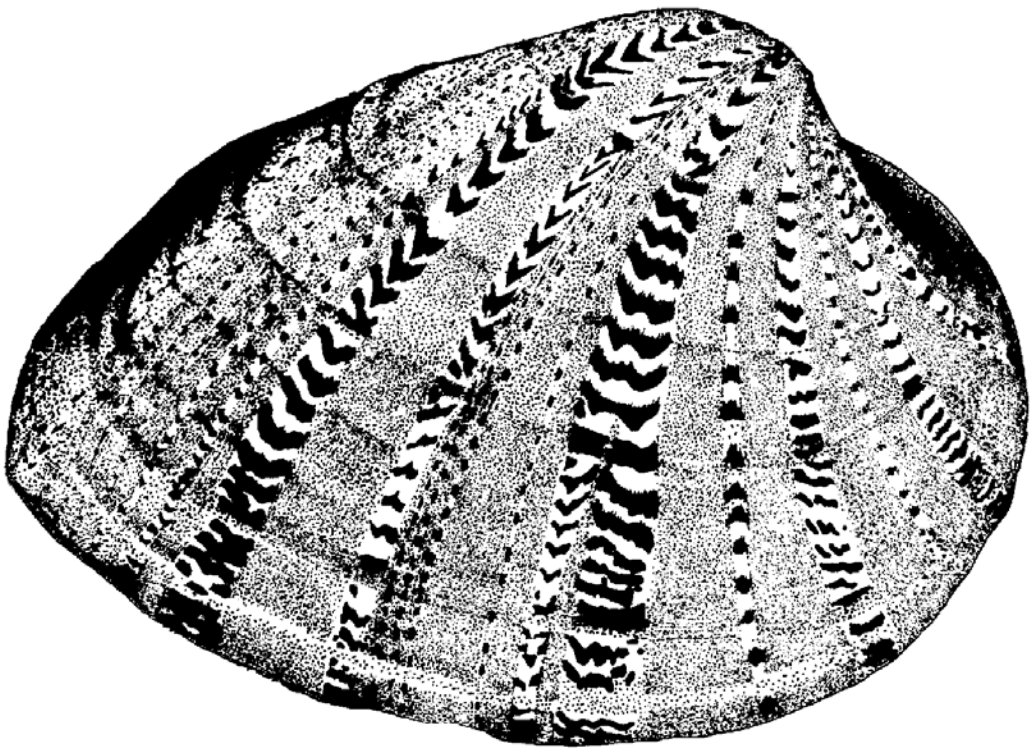
Ellipsaria

The Newsletter of the Freshwater Mollusk Conservation Society

Volume 5 – Number 1 **April 2003**



In this issue:

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Submissions for the August 2003 issue of *Ellipsaria* can be sent in at any time but are due by July 18, 2003. Anyone may submit an article but you must be a member of FMCS to receive *Ellipsaria*. Categories for contributions include news, new publications, meeting announcements, current issues affecting mollusks, job postings, contributed articles (including ongoing research projects), abstracts, and society committee reports. Electronic submissions are preferred; please send submissions to the editor.

Note: Submissions to *Ellipsaria* are not peer reviewed, but are checked for content and general editing.

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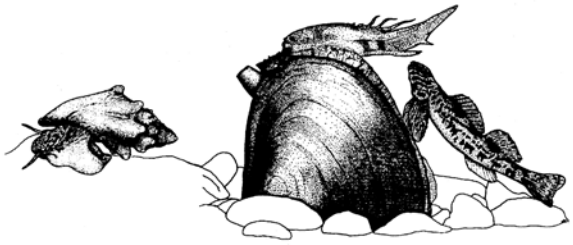

http://ellipse.inhs.uiuc.edu/FMCS/

FMCS Reports

2003 Election Results: President-Elect and Secretary

The new president-elect and secretary were announced at the March 2003 business meeting. The secretary will serve a 2 year term. The president-elect will serve for 4 years–1 year as president-elect, 2 years as president, and 1 year as past-president.

The new president-elect for 2003 is:

Robert M. Anderson, USFWS, State College, PA

The new (and former) secretary is:

Rita Villella, USGS, Kearneysville, WV

The 2003 FMCS Officers are:

President - G. Thomas Watters

President-Elect - Robert M. Anderson

Past President - Richard J. Neves

Secretary - Rita Villella

Treasurer - Heidi L. Dunn

FMCS Symposium Auction Durham, North Carolina

The recent auction and raffle were quite a success, raising $3399. I want to thank and acknowledge the efforts of all those who helped. Kudos to ticket hawkers Angela Boyer and Laura Zimmerman, all those who graciously donated or solicited items, the excellent and patient help of Jay Levine and his crew, Heidi Dunn, Chris Mayer, and Lisie Kitchell for keeping the receipts straight, Mark Faag, Nate Johnson, and the helpful raffle queens who moved and distributed the merchandise, Greg Cope for his role as repository, and the congenial "can do" attitudes of John Alderman and Judith Ratcliffe. It is the "happy family" approach that makes FMCS so excellent and so successful!
Sincerely,
Kurt Welke

Thanks for organizing a successful raffle Kurt!

FMCS Board Meeting March 16, 2003 Durham, North Carolina

Minutes of the November 2002 FMCS board meeting were published in *Ellipsaria* Vol. 4 No. 3.

Treasurer's Report
Total income for the society in 2002 was $55,815.00. The society spent $25,734.89 for an operating profit of $30,080.11. The society made $256.84 in interest income for a total operating profit of $30,336.95. A total of $9,100.00 was collected in membership dues and we have collected $3,000.00 in donations for the 2003 symposium. Our primary expense to date is the newsletter and a few miscellaneous items including AIBS dues. The $20,000.00 grant for the mussel valuation project was received and expenses so far are $11,005.00.

For the first quarter of 2003, the society collected $40,460.00 with the majority of this income from the symposium registration. An additional $7,165.00 was collected in membership dues. Total expenses for the quarter were $9,515.02 for a net profit of $30,944.98.

Retained earnings were $66,088.87 plus the current year earnings of $30,944.98 resulted in total assets of $97,033.85. A spreadsheet showing the breakdown of FMCS projects was presented. The society made a profit of $7,265.00 from the 2002 workshop, $9,653.07 from the 2001 symposium, $4,726.18 from the 2002 workshop, and $2000.00 from the report on techniques to prevent the spread of zebra mussels during mussel conservation activities.

Heidi recommended setting a cut-off date for registration and refunds for the next workshop and symposium as well as adding standing committee choices to the registration form. An additional item to add to the registration form is cost for spousal registration. The society may consider having commercial booths at the next symposium since there are more consultants and dive companies interested in attending society meetings. This can be another form of income.
Thanks to Heidi for doing a great job handling all the money transactions for the symposium.

Committees
All committees will be electing new chairs when they meet during the symposium. The following are reports to the board from the chairs:

Symposium Committee
John Alderman reported no problems - everything is on schedule. Many individuals are working to make this a successful symposium. John has 202 registrants to date and several walk-ups today. We are over the 300 room-night requirement (over 400 room-nights), so we will not have to pay for room and meeting space. There will be refreshments for the poster session and a hospitality room.

Gastropod Committee
Paul Johnson and Rob Dillon presented ideas about a gastropod workshop to be held in 2004. The committee will meet during the symposium and determine a location and schedule.

Guidelines & Techniques Committee
Rob Southwick has drafted the mussel valuation document and has sent the entire document (including the section on fish) to a small group to review. He is also looking for other reviewers; review comments are to be sent to Rob by April 4. This will be the only review - there will not be an AFS review. The document is being sent to a couple of solicitors to determine whether there are any legality issues with recovering dollars for mussel replacement. We need to be sure this is a document we can defend as far as costs of replacing mussels. The only unknown at this point is mortality of young mussels. To make it simple the mortality rate was made the same across species. This represents the best expert opinion on costs for replacing species of this small size group.

Authors of the guide to sampling freshwater mussel populations made their final revisions and the manual is currently being printed by AFS and should be available in April or May. FMCS donated $4300 but this isn't sufficient funding to allow us to give each member a copy (estimate 300 copies). Don Hubbs mentioned the sampling guide at a MICRA meeting and they are willing to pay for the document. It is estimated to cost $17 per copy in addition to the cost given from Dave Strayer to Heidi. Dick will check with John van Hassel on the total cost for the manual. We need to get the FMCS logo to AFS to put on the manual.

Information Exchange Committee
We still do not have the specifics of what is involved in taking over the journal. The committee will meet on Monday to set up an editorial board framework. The board needs to remind the membership that membership dues will increase to cover costs of the journal. Rob Dillon expressed concern this journal won't have a unique angle to make it different from other mollusk journals. It is important that we have a number of papers ready to put in the first issue to get it out on time and to try to keep the subscription costs down to increase library subscriptions.

Outreach Committee
Kurt Welke presented two draft designs for an FMCS display with the goal of having a display ready for the AFS annual meeting in Madison, Wisconsin in the summer of 2004. Kurt also had brochure information: design costs for a glossy colored brochure are between $1750 - $2250 plus $1500 for 3000 copies. Kurt felt the costs are high and that we should be able to design a brochure, possibly working through the University of Wisconsin at Madison The committee will discuss the content of the brochure at their meeting.

Propagation/Restoration Committee
Chris Barnhart sees this committee as distributing information about techniques. A website was established after the workshop with the workshop abstracts and key references on feeding, genetics and other references pertinent to propagation. So far he has not been getting many contributions (reports) from the membership for the website. [http://ellipse.inhs.uiuc.edu/FMCS/Propagation/] The FWS has not moved aggressively to identify areas of reintroduction to move forward with the propagation program. Some of the reluctance is at the state level and there is not much coordination among propagation programs. Several needs seem apparent: 1) There is a need for a clearinghouse for how to reintroduce a rare mollusk, and 2) There is a need for a compiled listing or database of where reintroductions have occurred and an entity to maintain a database. The committee would develop a standardized form that folks would be more inclined to complete and send in. Things to include are geographic location or watershed where brood stock were collected, number of males and females, location of reintroduction, etc. There is an additional need for the committee to develop a database for specimens for genetics so that these animals don't have to be continually collected. Either a notice will be put in *Ellipsaria* to request information on what species and their collection localities that members currently have that could be used for genetics or a list of contacts and their contact information of people that have material for genetics and/or propagation.

Student Award Ad hoc Committee
Student travel award and presentation award procedures were finalized this summer. Catherine Gatenby handled the student travel applications and 5 students applied even though the notice was out early. The board had agreed to $4000 be available for student awards, therefore the 5 travel award winners were given a check for $400 dollars and they will be announced at the business meeting Tuesday evening. Out of the 109 presentations at this meeting, 7 students are competing for the best poster award and 18 are competing for best platform presentation. Judging required 16 judges because of concurrent sessions. The best poster and platform winner will each be awarded $500. Greg Cope had two plaques made that will be awarded with the checks. Catherine will announce the travel award winners and Greg will announce poster and platform award winners. The committee spent $3000 of the allotted $4000 on student awards this year with the unspent dollars going back into the fund designated for student awards.

Awards Ad hoc Committee
The society awards Lifetime Achievement and Clench Awards. There was consideration of awarding a stewardship award and Steve Ahlstedt is to draft language for this award to recognize an individual, company, etc. for their conservation efforts. The board discussed combining the two award committees to make an overall awards committee with subcommittees to deal with student awards, lifetime achievement, etc. A motion will be made at the business meeting to combine the Student Award ad hoc committee with the Awards ad hoc committee to form an Awards standing committee. Greg Cope will draft this motion as well as the motion to change the water quality committee to present to the members for a vote at the business meeting.

Mussel Status and Distribution Committee
The atlas of unionid distribution is the main project of this committee. Kevin Roe sent an email to committee members asking the members to sign up for specific species accounts. Out of about 100 members on the committee, 15 people responded and they are signed up for 85 taxa. Kevin will ask additional members to sign up for taxa accounts when the committee meets this week Once the accounts start coming in Kevin will send them out for review.

Water Quality/Habitat/Zebra Mussel Committee
The committee completed the report on evaluation of techniques to prevent introduction of zebra mussels during native mussel conservation activities; a copy of the report is in the registration packet. The report has been reworked as a manuscript and has been accepted in the Journal of Shellfish Research. Other major discussion was on the possibility of renaming the committee to the environmental quality and affairs committee to cover the advocacy role for the society. Bob Anderson talked with Dick Biggins about taking on the letter writing responsibilities. A person with expertise on the particular issue would write the letter, the president and the committee members would review the letter, and Dick Biggins would sign it on behalf of the society if the committee chair could not sign the letter due to conflict of interest with their agency. There are times when there is a need for a FMCS presence at a meeting or public hearing, a person to be the face for the society. The committee needs to decide what the scope of these activities would be and what the limits, if any, would be. FMCS is a part of AIBS and Tom Watters will be at their council meeting in Arlington next week. The board will check the by-laws for changing the committee name.

Nominations Committee
A total of 106 ballots were cast. Bob Anderson is the new president-elect and Rita Villella was re-elected as secretary.

Genetics Workshop
Because of the amount of propagation work being done, there is a need for a practical workshop on molecular genetics. Dick Neves presented a brief proposal for a 2 day workshop to the board. The proposed date would be July 2004 at NCTC. The proposal was presented to determine whether there is interest in FMCS co-sponsoring this workshop. Dick has not yet heard whether the FWS was interested in sponsoring the workshop. Rita suggested contacting Alan Temple at NCTC. With propagation programs moving forward and the FWS does not yet have a reintroduction policy, in addition to state personnel having a lot of questions, there is a need to hold the workshop within the coming year. There may be a white paper or synthesis paper on guidelines as a workshop product. Any comments or ideas are to be forwarded to Dick Neves and Dick will get an idea of costs.

Symposium Location for 2005, 2007
The offer for the 2005 symposium to be held in Arkansas has been withdrawn. We will approach Arkansas for a final decision. Otherwise, the board suggested holding the symposium in the upper Midwest. Suggestions of Minneapolis, St. Louis, Iowa, and LaCrosse were offered. Dick will announce at Tuesday's business meeting the symposium will either be in Arkansas in 2005 or the society is looking for those willing to host the 2005 and 2007 symposium.

Herb Athearn Collection
The North Carolina State Museum of Natural History is going to receive Herb Athearn's collection. An estate attorney is lined up to transfer the material over upon Herb's death or if he becomes incapacitated. Someone needs to cover the attorney fees (estimated at less than $3000) to set up the estate to transfer the collection to the museum. The board proposes to pay these fees upfront, contingent on FWS' payment with those dollars reverting to FMCS. There is a contract with FWS to set up a database for the collection. Paul will also be getting some funding from Region 4. The board suggests this be presented at the business meeting as such: the society would like to help assure the acquisition of an important mollusk collection and put for a vote of the membership. Will have the lawyer bill Heidi and Paul will reimburse the society through grant money.

Other Business
Liability Insurance/Financial Plan
A premium of $1200 covers the board for a million dollar policy for each claim- yearly premium. Suggest we check with other societies to see if these costs are in line and we will revisit at the next board meeting.

The FMCS ad appeared in the November issue of BioScience. We hope this ad will result in new members to the society.

Several issues have come up with the nomination process including if the nominations committee should limit the number of nominees for an office and how to handle a tie vote. Leroy Koch is to draft an amendment to the by-law on the nominating process and present the draft at the next board meeting.

Membership dues for 2004
Members had voted to increase dues to support a journal paying $30 to $40 for a subscription, with most being comfortable with $30. This would double current dues. Thirty dollars would presumably cover our costs to print a journal. It was suggested we not raise dues next year, and cover the costs of the journal's first issue with current society funds, but increase membership dues thereafter. With the current structure, FMCS brings in $9000 a year. Once we publish the first couple of issues, we will have costs in hand to determine the membership dues structure.

Policy for waiving symposium fees
We need a policy for waiving fees for those working the symposium and those receiving the Lifetime Achievement and Clench awards. The awards committee will draft a policy for the board to review. In the past, we have paid for those international members and lifetime achievement award recipients.

Finances
Think of other avenues to promote the society. Will be more interest over time for vendors to set up booths.

Black Carp
FWS will supposedly have a decision sometime this year.
Submitted by Rita Villella, Secretary

General Business Meeting
March 18, 2003
Durham, North Carolina

Thanks to all who helped put together an excellent 2003 symposium, especially John Alderman and Judy Ratcliffe.

The society needs a sponsor and an organizing committee for the 2005 symposium. FMCS has had symposia in Chattanooga, Tennessee, Pittsburgh, Pennsylvania, and Durham, North Carolina. Anyone wishing to sponsor the next symposium should contact an FMCS board member. Since these meetings take several years to prepare, we also need a sponsor for the 2007 symposium.

All paying members should be receiving *Ellipsaria,* the FMCS newsletter. Committee reports will be included in the next issue. If you are interested in participating in one of the standing committees, contact the committee chair.

Committees
New committee chairs were elected for 2-year terms:

Awards	Greg Cope, greg_cope@ncsu.edu
Environmental Quality/Affairs	Patty Morrison, patricia_Morrison@fws.gov
Gastropod Status/Distribution	Paul Johnson, pdj@tennis.org
Guidelines/Techniques	John van Hassel, jvanhassel@aep.com
Information Exchange	Kevin Cummings, ksc@inhs.uiuc.edu
Outreach	Kurt Welke, welkek@dnr.state.wi.us
Propagation/Restoration	Jess Jones, vtaquaculture@hotmail.com
Symposium	Depends on host state
Unionid Status/Distribution	Kevin Roe, kroe@delmnh.org

2004 FMCS Gastropod Workshop
The society will be sponsoring a gastropod workshop in 2004. There will be a general gastropod identification session of the major families, possibly to genera for some of the families. Invited speakers will focus on various topics including biology, ecology, physiology, propagation, genetics, and conservation. There will also be a review of a draft national conservation strategy for gastropods. A show of hands indicated most members would be interested in attending such a workshop. The workshop will be held at the Paul Bear Bryant Convention Center at the University of Alabama in Tuscaloosa. The tentative date is March 15 – 17, 2004. For further information on the workshop, contact Paul Johnson at pdj@tennis.org [see newsletter insert].

Genetics Workshop
Dick Neves is organizing a two-day freshwater mollusk conservation genetics workshop to possibly be held in July 2004 at the FWS National Conservation Training Center in Shepherdstown, West Virginia. The workshop will provide resource managers and biologists with an opportunity to learn the principles and practices of conservation genetics as applied to the recovery of freshwater mollusks. Talks will introduce the topics of quantitative genetics, molecular genetics, phylogeography, species concepts, taxonomic analysis, detection of cryptic species, genetic assessment of fitness related loci, and genetic management guidelines for captive propagation and stocking endangered mollusks. Case studies will demonstrate how the tools of conservation genetics are applied to real world examples to help protect mollusks and understand their historical ecology. Anyone having comments or suggestions for the workshop should send them to Jess Jones at vtaquaculture@hotmail.com.

Membership Dues
The board voted to maintain the membership dues for 2004 at the current level of $30 for regular membership and $15 for student membership. Next year FMCS anticipates producing at least one issue of *Walkerana*. At the Pittsburgh symposium, the majority of the members responding to a survey voted to increase the membership dues to support a journal for the society. Once the society publishes the first issue we will have a better idea of publication costs to structure the new membership dues. If members are interest in serving on an editorial board, they should get in touch with Kevin Cummings at ksc@inhs.uiuc.edu and Tom Watters at waters.1@osu.edu.

Mussel Valuation Document
A draft of the document is available for review. The document has been sent to the board and to the advisory committee working with Rob Southwick for review. Members interested in reviewing the draft should contact Dick Neves at mussel@vt.edu

Student Awards
One of Dick Neves' goals as FMCS president was to increase student participation in the society and to establish a student awards committee. As committee co-chairs, Greg Cope and Catherine Gatenby developed the award criteria for the student travel award and best student poster and platform awards. This year FMCS awarded student travel awards to 5 students: Jennifer Buhay, Brigham Young University; Ariel Capili, University of Maryland; Elizabeth Neal, University of Pennsylvania; Josh Seagraves, Arkansas State University, and Daelyn Woolnough, Iowa State University. We encourage students to participate in this program.

Out of 109 presentations at this symposium, about 25% were student presentations. FMCS awards a best student poster and best student platform awards. Winners receive a plaque and a $500 cash award–we encourage students to use the funds to participate in other mollusk meetings.

This year's best student poster award recipient is Ashley McBride of Arkansas State University for her poster on freshwater mussel response to various flow conditions.

This year two best student platform awards were given. The two recipients are Lora Zimmerman of Virginia Tech for her presentation "Use of a complete habitat survey and a Geographic Information System (GIS) to identify suitable release sites for captively propagated freshwater mussels in the Clinch River, Virginia" and Constance Rogers of Wake Forest University for her presentation "Acquired resistance of a host fish to glochidia larvae after multiple infections."

Congratulations to all of the students for their excellent presentations and thanks to the judges for their efforts and commitment.

Amendment to the Bylaws
The society members were presented with two proposed amendments to the current bylaws. A motion was made in writing to the FMCS board from the ad hoc student awards committee and the ad hoc Lifetime, Stewardship and Clench Award Committee. The committees proposed to combine the efforts of both ad hoc committees into a single Awards Committee and to change the status of the committee from ad hoc to a permanent standing committee. The motion was signed by Greg Cope and Catherine Gatenby. The motion was passed by a voice vote.

A motion was made in writing to the FMCS board from the Water Quality, Habitat, and Zebra Mussel Committee. The committee proposed to include an environmental affairs component to the existing scope of the committee to promote and advocate for environmental stewardship to the benefit of freshwater mollusks, and consequently petitioned to change the committee name to Environmental Quality and Affairs. The motion was signed by Bob Anderson and Greg Cope. The motion passed on a voice vote. Patty Morrison is the chair and Dick Biggins is co-chair of this committee.

As published in *Ellipsaria* Vol 4, No. 3 the motion was put before the members to change the term of president from one year to two years, such that the president and secretary terms are in sync. The proposed change was approved by a voice vote of the members.

These three resolutions will be drafted and placed in the bylaws.

Clench Award
In recognition for significant collection, contribution, and commitment to the field of malacology, the 2003 William J. Clench Award was presented to Henry McCullogh and Marian Havlik.

Lifetime Achievement Award
The 2003 FMCS Lifetime Achievement award for outstanding service, commitment, and conservation of freshwater mollusks, and for being a leader in the establishment of the Freshwater Mollusk Conservation Society was presented to Dick Biggins.

Election Results
A total of 106 ballots were cast in this election. The new president-elect is Bob Anderson; Rita Villella was re-elected as secretary. Each will serve a 2-year term. Special thanks to the nominating committee for their efforts.

Other Business
The society is in good financial standing with total assets of $97,000.00.

The FMCS board approved the legal transfer of a large private mollusk collection to assure the protection of this valuable resource.

Dick Neves is organizing a session on freshwater pearl culture with 7-8 invited speakers at the National Shellfisheries Association annual meeting, April 15-17, 2003 in New Orleans.

FMCS had another successful raffle and auction. We brought in $4,569.00; costs were $1,190 for a profit of $3,399.00. These funds will help the society sponsor student awards at the next symposium. Thank you to all the members that participated with special thanks to Kurt Welke and Jay Levine for organizing this event.

The FMCS hat was ceremoniously passed to the 2003 FMCS president Tom Watters. Thank you Dick Neves for serving as president in 2002!
Submitted by Rita Villella, Secretary

Committee Reports

Each committee met during the March 2003 Symposium in Durham. These are the reports from those meetings.

Awards Committee Report

[formerly Student Awards Committee]
The Student Awards Committee was pleased to organize and present the inaugural FMCS Student Travel and Best Student Poster and Platform Awards at the 2003 Symposium in Durham, North Carolina. Student participation at the Symposium was excellent—about 25% of the 109 contributed papers given at the meeting were authored by students. Five students (Jennifer Buhay, Brigham Young University; Ariel Capili, University of Maryland; Elizabeth Neal, University of Pennsylvania; Josh Seagraves, Arkansas State University; and Daelyn Woolnough, Iowa State University) each received a $400 Student Travel Award

from the Society to help defray the costs of attending the 2003 Symposium.

The Best Student Poster Award, which consisted of a plaque and $500 check from the Society, was presented to Ashley S. McBride of Arkansas State University for her presentation entitled "Freshwater mussel response to various flow conditions". Her presentation was co-authored by Jerry L. Farris, Roger A. Kuhnle, and Daniel G. Wren.

The quality of student platform presentations at the conference was so great that two Best Student Platform Awards were given, each consisting of a plaque and $500 check from the Society. The first co-recipient was Lora L. Zimmerman of Virginia Tech University for her presentation entitled "Use of a complete habitat survey and a geographic information system (GIS) to identify suitable release sites for captively propagated freshwater mussels in the Clinch River, Virginia" and was co-authored by Richard J. Neves. The second co-recipient was Constance L. Rogers of Wake Forest University for her presentation entitled "Acquired resistance of a host fish to glochidia larvae after multiple infections". Her presentation was co-authored by Ronald V. Dimock.

All of these awards were made possible with the dedication and enthusiastic support of 16 FMCS members who volunteered to serve as judges at the conference—a sincere thanks to these folks!

Several new items of business were addressed by the Committee and approved by the FMCS Board and Society Membership at the 2003 Symposium in Durham, North Carolina. These items included combining the duties of the *ad hoc* Student Awards Committee with the *ad hoc* Lifetime Achievement, Stewardship, and Clench Awards Committee, re-naming that combined Committee to "Awards" Committee, and converting the status of the new Awards Committee from *ad hoc* to a permanent standing committee. Committee co-chairs Greg Cope (North Carolina State University) and Catherine Gatenby (Academy of Natural Sciences—soon to be U.S. Fish and Wildlife Service) agreed to continue leadership of the new Awards Committee for another two-year term, with substantial assistance from Al Buchanan of the Missouri Department of Conservation.
Submitted by Greg Cope, Co-chair

Environmental Quality and Affairs Committee Report

[formerly Water Quality, Habitat, & Zebra Mussel Comm.]
The Water Quality, Habitat, and Zebra Mussel Committee distributed copies of their final report for the U.S. Fish and Wildlife Service entitled "Evaluation of techniques to prevent introduction of zebra mussels (*Dreissena polymorpha*) during native mussel (Unionoidea) conservation activities", authored by Committee members Greg Cope (North Carolina State University), Teresa Newton (U.S. Geological Survey), and Catherine Gatenby (Academy of Natural Sciences), to all FMCS members attending the 2003 Symposium in Durham, North Carolina.

Several new items of business were addressed by the Committee and approved by the FMCS Board and Society Membership at the 2003 Symposium in Durham, North Carolina. These items included adding an environmental affairs component to the scope of the Committee to promote and advocate for conservation of freshwater mollusks and re-naming the Committee to "Environmental Quality and Affairs". Continuing co-chairs Bob Anderson (U.S. Fish and Wildlife Service) and Greg Cope (North Carolina State University) completed their two-year terms and Patty Morrison (U.S. Fish and Wildlife Service) and Dick Biggins (Happily Retired—formerly of the U.S. Fish and Wildlife Service) were elected as co-chairs of the new Environmental Quality and Affairs Committee.
Submitted by Greg Cope

Gastropod Status and Distribution Committee Report

In a very short meeting at the Raleigh, North Carolina Symposium, the Gastropod Committee elected a Paul Johnson as the new Chair, and re-elected Ken Brown as the committee Co-Chair. Following the Committee Chair elections, the only item of business was to discuss the upcoming Gastropod Workshop. The initial plan was to hold the meeting at the U.S. Fish and Wildlife Service National Conservation and Training Center (NCTC) in Shepardstown, West Virginia. However, because space at NCTC was available only during first week March 2004, and the limited availability of NCTC rooms during that time, the floor was opened to suggestions for another location where the FMCS might hold the workshop. Time did not allow a lengthy discussion of meeting options, but attendees were asked to voice their thoughts to the committee chair.

After the meeting, the discussion continued via-e-mail, as to the location, date, and format of the workshop. Chuck Lydeard made the kind offer to host the workshop at the University of Alabama's Tuscaloosa campus. The committee also had other offers from Marshall University in Huntington, West Virginia and the Mississippi State Museum of Natural History in Jackson, Mississippi. Because of U of A's longstanding work with freshwater gastropods, the general consensus among the committee members was to hold the meeting in Tuscaloosa, Alabama (Chuck also has several eager graduate students that are ready to help with the meeting!). The gastropod workshop is scheduled for March 16-18, 2004 at the Paul "Bear" Bryant Conference Center at the University of Alabama, in Tuscaloosa. The FMCS Gastropod Workshop will be preceded by 1.5-day general symposium highlighting Alabama's freshwater biodiversity crisis and outlining recovery strategies needed to help save it. The gastropod workshop will focus primarily on the identification of freshwater gastropods, but will also include other sessions on general topics (biology, ecology, conservation etc.), a working group session on a draft of the freshwater gastropod National Conservation Strategy, a short session on terrestrial gastropods, morphometric analyses, and a demonstration of genetics analyses. Specific Symposium and Workshop Program information will appear in the

August issue of *Ellipsaria*. The workshop committee will work over the next 2 months, planning program details. If you have some program ideas you would like to contribute or would like more information about the workshop, please contact Paul Johnson by e-mail at pdj@sari.org or phone (706) 937-6538.
Submitted by Paul Johnson, Chair

Guidelines and Techniques Committee Report

The major committee activity over the past two years has been the development of mussel valuation guidelines and associated procedures for performing mussel kill assessments. These efforts have resulted in two draft documents that are currently distributed among the FMCS membership for review. The mussel valuation document was prepared under contract by Southwick and Associates, who also developed the fish valuations for American Fisheries Society. The mussel documents will be added to the next update of AFS Special Publication 24, "Investigation and Valuation of Fish Kills".

Available members of the committee met on March 17, 2003, during the FMCS 3rd Biennial Symposium in Durham, North Carolina. The primary topic of discussion was the two draft documents mentioned above. Additionally, ideas are being solicited from the membership for future projects that the committee should consider. John Van Hassel was retained as committee chairman for 2003-2005.
Submitted by John Van Hassel

Information Exchange Committee Report

The Information Exchange Committee met briefly at the FMCS Meeting in Raleigh and elected Kevin Cummings as the new Chair, replacing Tom Watters (who is now FMCS czar). The most pressing issue discussed was the adoption of the Journal *Walkerana* and how that would be administered. After a spirited discussion, it was agreed that Kevin Cummings would serve as Editor and recruit volunteer Associate Editors to review manuscripts. Dan Graf has graciously agreed to help with the page-layout and formatting the papers for publication. Tom Watters will travel to Ann Arbor and discuss the transfer with Dr. Burch sometime in April. Those persons with a strong desire to serve as Associate Editors should contact the Chair as soon as possible. On another note, things are progressing well with the FMCS Web Site. Persons wanting to suggest changes or add content should contact the Chair by e-mail at ksc@inhs.uiuc.edu or phone 217-333-1623.
Submitted by Kevin Cummings, Chair

Mussel Status and Distribution Committee Report

Please see the FMCS website for a list of taxa and contributors for the Atlas of North American Mussels. A sample page of the atlas is also available:
http://ellipse.inhs.uiuc.edu/FMCS/Mussel/

Outreach Committee Report

The Outreach Committee of FMCS met with the following items of note to the membership:

1. A list of state contacts for scientific / endangered species collecting permit has been completed. It will be posted on the FMCS website, with hardcopy and Word files currently available from Kurt Welke at Kurt.Welke@dnr.state.wi.us . Federal FWS Regional contacts will be added to make your permit needs a 1-stop shopping affair!
2. Outreach will soon create and distribute 2 tri-fold pamphlets. One version will be similar to the cover of the recent Raleigh Symposium for use to advertise and showcase the Society to interested professionals. A second edition will be more layman-oriented for distribution at traditional outreach venues to raise general public awareness about mussels, their role, and the challenges facing the fauna. Two working groups have formed to define specific audience, message, and layout. Look for a brochure you can use by this fall.
3. Other Outreach ideas that were discussed included soliciting PBS type entities to produce an obligate mussel show. The current "Tools for Outreach" will be updated to include recent excellent tools such as *Russell the Mussel* and the *North Carolina Freshwater Mussel Conservation Partnership* activity books that were included in Symposium registration materials. We will be upgrading our web page and links to include lesson plans that use mussels metaphorically to teach. Look for other Outreach "goodies" like Mike Pinders' recipe for mussel molds and replicas to create those classy magnets – kids love them!

We welcome the new enthusiasm of Laura Zimmerman, Julie Boyles, and Jeremy Tiemann to our ranks. Kurt Welke has agreed to Chair the committee once again for a second 2-year term.

Outreach reminds FMCS members that our charge is to serve you. We welcome any ideas and new members.
Submitted by Kurt Welke

News

Freshwater Bivalve Ecotoxicology Book

A book with the working title of "Freshwater Bivalve Ecotoxicology" is currently in preparation for publication within the next year by the Society of Environmental Toxicology and Chemistry (SETAC). A dozen chapters covering all aspects of freshwater bivalve ecotoxicology, including such topics as laboratory and in-situ toxicity testing, mussel toxicokinetics, mussel responses to

environmental contaminants, and various biomonitoring applications, are being authored by leading researchers in these areas. The editors are Dr. Jerry Farris of Arkansas State University and John Van Hassel of American Electric Power. A special session presenting the book is planned for the November 2003, SETAC annual meeting in Austin, Texas.
Submitted by John Van Hassel

The American Malacological Society 69th Annual Meeting Ann Arbor, Michigan June 25–29, 2003

The 2003 American Malacological Society meeting will be held at the University of Michigan's Central Campus, June 25-29. Registration and abstracts are due May 1, 2003. For more meeting information and forms, see http://www.ummz.lsa.umich.edu/mollusks/ams/

Black Carp Escapes to the Wild

[Reprinted with permission from River Crossings, the newsletter of MICRA (Mississippi Interstate Cooperative Resource Association), 2003 Vol. 12 No. 2]

Black Carp Escapes to the Wild The first black carp (*Mylopharyngodon piceus*) ever reported taken from the wild in the United States was collected on 3/26/03 by Jim Beasley, a commercial fisherman, from Horseshoe Lake, IL (an oxbow lake) near the confluence of the Mississippi and Ohio rivers. The exotic carp measuring 30.8 inches and weighing 12.8 lbs was determined to be four years of age, and exhibited the molar-like pharyngeal (throat) teeth typical of the species. Black carp are very similar in appearance to the grass carp except for the presence of this characteristic (see accompanying photo). Rob Maher, Commercial Fishing Program Manager for the Illinois Department of Natural Resources (ILDNR), received the fish from Mr. Beasley and vouchered it with Brooks Burr, Southern Illinois University, Carbondale. Working with Maher, Greg Conover (U.S. Fish and Wildlife Service Marion, IL) obtained the services of Paul Wills at the *Logan Hollow Fish Farm* to conduct further tests. Mr. Wills extracted a blood sample from the fish and tested it to determine the size of the red blood cells (RBCs). Three known diploid (fertile) grass carp and three known triploid (sterile) grass carp were used as a reference regarding the nuclear diameter of the RBCs. The RBCs in the black carp sample were identical in size to that of the sterile grass carp.

According to Mike Freese, *Keo Fish Farms* (a primary supplier of triploid black carp in Arkansas), the nuclear diameter of RBCs are consistent between grass and black carp, suggesting that the Horseshoe Lake fish was in fact sterile. However, Conover cautioned that these results are preliminary and additional tests using tissue samples will be analyzed to confirm the fish's fertility. In late 1999 MICRA learned that fish farmers in the South were planning to begin using the imported black carp as a control for snail infestations in their catfish production ponds. Fearing that these fish would escape to the wild and prey on wild populations of threatened and endangered freshwater mollusks, MICRA petitioned the U.S. Fish and Wildlife Service (USFWS) on February 24, 2000 to list the black carp as an injurious species of wildlife under the federal Lacey Act. Such a listing would prevent interstate shipment of the species, and hopefully safeguard against its escape to the wild. Readers are referred to *River Crossings* Vol. 8, No. 6 and Vol. 9 Nos. 1-4 available on the Web at http://wwwaux.cerc.cr.usgs.gov/MICRA/. MICRA's hope was that the black carp could be listed and "contained" before it was allowed to escape to the wild. It had already been reported that a half dozen or so black carp had escaped from a private fish hatchery near Lake of the Ozarks, MO during the 1994 floods.

After more than two years of controversy and delay, the USFWS, on July 30, 2002 published in the Federal Register a notice of intent to so list the black carp. Most MICRA states and many other groups and individuals expressed support for such a listing, but to date no Lacey Act listing has been made. Based on the age of the fish taken from Horseshoe Lake, it is the result of a 1999 year class and so has escaped captivity sometime since then, validating MICRA's concern that any fish held in farm fish ponds or other loosely controlled environments will, in fact, escape to the wild. Under intense political pressure in 2000, Missouri chose to begin raising triploid black carp at one of its state fish hatcheries in order to supply fish farms in their state with the needed fish. Missouri feared that, if left in private hands, triploidy may not be guaranteed. Since 2001 Missouri has supplied about 1,800 sterile black carp to 5 different fish farmers. If the Horseshoe Lake black carp, indeed, proves to be sterile, biologists can breathe a slight sigh of relief — for now, no fertile black carp have been captured in the wild, so no natural reproduction should have occurred, and wild populations should not be established. But the truth is, that even sterile wild black carp will consume large numbers of freshwater mollusks. According to the USFWS, the species can grow to five feet in length and reach weights up to 150 pounds. Fish this size can consume huge amounts of freshwater mollusks to maintain their biomass. An Asian carp brochure and key to identification can be found on the MICRA Web Site. Contact: Rob Maher, Illinois Department of Natural Resources, Commercial Fishing Program, 8450 Montclaire Avenue, Brighton, IL 62012, (618) 466-3451

Job Announcements

Doctorate in Environmental Management at Montclair State University

Montclair State University has recently announced a new Doctorate in Environmental Management (D.Env.M.). The program is now accepting applications for enrollment in Fall 2003. This is the only Doctor of Environmental Management in the greater New York metro region, and one of the only such programs in the United States. The research-based degree is housed in the Department of Earth and Environmental Studies but is strongly interdisciplinary, involving over 8 departments. The program will admit both appropriate post-bachelor's and post-master's degree students, and will offer several graduate assistantships ($15,000 U.S. stipend plus full tuition waiver).

While not directed at malacologists per se, the D.Env.M. program has many aspects that could be of interest to those doing research in applied environmental issues and allied disciplines. Three foci characterize the program: Water-Land Systems, Sustainability /Vulnerability/Equity, and Modeling/Visualization. Strengths and expertise in the program may with interests in coastal and marine environmental management, global environmental change, hydrology, and sediment and water pollution, including heavy metal and other contaminants.

Full details can be viewed at the program web page:
http://www.csam.montclair.edu/denvm/

For more information, contact Dr. William Solecki (soleckiw@mail.montclair.edu) or Dr. Gregory Pope (popeg@mail.montclair.edu), or phone 973-655-4448.

M. S. Graduate Research Assistantship in Fisheries and Aquatic Ecology, Department of Fisheries and Wildlife Sciences, University of Missouri, Columbia

Ecology of freshwater mussels

Responsibilities: A relatively unexplored mussel community on a river within the existing and proposed Marais des Cygnes National Wildlife Refuge in eastern Kansas and western Missouri needs to be evaluated before planned upstream alterations along the river take place. The student will develop a thesis project related to surveying prairie streams for mussels, documenting species occurrences, determining community composition and population viability, and discovering potentially important habitat features. The student will interact with scientists and resource managers knowledgeable in mussel biology and ecology from the U.S. Fish and Wildlife Service, Kansas state agencies, Missouri Department of Conservation, and Virginia Tech.

Qualifications: B.S. in the life sciences, preferably fisheries and wildlife or ecology, a GPA above 3.0 and GRE's above the 50th percentile.

Salary: 12-month stipend starting at $11,600 and increasing to $13,000 after 1 year. Tuition is waived and health insurance is subsidized.

Starting Date: June 2003 or shortly thereafter

For more information contact Charles Rabeni, Leader, Missouri Cooperative Fish and Wildlife Research Unit, University of Missouri, Columbia at 573-882-3524 or preferably by e-mail RabeniC@missouri.edu

Information on the fisheries and wildlife program at the University of Missouri may be found at
http://www.snr.missouri.edu/fw/

Publications

Cope, W. G., Hove, M. C., Waller, D. L., Hornbach, D. J., Bartsch, M. R., Cunningham, L. A., Dunn, H. L., and Kapuscinski, A. R. 2003. Evaluation of relocation of unionid mussels to *in situ* refugia. *Journal of Molluscan Studies*. 69(1):27-34.

Contact Greg Cope (Tel: 919-515-5296 or greg_cope@ncsu.edu) to obtain a reprint of this article.

Contributed Articles

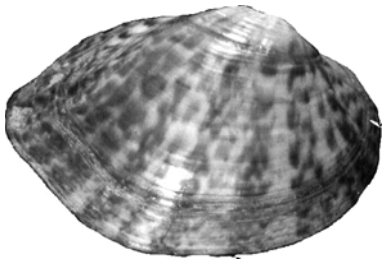

Image used with permission from University of Minnesota, Bell Museum of Natural History

Possible decline of fawnsfoot (*Truncilla donaciformis*) in upper Mississippi River

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Concern is growing in Minnesota that the abundance of fawnsfoot, *Truncilla donaciformis* (I. Lea, 1828), may be declining in the upper Mississippi River. This species generally inhabits large streams and rivers and is distributed widely throughout the Mississippi River basin (Oesch 1995). Over the past 10-15 years, anecdotal evidence has been growing that the species is decreasing in the Mississippi and St. Croix rivers. Hornbach and colleagues have conducted mussel community studies on the St. Croix River for 11 years (Hornbach 2000). Between 21 and 26 mussel species have been observed at Interstate State Park during the last 10 years and the number of species has not changed significantly. Also, there have not been significant declines of other mussel species at this location. Repeated measures ANOVA shows fawnsfoot density has declined significantly ($P=0.004$) from 3.3, 2.2, 0.4, 0.1, to 0 mussels/m^2 in 1992, 1995, 1998, 2000, and 2002 respectively. Interstate State Park mussel community demography and habitat data are available on http://www.macalester.edu/~hornbach/Research/Summary/interstate/interst.html. Minnesota is considering placing this species on its list of endangered, threatened, and special concern species. Please contact Mark Hove if you have observed a decline of this species.

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Oesch, R.D. 1995. Missouri naiades: a guide to the mussels of Missouri. Missouri Department of Conservation. Jefferson City, Missouri. 271 pp.

The Botanical Garden of the Tel Aviv University: An Eldorado for introduced freshwater snails

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Since my arrival in Israel in 1969, I have regularly frequented the botanical gardens of the Tel Aviv University in search for land- and freshwater molluscs. In the first years it was only a tiny garden near the premises of the Biological Department of the University in Abu Kabir, a quarter in the south of Tel Aviv. In the middle of the garden was a small pond with some Yellow pond lilies (*Nuphar lutea*) and a dense cover of Duckweed (*Lemna* spec.). Each time I sampled that pond the dominant snails were the Mimic lymnaea *Pseudosuccinea columella* (Say, 1817), the "European" physa *Physella acuta* (Draparnaud, 1805) (for the American origin of this species see Dillon et al., 2002), and the Seminole rams-horn *Planorbella duryi* (Wetherby, 1879); all introduced species from North America. Far less numerous were some local species like the Levant bithynia *Bithynia phialensis* (Conrad, 1852), the Red-rim melania *Melanoides tuberculatus* (Müller, 1774), and the African pondsnail *Radix natalensis* (Krauss, 1848).

The Biological Department moved to the new campus of the Tel Aviv University in the north of Tel Aviv in the late seventies; the botanical garden followed in 1980 after a very large Botanical Garden was laid out just east of the university in Ramat Aviv. Not only one can see (on a small scale) most of the different habitats encountered in Israel, ranging from the former wetlands of the Hula swamps to extreme dry desert biotopes, but also a huge tropical hothouse, numerous small ponds and streams, and a semi-commercial nursery.

The mollusc faunae encountered in the aquatic biotopes at the new location are also dominated by the North American species *Pseudosuccinea columella*, *Physella acuta* and *Planorbella duryi.* The latter especially may attain huge dimensions in the waters of the tropical hothouse.

During a recent visit to the Botanical Garden on 5 February 2003, I found a new introduction for the aquatic fauna of Israel: the Oval pond snail *Radix balthica* (Linnaeus, 1758), which until recently was better known as *Radix ovata* (Draparnaud, 1805) (for the recent change of that well known name, refer to Falknet et al., 2002). It was commonly encountered on the leaves of an unidentified Water lily (*Nymphaea* spec.) with very small purple flowers.

According to my observations, the Botanical Garden of the Tel Aviv University functions as a real eldorado for introduced freshwater snails. They not only dominate the species composition, but are also much more numerous than the local snails. Unfortunately, the garden is not an isolated area where these exotic species can enjoy their stay in a "Garden of Eden" without endangering the local fauna. Aquatic plants are propagated in the garden on a semi-commercial scale and on demand are transported to natural habitats. *Pseudosuccinea columella* reached the so-called "Nuphar lake" near the sources of the Yarqon River and the lake area of Hula Agmon, a recently inundated area in the former Hula swamps, by transplanting *Nuphar lutea* from the botanical garden to these wetlands. A last minute change in the transfer procedure of additional aquatic plants prevented the introduction of *Planorbella duryi* in the Hula Agmon area.

The presence of introduced aquatic snails in botanical gardens and in "garden-centers" is a real concern if we want to protect the native fauna (Mienis, 2001). These hotspots for introductions inadvertently function as breeding centers for introduced snails and possibly other unwanted organisms and they should be regularly monitored. Prevention is better than cure!

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Freshwater mollusks inventory (Gastropoda & Bivalvia) of Santa Catarina State, Southern Brazil

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Keywords: Freshwater mollusks; Gastropoda; Bivalvia; Continental malacological fauna survey; Santa Catarina state; Southern Brazilian country.

The State of Santa Catarina is part of Brazil's southernmost region (Agudo 2002). Continental malacological fauna in this region is poorly documented, with only 25 known species cited in historical records (75 species were surveyed in recently conducted field studies (Agudo, 2003)). Freshwater mussels/clams are one of the least studied elements of the malacological fauna in the Brazilian South (Agudo 2002).

Beginning in March of 1996, historical references and field work identified 25 species of mollusks (21 Gastropoda and 4 Bivalvia), taxonomically distributed in 14 genera, 8 families, and 2 classes. These species occupy localities of the hydrographical portion corresponding, basically, to Atlantic Coastal Plain and the Uruguay River basin (for a list of the zoogeographical records in the Santa Catarina's territory, see Agudo 2003).

Species List:

Class GASTROPODA
- Subclass Prosobranchia
  - Family AMPULLARIIDAE (7)
    - *Asolene megastoma* (Sowerby, 1825)
    - *Felipponea iheringi* (Pilsbry, 1983)
    - *Pomacea bridgesi* (Reeve, 1856)
    - *Pomacea canaliculata* (Lamarck, 1819)
    - *Pomacea insularum* (Orbigny, 1839)
    - *Pomacea paludosa* (Say, 1829)
    - *Pomacea sordida* (Swainson, 1822)
  - Family MELANIIDAE (1)
    - *Melanoides tuberculata* (Müller, 1774)
  - Family CHILINIDAE (2)
    - *Chilina globosa* Frauenfeld, 1881
    - *Chilina parva* Martens, 1868
- Subclass Pulmonata
  - Family PLANORBIDAE (7)
    - *Biomphalaria glabrata* (Say, 1818)
    - *Biomphalaria occidentalis* Paraense, 1981
    - *Biomphalaria oligoza* Paraense, 1981
    - *Biomphalaria straminea* (Dunker, 1848)
    - Bi*omphalaria tenagophila* (Orbigny, 1835)
    - B*ulinus tropicus* Krauss
    - Dr*epanotrema cimex* (Moricand, 1838)
  - Family PHYSIDAE (3)
    - *Aplexa* (= *Physa*) *marmorata* Guilding, 1828
    - *Aplexa* (= *Physa*) *rivalis* (Maston & Rackett, 1898)
    - *Physa* sp
  - Family LYMNAEIDAE (1)
    - *Pseudosuccicnea* (= *Lymnaea*) *columella* Say, 1817

Class PELECYPODA = BIVALVIA
- Order Unionoida
  - Family MYCETOPODIDAE (= MUTELIDAE) (3)
    - *Mycetopoda legumen* (Martens, 1888)
    - *Anodontites* sp
    - *Leila blainvilleana* (Lea, 1834)
- Order Veneroida
  - Family SPHAERIIDAE (1)
    - *Eupera klappenbachi* Mansur & Veitenheimer, 1975

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Sinanodonta woodiana – News from Europe

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I am trying to regularly follow the news concerning the Chinese pond mussel *Sinanodonta woodiana* (Lea, 1834) and its conquest of Europe. During the last few months, no new expansions of its distribution have come to my attention. However, three items have been published which ask for more publicity: one dealing with the Chinese pond mussel as a competitor of native species and two studies dealing with the exploitation of this introduced species.

Sinanodonta as a competitor of native species

Austria. Essl & Rabitsch (2002) have published a comprehensive annotated survey of the non-indigenous organisms occurring in Austria. Among the more than 1600 foreign plant and animal species enumerated, they listed also several land- and freshwater molluscs including *Sinanodonta woodiana*. This invader has recently been discovered in backwaters of the Danube and several of its tributaries. One conclusion of the authors is of particular interest; "The Muskrat (*Ondatra zibethicus*) and the Eastern Asiatic freshwater clam (*Sinanodonta woodiana*) may threaten the endangered autochthonous bivalves via predation and competition, respectively."

Exploitation of introduced *Sinanodonta*

Hungary. Trials have been carried out by Kadar, a M.Sc.-student, to use the native *Anodonta cygnea* (Linnaeus, 1758) and the introduced *Sinanodonta woodiana* as biological means for treating wastewater of breweries. Although the initial results look positive–elimination of considerable amounts of suspended materials and even bacteria–further studies have to show whether mussels can be used on a large scale for treatment of water contaminated with organic matter (web page Central European University).

Italy. Researchers of the University of Pisa have exploited the introduction of *Sinanodonta woodiana* in Italy by developing a method for the production of freshwater pearls. Professor Paul Berni and two of his students managed to grow 8 black pearls with a diameter of 8 millimeters by means of grafting. They also discovered a natural pearl of a yellow color in the gonad of one of the mussels during their research (web page University of Pisa).

Reference and Web pages

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North American freshwater and terrestrial mollusk conservation status, taxonomy, and distribution information available on NatureServe Explorer

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NatureServe (http://www.natureserve.org/) is a non-profit conservation organization dedicated to providing knowledge to protect our natural world. NatureServe works in partnership with a network of natural heritage programs in 85 independent centers (including all 50 U.S. states and 11 Canadian provinces) to help protect the environment by improving public understanding of biodiversity and developing information about rare and endangered biota and threatened ecosystems, resulting in the most comprehensive and current database of at-risk species and ecosystems for the Western Hemisphere. NatureServe Explorer (NSE) (http://www.natureserve.org/explorer) is an acclaimed website providing authoritative conservation information in a searchable database for more than 50,000 plants, animals (including 332 freshwater mussels, 775 freshwater snails, 1578 terrestrial snails, and 222 marine mollusks), and ecological communities in the United States and Canada. NSE represents a "snapshot" of dynamic data that is continually being refined through the input of hundreds of Natural Heritage scientists, support staff, collaborators, and contractors. NSE is updated from central databases three times each year to reflect new data from field surveys, the latest taxonomic treatments, and any updated conservation status assessments. Future enhancements to NSE include the addition of more detailed information on habitat requirements and ecology, guidelines for assessing relative viability of populations, interactive maps, images (freely downloadable for noncommercial use), and the ability to more readily download information.

Information compiled from NatureServe Explorer has been used in various projects such as mapping imperiled North American species by equal area hexagon, mapping Western Hemisphere hot spots of species rarity and richness, delineating proportions of animal species at risk by major taxonomic group (resulting in freshwater mussels being the most at risk), charting species extinction by U.S. state (most in HI, CA, and AL, again due to loss of freshwater mollusks), and the development of special conservation reports and literature (e.g. *America's Least Wanted: Alien Species Invasions of U.S. Ecosystems*, 1996; *Rivers of Life*, 1998; *Precious Heritage*, 2000) to influence decision-makers in their ongoing conservation activities. Information on terrestrial and freshwater mollusks is available for use by the research scientist and lay-person alike and includes taxonomy, conservation status, distribution, rank factors, economic attributes, management summary, ecology and life history, authors/contributors, and references.

NatureServe is looking into partnering with professional molluscan societies such as Freshwater Mollusk Conservation Society (FMCS) and American Malacological Society (AMS) in endeavors of mutual interest that facilitate and promote ongoing conservation of freshwater and terrestrial mollusks. NatureServe is ideally positioned to provide databasing and mapping assistance for North America's freshwater and terrestrial mollusk fauna and serve as a long-term repository for some types of information. FMCS and AMS members are equally well-positioned to assist NatureServe by providing specimen verification through museum visitation and collection of field locality data, periodic reviews of the information maintained in NatureServe's databases and web site, as well as images for use in promoting mollusk conservation. I encourage you all to visit our website (http://www.natureserve.org), explore the NatureServe data sets (http://www.natureserve.org/explorer/ and http://www.natureserve.org/getData/animalData.jsp), tell us what you like and do not like, and please feel free to point out errors.

Pathways for introductions of foreign freshwater molluscs in Israel and elsewhere

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Among the freshwater molluscs recorded from Israel are 15 that are considered introduced species. They can be divided into three groups according to their zoogeographic origin: America (i.e. North & South America), Europe, and Asia. Nine species are American species: *Marisa cornuarietis* (Linnaeus, 1758), *Pomacea bridgesi* (Reeve, 1856), *Pomacea canaliculata* (Lamarck, 1819), *Pomacea insularum* (d'Orbigny, 1839), *Pomacea paludosa* (Say, 1829), *Physella (Costatella) acuta* (Draparnaud, 1805) [incl. *P heterostropha* (Say, 1817)], *Physella (Costatella) ancillaria* (Say, 1825), *Planorbella duryi* (Wetherby, 1879) and *Pseudosuccinea columella* (Say, 1817); two are of European origin: *Radix auricularia auricularia* (Linnaeus, 1758) and *Radix balthica* (Linnaeus, 1758); while the remaining four come from East or South-East Asia: *Radix rubiginosa* (Michelin, 1831), *Radix viridis* (Quoy & Gaimard, 1832), *Cristaria plicata* (Leach, 1815) and *Corbicula fluminea* (Müller, 1774).

A closer look at these snail species and how they managed to reach Israel allows us to divide these introduced molluscs into two groups: species which have been directly imported for a certain purpose and indirect imports (i.e. hitch-hikers).

We divide the directly imported species into four categories:

1. Species imported for the pet-trade. All four species of *Pomacea* are readily available in pet shops. Since these snails soon become a nuisance in an aquarium, they are often released by their owners into nearby ponds.
2. Species imported for research. "Lymnaeids" have been imported in the past for neurological research, other "Lymnaeids" were checked for their possible role as a suitable host for flukes, while *Marisa* has been introduced for trials as a competitor of *Bulinus*, an intermediate host of *Schistosoma.* The survivors among the "Lymnaeids" seem to have been released in nearby ponds, while the *Marisa* stock was killed by the researcher.
3. Species imported for food production. In recent years, trials have been carried out to grow several species of *Pomacea* and *Corbicula fluminea* for consumption. As far as we know, all these trials ended at quite an early stage. No data are available concerning the fate of the original stock.
4. Species imported for purification of water and for rearing freshwater pearls. Trials have been carried out in a fish-farm to grow *Cristaria* in ponds for a double purpose: as a natural means of purification of water polluted by organic waste products and as a suitable species for growing freshwater pearls. Both trials were stopped after two years. The surviving mussels have been killed, but it is unknown whether the fish kept in the same pond could serve as a suitable host for glochidia of *Cristaria.*

Indirect imports can also be divided into four categories (only the first category is known in Israel):

1. Species found on imported aquatic plants. Shipments of aquarium and pond plants arrive regularly in Israel. These plants are often infected with either snails or their egg-masses. Although snails are easily discovered during routine checks by inspectors of the Department of Plant Protection of the Ministry of Agriculture, this is far from the case with the egg-masses. In pet shops, snails are encountered in almost every aquarium and are distributed to private houses with the sale of plants. When they become a burden, often the case soon after their arrival, they are usually disposed of in a nearby ditch, pond, or lake. The same

is true for pond plants and their unwanted guests. Exotic snails introduced in this way include species of the genera *Physella*, *Planorbella*, *Pseudosuccinea*, and *Radix*.

2. Species inadvertently introduced by means of exotic fish species infected with glochidia of large mussel species. No case is known from Israel, but a good example is the rapid spread of *Sinanodonta woodiana* in S.E. Asia, Europe and a number of Caribbean Islands due to the introduction of infected grass, black and silver carp with glochidia of *Sinanodonta*.
3. Species reaching new areas by means of ballast water. The arrival of two species of *Dreissena* in North America is attributed to the transfer of larvae of the mussel in ballast water of ocean-going vessels.
4. Species transferred on the hulls of boats from one watershed to another. This method of introduction occurs often with *Dreissena* when boats or yachts are hauled overland from one lake to another or from one country to another.

In Israel, the greatest risk of introduction of unwanted exotic freshwater molluscs is by the indirect import of aquatic plants. However, the sale of live *Pomacea* in pet shops can also lead to problems. The latter introductions can be avoided by applying the existing laws in Israel. Unfortunately, the hitchhikers are not only difficult to detect and control, but most are well adapted to extreme changes in the environment. They should be considered as the most problematic and dangerous species for the already deteriorating native freshwater mollusc fauna of Israel and probably elsewhere.

2002 Mississippi River Research Consortium Abstracts

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The following abstracts were selected from papers presented at the 34st annual meeting of the Mississippi River Research Consortium during April 2002. The next meeting will take place on April 24-25, 2003 at the Radisson Hotel in La Crosse, Wisconsin. Additional information is available on the consortium's web site (http://www.umesc.usgs.gov/mrrc.html).

EFFECTS OF AMMONIA ENRICHMENT ON SURVIVAL AND GROWTH OF JUVENILE MUSSELS IN THE ST. CROIX RIVERWAY

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The St. Croix Riverway contains an extremely rich fauna of unionid mussels. This group, which is highly sensitive to habitat changes, is one of the Riverways' most significant natural resources. As the metropolitan area of Minneapolis-St. Paul expands into the basin, there is an increased threat of contamination to water and sediment quality and its associated biota. We performed a series of tests to examine existing concentrations of sedimentary ammonia, and to determine what effects these concentrations were having on survival and growth of juvenile mussels. We conducted a combination of 4, 10, and 28 day *in situ* toxicity tests with *Lampsilis cardium* at 8 sites in the Riverway. At each site, we deployed 6 chambers in the sediment, each containing 20 juveniles, and randomly removed 2 chambers to evaluate survival and growth of juveniles at each exposure duration. Sedimentary ammonia was characterized using core and *in situ* pump samples, with concentrations ranging from 0.1 to 122.4 ug/L and 0.9 to 46.0 ug/L, respectively. Ammonia was also measured in individual chambers and ranged from 0.8 to 80.6 ug/L. Survival of mussels was highly variable (mean, 45% at 4d, 28% at 10d, and 41% at 28d) and our ability to predict survival based on sedimentary ammonia was generally poor. The growth rate was highly variable (range, 0 to 45 um/day), but in general, was positively correlated with ammonia. Although we were able to culture, deploy, retrieve, and measure survival and growth of juveniles in the 300-1,000 um size range, correlating survival or growth to sedimentary ammonia concentrations was problematic.

CHARACTERIZATION OF MACROINVERTEBRATE ABUNDANCE AND BIOMASS ASSOCIATED WITH DIFFERING WATERFOWL MANAGEMENT TREATMENTS IN THE LOWER MISSISSIPPI ALLUVIAL VALLEY

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Managers in the Lower Mississippi Alluvial Valley (LMAV) employ a variety of treatments to provide moist-soil seed crops and vegetation as food resources for migratory waterfowl. Little is known about macroinvertebrate communities associated with these management treatments, which may provide a secondarily important food resource for migrating waterfowl. We characterized benthic community abundance and biomass in four types of management treatments: permanent deep water (DE), fall flooded duck potato (DP), fall flooded millet (ML), and re-flooded shorebird management areas (SB). Aquatic worms (Oligochaeta) dominated abundance in all treatments, while biomass consisted primarily of oligochaetes, snails, midge larvae (Chironomidae), and aquatic larvae of the beetle *Berosus*. Abundance was significantly greatest under DE management (128,000/m^2), followed by ML (58,000/m^2) and SB (52,000/m^2), and significantly least in DP (12,000/m^2) areas. Standing stock biomass was very high in DE, ML, and SB treatments, with mean ash-free dry mass exceeding 10g/m^2. Standing stocks noted in DP treatment areas still exceeded 4 g/m^2. These results indicate that substantially large communities of macroinvertebrates are associated with waterfowl management areas in the LMAV. These communities represent a potentially important food resource, which, if not utilized during the fall waterfowl migration, may be available as a protein resource during the spring migration to the breeding grounds.

A COMPARATIVE STUDY OF MISSISSIPPI RIVER UNIONOID SURVEYS, ST. PAUL, MINNESOTA, TO CAIRO, ILLINOIS

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Prior to agency sponsored unionoid studies started in the 1970's, most Upper Mississippi River (UMR) researchers were aware of mollusk surveys by Utterback, Grier, and Ellis. Almost unknown is a survey done in 1907 by Dr. Paul W. Bartsch, from Mississippi River Mile 838.5-0.0. The Bartsch locations have been converted to present day Mississippi River Miles. In 1907, unionoids were found at 88 of 140 sites. Bartsch recorded 15 negative mainstem sites upstream of the Missouri River, and 17 negative sites downstream of the Missouri River. Overall, four species, *Quadrula pustulosa* (Lea 1831), *Amblema plicata* (Say 1817), *Lampsilis cardium* (Rafinesque 1820), and *Leptodea fragilis* (Rafinesque 1820), were found more frequently than *Fusconaia ebena* (Lea 1831), although the latter was apparently the most abundant species. *Lampsilis higginsi* (Lea 1857) were retained from 39 sites, *Potamilus capax* (Green 1832) from 13 sites, and *Cumberlandia monodonta* (Say 1829) from eight sites, but *Leptodea leptodon* (Rafinesque 1820), was only retained from a single site. Three species common today, *Utterbackia imbecillis* (Say 1829), *Toxolasma parvus* (Barnes 1823), and *Anodonta suborbiculata* (Say 1831), and several rare species including *Quadrula fragosa* (Conrad 1835), *Epioblasma triquetra* (Rafinesque 1820), and *Simpsonaias ambigua* (Say 1825), were either not found, or else not retained. Even in 1907, five to10 species appeared to be extralimital including *Ligumia subrostrata* (Say 1831), *Potamilus purpuratus* (Lamarck 1819), *Uniomerus tetralasmus* (Say 1831), *Alasmidonta viridis* (Rafinesque 1820), and *Lasmigona compressa* (Lea 1829). The 1907 areas with the highest species diversity continue to have the highest diversity today: Pools 10 (36 species), Pool 3 and 13 (35 species), Pool 8 and 9 (34 species), and Pool 14 and 15 (33 species). No more than two species were retained at 28 of the 140 sites.

A recent summary of archeological records reported 39 species from Pools 4-16. The 1907 survey retained 39 unionoid species, and the 1930 Ellis survey also reported 39 unionoid species. Havlik and Sauer (2000) reported that 51 unionoid species have been recorded from the Upper Mississippi River since the 1870's. Forty-four of these species have been recorded since 1968, with at least 38 species being reported alive since 1991. All of the rare species in the UMR today were rare even in 1907, but all of those rare species still survive today in tributaries within 100 miles of the Upper Mississippi River. I compare early Mississippi River unionoid distributions, rank, and frequency of occurrence, with present day UMR records, by Pool. Over the past century, the total fauna has remained stable, but some species have become more abundant, while others have become rare, or locally extirpated.

FRESHWATER MUSSEL SURVEY OF THE UPPER MISSISSIPPI (DAYTON, MN. TO LOCK AND DAM 3), LOWER ST. CROIX, AND LOWER MINNESOTA RIVERS, 2000-01

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In 1999, a survey was begun to determine the distribution and abundance of unionoid mussels in Minnesota. During 2000 and 2001, as part of this effort, 167 sites were sampled along an 83 mile (134 km) stretch of the Upper Mississippi River (UMR) that extends from approximately 20 miles (32 km) north of the Twin Cities near Dayton, MN. (RM 880), through the Twin Cities to Lock and Dam 3 near Red Wing, MN. (RM 797). Five pools or reaches were surveyed within this stretch and include from upstream to downstream; Coon Rapids Pool (above Coon Rapids Dam), St. Anthony Falls Pool (above St. Anthony Falls [SAF]), and Pools 1, 2, and 3. During 2001, 20 sites along a 24 mile (39 km) reach of the lower St. Croix River (LSCR) from Stillwater, MN to its confluence with the UMR at Prescott, WI, and 13 sites along a 4 mile (6 km) reach of the lower Minnesota River (LMNR) to its confluence with the UMR were also surveyed. Sample methods were consistent throughout the study and consisted of timed searches and hand collection of mussels while wading, snorkeling, and diving. One-person hour/site was targeted as the search time and sites were typically spaced no more than 1 mile (1.6 km) apart. Quantitative samples were also collected and mussel bed boundaries mapped at five sites within the UMR. Zebra mussel (*Dreissena polymorpha*) density was determined from quantitative samples and zebra mussels attached to unionids collected from timed searches were counted.

Over 25,000 live mussels representing 30 species were collected with an additional 11 species collected as empty shells. A total of 27 live species were collected in the UMR proper, 25 in the LSCR, and 9 in the LMNR. Mussels in the LSCR were more abundant and the assemblage appeared to more closely support its historic compliment of mussel species as compared to the UMR and LMNR. Exclusive to the LSCR mussel assemblage was the federally endangered *Lampsilis higginsi*. The mussel fauna of UMR Pools 1, 2, 3 appear to be recolonizing since its reported decimation by pollution during the first half of the 1900's. The survey provided clear evidence of recent and ongoing recruitment; many of the individuals collected were less than 10 years old. Several state listed species were collected including two listed as endangered in Minnesota in fairly high numbers (*Arcidens confragosus* and *Quadrula nodulata*). Neither of these two species were collected in the LSCR or LMNR. Recolonization is probably due to improved water quality conditions over the past 15-20 years. Furthermore, mussels may be expanding their range above SAF, which historically served as a faunal barrier to upstream dispersal but now are circumnavigated by locks. A total of 16 live species were collected from the St. Anthony Falls Pool including 10 species previously not reported above SAF, and the community very closely resembles the communities of Pool 1 and upper Pool 2 in species composition. Zebra mussels were absent above SAF and nearly absent from UMR Pools 1-3 and LMNR (<0.1% unionids infested and density < $0.1/m^2$). Nearly 1% of the unionids in the LSCR were infested with zebra mussels, many of which were <10mm in length. These UMR pools differ from those downstream (Pool 4 and below) where zebra mussels are extremely abundant and are decimating the native mussel communities and from the LSCR where zebra mussels have recently invaded and appear to be reproducing. Ironically, this reach of the Mississippi River between the Twin Cities and Red Wing, MN., once nearly a dead zone, may now constitute one of the last big river mussel refuges in the Midwestern United States.

EFFECTS OF UN-IONIZED AMMONIA ON JUVENILE UNIONIDS IN SEDIMENT TOXICITY TESTS

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The National Park Service has identified ammonia as one of the primary threats to biota in the St. Croix Riverway. Ammonia is a relatively toxic compound generated in water and sediments by heterotrophic bacteria as a by-product of organic matter decomposition. Ammonia and other contaminants preferentially accumulate in sediments and porewater. Recent data suggests that unionids are sensitive to un-ionized ammonia (NH_3), relative to other organisms. We conducted two 96-hour and two 10-day sediment toxicity tests. Ammonium chloride was delivered to each of 36 experimental units (6 replicates of 6 concentrations) by peristaltic pump and diffused from an airstone beneath test (reference) sediments into the overlying water. Twenty *Lampsilis cardium* juveniles were placed in cages that were buried ~2.5 cm into test sediments to facilitate porewater exposure and juvenile recovery. Survival, growth, the stressed:alive ratio (stressed defined as no evidence of foot movement but ciliary activity present), and NH_3 concentrations in porewater were measured at the end of each test. In all tests, survival exceeded 95% in the controls. The LC_{50s} were 127 and 165 ug/L in the 96-hour tests and 99 and 137 ug/L in the 10-day tests. The EC_{50s} (based on the stressed:alive ratio) were 73 and 119 ug/L in the 96-hour tests and 77 and 98 ug/L in the 10-day tests. Growth was substantially reduced, relative to controls, between 32 and 91 ug/L in all tests. A companion study measuring concentrations of NH_3 in porewater over a 150 km reach of the Riverway, found concentrations ranging from 0.1-141 ug/L. These data suggest that in some locations and under certain conditions (low flow

and high temperature), sedimentary ammonia concentrations in the Riverway approach, and sometimes exceed, concentrations shown to cause lethal and sublethal effects in laboratory tests.

THE MISSISSIPPI RIVER UNIONOID SURVEY OF 1907

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There have been several unionoid surveys of the Upper Mississippi River since the development, near the end of the last century, of commercial uses of the North American river shell. These studies provided a database for at least some understanding of which species were present and in what numbers at linear sites along the river over the last hundred years of human modification. One of the earliest efforts was that of the United States Bureau of Fisheries conducted by Dr. Paul Bartsch during July and August of 1907. The voucher specimens of this survey were, for the most part, deposited in the Smithsonian Institution's United States National Museum of Natural History.

The length of the Mississippi sampled extended from just below St. Paul, downstream to the mouth of the Ohio at Cairo. Several Mississippi tributaries as well as the lowermost Ohio and Tennessee Rivers were also included in the survey. Material was obtained from both commercial shellers and the personal collecting of Dr. Bartsch and his crew. The value of the unionoid of the Mississippi River revealed by the survey was instrumental in the construction of the Bureau of Fisheries Laboratory at Fairport, Iowa, to study this natural resource. Perhaps incidentally, it also provided for the evaluation of the fauna on into the future.

ROLE OF LAKE PEPIN IN SUSTAINING ZEBRA MUSSEL POPULATIONS IN THE UPPER MISSISSIPPI RIVER

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Because zebra mussel larvae are planktonic, persistence of adult zebra mussel populations at a given location within a river system is highly dependent upon a reliable supply of larvae drifting down from upriver source populations. Unlike the Illinois River, the Mississippi River does not have a large infested lake at it's headwaters to serve as a constant source of new recruits, yet populations in portions of the Upper Mississippi River (UMR) persisted for many years at high abundances. The sustainability of adult zebra mussel populations in the UMR has been variously attributed to upriver transport of zebra mussels by commercial barge traffic and/or the ability of Lake Pepin (a natural riverine lake in Pool 4 of the Mississippi River) to host self-sustaining populations independent of upriver source populations.

In 1998, the Wisconsin DNR (in cooperation with the Iowa DNR and the Illinois Natural History Survey) initiated a monitoring program to examine zebra mussel veliger dynamics in the Upper Mississippi River (UMR). Zooplankton samples were collected at various sites from Lock and Dam (LD) 2 - 12 from 1998 - 2000. Veliger abundance and flux were consistently low to absent above Lake Pepin and increased dramatically below Lake Pepin, with abundance/flux peaking near LD 7 during all three years of this study. Estimates of veliger flux below lock and dams 6-8 frequently exceeded 100 million veligers / second with a maximum flux of 1.5 trillion veligers / second estimated below LD 8 on July 2, 1998. Random sampling of various habitat types within Pool 8 in 1998 and 1999 provided no evidence of higher larval abundances in backwater as opposed to main channel sites. Sampling of four main tributary rivers located within the sampling area of this study provided no evidence that tributaries are an important source of veligers to the UMR although some live veligers were found in the St. Croix River in 1999 and 2000.

Data from this study suggest that Lake Pepin plays a critical role in maintaining zebra mussel populations in the UMR. Lake Pepin is the first infested section of the UMR that exhibits adequate retention times for local populations to maintain themselves via self-recruitment. It is unlikely that spawning of adults attached to barges could have produced the consistent, extremely high flux of veligers observed below Lake Pepin. No evidence was found for large numbers of veligers entering the main-stem river from backwaters or tributaries below Lake Pepin. At this time, it is unknown whether the large numbers of veligers observed below Lake Pepin were produced within the lake itself, or downriver by populations founded and maintained by self-sustaining populations within the lake. Efforts are currently underway to model veliger drift in the UMR and determine the importance of various parameters likely to produce the consistent longitudinal abundance pattern observed in this study.

MULTIPLE QUANTITATIVE UNIONIDAE SURVEYS OF THE SAME TRANSECT WITH SPECIMEN REMOVAL BETWEEN SURVEYS; CHIPPEWA RIVER, WISCONSIN

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During the summer of 2001 we conducted 4 consecutive unionid surveys along the same transect on the Chippewa River, Wisconsin. We relocated all unionids after each survey. Our purposes in this study were to determine 1) if there was any vertical movement by unionids during normal water levels, 2) if smaller individuals would be recovered in later swim-over surveys, and 3) if there were differences in the sizes or species collected by swim-over versus digging surveys.

From the 4 consecutive surveys of the same transect there were a total of 18 species found and 542 live unionids were counted (density of approximately 2.8 unionids/m2). Among the unionids collected were two Wisconsin Threatened and Endangered species, *Plethobasus cyphyus* and *Tritogonia verrucosa*. The dominant species were Potamilus alatus and Fusconaia flava, comprising nearly 57.4% of all the unionids.

The data from this study provide some indication that within a 46-day period unionids may move vertically within the substrate. The data also show there is a significant difference in the mean standardized lengths for the 3 consecutive surveys ($R2 = 0.9984$, $P < 0.05$). While there are only 3 data points and the range in size is slight, the data indicate swim-over surveys have a bias for larger unionids.

Overall we found smaller unionids and a greater number during the digging survey than the swim-over survey. Additionally, some species and some sizes were under-represented during the swim-over survey compared to the digging survey. These findings indicate surveys intending to obtain community and population structure should use digging.

2002 St. Croix River Research Rendezvous Abstracts

The following abstracts were selected from presentations made at the 14th annual meetings of the St. Croix River Research Rendezvous. The meeting was held on October 15, 2002 at Marine on the St. Croix, Minnesota and was sponsored by the Saint Croix Watershed Research Station. The next Rendezvous meeting will take place on October 21, 2003 at the same location. Abstracts from several meetings are presented on the Saint Croix Watershed Research Station's web site (http://www.smm.org/SCWRS/rendezvous.php).
Submitted by Mark Hove, Macalester College, Hove@macalester.edu

JUVENILE DENSITY HAS DECREASED IN SELECT ST. CROIX RIVER MUSSEL COMMUNITIES OVER THE LAST 10 YEARS

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The diverse and unique mussel community in the St. Croix River is a nationally recognized resource. We quantitatively assessed mussel communities during the summer of 2002 at: Interstate State Park, MN; Osceola, WI; Lakeland, MN; and Bayport, WI. These communities have been sampled at various times during the last 10 years: at Interstate State Park in 1992, 1995, 1998, and 2000, at Osceola in 1993 and 2000, at Lakeland in 1995 and 2000, and at Bayport in 1992 and 2000. During 2002 we observed 21 species at Interstate State Park, 19 at Lakeland, 13 at Osceola, and 9 at Bayport. The federally endangered Higgins eye was collected at Lakeland. Zebra mussels were also found at Lakeland. During the last 10 years 5 mussel species have numerically dominated the mussel community at Lakeland, 2 species at Bayport and Osceola, and 1 species at Interstate State Park. Average mussel density during 2002 was highest at Interstate State Park (14.6 mussels/m^2), followed by Lakeland (9.3 mussels/m^2), Bayport (5.2 mussels/m^2), and Osceola (2.6 mussels/m^2). Since 1992 total mussel density has declined significantly at Interstate State Park. Also, declines in juvenile mussel density have occurred at many sites over the ten-year period. Shell-length frequency diagrams suggest there has been little recruitment or there is low juvenile survival among most dominant species at all four sites. The decline in juvenile density at these four sites is consistent with data from four other sites in the St. Croix River, which suggests that a lack of recruitment or low juvenile survivorship is a system-wide issue. The reasons for the apparent decline in recruitment are unknown but at Interstate State Park there has been sediment deposition over the past 10 years. Declines at Interstate State Park are of particular concern due to its valuable mussel assemblage including the federally endangered winged mapleleaf.
Administrative and financial support was provided by the St. Croix National Scenic Riverway and the NRPP-Threatened and Endangered Species Fund and Macalester College.

DEVELOPMENT OF A DATABASE FOR THE ST. CROIX NATIONAL SCENIC RIVERWAY

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The Riverway is at the center of intense economic, political, legal, recreational, and value conflicts, because of its proximity to the growing metropolitan area of Minneapolis and St. Paul, Minnesota. Park Service staff need to assemble and use the best available data to make, justify, and enforce resource decisions. This Database application addresses these NPS needs in an easy-to-use application that requires no ancillary database software or advanced database knowledge to use effectively.

Data are being gathered on native freshwater mussels, rare plants, and rare animals from a variety of sources (reports, peer-reviewed literature, databases). The data from each of these sources are being placed into a database with over 100 fields of descriptive data relative to each theme (i.e., water depth, substrate composition, density, plot size, data of most recent observation). The Database will contain all the data (including metadata) from the existing 40+ paper reports, and can be easily updated as new information becomes available. A common application of this platform will be to search the database by the users field(s) of interest and then output the results along with the coordinate information for the selected records. These data can then be quickly and easily brought into ArcView or any other GIS. The application will include data entry screens with verification parameters applied to each field. Standard logical queries will be entered through an easy-to-use query builder menu for extracting and displaying records meeting user-defined criteria.

CURRENT STATUS OF ZEBRA MUSSELS IN THE ST. CROIX RIVER

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During three weeks of diving in June, August, and October 2002, the St. Croix National Scenic Riverway Dive Team, including Byron Karns and Bob Whaley of the National Park Service and Scott Yess and Nick Rowse of the U.S. Fish and Wildlife Service, conducted intensive searches for zebra mussels in the St. Croix River from the Arcola Sandbar at River Mile 30 to the mouth of the river. The results of this search will be presented in a panel presentation by members of the dive team.

SAVING THE HIGGINS' EYE PEARLYMUSSEL (*LAMPSILIS HIGGINSI*) FROM EXTINCTION

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The Higgins' eye pearlymussel (*Lampsilis higginsi*) was listed as a federal endangered species in 1976 under the Endangered Species Act. A recovery plan was completed in 1982 which may have been successful if the exotic zebra mussel (*Dreissena polymorpha*) had stayed away. The zebra mussel is an exotic species from Europe that entered the Great Lakes from ballast water of ocean ships. It entered the Illinois/Mississippi River Systems by a connection with Lake Michigan at Chicago and has infested nearly the entire Upper Mississippi River System. Zebra mussels attach to nearly all underwater objects. They encrust hard objects and can form a thick "carpet" on the bottom of the river. Unfortunately, they seem to prefer attaching to our native freshwater mussels. They can significantly harm individual mussels and entire mussel beds by competing for food, preventing opening/closing of shells, changing habitat conditions from good to bad, and preventing successful reproduction and recruitment.

In April 2000, the U.S. Fish and Wildlife Service provided a Biological Opinion to the U.S. Army Corps of Engineers on operation and maintenance of the existing 9-Foot Channel Project for another 50 years. Zebra mussels are transported by towboats and other large craft to upstream areas on the Upper Mississippi River using the locks and dams. The Service determined that operation and maintenance of the project for an additional 50 years would jeopardize the continued existence of the Higgins' eye pearlymussel because it provides for a steady upstream transport of zebra mussels on the Upper Mississippi River. In order to avoid jeopardy, the Service recommended that the Corps establish populations of Higgins' eye in areas with no/few zebra mussels, and implement a zebra mussel control program. The Corps accepted the Service's recommendations, developed a Higgins' Eye Pearlymussel Relocation Plan, and established an interagency Mussel Coordination Team to assist in implementing the Biological Opinion requirements. Since 2000, a variety of conservation measures have been implemented including genetics studies, mussel culture at the Genoa National Fish Hatchery, cage culture in the Upper Mississippi River and tributaries, stocking juveniles, relocating adults, stocking glochidia inoculated fish, cleaning and stockpiling adults, and survey/monitoring activities.

BROODING BEHAVIORS AND HOSTS OF QUADRULA FRAGOSA AND OTHER AMBLEMINES

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The federally endangered winged mapleleaf (*Quadrula fragosa*) once ranged throughout the upper Mississippi River watershed, and is now thought to occur only in the St. Croix River, bordering Wisconsin and Minnesota, and probably in the Ouachita River, Arkansas.

Objectives of this study include describing the brooding period and reproductive behavior, and determining suitable glochidial hosts. We used SCUBA to sample nine species of amblemines weekly from spring through fall in 1997-01. Unlike most amblemines, which brood glochidia during spring and summer, winged mapleleaf brood their young during a relatively short period in September and October. Demibranchs of gravid winged mapleleaf were usually only slightly swollen making non-lethal gravidity determinations difficult. Consistent with other amblemines, all four demibranchs served as marsupia. White, thin conglutinates released were roughly 5 mm wide by 10 mm long and tapered at both ends. A surprising behavior exhibited by brooding and some non-brooding individuals was the presence of a swollen excurrent siphon. The siphon protruded approximately 10 mm from the shell margin, had black-ridged crenulations overlaying the gray mantle.

Seventy-five host suitability trials (53 species tested) were conducted. Glochidia grew while attached to yellow, black and brown bullheads, and channel and flathead catfish. We collected juvenile winged mapleleaf from channel catfish. A variety of Ictalurids serve as hosts for other amblemines.

In 2003 we will describe environmental variables surrounding the winged mapleleaf brooding period, conduct additional host suitability tests, and attempt to collect fishes naturally infested with winged mapleleaf glochidia.

WHY IS THE MUSSEL FAUNA DIFFERENT AROUND THE CORNER FROM THE ST. CROIX? THE RECOVERY OF THE UNIONID FAUNA IN MISSISSIPPI RIVER MARGINAL HABITAT, LOWER POOL 2, MINNESOTA

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Malacological Consultants, La Crosse WI

A widely accepted fact has been that the Mississippi River unionid fauna, between the Twin Cities, MN, and the St. Croix River, was greatly impacted over time by various types of pollution from the Twin Cities. In June and 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 lower Pool 2, Mississippi R.M. 818.9, prior to the construction of a new wastewater outfall pipe. Seven species found are on the Minnesota Endangered, Threatened, or Special Concern list. The Endangered *Quadrula nodulata* (Rafinesque 1820) represented 7.37 % (1451) of the total, and was the 3rd 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 *Megalonaias 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. Living mussels were translocated to a nearby upstream area.

Nearly 600 of 1657 special status mussels were measured and uniquely numbered. The special status mussel species were widely distributed throughout the area, in all types of habitat. Although mean densities were very low, there was good reproduction by most species. The substrata was of marginal quality (mostly mud) in depths from <1 m to 6m. Most of the project area was quite shallow since the site was in the impounded area upstream of Lock and Dam 2 at 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, but with little current. There was a great deal of wind fetch in the area; almost no submerged aquatic vegetation was observed. The only areas of mussel concentrations were near the main navigation channel, where the substratum became coarser, and thus more suitable mussel habitat. However, there was evidence of damage to a number of mussels near the navigation channel, apparently from commercial barge traffic. Several mussel species had never been reported from Pool 2, dead or alive.

CONCLUSION: Some species doing well in lower Pool 2 are not in the nearby St. Croix, and vice versa. We have no idea why the mussel fauna differs around the corner from the St. Croix, but *Q. nodulata* and *A. confragosus* are almost nonexistent in the St. Croix River.

Common Unionid Questions and Probable Answers

How can you tell when unionids are sick?
They feel clammy

Where do bad unionids go when they die?
Shell

How can you tell which unionid is indiscrete?
He's the one with his foot in his mouth

Why did the unionid buy a Camero?
He always wanted a muscle car.

What did the mother unionid say to the baby unionid when the host fish dropped him off?
I hardly recognized you! Since I've seen you last, you've grown a foot!

Where do unionids keep their horses?
In stable substrate?

What do unionids recommend for your car's oil change?
Bi-Valv-o-line

Why don't unionids make good speakers?\
Every time you put them in front of a group, they clam up.

What is a unionid's favorite horror movie?
Night of the Weathered Dead

Submitted by Janee Kavanagh

Mussel Molds

Supplies:	InstaMold™	Mussel shells
	Water	Containers for molds
	Mixing bowl	Wire wisk or electric mixer

Directions: Mix 1 part InstaMold (small amount at a time, stirring constantly to avoid lumps) with 2 parts cold water. You may want to use a wire wisk or electric mixer. Pour mixture into container mold. Wait for mold to start to set up (thick batter consistency). Press object to be cast into mixture. Allow 10-15 minutes for casting to set up and molding to become rubbery. Carefully remove object from the mold. InstaMold will not damage original.

Storing Molds: Cover container molds with water and place in an airtight container in the refrigerator (be sure to empty water and restore mold to room temperature before re-using). Molds are reusable for a temporary amount of time and will shrink a small amount each day.

Mussel Replicas

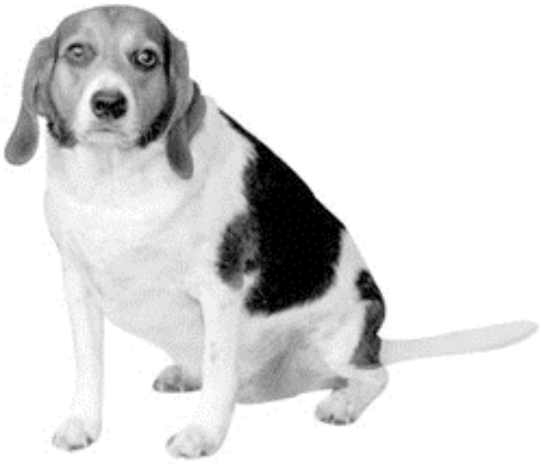
Supplies:	Art Plaster™	Paintbrushes
	Water	Magnets
	Mixing bowl	Clear coat spray sealer
	Mixing spoon	Flat spray paint - white
	Dremel™ or sand paper	Super glue™
	Acrylic paint colors of your choice	Paper towels

Directions: Add 1.5 parts plaster to 1 part cold water. Stir slowly until well dissolved. Mixture should be consistency of pancake batter. Pour mixture into prepared molds. Remove air bubbles by stirring mixture carefully with finger, trying not to let mixture overflow the mold. Allow 30-40 minutes for the plaster to set up well. Carefully remove casting from mold and let dry completely on paper towel. Sand edges and bottom of casting smooth. Spray on flat base coat so paints will adhere and not soak into casting. Paint as desired. Make sure to paint a nickel-sized dot on the back so magnet will secure when glued. After paint has dried, spray with a clear finish to seal. Glue magnet on back. Enjoy your masterpiece!

Mike Pinder - Virginia Department of Game and Inland Fish

Helpful Hints from Hoppy:

Dig substrate between bedrock ledges. I'm all lathered up and ready to go!



Submitted by Steve Ahlstedt

Join the UNIO Listserver

http://my.fit.edu/~rtankers/unio.htm

Freshwater Mollusk Conservation Society
Standing Committees and Chairs

If you are interested in joining an FMCS committee, please contact the appropriate chair.

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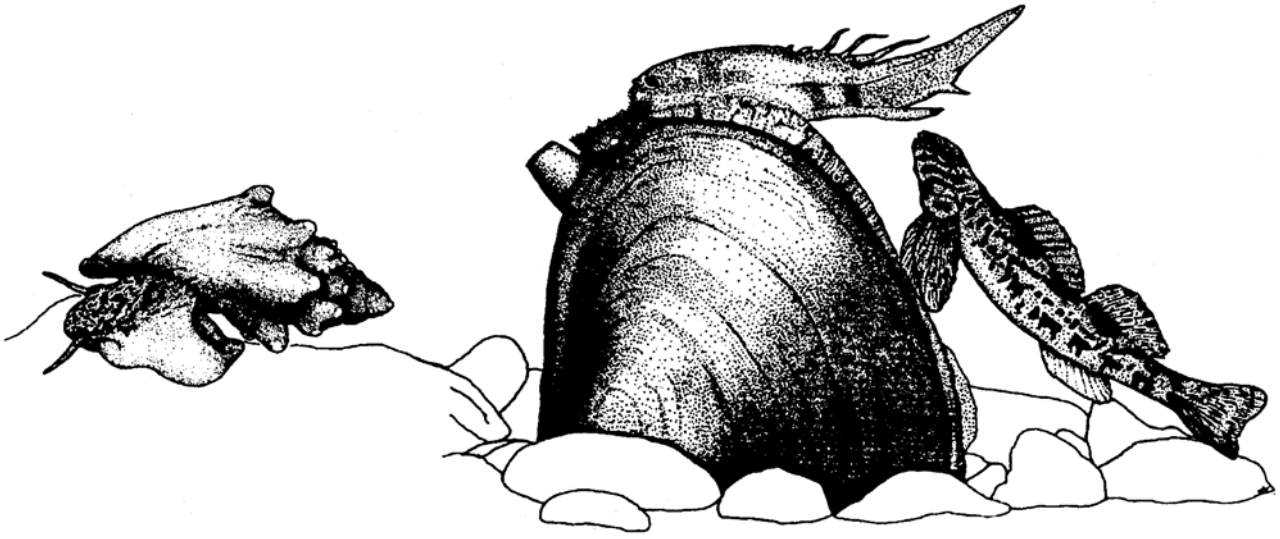
Symposium Committee
To be determined by host of 2005 symposium

Freshwater Mollusk Conservation Society



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