Newsletter of the Freshwater Mollusk Conservation Society
Volume 16 – Number 2 June 2014

Dam Removal Workshop A Success

Patricia Morrison, President

The 10th biennial FMCS Workshop was held on April 24-25, 2014, in Portland, Maine. The venue was the Holiday Inn by the Bay, located just a few blocks from the waterfront. The dam removal topic was very timely, the speakers were great, and the setting was superb! We had 76 registered attendees, 14 speakers, lots of dedicated students, and a great poster session on Thursday night. And the Workshop cleared a net profit of $3800 for the Society – not a requirement, but certainly good news. I also hope we were able to attract new members from the region to our mollusk conservation team.

Portland is a very "walkable" city, with lots of restaurants, pubs, distilleries, bakeries, and music venues. Many of us got to sightsee along the coast, visiting rocky shores, sandy coves, and lots of lighthouses. And boy, did we get to eat a lot of fresh seafood !

A huge Thank You goes out to the planning team – Mary McCann, Alan Christian, Becca Winterringer, and Deb Descoteaux. And we deeply appreciate the contributions of our wonderful sponsors who helped make this workshop a success: Enviroscience, Inc.; Virginia Department of Game and Inland Fisheries; Inter-fluve; Ecological Specialists, Inc.; Maine Department of Inland Fisheries and Wildlife; Mainstream Commercial Divers; U. Mass. Boston; HDR Engineering; and URS Corporation.

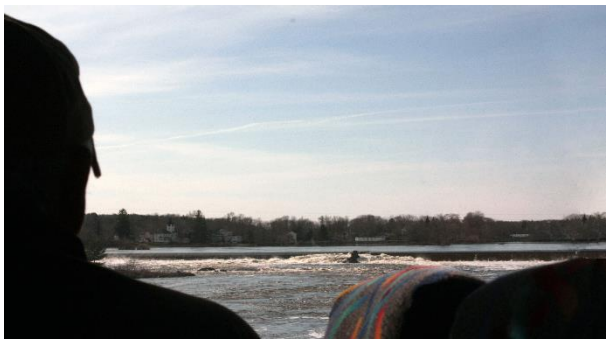
Titles and abstracts of the talks presented at this workshop are posted on this page of our web site: http://molluskconservation.org/2014Workshop/2014_FMCS-Workshop.html.

Here are some candid personal comments from members who attended this Workshop.

"*A well-organized workshop on a timely topic. I learned a lot and sincerely appreciated hearing the different techniques and perspectives being used in dam removals. I believe that FMCS members have a lot of knowledge and insight to contribute to this area of research and application, but working collaboratively with engineers, hydrologists, geomorphologists, and citizens will be critical to achieving natural resource management goals*." ***Dr. Greg Cope, North Carolina State University, Raleigh, NC.***

"For me, I find the panel discussions, one-on-one chats with poster presenters, and 'break time' conversations to be extremely valuable and my favorite part of FMCS meetings - lots of friendly folks excited to share information that could be applied to a variety of mussel relocation, recovery and monitoring projects. It had been 15 years since I lived in Maine, so after the conference was over, I took some time to visit Acadia National Park, stop by the Craig Brook National Fish Hatchery and drive along the Penobscot River. One project highlighted in the workshop was the removal of the Veazie Dam, which I remember from back when I worked at the FWS Maine Fisheries Resource Office – what an inspiring feeling to see a free flowing Penobscot River! Portland was a great city for the workshop – a historic seaside setting with plenty of good food and a thriving arts scene - I even saw a band (The Both) on my last night in town!" ***Tamara Smith, USFWS, Bloomington, MN.***

"This workshop combined presentations with panel discussions that provided attendees with an opportunity to question an array of experts on their topics. The conversation generated from these panel discussions permeated through the entire workshop, from the poster sessions to the field trip. There was an excellent mix of consultants, engineers, and biologists at the workshop and the field trip to the Penobscot River dam removal sites was well attended with the overarching optimism that we, as malacologists, do have information to make informative decisions about dams and dam removals—or at the very least are heading in the right direction." ***Dr. Daelyn A. Woolnough, Central Michigan University, Mount Pleasant, MI.***



Workshop photogtraphs provided by Janet Clayton and Dan Scoggin

Society News

Spring 2014 FMCS Board Meeting

April 23, 2014, 4:30 - 6:30 pm EDT Holiday Inn, Portland, Maine

Call to Order, Roll Call for Attendance, and Declaration of Quorum – Patty Morrison

Attendees:

Patty Morrison	John Harris	(via teleconference)
Heidi Dunn	Janet Clayton	
David Berg	Greg Cope	Caryn Vaughn
Jeremy Tiemann	Tim Savage	Braven Beaty
John Alderman	Steve McMurray	John Jenkinson
Brian Watson	Mary McCann	Greg Zimmerman
Megan Bradley	Tom Watters	
Teresa Newton	Art Bogan	

Call to Order – (Patty)

Approval of the November 22, 2013 Board Meeting Minutes (published in December 2013 *Ellipsaria*) Meeting Minutes Approved

Submitting reports ahead of time was very much appreciated; this helped streamline meeting.

Treasurer Report – Heidi Dunn

Income	
Misc (donation from Tom Keevin, credit card rewards, interest)	$227.64
Memberships	$4,400.00
2014 workshop	$9,885.00
Total Income	$14,512.64
Expenses	
2 Regional Meetings	$200.00
Banks charges/cc fees	$220.23
Symposium/workshop expenses	
2014 workshop	$350.00
2015 deposit	$6,060.00
Total expenses	$6,834.23
Net Income	$7,678.41
Total in the bank	$107,636.32

Secretary Report – Greg Zimmerman

Continued to support Treasurer and members with web support and notices. There has been some debate regarding frequency and content of FMCS communications, which is an action item for this meeting. I have tried to work to find a middle-ground between garnering participation and overloading members with unnecessary emails.

The current status of the membership. We have 575 active members, and 755 total members in the system. New updates to the Wild Apricot site automatically disable emails to members who emails fail repeatedly, and also after their membership lapses after two years.

Level	Total	Active	Renewal overdue	Lapsed
Author-Non Member	29	29	-	-
Contributing	8	8	1	-
Lifetime	10	10	-	-
Paper Registr Members	-	-	-	-
Regular	550	411	262	133
Student	158	117	77	37
Total	755	575	340	170

Committee Reports - Most committees submitted written reports prior to the meeting [presented on pages 7 through 10, below], so we will focus on items that require Board discussion and action.

Symposium – Teresa Newton and others

2014 Workshop, Portland, Maine

76 members at pre-registration

Some problem with late travel authorizations for some attendees

2015 Symposium, St. Louis, MO. Steve McMurray March 22-26, 2015. [Full report on page 7]

Room rate, estimated $118, includes breakfast and a mixer w/ FREE DRINKS!!!

Combined weekly rate will be discounted (FMCS/UMRCC)

Budget is 90K, registration will likely be $325 (members, early registration)

Joint plenary with UMRCC

Spot for 102 platform presentations

Event insurance will be required, hotel will assist with coverage. AFS has a larger coverage that covers individuals at chapter meetings, etc. Heidi will look into society coverage that could potentially cover chapter meetings

Board Meeting – due to workshop timing on Sunday, it may be a hardship to have people come in on Saturday, so propose Board Meeting be held on Sunday, 5 -7 pm following workshop. All agreed.

Entertainment "Diva and the Dude"

May invite commercial exhibitors, to apply for spots.

Field Trips –Thursday – March weather in Missouri may be a factor, so no river trips. Possibilities: Hellbender Propagation at St. Louis Zoo; National Great Rivers Research Center in Alton, Missouri; 3rd potential TBA

2016 Workshop on Genetics (NCTC, Shepherdstown, West Virginia) [See Report on page 9]

Phylogenetic Tree

Lab sessions

Poster Session

Awards – Greg Cope, Emy Monroe

Looking for nominations for major professional awards

Nominations – Leroy Koch

Looking for candidates for positions from newer members

Outreach – Megan Bradley [Report on page 9]
Megan would like to improve the functionality and usefulness of our website. Some things are embedded, not functioning on mobile devices. Mollusk state pages not functioning, looking for a solution – need to update state information / resources.
Suggested we make Megan the main web contact. Agreed.
Let Megan know directly about issues with the website.

Gastropod Status and Distribution – Jeremy Tiemann
Draft document in process

Guidelines and Techniques – Nevin Welte, Mary McCann [Report on page 9]
Protocols for photo documentation pending
Working on getting links or preferably hard files to local mussel / mollusk survey protocols, since many are live, but many are broken
Add a subcommittee to work on collecting protocols by states

Environmental Quality and Affairs – Steve McMurray, Braven Beaty [Report on page 9]
Braven – Worked on letters concerning the listing of four species and Texas boating regulations as they relate to invasive species.

Genetics – Dave Berg, Curt Elderkin [Report on page 9]

Information Exchange – Tom Watters, John Jenkinson
Walkerana has had some hiccups with manuscript submissions, overall not too bad. Time to move to a better, paid system like *Freshwater Science* or *Fisheries* – will look into costs. *Walkerana* has been up and running for two years – will have access to electronic journal indexes.

Mussel Status and Distribution – Art Bogan, John Harris [Report on page 10]
Mussel app is making progress; data format, other challenges being worked out. Ability to switch between topo / map view. Pre 1980, post 1980, filter option. Limiting access for TE species
Common and scientific names update – St. Louis, will be appointed

Propagation, Restoration, and Re-Introduction – Christopher Owen, Dan Hua
No report

Reports of the President's Ad Hoc Committees

Revision of National Strategy – Catherine Gatenby [Report on page 11]
No final publication date, but making progress.

Ecosystem Function – Dan Spooner, Danielle Kreeger – No report.

FMCS Procedures Manual – Patty Morrison, Steve McMurray, and Greg Cope
Will help new members to consider FMCS involvement, and provide long term continuity. Near final now.

New Business

NiSource HCP Mitigation Panel Representation,
NiSource has established a mitigation panel and has asked FMCS to participate.
Not sure about their expectations, frequency of meetings, costs, etc.
Review suggestions for representatives – Guidelines and Techniques? A number of candidates were discussed – ideally an experienced, non-federal, impartial representative or non-profit.
Patty will request more information from NiSource.

Setting Aside Funds for Discretionary Projects

How much money can we set aside for funding projects, and what procedures should we adopt? Keeping a secure cushion in the bank is critical. Will this change our tax exempt status? (Heidi thinks "no", some ambiguity). Maybe establish separate funds (Operations and Endowment). Endowment Fund could be used for student scholarships, projects. Can be in interest bearing or invested account. Donations for estate planning? 501c3, depending on percent private.

Patty appointed an Ad hoc financial planning committee -- consisting of Greg Cope, Heidi Dunn, and Al Buchanan -- to investigate this issue.

Frequency of Communications to the Membership

Some members expressed concern too many emails going out for FMCS. Is this true?

Because many emails go out to both UNIO listserv and FMCS mailing lists, there is some unfortunate redundancy; some UNIO not FMCS members, some members not on UNIO

Announcements do prompt action on workshop and sponsorship initiatives.

Most EXCOM committee memberss thought too many emails is not a problem.

Updating Freshwater Mussels of Upper Mississippi River – Jeremy Tiemann

This booklet, originally published in 1985, was reprinted in 2003 with some FMCS funds. The Corps wants to reprint it again. Seeking funds for 30k copies; Corps may be donating bulk of funds.

Request from FMCS – $3,000 of possible total $16,000 cost

Greg Z requested that, if we donate some funds, could the booklet be made available for download by FMCS members.

Problem taking donations, then paying for printing. Looking for "bank" to hold money, maybe FMCS can work to facilitate printing.

Motion to allocate $3000 of FMCS funds for 3rd edition. Motion carried.

FMCS Logo

Our [green] logo exists only in raster format right now. It would be in the Society's best interest to convert it to vector format. Requires re-digitizing the image and cleaning it up. Cost about $100 to $300. Could use Sophie Binder or other graphic designer. Funds approved.

Motion to Adjourn (by Patty). Motion carried.

Committee Reports -- Spring 2014

The following reports were prepared and circulated to members of the FMCS Board prior to the meeting on April 23, 2014. Decisions about the activities and recommendations made in these reports are included in the minutes of the Board (presented on pages 4 – 7).

Symposium Committee -- Teresa Newton and others

2015 Joint FMCS/UMRCC Meeting – Heidi Dunn & Steve McMurray

Local Arrangements

- St. Charles, Missouri, March 22-27, 2015, at the St. Charles Convention Center (http://www.stcharlesconventioncenter.com)
- Hotel rooms will be approximately $118/night for 1-2 people and $128/night for 3-4 at the Embassy Suites attached to the convention center

(http://embassysuites3.hilton.com/en/hotels/missouri/embassy-suites-st-louis-st-charles-hotel-and-spa-STLEMES/index.html)

Theme

- "Conserving Aquatic Ecosystems – At the Confluence of the Past and Future"
- Since it's a joint meeting, the plenary should cover a mix of topics that are interesting to members of both groups. We are thinking of doing a retrospective for each group, possibly officially presenting the new national strategy, and then talks that join the two groups together.

Registration Rates, Budget

- Rates will be approximately $10 to $25 more than in 2013 -- $325 early member, $250 early student, $400 for a combined registration (FMCS and UMRCC meeting); break even point would be 225 FMCS, 75 UMRCC, and 10 combined
- Budget is approximately $90,000

Schedule

- 102 possible platform presentations in the 4/10/14 proposed schedule

Timeline

February 15, 2014	Initial "Save the Date" Announcement for *Ellipsaria*
March 15, 2014	Registration Rates finalized
March 18 – 20, 2014	UMRCC Annual Meeting
April 23, 2014	FMCS Executive Board Meeting
April 24 – 25, 2014	Announcement at FMCS Workshop, Portland, ME
May 15, 2014	First Call for Papers, *Ellipsaria* announcement, e-mail blast
August 15, 2014	*Ellipsaria* announcement, e-mail blast
November 1, 2014	Registration Form(s) finalized
November 15, 2014	*Ellipsaria* announcement, e-mail blast
	Website up and running
December 15, 2014	Abstracts Due
	Draft logos due
January 15, 2015	Program/Agenda finalized
	Logo Decision made
January 31, 2015	AV/Posterboard needs finalized
	Early Registration Closes/Late Registration Opens
February 28, 2015	Finalize insurance
March 10, 2015	Late Registration Closes
	Finalize food order?
	Finalize field trip transportation/lunches
March 22, 2015	FMCS/UMRCC 2015 Joint Meeting

Questions/Actions for Board:

- Should FMCS get general business insurance that would cover liability at events?
- Should we move the Saturday FMCS Board Meeting to Sunday after the workshop?
- For the plenary we are planning on a mix of topics that are interesting to the members of both groups. We are thinking of doing a retrospective for each group, possibly officially presenting the new national strategy, and then talks that join the two groups together.
- Any issues with having vendors set up at the meeting?

Outreach Committee Report -- Megan Bradley

1. Coordinating a session dedicated to outreach and education for 2015 FMCS symposium -- 1 UMRCC member, 2 FMCS members. Will include additional information with call for abstracts.
2. Continued update and coordination of website. 17 states are missing links for the Mollusk Near You page (Arizona, Arkansas, Colorado, Delaware, Florida, Georgia, Hawaii, Idaho, Indiana, Kansas, Louisiana, Massachusetts, Nevada, New Hampshire, Pennsylvania, Rhode Island, and South Dakota). If you have a page you'd recommend or know someone to contact in any of these states, please email me at megan.bradley@dgif.virginia.gov or introduce me to them at the Workshop.
3. FMCS mollusk brochure. I have a very rough draft that I have to finish moving from hand drawn/written to Publisher. I will email it to everyone and bring copies to share at the Board Meeting for edits and suggestions -- if my computer survives the transition from XP to Windows 7 !

Guidelines and Techniques Committee – Nevin Welte, Mary McCann

We are working on two tasks: 1) to survey states and federal agencies and compile a list of those that have published mussel survey guidelines or protocols and obtain those that are available, and, 2) draft protocols for photo-documentation of mussel shells for voucher specimens.

We have compiled numerous survey protocols or guidelines for conducting mussel surveys and /or translocation procedures, including documents from Maine, Minnesota, Wisconsin, West Virginia, Ohio, Virginia, U.S. Fish and Wildlife Service Southeast, and Ontario. Following this year's Workshop, efforts to survey additional states and federal agencies will ramp up. We will also discuss how best to make these materials available to FMCS members. Draft protocols for photo-documentation are still in development.

Environmental Quality and Affairs – Steve McMurray, Braven Beaty

We have drafted letters in support of two separate federal listing actions. The first supported listing the Neosho Mucket as endangered and the Rabbitsfoot as threatened, as well as designating critical habitat for both species. The second supported listing the fluted kidneyshell and slabside pearlymussel as endangered and designating critical habitat for both species.

The issue of expanding the area in Texas requiring draining of all vessels and on-board receptacles was brought to the committee nearing the end of the comment period, but Texas Parks & Wildlife decided to enact the rule before comment could be provided, resulting in protective measures in 30 additional counties.

Genetics Committee Report – Dave Berg

We are just beginning to work on the 2016 Workshop.

1. We submitted a request to schedule it at the National Conservation Training Center (NCTC) from March 7-10, 2016. Unfortunately, NCTC would not accept the request because it was

"too early" to book. We resubmitted the scheduling request on April 8, 2014, and are waiting to learn whether it will be approved.

2. A rough outline of the symposium includes:
   a) biological principles that form the basis of commonly used genetic techniques;
   b) genetic tools and their use in population genetics and systematics;
   c) application of these tools to address questions in ecology, evolution, and conservation of freshwater mollusks; and
   d) hands-on "labs" to give attendees experience in analysis and interpretation of genetic data.
   We also plan to have a poster session will focus on current freshwater mollusk research, especially that utilizing genetic tools.

We have not made progress on the drafted "white papers" that have been submitted, nor on others that were proposed. The Committee needs to address this.

Mussel Status and Distribution Committee Report -- Arthur E. Bogan and John L. Harris

1. J. D. Williams et al. AFS Conservation assessment of freshwater mussels of United States, Canada and Mexico. This is a revision of the Williams et al. (1993) first edition that was so successful. The AFS/FMCS Mussel Conservation Subcommittee has drafted a manuscript for publication in the AFS journal *Fisheries*. The manuscript is being reviewed by three committee members prior to being submitted to the entire committee for their review and approval. We anticipate the manuscript going to the full committee in mid-May. We will contact AFS of our plans to publish the manuscript as soon as it is sent out for review by committee members. The manuscript is 30 pages, single spaced, with 2 appendices (one 2 pages in length and one 16 pages in length). We have all of the figures based on the revised list, but are still seeking good underwater shots of mussels doing things (lampsilines with mantle flaps, lures, etc.).
2. Development of Mussel ID App - Susan Oetker. Progress continues on development of the mussel identification app. We have acquired useable photographs for 229 of 317 taxa addressed in the app, and 4 mussel provinces (following Haag 2009) are complete for photos. The team continues to search for high quality photos to complete the North Amercian set. We have developed the first draft of the attributes database for 303 taxa, and these will be used as the basis for the app to "identify" mussels. The team has seen an initial version of the reconfigured app, which is now modeled after the Canadian app and will allow users to choose as many attributes for identification as they are able to identify.
3. Atlas of Freshwater Mussels of North America. Currently, 130 of the approximately 365 taxa addressed in the Atlas have volunteer authors for species accounts. Following the April FMCS workshop, we will begin actively pursuing additional authors. We have received 13 first draft accounts as of April 11, 2014. Distribution data for most of these accounts is still being acquired. [See related announcement on page 15]
4. Mussel Scientific and Common Names Subcommittee. John Harris and Paul Johnson are jointly drafting guidelines for the mussel and gastropod name subcommittees. We expect those guidelines to be circulated for comment to the Board and subcommittee members in June 2014.

Revision of the National Strategy for the Conservation of Freshwater Mollusks -- Catherine Gatenby

Introduction, Issue 2, 3, and 6 are in development; Intro and Issue 2 are near completion. Ad-Hoc committee will meet April 16 to discuss Issue 2 revisions and progress on Issues 3 and 6. Once we have agreement on content and format applied to these three issues, we may seek additional writers to assist with the other seven issues. Overall, making good progress considering the new ad-hoc team just got started writing this past October.

2015 Joint Meeting of the Freshwater Mollusk Conservation Society and the Upper Mississippi River ConservationCommittee

St. Charles, Missouri – March 22-26, 2015

The Executive Boards of the Freshwater Mollusk Conservation Society (FMCS) and the Upper Mississippi River Conservation Committee (UMRCC) would like to announce the 9th Biennial FMCS Symposium and the 71st Annual UMRCC Meetings will be held jointly on March 22-26, 2015, at the St. Charles Convention Center, St. Charles, Missouri. This meeting will feature contributed papers on a range of research and management topics in both oral and poster presentation format, FMCS Committee and Business meetings, and UMRCC Technical Sessions and Business Meeting.

In 1992 and 1995, the UMRCC sponsored two symposia in St. Louis, Missouri, that examined the status, conservation, and management needs of freshwater mussels. These symposia brought together a wide variety of people interested in freshwater mollusks and, in 1999, resulted in the formation of the FMCS. Now, 20 years after the second UMRCC symposium, we will hold joint meetings to recognize past conservation successes and future opportunities.

The theme for this joint meeting is "***Conserving Aquatic Ecosystems – At the Confluence of the Past and Future***." In addition to the customary platform and poster sessions, this meeting will include a joint plenary session focusing on the history and future of the organizations, a one-day mussel propagation workshop, and sessions on big river and landscape ecology. The mixers, breaks, auction, and banquets will also be joint affairs, offering multiple opportunities for networking among members. This joint meeting will be hosted by the Missouri Department of Conservation and Ecological Specialists, Inc.

Location and Travel:

St. Charles, Missouri, is located on the banks of the Missouri River just a short distance upstream from its confluence with the Mississippi River. St. Charles, the 3rd oldest city west of the Mississippi River, was the first Missouri state capital and was the last "civilized stop" on the Lewis and Clark *Corps of Discovery*. The St. Charles Convention Center is easily accessible by car via Interstate 70 from St. Louis, Missouri. The Convention Center is conveniently located approximately 8 miles from Lambert-St. Louis International Airport (STL); multiple ground-transportation vendors and car rental facilities are available

Facilities:

The St. Charles Convention Center (http://www.stcharlesconventioncenter.com) has more than enough space to accommodate our joint meeting. This facility includes over 65,000 square

feet of total meeting space organized in two ballrooms, an exhibit hall, five meeting rooms, a conference room, and an executive boardroom.

Discounted lodging will be available at the Embassy Suites St. Louis – St. Charles/Hotel & Spa (http://embassysuites3.hilton.com/en/hotels/missouri/embassy-suites-st-louis-st-charles-hotel-and-spa-STLEMES/index.html), which is directly adjacent to the convention center. The hotel rooms, consisting of a two-room suite with separate living and sleeping areas, will be $118/night for 1-2 people and $128/night for 3-4 people (plus tax). The room rate includes complimentary full breakfasts and evening reception, including beverages. The Embassy Suites also offers a free shuttle service to the St. Charles Historic District. More information on lodging will be available soon.

Meeting Registration:

Advanced registration will be available on the FMCS website by November 15, 2014. Registration rates have not yet been finalized but will include some meals, breaks, and membership dues for FMCS if registering for the full joint meeting or just the FMCS portion. Registration also will be available for just the UMRCC meeting, which includes one overlap day with the FMCS Meeting.

Student Travel Awards Available:

CALLING ALL STUDENTS - To facilitate your participation in the 9th Biennial Symposium, travel awards are being offered by the FMCS. Support is provided via Society-paid lodging accommodations for the duration of the meeting at the Embassy Suites St. Louis – St. Charles/Hotel & Spa. We anticipate that up to nine Student Travel Awards will be made for the 2015 Symposium. Please see the Awards Committee web site at http://molluskconservation.org/Mservices_awards.html for application forms and procedures. A complete application package must be submitted by e-mail as a PDF file to Dr. Teresa Newton, FMCS Awards Committee on or before January 15, 2015. Contact Teresa (tnewton@usgs.gov, phone 608-781-6217) for more information.

Meeting Theme:

The theme for this joint meeting is "***Conserving Aquatic Ecosystems – At the Confluence of the Past and Future***," and the joint plenary session will highlight the history of the two organizations and provide outlooks on the future. We also are planning on having sessions focusing on Big Rivers and Landscape Ecology and Outreach in Natural Resources. If you have an abstract for the Big River or Landscape Ecology sessions, please contact the symposium committee chair Stephen.McMurray@mdc.mo.gov. If you have an abstract regarding the Outreach in Natural Resources session, please contact the FMCS outreach committee chair Megan.bradley@dgif.virginia.gov.

Area Attractions and Planned Trips:

The St. Charles Convention Center is just minutes from historic downtown St. Charles (http://www.historicstcharles.com), where many shops, eateries, and bars are located. The hotel offers free shuttle service to historic Main Street. Several parks and other attractions are within an hour drive of St. Charles, so there will be plenty to do before or after the meeting. Downtown St. Louis is just 25 minutes away, with the Arch, riverfront, and historic Laclede's Landing. At Forest Park, the site of the 1904 World's Fair, discover the world-renowned St. Louis Zoo, Art Museum, Science Center, and Missouri History Museum. Stroll around the world-class Missouri Botanical Garden. Visit unique neighborhoods such as Soulard's historic farmer's market, the Central West End's boutiques/antiques, and the funky, fun Delmar Loop.

Possible organized trips during the joint meeting include a trip to the St. Louis Zoo for a behind-the-scenes tour of the hellbender propagation facility, a trip to the National Great Rivers Research and Education Center/Melvin Price Locks and Dam and Museum, and a possible trip to Cahokia Mounds State Historic Site.

If you have any questions about this joint meeting, contact Steve McMurray (Stephen.McMurray@mdc.mo.gov) or Heidi Dunn (hdunn@ecologicalspecialists.com). We look forward to seeing you in St. Charles next March.

FMCS-UMRCC JOINT MEETING -- PROPOSED SCHEDULE
ST. Charles, Missouri - March 22 -- 26, 2015
Conserving Aquatic Ecosystems – At the Confluence of the Past and Future

<table>
<tr><th>SUNDAY
MARCH 22</th><th>MONDAY
MARCH 23</th><th>TUESDAY
MARCH 24</th><th>WEDNESDAY
MARCH 25</th><th colspan="2">THURSDAY
MARCH 26</th></tr>
<tr><td>Registration
8:00 am-5:00 pm

Poster Setup</td><td>Registration
8:00 am-5:00 pm

Poster Setup</td><td>Registration
8:00 am-5:00 pm</td><td>UMRCC Executive Board Meeting
6:30-8:15 am

Registration
8:00 am-5:00 pm</td><td colspan="2">Registration
8:00 am-5:00 pm</td></tr>
<tr><td rowspan="4">Mussel Propagation Workshop
8:00 am-5:00 pm
(Box Lunch Provided to Attendees)</td><td rowspan="2">Concurrent Paper Sessions
8:00-10:00 am
10:20-12:00 pm</td><td rowspan="2">Concurrent Paper Sessions
8:00-10:00 am
10:20-12:00 pm</td><td>Joint Plenary Session
8:30-10:00 am</td><td rowspan="4">Optional Field Trips
8:00-5:00 pm</td><td>Mussel Technical Section
8:00-10:15 am</td></tr>
<tr><td>Big River Ecology/ Landscape Ecology Sessions
10:20-12:00 pm</td><td>Wildlife, Fisheries, Law Enforcement, Water Quality, OREIT
10:30-12:00 pm</td></tr>
<tr><td>Box Lunch (FMCS Comm. Mtgs.)
12:00-1:40 pm</td><td>Box Lunch (FMCS Comm. Mtgs.)
12:00-1:40 pm</td><td>Buffet Lunch
12:00-1:40 pm</td><td>Box Lunch
12:00-1:00 pm</td></tr>
<tr><td>Concurrent Paper Sessions
1:40-3:20 pm
3:40-5:00 pm</td><td>Concurrent Paper Sessions
1:40-3:20 pm
3:40-5:00 pm</td><td>Concurrent Paper Sessions
1:40-3:20 pm
3:40-5:00 pm</td><td>UMRCC Tech Sections Cont'd
1:00-3:30 pm

UMRCC Business Meeting
3:45-5:30 pm</td></tr>
<tr><td>Dinner
(On Your Own)
5:00-7:00 pm

FMCS Board Meeting
5:00-7:00 pm</td><td>Dinner
(On Your Own)
5:00-7:00 pm</td><td>FMCS Banquet, Business Mtg., Awards Presentations
6:00-8:00 pm</td><td>Dinner
(On Your Own)
5:00-7:00 pm</td><td colspan="2">UMRCC Banquet, Awards Presentations
6:00-8:00 pm</td></tr>
<tr><td>Welcome Reception
7:00-11:00 pm</td><td>Mixer/Poster Session
7:00-11:00 pm</td><td>Mixer
8:00-11:00 pm</td><td>Mixer/Joint Auction
7:00-11:00 pm</td><td colspan="2">Mixer
8:00-11:00 pm</td></tr>
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2015 FMCS/UMRCC Joint Meeting -- First Call for Abstracts

The abstract submission deadline for the March 2015 joint meeting will be December 15, 2014. This symposium will include both oral and poster presentations. Oral presentations will be limited to 20 minutes (including the question and answer period). Poster size will be limited to 4 by 4 feet. If you wish to bring a display unit, special arrangements can be made.

Abstracts for posters and oral presentations are limited to 300 words and should be submitted in Word utilizing Arial 11 point font. The title should appear in all caps and be followed by the author name(s), affiliation(s), and e-mail address(es). The body of the abstract should include clearly stated objectives, brief methods, general results, and the basic conclusion(s). At the bottom of your abstract, please indicate your preference of oral or poster presentation, and if you are willing to switch formats. Submit your abstract to: Stephen.McMurray@mdc.mo.gov by the due date, December 15, 2014.

Here is an example abstract from a previous symposium:

ASSESSING THE HAZARDS OF CURRENT USE PESTICIDES TO EARLY LIFE STAGES OF NATIVE FRESHWATER MUSSELS. Robert B. Bringolf[1], LeRoy F. Humphries[2], Peter R. Lazaro[1], Chris Eads[2], Chris Barnhart[3], Damian Shea[1], Jay F. Levine[2], and W. Gregory Cope[1]. [1]Department of Environmental and Molecular Toxicology, North Carolina State University, Raleigh, NC 27695; [2]College of Veterinary Medicine, North Carolina State University, Raleigh, NC 27606; [3]Department of Biology, Missouri State University, Springfield, MO 65804.

Native freshwater mussels (family Unionidae) are among the most imperiled faunal groups in North America. Approximately 67% of the nearly 300 freshwater mussel species are considered vulnerable to extinction or already extinct. North Carolina has historically supported 56 species of mussels; however, 82% of those species are currently listed as endangered, threatened, or of special concern by the U.S. Fish and Wildlife Service and the State of North Carolina. Although numerous stressors have been implicated in the decline of freshwater mussels, the effects of pesticides on native mussels is largely unknown. Timing of pesticide application combined with the unique life history and reproductive strategy of mussels makes them susceptible to pesticide exposure. The objective of this study was to determine the hazards of pesticides to early life stages of freshwater mussels. We performed acute toxicity tests with glochidia (7 species) and juveniles (6 species) exposed to a suite of current use pesticides (atrazine, fipronil, pendimethalin, and permethrin) and a reference toxicant (NaCl). Our results indicate that these pesticides, at concentrations approaching water solubility, were not acutely toxic to the species of glochidia and juveniles tested. However, in a 21-d chronic toxicity test performed with 4-month old juvenile *Lampsilis siliquoidea* exposed to atrazine, the 14-d atrazine LC50 was 15.8 mg/L (95% confidence interval 12.0-19.5) and the 21-d atrazine LC50 was 4.3 mg/L (95% confidence interval 2.8-5.8). Effects on growth and genotoxicity (single-strand DNA breaks) were also determined in the chronic test. Our results indicate that the relative risk associated with acute exposure of early life stages of mussels to the current use pesticides tested singly is likely low; however, survival and genotoxicity results indicate that chronic exposure of juvenile mussels to atrazine may be impacting mussel populations and warrants further investigation, as does the assessment of pesticide mixtures.

Preferred Presentation Format: Oral Platform
Willing to Switch Format: No

The Program Committee will assemble the draft meeting agenda and post the abstracts on the FMCS website (http://molluskconservation.org/) by mid-January, 2015. We hope to post the meeting program 90-days prior to the symposium to accommodate state resource agency attendees.

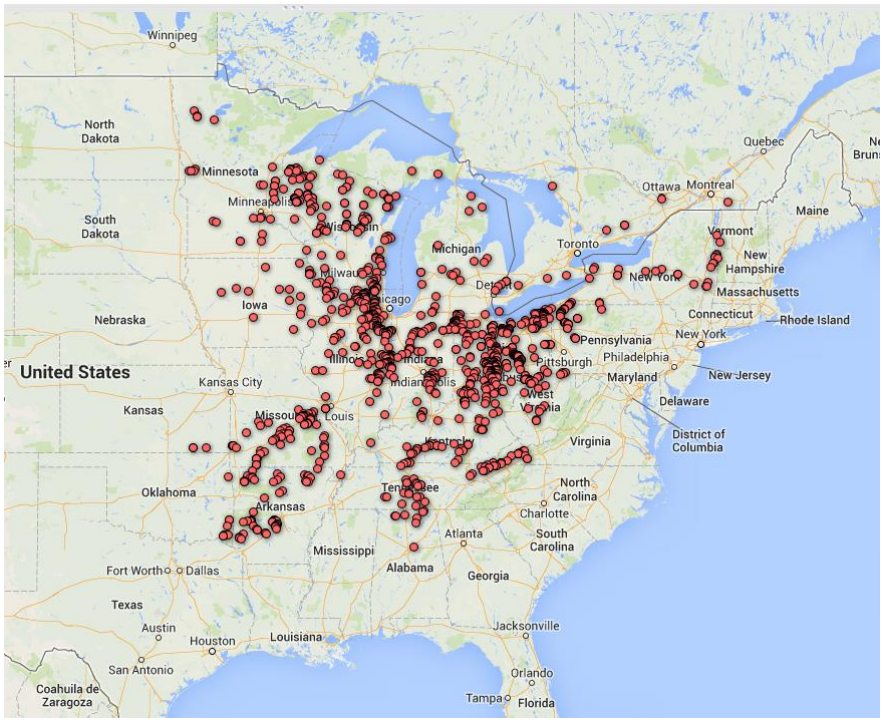
Update and Reminder -- North American Freshwater Mussel Atlas

Arthur E. Bogan and John L. Harris, Co-chairs
Mussel Status and Distribution Standing Committee

The North American Freshwater Mussel Atlas currently has volunteer authors for 134 of the 365 taxa being assessed. At this time, we have received 13 first draft accounts. Authors are reminded that first drafts are now due. Final species accounts will be due the week of the 2015 FMCS Symposium which coincides with the 25th anniversary of the society.

Instructions for Authors, templates, and the current list of authors are posted on the FMCS website at http://molluskconservation.org/MUSSELS/Mussel_Atlas.html.

Additional volunteer account authors should email their requests to John Harris (omibob1@gmail.com) and Arthur Bogan (arthur.bogan@naturalsciences.org). A corresponding co-author will be designated by the Co-chairs.



Pertinent part of the draft Mussel Atlas map for *Lasmigona costata*. This map was generated using Google Fusion Tables and the data for 3,146 records housed at four museums (North Carolina State Museum, Ohio State UniversityMuseum, University of Florida, and Illinois Natural History Survey).

Announcements

Jess Jones Wins U.S. Fish and Wildlife Service Science Excellence Award

Dr. Jess W. Jones, a long-time FMCS member, has received one of the U.S. Fish and Wildlife Service's top awards for scientific excellence. Jess received the 2013 Rachel Carson Award for Scientific Excellence (Individual). Given in both individual and group categories, the award recognizes exemplary scientific contributions to achieving extraordinary results in fish and wildlife resources. It is named in honor of renowned ecologist Rachel Carson, author of the groundbreaking book *Silent Spring*.

Based out of the Service's Gloucester field office in eastern Virginia, Jones is remotely stationed at the Virginia Tech Freshwater Mollusk Conservation Center, where he works with the freshwater mussel propagation program. Freshwater mussels are among the most imperiled group of animals in the country with a number of species teetering on the brink of extinction. Of the 300 species historically documented in the United States, more than 40 are currently listed as threatened or endangered. Many of these rare species inhabit the upper Tennessee River basin, an area where Jones and his team collect wild mussels, spawn them, and raise juvenile mussels for release in the Clinch and Powell rivers in Southwest Virginia.

Jones' award nomination form states that the task of recovering this group of rare species is "… complicated by environmental variables such as poor land use practices, extractive industries, climate change, and invasive species. These variables are further compounded by the freshwater mussel life cycle, one of the most complex in the animal world. Even with these hurdles, Jess and his team are consistently able to show demonstrable, high quality, recovery success both in the field and the laboratory."

"I am honored to receive the award," Jones said. "To be recognized for doing what I love means a lot to me. I have always enjoyed what I do as a biologist. Working in rivers and with freshwater mussels is a real passion of mine. Rivers are such dynamic systems that require a special way of thinking. Much of my success is a direct result of the hard work of the staff at the Freshwater Mollusk Conservation Center, the lab manager, the students, and the technicians who work there. We all care a lot about mussel and river conservation. To make each year successful requires dedication. I am proud of our achievements together and this partnership between the U.S. Fish and Wildlife Service and university."

In an effort to continually advance the technology at the center, Jones facilitated academic exchanges among the Service, Virginia Tech, and the Freshwater Fisheries Research Center in China. There he conducted seminars with scientists and graduate students to promote conservation and recovery of mussels so these principles can be used throughout China. In return, Jones hosted three visiting Chinese professors from the China Ocean University. These exchanges provided opportunities for the Service to learn how Chinese scientists propagate mussels and how their technology can be applied to improve mussel propagation efforts in the United States.

Jones also has broadened his reach to promote mussel conservation and is active in two regional Landscape Conservation Cooperatives (LCCs), which serve as forums for partners to link science and management to conserve species at multiple scales. For the Appalachian LCC, he has provided technical expertise to help develop aquatic indicator/surrogate species for monitoring aquatic systems. For the North Atlantic LCC, he has been working with others to study interactions between climate change, contaminants, and ecosystems.

Two Pertinent Courses Being Offered this Summer at Eagle Hill Institute, Steuben, Maine

Ecology of Lakes and Rivers - July 13 – 19, 2014

This course will address the biology and ecology of freshwater organisms (bacteria, phytoplankton, zooplankton, benthos, macrophytes and fish) from the organismal, community, and ecosystem perspectives. Specific topics will include primary production, seasonal succession, food web dynamics, nutrient cycling, and the interactions among aquatic organisms and communities with their physical and chemical environments. We will also discuss the importance of watersheds and the effects of pollution and eutrophication. During daily field trips, we will examine the flora, fauna, water chemistry, and ecosystem processes of local lakes and rivers and evaluate their water quality. This is a good course for students, instructors, lake managers, lake association members, research technicians, and anyone interested in lakes and rivers.

Course Leader -- Marilyn Mayer (marilyn@eaglehill.us) is an aquatic ecosystem scientist with a M.S in Ecology and Evolutionary Biology from Cornell University and a Ph.D. in Marine, Estuarine, and Environmental Sciences from the University of Maryland. She has studied lakes, streams and marine environments for the past 30 years. Before moving to Maine, Marilyn was a Professor at St. Lawrence University, where she taught Limnology and a course in Natural History & Ecology. Her research interests include the effect of watershed land use/land cover on stream water quality, comparative growth and feeding of larval zebra and quagga mussels, and nutrient cycling in lakes, streams, and estuarine environments, and the mercury levels in wetland organisms.

Freshwater Mollusks of the Northeast: Ecology, Distribution, and Identification -- July 20 - 26. 2014

The aquatic molluscan fauna of North America, north of Mexico, was historically the most diverse in the world. Today, freshwater mollusks (both bivalves and gastropods) are ranked as the most imperiled faunal group worldwide, and especially in North America. This dramatic decline can be linked to habitat alterations, loss of host fish species, and increased siltation resulting from past dam construction along major rivers. Currently, poor land use practices, urban development, and a spectrum of domestic, industrial, and agricultural pollution have disrupted the physical and chemical properties of freshwater systems, reduced habitat quality and quantity, and accelerated the decline of freshwater mussels throughout North America.

The first portion of this course will examine the biology, life history, and the worldwide distribution of freshwater mollusks. The second portion will focus on taxonomic problems, basic identification, shell landmarks and anatomy used in identification. Examples of the species of freshwater gastropods and bivalves found in the Northeastern United States will be provided. A workbook with keys and state by state introduction to the freshwater molluscan literature will be provided. Please come prepared for some fieldwork in rivers and lakes in the vicinity of Eagle Hill, Maine.

Course Leader -- Arthur E. Bogan (Arthur.bogan@naturalsciences.org) received his MA and Ph.D. in Anthropology with a specialty in zooarchaeology from the University of Tennessee, Knoxville. He has been working with freshwater mollusks for over 30 years across the southeastern United States and the length of the Atlantic Slope. He is the Research Curator of Aquatic Invertebrates at the NC Museum of Natural Sciences in Raleigh, North Carolina. Art previously taught four classes on the identification of freshwater mollusks of the Northeast at Eagle Hill. He has developed workbooks and guides for freshwater mussels for Pennsylvania, Maryland, North and South Carolina, as well as the Mid-Atlantic Region. Art also is co-author of *The Freshwater Mussels of Tennessee* and *Freshwater Mussels of Alabama and the Mobile Basin in Georgia, Mississippi and Tennessee*. His research focuses on the biology, distribution and taxonomy of modern freshwater mollusk species, including describing new species. He also continues to work on mollusks from archaeological sites.

General program information about Eagle Hill Institute ia available at http://www.eaglehill.us/programs/nhs/natural-history-seminars.shtml . The full list of courses being offered at Eagle Hill during 2014 is posted at http://www.eaglehill.us/programs/nhs/nhs-calendar.shtml. For more information, contact Marilyn Mayer at Marilyn@eaglehill.us

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 bring 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. Support is provided via a cash award of $100 to the regional group to help defray the costs (e.g., meeting room rental, speaker travel, break refreshments, etc.) associated with holding 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. 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.

Upcoming Meetings

June 23 – 27, 2014 -- **Mollusca 2014: The Meeting of the Americas** - Joint meeting of the Western Society of Malacologists, the Sociedad Mexicana de Malacología y Conquiliología, the American Malacological Society, and the Asociación Latinoamericana de Malacología. Library Complex Amoxcalli in the Facultad de Ciencias, Universidad Nacional Autónoma de México, Mexico City, Mexico. http://www.malacological.org/meetings.html

July 13 – 17, 2014 – Society for Conservation Biology North American Conference, Missoula, Montana, USA. http://www.conbio.org/conferences/section-meetings

March 22 -- 26, 2015 -- National Shellfisheries Association 107th Annual Meeting, Monterry, Claifornia, Theme: [yet to be announced] http://www.shellfish.org/annual-meeting .

March 22-27, 2015 – FMCS Symposium/ Joint meeting with the Upper Mississippi River Conservation Committee, St. Charles, Missouri. Theme: "*Conserving Aquatic Ecosystems – At the Confluence of the Past and Future.*"

May 17 – 21, 2015 -- Society for Freshwater Science Annual Meeting, Wisconsin Center, Milwaukee, Wisconsin. Theme: "*Our Freshwater Futures.*" http://sfsannualmeeting.org

March, 2016 – FMCS Genetics Workshop, National Conservation Training Center Shephardstown, West Virginia.

Contributed Articles

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

Are Early Stage Unionids Susceptible to Contaminants in their Fish Hosts?

Peter D. Hazelton[1,2,*] and **Robert B. Bringolf**[1]

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[2] Interdisciplinary Toxicology Program, University of Georgia, Athens, GA
[*] Current address: Natural Heritage & Endangered Species Program, Massachusetts Division of Fisheries & Wildlife, peter.hazelton@state.ma.us

Each stage in the life cycle of a freshwater mussel represents a unique exposure to environmental contaminants (Cope et al. 2008). While others have shown that glochidia are somewhat sheltered from contaminants when they are encapsulated on fish (Jacobson et al. 1997), there remains a question of whether mussels are affected by contaminants accumulated in their host. Fritts et al. (2013) demonstrated that encapsulated glochidia obtain nutrients from their hosts, thus direct transfer of toxicants to glochidia may be possible. Furthermore, the relationship between a fish host and its Unionid parasite is mediated through the host immune system, and a contaminant that acts upon this system may alter the relationship of host-parasite by mediating the immune response (Dubansky et al. 2011). In a preliminary experiment, we tested the effects of perfluorooctane sulfonate (PFOS) -- an industrial chemical known to exhibit acute and chronic toxic effects on Unionids (Hazelton et al. 2012) -- accumulated in host-fish on the metamorphosis success and vigor of early lifestages of paper pondshell (*Utterbackia imbecillis*).

We exposed ten largemouth bass (*Micropterus salmoides*) to each of three nominal concentrations of 0, 10, and 100 µg/L PFOS for 105 days in recirculating 67-L tanks. Fish toxicity endpoints revealed trends of reduced condition factor and liver somatic index, listlessness, reduced feeding and increased presence of external lesions (Hazelton 2013). These results are consistent with other exposures of fish to PFOS (Oakes et al. 2005, Ankley et al. 2005, Hagenaars et al. 2008).

Following fish PFOS exposure, unexposed *Utterbackia imbecillis* glochidia were pooled from three females (initial viability = 82, 91 and 93 %) and we inoculated 10 fish from the control and 10, 100 µg/L PFOS treatments with these paper pondshell glochidia. We monitored metamorphosis rates for individual fish for 14 days. Two week old juveniles recovered from each PFOS-fish treatment were exposed in triplicate to 0, 1, 2, 4 and 8 mg/L NaCl in unaerated moderately hard water at 20 °C in 120 mL beakers. Each beaker contained 11-14 juveniles. At 48-h after exposure initiation, effects endpoints were assessed as the presence of heartbeat, foot movement, or valve movement within a 5 min period of observation (ASTM 2006). The NaCl concentration at which 50 % of individuals were affected (EC50 ± 95% Confidence Intervals) was assessed for each PFOS-fish concentration using the Trimmed Spearman-Karber method (Hamilton et al. 1977; Hamilton 1978).

Metamorphosis rates did not differ among PFOS treatments (Figure 1); however, juveniles from the PFOS exposed host fish were more sensitive to toxicant challenge. NaCl EC50s were significantly lower for juveniles that metamorphosed on fish exposed to PFOS concentrations of 10 and 100 µg/L (Figure 2), suggesting a potential decrease in juvenile health.

It is currently unknown whether the health of juvenile mussels in this study was affected by the transfer of accumulated PFOS in host fish, or whether the poor condition of the hosts resulted in reduced energy transfer to encapsulated glochidia, thus reducing initial survival of metamorphosed juveniles. Fish treated with PFOS had lower mean condition factors and statistically significantly lower LSIs than control animals, the cause of which could be from PFOS toxicity or stress related reductions in feeding. Little work has been conducted on host fish health effects on early stage Unionid health and survival, but the

conservation implications of this relationship are important in assessing the effects of contaminants on mussels, and in improving mussel propagation yields. To better understand the role of contaminants on mussel populations, general stress and condition of host fish should be a consideration of future research.

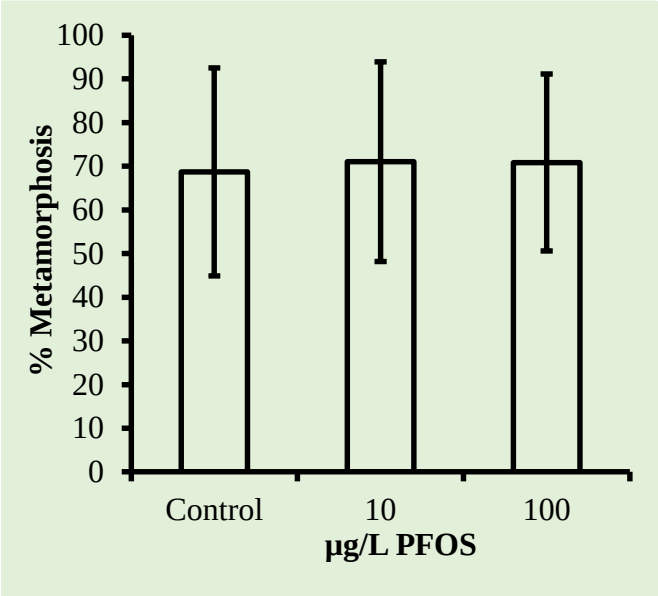

Figure 1. Metamorphosis success of paper pondshell glochidia on control and PFOS treated largemouth bass. Percent metamorphosis was not affected by host PFOS treatment. Error bars represent 95% confidence intervals.

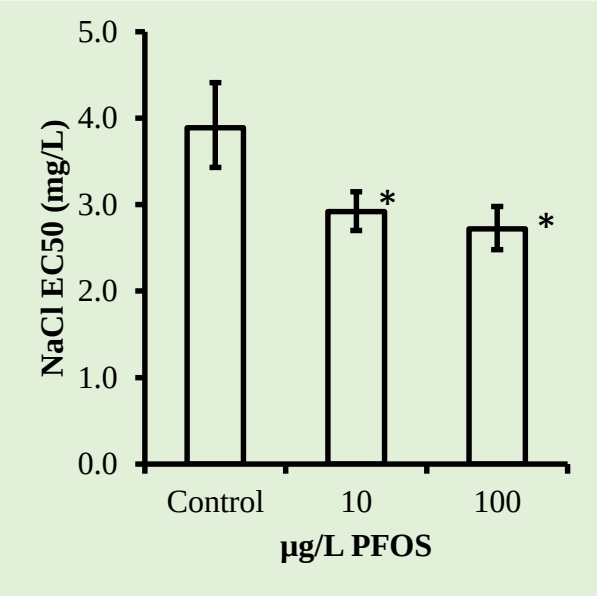

Figure 2. Forty-eight hour NaCl challenge EC50s for 2 week old *Utterbackia imbecillis* metamorphosed on fish exposed to varying PFOS concentrations. Error bars represent 95% confidence intervals. * denotes statistical significant difference at $\alpha = 0.05$.

Acknowledgements:

Funding for this project was a student research grant from the University of Georgia Interdisciplinary Toxicology Program. Thank you to Dr. Robert Gogal, Robert Ratajczak, Andrea Fritts, Joseph Styga, Derek Colbert, and Amos Tuck for their assistance in experimental design, mussel collection and laboratory aid.

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Laboratories Show *Lasmigona costata* Metamorphose on Several Fish Species

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Matt Berg, **Austin Handy**, **Austin Thoreen**, **Katharine Rod**, **Macy Hanson**, **Raelyn Pochman**, **Samantha Nelson**, and **William LaMere**, Grantsburg High School, Grantsburg, Wisconsin

The flutedshell, *Lasmigona costata* (Rafinesque, 1820), is widely distributed in east and central North America but is rare in places. The well-being of this species has become a conservation concern in Minnesota, and management would benefit from improved understanding of its life history needs. We followed standard methods similar to Fritts *et al.*, (2012) to conduct *L. costata* host suitability trials. Of 68 fish species exposed to glochidia, most facilitated metamorphosis. Fish nomenclature follows Page *et al.*, 2013.

Trials conducted at Grantsburg High School (GHS) showed that 2 of 13 fish species tested were suitable hosts (Table 1). Fishes tested at GHS that did not facilitate metamorphosis (number of fish tested) were: bluntnose minnow (100+), goldfish (18), spotfin shiner (100+), yellow bullhead (1),

High school students learning how to find flutedshells.

northern pike (2), brook silverside (23), black crappie (3), bluegill (17), largemouth bass (3), pumpkinseed (1), rock bass (1).

Table 1. Host suitability trials conducted at GHS. Water temperature 17-18 °C.

Species	No. fish	No. juveniles	Species	No. fish	No. juveniles
black bullhead	9	1	central mudminnow	3	3

Trials conducted by the Minnesota Deptment of Natural Resources (DNR) revealed that 25 of 34 fish species tested were potential hosts (Table 2). Fishes that did not facilitate metamorphosis (no. fish) were: bigmouth shiner (3), blacknose dace (1), Ozark minnow (5), sand shiner (1), southern redbelly dace (5), channel catfish (2), tadpole madtom (1), logperch (5), yellow perch (Trial 2) (3), longear sunfish (2), mudpuppy (1).

Table 2. Host suitability trials conducted at DNR. Water temperature 21 °C.

Species	No. fish	No. juveniles	Species	No. fish	No. juveniles
longnose gar	2	157	yellow bullhead	2	14
blacktail shiner	2	7	northern pike	2	54
bleeding shiner	1	73	trout-perch	4	24
common carp	2	8	pirate perch	1	10
eastern creek chubsucker	2	55	burbot	1	823
golden shiner	4	11	black crappie	4	81
hornyhead chub	3	3	Johnny darter	3	1
striped shiner	1	74	sauger	3	1399
whitetail shiner	2	34	walleye (1)	2	937
bigmouth buffalo	1	59	walleye (2)	1	20
quillback	3	61	yellow perch (1)	2	74
black bullhead	2	15	largemouth bass	4	1
brown bullhead	2	10	freshwater drum	3	186

Trials conducted at the University of Minnesota, St. Paul (UMN) found 38 of 47 fish species facilitated glochidia metamorphosis (Table 3). Fishes that did not facilitate metamorphosis (no. fish) during these trials were: shortnose gar (3), bigmouth shiner (4), blacknose dace (2), emerald shiner (3), goldfish (5), brown bullhead (2), channel catfish (6), tadpole madtom (4), banded darter (9).

The results from this study are consistent with previous flutedshell host suitability research which has shown that this mussel metamorphoses on several fishes (Lefevre and Curtis 1912, Luo 1993, Hove *et al.*, 1994, Watters *et al.*, 1998, Watters *et al.*, 2005, Thomason *et al.*, 2013). We are currently using scanning electron microscopy to identify juvenile anodontines recovered from fishes living near flutedshell.

Scanning electron micrograph of *Lasmigona costata* glochidia.

Table 3. Host suitability trials conducted at UMN. Water temperature 17-22 °C.

Species	No. fish	No. juveniles	Species	No. fish	No. juveniles
longnose gar	3	71	stonecat	2	6
bowfin	3	16	yellow bullhead	7	1
bluntnose minnow	7	2	northern pike	3	130
brassy minnow (1)	3	12	banded killifish	1	20
brassy minnow (2)*	4	5	brook stickleback*	8	2
bullhead minnow	3	1	black crappie	3	13
central stoneroller	6	223	largemouth bass	4	22
fathead minnow	6	2	orange-spotted sunfish	4	32
golden shiner	3	19	rock bass	4	2
hornyhead chub	4	121	smallmouth bass	1	3
mimic shiner	3	1	blackside darter (1)	6	7
red shiner	7	72	blackside darter (2)	6	1
silver chub (1)	1	3	fantail darter	8	5
silver chub (2)	1	7	Johnny darter (1)	3	16
southern redbelly dace	6	31	Johnny darter (2)	6	1
spotfin shiner	4	50	logperch	4	6
spottail shiner	1	1	river darter	5	6
northern hogsucker	2	54	sauger (1)*	2	10
shorthead redhorse	4	132	sauger (2)*	4	5
silver redhorse	2	105	slenderhead darter	7	1
blue catfish	1	1	freshwater drum	2	33
flathead catfish	3	127			

* Incomplete trial

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Additional Information Concerning the Conquest of Europe by the Invasive Chinese Pond Mussel *Sinanodonta woodiana*, 35. News from the Czech Republic, France, Hungary, the Republic of Moldova, Poland, and Serbia

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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. Here is some new information from the Czech Republic, France, Hungary, the Republic of Moldova, Poland and Serbia.

Czech Republica

Beran (2013) mentioned *Sinanodonta woodiana* from six localities in the lower part of the Dyje (Thaya) River and respectively two and three localities in its tributaries the Kyjovka River and Morava River. Interestingly, the shells of the Chinese Pond mussel formed suitable substrates for *Theodoxus danubialis*, an endangered species in Central Europe.

France

The article by Chovet & Thomas (2013) on the presence of the Chinese Pond mussel in the Canal of Orleans, is merely a republication of the paper by Thomas & Chovet (2013). Only here and there some sentences have been slightly altered, but no new information is given.

Hungary

During an international congress in Portugal, Bódis, Tóth & Sousa (2012) presented a study dealing with the die-offs of the Chinese Pond mussel during periods of extremely low water in the Danube, a side-arm of the Danube, and three localities in a tributary of the Danube, the River Ipoly. They reached the conclusion that such die-offs, especially near cooling outlets of power plants, form major resources of nutrients for other faunal and floral elements.

At the same congress, Benkö-Kiss (2012a) reported upon the data of up to 4000 specimens of Unionid mussels from nearly 70 localities collected between 1985-1996 throughout Hungary in general and from the year 2000 on in Lake Balaton in particular. In the latter lake, the invasive *Sinanodonta woodiana* formed within 10 years already 70% of the total biomass which affected negatively the presence of *Anodonta cygnea* and *Anodonta anatina* but not *Unio pictorum* and *Unio tumidus*. These changes were outlined in more detail in a poster during the same congress (Benkö-Kiss, 2012b).

Republic of Moldova

Balashov *et al.*, 2013 records the Chinese Pond mussel from the Prut Basin while referring to Munjiu (2009) and Munjiu & Shubernetski (2010), although a reference to Munjiu & Shubernetski (2008) should have been more directly.

Poland

In July 2012, the Chinese Pond mussel was reported for the first time from the lower part of the Postomia, a tributary of the Warta River by Domagała *et al.*, 2013. It had been recorded already from fish ponds near Sieraków and the Warta-Gopło Canal more upstream in the Warta River. The presence of gravid mussels in the Postomia means that this invasive species has established a viable population in the National Park Ujście Warty.

Łabęcka & Domagała (2013) reported on the presence of *Sinanodonta woodiana* in the heated waters of the Dolna Odra power plant in 2005 and 2007.

Serbia

During the international congress in Portugal, Kolarević *et al.* (2012) presented a poster dealing with the DNA damage of haemocytes in the Chinese Pond mussel during a case of severe pollution in the Velika Morava River.

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A First Record of *Ferrissia clessiniana* from Nigeria

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In July 1992, I participated in a feasibility study for the Kano River Irrigation Project (KRIP) Extension carried out by Tahal Consultants in Kano State, northern Nigeria. For an Environmental Impact Assessment, 33 aquatic biotopes between Kano in the north and the Tiga water reservoir in the south were surveyed for the presence of freshwater molluscs.

At station KRIP M-04, a field canal near the rice-field of the Kode-farm I found the following six molluscs on 21 July 1992:

Radix natalensis (Krauss, 1848)
Ferrissia clessiniana (Jickeli, 1882)
Biomphalaria pfeifferi (Krauss, 1848)
Coelatura aegyptiaca* (Cailliaud, 1827)
Corbicula tsadiana von Martens, 1903
Pisidium pirothi Jeckeli, 1881**

Remarks:

* Usually, this generic name is spelled *Caelatura*, however Conrad used the spelling *Coelatura* for a genus of freshwater mussels in 1853 and, in 1865, *Caelatura* for a genus of gastropods (Rosenberg *et al.*, 1990).

** The *Pisidium* species had been identified by the late J.G.J. Kuiper.

The freshwater limpet *Ferrissia clessiniana* was found on a small piece of dead *Typha.*

Freshwater limpets have been recorded only twice from Nigeria. Bidwell & Clarke (1977) recorded *Ancylus* species from Lake Kainji. This is most probably a misidentification of a *Ferrissia* species. As a matter of fact, *Ancylus* seems to be restricted in Africa to the Mediterranean coastal zone from Morocco to Tunisia and some scattered localities in the highlands of Ethiopa (Brown, 1980). Betterton *et al.* (1988) mentioned *Ferrissia* species from a single, undisclosed locality in Kano State.

Our specimens agree in shell characters in full detail with *Ferrissia clessiniana*, a species so far reported from Egypt, Ethiopia, and Kenya in Africa (van Damme, 1984). *Ferrissia clessiniana* differs from other species previously recorded from West Africa (Hubendick, 1970 & 1977; Brown, 1980) by its more elongate and depressed shell, and the almost straight sides. This record demonstrates that at least *Ferrissia clessiniana* is living in Nigeria.

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Ecobiology and Embryonic Study of the Freshwater Gastropod *Pila virens* (Lamarck, 1822)

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Pila virens, the apple snail, is one of the largest freshwater molluscs. It is commonly found in freshwater ponds, pools, tanks, marshes, rice fields, and sometimes even in streams and rivers. The animal creeps very slowly by its ventral muscular foot, covering about five cm per minute. The movement of the animal is like the gliding movement of a planarian.

These snails are amphibious. During the rainy seasons, *Pila* comes out of the ponds and makes long terrestrial tours, thus respiring air directly. It can overcome long periods of drought in a dormant condition buried in the mud; this period of inactivity is called aestivation or summer sleep.

Morphology

Pila virens (Lamarck, 1822)

The soft body of the animal is enclosed in a thick, calcareous shell. The shell has a conical structure, spirally coiled around a central axis, called the columella. The columella is hollow and its cavity opens to the outside by umbilicus. Each revolution around the axis is called a whorl. The small rounded tip of the shell is called the apex and the whorl surrounding it is called the apical whorl. The lower most whorl is the largest and is known as the body whorl. The whorl above the body whorl is called the penultimate whorl. All the whorls except the body whorl together are called spire. Internally, all the whorls freely communicate with one another and there is no separating partition between them and thus the shell is known as unilocular. Externally, there is a line at the junction of the two successive whorls which is known as suture. The penultimate whorl and the body whorl are large enough to enclose most of the body parts. The outer surface of the shell is marked with numerous fine vertical lines called lines of growth (Ranjana Saxena, 2007)

Food and Feeding

Ampullariids are microphagous, zoophagous, and microphagous; none being mutually exclusive (Estebenet, 1995). Ciliary feeding on particulate matter on the water surfaces has been described for some species. Some species will feed on insects, crustaceans, small fish, etc., mostly as carrion, but not always (McLane, 1939; Estebenet, 1995). The food consists of aquatic plants of succulent nature like *Vallisneria* and *Pistia*, which are cut by jaws and the odonotophore, and then the radula moves forwards and backwards filing the food into small particles exactly like the chain-saw mechanism. Thus, the food is cut up and masticated inside the buccal cavity.

Breeding System

Ampullariids are dioecious, with internal fertilization (not reciprocally-fertilizing hermaphrodites as stated by Chang, 1985). There is evidence that females are larger than males. The sex change is from males to female (protandry) and takes place during aestivation (*Pila*). The larger size of females in *Pila* has therefore been attributed to continuing growth following this change (Keawjam, 1987). The obliquity and significance of this phenomenon needs further investigation.

Mating, Oviposition, Eggs, and Fecundity

Pila virens laying eggs

Breeding in many Ampullariid species is seasonal and related to latitude, temperature, and rainfall (Andrews, 1964). In equatorial regions, many species aestivate during the dry seasons as their habitat dries up, breeding in the rainy season. In subtropical regions, they may only breed during summer, once temperatures reach a certain level (Andrews, 1964). Local variation in reproductive regime may be related to local climatic variation, especially availability of water (Bourne and Berlin, 1982).

The egg of *Pila* spp are laid out of water, but in depressions made by the snails on banks or mudflats (Michelson, 1961; Andrews, 1964). These eggs have a calcareous coating (Prashad, 1925; Keawjam, 1986). In India, laying begins at the start of the rainy season (Prashad, 1925; Andrews, 1964). Oviposition takes place predominantly at night or in the early morning or evening (Andrews, 1964; Chang, 1985; Schnorbach, 1995; Albrecht et al., 1996) about 24 hours after copulation (up to two weeks after mating according to Chang, 1985). Copulation takes place about three times per week (Albrecht et al., 1996). On each

oviposition occasion, a variable number of eggs is laid in a single clutch. The interval between successive ovipositions has been reported as 12- 14 days (Chang, 1985). One snail can produce an average of 4,375 (maximum observed 8680) eggs per year (Mochida, 1988, 1991). If the clutch size is about 200 eggs, this translates into about 22 clutches per year (Anon, 1989), up to 1200 eggs per month. Development is highly dependent on temperature (Robins, 1971; Demian and Yousif, 1973; Aldridge, 1983; Mochida, 1988; Estebenet and Cazzaniga, 1992; Schnorbach, 1995), and, therefore, locality. The eggs of *Pila* take 10-14 days at 32-38^{0}C and 3 weeks at 21-27^0 C (Demain and Yousif, 1973). Newly hatched snails immediately fall or crawl into the water.

Embryonic Development

To follow their embryonic development, eggs were successively separated from the egg mass, 2 at a time, at intervals ranging from 1/2 to 12 hours according to the age of the egg mass. Each egg was immediately dissected with a pair of sharply pointed needles in saline solution under a stereomicroscope. The embryo was carefully taken out of the egg capsule and freed from the surrounding albumen. Some embryos were examined fresh, while others were fixed, stained, and mounted whole, or in filtered with paraffin wax and sectioned. Drawings were made of both fresh and stained embryos with the aid of a camera lucida.

Gastrulation is mainly epibolic, not embolic as described for *Pila virens*. It is completed about 22 hours after egg-deposition. Shortly after the formation of the blastula, the embryo becomes slightly flattened at both poles. Cleavage the egg undergoes the typical cleavage common to the gastropoda in the eggs maintained at temp of 25-30^{o}C. The 5th cleavage takes place about 7 ½ hours after egg deposition. The average period for embryonic development in *Pila virens* was 10-14 days at 90-100^o –F or 3 weeks at 70-80^{o}F.

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Freshwater Bivalve Survey of Vietnam, Part II: Central Highlands and the Mekong Delta Area.

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This is the second extended field trip to explore the freshwater bivalve fauna of Vietnam. Our earlier field trip across the northern provinces of Vietnam was outlined, and the preliminary results were presented in a previous article (Bogan and Do, 2013). Our initial research focus on this trip was the modern documentation of the IUCN Red Listed Endangered species *Margaritifera laosensis*, the Lao Pearlmussel. It has been reported from the tributaries of the Mekong River in Điện Biên Province in the northwest and in the Central Highlands of Vietnam. The rest of the freshwater bivalve fauna both in the Central Highlands and southern provinces would be sampled, recorded, photographed and samples preserved for phylogenetic work as time permited.

This trip, which began in Hanoi on 21 March, 2014, included four of us, the two authors, our assistant Mr. Nguyen Tong Cuong, and the driver, Mr. Nguyen Ngoc Quyen (who also was our driver for the first trip). We traveled south, with the first stop in the southwest edge of Hanoi. Along the way, we visited local markets (Figures 1 and 2) and spoke to local people selling fish, freshwater bivalves, and gastropods about where the animals they were selling had been collected. Other local residents and fisherman were asked about local freshwater mussels.

Figure 1. Van Tu Do buying some snails in a local market, Vietnam. Photograph by A. Bogan.

Figure 2. Pan of several unionid species for sale in a market in Hanoi, Vietnam. Photograph by A. Bogan.

We talked to a boy who said he had collected a species in a local stream a couple of months ago. He took us to the locality and searched over 100 m of stream but could not locate any mussels. He said the animals were eaten and the shells ground for medicine. He pointed out a picture of the distinctive shape of *Margaritifera laosensis*.

When talking to some local people about freshwater mussels along a canal in Binh Long, Châu Phú District in An Giang Province, they directed us across the canal, upstream of the foot bridge. Crossing the rickety footbridge, we observed large rice sacks full of mussels used as fill under a new cement floor (Figure 3). Looking down from the floor, we could see mussel shells spilling out of sacks under the new floor. Walking down the unpaved street, we encountered a man who explained that they brought live freshwater mussels in from the surrounding area, cooked them over a fire fueled by rice hulls (Figure 4). The clam bodies were harvested and sold in the local market and the empty mussel shells discarded over the canal bank. (Figures 4 and 5). We were shown the rakes and poles they used to collect mussels from the mud bottomed canals and rivers (Figures 6 and 7). We were able to identify four species among the discarded shells: *Ensidens ingallasianus*, *Hyriopsis bialatus*, *Pilsbryoconcha compressa*, and *Uniandra contradens.*

Figure 3. New floor supported by rice bags full of discarded mussel shells. Photograph by A. Bogan.

Figure 4. View of the cooking facility with rice hulls in the front used as fuel for cooking mussels. Photograph by V.T. Do.

Figure 5. Shells discarded after cooking and collection of meat. Photograph by A. Bogan.

Figure 6. Rectangular wire frame nets with long bamboo handles used to dredge for freshwater mussels. Photograph by A. Bogan.

Figure 7. Close-up of the wire frame net with fine wires along the bottom edge. Photograph by V. T. Do.

We ended our search for freshwater mussels in a market in eastern An Giang Province, west of Ho Chi Minh City on 5 April 2014. Along the way, we passed through 25 provinces, covering 5,326 Km. We visited about 100 markets, and sampled, or worked with locals to sample, the rivers. We currently estimate we collected and documented 21 species of freshwater bivalves in Vietnam. This list includes probably two species of *Corbicula*, Cyrenidae; *Limnoperna fortunei,* Mytilidae, and about 18 species of Unionidae. We were not successful in confirming the continued existence of *Margaritifera laoensis,* Margaritiferidae, in the Central Highlands of Vietnam but remain optimistic that the local boy actually collected this species.

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Bogan, A.E. and Do, V.T. 2013. Field research on the distribution of freshwater bivalves in northern Vietnam, November 2012. *Ellipsaria* 15(1):13-14.

Freshwater and Amphibian Mollusks of Santa Catarina State/ SC, Central Southern Brazil Region: Definitive Integral Checklist

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Today, the general list of continental mollusk species known from Santa Catarina's State/ SC, the most central and small territory of the Southern Brazil region (Agudo-Padrón 2014a:20), includes 220 species and subspecies known regionally (190 gastropods and 30 bivalves). This tally is the result of 18 years of continuous and satisfying regional research developed unprecedentedly that State by us, with the opportune assistance - in many cases - of diverse collaborators. The same can be seen, in preliminary form, in the following link < http://noticias-malacologicas-am.webnode.pt/news/estado-da-arte-ordenamento-da-malacofauna-continental-de-santa-catarina-sc-/ >, and your taxonomic arrangement

basically follows the monographic contributions of Simone (2006), Thomé *et al.* (2006) and Pereira *et al.* (2012).

The part of list corresponding to 72 limnic species (70 freshwater – 40 gastropods and 30 bivalves – and two amphibious gastropods) so registered, taxonomically included in 31 genera and 15 families, is presented below, continuing with the previously published studies (Agudo-Padrón 2014a and b):

Freshwater and Amphibian Mollusks of Santa Catarina State/ SC to the month of May 2014

GASTROPODA

CAENOGASTROPODA

Family AMPULLARIIDAE

Asolene (Pomella) megastoma (Sowerby, 1825) (Figure 1)
Felipponea iheringi (Pilsbry, 1933)
Pomacea bridgesii (Reeve, 1856)
Pomacea canaliculata (Lamarck, 1819)
Pomacea lineata (Spix, 1827)
Pomacea paludosa (Say, 1829)
Pomacea sordida (Swainson, 1822)

Figure 1. AMPULLARIIDAE *Asolene (Pomella) megastoma* (Sowerby, 1825) and its known distribution in Santa Catarina State.

Family HYDROBIIDAE

Littoridina australis (d'Orbigny, 1835)
Littoridina piscium (d'Orbigny, 1835)
Littoridina charruana (d'Orbigny, 1840)
Littoridina davisi Silva & Thomé, 1985
Potamolithus catharinae Pilsbry, 1911
Potamolithus kusteri (Ihering, 1893)
Potamolithus lapidum (d'Orbigny,1835)
Potamolithus philippianus Pilsbry, 1911

Family ASSIMINEIDAE

Assiminea sp (in determining)

Family THIARIDAE

Aylacostoma sp (in determining) (Figure 2)
Melanoides tuberculatus (Müller, 1774)

Figure 2. THIARIDAE *Aylacostoma* sp. (in determining) and its known distribution in Santa Catarina State.

PULMONATA
Family SUCCINEIDAE
Omalonyx convexus (Heynemann, 1868)

Family ANCYLIDAE
Burnupia ingae Lanzer, 1991
Hebetancylus moricandi (d'Orbigny, 1837)
Ferrissia gentilis Lanzer, 1991
Uncancylus concentricus (d'Orbigny, 1835)

Family CHILINIDAE
Chilina fluminea (Maton, 1809)
Chilina globosa Frauenfeld, 1881
Chilina parva Martens, 1868

Family PHYSIDAE
Physa acuta Draparnaud, 1805
Aplexa marmorata Guilding, 1828

Family LYMNAEIDAE
Lymnaea columella Say, 1817
Lymnaea rupestris Paraense, 1982
Lymnaea viatrix d'Orbigny, 1835

Family PLANORBIDAE
Biomphalaria glabrata (Say, 1818)
Biomphalaria occidentalis Paraense, 1981
Biomphalaria oligoza Paraense, 1981
Biomphalaria peregrina (d'Orbigny, 1835)
Biomphalaria schrammi (Crosse, 1864)
Biomphalaria straminea (Dunker, 1848)
Biomphalaria tenagophila (d'Orbigny, 1835) (Figure 3)
Acrorbis petricola Odhner, 1937
Drepanotrema cimex (Moricand, 1838)
Drepanotrema heloicum (d'Orbigny, 1835)
Drepanotrema pfeifferi (Strobel, 1874)

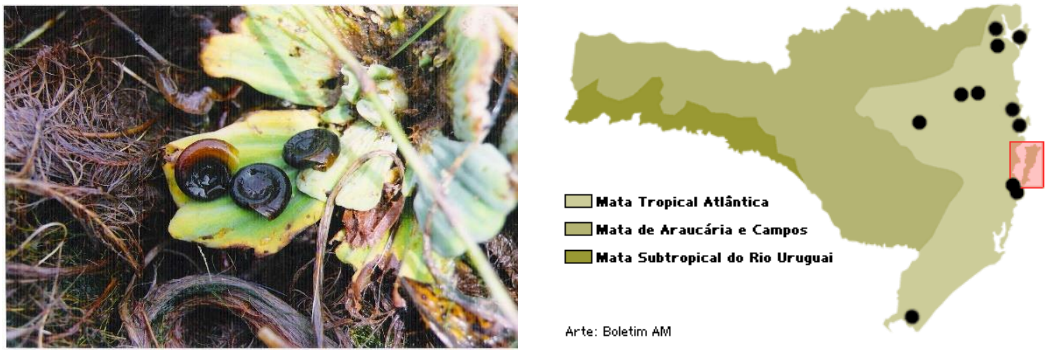

Figure 3. PLANORBIDAE *Biomphalaria tenagophila* (d'Orbigny, 1835) and its known distribution in Santa Catarina State.

CLASS BIVALVIA
UNIONOIDA
Family MYCETOPODIDAE

Mycetopoda legumen (Martens, 1888)
Mycetopoda siliquosa Spix, 1827
Anodontites elongatus (Swainson, 1823)
Anodontites tenebricosus (Lea, 1834)
Anodontites ferrarisii (d'Orbigny, 1835)
Anodontites moricandi (Lea, 1860)
Anodontites patagonicus (Lamarck, 1819)
Anodontites obtusus (Spix, 1927)
Anodontites trapesialis (Lamarck, 1819) (Figure 4)
Leila blainvilleana (Lea, 1834)
Monocondylaea minuana d'Orbigny, 1835

Figure 4. MYCETOPODIDAE *Anodontites trapesialis* (Lamarck, 1819) and its known distribution in Santa Catarina State.

Family HYRIIDAE

Rhipidodonta charruana (d'Orbigny,1835)
Rhipidodonta rhombea (Wagner, 1827
Diplodon ellipticus (Wagner in Spix, 1827)
Diplodon expansus (Küster, 1856)
Diplodon (*Rhipidodonta*) *koseritzi* (Clessin, 1888)
Diplodon multistriatus (Lea, 1834)

Diplodon delodontus (Lamarck, 1819)
Diplodon parallelipipedon (Lea, 1834)
Diplodon rhuacoicus (d'Orbigny, 1835)

VENEROIDA
Family CORBICULIDAE
Corbicula fluminea (Müller, 1774)
Corbicula largillierti (Philippi, 1844) (Figure 5)
Cyanocyclas (=*Neocorbicula*) *limosa* (Maton, 1809)

Figure 5. CORBICULIDAE *Corbicula largillierti* (Philippi, 1844) and its known distribution in Santa Catarina State.

Family SPHAERIIDAE
Eupera klappenbachi Mansur & Veitenheimer-Mendes, 1975
Eupera platensis Doello-Jurado, 1921
Pisidium globulus Clessin, 1888
Pisidium observationis (Pilsbry, 1911)
Pisidium pipoense Ituarte, 2000
Pisidium taraguyense Ituarte, 2000

Family MYTILIDAE
Limnoperna fortunei (Dunker, 1857)

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Continental Shelling in Lake Garda, Lombardy Region, Alpes-Maritimes Mountain Range, Northern Italy: Brief Chronicle of the "Project AM" in Europe

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Continental malacological traversing during October and November 2013 was carried by the Brazilian "Project AM" through the gorgeous geography of the Italian Peninsula (Figure 1). The specimens collected in the course totaled 17 species [16 Gastropoda & 1 Bivalvia (Figure 1)], were identified using the monumental monographic contribution of Welter-Schultes (2012), with help of some field guides (Pfleger & Chatfield 1983, Fechter & Falkner 1993) and the historical work of Alzona (1971).

Figure 1. Geographical territory of the Italian Península (map) and continental shell samples collected in the course of travel.

On November 3, 2013, during a brief visit to Sirmione on Lake Garda ("Lago di Garda"), located in the mountain range of Alpes-Maritimes region of Lombardy (Figure 2), we observed in the riversides abundant occurrence of operculate freshwater snails Viviparidae *Viviparus ater* (Cristofori & Jan, 1832) (Figure 3), in addition to the exotic Asian freshwater clams Corbiculida *Corbicula fluminea* (Müller, 1774) (Figure 4) – previously reported to said location in the literature (Doneddu & Trainito 2013:335) – and a isolated specimen of the Lymnaeidae *Radix* (= *Lymnaea*) *auricularia* (Linnaeus, 1758) (Figure 5). The recent literature (Cappelletti *et al.* 2009, Mienis 2013) reports that the invasive exotic Asian freshwater mussel/ naiad UNIONIDAE *Sinanodonta woodiana* (Lea, 1834) also occurs in Lake Garda.

Figure 2. Community of "Sirmione" on the side of Lake Garda.

Figure 3. Freshwater operculate snail *Viviparus ater* (De Cristofori & Jan, 1832), a common species in the Southern Alpine region of Sirmione (Lake Garda).

Figure 4. Invasive exotic Asian clams *Corbicula fluminea* (Müller, 1774), another common species in the Southern Alpine region of Sirmione (Lake Garda).

Figure 5. Freshwater pulmonate snail *Radix* (= *Lymnaea*) *auricularia* (Linnaeus, 1758), a little species of the Southern Alpine region of Sirmione (Lake Garda).

A total of six regions and eleven provinces were visited in the course of this cultural journey and malacological research on the Italian peninsula. The general results obtained can be viewed at https://www.facebook.com/pages/Avulsos-Malacol%C3%B3gicos-AM/293465304090756 – see November 2013.

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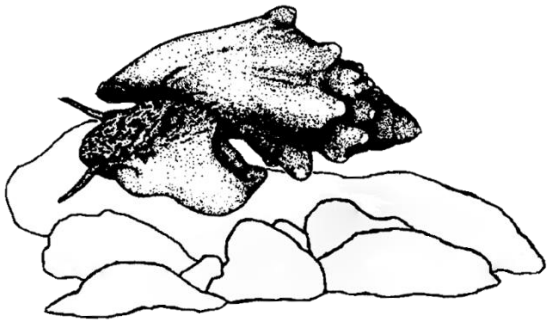

2013 Freshwater Mollusk Bibliography

Compiled by Kevin S. Cummings
Illinois Natural History Survey, Champaign, Illinois

The following are papers on freshwater mollusks that have been published up to and including 2013 that 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 & other FW 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 23,000 references on freshwater mollusks (including all previous FMCS 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, IL 61820. email: kscummin@illinois.edu .

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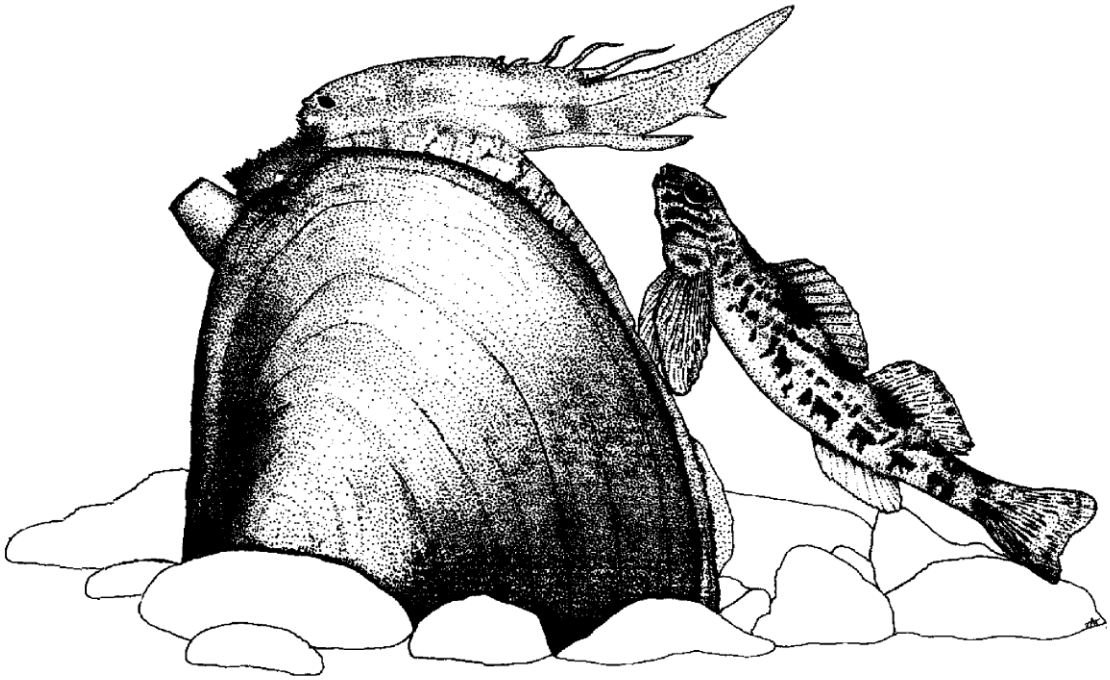

Obituary

Thomas Vincent Proch

Thomas (Tom) Vincent Proch was born in 1948 and passed away 22 September 2011. He was married to Karen (Mathews) Proch and had two sons, Gary and Brian. He was the son of the late Vincent J. and Loretta (Gorczyca) Proch. Tom graduated from the University of Notre Dame in 1969 with a B.S. in Biology, and from the University of Pittsburgh in 1971 with a M.S. in Applied Aquatic Biology.

In 1971 and 1972, Tom worked as a Water Pollution Control Specialist with the Allegheny County Health Department in Pittsburgh, Pennsylvania. He was responsible for developing a stream ranking and classification system based on both chemical and biological parameters for the purpose of establishing watershed priorities. He also was responsible for the development and testing of sampling protocols, and established and equipped a chemical and biological laboratory.

From 1972 untill his retirement in June 2007, Tom worked for the Commonwealth of Pennsylvania in the Department of Environmental Protection (DEP). Tom conducted surveys and prepared reports on the biological and chemical status of rivers, streams, and lakes in Southwestern PA. In 1985, Tom became a supervisor and provided technical services to the permitting and compliance sections of the DEP Southwest Regional Water Management Program. He provided expert legal testimony and liaised with other state and federal agencies and citizen groups. Tom developed a bar code data entry system and a Geographical Information System in the Pittsburgh Office for aquatic data. He conducted biology and wetland training courses for the DEP and was responsible for a major project, the aquatic resources study of the Ohio River in Pennsylvania.

Tom was the DEP expert on freshwater mussels for the entire state of Pennsylvania. He sampled for them across the state with Arthur Bogan. He also drafted a DEP survey protocol for the survey of freshwater mussels. Tom and Art were working on a draft of the Freshwater Mussels of Pennsylvania when he passed away.

Tom was heavily involved in two organizations: the North American Benthological Society (NABS - now the Society of Freshwater Science) and the Freshwater Mussel Conservation Society (FMCS). Tom served as Chairman of the NABS Environmental Stewardship Award Committee and as the meeting Local Arrangements Chair for that Society's 50th year annual meeting in Pittsburgh in 2002.

Tom was a founding member of FMCS. He organized and coordinated the FMCS Symposium "Biological Assessments: Evaluation of Endangered Mollusks" held in Pittsburgh in 2001. He was extremely dedicated to the FMCS and to freshwater mussel conservation. In his spare time, Tom was a volunteer at the Mollusk Section of the Carnegie Museum of Natural History.

Those who knew Tom will remember him as a great cook and connoisseur of great food, both at home and away at meetings. His passion away from work was his garden, fruit trees, and the large cultivated plot with corn, numerous varieties of garlic, and other vegetables.

Quote

Regarding freshwater mussels in the Allegheny River, Tom wrote: "Navigational pools aren't their preferred habitat. As their name implies, they prefer riffles and shallow water."

Thomas Proch Publications:

Abstracts: [11]

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Workbooks [4]

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Bogan, A.E. and **T. Proch.** 2004. *Workshop on Freshwater Bivalves of Pennsylvania*. pp. ii, 1-80, with 11 color plates, 65 figures. [reprinted 1993 version by PA DEP]

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Bogan, A.E. and **T. Proch**. 1993. Freshwater bivalves of the Monongahela River Basin and direct tributaries to the Ohio in Southwest Pennsylvania. *Triannual Unionid Report.* Report No. 2, Fall 1993 pp. [26].

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Ellipsaria is posted on the FMCS web site quarterly: early in March, June, September, and December. This newsletter routinely includes Society news, abstracts, job postings, meeting notices, publication announcements, informal articles about ongoing research, and comments on current issues affecting freshwater mollusks. Anyone may submit material for inclusion in *Ellipsaria*; however, only current dues-paying members of FMCS can access the two most recent issues. Older issues are accessible to anyone. Information for possible inclusion in *Ellipsaria* should be submitted via e-mail to the editor, John Jenkinson, at jjjenkinson@hotmail.com .

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

FMCS Standing Committees and Their Chairs/Co-chairs

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

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Parting Shot

A double handful of live snuffbox mussels, *Epioblasma triquetra*, from the Clinton River (Great Lakes drainage) in southeastern Michigan. The watershed is highly urbanized; however, reproducing populations of *E. triquetra* do occur there. Unfortunately, *Dreissena polymorpha* and *Corbicula fluminea* are also living in the same reach of the river. If you look closely, you can see *Dreissena* byssal threads on some of these snuffboxes. Photograph by "Woolnough Lab., Central Michigan University; Mandi Caldwell."

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