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THE Open Reading Frame

Newsletter of the
Genetics Section of the American Fisheries Society

In this issue

Calapooia River in winter, Oregon. Bonnie Moreland.

President's Message

Welcome to the Winter 2023 edition of the Genetics Section newsletter. This has been a busy year for the genetics section. There were some great meeting opportunities this year. The Coastwide Salmonid Genetics meeting was held in Idaho and had great attendance with the focus of talks ranging from topics in applied management to life history evolution. The Genetics Section was proud to fund two student travel awards for the Coastwide meeting this year. The next meeting will be held in 2025 in Anchorage, Alaska.

Dr. Garrett McKinney
AFSGS President

The AFS annual meeting was held this year in Grand Rapids, Michigan. The section organized a genetics/genomics symposia for graduate and early-career researchers and the Genetics section funded four student travel awards. Our business meeting was held as a hybrid meeting during the conference. One of the topics was potential bylaw changes this coming year including the addition of the new Utter Award, updating treasurer duties, adding the historian position to the excomm, and changing the timing of elections. Once the excomm has drafted the proposed changes we will submit to membership for approval.

Next year's Annual Meeting will be held in Honolulu, Hawaii. For those of you interested in organizing a symposium, the submission portal will open sometime in December and the final submission deadline is February 24th, 2024. Links to the submission portal will be available at https://afsannualmeeting.fisheries.org/.

Finally, the excomm has been working on ways to bet better engaged with our membership and one outcome of this is the formation of a communications committee to promote member engagement. Marlis Douglas, our past-president, is leading this committee. Anyone interested in participating in the communications committee or learning more about it can contact her.

Garrett J. McKinney
President, AFS Genetics Section

2023 Stevan Phelps Memorial Award

The Stevan Phelps Memorial Award was created in 2000 as a perpetual memorial to Steve who died prematurely from cancer in 1999. The award, honoring Steve's strong commitment to publication of applied genetic research in fisheries, is given annually for the best genetics paper published in an AFS journal the preceding year. This year's award was presented to a large, collaborative research team led by Dr. Dave Kazyak, for their paper titled "Population genetics of Brook Trout in the Southern Appalachian Mountains" (TAFS 151:127-149). Dr. Kazyak provided remarks below.

Although Brook Trout have been the focus of numerous scientific investigations, uncertainty with respect to the genetic relationships among populations has long challenged management. Previous work using allozymes on a modest number of populations identified putatively fixed differences between wild Brook Trout from the southern Appalachians when compared to those from higher latitudes, which fostered a widespread perspective that southern Appalachian Brook Trout represented a distinct entity. However, this inference had not been reevaluated using more contemporary genetic techniques or across broader spatial scales.

A small Brook Trout. Dave Kazyak.

We used a panel of 12 microsatellite markers to explore the population genetics of wild Brook Trout across their native range, with an emphasis on those populations in the southern Appalachian Mountains. We found tremendous levels of variation among populations, which appeared to reflect both deeper evolutionary lineages and more recent signatures of isolation and genetic drift. While diversity within populations in the southern Appalachians was generally lower relative to other regions, the population genetics of wild Brook Trout was much more complicated than the conventionally held "northern" versus "southern" dichotomy would suggest. Moreover, when viewed in aggregate, populations in the southern Appalachian region were more diverse than those at high latitudes. In addition, our work suggests that despite an extensive history of stocking domesticated conspecifics, many wild Brook Trout populations in the southern Appalachians showed little evidence of hatchery introgression. Our work challenged previously held paradigms and highlighted the extent of diversity among wild Brook Trout in the southern Appalachians. To facilitate application of our findings by conservation practitioners, we developed an interactive online viewer to allow our results to be explored at management-relevant scales.

Brook Trout in cool water. USFWS Southeast.

Our paper was the product of a massive effort which brought together a research team comprised of state, federal, and academic partners from across the country, motivated by a shared interest in the conservation of Brook Trout. I would like to recognize the contributions of some of the key people who made this work possible. The late Dr. Tim King played a critical role in envisioning and embarking on this ambitious project. Over the course of two decades, scores of partners collected tissue samples from >800 populations of wild Brook Trout, spanning a vast area from Georgia to Quebec, and Newfoundland to Iowa. These contributions were critical in advancing our understanding of wild Brook Trout. Barb Lubinski was steadfast in her efforts to genotype >22,000 individual samples, generating an enormous wealth of data to characterize patterns of diversity within and among populations. I would also like to thank our team members who helped to run analyses and draft the manuscript, many of whom voluntarily partnered on this effort to better understand wild Brook Trout. On behalf of my coauthors, I would like to express our gratitude for this award from the Genetics Section. We hope that our paper will continue to help support the conservation of this iconic yet imperiled species in the years to come.

James E. Wright Award Winners

The James E. Wright Graduate Award is given in the memory of Jim Wright, one of the founders of fish genetics research and education in North America. This award is presented annually to recognize excellence in graduate-level work in fisheries genetics, as well as assist graduate students with travel to the national meeting. For 2023, our student winners were William Rosenthal, Alana Luzzio, Sara Hugentobler, and Alicia Krause. Will and Alana introduce themselves and their research below.

William Rosenthal, University of Wyoming

I am a third year PhD candidate in the Program in Ecology & Evolution at the University of Wyoming hoping to better integrate the fields of evolutionary biology and conservation biology. My research focuses on the Yellowstone cutthroat trout – a subspecies of the (newly re-named) Rocky Mountain cutthroat trout native to the upper Snake & Yellowstone river basins. Thanks to the efforts of many collaborators, we've amassed a set of genomic data from over 200 wild populations of Yellowstone cutthroat trout, in addition to samples from populations and hatchery lines of other trout species & subspecies. Using these data, we hope to understand the extent of introgression resulting from historic fish stocking, document the evolutionary history and biogeography of the Rocky Mountain cutthroat trout, and determine if the environment has predictable effects on genetic diversity and gene flow between populations.

Will Rosenthal

I am extremely grateful to be awarded the James E. Wright Award, as it allowed me to attend this year's annual meeting without significant financial burden. It was wonderful to meet so many others that utilize genetic data to answer questions in evolutionary biology, fisheries assessment, and conservation, and to extend my network into the American Fisheries Society as a whole. The annual AFS meeting was my first time attending a large conference, and I feel that the experience was very much improved by being able to meet people within and just outside of my main areas of interest.

Alana Luzzio, University of California, Davis

I am a third year PhD student in the Genomic Variation Laboratory co-advised by Dr. Andrea Schreier and Dr. Amanda Finger. My research focuses on the conservation genetics of the federally threatened Lahontan cutthroat trout (Oncorhynchus clarkii henshawi). Two major threats to Lahontan cutthroat trout are extinction via hybridization with invasive rainbow trout and introduced Yellowstone cutthroat trout throughout the Great Basin, and low genetic diversity due to small, isolated populations. As part of my dissertation research, I am developing genomic resources to assess these threats in the form of two unique single nucleotide polymorphism (SNP) panels to aid in applied management and recovery of the Lahontan cutthroat trout. The first SNP panel is a hybridization panel to distinguish Lahontan cutthroat trout from rainbow trout and Yellowstone cutthroat trout. The second SNP panel seeks to identify diversity markers range wide for long term genetic monitoring. These two genomic resources will aid in the management and decision-making processes necessary to recover the Lahontan cutthroat trout.

Alana Luzzio

I am honored to receive the James E. Wright Award for my work on Lahontan cutthroat trout and I am grateful for the support of the AFS Genetics Section. This award allowed me to travel and present my current work at the AFS annual meeting in Grand Rapids, MI. Presenting at the meeting allowed me to meet and receive valuable feedback from fellow geneticists and build a sense of community within the AFS Genetics Section.

2023 Genetic Section Hall of Excellence Inductee - Dr. Anthony Gharrett

Dr. Anthony Gharrett

Dr. Anthony Gharrett is a fisheries geneticist whose expertise informs the management and conservation of many culturally and economically important fish species in Alaska, particularly Pacific salmon and rockfishes. Tony has spent most of his career as a professor in Fisheries at the University of Alaska, but he held several interim positions during that time including visiting professorships at the University of Michigan and Hokkaido and Kitasato universities in Japan. His research stands out for its rigor and creativity, using novel methods such as freezing pink salmon sperm to create hybrid lines between the even and odd broodyear lines to understand outbreeding depression, and breeding an allozyme marker into a population of pink salmon to study the evolutionary dynamics of run timing. Dr. Gharrett was instrumental in the development of Alaska Department of Fish and Game (ADF&G) Genetic Policy, and he played an important role in "melting the Ice Curtain" by initiating and sustaining research collaborations with Russian fisheries geneticists during Soviet times and since. He also cares deeply about mentoring his graduate students, who emerge with a profound understanding of population genetics and its applications to fisheries management. Many of the fisheries geneticist positions at the NOAA Alaska Fisheries Science Center and ADF&G have been and continue to be occupied by his students. He has authored more than 80 papers on fisheries genetics, three of which have won the Stevan Phelps Memorial Award for best genetics publication in an American Fisheries Society publication.

2023 Early Career Award Winner - Dr. Shannon White

I am a Research Biologist at the U.S. Geological Survey Eastern Ecological Science Center where I work to integrate genetics, demographic modeling, and behavioral ecology to improve management for species of conservation concern. While my study taxa span multiple phyla, my primary interest is in fishes, with much of my attention currently focusing on Atlantic sturgeon and brook trout.

Dr. Shannon White

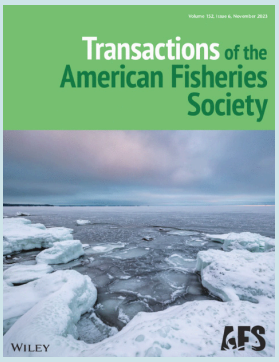
Although my research interests are quite broad, a major unifying theme to my work is applying genetics to gain insights into ecological processes that are otherwise difficult to study. As one such example, I've been using genetic tools to better understand fish movement ecology. Although advances in tagging technology have increased the capacity to directly track fish movement, it is generally not possible to monitor movement throughout an individual's life cycle, particularly for species that are small-bodied, broadly distributed, or long-lived. In these cases, combing movement data with genetic information can allow a more comprehensive look into individual- and species-level ecology. Some of this work has been instrumental in showing how rare behavioral phenotypes can maintain metapopulation connectivity in brook trout and for detecting novel trends in spatiotemporal habitat use in Atlantic sturgeon populations throughout the east coast.

It is an honor to be selected for the 2023 Early Career Award. While genetics is a large component of my research program today, I still make many former professors laugh at just how hard I evaded the topic through undergraduate and graduate courses. It was the patience and encouragement of many members of the AFS Genetics Section that inspired me to pursue topics in the field. The AFS Genetics Section has provided a welcoming platform for me to engage with other conservation geneticist to continue applying novel tools and technologies to advance management of some of the world's most imperiled species.

In case you missed it...

Recent genetics papers from AFS journals and beyond

Click citations for link to papers



Kratina et al. Using fish hard-part microchemistry and genetics to quantify population impacts of low-use lock-and-dam structures on the Alabama River. Transactions of the American Fisheries Society.

Katz et al. Molecular identification and environmental DNA detection of gill lice ectoparasites associated with Brook Trout declines. Transactions of the American Fisheries Society.

Breault et al. Genetic population structure of introduced and native lineages of kokanee in a large impounded watershed. Transactions of the American Fisheries Society.

Smith et al. Demographic and genetic consequences of a steelhead supplementation program. Transactions of the American Fisheries Society.

Elbassiouny et al. Genetic structure of the Silver Chub indicates distinctiveness of Lake Erie population. North American Journal of Fisheries Management.

Brino et al. Unlocking the genomes of formalin-fixed freshwater fish specimens: An assessment of factors influencing DNA extraction quantity and quality. North American Journal of Fisheries Management.

Lamy et al. Genetic analysis reveals a complex mosaic of admixture in Brook Trout in a historically fragmented watershed. North American Journal of Fisheries Management.

Casas and Saborido-Rey. A review of genomics methods and bioinformatics tools for the analysis of close-kin mark-recapture. Fronteirs in Marine Science.

Gonen et al. The genomic architecture of high temperature tolerance in a year class of Atlantic Salmon. Aquaculture.

Jeffrey et al. Using transcriptomics to examine the physiological status of wild-caught walleye (*Sander vitreus*). FACETS.

Ekman et al. Expanding non-invasive approaches for fish-healthmonitoring: A survey of the epidermal mucous metabolomesof phylogenetically diverse freshwater fish species. Journal of Fish Biology.

Walleye (*Sander vitreus*). Photographed at Gavins Point National Fisher Hatchery in Yankton, SD. Sam Stukel, USFWS Mountain-Prairie.

Calixto-Rojas et al. Delimitation and species discovery in the Profundulidae fish family: Using genetic, environmental and morphologic data to address taxonomic uncertainty. Molecular Phylogenetics and Evolution.

Riginos and Jahnke. Comparative landscape genomics has arrived with a splash. Molecular Ecology.

Beulke et al. Distinct patterns of inheritance shape life-history traits in steelhead trout Molecular Ecology.

Hsu and Habicht. Harnessing the power of regional baselines for broad-scale genetic stock identification: A multistage, integrated, and cost-effective approach. Evolutionary Applications.

Bernos et al. Environmental DNA (eDNA) applications in freshwater fisheries management and conservation in Canada: overview of current challenges and opportunities. Canadian Journal of Fisheries and Aquatic Sciences.

Calendar

Click listings for more info

January 2024

9th–10th: The Atlantic Salmon Ecosystems Forum. Orono, ME, USA.

16th: WDAFS Career Panel Winter Webinar Series "Your Path Forward."

28th–31st: 84th Midwest Fish & Wildlife Conference. Sioux Falls, SD, USA.

February 2024

12th–16th: Pacific Salmon Commission 39th Annual Meeting. Vancouver, BC, Canada.

18th–23rd: Ocean Sciences Meeting. New Orleans, LA, USA.

21st–24th: SCAS 2nd Annual Meeting. Fredericton, NB, Canada.

March 2024

3rd–7th: 9th World Fisheries Congress. Seattle, WA, USA.

11th–14th: 5th International Conference on Integrative Salmonid Biology (ICISB). Seattle, WA, USA.

May 2024

12th–16th: 23rd International Conference on Aquatic Invasive Species. Halifax, NS, Canada.

20th–24th: IAGLR's 67th Annual Conference on Great Lakes Research. Windsor, ON, Canada.

To find dates and information for AFS chapter meetings, visit fisheries.org/about/units/chapters/

Atlantic Salmon Male. E. Peter Steenstra, USFWS Northeast Region.

Job Postings

Click ads for more info

eDNA Technician - University of Illinois Urbana-Champaign.
The Illinois Natural History Survey seeks an hourly technician to conduct molecular genetic research with an emphasis on environmental DNA assay development and data analysis, community metabarcoding, and population genomics. Duties will include collecting and processing eDNA field samples, conducting DNA and eDNA extractions, participating in DNA quantification, plating for multi-locus metabarcoding, conducting PCR and qPCR validation, optimization, and data generation, participating in molecular genetic generation and data management, and contributing to technical reports and manuscripts. This position will be based out of Champaign, Illinois.

Supervisory Research Geneticist - USDA.
This position is located with the United States Department of Agriculture (USDA), Agricultural Research Service (ARS), Ft. Pierce, FL. In this position, the successful applicant will serve as the Supervisory Research Scientist, Research Leader for the National Warm Water Marine Aquaculture Unit. As Research Leader, they will recruit scientific staff, select, coordinate, and guide team efforts in a comprehensive research program improving marine finfish aquaculture production.

Hatchery Manager - Cannery Creek.
Prince William Sound Aquaculture Corporation (PWSAC) is looking for an experienced professional to join our team and lead our salmon hatchery operations. As a key member of our team, your duties will include planning and assisting with experimental fish rearing, disease control, genetic research, and other biological projects.

PhD Opportunity in QACs, eDNA, & RNA Seq - University of Manitoba, University of Windsor, and the IISD-Experimental Lakes Area.
We are seeking a motivated, enthusiastic, and dedicated PhD student to investigate how quaternary ammonia compounds (QACs) can impact the benthic and emergent insect communities of boreal lakes. The student will use traditional taxonomy combined with eDNA and RNA Seq approaches to examine changes at the molecular, individual, population, and community-levels. The student will collaborate with a large number of researchers and students as part of a larger project that will examine the fate and effects of QACs on whole lakes at the IISD-Experimental Lakes Area. The student will be provided latitude to develop specific research goals aligned with their interests in the areas of benthic macroinvertebrates and emergent insects, along with cutting edge molecular tools to characterize community structure and responses. The PhD student will conduct their degree at the University of Manitoba in the Department of Environment and Geography, co-supervised by Dr. Mark Hanson and Dr. Daniel Heath (Department of Integrative Biology, University of Windsor).

Fisheries Collaborative Program Specialist Pool - University of California, Santa Cruz
The Fisheries Collaborative Program (FCP) in the Institute of Marine Sciences (IMS) at the University of California, Santa Cruz (UCSC) invites applications for an ongoing pool of specialists who may be appointed to support research on the conservation and management of California's living marine resources in one or more of the following areas: Salmon ecology, fisheries assessment, molecular ecology and genetic analysis, ecosystem forecasting, salmon life history, climate and ecosystems, fisheries resources.

Laurelville Camp and Retreat

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