Newsletter of the Freshwater Mollusk Conservation Society
Volume 21 – Number 2 June 2019

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New President's Message
Jeremy Tiemann

I am extremely honored and humbled to be stepping into the role of FMCS President. My predecessors, whom I have idolized throughout my career, have left big shoes to fill. I hope to build upon their work and continue the legacies they left for us. I am forever indebted for their guidance and encouragement along the way.

A lot has changed since the FMCS seed was planted along the banks of the Mississippi River nearly 25 years ago. FMCS is no longer a small gathering of river rats; it has blossomed into an international society with

more than 500 members from all types of backgrounds. Today, more universities are conducting malacological research, more states have hired malacologists, and more hatcheries are producing mussels and snails since our inaugural symposium in Chattanooga in 1999. Our members are conducting cutting-edge research and are often at the forefront of environmental issues.

As a growing society with a diverse membership, I want to make sure our voice is heard, like when we joined CASS – the Consortium for Aquatic Science Societies – two years ago. I will continue to explore ways to make that happen without compromising the Society or creating unnecessary burdens on our members.

Our meetings also have grown since our inception. The Chattanooga symposium was three days with no concurrent sessions, compared to this year's symposium, which was three days with three concurrent sessions. This past year we also held our first FMCS-sponsored meeting outside of the United States. With the growth of the Society, the time has arrived to rethink how we organize future meetings. As we grow, our venue choices become more limited and the costs of hosting a meeting increases, both of which are reflected in registration fees. This growth also has led to increased scheduling conflicts during a three-day meeting. Several of you have shared your frustrations with me about these facts, and I am taking your concerns seriously. Because of the financial variations in potential host cities, coupled with identifying members willing to serve as symposium organizers, I don't have a simple solution. One idea I would like to explore is working with an event and marketing coordinator to help future symposium organizers. Doing so could reduce the financial burden some of our members face, while allowing us to increase the scope and integrity of our symposia.

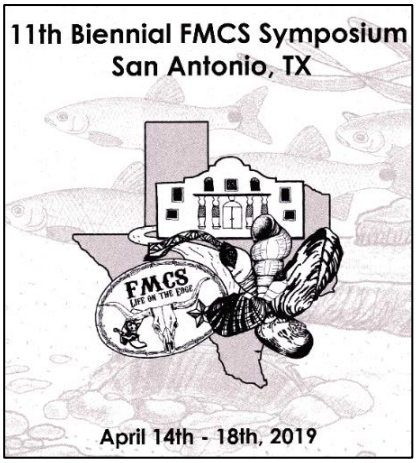
Another idea I would like to explorer is creating a Young Professional Travel Award to assist those recently out of school. Some employers are reluctant to send multiple people to meetings and will support attendance by only their more experienced/higher seniority personnel. A Young Professional Travel Award could help ensure that the "young blood" is retained in our society and continues to push us forward.

In addition to transitioning FMCS into a modest-sized society, I will continue to work with Past-Presidents Dunn and Newton on the restructuring of our [now] three types of committees: Functional, Technical, and Ad Hoc. Our committees need to be focused on ways to address the goals and objectives of the 2016 National Strategy, as well as to explore new opportunities as they arise. I look forward to working with committee chairs and the entire membership to continue to develop and help lead FMCS into the future. As we go forward, please do not hesitate to reach out to me (at jtiemann@illinois.edu) with ideas on how we can continue to grow and develop FMCS.

Society News

In spite of the Adversities, San Antonio was a Great FMCS Symposium

While the day-to-day challenges for the planning committee were not for the faint of heart, the FMCS 2019 Symposium in San Antonio, Texas, turned out to be a huge success! Over the Winter, the closure of much of the United States federal government prevented or delayed many from submitting abstracts and created challenges for federal employees trying to get approval to attend. Despite those obstacles, a total of 260 people registered for the Symposium, including participants from 31 US states (including Washington DC), two Canadian provinces (Ontario and Quebec), and six additional countries (Italy, Norway, Poland, Portugal, Russia, and Sweden).



The printed version of the program included abstracts for 126 oral presentations and 74 posters. Twenty-eight organizations agreed to be sponsors for this Symposium, contributing a total of $25,100 to help cover the cost of this event. As the start of the Symposium drew closer, a good number of people had registered, sponsorships were up, the program was packed full, and things looked surprisingly good.

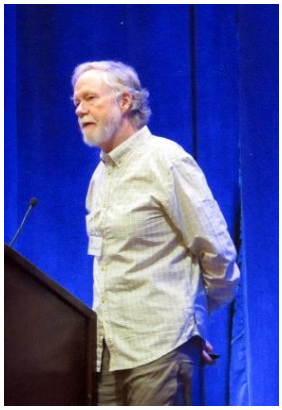
Then, at essentially the last minute, the weather threw the Symposium a curveball. Severe storms on Saturday and Sunday led to cascading airplane flight cancellations. Numerous people were not able to attend or arrived several days later than planned. Those folks included platform and poster presenters, Student Award judges, and the Chairs of some committees. With lots of help, the Local Committee was able to find enough of the right people and rearrange things to make the Symposium an enjoyable and quite productive success.

The atmosphere and the quality of service at the hotel were top notch. The Hyatt Regency San Antonio Riverwalk is an attractive, outdoor-focused hotel that, visually, flows right out onto the Riverwalk. The informal gathering spaces are located in a central atrium with a glass wall facing the Riverwalk. The meeting rooms, sound systems, lighting, and food service were always handled extremely well. And when we wanted to go out for something different, the Riverwalk was lined with a wide variety of restaurants, all types of shops, and lots of interesting people.

On Sunday, the meeting kicked off with the Conservation Genetics/Species Status Assessment Workshop. The first half of the day was devoted to conservation genetics, and we were fortunate to have Dr. Fred Allendorf, professor emeritus at the University of Montana, join the genetics team (Dave Berg, Kentaro Inoue, and Kevin Roe) to put on the Workshop. The afternoon focused on Species Status Assessments, which are the scientific analyses the US Fish and Wildlife Service is now using as the basis for all species listing and recovery decisions made under the Endangered Species Act. Nathan Allan, Sarah McRae, Susan Oetker, Gary Pandolfi, and Dave Smith hosted this portion of the Workshop.

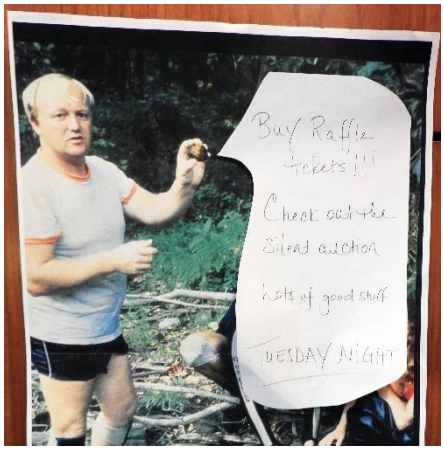
The invited speakers set the tone for an interesting and productive Symposium. Monday morning, Craig Bonds, Director of Inland Fisheries for the Texas Parks and Wildlife Department (TPWD), welcomed everyone to Texas, and Tim Birdsong, Chief of Habitat Conservation for TPWD, talked about the importance of involving landowners in conservation planning. On Tuesday

morning, Dr. Allendorf linked conservation genetics and Zen Buddhism, leading the attendees on a guided meditation. And that evening, Wyman Meinzer, the State Photographer of Texas, wowed the crowd with incredible photography and the stories behind those pictures. Not to be overlooked, on Wednesday morning snails were featured in their own plenary session by Dr. Jeanette Howard, Director of Science-Water Program, The Nature Conservancy, California Chapter. Later that day, the Diversity and Inclusiveness Ad hoc committee invited Erika Proser-Nirenberg, Director of Customer Insights for H-E-B, to share her insights on how FMCS can be a more welcoming organization and reach out to underrepresented groups. Thanks to all of these incredible invited speakers!



Besides the formal sessions, there was plenty of time for catching up with old friends, making new ones, and sharing stories and ideas. The Student/Mentor and Opening Mixer on Sunday evening loosened things up quite a bit and started exposing everyone to TexMex Cuisine. Similarly, on Monday evening, the Poster Session was followed by the opportunity to trek down to Roadmap Brewing Company to listen to some good music, sample some local beers, play games, and talk about work and life.

The “famous” FMCS Auction and Raffle was held on Tuesday night. While Steve Ahlstedt, our long-time auctioneer could not be with us this year, his spirit was present, and Greg Zimmerman provided yeoman service. In spite of the fact that the auction was not as extensive as usual (because several people affected by airline flight cancellations had intended to bring auction items with them), we did donate a total of $5,084 toward Student Travel Awards for the next Symposium.



On Thursday, we were supposed to go on one of three field trips; however, bad weather was not finished with us yet. A strong storm caused the local rivers to be at unsafe levels and both aquatic field trips had to be cancelled. Attendees were able to go on the Hill Country field trip to enjoy the scenery and the wide variety of roadside wildflowers. But even there, it was windy!

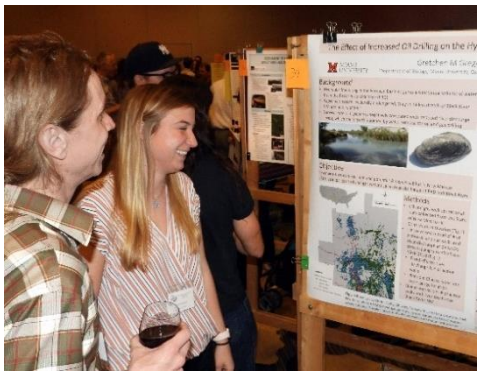
Thanks to all of the longtime, recent, and new FMCS members who attended this Symposium; you helped make it memorable and worthwhile for everyone else who was there. If you missed coming to San Antonio, we hope this summary will give you some idea of all the things you would have experienced and encourage you to join us in Portland, Oregon, in 2021. The pictures illustrating this and the other articles about this Symposium were taken by Janet Clayton, John Jenkinson, and Astrid Schwalb. The images will help us remember this event for years to come.

Here are some additional pictures from the San Antonio Symposium










Minutes of the FMCS Board Meeting
Sunday April 14, 2019 San Antonio, Texas

President Heidi Dunn called the meeting to order at 3:04PM after establishing a quorum. In attendance were: Heidi Dunn, Janet Clayton, Emily Grossman, Kevin Roe, Megan Bradley, Ryan Schwegman, Paul Johnson, Tom Miller, Charles Randklev, Alan Christian, Nathan Whelan, Tim Lane, Rachael Hoch, Tamara Smith, Greg Cope, John Jenkinson, Greg Zimmerman, Arthur Bogan, Lisie Kitchel, Dave Berg, Steve McMurray, Jeremy Tiemann, and (by phone) John Harris.

Rachael Hoch made a motion to approve the November 2018 Board Meeting Minutes published in the December 2018 *Ellipsaria*. Nathan Whelan provided a second and all approved.

Treasurer's Report – Emily Grossman
2019 Symposium Finances

Currently 255 people are registered for the Symposium. Sponsorship has been great this year, with nearly 30 sponsor organizations and over $25,000 contributed. Symposium finances as of 4/5/19 are summarized below.

Symposium Income

• Registration:	$99,000.00
• Sponsorships:	24,100.01
• Field trips	2,750.00
• Workshop:	5,450.00
• T-shirts/swag:	1,280.00
• Guest banquet tickets:	1,050.00
Total workshop income to date:	$133,630.01

Symposium Expenses to date: $12,888.98

Budget estimates suggest we will be close on this meeting, perhaps slightly in the negative, but we have plenty of surplus in the bank to cover the difference if that happens.

2018 International Meeting Recap

Finances from the September 2018 International Meeting in Italy have been finalized. The meeting came in just under budget. The only expense that was paid directly out of FMCS funds was Heidi's travel reimbursement (total cost was $2,262.23; $1,695 was paid out of the meeting budget and FMCS paid the remaining $567.23). The auction held at the Italy meeting raised $906, which has been earmarked to fund a travel award for an international student to attend an FMCS meeting.

Other income and expenses, 11/1/18 – 4/5/19

Income

- Memberships: $21,240.00
- Interest: 194.73
- Misc. donations 238.57
- Amazon Smile proceeds: 59.15

Total other income (excluding meetings): $21,732.45

Expenses

- Allen Press/FMBC costs: $14,658.03
  (includes loading back issues of FMBC onto BioOne)
- Webpage: (Sophie's fee) $3,980.00
- Regional meetings: $200.00
  (Chesapeake Bay, Interior Highlands)
- External meetings: $292.50
  (Teal Dimitre-Richards [EnviroScience] represented FMCS at the recent Wildlife Society meeting; FMCS paid a portion of her registration fee)
- PayPal/Square/bank fees: 3,371.13
- Misellaneous: 20.34

Total other expenses: $22,522.00

Bank balance as of 4/5/18

- Checking: $157,045.58
- Savings: 110,621.90
- PayPal: 3,966.23
- Total: $271,633.71

Other topics

- Jack (John) Burch made a donation of $500 to the Society. No plans have been formulated at this time as to what to do with it and other donations.
- This symposium marks the end of my term as FMCS Treasurer. Alan Christian has been elected as the new treasurer and will officially take over the role at the symposium. The transition may result in switching the FMCS accounts to a different bank. We will be working together over the coming weeks to get everything changed over.
- Many thanks to Alan for volunteering to be nominated and thank you all for the opportunity to serve as treasurer! I have enjoyed getting to know and work with many of our members over the past several years.

Janet Clayton made a motion to accept the report, Nathan Whelan provided a second, all approved.

Secretary's Report – Janet Clayton

There are currently 718 records within the FMCS mailing list. Of these, 400 are active members with 17 being Lifetime Free members (Lifetime Achievement Award Winners), 287 Regular members, 89 Student members and 7 Contributing members. The remaining 301 include some duplicate entries; however, most are lapsed members. Once the Symposium business settles down, a notice of lapsed dues will be sent out, a deadline will be provided, and those members that have lapsed as of January 1, 2017 will be archived. Archived members can be retrieved. Those that lapsed as of January 1, 2019 will remain on the active mailing list for the next two year cycle. Suggest to Sophie to get rid of the Author non-members category.

Old Business

By-Laws – Heidi Dunn noted vote for coming up for the by-laws changes at the business meeting. At least one conflict with the by-laws change was found and would be addressed prior to vote on Wednesday.

Proposals for Society Work - Heidi Dunn

FMCS currently has a procedure for approving funding requests in the Procedures Manual. Heidi drafted a selection process for outsourcing FMCS work. It was provided to the Baard and she is currently seeking comments.

Sterkiana – Steve McMurray and Kevin Roe

Steve has all but one issue of the journal scanned. Kevin has determined that there is no copyright. Iowa State University has hard copies and they are going to rescan. It will be hosted on the Iowa State University Library server and linked to our website, BioOne and others. It will be open source. Megan Bradley would like to know how soon this will occur as they are in the process of reworking the website.

Malacological Data Net -- Request for Funds – Arthur Bogan

Arthur has been unable to determine if this literature was copyrighted by Arthur Clark (who is deceased) or by anyone else. Jim Williams has a complete set and has requested $500 to scan them. Heidi called for a vote to provide him up to $500; all approved. Money would be held until the copyright issue is clarified.

New Business

New Committee Structure – Heidi Dunn

With the publishing of the new National Strategy, Heidi proposed to hold a special meeting of the Executive Committee before the fall Board Meeting to develop an outline for suggested structure changes to the committees. That outline will be submitted to the full Board for comment, with a follow-up webinar to discuss. Current committees will stand for now.

Business Meeting Agenda – Heidi Dunn presented the agenda for Wednesday's business meeting. (See Business Meeting minutes.)

Committee Reports

Symposium – Jeremy Tiemann

2019 Symposium, San Antonio – Charles Randklev, Clint Robertson and crew are ready to put on a great symposium. We have around 250 registrants when last checked. There are 126

platform presentations and 74 poster presentations. We have a great lineup, with several plenary speakers, socials, and three field trips. The entire program will not be printed (e.g., did not print abstracts) but has been uploaded to the FMCS website.

2020 Workshop, Henry Horton State Park, Tennessee – The Workshop on survey guidelines and techniques is being finalized. Lisie Kitchel and Ryan Schwegman are trying to determine which time of year would be better: late April/early May, or late September/early October. Weather and water levels could affect both time periods but seems more likely to affect spring dates. Autumn could interfere with end of the season reporting duties, and summer could be bad because of work requirements. They have their presentation prepared for the General Meeting. We will continue to work with them on finalizing the Workshop. Location will be Henry Horton State Park, in Tennessee. Four potential dates were presented and the Board indicated the first part of August probably would involve the fewest conflicts and have greater potential for good stream conditions. October starts the federal fiscal year and may create conflicts with folks wanting to attend both the 2020 Workshop and the 2021 Symposium which would be during the same federal fiscal year.

Topics for the workshop include an introduction to sampling and techniques as well as state regulators presenting their various protocols. Guidelines and Techniques committee is to join the Symposium committee during the committee lunches to further discuss.

2021 Symposium Pacific North West – Emilie Blevins and the rest of the planning committee have identified a few possible venues in Portland and have started forming their planning committee. They will be ready to start finalizing plans as time draws closer. Emilie and company are excited to share their presentation at the Business Meeting. Portland State University is a likely venue; however, they are looking at 3-4 other conference centers.

2022 Workshop Ideas – We are still looking for ideas for the 2022 Workshop. One possible option is to have it in conjunction with the Joint Aquatic Science Meeting (JASM). JASM will bring together members from several of the CASS societies – AFS, SFS, ASLO, etc. and is scheduled to be in Grand Rapids during late spring of 2022. There is a JASM conference call coming up end April and they most likely will finalize dates.

Carla Atkinson suggested we could have an Ecosystems Services Workshop. Upon discussion of the JASM conference, one idea presented was to add the Ecosystem Services Workshop to either end of the conference. Requests for other ideas will be brought up at the Business Meeting to see if others have suggestions.

2023 Symposium, Michigan – David Zanatta, Daelyn Woolnough and others have expressed an interest in hosting the 2023 Symposium in Michigan, possibly in Detroit, Grand Rapids, or Kalamazoo. More details will emerge as they talk with colleagues and collaborators. The have tentatively agreed to explore the idea.

Young Professional Travel Award – As Jeremy transitions to taking over the reins as president he is exploring the idea of creating a Young Professional Travel Award similar to the Award offered by the American Fisheries Society (AFS). The goal would be to retain our younger members as they leave school and join the work force. The AFS program provides funds to defray costs of young professionals (out of grad school $\leq$ 5 years) as these individuals are not usually selected to attend national meeting by their administrators. Illinois AFS also has Professional Travel awards. Greg Cope noted that these awards would logically be handled by the Awards Committee. We would need to set a dollar amount and establish eligibility criteria. Dave Berg expressed concern since we really don't have that many student awards; right now,

about 1/3 of students are getting travel awards. Dave also suggested doing it as a possible waiver of registration fee. Many of Board agreed this was the preferred option. Megan was requested to put a page on website that includes justification for attending the meeting. This will help folks apply for their travel request.

Event Marketing Coordinator – Jeremy further addressed the rising costs of registration and the tasks placed upon society members who volunteer to host meetings that are already over-tasked by their normal work. Because of the financial variation in host cities, coupled with identifying members willing to host and serve as Symposium organizers, we should at least consider working with an event and marketing coordinator to help future symposium organizers. Doing so, could help reduce the financial burden some of our members face, while allowing us to increase the scope and integrity of our symposia. Jeremy would like to explore this option. His wife does this for a living and saved this symposium a lot. She has experience contracting and negotiating, and this type person could be beneficial for future Symposia and Workshops. Heidi suggested the Pacific Northwest group considering hiring an Event Marketing Coordinator for the 2021 Symposium in Portland. Dave Berg brought up the idea of having this type person work up a deal based on regional site selection rather than sticking to one city. Smaller cities may have cheaper options than downtown locations. This process was looked into for the St. Charles meeting but was not found to be cost effective. All agreed to pursue this option. Greg Zimmerman offered his Mom for free!

Awards – Teresa Newton, Greg Cope, Emy Monroe

Student Travel Awards

The Awards committee announced and solicited applications for student travel awards to assist students in attending the biennial symposium. As in past years, travel awards were made in the form of pre-paid rooms at the Symposium hotel. A total of 25 students (5 BS, 8 MS, and 12 PhD) applied for travel awards. Based on the allotted funds for all awards from the society and the cost of rooms, nine student awards were presented. Of these students, one is earning their Bachelor's, five are earning their MS and three are earning their PhDs spread across nine Universities.

Best Student Platform and Poster Awards

This year, there were 38 students that asked to have their platform presentations judged and 18 students who asked to have their poster presentations judged. At the time of this report, judges were in the process of being assigned, with the target goal of three judges per presentation, but there may be only enough volunteer judges for two per platform. Total students participating is up from 38 to 56! Emy and Susan Oetker have been working on getting judges.

Professional Awards

The Awards committee solicited nominations and applications from the membership for professional awards to be presented at the biennial symposium. In 2019, we received one nomination for the Meritorious Service Award. Folks should consider making nominations for these awards. Start thinking now for 2021 as they are only presented every two years.

Regional Meeting Assistance Awards

To date for 2019, two Regional Meeting Assistance Awards have been approved for $100 each: one to the Chesapeake Freshwater Mussel Workgroup, and one to the Interior Highlands Mollusk Conservation Workgroup.

After 17 years Greg Cope is stepping down and after 14 years Teresa Newton is stepping down from The Awards Committee. Emy Monroe will be taking over as chair, and David Hayes and Susan Oetker have joined the committee as replacements.

Nominations – Leroy Koch has retired from the US Fish and Wildlife Service and giving up his position as Chair of the Nominations Committee. Thus, we are currently seeking a new chair for this committee.

Mussel Status and Distribution – John Harris, Art Bogan

1. **J. D. Williams *et al.* Conservation assessment of freshwater mussels of US, Canada and Mexico.** This revision of Williams *et al.* (1993) is on hold while Williams completes other projects. Future action items will include: 1) 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, 2) 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), 3) Revise and update historical vs current distribution information for each taxon, conservation status information, and complete the text revision from the previous submission.
2. **Development of Mussel ID App** - Susan Oetker. The App has been reviewed by a select group of the FMCS members and their comments have been incorporated where feasible. Following the Names of Freshwater Mollusks Subcommittee meeting and review of freshwater mussel petitions during this 2019 Symposium, the App will be updated to reflect accepted name changes. The App will be made available as a beta release soon after the Symposium. Should be out in a month for review to the public.
3. **Atlas of Freshwater Mussels of North America**. Currently, 152 of the approximately 356 taxa addressed in the Atlas have volunteer authors for species accounts. We have received 28 first draft accounts as of April 5, 2019. One species account is posted to the website. 17 species accounts have been reviewed by the Committee Co-chairs and returned to species account preparers for modifications prior to final review; one species account is under final review. Accounts will be posted to the FMCS website as they are completed. Updating photos is also ongoing.

John Harris is stepping down as chair. A new chair was nominated, Jason Wisniewski.

Naming Subcommittee – Nathan Whelan, Paul Johnson

The mussel and gastropod names subcommittee will be meeting after the Board Meeting. The current plan is to update the names checklist online every two years, but there has been some concern about this being too frequent. Paul Johnson wanted to hear the board's opinion on this. He thought the pros of updating every two years, to coincide with meeting at the Symposium, outweigh the cons, but the group is certainly willing to listen to opinions and reevaluate. Johnson *et al.*, the basis for the gastropod names, is currently on the website but it is buried there.

Paul said there are currently eight mussel petitions for name changes. Some more have come out in literature that did not meet the submission deadline for this round of revisions. Submissions are a written process; those will have to wait another two years. There are currently 23 petitions for gastropods which are mostly new species.

The official list will be posted on website after committee meeting today. Both committees will seat chairs this meeting. The process is to go through three iterations of this list (every two years); with each iteration the list goes on the website but the third would also be published in FMBC. At the end of each six-year cycle, the chair steps down. The FMBC article will have all the appendix notes with all the name changes and why. Website list will change every two years, each symposium.

Name changes by the US Fish and Wildlife Service have to be published in the Federal Register. It is not as complicated a process as listing. The name changes are important to the

states with regards to their state wildlife action species, especially if it is a new species. Important to get this out now as state wildlife action plans are due in 2025.

The petition process was discussed. The Chairman of the committee is to be watching the peer review literature for taxonomic changes that should be petitioned to the Committee. The committee reviews with final decision made by the Chairman. The gastropod committee consists of Paul Johnson, Nathan Whelan, David Hayes, Ken Hayes, Ellen Strong, Jeff Garner. The mussel committee consists of Kevin Roe, Kevin Cummings, Art Bogan, Jim Williams, John Piefer, and John Harris.

Dave Berg suggested that notification of what petitions are being considered for the next six months be made available. This would allow folks who may be working on that particular species and have information that is not yet published, to provide their work to the committee as they evaluate the petition or wait for the next round. Possibly provide a public comment period. Nathan said anyone can attend the meeting and present information for discussion, but it is up to the committee to determine validity of a proposed change. All petitions should have peer reviewed journal articles referenced in them and will be provided in appendix along with what got changed, when, and why.

Outreach – Jennifer Archambault, Megan Bradley

Members of the committee have organized the second Student/Mentor Mixer in coordination with the San Antonio program committee and plenty have signed up to attend. Amy Maynard will be stepping up as a co-chair of Outreach as of this symposium. The committee is interested in guidance for best outreach focus in the next two years and discussing potential ways to create professional outreach materials for the public.

Much of our outreach efforts have been internal to FMCS. Even our social media largely serves members. In the past two years, a handful of committee members attempted to start drafting outreach materials for the public, but those efforts stalled due to lack of volunteer time. I'm interested in fostering public outreach efforts if we can find a good way forward.

The committee is currently working on website and requested the Committee Chairs please provide their updates. Still would like to get photos, updated committee chairs, and updated text. Heidi suggested adding committee reports to their webpages.

Carla Atkinson, Ecosystem Services Committee Chair, wants to figure out how Outreach could work with her committee to develop some outreach messages around ecosystem services. If we would like the website to play a more prominent role in outreach to a public audience rather than an internal audience, it would need some changes. Right now, the website is more geared to the functioning of the Society. We do get a few questions throughout the year from the general public. We could make a more forward-facing structured page that was public but then make sure membership knows how to access the rest of the website.

The Outreach committee is looking for more folks to help manage Facebook and Twitter accounts. Right now, it is Jeremy Tiemann and Jennifer, and Jeremy is taking on more responsibility as President. We are also reaching outside this committee for help. Anyone that is a big Facebook or Twitter user that would like to get involved, here is your chance.

Rachael Hoch noted that the Federal Mediation and Conciliatory Service has bumped us from the top slot when conducting a google search for "FMCS;" we no longer come up as first page. Make FMCS your home page, it might help push us back to the top on the google search.

Megan brought up that since CASS is part of the Environmental Quality Affairs Committee, it stays at the top of the website and replaced "Mussels in the News." Should it be there? Steve McMurray is stepping down as co-chair, so that is a better question for Braven Beaty who is not in attendance. She noted that maybe the bigger question is do we want the website to have the breaking news or should we restrict that to Twitter and other social media. Greg Zimmerman noted that "Mussels in the News" really drove the traffic, so it depends on what the goals of the

website are as to whether to keep this or not. It was recently replaced by the CASS material and folks have questioned the replacement.

One of the calls in the National Strategy is to use outreach as a larger tool. One of those calls is to actually have an outreach coordinator. We would hire someone who has that as their expertise as opposed to somebody trying to do their job and handle this on the side. A major overhaul of the website, especially if you want to bring it into line with most current algorithms needs to have a more experienced person. Heidi asked the Board as to whether we want to explore hiring someone to put a public face to the Society and be more of a public education tool? Greg noted that a consulting company can pay as much as $1200/mth for this type person. The scope would need to be defined and we may get a break for being a non-profit. Megan also noted that we may be able to develop a partnership with a university that is focused on natural resources as well as communications. Heidi suggested we come up with a proposal and put in *Ellipsaria* and send out to membership and see what kind of response we get, figure out costs, evaluate it, and see if we can afford it.

Megan further noted that there is a need to align with the Diversity and Inclusiveness Committee in trying to improve the accessibility of the Society. We have added photographs and alternative text. We are also looking for the best readable format for digital readers. Sophie is onto some of this and going to test some readers. Megan will have multiple asks on these subjects. Nothing to ask right now but hopes to question some folks this week.

Environmental Quality and Affairs – Steve McMurray, Braven Beaty

Most resent work has been on comment letters relating to definition or Waters of the United States. Most of this discussion started with the wetlands folks, but since we are a part of CASS, we have contributed to that as well. We have a much broader voice working with these folks with around 20,000 scientists. Braven, Jeremey Tiemann, and Steve have been involved in the conference calls. We have never put anything forth to CASS since WOTUS has taken the front stage recently but they are always looking for items.

Genetics – Kevin Roe, Dave Zanatta

Members of the Genetics Committee are assisting with organizing the Workshop at the San Antonio meeting, and Committee members Berg, Inoue, and Roe presented at the Workshop as well. The workshop was well attended.

The committee is continuing to work on developing "1-pager" advisory documents including one describing sampling guidelines. One bought up during the Workshop was to maybe develop one on protocols for collecting of genetic material. The committee will also discuss changes to the mission statement.

Guidelines/Techniques - Ryan Schwegman and Kitchel

The Guidelines and Techniques Committee's goal is to develop consistent best practices for freshwater mollusks, and to review and disseminate information regarding guidelines and techniques that minimize harm to freshwater mollusks. There is a lack of standard practices for surveying, handling, and vouchering specimens among different organizations, agencies and individuals. The committee created and continues to maintain a list of mussel survey guidelines and protocols organized by state or government agency on the FMCS website and will be adding photo guideline publications to the FMCS website. We encourage individuals to submit guidelines and protocols to us as they are developed.

The Committee will host the 2020 Workshop on Survey Guidelines and Techniques. The Workshop will have a day of classroom activities focused on general survey guidelines and a state by state breakdown on protocols. Additionally, a day of field activities will focus on survey techniques. The committee is forming a small team to spearhead this Workshop effort; we

welcome any members that have expressed interest in planning or contributing to the Workshop. The Workshop will be held at Henry Horton State Park on the Duck River south of Nashville, Tennessee. Discussions are ongoing about the timing of this event and, while we appreciate timing is critical for the field portion of the Workshop, we do not want to hinder participation. A short presentation about the Workshop will be provided during the Business Meeting.

Gastropod Status and Distribution – Nathan Whelan
The gastropod committee had nothing new to report.

Information Exchange – John Jenkinson, Wendell Haag, Dave Berg

John noted that due date for submission of materials for the June issue of *Ellipsaria* is May 15.

Greg Cope noted that all is going well with FMBC. Volume 22 (1) was just completed and will be posted to website soon; it already has been sent to BioOne. Since we are a part of BioOne now, we were advised to wait a short period before requesting an impact factor. Greg will be putting together the application soon. Volume22 (2), slated for September or October, will feature a collection of eight articles from the Health and Disease Workshop, plus an additional four or five other contributed articles.

Greg has been the editor and chief of FMBC for ten years of what was supposed to be a six year term. His intent is to complete Volume 22 (2) and then step down in December or after the first of year. FMBC is looking for nominations to serve as third editor starting in 2020. Wendell will be stepping down about 2022. Interested folks that are qualified and know the publishing business inside and out may be considered for these replacements and should contact the present editors.

Dave Berg suggested that those writing journal articles cite FMBC if at all possible to help increase our impact factor.

Propagation – Rachael Hoch, Tim Lane

The committee continues to maintain a propagation/stocking/relocation database. Any facilities actively propagating freshwater mollusks and/or groups conducting restoration activities are encouraged to contact Tim Lane (tim.lane@dgif.virginia.gov). The committee is currently requesting participating members to submit data for updates before the symposium. The updated database will be made available after the symposium.

Members of the committee are currently collecting information for a literature review on reintroduction and translocation techniques. We are interested in results, reports, papers, observations, and protocols related to reintroductions, augmentations, translocations, and introductions. The goal of this document is to provide a review of the current techniques for species restoration. A spreadsheet to help gather and standardize data is available upon request. Please contact Louise Lavictoire (LLavictoire@fba.org.uk) if you are interested in contributing to this effort. We hope to generate a summary. If questions may contact Rachael, Louise or Paul Johnson.

Greg Cope requested that they consider a peer reviewed publication with results. Paul Johnson said they may produce at least a white paper and even a workshop for folks to put their ideas on the table. Rachael also noted that they will be placing some reference documents onto the committee's webpage.

Tim is working on a mapping database. There is an ArcGIS application that links to a base map. Can layout all HUC 8s across the nation. Instead of putting database up as excel, you could query the base map. Shows the species and who is working on it. Seven folks have responded to data request thus far. Would like to put on website that is accessible to members

only. Virginia Department of Game and Inland Fisheries is willing to host the online database; therefore, it could be linked from the committee's webpage.

Ad hoc Committees

Professional Development – Becca Winterringer

We have no new news or activities to report since the last Board meeting. Poster will be presented at the poster session.

International/Chapters – Art Bogan, Manuel Lopes-Lima

Manuel is going to head up developing guidelines for chapters. Heidi, Manuel, Celeste, Mark Hove, and Jeremy Tiemann had a conference call this past Monday and have made some good progress. They are looking at a top-down framework where the Society would manage money for all chapters. Otherwise, each chapter would have to incorporate as a 501 C3. Currently, Ohio (OVUM), Texas, the Pacifoc Northwest, and Europe have expressed interest at this point.

Monetary Values of Mollusks – Megan Bradley, Janet Clayton

This committee has a morning meeting planned for Tuesday morning durint this Symposium.

Megan Bradley and Janet Clayton are involved with the American Fisheries Society and the US Fish and Wildlife Service National Conservation Training Center in trying to develop an online course. Planning was delayed due to the federal shutdown and the beginning of the field season has delayed further progress. They hope to begin discussion with Rachael and folks to, possibly, incorporate values into the database.

Ecosystem Services – Carla Atkinson

The ecosystem services committee will be meeting on Monday. Currently, we have nothing new to report.

Inclusiveness/Diversity – Tamara Smith

Committee Chair: Tamara Smith. Members: Jeremy Tiemann, Brooke Penaluna, Kimberly Hordeski, Neil Ford, and Megan Bradley

2019 Activities

- Develop clear goals and objectives for the group.
  - Progress: The group has continued to draft a plan with goals, objectives and actions.
- Develop an optional demographic questionnaire to 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.
  - Progress: The committee has started a draft questionnaire. No new updates since November.
- Show photos of people on the website. In *Ellipsaria*, we asked folks to submit a photo of them and quote to be featured on the website! (Ask – In a sentence or two, tell us why you are a member of FMCS?).
  - Progress: We've received a good number of photographs and quotes for the FMCS website. We have submitted a few that are now featured on the website.
  - We plan to send out another call for additional photos and quotes. We hope to have a slide up during the Symposium.
- Create a presence on the FMCS website (of the ad-hoc committee).
  - The committee developed language and sent to Megan Bradley to give to Sophie.
  - We will discuss this at the Symposium -we hope to have a presence on the committee webpage soon!

- Secured a diversity and inclusion speaker for the 2019 symposium
- Explore ways to welcome new members to FMCS and committee members.
  - Progress: We sent in a request to partner with the Diversity Joint Venture for Conservation Careers, however, we have decided to table this idea because it is not a good fit at this time.
  - Idea: We're talking about a challenge for FMCS members reach out to their community schools to give talks, etc. to engage underrepresented groups/students. Initial focus will be in inner-city schools. *This has not yet been initiated.*
  - Submit another call for photos and quotes in the next issue of *Ellipsaria* or over Unio list-serve.
  - Plan to brainstorm additional ideas at FMCS to welcome and attract new members.
- The Committee continues to meet via conference calls and to work together over Google Drive.

Motion to Adjourn
Steve McMurray made motion to adjourn, Kevin Roe provided a second and all approved.

Minutes of the FMCS Business Meeting
Wednesday April 17, 2019 San Antonio, Texas

Heidi Dunn, President, called the Business Meeting to order at 12:30PM CDT.

Treasurer's Report

Emily Grossman reported that with the 25 onsite registrations so far, the total registrants for the meeting is approximately 270. This Symposium had approximately 30 sponsors, bringing in a total of about $25,000. The auction and raffle, conducted Tuesday night, brought in about $5000 which will be used towards student travel awards to the 2021 Symposium.

The 2018 International Meeting in Italy came in under budget and that auction and raffle there brought in $900. The money from that auction will be used to provide an international student travel award.

Since November 1, 2018, the Society has received approximately $21,000 in non-symposium income. Expenditures were approximately $22,000 with a total of nearly $270,000 in the bank.

Professional Certification Program Vote

Information was provided previously in an FMCS email blast on January 28, 2019 and during the poster session on the potential format for development of a Freshwater Mollusk Professional Certification Program. This item was brought before the general membership for a vote as to whether to proceed with the development of the Program. A vote was taken, and the proposal was overwhelmingly approved with only ~3 opposed.

By-laws Revision Vote

Suggested changes to the By-laws were presented by the Board in the December 2018 issue of *Ellipsaria*. A few minor edits to those changes were amended just prior to the vote by the general membership. All approved the proposed changes as amended.

Society Accomplishments

President Dunn presented an overview of the accomplishments that have been made by our Society during the past two years:

- **Chapters/International** is a new Ad hoc Committee. Manuel Lopes-Lima is going to head up developing guidelines for chapters. Currently, Europe, Texas, and the Pacific Northwest, have expressed interest in forming chapters. Additional changes to the by-laws may have to occur to address chapters.
- **Diversity and Inclusiveness** is a new Ad hoc Committee. Be sure to check out the front page of the website. This committee is still looking for more pictures and perspectives on why you are a member. Send them to Jeremy Tiemann (jtiemann@illinois.edu) or Tamara Smith (tamara_smith@fws.gov).
- **First FMCS International Meeting** was held in Italy in 2018 with about 100 participants.
- **FMBC is now on BioOne**. The journal will be applying for an impact factor soon.
- **Code of Conduct** is new for this Symposium. You can find it printed in your program. At future FMCS events you may be required to sign an acknowledgment that you have read and agree to abide by the Code.
- **Names Sub-committee** has been organized. This will provide a formal process for vetting and approving taxa name changes. Currently, only addressing North American taxa. Anyone can submit a petition which must be supported by scientific literature. Plans are to be fully organized by 2021.

Upcoming Events

- **2020 Workshop** – Lisie Kitchel and Ryan Schwegman, who co-chair the Guidelines and Techniques Committee, presented information on their proposed 2020 Workshop focused on sampling techniques. This Workshop will be held at Henry Horton State Park, about an hour south of Nashville, Tennessee. It is on the Duck River and, depending on river conditions, the Workshop will include an instream component. Watch for a Survey Monkey as the Workshop will be designed around the membership needs.
- **2021 Symposium** – Emilie Blevins and Patty Morrison invited the membership to make their way to Portland, Oregon in 2021 for our next Biennial Symposium.
- **Seeking 2022 Workshop Ideas** – Jeremy Tiemann is seeking ideas and proposals for the 2022 Workshop. Currently have one suggestion: a Workshop on Ecosystem Services, proposed by Carla Atkinson, Chair of that Ad-hoc Committee. If you have any additional ideas, please contact Jeremy.
- **2023 Symposium** – Dave Zanatta and Daelyn Woolnough from Central Michigan University invited the membership to Michigan for the 2023 Symposium. No venue has been selected at this point but stay tuned.

Other Society News

- **CASS Update** – Jeremy Tiemann noted that FMCS was the fifth or sixth society to join the Consortium of Aquatic Science Societies (CASS). There are now nine member societies, representing over 20,000 aquatic scientists. The main task recently has been commenting

on the proposed definition of the Waters of the United States. CASS also is planning for a Joint Aquatic Science Meeting (JASM) in 2022 in Grand Rapids, Michigan, which will include the CASS member societies and others. Dave Zanatta and Daelyn Woolnough have agreed to be on that planning committee.

- **Election Results** Results of our recent election were presented by President Dunn. Our next President-Elect is Steve McMurray, our new Treasurer is Alan Christian, and Janet Clayton has been reelected Secretary.
- **Nomination Chair** – With the retirement of Leroy Koch, the Board is seeking nominations for a new chair of the nominations committee. If interested, please contact any member of the Executive Committee.
- **Retirees Recognized** – Heidi recognized all retirees in attendance by having them stand for a round of applause.

Awards Presentations – Susan Oetker and Greg Cope made the presentations for the student and professional awards in the absence of committee chair Emy Monroe who was stormbound in Chicago. Details of those presentations are covered in the next article.

Passing of the Horns – As outgoing president, Heidi Dunn passed the Viking hat to Jeremy Tiemann, the new President. This year, the Viking hat was modified with the addition of a Kansas Jayhawk sitting on top. The pigtails (added in 2015) were now made to encircle the Jayhawk.

Incoming President's Remarks

As his first action, Jeremy acknowledged the services of outgoing President, Heidi Dunn, and presented her with a plaque for her services. He followed with some remarks about his priorities during his tenure as President. Jeremy has provided a written version of those remarks in the article starting on Page 1.

The Business Meeting was adjourned at 1:33PM CDT.

2019 FMCS Awards Committee Report

Student Awards

The Awards committee announced and solicited applications for student travel awards to assist students in attending the biennial Symposium. As in past years, travel awards were made in the form of pre-paid rooms at the symposium hotel. A total of 25 students (5 BS, 8 MS, and 12 PhD) applied for travel awards this year. Based on the allotted funds for all awards from the society and the cost of rooms, we were able to present nine awards students representing nine different universities. Of these students, one is earning their Bachelor's degree, five are earning their M.S. and three are earning their PhDs. Here are the names of the award winners: Alison

Aceves (Auburn U.) Jennifer Archambault (North Carolina State U.), Traci Dubose (U. of Oklahoma), Nicholas Gladstone (U. of Tennessee,-Knoxville), Mary Jones (Miami U.), Erica Levin (College of New Jersey), Muliska Olivera-Hyde (Virginia Tech), Lacey Rzodkiewicz (Central Michigan U.), and Christine Verdream (James Madison U.).

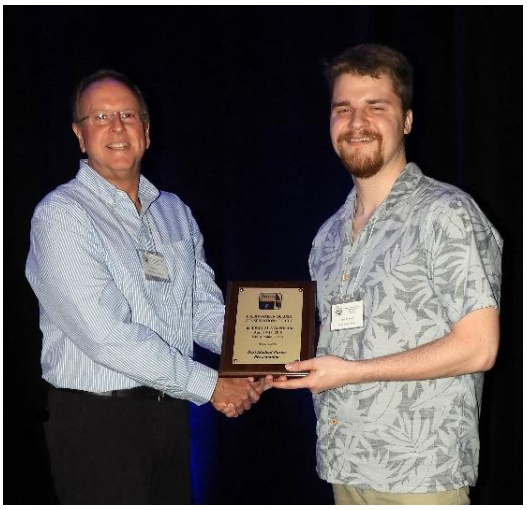
The nine Student Travel Award Winners for 2019

Best Student Platform and Poster Awards

A total of 56 student presentations required judging at the 2019 symposium (38 platforms and 18 posters). Each platform paper and each poster was judged by three separate judges, which meant that 43 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. We are also grateful to Sean Buczek and Curt Elderkin who helped Greg and Susan cover the judging duties because Emy missed the meeting due to bad weather!

The best platform paper award went to Dominique Alvear of the University of Texas Rio Grande Valley (co-authors Pete Diaz , Randy Gibson, Benjamin Hutchins, Benjamin Schwartz, and Kathryn E Perez) for her talk entitled “Determining the specific status of an unusual, phreatic, Texas cavesnail (Mollusca; Gastropoda; Hydrobiidae)”. The honorable mention platform award went to Rebecca K Osborne of the University of Guelph (co-authors Patricia L Gillis and Ryan S Prosser) for her talk entitled, “Assessing multi-generational and developmental ecotoxicological endpoints in freshwater gastropods.”

The best poster award went to Tyler Beyett of Central Michigan University (co-author David Zanatta) for his poster entitled, "Morphometric analyses and DNA barcoding distinguish *Truncilla donaciformis* and *T. truncata* (Bivalvia: Unionidae)". The honorable mention poster award went to Nicholas Wierman of SUNY Cobleskill (co-author Andrew Gascho-Landis) for his poster entitled, "Freshwater mussel hatchery development at SUNY Cobleskill: Varying host fish species and density to maximize *Pyganodon grandi*s transformation". Congratulations to all the fine student presentations given at this year's Symposium!



Professional Award

The Awards Committee solicited applications and nominations from the membership for professional awards to be presented at the biennial symposium. In 2019, we received one nomination for the Meritorious Service Award. This award was presented to Susan Oetker (U.S. Fish and Wildlife Service) for her advocacy and leadership in the protection and conservation of endangered mussel species in the Southwestern United States. Susan has played a significant and key role in the conservation and protection of rare mussels in Texas and New Mexico. She was the listing biologist for *Popenaias popeii* (Texas Hornshell), the first mussel species federally listed from the Southwestern United States. Susan's Species Status Assessment for Texas Hornshell set the bar for these types of conservation assessments and has been the go-to guide for other proposed mussel species in Texas/New Mexico and outside of the state. Along with Dave Smith, Susan and a few others are considered the experts on Endangered Species Act conservation status assessments for rare mussel species, which has proved invaluable in places like Texas where conservation efforts are now just beginning. Her professionalism and authentic passion for conservation serve as an example for others in this line of work and has influenced a new generation of state and federal natural resource managers in Texas and New Mexico.

Meritorious Service Award Winner Susan Oether surrounded by members of her nomination team.

Thank You Teresa and Greg!

The new members of the Awards Committee and I would like to express our gratitude to Greg Cope and Teresa Newton for co-chairing this committee for many years, and for their guidance and support as we worked our way through the process this past year. We could not have accomplished presenting the awards this year without you. I am especially grateful for Greg taking the lead in organizing the student judging processes when I could not make it to the meeting. – *Emy*

Note and Donation from Peggy and John Burch

Peggy Burch recently sent the following note and a check to the FMCS Treasurer:

> "I am enclosing a donation in the amount of $500 at the request of my husband John B. Burch. He has for years been a member of FMCS and attended the annual meetings but has not been able to attend for the past couple of years.
>
> Jack has felt the organization has had a history of doing important work. He hopes this contribution will help the continuation of good work.
>
> Please give his best regards to all the members and most especially to Steve Ahlstedt, Paul Johnson, and Kevin Cummings - to name a few - and to Trevor Hewitt."

Members may remember that John B. (Jack) Burch was a Professor at the University of Michigan and Curator of Mollusks at the Michigan Museum of Zoology from 1962 to 2001. Dr. Burch's research has focused on freshwater mollusks and infectious diseases, resulting in more than 180 publications. His special contributions have been in cytotaxonomy and evolution of snails, cell and tissue culture of mollusks, and snails as vectors of disease. Among many other things, Dr. Burch has served as editor of *Malacologia*, *Malacological Review*, and *Walkerana* (which he transferred to our Society and was, eventually, renamed *Freshwater Mollusk Biology and Conservation*). He also was one of the first four recipients of our Lifetime Achievement Award (in 1999).

This donation has been gratefully accepted and is being held for future use. At present, that use has not been determined.

You Can Now Use BioOne Complete to Access FMBC

As you may have already heard, beginning in January 2019, the FMCS Journal *Freshwater Mollusk Biology and Conservation* (FMBC) became a member of the journal holdings of BioOne Complete. This means that our journal is now part of the marketing power held by BioOne and is accessible through libraries world-wide.

BioOne is the new flagship product of the nonprofit publisher BioOne. It is a database of more than 200 subscribed and open-access titles in the biological, ecological, and environmental sciences. BioOne provides libraries with cost-effective access to high-quality, curated research, and independent society publishers with a dynamic, community-based platform and global distribution. In addition to *Freshwater Mollusk Biology and Conservation*, BioOne includes other mollusk journals such as *Malacologia* and *American Malacological Bulletin*; a number of journals relevant to our interests such as *Freshwater Science*, *Journal of Great Lakes Research*, *Journal of Shellfish Research*; and several regional ecology journals.

The current and all back issues of FMBC published through our Society can be found on their website at https://bioone.org/. To view the holdings through BioOne Complete, simply navigate to their website and browse by either "Publishers" or "Titles." Under Publisher, choose "F," then select Freshwater Mollusk Conservation Society. Under Titles, "F" will lead you to *Freshwater Mollusk Biology and Conservation*. Society members and others also still can access the current and back issues of FMBC through the Publications tab on the Society website at https://molluskconservation.org/FMBC-journal.html.

Besides encouraging your library/agency/company/organization to subscribe to BioOne, you also can support our Society by accessing FMBC articles through BioOne. The number of times articles are accessed contributes to the amount of money received by our society, so doing your literature research on BioOne also helps the Society financially!

Freshwater Mollusk Professional Certification Program Moves Forward!

We are excited to say that FMCS is moving forward to develop a Freshwater Mollusk Professional Certification Program. At the Business Meeting during the San Antonio Symposium, the membership voted to approve the development of this program. Prior to the vote, the Professional Development Ad-hoc Committee presented the outline of the program during the poster session, and a copy of that poster can be viewed at https://fs.es-webservices.com:52001/sharing/WqJCX9rS7 The goals of the program are to: 1) Provide recognition of achievements for mollusk professionals, and; 2) Present minimum standards for key skills and competencies for mollusk conservation professionals.

The intent of the Mollusk Professional Certification Program is to have an education and experience-based certification that will support the mission of FMCS. We have said it before, but we will say it again: THIS IS NOT A TAXONOMIC CERTIFICATION, but an endorsement for applicants having minimum standards of education and experience in freshwater Malacology.

Next Steps:

- The Ad-Hoc Committee will further develop evaluation criteria and procedures. A draft rubric is currently in development.
- The FMCS Board will appoint a Certification Review Panel and an Independent Reviewer.
- Once the Program is up and running, interested members who believe they meet the criteria for a Certification level will be able to submit their applications, evidence of their qualifications, and pay any applicable application fee. Participants also must sign the FMCS Code of Conduct.
- Certification will be on a cycle (to be determined, i.e. 6 years), maintained with Professional Development education credit.
- Fee structure will be determined.
- Pilot testing will be implemented to identify issues and improve workflow.
- Proposed roll-out – 2021 Symposium

If you have any questions or comments about the next steps in developing this program, please contact Becca Winterringer, beccawint6@gmail.com or Amanda Rosenberger, arosenberger@tntech.edu.

Scientific and Common Names Committee

On April 14, 2019 the FMCS Board of Directors formally approved the creation of the Scientific and Common Names Committee, presently as extensions of the Mussel and Gastropod Technical Committees. This Committee will operate in two parts: one for Gastropods and another for

Bivalves. Initial consensus lists will be confined to the families, genera, species native to the United States and Canada; however, the geographic scope of the checklists may be expanded to include Mexico. Additionally, the Gastropod Subcommittee will continue to maintain a checklist of native Hawaii freshwater snails. Individual subcommittees are charged with reviewing potential changes and maintaining consensus lists on the FMCS website. The Committee will publish consensus checklists and summary appendices of petitions considered by the Committee in *Freshwater Mollusk Biology and Conservation* every 6 years. The printed checklist will include all modifications since the previous checklist and provide summary appendices concerning all Committee decisions.

The Committee held its first meeting following the conclusion of the Board Meeting on April 14, 2019. The formal guidelines were reviewed, edited, and approved the committee members. The following individuals were nominated and approved to serve for the Committee.

Bivalve Subcommittee Chair: John Harris
Members: Art Bogan, Kevin Cummings, Andrew Henderson, Nathan Johnson, John Pfeiffer and Kevin Roe. Andrew Henderson, Nathan Johnson and Kevin Roe agreed to initial 2-year terms while Art Bogan, Kevin Cummings and John Pfeiffer have 4-year terms. FMCS Names Committee members may serve multiple terms.

The Bivalve Subcommittee reviewed and approved 7 of the 8 petitions received on 14 April 2019. A summary of petition details are as follows:

- The bivalve subcommittee recognized three new species descriptions: *Cyclonaias necki*, *Strophitus pascagoulaensis*, and *Strophitus williamsi*.
- Assignment of *Anodontoides radiatus* to *Strophitus* was recognized.
- The reassignment of *Strophitus connasaugensis* and *S. subvexus* to *Pseudodontoideus* was recognized.
- The synonymy of *Cyclonaias aurea*, *C. houstonensis*, *C. mortoni* and *C. refulgens* into *Cyclonaias pustulosa* was also recognized.
- A gender-based spelling change was made to *Anodontoides denigratus* and the spelling correction of *Popenaias* were approved.
- The subcommittee approved the affiliation of *Popenaias* and *Disconaias* to the tribe Popenaiadini and *Plectomerus* and *Reginaia* were reassigned to the Amblemini.
- The subcommittee also resurrected *Cumberlandia monodonta* as the scientific name of the Spectaclecase.
- The subcommittee did not approve the recognition of *Fusconaia askewi*.

Gastropod Subcommittee Chair: Paul Johnson
Members: Jeff Garner, David Hayes, Ken Hayes, Katheryn Perez, Ellen Strong, Nathan Whelan. Jeff Garner, David Hayes and Ellen Strong agreed to initial 2-year terms, while Ken Hayes, Katherine Perez and Nathan Whelan have 4-year terms. FMCS Names Committee members may serve multiple terms.

The Gastropod Subcommittee reviewed and approved 19 of 23 petitions received on 14 April 2019. A summary of the petition details are as follows:

- The recommendations to reassign *Archiphysa ashmuni* and *Archiphysa sonomae* to *Physella* and *Laurentiphysa chippauvarum* to *Physa* were tabled until 2021 when an appropriate review can be made.
- The recommendation to reassign *Micromenetus* to *Menetus* was tabled until 2021 when an appropriate review can be made.
- The inclusion of *Phreatodrobia conica* and *Physella acuta* were made to the existing checklist.

- The gastropod subcommittee recognized 16 new species descriptions: *Fluminicola fresti*, *F. klamathensis*, *F. umpquaensis*, *Idaholanx fresti*, *Lithasia bubala*, *Pyrgulopsis hualapaiensis*, *P. lindae*, *P. lindahlae*, *P. marilynae*, *P. nuwuvi*, *P. ojaiensis*, *P. pinetorum*, *P. santaclarensis*, *P. similis*, *P. torrida*,and *Tryonia infernalis*.
- •The subcommittee recognized the validity of *Leptoxis coosaensis* as the priority name for the Painted Rocksnail.

Additionally, the Gastropod Subcommittee agreed to initiate a process for common name revisions. Currently, some gastropod common names, across multiple families, utilize a genus as part of the formal common name (e.g., *Elimia carinifera* (Lamarck, 1822) as Sharp-crest Elimia). Since generic assignment is often transitory, this effort would target those taxa to develop more consistent and descriptive common names.

Over the next few months the full Committee will work to complete a new webpage detailing its activities. In addition to revised Gastropod and Mussel checklists, the page will post operational Guidelines of the Committee and include a downloadable petition form. The FMCS Petition process is open and anyone may submit a petition to the appropriate Subcommittee Chair; however, strict adherence to Committee Guidelines will be a requirement. We hope to have the webpage operational by the end of 2019.

Report Submitted by John Harris and Paul Johnson

Announcements

Freshwater Mussel Identification Workshop
The Stansbery Mollusc Collection at The Ohio State University
Columbus, Ohio 7-10 October 2019

This workshop is geared towards the identification of upper Ohio River and Great Lakes mussel species, survey methods, and conservation. The course would be applicable for most of the upper Mississippi River drainage as well. The entire collection will be available for study but only these geographic areas will be covered in the course.

Identification topics will include discerning look alike taxa from one another, identifying rarely seen species, those pesky "Fuscobemas," and general key characteristics. A guest speaker will cover survey methods and protocols used in mussel projects, and representatives from the US Fish and Wildlife Service and Ohio Department of Natural Resources will address permitting policies.

There will be a field trip to the Columbus Zoo and Aquarium Freshwater Mussel Conservation and Research Facility, with (we hope) a bonus trip behind the scenes at the Aquarium and/or Manatee exhibits led by a Zoo curator. An additional field trip will be to Big Darby Creek to see the Northern Riffleshell introduction sites and the use of PIT tags in monitoring. We will conclude with a tour of the new Battelle-Darby Creek Nature Center (including bison!)

Visit this link for more information and to register:
https://www.asc.ohio-state.edu/eeob/molluscs/OSUM2/Workshop/Description.html

First Celebration of Day of Freshwater Bivalves of South America

BIVAAS Group grupo.bivaas@gmail.com

Since the first Earth Day on 22nd April of 1970, the celebration of "Day of _____" has become a great tool for the communication of the wonders and threats to species. This year, the 30th of March of 2019 was celebrated as the first **Day of Freshwater Bivalves of South America**. That specific date was chosen in honor of Dr. Maria Cristina Mansur who has been working on the conservation of freshwater bivalves for more than fifty years.

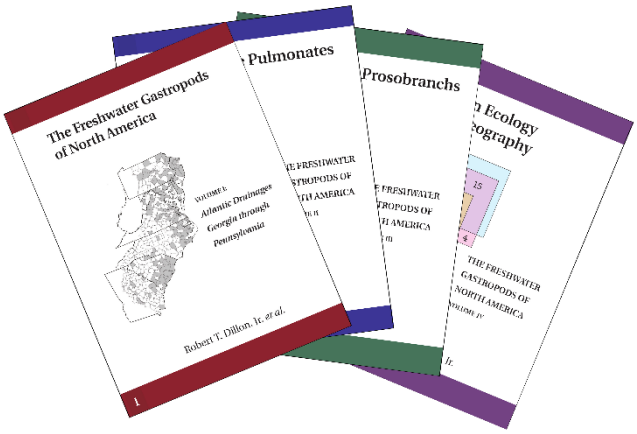
During the Day of Freshwater Bivalves of South America (and on adjacent days), different activities related to freshwater bivalves were promoted in thirteen cities in five South American countries (indicated on Map). More than 250 people assisted in conferences, nearly 5000 were reached by social media (Facebook, Instagram, Twitter), and the topic was even talked about on a national radio broadcast in Brazil.

This First Day event contributed to announce and alert people about the threats to freshwater bivalves but, more importantly, was a day of communion between researchers and students in South America. It was a day of action and celebration.

Interactions with students in Cuiabá (left) and Nobres (right) Brazil during the Day of Freshwater Bivalves of South America activities

BIVAAS Group is a network of South American researchers that was formed seven years ago to research and protect South American freshwater bivalves. This year was the first time they had coordinated to celebrate Day of Freshwater Bivalves of South America. You can follow them on Facebook (BIVAAS-Bivalves da Água Doce da América do Sul) and on Instagram (@bivaas).

Freshwater Gastropods of North America, Volumes 1 – 4



The first hardcopy publications of the Freshwater Gastropods of North America Project are now available from all the usual online outlets, and directly from the publisher at a substantial discount. Volume 1, by Dillon, Ashton, Reeves, Smith, Stewart and Watson, reports the results of a comprehensive survey of the freshwater snail fauna conducted in the Atlantic drainages from Georgia through Pennsylvania. This volume includes full-color figures, a dichotomous key, range maps, natural history notes for all 70 species recovered, and an update of their taxonomy to modern standards. A new, objective system of conservation status ranking also is proposed, and a new species of pleurocerid snail is described in the appendix.

Accompanying Volume 1 are three volumes of essays intended to support the scientific findings and offering additional evolutionary, ecological, and systematic notes for the fauna. Volume 2 collects 29 essays on the systematics and evolution of the freshwater pulmonates of North America, Volume 3 consists of 37 essays on the systematics and evolution of the prosobranchs, and Volume 4 collects 38 essays reviewing ecological and biogeographical themes.

Listed prices for these four volumes are as follows: Vol. 1 - $39.95, Vol. 2 - $35.95, Vol. 3 - $35.95, and Vol. 4 - $34.95. All four volumes are available for a package price of $99.95 from www.fwgna.org/publications.

Regional Meetings

2019 Meeting of the Interior Highlands Mollusk Conservation Committee

The Interior Highlands Mollusk Conservation Committee meeting in 2019 was held at Neosho National Fish Hatchery on March 13 and 14, 2019. Those in attendance include: Patrick Kroboth, Jaxson Priest, Allison Sieja, Eric Stegmann, Regina Sapp, Gary Pandolfi, David Martinez, Chris Barnhart, Don George, Keifer Shipley, Kyle Steinert, Josh Jagels, Edwin Miller, Dan Mosier, Curtis Tackett, Matt Fullerton, Mark Howery, Victoria Grant, Sara Seagraves, John Besser, Cathy Richter, James Candrl, Antoinette Sitting Up Perez, Kendall Moles, Bill Posey, Scott Faiman, Ning Wang, Justin Downs, Amy Smith, Nathan Eckert. They represented a wide variety of State, Federal, Tribal, and Non-governmental organizations.

The meeting began with updates from the surrounding states, followed by reports on primary research on mollusk in the area.

Ed Miller, Kansas Department of Wildlife and Parks and Tourism, described the mussel condition in the Cottonwood, Fall, Verdigris, and Neosho rivers. Mussels within the Neosho River are not doing well. This is likely due to increased erosion and loose gravel. The other three rivers appear healthy and

there is evidence of Neosho mucket reproduction in the Verdigris River. The Neosho mucket and rabbitsfoot reintroductions in the Cottonwood River.

Ed is in the process of completing the 5-year status reviews which are part of the Kansas statutes. Surveys indicate that the cylindrical papershell should be considered for endangered status within the state. The Wabash pigtoe has increased in number and will be petitioned for delisting. Zebra mussels have been found in the upper Cottonwood River but are not abundant yet.

Curtis Tackett, Oklahoma Department of Wildlife Conservation (ODWC), said that Oklahoma does not have a dedicated malacologist. They attain mussel data by funding university research. ODWC is supporting research on the rabbitsfoot, Neosho mucket, southern hickorynut, western fanshell, purple lilliput (not know to occur in the state currently), and Louisiana pigtoe. Currently, there are 22 mussel species of the greatest conservation concern. Zebra mussels occur in 20 reservoirs and most river systems. No black carp have been reported yet.

Scott Faiman, Missouri Department of Conservation, shared survey results collected in collaboration with Stephen McMurray. They have completed three recent publications and are collaborating on a predictive model. In 2017-2018, they completed surveys on Jacks Fork, Niangua and Eleven Point rivers. Most mussels are declining. They are finding fewer species and lower catch per unit effort of mussels. The kidneyshell was the most abundant in Jacks Fork. The Niangua was dominated by Britt's mussel while Reeve's mussel was abundant in the Eleven Point River. Curiously, they found some Neosho muskets in riprap stabilized areas. In 2019, they intend to finish surveys on the Eleven Point and Warm Fork.

Kendall Moles, Arkansas Game and Fish Commission, reported that surveys in Arkansas have found the spectacle case to be abundant in six locations within the Ouachita's. The Neosho mucket surveys in the Illinois River indicate that they are doing poorly; likely due to slugs of gravel moving down river. The speckled pocketbook is endemic to the Little Red River and is doing okay. The Arkansas Fat Mucket is okay in the Saline River but not well in the Ouachita's.

Gary Pandolfini, U.S. Fish and Wildlife Service (FWS)**, Texas** There are 52 species of mussels in Texas of which 15 are state threatened. The FWS is working on status reviews. Three packets are in the works including the 2016 status assessment of the Texas hornshell, central Texas mussels, and east Texas mussel groups. Three hatcheries are beginning propagation programs. In Texas, each river basin has a River Authority that is providing increased input and interest in mussels.

U.S. Geological Survey, Columbia Environmental Research Center The Columbia Environmental Research Center (CERC) is developing a mussel culture facility to examine their toxicological response. The facility includes ponds and artificial streams. **Ning Wang** indicated that their research findings indicate that the current levels of acceptable NaCl and zinc designated by EPA and Iowa are not low enough to protect mussels. The criteria should be lowered to suitable protect mussels.

John Besser reported that the CERC team examined water toxicity, sediment, and naturally occurring mussel communities in areas impacted by zinc mining and compared them against control sites (no zinc mining). Zinc levels observed in the field were mimicked in laboratory tests. Juvenile mussels exposed to field observed zinc levels had a lower survival rate and growth than mussels exposed to control conditions. This supports Ning Wang's results that the EPA criteria are not low enough to protect mussels.

Cathy Richter is examining environmental DNA (eDNA) within the Clinch River (Virginia/Tennessee) and Big Piney (Missouri) to monitor the occurrence of rare mussel species. This is a tool that would allow researchers to collect a water sample and run a DNA analysis to check for mussel occurrence. There are two ways to utilize eDNA. Quantitative Polymerase Chain Reaction (qPCR) is used to detect single species. Metabar Coding uses mitochondrial DNA to scan for multiple species. Both require identified sequences for comparison. Species were successfully identified with the qPCR method. This method does not indicate quantities nor prove absence of mussel species.

Patrick Kroboth discussed Black carp, an exotic invasive molluscivorous currently found in AR, IL, KY, LA, MO, MS, TN. The USGS hired commercial fisherman to provide black carp for dietary studies. The found that black carp feed on native mussels and snails. They also feed on exotic mussels, but this comprised a low percentage of the diet. The black carp will feed on multiple mollusk species within lotic and lentic habitats. Patrick described an artificial bait with piscicide that they are developing to target black carp.

John Harris, Arkansas State University, described graduate student research on morphology (shell outline and inflation) and molecular studies of Pleuobemini to distinguish between *P. flava, habetata, sampsoniana,* and *ozarkensis*. The results of 76 new sequences from 85 specimens indicates there are four taxa. *Pleurobema sintoxia* and *rubrum* are probably one species because there is not distinct genetic structuring. *P. habetata/sampsoniana* are wide spread. *P. flava* is hard to identify in the field because of the highly variable morphology.

Nathan Eckert, U.S. Fish and Wildlife Service, Neosho National Fish Hatchery, led a discussion of the Neosho mucket recovery actions. The Neosho mucket is considered to have viable populations in two of the four historic river basins that it occurred within. The discussion resulted in numerous questions and research opportunities: 1) information is needed on size classes to assess recruitment, 2) identify what sites have been lost and compare them to remaining sites, 3) there is a need to develop common monitoring protocols, 4) identify how hydrology can be modified to protect mussel beds, and 4) determine why the mucket is not increasing even though it is reproducing.

Justin Downs, Peoria Tribe Aquatics Center. This grassroots program has grown thanks to support from Indian Affairs, the U.S. Fish and Wildlife Service, and grants. They currently have 20 ponds for host fish and mussel production. There system is largely run on solar energy which produces 60,000 watts. Their system allows them to measure food availability on site and laser engrave mussels. A new building in development.

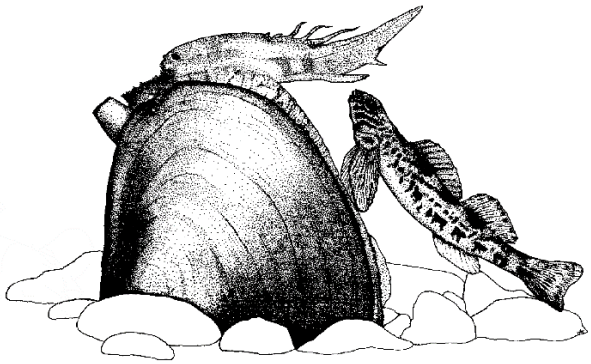
Dan Mosier, Kansas Department of Wildlife and Parks and Tourism, Kansas Aquatic Biodiversity Center This facility has been converted from a federal sport fish hatchery to a facility to propagate and provide refugia for imperiled aquatic fauna. The facility contains a quarantine area, modular tanks, lab area, living stream tanks, and mussel propagation units (mucket buckets). The currently maintain alligator snapping turtles as a joint research program with Missouri State. They intend to collect and spawn plains minnows and perhaps cylindrical papershell mussels.

Missouri State University Graduate student **Regina Sapp** presented her research on the effects of chronic hypoxia on survival and growth of juvenile freshwater mussels. Dissolved oxygen (DO) levels below 2mg/l are considered hypoxic. The frequency of hypoxic conditions is predicted to increase with global climate change. Hypoxic conditions would be especially problematic in they hyporheic zone where juvenile mussels occur. In the lab study, mortality was 100% at 0.1mg/l DO levels. Results varied between trials at higher DO levels and more data will be collected to assess variations.

Graduate student **Allison Sieja** presented her proposal to research the effects of competition between *Corbicula* and native freshwater mussels. While *Corbicula* may improve water clarity and provide a food source for vertebrates, they can displace native through food competition and sediment disturbance. Allison will be examining competition *in situ*.

Graduate student **Eric Stegmann** presented his research proposal to examine the habitat selection and host detection behavior of the salamander mussel. The salamander mussel is a small, active mussel that aggregates under rocks with its host - the mudpuppy. Eric will be examining mussel behavior in artificial stream units.

Professor **Chris Barnhart** shared the results of a collaborative study examining the relationship between body size and filtration rate of fat muckets. They found a linear relationship between size and filtration rate of juveniles. Peak filtration rate approached 10 liters per gram of dry mass per hour. Data suggests juveniles can suspension feed throughout development.



Upcoming Meetings

August 11 – 16, 2019 – The World Congress of Malacology, Asilomar Conference Grounds, Pacific Grove, California, USA https://calacademy.org/world-congress-of-malacology-2019

September 29 – October 3, 2019 – Joint Meeting of the American Fisheries Society and the Wildlife Society, Reno-Sparks Convention Center, Reno, Nevada, USA Theme: (not yet announced) http://afstws2019.org/

October 27 – 30, 2019 – Southeastern Association of Fish and Wildlife Agencies 73nd Annual Conference, Hilton Head Marriott Resort, Hilton Head, South Carolina., USA. http://www.seafwa.org/conference/overview/

March 29 – April 2, 2020 – National Shellfisheries Association 112th Annual Meeting, Radisson Hotel Baltimore Downtown-Inner Harbor, Baltimore, Maryland USA. Theme: {not yet posted] https://www.shellfish.org/annual-meeting

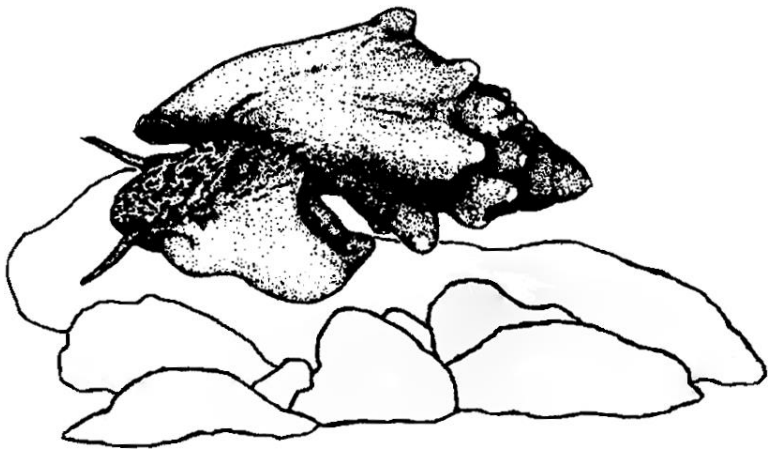
May ? – ?, 2020 – Society for Freshwater Science Annual Meeting, [Dates, Location, and Theme not yet posted] http://sfsannualmeeting.org/

July ? – ?, 2020 – Society for Conservation Biology North American Sectional Meeting, [Dates, Location, and theme not yet posted] http://conbio.org/groups/sections/north-america/meetings/

August ? – ?, 2020 – FMCS Survey Guidelines and Techniques Workshop, Henry Horton State Park (?), [Specific content, dates, and other details now being developed]

Spring ? 2021 – FMCS 12th Biennial Symposium, Portland, Oregon, USA [Dates, Location, and Theme not yet determined]

Spring ? 2023 – FMCS 13th Biennial Symposium, Michigan (?) [Dates, Location, and Theme not yet 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.*

Notes on the Terrestrial Breathing of *Pomatiopsis lapidaria* (Say 1817)

Aydin Örstan, Research Associate, Section of Mollusks, Carnegie Museum of Natural History, 4400 Forbes Ave., Pittsburgh, Pennsylvania, 15213-4080 USA. anothersnail@hotmail.com

A continuum of habitats exists within the zone extending from shallow waters -- where there may be frequent exposure to air -- to the margins of the bordering land -- where it is either always wet or alternatingly wet and dry. The snails that live in this transition zone have evolved mosaics of aquatic and terrestrial traits that defy our ingrained tendency to divide animals into two mutually exclusive groups as either aquatic or terrestrial.

The snail *Pomatiopsis lapidaria* occurs in this transition zone and is neither aquatic nor terrestrial. In the 1930s, it created a minor controversy between the two leading malacologists of the period. Bohumil Shimek argued that *P. lapidaria* was terrestrial (1930a, 1930b), while Frank Baker counterargued that it was amphibious (1930, 1931). The controversy was never resolved. Pilsbry did not include *Pomatiopsis* in *Land Mollusca of North America* (1948), but Hubricht did in his compilation of the distributions of the land snails of the eastern United States (1985).

I have been studying *P. lapidaria* on occasion for several years (Örstan and Pearce 2011). *Pomatiopsis lapidaria* has a small gill along the left-hand border of its mantle cavity, but the roof of the cavity is not vascularized (Stimpson 1865; Dundee 1957). Obviously, the gill is involved in gas exchange when the snails are in water but how do they respire on land? Here, I present some observations of live snails and give a preliminary answer to this question.

I have watched several *P. lapidaria* as they were emerging from their shells (aperture facing up) outside of water. During this process, the snail's body follows the direction of the dextral coiling of its shell and leans toward the columella, thereby creating an opening into the mantle cavity within the upper right-hand corner of the aperture (Figure 1). I will refer to this opening as the pseudo-pneumostome because its position coincides with that of the pneumostome of pulmonate snails. No gaps were visible along the rest of the unattached mantle edge, which was apparently pushed against the shell.

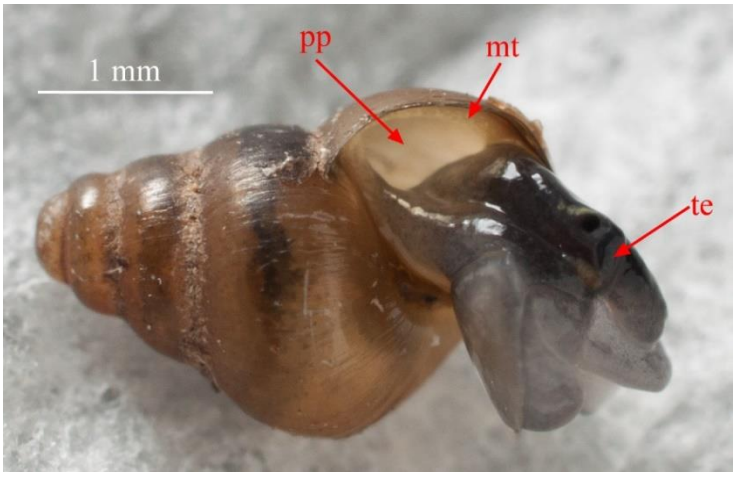


Figure 1. *Pomatiopsis lapidaria* emerging from its shell in air. The pseudo-pneumostome (pp) opens into the mantle cavity as indicated by the bordering mantle tissue (mt) visible along the shell. Note that the snail can't keep its tentacles (te) erect in air.

Observations of snails on glass plates showed that the pseudo-pneumostome remains open during crawling and reveals an elongated air bubble in the mantle cavity (Figure 2). I believe this bubble forms when air is sucked in through the pseudo-pneumostome during emergence from the shell. The previous authors who studied *P. lapidaria* did not notice this bubble (for example, Stimpson 1865; Ameel 1938; Dundee 1957). The only possibly relevant observation I have found was that of Lewis (1862) who noted that live snails dropped in water released air bubbles.

Air can hold more oxygen than an equal volume of water saturated with oxygen (Maina 2011:60); therefore, I hypothesize that the bubble in the mantle cavity of *P. lapidaria* functions as an oxygen store. The snail still uses its gill to extract oxygen from the water remaining in the mantle cavity but, as the dissolved oxygen is depleted, more of it diffuses in from the bubble. Besides, since the diffusion distance of oxygen from the distal edge of the elongated bubble to the gill is much shorter than that from the pseudo-pneumostome to the gill (Figure 2), the time needed to replenish the oxygen concentration near the gill is reduced (Maina 2011:42). When the air bubble runs out of oxygen, the snail can probably replace it with a fresh one through the pseudo-pneumostome.

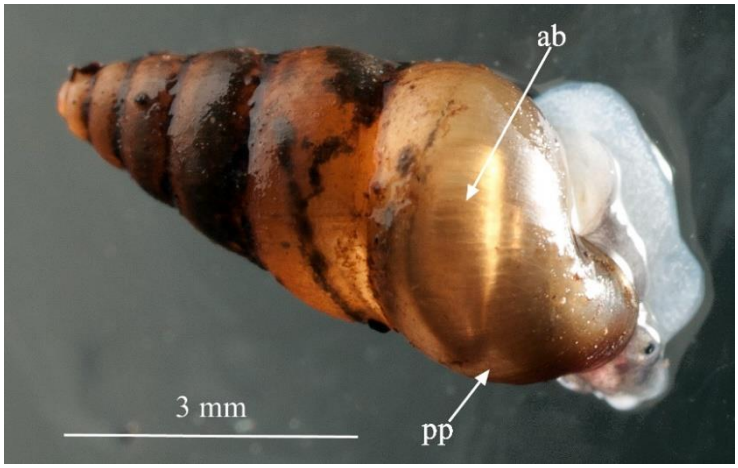


Figure 2. *Pomatiopsis lapidaria* crawling on a glass plate lit at a low angle from the front. The air bubble (ab) in the mantle cavity and the open pseudo-pneumostome (pp) are both visible through the shell.

These observations suggest that the functional anatomy of the mantle cavity of *P. lapidaria* contributes a few tiles to its mosaic of traits. In addition to the Pomatiopsidae, the superfamily Truncatelloidea incorporates other families of small semi-terrestrial snails, including the Assimineidae and the Truncatellidae. The comparison of the air-breathing mechanisms of these snails is an ongoing project.

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Natural Hosts of Some Common Mississippi River Mussel Species

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More than half of Minnesota's native mussel species are endangered, threatened, or of special concern (MN DNR 2019). Recent life history studies on threatened mussel species are improving management efforts; however, similar insights are needed for common species to enhance their sustainability and better understand variables influencing their success (Watters et al. 2009). To broaden our understanding of natural host relationships of Mississippi River mussel species, we studied juvenile mussels and glochidia released from naturally infested fishes living in Turtle Creek, a Mississippi River watershed stream in Freeborn County, Minnesota.

Standard methods were followed to collect and identify juvenile mussels and glochidia (Hove et al. 2016). Fishes were collected from June to August of 2018, brought to the UMN Wet Laboratory, and separated into species-specific aquaria to be observed over a six-week period. Juvenile mussels and glochidia released by these fishes were counted using a dissecting microscope. We used scanning electron microscopy to measure glochidia height, length, and hinge length from known mussel species living in Turtle Creek (Table 1), and glochidia valves of juvenile mussels and glochidia recovered from these naturally infested fishes. Using discriminant analysis (JMP v.14), we identified unknown juvenile mussels and glochidia (Tables 2 and 3).

For some fishes, there were a large number of juvenile mussels or glochidia recovered that necessitated sampling. Tables 2 and 3 only report measured animals. *Amblema plicata*, *Fusconaia flava*, and *Toxolasma parvum* were relatively easy to identify based on their size and outline (Watters et al. 2009). We observed 2976 glochidia and 143 juveniles of what appeared to be *T. parvum* from *Perca flavescens,* but only measured 19 of the presumed *T. parvum* juveniles. Similarly, 421 of what appeared to be *F. flava* glochidia were collected from *Luxilus cornutus,* but we only measured seven of them. Finally, we observed 130 of what appeared to be *A. plicata* glochidia from *Ameiurus melas,* but only measured two of them. No juvenile mussels or glochidia were recovered from one *Cyprinella spiloptera*, two *Notropis rubellus*, four *Notropis stramineus*, or five *Percina maculata.*

This work expands what is known about the natural hosts for five mussel species. It is the first to show that *Pimephales promelas*, *Ameiurus melas*, *Lepomis cyanellus*, *L. macrochirus*, *Etheostoma nigrum*, and *Perca flavescens* are natural hosts for *A. plicata*, confirming previous studies that described their glochidia attached to wild fish or as suitable laboratory hosts (Howard 1914, Pearse 1924, Stein 1968, Weiss and Layzer 1995, Marshall 2014). As expected, *F. flava* appears to use cyprinids as hosts. We found that *Luxilus cornutus* and *Pimephales promelas* are natural hosts for *F. flava*, *Cyprinella spiloptera* were shown to be natural hosts for *F. flava* (Boyer et al. 2011), *Notropis photogenis* and *Semotilus atromaculatus* were suitable hosts in the laboratory (O'Dee and Watters 2000), and *Pomoxis annularis* and *P. nigromaculatus* have been observed naturally infested with *F. flava* glochidia (Wilson 1916, Coker et al. 1921). *Toxolasma parvum* naturally infest *Lepomis* in the field and metamorphose on them in the laboratory (Wilson 1916, Hove 1995), and this report shows that *L. macrochirus* and *Perca flavescens* are natural hosts. *Lampsilis siliquoidea* is known to naturally infest and metamorphose in the laboratory on a variety of fishes (summarized in Watters *et al.* 2009) and now *A. rupestris* and *P. flavescens* have been identified as natural hosts. Finally, previous studies determined that *L. cardium* will naturally infest and metamorphose on centrachids in the laboratory (Wilson 1916, Coker et al. 1921), which was corroborated by our recovery of a juvenile from an *A. rupestris*.

We thank landowner Jim Fleming for granting us access to Turtle Creek, and the Competitive State Wildlife Grants program, Grant F19AP00119, in cooperation with the U.S. Fish and Wildlife Service, Wildlife and Sport Fish Restoration Program for project funding.

Table 1. Glochidia dimensions of known mussel species used to identify unknown specimens from naturally infected fishes. Dimensions are described using mean ± 1 standard deviation with ranges in parentheses.

Species	Glochidial shell height (µm)	Glochidial shell length (µm)	Glochidial shell hinge length (µm)	Source (No. females, No. glochidia)
Amblema plicata	214 ± 6 (204-227)	204 ± 6 (189-218)	136 ± 6 (123-152)	Turtle Creek study site (5, 50)
Fusconaia flava	171 ± 5 (162-178)	173 ± 4 (162-181)	145 ± 6 (132-157)	Turtle Creek study site (5, 50)
Lampsilis siliquoidea	284 ± 9 (265-299)	231 ± 6 (221-247)	122 ± 6 (112-133)	Turtle Creek study site (2, 20)
L. cardium	247 ± 15 (214-279)	206 ± 11 (185-235)	101 ± 7 (88-120)	St. Croix River (4, 22) Chippewa River (3, 18)
Toxolasma parvum	191 ± 14 (168-212)	169 ± 14 (143-197)	96 ± 9 (80-115)	Sturgeon Lake (2, 20) Kohlman Creek (5, 25) Chanarambia Creek (1, 10) Kanaranzi Creek (1, 10)

Table 2. Juvenile mussels collected from naturally infested Turtle Creek fishes.

Fish species (No. individuals)	Mean glochidia shell height ± 1 std dev (µm)	Mean glochidia shell length ± 1 std dev (µm)	Mean glochidia hinge length ± 1 std dev (µm)	No. juveniles (Discriminant analysis prediction probability)
Luxilus cornutus (n=5)	147 ± 9	147 ± 4	119 ± 4	6 *Fusconaia flava* (100%)
Pimephales promelas (n=22)	157 ± 1 211	156 ± 4 204	129 ± 7 141	2 *F. flava* (100%) 1 *Amblema plicata* (100%)
Ameiurus melas (n=25)	201 ± 9	192 ± 11	132 ± 10	8 *Amblema plicata* (98-100%)
Ambloplites rupestris (n=1)	282 ± 10, 254	229 ± 11, 216	127 ± 5, 115	3 *Lampsilis siliquoidea* (99-100%) 1 *L. cardium* (94%)
Lepomis cyanellus (n=1)	226 ± 7	220 ± 4	140 ± 3	2 *Amblema plicata* (100%)
Lepomis macrochirus (n=8)	221 ± 5, 201 ± 9	212 ± 7, 192 ± 11	140 ± 6, 132 ± 10	11 *A. plicata* (100%) 8 *Toxolasma parvum* (100%)
Etheostoma nigrum (n=9)	221 ± 12	218 ± 5	145 ± 3	2 *A. plicata* (100%)
Perca flavescens (n=20)	188 ± 18, 289 ± 9, 230	159 ± 15, 230 ± 17, 223	93 ± 10, 122 ± 8, 144	19 *T. parvum* (100%) 10 *L. siliquoidea* (99-100%) 1 *A. plicata* (100%)

Table 3. Glochidia collected from naturally infested Turtle Creek fishes.

Fish species (No. individuals)	Mean glochidia shell height ± 1 std dev (µm)	Mean glochidia shell length ± 1 std dev (µm)	Mean glochidia hinge length ± 1 std dev (µm)	No. glochidia (Discriminant analysis prediction probability)
Luxilus cornutus (n=5)	164 ± 4, 218 ± 2	168 ± 3, 214 ±1	134 ± 3, 142 ± 2	7 *Fusconaia flava* (100%), 2 *Amblema plicata* (100%)
Pimephales notatus (n<20)	173 ± 7	175 ± 7	144 ± 6	12 *F. flava* (100%)
P. promelas (n=22)	169	169	134	1 *F. flava* (100%)
Catostomus commersoni (n=2)	205 ± 14	206 ± 1	135 ± 7	2 *A. plicata* (100%)
Ameiurus melas (n=25)	166 ± 3, 217 ± 2, 283 ± 0, 265	169 ± 4, 213 ± 3, 234 ± 1, 222	134 ± 5, 143 ± 1, 124 ± 0, 110	3 *F. flava* (100%) 2 *Amblema plicata* (100%) 2 *Lampsilis siliquoidea* (100%) 1 *L. cardium* (85%)

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The Giant Native Freshwater Mussel/Naiad Mycetopodidae *Anodontites trapesialis* (Lamarck, 1819), an Emerging Invasive Plague in Fish Culture Farms of Santa Catarina State/ SC and Other Localities in Southern Brazil: New Geographical Records and Brief Revision

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The native freshwater mussel/ naiad Mycetopodidae *Anodontites trapesialis* (Lamarck, 1819) is a giant species which occurs naturally in all South American basins east of the Andes Mountain Range. It exists in all of the large river basins and biomes (Amazonia, Chaco, Pampe, Caatinga, Cerrado, Atlantic Forest, Pantanal) and occurs in creeks, lakes, and marginal lagoons (Simone 1994:179-181; Simone 2006:281; Pereira *et al.* 2012:89-Tabela III; Pereira *et al.* 2013: Table 2; Linares *et al.* 2018:252-255; Torres *et al.* 2018: Table 1; ... among others).

Anodontites trapesialis (Lamarck, 1819) deserves special mention as an emerging pest/plague in fish culture farm areas and tourist fishing places (economic importance). The species has great plasticity/capacity to adapt to adversities in the natural environment (Simone 1994:180; Agudo 2005; Agudo 2008; Felipi & Silva-Souza 2008; Agudo-Padrón 2011a:21, 23; Agudo-Padrón 2011b:62; Agudo-Padrón 2012b:45-46). This remarkable species is confirmed and recognized as a synanthropic form (Agudo-Padrón 2011a:21, 23), mainly through the unnoticed introduction of infested fishes (breeding adults and fingerlings with temporary ectoparasitic larvae lasidia attached) into fish farms, other fish culture areas, and tourist fishing facilities in the Paraná/ PR, Santa Catarina/ SC and Rio Grande do Sul/ RS States, Southern Brazil region (Figure 1) (Agudo 2005; Agudo 2008; Felipi & Silva-Souza 2008:901; Agudo-Padrón 2011a:21, 23; Agudo-Padrón 2011b:62; Agudo-Padrón & Lenhard 2011:168-169; Agudo-Padrón 2012a; Agudo-Padrón 2012b:46; Agudo-Padrón 2013, Linares *et al.* 2018:254-255). This situation characterizes an important "piscicultural plague" generating losses to producers, with significative socioeconomic farming impact (Agudo 2005; Agudo 2008; Felipi & Silva-Souza 2008:901).

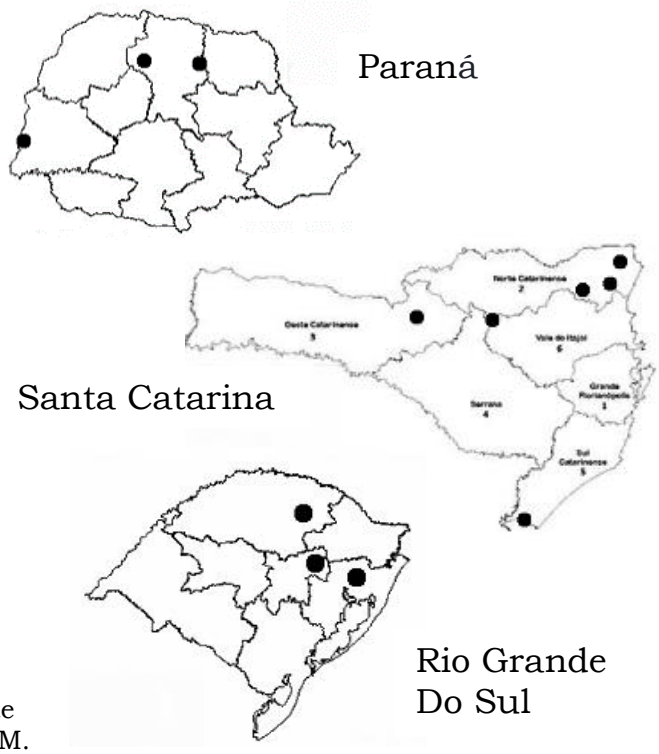

Figure 1. Map showing the known emerging invasive plague in fish culture farms in the Southern Brazil region of the native giant naiad Mycetopodidae *Anodontites trapesialis* (Lamarck, 819). See the occurrence ("black points") in each of the three State territories. Source: Archive/ Database of Project AM.

Recent geographic records:

1. On March 22, 2019, local professional biologists Franciani Durda and Francisco Carneiro requested the identification of some large limnic bivalves (random samples) illustrated in field photographs. These animals (approximately 160mm long) were found in an inner fishery lagoon (species occurring in several lagoons of the region) in the Rio do Campo Municipal District (26° 56'56"S & 50°08'27"W), of the Upper Itajaí Basin in Santa Catarina State/ SC, Central Southern Brazil (Figure 2). The species was immediately confirmed by us as typical of the native giant mussel/ naiad Mycetopodidae *Anodontites trapesialis* (Lamarck, 1819) based in the fundamental contribution of Simone (2006).

Figure 2. Rio do Campo Municipal District (Map – red color) in the Upper Itajaí Basin Valley, Santa Catarina State/ SC, Central Southern Brazil, and the giant naiad *Anodontites trapesialis* (Lamarck, 1819) specimen found in a local fishery lagoon.

2. On April 07, 2019, several specimens of *Anodontites trapesialis* (Lamarck, 1819) with sizes ranging between 30 and 101 mm were found at a tourist fishing farm located along the left bank of the Ribeirão Morangueiro, Guaiapó Road sector of Maringá Municipal District, Paraná State/ PR, Southern Brazil region (Figure 3). These animals probably had been pulled from the water and eaten by malacofagous birds. The giant mussel was the dominant mollusc species in the place, with the next companion (gastropod) malacofauna: natives Ampullariidae *Pomacea lineata* (Spix, 1827), Physidae *Stenophysa marmorata* (Guilding, 1828), and exotic invasive Thiaridae *Melanoides tuberculata* (Müller, 1774).

Figure 3. Maringá Municipal District (Map – red color) in Paraná State/ PR, Southern Brazil, with general aspect of the local tourist fishing farm (right photo) and the *Anodontites trapesialis* (Lamarck, 1819) specimens found there (lower photos).

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Two New Records of Native Freshwater Mussels/Naiads Hyridae genus *Diplodon* Spix, 1827 from Rio Grande do Sul State/ RS, Southernmost Brazil

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Previously, a total of ten (10) representative forms of the genus *Diplodon* Spix, 1827 were known and recorded for the Southernmost Brazilian State of Rio Grande do Sul/ RS (Agudo-Padrón 2009: 10; Agudo-Padrón 2012: 26-Fig. 2, 27), geographic territory member to the South American "Atlantic Slope of the Southern Cone".

On March 28, 2019, Régis Josué Bohn, a local professional biologist, requested the identification of very young naiads (random samples) illustrated in field photographs (Figure 1). These specimens had been found in the Rio Forqueta (Figure. 2), a tributary of the right bank of the Rio Taquari, in Arvorezinha Municipal District (28°52'20"S & 52°10'31"W) in the Taquari Valley, Northeast region of Rio Grande do Sul State/ RS, Southernmost Brazil. This area is part of the Araucárias Plateau region of the State, domain of Atlantic Forest formation with large Araucaria groves and a mild dry subtropical climate with snowfall at least once a year and frequent frosts from June to July) (Figure 2). For a complete regional geographic and environmental description, see Ferrer *et al.* (2018: 5-6).

After close examination, two species of post-larval native mussels Hyriidae were confirmed by us as *Diplodon* aff. *multistriatus* (Lea, 1834) and *Diplodon* cf. *fontainianus* (d'Orbigny, 1835). This taxonomic determination was based in the fundamental contribution of Simone (2006:259). These are both new records for this State. Both of these endemic Brazilian species were previously mentioned in the literature as occurring in the "Atlantic Slope Microbasins" present in the coastal range between the Brazilian States of Bahia/ BA (Northeast region), Espírito Santo/ ES (Southeast region), Paraná/ PR and Santa Catarina/ SC (in Southern region) (Simone 2006: 259; Pereira *et al.* 2012:91; Pereira *et al.* 2013:10-11- Table 2).

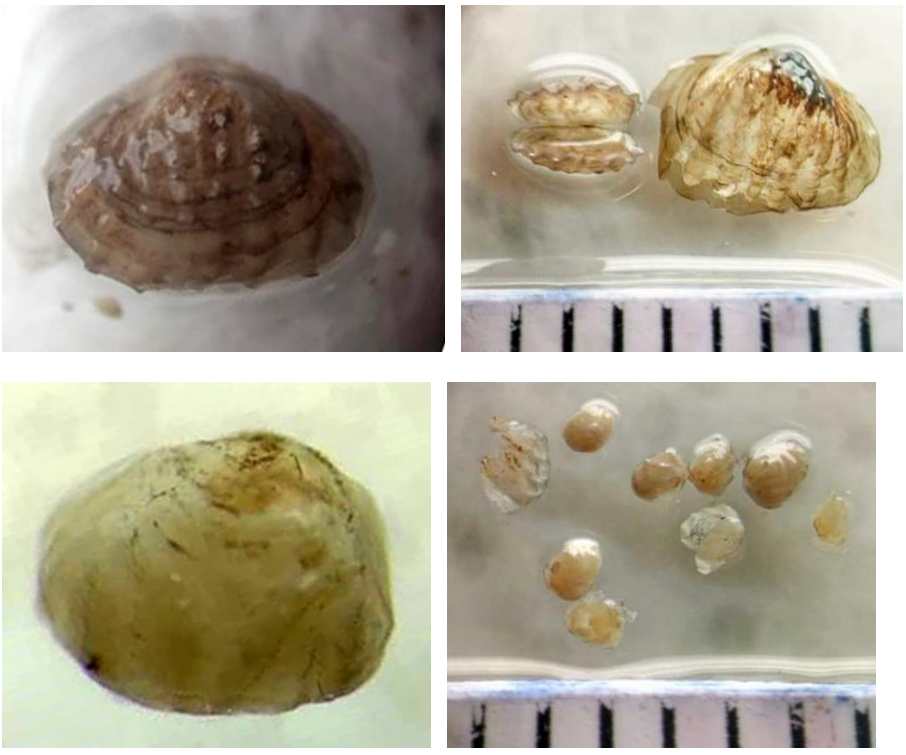

Figure 1. Specimens of post-larval native freshwater mussels/ naiads Hyriidae *Diplodon* aff. *multistriatus* (Lea, 1834) (upper photos) and *Diplodon* cf. *fontainianus* (d'Orbigny, 1835) (lower photos) found in the Rio Forqueta, Taquari River Basin Valley in Arvorezinha Municipal District, Araucárias Plateau region of Rio Grande do Sul State/ RS. Photographs by Biologist Régis Josué Bohn.

Figure 2. Arvorezinha Municipal District (Map, red color) in Rio Grande do Sul/ RS State, Southernmost Brazil, and a view of the Rio Forqueta in the Taquari River Basin.

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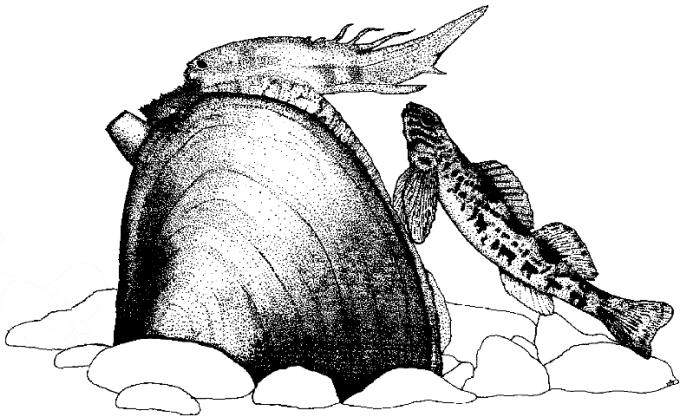

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Information for possible inclusion in *Ellipsaria* should be submitted via e-mail to the editor, John Jenkinson, at jjjenkinson@hotmail.com. Contributions may be submitted at any time but are due by the 15th of the month before each issue is posted.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

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Parting Shot

If you attended the FMCS Symposium this year in San Antonio, you probably say Janet Clayton taking candid and more formal pictures all over the place. She has been doing that for a number of years (at least since 2013), helping to document the ongoing history of our Society. Nobody asked her to do this, she just saw a need and stepped up. At these events, Janet also keeps up with her duties as FMCS Secretary and, typically, presents at least one platform talk. We are not sure what is going to happen when Janet retires ! Photograph by John Jenkinson, another volunteer picture-taker.

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.