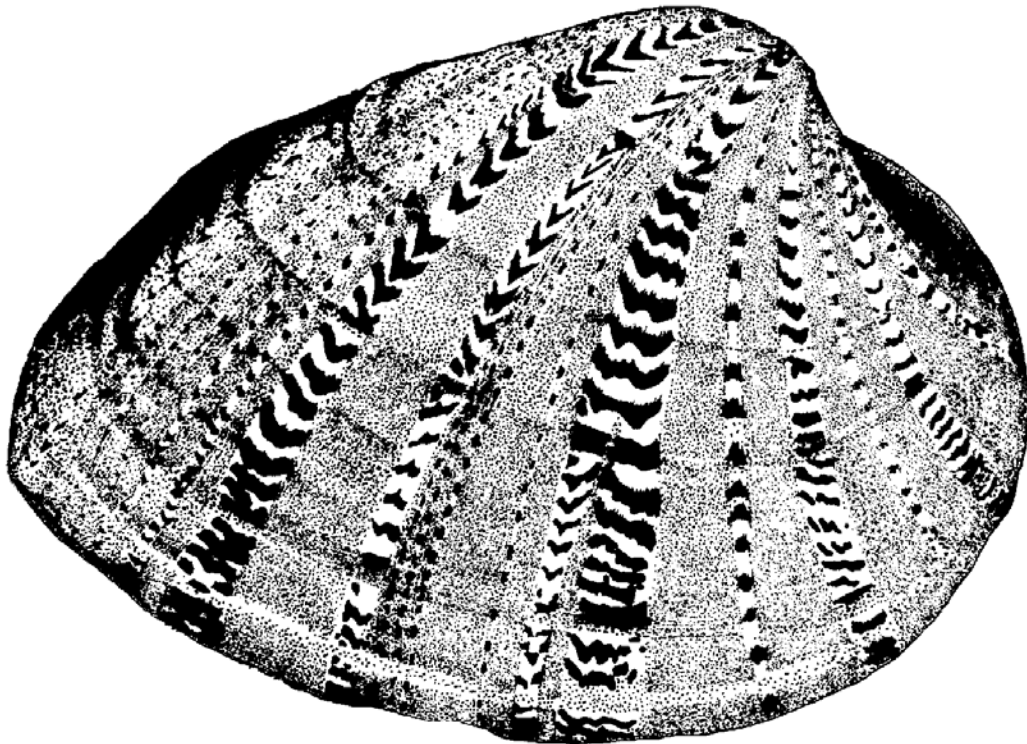


Ellipsaria

The Newsletter of the Freshwater Mollusk Conservation Society

Volume 4 - Number 2

August 2002



In this issue:

2003 Symposium Registration and Call for Papers

New FMCS Student Awards

2002 FMCS Membership List

2001 Freshwater Mollusk Bibliography

***Ellipsaria* – Volume 4, Number 2 – August 2002**

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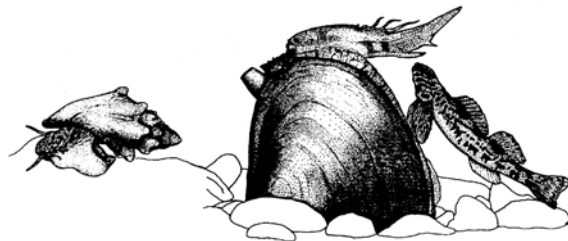
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Freshwater Mollusk Conservation Society



FMCS Reports

FMCS 2003 SYMPOSIUM MARCH 16 – 19, 2003 Sheraton Imperial Hotel Durham, North Carolina

North Carolina is pleased to host the 2003 Symposium of the Freshwater Mollusk Conservation Society. The symposium will be held at the Sheraton Imperial Hotel, a facility centrally located among 3 university cities - Chapel Hill, Raleigh, and Durham. These cities form North Carolina's Research Triangle, one of the region's rapidly growing metropolitan areas. As time allows, we welcome you to explore the area's natural resource, cultural, and culinary delights.

Theme:

“Connections . . . A Focus on Habitat Conservation”

Rationale: A small army of professionals is constantly working to conserve the habitats of freshwater mollusks; however, the “scientific evidence” needed to support requirements associated with project-related permits often isn't readily available. These folks need your help! The 2003 symposium will provide an opportunity for biologists and others to share ideas, exchange information, and engage in the interpersonal networking needed to support the conservation of our freshwater molluscan resources.

Think critically about your research, its association with other research projects, and its suggestions relative to the following interrelated topics:

- Width of wooded riparian corridors
- Large woody debris input
- Coarse and fine particulate organic matter input
- Maintenance of stream and riparian microclimates (including stream temperatures)
- Control of sediments and contaminants
- Stormwater limits
- Minimum flows
- ...and other topics related to habitat conservation

Last Call for Abstracts

Instructions for Abstract Preparation and Submittal

We are requesting abstracts associated with the above theme and others associated with the following topics: Conservation Initiatives, Range-wide Status (co-authorship encouraged), Life History and Ecology, Life History and Ecology of Host Fish, Evolution and Phylogenetics, Outreach, Propagation, Recovery, and Contaminants.

Submittal form: Abstracts should be submitted as an email attachment in Microsoft Word® or ASCII text to both John Alderman (aldermjm@mindspring.com) AND Judy Ratcliffe (jaratcliffe@mindspring.com). File name should include presenter's last name and initials (e.g., jonesjm.doc).

Acknowledgment of abstract receipt, if requested, will be provided by e-mail. Abstracts must be received by November 30, 2002.

Limit abstracts to 300 words or less (including title, authors, and affiliations). Abstracts over 300 words will be edited.

Submittal format: The abstract should contain the title in **BOLD, CAPITAL** letters, followed by the author(s), and address(es). Underscore the presenter's name. Skip one line and begin the text (see example below) including a clear summary of presentation including objectives, results, and conclusions.

PROPAGATION OF FRESHWATER MUSSELS IN A CLOSED RECIRCULATING SYSTEM, Shane D. Hanlon¹, Jay F. Levine², Lori Gustafson², and Chris Eads². ¹U.S. Fish and Wildlife Service, Southwestern Virginia Field Office, 330 Cummings Street, Abingdon, VA 24210; ²College of Veterinary Medicine, North Carolina State University, Raleigh, NC 27606.

We renovated a preexisting wet laboratory located at North Carolina State University for purposes of propagating...

At the bottom of the page, type:

1. The name, address, telephone, fax, and e-mail of the presenting author
2. Preference for Platform or Poster presentation and willingness (yes or no) to convert from one format to another
3. Regular or Student* attendee

*Note: All students submitting abstracts, provided they meet eligibility requirements (see accompanying newsletter article), will be judged for the best student platform or poster competition, unless otherwise indicated.

**ABSTRACTS MUST BE RECEIVED
BY NOVEMBER 30, 2002**

Presentation requirements

Oral presentations are not to exceed 20 minutes (15 minutes for talk and 5 minutes for questions and answers).

Slides and LCD projector visual aids only - no overheads. Laptop computers for LCD presentations will be loaded with PowerPoint 2000 for Microsoft Windows. Presentations should be developed at XGA 1024 X 768 resolution. Both 250 zip drives and **CD-R** will be available to load presentations (**DO NOT** use **CD-RW** disks). Presentations must be loaded, by the author, onto provided laptops between 5-6 pm the evening before the presentation. **No personal laptops may be used for presentations.** If the author will not arrive until the day of the presentation, the presentation must be sent to John Alderman or Judy Ratcliffe 2 weeks before the symposium begins. Additional information regarding presentations (including addresses of Alderman and Ratcliffe) will be sent to authors of accepted abstracts.

Poster requirements

The poster should be readable from 5 feet, titles from 10 feet; and the poster should not exceed a size of 4 feet high by 8 feet wide. Authors must be present at the poster session from 7:00 to 9:00 p.m. on Sunday, March 16, 2003.

Accommodations

The Sheraton Imperial Hotel and Convention Center rate is \$90.00 per night, single or double occupancy. Rooms must be booked by **February 28, 2003** to guarantee this rate. Please call 919-941-5050 or 800-325-3535 for reservations and tell them that you are attending the FMCS symposium. Check-in time is 3 p.m., check-out time is 12 noon. The Sheraton Imperial is located at exit 282 off I-40 in Research Triangle Park between Durham and Raleigh, North Carolina.

Please plan to book your room with the Sheraton Imperial. FMCS meeting room rental costs are based upon the number of hotel rooms booked by members. We need to book at least 100 rooms each night to ensure reasonable meeting room costs.

Travel

Free shuttle service from Raleigh-Durham International Airport is provided by the Sheraton Imperial Hotel for registered guests. Also, free parking at the hotel is provided for all symposium attendees.

Awards for Best Student Platform and Poster Presentation Eligibility Requirements for Students

The Freshwater Mollusk Conservation Society (FMCS) is initiating a competition for Best Student Platform and Poster awards at the 2003 Symposium to be held March 16-19, 2003 in Research Triangle Park, North Carolina. Cash awards of \$500 will be presented by the Society to winners in each of the two categories. Students awarded these prizes are encouraged, but not required, to use the cash awards from the FMCS to present their winning presentations at other mollusk-related scientific meetings (e.g., the American Malacological Society, North American Benthological Society, or National Shellfisheries Association) to broaden awareness of the FMCS. All students submitting abstracts for the 2003 Symposium, provided they meet the eligibility requirements below, will be judged for the best student platform or poster competition, unless otherwise indicated on the abstract submittal form.

1. You must presently be a student or have graduated after March 2002.
2. You must be the first author and present the paper.
3. The presentation must be from research conducted as a student and not as a post-graduate.
4. The FMCS encourages students to give presentations on preliminary stages of their research (e.g., on the experimental design) prior to any data having been collected; however, **ONLY** presentations that contain data (i.e., results) will be considered for awards.

5. Student status must be indicated on the abstract (follow the "Instructions for Abstract Preparation and Submittal" in the Meeting Announcement and Call For Papers).

Awards will be announced and presented during the 2003 symposium at the FMCS Business Meeting.

Announcement 2002 FMCS Student Travel Award Program

In 2002, the Freshwater Mollusk Conservation Society (FMCS) established a Student Travel Award Program for the specific purpose of encouraging maximal participation of students (undergraduate and graduate) in the biannual symposium of the Society. The 2002 announcement is for travel awards to attend the 2003 Symposium to be held March 16-19, 2003 in Research Triangle Park, North Carolina. Support is provided via an award of \$100 to \$300 (actual amount depends on the number of qualified applicants) to help defer the cost of travel and accommodations. It is anticipated that approximately 10 to 30 awards will be made for the 2003 Symposium. The number of future annual awards will be determined each year by the Society's Executive Board. Awards will be made directly to the students during registration at the annual meeting. All student members of the FMCS are eligible.

Requirements and Limitations: Each applicant must (1) be a student member of the Society **or** (2) have included dues (\$15) for membership in their application for the travel award. Applicants for Student Travel Awards must be making a platform or poster presentation at the biannual symposium of the Society (written acceptance of abstract from FMCS is not required as long as an abstract was submitted).

Application Materials: The following materials comprise a complete application package. One copy of the complete application package must be received by the Co-chair of the Student Awards Committee on or before **December 6, 2002**. (Applications received by FAX will not be accepted.) Failure to meet the deadline or to follow instructions invalidates the application.

- 1) A completed application form (enclosed in newsletter and/or posted on web site).
- 2) A copy of the applicant's abstract that was already submitted through the abstract submission process.
- 3) A one-page curriculum vita of the applicant.
- 4) A letter of recommendation and statement of financial need (why travel funds are not available from the home institution) from the applicant's research advisor (one page maximum).

**EACH APPLICATION MUST STAND ALONE:
GROUP APPLICATIONS WILL NOT BE ACCEPTED.**

Evaluation Procedures: We anticipate that most applicants for a travel award will be funded. However, because the

number of awards is limited by available funds, applicants will be ranked on the basis of the following criteria:

- 1) Completeness and timeliness of the application package;
- 2) Quality of the abstract; and
- 3) Letter of recommendation and statement of financial need.

Submit Application to:

Dr. Catherine M. Gatenby
FMCS Student Awards Committee
Academy of Natural Sciences
Patrick Center for Environmental Research
1900 Ben Franklin Parkway
Philadelphia, PA 19103

DEADLINE FOR RECEIPT: December 6, 2002

FAXED COPIES WILL NOT BE ACCEPTED

Submitted by Greg Cope, Chair

President's Report Update from the Semi-Oval Office

After a hectic spring and a bumper crop (>100,000) of endangered juvenile mussels in 2002 for Virginia and Tennessee, I can finally provide a summary of what I've been doing as President of FMCS.

I established a Student Awards Committee under the capable hands of Greg Cope at NC State. He has had considerable experience with the SETAC (Society of Environmental Toxicology and Chemistry Student Committee. Catherine Gatenby has participated in the NSA Student Endorsement/ Awards Committee, so she worked with Greg to establish guidelines and protocols for our FMCS Awards Committee. I provided Greg with a prototype document for FMCS, sent to Paul Johnson from Linda Drees. Greg has a draft circulating to the Executive Board for review and comment. I will finalize it at least by our November meeting so that we can plan for awards at the 2003 Symposium.

I am in the process of drafting guidelines/mission statement for an Environmental Affairs Committee. This was discussed last year; i.e., the need for us to be proactive and reactive to major projects likely to have a significant adverse impact on freshwater mollusks. Many other societies have such a group (NABS, AMS, etc.), and because our taxon leads the lists for degrees of endangerment, it is imperative that we represent these species in the politico-economic area. Projects such as the proposed Sunflower River dredging, recent mussel kills, effects of dam removals, low DOs, etc. should have our expertise included in their evaluation. Our goal would be to eventually have agencies approach us when such projects arise, because of our expertise and fair-minded evaluations.

I have been corresponding with A.I.B.S., to learn more about the benefits of belonging to their umbrella organization and to exploit those benefits. This summer, I

prepared a half-page announcement for BioScience, relating who we are, what we do, and soliciting new members for FMCS. This is one of the perks that A.I.B.S. provides, and we will take advantage of this opportunity for full publicity. I am getting their meeting drafts for 2003, to see whether I can attend. It would be helpful for FMCS to make its presence known with some of the 83 professional societies and organizations who are members of A.I.B.S. There may be an opportunity to network and collaborate with other freshwater organizations with goals similar to ours.

Plans for the Symposium are proceeding on schedule, thanks to the organizational skills of John Alderman. Even though John changed jobs this spring from one NC agency to another, this change should not affect his ability to continue to coordinate the conference. We are well prepared for an excellent meeting in 2003, so let's get those abstracts submitted.

I have nothing new to report on Walkerana. I talked to Jack Burch at the AMS meeting in Charleston and he assures me that there will be a smooth transition from his editorship to that of FMCS. This will be discussed by the Executive Committee at our November meeting. The able Kevin Cummings and Tom Watters are overseeing this venture.

The Guidelines and Techniques Committee, under Chairman John Van Hassel, is coordinating a review of the Strayer and Smith manuscript entitled 'A Guide to Sampling Freshwater Mussel Populations.' As you may recall, FMCS is contributing half of the publication cost for this manual, with the intent to distribute a copy to each FMCS member. The American Fisheries Society will publish the guide, presumably through Allen Press, and pay the other half of publication cost.

The featured symposium at AMS this year, 'The Biology and Conservation of Freshwater Gastropods' was organized by our own Rob Dillon. Rob is President of AMS this year and has made inroads into bringing our societies closer together. I met briefly with Rob at the AMS meeting to discuss the future of both societies. Who knows, maybe a joint meeting could be considered in the future.

I haven't received any news from the Chairs of other Standing Committees, but I will get updates at our November meeting.

Finally, I would like to acknowledge the success from our Propagation Workshop at Club Fed in Shepherdstown, WV. Thanks to Chris Barnhart, the presenters, and the enthusiastic attendees, everyone left there with new hope and a determination to implement conservation at their own scale. There is a bright side to the doom and gloom cloud that has caused a shadow of futility within us. Public education agency support, and dedicated biologists are the ingredients necessary for recovery success stories. We have broken ground, and not wind, in our ability to implement what was once wishful thinking. We now have sufficient momentum in various states to do restoration through propagation, such that other states will soon come on board.

I will send out another update from the Semi-Oval Office after our meeting in Crittenden, KY on November 6-7, 2002. Enjoy the summer and pray for a continued terrorist-free 2002.

Dick Neves, President

Board Meeting November 6-7, 2002 Crittenden, Kentucky

Our next FMCS board meeting is scheduled for November 7 and 8 at the Lloyd Wildlife Management Area in Crittenden, Kentucky, in conjunction with the ORVE Mussel Subgroup meeting. We will begin at 1 pm on Thursday and end at lunchtime on Friday. FMCS board meetings are open and any society member may attend. However, only officers and committee chairs are allowed to vote on business issues.

Draft Agenda:

- Preparations for 2003 Symposium
- Site selection for the 2007 Symposium
- Topic for the 2004 Workshop
- Guidelines for Student Awards
- Proposal for Environmental Affairs Committee
- Advertisement in BioScience
- Update on Walkerana
- Committee reports
- Zebra mussel review document
- Smith/Strayer sampling publication
- Update on mussel valuation project

Please send any additional agenda items to Dick Neves at mussel@vt.edu

Submitted by Dick Neves, President

Treasurer's Report

Current financial status:

The society is in good shape financially. So far this year we have income from dues (\$7,340), and from the workshop, hat, and t-shirt sales (\$9945). Total income of \$17,825.00. Expenses have included workshop costs, a few remaining bills from the Pittsburg meeting, newsletter expenses, credit card and bank fees, and a few other miscellaneous expenses (total expenses \$8008.49). We also have received interest of \$124.48 on our saving account. Net for the year through July is \$9400.99. This gives us a balance of \$45,152.91.

Upcoming expenses:

The society agreed at the Shepardstown meeting to provide funding (\$4300) for publishing of Dave Strayer and Dave Smith's monograph on mussel sampling, which will be published through AFS. Greg Cope and Catherine Gatenby are in the process of establishing criteria for student awards for best platform and poster presentations (\$500) and assistance with travel to the NC meeting (\$100-\$300).

If anyone would like more detail or a copy of the current finance statements, please feel free to send me an e-mail.

Submitted by Heidi Dunn, Treasurer

Committee Reports

Freshwater Gastropod Committee Report

Freshwater gastropods were the marquee attraction at the 68th meeting of the American Malacological Society just concluded in Charleston. The scientific sessions commenced



Sunday morning August 4 with a pair of plenary addresses on our favorite animals: Amy Wethington reminding us what marvelous models freshwater snails may be to address scientific questions of great generality, and Ken Brown & Paul Johnson highlighting their presently imperiled status.

These talks segued smoothly into the featured symposium of AMS 2002: "The Biology and

Conservation of Freshwater Gastropods," a program of 15 talks ranging broadly across the ecology, evolution, and genetics of snails from Alberta to Zambia. Speakers included John Alderman, Art Bogan, Rob Dillon, Eileen Jokinen, Chuck Lydeard, Bob McMahon, Doug Shelton, Tim Stewart, Brian Watson, and a host of others. The symposium was designed to build toward a meeting of the Freshwater Gastropods of North America project Sunday evening. Minutes of that eventful gathering will be offered in a future issue of *Ellipsaria*.

But the celebration of freshwater gastropods was not over. There were seven contributed talks and ten poster presentations on freshwater snails Monday afternoon. And Tuesday, August 6 featured a special session, organized by Amy Wethington, entitled "Pulmonates in the Laboratory." The eight invited presentations primarily involved *Physa* and *Biomphalaria* and focused on behavioral, morphological, and genetic questions.

A good time was had by all. For more details, the Program and Abstracts of all presentations at the Charleston meeting will be available soon as a PDF file from the AMS website:

<http://erato.acnatsci.org/ams/>

Submitted by R.T. Dillon, Chair

Guidelines & Techniques Committee Commercial Report

Robb Southwick from Southwick and Associates is moving right along on producing a document for monetary values of mussels. He expects that this will be done and sent out to committee members for review and will be presented at the November FMCS board meeting. Robb had indicated to me that some states were not too excited about this because they don't have the resources to evaluate mussel kills. It will be interesting to see what recommendations can be made to get states to accept this.

Submitted by Steve Ahlstedt

Propagation and Restoration Committee Mussel Propagation News

The *Lampsilis higginsi* crew at Genoa National Hatchery continues to report impressive results. Grow-out in cages in the lower St. Croix River has been particularly successful. Some of the cages examined in June yielded hundreds of grape-sized juveniles! A report describing this effort is available from Mark Steingraeber, U.S. Fish and Wildlife Service, LaCrosse Fishery Resource Office, 555 Lester Ave, LaCrosse, WI 54650. Pictures and more informal reports from Mike Davis can be viewed at the Propagation website (see below).

According to Jess Jones at Virginia Tech, field surveys of release sites on the Clinch recently resulted in about a dozen recaptures of *Epioblasma capsaeformis*. We look forward to more news as dry weather and low water in Virginia are facilitating searches.

The propagation program at Southwest Missouri State and the Missouri Department of Conservation produced and released the federally endangered scaleshell for the first time this summer. The MDC Lost Valley Hatchery transformed snuffbox and black sandshell which were then released in rivers of the Meramec system. Neosho mucketts (*Lampsilis rafinesqueana*) transformed and released in 2000 (now 24 months old) have reached over 70 mm shell length at two sites in the Verdigris river system in Kansas.

For resources and news about mussel propagation, visit the Propagation website: <http://unionid.smsu.edu/> Contributions (information, that is) for the website are welcome.

Submitted by Chris Barnhart

Student Awards Committee Report

The Student Awards Committee was established by FMCS President, Dick Neves, in early 2002. Greg Cope (North Carolina State University) and Catherine Gatenby (Academy of Natural Sciences) have taken the lead in getting the defining documents and procedures written and approved. The Committee is pleased to announce that Student Travel and Best Student Platform and Poster awards will be given in conjunction with the 2003 Symposium in Research Triangle Park, North Carolina. Students and their advisors are encouraged to see the Award Announcements and Eligibility Requirements in this newsletter. For the upcoming Symposium, a cash award of \$500 will be presented by the Society to a student making the best platform and poster presentation. Up to \$3000 will be available qualified students for Student Travel Awards to help defer the costs of attending the 2003 Symposium. It is anticipated that 10 to 30 travel awards of \$100 to \$300 (actual number and amount depends on the number of qualified applicants) will be presented during this cycle.

Submitted by Greg Cope, Chair

Water Quality, Habitat, and Zebra Mussel Committee Report

Efforts of the Water Quality, Habitat, and Zebra Mussel Committee have focused on completing a report for the U.S. Fish and Wildlife Service that summarizes techniques for preventing the incidental introduction of zebra mussels during native mussel conservation activities. The report entitled "Evaluation of techniques to prevent introduction of zebra mussels (*Dreissena polymorpha*) during native mussel (Unionoidea) conservation activities," was authored by Committee members Greg Cope (North Carolina State University), Teresa Newton (U.S. Geological Survey), and Catherine Gatenby (Academy of Natural Sciences). A draft of the report has been completed and is currently undergoing peer-review by FMCS members. The final report is scheduled for submission to the U.S. Fish and Wildlife Service in mid to late August 2002. A copy of this report may be distributed to FMCS members attending the 2003 Symposium in Research Triangle Park, North Carolina, if sufficient funds are available for duplication.

Submitted by Greg Cope, Co-chair

Ellipsaria Submission - December Issue

Submissions for the December issue of *Ellipsaria* can be sent in at any time but are due by November 15, 2002. Anyone may submit an article but you must be a member of FMCS to receive *Ellipsaria*. Categories for contributions include news (meetings, current issues affecting mollusks, and the like), new publications, job postings, contributed articles (including ongoing research projects), abstracts, society committee reports, etc. Electronic submissions are preferred; please send to:

cmayer@inhs.uiuc.edu

or

Chris Mayer

Illinois Natural History Survey

607 E. Peabody Dr.

Champaign, IL 61820

News

Zebra Mussel Alert

Zebra mussels were detected by EnviroScience in June during a freshwater mussel survey on French Creek in Crawford County, northwestern Pennsylvania. The survey was initiated in response to recommendations by the United States Fish and Wildlife Service under Section 7 of the Endangered Species Act, and the Pennsylvania Fish and Boat Commission. The project is being funded by the Pennsylvania Department of Transportation District 1-0 and the Federal Highways Administration. The purpose of the survey was to determine the presence and distribution of any federally threatened or endangered freshwater mussel species within several potential construction impact areas.

To my knowledge, this represents the first record of zebra mussels within French Creek, though they are known from Edinboro Lake which empties into French Creek via Conneauttee Creek, its outlet stream, upstream of the project area. A total of 4 live zebra mussels were found during the survey, at a density of 0.012/ sq. m (0.0115 SE) based on 600 quadrat samples. In addition, 23 species of freshwater mussels were detected (26 total are known) at densities approaching 90/sq. m in some areas. The federally listed northern riffleshell and clubshell, and a number of other rare mussel species were among those detected (due to the presence of federally protected species and the sensitive nature of this site, I have omitted our exact survey location).

It may be that zebra mussels will not heavily colonize this high-quality stream because French Creek is largely free flowing and unsuitable for the veliger larvae, but that remains to be seen. The zebra mussels we found all appeared to be approximately 2 years old or more, and from the same age class. We did not detect any juvenile zebra mussels. The Pennsylvania Department of Environmental Protection (DEP) has been working with Edinboro Lake to implement winter draw-downs since the exotic species was detected there. This has apparently been effective at killing most of the Zebra Mussels from the hard substrates near the shore.

Zebra mussel sightings in Pennsylvania should be reported to DEP's Tony Shaw at (717) 787-9637.

Submitted by Gregory Zimmerman

New Mussel Screensaver

A new free screensaver is available at the The Ohio State's Museum Division of Molluscs website:

<http://www.biosci.ohio-state.edu/~molluscs/OSUM2>

Freshwater Mussels - 33 images of some far flung and seldom seen beasts.

Also, the Smokies ATBI page has been expanded to include a snail photo gallery and site map; look in the Gastropods page.

Submitted by Tom Watters

Pearls at the Field Museum

See the most spectacular collection of pearls ever assembled in an exhibition that combines nature, science, history, and glamour. Co-curated by The Field Museum in Chicago and the American Museum of Natural History in New York, Pearls is the largest, most comprehensive exhibition ever put together on this subject. The exhibition, at the Field Museum in Chicago, ends January 5, 2003.

For additional information see: <http://www.fmnh.org/pearls/>

II Congreso de las Sociedades Malacológicas Europeas

The II Congreso de las Sociedades Malacológicas Europeas will take place in September 2002. For more information, visit: <http://www.vincit.es/malacologia/resumenes.htm>

Submitted by Rafael Araujo

Australian Course on Mollusca

The University of Wollongong, in conjunction with the Australian Museum, is offering an advanced course on molluscan biology in February 2003. It will be held at the University of Wollongong (situated a little over an hour south of Sydney) with field work in Jervis Bay (and surrounds), one of the most pristine embayments on the east coast of Australia.

Details concerning costs, credit points, enrollment, requirements, etc., can be found on the website: <http://www.uow.edu.au/science/biol/molluscs/>

Submitted by Winston Ponder

Job Announcements

Virginia Polytechnic Institute: Graduate Research Assistantship

I have an opening for a graduate student to assess the effects of siltation on juvenile and adult freshwater mussels. It can be MS or PhD depending upon the credentials of the most qualified candidate. Position will begin January 2003 or as soon as a qualified candidate can be recruited. Interested persons should contact Dick Neves at mussel@vt.edu.

Univ. of Alabama and Univ. of New Mexico: Graduate Research Assistantships

The Center for Freshwater Studies at the University of Alabama (UA) and the Hydrogeoecology Group at the University of New Mexico (UNM) are pleased to announce the availability of Ph.D. fellowships for our collaborative Freshwater Sciences Interdisciplinary Doctoral Program that is funded through the National Science Foundation (NSF) Integrative Graduate Education and Research Training (IGERT) Program. This program was initiated by the NSF to broaden career options for Ph.D. graduates by developing expertise in interdisciplinary, team-oriented research. Our UA/UNM Freshwater Sciences program emphasizes aquatic ecology, environmental geology, and hydrology. It provides opportunities for IGERT Fellows through a newly developed core curriculum, inter-regional research, applications of fundamental research to problem-solving in ecosystem restoration and management, and other activities that will enhance student skills in team-building and communication.

We are recruiting students for entry in the 2003/2004 academic year. Students receive 12-month, \$15,000 stipends for up to 3 years and additional years of support through graduate research and/or teaching assistantships (with tuition and fees paid) as needed to complete the degree. Additional funding is provided to support IGERT activities. The application process includes (1) application and acceptance into one of the participating IGERT departments at either UA or UNM (deadlines for application vary depending on department or institution); and (2) review of applications for an IGERT fellowship. The IGERT fellowships are available only to US citizens.

Please visit our website at: <http://www.as.ua.edu/IGERT/>
Before you apply or for more information, please contact one of the following:

Dr. Amy Ward
Director, Center for Freshwater Studies
The University of Alabama
P.O. Box 870206
Tuscaloosa, AL 35487-0206
205-348-1896; award@biology.as.ua.edu

Dr. Cliff Dahm
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Department of Biology, 167A Castetter Hall
Albuquerque, NM 87131-1091
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Charles Lydeard, Associate Professor
Biodiversity & Systematics
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Publications

Cherry, D.S., J.H. VanHassel, J.L. Farris, D.J. Soucek, and R. J. Neves. 2002. Site-specific derivation of the acute copper criteria for the Clinch River, Virginia. *Human and Ecological Risk Assessment* 8(3): 591-601.

Jones, J.W., and R.J. Neves. 2002. Life history and propagation of the endangered fanshell pearly mussel, *Cyprogenia stegaria* Rafinesque (Bivalvia:Unionidae). *Journal of the North American Benthological Society* 21(1): 76-88.

The Mussels of Muscle Shoals

Recently published by Alabama Heritage Magazine, *The Mussels of Muscle Shoals* includes a discussion of the mussels and their importance to man, the selection of the name "Muscle Shoals," settlement of the area, and other

interesting tidbits. The magazine is well done and includes other interesting articles regarding Alabama Heritage and natural history subjects. You can find the article in the Spring 2002, Number 64 issue of the magazine. Back issues can be purchased through the website at <http://www.alabamaheritage.com/bissue.htm>

Not strictly geared toward mussels, but interesting none the less, articles on the Paint Rock River (Spring 1999, No. 52) and the Cahaba River (Fall 1988, No. 50) can be found through the website as well.

Also, Walkerana recently came out with an article on the Cahaba mussels' current status, centering on efforts by the GSA in the lower Cahaba in 1994 and by Malcolm independently, along with brief discussions of each species from the river. To wit:

McGregor, S.W., P.E. O'Neil, and M.F. Pierson, 2000. Status of the freshwater mussel (Bivalvia: Unionidae) fauna in the Cahaba River system, Alabama: *Walkerana*, 11(26): 215-237.

New Freshwater Invertebrates Book

Reese Voshell, Professor of Entomology at Virginia Tech, has recently (June 2002) published *A Guide to Common Freshwater Invertebrates of North America*. Reese has drawn upon his 30 years of experience to write a book for anyone who is interested in nature generally, and freshwater biology and ecology in particular. This book is written in the style of classic field guides and allows users to find and identify common freshwater invertebrates. Special features of this 456-page book include the following:

- Covers about 100 of the invertebrates most likely to be found in streams, rivers, ponds, lakes, marshes, and swamps of North America.
- Includes 104 color and 106 black and white illustrations done by a nationally known artist.
- Introductory section concisely explains the fundamentals of invertebrate biology and freshwater ecology, the importance of these amazing creatures, and simple methods for finding, collecting, observing, and studying them.
- Identification section enables users to recognize organisms in the field with the naked eye, or sometimes assisted by a simple magnifying glass.
- Biology section includes more than 200 pages of information on the various kinds of freshwater invertebrates, such as their habitat, movement, feeding, breathing, life history, and environmental significance.
- Written in non-technical language and presented in a user-friendly format and convenient size for field use.

A Guide to Common Freshwater Invertebrates of North America (ISBN: 0-939923-87-4) is available nationwide from a variety of retailers or it can be purchased directly from McDonald and Woodward Publishing Company, 1-800-233-8787, \$29.95 plus shipping and handling. For more information visit: <http://www.mwpubco.com>

Mussel Surveys

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Upper Nolichucky River and Hiwassee River (Appalachia Cut-off), TN

The upper Nolichucky River and Hiwassee River were surveyed for federally listed mussels along the boundary of the Cherokee National Forest. Approximately 20 live specimens of *Alasmidonta raveneliana* were found in the Nolichucky including small individuals and both live and fresh dead specimens of *Villosa trabalis* were found in the Hiwassee. Intensive sampling produced no specimens of *Epioblasma walkeri* in the Hiwassee.

Harpeth River, TN

The Tennessee Wildlife Resources Agency (Don Hubbs and David Simms) has selected some sites to be sampled on the Harpeth River both above and below Nashville. The river will be evaluated for future mussel restoration efforts. Sampling will commence the week of July 22.

Duck River, TN

Final sampling of the Duck River will commence August 5-23. Both mussels and snails are being sampled. This is a Nature Conservancy project that is being done jointly with Dr. Paul Johnson, Tennessee Aquatic Research Unit, Cohutta, Georgia.

Collins River and Upper Caney Fork, TN

Sampling sites are being selected to determine what occurs (what's left) in the Collins and upper Caney Fork system. Robb Tawes, U. S. Fish and Wildlife Service, Cookeville, TN is assisting with this. The drainage is known to contain endangered populations of *Pegias fabula* and *Pleurobema gibberum*. Streams and tributaries are being targeted for future mussel restoration efforts.

Big South Fork Cumberland River, TN & KY

Final sampling of the Big South Fork will commence the week of September 23. This is a three-year project funded by the National Park Service. Five federally listed mussel species have been documented in the river: *Alasmidonta perpurpurea*, *Epioblasma brevidens*, *E. walkeri*, *Pegias fabula*, and *Villosa trabalis*. Efforts are underway to expand the present fauna and restore extirpated mussel species back into the Big South Fork via propagation and moving of adult mussels.

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During the preparatory phase of a study on the Margaritiferidae (Smith, 2001), a large number of collections were surveyed for specimens. An interesting specimen of *Margaritifera margaritifera* was brought to my attention and eventually made available for study. The specimen is part of the Carnegie Museum (Pittsburgh) collection (61.7207) and the locality information is "riverlets, Reykjavik, Iceland." The specimen is an adult, 110 mm in length and was apparently collected alive as the nacre shows no sign of deterioration. According to the label, the specimen was collected by a Mr. Fröstrup in 1888 and wound up in the W. Israel collection before eventually being transferred to the Carnegie Museum.

The specimen spurred considerable interest as accompanying the specimen is a letter to A. Ortmann from L. Steineger concerning the authenticity of the locality. Actually, the occurrence of *M. margaritifera* in Iceland has been addressed for over a century but has never been completely resolved. In early, exhaustive accounts of the distribution of this species (Scharff, 1907, 1911; Walker, 1910; Jackson, 1925), Iceland is mentioned by the latter two but only as a questionable domicile. Scharff (1907, 1911), in his elegant study of the distribution of this species, makes no mention of Iceland but was certainly interested in Iceland-Europe connections and its impact on fauna (Scharff, 1907:68). Elsewhere, accounts on the natural history of Iceland by Hermannsson (1924) and especially the renowned invertebrate zoologist N. Annandale (1905) make no mention of the species. Mandahl-Barth (1938) reviewed the specific references to *M. margaritifera* in Iceland and concluded somewhat reluctantly to exclude the species from the Icelandic fauna. Responses from recent inquiries to local authorities and naturalists regarding the occurrence of *M. margaritifera* in Iceland have all been negative (K. Hartel, pers. com.; A. Petersen, pers. com.).

One possibility for reports of *M. margaritifera* in Iceland is that specimens simply scribbled "Ireland" have been misinterpreted as being from Iceland.

All this brings us back to the Carnegie Museum specimen, which can not be dismissed as a misinterpretation. Reykjavik is festooned with small rivers and conditions for survival of mussels have certainly existed over the last few million years. Many of the rivers and lakes of Iceland contain salmonids, including *Salmo salar*, *Salmo trutta*, and *Salvelinus alpinus*, the first two are known natural hosts of European *M. margaritifera*. If the early biogeographers are correct, land bridges connecting northern Scotland, the Orkney and Faroe Islands, and Iceland existed during the

Pliocene or Pleistocene Periods allowing animals to colonize Iceland from the British Isles.

We have all learned in recent years that ardent and persistent search has led to the discovery of small populations of mussel species previously unknown or believed extirpated. Many European populations of *M. margaritifera* are declining or extirpated. Since the finding of new or overlooked populations would greatly aid in conserving the species the question becomes have we really looked for *M. margaritifera* in Iceland?

Thanks to Karsten Hartel of the Museum Comparative Zoology, Harvard University, and Aevan Petersen of the Icelandic Institute of Natural History for their help and input.

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The Recovery of the Unionid Fauna in Marginal Habitat, Mississippi River, Pool 2, Cottage Grove, MN

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A widely accepted fact has been that the Mississippi River unionid fauna, downstream of the Twin Cities, MN, was greatly impacted over a period of time by various types of pollution from the Twin Cities. Some recovery of this fauna has been reported recently by various researchers.

During June to mid-July, 2002, 19,680 unionids, representing 23 living species (mean density 0.38/m²), were recovered from 52,250 m² of marginal habitat in the impounded area of

Pool 2 of the Mississippi River prior to the construction of a new wastewater disposal pipe. Seven species (8.4% of the 1451 individuals collected) are on the Minnesota Endangered, Threatened, or Special Concern list. The Endangered *Quadrula nodulata* (Rafinesque 1820) represented 7.37 % of the total (1451), and was the third most abundant species. The Endangered *Arcidens confragosus* (Say 1829) represented 0.99% (194) of the fauna, and was the 10th most abundant species. Other living Special Status species, each represented by 1-7 specimens, included *Megaloniaias nervosa* (Rafinesque 1820), *Tritogonia verrucosa* (Rafinesque 1820), *Actinonaias ligamentina* (Rafinesque 1820), *Obovaria olivaria* (Rafinesque 1820), and *Ligumia recta* (Lamarck 1817). The most common species were *Obliquaria reflexa* Rafinesque 1820 (46.8%) and *Quadrula quadrula* (Rafinesque 1820) (23.9%). *Amblema plicata* (Say 1817) was only 3.2% of the fauna. Mussels were translocated to a nearby upstream area.

The special status mussel species were widely distributed throughout the project area. Although mean densities were very low, there was good reproduction by most species. Nearly 600 (of 1657) special status mussels were measured and uniquely numbered. The substrata was of marginal quality (mostly mud) in depths that ranged from <1 m to 6m. Most of the area was quite shallow since the site was in the impounded area behind Lock and Dam 2, Hastings, MN. The large old (main) Ninninger channel, adjacent to the N shoreline ranged from 125-300 m wide, and was up to 6 m deep with little current.

The only areas of mussel concentrations were near the main navigation channel, where the substrata became coarser, and thus more suitable mussel habitat. There was evidence of damage from commercial barge traffic to a number of mussels near the navigation channel. Several species had never been reported from Pool 2, dead or alive. Some species doing well in Pool 2 are not in the nearby St. Croix River, and vice versa.

Preliminary Report on the Freshwater Mussels/Clams (*Bivalvia* : *Unionoida* & *Veneroida*) of Santa Catarina State, Southern Brazil

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Keywords : Freshwater mussels/clams; Unionoida; Veneroida; Continental malacological fauna survey; Santa Catarina state; Southern Brazilian country.

The State of Santa Catarina is part of Brazil's southernmost region, situated between the states of Paraná to the north and Rio Grande do Sul to the south. To the west is Argentina and

along the entire eastern border lies the Atlantic Ocean. Lying between latitudes 25° and 30° S and longitudes 48° and 54° W, Santa Catarina measures 377 km from north to south and 547 km from east to west at its farthest points. The state has an area of 95,985 km², which includes 502 km² of rivers and lakes. The state territory represents no more than 1.13% of the area of Brazil and is geographically divided into two large parts: the Atlantic coastal plains and the western Highlands. The dominant climate is damp and sub-tropical, with average temperatures varying between 17° and 21° C. The vegetation is coastal damp forest (mainly tropical atlantic woodland) covering 29,622 km². Two independent river basin systems drain the land: the Uruguay and Iguazu rivers form one of these basins and several rivers that discharge into the Atlantic Ocean form the other.

The continental malacological fauna in this portion of southern Brazil is poorly documented, with only 25 known species cited in historical records (38 surveyed species in recently conducted field studies). Particularly, the regional freshwater mussels or clams can be considered, in light of the knowledge today, one of the elements of the malacological fauna less studied and well-known in southern Brazil.

Starting in September of 2001 through the Naiade Project (Agudo 2002), using literature references and past field work, we determined that there are 4 species (taxonomically distributed in 4 Genera, 2 Families, and 2 Orders) found occupying 5 localities of the Atlantic coastal plain: 3 Unionoida (*Anodontites* sp., *Leila blavilleana*, *Mycetopoda legumen*), and 1 Veneroida (*Eupera klappenbachi*).

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Finally a confirmation of the former presence of *Leguminaia saulcyi* in Israel (Bivalvia, Unionidae)

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Between 8th December 1850 and 4th April 1851, the French naturalist F. de Saulcy made an extensive collecting trip in the Levant. The land- and freshwater molluscs that he brought back to Paris were entrusted for further elaboration to J.-R. Bourguignat. Bourguignat, founder of the so-called “Nouvelle École,” described numerous new species based on de Saulcy’s material. One of these specimens has remained a puzzling object in Israel for almost 150 years: *Leguminaia saulcyi* (Bourguignat, 1852), Fam. Unionidae.

Adult specimens of an unknown freshwater mussel species collected “circa Joppitarum urbem” were described by Bourguignat (1852: 27) as *Unio saulcyi*, while juvenile shells were named *Unio michonii* (Bourguignat, 1852: 27-28). These mussels were figured by Bourguignat (1853: pl. 3, figs. 1-3: *Unio saulcyi*, and pl. 3, figs. 10-12: *Unio michonii*), while the type locality was clarified by the addition: “habite les ruisseaux des environs de Jaffa.”

Only two perennial streams are situated near Yafo: the Yarqon River (formerly Nahr el Aoudsche/Auja) at 5 km to the north and the Soreq River (formerly Wadi Rubin) at some 13 km to the south. Since Kobelt (1913: pl. 534, figs. 2749 at the right and 2750) figured specimens of *Unio michonii* collected in the Nahr el Aoudsche by Frenchman A.H. Letourneux, the latter stream (today’s Yarqon River) is now considered the type locality of both *Unio saulcyi* and *Unio michonii* (see also Falkner, 1994: 147). In the meantime another traveller in the Holyland, this time the well-known Englishman H.B. Tristram, had recorded *Unio michonii* from the Zerka or Crocodile River (currently: Tanninim River) and *Unio saulcyi* from the Kishon River (today’s Qishon River) (Tristram, 1865: 544).

In spite of the fact that these mussels had been during three occasions by three foreign travellers at three different localities in present-day Israel in the middle of the 19th Century, not a single specimen or even a fragment of what is now known as *Leguminaia saulcyi* (Bourguignat, 1852) could be traced in any of the local public and private collections investigated during the past 30 years. Also our studies of the past and present mollusc fauna of three coastal rivers: Yarqon, Tanninim and Na’aman, remained without success (Mienis, 1995; Mienis & Ortal, 1997 & 2001).

After such negative results one starts to doubt: maybe those early foreign travellers made some mistakes while labelling their finds? It has happened many times in the past. To give only a single example: a new land snail collected by the German naturalist J.R. Roth during his last and fatal journey in the Levant (he died of a sunstroke) was described by Mousson (1861: 28) as *Helix genezarethana* after the old biblical name Gennezareth, preserved in the Hebrew name Kinnereth (Sea of Galilee). Only recently it was discovered that the sample had been mislabeled. Mousson was in fact dealing with a *Monacha* species restricted in its distribution to the vicinity of Iskenderon, Turkey, a place called Alexandretta at the time that Roth visited it!

The question whether *Leguminaia saulcyi* was indeed once living in the coastal rivers of Israel has now been solved. In the second half of the summer of 2001, Dr. Eitan Ayalon of the nearby Ha’aretz Museum (Tel Aviv) carried out an excavation of a complex of watermills known as the “Seven Mills” in the Yarqon River at the border of the municipalities of Tel Aviv and Ramat Gan. On the 4th of September 2001, I had the opportunity to sample layers in a water basin in front of the watermills. To my surprise, I found several fine, complete, but long dead specimens of *Leguminaia saulcyi*. De Saulcy’s mussel can now be officially registered as a

former inhabitant of at least the Yarqon River, near Tel Aviv-Yafo. Unfortunately, the rediscovery of this species in Israel comes far too late. It has to be considered as another extinct species in the mollusc fauna of Israel. Representative samples of this mussel have been lodged in the local National Mollusc Collections of the Tel Aviv University (TAU) and the Hebrew University of Jerusalem (HUJ).

I like to thank Dr. Eitan Ayalon (Ha'aretz Museum, Tel Aviv) for giving me permission to sample the archaeological site for the presence of freshwater molluscs.

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The Chinese Pond Mussel *Sinanodonta woodiana* in Europe: Further Gleanings

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Since the first discovery of the Chinese Pond mussel, *Sinanodonta woodiana* (Lea, 1834), Fam. Unionidae, in Europe in 1983 where it was found in fishponds that were

stocked with grass carp, *Ctenopharyngodon idella* (Valenciennes, 1844), and silver carp, *Hypophthalmichthys molitrix* (Valenciennes, 1844) imported from the Far East some 20 years earlier (Petro, 1984), this introduced freshwater mussel continues to reach the headlines regularly. Its slow but steady spread throughout large parts of Europe has been summarized by Watters (1997) and Mienis (1999, 2001 & 2002). Not only is this huge mussel (for European standards) a serious competitor for the native mussel fauna, its main host-fish, the imported grass and silver carp may cause even more havoc in freshwater ecosystems throughout that continent.

Since this mussel has also reached Costa Rica and the Dominican Republic in the Americas, it is important to keep track of its spread and behaviour outside its native range. What takes place at this moment in Europe might happen some day in North America, in spite of the numerous stringent restrictions and regulations dealing with the import of living freshwater fish and other organisms. New information has become available concerning its presence in Austria, Germany, Poland, and Ukraine and is briefly enumerated here.

AUSTRIA: In a previous report I mentioned that Reischütz & Reischütz (2000) recorded the find of this mussel in an old branch of the river Thaya by Neemann in September 1999. Almost at the same time, Edlinger & Daubal (2000) wrote about a specimen from the Stockerauer Arm, a former branch of the Danube, near Klosterneuburg. Most recently, Fischer *et al.* (2002) mentioned its presence in the Perschling. All of these waters—Thaya, March (also mentioned in Fisher *et al.*, 2002), Perschling and the Stockerauer Arm—are connected with the Danube.

GERMANY: In a previous review I mentioned that *Sinanodonta* had not been recorded from the German stretch of the Danube. Although this statement is still correct, it has recently been found in the close vicinity of that river. Dr. Bernd Horst wrote recently that six Chinese Pond mussels were living in one of his fishponds in Donauwörth, Bavaria. All but one mussel perished in the meantime due to the complete freezing of the shallow pond. This fishpond dated back from 1997 and had been stocked with Bitterlings, *Rhodeus sericeus* (Pallas, 1776), bought at a local Garden Center, which had imported the fish most probably from the Czech Republic or Hungary. Since several other species of Bitterlings from the Far East serve as suitable hosts for the glochidia of the Chinese Pond mussel, it is likely that the European Bitterling may serve as a host too. If that is the case, then the Chinese Pond mussel may be expected to occur in numerous other ponds in the area.

POLAND: The occurrence of *Sinanodonta* in the thermic polluted Konin lakes has resulted in a number of important studies. Afanasjev *et al.* (2001) published on the growth and population structure of these mussels; Krolak & Zdanowski (2001) dealt with the bioaccumulation of heavy metals in *Sinanodonta* and *Dreissena*; while Soroka & Zdanowski (2001) studied the morphological and genetic variability in the Konin population.

UKRAINE: Yurishinets & Korniuschin (2001) have reported extensively on the first find of the Chinese Pond mussel in the Danube-Sasyk canal in S.W.-Ukraine. They dealt with the methods of introduction, the external morphology of the adult mussels and the glochidia, the taxonomy and the species diagnostics.

Records from the following Danube-countries are still missing: Croatia, Serbia, Bulgaria and Moldavia, although *Sinanodonta woodiana* is most likely to occur there too.

I like to thank Dr. G. Thomas Watters (Columbus, Ohio, U.S.A.) for sending me some valuable papers and Dr. Bernd Horst (Donauwörth, Germany) for sharing his information concerning the temporary presence of this species in one of his fishponds in the south of Germany.

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Some of the 2002 upper St. Croix River mussel survey field crew.

No evidence of endangered winged mapleleaf found in upper St. Croix River during second year of survey

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This survey is a continuation of work begun last year on the St. Croix River (Hove *et al.* 2001). The objective of the study is to describe the former and present range of the federally endangered winged mapleleaf, *Quadrula fragosa*, in the river. The species is known to occur downstream of the hydropower dam at St. Croix Falls, WI but only empty valves have been observed upstream of the dam (Hove *et al.* 1999). The hydropower facility is a barrier to fishes swimming upstream with notable differences between upstream and downstream mussel communities (Hornbach 2001).

We followed a standard timed search protocol to conduct the survey between June 24 - July 3, 2002. Three to five people searched each site for up to 15 minutes for living mussels and empty valves using SCUBA and snorkeling. We searched all habitats at each site, although we spent most of our time over mussel beds or good mussel habitat (stable mixture of sand, gravel, and cobble). All specimens were recorded and living mussels were returned to the collection site. Voucher specimens will be deposited at the Bell Museum of Natural History, University of Minnesota. Mussel nomenclature follows Turgeon *et al.* 1998.

We collected a total of 751 live and 5372 dead mussels at the 24 sites visited. A total of 19 species was collected. All species we collected this summer have been previously recorded from the upper St. Croix River (Doolittle 1988). *Elliptio dilatata* and *Actinonaias ligamentina* were

commonly observed and *Cumberlandia monodonta* and *Pyganodon grandis* were rare. We observed 9 species listed in Minnesota and 3 listed in Wisconsin. Although the federally endangered winged mapleleaf and Higgins eye (*Lampsilis higginsii*) have been observed upstream of the dam at St. Croix Falls (Hove *et al.* 2001 and H. Dunn, Ecological Specialists, Inc., personal communication), these species were not observed this year. This survey will be concluded next summer when we search the upper St. Croix River. The presence or absence of live winged mapleleaf in the upper St. Croix River could be crucial for the survival of this species since the lower St. Croix, home to the largest population of this species, is threatened by zebra mussels.

We thank Jill Medland, Bob Whaley, and Randy Ferrin and the St. Croix National Scenic Riverway, National Park Service and Macalester College for funding and support for this project.

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Spanish Malacological Society: Zebra Mussels in the Ebro River

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The Spanish Malacological Society announcement about the grave risk of ecological and socio-economic disaster as a consequence of the introduction of the Zebra Mussel in the Ebro River



The intentional introduction of exotic species is becoming more common in Spain, despite being declared illegal in the penal code. However, the effects caused by these introduced species do not always have appreciable effects for society in general, and negatively affect the native flora and fauna because they fail to encounter natural enemies in the ecosystems they invade, easily adapting themselves to their new medium. The press recently announced the discovery of the *Dreissena polymorpha* in the lower Ebro, whose common name is the zebra mussel, news which has been received with great concern by the Spanish Malacological Society due to the grave environmental (ecological and socio-economic) impact that this introduced bivalve can cause in the Ebro basin, and from there, the rest of the Iberian peninsula.

The important discovery was made by biologists who specialize in freshwater bivalve conservation. These investigators had collected adult specimens of the zebra mussel at three distinct points in the lower section of the Ebro, and this species has also probably colonized the waters of the Ebro at its passage through Aragon. The introduction was likely caused by the use of specimens of *Dreissena polymorpha* as recreational fish bait or by the entrance to the Ebro by boats infested with this species, but the exact cause is unknown. Now, it can easily extend to all of the Ebro basin via boat traffic, recreational fishing, and the dynamic natural hydrology.

Dreissena polymorpha was described by Pallas in 1771 and originated in the Black and Caspian Seas (where it is in ecological equilibrium). At the beginning of the 19th century, it extended its range through Europe via river boat traffic. Beginning in the 1980s, it expanded into North America with the maritime trade. Currently it has colonized numerous continental waters of North America and Central and Western Europe, and for this it has been the object of exhaustive scientific study.

The zebra mussel is characterized by causing great ecological disequilibrium by covering all the surfaces that it encounters in its path: rocks, vegetation, native bivalve shells (which are very threatened, such as *Margaritifera auricularia*, which is in danger of extinction), hydrologic constructions of all types, turbines, pumps, hulls, motors and anchors, water purification plants, ditches, canals, etc., including the ability to totally block irrigation ducts, and water pipes in general. Also, this invasive species feeds on phytoplankton, competing for this food source with native species, and increasing the level of organic matter, thus affecting the quality of the continental waters. Additionally, this mussel is host to parasites and nematodes, and as a bioaccumulador of contaminant substances and elements, its human consumption is not recommended.

This threat to the aquatic ecosystems presents a grave risk of ecological and socio-economic damage. The manual and chemical methods of eradicating this introduced species are very expensive and not always satisfactory. In the United States, the presence of this invasive bivalve has caused multi-million dollar damage (two billion dollars). All over the world, the efforts of scientists and public administrators have

been intensified in order to investigate and combat the introduction or proliferation of this species.

We are facing a risk of ecological and socioeconomic disaster of great magnitude that shall manifest itself with the rapid expansion of this species through all of the Ebro basin, with the capacity to extend itself to the rest of the Iberian Peninsula, which would probably be one of the greatest negative impacts provoked by the introduction of an exotic species in Spain. For this, the Spanish Malacological Society insists that the Minister of the Environment, in the development of his duties attributed to him in article 27 of law 4/1989 of Conservation of Natural Spaces and of Wild Flora and Fauna, urgently adopt the rules and basic directives to the effect of coordinating with the autonomous communities in the Ebro drainage and Hydrological Confederation of the Ebro to achieve the elaboration and carrying out of a plan of monitoring control of the introduction, expansion and negative effects of *Dreissena polymorpha*.

Thanks to Gary E. Peeples and Dick Neves for the translation of this note.

Mathiak Collection Provides Opportunities for Unionid Research

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Harold A. Mathiak surveyed 251 rivers and creeks across Wisconsin for the presence of unionids during the summers of 1973 through 1977 and published (Mathiak 1979) the results of that 641-site survey. Mathiak waded in water up to depths of 1.2 m and used a pitchfork with 25 mm-meshed welded fabric wired across the tines to locate and bring unionids to the surface. Drought conditions from 1975 to mid-1977 caused exceptionally low water levels, facilitating collecting. Voucher specimens (7000+) were donated to six institutions including the Milwaukee Public Museum (MPM). Each lot was accompanied by a printed card giving the pertinent date, stream, county, and township/range/section data. The Mathiak Collection can be a good source of material for addressing various unionid research questions; see for example Jass and Glenn (1999).

Another example of how the degree of within species variation can be elucidated using Mathiak's specimens is provided by the variable and abundant cylindrical papershell *Anodontooides ferussacianus* (Lea). Baker's Wisconsin monograph (1928) included as separate congeners the currently synonymized smaller "creek form" *A. f. subcylindraceus* (Lea) and a "lake form" *A. birgei* Baker with fine beak sculpture and an umbonal ridge, differentiating these not only by beak sculpture but also by shell shape, size and color. Baker's (1928) "creek form" specimens were without rays and had smaller widths, heights, and lengths than his typical *A. ferussacianus*. Clarke (1973) subsequently questioned these taxa, remarking on the presumed ecophenotypic variations of this species, and called for additional investigation of them.

Mathiak ranked *Anodontooides ferussacianus* fifth both in number of sites from which he collected it ($n = 127$) and in number of specimens collected ($n = 657$). Those collecting localities covered 39 Wisconsin counties, 26 of which are represented in the MPM Mathiak collection. For this example study, data were gathered on: 1) length, 2) height, 3) width, 4) anterior-to-beak length of the right valve, 5) shell color, 6) presence/absence of color rays, 7) relative fineness of beak sculpture, and 8) presence/absence of an umbonal ridge. Traits 1-4 were measured to the nearest 0.1 mm with a dial caliper.

To look for the variation Baker (1928) reported from Wisconsin and Clarke (1973) suggested investigating, MPM Mathiak specimens with rays were compared to specimens without rays. Statistical analysis was conducted using SAS Software (Version 6.12). Tables 1 and 2 show rayed specimens to be larger in terms of the means of their lengths and their width/length

ratios. Rayed/rayless differences were tested using the rank sum (Wilcoxon two-sample) test, with a P value of 0.05 chosen as the level for statistical significance. Mean length was the only trait where rayed specimens had a significantly larger value (Table 3).

Table 1. *Anodontooides ferussacianus* measurements for rayed Mathiak Wisconsin survey shells.

Trait	N	Range	Mean	S
Length (mm)	34	39.1-90.9	57.2	12.35
Height/Length	34	0.449-0.614	0.546	0.0339
Width/Length	34	0.328-0.481	0.375	0.0346
Anterior/Length	34	0.232-0.341	0.279	0.0229

Table 2. *Anodontooides ferussacianus* measurements for rayless Mathiak Wisconsin survey shells.

Trait	N	Range	Mean	S
Length (mm)	19	39.5-85.0	52.4	11.00
Height/Length	19	0.485-0.630	0.552	0.0371
Width/Length	19	0.342-0.400	0.372	0.0156
Anterior/Length	19	0.207-0.331	0.279	0.0288

Table 3. Wilcoxon Rank Sum test results for differences between means for rayed and rayless *Anodontooides ferussacianus* at the 5% significance level.

Trait	P value	Significant?
Length	0.0417	Yes, rayed > rayless
Height	0.0533	No
Width	0.0972	No
Anterior-to-beak	0.1004	No

Questions such as those from this example could be better addressed with access to the entire Mathiak Collection rather than just the subset which exists at MPM. MPM is in the process of adding Mathiak's unionid data from his other voucher institutions [the Frank H. McClung Museum at the University of Tennessee-Knoxville, the Museum of Natural History at the University of Wisconsin (UW)-Stevens Point, the Museum of Zoology at the UW-Madison, the Ohio State University Museum of Biological Diversity, and the UW Center at Waukesha] to its computerized database. The resulting composite should prove useful to the institutions which house this valuable resource on Wisconsin unionids, and to other interested researchers as well, from whom inquiries are welcomed.

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Wisconsin County Records in the Milwaukee Public Museum Freshwater Gastropod Collection

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Computerization of Milwaukee Public Museum (MPM) mollusk accessions has facilitated analysis of the collection (Jass 2000). MPM Wisconsin county records for 50 species from 9 freshwater gastropod families are given alphabetically below. Nomenclature follows Turgeon *et al.* (1998). An asterisk marks counties not reported from the MPM collection by Chadwick (1906). Synonymies in Baker (1928), Burch (1982), and Roy (1963) guided the use of Chadwick's (1906) names. The majority are widely distributed species whose ranges span both Wisconsin drainages, the Great Lakes-St. Lawrence (GL), and Mississippi River (MR). Exceptions according to Burch (1982) are *Lioplax sulculosa* (MR), *Physella ancillaria*

(GL), and *Somatogyrus depressus* (MR), as well as the recently invasive viviparids *Cipangopaludina chinensis malleata* [now *Bellamyia c.* according to Smith (2000)] and *Viviparus georgianus*. Taxonomic re-study of these specimens has not been undertaken and users of this data are encouraged to contact the author for specimen loans to verify determinations and for more detailed locality information.

Ancylidae (4)

Ferrissia fragilis (Tryon 1863) Milwaukee*
Ferrissia parallelus (Haldeman 1841) Grant*, Milwaukee, Winnebago*
Ferrissia rivularis (Say 1817) LaCrosse*, Milwaukee, St. Croix*
Laevapex fuscus (C.B. Adams 1841) Racine*, Wood*

Hydrobiidae (8)

Ammicola limosus (Say 1817) Burnett*, Calumet, Milwaukee
Birgella subglobosus (Say 1825) Calumet, Kenosha, Milwaukee
Cincinnatia integra (Say 1829) Milwaukee
Lyogyrus pilsbryi (Walker 1906) Milwaukee*, Washington*, Waukesha*
Lyogyrus walkeri (Pilsbry 1898) Fond du Lac*
Probythinella emarginata (Kuster 1852) Calumet
Pyrgulopsis lustrica (Pilsbry 1890) Door*, Milwaukee
Somatogyrus depressus (Tryon 1862) Milwaukee*

Lymnaeidae (10)

Acella haldemani (W.G. Binney 1867) Washington*
Bulimnaea megasoma (Say 1824) Brown*, Burnett*, Douglas*, Jefferson, Manitowoc, Vilas*
Fossaria modicella (Say 1825) Jefferson*
Fossaria obrussa (Say 1825) Milwaukee
Fossaria parva (I. Lea 1841) Jefferson*, Milwaukee
Lymnaea stagnalis Linnaeus 1758 Brown*, Dodge*, Door*, Forest*, Iron*, Langlade*, Manitowoc, Marinette*, Milwaukee, Oconto*, Washington*, Waukesha
Pseudosuccinea columella (Say 1817) Marinette*, Ozaukee*, Waukesha
Stagnicola caperata (Say 1829) Door*, Kenosha, Milwaukee
Stagnicola catescopium (Say 1867) Milwaukee, Washington*
Stagnicola elodes (Say 1821) Brown*, Burnett*, Dane*, Dodge*, Door*, Douglas*, Grant*, Jefferson*, Manitowoc*, Marinette*, Milwaukee, Oconto*, Racine*, Washington*, Waukesha*, Winnebago

Physidae (5)

Aplexa elongata (Say 1821) Grant*, Milwaukee, Rock*, Washington*
Physella ancillaria (Say 1825) Door*
Physella gyrina (Say 1821) Barron*, Burnett*, Dodge*, Door*, Douglas*, Kenosha, Manitowoc, Milwaukee, Oconto*, Oneida*, Rock*, Washington*, Waukesha*
Physella heterostropha (Say 1817) Door*, Milwaukee*, Pierce*, Waukesha
Physella integra (Haldeman 1841) Milwaukee

Planorbidae (9)

Gyraulus deflectus (Say 1824) Manitowoc, Milwaukee, Washington
Gyraulus parvus (Say 1817) Fond du Lac*, Milwaukee
Helisoma anceps (Menke 1830) Burnett*, Calumet, Dodge*, Door*, Douglas*, Forest*, Jefferson*, LaCrosse*, Milwaukee, Oneida*, Washington, Waukesha
Planorbella campanulata (Say 1821) Burnett*, Dodge*, Door*, Jefferson*, Langlade*, Manitowoc, Marinette*, Milwaukee, Oconto*, Racine*, Sheboygan, Walworth*, Washington, Waukesha
Planorbella pilsbryi (F.C. Baker 1926) Dodge*, Milwaukee*, Vilas*, Waukesha*
Planorbella trivolvis (Say 1817) Brown*, Dodge*, Door*, Douglas*, Forest*, Iron*, Langlade*, Manitowoc, Milwaukee, Oconto*, Polk*, Sheboygan*, Vilas*, Washington*, Waukesha, Wood*
Planorbula armigera (Say 1821) Jefferson*, Milwaukee, Waukesha*
Promenetus exacuus (Say 1821) Waukesha*
Promenetus umbilicatellus (Cockerell 1887) Jefferson*

Pleuroceridae (2)

Elimia livescens (Menke 1830) Door*, LaCrosse*, Milwaukee, Waukesha*
Pleurocera acuta Rafinesque 1831 Brown*, Burnett*, Milwaukee, Pierce*, St. Croix*, Walworth*, Waukesha*

Pomatiopsidae (1)

Pomatiopsis lapidaria (Say 1817) Milwaukee

Valvatidae (3)

Valvata bicarinata I. Lea 1841 Milwaukee
Valvata sincera Say 1824 Milwaukee, Ozaukee*
Valvata tricarinata (Say 1817) Dodge*, Fond du Lac*, Milwaukee, Ozaukee*, Racine*, Waupaca*

Viviparidae (8)

Campeloma brevispirum (F.C. Baker 1928) "Wisconsin"

Campeloma crassulum Rafinesque 1819 Burnett*, Douglas*, Manitowoc, Milwaukee, Pierce*, St. Croix*

Campeloma decisum (Say 1817) Brown*, Burnett*, Door*, Forest*, Manitowoc, Milwaukee, Ozaukee*, Racine*, Sheboygan*, Waukesha*

Campeloma milesi (I. Lea 1863) Brown*, Milwaukee*, Washington*

Campeloma rufum (Haldeman 1841) Burnett*, Calumet, Waukesha

Cipangopaludina chinensis malleata (Reeve 1863) Milwaukee*, Shawano*, Waukesha*

Lioplax sulculosa (Menke 1827) Calumet, Dodge*, Kenosha

Viviparus georgianus (I. Lea 1834) Milwaukee, Walworth*, Waupaca*, Waushara*

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Several fishes are suitable hosts for creek heelsplitter glochidia

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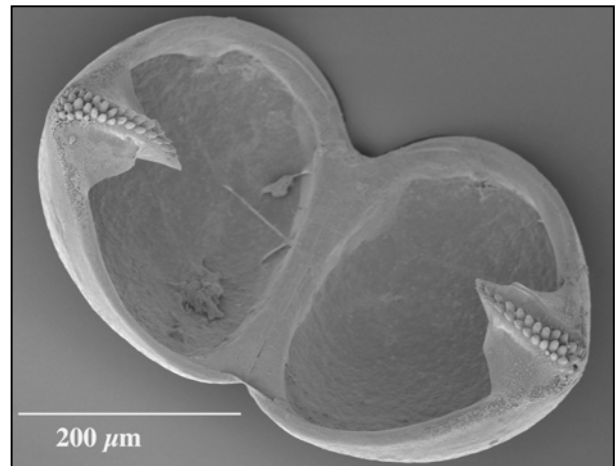


Figure 1. Creek heelsplitter glochidium

Creek heelsplitter, *Lasmigona compressa* (I. Lea, 1829), glochidia use a variety of host fishes to facilitate their metamorphosis. Kakonge (1972) observed glochidia naturally infesting rock bass, brook stickleback, common shiner, fathead minnow, and creek chub. Creek heelsplitter glochidia (Figure 1) will metamorphose on spotfin shiner, black crappie, slimy sculpin, and yellow perch (Hove *et al.* 1995). The purpose of this study was to conduct additional host suitability trials using creek heelsplitter glochidia.

We determined suitable hosts for creek heelsplitter glochidia by artificially infesting fishes in the laboratory. Brooding creek heelsplitter were collected during late August from the upper Mississippi River near the Cass-Itasca county line. Fishes were collected from central and southern Minnesota and held at the UMN approximately two months before being used in host suitability trials. Between 1 and 35 (avg.=8) individuals of 45 fish species (15 families) were exposed to glochidia suspended in an aquarium by heavy aeration. Infested fish were held at 11 °C. To prevent fishes from eating juvenile mussels from the aquarium floor (Hove *et al.* 1995), small fish of all species and Catostomids were held in suspended nets. Fish nomenclature follows Robins *et al.* (1991). Siphonate from aquaria was checked for glochidia and juveniles approximately every week. Six species were not successfully infested with glochidia. Eighteen fish species facilitated glochidial metamorphosis (Table 1),

twenty-one species did not (Table 2). Our findings confirm host suitability status of several fish species and identify many previously unknown suitable hosts.

Table 1. Fishes that facilitated metamorphosis of creek heelsplitter glochidia.

Species	Number infested	Number survivors	Excystment period	Number juveniles recovered
shortnose gar	1	1	44-51	1
gizzard shad	3	0*	24-33	2
brassy minnow	17	11	24-51	18
creek chub	5	2	24-50	7
emerald shiner	13	6	26-57	17
longnose dace	9	4	34-85	232
mimic shiner	35	17	24-43	6
<i>Rhinichthys</i> spp.	5	4	24-64	36
spotfin shiner	24	1	26-50	7
black bullhead	4	3	26-51	5
flathead catfish	1	0	26-43	3
yellow bullhead	7	7	24-50	18
brook stickleback	10	1	26-50	11
black crappie	8	8	23-50	9
bluegill	19	18	23-50	13
green sunfish	4	0*	23-29	11
orange-spotted sunfish	7	7	24-43	3
smallmouth bass	5	4	26-34	1

*-Study incomplete, fish died before the end of the trial

Table 2. Fishes that did not facilitate glochidial metamorphosis.

Species	Attachment period (days)	Species	Attachment period (days)
lake sturgeon	2-3	northern pike	17-26
longnose gar	5-9	troutperch	9-19
bigmouth shiner	9-22	burbot	17-26
bluntnose minnow	19-26	banded killifish	12-17
carp	5-9	largemouth bass	17-23
hornyhead chub	9-22	rock bass	23-33
shorthead redhorse	3-9	blackside darter	9-19
tadpole madtom	2-5	logperch	9-17
channel catfish	9-19	yellow perch	17-23
stonecat	26-34	freshwater drum	9-26
muskellunge	3-9		

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Freshwater Mussel Classifications Index: Identifying Mussel Assemblages of State-wide Significance

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Introduction

The purpose of this project was to draft an index that can be applied to freshwater mussel survey data in Illinois and return a Resource Value of the mussel community. Resource Value is defined as the statewide significance of the mussel assemblage at the sampling station. This technique can provide a quantitative method for ranking mussel conservation priority needs, evaluating pre- and post-project impacts to mussel communities, and monitoring long-term changes in mussel communities over time.

The factors and data ranges were determined from data collected during the 1999 and 2001 field seasons through uniform sampling at over 93 stations over a wide range of stream quality, size, and substrate in 5 major watersheds in Illinois. All sampling was performed in wadable streams or wadable portions of larger rivers and was based on visual observation and hand grabbing. The distribution of each parameter over all sampling sites was graphed and factors were assigned based on natural breaks in the frequency distributions.

This index is not to be confused with the Index of Biotic Integrity (IBI) as currently used by fisheries biologists. The IBI uses fish sampling data to evaluate the biological integrity of the stream in which the sample was taken. It may be assumed that it also measures Resource Value of the fish community present. The Mussel Resource Value has not been correlated to actual stream disturbances or levels of degradation, so it cannot be used at this time to evaluate stream condition or biological integrity. It is hoped that future analyses can be performed to determine this metric's value in this regard or to develop an analogous metric that corresponds well to stream quality. However, it is likely that many, if not all, sites that score high on Mussel Resource Value will be indicative of high quality stream conditions.

I view this as work in progress and would appreciate any comments or criticisms of this draft as well as communications from colleagues working on similar indices for freshwater mussels.

Calculating the Mussel Classification Index

The index is calculated as the sum of 4 factors:

Mussel Classification Index (MCI) =

Species Richness Factor + Intolerant Species Factor + Abundance Factor + Reproduction Factor

1. The **Species Richness Factor** is determined from the number of extant species recorded at the sampling sites. Extant species are mussel species that are recorded by live individuals and recent dead shells. Recent dead shells are those with periostracum intact, nacre lustrous or nearly so, with or without tissue attached.

Extant species in sample	Species Richness Factor
0	1
1 - 3	2
4 - 6	3
7 - 9	4
10 +	5

2. The **Intolerant Species Factor** is determined as the number of disturbance intolerant species recorded as live in the sample. A statewide list of disturbance intolerant species has been developed by the Illinois Ad Hoc Mussel Committee.

Number of Intolerant Species	Rare Species Factor
0	1
1	3
2 +	5

3. The **Abundance Factor** is determined from the Catch-per-Unit-Effort (CPUE) for the sample station. It based only on live individuals. The CPUE is equal to the number of live individuals recorded divided by the man-hours spent sampling.

Catch-per-Unit-Effort	Abundance Factor
0	1
1 - 10	2
11 - 30	3
31 - 60	4
61 +	5

4. The **Reproduction Factor** is determined from the percentage of the number of live species recorded that are represented by individuals less than 30mm in length or with 3 or fewer growth rings.

% Live Species w/Recent Recruitment	Reproduction Factor
0	1
1 - 30	3
31 - 50	4
51 +	5

Determining Mussel Resource Value

The Mussel Resource Value (MRV) is then determined from the Mussel Classification Index (MCI) as follows:

MCI	Mussel Resource Value
0 - 4	Restricted
5 - 7	Limited
8 - 11	Moderate
12 - 15	Highly Valued
16 +	Unique

Approximate description for each Mussel Resource Value:

Unique	Very high species richness &/or abundance; intolerant species common; evidence of recruitment for over half species present A resource of state-wide significance
Highly Valued	High species richness &/or abundance; intolerant species present; evidence of recent recruitment for at least a third of species present A resource of state-wide significance
Moderate	Species richness &/or abundance typical for stream of given location and order; evidence of recent recruitment for at least 1 species May be a resource of local significance or recovering from degradation
Limited	Low species richness &/or abundance; no evidence of recent recruitment (all individuals old or large for the species) May be recoverable or recovering with improved conditions
Restricted	No live mussels present; only weathered dead, sub-fossil, or no shell material found Unlikely to be recoverable except through immigration from better sites after conditions improved

FMCS 2001 Freshwater Mollusk Bibliography

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The following bibliography lists freshwater mollusk papers that have been published up to and including 2001 and have not appeared in previous FMCS bibliographies. Citations are split into five groups: Unionoida, Sphaeriidae, Corbiculidae, Dreissenoida, and Gastropoda. Papers which include taxa from more than one of these categories will be repeated in each group. A database of over 11,000 references on freshwater mollusks can be found at: <http://ellipse.inhs.uiuc.edu/mollusk/biblio.html>. To insure that papers are cited correctly, researchers are encouraged to send reprints to: Kevin S. Cummings, Illinois Natural History Survey, 607 E. Peabody Drive, Champaign, IL 61820; ksc@inhs.uiuc.edu

UNIONOIDA

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Freshwater Mollusk Conservation Society Membership List - August 2002

Please contact Rita Villella, FMCS secretary, for any corrections, additions, or deletions (her address is below).
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Helpful Hints from Hoppy:

Sampling tip:

"Dig among Asian clams and
you will find native
mussels!! "



Submitted by Steve Ahlstedt

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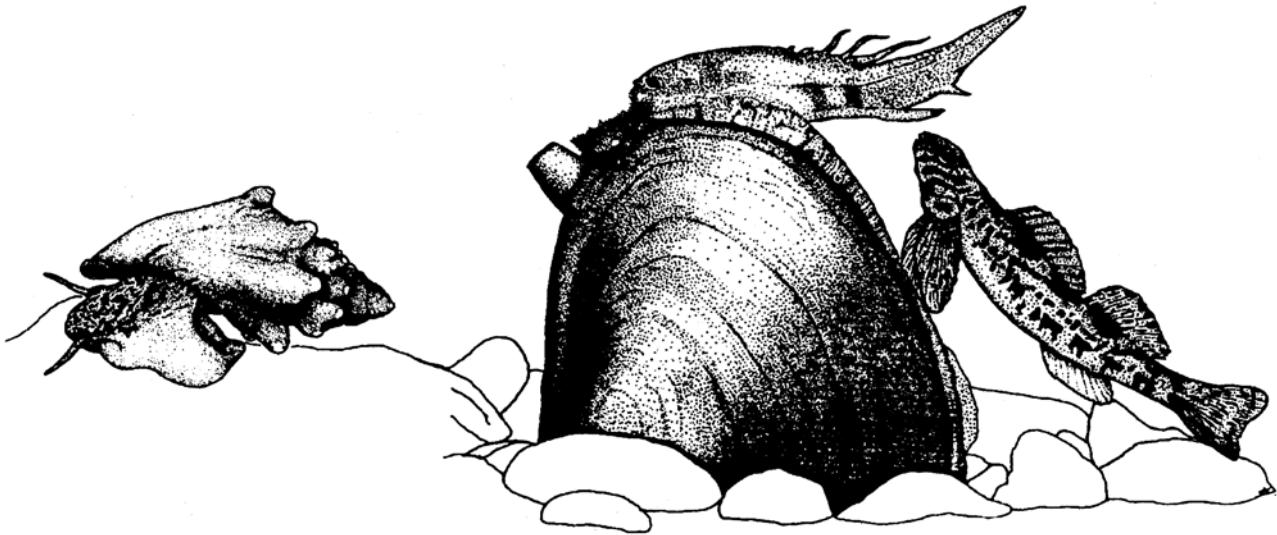
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Freshwater Mollusk Conservation Society



... dedicated to the advocacy and conservation science of freshwater molluscan resources