



Newsletter of the Freshwater Mollusk Conservation Society
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President's Message, 2021

I would like to thank those of you who voted for me as President-Elect. I'm not completely convinced that I was the best choice, but I am determined to live up to your expectations. It is truly an honor for me to serve as President of FMCS. It's hard to believe that a young, wet-behind-the-ears, impressionable graduate student who attended his first mussel meeting in St. Louis in 1995 and years later was one of the attendees to cast a vote to form the Freshwater Mollusk Conservation Society, would one day be its President. I have some rather large shoes to fill, and my predecessors did an amazing job steering the Society to where we are now,

and it is my intent to keep up their legacy. I also would like to thank my family, my wife Becky, and kids Grace, Sofie, and Noah, for their support and encouragement. I know that I would not have run for President had Becky not convinced me that it was something I could do and do well. Finally, I would like to thank Alan Christian and the rest of the virtual symposium planning committee. With the cancellation of our 2020 Workshop and ongoing travel and work restrictions, it wasn't looking like we would be able to have a 2021 Symposium, but those folks made it happen, and made it successful.

My vision for the next two years is to continue with the things that have made FMCS such a success over the last two decades. I know the transition to the new committee structure was difficult for some and may have been a little tricky to figure out but I want to assure each of you that just because your committee may now have a new name or may now be part of a larger committee, the work that you do is important and has not been forgotten. In fact, the work that has been accomplished in the past by the committees led us to our commitment to function under a new committee structure. On that note, I would like to thank the committee chairs for making the transition to the new structure work. I know some of you didn't quite agree, but it was great to see you doing your best to make it work. To those of you who are not a member of a committee, or are only a member in name only, JOIN ! It doesn't matter which committee, they all need members willing to volunteer time to make them successful, much like the Society as a whole. The committees are the backbone of the Society, and our success is dependent on our colleagues who dedicate time and energy to make it a success. Be one of those members.

As Jeremy Tiemann mentioned in his President's Message, we have grown from a small group of river rats on the banks of the Mississippi River to an international society. As with anything, that growth can sometimes come with growing pains. We will continue to focus on keeping costs for our Symposia and Workshops affordable for all members -- students, professionals, and emerita alike. To that end, the work of the Chapters Committee will be important to continue our efforts to form regional chapters that can further our mission.

The Professional Development Committee has been hard at work coming up with a program and criteria for Certified Mollusk Professionals. I think it is extremely important, given the growth of interest in mollusks and efforts to conserve them, that we follow the lead of other professional societies and develop a mechanism to recognize individual achievements and identify minimum standards in key skills and competencies for mollusk biologists.

Given the societal changes that have occurred over the last few years, I think it is important that, as a society, we recognize we have a voice and an imperative to use it to improve social justice, not only in our field, but also in our communities. To that end, I want to continue the efforts of the Diversity, Equity, and Inclusion Committee to entrench diversity and inclusion as a core value of FMCS.

A new committee is the Finance Committee. It is my vision that this group will help the Treasurer guide the financial future of the society and support the Treasurer in creating a society budget and making sound financial decisions.

The last year has been difficult for all of us at different times and at different levels. I hope that all of you, and your families and friends were able to stay healthy and safe. I also hope that as we transition into a new phase of being able to travel, not/maybe not wear masks, and see other people in-person, that all of you remain safe and healthy. Many of us had our field seasons interrupted, delayed, or outright cancelled this past year, so as we progress into Spring and Summer, I hope everyone has a safe and productive field season.

All the best,

Steve McMurray

Society News

Review of the FMCS 2021 Virtual Symposium

Alan Christian, Local Committee Co-chair

The FMCS 2021 Virtual Symposium, *Back to the Future: The Virtual Unknown*, was held from Monday 12 April to Wednesday 14 April 2021 and consisted of both synchronous ZOOM sessions and asynchronous contributed presentations. While most of us agree that there is no substitute for an in-person FMCS Symposium or Workshop, the FMCS 2021 Virtual Symposium was a success considering the unprecedented pandemic circumstances, the short preparation time for the Local Committee, and the virtual platform that was new to many of us. The success of this meeting was due to the efforts an outstanding planning committee and, more importantly, the willingness of the so many people to participate.



We were able to take care of business during the synchronous Board Meeting, two breakout sessions for committee work, the Business Meeting; and do some professional and social networking during several topical breakout sessions. Our Plenary Talk “Four Reasons Your Green Organization is Still Predominantly White (and What to Do About it)” presented by Ms. August Ball, the founder of Cream City Conservation, was one of the asynchronous YouTube video presentations. We also had an outstanding assortment of asynchronous contributed oral and poster presentations and associated YouTube videos. This article provides some basic statistics regarding participation in the Symposium and presents some results from the post-symposium survey on what attendees thought about this event and how it might change participation for future FMCS symposia and workshops.

Symposium Participation

We had a total of 370 registrants for the virtual Symposium, of which 199 were continuing FMCS members (150 regular, 49 students/retirees) and 171 were non-members (136 regular, 35 student/retirees). ZOOM participation ranged from a low of 247 unique viewers on Day 3 to a high of 281 unique viewers on Day 2 (Figure 1). Participants averaged from 120 to 150 minutes of ZOOM time each day at the synchronous events (Figure 1).

The FMCS 2021 Symposium included a total of 173 contributed presentations. Of that total, there were 98 12-minute traditional talks (37 of which were presented by students), 42 5-minute lightning talks (14 presented by students), and 33 poster presentations with associated YouTube videos (19 by students). In all, this Symposium included 70 student-presented traditional, lightning, and poster presentations.

Some Screen Shots from FMCS 2021 Virtual Symposium Presentations

Microbiomes Are Important for Marine Bivalve Health

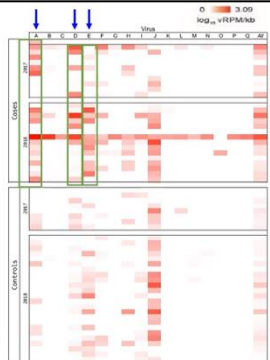


What About Freshwater Bivalves?



Introduction: Clinch River mussel die-off – virology

- 17 Novel Viruses
- 5/17 viruses stand out
 - 3 → higher prevalence
 - 3 → higher viral load
 - Only 1 with both (Clinch densovirus 1)
- Densoviruses
 - Highly prevalent
 - Often endogenized/fragmented
 - Frequently associated with invertebrate mass mortality



Richard et al. 2020. Mass mortality in freshwater mussels (*Actinonaias pectorosa*) in the Clinch River, USA, linked to a novel densovirus. *Sci Rep* 10, 14498 (2020).

Museum Collections Data



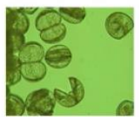


This map was compiled from examination of over 2800 specimen lots collected from Central America during the period from December 2002 to January 2021.



All data points as of January 2021



Disconaias disca (Lea, 1838)

Response of Eastern *Elliptio (Elliptio) complanata* Populations to the Reintroduction of American Eel (*Anguilla rostrata*) in the Susquehanna River Basin

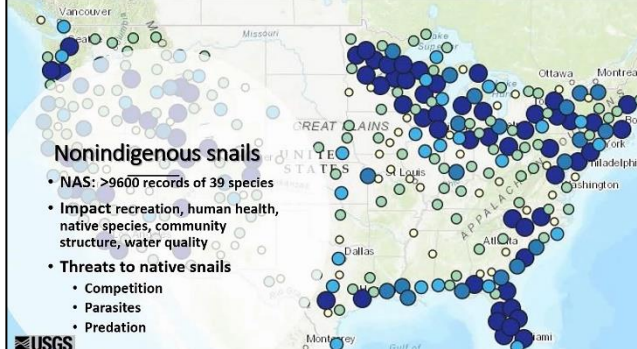




U.S. FISH AND WILDLIFE SERVICE MARYLAND FISHERY RESOURCES OFFICE
Julie Devers, Josh Newhard and Steve Minkinen

U.S. GEOLOGICAL SURVEY – NORTHERN APPALACHIAN RESEARCH LABORATORY
Heather Galbraith, Carrie Blakeslee, Barb Jeffrey Cole and William Lellis

Nonindigenous snails




- NAS: >9600 records of 39 species
- Impact recreation, human health, native species, community structure, water quality
- Threats to native snails
 - Competition
 - Parasites
 - Predation

USGS

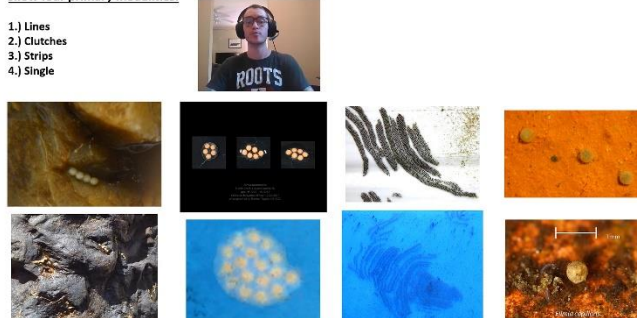
Sub-globose Snake Pyrg *Pyrgulopsis saxatilis*

- Described by Hershler in 1998
- Endemic to one spring complex in Utah's West Desert
- Considered "common" in historical surveys (average = 343/m², Vinson 2002)
- Species Status Assessment scheduled for 2019
- 2019 surveys found species distribution and abundance had declined
- Non-native fishes present in 2019 surveys (Loricariidae, likely *Ancistrus* sp.)

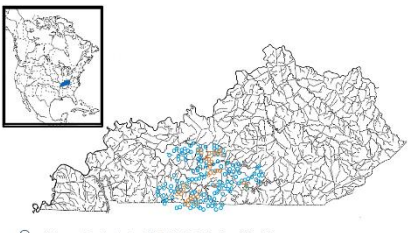


Interspecific variation in pleurocerid egg-laying strategies show four primary modalities:

- 1.) Lines
- 2.) Clutches
- 3.) Strips
- 4.) Single

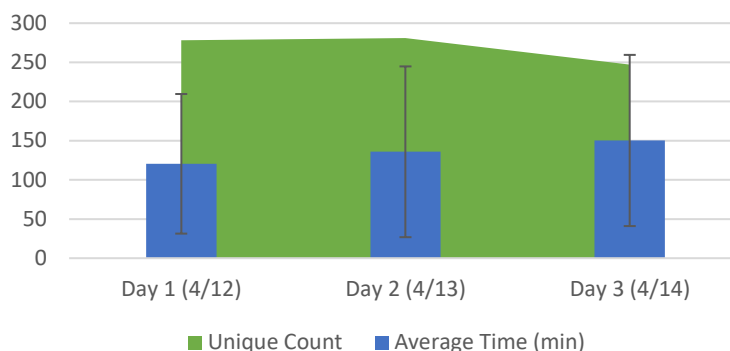


Distribution of the Kentucky Creekshell and its host fish, the banded sculpin



○ *Cottus caroliniae*, banded sculpin distribution in the Green River, KY
● *Villosa ornamentum*, Kentucky creekshell distribution in the Green River, KY

Figure 1. FMCS 2021 Symposium unique participants and average participation time (in minutes) for each day of the Symposium.



Survey Results

The post-symposium survey regarding the FMCS 2021 Symposium and future FMCS events was responded to by 76 of the 370 registrants. Based on my survey experience with similar events, this was not a bad response rate, and the respondents provided some important feedback on this Symposium and for consideration as we plan future FMCS events.

The survey questions were broken into pre-meeting onboarding activities, Symposium communications, and Symposium activities. Overall, onboarding activities such as registration, abstract submission, and presentation submission were rated “good” (2.9 out of 5) to “excellent” (4.5). A majority of the comments were very supportive and appreciative of the local activities, but there were several comments about cleaning up the registration process and standardizing or automating (via uploads) the abstract and presentation submission processes, which is good feedback for future meetings.

Overall, conference communications were rated “good” (3 out of 5) to “excellent” (4.2 out of 5). Like the onboarding comments, most comments were appreciative of the local committee’s efforts, although there were some comments that we over-communicated during the ‘morning of’ emails with redundant PDFs.

Symposium activities were rated excellent overall, ranging from “good” (2.9 out of 5) to “excellent” (4.4 of 5). The lowest scores, aside from those who did not attend the Board Meeting, were for the asynchronous contributed presentation comment form and responses. Several commentators shared disappointment with some forms not working for every presentation. Additional comments indicated disappointment with the synchronous concurrent social and professional networking sessions, and not being able to attend more than one, thus missing out. There also were concerns about the flow and energy of the Business Meeting this year and during previous symposia, suggesting we ought to rethink the flow of the Business Meeting.

The post-symposium survey ended with general questions concerning virtual symposia/workshops, blended (in-person meetings with virtual components) events, and in-person breakout options for future events. There was overwhelming support for attending future virtual FMCS events, with most participants stating they would “likely” (4.5 out of 5) attend a future virtual workshop or symposium. For the five “blended” event questions, the overall response was “supportive,” with individual agreement ranging from an average of 4.1 to 4.4 out of 5. Survey respondents were “very supportive” of blended virtual access to asynchronous presentations, having blended virtual access synchronous breakout sessions, blended virtual access synchronous contributed presentations, and blended virtual access synchronous plenary sessions. The major comment from the virtual access to in-person meetings was that virtual access would allow those not able to be present the meeting to still attend and participate, which would improve inclusion and accessibility for many members. With regard to adding virtual breakout sessions to in-person meetings, survey respondents also were “supportive” of adding social networking (3.5 out of 5), contributed presentation topical discussion (4.1 out of 5), and mentoring sessions (3.9 out of 5). One overwhelming request or comment from the survey

respondents was to have asynchronous contributed presentations posted for a longer period of time because they wanted to be able to view more presentations. While we limited the “visibility” this year to three days due to intellectual property concerns and some agencies requirement for limited public access, this could be discussed and worked out for future events.

Acknowledgements

The success of the FMCS 2021 Virtual Symposium would not been possible without the dedicated support from some key groups and people. First, Clarkson University provided Information Technology support, physical space with stable internet, and financial support. Clarkson’s Office in Information Technology supported both ZOOM and the Clarkson Google Sites for the contributed presentations and provided a “war room” with high-end computing, audio, and video support during the synchronous events. Clarkson’s Provost Office/Academic Affairs provided a Welcome Address and financial support for additional ZOOM seat purchases once we went over the anticipated 300 participants. Members of the Local Committee rolled up their sleeves and organized and executed a full Symposium in just about six months. This was a great group that not only shared ideas and worked well together, but individually did an unbelievable amount of work. Our committee consisted of myself (Alan Christian, Co-chair; Meeting Tech), Steve McMurray (Co-chair; Program), Alexa Maine (Abstracts), Patty Morrison (Abstracts), Matthew Patterson (Program), Jeremy Tiemann (Abstracts), Jenifer Archambault (Outreach Committee), Curt Elderkin (Awards Committee), Amy Maynard (Outreach Committee), and Tamara Smith (DEI Committee). Special thanks go to Walt Householder (student at California State University, Monterey Bay, and a US Fish and Wildlife Service intern) for making the awesome 2021 logo, and to Mark Hove for supplying past meeting photographs for the Symposium web page. Sponsorship for the FMCS 2021 Symposium was outstanding, with 13 contributing sponsors and seven additional in-kind sponsors. Finally, we were impressed and appreciative of the interest and participation of so many “attendees” to this meeting. While the Local Committee organized and planned the activities, it was the willingness, enthusiasm, and contributions of the registrants that executed the plan, engaged, and made the most out of a less than ideal situation.

While most of us would prefer to meet in person, the overwhelming conclusion was that FMCS 2021 Virtual Symposium was a success. We took care of Society business, watched some extremely interesting presentations about freshwater mollusks, shared ideas and made connections, became more appreciative of in-person meetings, have seen ways to be more inclusive and provide access to those who cannot make it to in-person events, and gave some feedback on improving future events. I also recognized that it would be good idea if the Symposia and Workshop Committee could develop some standardized questions for pre- and post-event surveys to help continuously improve everyone’s experiences at Society functions.

Minutes of the Spring 2021 FMCS Teleconference Board Meeting Monday, April 12, 2021

The Call to Order and Roll Call was made by President Jeremy Tiemann. In attendance were: Jeremy Tiemann, Janet Clayton, Alan Christian, Steve McMurray, Ryan Schwegman, David Hayes, Wesley Daniel, Lisie Kitchel, Jennifer Archambault, John Harris, Gerry Dinkins, Mickey Matthews, Tim Lane, Kevin Roe, Dave Zanatta, Wendell Haag, Robert Bringhoff, Megan Bradley, Maddie Pletta, Tam Smith, Becca Winterringer, Nathan Whelan, Dave Berg, Heidi Dunn, Matt Patterson, Emilie Blevins, Jason Wisniewski, Rachael Hoch, John Jenkinson and Paul Johnson. A quorum was determined to be present.



Some of the attendees of the virtual Board Meeting

A motion was made by Heidi Dunn with a second by Dave Berg to approve the November 2020 Board Meeting Minutes as published in the December 2020 *Ellipsaria*. All approved.

Treasurer's Report – Alan Christian

Due to switch over from PayPal to Wild Apricot AffiniPay third party payment system in early 2021, the setup of Square for point of contact and no card present sales, and the volume of transactions due to symposium sponsorship, renewals and symposium registrations in early 2021, it is going to take time to reconcile payments and service charges. Therefore, only the 2020 Profit and Loss and Balance Sheet statements could be accurately reported. The current balance through December 2020 for the Bank of America checking and savings account, the expenses of the symposium, and the number and income of member and non-member registrants of the FMCS 2021 symposium as of the morning of 3/25/21 are provided below.

- Our Profit and Loss statement calendar year 2020 in which our income was \$13,312.84 and our total expenses for 2020 was \$31,191.04 resulting in a net negative income of -\$17,878.20 (Table 1).
- Our Balance Sheet statement for calendar year 2020 showed a Total Liabilities & Equity of \$107,129.76 (Table 2). Our 2020 year ending balance for Bank of America checking and savings was \$95,074.07 and \$10,009.06, respectively (Table 2). As of the morning of 3/28/2021, we had \$123,920.93 in our Bank of America checking account and \$10,009.87 in our Bank of America savings account. Since the new year, our income has increased due to every other year membership renewals and sponsorship (~\$10,000 to date) and regular membership and non-member registration to the FMCS 2021 virtual symposium.

- FMCS 2021 Symposium
 - Our expenses for the FMCS 2021 Virtual Symposium have been minimal, only a \$1,000 speaker fee for the plenary speaker.
 - Gross income for FMCS 2021 Symposium as of 25 March 2021 was \$2,095 for members (99 regular and 23 student/retiree) and \$11,405 for non-members (101 regular and 29 student/retiree) (Table 3).

Table 1. FMCS Profit and Loss statement January through December 2020 as of March 28, 2021.

Income	
2020 Workshop	480.70
PNW Funds	366.40
Amazon Smile Income	277.41
Donations	3,174.00
Tom Watters - \$ 805.00	
Donations - Other - \$ 2,369.00	
Interest Income	5.92
Memberships	8,908.41
2021 Memberships - \$ 80.00	
2020 Memberships - \$ 5,428.41	
Memberships - Other - \$ 3,400.00	
Workshops and Symposiums	100.00
2020 PNW Workgroup Workshop Spon - \$ 100.00	
Total Income	13,312.84
Expense	
CBFMW Regional Meetings	566.40
CBFMW Regional Meeting PNW Regional Meeting - \$ 466.40	
CBFMW Regional Meeting - \$ 100.00	
Webpage	5,268.60
Annual registration fee	1,827.00
Bank charges	62.21
PayPal fees Symposium/Workshop expenses	199.22
FMCS 2021 Symposium	6,410.00
Walkerana/FMBC costs	16,857.61
Total Expense	31,191.04
Net Income	-17,878.20

Table 2. FMCS Balance Sheet statement as of December 31, 2020.

ASSETS	
Current Assets	
Checking/Savings	
BofA savings	10,009.47
BofA checking	95,074.07
Paypal	2,046.34
Paypal income	-0.12
Total Checking/Savings	107,129.76
Total Current Assets	107,129.76
TOTAL ASSETS	107,129.76
LIABILITIES & EQUITY	
Equity	
Retained Earnings	125,007.96
Net Income	-17,878.20
Total Equity	107,129.76
TOTAL LIABILITIES & EQUITY	107,129.76

Table 3. Member and Non-member registration counts and sum of gross registration fees as of 25 March 2021. Gross income does not account for third party vendor service fees via PayPal, AffiniPay, or Square. Gross income includes meeting registration (\$20 regular; \$5 student/retiree).

Registration type/Invitee reply	Number of Registrants	Gross Income (\$)
Member	99	1,980.00
Student/Retiree	23	115.00
Subtotal	122	2,095.00
Non-Member	101	10,100.00
Non-Member Student/Retiree	29	1,305.00
Subtotal	130	11,405.00
Grand Total	252	13,500.00

Secretary's Report – Janet Clayton

The membership database has not been updated with renewals of members which registered as non-members for the Symposium and, thus, an accurate count cannot be provided for active members. Therefore, the totals provided are both active and lapsed members. There appear to be three contributing members for 2021, three paying lifetime members, 19 free lifetime members (Lifetime Achievement Award winners), and 927 regular members (which includes lapsed members back to 2017). Lapsed members will be cleaned out as soon as Alan rectifies the 2021 renewals. There are also 350 student members which also includes lapsed members back to 2017.

I will be turning over the secretarial duties to Sarah Veselka following this Symposium. As she is also living in West Virginia, the transition should be rather easy as I can transfer her the files with little effort. I have enjoyed working for FMCS, it is a great bunch of folks and thanks for everyone's support over the last six years.

OLD BUSINESS**JASM** – Daelyn Woolnough, David Zanatta

The planning group for the second Joint Aquatic Sciences Meeting (JASM) currently includes nine member organizations. This JASM meeting is now scheduled to occur in Grand Rapids, Michigan from May 16 to 20, 2022. The recent survey of FMCS members indicated that 78% of more than 100 respondents would attend the meeting. This survey also indicated that many FMCS members are also members of the other participating organizations. The planners are currently having monthly meetings and if anyone is interested in helping, please contact Daelyn or David.

Scanning and uploading of miscellaneous mollusk journals to FMCS website – Jeremy Tiemann

We are still trying to obtain other older and generally unavailable publications for uploading. Those already uploaded are posted on the FMCS website under the Publications tab.

Update on committee new structure – Jeremy Tiemann, Heidi Dunn

This Symposium will be the kick-off using the new committee structure. The committees will meet according to the new structure and then elect a chair under the new structure and reorganize accordingly. Only the head chair will be a voting member to the Board. Each committee will decide on how they wish to break out into sub-committees.

NEW BUSINESS**2021 Virtual Symposium** – Alan Christian

There are over 360 registrants for this Symposium with over 100 presentations. There is a counter on the overall webpage and each individual YouTube video contributor should be able to track their users.

FMCS support for Developing a digital database of printable 3D freshwater mussel reconstructions – Matthew Patterson

Through collaborative efforts involving the Chesapeake Bay Foundation (CBF) and the Smithsonian Institution's National Museum of Natural History (NMNH), we are looking to develop a taxonomically comprehensive database of digital and printable 3D reconstructions of the freshwater mussels of the United States. This resource will be designed to enhance research, training, outreach, and education across the country. This project will result in a digital database of 3D reconstructions of all freshwater mussels (Unionidae and Margaritiferidae) native to the United States that can easily be converted into life-sized and realistically-colored replicas using a 3Dprinter. This project proposal seeks to create a comprehensive digital inventory of all US species of freshwater mussels by leveraging the Nation's bivalve collection and the state-of-the-art imaging facilities at the NMNH. The NMNH has a vast collection of mussel specimens, the required imaging technology, and has agreed to host the proposed project. Mary Jones, a Ph.D. student from Miami University has developed an efficient 3D imaging and reconstruction protocol capable of quickly creating reconstructions for representatives of the targeted species.

After digitally reconstructing the shells, a database of all species will be made publicly available. This database will house files that can be used for 360°, three-dimensional, virtual observations or can be used for 3D printing. Printed mussels can be used for training and as education and outreach tools for the general public. For threatened and endangered species, which by definition are uncommon and difficult to find, access to quality specimens is limited and often requires extensive collecting/transport permits - these printed replicas will substantially improve access. The printed life size and colored shell replicas will provide important hands-on training, education, and outreach opportunities that might not otherwise

be available. These replicas are cheap to reproduce, durable, do not require permits, and most importantly, provide stakeholders with easy access to realistic mussel “specimens” that can be used in various training, education, or outreach programs.

We have submitted a National Fish and Wildlife Foundation (NFWF) proposal, which if funded, would partially support this initiative and provide a more robust proof of concept. We are seeking an additional \$20,000 to support the first phase of this effort which would result in scans of all 32 species that exist within the Chesapeake Bay drainage and the 76 US Federally Endangered freshwater mussels. Ultimately, we estimate to secure digital reconstructions for an entire set of all the species in the U.S. we will require \$80,000 to support a 1-year postdoctoral position at NMNH. We would like to ask for FMCS support in pursuing these efforts. The deliverable would be a comprehensive library of 3D reconstructions of all US species and the associated files for printing. The rotatable 3D reconstructions will be freely available on the web similar to the reconstruction in this link <https://sketchfab.com/3d-models/usnm-85728-r-7e1654c6fa2c42b4b06bf229ca3697e8>.

NCTC is looking into developing new courses, including mussel ID. This project would allow more shell material including endangered species. Also helpful for outreach. The \$20,000 request is only for the Chesapeake Bay drainage and 76 endangered species scan. The scans would then be publicly available and could be printed for an additional cost of approximately \$5 to \$10 per shell. There was further discussion on the possible need for scans to be embossed with a logo or the like to indicate they were replicated. Ultimate test is that they melt with heat.

Jeremy and Heidi had received examples and said the replicas are very realistic. Thought they were real when they got them other than being light in weight. Heidi still noted that one shell does not represent the variability in shells that can occur. Links to examples are:

It was not clear as to whether they were asking FMCS for the full \$20,000 or if they were seeking other funding sources. One suggestion was to also check with DOT agencies as potential funding opportunities. As there are procedures for seeking funding from FMCS, the request was tabled until an appropriate funding request is submitted and reviewed.

COMMITTEE REPORTS

Symposium -- 2023 – Portland – Emilie Blevins, Steve McMurray

No additional update since the last meeting. The Portland planning committee negotiated with the DoubleTree hotel to amend the contract and transition the event to 2023 with Board approval. All other terms remain the same, and the contracted dates are now April 9-13, 2023. Planning will resume over the next year.

Guidelines/Techniques – Ryan Schwegman, Lisie Kitchel – workshop

The Field Sampling Workshop has been tentatively rescheduled for the week of August 1, 2022, with a backup of August 8. A new contract still needs to be made with Henry Horton State Park in Tennessee. We are still planning for the Workshop to start on that Monday with trip to the Duck River on Thursday. Costs may be a little higher than was anticipated earlier because of concerns about the potential for lower participation.

Awards – David Hayes, Curt Elderkin, Susan Oetker

There are a total 70 student presentations: 37 platform and 63 posters. We have 55 judges.

Nominations – Wes Daniel

The FMCS 2020/2021 officer election was conducted through Google forms and saw 55 members cast votes. The only contested race was for President-Elect, with candidates Megan Bradley and Matthew Patterson. Megan won the position with the majority of the votes. Sarah Veselka will take over from Janet Clayton as Secretary, and Alan Christian will retain his

position as Treasurer. All winners have been informed of the results, and Alan and Sarah have accepted the positions.

We have informed Matthew of the results. Megan is in the process of getting approval from the USFWS ethics group to serve as the next president of FMCS. As of today, she is still waiting on that approval. I would suggest preventing this potential issue in the future by requiring all candidates to get preapproval from their employer before agreeing to run for FMCS elective positions.

Outreach – Jennifer Archambault, Amy Maynard

The Outreach Committee planned and executed the third biennial Student-Mentor Networking Session at the FMCS 2021 Symposium “Back to the Future: The Virtual Unknown.” In this iteration, students spoke with mentors aligned to their career interests through ZOOM break-out rooms. This spring, the Outreach Committee co-chairs routinely joined the symposium local committee to provide committee-specific aid in the execution of this year’s event. We communicated announcements of the Symposium via social media (Facebook, Instagram, and Twitter) and recorded a portion of the Symposium promotional video. The Diversity, Equity, and Inclusion (DEI) Committee has developed DEI social media content and we published those posts upon request using the hashtag #DiversityEquityInclusionFMCS.

Committee member Nora Straquadine recently volunteered to manage the society webpage, and she has transitioned into management with the guidance of Megan Bradley, who served in that role for several years. Please contact Nora with any website update requests at nrstraquadine@gmail.com. The committee is evaluating options that would streamline the society webpage and improve its accessibility. Looking to transfer from a static platform to a dynamic one. Nora has a lightning talk about the website, separate from the Outreach Committee's talk.

Finally, we welcome a new committee co-chair, Daniel Symonds. Together, Amy Maynard and Daniel Symonds will chair the Outreach Committee. Jennifer Archambault’s term as committee co-chair closes after six years of service. We thank Jennifer Archambault and Megan Bradley for their years of esteemed service and dedication to the committee!

Mussel App update – John Harris

The Freshwater Mussel Identification Guide App was released and last updated on 8 July 2019. The app has been installed 100+ times according to the Google Play store.

Since December 2020, the core group (Oetker, Bogan, Harris, Johnson, Randklev, Robertson) has begun development of App Version 2. Texas is near completion with their V2 under separate contract with the app developer (Science Apps, L3C - Stan Martin). Our group has worked on drilling down from the Mussel Province divisions of V1 and we are concentrating on distribution data for river basins for V2. The exact definition of our river basins is fluid at the moment but will be refined once the spreadsheets of what species occur where are complete. Currently we have most of the data by HUC 8 drainage, but some of the distribution data is refined to the HUC 12 level.

As many of you may know, the App V1 is currently inaccessible. Apple upgraded the operating system, and the app was no longer compatible. The App V1 requires work from someone to upgrade it to work in the new operating system and then upload it to the app store.

Maintenance and continued updates to the App V1 and future App V2 will require funding. Science Apps, L3C has quoted FMCS a price of \$2,500/ year for "needed equipment upgrades, paying the play store and apple store fees, periodic touch point calls, and routine maintenance like rebuilding the app, when Apple or Google or Art breaks something".

Gastropod Status and Distribution – Nathan Whelan, Wesley Daniel

Activities since the last board meetings: review the gastropod outreach poster, and Names subcommittee is functioning as intended. A joint meeting of the mussel and gastropod names subcommittees will occur on Wednesday April 14. Voting members will meet on April 21 to vote on name petitions.

The new Mollusk Status and Distribution Committee will meet on Tuesday April 13. Discussion among the four current co-chairs has led to the desire to have at least one “mussel expert” and one “gastropod expert” as co-chairs to ensure a broadly focused mollusk committee can accomplish what the individual committees were doing prior to the reorganization.

Mussel Status and Distribution – Gerry Dinkins, Jason Wisniewski

Conservation assessment of freshwater mussels of US, Canada and Mexico. This revision appears to still be on hold while the authors of the most recent compilation assess whether they wish to return to this project. Previously, the members of the committee were contemplating the following action items:

- Request co-author input on a revised methodology for conservation status determinations using the taxonomy adopted in the revised list of freshwater mussels in the United State and Canada (Williams et al. 2017),
- Update status information for the geographic areas of responsibility to include examination of all the state T&E mussel lists or equivalent documents (species of greatest conservation need), and
- Revise and update historical vs current distribution information for each taxon, conservation status information, and complete the text revision from the previous submission. A publication date of 2019 had been anticipated but we are unsure if this initiative is still being considered.

Atlas of Freshwater Mussels of North America. No change or advancement of this initiative has occurred since the last committee meeting. Currently, 151 of the approximately 356 taxa addressed in the Atlas have volunteer authors for species accounts. There were 27 first draft accounts as of November 3, 2018 and one species account had been posted to the website for volunteers to use as a template. We will be looking at the remaining 26 draft species accounts so they can be sent to external reviewers. Accounts will be posted as they are completed.

Naming subcommittee – Paul Johnson, John Harris

This committee is being absorbed in the new structure. Individual petition reviews will be addressed in a separate three-hour TEAMS meeting. Any member can attend to assess the 38 new petitions. Of these, 18 are mussels and 20 are gastropods. Draft positions are posted on the FMCS website. The groups are meeting separately due to time constraints. Nate Johnson, Andrew Henderson, and Kevin Roe agreed to four-year extensions for the bivalve group. Ken Hayes and Alan Strong are two new members to the gastropod group for four-year terms and Chuck Lydeard has agreed to replace David Hayes for a four-year term.

Environmental Affairs – Braven Beaty, Mickey Matthews – updates on CASS

Things have slowed down with the change in Federal administration. We recently signed onto a letter with the Consortium of Aquatic Sciences Societies (CASS) for support to the USGS stream gauge network. There has also been a request to review Waters of the United States and injurious wildlife to the Lacey act.

Genetics – Kevin Roe, Dave Zanatta

We have a talk in the Symposium lightening round describing what the committee is supposed to do.

Information Exchange**Ellipsaria**, John Jenkinson, Editor

The newsletter continues to be posted -- on schedule -- every three months. Many thanks to everyone who submitted items over the past year in spite of all of their COVID-19-related issues. An email reminder about the due date for input to the next (June) issue is scheduled to go out Thursday.

Freshwater Mollusk Biology and Conservation (FMBC): Editors- David Berg, Robert Bringolf, and Wendell Haag; Managing Editor- Megan Bradley

Volume 24(1) should be published any day now. We submitted everything to Allen Press on time for March publication but, during the last year, Allen Press has been slow to return proofs and accomplish other tasks promptly; they attribute this to COVID-19. These delays caused us to just miss our March target. The issue has five papers, all of which are available on early view.

Volume 23(2) was published on October 26, 2020. The issue had eight papers. This issue had similar delays with Allen Press. We are still working hard to try to make our publication deadlines (March 31 and September 30).

Volume 24(2) should consist of at least five manuscripts, possibly more. Submissions have been strong (more on this later), but please continue to encourage members and non-members to submit their work to FMBC.

We are still exploring how to receive an impact factor from Clarivate Analytics. Have not made much progress on this since our last meeting (Nov 2020), but the discussion continues.

We continue to be pleased with copyediting service provided by Two Herons Consulting. Our copy-editing procedures are running smoothly and effectively.

Due to the volume of submissions (a great thing), we have had trouble turning around manuscripts as quickly as we would like. To address this, we are considering changes to the editorial structure and responsibilities to help improve efficiency of workflow, communication with authors and others, and overall accountability. The restructuring may also help with communications with Allen Press, Clarivate Analytics, etc. We will update the Board and membership as we work out the details of this restructuring.

Propagation – Rachael Hoch, Tim Lane, Maddie Pletta

The committee voted in favor of the proposed subcommittee divisions; “Habitat Restoration” and “Aquaculture and Population Restoration.” There were 17 committee members who participated in the poll, 12 members voted in favor of both subdivisions (70.6%). Five members offered other suggestions including; Habitat Remediation, Habitat Conservation and Restoration, Captive Propagation and Restoration, and Propagation and Population Restoration. Due to low participation (24%), we plan to revisit the subcommittee names during our committee meeting on April 14. The goals and mission statement for each subcommittee will be determined once chairs are elected at the symposium. No nominees have been received for subcommittee chairs. We are still accepting nominations via email to any of the current co-chairs. Rachael Hoch’s term as committee co-chair closes after six years of service. We thank Rachael Hoch and Tim Lane for their years of service and dedication to the committee!

AD HOC COMMITTEES**Chapters** – Manuel Lopes-Lima, Emilie Blevins

The committee provided a memo during the last Board meeting outlining the general proposal to establish Divisions in the Society. Since then, the committee has drafted proposed language for the Society’s By-laws and Procedures for adoption by the society: <https://drive.google.com/file/d/1CZP5yt92HoKlmcBKg4CCmNQSEyXbqcvW/view?usp=sharing>. After talking with a lawyer, the group decided that Divisions is the best way to go.

Geographic groups provided best avenue to avoid tax issues. It does not close the door for other options later.

Heidi recommended that the Board look at things and get comments back to Emilie so that the Board can address this topic during the November 2021 meeting, ideally post it in the December issue of *Ellipsaria*, with the hope of voting on changes to the bylaws at the 2023 Symposium.

Monetary Values of Mollusks – Megan Bradley, Janet Clayton

Nothing new to report. The AFS/NCTC plans may have been a casualty of Covid-19.

Ecosystem Services – Carla Atkinson

Nothing to report.

Diversity, Equity, and Inclusion – Tamara Smith

The last group meeting via phone call was March 18, 2021. We continue to meet via calls/Teams/Zoom. Our next call will be after the FMCS Symposium (TBD). Anyone is welcome.

Committee Tasks:

- Transitioning from Ad-Hoc to functional committee during the April FMCS Symposium
 - Develop and implement an anonymous, optional diversity and inclusion survey for FMCS members to get baseline data to help us identify needs or areas of concern and to provide baseline data to help measure our success. *Completed – thanks to those that participated. The data has been analyzed and posted in the March issue of Ellipsaria. We are also presenting the results during the FMCS symposium. Sara Andree (Craft)(traditional talk – ed/outreach)*
 - Help write a statement on racial equity after the killing of George Floyd. *Completed – see notes from November 2020 committee report.*
- Keeping DEI issues on the forefront.
 - As Amy mentioned, develop short social media posts to keep diversity issues on the forefront. *Ongoing posts to social media.*
 - Develop DE&I content for *Ellipsaria*. *Ongoing. Latest content was from the demographic survey.*
 - Develop resource guide and links that people interested in racial equity, diversity and inclusiveness issues can access that will be available on the FMCS DEI webpage. *Progress: Developed a resource link. Ready to publish on the DEI web page.*
- Foster a welcoming environment for FMCS members (and other interested people)
 - Continue to add photos of people on the FMCS main webpage. Sent out calls over the unio listserve and social media to request photos and quotes to be featured on the website! (Ask – In a sentence or two, tell us why you are a member of FMCS). *Received roughly 30 responses in late 2019/early 2020. The photos and quotes have been compiled and submitted to Nora and Sophie. Waiting on getting them on the website, with the request to randomize the photos.*
 - Continue to develop a presence on the FMCS website
 - Add list of accomplishments, link to *Ellipsaria* article, resource list, etc.
 - Improve accessibility of FMCS website. *On hold.*
 - Explore ways to make future meetings/Symposia/Workshops more inclusive. *Progress: Added a DE&I committee member to the symposium planning committee. Featured plenary speaker at the virtual symposium – August Ball.*
 - Participate in DEI committees of other scientific societies to share resources and ideas. *Progress: Erin has been attending CASS meetings.*

- Review the proposed FMCS certification document. *Completed review.*
- We plan to revisit our draft strategic plan and draft a strategy for our committee with step down goals and actions, during the symposium and meetings to follow.

Professional Development – Becca Winterringer

This committee and its initial purpose were initiated in 2015 and approved as an ad-hoc committee in 2016. The Mollusk Certification program was approved by the membership in San Antonio. Thanks to everyone's patience as we moved through nearly seven iterations of the draft guidelines and procedures document. Now we have a light at the end of the tunnel. The hard work now begins, and we are excited to present and share this very important process of recognition with our colleagues!

The Professional Development Committee recently submitted the Mollusk Professional Certification, Guidelines and Procedures Draft document to the Board and third-party reviewers for comment. Feedback and input are requested by May 7, 2021. We have outlined a few action steps of the certification program to be finalized during our committee meeting on 4/14/2021, which include:

1. Draft Acceptance and Implementation Schedule
2. Committee structure and identifying sub-committee needs (i.e., Mollusk Certification, Review Panel, Professional Development)
3. Developing a strategy for establishing a Certification Review Panel
4. Roll out a beta-testing of the certification (1-year)

Thanks again to everyone serving on the committee for your hard work and attention to detail. If any FMCS members have an interest in serving on this committee, please contact Becca Winterringer (beccawint6@gmail.com) or Amanda Rosenberger (arosenberger@tnitech.edu).

Motion to Adjourn was made by Jennifer Archambault with a second by Heidi Dunn. All approved.

Respectfully submitted by Janet L. Clayton, Secretary

Minutes of the FMCS Business Meeting
Wednesday April 14, 2021
Virtually Hosted by Clarkson University

Alan Christian, Treasurer, called the Business Meeting to order at 2:16 EDT.

President, Jeremy Tiemann, addressed the participants and thanked Alan and the whole planning committee for their efforts in putting together the first ever, and hopefully the last, virtual FMCS Symposium. He asked for a moment of silence to recognize the passing of Tom Watters who was the society's 5th president.

Alan Christian presented the Treasurer's report. The 2020 calendar year Profit and Loss statement showed an income of \$13,312.84 and total expenses of \$31,191.04, resulting in a net negative income of -\$17,878.20. The full report can be found within the minutes of the Board Meeting Minutes (on Page 7). With over 360 participants in this year's Symposium, Alan noted that Clarkson University covered the increased cost encumbered from greater than expected participation.

A summary of the Secretary's report was provided by Janet Clayton. Her full report is provided within the Board Meeting minutes (on Page 9).

President Tiemann invited a couple of Committee chairs to mention some of the recent accomplishments of our Society. Diversity, Equity, and Inclusion Committee chair Tam Smith identified that committee's recent activities and noted that, under the new structure, this group has moved from an Ad hoc committee to a full committee status. A full version of her report is included in the minutes of the Board Meeting (on Page 15). Committee chair Becca Winterringer reported that a full draft of the Professional Certification Program document is now being reviewed by members of the Board and expressed the hope that approval of that program could occur during the 2023 Symposium. More details of this report also are included in the minutes of the Board Meeting (on Page 16) Professional Certification also has also been moved from Ad hoc to full committee status.

Jeremy provided an update on the new committee structure. He noted that the Board was responsible for the restructure and that it was done to be more reflective of the National Strategy. More guidance will be provided soon to the suite of Functional and Technical committees. (The new sets of Functional, Technical, and Ad Hoc Committees and their Chairs are presented on Page 35.)

An update on our involvement with the Consortium of Aquatic Sciences Societies (CASS) was provided by Mickey Matthews representing the Environmental Quality and Advocacy Committee. CASS is a joint activity of nine science-based societies and, by being part of CASS, our small voice becomes part of a group of over 25,000 voices that addresses issues important to aquatic scientists, aquatic life, and aquatic ecosystems. Some recent CASS activities have focused on how our societies are dealing with the COVID-19 pandemic, social justice, and issues related to activities from the previous administration. Most of the work during the past two years has been involved in defining Waters of the United States. With the new Federal administration now in place, we are being asked to revisit this topic along with climate change, and funding to the USGS gauging stations. If any member knows of an issue they feel the Society or CASS should address, please contact the committee.

Daelyn Woolnough provide and update on the upcoming Joint Aquatic Sciences Meeting (JASM). This Second JASM meeting will take place in Grand Rapids, Michigan, from May 16 to 20, 2022. The previous JASM event was held in 2014. The results of the recent FMCS survey indicated that many of our members are planning to attend the JASM event, and that it should be separate from any meeting we plan to hold in 2022. If you are interested in being involved with planning FMCS activities at JASM, please contact Daelyn or Dave Zanatta.

Jeremy noted that FMCS has an active presence in social media. Besides the website, we have Facebook, twitter, and Instagram accounts. Just need to be aware there is another FMCS organization posting on these sites; ours is **FMCS-mollusk**.

Emile Blevins provided an update on the status of forming FMCS chapters. Following discussions with a lawyer, it was decided that the best option to proceed is with creating FMCS "Divisions" rather than "Chapters." These Divisions would be created based on geographic units. For example, the Pacific Northwest Working Group would become the Western North America Division of FMCS. See full report in the Board Meeting minutes (on Page 14).

Lisie Kitchel and Ryan Schwegman provided an update on the planned Guidelines and Techniques Workshop that was postponed from 2020. It probably will be held the first week of August 2022 at Henry Horton State Park on the Duck River in Tennessee, about an hour south of Nashville. Sessions will be included for both beginners and experienced malacologist. Anyone interested in hosting future Workshops please reach out to members of the Executive Committee.

Emilie Blevins and Patty Morrison provided an update on the 2023 Symposium which was rescheduled when the decision was made to move to a virtual format in 2021. That Symposium

will be April 9 -- 13, 2023, at the Lloyd Double Tree Hotel, in Portland, Oregon. The theme will be "Mountains to Sea and Mollusks Between". The DEI Committee is actively participating in the planning for this Symposium and may have some ideas on how to make FMCS more visible in Portland. The Executive Committee wants to thank the Portland planners for hanging in there with the change of plans and delays.

Dave Zanatta and Daelyn Woolnough are spearheading the planning for our 2025 Symposium. Potential venue options include Kalamazoo or Detroit Michigan. Due to being in northern climes, the meeting is being planned to occur in mid-May instead of March or April.

Jeremy Tiemann requested that anyone interested in hosting a future Workshop or with ideas for future Workshop topics please reach out to the Executive Committee.

Wesley Daniel presented the result of the recent election of new officers. Megan Bradley was elected President Elect, Alan Christian was reelected as Treasurer, and Sarah Veselka was elected as Secretary.

Recognition of Retirees was made by Jeremy Tiemann. Recent retirees include Janet Clayton (West Virginia Division of Natural Resources), Kevin Cummings (Illinois Natural History Survey), Patricia Morrison (US Fish and Wildlife Service), and Don Hubbs (Tennessee Wildlife Resources Agency).

Awards for student presentations during the Symposium made by Susan Oetker and Curt Elderkin. No travel awards were made due to this Symposium being virtual. 70 student presentations were judged by 55 judges (thank you judges). Of those 70, 13 were lightening talks, 20 were posters, and 37 were platform presentations. See the accompanying article for the names of the winners and honorable mentions in each category (on Page 19).

A Meritorious Service Award was presented to Greg Cope by Heidi Dunn. Other members of the nominating group were Teresa Newton and Wendall Haag. Greg's accomplishments are described on Page 20.

President Jeremy Tiemann's "Passing of the Horns" to incoming President Steve McMurray was not quite the event this year it normally would be due to the virtual nature of the meeting. Jeremy put a COVID mask to the Jayhawk logo he added to the "ornamentation" on the helmet and said Steve would like it better that way because of their colleges' long-standing rivalry. The mask (sown by Jeremy's wife) was made from cloth showing the 2019 FMCS Texas Symposium logo.

Incoming President Steve McMurray recognized the outgoing officers. He thanked Jeremy for his service and recognized the efforts of the presidents before. He also thanked outgoing Secretary Janet Clayton for her service and Alan Christian and his committee for pulling off the virtual event. He thanked Emilie Blevins, Patricia Morrison and the Pacific Northwest Working Group for keeping things in place to move forward to 2023, and Ryan Schwegman and Lisie Kitchel for moving forward with the Workshop that was postponed from 2020. Finally, Steve provided his vision for moving the Society forward during the next two years (presented in full on Page 1).

Jeremy Tiemann made a motion to adjourn. A second was provided by Curt Elderkin and all approved.

Respectfully Submitted, Janet L. Clayton, Outgoing Secretary

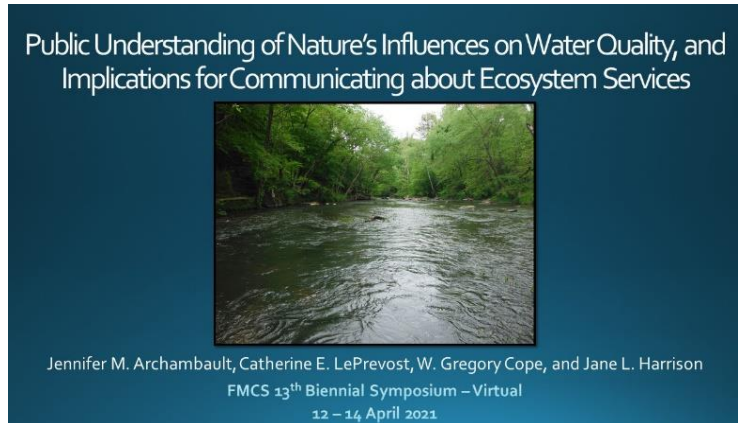
2021 FMCS Awards Committee Report

Submitted by Curt Elderkin, David Hayes, and Susan Oetker

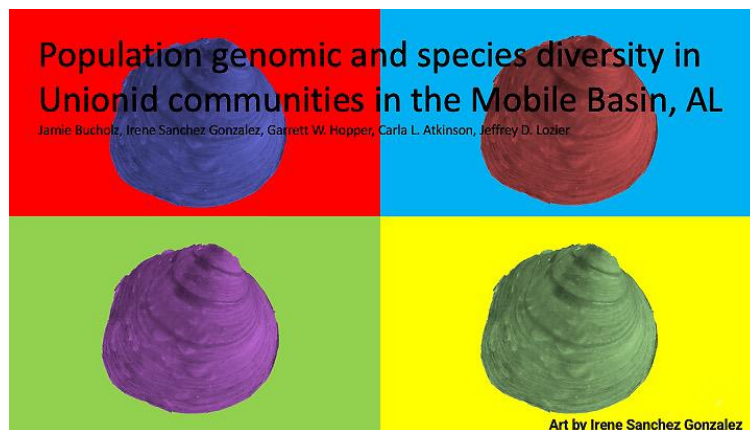
Best Student Platform, Poster, and Lightning Awards

A total of 78 student presentations required judging during the 2021 Virtual Symposium (37 platforms, 20 posters, and 11 lightnings). Each presentation was judged by 3 separate judges, which meant that 50 FMCS members volunteered to get the job done! The awards committee thanks every member who helped us judge student presentations; we could not present these awards without you.

The **Best Platform Paper Award** went to **Jennifer Archambault** of **North Carolina State University** (co-authors Catherine E. LePrevost, W. Gregory Cope, and Jane L. Harrison) for her talk entitled “Public Understanding of Nature’s Influences on Water Quality, and Implications for Communicating about Ecosystem Services.” The Honorable Mention platform paper went to Nicholas Gladstone (co-authors Paul D. Johnson and Nathan V. Whelan) from Auburn University for “Evolution of Interspecific Egg-laying Strategies in the Freshwater Gastropod Family Pleuroceridae (Caenogastropoda: Cerithioidea).”



The **Best Poster Award** went to **Jamie Bucholz** of the **University of Alabama** (co-authors Irene Sanchez Gonzalez, Garrett W. Hopper, Carla L. Atkinson, and Jeffrey D. Lozier) for his poster entitled, “Population Genomic and Species Diversity in Unionid Communities in the Mobile Basin, AL.”



The Honorable Mention award in this category went to Megan Kubala (co-authors, Garrett W. Hopper, Irene Sanchez Gonzalez, and Carla L. Atkinson) from University of Alabama for “Freshwater Mussels: An Integral Link Between Brown and Green food Webs.”

The **Best Lightning Talk Award** went to **Jonathan Lopez** of the **University of Oklahoma** (co-authors Rachel N. Hartnett, Thomas B. Parr, and Caryn C. Vaughn) for his talk entitled “Mussels in Their Element: Mussel Beds Associated with Changes in Macro- and Micronutrient Availability.” The Honorable Mention Lightning talk went to Alia Benedict (co-author Juergen Geist) from Technical University of Munich for “Effects of Water Temperature on Glochidia Viability of *Unio crassus* (Philipsson), 1788) and *Sinanodonta woodiana* (Lea, 1834): Implications for Conservation, Management, and Captive Breeding.”

Congratulations to all the fine student presentations at this year’s symposium, and thanks again to everyone who volunteered their time to serve as judges!

Meritorious Service Award

During the Virtual Symposium, the Awards Committee was pleased to present the FMCS Meritorious Service Award to Dr. Greg Cope. His commitment to freshwater mussel conservation is apparent to all. He was part of the group that formed our Society and has worked in leadership roles within FMCS since its inception. His leadership and innovative ideas have shaped FMCS in many ways. Dr. Cope has worked tirelessly to advance the mission of FMCS; he has been a member since 1999, served on various committees between 1999 and present, and actively participates in the technical aspects of the Society. Dr. Cope has actively participated in most Workshops and Symposia as a committee member, presenting papers, moderating sessions, judging student papers, and presenting awards. He is well known for his competence, attention to detail, and, above all, his kindness.



Currently, Dr. Cope is the William Neal Reynolds Distinguished Professor of Applied Ecology and Environmental Toxicology at North Carolina State University. In that role, he leads research efforts to understand the toxicological effects of waterborne and sediment-associated contaminants on fish and mollusks. He also directs and manages the Department's public outreach program, participates in teaching, advising, and supervising graduate student research, co-instructs graduate courses, and serves as scientific advisor to various state and federal agencies. During his 30-year career, Dr. Cope has authored or co-authored 105 research publications, nine book or book chapters, advised 26 MS or PhD students, and authored or co-authored ~300 presentations. By all metrics, Dr. Cope is an exceptional research scientist.

Conducting cutting-edge-science is only a portion of Dr. Cope's legacy. He has also given considerably of his time and talents in shaping several professional societies, including being a member of the Executive Committee of the American Fisheries Society, the Society of Environmental Toxicology and Chemistry, and FMCS. For FMCS, he served as President elect, President, Past President from 2007-2012; he updated the by-laws; helped implement *Walkerana* as an FMCS journal; oversaw the transition to a new and improved website; oversaw the transition of *Ellipsaria* to an electronic-only format; and oversaw FMCS submission of comments to USEPA on revised Water Quality criteria for ammonia and other issues. Most recent Presidents of the Society have contacted him on several occasions for advice, which he freely gives. He has also developed many students who are now leaders within FMCS.

Specifically for this Society, Dr. Cope was the Water Quality Committee Co-chair in 2001-2003; Chair of the Technical Program Committee for the 3rd (2003), 4th (2005), and 9th (2015) Biennial Symposia; served on the 11th Biennial (2018) Workshop Program Committee; authored or co-authored 55 presentations at FMCS Symposia or Workshops, including invited plenary presentations in 2007 and 2019; Awards Committee Chair from 2002 to 2009 and Co-Chair 2009-2019; started the regional meeting funding awards to encourage local and regional mollusk groups to be a part of FMCS; co-managed the professional awards and student awards; Editor of *FMBC* from 2010-2020; responsible for changing journal name from *Walkerana* to *FMBC*; obtained the contract with Allen Press to publish the journal and provide use of online submission and review system; responsible for indexing of *FMBC* by BioOne; supported hiring of copyeditors and managing editor; Initiated process of obtaining impact factor for journal from Clarivate Analytics; and authored or co-authored eight papers in published in *FMBC*.

We are lucky to have Dr. Cope as a colleague and friend. Through his exemplary research program and his service to freshwater mussels, Dr. Cope has distinguished himself among the

United States' leading Malacologists. In general, he has been willing to pitch in whenever something needed to be done for FMCS, and his professionalism and devotion to the Society and the greater cause of mollusk conservation are unsurpassed. Congratulations and thank you, Dr. Cope!

Genetics Committee Meeting Report

The Genetics Committee met, virtually, on April 13. In attendance were: Kentaro Inoue, Jer Pin Chong, Jamie Bucholz, Rachel Hoch, Isa Porto Hannes, Dylan Powell, Nathan Johnson, Curt Elderkin, Roger Thomas, Dan Mosier, Taylor Villeneuve, Steve Hein, Christine Ortega, C. Shulz, Tim Lane, Barret Clark, Katy Klymus, Dave Berg, and Curt Cheng.

The newly-elected Co-chairs are Kentaro Inoue and Nathan Johnson.

Attendees discussed the possibility of conducting a Workshop on genetics in the near future. Additional input on this could be derived from the upcoming survey.

The Genetics Committee is planning on developing a survey to query the FMCS membership on what ways our committee can better serve the Society. The Committee also is planning to update the annotated bibliography for genetics and propagation.

Important Notice Concerning Your FMCS Database Profile

The information you provide on your profile in the FMCS member database is important. It is how FMCS contacts you regarding issues you may be interested in (such as publication announcements, meeting updates, and committee activities) and it gives other active FMCS members quick access to your contact information. [The database is not accessible by non-members.] Your information will remain in the active database for four years after your membership has lapsed, then it will be archived. If you rejoin FMCS, your profile can be reactivated when you pay your membership dues.

If you need to change something on your profile (such as email or mailing address, membership type, or something else), please DO NOT create a new profile in the database. If you create a new profile, the old one will still be in the database with all of your old information. The best way to make any change is to log into your original profile and change the information there. Even if you no longer have access to the email address used to set up an out-of-date profile, if you remember your password, you still can access the profile and update any or all of the information. If in doubt, don't hesitate to contact our Society Secretary (now Sarah Veselka sveselka@enviroscience.com) or Treasurer (now Alan Christian, adchrist@clarkson.edu).

A BioOne Earth Day Selection

For Earth Day, April 22, 2021, and for the second year in a row, BioOne shared a highlighted collection of 24 environmental sciences articles to inspire and inform their diverse biological audiences. One of those articles was published in the October 2020 issue of our Journal, *Freshwater Mollusk Biology and Conservation*. Congratulations to Alfred E. Pinkney, Kathleen M. Kline, and Raymond P. Morgan II for having "Comparison of Surface- and Pore-Water Quality Between Two Maryland Streams with the Endangered Dwarf Wedgemussel (*Alasmodonta heterodon*)" selected as worthy of wide readership for Earth Day 2021. The full collection of 24 articles is available at [Join BioOne in Celebrating Earth Day 2021](#).

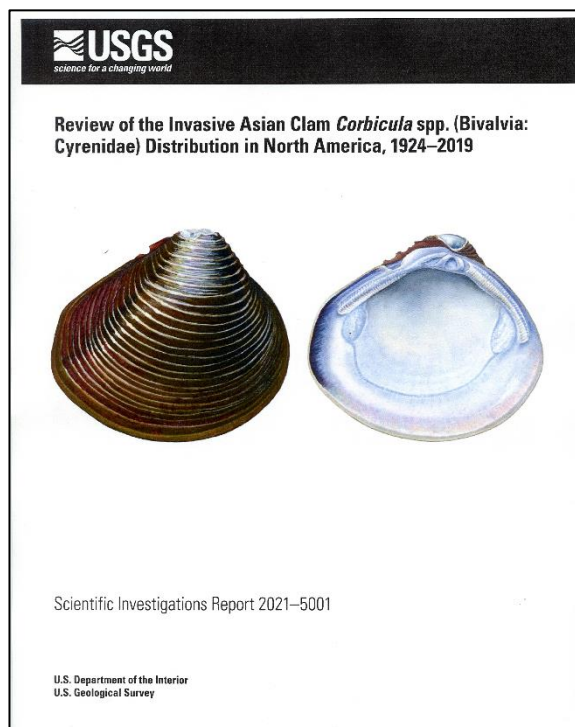
Announcement

New Corbicula Publication

Benson, A.J., and Williams, J.D. 2021. *Review of the invasive Asian clam Corbicula spp. (Bivalvia: Cyrenidae) distribution in North America, 1924–2019*. U.S. Geological Survey Scientific Investigations Report 2021–5001, 66 p. Available online at <https://doi.org/10.3133/sir20215001>.

Abstract

The bivalve *Corbicula* is one of the most successful aquatic mollusk invaders in the world. Since being introduced to North America from its native range in Asia, it has dispersed widely over a large portion of the continent from southern Canada to Panama. The first evidence of its introduction in the Western Hemisphere was discovered in 1924 in British Columbia, Canada. A review of distribution records from natural history museums, scientific literature, Federal and State agencies, universities, and oral and written communications with scientists has shown the continued dispersal of *Corbicula* in North America. Since the most recent comprehensive review of its distribution information through the mid-1980s, *Corbicula* has been found in an additional two Canadian Provinces, 10 U.S. States and Puerto Rico, nine Mexican States, Cuba, and Panama. The known distribution in North America now includes 47 U.S. States, District of Columbia, Puerto Rico, three Canadian Provinces, 16 Mexican States, Cuba, and Panama. *Corbicula* has been found in three of the Laurentian Great Lakes (Erie, Michigan, Superior) primarily associated with industrial warmwater effluent refugia. Problems associated with *Corbicula* populations were widely realized not long after its arrival and included negative impacts to power generation, industrial water supply operations, and agricultural water conveyance. In natural settings, impacts on native mussels such as altering nutrient cycling, food webs, and sediment distribution dynamics have occurred. In past decades, control of established open water populations had not been a management priority. With a relatively recent interest in eradication of small, newly established populations, several attempts were made in the United States but were unsuccessful. Recent molecular genetic analyses provide evidence of multiple species and (or) genetically and morphologically distinguishable “forms” in North America. However, the number and identification of *Corbicula* species in North America remain unresolved. It appears likely that more than one species of *Corbicula* has been introduced into U.S. waters.



Upcoming Meetings

June 14 – 18, 2021 – American Malacological Society Virtual Meeting,

https://whova.com/web/amoam_202106/

September 5 – 9, 2021 – Ninth European Congress of Malacological Societies (EUROMAL 2021), Prague, Czech Republic www.euromal.cz. [Now shifted to virtual format]

October 17 – 20, 2021 – Southeastern Association of Fish and Wildlife Agencies 75th Annual Conference, Roanoke, Virginia, USA. <http://www.seafwa.org/conference/overview/>

November 6 – 10, 2021 – American Fisheries Society Annual Meeting, Baltimore, Maryland, USA
Theme: *Investing in People, Habitat, and Science* <https://afsannualmeeting.fisheries.org/>

May 16 - 20, 2022 – Joint Aquatic Sciences Meeting, JASM 2022, Grand Rapids, Michigan, USA.

<https://jasm2022.aquaticsocieties.org/>

March (?), 2022 – National Shellfisheries Association 114th Annual Meeting, [site and other details not yet posted]

May (?), 2022 – Society for Freshwater Science Annual Meeting, [site and other details not yet posted]

August 1 - 4, 2022 – FMCS Field Sampling Workshop, Henry Horton State Park, Tennessee, USA [details still under discussion]

Summer (?) 2022 – Society for Conservation Biology North American Sectional Meeting, [dates and location not yet posted] <https://scbnorthamerica.org/index.php/about-nacsb/>

April 9 – 12, 2023 – FMCS Biennial Symposium, Double Tree Hotel, Portland Oregon, USA.
Theme: *Mountains to Sea and Mollusks Between*. [other details yet to be determined]

May (?) 2025 – FMCS Biennial Symposium, somewhere in Michigan, USA. [dates, location, theme, and other details yet to be determined]



Contributed Articles

The following articles have been contributed by FMCS members and others interested in freshwater mollusks. These contributions are incorporated into Ellipsaria without peer review and with minimal editing. The opinions expressed are those of the authors.

Could Conserving Freshwater Mussels be Spreading Parasites and Diseases?

Joshua I. Brian¹, Isobel S. Ollard¹, David C. Aldridge^{1,2}

¹ Aquatic Ecology Group, The David Attenborough Building, Department of Zoology, University of Cambridge, Cambridge, UK

² BioRISC, St Catharine's College, Cambridge, UK

[Not Peer-reviewed]

The recognition that parasites and diseases could harm freshwater mussels is over a century old. Kelly (1899), studying mussels in Illinois, wrote of trematode infections leading “to the utter destruction of the proper reproductive tissue.” However, we still know remarkably little about the parasites and diseases of unionids. Despite over 180 organisms having been identified living inside mussels in the past century, over 85% of North American and European mussels are understudied in terms of their endosymbiotic fauna, with 53% having no records at all (Brian and Aldridge 2019).

The lack of knowledge on unionid parasites and diseases is concerning from a conservation perspective. First, given the threatened status of many unionids worldwide (Lydeard et al. 2004; Lopes-Lima et al. 2018), any stressor that negatively affects population success may exacerbate declines. However, we also believe that conservation action has a significant chance to spread pathogens which could hinder rather than help efforts to safeguard populations. In particular, translocations and captive breeding programs, which bring disparate mussel populations into close contact and manipulate factors like host density, may facilitate the rapid spread of parasites or diseases. In a recent article published in *Conservation Letters* (Brian et al. 2021, <https://doi.org/10.1111/conl.12799>), we have explored the factors that determine the risk of this occurring, and how best to reduce those risks.

We have found that the risk of spreading a pathogen from one population to another is extremely high. For example, if a pathogen is found in 5% of mussels at a certain location, and fifty of those mussels (the median translocation size in our review of unionid translocations) are moved to a new location, there is a 92% chance of that pathogen being moved along with them. This emphasizes that we need to better understand the prevalence of pathogenic organisms in mussel populations – we can't guard against something if we don't know it's there! In addition to traditional dissection, which can reveal a range of macroparasites such as trematodes and mites, recent molecular work is revealing a broad bacterial and viral fauna (e.g. Goldberg et al. 2019), some of which may be linked to recent die-offs (Richard et al. 2020). The ubiquity of these pathogens, combined with their current cryptic nature, makes their spread in mussel translocations highly likely.

We also need to understand the life histories of pathogens, as this can determine their patterns of spread between sites and through time (Brian and Aldridge 2021). For example, some parasites require multiple hosts, such as fish and waterfowl, in their life cycle: if those hosts are present at a transplant recipient site the parasites are likely to succeed and spread in the new site.



The digenean trematode *Rhipidocotyle campanula*, which lives in the gonad and castrates mussels. The scale bar is 250um.



The aspidogastreaean trematode *Aspidogaster conchicola*, a common parasite that lives in the mantle of mussels. The scale bar is 250um.

Conversely, recipient waters with an incomplete host community should be protected from long term establishment of a new pathogen. Life-history strategy will also determine pathogen response to mussel density, which is another key consideration. High mussel densities (e.g. in captive breeding facilities, or after an initial large translocation to one location) could allow pathogens to spread easily between mussels, while low host densities can prevent the rapid spread of etiological agents. Finally, we also need to understand more about mussel immune systems – how might unionids be able to deal with parasites and disease, how might this vary among populations, and how does environmental stress affect these responses? Answering these questions could be crucial to predicting and potentially avoiding future outbreaks.

The aim of our paper was to encourage critical thinking about disease and parasitism in freshwater mussels, particularly through a lens of conservation action. We make several recommendations in the paper, the most urgent of which is to understand the distribution of parasites and pathogens among host species and locations. We also recommend a quarantine period, but one that is appropriately targeted to the pathogen of interest. For example, castrating trematodes may live for years inside the gonads of mussels, and a month-long quarantine will do nothing to change that! We need procedures to effectively identify a range of possible parasites, which will allow for appropriate action to be taken.

We hope that freshwater mussel biologists globally will heed our call, and carefully consider the risk of parasite and disease spread when taking conservation action. None of us want to inadvertently do more harm than good, and especially when the effects could be irreversible!

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Identification of Two Potential Host Species for the Salamander Mussel (*Simpsonaias ambigua*)

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[Not Peer-reviewed]

Unionid mussels parasitize numerous fish species as they complete their life cycles and are distributed throughout the rivers of North America. The Salamander Mussel (*Simpsonaias ambigua*) holds a unique distinction among Unionid mussels because it is the only known species to use a non-fish host for juvenile transformation, the common mudpuppy (*Necturus maculosus*) (Barnhart 1998; Howard 1951). *Simpsonaias ambigua* populations are severely fragmented and in decline (Bogan 2017), as are populations of *N. maculosus* (Howard 1951). Typical mussel propagation techniques at hatchery facilities are heavily dependent on the availability and sustainability of suitable host species, therefore, identifying alternative hosts for mussels with only one known host may increase their future propagation success.

We tested two species of salamanders [axolotls (*Ambystoma mexicanum*) and tiger salamanders (*Ambystoma tigrinum*)] for possible suitability as hosts for *Simpsonaias ambigua*. *Necturus maculosus* also was included in this test as a control. Host suitability was determined by two criteria: 1) collecting live transformed juveniles from the potential host, and 2) determining if the collected juveniles were alive and growing after one week. Glochidia were extracted from three adult mussels and each salamander species was inoculated in a glochidia bath, then placed in species-specific troughs held at room temperature. Salamanders were fed live nightcrawlers and commercial sinking pellets daily until live juvenile mussels were found in each trough, at which time feeding was ceased to allow for easier collection of the mussels. Each trough had sieve bags on the outflow and each trough was siphoned through a sieve stack daily, starting at two weeks post-infestation. Glochidia and juvenile mussels collected from each system were examined under a dissecting microscope and live individuals were identified by foot movement or repeated shell closure.

Live mussels were collected from all three salamander species (Table 1). Sample collection continued until no live mussels were found for two days, giving a total test time of 62 days for both *A. mexicanum* and *A. tigrinum*, and 54 days for *N. maculosus*.

Table 1. Results of host tests for *Simpsonaias. ambigua*. Total infestation period is the number of days from the day animals were infested to the last day mussels were found. Peak excystment was the day(s) of the highest number of mussels were collected from the system.

Salamander Species	Number inoculated	Number at end	Infestation period (days)	First live juveniles collected (day)	Peak excystment (days)	Number of live mussels collected
<i>Ambystoma mexicanum</i>	10	9	60	44	53-54	455
<i>Ambystoma tigrinum</i>	60	33	60	35	40	761
<i>Necturus maculosus</i>	2	2	52	35	40	397

The collected juvenile mussels were placed in mussel culture systems and fed a commercial diet. Juveniles were separated by host species to evaluate any potential differences in their survival. Mussel culture units were examined on average one week after the juvenile mussels were added (Table 2). This yielded a more accurate count of the juvenile mussels because metamorphosed juveniles are easier to identify as alive than newly excysted juveniles.

Table 2. Survival of *Simpsonaias ambigua* by host species. Average number of juveniles per salamander is the average number of mussels after one week under culture per salamander that remained at the end of the test for each host.

Salamander Species	Total live juveniles collected	Number counted after about one week	Average number of juveniles per salamander
<i>Ambystoma mexicanum</i>	455	404	44.9
<i>Ambystoma tigrinum</i>	761	901	27.3
<i>Necturus maculosus</i>	397	423	211.5

A long excystment period, the relatively low number of juveniles collected each day, and space availability led to juveniles in each culture unit ranging in age by seven to nine days. Growth was highly variable in each culture unit; mussels in each culture unit grew between 25-75 µm over the holding period.

This study identifies two additional salamanders (*Ambystoma mexicanum* and *Ambystoma tigrinum*) as potential hosts for *Simpsonaias ambigua*. Both *A. mexicanum* and *A. tigrinum* met the criteria as a suitable host species for *S. ambigua*: glochidia were able to transform on them, and those juveniles were able to survive and grow for at least one week. This suggests that *A. mexicanum* and *A. tigrinum* could be potential alternatives for hatchery propagation. *A. mexicanum* was relatively easy to hold in captivity and showed no issue with being held in close quarters at high density. In contrast, the *A. tigrinum* specimens included in this study were prone to fungus outbreaks and showed an inclination to attack each other, often resulting in death. For this reason, *A. mexicanum* may be a better alternate host when *Necturus maculosus* is not available for propagating *S. ambigua*.

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DNA Confirmation of a Reproducing Population of Federally Endangered Winged Mapleleaf (*Quadrula fragosa*) in the Little River, Oklahoma.

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The Little River is a tributary of the Red River in southeastern Oklahoma that harbors a diverse unionid fauna, including the federally-listed endangered Winged Mapleleaf *Quadrula fragosa* (USFWS, 2015). Historically, *Q. fragosa* had a widespread distribution within the Mississippi River drainage basin,

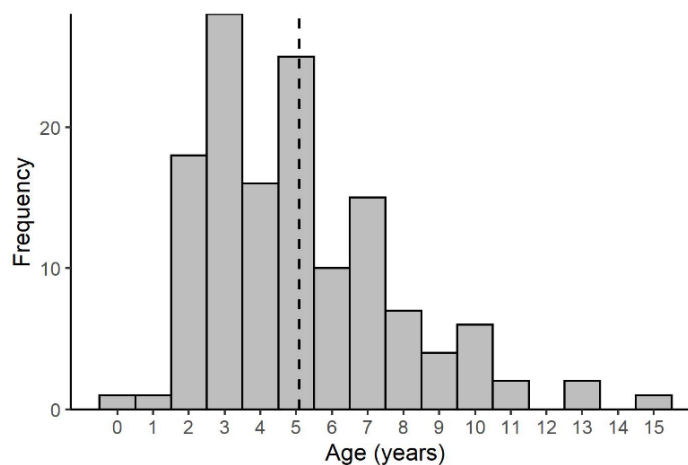
and records of the species exist from 12 states (USFWS, 1997). The current distribution of *Q. fragosa*, however, is highly fragmented and consists of five isolated populations, two of which are known to be reproducing (Hove et al. 2012; USFWS, 2015).

During November 2020, EcoAnalysts, Inc. was contracted to survey and relocate a dense multispecies unionid assemblage in the Little River near Idabel, Oklahoma. The approximately 1800 m² site (60 m long by 30 m wide) identified for mussel removal was divided into 18 approximately 10 x 10 m grid cells. Timed searches were conducted until each cell was collected to diminishing returns. We measured the length and counted external annuli on the first 30 individuals of each common unionid species and used a Dremel tool to etch a hash mark on all members of those species. All individuals of proposed or federally-listed species were measured, aged, and marked with a unique Dremel identifier.

During the relocation project, a total of 11,855 individuals of 28 species including three federally listed species were found (Table 1). Unionid density in the salvage site was about 6.58 individuals per m²; actual density was likely much higher because we were not able to excavate all unionids from each cell. Among the federally-listed species, *Q. fragosa* was the most abundant (n = 136), followed by Rabbitsfoot, *Theliderma cylindrica* (n = 9), and Southern Rock Pocketbook, *Arcidens wheeleri*, (n = 5). Five hundred forty-nine (549) individuals of the Louisiana Pigtoe, *Pleurobema riddellii*, a candidate for federal listing (USFWS 2021) also were found. *Quadrula fragosa* comprised 1.1% of the total, with a density of about 0.07 individuals per m². That density is comparable to density estimates reported for the St. Croix River in Minnesota (USFWS, 2015). Mean age of *Q. fragosa* was 5.07 years (± 2.47 SD), and juveniles (≤ 5 years old) comprised 66% of the population (Figure 1).

All collected mussels were relocated to a suitable recipient site about 800 m downstream from the salvage area. Common species were broadcasted into the recipient site from a boat. Federally-listed species and *P. riddellii* were hand placed into a 105 m² monitoring area. All unionids were placed in the recipient site such that the number of additional individuals increased the density by no more than 10 percent.

Figure 1. Estimated ages of *Quadrula fragosa* specimens found in the Little River near Idabel Oklahoma in November 2020.



To confirm the identification of *Q. fragosa* in the Little River, we sequenced mitochondrial DNA and compared sequence data with known *Q. fragosa* samples from the St. Croix River in Wisconsin and other quadruline species in a phylogenetic framework. Specifically, we collected DNA brush-swab samples from the foot of ten individuals from the Little River (Henley et al. 2006), sequenced two mtDNA genes (COI and NDI), and ran a maximum likelihood phylogenetic analysis. The results of this analysis indicated the samples from the Little River and *Q. fragosa* samples from the St. Croix River share identical mtDNA sequences and form a clade (Figure 2).

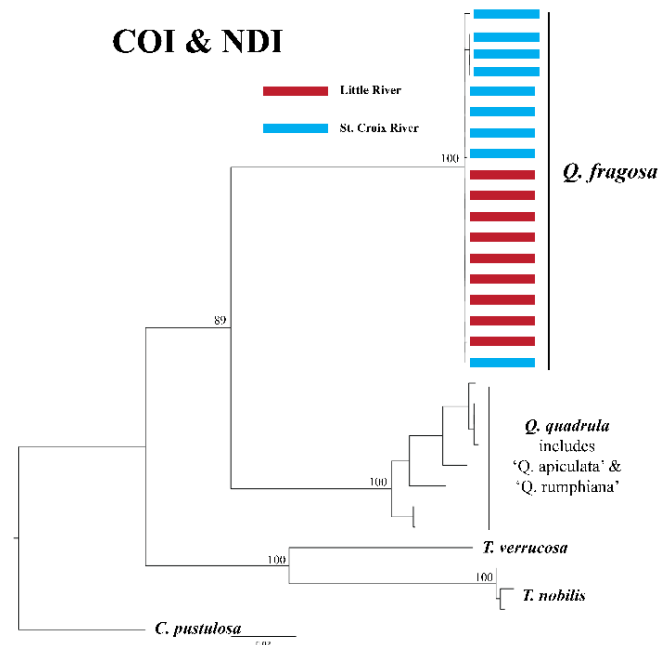
Table 1. Unionids collected in November 2020 in the Little River near Idabel, Oklahoma during this project.

Tribe/Species	Status ¹	Number Live	Relative Abundance (%)
Amblemini			
<i>Amblema plicata</i>		2,280	19.23
Pleurobemini			
<i>Fusconaia flava</i>		479	4.04
<i>Pleurobema riddellii</i>		549	4.63
<i>Pleurobema sintoxia</i>		53	0.45
Quadrulini			
<i>Cyclonaias pustulosa</i>		3,067	25.87
<i>Megalonaias nervosa</i>		98	0.83
<i>Quadrula apiculata</i>		56	0.47
<i>Quadrula fragosa</i>	FE	136	1.15
<i>Quadrula quadrula</i>		218	1.84
<i>Theliderma cylindrica</i>	FT	9	0.08
<i>Tritogonia verrucosa</i>		488	4.12
Lampsilini			
<i>Actinonaias ligamentina</i>		263	2.22
<i>Ellipsaria lineolata</i>		152	1.28
<i>Lampsilis cardium</i>		54	0.46
<i>Lampsilis siliquoidea</i>		13	0.11
<i>Lampsilis teres</i>		217	1.83
<i>Leptodea fragilis</i>		105	0.89
<i>Obliquaria reflexa</i>		1,791	15.11
<i>Obovaria arkansasensis</i>		318	2.68
<i>Plectomerus dombeyanus</i>		644	5.43
<i>Potamilus purpuratus</i>		343	2.89
<i>Toxolasma texasiense</i>		2	0.02
<i>Truncilla donaciformis</i>		63	0.53
<i>Truncilla truncata</i>		432	3.64
<i>Villosa lienosa</i>		7	0.06
Anodontini			
<i>Arcidens wheeleri</i>	FE	5	0.04
<i>Lasmigona costata</i>		5	0.04
<i>Strophitus undulatus</i>		8	0.07
Total Live Animals		11,855	-
Total Species		28	-

¹ FE = Federally Endangered

FT = Federally Threatened (USFWS, 2020)

Figure 2. Maximum likelihood phylogenetic analysis of COI and NDI mtDNA genes from *Quadrula fragosa* specimens found in the Little River near Idabel Oklahoma, specimens of *Q. fragosa* from the St. Croix River, Minnesota, and other quadruine species.



Our findings confirm the existence of a previously unknown reproducing population of *Q. fragosa* in the Little River. The age structure of this population suggests that reproduction is occurring and that juveniles are recruiting to adulthood. This population could provide an opportunity for additional genetic and demographic studies on the species. Additionally, this population could serve as a source for ex-situ propagation efforts, population augmentations, and reintroductions.

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First Confirmed Record of the Native Limnic/ Freshwater Operculate Snail Cochliopidae *Heleobia* (- *Littoridina*) *cuzcoensis* (Pilsbry, 1911) in Santa Catarina State/ SC, Central Southern Brazil Region

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The inventory of non-marine mollusks known to occur in the central-southern region of Brazil in the State of Santa Catarina/ SC (Agudo-Padrón 2020, 2021) continues to grow. On May 12, 2021, the second author of this report (F.C.) forwarded two photographs of a singular little limnic snail for taxonomic determination (Figure 1). This snail were found with the aid of Surber Sampler for Benthos in silted, with clay substrate during biotic sampling of a degraded area in the Rio Benedito (26°47'05.2"S & 49°22'32.9"W). This river is located in the Benedito Novo (city and Municipal District in the Blumenau Micro-region), Malacological Region 6, Itajaí River Basin Valley (Agudo-Padrón 2018: 58-Figure 1),

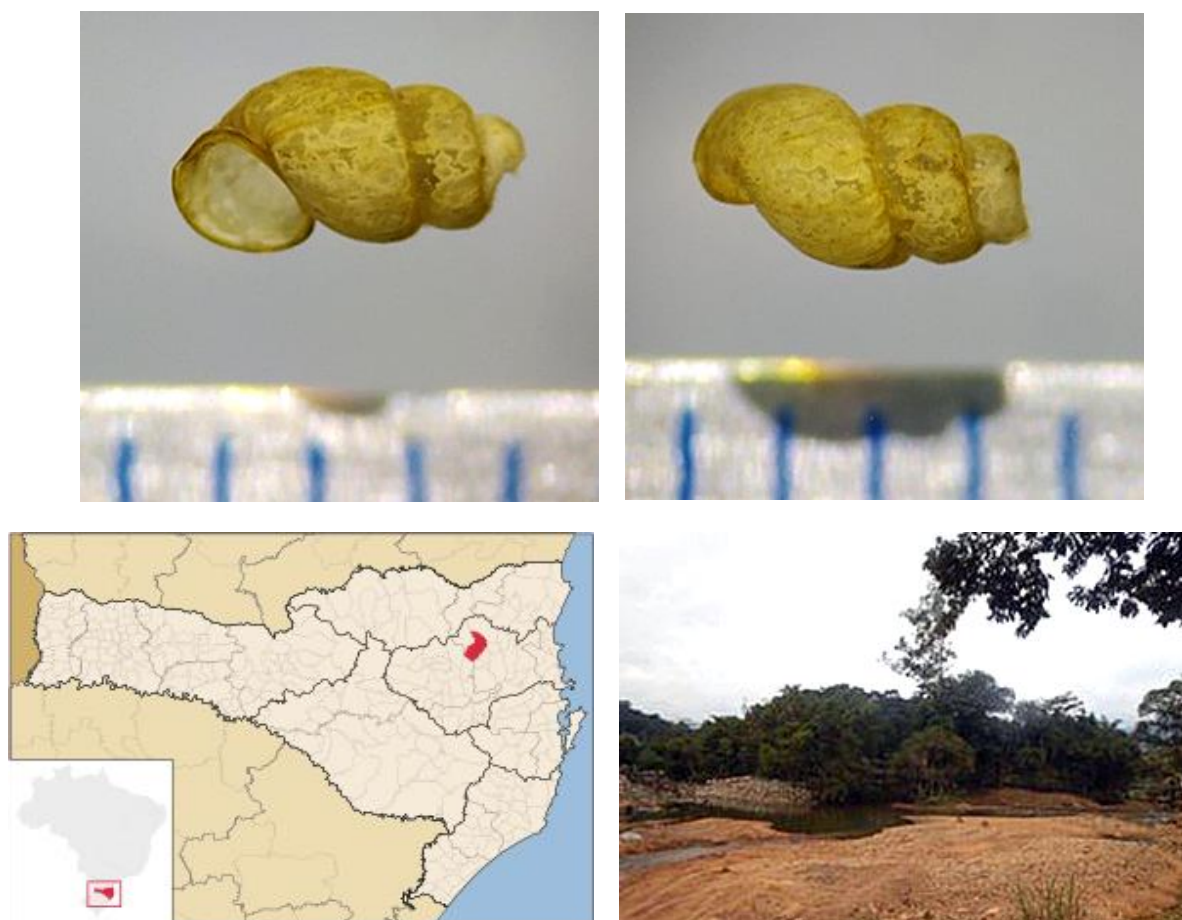


Figure 1. Native limnic/ freshwater operculate snail Cochliopidae *Heleobia* (- *Littoridina*) *cuzcoensis* (Pilsbry, 1911) rolled specimen/ shell found in riverside of the Rio Benedito, hydrographic microbasin, spatial localization of the Benedito Novo Municipal District in the Itajaí River Basin Valley region of Santa Catarina State/ SC (map – red color), and a general view of the collection area (photo). Photographs by Francisco Carneiro.

This specimen was confirmed to be the native limnic/ freshwater operculate snail Cochliopidae *Heleobia* (- *Littoridina*) *cuzcoensis* (Pilsbry, 1911), a new species record for this family in Santa Catarina State. This rolled specimen showing loss of its apical portion, has been deposited in the Malacological Collection of the Regional University Foundation of Blumenau – FURB, Blumenau/ SC ~ Voucher FURB-MO 383.

Previously, the family Cochliopidae Tryon, 1866, had been represented in this state by only four species (Agudo-Padrón 2018:55-Table 1 = see “Family Hydrobiidae Stimpson, 1865”). This new addition to the list of freshwater/ limnic mollusk species from this small Brazilian geographical territory -- once again in the Itajaí River Hydrographic Region (Agudo-Padrón 2011, 2018; Agudo-Padrón and Carneiro 2020; Gerber *et al.* 2018) -- brings the known total of non-marine mollusks in Santa Catarina State to 256 species: 87 limnic/ freshwater, 3 amphibious/ limnophiles, and 166 terrestrial forms.

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First Geographical Record of a Native Apple Snail in the Maciambú Valley region, Greater Florianópolis, Santa Catarina State/ SC, Central Southern Brazil

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On April 25 2021, shortly after the passage of remarkable subtropical storm Potira, a curious/ unusual freshwater shell was found by us in the coastal edge of Praia do Sonho [Dream Beach], at the mouth of Baía Sul [South Bay] in front of the neighbor Santa Catarina Island (Figure 1). This site is near Ponta do Papagaio Seaside Resort, Pinheira Cove, Maciambú Valley (domain of the "Tabuleiro" Mountain Range State Park), Palhoça Municipal District (~ 27°38'42"S & 48°40'04"W), Greater Florianópolis Continental region, Santa Catarina State/ SC, Central Southern Brazil. The shell was found in the miscellaneous

garbage, swamp vegetation, seaweed, and fragmented sea shells dumped on the beach the night before during the storm.

A quick preliminary examination at the collection site revealed immediately, and without a doubt, that this 29mm shell was a limnic/ freshwater apple snail in the family Ampullariidae Gray, 1824 and the genus *Pomacea* Perry, 1810, a group of operculate freshwater mollusks previously unknown in the region in spite of sustained years of local malacological field research (Agudo-Padrón and Bleicker 2009; Agudo-Padrón 2011 a, b). Further examination of this specimen has finally revealed that it corresponds to the native form *Pomacea sordida* (Swainson, 1823), a common species with known populations in the southern section of the nearby Santa Catarina Island (Agudo-Padrón 2016:17-Figures 3 and 6). Additional environmental description of this insular territory is presented in Agudo-Padrón 2015.



Figure 1. Native limnic/ freshwater operculate snail Ampullariidae *Pomacea sordida* (Swainson, 1823) (shell photos) found on Praia do Sonho [Dream Beach] (red point on photo and map) near Ponta do Papagaio Seaside Resort, Pinheira Cove, Greater Florianópolis Continental region, Santa Catarina State/ SC, Central Southern Brazil.

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Ellipsaria is posted on the FMCS web site quarterly: around the first of March, June, September, and December of each year. The newsletter routinely includes Society news, meeting notices, pertinent announcements, and informal articles about ongoing research concerning freshwater mollusks and their habitats. Anyone may submit material for inclusion in *Ellipsaria* and all issues are accessible to anyone on the FMCS website (<http://molluskconservation.org>).

Articles contributed to *Ellipsaria* should be preliminary or initial observations of note (e.g., natural history observations, meaningful new distribution records, interesting finds, etc.) concerning freshwater mollusks, their habitats, and/or their conservation. Articles that include quantitative analyses, draw conclusions based on analyses, or propose taxonomic revisions should not be submitted to *Ellipsaria* and, instead, should be submitted to a peer-reviewed journal such as *FMBC*. Please limit the length of contributed articles to about one page of text (i.e., excluding pertinent tables, figures, and references).

Information for possible inclusion in *Ellipsaria* should be submitted via e-mail to the editor, John Jenkinson, at jjjenkinson@hotmail.com. Contributions may be submitted at any time but are due by the 15th of the month before each issue is posted. MSWord is optimal for text, but the editor may be able to convert other formats. Graphics should be in a form that can be manipulated using PhotoShop. Note that submissions are not peer-reviewed but are edited for clarity and checked for appropriateness for posting in this freshwater mollusk newsletter. Feel free to contact the editor with questions about possible submissions or transmission concerns.

FMCS Committees and Their Chairs/Co-chairs

If you are interested in participating in committee activities, please contact one of the appropriate chairs.

Functional Committees

Awards

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Ad-Hoc Committees

[None at present]

Parting Shot



The presentations available for viewing during in the FMCS 2021 Virtual Symposium seemed to include an unusually wide variety of topics. One of the most intriguing was Laura C. Carlson's talk about how artists use conservation research to inform the public. This image was part of a video included in their talk showing "*a human-mussel spirit who calls through geologic time to illustrate the ancient role of freshwater mussels and detailing colonial praxes of damming, dredging, and runoff that threaten mussel lives and entire freshwater ecosystems.*" The full 3-minute "flow through me" video is available at [flow through me - Laura Carlson \(lauraccarlson.com\)](https://lauraccarlson.com).

If you would like to contribute a freshwater mollusk-related image for use as a **Parting Shot** in *Ellipsaria*, e-mail the picture, informative caption, and photo credit to jjjenkinson@hotmail.com.

