Newsletter of the Freshwater Mollusk Conservation Society
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Survey Guidelines and Techniques Workshop
August 8 – 11, 2022
Henry Horton State Park, Tennessee

This isn't déjà vu. COVID may have delayed the 2020 Workshop, but it did not cancel it!

Where to sample? How to sample? How do you apply the data? What does it all mean??? These are questions everyone who samples mollusks have had to answer. The 2022 FMCS Guidelines and Techniques Workshop, along the banks of the famous

Duck River, is designed to provide you with the answers. Whether you are a beginning biologist or an experienced malacologist, we all need to collect mollusks and interpret and apply the data at all levels.

This Workshop will be organized into two levels of content; introductory/intermediate and experienced, but there will be overlap depending on participant's interest. The introductory and intermediate content will cover equipment and design for sampling mussels including sample size and the amount of effort to 'adequately' sample a site or a species. Field instruction will include techniques such as qualitative, semi-quantitative and quantitative sampling, habitat measurements, protocol implementation, data collection and analysis, as well as quality assurance/quality control.

The experienced content will cover information on data applications including density and abundance, mark-recapture, population estimates, as well as estimates of survival and mortality, and mussel mortality evaluations. Field techniques will include nontraditional sampling, marking and tagging mussels, collection and processing for genetic analysis and eDNA, and mortality events and valuation.

Schedule overview:

Monday, August 8 –	Arrival, Registration, Evening Mixer
Tuesday, August 9 -	Breakfast, Introduction with Dave Smith, Lunch, Lecture and Field Sessions, Poster Session and Mixer
Wednesday, August 10 -	Breakfast, Lecture and Field Sessions, Lunch, Lecture and Field Sessions, Dinner, State and Federal Survey Protocols Town Hall Session
Thursday, August 11 -	Field Trip, Departure

Poster Session:

The poster session will take place on Tuesday evening, August 9th. Poster presentations will not be limited in topic and can include a wide variety of information and research pertinent to freshwater mollusks. See the Call for Abstracts on the FMCS Events web site at (http://molluskconservation.org/Events.htm) for details and instructions for submitting abstracts. Abstracts are due no later than May 31st

What to bring:

This is a hands-on Workshop, so come prepared to get in the water and get dirty. Bring a wetsuit if you have one, otherwise clothes and shoes if you don't mind getting wet. Mask and snorkel are beneficial and any other field gear you typically use in the water. Don't forget the sunscreen and camera. Casual, dry clothes are suitable at all other times.

Field Trip:

On Thursday August 11th, Workshop attendees will have the option of attending a Duck River mussel sampling field trip with the Tennessee Wildlife Resource Agency. Due to our proximity to such tremendous freshwater mussel resources the fieldtrip will focus on freshwater mussels of the Duck River and a TWRA ongoing monitoring program. The cost is $50 and will include roundtrip transportation from Henry Horton State Park and a box lunch.

Registration:

As with all things in our post-COVID world, the prices have increased. Early registration will begin on March 1st and will close on June 15th. Late registration will end on July 8. Registration costs are:

Type	Early Registration March 1 – May 31	Late Registration June 1 – July 8
FMCS member	$300	$325
Non-Member	$380	$405
Student FMCS member	$200	$225
Student non-member	$240	$265

Register online at the FMCS Events web site (http//molluskconservation.org/Events.html). An email reminder will be sent out when registration opens and before early registration ends.

Student Sponsorship:

We want student participation in this Workshop and will be soliciting for sponsorships to support them as much as possible. Students, please check back on the Events web site by April 15th for more information and how to apply.

Location:

Henry Horton State Park, constructed in the 1960s on the estate of Henry Horton, a former governor of Tennessee, is located along the shores of the historic Duck River, one of the most diverse aquatic ecosystems in the world. It is located in Chapel Hill, Tennessee, south of Nashville. The Park has self-contained accommodations, meals will be catered by the Park's Governor's Table Restaurant, and the Tipped Canoe Lounge is located on site.

Lodging will be at Henry Horton State Park. All of the available rooms have been reserved at the Park Lodge, and eight cabins are also available. Rental rates in the Lodge are: Two Double Beds Room $86.40/night plus taxes, King Room: $90.90/night plus taxes, Suite Room (pullout sofa and small kitchen): $99.90/night plus taxes. Rates vary on the fully equipped 2- or 3-bedroom cabins. Make your room reservations online at https://tnstateparks.com/parks /henry-horton or by telephone at 931-364-2222. When booking ask for the Freshwater Mollusk Conservation Society rate and **provide our group number: 4549**. Please make every effort to book rooms with co-workers and friends as space is limited. Reservations must be made by July 10th.

Campsites for both RV's and tents are available, if you are so inclined. Rates vary between $11-$35/night, not including taxes and fees. Campsite reservations can be made by visiting: https://reserve.tnstateparks.com/henry-horton/campsites.

Transportation:

Henry Horton State Park is located in Chapel Hill, Tennessee. It is approximately 50 miles (1 hour) south of Nashville, approximately 115 miles (2 hours) west of Chattanooga, and approximately 220 miles (3.5 hours) east of Memphis. Nashville International Airport is the closest large airport.

Sponsorships:

The FMCS is a not-for-profit society, dedicated to the advocacy and conservation science of freshwater mollusk resources. Our Workshops provide great opportunities to network and build relationships with conservation professional from state and federal governments, industry, universities, and conservation organizations. The Society has a membership of over 500, of which about 150 generally attend the biennial Workshops. Instructors for the Workshops are members of the Society and other leaders in Conservation. These professionals are constantly working to conserve freshwater mollusks and we need your help. We are requesting monetary sponsorships to help cover the costs of the Workshop facilities and student attendance.

All Sponsor Contributions Include Recognition in the Workshop Program		
River	>$2000	One Complimentary Registration, Logo on Website Registration Page
Stream	>$1000	One Registration Reduced by 25%, Logo Displayed at the Welcome Social, Logo on Website Registration Page
Eddy	>$500	Logo on Website Registration Page
Mussel	>$100	Recognition in the Workshop Program

Further Information:

For further information about the Workshop content and specific curriculum, please contact Lisie Kitchel lisie.kitchel@wisconsin.gov. For more information of the venue, lodging, transportation, or sponsorships, please contact Ryan Schwegman, rschwegman@enviroscienceinc.com

We look forward to seeing you on the banks of the historic Duck River in Tennessee!!

Society News

JASM is Going to be REALLY BIG

The second ever Joint Aquatic Science Meeting (JASM) will occur in Grand Rapids, Michigan, USA, May 16 – 20, 2022. Over 2700 abstracts have been submitted, to be be included in 33 contributed sessions and more than 10 integrative events. There also will be many workshop/professional development opportunities. One or two plenary speakers are already scheduled to talk every day of the conference and more are being added.

Registration to attend JASM is NOW OPEN at: https://jasm2022.aquaticsocieties.org/ registration/. Early registration is open until April 1st, 2022; regular registration is from April 1-30th; then late registration (each at increasingly higher costs). There are discounts for the following registrants: active members of CASS societies,

student, early career, retired, one day, and guest passes. Many of the CASS societies, including FMCS, are offering monetary support for different members: https://jasm2022.aquaticsocieties.org/student-travel-grants/. If you are a current FMCS member (or a member of one of any of the other CASS societies) your registration will be less if you "check" FMCS member- so be sure your membership with FMCS is up to date (at https://molluskconservation.org/Join.html) prior to registering.

For those of you who have decided that travel is not something you feel comfortable doing, there WILL be a virtual component and the virtual registration is also discounted. The virtual registration rates are listed in the far-right column of the rates table.

The JASM website includes lots of pages focused on different aspects of this huge meeting. Student activities and events are listed here: https://jasm2022.aquaticsocieties.org/student-activities/; family and childcare information can be found here: https://jasm2022.aquaticsocieties.org/families-and-childcare/#; field trip information is here: https://jasm2022.aquaticsocieties.org/field-trips-tours/; and host hotel information (with discounts and codes) can be found here: https://jasm2022.aquaticsocieties.org/hotels/.

For the social media savy FMCSers that are attending, JASM is encouraging the use of #JASM22 and #aquaticsocieties for this conference.

Many FMCS members are helping on the numerous JASM subcommittees needed to organize a conference of this size. If you have any questions about FMCS participation in JASM, please feel free to reach out to Daelyn Woolnough (wooln1d@cmich.edu). It will be great to finally see everyone this coming May!

Minutes of the Winter 2022 FMCS Virtual Board Meeting
Tuesday, January 18, 2022

Call to Order and Declaration of Quorum

President Steve McMurray called the meeting to order at 9:05 AM and requested a roll call of attendees. Secretary Sarah Veselka called the roll. In attendance were: Steve McMurray, Megan Bradley, Alan Christian, Sarah Veselka, Curt Elderkin, Kaelyn Fogelman, Xenia Rangaswami, Amanda Rosengerger, Becca Winterringer, Daelyn Woolnough, Dan Symonds, Emilie Blevins, Heidi Dunn, Jeremy Tiemann, Jim Stoeckel, Kentaro Inoue, Lisie Kitchel, Madeline Pletta, Megan Bradley, Sara Andree, Tam Smith, Tyler Hern, Wes Daniel, Nathan Johnson, Amy Maynard, John Jenkinson, Jason Wisniewski, and Jim Stoeckel.

Approval of Previous Minutes

Steve McMurray called for a motion to approve the minutes of the April 2021 Board Meeting as published in the June 2021 *Ellipsaria*. Motion made by Jeremy Tiemann and seconded by Curt Elderkin. No discussion. Motion Passed.

Treasurer's Report: Alan Christian

Alan Christian reported that, as of 4 January 2021, profits and losses for FMCS included a total income of $42,698.02 and total expenses of $23,343.13 for a net income of $19,354.89 (details presented on Page 10). The major source of income for 2021 was $39,266.91 from the 2021 Virtual Symposium sponsorships and registrations, which also included some membership income associated with non-member registrations. Total non-symposium associated membership income in 2021 was $3,195.00. Amazon Smile income generated $226.44 during 2021.

The major expenses in 2021 were *FMBC* costs ($9,837.59), webpage and database expenses ($5,708.56), Symposium/Workshop expenses ($3,393.00), mussel app expenses ($2,500.00), and student award expenses ($537.79). The Balance Sheet for FMCS Liabilities and Equity was $126,484.24 as of 31 December 2021 (details on Page 11).

Secretary's Report: Sarah Veselka

At present, the membership records include 780 persons, of which 464 are active members. Other pertinent numbers are presented in the table on the right.

Level	Total	Active	Renewal overdue	Lapsed	New
Author-Non Member	9	3	-	6	-
Contributing	10	6	4	4	-
Lifetime	3	3	-	-	-
Lifetime - Free	17	17	-	-	-
Paper Registr Members	-	-	-	-	-
Regular	551	339	210	209	3
Student/Retiree	190	96	93	93	1
Total	**780**	**464**	**307**	**312**	**4**

Sarah reported that several committees have requested updated lists of their members with contact information. What is available in Wild Apricot is based on the previous committee structure and needs to be updated. The discussion of this topic included the statement that Committee chairs should have lists of their committee members and that contact information for all FMCS members is available on the website members directory. We need to update the website with new committee structures and the present set of FMCS officers. Alan Christian said we also need to update website with new committee structures for IRS.

Old Business

Update on JASM – Daelyn Woolnough

Many FMCS members are collaborators working on JASM - the Joint Aquatic Sciences Meeting. The March issue of *Ellipsaria* will include a reminder to attend JASM. The abstract submission date was extended to January 17, 2022; abstract acceptances are going out February 23rd. Early registration will end on April 1st. There are a variety of levels for participation. Promoted website. Recommend do a FMCS membership drive prior to JASM registration. Contact Daelyn with any questions.

Kaelyn Fogelman asked if FMCS is going to offer any student travel scholarships? Other societies may be offering that. This idea is discussed further under New Business (on Page 7).

Update on New Finance Committee – Steve McMurray

Steve and Alan Christian have worked through some of the description of this new committee and have received good feedback from the rest of the ExComm. Steve to revisit this subject following the Board Meeting and will report on it during a future Meeting.

Other Publications Posted on the FMCS Website – Jeremy Tiemann

Several new additions have been posted on the Publications page of our website (such as: UMRCC booklets, Malacological Data Net) or are linked there to postings hosted by Iowa State University. These publications are no longer in print and were not readily available until scanned and uploaded to our website. We are exploring copyright issues associated with other similar publications.

Steve McMurray indicated that Art Bogan had asked about adding Dave Stansbery's articles and grey literature to have them housed in one place. John Jenkinson asked if Ohio State University is doing any of this? Alan Christian said that Tom Watter's replacement recently

became an FMCS member and we should check in with him. Steve McMurray will request that Art contact the new curator and see if Ohio State has anything planned.

New Business

Student Support for JASM

Megan Bradley indicated that early registration for JASM is $295 for students and wondered if FMCS could support a few students? Curt Elderkin asked when does that need to be approved? Megan responded that April 1st is the end of early registration and that the Awards committee could handle this and pay directly to JASM. Heidi Dunn mentioned that auction funds should go to student support; we previously supported students by paying for their hotel rooms. Megan suggested that JASM be treated outside of our standard budget as it doesn't come around often. Paying the registration fee in this case would be a straight-forward approach since the meeting may be virtual or hybrid.

Curt Elderkin made a motion to support two students out of the general fund to attend JASM 2022 with the Awards committee to manage the selection and payment. The motion was seconded by Heidi Dunn and passed. Megan will follow up with a discussion email. The plan is to get a form uploaded to the website quickly and send out an email with other things like the membership drive.

DEI Committee Proposal – Tam Smith, Sara Andree, and Xenia Rangaswami

Xenia indicated that the DEI committee is proposing an 8-week summer internship for underserved High School students to be paired with professional mentors. FMCS would provide the student stipend. The proposal is for the stipend to cost up to $3,500 per student: $3,200 in salary and $300 in materials. They are aiming for three students. Maybe do a pilot project with one or two students.

An extended discussion of this proposal included Daelyn Woolnough indicating that National Science Foundation does a $5,600 stipend plus room and board. We also need to consider pay by the mentor. She recommended an hourly rate of $14-$15 an hour. Would we also need to pay travel to and from the program? 20-25 hours per week as 40 seems to be a lot for a PI. Xenia responded that under the DEI proposal, the mentor would recruit from a local high school.

Heidi Dunn asked if FMCS can we afford this? Alan Christian said we could afford to pilot the program for one or two students and suggested that, if the program continues, we could have a future line item that members could voluntarily donate to when they pay their membership dues.

Amanda Rosenberger said that the American Fisheries Society (AFS) runs the Hutton Fellowship. We might develop a subset of what already exists in their fellowship to make it a mussel project. AFS has a fulltime staff member dedicated to this fellowship which might be helpful. The DEI group will look into it. Jeremy Tiemann asked about a possible partnership with the American Malacological Society. Dan Symonds said that Ohio State does fellowships as "awards" from an IRS perspective where they cut checks and then student is responsible for quarterly taxes.

Steve McMurray said the Board seems supportive of the idea, but we have nothing to vote on currently. The DEI group will reach out to the Hutton program to see if we can partner with them and will work through some of the details based on the questions above. Target two pilot students.

FMCS Freshwater Gastropod Poster – Amy Maynard

Amy sent the poster out to the Board members one month ago. She asked if the group is comfortable with disseminating it further. Steve McMurray had a concern about copyright issues and asked if the artwork is original? Amy responded that Nora and Sara used a program

to "edit" others' work and the citations are listed at the bottom of the poster. Amy will double check that citations are good with dissemination.

John Jenkinson asked where the poster will be disseminated and how much would it cost to print? Amy responded that it was intended for schools and was designed to be a movie poster size. She was not sure on cost but can look into it; the original idea was for folks to print it themselves if they wanted.

Steve McMurray moved to approve publication of the gastropod poster on the FMCS website provided we have permission from image copyright holders. The motion was seconded by John Jenkinson and passed.

Amanda Rosenberger offered to help with artwork if there are any issues with copyright holders. John Jenkinson suggested that a copy of the poster could be provided in the March issue of *Ellipsaria* if Amy is interested.

FMCS Funding Requests – Heidi Dunn

Heidi will revisit this topic and report on it during the Spring Board meeting.

Society Google Account – Megan Bradley

Jeremy Tiemann established the FMCS google account. Megan wondered if committees could open their own google accounts and, more broadly, wondered where should FMCS committee and organization data be stored? We need to get a data management policy in place. Amy Maynard said that the American Fisheries Society uses google and google drive. Our committees could have their own google accounts and email. Steve McMurray said that Megan and Nora can explore what to do with the website moving forward. He requested that we move Google account and organizational sustainability to old business.

Alan Christian mentioned that FMCS is tied to a Missouri residency. We need to consider what happens when we don't have a residence for our charter in Missouri. Do we need to be thinking about organization sustainability?

Functional Committee Reports

Awards – Curt Elderkin, Susan Oetker, and David Hayes

Curt - Working with Jer Pin and the DEI committee on a diversity mid-career award. Uncertain on how to judge. Will continue discussions with the DEI committee.

Chapters – Emilie Blevins and Manuel Lopes-Lima

See committee report (on Page 12). Steve McMurray requested the committee identify next steps at the board level and reach out to the ExCom on this.

Diversity, Equity, and Inclusion – Tamara Smith

See committee report on Page 12.

Elections – Wes Daniel

In between election cycles. Nothing else to report [***BUT*** see invitation on Page 16.]

Outreach – Amy Maynard and Dan Symonds

See committee report on Page 13.

Jeremy explained that the Mussel App does not work on newer telephones. Jason Wisniewski and Maddie Pletta said it may need to be completely reprogrammed which is a long process. Alan Christian said that funding may also be an issue.

Professional Development – Becca Winterringer and Amanda Rosenberger

See committee report on Page 13.

Becca said the committee will work on the draft document in the next few months. Might need subcommittees to support current efforts.

Publications – Robert Bringolf
See committee report on Page 14.

John Jenkinson indicated that two well-qualified candidates are under training to take on the editorial duties for *Ellipsaria*. The expectation is that one or both of them will be in charge of editing the newsletter by the end of the calendar year.

Symposia and Workshops – Megan Bradley
2022 Workshop – Lisie Kitchel and Ryan Schwegman
See article on Page 1.

Alan Christian urged the planners to get things done soon on the website for the Workshop. John Jenkinson said that the planned Cover Story in the March *Ellipsaria* will be about the Workshop and the planners will need registration details for that. Megan Bradley said they will meet the deadline.

2023 Symposium – Emilie Blevins
See report on Page 14.

2024 Workshop Topic Proposal – Kaelyn Fogelman and Jim Stoeckel

Jim Stoeckel said a group is proposing to hold a Workshop on Ecophysiology and Environmental Tolerances. The Workshop would cover exposure regimes, various ways to interpret data, modeling approaches, growth models, dynamic energy budgets, DO thresholds. What does the Board think of thuis idea and does the Board want a formal proposal for this idea?

Heidi Dunn, Alan Christian, and Sarah Veselka all said it is a good idea. Steve McMurray asked if the group had a location in mind? Jim responded that a university setting would have the appropriate laboratory facilities and offered Auburn University if the Workshop is not too large. Heidi Dunn suggested the US Fish and Wildlife Service National Conservation Training Center (NCTC) could be an option. Megan Bradley offered to pull budget data for NCTC workshops to compare to others. Jim will send Sarah Veselka a summary of their proposal for dissemination. Steve McMurray said the Board will address this proposal at our Spring meeting.

Technical Committee Reports

Conservation and Restoration – Maddie Pletta, Tyler Hern, and Jesse Weinzinger
See committee report on Page 15.

Maddie asked where the committee should publish its annual committee document. *Ellipsaria*? John Jenkinson responded that *Ellipsaria* is always ready to accept submissions.

Maddie said they did sign up for a gmail account for this committee and will identify it on the website. She asked for suggestions for how to host virtual committee meetings? Megan Bradley said that she and Matthew Patterson can host large group virtual meetings.

Environmental Quality and Advocacy – Braven Beaty and Mickey Matthews
No report. Not in attendance. Steve McMurray will follow up with them on the following items:

- The Freshwater Bivalves and Lacey Act (will FMCS write a letter of support attempting to add several taxa?)
- Were we able to support the "Stop the Spread of Invasive Mussels Act" introduced back in October?

Field Studies and Ecosystem Services – Lisie Kitchel and Carla Atkinson
Lisie – The committee is focused on the upcoming Workshop.

Genetics – Kentaro Inoue and Nathan Johnson
Nate is going to chair the committee.

Mollusk Status and Distribution – Jason Wisniewski and Wes Daniel
See committee report on Page 15.

Motion to Adjourn – 12:13 PM
Motion to adjourn made by Wes Daniels; seconded by Heidi Dunn. Motion passed.

Respectfully submitted by Sarah Veselka, Secretary

Committee Reports Referred to During the January 17, 2022, FMCS Board Meeting

Treasurer's Report Details

2021 Profit and Loss Statement for FMCS

Income		Jan - Dec 2021
	Service Fee Refund	4.92
	Amazon Smile income	226.44
	Interest income	4.75
	Memberships	
	2021 Memberships	3,195.00
	Total Memberships	3,195.00
	2021 Virtual Symposium	
	Sponsorships	2,196.20
	Registration	37,070.71
	Total 2021 Virtual Symposium	39,266.91
	Total Workshops and Symposiums	39,266.91
Total Income		42,698.02
Expense		
	Third-Party Payment Processor	804.57
	Credit card fees	0.01
	Bank charges	38.58
	Total Service Fees	843.16
	Mussel app	2,500.00
	Student award expenses	537.79

Total Award expenses	537.79
International Bank Service Fee	61.56
Webpage - Other	5,647.00
Total Webpage	5,708.56
Bookkeeping	213.83
Total Office supplies	213.83
Annual registration fee	42.50
Tax expenses	166.70
2022 Joint Meeting	1,893.00
FMCS 2021 Symposium	
Speaker Fees-Honorarium	1,600.00
Total FMCS 2021 Symposium	1,600.00
FMBC costs	
BioOne	1,260.00
Editing	1,785.00
Allen Press	6,792.59
Total FMBC costs	9,837.59
Total Expense	23,343.13
NET INCOME	19,354.89

2021 Balance Sheet for FMCS

As of December 31, 2021	
ASSETS	
Current Assets	
Checking/Savings	
BofA savings	10,013.81
BofA checking	116,470.55
PayPal income	-0.12
Total Checking/Savings	126,484.24
Total Current Assets	126,484.24
TOTAL ASSETS	126,484.24
LIABILITIES & EQUITY	
Equity	
Retained Earnings	107,129.35
Net Income	19,354.89
Total Equity	126,484.24
TOTAL LIABILITIES & EQUITY	126,484.24

Functional Committee Reports

Chapters – Emilie Blevins and Manuel Lopes-Lima

At the 2021 symposium, the committee met to discuss the past research and concept behind development of FMCS Divisions, a type of regional subunit under the FMCS umbrella. Draft language for adoption by the Board was shared: https://drive.google.com/file/d/1CZP5yt92HoKImcBKg4CCmNQSEyXbqcvW/view?usp=sharing. Under this proposal, all FMCS membership would be grouped into geographic divisions based on their location but with the option to request inclusion in another Division.

Feedback was received from a handful of people following the meeting. There was a recommendation to begin with large Division boundaries as with AFS. FMCS members indicated that neither membership from Mexico nor an existing southeast Asian mollusk group would be prepared to join as Divisions yet. Otherwise, there were some questions or comments on how voting at Board meetings might be undertaken on behalf of Divisions. Several individuals/groups have confirmed interest in or support of the idea, and no comments have been received against the idea of developing Divisions. The next steps will be to make final decisions about the manner in which Divisions will be incorporated into FMCS by-laws, receive Board approval, publish in *Ellipsaria*, and then a final vote. Ideally, Divisions would be adopted in April 2023 at the Portland FMCS Symposium.

Diversity, Equity, and Inclusion – Tamara Smith

The last group meeting via phone call was Dec. 14, 2021. We continue to meet via calls/Teams/Zoom. Our next call will be in January 20 (2pm CST). Anyone is welcome.

Committee Tasks (April -December):

- Keeping DEI issues on the forefront.
  - Develop short social media posts to keep diversity issues on the forefront. *Ongoing posts to social media – submitted idea to feature photos/quotes from FMCS webpage (see below)*
  - Develop DE&I content for *Ellipsaria*. *Ongoing.*
  - Develop resource guide and links that people interested in racial equity, diversity and inclusiveness issues can access that will be available on the FMCS DEI webpage. *Progress: Developed a resource links. Resource guide has been published on DEI web page.*
- Foster a welcoming environment for FMCS members (and other interested people).
  - Develop a student scholarship program – *Xenia, Sara and Kaeylyn drafted a proposal for a student scholarship program, sent to ExCOM for their consideration.*
  - FMCS DEI award – *Jer Pin drafted a proposal for a DEI award to be given to a FMCS members, may become an Awards subcommittee with input from the DEI committee.*
  - Continue to add photos of people on the FMCS main webpage. Sent out calls over the unio list-serve and social media to request photos and quotes to be featured on the website (Ask – In a sentence or two, tell us why you are a member of FMCS?).
    - Progress: *Added 20-30 photos to the FMCS website front page (Mark and Nora)*
  - Continue to develop a presence on the FMCS website
    - *Updated the FMCS DEI webpage - Added list of accomplishments, link to Ellipsaria article, resource list, list of members, etc.*
  - Improve accessibility of FMCS website. *On hold.*
  - Explore ways to make future meetings/symposiums/workshops more inclusive
    - *Progress: DE&I committee member has reached out to the workshop planning committee to see how we can assist with the planning.*
    - Participate in DEI committees of other scientific societies to share resources and ideas.

  - *Progress: CASS – Erin has attended some of these meetings*
  - *JASM – FMCS DEI committee submitted an abstract to the 2022 JASM conference, to highlight the results of the demographic survey and the work of the DEI committee*
  - *Society of Wetland Scientists Professional Certification Program (SWSPCP) -*
- *SWSPCP reached out to Sara and Tam about how FMCS DEI went about approaching our Demographic survey. Nice to see others looking towards FMCS for DEI issues.*
- *International malaco-diversity survey – Tam is working with an international group to establish a world-wide malacologist demographic (and attitudes to DEI issues) survey, with plans to publish results*
- We occasionally revisit our draft strategic plan and draft a strategy for our committee with step down goals and actions.

Outreach – Amy Maynard and Dan Symonds

To increase social media post frequency and to highlight our members' work, the outreach committee has taken time to encourage member-led post submissions. We continue to receive and post job advertisements and other internal post requests on social media, as well as on our website. Receiving member contributed posts has been particularly useful for Instagram and its heavy reliance on photographs. The Diversity, Equity, and Inclusion Committee provided our committee with a plethora of photographs of society members this spring to post on social media to foster a welcoming environment online and we are gradually putting out these photographs. Amy Maynard (amymaynard212@gmail.com) is attending marketing meetings for the upcoming Joint Aquatic Sciences Meeting (JASM) to advertise and communicate JASM news to FMCS members and internal leadership. The outreach committee is preparing a draft guidance document for FMCS social media administrators regarding post content and social media account security. With questions about long-term information storage for all FMCS committees, we have reached out to communication managers belonging to a few other societies and internally, plan to discuss information management with other FMCS committee chairs. We have provided a copy of a "Gastropod 101" poster for board members to give comments on and would like to discuss whether the FMCS would like to make an official statement in support of Recovering America's Wildlife Act of 2021.

Professional Development – Becca Winterringer and Amanda Rosenberger

The Professional Development Committee received comments on the Mollusk Professional Certification, Guidelines and Procedures (Guidelines) Draft by the FMCS Board and third-party reviewers for comment just as field season ramped up. Comments received are currently being addressed and we hope to have a final iteration of the Guidelines in early 2022. The committee is planning on meeting after the holidays to work on the action steps outlined in the April 2021 meeting listed below:

1. Draft Acceptance and Implementation Schedule.
2. Committee structure and identifying sub-committee needs (i.e., Mollusk Certification, Review Panel, Professional Development)
3. Developing a strategy for establishing a Certification Review Panel 4. Roll out a beta-testing of the certification (1-year) 5. Collaborate with the Outreach and other FMCS Committees

The committee has a lost a few members and if any FMCS members have interest in serving on this committee, please contact Becca Winterringer (beccawint6@gmail.com) or Amanda Rosenberger (arosenberger@tntech.edu).

Publications – Robert Bringolf

***Freshwater Mollusk Biology and Conservation* (*FMBC*)**

Editor in Chief: Wendell Haag; Managing Editor: Megan Bradley; Associate Editors: David Berg, Robert Bringolf, Serena Ciparis, Daniel Hornbach, Caryn Vaughn, and Alexandra Zieritz

Recent, current, and upcoming issues

Volume 24(2) had five papers. We barely missed our September 30 target publication date, but we were close. As for the previous two issues, Allen Press was slow to return proofs and accomplish other tasks promptly; they attribute this to COVID-19.

We're working on Volume 25(1) now. This issue should have at least four papers. One paper has been submitted to Allen Press for production, two are with Two Herons for copyediting, and one is accepted and awaiting transmittal to Two Herons. We are trying to get everything to Allen Press as early as possible.

Submissions continue to be strong. We have about 15 live papers at various points in the review process, and several of those are at an advanced stage that should make them good candidates for inclusion in the September issue.

Impact factor

We have not made progress on this since our last meeting.

Copy editors

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

Structural change discussion

At our last meeting, we introduced our idea of restructuring the *FMBC* editorial board, and this change has been implemented fully. We disbanded the former editorial board, which had a large number of people and didn't truly function as an editorial board. We replaced this with six Associate Editors, a Managing Editor and an Editor in Chief. This structure is similar to that of most journals. When we made this change, we first notified all members of the former editorial board and thanked them for their service. We then placed an article in *Ellipsaria* informing FMCS membership of the change. Our Associate Editors comprise a diverse and inclusive group representing a broad range of scientific expertise, geographical locations, affiliations, and demographics. So far, the new structure is working smoothly.

Ellipsaria

The newsletter continues to be posted quarterly and on time. Thanks to members of the Executive Committee and all of the other contributors for responding to due dates and editorial requests. *Ellipsaria* would be all blank pages without your input.

Two well-qualified FMCS members have started receiving training on what is involved in editing the newsletter. The intention is for one or both of them to be fully responsible for editing *Ellipsaria* by the end of 2022.

Symposia and Workshop Committee – Megan Bradley

2022 Survey Workshop – Ryan Schwegman and Lisie Kitchel

The Committee continues to work out details for the Summer 2022 Survey Workshop scheduled for August 8-11 at Henry Horton State Park, Tennessee. This event is going to mirror the event that was planned previously in content and venue. There have been some delays in getting details from the Park, due to changes in staff, but lodging has been finalized. The Cover Story in this (March) issue of *Ellipsaria* provides logistical information on the Workshop;

travel, transportation, and what to bring. The Workshop Committee will be meeting soon to refine details of lectures and field sessions.

Not everyone on the original Committee is available at this time, if anyone is interested in helping plan or has suggestions for the Workshop, please let Ryan or Lisie know.

2023 Symposium – Emilie Blevins

The 2023 Symposium is still scheduled for Portland, Oregon, with the theme "Mountains to Sea and the Mollusks Between," with the assumption that an in-person event will be possible at that point. During our initial year of planning in 2019/2020, we entered into a contract for the venue, had a budget approved by the Board, and had begun planning sessions, a workshop and symposia. In 2020 the venue agreed to amend our contract to the new dates of April 9-13, 2023. In the next several months, the local planning committee will reconvene to begin developing the program, revisit the budget, and reach out again to the venue.

In addition to reaching out to FMCS and locals to request assistance in planning the event, it would be good to also discuss any virtual meeting adaptations based on successes from the 2021 virtual symposium. Please share your ideas or thoughts.

Technical Committee Reports

Conservation and Restoration – Maddie Pletta, Tyler Hern, and Jesse Weinzinger

The Conservation and Restoration Committee meeting was highly attended by members during the April symposium. During that session, two subcommittees were created and co-chairs elected: Aquaculture and Population Management (chaired by Tyler Hern), and Habitat Restoration and Protection. chaired by Jesse Weinzinger. This year the C&R Committee will conduct outreach to our members on the new Committee structure. It will continue ongoing efforts to update and increase awareness of the FMCS facilities database, and promote collaboration on national recovery activities and development of techniques for species recovery.

We are currently seeking a repository for grey literature to help compile protocols for best management practices relating to propagation efforts and habitat restoration.

Mollusk Status and Distribution – Jason Wisniewski and Wes Daniel

1. Conservation assessment of freshwater mussels of US, Canada and Mexico. No activity since last report.

2. Atlas of Freshwater Mussels of North America. Co-chairs Wesley Daniel and Jason Wisniewski had a call with the previous co-chair Gerry Dinkins regarding the current status of this ongoing project. Discussion focused on the current status of the project and potential approaches to moving forward on this project. The suggestion of contacting Species Status Assessment leads to inquire if they would be willing to draft species accounts was discussed as these SSAs contain all of the necessary information for drafting the accounts for the mussel atlas. Currently, 151 of the approximately 356 taxa addressed in the Atlas have volunteer authors for species accounts. There were 27 first draft accounts as of November 3, 2018, and one species account had been posted to the website for volunteers to use as a template. Taxonomy of several taxa have undergone recent revisions and will need to be updated for this project.

Early Call for FMCS Officer Nominations for 2023

Every other year, our Society elects members to serve in three Executive Committee positions: President-elect (who, after two years, goes on to serve as President for two years, then Past-President for two years), Treasurer (for a 2-year term), and Secretary (also for a 2-year term). This is an early invitation for nominees to fill all three positions. Any member may volunteer themselves or nominate another member, but the nominee must be a current FMCS member in good standing and agree to be nominated. Please consider yourself or another worthy member for these positions.

These positions will be filled during an election to be held later this year and the new officers will assume their duties during the 2023 FMCS Symposium in Portland, Oregon. If you want to nominate someone or have questions about this process, send an email to the Election Committee Chairman, Wesley Daniel, at wdaniel@usgs.gov.

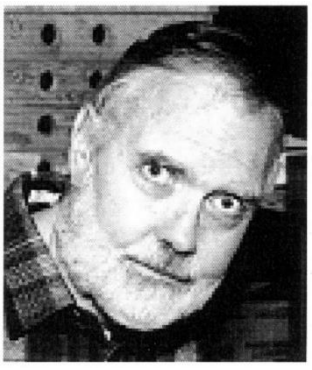
On a branch
floating downriver
a cricket, singing.

Haiku by Kobayashi Issa; translated by Jane Hirshfield

The FMCS Diversity, Equity, and Inclusion (DEI) Committee has been working hard to develop strategies to further foster diversity and enhance a welcoming environment of our Society. The committee's page on the FMCS website (https://molluskconservation.org/MServices_Diversity.html) now includes a downloadable list of DEI resources that we all can use as we strive for growth and care – both personally and professionally. If you have any additional ideas to add to this list or would like to become involved in the DEI Committee's mission, please contact Tam Smith at tamara_smith@fws.gov.

Announcements

Dr. William H. Heard has Passed Away



While little information is available at present, it appears that Dr. William H. (Bill) Heard passed away on February 2, 2022. His brief obituary is available at https://www.echovita.com/us/obituaries/fl/tallahassee/william-heard-14167312. Dr Heard was a University of Michigan graduate and a long-serving Biologist at Florida State University who studied all types of freshwater clams and mussels. His 1979 *Identification Manual of the Freshwater Clams of Florida* was an important contribution to the identification and distribution of the freshwater bivalve fauna of the state for many years. Bill was a 2001 recipient of the FMCS Lifetime Achievement Award "for his significant contributions to bivalve reproductive biology and Unionacea and Sphaeriidae structural systematics." What appears to be only a partial bibliography of his publications is posted at https://www.researchgate.net/profile/William-Heard.

Fourth Biennial Canadian Freshwater Mollusc Research Meeting

The fourth biennial Canadian Freshwater Mollusc Research Meeting was hosted by Fisheries and Oceans Canada, and the Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry on December 7th and 8th 2021. Due to ongoing pandemic restrictions, the meeting was held fully virtually in 2021 which may have contributed to the record attendance. The meeting saw a total of 31 platform presentations and attendance by 141 individuals over the two days. Topics of discussion included status and distribution, species at risk, threats, outreach and education, conservation genetics, and habitat; and saw participation from malacologists across Canada, the Great Lakes states and even as far away as New Zealand. The introduction of virtual break-out rooms at the end of each day provided additional opportunities for attendees to connect with presenters, to engage in further discussions and to share ideas to advance malacology in Canada. Presentations included research plans from many new graduate students who will undoubtedly be back at the fifth biennial meeting in 2023 to fill us in on all their great work!

Proceedings of the meeting will be published as a Canadian Technical Report of Fisheries and Aquatic Sciences [Morris, T.J., McNichols-O'Rourke, K.A., Goguen, M.N., and Reid, S.M. (Editors). *in press*. *Proceedings of the 2021 Canadian Freshwater Mollusc Research Meeting: December 7-8, 2021, Burlington, Ontario*. Can. Tech. Rep. Fish. Aquat. Sci. XXXX: vi + 37 p.] and soon will be available at https://waves-vagues.dfo-mpo.gc.ca/. Proceedings of the previous meetings can be found there as well.

Chesapeake Bay Freshwater Mussel Workgroup Meeting

The Chesapeake Bay Freshwater Mussel Workgroup met virtually on February 3, 2022, to share updates about mussel conservation efforts. The virtual format allowed over 70 individuals from several states to participate, increasing the breadth of perspectives that were shared compared to past meetings. Meeting attendees represented state and federal resource agencies, non-profit organizations, environmental consulting groups, and academia. We also heard from graduate students in the afternoon who are working on exciting research focused on understanding *Lampsilis cariosa* life history and creating predictive models to optimize freshwater mussel conservation strategies. This year's meeting was particularly focused on partnerships; many presenters highlighted ways in which they were collaborating with other attendees, and materials such as protocols and methods were shared widely in the chat box.

Presentation topics and projects included:

- *In situ* mussel propagation and culture to improve water quality
- Analysis of *Elliptio lanceolata* eDNA samples
- Juvenile *Lampsilis cardium* success in defaunated vs. reference streams
- Genetic similarity between propagated and wild *Lampsilis radiata* and *Sagattunio nasutus*
- U.S. Fish and Wildlife Service's at-risk mussel initiative
- *Pleurobema collina* 5-year-review and range-wide species distribution model
- *E. lanceolata* and *Fusconaia masoni* listing status, ongoing activities, and needs
- *Alasmidonta varicosa* projects, including standardized surveys, population modeling, propagation, conservation, and outreach
- C&O Canal National Historical Park mussel surveys
- Mussel propagation at Harrison Lake National Fish Hatchery
- Mussel propagation at White Sulphur Springs National Fish Hatchery

- Susquehanna Mussel Initiative and mussel restoration as a Chesapeake Bay pollution best management practice
- Freshwater mussel restoration and outreach in the Anacostia River
- Bioaccumulation of toxins in freshwater mussels in the Anacostia and Potomac Rivers
- Mussel propagation and techniques at the Freshwater Mollusk Conservation Center
- *Anguilla rostrata* restoration and freshwater mussel surveys in New York
- A decision-making framework and model for mussel conservation in the Delaware Basin

This year's meeting was hosted by Matthew Ashton with the Maryland Department of Natural Resources Resource Assessment Service, and Sandra Doran with the US Fish and Wildlife Service New York Field Office. If you have any questions about this or future meetings, please contact Matthew at matthew.ashton@maryland.gov or Sandra at Sandra_Doran@fws.gov. Detailed meeting notes were compiled by Selina Cheng of Maryland DNR.

Upcoming Meetings

February 28 - March 4, 2022 – National Shellfisheries Association AQ' 2022 Triennial Meeting, Town and Country Resort and Convention Center, San Diego, California, USA Annual Meeting (shellfish.org)

May 16 - 20, 2022 –Joint Aquatic Sciences Meeting, JASM 2022, DeVos Place Convention Center, Grand Rapids, Michigan, USA. https://jasm2022.aquaticsocieties.org/

June (?), 2022 – American Malacological Society Annual Meeting, [site and other details not yet posted]

August 8 - 11, 2022 – FMCS Field Sampling Workshop, Henry Horton State Park, Tennessee, USA [see article on Page 1]

July 16 - 21, 2022 – Society for Conservation Biology North American Sectional Meeting, Reno, Nevada, USA Theme: *Restoring Connections and Building Resilience in a Changing World*, https://scbnorthamerica.org/index.php/naccb-2022/

August 21 – 25, 2022 –American Fisheries Society 152nd Annual Meeting, Spokane, Washington, USA Theme: *What do fish mean to us? Perspectives above and below the water* https://afsannualmeeting.fisheries.org/

October 23 – 26, 2022 – Southeastern Association of Fish and Wildlife Agencies 76th Annual Conference,. Charleston, West Virginia, USA. http://www.seafwa.org/conference/overview/

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

June 3 – 7, 2023 – Society for Freshwater Science Annual Meeting, Brisbane, Australia [Theme and other details not yet posted]

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

Contributed Articles

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

Lampsilis siliquoidea Suitable Host Fish Relationships

Jonathan Wilson-Thieroff[1], **Rachel Fields**[1], **Ethan Haefner**[1], **Edward Hicks**[1], **Mark Hove**[1,2], **Hannah Larson**[3], **Gracie Mertes**[1], **Elizabeth Nelson**[1], **Braydon Ritzema**[3], **James Vande Glind**[3], **Dawn Wheeler**[1], and **Dan Hornbach**[2]

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[Not Peer-reviewed]

Lampsilis siliquoidea glochidia have relatively broad host requirements. Previous studies have shown that several fish species are natural or suitable hosts or are naturally infested with *L. siliquoidea* glochidia (INHS 2022). Glochidial host requirements for this species may influence the broad distribution of *L. siliquoidea*. Although numerous fishes are known to facilitate glochidia metamorphosis, the host relationship with many other fish species is unknown. The purpose of this study was to improve our understanding of suitable hosts for *L. siliquoidea* glochidia.

Testing procedures followed Hove et al., (2016). We collected test fishes near the mouth of Rice Creek, Anoka County, Minnesota. We also collected fishes, and gravid *L. siliquoidea*, approximately 5 km upstream of the mouth of Rice Creek at the Rice Creek Regional Trail Corridor. Fishes were inoculated with *L. siliquoidea* glochidia and held in species-specific aquaria (2-50 L) at water temperature between 20-22° C. Two fish species, *Lepomis macrochirus* and *Micropterus salmoides*, total length between 10-15 cm, were held individually in separate 2 L aquaria. Once or twice a week, aquaria floors were vacuumed with a siphon, the water was filtered through a 125 µm sieve, the filtrate was examined with a dissecting microscope, and the number of glochidia or juvenile mussels recorded.

We also tested differences in the number of juveniles produced and the glochidia transformation rate between *Lepomis macrochirus* and *Micropterus salmoides.* The proportion of glochidia that were transformed to juveniles was calculated as the number of juveniles collected divided by the number of juveniles plus sloughed glochidia collected. Proportions were arcsine square root transformed to yield a more normal distribution (Zar 1996). For all comparisons examined, pooled t-tests were used if the variance between groups was unequal, or a regular t-test if variances were equal. We used JMP Pro (v.16) to conduct our statistical analyses.

Of the 16 fish species we inoculated with *L. siliquoidea* glochidia (Table 1), five released juvenile mussels. *Micropterus salmoides* produced the most juveniles, with 1,162 individuals observed, followed consecutively by *Lepomis gibbosus* (417 individuals); *Culaea inconstans* (142 individuals); *Lepomis macrochirus* (26 individuals); and *Rhinichthys cataractae* (2 individuals).

The individual *L. macrochirus* included in this study released 4, 2, and 2 juvenile mussels while the individual *M. salmoides* released 314, 99, and 252 juveniles. A t-test showed juvenile production rates were almost significantly different between the two fish species (t ratio=3.4, DF=2, P=0.08). These same fishes sloughed 376, 290, and 598, and 100, 762, and 199 glochidia, respectively. A pooled t-test showed the two species nearly had significantly different glochidia transformation rates (t ratio=3.2, DF=2, P=0.09). Interestingly, one *M. salmoides* did not eat for the first two weeks of the study and this fish had the lowest glochidia transformation rate among the bass and produced the fewest number of juveniles.

Table 1. *Lampsilis siliquoidea* host suitability trial results.

Fish Species	No. Fish Inoculated	No. Fish Survived	No. Juveniles Recovered	Percentage of glochidia transformed to juveniles	Juvenile Release/Glochidia Attachment Period (days)*
Luxilus cornutus	7	7	0	-	5
Nocomis biguttatus	3	3	0	-	5
Pimephales notatus	11	11	0	-	5
Pimephales promelas	4	4	0	-	5 - 8
Rhinichthys cataractae †	10	10	2	1%	16
Moxostoma macrolepidotum	6	6	0	-	5
Ictalurus punctatus	2	2	0	-	5
Noturus flavus	1	1	0	-	5
Culaea inconstans †	2	2	142	81%	13 - 26
Lepomis gibbosus	11	10	417	14%	13 - 22
Lepomis humilis	1	1	0	-	8 - 13
Lepomis macrochirus trial 1	11	11	26	0.8%	8 - 16
Lepomis macrochirus trial 2	3	3	8	0.6%	23
Micropterus salmoides trial 1	5	5	1162	43%	13 - 33
Micropterus salmoides trial 2	3	3	665	38%	23-29
Etheostoma nigrum	6	6	0	-	8 -13
Percina maculata	14	14	0	-	5 - 8
Aplodinotus grunniens	1	1	0	-	5

† Indicates newly identified suitable host species.
* Day or range of days in which juvenile mussels or glochidia (trial where no juveniles were produced) were recovered.

This study adds to our understanding of *Lampsilis siliquoidea* host relationships. We found two new host fishes (*Culaea inconstans* and *Rhinichthys cataractae*) and added an additional family (Gasterosteidae) to the list of suitable hosts for *L. siliquoidea*. This expands the evidence that this mussel can utilize a relatively broad suite of host fishes compared to other Lampsiline or Amblemine unionids (INHS 2022). Across the range of *L. siliquoidea* (Williams et al. 1993), there are approximately 28 co-occurring native freshwater fish families (Page and Burr 2011, Warren and Burr 2014, Warren and Burr 2020), 15 of which have been examined for host relationships with *L. siliquoidea*. Including results from this study, eight of the studied fish families have been shown to be natural or potential hosts, or have

been found naturally infested with *L. siliquoidea* glochidia (INHS 2022). Additionally, our small *Lampsilis siliquoidea* juvenile production study suggests that a larger study might reveal if there is a difference in host suitability between *Micropterus salmoides* and similar sized *Lepomis macrochirus*.

We thank the following people and institutions for their support. Several Avail Academy high school students assisted with this project, including Isaac Aune, Parker Borchardt, Gabe Condiff, Zach Henry, Caedmon Mick, Carrick Mick, David Oki, Dawn Oki, Joshua Schonberg, and Anderson Schuttinga. The MN DNR and WI DNR lent us dissecting microscopes for this study.

References

Hove, M. C., B. E. Sietman, M. S. Berg, E. C. Frost, K. Wolf, T. R. Brady, S. L. Boyer, and D. J. Hornbach. 2016. Early life history of the sheepnose (*Plethobasus cyphyus*) (Mollusca: Bivalvia: Unionoida). *Journal of Natural History* 50(9-10):523-542.

INHS (Illinois Natural History Survey) [Internet]. 2022. Freshwater Mussel Host Database. Retrieved 2022 01 07 from: http://wwx.inhs.illinois.edu/collections/mollusk/data/freshwater-mussel-host-database.

Page, L. M. and B. M. Burr. 2011. *Peterson field guide to freshwater fishes of North America north of Mexico, second edition*. Houghton Mifflin Harcourt Publishing Company, New York, 663 pages.

Warren, M. L. and B. M. Burr (eds.). 2014. *Freshwater fishes of North America: Petromyzontidae to Catostomidae*. Johns Hopkins Press, Baltimore, MD. 644 pages.

Warren, M. L. and B. M. Burr (eds.). 2020. *Freshwater fishes of North America: Characidae to Poeciliidae*. Johns Hopkins Press, Baltimore, MD. 911 pages.

Williams, J. D., M. L. Warren, K. S. Cummings, J. L. Harris, and R. J. Neves. 1993. Conservation status of freshwater mussels of the United States and Canada. *Fisheries* 18(9):6-22.

Zar, J. H. 1996. *Biostatistical Analysis*, 3rd Edition. Prentice Hall, Upper Saddle River, New Jersey. 662 pages.

Increased Population Size of the Federally Endangered *Ptychobranchus subtentus* in the Wolf River, Fentress and Pickett Counties, Tennessee

Jack Fetters[1], **Amanda Rosenberger**[2], **Kristin Irwin Womble**[1], **Anthony Ford**[3], and **Brittany Bajo**[1]

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[2] U.S. Geological Survey, Tennessee Cooperative Fisheries Research Unit, Tennessee Tech University, Cookeville, Tennessee 38505
[3] U.S. Fish and Wildlife Service, Tennessee Ecological Services Field Office, Cookeville, Tennessee 38501

[Not Peer-reviewed]

Ptychobranchus subtentus, the Fluted Kidneyshell (Figure 1), was listed as a federally endangered species in 2013. Historically, this species was known to exist in twenty populations within the Cumberland and Tennessee River drainages of the Ohio River system in the states of Alabama, Kentucky, Tennessee, and Virginia. Several of those populations are now considered extirpated, coinciding with impoundments, degraded water quality, and land development. Currently, ten of the twenty historical populations are considered extant, only three of which occur in the Cumberland River basin. One of these populations occurs in the Obey River basin, a tributary to the Cumberland River (U.S. Fish and Wildlife Service 2021). A portion of this population occurs in the Wolf River, a direct tributary of the Obey River that was historically

Figure 1. The aperture of a living specimen of *Ptychobranchus subtentus* in place in the Wolf River.

affected by mining for coal, stone, and petroleum (Campbell 1995). An impoundment created by the construction of Dale Hallow Dam on the Obey River in 1943 isolates the freshwater mussel populations in the Wolf River. Isolated mussel populations such the ones in the Obey River basin have been understudied and could be critical for future conservation and recovery efforts of *P. subtentus* in the Cumberland drainage.

The most recent previous mussel survey of the Wolf River, Moles et al. (2007) used visual and tactile search methods at 45 sites on the Wolf River, with an average sampling effort of 0.5 person hours per site and a Catch Per Unit Effort (CPUE) of 5.42 mussels per person-hour. They observed 357 live and fresh dead individuals of twelve species , 25 of which were *P. subtentus* (Table 1).

During May - September 2021, we revisited the same 45 study sites using standardized visual and tactile methods modified from Strayer and Smith (2003) and Moles et al. (2007) to update the distribution and status of freshwater mussels in the Wolf River. While snorkeling, we used ten-minute replicate intervals with an average of 2.5 person hours per site. During the sampling period, we noted eroded banks (Figure 2), urban development, and the presence of livestock in the river. Our CPUE (4.98 mussels per person-hour) was comparable to the previous study (5.42 per person-hour); however, we found a total of 659 live and fresh dead individuals -- 311 of which were *P. subtentus* -- of eight species (Table 1). Contrary to our expectations, *P. subtentus* was the most abundant species at several sites. While the majority of *P. subtentus* individuals occurred in the lower reach of the Wolf River, their abundance decreased near the impoundment, and we did not observe the species at any of the upstream sites (Figure 3). Although we found fewer species and our survey effort was significantly higher than the previous survey, the overall increase in abundance and variable sizes of *P. subtentus* that we found (Figure 4) indicates an increase in the population in, at least, a 10-km reach of this river.

Figure 2. An example of an eroded bank in a reach of the Wolf River where *P. subtentus* is present.

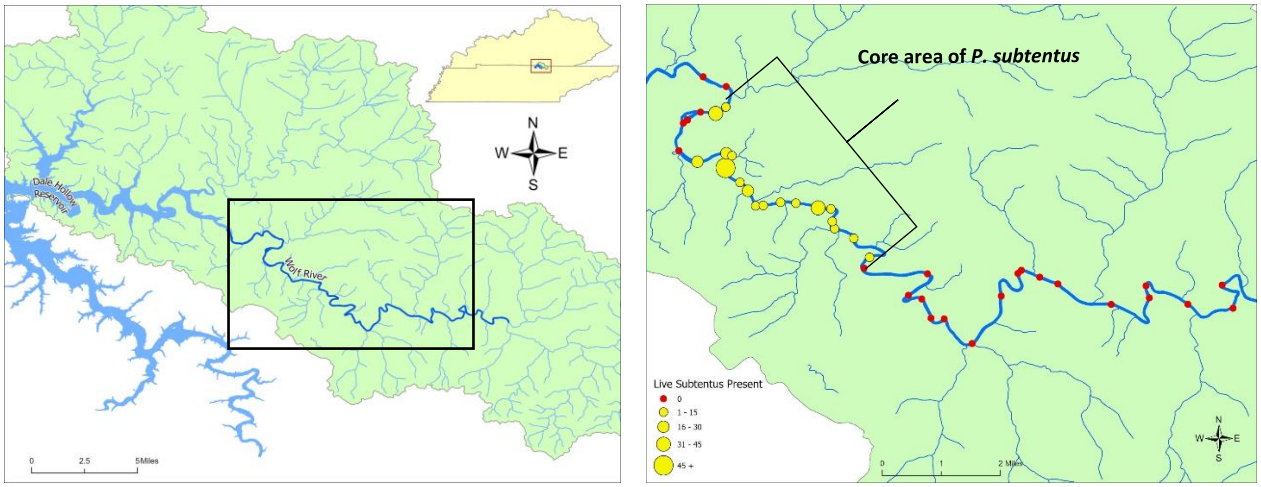

Figure 3. Reach of the Wolf river upstream from Dale Hollow Reservoir where this study was conducted and the core area of the *Ptychobranchus subtentus* population that we found.

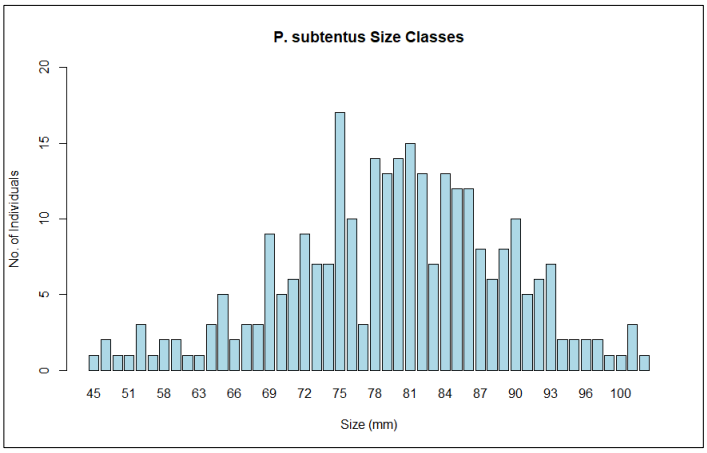

Figure 4. Size structure of the *P. subtentus* population in the Wolf River based on indiviudals found during our visual surveys and an example of the sizes of *P. subtentus* collected and returned during this survey. Note: visual surveys are generally biased towards finding larger indiviauals; our proposed research will involve quadrat surveys to enhance finding smaller individuals.

Table 1. Freshwater mussels reported from the Wolf River, Pickett and Fentress counties, Tennessee.

Mussel Species	Shoup et al. 1941	Hatcher and Ahlstedt 1982 (unpublished)	Layzer and Anderson 1992	Layzer and Madison 1998	Moles et al. 2007	This Study 2021
Actinonaias pectorosa		L	D		1	30
Alasmidonta viridis		D	L	L	2	
Amblema plicata	X					
Cyclonaias tuberculata	X					
Lampsilis cardium		D	D	D	2	3
Lampsilis fasciola		D	L	D	8	2
Medionidus conradicus		L	L	D	10	46
Pleurobema oviforme			D	D	2	
Potamilus alatus			D		2	
Ptychobranchus subtentus		L	D	L	25	313
Pyganodon grandis		D			1	
Strophitus undulatus			D			
Toxolasma lividus				D	14	1
Villosa iris		L	L	D	109	44
Villosa taeniata		L	L	L	183	220
Total Specimens					**359**	**659**
Species Represented	**2**	**9**	**11**	**9**	**12**	**8**

D = Dead, L = Alive , X = Present

We intend to return to species-rich sites of the Wolf River in the summer of 2022 using more intensive survey methods (quadrat sampling) to determine densities and size-structure of all mussel populations. Additionally, we will conduct a basin-wide habitat assessment using remotely-sensed data, coupled with the collection of several water quality parameters and the determination of food availability. This effort will facilitate the identification of a potential areas that could be targeted for restoration or recovery.

We thank the U.S. Fish and Wildlife Service for funding this project and all the students who assisted in the field. A special thanks goes to Clay Mahan; without his help, this project could not have been completed. Finally, a thank you to Dr. Christopher (Kit) Wheeler and Dr. Bradley Cohen for their assistance with edits and review on this article as part of the USGS Fundamental Science Practices process. All three photographs included in this article were taken by the senior author. For more information about this project, please contact Jack Fetters at jgfetters42@tntech.edu or Amanda Rosenberger at arosenberger@tntech.edu.

References:

Campbell, J.F. and D.L. Newton. 1995. *Soil Survey of Fentress and Pickett Counties, Tennessee.* United States Department of Agriculture: Soil Conservation Service.

Hatcher, R. M. and Ahlstedt, S. A. 1982. *Survey of Endangered and Threatended Mollusks in Tennessee Streams.* Tennessee Wildlife Resources Agency and Tennessee Valley Authourity. Project No. E-2. (unpublished)

Layzer, J.B., and R.M. Anderson. 1992. *Impacts of The Coal Industry on Rare and Endagered Aquatic Organisms of The Upper Cumberland River Basin.* Final Report. Submitted to the Kentucky Deptment of Fish and Wildlife Resourses and the Tennessee Wildife Resourses Agency.

Layzer, J.B., and L.M. Madison. 1995. Microhabitat use by freshwater mussels and recommendation for determining their instream flow needs. *Regulated Rivers: Research & Management*, *10*(2-4):329-345.

Moles, K.R., N.T. Welte, and J.B. Layzer. 2007. Mussel fauna of the Wolf River, Fentress and Pickett Counties, Tennessee. *Journal of the Tennessee Academy of Sciences*, 83:77-82.

Shoup, C.S. et al. 1941. A limited biological survey of the Obey River and adjacent streams in Tennessee. *Journal of the Tennessee Academy of Sciences*, 16:48-76.

Strayer D.L. and D.G. Smith. 2003. *A Guide to Sampling Freshwater Mussel Populations*. American Fisheries Society, Bethesda, Maryland.

U.S. Fish and Wildlife Service. 2021. *Species Status Assessment Report for the Fluted Kidneyshell (Ptychobranchus subtentum (=subtentus))*, Version 1.0. Atlanta, Georgia

New Geographical Records for the Exotic Invasive Freshwater Asian Clam Cyrenidae *Corbicula largillierti* (Philippi, 1844) in two Sub-systems of the Upper Uruguay River in Western Santa Catarina State/ SC, Central Southern Brazil

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[Not Peer-reviewed]

Field studies continue to document the worrying and unstoppable advance of the exotic invasive freshwater Asian clam Cyrenidae *Corbicula largillierti* (Philippi, 1844) in the upper Chapecó River sub-basin (Agudo-Padrón 2021:13) and neighboring river systems in malaco-geographic region 3 (West) of the Santa Catarina's State/ SC (see Agudo-Padrón 2018:58 Fig. 1). On December 04, 2021, professional Military Firefighter and AM Project field collaborator Saida Lina Agudo-Blondell conducted a routine technical inspection of a recreational bathing and fishing area at the Cascata S. (Salomão) Manella, a set of three waterfalls in the middle of a preserved forest (~ 26°45'45"S & 52°28'01"W, Figure 1), During this inspection, several disarticulated dead shells of the exotic invasive freshwater Asian clam *Corbicula*

largillierti (Philippi, 1844) were found randomly in the riverbed in middle of rocks and sandy substrate exposed during the regional strong drought period (Figure 2). No other evidence of any mollusc species was observed at the locality. This site is located between the Municipalities of Xanxerê (see Agudo-Padrón 2016, 2017a) and Ipuaçu (~ 26°37'51"S & 52°27'18"W -- see Agudo-Padrón 2017b), approximately 21 km from the center of Xanxerê in the Chapecozinho River sub-basin (Figure 1 – Maps). The Chapecozinho River is an important tributary of the Chapecó River, an integral part of the Upper Uruguay River macro-basin in Xanxerê and Municipal District in (~ 26°52'37"S & 52°24'14"W) Santa Caterina State.

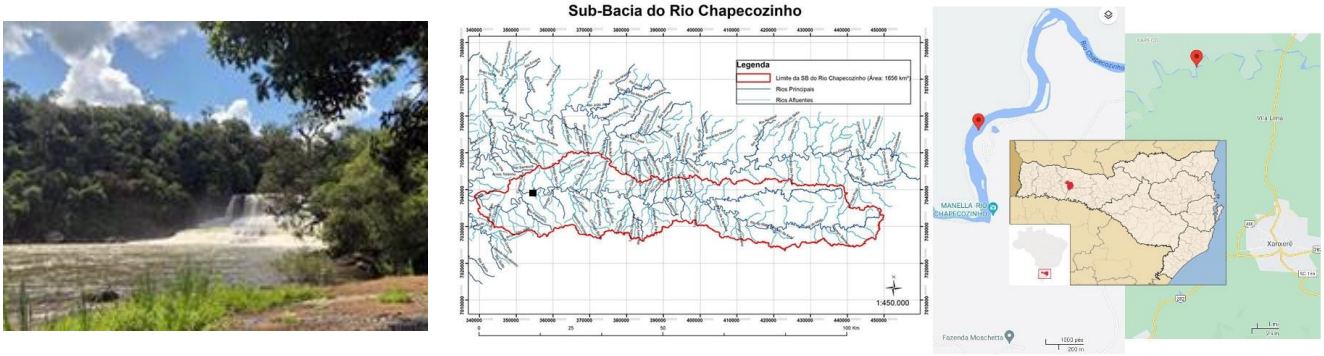

Figure 1. The Cascata S. (Salomão) Manella waterfall located between the Municipalities of Xanxerê and Ipuaçu in the Chapecozinho River sub-basin (Left map – black point) within the red outline of the sub-basin), Xanxerê Municipal District (Right maps -- red dots), in the Western region of Santa Catarina State/ SC, Central Southern Brazil. Area photograph by Saida Lina Agudo-Blondell.

Figure 2. Random samples of the exotic invasive freshwater Asian clam *Corbicula largillierti* (Philippi, 1844) found at the Cascata S. (Salomão) Manella waterfall. Photographs by Saida Lina Agudo-Blondell.

More recently, on January 13, 2022, field biologist and AM Project collaborator Douglas Meyer forwarded some photographs of freshwater clams that were found during biotic sampling in the channel of the Rio Castelhano in Caçador Municipal District (~ 26°46'30"S & 51°00'54"W, Agudo-Padrón and Lisboa 2013:38), also in the Upper Uruguay River basin (Figure 3 – Map, red color). These specimens were immediately identified by us as *Corbicula largillierti* (Philippi, 1844), thus adding yet another unexpected new geographic location in the Western part of Santa Caterina State. The Rio Castelhano, located near the source of the Peixe River (another regional river sub-system), is another important tributary of the Uruguay River with only historical occurrence records of invasive Asian clams *Corbicula* spp. in the downstream and middle sections, close to its mouth (Agudo-Padrón 2008: 168; Agudo-Padrón 2017c).

Figure 3. A random sample of shells of the exotic invasive freshwater Asian clam *Corbicula largillierti* (Philippi, 1844) found in the Castelhano River basin, located in Caçador Municipal District (Right map -- red color), Upper Uruguay River Basin in the Western region of Santa Catarina State/ SC, Central Southern Brazil. Shell photographs by Douglas Meyer.

These new records for the Asian clam *Corbicula largillierti* show the aggressive active advance and spatial coverage that this species is experiencing in the environment of the region, with obvious detriment of local native forms, but those effects are very little known and studied so far (Agudo-Padrón and Lisboa 2013), ... a terrible race against time !

References:

Agudo-Padrón, A.I. 2008. Listagem sistemática dos moluscos continentais ocorrentes no Estado de Santa Catarina, Brasil. *Comunicaciones de la Sociedad Malacológica del Uruguay*, 9(91):147-179. Available online at: https://www.redalyc.org/articulo.oa?id=52412049003

Agudo-Padrón, A.I. 2016. New record of the invasive non-native Asian clam *Corbicula largillierti* (Philippi, 1844) in the Irani River microbasin, Western region of Santa Catarina State/ SC, Southern Brazil. *Ellipsaria*, 18(4):29-30.

Agudo-Padrón, A.I. 2017a. Additional record of the invasive non-native Asian clam *Corbicula largillierti* (Philippi, 1844) in the Irani River microbasin, Western region of Santa Catarina State/ SC, Southern Brazil. *Ellipsaria*, 19(1):22-24.

Agudo-Padrón, A.I. 2017b. Another invader among us: first confirmed record of the invasive non-native Asian clam *Corbicula fluminalis* (Müller, 1774) in Santa Catarina State, Southern Brazil. *Ellipsaria*, 19(3):28-30.

Agudo-Padrón, A.I. 2017c. First occurrence record of the native freshwater mussel/ naiad Unionoida/ Hyriidae *Diplodon rhuacoicus* (d'Orbigny, 1835) in the Rio do Peixe (Fish River) basin, Western region of Santa Catarina State/ SC, Central Southern Brazil. *Ellipsaria*, 19(4):14-15.

Agudo-Padrón, A.I. 2018. Revised and updated systematic inventory of non-marine molluscs occurring in the State of Santa Catarina/SC, Central Southern Brazil region. *Advances in Environmental Studies*, 2(1):54-60. Available online at: https://scholars.direct/Articles/environmental-studies/aes-2-007.pdf?jid=environmental-studies

Agudo-Padrón, A.I. 2021. First confirmed record of the native operculate apple snail Ampullariidae *Pomacea* (- *Asolene*, Pomella) *megastoma* (Sowerby, 1825) in the Chapecó River Basin, Western Santa Catarina State, Central Southern Brazil. *Ellipsaria*, 23(4):13-15.

Agudo-Padrón, A.I. and Lisboa, L.K. 2013. Two new geographical records of freshwater mollusks in the influence area of the Uruguay River Basin, Midwest region of Santa Catarina State/ SC, Southern Brazil. *Ellipsaria*, 15(4):37-40.

Extinction Risk Reassessment of Continental/Freshwater Bivalve Mollusks of Brazil

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One of the functions of the Chico Mendes Institute for Biodiversity Conservation (ICMBio), the federal agency responsible for promoting the conservation of Brazilian biodiversity, is the assessment by taxonomic group of the conservation status of the country's fauna, providing periodic diagnoses about the risk of extinction of vertebrate and invertebrate species – mollusks in this case, selectively (Agudo-Padrón 2019a). The ICMBio also coordinates the adoption of the criteria and categories established globally by the International Union for Conservation of Nature (IUCN). Information regarding distribution, habitat, impact of threats, lifetime, and reproduction are considered the most relevant for the categorizations. The group has developed a continuous evaluation process with the involvement of as many researchers as possible.

Phase 2 of the extinction risk assessment of Brazilian mainland/freshwater bivalve species occurred in October and November 2021 (Figure 1), with similar work on the gastropod forms to follow soon after. Each species to be evaluated was described on an individual online form, available during the period in the official SALVE System < https://salve.icmbio.gov.br/salve-consulta/ >. That form contained information compiled from previous evaluations, as well as recent data added based on the literature. Recently, between January 31 and February 03, 2022, Phase 3 of the process flowchart – Assessment Workshop [Oficina de Avaliação] (Figure 1) occurred and completed with the interactive participation of malacologist researchers from the scope, the Coordinators Leaders of the work in progress, and ICMBio Official Technical Officers.

Figure 1. National public call poster for Phase 2 of the extinction risk assessment for the freshwater bivalve mollusks of Brazil (left) and the six phases in the review process flowchart (right).

Worldwide, limnic/freshwater bivalves are recognized today as the mollusks most threatened with extinction, basically because they are highly vulnerable to the various anthropic actions and changes that act directly or indirectly on their restricted/limited habitats. As a result of these evaluations, a total of thirty-eight continental/freshwater bivalve species were included on the new Brazilian review list, involving five families and twelve genera (presented in alphabetical order in Table 1): 19 Mycetopodidae (10 *Anodontites*, 1 *Fossula*, 1 *Haasica*, 2 *Leila*, 2 *Monocondylaea*, 3 *Mycetopoda*), 16 Hyriidae (4 *Castalia*,

9 *Diplodon*, 3 *Rhipidodonta*), 1 Etheriidae (*Bartlettia*), 1 Cyrenidae (*Cyanocyclas*) and 1 Sphaeriidae (*Sphaerium*). Sixteen of these species are endemic forms from the territory of Brazil, and twelve of the total occur in the State of Santa Catarina/ SC (Table 1), geographical Atlantic slope portion of the Southern Cone (Agudo-Padrón 2012), where systematic inventory of their malacological species in general has been carried out since 1996 (Agudo-Padrón 2018a, b). Two of the species included in the evaluation were included in the previous edition of the Red Book of the Brazilian Fauna Threatened with Extinction (Agudo-Padrón 2019a): Hyriidae *Diplodon* (= *Rhipidodonta*) *koseritzi* (Clessin, 1888) and Mycetopodidae *Mycetopoda legumen* (Martens, 1888). The final results of the evaluation now in progress (including the established IUCN conservation status – Phase 5, Figure 1), will become part of the contents of the future edition of the Red Book of Brazilian Fauna Threatened with Extinction.

Table 1. Freshwater bivalve mollusks being considered in the Brazilian National Reassessment Process.

Anodontites crispatus (Lea, 1834)
Anodontites elongatus (Swainson, 1823) ◈
Anodontites ensiformis (Spix & Wagner, 1827)
Anodontites ferrarisii (d´Orbigny, 1835) ◈
Anodontites iheringi (Clessin, 1882) ▣
Anodontites soleniformis (d`Orbigny, 1835)
Anodontites tenebricosus (Lea, 1834) ◈
Anodontites trapesialis (Lamarck, 1819) ◈
Anodontites trapezeus (Spix, 1827)
Anodontites trigonus (Spix, 1827)
Bartlettia stefanensis (Moricand, 1856)
Castalia ambigua (Lamarck, 1819)
Castalia duprei Récluz, 1842 ▣
Castalia martensi (Ihering, 1981)
Castalia undosa Von Martens, 1827 ▣
Cyanocyclas limosa (Maton, 1809) = *C. guahybensis* Marshall, 1927 ◈
Diplodon caipira (Ihering, 1893) ▣
Diplodon ellipticus Spix, 1827 ▣◈
*Diplodon fontainianus d´*Orbigny, 1835 ▣
Diplodon granosus (Bruguière, 1792)
Diplodon greeffeanus (Ihering, 1893) ▣
Diplodon jacksoni Marshall, 1928 ▣
Diplodon martensi (Ihering, 1893) ▣
Diplodon multistriatus (Lea, 1831) ▣◈
Diplodon rotundus (Wagner, 1827) ▣
Fossula fossiculifera (d´Orbigny, 1835)
Haasica balzani (Ihering, 1893)
Leila blainvilliana (Lea, 1834) ◈
Leila esula (d´Orbigny, 1835)
Monocondylaea franciscana (Moricand, 1837) ▣
Monocondylaea paraguayana (d´Orbigny, 1835)
Mycetopoda legumen (Martens, 1888) ◈
Mycetopoda siliquosa (Spix, 1827) ◈
Mycetopoda soleniformis (Orbigny, 1835)
Rhipidodonta garbei (Ihering, 1910) ▣
Rhipidodonta iheringi (Simpson, 1914) ▣
Rhipidodonta (- *Diplodon*) *koseritzi* (Clessin, 1888) ▣◈
Sphaerium cambaraense Mansur, Meier-Brook & Ituarte, 2008 ▣◈

▣ – Endemic to Brazil

◈ – Species occurring in Santa Catarina State

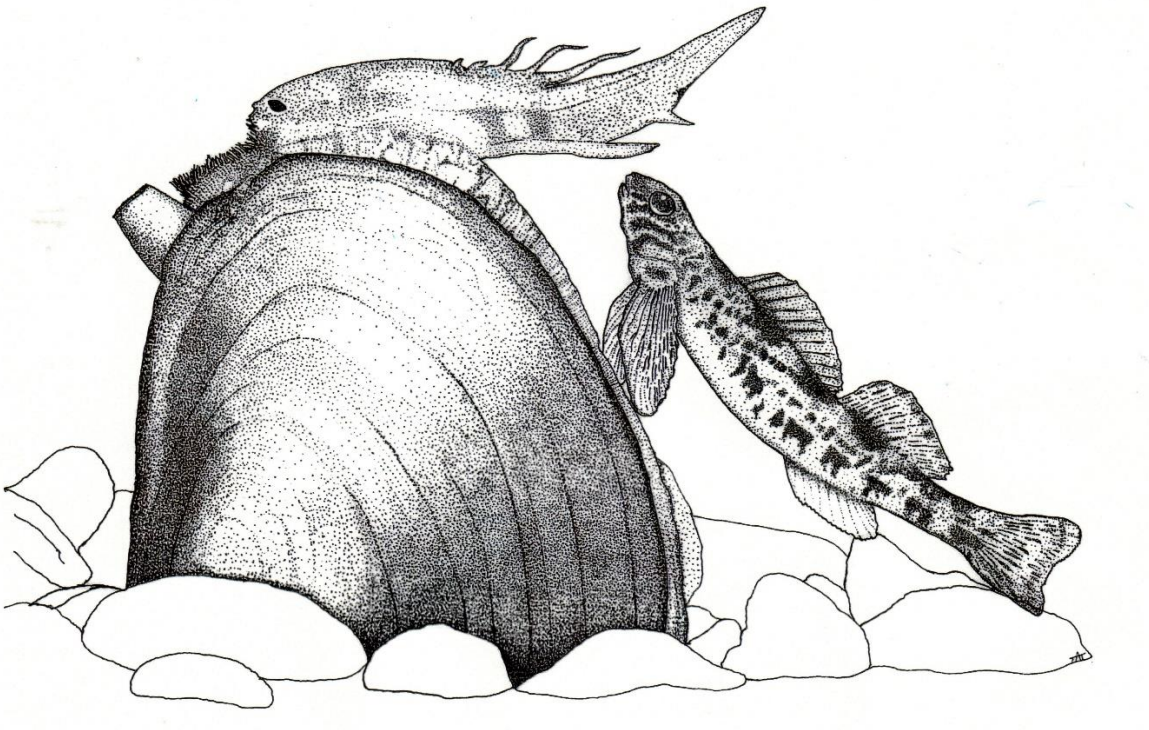
References:

Agudo-Padrón, A.I. 2012. Mollusc fauna in the Atlantic Slope region of the Southern Cone of South America: a preliminary biogeographical interpretation. *International Journal of Aquaculture*, 2(4):15-20. Available online at: https://doczz.com.br/doc/112888/mollusc-fauna-in-the-atlantic-slope-region-of-the ; https://www.researchgate.net/publication/266222419_Mollusc_Fauna_in_the_Atlantic_Slope_Region_of_the_Southern_Cone_of_South_America_a_Preliminary_Biogeographical_Interpretation

Agudo-Padrón, A.I. 2018a. Revised and updated systematic inventory of non-marine molluscs occurring in the State of Santa Catarina/SC, Central Southern Brazil region. *Advances in Environmental Studies*, 2(1):54-60 < https://scholars.direct/Articles/environmental-studies/aes-2-007.pdf?jid=environmental-studies&fbclid=IwAR0jVKm3aMwsKV0gxi%20VCuJd2HT1pxo4xFjf4Y91atMhChKfmIYYqd9Ww3z4 >.

Agudo-Padrón, A.I. 2018b. The freshwater bivalve mollusks of Santa Catarina State/ SC, Central Southern Brazil: current state of our knowledge after 22 years of research. *Ellipsaria*, 20(1):39-42.

Agudo-Padrón, A.I. 2019a. Mollusc included in the new version of the Red Book of Brasilian Fauna Threatened with Extinction. *IUCN/ SSC Newsletter Tentacle*, (27):32-33 < http://www.hawaii.edu/cowielab/Tentacle/Tentacle_27.pdf >.



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

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

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

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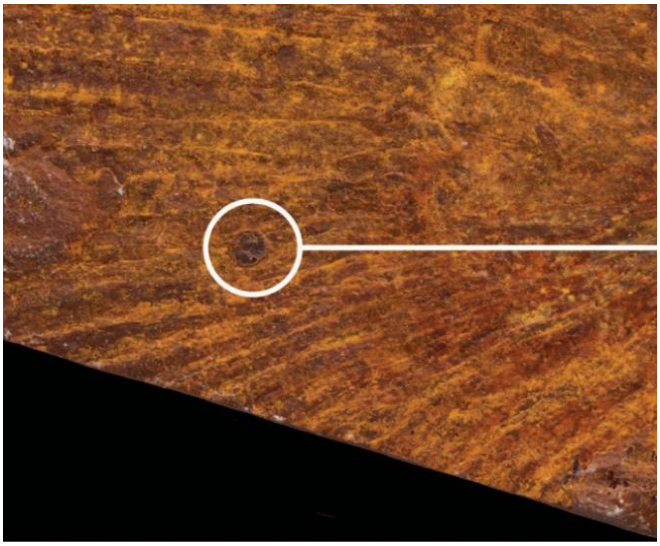
Parting Shots



Early in January 2022, several news articles reported on a newly-discovered fossil site called McGraths Flats in New South Wales, Australia. Many of those articles eventually referenced the [first] scientific report about the site published in *Scientific Advances* (McCurry et al., Sci. Adv. 8, eabm1406 (2022) 7 January 2022 -- PDF available at https://www.science.org/doi/pdf/10.1126/sciadv.abm1406). The McGraths Flats fossils, dated as Middle Miocene (~11 to 16 Million years ago), are spectacular mostly because "the site preserves soft tissues from a wide variety of plants and animals and provides a unique opportunity to study the flora and fauna of Australia during the Miocene aridification of the continent." As you marvel at the variety and the spectacular details in the photographs of plants, insects, and other animals in the *Scientific Advances* article, you eventually will come across these two photomicrographs of a freshwater mussel glochidium on the caudal fin of a fish. The article states that "While glochidia are not unusual components of freshwater fossil deposits, this is the first example of a glochidium attached to a host in the fossil record."

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.