channels in the membranes of electrocytes (electric cells). These ion channels are highly conserved throughout the evolutionary history of vertebrates but may have undergone interesting adaptations in electric fishes. We tested the effects of ACTH in two species, *Brachyhypopomus bennetti* and *Sternopygus obtusirostris* (Gymnotiformes, Hypopomidae and Sternopygidae), by injecting fish with 1 µg of ACTH per gram of body weight and recording fish EODs in a recording chamber. We also used current-clamping techniques on single electrocytes, in order to determine the effects of ACTH on membrane potentials. We found variable effects of ACTH between species that we suspect are due to the unique properties of the waveforms each species produces.

Flow-specific floodplain inundation modeling, availability of suitable spawning habitat and recruitment of Alligator Gar in the lower Trinity River

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Hydrologic alterations of river systems and reduction in river-floodplain connectivity is thought to be a main driver of Alligator Gar *Atractosteus spatula* population reductions or extirpations in many parts of their range. However, limited data are available on recruitment dynamics of Alligator Gar in relation to floodplain connectivity and availability of suitable spawning habitat. We developed a stage-specific floodplain inundation model for the lower Trinity River using HEC-RAS and 1 m LiDAR-derived DEMs, with Landsat-based validation. The inundation model was coupled with TPWD Ecological Systems Classification land cover vegetation classes to quantify availability of suitable spawning habitats based on depth and vegetation type at 5,000 cfs flow increments. Indices of Hydrologic Alteration were quantified for the period of record for relevant USGS gaging

stations and integrated with the floodplain inundation model to estimate historic spawning habitat availability. Alligator Gar year class strength was estimated based on non-selective gill net sampling and age estimates of individuals from multiple independent reads of sagittal otoliths. Year class strength was correlated with estimated historic spawning habitat availability and flow regime attributes (e.g. timing, magnitude and duration of flood events). Alligator Gar in the lower Trinity River demonstrated strong year class structure and recruitment success was positively correlated with spawning habitat availability and long duration flood pulses during the spawning season. Our findings provide further evidence that management of the flow regime as well as off-channel habitats is important for recruitment success of Alligator Gar populations.

Cephalic and body tuberculation of the Shoal Chub *Macrhybopsis hyostoma* (Teleostei: Cyprinidae)

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Cyprinidae, the largest family of fishes, currently contains 3000+ species of freshwater fishes that exhibit remarkable diversity in morphology, ecology and habitat. Most species of cyprinid possess tubercles (aggregations of keratinized cells) on the surface of the epidermis of the head, body, and fins. These structures have been hypothesized to primarily play a role in reproduction, including (but not restricted to) aiding close bodily contact between male and female individuals during spawning, aiding nest building, or the defense of a territory. In many species of cyprinid tubercles are conical, with many cell layers contributing to the formation of a single pointed structure and are sexually dimorphic in size and position. Despite the potential importance of tubercles to the life history of cyprinids, these structures have yet to be studied in detail for the majority of species, including most members of the relatively well-studied radiation of North American cyprinids. In order to further our understanding of the diversity, distribution and potential function of tubercles across the radiation of North American cyprinids, we provide a detailed description of the gross morphology and distribution of tubercles locate on the head and body of *Macrhybobpsis hyostoma* using a combination of light microscopy, scanning electron microscopy and histology. The tubercles of *M. hyostoma* depart from the typical conical shape ubiquitous in minnows and instead consist of low, oval plates of keratinized cells, each with a single microprojection arising from the surface. These tubercles do not appear to be sexually dimorphic and we propose a hydrodynamic (vs. reproductive) function for the tubercles located on the surface of the head and body of *M. hyostoma*.

A semi-arid river in distress: contributing factors and recovery solutions for three imperiled freshwater mussels (Family Unionidae) endemic to the Rio Grande basin in North America

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Freshwater resources in arid and semi-arid regions are in extreme demand, which creates conflicts between needs of humans and aquatic ecosystems. The Rio Grande basin in the southwestern United States and northern Mexico exemplifies this issue, as much of its aquatic biodiversity is currently in peril as a result of human activities. Unionid mussels have been disproportionately impacted, though the specific factors responsible for their

decline remain largely enigmatic. This is problematic because the Rio Grande basin harbors three unionid mussel species (*Potamilus metnecktayi*, Salina mucket; *Popenaias popeii*, Texas hornshell; and *Truncilla cognata*, Mexican fawnsfoot), which are being considered for listing under the U.S. Endangered Species Act. To date, surveys for these species have not corrected for variability in detection; thus, current range estimates may be inaccurate. Using single occupancy-modeling to estimate detection and occupancy at 115 sites along ~ 800 river kilometers of the Rio Grande in Texas, we found that detection probabilities were relatively high, indicating that our survey design was efficient. In contrast, the estimated occupancy was low, indicating that our focal species were likely rare within the Rio Grande drainage. In general, the predicted occupancy of our focal species was reduced throughout their respective ranges, indicating possible range declines. A comparison of currently occupied ranges to presumptive ranges underscores this point. The best-approximating models indicated that occupancy was influenced by habitat, water quantity, and quality and proximity to large-scale human activities, such as dams and major urban centers. Our study provides important empirical evidence on the ecological implications of hydrologic alterations and land use on rare endemic mussel species and highlights the need for better management of semi-arid rivers. We also provide recommendations on conservation activities that may not only improve the long-term prognosis of our focal species but also other aquatic taxa within this basin.

Should I stay or should I go? Analyzing the genetic basis of migration-related traits in Rainbow Trout *Oncorhynchus mykiss*

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Many rainbow trout (*Oncorhynchus mykiss*) populations exhibit partial migration, where resident and migrant individuals coexist in a single population. Due to anthropogenic, environmental, and population-specific factors, migratory individuals have been decreasing in frequency across the continental United States. Biologically, whether an individual will migrate is determined by both genetic and environmental factors. Although migration in many salmonids is known to be highly heritable, the environment plays an overriding role. Previous studies investigating the genetic basis of migration have failed to control for environmental variance and, consequently, the genes and regions of the genome underlying the development of the migratory phenotype remain unknown. We used data from a common garden experiment to identify single nucleotide polymorphisms (SNPs) significantly associated with migration in the F1 generation of a resident-by-resident and a migrant-by-migrant cross. We genotyped 192 F1 individuals on an Affymetrix SNP chip at 57,501 known polymorphic locations throughout the genome. We identified 5002 significant SNPs in the migrant-by-migrant family and 429 significant SNPs in the resident-by-resident family, using an FDR-corrected p-value of 0.01. For the migrant cross, we located significant markers associated with 28 genes whose functions are connected to pathways previously hypothesized to be important in migration. Five genes on three chromosomes were associated with migration in both familial crosses, suggesting that these regions are important in determining life history regardless of familial origin in this population. These data will be further used to develop a model to predict life history in individuals that are yet to make that determination. Understanding the genetic factors involved in the decision to migrate, through the identification of polymorphisms associated with migration, will assist fisheries managers in restoring and maintaining migratory rainbow trout populations.

Tracking hypoxia induced trophic shifts of Atlantic Croaker *Micropoginias undulatus* in the Gulf of Mexico using stable isotopes

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Seasonal hypoxia in the northern Gulf of Mexico (nGoMex) can have sublethal effects on fishes by impairing reproductive capabilities, displacing individuals to suboptimal habitat, and altering trophic interactions. Bottom-water hypoxia may enable predators to continue foraging on stressed benthic prey. Alternatively, vertical displacement from hypoxia may increase predation of pelagic diet items. Atlantic Croaker, (*Micropogonias undulatus*), are demersal omnivorous fish found throughout the nGoMex hypoxic zone with documented tolerance to benthic hypoxia (≤2.0 mg O2/L). Stable isotopes were used to resolve benthic to pelagic trophic shifts given known isotopic endmembers (benthic macroalgae and POM). We used microchemical otolith markers for hypoxia (manganese) and salinity (barium) to identify and cluster fish by exposure history. Recent otolith exposure histories were matched to experimentally validated tissue turnover rates of δ13C and δ15N in Croaker muscle and liver, allowing direct comparisons between exposure type and food web dynamics. Using standard ellipse area (SEA), isotope niche widths revealed variable trophic shifts among individuals across two years. Hypoxia exposed fish had depleted δ13C relative to normoxic fish indicating shifts to pelagic food webs. SEA for hypoxic individuals show expanded isotopic niche width of δ13C and δ15N supporting trophic shifts as a consequence of benthic displacement. Combining otolith microchemistry with stable isotopes enhances our understanding of sub-lethal hypoxia and trophic webs for key fish species in the northern Gulf of Mexico.

Mercury risk to fish in the south-central U.S.: effects of mercury deposition, fish trophic position and fish length

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Methyl mercury (MeHg) is a toxic heavy metal that contaminates all aquatic systems and can pose a risk to fish. Inorganic and elemental mercury (Hg) is emitted into the atmosphere primarily from anthropogenic sources and inorganic Hg is deposited on the landscape. In waterbodies, inorganic Hg can be methylated by bacteria and incorporated in the food chain, becoming concentrated in fish. Previous studies have found that MeHg concentrations in fish are high enough to pose a risk to fish in many parts of North America, but the risk to fish in the south-central U.S. has not been studied. In this study, we examine how Hg deposition, fish trophic position and fish length affect MeHg risk to fish. Mercury deposition sets the potential for MeHg contamination in fish while fish trophic position and length determines the realized MeHg contamination of fish. We used data from the Mercury Deposition Network to estimate average Hg deposition for 14 ecoregions of the south-central U.S. Fish were collected by government agencies from 728 sampling sites in the south-central U.S. We used the National Descriptive Model for Mercury in Fish to estimate average MeHg concentrations of five size categories of Bluegill (Lepomis macrochirus), a low trophic position invertivore, and Largemouth Bass (Micropterus salmoides), a high trophic position piscivore, at each site. We determined the percentage of sites where estimated MeHg concentrations in fish exceeded risk thresholds associated with potential 1) biochemical effects, 2) reproductive and behavioral effects and 3) growth effects. The percentage of sites where fish MeHg concentrations exceeded at least one risk threshold increased with Hg deposition, fish trophic position and fish length, with large-sized Largemouth Bass in ecoregions with high Hg deposition being at the greatest risk. Our results indicate that MeHg contamination in the south-central U.S. could negatively impact Largemouth Bass fisheries.

Associations between the ratio of organic to inorganic nitrogen and growth of the ichthyotoxic golden alga

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Golden alga (*Prymnesium parvum*) is a harmful bloom-producing microalga which in inland ecosystems is typically found in brackish waters. Nitrogen (N) is an essential general nutrient for golden alga growth but the relative importance of its organic (NO) and inorganic (NI) fractions is uncertain. Ammonium (form of NI) at high concentrations can be toxic to golden alga. Also, a study of the Colorado River reported that seasonal declines in golden alga abundance occurred as levels of NI increased. A study of the Pecos River found a similar negative association between golden alga and NI but also reported a positive association with NO. Thus, while field and laboratory observations both point to the suggestion that golden alga growth is negatively associated with NI, the positive association with NO requires further evaluation. The objective of this study is to determine the influence of NO (urea or glycine) and NI (sodium nitrate) on golden alga growth performance under laboratory conditions. Different molar ratios of NO to NI were tested for their effects on exponential growth rate (r, day-1) and maximum cell density (cells ml-1) while keeping total N constant (880 µM) – 0%:100%, 25%:75%, 50%:50%, 75%:25% and 100%:0% (NO%:NI%). Cultures were conducted under standard conditions (initial density, 100 cells ml^{-1}; 5 psu; 22°C; 36 µM total phosphorous). Growth rate was not affected by changes in initial NO:NI ratio. Maximum cell density, however, gradually increased with increasing relative content of NO up to 75%, followed by a decline at 100%. In conclusion, while golden alga can grow in cultures containing exclusively NO or NI, optimal growth occurs when both are present and NO is the predominant fraction. These observations are consistent with field observations and provide context for a better understanding of the association between nutrient stoichiometry and golden alga growth.

Habitat preferences of the Gulf Toadfish *Opsanus beta*

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Recent studies have shown that much is known about their metabolic plasticity, but little is known regarding their natural history. It is likely that toadfish are top predators in the grassbed ecosystem. Since little is known about this aspect of toadfish, I aim to investigate and to better understand the habitat preferences of Gulf toadfish in Redfish Bay, Texas. In a series of three experiments, I tested habitat preference of small, medium, and large toadfish. In the first field experiment, we tested habitat preferences in the field of the larger toadfish in plastic mesocosms (kiddy pools). These mesocosms consisted of a sand/mud mix bottom, 1/3 sand, 1/3 *Halodule*, and 1/3 *Thalassia*. Initial positions were recorded, and after one hour their position was recorded again. The bigger individuals were tagged with a plastic visual elastomer before being released. Smaller toadfish were brought back to the lab. In the lab, tubs were set up and randomly assigned 1/3 *Halodule*, 1/3 *Thalassia*, and sand. Both one hour and 24-hour observations occurred. Similar to the procedure in the field, initial, after one hour, and final position were recorded. The results showed that the toadfish do have a habitat preference of the *Halodule* vegetation. There was no significant difference between their positions at 1 and 24 hours. Knowing more about where and how this particular species interacts with the ecosystem they live in can be beneficial to understanding the habitat requirements of a potentially important keystone predator in grass bed ecosystems.

Size matters: investigating the ecology of low-profile artificial patch reef systems

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The inclusion of low-profile artificial patch reefs in the development of artificial reefing areas may provide crucial transitionary habitat for reef fishes at habitat-limited stages in their ontogeny. The aim of this study was to investigate differences in fish communities across a series of different low-profile artificial patch reef

treatments in order to inform the adaptive design of nearshore reefing zones and pre-fabricated reefs. Eight replicates were deployed at bare areas around the periphery of the nearshore artificial reef complex PS-1047. Each replicate contained four different low-profile patch reef sizes: 0.08 m^2, 0.17 m^2, 0.330 m^2, and 1.32 m^2. Replicates were visually surveyed by SCUBA divers during months of high visibility between July 2016 and August 2017. Surveys revealed the recruitment of 30 fish species from 18 families with age 0-1 *Lutjanus campechanus* contributing to over 65% of all observed individuals. Species richness, total abundance, and diversity values demonstrated exponential increases with increasing patch reef surface area. These results indicate that low-profile patch reef fish communities are mainly comprised of a mixture of benthic and reef-associated invertivores (e.g., *Balistes capriscus*, *Haemulon aurolineatum*, *Pareques umbrosus*, *Orthopristis chrysoptera*, *Diplectrum formosum*) with mesopredators (e.g., *Scorpaena plumieri*, *Opsanus beta*) becoming more prevalent at larger reef treatments. Fish densities were highest at 0.33-m^2 treatments suggesting this as an optimal patch size to maximize recruitment of economically important sport fishes while reducing mesopredator recruitment. Patch reefs can support a diverse assemblage of reef-associated species and may function as a critical transitionary habitat between true nursery grounds and high-profile reef structures.

The influence of freshwater inflow on the estuarine nekton of a tidal river

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The majority of estuaries within the Gulf of Mexico can be characterized as lagoons or semi-enclosed bays. The Brazos River, Texas however discharges directly into the Gulf of Mexico. The State of Texas recently adopted environmental freshwater inflow standards for all estuaries to protect the assemblage of species found within each estuary. Physical and biological indicators that are believed to be sensitive to freshwater inflow were selected for most estuaries to characterize the health of these assemblages. However, information on the estuarine biota of the Brazos estuary is largely lacking due to a paucity of historical data. As a result, the existing Texas state freshwater inflow standard for the tidal portion of the river utilizes the instream flow standard adopted for the most downstream stream gage. This adopted standard is now being evaluated by current studies of water quality and coastal nekton. The primary objective of our study was to characterize the influence of river discharge on spatiotemporal ecology of the nekton of the Brazos River estuary. We conducted multiple surveys of hydrology, physicochemistry and nekton during 2012 to 2017 at multiple sites extending from the mouth of the river to 42 kilometers upstream at the head of tide. We also compared our results with limited historical data. Based on this limited data set we detected distinct lateral and vertical gradients in physicochemistry, nekton assemblages, and trophic composition associated with river discharge. We conclude that changes in freshwater inflow significantly altered the nekton community and trophic linkages. Nekton assemblages were altered due to dynamic changes in vertical and lateral gradients in salinity and dissolved oxygen after adjusting for seasonal patterns.

Instream habitat use of invasive armored catfishes in the Upper San Marcos River

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The state of Texas is host to eight invasive species of fishes; including two species of non-native South American armored catfishes: the vermiculated sailfin catfish (*Pterygoplichthys disjunctivus*) and the sucker mouth catfish (*Hypostomus plecostomus*). These non-native grazers are known to have significant impacts on the ecosystems they invade, on both trophic levels and general ecosystem services including vegetation distribution, riverbank stability and erosion rates. These armored catfishes have established populations in the spring-fed San Marcos River watershed in San Marcos, Texas. Through nine months of intensive surveys, we have observed over

120 armored catfishes and categorized the habitats these animals were associated with. Analyses were conducted to categorize which environmental factors are most influential in affecting armored catfish density and distribution in the upper San Marcos River.

GoMexSI: sharing species interaction data with fisheries modelers using platforms such as Github, Wordpress, GloBI, FishBase, and SeaLifeBase

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The Gulf of Mexico Species Interactions (GoMexSI) database, an application of GloBI, endeavors to assemble, extract, upload, and serve all recorded Gulf of Mexico species interaction data. This is dependent on the interoperability of biodiversity databases, e.g., EOL (Encyclopedia of Life), WoRMS (World Register of Marine Species), in resolving invalid species names. GoMexSI takes advantage of the GloBI infrastructure to integrate, link, and disseminate these data using various formats and methods. Data are shared through GoMexSI's webpage. A key goal of the GoMexSI project is to provide standards for species interaction data where none existed previously, e.g., basis of prey identification, and diet analysis methods, or improve controlled vocabularies that currently exist, e.g. for life history stages, prey parts, and locations. Species-specific interaction data are also available for the Gulf from biodiversity information systems, e.g. such as FishBase and SeaLifeBase. Ecosystem simulation models are key tools for evaluating the impacts of human actions on marine ecosystem services and functions. Species-specific data are indispensable building blocks of ecosystem models. In response to data needs for an ecosystem simulation model for the Gulf, a query wizard ("bridge") was created to import species interaction data from GoMexSI to FishBase and SeaLifeBase, serving available data in one platform. This improves the estimation of parameter proxies provided by these databases via a similar bridge for use in, e.g., an OSMOSE ecosystem simulation model for the Gulf. Addition of host/parasite, commensal, mutualistic interactions, and stable isotope data are planned. We have advised the US Marine Mammal Commission in their effort to create a diet database for marine mammals, and we are currently assisting Centro Interdisciplinario de Ciencias Marinas (CICIMAR) in La Paz Mexico to construct a species interaction database for the Gulf of California.

Chemical species of nitrogen source drives changes in microcystin and pigment production in *Microcystis aeruginosa*

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The cyanobacterium *Microcystis aeruginosa* generates the potent hepatotoxin microcystin and causes toxic blooms in aquatic ecosystems worldwide. These blooms are commonly found in conjunction with high fish mortality (Eriksson et al. 1986; Lindholm, 1991), and microcystin has been proven toxic to a number of fish species, including Rainbow Trout *Oncorhynchus mykiss* (Tencalla et al. 1994) and Channel Catfish *Ictalurus punctatus* (Zimba et al. 2001). Microcystin production in Microcystis aeruginosa is known to be modulated by nitrogen availability, but the effect that the chemical species of the nitrogen source on toxin production is not well-characterized. In this study, *Microcystis aeruginosa* strain LE05 was grown in culture in BG11 medium with urea, nitrate, or ammonium as the nitrogen source. Growth phase was monitored by cell counts. Microcystin-LR and microcystin-RR concentrations were analyzed during each growth phase by HPLC-MS/MS, and pigment (beta

carotene and chlorophyll a) concentrations were measured using HPLC with diode array detection. It was found that that the nitrogen treatments showed significant differences in growth rate and in microcystin, beta carotene, and chlorophyll a concentrations. In particular, high microcystin-LR and RR concentrations during the lag phase and the senescent phase, as well as prolonged growth, were exhibited by the ammonium treatment cultures, suggesting that increased focus on minimizing ammonium levels in aquatic environments may improve control and prevention measures for blooms of *Microcystis aeruginosa.*

Testing the novelty hypothesis as an explanation of heterospecific mating in livebearing fishes

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In nature, males should prefer to mate with females of the same species to avoid hybridization. However, recent studies have shown that levels of male permissiveness (a male's likelihood of mating with a different species) may be higher than expected. The Novelty Hypothesis has been put forth as a possible explanation for such increases and permissiveness, whereby males are more likely to notice, and subsequently mate with, a female that they perceive as physically different resulting in "mating mistakes" by males. We tested this hypothesis to explain male permissiveness in two species of mosquitofish from Central Texas: Western Mosquitofish (*Gambusia affinis*) and Largespring Gambusia (*Gambusia geiseri*). In order to examine whether the novelty of a female can provide a mechanism for permissiveness, males of both species were acclimated for approximately three to six weeks within three groups: (1) conspecific, (2) heterospecific or (3) both conspecific and heterospecific females. Males were placed in a 10-gallon tank in order to examine both association time and copulation attempts towards a conspecific and heterospecific stimulus female. Based upon the mean association time differences between the six treatments, males acclimated with their conspecific females were found to desire heterospecific females more at very similar rates across species. After measuring the mean differences in gonopodial displays towards the females, males were also shown to display towards heterospecific females significantly more after being acclimated with their own species rather than both species or the novel species. These factors indicate that mating permissiveness was evident across both species as found in previous studies, however, they also show that mating permissiveness was significantly higher in males not exposed to the other species, suggesting that the Novelty Hypothesis was supported.

Determining the host fish of a state-listed freshwater mussel species, *Pleurobema riddellii*

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Freshwater unionid mussels are one of the most imperiled groups of invertebrates. Primary contributors to their decline include damning, sedimentation, enviro-toxins, and habitat destruction and fragmentation. There are approximately 300 species in North America with 53 of them occurring in Texas. Six of the Texas Unionids are state-listed and being petitioned for federal protection under the Endangered Species Act of 1973. The Louisiana Pigtoe mussel, *Pleurobema riddellii*, is one petitioned species which historically occurs as far west as the San Jacinto and Trinity rivers, eastward to the Neches, Sabine and Red rivers. *P. riddellii* abundance has decreased in recent years, and an understanding of their life-history and reproductive characteristics is imperative to federal protection status. During the larval stage of freshwater mussels' life cycle, juveniles are obligate parasites of fish. This study sought to determine the host fish for *P. riddellii* by collecting wild infected fish from the Neches river, and observing them in the laboratory. Juveniles that naturally fell from the fish were preserved, cataloged, and analyzed genetically. This portion of the research indicated the host-fish species in addition to providing morphological characterization of the juveniles, and spawning times of adult *P. riddellii*. Additionally, this study used gonadal fluid samples of wild *P. riddellii* throughout a one-year span to provide insight into population structure, reproductive size, fecundity potential, and spawning.

Habitat associations of young-of-the-year 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 young-of-the-year (YOY) Rio Grande Blue Sucker, *Cycleptus sp. cf. elongatus*, and various abiotic variables in the Trans-Pecos region of the Rio Grande in Texas in April, May, and June of 2016 and 2017 using open N-mixture modeling. Additionally, we examined differences in Blue Sucker body size (total length) among the three mesohabitat types (pool, riffle, and run) using analysis of variance (ANOVA). The preliminary results of open N-mixture modeling suggested that as pool area increased, the initial abundance and recruitment of Rio Grande Blue Sucker increased. Our results further suggested that apparent survival probability was not correlated with habitat. The results of the ANOVA indicated that the total length of YOY Rio Grande Blue Sucker significantly differed among the three mesohabitat types. The total length of YOY Rio Grande Blue Sucker in pool habitats was significantly lower than other mesohabitat types. These results suggest that Rio Grande Blue Sucker could change their habitats from slow moving water to fast moving water during their early life stage.

Mercury body burden and maternal transfer, egg quality and fecundity of Alligator Gar in the lower Trinity River: Are bigger fish always better for recruitment?

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There are many factors that influence reproductive potential and success in long-lived, periodic strategists like the Alligator Gar (*Atractosteus spatula*). These can include population size structure, modification of landscapes that alter access to suitable spawning areas and exposure to contaminants that can be maternally transferred, thus affecting the survival of eggs and larvae. Generally, for long-lived species, both egg quality and quantity increase with increases in maternal age and size, resulting in greater recruitment with larger, older females compared to smaller, younger females. When considering management strategies, typically the largest fish are protected because of their higher reproductive success. However, if there is a higher body burden of contaminants in these individuals that affects the survival of larvae, we may need to consider trade-offs between reproductive capacity and contaminant loading. We measured the concentration of total mercury in muscle and liver samples from approximately 40 adult Alligator Gar collected from the lower Trinity River, Texas, ranging from 1,241 to 2,192 mm total length, as well as egg total mercury and lipid concentration, and estimated fecundity from approximately 40 females ranging from 1,450 to 2,275 mm total length. For both males and females, mercury concentration in muscle and liver increased with body size. For females, fecundity was positively correlated with body size, and egg mercury concentration increased with body size and muscle mercury concentration. Egg lipid concentration was not significantly correlated with body size or fecundity. These results highlight the need for further research on the effects of contaminant loading for recruitment of Alligator Gar in the lower Trinity River and potential re-evaluation of conservation and management strategies.

Thermal tolerance of *Popenaias popeii* (Texas hornshell) from the Rio Grande, Texas and implications for water management in Texas

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There is increasing evidence that many unionid mussel species are already living close to or beyond their upper thermal limits, and changes in water temperature are leading to population declines, shifts in mussel assemblages to thermally tolerant species, and lower rates of mussel-contributed ecosystem services.

Unfortunately, quantitative information on lethal temperatures for freshwater mussels is limited, which includes *Popenaias popeii* (Texas hornshell), a species currently proposed for listing under the Endangered Species Act. This study will be the first of its kind to examine thermal tolerances for subpopulations of Texas hornshell throughout its geographic range in the United States. Moreover, because there have been so few studies examining the effects of elevated water temperature on mussels, there exist opportunities to refine laboratory methods and explore additional biological endpoints. This information can be used by USFWS to determine whether the decline of Texas hornshell is related to elevated water temperatures and to forecast how this species may respond to changing climate conditions, which is expected to be severe for the Southwest U.S. and the Rio Grande drainage.

The importance of low-salinity habitats to Red Drum

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The Nueces and Mission-Aransas Estuaries provide vital habitat for larval, juvenile and sub-adult red drum (*Sciaenops ocellatus*) and receive freshwater inflow from several tidal creeks and rivers. We seek to address the importance of low salinity habitat to red drum by characterizing the proportion of our study population that migrate into low salinity habitats, and quantify when, how often, and how long these migrations occur using a retrospective approach based on otolith chemistry analysis. We also hypothesize that red drum are engaging in trophic interactions while in low salinity habitats, and will analyze muscle and liver tissue using stable isotope analysis. This work will provide a more comprehensive habitat use assessment and understanding of life history diversity within this red drum population, with important implications for Essential Fish Habitat designation and recreational fisheries management.

Home range of Red Snapper *Lutjanus campechanus* over a large artifical reef

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Red Snapper (*Lutjanus campechanus*) is a focal species for many artificial reef efforts in the Gulf of Mexico. To elucidate Red Snapper use of the man-made habitat, their fine-scale movement patterns need to be examined further. Much effort until now has focused on examining movement patterns of Red Snapper at isolated reef structures, yet these fish may behave differently on a reef that has material spread throughout a large area. To address this, fifteen Red Snapper were tagged, and their movements characterized over three months at a large artificial reef (PS-1047, 1 km2) that contains over 4,800 structures deployed randomly around the area. An array of nine data loggers was arranged on the reef to triangulate locations of individuals. Depth and ID were transmitted every 15s and data from each fish were averaged every 20 min. Kernel densities (KDE) were calculated at 50% and 95% to define core area and home range use, respectively. Surface water temperature and total length accounted for some of the variability, and there were marked decreases in KDE observed after a drastic drop (4°C) in water temperature, as expected for poikilothermic fish. Overall, our analyses showed two key areas at PS-1047 (50% KDE), and each area was composed of a separate group of fish without overlap. For fish at PS-1047, we detected home range and core area values that were more than four times larger than those calculated for Red Snapper in other studies.

Molecular phylogenetics reveals the presence of cryptic diversity within an endangered freshwater mussel species, *Lampsilis bracteata* (Gould, 1855), in central Texas rivers

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Species identification of freshwater mussels (Bivalvia: Unionida) is often challenging due to morphological convergence and phenotypic plasticity. Nevertheless, external shell morphology is a primary characteristic to delineate species. Recent efforts on molecular systematics revealed the presence of cryptic diversity within the currently recognized taxa. *Lampsilis bracteata* (Texas fatmucket), whose shell morphologies resemble to its common congener *Lampsilis hydiana* (Louisiana fatmucket), is endemic to the Colorado and Guadalupe rivers of central Texas and a candidate for listing under the U.S. Endangered Species Act due to drastic decline in number of populations. The phylogenetic relationship of *L. bracteata* with its congeners has not yet examined and it is necessary to elucidate the taxonomic status before the listing decision is finalized. We collected 89 individuals of *L. bracteata* and 116 individuals of *L. hydiana* across their distributional ranges and conducted molecular phylogenetic and species delineation analyses based on a mitochondrial DNA gene. Phylogenetic analyses showed that both species comprised of putative cryptic species: *Lampsilis cf. bracteata* from the upper Guadalupe River and *Lampsilis cf. hydiana* from a tributary of the Red River appear to be currently unrecognized species, respectively. The distribution of *L. bracteata* is likely restricted to tributaries of the Colorado River; populations of *L. hydiana* were panmictic across its range. Genetic diversity of *L. bracteata* was much smaller than one of *L. hydiana*. Additional microsatellite markers will be used to examine population genetic structure of *L. bracteata* and *L. hydiana*. Given the reduction of the distributional range and small genetic diversity in mitochondrial DNA, the results of this study will be of great value to agencies charged with conservation and listing decision of *L. bracteata*.

Fish assemblage convergence along stream environmental gradients: an intercontinental analysis

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Convergence of functional traits across evolutionary and biogeographically distinct assemblages suggests key, repeated mechanisms that play a role in structuring assemblages along environmental gradients. However, few studies at the assemblage level have involved analyzing quantitative data collected using standardized methods at both regional and microhabitat scales to study possible convergence. In this study, the hypothesis that patterns of trait–habitat relationships converge across zoogeographic regions as a result of universal environmental filters acting on functional traits four distinct zoogeographical regions was tested at multiple scales and zoogeographic regions using various functional traits reflecting aspects of habitat use, trophic position, defense ability, and life history. Convergence of habitat groups and along environmental gradients, such as depth, substrate, and flow, were analyzed using various multivariate techniques. After controlling for phylogenetic relationships, significant trait convergence was found among habitat groupings across all four regions. However, some habitat groups show no convergence. In addition, there was no significant difference between the slopes when testing the correlation among some morphological traits and environmental gradients for all regions, suggesting similar trait-environment relationships across all zoogeographic regions. Fourth-corner analysis also revealed similar trait-habitat relationships across all zoogeographic regions. Together, these results imply common environmental filters acting to influence fish assemblages.

Assessing the status of the critically endangered *Popenaias popeii* (Lea, 1857) (Family Unionidae) and mussel diversity in Select Mexican Gulf Coast Drainages

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Freshwater mussels (Bivalvia: Unionida) are some of the most imperiled organisms in the world and their conservation relies heavily on the systematics and distribution of remaining populations. Despite the importance of both, knowledge regarding species boundaries and phylogenetic relationships is limited. The Río Pánuco basin, in east-central México (Gulf of México drainage), exemplifies this issue as it contains 10 mussel species native to the area. Included is *Popenaias popeii* (Texas hornshell), a species found in this region and the Southwestern United States that was recently proposed as "endangered" by USFWS. However, the taxonomic validity of *P. popeii* in the Pánuco basin and its phylogenetic relationship with other extant populations is unknown, which may confound listing efforts in the United States. Thus, the objectives of this study are to (1) determine if *P. popeii* from the Río Pánuco basin is valid; (2) assess whether this population contains cryptic diversity; and (3) examine phylogenetic relationships between the population in the Río Pánuco basin and those that occur in the Rio Grande basin. To address these objectives, we plan to use DNA sequence data from museum specimens and field samples in conjunction with standard species delimitation and phylogenetic methods. Preliminary analyses based on museum specimens revealed high genetic divergence (12% nucleotide difference) between *P. popeii* of the Rio Grande and Río Valles populations, which suggests that the Mexican population may not be *P. popeii*. Field surveys from the Río Pánuco basin in December 2017 resulted in additional DNA samples of *P. popeii* that will be sequenced to corroborate our preliminary results. Upon completion of this study, the information provided will be critical to accurately determining the conservation status and recovery priorities of not only *P. popeii* but also the mussel fauna in the Río Pánuco basin.

Assessing the salinity toxicity of *Popenaias popeii* (Texas Hornshell) from the Rio Grande, Texas

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Popenaias popeii, Texas hornshell, is endemic to the Rio Grande drainage, in Texas and New Mexico, and to Mexico in select coastal streams. Currently, only four populations persist in the United States and its status within Mexico remains unknown. In 2016, USFWS proposed Texas hornshell for listing as Endangered under the ESA. A number of factors have been implicated in the decline of this species including degraded water quality due to changes in land use, river impoundment, and ground water pumping, but none of these stressors have been explicitly tested. In particular, salinization of the Rio Grande and its tributaries has long been a concern due to the underlying geology, the effects of which have been exacerbated by decreased freshwater input caused by agricultural practices, natural gas extraction, and river impoundments. In general, unionid mussels are considered sensitive to even low levels of salinity due to their physiology so increased salinization could be a major contributing factor to the decline of Texas hornshell in the Rio Grande. The objective of this study was to determine the effects of various concentrations of salinity on survival of adult mussels of Texas hornshell from two of the four extant populations: Lower Canyons and Laredo. We performed acute and chronic toxicity tests at various salinity concentrations for up to 10 days. We found that mussels exposed to concentrations above 4 ppt showed significant mortality, while concentrations at or below this level showed little to no mortality. Our results demonstrate that Texas hornshell is tolerant of salinization compared to other unionid mussel species. However, large segments of the Pecos and parts of the Rio Grande are near or exceed 4 ppt, which indicates that these reaches are becoming unsuitable and populations within them at risk.

POSTER SESSION ABSTRACTS

Survey for the oyster parasites *Bonamia* and MSX in Texas bays

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Texas Parks and Wildlife Department restricts movement of American oysters (*Crassostrea virginica*) from one Texas bay system to another because of potential disease transfer and genetic differences in natural oyster stocks. Oyster diseases, such as Bonamiosis, which was found serendipitously in 2007 in Florida waters, and MSX have not been characterized in Texas bays. Therefore, it is prudent to periodically examine *Crassostrea virginica* and other related species (e.g., *Ostrea equestris* and *Isognomon* sp.) from different Texas bays for the presence of the causative agents of these diseases, i.e., Bonamia and *Haplosporidium nelsoni* (MSX). *Perkinsus marinus*, the causative agent of Dermo, is endemic in Texas and was also measured. One-hundred-fifty American oysters were collected during October to December 2016 from Copano Bay, San Antonio Bay, Matagorda Bay, Galveston Bay, and Sabine Lake. PCR analysis of tissues found no *Bonamia* in these oysters, but an average prevalence of 4.67% for MSX and 14.67% for Dermo. In addition, 89 historical American oyster tissue samples from 2010 and 2011 were assessed by PCR. Again, no *Bonamia* was found, but there was a 6.74% MSX prevalence and a 28.09% Dermo prevalence. MSX is endemic to the Northeastern U.S. seaboard and up until this point, the Gulf of Mexico has been considered free of this pathogen. Further research to confirm the MSX findings is necessary and will be completed using histological examination of oyster tissue and Sanger sequencing of isolated DNA.

Economics and characteristics of large (>200 participants) fishing tournaments at Lake Fork Reservoir

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An economic valuation of the recreational sport fishery of Lake Fork was completed in 2015 and found that anglers spent $18.8 million dollars annually on fishing trips to the reservoir. Some tournament anglers were encountered and included in the study; however, economic data from large (>200 participants), annual fishing tournaments was excluded to avoid biases associated with the random study design. Since first estimated in 2006, tournament effort at Lake Fork has generally increased to comprise 45% of all fishing activity in the reservoir and is believed to account for a substantial portion of the overall economic value of the Lake Fork sport fishery. To estimate the economic impact of these competitive angling events, we surveyed anglers from seven of the largest annual fishing tournaments between July 2015 and June 2016. A total of 8,117 anglers participated in the seven events, and resulted in $6.5 million dollars in direct expenditures, and an overall economic value of $7.2 million dollars. Understanding the economics of tournaments is important to fisheries managers, businesses, and local economic development groups engaging in decisions which may impact tournament angling. In addition, our study highlights the importance of accessing the economic value of fishing tournaments as discrete events, separate from non-competitive angling.

Potential influence of exchanges between the lower Guadalupe River and oxbow lakes on food web dynamics

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This project examined relationships between hydrology, lateral connectivity, and food-web dynamics in the lower Guadalupe River and oxbow lakes within its floodplain. Ratios of stable isotopes of carbon and nitrogen were analyzed to infer the potential for alternative basal production sources to support fish and mussel biomass in oxbow lakes and sites in the river channel under contrasting flow conditions. Of particular interest was evidence that fishes and mussels in the river channel had assimilated material from basal sources from oxbows, and that fishes and mussels in oxbows had assimilated material originating from the river channel. Fishes and mussels were collected from two oxbow lakes and adjacent sites in the river channel during six surveys conducted between March 2016 and April 2017. Samples of plant leaves, seston, and periphyton also were collected for stable isotope analysis. The discharge level associated with establishment of lateral connectivity was estimated for each oxbow. Turbidity was high throughout the study period, which was a relatively wet year, and aquatic primary production apparently was low. Stable isotope analysis indicated that terrestrial vegetation was the most important basal production source supporting biomass of most fishes and mussels in both oxbows and the river channel during every survey. Isospace polygons indicated that periphyton and seston could have contributed only minor proportions to consumer biomass at most sites during most periods. Isotopic evidence of cross-habitat exchange of basal sources or consumers was found for 7% of 316 specimens from oxbows and 11% of 231 specimens from the river channel. Most of the specimens that were analyzed had isotopic signatures that were either 1) consistent with assimilation of material from the habitat from which they were captured, or 2) inconclusive with regard to cross-habitat exchanges.

Using qualitative site characteristics data in marine recreational fishing models: a new site aggregation approach

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In the marine recreational fishing literature, especially studies using Marine Recreational Information Program (MRIP) data, information on qualitative site characteristics is largely limited as it is often overlooked or too expensive to obtain. This is unfortunate because characteristics such as the proximity to bait or tackle shops, the number of boat ramps, or ample parking space are important components in an angler's site selection process. Most recreation demand models have incorporated only a small number of site characteristics in their empirical estimation, usually limited to the travel distance to the site and some form of expected catch as the only key factors explaining angler site choice. In this paper we use a relatively new National Marine Fisheries Service data set that allows us to incorporate a variety of site characteristics not previously analyzed. To our knowledge, studies using MRIP data have always aggregated sites by county, but it is apparent that further research is needed to understand how aggregation may bias parameter estimates. A methodological contribution is made by aggregating less significant sites in a new way, while an empirical contribution is made by incorporating new information on more relevant sites in the angler's choice set in several Gulf States.

Evaluating the effects of different land uses on habitat and fish assemblages in amazon rainforest streams

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The Amazon Rainforest contains a large fraction of the world's biodiversity, much of it still undescribed, but it is gradually being lost as native forests are being converted to other land uses. We assessed different agricultural and logging activities in the Amazon to determine which environmental variables of streams are being most affected, and how these modifications are affecting the structure of fish assemblages. The study was conducted in a region originally covered by rainforest within the Belém Endemism Area in Brazil. Variables associated with land cover, stream habitat, and local fish assemblages were measured at 71 first- to third order streams within the Acará-Capim Basin. Twenty-one of these streams were located within areas of forest, 15 streams were in areas where reduced-impact logging is practiced, eight streams were in areas with conventional logging, 15 streams were in areas dominated by oil palm plantations, and 12 stream were in areas dominated by pasture. Land use class were quantified in 150-m riparian buffers, and 23 stream habitat variables were measured. Fish assemblages were sampled using 75-cm diameter sieve with 2-mm mesh. Data were analyzed using multivariate methods. Highest percentages of forest were in areas defined as Forest and Reduced-impact Logging. Four variables associated with the riparian zone and substrate were significantly correlated with land use. A total of 27,733 fish specimens representing 91 species was collected. Partial RDA revealed that habitat variables explained 11% of the variation in fish assemblage structure. Land uses associated with reduced forest cover in the riparian zone (e.g., oil palm, pasture) affected stream habitat by reducing instream and bank cover and increasing fine sediment cover, both of which reduce habitat quality for fishes.

The Kisatchie Painted Crayfish *Orconectes maletae* status in Louisiana

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The Kisatchie Painted Crayfish (*Orconectes maletae*) is an endemic species located within Louisiana and Texas. The species is listed as data deficient by the International Union for the Conservation of Nature. A petition for listing this species under the Endangered Species Act was filed in 2010. Due to the lack of data, the species has yet to be listed. After sampling four historical sites in Louisiana, the species was rare which indicates the increasing absence of the species in these sites. The Texas portion was found to be absent in 60% of its historical range. The goals of this experiment are as follows: 1) determine occupancy of this species in historical localities, 2) create a MAXENT ecological niche model for the Louisiana population and compare to the Texas population, 3) determine population dynamic estimates (reproduction information, sex ratio, and abundance) by performing field sampling, 4) perform mark and recapture using Visible Implant Elastomer Tags, 5) perform Restriction Site

Associated DNA Sequencing to investigate population genetic variation across the species range and assemble an entire species genome. These data in their entirety will allow for the Unites States Fish and Wildlife Service to complete the species assessment. This will allow us to determine the causes of the apparent population decline observed across its range.

Stream biomonitoring at Camp Swift, Bastrop Co., Texas

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Camp Swift, Bastrop Co., Texas is a Texas Army National Guard Training Site, which is located within the central Texas hill country. Camp Swift is characterized by a remnant loblolly pine forest with intersperse grasslands with deep sands. The Texas Army National Guard conducts infrequent training exercises at Camp Swift, which provides a small amount of disturbance to the landscape. Water quality testing was initiated at Camp Swift to determine the potential impact military training has on aquatic communities. Fish community surveys, compiled as an Index of Biotic Integrity (IBI) and physical habitat assessments, compiled as a Habitat Quality Index (HQI), are used to better understand the health of river ecosystems. Samples of fish were taken from 5 streams at Camp Swift on September 23, 2017. From McLaughlin Creek, a total of 16 fish were obtained from 3 species. From four sites on Big Sandy Creek, 240 fish (19 species), 63 fish (14 species), 50 fish (9 species), and 163 fish (12 species) were collected. IBI and HQI scores will be calculated to obtain water quality scores to assess the health of each site sampled.

Physiological responses of the state-threatened Texas Pigtoe to environmental stress

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Laboratory experiments were designed to evaluate physiological responses of the Texas Pigtoe (*Fusconaia askewi*) to environmental stressors of elevated temperature, nitrogen, and siltation. Mussels were exposed to treatments of 20, 25, 30, and 35 degrees Celsius for 21 days to assess thermal tolerance. Twenty-one animals were used per treatment with one third of the animals removed every 7 days for analysis. The effect of nitrogen levels was evaluated by exposing 12 animals per treatment to six different concentrations of ammonia over a 96-hour period. Siltation stress was measured by burying 20 animals each at 0.25 and 0.5-meter depths. Mussels were tagged with filament line to monitor movement and 5 animals were removed at 24, 48, 72, and 96 hours for analysis. In all treatments, mortality and alterations in tissue glycogen levels, as determined with spectrophotometric analysis, were used to quantify physiological response to stress. Mussels sessile behavior and filter feeding ecology suggests an increase in mortality and sub-lethal behaviors such as gaping, and a decrease in tissue glycogen levels in response to increased environmental stressors.

Prevalence, mean intensity, and abundance of *Rhabdocona denudata* in native fish species of Zaringol Stream, Golestan Province – Iran

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The seasonal dynamic of *Rhabdocona denudata* in fish hosts, *Alburnoides eichwaldii*, *Paracobitis malapterura,* and *Neogobius fluviatilis* was studied in Zaringol Stream, Iran. A total number of 120 fish specimens were caught seasonally by electrofishing (10A, 200-300V) from December 2009 to September 2010. Fish age was determined using otolith and parasitology parameters were measured including prevalence, intensity, and abundance. The total number of 233 *R. denudata* were separated from the gastrointestinal tract of 40 infected fish including *A. eichwaldii* (n=10), *P. malapterura* (n=10), and *N. fluviatilis* (n=20). Results showed that the maximum prevalence (50%), mean intensity (9.36%), and abundance (5.79) were observed in *N. fluviatilis*. No significant difference was detected between infected male and female ($P>0.05$). The prevalence increased with age which was significantly in *N. fluviatilis* ($P<0.05$). The *A. eichwaldii*, showed the least susceptibility. Seasonal variation of parasitological indices showed the maximum prevalence (42.9-66.7%), mean intensity (2±0.98-7.83±5.91), and mean abundance (0.93±1.27-5.22±6.1) were calculated in summer which was significantly in *P. malapterura* ($P<0.05$).

Functional diversity of stream fish assemblages in the eastern Amazon: oil palm plantations acting as an environmental filter

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In the Amazon, oil palm (*Elaeis guineensis*) plantations have been expanding in recent years and posing a potential threat to biodiversity. The aim of our research project was to evaluate the relationship of oil palm plantations and other land use categories on the functional diversity of stream fish assemblages in the Eastern Amazon. We hypothesized that oil palm plantations affect habitat in stream channels and margins, even when native vegetation has been maintained in riparian areas. In this manner, oil palm plantations could act as an environmental filter that selects for a limited set of fish functional traits among those observed within the regional fish fauna. Thirty-nine streams were surveyed in the Eastern Amazon, and values for 27 local instream and riparian environmental variables were recorded for each. Local watersheds were categorized as oil palm plantation, pasture, forest or bare soil. Surveys yielded 13,868 fish specimens representing 56 species. Morphological measurements and ecological information were used to create a dataset of functional traits of each species. Associations between watershed, habitat, and fish assemblage variables were analyzed using RLQ analysis. The presence of oil palm plantations in watersheds was strongly associated with stream habitat characteristics and taxonomic composition of fish assemblages (RLQ model 2, $p = 0.006$); however, functional diversity was not significantly affected (RLQ model 4, $p = 0.144$). Habitat variables with strongest associations with assemblage taxonomic structure were: 1) substrate embeddedness, 2) instream root cover, and 3) streambank incision height. Conversely, watershed landcover had weak association with taxonomic and functional compositions of stream fish assemblages. Oil palm plantations appear to affect stream habitat and spatial distributions of some fish species; however, its affect on fish functional diversity appears to be subtle when there is sufficient native riparian vegetation.

Gold at what cost? Mercury levels in aquatic food webs in Mazaruni River, Guyana

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Mercury (Hg) typically enters riverine food webs as a result of human activities including gold mining, deforestation, and erosion from agriculture. In tropical floodplain rivers changes in flood levels affect the dynamics of fish feeding and movement in floodplains. During high floods, the exposure of riverine fish species to Hg may increase due to connectivity of floodplain lagoons to river channels. In Guyana, South America, many floodplain rivers are affected by gold mining. Mercury released into the environment during gold amalgamation, bioaccumulates in organisms and moves up the food chain to eventually affect people that rely on fish as a major food source. We measured total mercury (THg) concentrations in fishes in the Middle- Lower Mazaruni River and used stable isotopes analysis (δ13C and δ15N) to estimate trophic position of fishes. A positive relationship was observed between THg and δ15N (indicative of vertical trophic position) of fish species ranging from omnivores to piscivores. Trophic magnification greater than 1 mg/kg was recorded, indicating strong potential for bioaccumulation in the aquatic food web. Several fishes important in local human diets had THg levels higher than the threshold proposed by the World Health Organization (0.5 mg/kg), and Amerindian communities along the Mazaruni River are exposed to dangerous levels of mercury through consumption of fish as well as piscivorous wildlife. Our findings suggest that disruption of ecosystems caused by gold mining also influences essential fish habitat and community structure. The Mazaruni River has high freshwater fish diversity and endemism, including unique evolutionary lineages. The recent increase in gold mining operations in the Mazaruni River system, therefore, poses significant risk to both human health and globally unique biodiversity.

Is trophic level related to body size in Texas fishes?

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Predators are typically larger than their prey, and consequently, trophic level (TL) should increase with body size (size). Theoretical studies have used this general relationship to predict, with some success, food web structure and dynamics in mesocosms and simple communities. However, some have argued that TL-size relationship may not exist for all kinds of communities or evolutionary lineages. Moreover, influential traits, such as gut length, are usually ignored. We explored the relationship between TL and size in Texas fishes, and how this relationship may change according to other traits. Two hypotheses were tested: 1) size is directly related to TL; 2) the relation between size and TL is mediated by gut length. Data were compiled for 19 species with at least 100 specimens analyzed in previous diet studies. Gut length was measured and standardized by size (SL). A mixed model was carried out using TL as response variable, size as the main factor, and species as a random factor. The random effect slopes (TL-size slope for each species) were then related to the relative gut length of each species using a generalized additive model (GAM). Our results indicate that the relationship between size and TL depend on species identity. *Micropterus salmoides*, *Pomoxis annularis* and *Menidia beryllina* had consistent positive relationships*, Lagodon rhomboides* had a negative relationship, and the rest of the species had no clear relationship. The GAM model showed a negative polynomial relationship between the random slopes and gut length suggesting that carnivorous (short gut) tend to occupy higher TL as they grow, whereas the TL of detritivorous/herbivorous (long gut) is constant or declines during growth. Although based on few species, our findings suggest that TL may not be correlated with size among Texas fishes, and this poses a challenge for certain food web models used for fisheries management.

Friend, foe, or frenemy? Testing the dear enemy hypothesis in a sex role reversed Pipefish, *Sygnathus scovelli*

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One mechanism organisms have evolved to reduce the costs of prolonged aggression is the Dear Enemy Hypothesis, stating that aggressive behaviors will decrease over time between neighboring individuals of a given species and increase when a novel individual is introduced. Most studies to date on the Dear Enemy Hypothesis focus on territorial males. Here, we tested its applicability in a sex role reversed female, the gulf pipefish *Syngnathis scovelli*. We predicted these territorial females would display fewer aggressive behaviors to neighbors over time, and more aggressive behaviors toward novel females. We also predicted that aggressive behaviors of dominant females would decrease toward subordinate females after a dominance hierarchy had been established. To test this, we collected mature female *S. scovelli* from Port Aransas, TX. We used repeated measures ANOVA to observe behaviors across 3 days, measuring aggression and activity of both females on both days, allowing time to establish dominance. Behaviors across time was the repeated measure, and novel vs. familiar females the treatment. On day 3, either a novel or familiar female was introduced to the dominant female. To date, data show that dominance is not clearly established across two days. However, for some behaviors, dominant females performed more aggression toward the novel female as predicted. This study sheds light on the general applicability of an established ecological theory in a novel system (sex role reversal) whereby females are territorial and aggressive, rather than males.

American Eel: utilizing modern techniques to assess conservation status in Texas

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The American Eel, *Anguilla rostrata*, is a remarkable fish that makes epic migrations throughout its complex life history, which begins in the Sargasso Sea, goes far inland in rivers of North and Central America and the Caribbean, then back to the Sargasso. Populations in U.S. and Canadian drainages have been well-studied for years, with events such as the arrival of early life stage “glass” and “elver” eels coming into coastal basins well known and predictable. However, relatively little is known about those that make their way into Gulf of Mexico and Caribbean drainages. Additionally, there is debate as to the species’ conservation status, with listings among agencies ranging from ‘Threatened’ or ‘Endangered’ to no listing at all. Especially in Texas, there is a critical need for data to many unanswered questions about the species’ historical and current distribution, genetics, parasites, age structure, habitat utilization, etc. to help guide establishment of effective management and conservation strategies. To help answer some of these questions, we are conducting basic sampling and genetic and life history studies, organizing a state-wide citizen-science effort to help collect specimens of all ages and sizes, and reaching out to fish enthusiasts (fisherman and scientists alike) to help better understand these astounding fishes.

Artisanal fisheries in Tela Bay, Honduras

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Fishing is very important for fishermen who rely entirely or heavily on daily catches for their living, and it is critically important for the subsistence of artisanal fishermen in Tela Bay, Honduras. Tela Bay is located in the Caribbean of Honduras, and it is a part of the Mesoamerican Barrier Reef, which makes the area very important for conservation. Nevertheless, there is a large amount of fishing activities occurring, and this may be affecting fish in the area. A total of 194 landing surveys of the daily catches of four artisanal fishing communities were conducted from 2015 to 2017. During every survey, morphometric data of fish, CPUE, fishing areas, and fishing gear types were recorded. Five types of fishing gear were observed: gillnets of 2" and 3" mesh sizes, hook and line, fish traps, beach seine, and harpoon, with the gillnets and hook and line being the most predominant. Lane Snapper (*Lutjanus synagris*) was the most important fish with gillnet and hook and line, representing 40% of all the catches. Their size ranged from 13 cm to 52 cm in fork length. The data collected during landing surveys from artisanal fisheries are very important to help understanding the impacts that a certain fishing gear type might have on fish populations because these fisheries are considered to be "data poor fisheries". More research on gear selectivity and modelling of data poor fisheries are needed.

Recovery of Galveston Bay saltmarsh nekton communities after Hurricane Harvey

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Coastal saltmarshes provide habitat and nursery grounds for many estuarine dependent species. The unique habitat at the interface of tidal coastal waters and saltwater dependent wetlands supports some species of particular interest to resource managers such as the Saltmarsh Topminnow (*Fundulus jenkinsi*), an ESA candidate species. A population distribution, abundance, and habitat utilization study is ongoing for the Saltmarsh Topminnow along the Texas Coast. Two index sites in the Galveston Bay system with known Saltmarsh Topminnow populations have been studied over the past year on a bi-monthly basis. Three replicate samples of minnow seines and Breder traps were deployed at each sampling event. Torrential rainfall from Hurricane Harvey resulted in wide-spread flooding in the Houston area. A special study was developed to examine the impacts of disturbance on two well-studied saltmarsh nekton communities, and bi-weekly sampling was conducted for three months following the hurricane. A time-step analysis was performed on pre- and post-flood data to evaluate the recovery of these nekton communities. Preliminary results suggest a decrease in species richness and abundance following the flood. We are continuing to monitor these sites to better understand disturbance recovery among coastal saltmarsh nekton communities.

Salinity adaptation in golden alga

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Golden alga (*Prymnesium parvum*) is a toxin-producing, euryhaline species responsible for fish-kills worldwide. Although thought to have originated in high salinity habitats, *P. parvum* abundance in US inland

waters and its growth potential in the laboratory show a biphasic relationship to salinity, with peak abundance at ~10–15 psu. It is unclear, however, if *P. parvum* growth can adapt to (compensate for) long-term exposure to high salinity. This information is necessary to understand the spatial distribution of golden alga blooms and especially their absence from Texas coastal habitats. A Texas strain of *P. parvum* maintained for ~3 years at 5 psu (inland-level salinity) in modified Artificial Seawater (ASW) was subjected to the following treatments over 5 continuous batch cultures: ASW at 5 psu (ASW-5 psu, control), ASW-30 psu, ASW with salinity gradually increasing to 30 psu (5-psu/batch), and Instant Ocean® (IO)-30 psu. Treatments were conducted in triplicate and each replicate served as inoculum (taken during late-exponential growth) for subsequent cultures. Cell density was measured every 3 days and exponential growth rate (r) and maximum density were determined. Growth rate was reduced when salinity increased directly from 5 to 30 psu in ASW but compensation occurred during the second culture. Gradual adjustment did not influence this outcome–inhibition was still apparent during the fifth culture when ASW salinity increased from 25 to 30 psu. Inhibition of maximum density was consistently observed in ASW-30 psu after direct transfer or gradual adjustment. Growth rate and maximum density in IO-30 psu were generally similar to observations in ASW-5 psu. In conclusion, adaptation to high salinity in ASW is observed for r but not maximum density, and relatively complex salt mixtures (e.g., IO) can mitigate the inhibitory effects of increased salinity. Findings may give insight on *P. parvum*'s ability to disperse into new environments.

An undescribed species of *Parachiloglanis* from Nepal (Siluriformes: Sisoridae)

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The sisorid catfish *Parachiloglanis hodgarti* (Hora, 1923) is found in high altitude rivers and streams across the Himalayan region, including Bhutan, Nepal, and India. The distribution of this species is highly fragmented with disjunct populations in central and eastern Nepal (type locality), northern India (Assam, Sikkim, West Bengal) and throughout Bhutan. A recent investigation of Bhutanese material of *P. hodgarti* concluded that multiple undescribed species are confused under the name *P. hodgarti* and it is likely that a similar situation exists in India and Nepal. We investigated material of *P. hodgarti* from central and eastern Nepal (including material collected close to the type locality) to assess whether the material from these different areas belongs to the same species. We collected standard counts and measurements, and information on external morphology, and osteology. Principal component analysis recovered no quantitative differences in body measurements. Qualitative traits proved to be more significant in distinguishing between material belonging to the different populations that we investigated, including the following features: pattern of skin granulation, coloration, and presence of a notch between the base of the adipose fin and caudal fin. From the observations recorded herein, we concluded that material of *P. hodgarti* from eastern Nepal represents an undescribed species.

A riverscape divided: longitudinal change in fish community structure in White Creek, College Station, Texas

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Principles of landscape ecology such as scaling, habitat connectivity, and pattern-process relationships can be immersed in water, specifically rivers and streams, to form 'riverscape' ecology. In streams, habitats are arranged as linear (upstream to downstream) and dendritic (branching) networks in which individual dispersal, meta-population dynamics, and meta-community processes are constrained. This means habitat fragmentation and loss caused by alterations to streams can result in strong changes to ecological properties such as species distributions and community structures. We studied stream fish communities in White Creek, College Station, Texas to assess spatial change-over in fish communities associated with an upstream-downstream gradient in stream size that is interrupted by serial fragmentation by road crossings. We seined >50 discrete habitats and tracked the geographic location and fish species encountered. Results suggest the White Creek fish assemblage is dominated by Western Mosquitofish (*Gambusia affinis*), Green Sunfish (*Lepomis cyanellus*), Bluegill (*Lepomis macrochirus*), Longear Sunfish (*Lepomis megalotis*), Red Shiner (*Cyprinella lutrensis*), and Bullhead Minnow (*Pimephales vigilax*). Local community structure was dominated by Western Mosquitofish and Green Sunfish at

upstream locations, but species diversity and community complexity increased in a downstream direction. Our results suggest fish species distributions are partly regulated by longitudinal arrays of habitat fragmented by road crossings. For example, the upstream distribution of Bluegill was apparently constrained by a single barrier to dispersal. Overall, community clustering algorithms revealed the spatial scales associated with longitudinal community change, breaks in communities at barriers illustrated habitat fragmentation, and habitat-community gradients illustrated relationships between geomorphic processes and the ecology of fishes. Our application of landscape principles in White Creek emphasizes the utility of riverscape ecology in freshwater resource conservation and management.

Utilization of a web-based mapping interface to enhance inland fisheries management strategies in Texas

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Texas Parks and Wildlife Department Inland Fisheries biologists traditionally use "stand-alone" mapping interfaces to generate 2-dimensional aerial outputs of fish habitat and benthic surveys of aquatic systems. Preliminary work has shown promise in the use of a different method which generates interactive 3-dimensional high-definition (HD) outputs. During field surveys, a Lowrance© Elite 9Ti GPS unit with TotalScan™ transducer was used to generate data points along boat transects on waterbodies of interest. A waterbody "Vegetation Analysis Report" and HD maps were then generated from these data using web-based mapping algorithms through BioBase©, and ArcMap 10.3© GIS software. Aquatic vegetation biovolume, bathymetric mapping, and benthic substrate composition outputs, produced by BioBase© aided biologists in selecting best management strategies, regarding aquatic vegetation management and angler access development at three central Texas impoundments. This tool can prove valuable to fisheries managers needing a higher resolution of survey results to fine-tune management strategies. At a cost of $2,500 US for a yearlong subscription, cost-benefit would have to be assessed by individual users, based on their needs.

Early life history of Guadalupe Bass *Micropterus treculii*

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The Guadalupe Bass *Micropterus treculii* is a threatened black bass endemic to Texas. Guadalupe Bass are currently reared at the A. E. Wood State Fish Hatchery to support conservation efforts. Fry culture originally developed for Largemouth Bass *Micropterus salmoides* are followed due to the lack of information on spawning and rearing Guadalupe Bass. A research project was conducted to document the early life history of Guadalupe Bass in a hatchery setting so that future culture decisions can be more species-specific. Fertilized eggs were placed in 250 mL beakers and split into a 21°C or 24°C water bath. The eggs and fry were then observed for developmental stages and photographed under a microscope at set intervals. The images were later analyzed using imaging software. The gut content of fish in ponds was also documented. The Guadalupe Bass had a shorter incubation period, and faster development and yolk depletion at the higher temperature. The mean egg incubation period was 61.1 ±4.4 h at 21°C and 47.9±2.9 h at 24°C. Yolk and oil globule traces were present up to 9-11 days post-hatch, respectively at 24°C. Fry consumed Artemia nauplii at swim-up while yolk was still present, indicating a suitable milestone for stocking into ponds. Fry consumed a variety of zooplankton in ponds, with prey size and size variation increasing as fish grew. This study has filled in many gaps in the early life history of the Guadalupe Bass, while raising more questions. High incidence of fatal malformations was observed in the fry without any correlation with parentage, environmental conditions, or chemical treatment. Further studies will be conducted to confirm the suspected connection between maternal stress and fry malformation.

Artificial reef monitoring: using time-lapse videography for long-term field observations of low-profile artificial patch reefs

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Remote time-lapse camera technology has proven to be an innovative tool for the study of community structure in terrestrial ecosystems but has seldom been utilized for research in aquatic environments. Recent advances in camera development, such as remote operation software and waterproof housings, have allowed for the employment of time-lapse photography to study fine-scale changes in marine community structure over time. The use of time-lapse videography offers a non-invasive approach to documenting community dynamics at low-profile artificial patch reefs in the Western Gulf of Mexico. In this study, we use submersible cameras fitted with time-lapse controllers for long-term field observations over a variety of low-profile artificial patch reefs. Time-lapse cameras are deployed at two-week intervals during months of high reef fish settlement and recruitment, based on previous studies, and are set to operate for four predetermined monitoring periods during daylight hours. Cameras are deployed around the periphery of four patch reef types: oyster shell hash, limestone rubble, prefabricated low-profile artificial reef modules, and a nearby natural reef site for comparison. Maximum species counts per day observed in the videos are used to characterize patch reef communities. This methodology will allow for the observation of differences in species community based on reef patch type as well as rates of juvenile recruitment and mortality for commercially important reef fish species, such as *Lutjanus campechanus.*

Exploring impacts of physical stressors on fish diversity and abundance in the Brazos River estuary

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Marine fish species spawned offshore have a strong connection with nearshore estuarine habitat. The larvae of a variety of species immigrate into estuarine nursery areas where they utilize abundant resources to grow and mature (Hettler and Chester 1990, Patterson and Whitfield 1997). Using the lower 42 kilometers of the Brazos River, 5 sites were sampled monthly from December 2016 – October 2017. Data on adult, juvenile, and larval fish was collected to analyze impacts of biotic and physical factors on the arrival, distribution, abundance, and diversity of fish within the Brazos River estuary. Preliminary analysis has revealed physical parameters such as flow severity and salinity play an important role in stratifying the assemblages of fish species through the lower 42 kilometers of the Brazos River. Overall diversity and abundance of fish species also showed significant variation based on sample site and time of year. Future analysis intends to focus on abundant estuarine species, such as Atlantic Croaker, to determine level of impact these biotic and abiotic stressors have on fish diet. Stable isotope analysis will be used to determine variation in diet by size/age, location and the overall contribution of marine and terrestrial/freshwater food sources comprising fish diet.

There's an app for that! Development of a web-based application for predicting the sex of Alligator Gar afield

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Sexual dimorphism in the Alligator Gar, *Atractosteus spatula*, is limited to relatively small differences in snout and anal fin base lengths, making non-lethal sex identification difficult afield. We describe a handy smartphone application that uses snout, anal fin, and standard length measurements to both predict the sex of fish and estimate the certainty of predictions. Our method uses a discriminant function built and tested using a sample size of 262 Alligator Gar ranging from 707 to 1920 mm TL from seven Texas populations. The discriminant function was then built into a web-based application platform, which can be accessed afield on any smart device using cellular data. Use of our prediction tool will improve our ability to understand sex-specific population dynamics, as well as provide a means to identify sex afield, which will be useful for general monitoring, broodfish selection, and trap-and-transfer reintroduction efforts.

Conservation of Guadalupe Bass: a ten-year plan for restoring and preserving the state fish of Texas

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Guadalupe Bass are native to streams of the Brazos, Colorado, Guadalupe, and San Antonio river basins in Texas. In the heart of its range, Guadalupe Bass are commonly found in habitats considered emblematic of the Texas Hill Country and are well adapted for the swifter stream habitats where they are often found around boulders, cypress knees, and woody debris. As one of the most abundant predatory fish species in these systems, the importance of Guadalupe Bass is both ecological and recreational. Forty-two percent of anglers fishing in Hill Country streams report targeting Guadalupe Bass and recent estimates report an economic impact of fishing in Hill Country streams of $71 million over a sixteen-month period (Thomas et al. 2015). Texas Parks and Wildlife Department has continued to foster the growth of this fishery through the Texas Paddling Trails Program and the River Access and Conservation Areas Program, both of which increase river access to anglers, as well as through angler outreach efforts. Guadalupe Bass has declined across much of its range and continues to face multiple threats. Hybridization with Smallmouth Bass and habitat degradation and loss associated with changing land use patterns and altered streamflow has led to the loss of some populations. A watershed-based approach to conservation was adopted by TPWD through the Guadalupe Bass Restoration Initiative to promote healthy ecosystems capable of supporting self-sustaining Guadalupe Bass populations as part of a properly functioning ecosystem. The Guadalupe Bass Conservation Plan is to provide a well-defined framework with distinct management units under which progress can be planned and measured towards achieving specific conservation and restoration objectives. Components of the Plan include assessing data gaps and threats to Guadalupe Bass, refining conservation and restoration objectives, prioritizing populations for conservation and restoration, and recommending actions and strategies to achieve the stated conservation objectives.

Current status of the data-deficient Dwarf Seahorse *Hippocampus zosterae* in the Gulf of Texas

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Dwarf seahorse (*Hippocampus zosterae*) populations have not been assessed fully in Texas, and are, therefore, considered data-deficient. To assess the current population status of the dwarf seahorse, we measured its relative abundance and distribution along an 8.4 km stretch of seagrass habitat in Redfish Bay, Texas, a popular fishing community with high seagrass productivity. In summer 2017, we sampled 14 sites, collecting a total of 39 dwarf seahorses at 7 of the locations. Of the seahorses collected, 20 were male, 18 were female and 1 juvenile (sex could not be determined). Here we present preliminary results that suggest dwarf seahorse numbers may be higher than anticipated. However, due to its specific habitat requirements and paucity of information on its distribution and ecology, coupled with high levels of habitat degradation, we suggest an imminent need for longer-term monitoring of dwarf seahorse populations in Texas.

Comparison between stage-structured and age-structure matrix population models

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Population matrix models play an essential role in in modern ecology as they help project population abundance over different time intervals. A population can be modeled as a stage-structured or age-structured depending on the most important predictor of demographic properties. In recent years, the use of stage-structured models has been favored. Although it is known that the conversion from age-structured to stage-structured vital rates can introduce bias in a population growth rate, the sign and magnitude of the bias have not been investigated. Furthermore, different methods for converting vital rates exist. The objective of this study was to evaluate the different approaches and compare between age- and stage- structured models. Our study involved converting the life table of common bottlenose dolphin into a stage-structured population model with three stages. We calculated the transition rates (proportion of survived individuals making transition into the next stage) using two methods that are commonly used in the literature: one matches the mean duration in each stage, and the other matches the proportion of individuals making the transition within each time unit. We also calculated fertility rate using two different methods. This resulted in four ways of obtaining stage-structured models. These models were compared with age-structured population models consisting of 30 age classes. Our results suggest stage-structured population models grossly underestimate a population growth rate. The population growth rate was also very sensitive to fluctuation in fecundity. These results suggest it is important to consider the potential biases in selecting the type of population matrix.

Impact of a catastrophic flood event on the macroinvertebrate communities and its recovery in the Blanco River and the Colorado River in TX

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Although rivers experience regular fluctuations in discharge, large flood pulses such as a 500-year flood event can cause significant changes to instream habitats. The Blanco River and the Colorado River experienced 500-year flood events following excessive rainfall in May and October of 2015. This study attempted to capture the effects of the October flood event on the benthic macroinvertebrate communities at six sites on each river. Benthic macroinvertebrates were collected with a Hess sampler immediately after the flood event. Benthic invertebrates and environmental data were collected for four months, where sampling frequency transitioned from once a week to once a month. The macroinvertebrate communities were drastically affected in both the rivers,

albeit differences in substrate types with bedrock as the primary substrate on the Blanco River, and the typical sand-gravel mix on the Colorado River. Flooding reduced invertebrate densities to less than 2% and taxa richness by 17-70% at some of the sites. A total of 73 taxa belonging to 42 families within 14 orders were recorded between the two river systems, with most representative orders being Ephemeroptera and Diptera. Mayflies, caddisflies, dragonflies, and coleopterans/beetles abundances were impacted, but a steady increase in abundance and diversity was observed over the sampling period. Time trajectories in nonmetric multidimensional scaling (nMDS) analyses revealed the macroinvertebrate communities had stabilized toward the end of the sampling period (four months). Macroinvertebrate communities at downstream sites were more strongly affected by the flood compared to the upstream sites and can be explained generally by the river continuum concept and specifically by the network dynamics hypothesis. This may be a result of higher discharges at sites further downstream, and associated scour of the stream bed. Ultimately, large flood events in rivers potentially have major implications for the maintenance of regional macroinvertebrate diversity within affected regions.

Population estimation of Guadalupe Bass on the North Llano River

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Guadalupe Bass *Micropterus treculii* is a species of greatest conservation need in Texas due to habitat loss and introgressive hybridization. The habitat associations and population dynamics of Guadalupe Bass has been evaluated in the relatively undisturbed systems, such as the South Llano River. However, there has been little work conducted in more disturbed systems, such as the North Llano River (NLR). While both are spring-fed systems, the NLR is subject to annual dewatering and has a more variable flow regime. Our objective was to assess the population density of Guadalupe Bass across four study sites in the NLR through a mark-recapture study conducted during May-August 2017. The study sites were dispersed throughout the middle and lower river stretches and were surveyed during three independent sampling events. A total of 70 Guadalupe Bass (>170 mm TL) were tagged and seven individuals were recaptured. Guadalupe Bass were collected from all three mesohabitat types, but catch per unit effort was highest in riffle-run habitat. Population estimates were highest (162 individuals km^{-1}) at the most upstream site, which maintained stream flow throughout the summer. In comparison, the downstream sites were reduced to a series of isolated pools by mid-July due to low flows and supported lower Guadalupe Bass population densities ($\leq$ 51 individuals km^{-1}). Our results suggest that maintaining streamflow and habitat connectivity will be important to supporting healthy Guadalupe Bass populations throughout the NLR and other streams in central Texas.

Taxonomic revision of the seagrass dwelling clingfishes of the genus *Acyrtops* (Teleostei: Gobiesocidae)

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Members of the clingfish genus *Acyrtops* are small (>23mm SL) obligate inhabitants of seagrass beds throughout the western central Atlantic. The two valid species of *Acyrtops*, the Emerald Clingfish *A. beryllinus* (Hildebrand & Ginsburg, 1927) and the Flarenose Clingfish *A. amplicirrus* Briggs 1955, are morphologically similar and difficult to distinguish based on external characteristics. This has led some authors to question the validity of *A. amplicirrus* and has hampered attempts to circumscribe the geographic range of both species, especially within the Caribbean Sea. Using a combination of museum specimens and COI sequence data, we plan

to clarify: (1) how many species of *Acyrtops* are present in the western and Central Atlantic; and (2) the geographic range of each species. Our preliminary results suggest that material of *A. beryllinus* and *A. amplicirrus* are conspecific and the later should be considered a junior synonym of the former.

Quantifying spatial extent and distribution of habitat suitability with changing salinity regimes

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Salinity is known to be a driving factor in defining habitat suitability for estuarine dependent species. With increased demands placed on freshwater resources and extreme drought conditions becoming prevalent for many Texas watersheds, it is important to understand how these changes will impact the extent and distribution of suitable habitat for species that rely on the passage of freshwater to the coastal region. Here, I present boosted regression tree models used to quantify juvenile (< 100 mm) habitat suitability across simulated low (mean ± SD; 13.7 ± 8.5 ppt), moderate (19.3 ± 7.4 ppt), and high (27.5 ± 7.1 ppt) estuarine salinity regimes and present model outputs for two species of finfish (Spotted Seatrout and Atlantic Croaker) in Aransas Bay, Texas. Model outputs suggest only a moderate impact of salinity on Spotted Seatrout nursery habitat (7.5 percent model influence) but a more substantial impact on Atlantic Croaker nursery habitat (12.9 percent model influence). For Spotted Seatrout, a moderate salinity regime resulted in the greatest proportion of highly suitable habitat in the Aransas estuary (69 percent) with a 10 percent decrease in highly suitable habitat as we moved from moderate to high salinity regimes. For Atlantic Croaker, the proportion of highly suitable habitat decreased from 47 percent to 0 as we moved from low to high salinity regimes in the Aransas estuary. Regarding habitat distribution, a majority of highly suitable habitat was found in upper Aransas Bay for both species. Moderate salinity regimes maximized this area for Spotted Seatrout while increasing salinities away from low salinity regimes pushed suitable habitat into the far reaches of the upper bay for Atlantic Croaker. This modeling exercise has many implications for juvenile habitat selection and associated bioenergetics and mortality. It will further be applied to different species and estuary types on the Texas coast.

Variation in environmental conditions and fish assemblages in sub-lakes of the Poyang Lake floodplain, China

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Fish assemblages and seasonal dynamics of three sub-lakes (Banghu, Dahuchi, and Shahu) of Poyang Lake floodplain, located in the middle and lower Yangtze River basin, were investigated during July, September, December 2015, and April 2016. The conductivity, turbidity and DO were higher during December. Conductivity was higher in Banghu Lake than the other lakes. Seine surveys produced 9,440 fish specimens weighing 8.63 kg and belonging to 11 families, 31 genera, and 37 species. The eight most abundant species comprised 84.34% of the total catch, i.e., *Hemiculter leucisculus*, *Carassius auratus*, *Rhinogobius giurinus*, *Xenocypris argentea*, *Botia superciliaris*, *Pseudorasbora parva*, *Pseudobrama simoni*, and *Rhodeus lighti*. Fish species richness was highest July and lowest in April. Total abundance and biomass tended to be higher in Banghu than Dahuchi and Shahu during October and December. The abundance of most fish species was positively correlated with water level and macrophyte area. Fish assemblage similarity decreases with increasing dry season among floodplain habitats. As a result, hydrological connectivity seemed to play an important role in structuring fish assemblages in sub-lakes of Poyang Lake floodplain, but its effect was confounded by water level, lake size, macrophyte area.

Landscape influences on species assemblage patterns of ichthyofauna in Texas, New Mexico, and Oklahoma

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With the influx of GIS in recent years, there has been an enormous increase in biogeographic analyses. However, many studies still focus on small areas with limited environmental components and rarely cross political boundaries. My study looked at the species of fishes found in the states of Texas, New Mexico, and Oklahoma, because of how closely intertwined these river systems are and the wide diversity of habitats and environmental variables found in these states. I compiled a comprehensive list of fish species within the 3 states and then reduced that total number to the 249 species that had the most records, resulting in a total of 172,214 individual, mappable locations which were then imported into a GIS. I then used 8-digit Hydrolaugic Unit Classifications to relate landscape, geographic, basin characteristic, and climate variables to fish distribution using a Canonical Correspondence Analysis. The CCA revealed 4 different communities within the study area. These communites were labeled as a coastal community, a eastern and generalist community, a western community, and a Pecos/Devil's River community. The relationships between these communities and the variables allowed conclusions as to the biology and the evolution of these fish species. While 3 of the communities incorporated large amounts of the study area, it is interesting to note that the Pecos/Devil's River community of fish arose from our study which is an extremely small area, pointing either to the fact that these species are much more dependent on landscape variables for their evolution or that the species of fish found within these river systems are distinct from any other communities found within the rest of the 3 states. The overall patterns suggest that the western species of fish from this study area evolved on a more landscape scale while eastern communities are more dependent of microhabitat scaling.

Is there sexual dimorphism in an endangered Great Plains cyprinid?

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North American cyprinids can exhibit sexual dimorphism in different characters such as size or coloration. Determining sexual dimorphism in Great Plains cyprinids can be useful for possible field identification and can be a powerful tool for their conservation. At present, there are few studies on the determination of sexually dimorphic external traits for Great Plains cyprinids; therefore, we propose to catalog different measurements for an endangered Great Plains cyprinid, the Smalleye Shiner (*Notropis buccula*), and determine if there are external features that are sexually dimorphic. To do this, we used existing collections of mature fish collected from the Upper Brazos River basin. Individual fish were photographed and morphometric measurements were made to assess whether males and females could be distinguished in the field. Knowledge of sexual dimorphism in the Smalleye Shiner could serve as an asset to conservation managers and could be useful for use in captive breeding of the species.

Comparing habitat types and fish assemblages in the Flower Garden Banks mesophotic zone

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The objectives of this study were to provide a descriptive analysis of the various habitats of the mesophotic zone surrounding the federally protected Flower Garden Banks National Marine Sanctuary and utilization of each habitat by the corresponding fish assemblage. The study area was located outside the current marine sanctuary in adjacent unprotected regions, such as McGrail Bank. Archival raw video footage taken with a remotely operated vehicle was the primary data source used during the study. The videos were used to create a fish survey, where depth, bottom and habitat type, and the number of fish and taxa observed were recorded at regular

intervals. This information was used to examine the relationship between various habitat variables and the fish assemblages in the locations surveyed. Preliminary findings suggest that as depth increases, hard bottom and associated structure are utilized more frequently and at higher densities by both smaller reef fish and pelagic species, in contrast to soft bottom. Highest fish biodiversity was generally observed in shallower habitat in contrast to deeper depths dominated by zooplanktivorous fish such as Roughtongue Bass. In addition, large schools of economically significant species, such as Greater Amberjack and Red Snapper were associated with hard bottom. Areas with algal nodules exhibited supported a higher biodiversity of primarily small reef fish such as Cherubfish and Yellowtail Reeffish, suggesting that this type of habitat may function as a nursery habitat for reef fish. Additional studies utilizing data from more recent video surveys from McGrail Bank will be compared to these original surveys to determine if habitat and fish species composition has changed.

Recovering America's Wildlife Act: potential opportunities to expand the scope and scale of aquatic resources conservation in Texas

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Aquatic systems of the US have been dramatically altered, resulting in degradation of fish habitats and declines in populations of native fishes and aquatic biodiversity. Anthropogenic changes continue to occur at scales and rates that aquatic systems cannot sustain. In areas of Texas, water demands associated with human population growth, agricultural irrigation, and energy development have significantly depleted groundwater resources with concomitant reductions in spring flows and river base flows. Rampant construction of dams in the mid- to late twentieth century resulted in substantial fragmentation of Texas rivers, loss of aquatic connectivity, altered natural flow patterns, and declines in populations of riverine fishes. These and a myriad of other interrelated issues – urbanization, climate change, water quality degradation, increased stream temperatures, and the negative effects of non-indigenous species (e.g., predation on, competition with, and hybridization with native forms) – threaten aquatic biodiversity. Conservation intervention is urgently needed. The Recovering America's Wildlife Act, under consideration by US Congress, has the potential to provide a substantial and unprecedented level of financial investment in restoring and conserving aquatic species and their habitats. This presentation will offer an overview and status of this proposed legislation, and discuss opportunities for the fisheries community to engage in identifying priorities for investing this new potential funding in transformative conservation actions.

Reproductive life history and host fish selectivity of *Fusconaia mitchelli* and *Quadrula petrina*

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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, we assessed gametogenesis, brooding period and host fish associations for both species in the lower Guadalupe River. The gametogenic cycle was monitored using a syringe method to extract gonadal fluid. Gravidity was assessed during gamete sampling by visual inspection. Fecundity was assessed for vouchered gravid females via gill excision following existing guidelines. Host fish were determined through laboratory host fish trials. To date, we have assessed gametogenesis either monthly or bimonthly from November 2016 to November 2017. Fecundity has been estimated for 22 *Q.*

petrina and 17 *F. mitchelli*. Host fish trials were conducted using 13 fish species collected from the Guadalupe basin and representing a broad spectrum of fish genera. Although this study is ongoing, preliminary results indicate that spawning for our focal species occurs late winter while brooding ranges from spring to early summer. Spawning and brooding behavior was determined to be bradytictic in timing and tetragenous in morphology. Fecundity estimates for *F. mitchelli* are typical of species within this genus while those for *Q. petrina* are lower than expected. Host trials indicate that *F. mitchelli* uses cyprinids while *Q. petrina* uses ictalurid fishes, which is expected from known hosts of congeners of both species.

Trophic Ecology of Deep-Sea Micronekton

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The deep sea is the largest habitat on the planet, yet significant data gaps remain, including a paucity of information regarding the trophic structure of meso- and bathypelagic food webs. Here, we describe the trophic ecology of a suite of globally distributed deep-sea micronekton (2-20 cm total length) with contrasting vertical migration habits (vertical migrators and non-migrators) thought to represent important trophic links between upper and lower level consumers in the pelagic ocean. Results from stomach content analysis demonstrate fishes, crustaceans and cephalopods were the most common prey items. Mean δ13C micronekton values were similar among species ranging from -18.17‰ to -18.99‰ suggesting all species are supported by a similar carbon source regardless of their vertical depth distributions, a finding that was supported by mixing model analysis which estimated all species received the majority (>78%) of their carbon from epipelagic food resources. Mean δ15N values of micronekton ranged from 9.18‰ to 11.13‰ resulting in trophic position estimates between the third and fourth trophic level although significant shifts in δ15N with increasing body size suggest many of these species undergo ontogenetic shifts in diet and trophic position. These results, which provide some of the first trophic descriptions using dietary tracers for this group of deep-sea micronektonivores, offers insight into the trophic structure of deep-sea ecosystems and will help inform the construction of ecosystem-based impact models.

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