



**Newsletter of the Freshwater Mollusk Conservation Society**  
**Volume 15 – Number 2** **June 2013**

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**President’s Message**

Thank you all for the privilege and opportunity to serve the Society as its 10<sup>th</sup> President. Caryn Vaughn’s exemplary leadership in her term as President has resulted in a stronger, larger, more active Society, and I will continue to rely on her for guidance and inspiration. I have seen us grow from a fledgling group of enthusiastic biologists back in 1995 to the 530+ active members that we are today. WOW !! Our native freshwater mussels and snails are on the radar as never before, thanks to the dedication and persistence of all of you in your “day jobs,” as well as your efforts serving the Society on committees and working groups. We have a great journal in *Walkerana*; please continue to submit your articles for publication.

During the next two years, my focus will be to:

1. Encourage the formation of new regional groups, and help them step-down the National Strategy document to regional and local actions;
2. Continue the documentation of Policies and Procedures for all Committees and organizations within the Society;
3. Evaluate the current committee structure of the Society to make sure we are responsive to the new issues and goals that come out of the new National Strategy; and
4. Encourage the formation of new “Working Groups” to address important timely topics and issues, such as the newly proposed “Mussel Health Assessment Group.”

Stay tuned for great events coming up! The Society has a Facebook page, just “like” us and keep in touch with news and events (you will need to type, in full, Freshwater Mollusk Conservation Society, I guess the acronym was already taken!!). And our FMCS website is the first place to go for the most current Society happenings. We are doing our best to keep it updated and interesting!

Our next Workshop will be April 21-22, 2014, in Portland, Maine, focusing on “Mussel Studies and Regulatory Process Associated with Dam Removals.” Look for more details in this newsletter, and mark your calendars to attend! Thank you, Mary McCann and Alan Christian, for planning and leading the effort. And, our next Symposium, in 2015, will be in St. Louis, MO. Steve McMurray and Heidi Dunn are leading that charge, and I’m sure they’ll be contacting folks for help in the near future.

I am looking forward to working side by side with you in the years ahead.

*Patty Morrison*

## Society News

### **Guntersville Meeting a Success**

The Eighth Biennial FMCS Symposium was held at Guntersville State Park in Guntersville, Alabama on March 10-14, 2013. This symposium was hosted by the Alabama Department of Conservation and Natural Resources, and a dozen sponsors assisted to make this symposium a success. At the end of late-registration on March 1, 254 individuals had pre-registered for this event; however, the federal sequestration went into effect the following week and most members employed by the U.S. Fish and Wildlife Service and the U.S. Geological Survey were not allowed to attend. As a result, actual attendance at the Guntersville meeting fell to 242 after including about a dozen walk-up registrants. Participants in the symposium came from 31 states and 5 other nations (Canada, Finland, Germany, Luxembourg, and Portugal).

The sequestration also forced several federal employees to cancel their submitted presentations, resulting in the loss of 10 scheduled platform talks. Many members volunteered substitute presentations, however, so very few program slots remained unfilled. As a result, about 110 platform presentations were made in 24 different sessions over the three-day period. John Gallacher with the Alabama Department of Conservation and Natural Resources – IT Department was invaluable in organizing the presentations. The symposium organizers and session moderators also wish to thank all of those who volunteered presentations to fill the gaps in the program.

There were 80 posters presented during the Monday evening session, of which 38 were student contributions. Results of the judging of the student poster and platform presentations are covered in in another article (See Page 4, below).

Here are some candid images of members and events taken during the Gunterville Meeting.



Thanks to Janet Clayton, John Jenkinson, and Luba Burlakova for taking the pictures used here.

The meeting concluded on Wednesday evening with dinner at the Top O' The River, followed by a musical presentation by the Okratones, including our own Wendell Haag.

The optional field trips took place on Thursday March 14, with approximately 20 participants in the Paint Rock River trip, and 8 attending the Cathedral Caverns / Little River Canyon tour. Special thanks go to Paul Freeman, The Nature Conservancy of Alabama, and Dr. Lori Tolley-Jordan, Jacksonville State University, who assisted with the field trips.

The symposium committee extends our thanks to the staff at Guntersville State Park, Veal Productions, Sullivan Productions, Valley Graphics, Top O' The River, and Rare Transportation for making this symposium such a success. And, as always, this meeting would not have been possible without the assistance of FMCS Treasurer, Heidi Dunn! Finally, thanks to all of you who attended the Guntersville Symposium.

Paul Johnson for the Local Committee

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### **Auction – A Big Success, too!**

The 2013 auction was a great success; we earned an amazing \$7,135 for student awards! Thanks to ALL for your generous donations and for purchasing raffle tickets and auction items! We had an incredible assortment of donations, ranging from classic mollusk literature to art, photographs, jewelry, outdoor gear, food, drink, and even a picnic table to put them on. And don't forget the 'one of a kind' collectibles, such as the slug and baby doll head sculpture!

A SUPER big thanks to Steve Ahlstedt, *auctioneer extraordinaire*, and all the others who helped make the auction happen, including donating items and selling tickets. We will be needing more of the same in two years, so start thinking about what you will make or donate, and keep an eye out for those 'rare and unusual' finds.

Once again, thanks to everyone for participating in the auction. Without you, we could not do it. The students very much appreciate the financial assistance they get from this!

Lisie Kitchell for the Auction Team

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### **Awards Presented at the 2013 FMCS Symposium**

Submitted by Teresa Newton, Emy Monroe, and Greg Cope, FMCS Awards Committee

#### **Student Travel Awards**

The Awards committee announced and solicited applications for student travel awards to assist students in attending the biennial symposium. Similar to past years, travel awards were made in the form of pre-paid rooms at the symposium hotel. A total of 30 students applied for travel awards (almost twice the number of applicants over 2011!!) and, based on the allotted funds for all awards and the cost of rooms, 8 student awards were presented. Of these students, two are working toward their B.S. degrees, four are seeking their M.S.s and two are working toward their Ph.D.s. The following students were selected: Jennifer Archambault (North Carolina State University), Andrea Fritts (University of Georgia), Traci Griffith (Central Michigan University), Samantha Parker (Central Michigan University), Madeline Pletta (Missouri State University), Jared House (Bemidiji State University), Cayla Morningstar (Miami University), and Ieva Roznere (The Ohio State University).

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Student Travel Award Winners: From Left to Right, Jennifer Archambault, Andrea Fritts, Traci Griffith, Madeline Pletta, Samantha Parker, Cayla Morningstar, and Ieva Roznere. Missing from photo was Jared House.

**Best Student Platform and Poster Awards**

A total of 58 student presentations required judging at the 2013 symposium (31 platform papers and 27 posters). Each student was judged by three separate judges, which meant that 45 FMCS members helped to get this job done! The Awards Committee thanks every member who helped judge these student presentations; we could not present these awards without you.

The best platform paper award went to Rachael Hoch of Appalachian State University (co-authors M. McCormick, C. Eads, M. Madritch and M. Gangloff) for her talk entitled, “Beaver and mill dams alter freshwater mussel habitat, growth and survival in North Carolina piedmont streams”. The Honorable Mention platform award went to Jennifer Bergner of Central Michigan University (co-authors D. Woolnough and D. Zanatta) for her talk entitled, “Spatially explicit genetic structure of two unionid species, *Lampsilis cardium* and *Lasmigona costata*, in the central Great Lakes”.



Emy Monroe presents the Best Student Platform Paper Award to Rachael Hoch (l), and the Platform Honorable Mention Certificate to Jennifer Bergner (r)

The Best Poster Award went to Daniel Schilling of Virginia Tech (co-authors J. Jones, A. Phipps, M. Pinder, and E. Hallerman) for his poster entitled, "Assessment of morphological genetic variation of freshwater mussel species belonging to the genera *Fusconaia*, *Lexingtonia*, and *Pleurobema* in the Tennessee River drainage." The Honorable Mention Poster Award went to Jordon Holcomb of Appalachian State University (co-author M. Gangloff) for his poster entitled, "Effects of landuse change on federally endangered dwarf wedgemussel (*Alasmidonta heterodon*) in the Tar River, North Carolina". Congratulations to all the fine student presentations at this year's symposium!



Poster Award Winner Daniel Schilling



Honorable Mention Jordon Holcomb

### Professional Awards

The Awards Committee solicited nominations from the membership for professional awards to be presented at the biennial symposium. In 2013, we received one nomination for the Lifetime Achievement Award and, at the Guntersville Symposium, Dr. Caryn Vaughn was presented with the Lifetime Achievement Award for over 20 years of dedicated service to the conservation of freshwater mollusks.

Dr. Caryn Vaughn, Presidential Professor of Biology at the University of Oklahoma and Director of the Oklahoma Biological Survey, has been an active member of FMCS since its inception. Her first mussel paper was published in the 1993 *Proceedings* of the first national mussel symposium organized by the Upper Mississippi River Conservation Committee, the meeting which ultimately led to formation of FMCS, and she capably served as the most recent President of FMCS. During this time, Caryn has distinguished herself as one of the leading mussel researchers in the world, and her research has been instrumental in bringing mussel issues to the forefront of mainstream ecology and conservation. Caryn's papers have appeared in leading ecological journals such as *Bioscience*, *Ecology*, *Conservation Biology*, *Oecologia*, *Oikos*, *Ecography*, *Biological Conservation*, *Freshwater Biology*, and the *Journal of the North American Benthological Society (JNABS)*. Her groundbreaking work showing the integral roles that mussels play in freshwater ecosystems represents one of the most important conceptual advances in mussel ecology since the discovery of the host-fish relationship. In addition to raising the visibility of mussels beyond the realm of specialists, these studies provide a concrete imperative for mussel conservation that is vastly more compelling to policy makers than a simple need to conserve biodiversity for its own sake. In short, Caryn's work has earned mussels and mussel conservation a relevance that was previously lacking.

Caryn also has a strong record of mentoring and service. Her research program has produced many talented and energetic students, several of whom now lead their own mussel research programs, and she has provided great service as Associate Editor of *Freshwater Science* (formerly *JNABS*) and *American Midland Naturalist*, and on the editorial board of *Walkerana*. Caryn’s development as a researcher has paralleled that of the FMCS, and her receipt of the Lifetime Achievement Award celebrates the arrival of an exciting, new, and mature phase in mussel ecology that she has helped usher in.



Caryn Vaughn (center) with Wendell Haag (left) and David Berg (right), two of her five nominators for the 2013 FMCS Lifetime Achievement Award

**Minutes of the FMCS Board Meeting  
Guntersville State Park, Sunday, March 10, 2013**

**Call to Order and Roll Call for Attendance**

Attendees:

- Caryn Vaughn (President)
- Patty Morrison (President-Elect)
- Heidi Dunn (Treasurer)
- Greg Cope (Past President)
- Greg Zimmerman (Secretary)
- Braven Beaty
- Megan Bradley
- Chris Owen
- John Jenkinson
- Paul Johnson
- Tom Jones
- Teresa Newton

- John Harris
- Art Bogan
- Jeff Garner
- Jeremy Tiemann
- Mary McCann
- Steven McMurray
- Susan Oetker
- Wendell Haag
- Tom Watters
- Steve Ahlstedt
- Steve Fraley
- Bob Butler
- Monte McGregor

**Approval of Nov. 13, 2012 Board Meeting Minutes (see Dec. 2012 Ellipsaria)**

Minutes approved.

**Treasurer Report - Heidi Dunn**

During 2012, we had income of \$37,724.60

Rewards/Interest	299.61
Memberships	11,200.00
Books	20.00
2013 symposium	12,220.00
2012 Workshop	15,985.00

Total expenses were \$26,225.28

Pay pal, credit card, bank fees	1316.36
Tax filing	35.00
Regional meeting sponsorships	200.00 (Maryland and NC)
Mussel App	5000.00
Shipping	14.04
Webpage	3831.60
Hats	1622.40
Tshirts for the workshop	460.64
2012 Workshop expenses	9620.24
Total income for 2012	\$11,499.33

So far in 2013 income of \$83,865.00

Memberships	13,040.00
Symposium/Workshop	70,825.00

Expenses of \$5698.33

Paypal, credit card, bank fees	1812.08
Regional Meetings	100.00 (Virginia)
Symposium/workshop expenses	3786.25
Total income for 2013	\$78,166.67

Total in savings and checking \$189,616.67 (still owe bills for this symposium)

**Secretary Report – Greg Zimmerman**

The transition to the Wild Apricot web widget on the FMCS website has greatly simplified the duties of the secretary in terms of maintaining members and, I believe, has helped retain lapsed members. We have 702 contacts in the database, 558 of which are active members. Inactive member numbers are not surprising as students graduate and do not renew memberships as they move on to other fields (see table below, updated May 20, 2013).

Level	Total	Active	Renewal overdue	Lapsed	Pending			New in last	
					New	Renewal	Level change	7 days	30 days
Author-Non Member	<u>15</u>	<u>15</u>	-	-	-	-	-	-	<u>1</u>
Contributing	<u>7</u>	<u>7</u>	<u>1</u>	-	-	-	-	-	-
Lifetime	<u>10</u>	<u>10</u>	-	-	-	-	-	-	-
Paper Registr Members	-	-	-	-	-	-	-	-	-
Regular	<u>518</u>	<u>405</u>	<u>254</u>	<u>110</u>	<u>1</u>	<u>2</u>	-	<u>1</u>	<u>1</u>
Student	<u>152</u>	<u>121</u>	<u>70</u>	<u>28</u>	<u>2</u>	<u>1</u>	-	-	-
<b>Total</b>	<u>702</u>	<u>558</u>	<u>325</u>	<u>138</u>	<u>3</u>	<u>3</u>	-	<u>1</u>	<u>2</u>



**2013 Symposium Update – Paul Johnson, Patty Morrison, Jacob Culp, Monte McGregor, Heidi Dunn, Steve McMurray**

At the end of late-registration (March 1st), 254 individuals had pre-registered on-line; however, the federal sequestration went into effect and most members employed by the US Fish and Wildlife Service or the US Geological Survey were not allowed to attend or present / display posters. Consequently, total attendance (242) was less than expected, which included about a dozen walk-up registrants. Registrants for the symposium came from 31 states and 5 different nations (Canada, Finland, Germany, Luxembourg, Portugal).

**2014 Workshop Update, Maine – Mary McCann**

Theme: “Mussel Studies and Regulatory Process Associated with Dam Removals.” Looking at two potential locations in Maine: one is closer to a major airport, the other is farther out but in a smaller town with more character. The Board discussed the overall preference of a final location which would be easy to access for people traveling from out of town for good attendance. [See announcement on Page 16]

**Future Symposia & Workshops -- Steve McMurray, Heidi Dunn**

2015 – “Homecoming” in St. Louis. Steve and Heidi think there are a large number of potentially good locations in St. Louis, so they are just starting to look around since it is a few years out. Considered the casino in downtown but there could be issues with government travel reimbursement.

(Greg Cope) Society of Environmental Toxicology and Chemistry (SETAC) North America to be held 17-21 November in Nashville, Tennessee. A special session entitled, "Use of Freshwater Mollusk Toxicity Data for Improved Conservation of Water and Sediment Quality" [Subsequent announcement sent via email] Registration opens in July. Check <http://nashville.setac.org> for the latest meeting news.

**Awards – Teresa Newton, Greg Cope, Emy Monroe**

Judging – 58 student presentations, 1 nomination for the lifetime achievement award. Regional awards assistance – 3 applications. Matt Ashton was the first in for a meeting in Maryland during January. North Carolina and Virginia were the others. Student travel awards: 30 applicants in 2013, covers room for 4 nights. For comparison, there were 16 applicants in 2011.

**Genetics** - no report

**Guidelines and Techniques -- Nevin Welte, Rita Vilella Bumgardner**

Not in attendance but per others have been working on streamlining and improving protocols for West Virginia and Ohio streams, and qualifications / tests for surveyors.

**Information Exchange*****Walkerana* -- Tom Watters, Greg Cope, Wendell Haag**

Manuscript submission – may need to be tweaked. Files are getting cluttered and emails are not being received when authors upload documents. Will work with Greg Z. and EnviroScience’s IT guy to diagnose.

***Ellipsaria* – John Jenkinson**

Everyone commended John for keeping the newsletter going with high energy and so well-organized. Greg Z. would like to further investigate converting publication to HTML in its

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entirety, but we need more data on readership and technical difficulty. Member survey being conducted during March [results in article on Page 13]

**Outreach – Megan Bradley, Andy Roberts, Tom Jones**

Meagan wondered if we can get new outreach mollusk presentation boards? Not very many people are using the large one, and it is very bulky and difficult / expensive to ship. Perhaps survey if there is a need. General Board consensus was to look into more electronic materials that could be better utilized rather than physical materials. [Survey results presented in article on Page 12]

A set of Mollusk / Freshwater Mussel Playing Cards were presented from [Sandra.shumway@uconn.edu](mailto:Sandra.shumway@uconn.edu). Concepts for FMCS-themed cards were considered as a good outreach tool.

**Web site – Sophie Binder** – not in attendance. Board members were happy with Sophie's responsiveness to web edits. It was noted that there is no clear way to get web changes made, but the system seems to be generally working. Committees are in charge of relevant web sections and can contact Sophie with changes, and, when in doubt, contact Greg Z.

**Environmental Quality and Affairs - Steve McMurray, Braven Beatty**

Not too much going on since last meeting. Letter sent from FMCS to TVA regarding propagation facility closing. Looking for more issues.

**Gastropod Status and Distribution – Jeremy Tiemann, Jeff Garner.**

American Fisheries Society status of gastropods paper due out in June. Not much else going on. Looking for assistance with FMCS website.

**Mussel Status and Distribution – John Harris, Arthur Bogan**

Discussed Discover Life (DiscoverLife.org) and the GIS mussel framework. There was some money invested just to get a framework up. Propose to base the taxonomy on AFS lists. [See extended committee report on Page 11 and announcement on Page 16]

Development of a Mussel ID App – Susan Oetker, Arthur Bogan, Facilities Database – Chris Owen Android App Developed pilot for Clinch River. FMCS will accept proposal to further develop the app, do online voting with Board members to approve. Eventually, want to get the app up on the website.

**Propagation, Restoration, and Introduction - Rachel Mair, Christopher Owen**

Continued work to develop propagation and release database. The skeleton of a facility database is already up and being used. Need to update host fish status regularly.

**Ad hoc Committee on Revising the National Strategy – Patty Morrison**

Patty gave an update on the revision process. Member input has been extensive, and will continue. The interactive webinars were a success. Patty wondered what should be the plan for the National Strategy, and proposed to publish in *Fisheries* or *BioScience*. It may have to be written for a broader audience, but try to avoid double-publication. The Board's general consensus was a broad journal like *BioScience* would be better than a specialized journal like *Walkerana* since we are looking for a broad audience. The goal will be by the end of this year to publish. Perhaps do FMCS webinars?

Jeremy Tiemann – discussed AFS Partnership and AFS – Canada

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**Old Business****FMCS Procedures Manual – Steve McMurray and Greg Cope**

Steve presented Revision 1 of the Procedures Manual. This document will allow for changes to be made to the document, vs. changes to bylaws which are difficult to change, and there would be inconsistency. Manual will include deadlines to reports in *Ellipsaria*, etc. Note templates. All officers and committees need to edit and update the draft information.

**Tribute for Tom Proch** – Art Bogan to prepare, with help from others

**New Business**

Will establish two new committees: **North American Freshwater Mollusk Names Committee** and **Scientific and Common Names Checklist Committee**.

FMCS Flyer -- Teresa Newton presented a flyer about the National Shellfisheries Association that FMCS might want to consider as a model for an outreach tool. Teresa estimated cost would be \$300 for 1000; approved to print them and put a pdf on the FMCS website. Megan Bradley offered to mock up a draft for FMCS.

National Shellfisheries Association Annual Meeting in Jacksonville, Florida, March 29 -April 2, 2014 (NOTE: After discussions with Paul Johnson and Jim Williams, we decided not to pursue a special session at this meeting)

**Bylaws and Committee Reviews – Heidi Dunn and Steve McMurray**

Heidi and Steve asked when will the changes occur to the Strategy? (see Ad Hoc Committee report above)

Greg Cope – We need to scan all the back issues of *Walkerana* to be placed on the FMCS website. A motion was offered to do this scanning work, not-to-exceed a limit of \$2000. Motion Carried.

**Motion to Adjourn.** Motion carried.

**Mussel Status and Distribution Committee Report**

Arthur E. Bogan and John L. Harris

The biennial meeting of the Mussel Status and Distribution Standing Committee was held Sunday, March 10, 2013 from 5:00-6:00 p.m. Arthur Bogan and John Harris were nominated and approved by show of hands to serve as co-chairs of the standing committee for another 2-year term. In addition, the following topics were discussed during the meeting and/or during the remainder of the symposium.

1. **J.D. Williams et al. Conservation assessment of freshwater mussels of US, Canada and Mexico.** This document is in the final stages of revision and will be submitted to Fisheries in the near future. This is a revision of the Williams et al. (1993) first edition that was so successful.
2. **Development of Mussel ID App** - Susan Oetker. Progress continues on development of the mussel identification app. The app works much like topo map apps, where the user downloads the state-level information onto their device for the sites that they will be visiting prior to going out in the field. Once in the field, all of the information for their location will be native on the phone, allowing for full use of the app even in remote locations with no internet access. Stan Martin and Art have prepared a trial version of the app using the

Clinch River basin fauna. The trial app will be previewed for the Board in Lake Guntersville with the intent of posting the trial version on the FMCS website for members review and suggestions after the meeting. We are planning to secure funding from outside grants to fully fund the app.

3. **Atlas of Freshwater Mussels of North America.** We have revised the concept of the Atlas to a web-based document that will be dynamic, facilitate regular update, and can be linked to the id-guide at Discover Life. We have prepared a draft species account and instructions to authors that were distributed to the Board and attendees at the Mussel Status and Distribution Committee meeting. We requested species account authors / volunteers during the Committee meeting and also have submitted the call for authors and instructions to authors for posting on the FMCS website. [See announcement on Page 16]
4. **Ad Hoc Scientific and Common Names Committee.** During the Gastropod Status and Distribution Committee meeting, there was a discussion to evaluate whether maintaining a list of North American freshwater mollusk common and scientific names on the FMCS website would be of value to the society. Following the discussion, the *Ad Hoc* Committee recommended that the Gastropod Status and Distribution Committee and the Mussel Status and Distribution Committee establish separate subcommittees for gastropods and freshwater mussels charged with reviewing proposed name changes and maintaining consensus lists on the FMCS website.

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### FMCS Member Survey – Outreach Questions

Megan Bradley, Outreach Co-chair

Thanks to everyone who participated in the March 2013 survey about *Ellipsaria* and Outreach. One-hundred eighteen members took part in this survey: 100 during the Guntersville Meeting, and 18 on-line. The participants included a good spectrum of our membership: from new members (23%) to those who have been in the Society for more than 15 years (15%). Most respondents listed Ecology as their chief interest in freshwater mollusks (52%), work in an academic setting (51%), consider themselves proficient on a computer (64%), and read articles, etc., on-line on a daily basis (63%).

In a society as widely distributed and diverse as FMCS, the outreach goals vary from person to person and place to place. Further, the needs in Virginia aren't necessarily the same as in Missouri. My goal in working with the Outreach Committee is to make it easier for all members to share information about snails and freshwater mussels. The survey was a great opportunity to learn more about how much our members participate in outreach activities and how they do it.

The majority of respondents (63%) rarely provide mollusk displays for events, and equal numbers of you are happy with what you've developed (35%) or are looking for digital materials to augment your presentations (32%). These answers are what I expected; most of us don't spend all of our time working on outreach but it is part of our individual strategies for regional mussel conservation. Further, digital material is versatile and I think we're all trying to engage audiences in conservation through novel experiences. What, other than the critter in the stream, is better than a video for showing rare behaviors?

What I was most curious about was the response to questions about the FMCS display board. Most people believe it is too big for everyday events (49%), but would consider using it for big events (66%) and many of you (66%) think that the board presents mollusk conservation well. I have been struggling with whether FMCS should replace our large board with multiple small, regional boards; move forward with replacing our large board with a lighter, more easily transported board; or keep what we have. After my experience with the board at the symposium and reading your responses to the survey, I strongly agree that the

board is large and cumbersome but also that it's a great tool for teaching about mollusk conservation. Display boards have become much cheaper and are now being designed for easy transport, so maybe it's time to retire the behemoth.

At the recent Symposium, the Outreach Committee discussed the possibility of simply replacing our large FMCS board with another large, more easily-managed one. In addition, we will try to provide more material on the outreach committee webpage for members to access and incorporate into your regional presentations. If you have developed materials that you're willing to share with other members, please contact the committee. Also, if you know of specific needs that we can help with or collaborate on meeting, contact the committee.

Finally, just some additional notes from the Outreach Committee about ideas we are pursuing. These include a new brochure that will include information about ecosystem services, diversity, life cycles, and what the average person can do to protect freshwater mollusks. Ideally, some of these brochures will be printed on glossy paper and there will also be a digital copy on our website so they can be downloaded and printed by members as needed. Also, Dan Scoggins is working on a brief freshwater mussel life cycle video montage using material from Dr. Chris Barnhart. This hasn't moved much past the discussion phase. There is interest in making a deck of freshwater mollusk playing cards; zebra mussels as Jokers anyone? We have a concept sketched out with a species image on one side and the FMCS logo on the other with the species name in fine print horizontally so they could be used as flash cards. This project will demand great pictures that we hope to collect from the membership so, if you see the opportunity this field season, snap a photo of your favorite species.

Please let me know if I can do anything to help, and have a great field season.

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### **FMCS Member Survey – *Ellipsaria* Questions**

John Jenkinson, *Ellipsaria* Editor

When evaluating the survey questions concerning *Ellipsaria*, we excluded the responses from the 27 people who identified themselves as new members because they probably have not had a chance to see our newsletter. Nearly all continuing members want us to continue sending e-mail reminders about *Ellipsaria* due dates (95%) and notices when new issues are posted on the FMCS web site (98%). Most members usually or always look at new issues (71%) and read most or "every bit" of the issues (60%). The evaluations of the eight regular features in *Ellipsaria* were very consistent; most received between 70 and 90% great or good scores. The highest rated feature was the Cover Story (88% great or good), followed by Announcements (83%) and Parting Shot (80%). The lowest rated feature was Board Meeting Minutes (64% great or good), followed by Regional Meetings (73%) and Society News (77%).

Perhaps the most interesting response on the *Ellipsaria* part of the survey concerned how often members have contributed something to appear in the newsletter. Fifty-eight percent of continuing members who took the survey indicated they had NEVER contributed to *Ellipsaria* !

The final three questions about *Ellipsaria* were purposely open-ended so that people could use their own words to describe their opinions about our newsletter. Of the 32 people who commented on what they like most about *Ellipsaria*, ten indicated they like the contributed articles most, and nine said they most like the fact that it is available on-line and/or is paperless. Six focused on the value of the newsletter to "really make me feel connected to the mollusk world" and two members specifically mentioned the annual freshwater mollusk bibliography – a regular feature we forgot when setting up the list for the survey.

With regard to potential improvements to *Ellipsaria*, the 20 suggestions ranged from including more reports or abstracts from regional meetings (2), to reducing the number of narrow-focus South American articles (5). One comment suggested we include a section

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where people could announce (and provide links to) new peer-reviewed publications [When items like this come in, we generally post them under Announcements.] Someone even suggested we encourage more people to contribute to the newsletter.

The “any other comments” question netted 16 responses, eight of which were some form of “keep up the good work.” Three people suggested making *Ellipsaria* available to non-members to broaden public interest in freshwater mollusks. And someone suggested using *Ellipsaria* to invite members to participate in up-coming outreach activities and report on recently-completed outreach projects.

Thanks, again, to everyone who participated in this survey. We sincerely appreciate your evaluations and will give serious consideration to your comments and suggestions.

## Regional Meetings

### FMCS Regional Mollusk Meeting Assistance Award Program

As described in the December 2012 issue of *Ellipsaria*, the FMCS has established a Regional Mollusk Meeting Assistance Award Program to facilitate regional mollusk meetings that address local and regional concerns with freshwater mollusk conservation and management. Our interest in assisting with these meetings is to achieve a common goal of bringing people together who work with freshwater mollusks to exchange information on how to conserve and protect this faunal group. These meetings are often attended by a variety of individuals, including agency personnel, academia, private citizens, scientists, and others, some of whom may not be FMCS members. Therefore, a secondary goal of this program is to increase the awareness of, and membership in, FMCS among individuals in these groups who are not yet members. Support is provided via a cash award of \$100 to the regional mollusk meeting group to help defray the costs (e.g., meeting room rental, speaker travel, break refreshments) associated with hosting their meeting. It is anticipated that about 15-20 awards will be made in a given calendar year.

The complete program description and application form may be obtained from the Awards Committee website at [http://www.molluskconservation.org/Mservices\\_awards.html](http://www.molluskconservation.org/Mservices_awards.html) . One copy of the completed application must be received by the Chair of the Awards Committee at least two months prior to the Regional Mollusk Meeting to allow for application and payment processing.

### North Carolina Freshwater Mollusk Workgroup

The 2013 Annual Meeting of the North Carolina Freshwater Mollusk Workgroup was held in Burlington, North Carolina, on February 27. The meeting was held jointly with the North Carolina American Fisheries Society Chapter annual meeting. There were about 100 attendees at the conference, which included presented papers on fishes and mollusks, and a conservation genetics workshop. One session was devoted to freshwater mussel biology and conservation, with papers on beaver and mill dam influences on mussel communities, sublethal thermal effects on mussel behavior and physiology, the use of probiotics for *in vitro* mussel propagation, the use of museum specimens to develop a catch curve analysis, and mussel and fish population restoration and augmentation in western North Carolina.

The Mollusk Workgroup meeting was attended by a subset of the larger meeting’s attendees. The 45 participants represented four state agencies, one federal agency, two universities, and two private companies. The meeting featured general updates by participants, including a summary of propagation efforts in the state, and initiatives to determine conservation strategies for listed species. Anyone interested in notes from this meeting should contact Andrea Leslie ([andrea.leslie@ncdenr.gov](mailto:andrea.leslie@ncdenr.gov)).

The Mollusk Workgroup meeting was supported by a FMCS Regional Mollusk Meeting Assistance Award, which was used to defray break refreshment costs.

Submitted by Andrea Leslie, North Carolina Natural Heritage Program

## Virginia Atlantic Slope Mollusk Recovery Group

On Friday, March 1, 2013, Brian Watson (Virginia Department of Game and Inland Fisheries) convened the 7<sup>th</sup> annual meeting of the Virginia Atlantic Slope Mollusk Recovery Group (VASMRG) in Forest, Virginia. The VASMRG was formed in 2006 to discuss and address conservation and recovery issues pertaining to freshwater mollusks in Virginia's Atlantic Slope waterways and is comprised of members from the VA Department of Game and Inland Fisheries (DGIF), U.S. Fish and Wildlife Service (USFWS), VA Department of Conservation and Recreation's Heritage Program (DCR), Virginia Tech (VT), The Nature Conservancy (TNC), U.S. Forest Service and private consultants.

Eighteen people attended the 2013 meeting. The morning session primarily revolved around propagation at the VA Fisheries and Aquatic Wildlife Center (VFAWC) at Harrison Lake National Fish Hatchery, the Aquatic Resource Recovery Center (ARRC) at White Sulphur Springs National Fish Hatchery, and the Freshwater Mollusk Conservation Center (FMCC) at Virginia Tech. In 2012, the VFAWC propagated over 450,000 juvenile mussels from 8 species and released 9,000 tagged mussels to the lower Nottoway River. The ARRC primarily continued work with the endangered James spiny mussel (JSM), producing 4,454 juveniles with 390 remaining in culture, averaging 10-13 mm in length. ARRC also has 205 JSM in culture from 2011, ranging in size from 21-29 mm. The FMCC continued annual streamside infestations with JSM as part of a FWS Biological Opinion with the VA Department of Transportation, releasing over 11,000 infested cyprinids to Craig Creek and Johns Creek.

The afternoon session continued with significant surveys, conservation activities, and research projects:

- DGIF and DCR reviewed results of mainstem James River and tributary surveys conducted from 2010-2012. Ten sites and 43 locations on the James River and 98 tributary sites were surveyed with 9 live species collected, including the endangered JSM and state threatened green floater.
- Alderman Environmental Services reviewed their Section 6-funded 2011-2012 dwarf wedgemussel surveys, resulting in positive finds only in the upper Po River, which were new locations at which the species was documented. However, previous downstream sites and sites in the Nottoway River and Aquia Creek resulted in negative finds.
- DGIF also reviewed a lower Atlantic Slope river survey contracted with The Catena Group (TCG) and a Rivanna River tributary survey conducted by Brett Ostby and funded by TNC to determine presence and status of the JSM. Twenty-one field days and 123 sites have been surveyed by TCG for the lower Atlantic Slope project, with 16 species documented. Additional sites will be surveyed in the spring of 2013 as the project concludes. Ostby surveyed the entirety of 5 Rivanna River tributaries in 2011-2012 – Swift Run, Wards Creek, Rocky Creek, Buck Mountain Creek and Piney Creek. Four species were documented and of the 112 reaches surveyed, mussels were found in 82 and JSM in 24 and all 5 streams.

Conservation activities discussed included the public mussel event and release on the Rivanna River in June 2012; the South River/DuPont Natural Resource Damage Assessment and Restoration case, and South River mussel assessment project; proposed Nottoway River water withdrawal; raccoon trapping along Johns Creek due to JSM predation; and state conservation plans for Atlantic pigtoe and green floater, and the regional assessment/conservation plan for brook floater.

Research activities discussed included the Atlantic pigtoe life history assessment at Virginia Tech and the DGIF JSM mark-recapture project, which was presented at the FMCS symposium in Guntersville, AL. The meeting wrapped up with an overview of the "Crayfishes of VA" guide that is currently being developed with anticipated release in winter 2013/2014, and the VA terrestrial snail web atlas, due for launch in June 2013.

For more information about this meeting, contact Brian Watson at [brian.watson@dgif.virginia.gov](mailto:brian.watson@dgif.virginia.gov) or (434) 525-7522, x 114.

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## Announcements

### **Federal Office of Government Ethics Revises Rule Concerning Service on Nonprofit Organizations**

Federal employees, once again, have the opportunity to serve as officers, directors, or trustees of nonprofit organizations without fear of violating a federal criminal statute. On March 6, 2013, the federal Office of Government Ethics (OGE) issued a final rule that amends how the statute is interpreted. Under this amendment, federal employees may serve nonprofit organizations because OGE determined that the possibility of a conflict of interest between the employee's loyalty to the government and any fiduciary duties to the organization is remote. The amendment eliminates waivers because regulations are already in place that allow federal employers to approve an employee's participation in nonprofit organizations ahead of time and to require employees to document, limit, or end their service to nonprofit organizations if conflicts of interest do arise. The Federal Register article of this final rule is available here: <http://www.gpo.gov/fdsys/pkg/FR-2013-03-06/html/2013-05243.htm>

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### **Request for Contributors to the North American Freshwater Mussel Atlas**

The Co-chairs of the Mussel Status and Distribution Standing Committee are requesting volunteers to provide species accounts for the North American Freshwater Mussel Atlas to be published as a digital document by the FMCS. Instructions for Authors and template files are posted on the FMCS website under Committees, Mussel Distribution and Status, North American Mussel Atlas

( [http://molluskconservation.org/MUSSELS/Mussel\\_Atlas.html](http://molluskconservation.org/MUSSELS/Mussel_Atlas.html) ). A current list of assigned authors is also posted on the website at the same location under List of Taxa and Person Responsible. At this time, only ~25% (93 of 365) of the taxa proposed for accounts have any author assigned. First draft species accounts will be due by April 22, 2014 (Earth Day) which also coincides with the last day of the 2014 FMCS Workshop in Portland, Maine. Final species accounts will be due the week of the 2015 FMCS Symposium, which coincides with the 25th anniversary of the society.

Volunteers should email their species requests to John Harris ([omibob1@gmail.com](mailto:omibob1@gmail.com)) and Arthur Bogan ([arthur.bogan@naturalsciences.org](mailto:arthur.bogan@naturalsciences.org)). A corresponding co-author will be designated by the Co-chairs.

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### **2014 FMCS Workshop "Mussel Studies and Regulatory Process Associated with Dam Removals"**

The next FMCS workshop will be held in beautiful coastal Maine next spring, April 21-22 2014, in Portland, Maine.

For a variety of reasons, in recent years there has been increasing interest and success in the removal of a number of large and small dams. Dams are often associated with negatively affecting mussel populations, so the expectation is that dam removal will improve aquatic habitat and freshwater mollusk communities in the affected reaches. In some cases where reservoirs are small or riverine, freshwater mussels may be abundant and the removal and restoration of the stream may affect existing resident mussel communities. It is also important to have a good understanding of the state and federal regulatory process involved in dam removals to facilitate planning. Some states have developed a regulatory permitting process specific to dam removals, or have guidelines on both pre- and post dam removal environmental studies, including mussel studies.

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The intent of this workshop is to provide a “lessons learned” from past studies and removal efforts and to help guide efforts for future dam removals and the protection and restoration of mussel populations. For example, mussel studies associated with two mainstem Penobscot River dam removals will be presented and a site visit to the removal locations will be offered if of interest as well as other dam removal projects that have been conducted.

Contact Mary McCann (207-239-3873 [mary.mccann@hdrinc.com](mailto:mary.mccann@hdrinc.com)) or Alan Christian (617-287-6639; [alan.christian@umb.edu](mailto:alan.christian@umb.edu)) if you have information you would like to share during this Workshop on mollusk studies associated with a dam removal.

Holiday Inn by the Bay, located in Portland, Maine, will be the venue for this Workshop. The hotel is in walking distance of the Portland’s Old Port area and working waterfront. The hotel also provides free shuttle service to and from the Portland airport, and free parking. Portland is a vibrant community and is known for its many local breweries and eateries -- and for lobster and other seafood of course! Hope to see you there!



## Upcoming Meetings

**June 23 – 26, 2013** -- Western Society of Malacologists 46<sup>th</sup> Annual Meeting, San Diego, California.  
<http://biology.fullerton.edu/wsm/>.

**July 21 – 25, 2013** – Society for Conservation Biology 26<sup>th</sup> International Congress for Conservation Biology, Baltimore, Maryland Theme: "*Connecting systems, disciplines and stakeholders*"  
<http://www.conbio.org/mini-sites/iccb-2013>

**July 21 – 28, 2013** – The American Malacological Society will take part in the 2013 World Congress of Malacology to be held in the Azores. More information is available at:  
[http://www.malacological.org/meetings/wcm2013\\_circular1.pdf](http://www.malacological.org/meetings/wcm2013_circular1.pdf)

**November 17 – 21, 2013** -- Society of Environmental Toxicology and Chemistry (SETAC) 34<sup>rd</sup> North American Annual Meeting, Gaylord Opryland, Nashville, Tennessee, USA Theme: *Harmonizing Science Across Disciplines* <http://www.setac.org/?page=SETACMeetings>

**March 29 -- April 2, 2014** -- National Shellfisheries Association Annual Meeting, Hyatt Regency Jacksonville Riverfront Hotel, Jacksonville, Florida, Theme: [yet to be announced]  
<http://www.shellfish.org/annual-meeting> .

**April 21 – 22, 2014** – FMCS Workshop, Holiday Inn by the Bay, Portland, Maine, USA  
Theme: *Mussel Studies and Regulatory Process Associated with Dam Removals.*

## Contributed Articles

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

### A Carnivorous Aquatic Gastropod in the Pet Trade in North America: the Next Threat to Freshwater Gastropods?

**Arthur E. Bogan and Eric H. Hanneman**

North Carolina State Museum of Natural Sciences, 11 West Jones, St. Raleigh, NC 27601

North America has been subject to a wide variety of alien species being introduced both actively and passively into our freshwaters. Some are food items introduced intentionally, such as the Asian Clam (*Corbicula fluminea*), while others are introduced by accident, such as the Zebra Mussel (*Dreissena polymorpha*) and the New Zealand Mudsnail (*Potamopyrgus antipodarum*). Both of the species have rapidly become major invasive pest species.

Another species that has been in the aquarium trade in the United States since about 2007 that may become a major pest is the predatory Assassin Snail (*Clea helena*). This species also goes by the names Snail Eating Snail, Killer Snail, or Bumble Bee Snail. It is sold in the aquarium trade as a biological means to control aquaria overrun by other snails including *Physa* sp., Ramshorn Snails (*Planorbella* sp. or *Helisoma* sp.) and the introduced Livebearing Trumpet Snail, also known as the Malaysian Trumpet Snail, Red-rimmed Melania (*Melanoides tuberculata*). Livebearing Trumpet Snails are often moved around on aquatic vegetation in the aquarium trade and easily become a major pest in aquaria. Assassin Snails will also eat introduced Mystery Snails (*Cipangopaludina* sp.).

*Clea helena* (Meder in Philippi, 1847), also listed as *Clea (Anentome) helena* and *Anentome helena*, is one of six species in the genus *Clea* reported from Malaysia and Indonesia, Thailand, and Laos was originally described from Java (Van Benthem Jutting 1929; 1959; Brandt 1974). *Clea helena* is a member of the predominately marine gastropod family Buccinidae and is reported not to be restricted to running water and is found in lakes and ponds (Brandt 1974). The predominate native food of the Assassin Snail is decaying animals, live worms and snails (Brandt 1974). Reports from aquarists indicate it also consumes fish eggs and attacks shrimp. [See also Wikipedia [http://en.wikipedia.org/wiki/Clea\\_helena](http://en.wikipedia.org/wiki/Clea_helena) [Accessed 6 March 2013].

*Clea helena* reaches a shell length of 18-28 mm, the shell is elongate conical, ranging in color from yellow or straw colored to brown, uniform colored or with one to three brown to black spiral bands, shell with axial ribs and six to eight whorls. Aperture is large and is about two thirds of the shell length, with a basal siphonal canal (Brandt 1974). This species is reported to be most active at night, lays clear soft eggs, one egg laid every 10 days or so. Eggs take about three weeks to hatch and four or more weeks to mature to adulthood. In this species, the sexes are reported as separate.

Use of the Assassin Snail is reported in European literature as a successful biological agent for control of other harmful snails in aquaria (e.g. Butot 1954; Van Neil 1954; Behrendt 2009; Schiffbauer 2009; Smid 2009). We have not seen any articles in the literature for North America. Mienis (2011) cautioned about the wide sale of the Assassin Snail throughout Israel and the potential for devastation of the native aquatic gastropod fauna. The Invasive Species Compendium <http://www.cabi.org/isc/?compid=5&dsid=108187&loadmodule=datasheet&page=481&site=144> lists *Clea helena* but notes "It has not been reported in the literature as an invasive species but is potentially a threat in warmer regions for a number of reasons." They continue with "it is able to



Figure 1. *Clea helena* shell (NCSM 83256) purchased in a shop in Wake County, North Carolina. Total shell length is 14.4 mm.

reproduce under aquarium conditions. Finally, under aquarium conditions at least, it will readily consume small aquatic snail species that it would not encounter in its natural habitat, and there is no reason to suppose it would be any less predatory if introduced populations became established outside the species' natural range." An aquarist observed *Clea helena* had been kept in aquaria outside over the winter in the Seattle area and the snails survived. This does not bode well for this species being too limited by climate in the United States.

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### Laboratory Trials Show flutedshell (*Lasmigona costata*) Transform on Several Fishes

**Jade Thomason<sup>1</sup>, Mark Hove<sup>1</sup>, Bernard Sietman<sup>2</sup>, Matt Berg<sup>3</sup>, Stephanie Anderson<sup>3</sup>, Samantha Bump<sup>2</sup>, Ashley Lindeman<sup>2</sup>, Nicole Ward<sup>2</sup>, Scott Morley<sup>3</sup>, Shepard Berreth-Doran<sup>3</sup>, and Clay Poeschl<sup>3</sup>**

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The flutedshell (*Lasmigona costata*) is a species of special concern in Minnesota and life history information is needed to improve conservation efforts. We followed standard protocol to identify suitable glochidia hosts (Fritts *et al.*, 2012). Forty-nine fish species were infested with flutedshell glochidia and 37 species facilitated metamorphosis (Table 1). Juveniles released from suitable hosts between 9-31 days after inoculation, and unsuitable hosts sloughed glochidia between 2-17 days. Creek chub, green sunfish, rainbow darter, white sucker, and yellow perch produced particularly high numbers of juveniles.

Laboratory trials suggest flutedshell is a host generalist but there have been very few observations from natural conditions to verify this hypothesis. Previous studies have reported brown bullhead, bowfin, northern pike, northern studfish, some minnows, suckers, sculpins, several sunfishes, and perches as suitable laboratory hosts for flutedshell (Lefevre and Curtis 1912, Luo 1993, Hove *et al.*, 1994, Watters *et al.*, 1998), many of which were confirmed in our study. Weiss and Layzer (1995) found flutedshell naturally infesting gizzard shad and river redhorse. As a future part of this study, we hope to recover juvenile flutedshell from naturally infested fishes.

Table 1. Fish host trials for the flutedshell, *Lasmigona costata*. Fishes were collected from Minnesota except for those collected from Missouri (MO), upper east coast river (EC), or from a local pet store (PS). The following laboratories contributed data (water temp. in parenthesis): U - UMN (21-22°), M - MN DNR (21-24°C), G - GHS (18°C)

Common Names	Scientific Names	Source/ Lab. Site	No. infested/ No. survivors	Juveniles recovered
longnose gar	<i>Lepisosteus osseus</i>	/M	2/2	0
bowfin	<i>Amia calva</i>	/M, U	3/3	25
American eel	<i>Anguilla rostrata</i>	EC/U	1/1	3
goldfish	<i>Carassius auratus</i>	/U	10/10	0
whitetail shiner	<i>Cyprinella galactura</i>	MO/U	1/0	17
spotfin shiner	<i>Cyprinella spiloptera</i>	/M	6/4	41
steelcolor shiner	<i>Cyprinella whipplei</i>	MO/U	3/1	33
common carp	<i>Cyprinus carpio</i>	/M, U	10/8	1
creek chubsucker	<i>Erimyzon oblongus</i>	MO/U	2/0	0
brassy minnow	<i>Hybognathus hankinsoni</i>	/M	1/1	9
common shiner	<i>Luxilus cornutus</i>	/M	5/5	65
honeyhead chub	<i>Nocomis biguttatus</i>	/M	2/1	8
golden shiner	<i>Notemigonus crysoleucas</i>	/M	1/1	10
spottail shiner	<i>Notropis hudsonius</i>	/M	1/1	6
Ozark minnow	<i>Notropis nubilus</i>	/U	5/0	0
mimic shiner	<i>Notropis volucellus</i>	/M	5/5	1
southern redbelly dace	<i>Phoxinus erythrogaster</i>	/M	1/1	23
bluntnose minnow	<i>Pimephales notatus</i>	/M, U	4/3	13
longnose dace	<i>Rhinichthys cataractae</i>	/M	3/2	14
creek chub	<i>Semotilus atromaculatus</i>	/M	3/2	140
white sucker	<i>Catostomus commersonii</i>	/M, G, U	7/5	200
northern hogsucker	<i>Hypentelium nigricans</i>	/G	5/5	64
bigmouth buffalo	<i>Ictiobus cyprinellus</i>	/M	1/1	30
shorthead redhourse	<i>Moxostoma macrolepidotum</i>	/M	1/1	25
black bullhead	<i>Ameiurus melas</i>	/G, M	6/6	2
yellow bullhead	<i>Ameiurus natalis</i>	/G, U	13/13	2
brown bullhead	<i>Ameiurus nebulosus</i>	/G	1/1	0
channel catfish	<i>Ictalurus punctatus</i>	/M, U	10/9	1
tadpole madtom	<i>Noturus gyrinus</i>	/U	2/2	0
flathead catfish	<i>Pylodictis olivaris</i>	/M	3/3	0
eelpout	<i>Lota lota</i>	/U	5/5	0
blackspotted topminnow	<i>Fundulus olivaceus</i>	MO/M	5/5	42
mosquitofish	<i>Gambusia affinis</i>	MO/M, U	5/4	45
black molly	<i>Poecilia sphenops</i>	PS/M	4/1	48
rock bass	<i>Ambloplites rupestris</i>	/U	1/1	0
green sunfish	<i>Lepomis cyanellus</i>	/M, G, U	15/15	227
pumpkinseed/green sunfish	hybrid <i>L. cyanellus/L. gibbosus</i>	/M	3/3	107
pumpkinseed	<i>Lepomis gibbosus</i>	/M, G, U	18/18	51
orange spotted sunfish	<i>Lepomis humilis</i>	/U	2/2	1
bluegill	<i>Lepomis macrochirus</i>	/M, G, U	25/25	80
redeer sunfish	<i>Lepomis microlophus</i>	MO/M, U	4/4	55
black crappie	<i>Pomoxis nigromaculatus</i>	/G, M	5/5	2
smallmouth bass	<i>Micropterus dolomieu</i>	/U	10/9	12
largemouth bass	<i>Micropterus salmoides</i>	/M, G	5/4	13
greenside darter	<i>Etheostoma blennioides</i>	MO/U	1/0	0
rainbow darter	<i>Etheostoma caeruleum</i>	/U	19/17	531
yellow perch	<i>Perca flavescens</i>	/M, U	9/9	200
walleye	<i>Sander vitreus</i>	/M	5/2	61

Fish nomenclature follows Robins *et al.*, 1991

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## Chippewa River Mussel Bed Holds Federally endangered *Plethobasus cyphus*

Mark Hove<sup>1,2</sup>, Bernard Sietman<sup>3</sup>, Matt Berg<sup>4</sup>, Dan Hornbach<sup>2</sup>, and Sarah Boyer<sup>2</sup>

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As part of a research effort to describe the early life history of the sheepsnose (*Plethobasus cyphus*), we recorded living mussel species encountered in the Chippewa River near Meridean, WI (Figure 1). We observed 25 mussel species including the federally endangered sheepsnose (Figure 2) between 2008-2011 (Table 1). Sheepsnose was relatively common at this site, such that we could routinely collect about 20 adults in 2-3 hours, and we occasionally found young individuals (Figure 3). A status review of sheepsnose by Butler (2002) suggests the Chippewa River population is among the best in the Upper Mississippi River system.

Most of the species we observed had been reported previously from this river. The Chippewa River reach between Meridean (≈25 km downstream of Eau Claire) and Durand, WI (≈40 km downstream) was surveyed by Balding (2002) and Heath *et al.*, (2004), and a few locations downstream of Durand were surveyed by Mathiak (1979). Our observation of *Quadrula quadrula* is the first we could find for this species in the Chippewa River drainage, although it is common downstream in the Mississippi River (Sietman 2003). We did not observe *Truncilla donaciformis* or *Simpsonaias ambigua*; these two species are small and we may have missed them.



Figure 1. Chippewa River near Meridean, Wisconsin



Figure 2. Chippewa River sheepnose in natural position. Note the branched incurrent aperture papillae.



Figure 3. Young sheepnose from the Chippewa River

Table 1. Mussel species observed in the Chippewa River near Meridean, Wisconsin, and downstream. Nomenclature follows Turgeon *et al.*, 1998.

Species	Mathiak 1979	Balding 2002	Heath 2004	This study
<i>Actinonaias ligamentina</i>		X	X	X
<i>Alasmidonta marginata</i>		X	X	X
<i>Amblema plicata</i>	X	X		X
<i>Cyclonaias tuberculata</i>				X
<i>Elliptio dilatata</i>				X
<i>Ellipsaria lineolata</i>		X		X
<i>Fusconaia flava</i>	X	X	X	X
<i>Lampsilis cardium</i>		X	X	X
<i>L. siliquoidea</i>		X		X
<i>Lasmigona complanata</i>	X	X	X	X
<i>L. costata</i>		X	X	X
<i>Leptodea fragilis</i>		X	X	X
<i>Ligumia recta</i>		X	X	X
<i>Obliquaria reflexa</i>		X		X
<i>Obovaria olivaria</i>		X	X	X
<i>Plethobasus cyphus</i>		X	X	X
<i>Pleurobema sintoxia</i>		X	X	X
<i>Potamilus alatus</i>		X	X	X
<i>P. ohiensis</i>		X	X	
<i>Pyganodon grandis</i>		X		X
<i>Quadrula metanevra</i>		X		X
<i>Q. pustulosa</i>		X		X
<i>Q. quadrula</i>				X
<i>Simpsonaias ambigua</i>		X	X	
<i>Strophitus undulatus</i>		X	X	X
<i>Toxolasma parvus</i>	X	X		
<i>Tritogonia verrucosa</i>		X	X	X
<i>Truncilla donaciformis</i>		X		
<i>T. truncata</i>		X	X	X
<i>Utterbackia imbecillis</i>	X			

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**Discovery of a Reproducing Population of the Critically Endangered Freshwater Mussel *Quadrula mitchelli* in Central Texas**

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The false spike (*Quadrula mitchelli*) is a state threatened freshwater mussel (Bivalvia: Unionidae) endemic to central Texas and currently under review for federal listing under the Endangered Species Act (USFWS 2009). The species was presumed extinct (Howells et al., 1996; Haag, 2009a; Howells, 2011) until a very-recently deceased individual was found on the San Saba River in 2011 (Randklev et al., 2011). Later surveys in central Texas produced 7 live specimens of *Q. mitchelli* on the Guadalupe River in south-central Texas (Randklev et al., 2011). While these findings demonstrate the continued existence of *Q. mitchelli* in central Texas, it is important to note that the live specimens found were all adults in the same size class. Freshwater mussels can be long-lived, with life spans ranging from <10 to approximately 130 years (Haag, 2009b), and functionally extinct populations, composed solely of non-reproducing adults, have been reported from heavily altered river systems (Layzer et al., 1993; Hughes and Parmalee, 1999). The lack of a range of size classes in the only known population of *Q. mitchelli* left the reproductive status of the species in question.

In September 2012 we located eight live specimens of *Q. mitchelli* during a survey on the Guadalupe River near Cuero, Texas. The recently dead valves of an additional six specimens (Figure 1) were also collected at the same location and returned to the Elm Fork Natural Heritage Museum at The University of North Texas. Field identification of *Q. mitchelli* using the recently dead valves was verified by Robert Howells, a 22 year veteran of the Texas Parks and Wildlife Department and a recognized expert on freshwater mussels in Texas. Both live and dead specimens represented a range of size classes; shell lengths of the live specimens were 31.5 - 57.5 mm, while lengths of the recently dead were 23.8 - 48.0 mm. Because shell length is an indicator of relative age in freshwater bivalves (Harmon and Joy, 1990, Haag, 2009b), this finding constitutes the first documentation of a *reproducing* population of *Q. mitchelli* in at least 30 years (Howells, 2011). The discovery of this population reaffirms the existence of relic populations of this critically endangered species in the Guadalupe River and extends the known distribution of living *Q. mitchelli* approximately 101 river kilometers downstream from the only other known living population documented by Randklev et al. (2011). Moreover, the discovery of two relic populations of *Q. mitchelli* in the last two years suggests a dedicated survey effort targeting remote reaches that lie far from easy access points such as road crossings may uncover more locations where the species persists. Finally, the reproductive biology and life history of *Q. mitchelli* are unknown and

the discovery of a reproducing population offers a rare opportunity to study reproductive traits (e.g. timing, fertilization success, fecundity, and host fish species) that may be critical for the development of effective management plans for the species.



Figure 1. Recently dead valves of *Quadrula mitchelli* from the Guadalupe River near Cuero Texas. The valves pictured represent the largest (48.0 mm) and second smallest (27.7 mm) of the spent valves that were collected.

**Acknowledgement** -- We would like to thank Robert G. Howells at BioStudies for verifying the species identification.

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### **Comparative Ranges of Freshwater Mussels and Freshwater Drum in Texas: Clues to Possible Host Relationships**

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Among the 15 unionid taxa currently listed as legally threatened in Texas, host fishes are only known for one, Texas Fatmucket (*Lampsilis bracteata*) (Howells 1997; Johnson et al. 2012). Among the other species, Haag (2012) hypothesized that Texas Fawnsfoot (*Truncilla macrodon*) and Mexican Fawnsfoot (*T. cognata*) likely use Freshwater Drum (*Aplodinotus grunniens*), given that two other species of the genus require this host fish. Comparison of collection and distribution records for Freshwater Drum and both endemic fawnsfoot taxa suggest Haag is likely correct.

Mexican Fawnsfoot occurs only in the Rio Grande drainage (Howells 2010c) and Texas Fawnsfoot is restricted to the Brazos and Colorado rivers of Central Texas (Howells 2010a, b). Freshwater Drum ranges from Yucatan to Hudson Bay, including much of Texas except for the far west where permanent fresh water is limited (Fremling 1979; [www.fishesoftexas.org](http://www.fishesoftexas.org)). In the Rio Grande, Freshwater Drum has been documented throughout the range of Mexican Fawnsfoot (Figure 1). However, collection records for Freshwater Drum (Fremling 1979; [www.fishesoftexas.org](http://www.fishesoftexas.org)) from the Brazos and Colorado rivers (Figure 1) indicate several tributaries where this fish is apparently absent. In several streams lacking records of Texas Fawnsfoot also have no documentation of Freshwater Drum (Figure 2).

No Freshwater Drum records were found for the upper Bosque, San Gabriel, or Lampasas rivers of the Central Brazos drainage, and mussel collections in these waters failed to find Texas Fawnsfoot as well. In recent decades, these rivers have experienced scouring floods and periodic dewatering. These resultant unfavorable environmental conditions could preclude both species. Perhaps more curious is the absence of both Freshwater Drum and Texas Fawnsfoot records from the upper and central Leon River, also in the Central Brazos drainage. This river continues to support a diverse unionid assemblage, including Smooth Pimpleback (*Quadrula houstonensis*), another state-threatened species (Randklev et al. 2012). In the Colorado River drainage, both Freshwater Drum and Texas Fawnsfoot records are lacking from the Pedernales River; however, Pedernales Falls in the lower river reaches likely prevents several fish and mussel species from accessing the upper reaches of this system.

The lack of Freshwater Drum records from the San Sab River, also in the Colorado River drainage, may well be more a function of lack of sampling and reporting than absence of this fish. Recent collections have confirmed the presence of Texas Fawnsfoot in the lower reaches of the San Saba River not far from its confluence with the Colorado River. Bleufer (*Potamilus purpuratus*), that uses Freshwater Drum as its only host, also occurs in both the San Saba and Leon rivers, suggesting this fish is probably present, but undocumented.

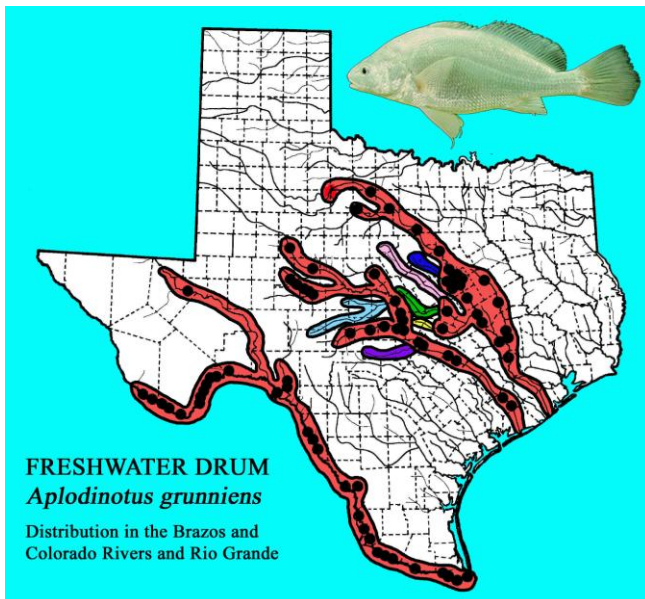


Figure 1. Range and collection records of Freshwater Drum (*Aplodinotus grunniens*) in the Brazos and Colorado rivers and Rio Grande drainage in Texas (red). Rivers with no collection records in their upper reaches include the Bosque (dark blue), Leon (pink), Lampasas (green), San Gabriel (yellow), San Saba (light blue), and Pedernales (violet) rivers. Records in other drainages are not shown.

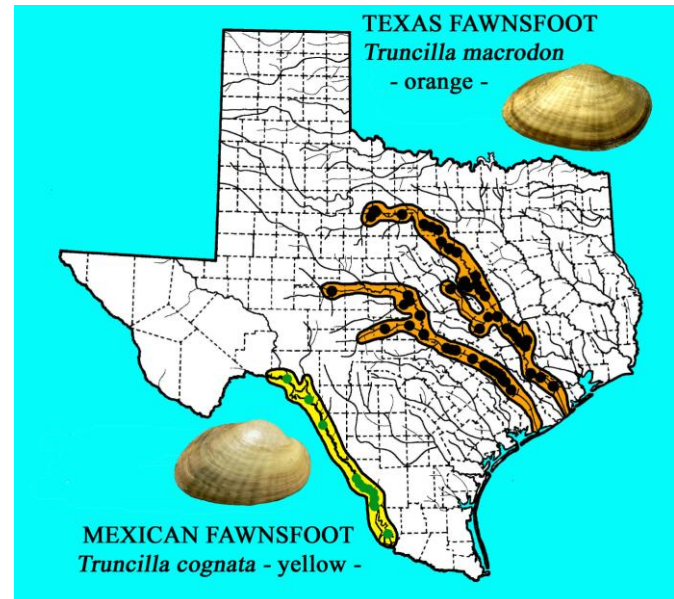


Figure 2. Ranges and collection records of Texas Fawnsfoot (*Truncilla macrodon*) in the Brazos and Colorado rivers (orange), and of Mexican Fawnsfoot (*T. cognata*) in the Rio Grande (yellow).

Freshwater Drum is widely distributed, but not highly regarded as an important game or forage fish. It is among only a few native freshwater fishes with highly buoyant eggs, such that populations in impounded waters above overflow dams may not persist for extended periods. It is also sensitive to capture, transport, and handling, and can be aggressive in confinement. Some of these traits make Freshwater Drum difficult to manage in the laboratory during host determination studies.

Both truncillids have been so rare that reproductive biology (e.g., glochidia, seasons) remains unknown. Definitive host determination for either endemic fawnsfoot is therefore likely to prove challenging. The assumption that Freshwater Drum is the likely host for both Texas Fawnsfoot and Mexican Fawnsfoot, however, may well be correct based on distribution records for these species.

**Acknowledgment:** Thanks to C.R. Randklev for review comments on this note.

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### **Additional Information Concerning the Conquest of Europe by the Invasive Chinese Pond Mussel *Sinanodonta woodiana*. 31. News from France, Italy, Poland, Serbia, and Ukraine**

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Papers dealing with the presence of the invasive Chinese Pond mussel *Sinanodonta woodiana* (Lea, 1834) in Europe continue to be published. Although I regularly search the internet for such papers, sometimes they become available by means of a website many years after they had been published in print. This has happened with an important paper published in Ukraine more than 12 years ago.

#### **France**

The pre-published paper by Thomas & Chovet referred to in the previous instalment (Mienis, 2013) has been published now in MalaCo No. 9 (Thomas & Chovet, 2013).

#### **Italy**

Kamburska, Lauceri & Riccardi (2013) reported the first finds of the Chinese Pond mussel in the southern part of the Lake Maggiore. It had been documented already from another North-Italian lake: Lake Garda (Cappelletti et al., 2009). According to the morphology of the figured mussels, we are dealing here with rather unusual slender specimens. This feature has raised some doubts among some Dutch malacologists (including myself) whether we are indeed dealing with *Sinanodonta woodiana* here.

#### **Poland**

Urbańska & Mizera (2009) have written an interesting article on how to recognize a mussel belonging to the invasive species *Sinanodonta woodiana*. Unfortunately it is written in Polish and, in spite of the already available material on the internet, an English version of it would be most welcome.

#### **Serbia**

Although *Sinanodonta woodiana* was encountered in the Serbian part of the Danube, it was far less common than the Ponto-Caspian species *Lithoglyphus naticoides* (Pfeiffer, 1828) and *Dreissena polymorpha* (Pallas, 1771).

#### **Ukraine**

The classic paper by Yurishinets & Korniyushin (2001) dealing with the first discovery of the Chinese Pond mussel in Ukraine has now become available on line. The authors give not only a full description of the external morphology of the shells of this exotic mussel but also of its glochidia.

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### Additional Note Concerning the (Semi-)Aquatic Molluscs of the Formerumerwiel, Terschelling, the Netherlands

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In a previous issue of *Ellipsaria* (Mienis, 2013), I published some further data concerning the (semi-)aquatic mollusc of the Formerumerwiel, a large brackish water pool on the island Terschelling, Province Friesland, the Netherlands. I was able to report the presence of six species in that lake in the autumn of 2012.

Only recently, the material was transferred permanently to the Mollusc Collection in the Steinhardt National Collections of Natural History, Tel Aviv University. To my surprise, two small gastropod shells dropped out of the apertures of specimens belonging to *Stagnicola palustris*. These two shells belonged to as many species: *Gyraulus crista* and *Gyraulus albus*. The former had been collected already once before, in 1969, but the latter is the first record for this interesting brackish water pond. Ten species are now known from the Formerumerwiel (Table 1).

Table 1: Gastropods recorded so far from the brackish water pool Formerumerwiel on the island Terschelling, the Netherlands, during the period 1969-2012.

Family	Species	Year First Collected	Presence in 2012
Hydrobiidae	<i>Potamopyrgus antipodarum</i> *	1969	+
Lymnaeidae	<i>Galba truncatula</i>	2012	+
	<i>Stagnicola palustris</i>	1969	+
	<i>Radix balthica</i>	1969	+
Physidae	<i>Haitia acuta</i> *	2011	-
	<i>Physa fontinalis</i>	1969	-
Planorbidae	<i>Gyraulus albus</i>	2012	+
	<i>Gyraulus crista</i>	1969	+
	<i>Planorbis planorbis</i>	1969	+
Succineidae	<i>Oxyloma elegans</i>	2011	+

\* Invasive, exotic species.

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## Molluscs on Water Lilies, 1: Snails and Mussels on *Nymphaea alba* and *Nuphar lutea* in Edam, the Netherlands

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Water lilies are well-known perennial aquatic plants usually with large floating leaves and gorgeous flowers, which continue flowering for quite some time. Most continents have their own wild species; however, numerous species are also being cultivated as attractive pond plants and are distributed over large areas outside their native ranges. These cultivated plants are often hybrids and sometimes it is nearly impossible to tell the origin of them (Figure 1).

Two autochthonous species of water lilies occur in the Netherlands: the European White Water lily *Nymphaea alba* and the Yellow Pond lily *Nuphar lutea* (Figure 2). They are commonly seen in built up areas in the province of North-Holland, but most of these plants, especially those occurring north of Amsterdam, do not occur there in a natural way.



Figure 1. A cultivated (hybrid?) *Nymphaea*, somewhere in a ditch among the meadows near Edam, the Netherlands.



Figure 2. A small patch of the European White Water lily *Nymphaea alba* in a canal in Edam, the Netherlands.

The floating leaves of the water lilies form favourite habitats of certain aquatic molluscs. Especially cap-like species like *Acroloxus* and *Ferrissia*, but also other Basommatophora and in a lesser degree Prosobranchia, are among the gastropods often encountered among the inhabitants of water lily leaves.

Many years ago, I started a survey in counting cap-like snails on water lily leaves in order to know whether the native *Acroloxus lacustris* could cope with the establishment of the invasive, exotic *Ferrissia clessiniana*. Not only did I count these cap snails but also all other species present on ten randomly picked leaves. In this way, I established the percentage of occupation of the leaves by snails and their mean density per leaf in a particular stand of either *Nymphaea* or *Nuphar* (Mienis, 2001, 2002 and 2003). Since these surveys were usually carried out in autumn, when the leaves of the water lilies already had started to weather, the removal of ten leaves did not markedly influence the health of the water lilies. It is advisable to put a plastic plate under the leaf while removing it because several particular snail species tend to drop easily from the leaf while cutting it.

On 13 October 1998, I checked the presence of aquatic snails and mussels on the leaves of the European White Water lily *Nymphaea alba* and the Yellow Pond lily *Nuphar lutea* at two localities in Edam, North-Holland, the Netherlands. On 11 October 2005, a third locality was investigated. All three localities are canals within the town Edam and, at some time in the past, these water lilies had been planted in the canals.

The results of the snail counts at the three localities are given in Tables 1-3. The number of species ranged from 5-7, while the number of specimens ranged from 29 to 227. The large number of snails at the third locality (Table 3) was caused by the omnipresence of the invasive *Ferrissia clessiniana*: 214 specimens, or a mean number of 21.4 specimens per leaf. Noteworthy is still the fact that the second locality (with the lowest number of specimens) is located in the same canal at a distance of only 120 m from the third locality (with the highest number of specimens)!

Table 1: Edam, canal between Zuidervesting and Singelweg, west-side; on *Nymphaea alba*, 13 October 1998

Species	Samples										Percent Occupation of Leaves	Mean Specimens Per Leaf
	1	2	3	4	5	6	7	8	9	10		
<i>Bithynia leachii</i>	-	2	3	1	-	1	-	-	-	-	40%	0.7
<i>Bithynia tentaculata</i>	-	2	-	-	-	-	-	-	-	-	10%	0.2
<i>Valvata cristata</i>	-	-	2	-	-	-	-	-	-	-	10%	0.2
<i>Acroloxus lacustris</i>	3	1	13	9	1	1	-	5	2	-	80%	3.5
<i>Haitia acuta</i>	1	-	-	-	-	-	-	-	-	-	10%	0.1
<i>Physa fontinalis</i>	-	2	2	1	2	1	1	-	-	1	70%	1.0
<i>Anisus vortex</i>	-	-	-	1	-	-	-	-	-	-	10%	0.1

Table 2: Edam, canal between Baandervesting and Burgemeester Versteeghsingel; west-side, on *Nuphar lutea*, 13 October 1998

Species	Samples										Percent Occupation of Leaves	Mean Specimens Per Leaf
	1	2	3	4	5	6	7	8	9	10		
<i>Bithynia leachii</i>	-	-	-	-	-	-	-	-	-	1	10%	0.1
<i>Acroloxus lacustris</i>	4	-	-	-	6	3	2	-	2	2	60%	1.9
<i>Physa fontinalis</i>	-	-	-	-	-	-	-	-	1	-	10%	0.1
<i>Ferrissia clessiniana</i>	-	-	1	1	-	-	-	1	-	-	30%	0.3
<i>Anisus vortex</i>	1	1	1	-	1	-	-	-	-	-	40%	0.4
<i>Dreissena polymorpha</i>	-	-	-	1	-	-	-	-	-	-	10%	0.1

Table 3: Edam, canal between Baandervesting and Burgemeester Versteeghsingel; south-side, opposite # 22 on *Nuphar lutea*, 11 October 2005

Species	Samples										Percent Occupation of Leaves	Mean Specimens Per Leaf
	1	2	3	4	5	6	7	8	9	10		
<i>Acroloxus lacustris</i>	-	1	1	2	-	-	1	2	1	-	60%	0.8
<i>Haitia acuta</i>	-	-	-	-	1	2	-	-	-	-	20%	0.3
<i>Galba truncatula</i>	-	-	-	-	1	-	-	-	-	-	10%	0.1
<i>Ferrissia clessiniana</i>	42	17	5	48	8	30	25	16	16	10	100%	21.4
<i>Succinea putris</i>	1	-	-	-	-	-	-	-	-	-	10%	0.1

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## **The conservation status of the freshwater Pearl Mussel *Margaritifera dahurica* in Far Eastern Russia**

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Freshwater Pearl Mussels (Bivalvia: Unionoida: Margaritiferidae) are rare or endangered almost everywhere they occur (Ziuganov et al., 1994; Bogan et al., 2003; Frank and Gerstmann, 2007; Geist, 2010; Oulasvirta, 2011; Köhler et al., 2012). Many *Margaritifera* species are included in the Red List or regional Red Books as being threatened or endangered. The main reason for the decline in the density of populations is disturbance of their habitat and pollution of waters. In historical times, Pearl Mussels *Margaritifera margaritifera* (Linnaeus, 1758) in mountain rivers of north-west Europe and *Margaritifera dahurica* (Middendorff, 1850) in rivers of north-east Asia constituted the main source for pearl and nacre trade with disastrous effects for their populations (Bespalaya et al., 2012; Kochetova and Paramonova, 1998). There are many other natural reasons for low reproduction of pearl mussel populations, such as features of life cycle with limited ability of larval stage (glochidia) to attach, encyst and metamorphose to juvenile mussels on the gills of the suitable host fishes. The host fishes for *M. dahurica* in rivers of the Far East of Russia are anadromous Pacific Salmonidae (Chum Salmon, Humpback Salmon, Silver Salmon, Black Salmon, Salmon Trout). In rivers of the Upper Amur basin in Transbaikalia, the host fishes for *M. dahurica* are nonmigratory salmon: Goldilocks (*Brachymystax lenok*) and probably Taimen (*Hucho taimen*) whose density is reduced to critical level as a result of anthropogenic impact (poaching). In addition, in the rivers of Zabaikalsky Territory, muskrats actively feed on and destroy *M. dahurica*, extirpating whole populations. In consideration of the limiting factors, *M. dahurica* was included as strictly protected in the Red Book of the Zabaikalsky Territory (2012).

Such grave conditions for the Pearl Mussel, *M. dahurica*, in Transbaikalia are complicated by the reproductive behavior of Bitterlings (*Rhodeus sericeus*, Cyprinidae). The Bitterling is a freshwater fish with an unusual spawning symbiosis with freshwater mussels. The Bitterlings spawn primarily on the gills of living freshwater mussels of the Unionidae family (C. Smith et al., 2004; Reynolds et al., 2007; Kitamura et al., 2009; Bogutskaya et al., 2009), but they have also been found using the Margaritiferidae (Zhul'kov & Nikiforov, 1998; D.G. Smith & Hartel, 1999; Klishko, 2012). Where Bitterlings have been naturalized, they use every native mussel species. Even so, Bitterlings display remarkable morphological, physiological and behavioural adaptations for using mussels as spawning sites (C. Smith et al., 2004). Female Bitterlings possess long ovipositors that they use to place their eggs onto the gills of a mussel through the mussels' exhalant aperture and males fertilize the eggs by releasing sperm into inhalant aperture of the mussel.

Usually, Pearl Mussels, *M. dahurica*, occur in a colony or bed (Figure 1). During the spawning season, Bitterlings actively use Pearl Mussels as spawning and developmental sites for their offspring. The morphology of the branchial lamella of the margaritiferid mussels lack continuous vertical septa with only infrequent interlamellar junctions. Developing Bitterling embryos reside inside the mussel gills for approximately a month, during which time they develop and grow to a length of 7-8 mm. Eventually the fish leave the mussel as actively swimming pre-larva. The number of embryos in one mussel varies from 5 to 45, but may amount to 120-150 (Figure 2). The mussel with Bitterling embryos developing in its gills bears certain costs, such as deformation, perforation and damage of the demibranch epithelial walls, and competition for oxygen. Bitterling embryos seem to inhibit free water circulation through the gills of a mussel, which could have a negative impact on normal filtration by the gills and, therefore, on the feeding and respiration of the mussel. However, both mussels and Bitterlings appear to have adapted to these relationships during long-term coevolution.

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Figure 1. The colony or bed of *Margaritifera dahurica* and spawning Bitterlings, Ingoda River, Transbaikalia (Photo by: Rashid Biktogirov).



Figure 2. Bitterling embryos in the gills of *M. dahurica*, shell length 9 cm (Photo by Olga Klishko).

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## **The Asiatic Golden Mussel, *Limnoperna fortunei* (Dunker, 1857), in the Upper Uruguay River Basin, Southern Brazil: Current Situation to one year of its Regional Discovery**

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The occurrence of the Asiatic golden mussel *Limnoperna fortunei* (Dunker, 1857) (Figure 1), only freshwater/ limnic representative known of the Family Mytilidae (an invasive introduced species), was confirmed for first time in Santa Catarina's State/ SC and the system of the Upper Uruguay River Basin, central southern Brazil, in 2012 (Agudo-Padrón 2012a: 22-23, b, c; Agudo-Padrón *et al.* 2012).



Figure 1. Asiatic golden mussel *Limnoperna fortunei* (Dunker, 1857) specimens detected in the watershed of the Upper Uruguay River in Santa Catarina's State.

Presumably introduced in this region as a consequence of anthropogenic actions, and showing a relatively low population density, in June 11 2012 five field pictures and a lot (random sample) composed of 19 specimens of this exotic species were examined, presenting sizes between 6,0 and 17,0 mm of length, collected by the Technical BAESA José Manuzzi (May 30 2012) in the reservoir area between "Barra Grande" and "Machadinho" hydroelectric power plant installations, Pelotas River Basin in Anita Garibaldi Municipal District (Agudo-Padrón 2012a; Agudo-Padrón *et al.* 2012). Comparative material finally deposited in the scientific malacological collection of the Museum of Sciences and Technology, Pontifical Catholic University of Rio Grande do Sul - PUCRS, Porto Alegre/ RS (MCP 09547).

A second lot composed of 14 specimens coming from the same locality and presenting the same biometric characteristics, was deposited in the mollusk collection of the Ecology and Zoology Department, Center for Biological Sciences, Federal University of Santa Catarina State - UFSC, Florianópolis/ SC (CMOUFSC s/c).

Today, one year after its discovery, persists the inevitable and explosive invasive advancement to downstream of the golden mussel in the Upper Uruguay River Basin (Figure 2). Recently, by example, the maintenance team of the “Machadinho” hydropower plant (Agudo-Padrón 2013a: 24-Figure 5) detected the presence of individuals of this species in the "cooling system" of the plant. With this fact, it is definitely evident that the region is severely and irreversibly compromised, unfortunately with predicting of catastrophic results in the short and medium term, both for the efficiency of regional energy production and the surrounding environment (aquatic biota).

Important considerations extra about its entry into the regional environment and the biotic/ abiotic local vector agents of dispersal are further discussed in Agudo-Padrón 2013b. It is expected that within a maximum period of two years, the species will have spatially occupied the entire basin of the Upper Uruguay River (Figure 2). The species also advances to “upstream” in the middle basin region of the river, in the neighboring State of Rio Grande do Sul/ RS (Terra *et al.* 2007, Lima *et al.* 2008, Santos *et al.* 2012, Galarça *et al.* 2012, Darrigran *et al.* 2012).



Figure 2. Actual spatial invasive occupation progress, from upstream to downstream (left map), of the golden mussel *Limnoperna fortunei* (Dunker, 1857) in Santa Catarina's State/ SC, Upper Uruguay River Basin, involving the hidroelectric power plant headquarters of “Barra Grande” – geographical origin of the invasion (A), “Machadinho” (B), “Itá” (C), and its estimated occupancy of the basin in the next two years as maximum (black shading on right map).

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## First Record of the Freshwater Mussel/ Naiad *Rhipidodonta rhombea* (Wagner, 1827) (Unionoida: Hyriidae) from Upper Uruguai River Basin Region in Santa Catarina State, Central Southern Brazil

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Giving continuity to malacological research developed in the Upper section of Chapecó River Basin in “Passos Maia” Municipal District (26°41'32"S; 51°54'58"W), with elevation of 976 m, field locality in the Western region of Santa Catarina State next to SC highway 453 (Agudo-Padrón 2012 a: 22), in date 15/01/2013 a lot of four singular young native freshwater mussel/ naiad specimens were delivered to us for analysis.

The taxonomic determination of these little bivalves (10 to 14 mm of length) was based on the fundamental contribution of Simone (2006: 270), coming to the conclusion that they belong to the species *Rhipidodonta rhombea* (Wagner, 1827), representative of the family Hyriidae (Figure 1), a freshwater mussel/ naiad species not previously reported from Santa Catarina State (Agudo-Padrón 2008, 2012 b).

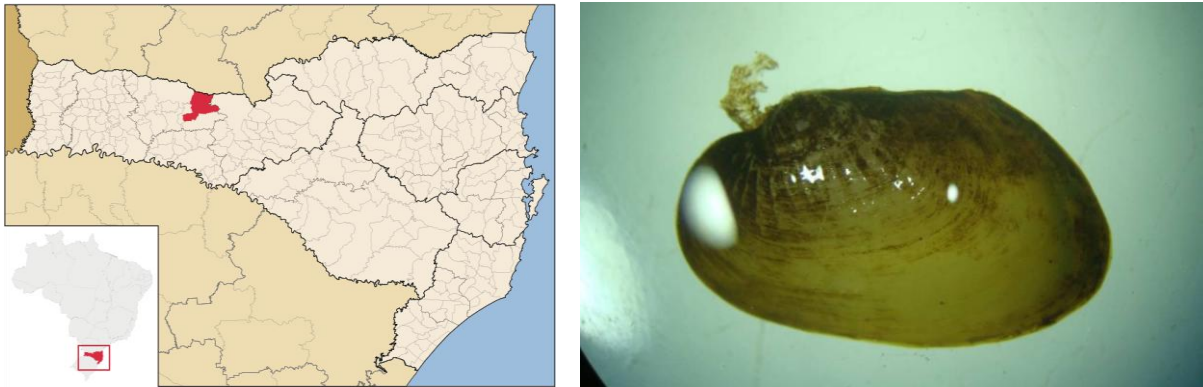


Figure 1. The location of Passos Maia Municipal District (red color) in Santa Catarina State (left), and a specimen of *Rhipidodonta rhombea* (Wagner, 1827) (right), from the Upper Chapecó River Basin  
 Photo: Leonardo Kleba Lisboa

Considered in the contribution of Pereira *et al.* (2012: 92-table III) under the specific taxonomic status *Diplodon rotundus* (Spix, 1827)\*, an “endangered” species (Machado *et al.* 2008: 207-208), this naiad is characterized by “non producing parasitic *glochidium* larvae”, sharing your habitat with little freshwater snails *Potamolithus* sp., limnic gastropod representative of the family Hydrobiidae (Figure 2) – a random sample of three specimens has been examined in this opportunity.

\* For a “*taxonomic generic discussion*” see Agudo-Padrón (2011) ...

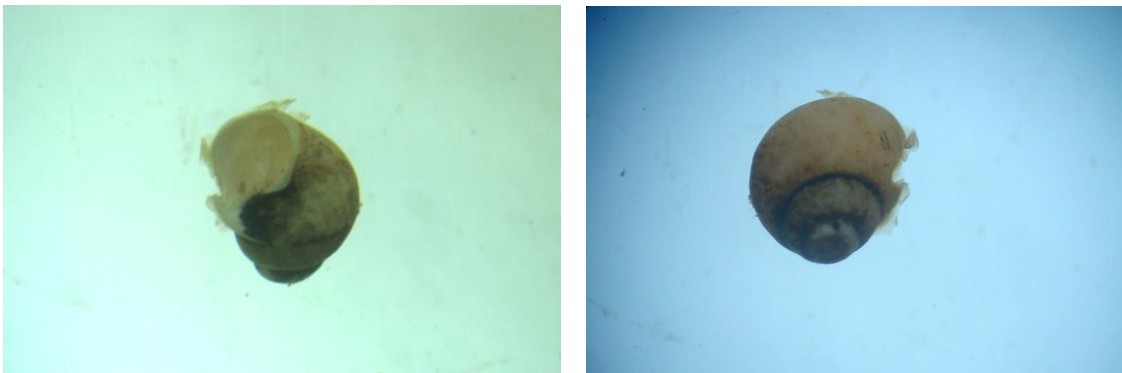


Figure 2. *Potamolithus* sp. specimens from the “Passos Maia” Municipal District, Upper Chapecó River Basin (MCP 09887). Photos: Leonardo Kleba Lisboa

Originally collected by Daniel Dinslaken, on 28/11/2012, the specimens finally were deposited in the scientific malacological collection of the “Museum of Sciences and Technology”, Pontifical Catholic University of Rio Grande do Sul - PUCRS, Porto Alegre/ RS (MCP 09882).

This short report brings to 195 the total number of continental mollusks, terrestrial and freshwater, known to the State, including 29 freshwater/ limnic bivalves (26 natives + 3 exotic invaders): 20 Unionoidea, 8 Veneroidea, 1 Mytiloidea.

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## New Geographical Records of Some Little Continental Molluscs from Santa Catarina's State, Southern Brazil region

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Based on extensive literature review and the examination of samples obtained in the course of works done in the field, the present contribution incorporates the geographical records of seven more forms (five limnic/ freshwater and two terrestrial) to previous systematic inventories of known continental molluscs of the Santa Catarina's State/ SC, central portion of southern Brazil region (Agudo-Padrón 2008, 2012, 2013), including six forms of Gastropoda (three limnic/ freshwater and one eurihaline) and one of Bivalvia (eurihaline) distributed in seven genera and six families.

The taxonomic arrangement accompanying basically the original proposal of Agudo-Padrón (2008, 2012, 2013), based on the monographic contributions of Simone (2006), Thomé *et al.* (2006) and Rios (2009). Additional information about the material deposited in museum is included. MCP – Malacological collection of "Museu de Ciências e Tecnologia da Pontifícia Universidade Católica do Rio Grande do Sul – PUCRS", Porto Alegre, RS, Brasil.

### I. Freshwater forms

Class GASTROPODA

Subclass PROSOBRANCHIA / CAENOGASTROPODA

Family HIDROBIIDAE

*Potamolithus catharinae* Pilsbry, 1911

New confirmed occurrence in "Joinville" city (Figure 1) and Municipal District (MCP 09890). Species previously cited for the State in Agudo-Padrón (2008: 152, 2011: 21).

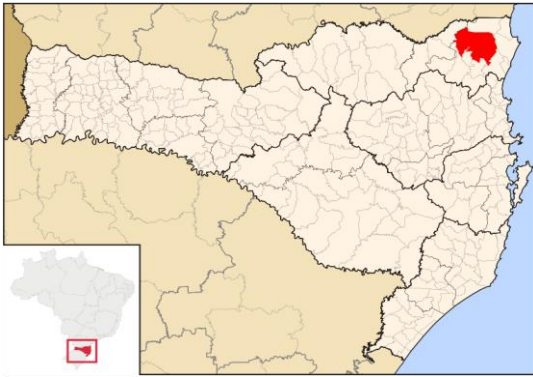


Figure 1. Joinville Municipal District (red color), North region of Santa Catarina's State

*Littoridina piscium* (d'Orbigny, 1835)

New confirmed occurrence in "Lagoa da Manteiga" (Manteiga Lagoon), Tubarão Municipal District (Figure 2), in eurihaline environment (MCP 09893). Previously cited for the State in Agudo-Padrón (2008: 152).

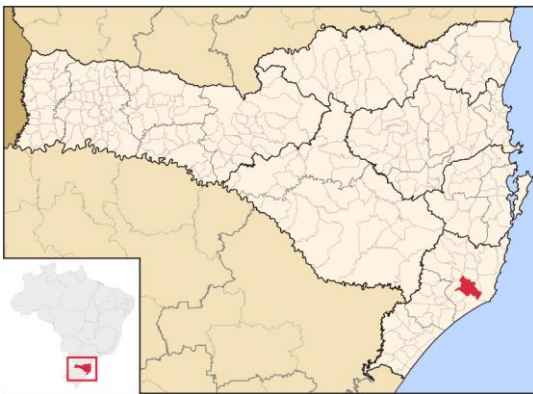


Figure 2. Tubarão Municipal District (red color), Southern region of Santa Catarina's State

Subclass PULMONATA

Family LYMNAEIDAE

*Lymnaea viatrix* (d'Orbigny, 1835)

New confirmed occurrence in "Rio Itajaí Mirim" (Itajaí Mirim River), Vidal Ramos Municipal District (Figure 3) in the "Itajaí-Açu River Basin Valley region" (MCP 09897). Previously cited for the State in Agudo-Padrón (2008: 155).

Family PLANORBIDAE

*Drepanotrema pfeifferi* (Strobel, 1874)

New confirmed occurrence in "Rio Itajaí Mirim" (Itajaí Mirim River), Vidal Ramos Municipal District (Figure 3) in the "Itajaí-Açu River Basin Valley region" (MCP 09896). Previously cited for the State in Agudo-Padrón (2008: 156).



Figure 3. Vidal Ramos Municipal District (red color), Itajaí-Açu River Basin Valley region of Santa Catarina's State

Class BIVALVIA  
 Order UNIONOIDA  
 Family ERODONIDAE

*Erodona mactroides* Bosc, 1801

Confirmed occurrence in “Lagoa da Manteiga” (Manteiga Lagoon), Tubarão Municipal District (Figure 4), in eurihaline environment (MCP 09894). Species previously cited for the State in Agudo-Padrón *et al.* (2009: 14).

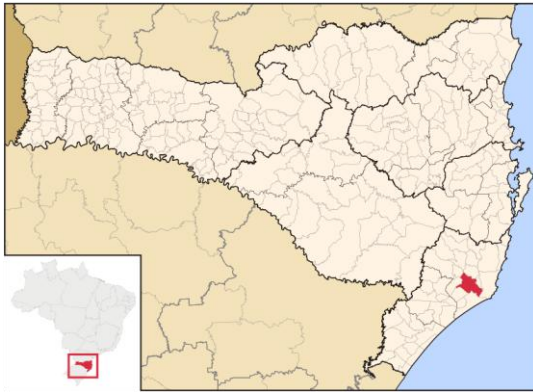


Figure 4. Tubarão Municipal District (red color), Southern region of Santa Catarina’s State

II. Terrestrial forms

Class GASTROPODA  
 Subclass PULMONATA  
 Family AMPHIBULIMIDAE

*Eudioptus* sp.

Confirmed occurrence in Ribeirão do Bugre (Bugre Creek) basin, Vidal Ramos Municipal District (Figure 5) in the “Itajaí-Açu River Basin Valley region”. Under taxonomic determination (MCP 09895). Genus previously cited for the State in Agudo-Padrón (2008: 160).

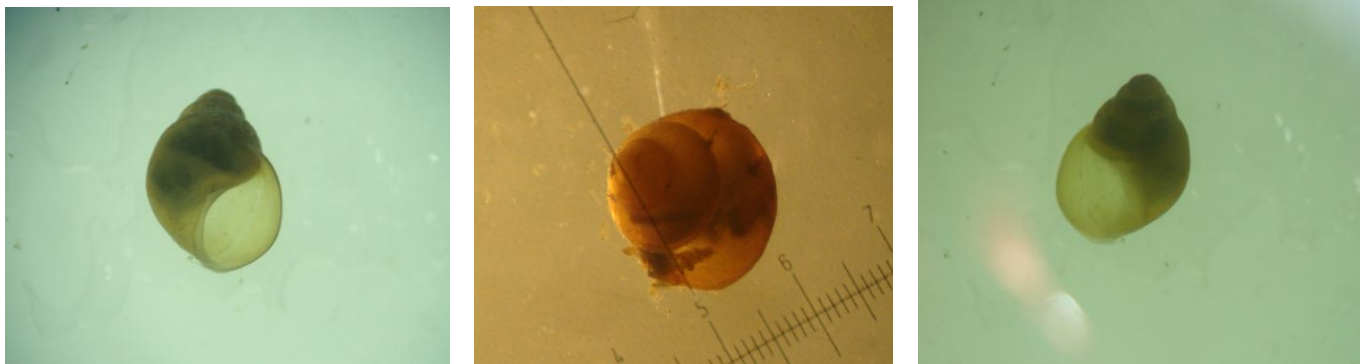


Figure 5. *Eudioptus* sp. specimen (upper) and its distribution in Vidal Ramos Municipal District (map - red color), Itajaí-Açu River Basin Valley region of Santa Catarina’s State. Photos: Leonardo Kleba Lisboa

## Family SYSTROPHIIDAE

*Happia* sp.

Confirmed occurrence in “Joinville” city (Figure 6) and Municipal District. Under taxonomic determination (MCP 09891). Genus previously cited for the State in Agudo-Padrón (2008: 165).

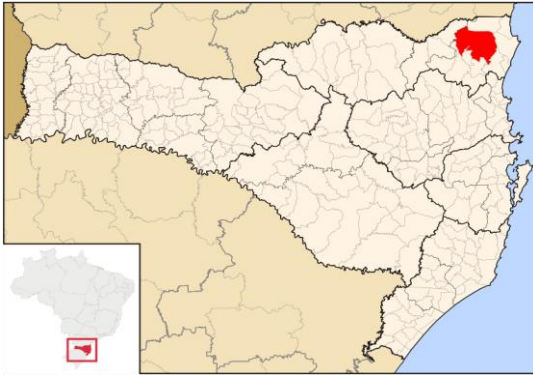


Figure 6. Joinville Municipal District (red color), North region of Santa Catarina's State

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Compiled by Kevin S. Cummings

Illinois Natural History Survey, Champaign, Illinois

The following lists papers dealing with freshwater mollusks that have been published up to and including 2012 and have not appeared in previous FMCS bibliographies. Citations for Aquatic Mollusca are split into five groups for the convenience of researchers: Unionoida, Sphaeriidae, Corbiculidae, Dreissenidae and other bivalves, and Gastropoda. Those papers which list taxa from more than one of the above categories are included in each group. A web searchable database of over 22,000 references on freshwater mollusks (including all previous FMCS and SFS bibliographies on freshwater mollusks) can be found at: <http://ellipse.inhs.uiuc.edu:591/mollusk/biblio.html>.

To insure that papers are cited correctly, researchers are encouraged to send pdf's or reprints to: Kevin S. Cummings, Illinois Natural History Survey, 607 E. Peabody Dr., Champaign, Illinois 61820. email: [ksc@inhs.illinois.edu](mailto:ksc@inhs.illinois.edu)

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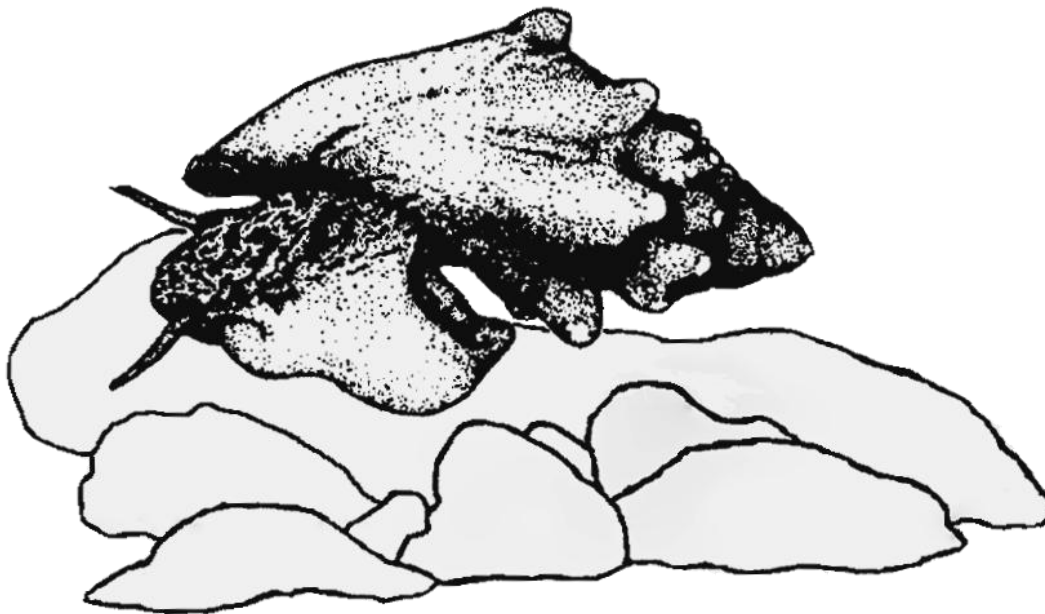
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Parting Shot



The meeting at Gunterville State Park, like all of our biennial symposia, included many images that we will remember for a long time. In this case, the image is of Dr. John B. (Jack) Burch presenting a talk about physid snails in one of the excellent meeting rooms at the Gunterville Lodge. The natural light coming through the (shaded) wall of windows just out of the right side of this picture created the mood caught in this shot by John Jenkinson.

If you would like to contribute a freshwater mollusk-related photograph for use as a **Parting Shot** in *Ellipsaria*, e-mail the picture, caption, and photo credit to [jjjenkinson@hotmail.com](mailto:jjjenkinson@hotmail.com).

