



The American Fisheries Society Genetics Section Newsletter

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President's message

Dear Genetics Section Members,

An important role that we serve as a section is to provide the science and information about how genetics can help inform the conversation about important issues the society and fisheries field is facing. The Genetics Section provides a forum for these conversations, bringing together various perspectives to identify and discuss these issues and develop approaches to answer important management questions. The theme of the 2013 annual meeting is "Preparing for the Challenges Ahead", and highlights a range of important conservation challenges we face moving forward. More than ever, bringing together science and management to discuss these challenges and inform our path forward is increasingly important.

The Genetics Section will be sponsoring two symposiums at the annual meeting in Little Rock, Arkansas. Jeff Olsen, Denise Hawkins, Jon Amberg, and myself organized a symposium titled: "Environmental DNA (eDNA) analysis - a new genetic tool for monitoring, managing, and conserving fishery resources and aquatic habitat". Jeff Olsen, William S. Grant, Carol A. Stepien and Marlis R. Douglas organized a second symposium titled: "Applying genetic principles and technologies to the management and conservation of fishery and aquatic resources". Both symposiums will be presenting examples of how genetic tools can be used to help provide information for management and conservation challenges, and are very relevant to the meeting theme. The section will also be holding its business meeting during the week; date and location will be announced in a future newsletter. We hope to see you there!

A new venture within the Genetics Section is the establishment of a Hall of Excellence. The Genetics Section Hall of Excellence was approved by the section and the Governing Board and has now been incorporated into our section bylaws. The award gives the section an opportunity to honor professionals for their outstanding achievements and contributions to the field. To complete the nomination review process, we need a section member to volunteer to join the Hall of Excellence committee. If you are interested in serving on this committee, please contact Bill Templin (Bill.Templin@alaska.gov) or Jeff Olsen (Jeffrey_Olsen@fws.gov).

Thank you for the opportunity to serve as section president for the next two years. I've enjoyed the past few years participating as secretary/treasurer and president-elect, learning *continued on page 2*

President's message continued

about how the section and society function and working with the membership and other section officers. Please consider reaching out to others in the genetics field and invite them to join us as members of the Genetics Section. Feel free to contact me or any of the other officers if you have comments or questions.

Feature article by Michael Tringali, Ph.D.

After Hiding In Plain Sight For Decades, A Provisional Species Of Black Bass Is Now Making A Splash



If the distribution maps are to be believed (e.g., MacCrimmon and Robbins 1975), the natural range of the spotted bass *Micropterus punctulatus* includes the entire ecoregion known as the East Gulf Coastal Plain (EGCP). All 'non-largemouth' bass inhabiting this ecoregion west of the Apalachicola-Flint-Chattahoochee drainage are presumed by anglers and biologists alike to be spotted bass. Unquestionably, these EGCP micropterids resemble spotted bass. It could also be said that they resemble the Alabama bass *M. henshalli*, which inhabit nearby drainages in the Mobile Basin (Baker et al. 2009).

Sixty years ago, Bailey and Hubbs (1949) reported differences in scale counts of specimens from the EGCP relative to non-EGCP spotted bass and Alabama bass. Intermediacy in some of the counts led them to suspect that they were spotted bass $\times$ Alabama bass intergrades. Curiously, this suspicion was never genetically tested and the EGCP 'spotted' bass escaped attention in the decades that followed – that is, until they made themselves known to us and, independently, to former University of Alabama student Justin Bagley. Justin's now-published thesis research uncovered cryptic mtDNA diversity within these bass that

suggested that they may be most related, at least through maternal ancestry, to Guadalupe bass *M. treculii* (Bagley et al. 2011).

Our first inkling that something was amiss materialized in 2006. While investigating hybridization between invasive spotted bass and shoal bass *M. cataractae* in the Chipola River, FL, we identified a distinctive introgressive signature that we could not assign to any known micropterid species. We soon pinpointed the source of the signature to bass populations inhabiting coastal rivers along the Florida panhandle, west of the Chipola. Just as quickly, we discovered that the bass in these rivers are not spotted bass or Alabama bass, or even intergrades of the two. Whereas they indeed share a distant common maternal ancestor with some Guadalupe bass, which is polyphyletic in terms of mtDNA, they are not Guadalupe bass. In fact, we could not genetically assign these bass to *any* recognized micropterid species.

Does this novel form of black bass merit a species ranking? Well, here's what we've determined so far. All specimens are cladistically diagnosable by 13 (and counting) mtDNA and nuclear DNA sequence autapomorphies. *Continued page 3*

Feature article continued

They can also be phenetically diagnosed by Bayesian/multivariate clustering techniques with microsatellite markers. In our nuclear DNA phylogeny (Figure 1), the novel taxon is reciprocally monophyletic, sharing a common ancestor with both spotted bass and Guadalupe bass. Our alpha-taxonomic inferences will be strengthened by the fact that this phylogram is 1) statistically robust and 2) represents the best available 'species tree' for this genus, reconstructed from a set of 10 functionally diverse nuclear genes.

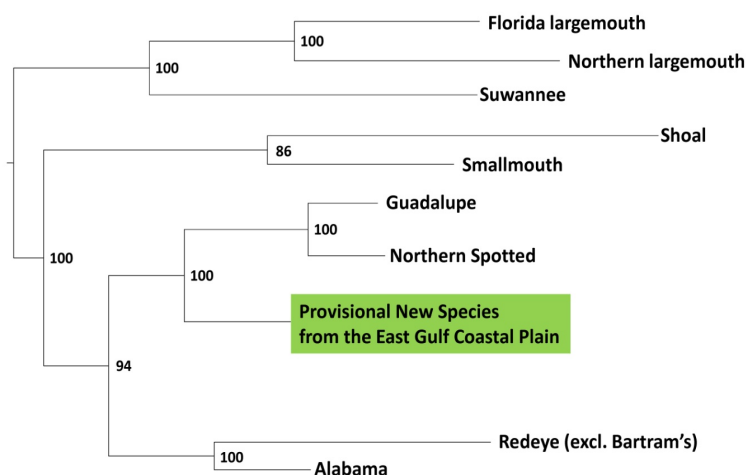


Figure 1. Phylogram of micropterid interrelationships inferred from 5,518 nucleotides from a combined data of ten nuclear gene introns. The optimal model of sequence evolution for each intron was determined with ML and AIC procedures in JMODELTEST 1.0 (Posada 2008); optimal models were then implemented during reconstruction in MRBAYES 3.0 (Ronquist and Huelsenbeck 2003). For the run depicted, 1.5×10^5 metropolis-coupled MCMC generations were performed following a burn-in of 5×10^5 generations. Trees were sampled every 100 generations. Bootstrap values are indicated at corresponding nodes.

Our morphological analyses are ongoing but insightful. These novel bass appear to differ from both spotted bass and Guadalupe bass in mean counts of soft anal-fin and dorsal-fin rays. Although more Guadalupe bass need to be examined, the novel bass may further differ from them in mean counts of scales above and below the lateral line and around the caudal peduncle. We know very little about the life history and ecology of these new bass. About all we can really say at this point is that they tend to occupy different mesohabitats than those occupied by sympatric congeners and their basic habitat

preferences seem to be most similar to those of the Guadalupe bass.

Since its inception, the genus *Micropterus* has endured recurrent episodes of taxonomic tomfoolery. Wary, we sought refuge in a pluralistic application of Mayden's (1997) hierarchical approach, finding that the operational criteria for species recognition are fully satisfied in 13 of 19 "secondary" concepts (Figure 2). Concordance with the "primary" (*evolutionary species*) concept is thus robustly inferable. For those secondary concepts in which criteria are either unresolved or rejected, we point to analogous lapses in *each and every* recognized bass species.

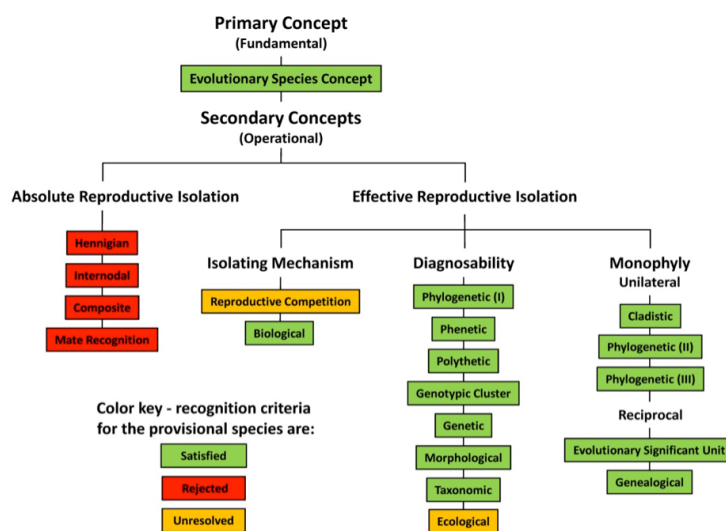


Figure 2. Results of species-concept evaluations for the provisional species of black bass. A modified form of Mayden's (1997) hierarchical approach was used. Secondary concepts categorized by virtue of sharing an operational emphasis.

We are expanding our investigation to the coastal rivers west of the Mobile Basin because evidence from Bailey and Hubbs (1949) and Bagley et al. (2011) suggests they may occur there as well. If our findings hold, it seems there are really only two logical options – full species status for the novel form or wholesale genus consolidation. Recognizing that opinions may differ, we remain secure in our belief that the black basses comprise more than one species. *Continued on page 4*

Feature article continued

By the time you read this article, we will have presented our findings and recommendations at the 2013 SDAFS meeting in Nashville. The details will appear in the published proceedings of the Black Bass Diversity Symposium.

Michael D. Tringali, Brandon L. Barthel, Seifu Seyoum, and John Knight
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Comic

"IT HAS LONG BEEN KNOWN"	I didn't look up the original reference.
"A DEFINITE TREND IS EVIDENT"	The data are practically meaningless.
"WHILE IT HAS NOT BEEN POSSIBLE TO PROVIDE DEFINITE ANSWERS TO THE QUESTIONS"	An unsuccessful experiment, but I still hope to get it published.
"THREE OF THE SAMPLES WERE CHOSEN FOR DETAILED STUDY"	The other results didn't make any sense.
"TYPICAL RESULTS ARE SHOWN"	This is the prettiest graph.
"THESE RESULTS WILL BE IN A SUBSEQUENT REPORT"	I might get around to this sometime, if published/funded.
"A CAREFUL ANALYSIS OF OBTAINED DATA"	Three pages of notes were obliterated when I knocked over a glass of beer.
"AFTER ADDITIONAL STUDY BY MY COLLEAGUES"	They didn't understand it, either.
"THANKS ARE DUE TO JOE BLOTZ FOR ASSISTANCE WITH THE EXPERIMENT AND TO CINDY ADAMS FOR VALUABLE DISCUSSIONS"	Mr. Blotz did the work and Ms. Adams explained to me what it meant.
"A HIGHLY SIGNIFICANT AREA FOR EXPLORATORY STUDY"	A totally useless topic selected by my committee.
"IN MY EXPERIENCE"	Once
"IN CASE AFTER CASE"	Twice

Translating scientific papers. From: Graham, CD. 1957. A glossary for research reports. Metal Progress 71 : 75 via I Love Science.

Feature article by Joseph DiBattista, Ph.D.

Don't be Fooled by the Round Herring

Ask any ichthyologist and they will tell you that figuring out the relationship between closely related species of fish is not always straightforward. Defining "a species" can be even more of a challenge. This couldn't be more true than for the Round Herring, which until recently has been categorized as a single species worldwide, *Etrumeus teres*, despite isolated populations in Japan, southern Australia, the Hawaiian Islands, Peru, the Galápagos Islands, California to Baja California, the western Atlantic, the Red Sea with a recent invasion into the Mediterranean, and East Africa (Figure 1). It should be noted that we discovered a valid earlier name for this fish, which we henceforth refer to as *Etrumeus sadina*. The renowned British ichthyologist Dr. Peter Whitehead last revised this group in 1985, and hinted that DNA may help unravel their complicated taxonomy given the subtle yet variable differences in morphology (*i.e.*, body depth, fin rays, gill rakers) between locations, "Electrophoretic studies on proteins may well point to differences between the various populations that will justify separation of sub-species or even species." Now that sequencing technology has developed to the point where we can begin to discriminate between "species" with DNA barcodes, or use a suite of other mitochondrial and nuclear markers to do so, we decided to conduct a morphological and genetic re-evaluation of the *Etrumeus* genus. The time was right, and in this case, we let DNA be our guide.

By starting with tissue samples and whole specimens collected in the Pacific and western Atlantic Ocean, where the original *E. sadina* holotype from New York was described by Mitchill in 1814, we found that mitochondrial DNA (mtDNA) differences between Japan, Hawai'i, and sites in the eastern Pacific (coastal California to Baja California) pointed to complete separation of the populations at least 1.1 million years (MY) ago using a rough molecular clock, and an even greater separation (8.0 to 8.8 MY) when

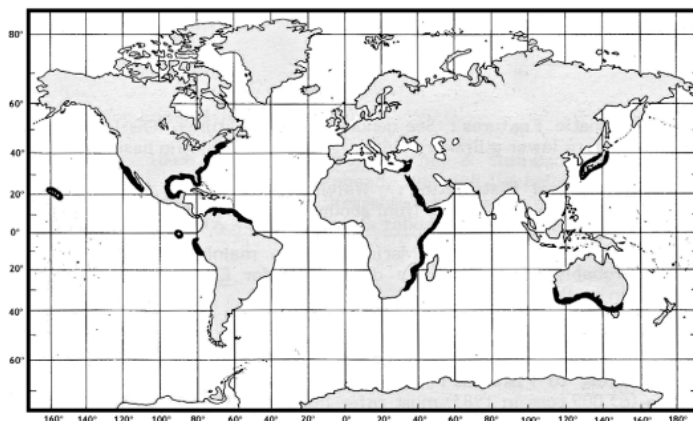


Figure 1. Distribution map given by Whitehead (1985) of the clupeid fish *Etrumeus teres*.

comparing the populations to the original "*E. sadina*" from the western Atlantic. The mtDNA differentiation was supported by nearly diagnostic differences in pectoral rays, gill rakers, and maximum body size upon closer inspection. Based on these findings, we described a new endemic Round Herring species from Hawai'i (Randall and DiBattista 2012), naming it *Etrumeus makiawa* after the local Hawaiian name for this fish (Figure 2). Despite examining dozens of museum preserved specimens collected in Hawai'i over the years, our first manuscript submission was rejected because we had DNA data from only one fish. Adult *Etrumeus* has been a rare occurrence in the state of Hawai'i since the early 1980's. Amazingly, just as our search for fresh specimens was growing desperate indeed, a photo of a seven year old boy from Hilo, Hawai'i holding his catch of a Round Herring popped up in Hawai'i Fishing News (http://www.hawaiiifishingnews.com/records_d.cfm?ID=623). We were able to extract DNA from the salted fish his uncle had prepared but kindly agreed to share with us. This stresses the importance of storing separate tissue samples for each vouchered museum specimen prior to preserving in formalin, which is a chemical compound that makes it difficult, if not impossible, to extract DNA. *Continued on page 6*

Feature article continued

A new fish from Hawai'i is not that surprising given that it is known as the hotspot of all hotspots for endemic shore fish fauna, with some authorities claiming that at least one quarter of all Hawaiian reef fish species are found nowhere else on the planet. The synonyms *E. acuminatus* and *E. micropus* were resurrected for the fish that we had sampled from the eastern Pacific and Japan, respectively, moving us up to four distinct *Etrumeus* species in the surveyed regions.



Figure 2. Paratype of *Etrumeus makiawa*, BPBM 40490, 188 mm, O'ahu (photo credit: John E. Randall).

The species count did not stop when we moved on to study these same fish from the distant continent of Africa, where *Etrumeus* features prominently in the multi-species purse-seine fisheries of South Africa and Egypt, and is now starting to become important in regional markets surrounding the Mediterranean Sea since its introduction was first recorded 50 years ago. Such introductions are certainly not rare, as there have been many Lessepsian migrants (as they are commonly referred to) that have entered the Mediterranean from the Red Sea via the Suez Canal without our control since it opened in 1869, but with much less migration in the opposite direction. In our case, we documented two new species in Africa, both formerly identified as *E. teres* (now *E. sadina*), one from Durban to northeastern Somalia (now *Etrumeus wongratanai*), and one from the northern Red Sea and eastern

Mediterranean Sea (now *Etrumeus golanii*). With regards to naming the new species, Dr. Thosaporn Wongratana from Thailand was honored for his extensive research on clupeid fishes, and Dr. Daniel Golani of the Hebrew University in Jerusalem provided us with type specimens, genetic material, and a photograph of the holotype from the Mediterranean. Our mtDNA sequences here supported evolutionary distinct units and differences in the number of gill rakers among "species", although these meristic counts were overlapping in some cases (DiBattista et al. 2012). So for those keeping track, we are now up to six putative species of *Etrumeus*.

An ongoing study of these fish collected from Australia will almost certainly add to this species total given that we have already found strong genetic and morphological differentiation from all other populations surveyed thus far. We even suspect populations from southern Australia versus eastern Australia may represent distinct species based on their current (and historical) isolation and divergence in mitochondrial genes. Our work parallels that on some other members of the ancient "lower" teleosts, which display relative morphological homogeneity with sometimes deep genetic differentiation. A few recent examples include the bonefish (*Albula* sp.) and the flathead mullet (*Mugil cephalus*), with the former in particular forming a single pantropical species with highly conserved morphology across its range. Subsequent genetic investigation revealed eight deeply divergent bonefish lineages that are now receiving recognition as distinct species. We hope that the genetic approaches described herein will continue to clear up an otherwise muddled story in these complex teleost groups.

Contributed by

Dr. Joseph DiBattista, former postdoc at the Hawai'i Institute of Marine Biology
Study funded in part by the Lerner Gray Memorial Fund of the American Museum of Natural History

Feature article continued

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Whitehead, P. J. P. 1985. Clupeoid fishes of the world (Suborder Clupeoidei). FAO Species Catalog, vol. 7, part 1.

Award Announcement

Apply for the AFS Genetics Section Graduate Award in Memory of



James E. Wright



The Genetics Section of the American Fisheries Society is pleased to announce the James E. Wright Graduate Award. This award is presented annually by the Genetics Section at the AFS Annual Meeting and is intended to recognize excellence in graduate-level work in fisheries genetics and to assist graduate students with travel to the national meeting. The section anticipates awarding an award for \$500 to attend the 2013 AFS annual meeting in Little Rock, Arkansas. All graduate students are encouraged to apply.

Selection will be based on the following criteria:

1. Potential for success in research in fisheries genetics (60%)
2. Anticipated contribution to upcoming annual meeting, e.g. paper, poster, or other contribution (20%)
3. Service to the Society, its Sections, or Chapters (10%)
4. Demonstrated need for travel assistance (10%)

Application Procedure:

1. Applicant must be a full or affiliate member of the Genetics Section at the time of application.
2. Application package should include:
 - a. A brief curriculum vitae including anticipated degree, date of completion, and career goals.
 - b. A statement of the thesis or dissertation and abstract of progress to date.
 - c. The names and contact information for two references familiar with the applicant's background and abilities.
 - d. A statement of previous service to the Society, its Sections, or Chapters, and need for travel assistance.
 - e. A statement addressing anticipated contribution to the upcoming annual meeting.

Deadline for application is: **June 17, 2013**
All application materials should be sent via email to:
Amy B. Welsh, email: amy.welsh@mail.wvu.edu

Calendar

March 2013

15th Application due. Sigma Xi Grants-In-Aid of Research

15th Abstract due. Annual AFS meeting.

15th Application due. AFS J. Frances Allen Award

19th Abstract due. SMBE meeting.

30th Abstract due. American Society of Ichthyologists and Herpetologists (ASIH) meeting

April 2013

1st Application due. American Fisheries Society J. Frances Allen Scholarship Award

1st Nominations due. AFS Award of Excellence, Carl R. Sullivan Fishery Award, Distinguished Service Award, Excellence in Public Outreach, Honorary Membership, Meritorious Service Award, Outstanding Chapter Award, President's Fishery Conservation Award, William E. Ricker Conservation Award, and the Emmeline Moore Prize

1st Application due. Retired members travel Awards for the AFS Annual Meeting

1st Application due. AFS Student Writing Contest

1st Application due. AFS John E. Skinner Memorial Fund Award for student travel

24th-28th Meeting. 3rd Genome 10K Community of Scientists in Hollywood, FL

30th Registration due. SMBE meeting

June 2013

17th Application due. AFS Genetics Section Graduate award in memory of James E. Wright

July 2013

7th-11th Meeting. Society for Molecular Biology and Evolution (SMBE) in Chicago, IL

10th-15th Meeting. ASIH meeting in Albuquerque, NM

August 2013

9th Application due. AFS Best Student Poster Award from the Fisheries Information and Technology Section (FITS)

September 2013

8th-12th Meeting. Annual AFS meeting in Little Rock, AR

Symposia

Genetics of Adaptation Workshop

3-6 April 2013. Evolutionary Biology Center, Uppsala University, Sweden.

This course will employ a number of expert instructors to provide lectures and hands on analysis in Population Genetics Theory, Quantitative Genetics Theory, QTL mapping implementation, Population Genetic Implementation, and empirical evidence to date. For more information visit <http://evol.mcmaster.ca/~brian/evoldir/WorkshopsCourses/Uppsala.GeneticsofAdaptation.Apr3-6>.

Graduate and Professional Course Non-Invasive Genetic Techniques in Wildlife Conservation

1-7 June 2013. Smithsonian-Mason School of Conservation At the Smithsonian Conservation Biology Institute, Front Royal, VA.

This course is an introduction for graduate students and professionals to the applications, benefits, and drawbacks of non-invasive genetic techniques to wildlife conservation. Visit <http://SMconservation.gmu.edu> or contact SCBITraining@si.edu for more information.

Applying Genetic principles and Technologies to the Management and Conservation of Fishery and Aquatic Resources

(Annual AFS Meeting)

Black Bass Diversity: Multidisciplinary Science for Conservation

(Annual AFS Meeting)

Environmental DNA (eDNA) Analysis – a New Genetic Tool for Monitoring, Managing, and Conserving Fishery Resources and Aquatic Habitat

(Annual AFS Meeting)

8-12 September. Statehouse Convention Center, Little Rock, AR.

Jobs

LECTURER/ASSISTANT PROFESSOR IN GENETICS. Massey University, New Zealand. Permanent tenure track. Seeking a strong candidate with a distinguished record of research in any aspect of genetics. For more information please visit <http://jobs.massey.ac.nz/PositionDetail.aspx?p=7689>.

Graduate positions and postdocs

GRADUATE RESEARCH ASST-PH.D. WV University Wildlife & Fisheries Resources Program. Genetic research on juvenile lake sturgeon. MS required. Stipend plus full tuition waiver. For questions, contact Dr. Amy Welsh, Amy.Welsh@mail.wvu.edu.

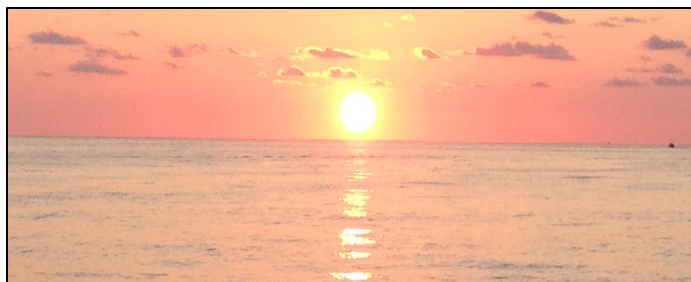
POSTDOC. Marine station of Banyuls/mer, France. Candidate will investigate how photoperiod and temperature interact in the synchronization of Salmonids physiological function. For more information please visit http://evol.mcmaster.ca/~brian/evoldir/PostDocs/CNRS_France.FishAdaptation.

Editor's blurb

Greetings from the east coast of Florida!

I hope everyone had a wonderful holiday season. My New Year's resolution for the Genetics Section Newsletter is to provide an avenue of communication for scientists across the country conducting fish genetics research. I have been busy compiling a list of contacts to hound for articles, but **I need your help**. If you know of any project, lab, student or professional that might be persuaded to show off their research please let me know. My email is open 24/7. I also hope to get the newsletters uploaded to the section website soon and begin re-vamping the Facebook page. As always I am open to any and all comments, critiques, and suggestions. Happy (almost) first day of spring!

Joy Young, *newsletter editor*
Joy.Young@myFWC.com



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Hall of Excellence

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James Wright Award

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Andrea Schreier

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Listerve

Andrew Whitely

Stevan Phelps Award

???

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Black Bass Symposium

Meredith Bartron

Fisheries

Marissa Jones

What are those question marks? Your opportunity to volunteer!!!