



**HKD Stuttgart National Aquaculture Research Center
USDA-ARS Stuttgart, Arkansas
SEPT – DEC 2024**

QUARTERLY RESEARCH HIGHLIGHTS

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- **Recent Scientific Publications**

This addresses USDA-ARS Research Goal: Goal 4.2: Prevent and Control Pests and Animal Diseases that Pose a Threat to Agriculture, Public Health, and the Well-Being of American Citizens

Redman, N., **D.L. Straus**, M. Murray and C. Good. 2025. Assessing the toxicity of peracetic acid to parr, smolt, and post-smolt Atlantic salmon *Salmo salar* in RAS water. *Aquaculture Research*, 9934217, 7 pages. (Published 01/23/2025.) <https://doi.org/10.1155/are/9934217>

Harmful fungus and bacteria pose a significant threat to Atlantic salmon reared in land-based recirculating aquaculture systems (RAS). Due to the risk associated with these pathogens, there is need for a low-cost, safe, and effective disinfectant that can be used in systems where fish are present. Before assessing the application of a new disinfectant, it is important first to investigate the chemical's toxicity to the fish. In this research, we looked at the acute toxicity of peracetic acid (PAA) during three late juvenile life-stages of Atlantic salmon (parr, smolt, and post-smolt). The toxicities provide guidance for developing safe PAA treatment protocols for these fish in RAS. Our findings can support the development of PAA as a disinfectant in the Atlantic salmon RAS industry.

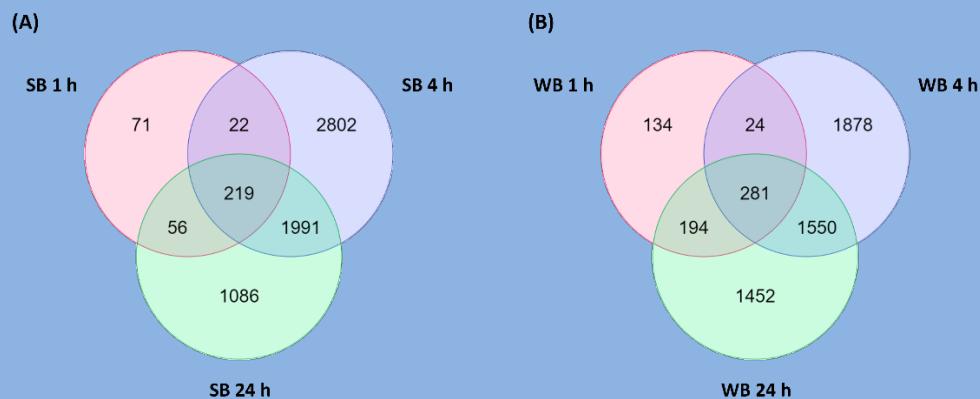


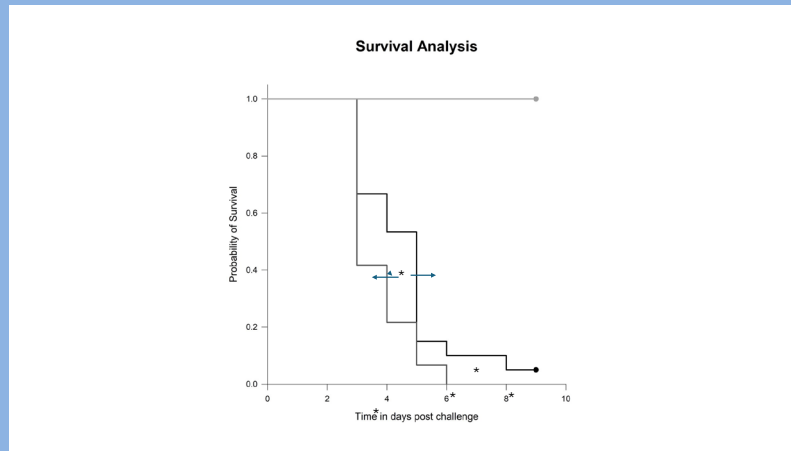
Peracetic acid

This addresses USDA-ARS Research Goal: Enhance Hybrid Striped Bass Aquaculture Production.

Andersen, L.K., Abernathy J.W., **Farmer, B.D.**, Lange, M.D., Sankappa, N.M., McEntire M.E., Rawles S.D. 2024. Analysis of striped bass (*Morone saxatilis*) and white bass (*M. chrysops*) spleen transcriptome following *Streptococcus iniae* infection. Submitted to Marine Biotechnology 11/1/24.

Streptococcal disease results in major mortality events of both marine and freshwater fishes worldwide. *Streptococcus iniae* is among the prominent causative bacterial strains as it has been found to cause a higher incidence of mortality and act as a zoonotic pathogen. Here we examine the susceptibility of two important aquaculture species in the United States, striped bass (*Morone saxatilis*) and white bass (*Morone chrysops*), to *S. iniae*. A high incidence of mortality was observed in both species, although striped bass succumbed more rapidly than white bass. Spleen gene expression at three time points following infection was analyzed to further elucidate the mechanisms underlying these observations. The down-regulation of gene transcripts associated with pathogen detection (*tlr1*, *tlr8*, *tlr9*), antigen processing (*cd74a*), immune cell recruitment and migration (*ccr6b*, *ccr7*), macrophage function (*csf1ra*), T-cell signaling and NF- κ B activation (*card11*, *fyna*, *tirap*) was detected in both species. These findings potentially indicate impairment in these critical early immune system processes such that both species were ultimately highly susceptible to *S. iniae* infection despite the detected up-regulation of transcripts typically associated with effective immune response, such as cytokines (*il1 β* , *il8*, *il12b2*, *il17rc*, *tnfa*) and hepcidins (*hamp*, *hamp2*). The presented results collectively identify several candidate genes and associated pathways for further investigation to characterize the vulnerability of striped bass and white bass to *S. iniae* and that may be considered for selective breeding efforts, biotechnological intervention, and/or exploitation in the development of vaccines and alternative treatments.

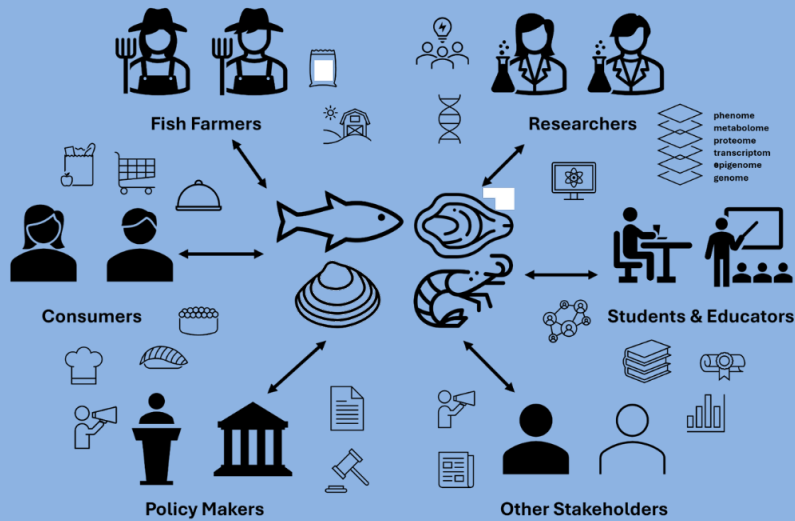




This addresses USDA-ARS Research Goal: Enhance Hybrid Striped Bass Aquaculture Production.

Andersen LK, Thompson NF, Abernathy JW, Al-Tobasei R, Beck BH, Calla B, Delomas TA, Dunham RA, Elsik CG, **Fuller SA**, Garcia JC, Gavary MR, Hollenbeck CM, Legacki EL, Liu S, Liu Z, Matt JL, May SA, Older CE, Overturf K, Palti Y, Peatman EJ, Peterson B, Phelps MP, Plough LV, Polinski MP, Proestou DA, Purcell CM, Quiniou SMA, Rexroad CE, Riley K, Roberts S, Salem M, Wang H, Waters CD, Reading BJ. (Accepted 1/15/2025.) Advancing genetic improvement in the omics era: status and priorities for United States Aquaculture. BMC Genomics.

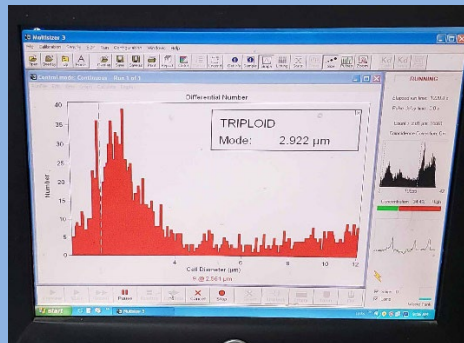
Dramatic technological and methodological innovations have created a plethora of scientific tools that broadly fall under the “Omics” categorization. Such tools and resources have significantly advanced United States aquaculture by producing whole genome sequences, fully annotated genomes, as well as provided the raw materials to produce many molecular tools and methods. Such rapid advancement demands robust planning and identification of pressing opportunities and challenges that will further advance the United States aquaculture industry and the genetics, genomics and breeding research community. The topic of this paper is the identification of priority topics that are intended to facilitate the continued advancement of aquaculture and spur continued development within the aquaculture genomics, genetics and breeding research community. The research products within this paper will be used to guide future study topics and efforts within aquaculture genetics, genomics and breeding as well as facilitate inter-disciplinary studies that are vital to fully realize the power afforded by ‘Omics tools currently available, and those that will continue to be developed considering the highlighted priorities identified herein.



Input from multiple groups impacts the success of aquaculture production from farm to lab to plate.

✓ **Interactions with the Research Community**

Dr. Dave Straus continued monthly meetings with a professor and graduate student from University of Arkansas at Pine Pluff (UAPB) for research during the upcoming spawning season (April - May) to produce triploid hybrid striped bass.



Coulter Counter display

Drs. Dave Straus and **Mike Deshotel** had several phone conversations with the Mississippi State Chemical Lab (MSU) in preparation for pesticide analyses by the lab for upcoming research on hitchhiker control in baitfish facilities.

Dr. Dave Straus and **Ms. Cindy Ledbetter** met with collaborators to prepare for upcoming research (spring and summer 2025) on the toxicity of pesticides to baitfish, crawfish and ghost shrimp; the latter species are considered “hitchhikers” to eliminate during harvests.



Crawfish



Experimental setup



Ghost Shrimp

On January 8, 2025, Dr. Adam Fuller met with Dr. Yathish Ramena from the University of Arkansas-Pine Bluff School of Aquaculture and Fisheries, Pine Bluff, AR, to discuss areas of future collaborative research. Among topics discussed were potential funding opportunities, undergraduate and graduate student research opportunities at SNARC, and leveraging resources of both facilities to meet research goals.



- **Stakeholder Interactions**

Dr. Dave Straus visited farms to discuss future research needs in December. Farms included Keo Fish Farm (raises hybrid striped bass fingerlings) and Anderson Minnow Farm (raises baitfish and collaborator on incoming CRIS). Also visited recirculating aquaculture system (RAS) facilities at Dunn's Fish Farm and Glennon Fish Farms to better understand their systems where they are raising largemouth bass as food fish.



Largemouth Bass

Evaluation of SNARC Select Line hybrid striped bass in a pond production environment

SNARC initiated a selection program in 2018 to select for white bass that consumed a fishmeal-free feed (formulated using animal and plant proteins) or an all-plant protein diet readily and grew well. We previously reported the performance of second generation select white bass as compared to a non-selected control line, with the F2 Select line fish showing a 21.4% gain in weight ($P = 0.0014$) and a 5.2% increase in length ($P = 0.0002$) as compared to a control line when fed an all-plant protein diet. To further investigate the performance of these fish as hybrid striped bass broodstock, SNARC used Select line white bass broodstock with North Carolina State University Select striped bass to produce an improved line of hybrid striped bass. These fish were then subjected to communal pond production performance evaluations against industry hybrid striped bass obtained from an aquaculture producer. Midpoint sampling revealed the Select line hybrid striped bass had a 46.2% gain in weight ($P < 0.0001$) as compared to industry hybrid striped bass. The study is ongoing through summer 2025 to produce market size fish to determine performance differences in weight and carcass traits between the two groups. Based on initial results from these evaluations, we are in discussions to expand our existing collaborations for on-farm white bass broodstock performance testing with Keo Fish Farms (Keo, AR) to include performance testing of hybrid striped bass as well as new collaborations for on-farm evaluation with Colorado Catch (Sanford, CO) and multiple hybrid striped bass foodfish producers in North Carolina.



Split-pond production system used to evaluate SNARC Select hybrid striped bass performance against industry control fish.

On November 4, 2024, Dr. Adam Fuller met with Mike Freeze, owner of Keo Fish Farms, Keo, AR, to discuss expanding an existing collaboration for evaluation of broodstock to include additional on-farm trials of SNARC/NCSU Select hybrid striped bass at his fry and fingerling production facility. Potential production parameters to be collected and shared as part of the agreement were discussed. A research agreement will be developed over the coming months to allow the collaboration to proceed.



Keo Fish Farms receiving SNARC broodstock for on-farm evaluation.

On December 11, 2024, **Dr. Adam Fuller** met with Tyler Faucette, owner of Colorado Catch, Sanford, CO, to discuss a collaboration for on-farm trials of SNARC/NCSU Select hybrid striped bass at his foodfish growout facility. Potential production parameters to be collected and shared as part of the agreement were discussed. A research agreement will be developed over the coming months to allow the collaboration to proceed.

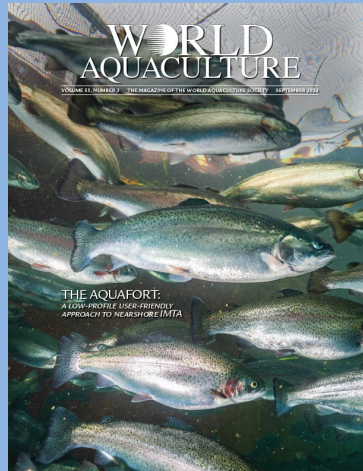


Tyler Faucette, owner Colorado Catch, receiving fingerling hybrid striped bass at Keo Fish Farms.

- **Education and Outreach**

Grenn, J., M. Walsh, K. Hartman, C. Engle, A. Kelly, D. Cline, R. Lochmann and **D. Straus**. 2024. USAS Student Subunits: History and Impact. *World Aquaculture Magazine*, 55(3):64-65. (Published 09/18/2024.)

This article is a summary of the history of the creation of higher learning institution Student Subunits of the US Aquaculture Society (USAS) which started in 1990. USAS is a Chapter of the World Aquaculture Society (WAS). The first Subunit was created in 2004, and we now have 10 of these student organizations. The history of the USAS Student Subunits is rich and diverse. In addition to the opportunities these Subunits provide, USAS Boards, past and present, have worked hard to ensure students, whether a Society member or not, feel valued and respected and are provided unique opportunities to learn about aquaculture.



On December 10, 2024, **Dr. Adam Fuller** met with MS graduate student Ram Babu Kurapati from University of Arkansas at Pine Bluff to plan upcoming research to evaluate the effects of diet on genomic, physiological, and immunological parameters in aquaculture species.

On January 8, 2025, **Dr. Adam Fuller** attended the thesis proposal defense of Ram Babu Kurapati titled “Application of Artificial Intelligence in Health Evaluation, Dietary Effects, and Disease Management in Aquatic Species” as a member of his thesis committee.



Max White joins Breeding Program

SNARC welcomed a new animal caretaker, Max White, who began working with our White Bass/Hybrid Striped Bass Selective Improvement Program on July 14th. Max has primary responsibilities for the care and maintenance of select lines of white bass and hybrid striped bass within our tank and pond systems and is supervised by Dr. Adam Fuller. Max previously worked in industry at Keo Fish Farms, where he performed a similar role culturing industry hybrid striped bass for the world's largest producer of hybrid striped bass fry and fingerlings.



Max White, SNARC Animal Caretaker

Retirement of Dr. Bart Green

Dr. Bart Green retired from SNARC on January 11, 2025, with a retirement reception on January 9 attended by work colleagues, friends, and family. Dr. Green began his research career at Auburn University where he primarily focused on international production aquaculture, working in numerous countries across Latin America and Africa. Dr. Green joined ARS in 2001 as the Research Leader at the Aquaculture Systems Research Unit co-located at the University of Arkansas at Pine Bluff. Following the closure of the Unit, Dr. Green was re-directed to SNARC as a Research Fishery Biologist, primarily focused on aquaculture production of numerous aquaculture species. Dr. Green is regarded as an international expert for the practical impact of his work on production systems, water quality management, and production intensification. His contributions will be missed across the aquaculture community and by his fellow SNARC staff. We wish him well for a happy and healthy retirement.



Dr. Bart Green retired from SNARC after 27 years of federal service.

New IACUC Chair

As of January 1, 2025, Bradley Farmer assumed the role of IACUC Chair following the retirement of Dr. Bart Green. SNARC subsequently hosted the 1st SEA Area IACUC call of 2025 on January 16th. SNARC is looking forward to our continuing commitment to provide excellent care to our research animals.

See the web version of all HKDSNARC research highlights at:

<https://www.ars.usda.gov/southeast-area/stuttgart-ar/harry-k-dupree-stuttgart-national-aquaculture-research-cntr/news/httpswwwarsusdagovumbracocontentcontentedit167576-text-arsuserfiles602810002024-highlights-upload20file/>