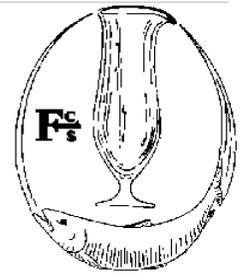


Fish Culture Section of the American Fisheries Society

Fall 2022 Newsletter



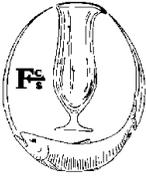
Bringing together individuals interested in advancing the science and technology of fish culture



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President's Message

Greeting Peers, Colleagues and Friends!

Fall edition... were it not for the expertly managed, gentle prodding of Newsletter Editor **Matt Wipf** and Co-Editor **Stephanie King**, you might have been saved from my rambling ... I'm not really sure where the year went? A special note of "thanks" to our Newsletter team for their continued leadership and exemplary service to the Section!

A quick Fish Culture Section (FCS) recap of the **AFS 152nd Annual Meeting** in Spokane, WA (Aug. 21-25, 2022). FCS leaders and members cooperated in the development of three great sessions in Spokane:

- Indigenous Aquaculture Leadership and Innovation in Fisheries Management; Thirty Years and Counting
- Getting it Right: Advancing Successful Supplementation For Recreation, Restoration, and Recovery
- Application of "Recirculating" Aquaculture Systems for Conservation, Enhancement, and Sportfish Management Programs).



Jeff Heindel, Current FCS President

Matt Wipf and **Nathan Wilke** (USFWS) hosted the *Getting it Right* session, FCS President-Elect **Dan Mosier II** led the *Recirculating Aquaculture* session, and I was fortunate to moderate the *Indigenous Aquaculture Leadership* session -- a total of 40 oral presentations were delivered over four days with content that addressed a wide range of species and aquaculture disciplines ... thanks to all who participated and were part of making this a success!

Next up on the professional conference circuit is **Aquaculture America** in New Orleans, LA (February 23-26, 2023) ... the abstract submissions deadline has been extended (December 1, 2022) and the registration site is active: [Aquaculture America 2023 | World Aquaculture Society Meetings \(was.org\)](https://www.was.org) -- FCS members are planning to sponsor several aquaculture-themed sessions and more information will be provided as the Program is finalized.



Current Fish Culture Section Member Count –

Current FCS member count 294 (as of 08/2022); time to start thinking about your 2023 AFS member renewal ... don't forget to check the **Fish Culture Section** box on your renewal; please continue to support the Section and help guide the future of aquaculture!

Thanks to all for your role in aquaculture ... AQUACULTURE MATTERS!!

Jeff Heindel



Student Spotlight

Mark Johannemann, Kentucky State University

An accumulation of nitrate is a limiting factor in recirculating aquaculture systems. Mark Johannemann is a graduate student at Kentucky State University studying under Dr. Andrew Ray. Through Mark's undergraduate and graduate career, he has been investigating simple, low-cost denitrification methods in biofloc-type brackish water recirculating aquaculture systems (RAS). Mark has led three studies as an undergraduate, the first testing the effectiveness of different media types in simple denitrification reactors and the second and third examining the potential of suspended growth denitrification post-harvest using the culture tank itself as the denitrification chamber and ethanol as a carbon source. The third study showed denitrifying in the culture tank to be highly effective at removing nitrate, showing a 99% reduction in total inorganic nitrogen. A follow-up trial at a local shrimp farm showed similar results, where a 17 m³ shrimp production system was denitrified from 493 mg/l NO₃ to 1.4 mg/l NO₃ in 7 days, while only using 34.1 liters of ethanol. This has important implications for producers as this denitrification method reduces wastewater discharge, saves money by reducing water and salt use, requires no modification to an existing RAS, and only uses ethanol which is cheap and commonly available, especially in Kentucky! Mark is currently starting his graduate thesis project which is further investigating low-cost denitrification reactors using woodchips as media. For more information contact Mark at Mark.Johannemann@ksu.edu.

Spokane AGM Recap

The 152nd annual American Fisheries Society meeting was held in Spokane, WA this last August with the Fish Culture Section supporting three symposiums. As the chairs of those symposia, we would like to send out thank you to all of our contributors, audience members, and fellow Fish Culture Section supporters for all of your hard work and dedication that goes into attending and contributing at these meetings.

Indigenous Aquaculture Leadership and Innovation in Fisheries Management; Thirty Years and Counting (Chair: Jeff Heindel)

A note of thanks to the 17 authors (and a host of co-authors and support staff) that took the time to share their diverse programs with AFS Members in Spokane ... for well over 30 years, Indigenous Aquaculture programs have been major contributors to the fisheries management community and species recovery efforts nationwide. We hope to continue to build on this session in future meetings and we look forward to participation as we continue to highlight the industry accomplishments of our fellow aquaculture peers and colleagues.

Application of “Recirculating” Aquaculture Systems for Conservation, Enhancement, and Sportfish Management Programs (Chair: Jeff Heindel)

My thanks to the five authors (Steve Sharon, Greg Fischer, Rylee Olson, David Whitbeck, Sage Hallenbeck) who provided wonderful presentations on the continued development of RAS/PRAS for the Conservation, Enhancement, and Sportfish Management elements of our industry. We look forward to building on this session as RAS/PRAS technology and infrastructure continues to advance for programs that culture species that often have far-different needs and “end-uses” than our fellow species that are well-represented in the food-fish industry.

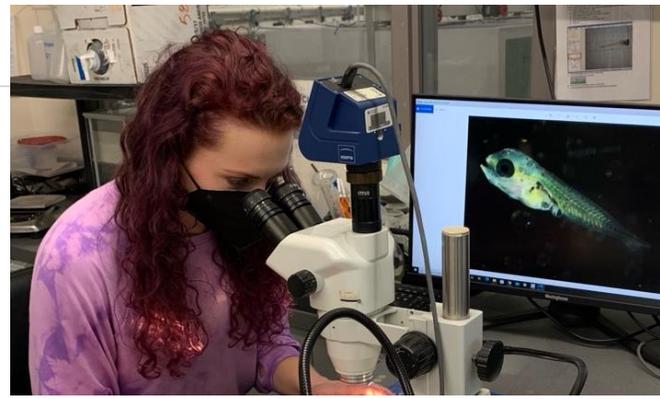
Getting it Right: Advancing Successful Supplementation for Recreation, Restoration, and Recovery (Chairs: Matthew Wipf and Nathan Wilke)

We would like to thank the authors who contributed to make Getting It Right a success in Spokane. Nathan Wilke developed the Getting it Right symposium some years ago and its list of contributors from meeting to meeting continues to grow. This year Getting it Right spanned 2 days of meetings filling 4 sessions brimming with excellent content, and a few dad jokes. The diverse contributing talks covered fish species from warm, cool, and coldwater aquaculture and we even dabbled in the human dimension aspect of fish culture. Aquaculture is advancing and without these symposia and, more importantly, the fisheries scientists who are making these advancements who are brave enough to stand on a stage and present the research, few would get to hear or see the great advancements of our time. So, to all who contributed, we thank you!



*Ph.D. Candidate Casey Murray from the University of Florida Tropical Aquaculture Lab receiving the Best Student Abstract Travel Award for “Utilizing Digestive Ontogeny to Improve Larval Culture Protocols of *Pristella maxillaris*.” Casey received a plaque and a check in the amount of \$850. See following summary of Casey’s work.*

Student travel award: Casey Murray



My name is Casey Murray, and I am a fourth-year PhD candidate at the University of Florida's Tropical Aquaculture Lab in Ruskin, FL. I am studying marine and freshwater larval fish physiology and nutrition with Dr. Matthew DiMaggio. My research is focused on utilizing the digestive physiology of larval fish to inform successful feeding and weaning protocols for culture to promote larval survival and growth.

My research takes a cross-disciplinary approach to increasing the sustainability of marine and freshwater fisheries by investigating the several aspects of larval fish development to improve aquaculture production protocols. I study the digestive physiology, morphological development, and nutrition of larval freshwater and marine fishes to streamline the production of these fish in captive environments. My goal is to create comprehensive larval rearing protocols to allow for aquaculture to be used as a fisheries management tool through stock enhancement and/or alleviation of harvest pressures.

My dissertation research is focused on creating or improving upon larval rearing protocols of six fish species: Hogfish (*Lachnolaimus maximus*), Clownfish (*Amphiprion ocellaris*), Blackbanded Sunfish (*Ennaecanthus chaetodon*), Chinese algae eater (*Gyrinocheilus aymonieri*), Siamese fighting fish (*Betta splendens*), and X-ray tetra (*Pristella maxillaris*). To comprehensively understand the larval development of these fish species, I utilize a variety of techniques that give insight into morphological development (fig. 1), digestive enzyme ontogeny, and nutritional requirements throughout the larval period. First, I collect fertilized embryos from captive broodstock and raise the larvae on live feeds similar to those they would find in the wild. Throughout their larval period, I sample larvae to characterize the digestive enzyme ontogeny via spectrophotometric microplate assays and to examine the morphological development of the digestive tract via histochemistry. Using this data, I can distinguish the developmental milestones that indicate the transition of larvae to juvenile. The peaks in certain digestive enzymes and the developmental patterns of the digestive tract also give insight into the best timing for transitioning larvae from live feeds to inert microdiets. Transitioning larval fish to an inert microdiet as early as possible increases the efficiency and cost-effectiveness of aquaculture production. Subsequent larval nutrition and weaning experiments are used to better define the timing of feed transition that results in the highest survival and growth. I also examine the effect of diet transition on the stress response of the larvae to determine if certain diets allow for greater stress resistance. Lastly, larval dietetics trials are conducted to identify the type of inert microdiet that results in the highest survival and growth. My ultimate goal is to utilize digestive ontogeny data to increase the efficiency of larval production to support potential stock enhancement programs for native fishes and the ornamental aquaculture industry in Florida.

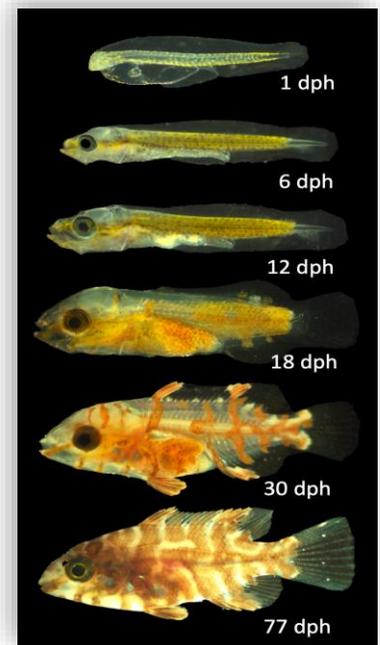


Figure 1. Developmental progression of hogfish (*Lachnolaimus maximus*) from 1-77dph (days post hatch).



Volunteers clipping fins on Coho

The Evolution of the Goldstream Community Hatchery

By Peter McCully, Long-term technical advisor to the Goldstream Hatchery

The Goldstream River Hatchery (also known as the Howard English Hatchery named for its founder) is located on the upper reaches of the Goldstream River on the outskirts of Victoria, British Columbia, Canada. Goldstream is a small coastal river with about four kilometers of spawning habitat that then empties into Saanich Inlet which is part of the Salish Sea. The hatchery is a small Community Involvement Project operated by volunteers with technical oversight provided by Fisheries and Oceans Canada (DFO). The focus of enhancement is directed primarily to Coho *Oncorhynchus kisutch*, Chinook *O. tshawytscha* and Chum *O. keta* salmon. Broodstock is taken from the

river with consequent progeny being released back into the natal river or transferred to adjacent watersheds to: (a) supplement existing stocks that are depressed; (b) replace stocks that have suffered extirpation or; (c) establish sustaining populations where none existed.

This initiative had humble beginnings when, in 1969, Howard was granted permission by the DFO to incubate 20,000 Coho eggs in a simple, riverside upwelling incubation box. The Coho population was on the verge of extirpation with less than fifty adults returning to spawn when Howard and volunteers interceded. It was then decided that the fry would have a better chance if they were held for six to eight weeks and fed on site. Simple earthen channels were constructed and again supplied with gravity fed water. These fish were not marked, tagged or otherwise recognizable as being of hatchery origin. While the number of spawners did increase, results were underwhelming and without being able to differentiate between hatchery and natural production, there remained the unanswered question. Sadly, Howard passed away before the mystery was solved.

Howard's passing proved to be a crossroads for the project. Following a guarantee of support from DFO, the volunteers formed a non-profit society for governance and decided on a production target that

would rely heavily on proven science and best management practices for fish culture. Furthermore, the mandate for the hatchery would emphasize conservation rather than production and significant effort would be made to have a robust education and outreach component. This would include providing a venue for research should local universities show interest. An early decision meant that Coho and Chinook would no longer be released as fry but would be held on site until smoltification. Chum would still be released shortly after ponding because of their natural preference for early emigration to salt water. It was recognized that if such practices were in the works, assessment was a vital component to determine their efficacy. The volunteers would take a year to finesse new rearing practices, carefully monitoring and recording data related to water quality parameters, feed requirements and fish health protocols.

Over the years we have enjoyed some successes, lamented some failures and have carried on with works in progress. One of the most satisfying and successful initiatives that we have been involved in is the DFO created curriculum, initially known as the “Salmonids in the Classroom”, a package primarily aimed at elementary students. Basically, it requires the placement of a 20 gallon tank equipped with a chiller in a school. This package, operating on the principals of recirculation, provides a platform for incubation and rearing that students can witness. Once the fry emerge, they are fed for a few days and the students then release them into local watersheds. This formula has proven to be exceptionally popular and, since its adoption over thirty years ago, it has enjoyed the participation of thousands of students in B.C. and the Yukon. For our part, we own the bragging rights to the fact that Goldstream Hatchery provides eyed eggs to approximately 100 schools in 5 school districts, which means we support more schools than any other hatchery in BC involved in this program.

Our early recognition and emphasis on the importance of education have resulted in the development of a facility whose resources are being made available to post-secondary institutions. Several students from Vancouver Island University have completed their practicums here. Our venue was also utilized by a graduate student from the University of Victoria who successfully completed a Master’s thesis uncovering some of the mysteries of eDNA. Currently, our facility is providing the opportunity for a PhD candidate’s research into factors extant in hatchery rearing of Coho. Specifically, is the hatchery environment implicated in a unique condition found in hatchery raised salmonids? Such fish are found to have an abnormal deposition of a polymorph of calcium carbonate (vaterite) on their otoliths (photos below). The research is studying possible contributing factors such as food and feeding rates/schedules, rearing densities and the complexing of incubation and rearing containers to name a few.

We also determined early on that our activities and those of local First Nations were intertwined and that it fell upon our shoulders to reach out and develop a relationship with our indigenous neighbors. To be successful in our pursuit, we needed the assistance of Saanich Tribes. We sought the counsel



A normal otolith (upper photo) and an otolith showing excessive vaterite (lower photo).

of elders and listened to the experiences of tribal fishers. We learned that Goldstream River, its flora and fauna and the culture of the Saanich people were irrevocably connected. Their knowledge contributed to our success. When the time was right, we stocked hatchery fry in some streams running through Native lands to bolster runs that had been weakened by development. We look forward to the future and are thankful for these partnerships that have evolved.



The last of five fish ladders in Millstream Creek.

With all these developments ongoing, our Association decided to turn our attention to habitat issues and, being situated adjacent to a large urban area, there were no lack of them to focus on. We had been considering an urban watershed, Millstream Creek that flowed through four municipalities before it emptied into salt water. This watershed had suffered serious degradation due to a host of human activities that were close to streamside. These included a couple of auto wreckers, an oil recycling depot, a secondary sewage treatment plant that was prone to failure and a regional septage dump. However, the saving grace for this stream was that it had its

source in a sparsely settled area that contained a number of glacial kettle lakes and bogs that acted like a big sponge. Over the last forty years the municipalities have done a reasonable job of cleaning up this waterway and removing the sources of pollution. We conducted a survey in 1989 and found the stream to have fairly healthy conditions that might support a population of Coho. The main drawback was that there were a number of waterfalls and cascades. In the ensuing years with help of the municipalities and a partnership with a local non-profit that specializes in community driven habitat restoration (the Peninsula Streams Society), we constructed five fish ladders whose total cost was over one million dollars. Our efforts have been rewarded with a self-sustaining Coho population and we have recorded sea run cutthroat opportunistically taking advantage of the access provided by the fish ways. That a self-sustaining population of salmonids can be maintained in a heavily urbanized setting is a reminder that, given sufficient resources coupled with a strong community component, conditions can be controlled that will assist salmonids to coexist with humans.

This is simply a brief history of the Goldstream Hatchery and a glimpse of some of our activities. It is just a snapshot of what has evolved into a very successful initiative. There are many more stories to be told. While its achievements are the envy of other like-minded groups it is not necessarily a template for success in all watersheds. A cookie cutter approach to enhancement in various settings may not be the best solution. We have a saying here; "Best Management Practices" are a tool...not the rule. What our experience does exemplify is that when the greater community of governance at all levels, regulators, NGOs, educators and volunteers share a common vision and exert their efforts to achieve these goals, good things can happen.

It's in my blood

By Matthew M. Wipf

My dad came to my office a few months ago bearing a gift - perhaps, you might say, it was an unassuming gift. But to me it was a gift of a legacy, a reminder of who I am and who I want to be. He presented me with two fish mounts, both albino Rainbow Trout, each a little more than 20 inches long, obvious hatchery fish (with ample fin



erosion), caught, and mounted in perpetuity to a beautiful piece of driftwood. I am the manager of Bluewater Springs State Fish Hatchery near Bridger, Montana (Montana Fish, Wildlife & Parks) and we raise primarily Rainbow Trout, so this gift doesn't seem too out of the ordinary and fits the motif of my office very well. However, the story doesn't really start there, it starts 72 years ago in 1950.

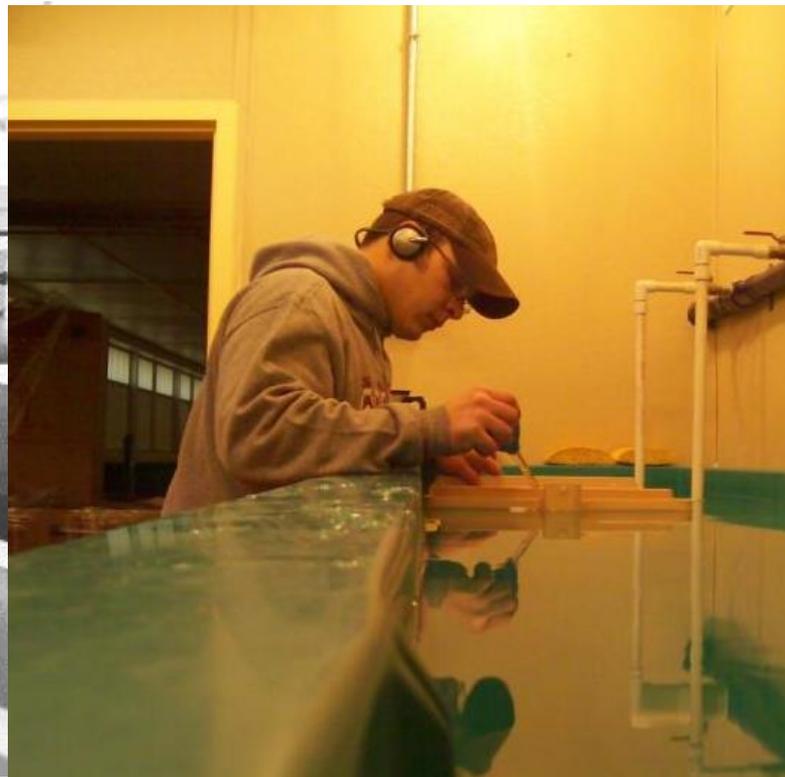
For fish hatchery folks, 1950 is right about the time when McCay and Tunison made the discovery of the missing micro-nutrient (Factor H) for salmonid specific diets - folic acid and vitamin B12. Their findings were the start of the fish feed pellet industry - it was the beginning of something magical for anglers and hatchery staff alike. In that same year my great grandfather, Harry Willard, started his career as a fish culturist for the USFWS Spearfish Hatchery Complex: D.C. Booth, McNenny, and Ranch A NFHs. I don't know much about his career aside from an old (priceless) photo album of his fish culture days and some vague memories of watching my great grandfather plant fish into local lakes in the Black Hills of South Dakota and later catching some of those fish with him and my dad. On page 96 of the recently published, *Images of America - Spearfish National Fish Hatchery* book there is a picture of Harry showing off the new fish distribution tank that D.C. Booth had just acquired. I have several great images of my great grandfather working for the USFWS and I look at them frequently. I even have some old reel-to-reel film that some years ago were transferred to a VHS of Harry planting fish, which I hope to digitize soon.

In September of 1982, months before my great grandfather retired from the service, he planted some 20+ inch albino Rainbow Trout, that he had reared, into Iron Creek Lake. Like always, he called my dad and let him know they had stocked his favorite fishing hole and he should go try his luck. On September 28 (my dad's birthday), 1982 he took my second oldest sister fishing at Iron Creek Lake. Dad landed one of those beautiful albinos and brought it home, like any respectable sibling, to show off to his brother (my uncle). As a birthday gift my uncle paid to have that fish mounted, so they took the fish down to the local taxidermy shop, Feather, Fin, & Fir and paid the \$1/inch fee to have it mounted. Two weeks later, that same uncle, went up to Iron Creek Lake and caught himself one of those beautiful 20+ inch albino Rainbow Trout. Like a good brother, he took it to Dad and did a little bragging of his own. That fish

found its way to Feather, Fin, and Fir as well. Almost all my childhood, Dad's albino has been on the wall proudly displayed as a trophy and a wonderful birthday present. When my uncle passed, his albino mount was given to my dad to cherish and have that memory.

Now, you would think that this wonderful story ends here. But the ties go beyond my great grandfather planting those fish and my dad and uncle catching them. As an undergrad at Black Hills State University, I did most of my intern work at McNenny, and some work at D.C. Booth (now National Historic Fish Hatchery). D.C. Booth and McNenny share space in my memory as a child visiting my great grandfather at his work, feeding the fish, and wishing I could put my line into one of those raceways. All those years later, I stepped into a professional work roll at both facilities – I fed fish in the same building and raceways as my great grandfather, I loaded fish from the same ponds and raceways, I literally sat on the D.C. Booth pond walls that my great grandfather had repaired with his own two hands, a trowel, and a passion for fish culture. Later, I became the Assistant Manager at McNenny State Fish Hatchery – that was when my grandmother handed me my great grandfather's bolo-tie and his beloved fish culture memories in a photo album I cherish to this day.

In 1996, I was a pallbearer at my great grandfather's funeral, carrying him from the church to the hearse and then to his final resting place. I didn't know it then, but when my dad showed up with those fish a few months ago, I realize that he passed on his legacy to me. Those fish are my inspiration, my family's memories, and my destiny. My great grandfather shared the same hatchery chores that I relish today, and I can't help but think of what Dr. Jesse Trushenski once said to me, "Fish culture, is in your blood" and she was right, it is without a doubt in my blood.



Harry Willard feeding fish at McNenny NFH (left; circa early 1980s) and Matt picking eggs at McNenny (right; circa 2007)

North American
Journal of
Aquaculture

NAJA Feature

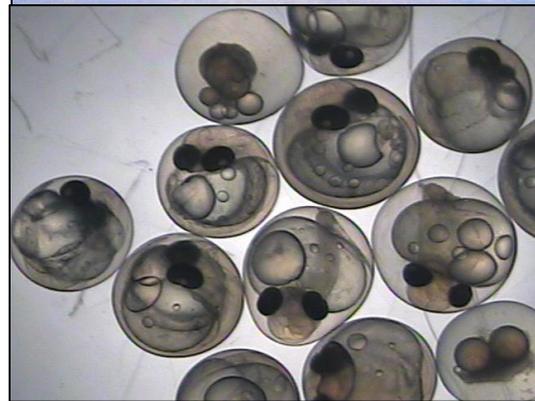
Cisco Aquaculture Best Practices: Randomized Experiments from Eggs to Juvenile

Summary by Gregory J. Fischer

In the early 2000s, Cisco *Coregonus artedii* (also known as Lake Herring), had become a species of interest for restoration and rehabilitation in the Great Lakes and the University of Wisconsin Stevens Point Northern Aquaculture Demonstration Facility (UWSP NADF) located on the shores of Lake Superior in Bayfield, Wisconsin was enlisted to conduct research on the several aspects of culture and husbandry by various agencies including the U.S. Fish and Wildlife Service and the Great Lakes Fish Commission among others. Due to the proximity to Lake Superior, the UWSP NADF facility was in an ideal location to conduct applied research on culture and husbandry of Lake Herring and was able to enlist the assistance of the local commercial fisheries to assist with collection of broodstock and fertilized eggs for the various projects that were conducted. Although there had been previous studies on some aspects of culture, husbandry and stocking, more detailed information was needed by various agencies for specific items such as fish health, diets, growth rates in various systems, fish health treatments, and other related culture and husbandry items in order to move forward with rehabilitation and restoration plans. During this time, several research projects were undertaken to learn more about specific culture and husbandry of Lake Herring including;

- 1) Evaluation of Lake Herring propagation on a commercial scale for the aquaculture industries of Northern Wisconsin. Funding received from Department of Agriculture, Trade, and Consumer Protection, Division of Agricultural Development, Agriculture Development and Diversification Program (ADD).

Photos right, from top to bottom: 1) Commercial fishing boat utilized for collection of Cisco broodstock and eggs from Lake Superior; 2) Developing Cisco eggs; 3) UWSP NADF Hatchery Foreman, Kendall; 4) Cisco fingerlings from tank sample at UWSP NADF Holmes, sampling Cisco fry; 5) Cisco fingerlings from tank sample at UWSP NADF; 6) Yearling Cisco reared in RAS system at UWSP NADF; 7) Yearling Cisco reared in RAS system at UWSP NADF.



- 2) Transfer of Finnish coregonine culture techniques and retrospective analysis of restoration strategies to advance coregonine restoration in the Great Lakes. Funding was received from the Great Lakes Fishery Commission.
- 3) Lake Herring (*Coregonus artedii*) Intensive Culture Manual. This manual was created by the University of Wisconsin-Stevens Point Northern Aquaculture Demonstration Facility using best management practices for Lake Herring based on previous research and success at UWSP-NADF (see Fischer et.al, 2016). Funding for this project was received from the U.S. Fish and Wildlife Service through the Great Lakes Fish and Wildlife Restoration Act.
- 4) Cisco Aquaculture Best Practices: Randomized Experiments from Eggs to Juvenile. Accepted for Publication in North American Journal of Aquaculture: August 5, 2022. Highlights and summary below.

UWSP NADF Lake Herring Project reports and papers can be found here:

<https://www3.uwsp.edu/cols-ap/nadf/Pages/UWSP%20Northern%20Aquaculture%20Demonstration%20Facility%20Home%20Page.aspx>.

Full citation: Fischer, G.J., Hartleb, C., Holmes, K., Hansum, C. and Tintle, N. (2022), Cisco Aquaculture Best Practices: Randomized Experiments from Eggs to Juvenile. North Am J Aquaculture.

<https://doi.org/10.1002/naaq.10267>

Reviews in Aquaculture

AFS members have access to all the journals published by the Society, but did you know members also receive complementary access to Reviews in Aquaculture? It's true! Log in to your account at fisheries.org [fisheries.org], select Journal Online Access from the Publications menu, then scroll down to find a link to Reviews in Aquaculture. You'll find a wealth of information on a wide range of topics in this journal. But if feed and nutrition is your thing, we recommend recent publications on the use of phytases in aquafeeds [doi.org], insect meals [doi.org], risk assessment of plant and animal ingredient [doi.org], and advances in larval fish nutrition [doi.org]. Take full advantage of your AFS membership by exploring Reviews in Aquaculture--happy reading!



Food for Thought

'Old School' isn't always out-dated. Automatic feeders can be great labor-saving devices, but they don't do a better job than a fish culturist who's paying attention. Hand feeding fish--or just watching them while the automatic feeder does the work--is an opportunity to observe the fish, note any unusual behavior, and get a sense of how the population is doing as a whole. Don't miss the chance to put your 'finger on the pulse' of the pond--go old school every once in a while and give hand feeding a try!

Keeping tabs on feed quality--what should you look for? Feed quality can vary from batch to batch or deteriorate over time if improperly stored. Mold or evidence of vermin getting into your feed are obvious signs of trouble, but fish culturists should be mindful of other, more subtle clues. Changes in pellet color aren't necessarily a problem, but they can be a clue to recipe or manufacturing changes. Oily bags or mixes of well-oiled and dry pellets can be the result of manufacturing issues or storing feed in an area that's too warm. Pellets that are unusually hard or crumbly can create problems for fish or filters, and excessive fines can indicate problems with the pellets or feed handling. Check every batch and monitor feed during storage to keep quality issues in check.

Spend quality time with new staff--feed fish together! As noted above, feeding time is a great opportunity to get a sense of how your fish are doing...but only if you know what you're looking for. Inexperienced folks might not yet know what 'normal' looks like for your species or system. Take some time to train new staff to see what you see and to know what to look for--good and bad. Time spent together, learning the nuances of feeding--or any aspect of fish culture--is time well-spent.

Links, resources, etc.

 [The Fish Site](#) [The Fish Site](#) is a knowledge-sharing platform with premium news, analysis and resources for the aquaculture industries.



[Global Seafood Alliance](#) is an international non-profit trade association dedicated to advancing responsible aquaculture.



[National Aquaculture Association](#) provides a unified national voice for aquaculture that ensures its sustainability, protects its profitability, and encourages its development in an environmentally responsible manner.



[E&E News](#)' five daily publications deliver news on energy and environment issues aimed at informing top decisionmakers in government, business, NGOs and academia.



[World Aquaculture Society](#), through its commitment to excellence in science, technology, education, and information exchange, contributes to the progressive and sustainable development of aquaculture throughout the world.



[Hatchery International](#) is a trade newspaper focused exclusively on the early rearing (hatchery) side of the aquaculture industry, fisheries enhancement and recirculation technology.



[Aquaculture North America](#) is a trade publication for all aquaculture industry professionals in North America.



[RASTECH](#) is the media source for owners and operators of Recirculating Aquaculture Systems (RAS) around the world. Listen to the [RASTalk Podcast](#) hosted by Brian Vinci and Jen Ko Din.



[IntraFish](#) is a global seafood and aquaculture news source reporting on R&D innovations, market trends and key developments. Most articles require a subscription but the [Podcast](#) is freely available.

Upcoming events

February 2023

83rd Midwest Fish & Wildlife Conference
February 12-15, 2023
Overland Park, Kansas
[More info](#)

Aquaculture America 2023
February 23-26, 2023
New Orleans, Louisiana USA
[More info](#)

March 2023

Aquatic Animal Life Support Operators
(AALSO) Symposium and Workshop
March 25-29, 2023
Milwaukee, WI
[More info](#)

Eastern Fish Health Workshop
March 27-31, 2023
Atlantic Beach, NC
[More info](#)

May 2023

Aquaculture Canada
May 7-10, 2023
Victoria, BC

46th Annual Larval Fish Conference
May 8-11, 2023
Lisbon, Portugal
[More info](#)

August 2023

AFS Annual Meeting 2023
Aug 20-24, 2023
Grand Rapids, Michigan
[More info](#)

September 2023

Marine Aquarium Conference of North
America
September 8-10, 2023
Pittsburgh, PA
[More info](#)

*see the AFS website's [calendar](#) for a comprehensive listing of chapter and division meetings.

Fish Nerd

- Global aquaculture production is dominated by Asia (92 percent); China alone accounts for 57.8 percent. According to the most recent Fisheries of the United States report, the U.S. ranks 17th in aquaculture production. (NOAA Fisheries)
- According to the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation produced by the U.S. Fish and Wildlife Service the Largemouth Bass and the Smallmouth Bass are the most sought-after hook and line fish in the United States.
- 75% of shrimp harvested in the United States comes from the Gulf of Mexico with an average per capita consumption of shrimp of 4.60 lbs (NOAA Fisheries).

Highlights from the FCS Business Meeting

The AFS Fish Culture Section Annual Business Meeting was held on Sunday, August 21, 2022, 5:30-7:00pm at the AFS Annual Meeting in Spokane, Washington. Full minutes, attendance list and budget available online at: <https://fishculture.fisheries.org/about/agendas-minutes-reports/>. Here we provide the highlights from the meeting:

Secretary/Treasurer's Report (**Deb Eddy**)

- FCS has approximately \$49,000 in Dedicated Accounts, \$17,000 in its operating account, and the balance of the investment account is approximately \$74,000.
- Members approved an amendment of \$1,000 to support the student mentor/mentee breakfast at either the Aquaculture America or Triennial meeting.

Governing Board Update (**Jeff Heindel**)

- AFS has a [Code of Conduct](#) and members are encouraged to review it.
- Mid-Year Governing Board Meeting will be January 11, 2023.
- **Drue Winters**, AFS Policy Analyst, discussed FCS involvement with Marine Aquaculture Research Policy matters and updated the group on the pending Recovering America's Wildlife Act (RAWA) legislation; if members have additional questions, please reach out to FCS Leadership.

Standing/Ad-Hoc Committee Reports

- Membership (**Jeff Heindel**) – as of August 10, 2022, FCS had 293 members.
- Newsletter (**Matt Wipf**) – Matt has taken on a co-editor, **Stephanie King**.
- Nominating Committee (**Mick Walsh**) – Announced official call for nominations and self-nominations for FCS leadership. We will vote on new officers next spring/summer.
- Program Committee (**Dan Mosier II**) – Review of current meeting. Getting it Right, Ornamentals, and Life Support Systems will be presented at Aquaculture America 2023.
- Audit Committee (**Jeff Heindel**) – FCS is due for an audit which will be discussed with **Mike Matthews**, Audit Committee Chair.
- Hall of Fame (**Jeff Heindel**) – Matt Wipf represented FCS leadership at **Dale Bast**'s induction into the Hall of Fame at D.C. Booth Historic National Fish Hatchery in Spearfish, South Dakota. FCS is seeking nominations for the 2023 Hall of Fame.
- Awards Committee (**Matt Cochran/John Bowzer** not present) - a student award will be presented at the end of this meeting.

Other Business

- Members should be thinking about potential officer candidates.
- Emerging Leaders Mentorship (ELMA) Funding Initiative (**Dan Mosier II**) – FCS will provide funds to support the President-Elect's participation in the Governing Board for one year.
- Hutton Program (**Mick Walsh**) - The funds FCS donates to the Hutton program are earmarked for students on a fish culture track. FCS will be ready to assist Hutton in 2023.

Officers

President	Jeff Heindel	heindel@mcmjac.com
Immediate Past-President	Michelle “Mick” Walsh	michelle.walsh@cfk.edu
President-Elect	Dan Mosier II	Dan.Mosier@KS.gov
Secretary-Treasurer	Deb Eddy	fishqueen_1@yahoo.com

Committee Chairpersons (Standing):

Auditing	Mike Matthews	michael.matthews@myfwc.com
Hall of Fame	Michelle “Mick” Walsh	michelle.walsh@cfk.edu
Membership	Jeff Heindel	heindel@mcmjac.com
Newsletter	Matt Wipf	matt.wipf@mt.gov
Newsletter Co-Editor	Stephanie King	stephanie.king@inwatertech.com
Nominating Program	Michelle “Mick” Walsh	
	Dan Mosier II	Dan.Mosier@KS.gov

Committee Chairpersons (Ad Hoc):

Professional Development and Resources		Mike Matthews
Student Awards Co-Chairs	Matt Cochran	matt.cochran@hdrinc.com
	John Bowzer	john_bowzer@adm.com
Social Media and Promotion	Timothy Bruce	tim.bruce@mdc.mo.gov
Student Comm. Co-Chairs	Allison Durland Donahou	adurland@flsouthern.edu
	Henry Fleener	henry.fleener@oregonstate.edu

President’s Appointees:

FCS Rep. to Triennial Program Comm.	Dan Mosier II	
FCS Rep. to Triennial Steering Comm.	Michelle “Mick” Walsh	
FCS Liaison to WAS/USAS	Michelle “Mick” Walsh	
FCS Webmaster	Shane Ramee	shane_ramee@fws.gov

About the FCS:

The Fish Culture Section of the American Fisheries Society is an organization concerned with advancing cultivation technology of aquatic organisms for food, commercial and recreational fisheries enhancement, ornamental purposes, and conservation. The Section represents fish culturists and those involved in allied fields such as nutrition, physiology, toxicology, drug development, genetics and breeding, bioengineering, economics, fish ecology, and everything in between. The Section disseminates information about fish culture, and supports the fish culture programs of private, governmental, and international entities.

