

MUDDY WATERS

News from the Missouri Cooperative Fish and Wildlife Research Unit

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INSIDE THIS ISSUE:

<i>Students and staff</i>	2
<i>Current projects</i>	4
<i>Publications</i>	7
<i>Collaborations</i>	7
<i>Directory</i>	8

Missouri Cooperative Fish and Wildlife Research Unit

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COOPERATORS



GOVERNMENT DOWNSIZING?

Let's face it—the federal government has had a black eye or two recently. Examples of excessive spending, travel, and lavish gifts have all been in the news recently and there has been some trickle down effects to us in the Cooperative Research Units through increased scrutiny of our travel to meetings and purchases. It's the world we live in.

One would think this increased scrutiny and tight budgets would mean the Cooperative Research Units would see tight times as well. Although the future budget years are uncertain, the Missouri Unit will be fully staffed in June 2012 for the first time since 2003. Rather than follow GSA's model and hold a lavish and expensive meeting in Las Vegas, we decided to fill our Assistant Leader Fisheries with Dr. Amanda Rosenberger, who begins June 4. So how can we fill positions in these tight times and increased scrutiny? I believe the answer comes from our cooperative structure. The Cooperative Research Units are an extremely cost effective program for all that are involved. I think a common misconception with the Unit Program is that we have a large federal base of funds. In fact, we have minimal federal funds and the primary contribution from the federal side is salaries for the three scientists of the Missouri Unit. Our research projects and operations are funded by grants from the cooperators, and our facilities are owned by the university. As you look through this issue of Muddy Waters you will see numerous presentations, publications, collaborations, and projects. Although I may be a little biased, I believe the federal government is getting a substantial bang for the buck in the Unit program.

The future is always uncertain with changes in budgets, administration, etc. However, the Cooperative Research Units remain an integral part of training future professionals in natural resources and meeting the needs of our cooperators through graduate teaching, research, and



technical assistance relevant to Missouri and beyond.

Craig Paukert
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AMANDA ROSENBERGER NEW ASSISTANT LEADER

Dr. Amanda Rosenberger was hired as our Assistant Leader-Fisheries and will be joining the Missouri Unit in June 2012. Amanda comes to us from the University of Alaska-Fairbanks where she was an Assistant Professor in the School of Fisheries and Ocean Sciences since 2006. Her interests involve ecology and conservation of freshwater fishes with an emphasis on the role of ecological processes in shaping fish distributions, population characteristics, and community structure. Amanda will still be finishing several students at Alaska, but also began working with the Missouri Department of Conservation biologists on proposals related to mussel conservation in the state. We will have much more about Amanda in the fall newsletter, but feel free to contact her at rosenbergera@missouri.edu.

STUDENTS AND STAFF CONTRIBUTE THROUGH EDITORSHIPS AND PUBLICATION REVIEWS

Craig Paukert just finished as Guest Co-Editor for the journal *Endangered Species Management* of an issue focused in imperiled river fishes. **Lisa Webb** continues as an Associate Editor of the *Wildlife Society Bulletin* where she reviews papers on waterfowl and wetlands. **Jeff Fore** is the Student's Angle Editor for *Fisheries*, the monthly periodical of the American Fisheries Society. **Landon Pierce** is the Co-Newsletter Editor for the Education Section of the AFS. **Allison Pease** serves as Chair of the Transactions of AFS Publications Award Committee.

STUDENTS WORK WITH MU AFS TO TEACH MIDDLE SCHOOL KIDS

Graduate students **Emily Pherigo** and **Jake Faulkner** worked with the MU undergraduate group, Fisheries and Aquatic Sciences Society to help with an outdoor workshop to the Harrisburg Middle School students. The workshop was held in April 2012 at Missouri Department of Conservation biologist Bob DiStefano's ponds. Topics included fish identification and ecology, fisheries management, fisheries professions, and numerous sampling gear demonstrations. In addition to the graduate students helping organize, the Missouri Unit provided vehicles and equipment for the event.



Emily Pherigo with middle school students

STUDENTS AND STAFF

The backbone of the Unit's research is the graduate student and research staff. We will have a growing number of students and staff as Lisa and Amanda start establishing their research programs so although we are large now, we expect to get much bigger. Currently the Unit faculty have six MS students, three PhD students, and seven post docs, research staff and faculty. Stay tuned for several new students and post docs this fall.

Our MS students are the core of our graduate students and come from varied regions and backgrounds. **Jake Faulkner** is from Jefferson City, Missouri, received his BS from MU, and will



Jake Faulkner

be finishing his MS work in 2012 on resource selection of Niangua darters. Previously Jake had worked with MDC on various stream issues, including Niangua darter monitoring. **Jason Harris**, a South Dakota native and South Dakota State University graduate, started his MS work at MU in January 2011 to determine movement and habitat selection of largemouth bass in Table Rock Lake. Radio telemetry is being used to evaluate movement rates and seasonal habitat usage, and how this information relates to augmentation habitat structures. **Andy Dinges** is a MS student studying the effects that hunting disturbance has on waterfowl behavior and distribution during the Light Goose Conservation Order in the Rainwater Basin of Nebraska. A native of Nebraska, Andy received his BS from the University of Nebraska-Lincoln. He is planning on graduating in the fall of 2012. **Nick Sievert**, a Sturgeon Bay, Wisconsin native, finished his BS from the University of Wisconsin-Madison before arriving at MU in fall 2011 to start his MS. Nick is evaluating how to calculate vulnerability of fish communities to climate change and using that information to identify strategies to best protect biodiversity in future scenarios of land use and climate change in Missouri. **Emily Pherigo** started at MU in summer 2011 and will be helping determine how river regulation in Missouri River tributaries effect big river fish populations. Emily is a native of St. Louis and, prior to grad school, worked for USGS and the USFWS in Columbia. **Jessi Tapp**, a western Kentucky native, began her MS research in January 2011 at Arkansas Tech University and followed her advisor Dr. Lisa Webb to MU in August 2011. Jessi has been conducting waterbird management related research on private lands in the Lower Mississippi Alluvial

Valley and will continue with data collection through fall 2012.

Landon Pierce is a PhD student studying how landscape factors affect fish distributions in the



Jessi Tapp

Missouri and Colorado River basins. He is a native of Nebraska, and completed his BS at Nebraska before finishing his MS at South Dakota State University working on paddlefish population dynamics, where he has recently published his thesis work.

Jeff Fore is a PhD student working on how conservation practices in the Missouri River Basin affect fishes. He received his BS from Oklahoma State University and MS from Eastern Illinois University and is a native of Ponca City, Oklahoma. Jeff just submitted his dissertation to his committee and will defend this summer. **Joe Gerken** is a PhD student at K-State and is working on how floodplain connectivity and river flows affect river fishes. Joe is a native of Ohio and has his BS from Miami University of Ohio and a MS from the University of Central Arkansas. Joe will be wrapping up at K-State in 2012.

There are several research staff members or co-investigators affiliated with the Unit. **Dr. Jodi Whittier** is lead or co-principal investigator on several grants related to conservation planning for fishes, and how climate change will affect fish habitat, and modeling stream temperatures in Missouri and the northeast United States. She is a native of California and has a BS from Cal Poly-San Louis Obispo, and a MS and PhD from Oklahoma State University. She spends much of her time helping graduate and undergraduate students with their research, as well as conducting her own work, and teaching a GIS course at MU. **Dr. Allison Pease** is a post-doctoral researcher working on the population-level effects of climate change on smallmouth bass. She is a native of Texas and received her BS from University of Texas, MS from University of New Mexico, and PhD from Texas A&M University before arriving in summer 2010 at MU. **Dr. Jacob Westhoff** received his BS from MU, his MS at Tennessee Tech University, and his PhD from MU. Jacob is currently working on modeling stream temperature and habitat in the Current and Jack's Fork rivers and has been tracking smallmouth bass in the Jack's Fork River the last several months to determine if they select certain temperatures. **Dr. Michelle Staudinger** is stationed at the USGS National Climate Change and Wildlife Science Center in Reston, VA, but is a MU post doc that worked on the biodiversity component of the National Climate Assessment, which included being part of the

(Continued on page 3)

STUDENTS/STAFF WIN UNIVERSITY AWARDS

Students and staff affiliated with the Unit received accolades in spring 2012 for their achievements. **Craig Paukert** was selected as one of the Outstanding Graduate Faculty from the University of Missouri, and **Jake Faulkner** was selected as an Outstanding Graduate Student. Both of these awards are selected by the graduate



Craig Paukert receiving Outstanding Faculty Award

students, which makes them particularly special as our main mission is to work with the graduate students.

UNIT STUDENTS/STAFF OFFICERS IN PROFESSIONAL SOCIETIES

Jodi Whittier and **Craig Paukert** are both elected officers of sections of the American Fisheries Society. Craig is President-Elect of the Education Section of AFS, and Jodi is President for the Fisheries Information and Technology Section of the AFS. The students have also been very active in professional societies. **Jeff Fore** is President the Student Subsection of the Education Section of the AFS. **Landon Pierce** is Secretary-Treasurer of the same organization. The Student Subsection has over 800 members in the US and beyond so it is an honor to be elected to represent all fisheries students in AFS.

STUDENTS AND STAFF (CONTINUED)



Michelle Staudinger (right) imitating a longnose gar

steering committee for the entire technical input on biodiversity, ecosystems, and ecosystem services, and organizing a meeting of

over 60 experts on climate change and biodiversity. Michelle received her PhD from University of Massachusetts, MS from SUNY Stony Brook, and BS from Boston University. **Dr. Katy Klymus** has just started with the group as a post-doctoral researcher working on how environmental DNA can be used as a detection tool for Asian carp invasion. Katy received her PhD



Katy Klymus

from Missouri in 2011 working on genetic differentiation of canyon tree frogs, and also holds a BS from the University of Texas. **Dan Whiting** is a Senior Research Technician working in the Grand Canyon. He received his BS and MS from Southern Illinois University. Dan splits his time between the Grand Canyon and the lab, evaluating the impacts of non-native trout on native fish species in tributaries within the Grand Canyon. He will stay on for a couple more years working with Grand Canyon National Park in humpback chub recovery. Finally, **Emily Tracy-Smith** is a research associate working on identifying the key biological metrics that are related to flows to help the Missouri Department of Conservation identify future research needs related to environmental flows. Emily received her BS from Florida, and her MS from MU, and worked for a couple years with the MO DNR before accepting her current position.

Recent Graduates

Jon Spurgeon finished his MS in May 2012 working on evaluating the success of translocations of humpback chub in Grand Canyon. He will be starting his PhD at the University of Nebraska in June 2012. **Jason Fischer**, a student of Craig Paukert's at K-State also received his MS in May where he worked on the effects of sand dredging on fish and fish habitat in large

ivers. He moved to Pinetop, Arizona to work with the US Fish and Wildlife Service. **Justin Buckler** received his MS in December 2011 under the direction of David Galat and is currently a Biologist with Five Rivers Services, but works closely with USGS Columbia Environmental Research Center. Finally, **Karthik Masagounder**, a former post doc of Craig Paukert, left in January to work for Evonics, an industry in Singapore where he is working on developing feeds for domestic animals, which was closely aligned with his interests in food nutrition and aquaculture.

STUDENTS LEADERS IN GRADUATE STUDENT ORGANIZATION

The graduate students in the Department of Fisheries and Wildlife Sciences are represented by their Graduate Student Organization, and students associated with the Unit are leaders in that group. Officers for the 2012-2013 academic year are MS students **Emily Pherigo** (President), **Nick Sievert** (Vice President) and **Jessi Tapp** (Secretary). These students have shown a commitment above what is expected by taking these leadership roles.



STUDENTS SHINE IN PRESENTATIONS

Dissemination of our research through presentations is an excellent way to provide a timely mechanism to show others what we are doing. Just since January 2012, students and research staff have given over 10 presentations to various local, national, and international groups. In addition, these students have been awarded for their efforts. **Jon Spurgeon**, MS student, was selected as a finalist for the Best Student Presentation at the Annual American Fisheries Society Meeting in St. Paul, Minnesota. The presentations will occur in August 2012 and Jon was one of about 15-20 students selected. **Jake Faulkner**, MS student, was selected as second place of the Missouri Chapter of the Society for Conservation Biology poster competition at the Missouri Natural Resources Conference in February 2012. **Jason Harris**, MS student, was awarded the Best Student Aquatics Presentation at the same conference.

RESEARCH PROJECTS

Managing the nations fish habitat at multiple spatial scales

This USGS-funded study addresses the objectives of the National Fish Habitat Action Plan to examine the impact of climate and land-use change on the Nation's aquatic systems. This is a large effort with 17 principal investigators, and 13 students, post docs, and research staff throughout the country. At MU, **Jodi Whittier** is leading the effort to determine how climate and land use will affect fish habitat in the Lower Colorado River Basin, where **Allison Pease**, a post-doctoral researcher, is working on how climate change will affect smallmouth bass populations in the Central US. **Jake Faulkner**, MS student, is helping determine how climate change may affect Nian-gua darter distributions in Missouri.

Remediating the effects of human threats on lotic fishes

The goal of this NRCS-funded study is to assess effectiveness of conservation practices at conserving lotic fish assemblages throughout the Missouri River Basin. **Jeff Fore**, a PhD student, has developed threat indices that represent the cumulative effects of multiple agriculture, urbanization, point-source pollution, and infrastructural threats for every stream segment in the Missouri River Basin. Results indicate that substantial agricultural conservation will be needed to improve ecological condition of streams in the Missouri River basin.

Habitat selection of largemouth bass in Table Rock Lake

In Table Rock Lake, MDC and other partners are attempting to improve fish habitat for largemouth bass and other fishes, and **Jason Harris**, MS student, will be helping these partners determine if largemouth bass select habitat structures that are being placed in the lake. Jason has used telemetry to track largemouth bass to determine if they use these habitat structures and if this selection differs seasonally. The project, funded by MDC, works closely with MDC Fisheries Biologists. Initial results suggest the highest areas of use are coming from natural structure (coarse woody debris). However, the structures placed in the lake by cooperators are also being selected, especially trees and brush piles. The project will continue through 2012.



Tracking largemouth bass in the snow

ies Biologists. Initial results suggest the highest areas of use are coming from natural structure (coarse woody debris). However, the structures placed in the lake by cooperators are also being selected, especially trees and brush piles. The project will continue through 2012.

Helping refine ecological flow research in Missouri

The MDC has researched ecological flow for several years and has developed a Missouri Hydrologic Assessment Tool (MOHAT) which can be used to establish a hydrologic baseline and help aid in the development of ecological flow standards. However, there are still substantial improvements that need to be made to MOHAT. This study, funded by MDC and led by Research Associate **Emily Tracy Smith**, will help refine the list of flow metrics that can be used in refinement of MOHAT and further evaluate how these metrics are linked to biological metrics. In addition, Emily is conducting a thorough literature review to determine what flow metrics are associated

with actual fish responses. Ultimately, this work could be used to determine the ecological response from altered hydrology to recommend suitable ecological flows for streams.

Climate change effects on biodiversity

The objective of this study, funded by the USGS National Climate Change and Wildlife Science Center, is two-fold. First, **Michelle Staudinger**, a post-doctoral researcher, is helping USGS in the National Climate Assessment determine how climate change affects biodiversity. The work included an expert panel that was held in Palo Alto, CA to summarize how climate change may affect biodiversity. This was completed in January 2012 and the final report (all 292 pages of it!) is in press. This technical input document will be used to inform the 2013 National Climate Assessment and be a valuable resource to anyone interested in the current and future impacts of climate change on ecological resources. The second phase of the project will be conducted in the state of Missouri, where MS student **Nick Sievert** will determine if different methods to calculate fish community vulnerability to climate change provide different conclusions. In addition, he will identify areas of greatest aquatic biodiversity in Missouri and determine how well existing public lands and other areas protect aquatic biodiversity in the state.

The role of tributaries on Missouri River recovery

Tributaries may play an important role for obligate large river fishes. This study, funded by USGS with support from the US Fish and Wildlife Service, will determine seasonal use of the highly regulated Osage River and the unregulated Gasconade River by mainstem Missouri River fishes. **Emily Pherigo** is the MS student on the project, and will also work with USGS CERC fish



Technician Matt Dolan with an Osage River paddlefish

physiologist Diana Papoulias to determine reproductive condition of fishes in these rivers. The project began in fall 2011 and will continue for two years.

Smallmouth bass movement and habitat use related to thermal regimes

Smallmouth bass are an important sport fish, but also a key indicator of stream health and thus are excellent study organisms to determine the effects of climate change. This study will classify habitats in the Current and Jack's Fork rivers in the Missouri Ozarks, and link these classifications to thermal habitats. In addition, smallmouth bass were implanted with radio transmitters and thermal loggers to determine the distribution and movement of these fish, particularly related to thermal habitat and springs. **Jacob Westhoff** is the post-doctoral researcher on the project, which will continue into 2013.

(Continued on page 5)

RESEARCH PROJECTS CONTINUED

(Continued from page 4)

Evaluations of translocation humpback chub in Grand Canyon

This project is evaluating the response of humpback chub translocated in Shinumo Creek, and potential interactions including predation and trophic suppression between native and non-native fishes in Bright Angel Creek, a potential site for HBC relocations. Initial analysis show that 42% introduced chub have left Shinumo Creek since beginning translocations in 2009, and that rainbow trout and humpback chub are consuming resources at the same trophic level. This work is part of a group effort between the National Park Service, US Bureau of Reclamation, the US Fish and Wildlife Service, MU, and others. **Jon Spurgeon**, finished his MS in 2012 on this project, but **Dan Whiting**, Sr. research technician, will continue to work with the cooperators on these issues. The project is funded by USGS and the NPS.



Dan Whiting (left) getting breakfast in Grand Canyon

Conservation planning for fishes in the Upper Colorado River Basin

This project builds on previous and on-going research we have been conducting on fish communities in the Lower Colorado River Basin. We have compiled a suite of environmental characteristics and threats frequently associated with presence or absence of freshwater fish species. Federal and state agencies from all the states encompassing the Basin have contributed nearly 800,000 records of fish sampled from the late 1800's to 2010. The USGS-funded project is a group effort between **Jodi Whittier** and **Landon Pierce**.

Evaluation of environmental DNA as a tool for Asian carp detection

Environmental DNA (eDNA) is a method in which DNA material from an organism that is released into the water through slime, skin cells, urine, or feces, can be detected from a species and has promise as a tool for detection of the invasive Asian carp. However, there are still questions on what a positive eDNA result means. For example, it is unclear if a positive eDNA detection means a live fish was actually in the vicinity, if the concentration of eDNA can be used to estimate relative abundance of Asian carp in the system, or how long the eDNA remains in the water before degradation. This study, which will be conducted by post-doctoral researcher **Katy Klymus**, is in collaboration with USGS Columbia Environmental Research Center and the Department of Biological Sciences at MU, and just began in summer 2012.

Evaluation of biological and ecological factors influencing the sustainable management of large pelagic fishes in North Carolina

Michelle Staudinger is a co-PI with Dr. Fred Scharf on a project funded by North Carolina Sea Grant, and based out of the University of North Carolina Wilmington. Tuna, dolphinfish, wahoo, and marlin are top predators in pelagic ecosystems and valuable sport fishes in the South Atlantic Bight. This study seeks to gain a better understanding of trophic relationships and competitive interactions among these

ecologically and commercially important populations using a paired approach of stomach content and stable isotope analyses. In addition, the reproductive biology of poorly known species such as blackfin tuna (*Thunnus atlanticus*) will be evaluated. Sampling is largely conducted at recreational fishing tournaments and in collaboration with the NC DENR and the SC DNR. The project began in spring 2012 and will continue for two years.

The feeding ecology of pygmy sperm whales and dwarf sperm whales in the western North Atlantic Ocean

Michelle Staudinger is working with the Marine Mammal Stranding Network at University of North Carolina Wilmington to complete the most comprehensive evaluation of the foraging ecology of Kogid whales conducted to date. Kogid whales represent one of the most common live-stranded cetaceans in North Carolina and Virginia, yet our understanding of their normal behaviors remains poorly understood. This study will help improve knowledge of the types of prey and habitats, which Kogid whales utilize in the South Atlantic Bight. This project began in 2010 and is expected to be completed later this year.

Effects of the Light Goose Conservation Order on behavior of waterfowl and hunting participants in the Rainwater Basin, Nebraska

Spring is an energetically important time period for migratory waterfowl and special regulations have been set in this region to protect non-target species during this hunting season. The goal of this project is to determine how waterfowl respond to hunting disturbance in relation to these special regulations. In 2011 Mallards and Pintails spent twice as much time foraging in wetlands closed to hunting during the first four weeks of migration when 83% of the hunting encounters were documented in the region. Dabbling duck densities were also at least three times greater on wetlands closed to hunting in every week of this time period. Information from this mail survey as well as field data collected will be evaluated together to make future decisions regarding spring hunting regulations in the region. **Andy Dinges**, MS student, is heading up this project, which is funded by the Nebraska Game and Parks Commission and MU.

Waterbird use and food availability at migratory bird habitat initiative wetlands

NRCS implemented the Migratory Bird Habitat Initiative (MBHI) in summer 2010 to mitigate potential impacts to coastal wetlands as a result of disturbance. The goal of the MBHI is to improve habitats on private farmlands, catfish ponds, and WRP easements in states near the Gulf of Mexico to provide additional habitats for wintering and migrating waterbirds that may be displaced from impacted coastal wetlands. To evaluate the effectiveness of the MBHI on WRP



Actively managed wetland

lands, **Jessi Tapp** is examining waterbird use and food availability on actively and passively managed wetlands enrolled in WRP, and on

(Continued on page 6)

RESEARCH PROJECTS CONTINUED

(Continued from page 5)

long-term actively managed public sites in the LMAV of Arkansas and Missouri.



Assessing validity and precision of moist-soil seed estimation techniques

This project stemmed from discussion with MDC biologists and is a joint effort between MDC and Lisa Webb's current research estimates of moist-soil seed biomass are used to calculate dabbling duck carrying capacity, or duck-energy days (DEDs), on public and private wetlands. **Lisa Webb** and **Jessi Tapp** are assisting MDC in an evaluation of various techniques used to estimate moist-soil seed availability in wetlands. MDC biologists joined Jessi at her study sites in October 2011 in south-eastern Missouri to field-test an estimation technique involving plant measurements (e.g., plant height, seed-head diameter) and the lab component of this study is underway. This project started when it was determined that much of the data collected by Lisa and Jessi could also help MDC so this is a collaborative effort between MDC and the Missouri Unit.

PRESENTATIONS BY UNIT STUDENTS AND STAFF IN 2012

- Faulkner, J., and C. Paukert. Effects of season on microhabitat selection by Niangua Darters. Missouri Natural Resources Conference, Osage Beach, Missouri. 1 February 2012.
- Fischer, J., C. Paukert, and M. Daniels. Influence of in-stream and watershed alterations on sandbars and islands in the Kansas River. Kansas Natural Resources Conference, Wichita. 26 January 2012.
- Harris, J., C. Paukert, S. Bush, M. Allen, and M. Siepker. Movement and habitat selection of largemouth bass in Table Rock Lake, Missouri. Missouri Natural Resources Conference, Osage Beach, Missouri. 3 February 2012.
- Kaemingk, M., J. Jolley, C. Paukert, D. Willis, R. Holland, G. Wanner, and M. Lindvall. Do common carp deserve their bad reputation? Nebraska Chapter of the American Fisheries Society Annual Meeting, Gretna, Nebraska. 14 February 2012.
- Moore, M., L. Pierce, and C. Paukert. Correlations of human activity with non-native fish species in North America at two spatial scales. Midwest Student Fisheries Colloquium, Champaign-Urbana, IL. 21 January 2012.
- Anglin, D., L. Pierce, and R. Hayward. Knowledge vs. habit: can angler's behavior be changed? Lessons learned from a class project. Midwest Student Fisheries Colloquium, Champaign-Urbana, IL. 21 January 2012.
- Paukert, C. Rivers and streams funding from USGS. Missouri Chapter of the American Fisheries Society Rivers and Streams Technical Committee, Jefferson City, MO. 13 March 2012.
- Paukert, C., and A. Pease. Effects of a warming climate on growth and consumption of smallmouth bass across a latitudinal gradient. 6th World Fisheries Congress, Edinburgh, Scotland. 8 May 2012.
- Paukert, C., J. Spurgeon, D. Whiting, E. Omana, and B. Healy. Evaluations of humpback chub translocations in Shinumo Creek with insights from food web dynamics from Bright Angel Creek. Glen Canyon Dam Adaptive Management Program Technical Working Group Meeting, Phoenix, AZ. 31 January 2012.
- Pease, A. Impacts of environmental change on the functional structure and diversity of stream fish communities. School of Agricultural, Forest and Environmental Sciences, Clemson University, Clemson, SC. 30 March 2012 and Department of Natural Resources Management, Texas Tech University, Lubbock, TX. 3 May 2012.
- Staudinger, M.D. Impacts of global change on biodiversity, ecosystem processes, and ecosystem services in the United States. University of Missouri, Department of Fisheries and Wildlife Sciences, Columbia, MO. 20 April 2012.
- Staudinger, M.D. The trophic role of cephalopods in Northwest Atlantic Ocean food-webs: implications for fisheries and climate change. Gulf Coast Research Laboratory, Mississippi. 26 April 2012.
- Staudinger, M.D. Climate change impacts on biodiversity, ecosystems, and ecosystem services. Developing a federal response to the PCAST Report on Sustaining Environmental Capital, Inter-Federal Agency Workshop, Washington DC. 9 May 2012.
- Webb, E.B. Life history needs of marsh birds. Missouri Department of Conservation Wetland Management Meeting. Spring 2012.
- Webb, E.B., P.R. Tidwell, M.P. Vrtiska, and A.A. Bishop. 2012. Effects of landscape context on waterfowl food selection and lipid acquisition. Rainwater Basin Joint Venture Informational Seminar, Hastings, Nebraska. Spring 2012.
- Westhoff, J., and C. Paukert. Thermal and physical habitat mapping of the Ozark National Scenic Riverways. Missouri Natural Resources Conference, Osage Beach, Missouri. 1 February 2012.
- Westhoff, J., and C. Rabeni. Use and selection of habitat by two species of crayfish determined by passive integrated transponder (PIT) telemetry. Society of Freshwater Science Annual Meeting, Louisville, KY. 23 May 2012.
- Whiting, D., C. Paukert, J. Spurgeon, and B. Healy. Diets and food availability of non-native trout in Bright Angel Creek, Grand Canyon: implications for native fish conservation. Society of Freshwater Science Annual Meeting, Louisville, KY. 23 May 2012.
- Whittier, J., C. Paukert, J. Olden, A. Strecker, and K. Pitts. Linking protected lands with streams of high biological conservation potential in arid systems: now and in the future. 6th World Fisheries Congress, Edinburgh, Scotland. 10 May 2012.

UNIT PUBLICATIONS IN 2011 AND 2012

- Schloesser, J., C. Paukert, W. Doyle, T. Hill, K. Steffensen, and V. Travnichek. In press. Fish assemblages at engineered and natural channel structures in the Lower Missouri River: implications for modified dike structures. *River Research and Applications*.
- Westhoff, J., A. Watts, and H. Mattingly. In press. Efficacy of artificial refuge to enhance survival of young Barrens topminnows exposed to western mosquitofish. *Aquatic Conservation: Marine and Freshwater Ecosystems*.
- U. S. Geological Survey. In press. Climate Change Impacts on Biodiversity, Ecosystems, and Ecosystem Services: Technical Input to the National Climate Assessment. [Lead Authors: S. Carter, F. S. Chapin III, N. Grimm, P. Kareiva, M. Ruckelshaus, M. Staudinger, A. Staudt, B. Stein]. Technical input to the National Climate Assessment Federal Advisory Committee.
- Staudinger, M., F. Juanes, B. Salmon, and A. Koske. In press. The distribution, diversity, and importance of cephalopods in top predator diets from the Northwest Atlantic Ocean. Accepted by *Deep Sea Research II* May 2012.
- Hanlon, R., K. Buresch, H. Moustahfid, and M. Staudinger. In press. *Doryteuthis pealeii*, Longfin inshore squid. In: R. Rosa and G. Pierce, and R. O'Dor (eds) *Advances in Squid Biology, Ecology, and Fisheries*. Nova Science Publishers, Inc. Hauppauge, NY.
- Cooke, S., C. Paukert, and Z. Hogan. 2012. Endangered river fish: Factors hindering conservation and restoration. *Endangered Species Research* 17:179-191.
- Pease, A., A. Gonzáles Díaz, R. Rodiles Hernández, and K. Winemiller. 2012. Functional diversity and trait-environment relationships of stream fish assemblages in a large tropical catchment. *Freshwater Biology* 57:1060-1075.
- Schloesser, J., C. Paukert, W. Doyle, T. Hill, K. Steffensen, and V. H. Travnichek. 2012. Heterogeneous detection probabilities for imperiled Missouri River fishes: implications for large river monitoring programs. *Endangered Species Research* 16:211-224.
- Westhoff, J., R. DiStefano, and D. Magoulick. 2012. Do environmental changes or juvenile competition act as mechanisms of species displacement in crayfishes? *Hydrobiologia* 683:43-51.
- DiStefano, R. and J. Westhoff. 2011. Range expansion by an invasive crayfish and subsequent range contraction of imperiled endemic crayfish in Missouri (USA) Ozarks streams. *Freshwater Crayfish* 18:37-44.
- Jeffress, M., C. Paukert, J. Whittier, B. Sandercock, and P. Gipson. 2011. Scale-dependent factors affecting North American river otter distribution in the midwest. *American Midland Naturalist* 166:177-193.
- Jeffress, M., C. Paukert, B. Sandercock, and P. Gipson. 2011. Factors affecting the detectability of river otters during sign surveys. *Journal of Wildlife Management* 75:144-150.
- Paukert, C., K. Pitts, J. Whittier, and J. Olden. 2011. Development and assessment of a landscape-level ecological threat index of the Lower Colorado River Basin. *Ecological Indicators* 11:304-310.
- Pease, A., J. Taylor, K. Winemiller, and R.S. King. 2011. Multi-scale environmental influences on stream fish assemblage structure in central Texas streams. *Transactions of the American Fisheries Society* 140:1409-1427.
- Pierce, L., B. Graeb, D. Willis, J. Sorensen, and M. Pegg. 2011. Stocking success of paddlefish in Lake Francis Case, South Dakota: population characteristics and sport fishery potential. *Transactions of the American Fisheries Society* 140:1359-1369.
- Staudinger, M. 2011. Species- and size-specific variability of mercury concentrations in four commercially important finfish and their prey from the northwest Atlantic. *Marine Pollution Bulletin* 62:734-740.
- Staudinger, M., R. Hanlon, and F. Juanes. 2011. Primary and secondary defenses of squid to cruising and ambush fish predators: variable tactics and their survival value. *Animal Behaviour* 81:585-594.
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Missouri Dept. of Conservation resource scientist Doreen Mengel (left) working with MO Unit staff on moist soil seed project

COLLABORATION AT MISSOURI UNIT

Missouri Unit scientists have strong collaborations throughout the US. Currently Missouri Unit scientists are collaborating with scientists from at least 20 states (shown in blue on map at right). These collaborations often include co-investigators on grants, co-authors on publications, committee members, or other research activities.



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MISSOURI UNIT HELP ASSESS EFFECTS OF CLIMATE CHANGE ON BIODIVERSITY

The Global Change Research Act requires a report to the President and the Congress on the effect of climate change every four years and the National Climate Assessment (NCA) is part of that report. The Missouri Unit staff were contacted to help with the technical input document for the section of the NCA that summarized how climate change will affect biodiversity, ecosystems, and ecosystems services.

Michelle Staudinger, a post-doctoral research with the Missouri Unit and the National Climate Change and Wildlife Science Center helped organize the workshop of over 60 experts in the field of climate change and biodiversity. The workshop was held in Palo Alto in January, and **Craig Paukert** was part of the panel. In addition, **Jodi Whittier** organized the travel and logistics for panel members. The end result was a 292 page document that provides the current state of the knowledge assessment on the effects of climate change on biodiversity and ecosystems services. The document is currently in press, but will be used to inform the NCA report to our government's leadership.

MDC AND MO UNIT RESEARCHERS ATTEND MARSHBIRD TRAINING

To prepare for future marsh bird research projects, **Lisa Webb** and MDC Resource Scientist **Doreen Mengel** attended a three day training workshop for marsh bird survey techniques in Yuma, AZ in late March. The training workshop was organized and led by Dr. Courtney Conway, Unit Leader with the Idaho Coop Unit.

*Emily Pherigo
and Michelle
Staudinger sam-
pling fish on the
Gasconade River*

