



PENNSYLVANIA
CHAPTER

PENNSYLVANIA CHAPTER

AMERICAN FISHERIES SOCIETY



July 2016 Newsletter



2015/2016 Chapter Officers:

President:
Doug Fischer



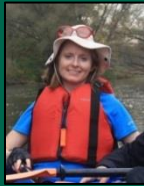
President-Elect:
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Past-President:
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Mary Walsh



ExCom 1:
Tom Shervinskie



ExCom 2:
Dave Argent



Student Representative:
Thomas Casey Weathers



Technical Meeting of the Pennsylvania Chapter of the American Fisheries Society

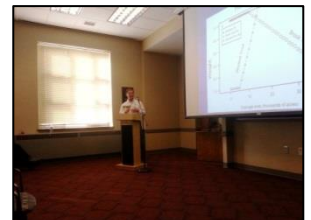
11 and 12 February 2016

**Degenstein Campus Center, Susquehanna
University**

Selinsgrove, PA

The Chapter drew nearly 70 participants to the Degenstein Campus Center in early February this year. There were 23 talks given and six posters presented. A myriad of topics were covered (see next page), but the main theme of the meeting was clearly the aquatic ecology of the Susquehanna River drainage. Many agencies and organizations were represented and about 20 students attended. The research of the Susquehanna River Heartland Coalition for Environmental Studies (SRHCES) was a focus of the meeting with many affiliated researchers presenting projects and participating in the SRHCES panel discussion that punctuated the meeting. To learn more about the mission of SRHCES visit their website: <http://www.srhces.org/>. The best student presentation went to Megan Kepler-Schall. The best poster award and the Cooper Award both went to Dan Isenberg. Megan's and Dan's abstracts can be found in the "Featured Projects" section of this newsletter.

<http://pa.fisheries.org/wp-content/uploads/2015/12/2016-PA-AFS-Meeting-Compendium.pdf>



Chapter updates available at: www.pa.fisheries.org

2016 Technical Meeting of the Pennsylvania Chapter of the American Fisheries Society

Continued...list of contributions



Plenary Speaker

Andrew Dehoff: Executive Director, Susquehanna River Basin Commission

Technical Sessions

Dustin Shull: Causal Analysis of the Smallmouth Bass Decline in the Susquehanna and Juniata Rivers

Geoffrey Smith: Comparing Drivers of Smallmouth Bass Reproduction and Recruitment in the Susquehanna River and Other Large Pennsylvania Rivers

***Megan Kepler-Schall:** Investigation of Smallmouth Bass Population Genetic Structure in the Susquehanna River Basin

Sheila Eyler: Migratory Fish Restoration in the Susquehanna River

Aaron Henning: Re-introduction Efforts and Current Status of American Eel in the Susquehanna River Basin

Luanne Steffy: Evaluation of Macroinvertebrate Communities in Exceptional Value and High Quality Streams within the Marcellus Shale Region of the Susquehanna River Basin

Kathleen Patnode: Use of In-situ Mussel Cages to Assess the Effects of Water Quality on Native Mussel Populations

Ben Page: Evaluation of Channel Catfish Spawning Success Using Pennsylvania Channel Catfish Spawning Boxes

Matthew Shank: Examination Of A Single-Unit Multiple Pass Electrofishing Protocol To Reliably Estimate Fish Assemblage Composition In Wadeable Streams Of The Mid-Atlantic, USA

Allen Keim: The Propagation and Management of Brown Trout (*Salmo trutta*) In the Pennsylvania Waters of Lake Erie

Eric Chapman: The Hunters Station Bridge Replacement Project: Quality Assurance/ Quality Control of Salvage operations for Threatened and Endangered Freshwater Mussel species in the Allegheny River

Patrick Shirey: Updating the AFS Policy Statements for Conserving Rare, Threatened and Endangered Aquatic Species

Tom Clark: Small Investment AMD Treatment Projects for Large Scale Brook Trout Restoration

George Merovich: Spatial and Predicted Outcomes of Watershed Restoration in an AMD-Impacted Watershed

Mike Millard: Aquatic Conservation Activities at the United States Fish & Wildlife Service's Northeast Fishery Center

Brian Wisner: Improvements in Effluent Water Quality Within the Pennsylvania Fish and Boat Commission's State Fish Hatchery Program

Gregory Moyer: Demographic Processes Influence Genetic Patterns of an Undescribed Redhorse

Susquehanna River Heartland Coalition for Environmental Studies Special Presentation Series

Mel Zimmerman: Contribution of Lycoming College's Clean Water Institute to the Pennsylvania Fish and Boat Commission's Unassessed Waters Project (2010 – 2015)

Peter Petokas: Artificial In-stream Habitat Structures for the Eastern Hellbender Salamander

Jonathan Niles: Brook Trout Population and Age Structure Recovery from a Catastrophic Flood in North Central Pennsylvania

Michael Bilger: The Diet of Crayfish in the Susquehanna River: A Preliminary View

Steve Rier: Polyphosphate and Stream Phosphorus Dynamics

Poster Session

Nathan Backenstose: Assessment of Fish and Macroinvertebrates Assemblages on Cucumber Run and its North Branch

Jordan Barton: Marcellus Shale Impact on In-stream Leaf Decomposition Via Sedimentation Across a Gradient of Land Use

Clayton Good: Comparing the Growth Rates and Population Parametrics of *Salvelinus fontinalis* of the Hammersley Fork and Cross Fork Stream Systems in the Kettle Creek Watershed

Chris Rocco: Use of Invertebrate Samples as an Indicator of Stream Community Health in the Allegheny National Forest

Kelsey Young: Surface area and prevalence of "blotchy bass" spots change over time in smallmouth bass (*Micropterus dolomieu*)

***Dan Isenberg:** Growth patterns of Channel Catfish in the Susquehanna River

*Student Award Winner, full abstract is included in the "Featured Project" section of this newsletter.

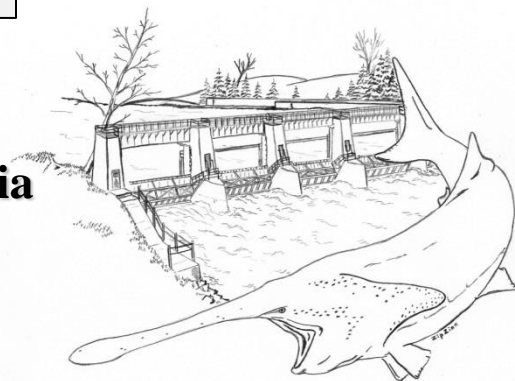
More meeting information here:
<http://pa.fisheries.org/>

Save the Date!

9-10 February 2017

**2017 Joint Meeting of the Pennsylvania
and West Virginia Chapters of the
American Fisheries Society**

**Where: California University of
Pennsylvania**



Treasurer's Report



As of April 2016 the Chapter account balance is \$13,194.33. Currently the Cooper Travel Award fund total is \$1,962.72. Recent expenses for the Chapter include the expenses (approximately \$4,400) for the Spring Technical Meeting. However, the meeting expenses were recovered by the registration fees.

PA Chapter Hats are still available!!!



PA Chapter throw back – the 1980s
Courtesy of Steve Kepler



Upcoming Event!!!



2016 Summer Social and Chicken Barbeque

- **When: Saturday 6 August 2016**
- **RSVP and registrations due no later than 30 July!!!**
- **Where: Camp Bason – Long Spring, along the West Branch of the Susquehanna (Ruth Ln, Mill Hall, PA 17751)**
- **This is a free event!**

Once again, Steve and Beth Bason have graciously agreed to host our annual summer picnic again at their river-side property, approximately 7.5 miles upstream of Lock Haven. Bring your family and share in our gratitude as we say goodbye to outgoing Executive Committee members and welcome our new officers.

Directions: 5.8 miles West on SR 120 from the red light at Lock Haven University. You will be turning right onto Long Spring Lane. The mapping programs (GPS) have not caught up to the name change from Ruth to Long Spring Lane.

More Summer Social information here:
<http://pa.fisheries.org/>

Agenda:

10:30 A.M. West Branch Paddle Trip (Pack a lunch) - Join the chapter for an informal canoe / kayak float trip down the West Branch Susquehanna. Paddlers can elect to float from "Camp Bason – Long Spring" to Lock Haven (~ 6 miles) or be transported up-river to DCNR's new Baker Run canoe / kayak launch and paddle to "Camp Bason" (~ 7 miles).

Contact Jordan Allison with paddle trip questions: jorallison@pa.gov / 570-337-5971

3:00 P.M. AFS Chapter Social & Chicken Barbeque (bring a dish) - Chicken / hotdogs / hamburgers and all the trimmings will be provided by the Chapter. Attendees are asked to bring a dish to share.

Presentation of Awards - share in our gratitude as we say goodbye to outgoing Executive Committee members and welcome our new officers



2016 Cooper Award Winner

Dan Isenberg

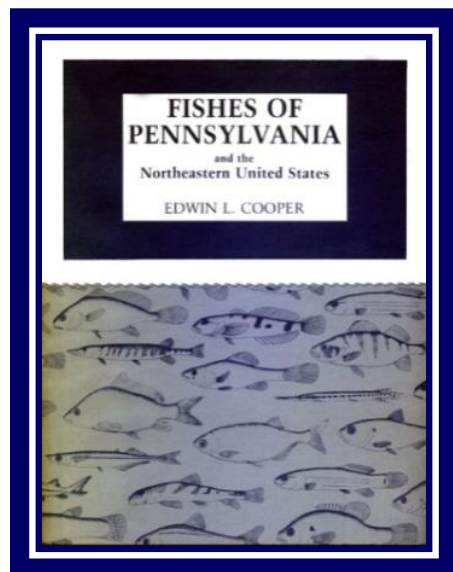
The Pennsylvania Chapter awarded the Cooper Award at its February 2016 Technical Meeting at Susquehanna University to Dan Isenberg. His project abstract, *Growth patterns of Channel Catfish in the Susquehanna River*, can be found in this newsletter's *Featured Projects* section.

The Cooper award was created to honor the memory of the late Penn State Professor Emeritus of Zoology, and famed author of *Fishes of Pennsylvania and the Northeastern United States*, Edwin Lavern Cooper, Ph.D. Under this program, the Pennsylvania Chapter provides a travel award to deserving Pennsylvania graduate and/or undergraduate students to attend a professional meeting.

The Chapter will soon be soliciting abstracts for the next Cooper Award. Student applicants are asked to submit a 500- to 700-word article explaining their own research, or a research project in their laboratory or college/university. The article must be written in a style (i.e., journalistic) understandable to the general public. Students may write about research that has been completed, is in progress, or is in the planning stages.

A committee chaired by Mary Walsh and selected by our Chapter's Executive Committee will judge all entries. Contact Mary at pachapterafs@gmail.com and watch the PAAFS for the article submission deadline.

Edwin Lavern Cooper, Ph.D. 1919 – 2009





The PA Chapter 2016 election results have been tabulated and we are pleased to announce that the new slate of officers will be assuming their duties after a brief swearing-in ceremony at the Summer Social. Membership voting increased from the previous year and we believe this is a reflection of increased interest in the Chapter and Chapter activities. Congratulations to all as we look forward to a continued high level of energy and enthusiasm to move the Chapter forward. The following members have been elected to serve during the 2016-2017 year.

President-Elect

Tim Wertz

Pennsylvania Department of Environmental Protection

Tim Wertz currently serves as a Water Pollution Biologist for the Pennsylvania Department of Environmental Protection (DEP), where he focuses on biological assessments using fish communities. Prior to this, Tim worked as a Mining Conservation Inspector for DEP out of their Moshannon Office. Tim has also spent a number of years working as a seasonal employee with the PA Fish and Boat Commission's Division of Environmental Services. Tim holds a degree in Wildlife and Fisheries Science from Penn State University and can be found hunting and fishing when he's not working on house projects.



Executive Committee

Allen Keim

Pennsylvania Fish and Boat Commission

Allen was hired by the Pennsylvania Fish & Boat Commission as a Fish Culturist at the Pleasant Gap State Fish Hatchery in 2010. In 2012, he accepted his current position as Fisheries Technician in the Cooperative Nursery Unit in the Division of Fish Production Services at Benner Spring State Fish Hatchery and Research Facility. Most of his time with this position is spent inspecting trout nurseries, offering technical guidance to our volunteers, and conducting fish health emergency inspections at the 162 nurseries that we operate statewide. Allen earned a B.S. degree from Mansfield University in Fisheries Biology in 2008 and during that time was fortunate enough to work with the US Fish and Wildlife Service working with Atlantic Sturgeon, Striped Bass, and Atlantic Salmon at their office in Lamar, PA. Outside of work Allen enjoys hunting, fishing for Smallmouth Bass (when his wife lets him!) and also spending time with the newest addition to his family, his daughter Kennedy.





Secretary / Treasurer

Mary Walsh

Western Pennsylvania Conservancy

Mary was re-elected as Secretary/ Treasurer of the Chapter. she has worked in the aquatic resource field for 16 years. She's an aquatic ecologist with the PA Natural Heritage Program at Western Pennsylvania Conservancy. She works on invasive species tracking, surveys of rare species, conservation of freshwater organisms, and conservation planning. Mary's education includes a B.S. in Ecology, Ethology, and Evolution from the University of Illinois at Urbana-Champaign and a M.S. in Ecology from Penn State University. Mary's been the PA AFS Chapter Secretary-Treasurer since August 2016.



Student Representative

Megan Kepler Schall

The Pennsylvania State University

Megan is currently pursuing a PhD at Penn State University studying research topics related to smallmouth bass ecology and health in the Susquehanna River basin. She began this work in 2013 after the completion of her MS degree (August 2013) at Penn State University on bioenergetics of two lake trout morphotypes. Prior to her graduate work, Megan received a BS in Biology (2009) from Lock Haven University and completed two fisheries internships during her time there. Megan was born and raised in central Pennsylvania and has a deep connection to both fisheries research and protecting environmental resources. Her current research on smallmouth bass involves a wide range of research topics including population genetics, radio-telemetry, fish health research, and emerging contaminants. During any free time she may have, Megan enjoys spending time outside, whether it be hunting with her husband or taking her dog Lily with her almost everywhere she goes.



California University Subunit Updates

Officers

- President: **Trevor Troxel**
- Vice President: **Nick Nelson**
- Secretary/Treasurer: **Tom Chapman**
- Web Coordinator: **Levi Kraus**
- Faculty advisor: **Dr. Argent**



Trevor Troxel (current CalU AFS president) holding a whopper (Rock Bass).



Sarah Martin fin clipping a Brown Trout, Trout Run, Lake Erie.

Activities

Fall 2015:

- Canoe Trip down the Yough River
- Trip to National Fish Hatchery, Lamar, PA
- Family Field Day, CalU in conjunction with CalU Wildlife Society Chapter
- Club and Organizational Fair, CalU
- NAN (Northern Appalachian Network) Conference, CalU Making safe seafood choices
- 10-mile Creek Stream Clean up
- Electrofishing, 10-mile Creek
- Electrofishing, Conemaugh River (assistance to Conemaugh Valley Conservancy)
- Steelhead Collection, Trout Run - Reynoldsdale Hatchery
- Gillnetting for Asian Carp, Ohio River (assistance to PA Fish and Boat Commission)

Spring 2016:

- Attended PA Chapter AFS Meeting, Susquehanna University
- Attend SD AFS Meeting, Wheeling, WV
- Professional Speaker Series: Mrs. Megan Kepler Schall, Dr. Patrick Shirey and Mr. Anthony Honick
- Hatchery Tour - Rolling Rock Hatchery, Laughlintown, PA
- Walleye spawning, Linesville fish hatchery
- Participated with CalU's Earth Week
- Stocking Pike Run
- Pike Run Fishing Festival
- 10-mile Creek Stream Clean Up
- Marianna Canoe Race and Anything that Floats



CalU AFS Members, electrofishing crew sampling the Conemaugh River. From left to right, Trevor Troxel, Becky Hixenbaugh, Dr. William Kimmel, Dr. David Argent, Nathan Bakenstose, Sean Wineland, Adam Scheirer, Kansas Michaels, and Chrissy Edwards.



Walleye collection and spawning trip, Linesville Hatchery. From left to right, Austin Hess, Chris McConnell, and Jordan Packard.

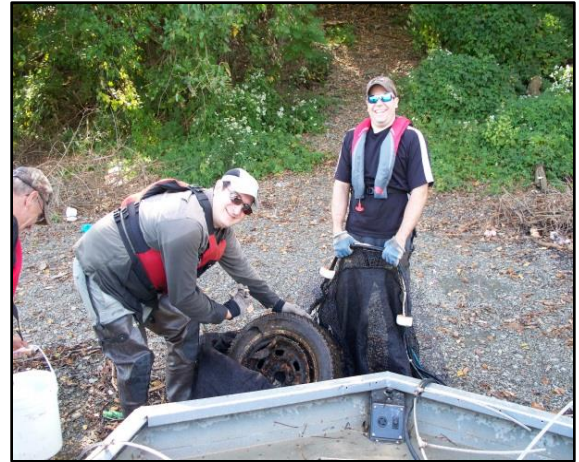


Featured Projects



Recently Developed Sampling Methods Reveal Distribution Changes in Three *Etheostoma* Darters (subgenus *Nothonotus*) within the Upper Ohio River Watershed

Anthony S. Honick and Dr. Brady Porter
Duquesne University



Dr. Porter and A. Honick identifying their catch.

Within the upper Ohio River watershed, *Etheostoma* darters of the subgenus *Nothonotus* have been documented in disjunct populations and were listed as threatened or endangered in Ohio and Pennsylvania. Surveys in the early 2000s of large riverine habitats utilizing the modified mini-Missouri trawl and the newly developed PSU electrified-benthic trawl suggested that these species were utilizing tailwater habitat below navigational lock and dam (L/D) installations and mainstem habitats that were not easily surveyed. Because *Etheostoma camurum* (Bluebreast darter), *Etheostoma tippecanoe* (Tippecanoe darter), and *Etheostoma maculatum* (Spotted darter) are often found associated with each other in similar habitats, we hypothesized that all 3 species were occupying tailwater habitat below navigational L/Ds on the Allegheny, Monongahela, and Ohio Rivers. Additionally, we gathered contemporary and historic distribution data to re-assess their distributions in the upper Ohio River watershed. Electrified-benthic trawling documented *E. camurum* and *E. tippecanoe* below 8 L/D installations, but *E. maculatum* was only documented below one L/D. In the Ohio River, benthic trawling documented *E. camurum* and *E. tippecanoe* utilizing habitat located within gravel outwashes and areas above and below islands. Compiling survey data, we show that these species have extended their distributions into the large riverine environment, with *E. camurum* and *E. tippecanoe* demonstrating expansion throughout the Allegheny and Ohio Rivers from the upper reaches of the Allegheny and French Creek in Pennsylvania downstream to the confluence with the Scioto River in Ohio. However, *E. maculatum*'s expansion has been more limited and warrants close monitoring. Our study confirms the effectiveness of utilizing trawling and electrified-benthic trawling in non-wadeable rivers to survey for benthic species such as river-inhabiting darters.



2016 Technical Meeting, Best Student Presentation Winner: Megan Kepler Schall

Investigation of Smallmouth Bass Population Genetic Structure in the Susquehanna River Basin

Schall, M.K.^{1,2*}, T. Wagner⁴, V.S. Blazer³, M.L. Bartron⁵, and T. Wertz⁶

¹ Intercollege Graduate Degree Program in Ecology, Pennsylvania State University, University Park, Pa USA

² Pennsylvania Cooperative Fish and Wildlife Research Unit, 413 Forest Resources Building, Pennsylvania State University, University Park, PA 16841 USA mvk10@psu.edu


³ U.S. Geological Survey, Pennsylvania Cooperative Fish and Wildlife Research Unit, Pennsylvania State University, 402 Forest Resources Building, University Park, PA 16802 USA txw19@psu.edu

⁴ U.S. Geological Survey, Fish Health Branch, Leetown Science Center, 11649 Leetown Road Kearneysville, WV 25430 USA vblazer@usgs.gov

⁵ U.S. Fish and Wildlife Service, Northeast Fishery Center, 308 Washington Avenue, Lamar, PA 16848 USA [Meredith Bartron@fws.gov](mailto:Meredith_Bartron@fws.gov)

⁶ Pennsylvania Department of Environmental Protection, Rachel Carson State Office Building, 400 Market Street, Harrisburg, PA 17101 twertz@pa.gov

There have been concerns about decreases in abundance of smallmouth bass (*Micropterus dolomieu*) in the Susquehanna River basin, with declines being attributed to poor recruitment into the adult smallmouth bass population. Since the initial declines in abundance of adult fish and more recent observations of disease and mortality of juvenile fish, a wide range of potential environmental stressors have been identified as potential contributing factors, including pathogens, water quality, and contaminants. Recent radio telemetry research on smallmouth bass has documented the importance of both tributary and river main-stem habitat in the Susquehanna River for completing essential life-history requirements. Additionally, the radio-telemetry study demonstrated intermixing of tributary and river-tagged fish, but population-level implications (i.e., gene flow) of these movements are unclear. To gain insight on how smallmouth bass are genetically structured in the Susquehanna River basin, we completed a population genetics study. Tissue samples were collected from 24 sites within the Susquehanna River basin and one out of basin site (the Allegheny River). The overall goal of this research was to assess connectivity and genetic population structure from both tributary and river sites across the Susquehanna River basin, and to determine how the Susquehanna River basin sites genetically compare to an out of basin site. A total of 1,034 fin clips were collected during the spring of 2015 for genetic analysis. These samples were collected during pre-spawn conditions and were analyzed with microsatellite markers to investigate differences within and among populations. Results indicate a lack of genetic structure between sites within the Susquehanna River basin (mean pairwise $F_{ST} = 0.01$). The Allegheny River site, in general, was the most different from sites within the Susquehanna River basin. Additionally, within the Susquehanna River, a small number of sites, including one of the most isolated sites, were significantly different from several other sites (mean pairwise $F_{ST} = 0.03$), but combined with other metrics of differentiation, were not sufficiently different to be considered separate populations. Overall, our results provide insight on the connectivity and genetic structure of smallmouth bass in the Susquehanna River basin, and may prove useful for informing fisheries management decisions and for investigations into the potential role disease and contaminants play in poor recruitment events.

A black rectangular box with a decorative border of small, light-colored, irregular shapes. Inside the box, the text "Featured Projects, continued" is written in a bright green, sans-serif font.

2016 Cooper Award and Poster Award Winner: Dan Isenberg

Growth patterns of Channel Catfish in the Susquehanna River

Dan Isenberg ¹, Geoff Smith ², and Jonathan Niles ¹

¹ Freshwater Research Initiative, Susquehanna University

² Pennsylvania Fish and Boat Commission

Channel Catfish (*Ictalurus punctatus*) is a common species in aquaculture and recreational fisheries in North America. They naturally occur from northern Mexico to southern Canada, with a large portion of research on the species taking place in the central to southern Mississippi River basin. However, in Pennsylvania, little is known about population characteristics of Channel Catfish, including age and growth. Typically, northern populations of Channel Catfish show a tendency to have slower growth rates, while southern populations show a tendency for a faster growth rates. This study seeks to determine how the growth patterns of Channel Catfish shift throughout the length of the Susquehanna River. We attempted to create natural-state growth models for two reaches of the Susquehanna River in central Pennsylvania. These growth models will allow resource agencies to better manage Channel Catfish populations.

Introduction

Catfish play a large role in the freshwater fisheries industry. In North America, Channel Catfish (*Ictalurus Punctatus*) are the primary catfish raised in every state. The Mississippi River basin is the hub of channel catfish fisheries, often the home for a large amount of research on Channel Catfish. This is due to the ease of studying the fish in this environment. Fisheries provide a unique opportunity that most scientists do not have, a natural yet manipulative environment. This type of research setup allows for a controllable environment that is similar to their naturally occurring environment.

However, what all of these growth studies lack is the true natural environment component. In aquaculture ponds there is no stress put on the fish. These issues can be addressed by performing a growth analysis on a watershed. This type of analysis would show growth under natural conditions and would have an additional benefit to the fisheries studies.

While smaller river systems are not often locations for rearing Channel Catfish they are often locations for wildlife management services to stock and maintain populations of certain fish species. Wildlife management will attempt to maintain or at least understand the ecosystem, as well as, the health of the fish populations. By knowing the average growth and ages of fish in a system they can calculate the amount that should be stocked and how old the population is.

Featured Projects, continued

In Pennsylvania Channel Catfish are one of the most stocked fish species with yearly stocking numbers averaging 175,000 individuals (Lorantus et al. 2005). However, growth of Channel Catfish is not known for any of the main drainages throughout Pennsylvania. The Susquehanna River is one of the main river drainages in Pennsylvania which means Channel Catfish growth rates could vary throughout the system which is what this study is focusing on. Channel Catfish have been known to have a slower Growth rate at higher altitudes and higher longitudes (Shepard and Jackson 2006). Unfortunately the previous study may be moot due to the Susquehanna River's northern position. Jackson's study was performed on the Southern Mississippi River which has very little in common with the Susquehanna River Basin.

A lack of information on this species in their northern range makes this study important. This study seeks to determine age structure, growth, and population estimates of channel catfish in the Susquehanna River. This study will add to already dense knowledge of channel catfish growth by not only determining a northern growth rate but also if Jackson's theory of growth holds true at the upper reaches of Channel Catfish's native range.

Methodology

All channel catfish collected for this study were done so by one of two methods, Electro-shocking via an electroshock boat or passive hoop nets. Hoop nets were the primary form of collection. Nets were let to soak for 72 hours. In the field Channel Catfish (*Ictalurus punctatus*), had total length recorded (mm), and twenty of each size class were returned to the Freshwater Research Initiative Lab at Susquehanna University. In the lab total length of the fish (mm), weight (g) were recorded and otoliths of each fish were removed. Otolith mounting occurred followed by sanding. The otolith was sanded until the hilt and the slide was placed under a dissecting microscope where annuli were counted and recorded as the fish's age.

Results

Results from this study are not finalized. Preliminary data processing shows slight differences between the two halves of the river. This cannot be stated as a definite result until all data sets are analyzed and compared



Ever wonder how a photographer pulls off presentation quality pictures of live fish? The photo to the left is one of the many tank and flash set-ups that Rob Criswell has used over the years for publications like the PA Angler and the book, *Fishes of PA* (2016). Various arrangements of these can be set up at home or in the field like the tanks below on the banks of the Scioto River in Ohio.



A decorative banner with a dark background and a pattern of light-colored, irregular shapes. The text "Featured Projects, continued" is written in a bright green, sans-serif font across the center of the banner.

Current Status of the Susquehanna Smallmouth Bass Study

Dustin Shull and Timothy A. Wertz
Pennsylvania Department of Environmental Protection

Natural fish mortality due to disease, predation, angling injuries and age is common. However, prior to 2005 no significant mortality events were noted on the Susquehanna River. Beginning in 2005, moribund Young of Year (YOY) Smallmouth Bass (SMB) and high mortality rates were observed. Additionally, length-frequency distribution of adult SMB during pre-2005 surveys were substantially different than post-2005 surveys, suggesting a change in population characteristics resulting from reduced YOY recruitment. Consequently, the Pennsylvania Department of Environmental Protection (PADEP) requested assistance from the United States Environmental Protection Agency (EPA) in identifying the causes of the SMB declines on the Susquehanna River. EPA's stressor identification process, known as the Causal Analysis/Diagnosis Decision Information System (CADDIS), provides a framework for identifying the cause of an environmental problem by determining which of a set of alternative candidate cause(s) is best supported by the body of evidence.

In cooperation with the Pennsylvania Fish and Boat Commission (PFBC), PADEP and EPA scheduled three workshops that included representatives from various State, Federal and academic organizations including, Susquehanna River Basin Commission (SRBC), United States Geological Survey (USGS), United States Fish and Wildlife Service (USFWS) and Susquehanna River Heartland Coalition for Environmental Studies (SRHCES). These workshops were the framework used to make a preliminary determination for the cause(s) of the case, detailed below. The case was defined as a decrease in abundance of SMB as a result of poor recruitment into the adult population. The temporal frame of the effect was established as 2005 to the present, since 2005 was the initial year that the decline was recorded. However, some longer term trend data were reviewed in order to elucidate the relationship between several candidate causes and the effect. The spatial range or study area was identified as the Susquehanna River from Sunbury to York Haven and the Juniata River from Port Royal to the mouth. These were the reaches identified to have a decrease in SMB abundance. In-basin and out-basin comparison sites were used throughout the State and may have disease documented, but SMB declines were not observed.

A total of 14 candidate causes were identified (Figure 1) during the first CADDIS workshop. Over 50 worksheets consisting of almost 400 pages of information were used as the evaluation culminated. Each worksheet was evaluated and scored using data available at that time, and as new data are collected results are considered dynamic.

Featured Projects, continued

	List of Candidate Causes:	Direct Cause	Synergistic Effect
1	High Flows	Unlikely	
2	Intraspecific Competition (Competition within the SMB species)	Unlikely	
3	Interspecific Competition (Competition with other species, possibly invasive species)	Uncertain	Uncertain
4	YOY Food quality	Unlikely	Uncertain
5	Egg Quality	Uncertain	Uncertain
6	YOY Habitat Degradation	Uncertain	Uncertain
7	High Temperature	Unlikely	Uncertain
8	High pH	Unlikely	
9	Low Dissolved Oxygen	Unlikely	Uncertain
10	High Ammonia	Unlikely	
11	Algal and Bacterial Toxins	Uncertain	Uncertain
12	Toxic Chemicals: Pesticides/ Polychlorinated Biphenyls (PCBs)/Metals	Unlikely	
13	Toxic Chemicals: Herbicides/Endocrine Disrupting Compounds (EDCs)	Most Likely	
14	Pathogens and Parasites	Most Likely	Uncertain

Figure 1. Candidate causes identified in the first CADDIS workshop, and likelihood of those causes determined at the end of workshop three. "Uncertain" refers to data limitation or an area that needs further study.

The full CADDIS report can be found at the DEP website listed below and represents an unprecedented amount of work from many dedicated people across multiple agencies and organizations. It is the culmination of the current understanding as it relates to the SMB population decline in the Susquehanna River and will serve as the starting-block for continued research. Considerable amounts of data were not included because they were still being processed or collected in the field. Consequently, many sub-lethal, complex interaction hypotheses were not fully developed and analyzed. Future areas of study include factors contributing to the likely causes of immunosuppression, and increased pathogen and parasite abundance. Additionally, potential interactions between physicochemical parameters, nutrients, emerging contaminants, algal toxins and their relationship to SMB YOY still require further investigation.

<http://www.dep.pa.gov/Business/Water/PointNonPointMgmt/WaterQuality/Pages/SusquehannaRiverStudy.aspx>



Left: Chapter member and Past-President, Rick Spear of the PADEP is all smiles in the field during a benthic trawl survey of the Allegheny River in 2011.

Right: Chapter member Steve Kepler (PFBC ret.) and his daughter, Megan Kepler Schall, our incoming student rep, both enjoy the events at the 2015 joint meeting of the PA and OH Chapters in Erie, PA.

Photos: D. Fischer



Featured Projects, continued

Mussels on the Move: An Interstate Effort to Recover Two Federally Endangered Species

Jordan Allison and Nevin Welte

The Northern Riffleshell, *Epioblasma torulosa rangiana* and Clubshell, *Pleurobema clava* historically occurred in many Ohio River tributaries as well as portions of the Lake Erie and Lake Huron Watersheds from Alabama to Michigan and West Virginia to Illinois. However, their current distribution has decreased by approximately 90% with contemporary records in only 21 of the roughly 154 waterways in which they were collected historically. Within Pennsylvania, Northern Riffleshell and Clubshell have either singly or both been extirpated from waterways like the Beaver River, Conewango Creek, Dunkard Creek, Mahoning Creek, Raccoon Creek and the Shenango River. Further exacerbating the reduction in geographic range, many extant populations are not exhibiting signs of successful reproduction or recruitment leaving biologists in limbo about their long-term viability. However, two of Pennsylvania's waterways, French Creek and the Allegheny River still support robust reproducing populations which can and are serving as a source of animals for species recovery projects.

After more than two decades of planning, an unparalleled effort to recover these two species is currently underway. The initiative began in 1994, when The Pennsylvania Department of Transportation started planning for the replacement of the Hunter Station Bridge which spans the Allegheny River near Tionesta, Pennsylvania. Through collaborative efforts by many Federal, State and Tribal agencies as well as non-governmental and private organizations, a plan was developed to salvage a proportion of the approximately 137,000 individuals of the protected mussel species slated to be impacted by the bridge project. Partners from Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania, West Virginia and the Seneca Nation have all developed reintroduction/augmentation and monitoring plans to utilize the animals from the Hunter Station Bridge Project for species recovery efforts.



Left to right: Pennsylvania Fish and Boat Commission Malacologist Nevin Welte, Western Pennsylvania Conservancy Biologist Ryan Miller, Pennsylvania Fish and Boat Commission, Division of Environmental Services Chief (ret.) Dave Spotts.

Featured Projects, continued



Tagged Northern Riffleshell mussels to be placed at one of sites on Conewango Creek Warren County, Pennsylvania.

Although we have completed the first leg of our journey to recover these two species in Pennsylvania, much work remains. In 2016, we plan to relocate at least one of the two species to each of the two Conewango Creek sites as monitoring results for Clubshell and Northern Riffleshell were favorable. However, stocking mussels is not the end of the road. After all the mussels have settled into their new homes the process of long term monitoring begins. Over the next five to seven years, we will periodically return to the sites to assess the survival of relocated individuals, examine their growth rates, and search for signs of reproduction and recruitment. If our efforts are successful, *i.e.* we establish one or more reproducing populations; we will have restored these species to several Pennsylvania creeks and rivers in which they have not been seen in over 100 years.

In 2014, the Pennsylvania Fish and Boat Commission kicked off Pennsylvania's efforts by stocking three experimental plots in the Shenango River and two in Conewango Creek with 90 individuals of each species. Each individual had a PIT Tag affixed to their shell to allow us to assess survival and growth on a small scale to answer questions about water quality and habitat suitability before large reintroduction/augmentations efforts could take place. After a year in the substrate, biologists returned to the sites in 2015 to recapture the stocked individuals. Detection and survival rates varied by site and waterway but were generally good. For example, of the 270 Clubshell we stocked in the Shenango River across the three sites, we were able to recapture 245 individuals of which 228 had survived. This gave us a detection rate of 90.7% and a survival rate of 84.4%.

The results of our monitoring demonstrated that Clubshell survived well in their new home and in September of 2015 the first large scale augmentation efforts on the Shenango River took place. Biologists from, EnviroScience Inc., the Pennsylvania Fish and Boat Commission, and the Western Pennsylvania Conservancy placed approximately 1,600 Clubshell upstream of Greenville in Mercer County.



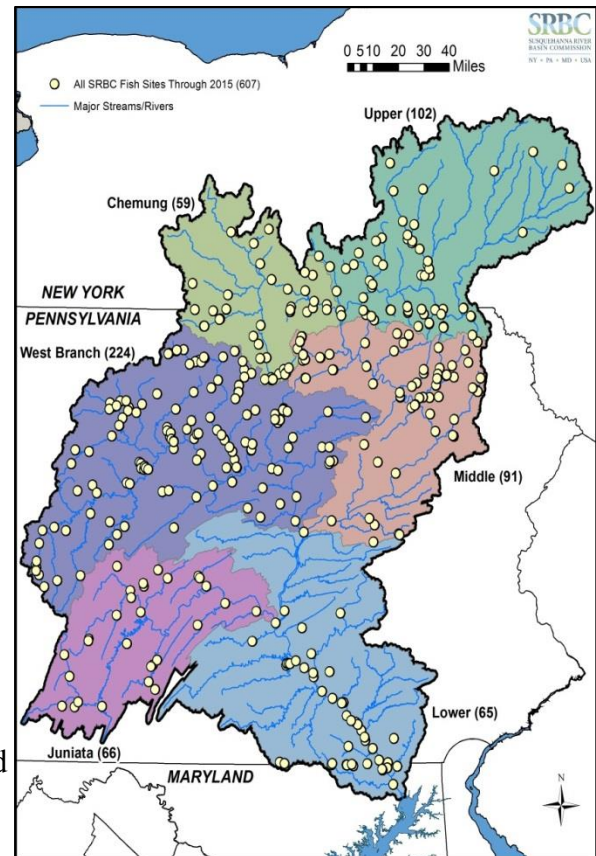
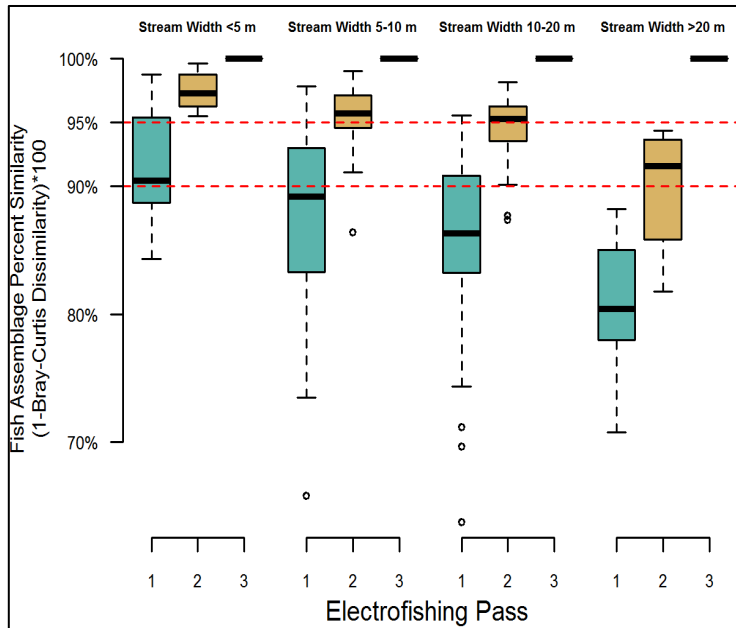
EnviroScience Inc., Pennsylvania Fish and Boat Commission and Western Pennsylvania Conservancy biologists placing approximately 1600 Clubshell mussels at a site on the Shenango River in 2015.

Featured Projects, continued

The ‘SRBC Method’ Electrofishing Protocol for Wadeable Streams

Matt Shank, Aaron Henning and Andy Leakey

Matt Shank, Aaron Henning and Andy Leakey of the Susquehanna River Basin Commission recently published a manuscript outlining the ‘SRBC method,’ a single-unit, multiple pass electrofishing protocol for wadeable streams. This paper presents an efficient method for obtaining reliable estimates of fish assemblage composition from streams throughout a large range of sizes. This width-based electrofishing protocol could be useful for resource (gear, manpower) limited crews.



SRBC has performed 607 electrofishing surveys throughout the Susquehanna River basin from 2008 to 2015. This data comprises the entire fish assemblage at each site and primarily uses the ‘SRBC method’ explained above. This data is available upon request or online using the SRBC water quality portal:

<http://mdw.srbc.net/waterqualityportal>.

Shank, M.K., A.M. Henning, and A.S. Leakey. 2016. Examination of a Single-Unit, Multiple-Pass Electrofishing Protocol to Reliably Estimate Fish Assemblage Composition in Wadeable Streams of the Mid-Atlantic Region of the USA. *North American Journal of Fisheries Management*. 36(3):497-505, DOI:10.1080/02755947.2016.1141122



Dr. David Janetski

Indiana University of
Pennsylvania



Dr. Janetski is an Assistant Professor of Biology at Indiana University of Pennsylvania (IUP), where he has been for two years. He holds B.S. (2002) and M.S. (2006) in Biology from Brigham Young University, and a Ph.D. (2012) in Biology from the University of Notre Dame. His past research focused on the ecological impacts of Pacific salmon introductions on Great Lakes tributaries, including nutrient subsidies, disturbance, and transport of organic pollutants. From 2012-14, Dr. Janetski was a postdoctoral researcher at the Annis Water Resources Institute in Muskegon, MI, where he studied spatiotemporal patterns of fish community structure and yellow perch population dynamics. At IUP, Dr. Janetski's research program aims to prepare students for successful careers in aquatic ecology and conservation. Current projects include yellow perch stock structure in west Michigan, brook trout passage through culverts, effects of anti-depressants on aquatic organisms, and interactions between brown trout and smallmouth bass. This summer, he is looking forward to involving students in the Pennsylvania Fish and Boat Commission's Unassessed Waters Program.

Heather is a Fisheries Biologist at the Pennsylvania Fish and Boat Commission (PFBC), where she currently serves as the Chief of the Natural Gas Section within the Environmental Services Division. Heather holds a B.S. degree (1994) in Wildlife and Fisheries Science from Penn State University. Heather has worked in the environmental field for the last 22 years and is currently enrolled in the Leadership Development Institute Class of 2016. As Chief, her primary responsibility is to coordinate the review of all permit applications from activities associated with the development and transport of natural gas products in Pennsylvania from unconventional gas wells. Heather and her staff develop proactive measures to assemble baseline biological information, participate in the Unassessed Waters Initiative, comment on or negotiate permit conditions, and aid industry in the monitoring of permit conditions to ensure protection of aquatic resources and other species under PFBC jurisdiction. .

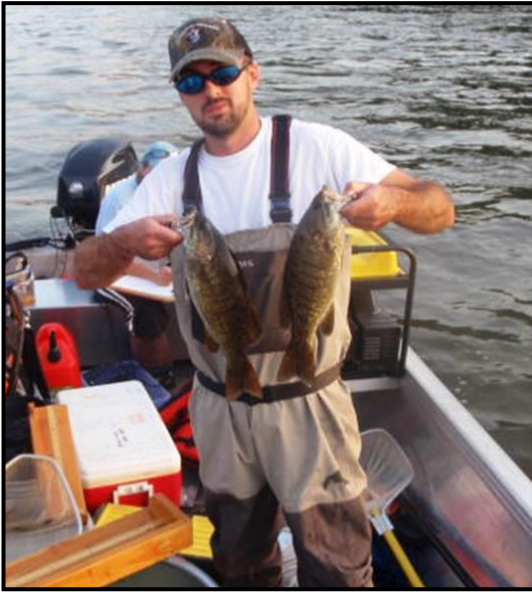
Heather Smiles

Pennsylvania Fish and Boat
Commission



Aaron M. Henning

Susquehanna River Basin
Commission



Aaron M. Henning is an Aquatic Biologist at the Susquehanna River Basin Commission, where he has been working since 2010. He is also a Certified Fisheries Professional and a 2007 graduate of Penn State. Aaron manages multiple projects for the Commission including American eel re-introduction, smallmouth bass monitoring and has recently begun overhauling SRBC's large river assessment project working in close cooperation with PADEP. He is also the Commission's biologist assigned to the re-licensing of hydroelectric projects within the basin. He serves as the agency's fisheries lead and taxonomist for EPA's national surveys and holds positions on technical advisory committees for smallmouth bass and migratory fish restoration. Areas of interest include rare, threatened and endangered species, hydroelectric/energy development, nonnative fish distributions and crossing political boundaries to study fish. He has worked in every major drainage in the Commonwealth and frequently collaborates with and supports fellow resource agencies' fisheries-related projects.

Matthew K. Shank

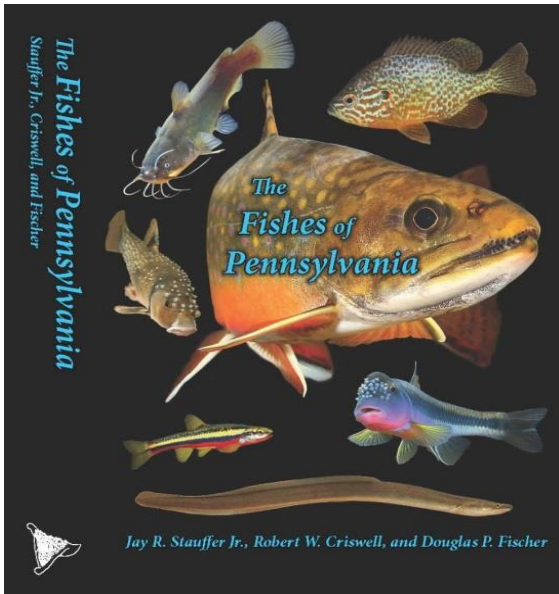
Susquehanna River Basin Commission

Matt is a Certified Fisheries Professional that has been serving as an Aquatic Biologist with the Susquehanna River Basin Commission since 2008. Matt holds a B.S. degree (2008) in Environmental Studies from Gettysburg College and a M.S. degree (2013) in Fisheries Science from Penn State. Matt has facilitated the expansion of SRBC monitoring activities in recent years by developing protocols, designing studies, and optimizing efficiency. Matt's primary responsibilities at SRBC include assisting the regulatory program with collection and review of biological data at proposed water withdrawals and by conducting research examining the effects of streamflow alteration on stream ecology. Recent research includes a comprehensive study of *Didymosphenia geminata* in Pennsylvania and an investigation of the effects of water withdrawals and impoundments in small watersheds on fish and macroinvertebrate assemblages. Additional professional interests include aquatic invasive species and using statistics to understand environmental data and guide management decisions.





Keystone Update !!!



THE FISHES OF PENNSYLVANIA

Jay R. Stauffer Jr., Robert W. Criswell, and Douglas P. Fischer

An Announcement of Publication

Douglas P. Fischer
Pennsylvania Fish and Boat Commission

After nearly twenty years in the making, Dr. Jay R. Stauffer Jr. (Pennsylvania State University), Robert W. Criswell (Pennsylvania Biological Survey), and Douglas P. Fischer would like to announce the 2016 publication of the book “The Fishes of Pennsylvania.”

The “Fishes of Pennsylvania” is certainly not a new subject. Edward D. Cope (1881) and Tarleton H. Bean (1892) authored early accounts of the fishes from Pennsylvania. Henry W. Fowler authored multiple reports and annotated lists focused on the fishes of Pennsylvania, culminating in “A List of the Fishes Recorded from Pennsylvania,” published in 1940. Dr. Edwin L. Cooper authored the commonwealth’s first regional reference book, “Fishes of Pennsylvania and the Northeastern United States,” published in 1983. In the intervening years between then and now, a wealth of information has become available due to our efforts and those of many others.

We have attempted to present comprehensive and current information with a mixed audience of researchers, fisheries professionals, and sportsmen and women in mind. Each freshwater and migratory species regularly occurring in Pennsylvania received a full species account, in addition to family and genera accounts. The species accounts contain descriptions of identifying characteristics (including dichotomous keys), color photographs of each species, colored distribution maps organized into three time periods, biological and ecological information, a conservation status summary, and additional remarks, where appropriate. The book’s chapters provide a description of the history of ichthyology in Pennsylvania, the waterways of the commonwealth, the origin of fish fauna, introduced fishes, conservation efforts, the study of fishes, basic anatomy, characters and methodology for identification, collection techniques, photography, videography, and sport fishing opportunities (guest-authored by John Arway, PFBC Executive Director). Rob Criswell’s vibrant color photography has been used liberally throughout the book. The formatting and layout are well thought out and easy on the eyes thanks to our publisher, Ad Konings (Cichlid Press, El Paso, Texas). Illustrations by Nevin Welte (PFBC and Western Pennsylvania Conservancy) also adorn many pages where pictures were unavailable or unable to capture characters which an artist can clearly present.

We hope the product of our efforts is well received and serves as another stepping stone advancing the study and appreciation of fishes in Pennsylvania. The Pennsylvania Fish and Boat Commission and United States Fish and Wildlife Service provided generous support for this project at multiple stages and has enabled the book to become available this fall at a modest cost of ~\$50. Sometime later this summer, hardcover copies will be available. We will forward additional information to the Pennsylvania Chapter AFS listserv as it becomes available.



Update from New York !!!

Atlas of Freshwater Fishes of New York

Douglas M. Carlson, Robert A. Daniels, and Jeremy Wright

An Announcement of 2016 Publication and Availability

The recently completed Atlas of Inland Fishes of New York is available from the online journal *NYS Museum Record* at no cost. The atlas has accounts for 179 fish species with detailed maps, fish pictures and annotations, in the 370 pages. The 460,000 fish records are available through a link to the entire data set. The full length atlas can be downloaded at: <http://www.nysm.nysed.gov/publications/record>

Additional information is available on the New York Chapter AFS website:



New York Chapter

of the American Fisheries Society

<http://newyork.fisheries.org/atlas-of-inland-fishes-of-new-york/>



Nice hats!

I like this one...

