



Ackerman, J.D., B. Sim, S.J. Nichols, and R. Claudi. 1994. A review of the early life history of zebra mussels (Dreissena polymorpha): comparisons with marine bivalves. Can. J. Zool. 72:1169-1170.

Babcock, R.C. and C.N. Mundy. 1992. Reproductive biology, spawning and field fertilization rates of Acanthaster planci. Aust. J. Mar. Freshwater Res. 43:525-534.

Baker, F.C. 1928. The Fresh Water Mollusca of Wisconsin. Illinois Museum of Natural History. Reprinted 1972 by Wheldon and Wesley, Ltd., New York, NY. 495 pp, 105 plates.

Baker, P. and S.M. Baker. 1993. Criteria for estimating zebra mussel risk for non-invaded regions. Dreissena polymorpha Information Review 4(4):4-10.

Baker, S.M. and D.J. Hornbach. In press. Acute physiological effects of zebra mussel (Dreissena polymorpha) infestation on two unionids, Actinonaias ligamentina and Amblema plicata. Can. J. Fish. Aquat. Sci.

Becker, G.C. 1983. Fishes of Wisconsin. University of Wisconsin Press, Madison, WI. 1052 p.

Beckett, D.C., B.W. Green, and S.A. Thomas. 1996. Epizoic invertebrate communities on upper Mississippi River unionid bivalves. Am. Mid. Nat. **135**:102-114.

Busacker, G.P. 1988. A biological assessment of Lampsilis higginsi in the St. Croix River near Stillwater, MN: Possible impacts associated with replacing the St. Croix River Crossing between Stillwater, Minnesota and Houlton, Wisconsin. Minn. Dept. Trans. Tech. Serv. Div., St. Paul, MN. 71 p.

Carlton, J.T. 1993. Dispersal mechanisms of the zebra mussel, Dreissena polymorpha, p 677-697. In: T.F. Nalepa and D.W. Schloesser (eds.) Zebra Mussels: Biology, Impacts, and Control. Lewis Publishers, CRC Press, Boca Raton, FL.

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Cope, W.G., M.R. Bartsch, and R.R. Hayden. 1996. Spatial assessment of zebra mussel density in the upper Mississippi River: 1995. National Biological Service, LaCrosse, WI. 8 p.

Cummings, K.S. and C.A. Mayer. 1992. Field Guide to Freshwater Mussels of the Midwest. Illinois Natural History Survey, Manual 5. Champaign, IL. 194 p.

Doolittle, T.C.J. 1988. Distribution and relative abundance of freshwater mussels in the St. Croix National Scenic Riverway. Cable Natural History Museum, Ashland, W.I.

Dunn, H.L. 1994. Final Report: St. Croix River I-94 Bridge Replacement Unionid Relocation Protocol. Ecological Specialists, Inc., St. Peters. MO. Prepared for Wisconsin Dept Transportation, Eau Claire, WI. 36 p.

Fuller, S.L.H. 1974. Clams and mussels (Mollusca: Bivalvia), p 215-273. *In:* C.W. Hart, Jr. and S.L.H. Fuller, (eds.) Pollution Ecology of Freshwater Invertebrates. Academic Press, New York, NY.

Fuller, S.L.H. 1980. Freshwater mussels (Mollusca: Bivalvia: Unionidae) of the Upper Mississippi River: observations at selected sites within the 9-foot navigation channel project for the St. Paul District, United States Army Corps of Engineers, 1977-1979. Vol. I and II. Acad. Nat. Sci. Philadelphia.

Fuller, S.L.H. 1985. Freshwater Mussels of the Upper Mississippi River. Wisconsin Dept. Nat. Res., Madison, WI. 64 p.

Griffiths, R.W., D.W. Schloesser, J.H. Leach, and W.P. Kovolak. 1991. Dispersal and distribution of the zebra mussel (*Dreissena polymorpha*) in the Great Lakes region. *Can. J. Fish. Aquat. Sci.* 48:1381-1388.

HACH Company. 1992. Water Analysis Handbook. 2nd ed. HACH Company, Loveland, CO. 438 p.

Havlik, M.E. 1981. The historic and present distribution of the endangered mollusk Lampsilis higginsi (Lea, 1857). Bull. Amer. Malacol. Union for 1980:19-22.

Havlik, M.E. 1983. Naiad mollusk populations (Bivalvia: Unionidae) in Pools 7 and 8 of the Mississippi River near LaCrosse, Wisconsin. Am. Malacol. Bull. 1:51-60.

Heath, D.J. 1989. Saint Croix River U.S. Highway 10 Bridge Freshwater Relocation Project at Prescott, Wisconsin. Phase 1: Mussel Removal. Ayers Associates, Madison, WI. Prepared for Wisconsin Dept. Transportation, Eau Claire, WI. 26 p.

Heath, D.J. 1995. A description of the Orion mussel aggregation on the Wisconsin River, Wisconsin, with reference to Lampsilis higginsi (Lea, 1857) (Bivalvia: Unionidae). Report to U.S. Fish Wildl. Serv. Order # 32410-4-8004. Available from U.S. Fish & Wildlife Service, Twin Cities Field Office, Bloomington, MN. 44 p.

Helms and Associates. 1994. Results of a mussel survey conducted in the St. Croix River near Stillwater, Minnesota. Prep. for U.S. Engineers, St. Paul District, St. Paul, MN, by Helms and Associates, Bellevue, IA. 7 p.

Hornbach, D.J., P. Baker, and T. Deneka. 1995. Abundance and distribution of the endangered mussel, *Lampsitis higginsi*, in the lower St. Croix River, Minnesota and Wisconsin. Final Report to the U.S. Fish and Wildlife Service, Twin Cities Field Office, Bloomington, MN. 65 p.

Isom, B.G. and Gooch, C. 1986. Rationale and sampling desings for freshwater mussels Unionidae in streams, large rivers, impoundments, and lakes, p 46-59. *In:* B.G. Isom (ed.) Rationale for Sampling and Interpretation of Ecological Data in the Assessment of Freshwater Ecosystems. American Society for Testing and Materials, Philadelphia, PA.

Jennings, S, and A. Hebig. 1995, 1995 zebra mussel response plan, St. Croix National Scenic Riverway. Final activity report. St. Croix National Scenic Riverway, Natl. Park Serv., St. Croix Falls, WI. 8 p.

Johnson, R.I. 1980. Zoogeography of North American Unionacea (Mollusca: Bivalvia) north of the maximum Pleistocene glaciation. *Bull. Mus. Comp. Zool.* **149**:77-189.

Karns, B. and S. Jennings. 1996. 1996 Zebra mussel response plan: Final report. St. Croix National Riverway, Nat. Park Serv., St. Croix Falls, WI. 11 p.

Kern, R., J. Borcherding, and D. Neumann. 1994. Recruitment of a freshwater mussel with a planktonic life-stage in running waters- studies on *Dreissena polymorpha* in the River Rhine. *Arch. Hydrobiol.* **131**:385-400.

Keevin, T.M., R.E. Yarbrough, and A.C. Miller. 1993. Long-distance dispersal of zebra mussels (*Dreissena polymorpha*) attached to hulls of commercial vessels. *Dreissena polymorpha Information Review* 4(1):2.

Kovalak, W.P., S.D. Dennis, and J.M. Bates. 1986. Sampling effort required to find rare species of freshwater mussels, p 34-35. *In* B.G. Isom (ed.) Rationale for Sampling and Interpretation of Ecological Data in the Assessment of Freshwater Ecosystems. American Society for Testing and Materials, Philadelphia, PA.

Layzer, J.B., M.E. Gordon, and R.M. Anderson. 1993. Mussels: the forgotten fauna of regulated rivers: a case study of the Caney Fork River. Regulated Rivers: Research and Management 8:63-71.

Levitan, D.R., and C. Petersen. 1995. Sperm limitation in the sea. *Trends in Ecology and Evolution* 10:228-231.

Lewis, D.W. 1984. *Practical Sedimentology*. Hutchinson Ross Publishing, Strousburg, PA.

Mackie, G.L. 1991. Biology of the exotic zebra mussel, *Dreissena* polymorpha, in relation to native bivalves and its potential impacts in Lake St. Clair. *Hydrobiol.* **219**:251-268.

Marsden, J.E. 1992. Standard protocols for monitoring and sampling zebra mussels. *Illinois Natural History Survey Biological Notes* 138.

Martel, A. 1992. Appendix III. Collector for veliger and drifting postmetamorphic zebra mussels, p 28-30. In J.E. Marsden (ed) Standard Protocols for monitoring and sampling zebra mussels. Illinois Natural History Survey Biological Notes 138.

Mathiak, H.A. 1979. A River Survey of the Unionid Mussels of Wisconsin, 1973-1977. Sand Shell Press, Horicon, WI.

McMahon, R.F. 1991. Mollusca: Bivalvia, p 315-399. In (J.H. Thorp and A.P. Covich, eds.) Ecology and Classification of North American Freshwater Invertebrates. Academic Press, Inc. New York, NY.

Miller, A.C. and B.S. Payne. 1995. The importance of a mussel bed near McMillin Island, Pool 10 of the upper Mississippi River, for *Lampsilis higginsi*. Rep. Aquatic. Ecol. Branch, U.S. Army Engineer Waterways Exp. Sta., Vickburg, MS. 35 p.

Miller, A.C., B.S. Payne, D.J. Schafer, and L.T. Neill. 1993. Techniques for monitoring freshwater bivalve communities and populations in large rivers, p 147-158. *In*: K.S. Cummings, A.C. Buchanan, and L.M. Koch (eds.) Conservation and Management of Freshwater Mussels. Proc. Upper Mississippi River Conservation Comm. Symposium, October 1992, St. Louis, MO.

Nalepa, T.F. 1994. Decline of native unionid bivalves in Lake St. Clair after infestation by the zebra mussel, *Dreissena polymorpha*. Can. J. Fish. Aquat. Sci. 51:2227-2233.

Nalepa, T.F. and D.W. Schloesser, eds. 1993. Zebra Mussels: Biology, Impacts, and Control. Lewis Publishers, CRC Press, Boca Raton, FL. 810 pp.

Neves, R.J. and S.N. Moyer. 1988. Evaluation of techniques for age determination of freshwater mussels (Unionidae). Am. Malacol. Bull. 6:179-188.

New York Sea Grant. 1991. Zebra mussels found in the upper Mississippi River near LaCrosse, Wisconsin. *Dreissena polymorpha Information Review* 2(5):5.

New York Sea Grant. 1996. North American range of the zebra mussel. Dreissena 6(5):6-7.

Oesch, R.D. 1984. Missouri Naiades: A Guide to the Mussels of Missouri. Missouri Dept. Conservation, Jefferson City, MO.

Oliver, J. and R. Babcock. 1992. Aspects of the fertilization ecology of broadcast spawning corals: sperm dilution effects and *in situ* measurements of fertilization. *Biol. Bull.* 183:409-417. Pennington, J.T. 1985. The ecology of fertilization of echinoid eggs: the consequences of sperm dilution, adult aggregation, and synchronous spawning. *Biol. Bull.* 169:417-430.

Ramcharan, C.W., D.K. Padilla, and S.I. Dodson. 1992. A multivariate model for predicting population fluctuations of *Dreissena polymorpha* in North American lakes. *Can. J. Fish. Aquat. Sci.* 49:150-158.

Ricciardi, A., F.G. Whoriskey, and J.B. Rasmussen. 1995. Predicting the intensity and impact of *Dreissena* infestation on native unionid bivalves from *Dreissena* field density. Can. J. Fish. Aquat. Sci. 52:1449-1461.

SAS Institute. 1990. SAS/STAT User's Guide, Version 6, Fourth Edition.1686 p.

SAS Institute. 1994. JMP Statistics and Graphics Guide. Version 3 of JMP. SAS Institute, Inc., Cary, NC.

Schloesser, D.W. and T.F. Nalepa. 1994. Dramatic decline of unionid bivalves in western Lake Erie after infestation by the zebra mussel *Dreissena* polymorpha. Can. J. Fish. Aquat. Sci. 51:2234-2242.

Schmidt, K. 1993. Risk assessment of the zebra mussel *Dreissena* polymorpha in the St. Croix River basin. Minn. Dept. Nat. Resources, St. Paul, MN. 20 p.

Sprung, M. 1987. Ecological requirements of developing *Dreissena* polymorpha eggs. Arch. Hydrobiol./Suppl. 79:69-86.

Sprung, M. 1993. The other life: an account of present knowledge of the larval phase of *Dreissena polymorpha*, p 39-53. *In*: T.F. Nalepa and D.W. Schloesser (eds.) Zebra Mussels: Biology, Impacts, and Control. Lewis Publishers, CRC Press, Boca Raton, FL.

Stern, E., W. Emanuel, H.F. Krosch, J. Mick, D. Nelson, D. Roosa, M. Vanderford, and R. Whiting. 1982. Higgins Eye Mussel Recovery Plan. Fish and Wildlife Reference Service, Rockville, MD. 98 p.

Stoeckel, J.A., L.A. Soeken, K.D. Blodgett, and R.E. Sparks. 1995. Zebra mussel veligers in the Illinois River: 1994 and 1995. Ctr. Aquat. Ecol., Illnois Nat. Hist. Survey, Havana, IL. 2 p.

Strayer, D.L., D.C. Hunter, L.C. Smith, and C.K. Borg. 1994. Distribution, abundance, and roles of freshwater clams (Bivalvia, Unionidae) in the freshwater tidal Hudson River. *Freshwater Biology* 31:239-248.

Vanderploeg, H.A., J.R. Liebig, and T.F. Nalepa. 1995. From picoplankton to microplankton: temperature-driven filtration by the unionid bivalve *Lampsilis radiata siliquoidea* in Lake St. Clair. *Can. J. Fish. Aquat. Sci.* 52:63-74.

Waller, D.L. and L.E. Holland-Bartels. 1988. Fish hosts for glochidia of the endangered freshwater mussel *Lampsilis higginsi* Lea (Bivalvia: Unionidae). *Malacol. Rev.* 21:119-122.

Whitney, S.D., K.D. Blodgett, and R.E. Sparks. 1994. Update on zebra mussels and native unionids in the Illinois River. Ctr. Aquat. Ecol., Illinois Nat. Hist. Survey, Havana, IL. 2 p.

Whitney, S.D., K.D. Blodgett, and R.E. Sparks. 1996. A comprehensive survey of three mussel beds in Reach 15 of the upper Mississippi River. Aquat. Ecol. Tech. Rep. 96/7. Ctr Aquat. Ecol., Illinois Nat. Hist. Survey, Havana, IL. 121 pp.

Wilcox, D.B., D.D. Anderson, and A.C. Miller. 1993. Survey protocols and decision criteria for estimating the likelihood that *Lampsilis higginsi* is present in area within the Upper Mississippi River System, p 168-172. *In:* K.S. Cummings, A.C. Buchanan, and L.M. Koch (eds.) Conservation and Management of Freshwater Mussels. Proc. Upper Mississippi River Conservation Comm. Symposium, October 1992, St. Louis, MO.

Williams, J.D., S.L.H. Fuller, and R. Grace. 1992. Effects of impoundments on freshwater mussels (Mollusca: Bivalvia: Unionidae) in the main channel of the Black Warrior and Tombigbee rivers in western Alabama. *Bull. Alabama Mus. Nat. Hist.* 13:1-10.

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

Yager, T. 1992. Zebra mussel monitoring: 1992. U.S. Army Engineer District, St. Paul, MN. 7 pp.

Yager, T. 1993. Zebra mussel monitoring: 1993. U.S. Army Engineer District, St. Paul, MN. 29 pp.

Yager, T. 1994. Zebra mussel monitoring: 1994. U.S. Army Engineer District, St. Paul, MN. 31 pp.

Yager, T. 1995. Zebra mussel monitoring: 1995. U.S. Army Engineer District, St. Paul, MN. 5 pp.

Yund, P.O. 1990. An *in situ* measurement of sperm dispersal in a colonial marine hydroid. *J. Exp. Zool.* 253:102-106.

Zar, J.H. 1996. Biostatistical Analysis. 3rd Ed. Prentice-Hall, Englewood Cliffs, NJ. 918 pp.



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Memo

To:

Dr. MacIntosh

From:

Dick Neves

Date:

February 17, 1997

Subject:

Baker and Hornback MS

Enclosed is my review of the manuscript sent by you (I believe) for my review. It is obvious to me that Dr. Hornback played a secondary role in its design and write-up. The work appears to be mussel sampling done on contract, with no initial sampling or statistical design. The occurrence of \underline{L} . <u>higginsi</u> in some samples, and previous collections of this species by previous studies was latched onto as possibly suitable for publication (now with the zebra mussel threat). I regret that there is more noise than music coming from within and between the lines of narrative presented as research.

/cwl

Baker and Hornbach MS

This manuscript has some interesting information on \underline{L} . <u>higginsi</u>, but there are numerous topics that distract from its suitability for publication. The following comments address my major concerns.

- 1. The document is not well written or proofed, reading more like a student thesis than a polished manuscript. A rewrite is in order.
- 2. The Abstract has little to say; there are few results. The essence of the Abstract is that <u>L higginsi</u> was found in high quality sand habitat, along with most other mussel species. This is hardly a revelation for this or other rare riverine mussels, and begs the question of whether these results deserve publication in a national journal.
- 3. The Introduction is for too long, covering subjects that are not directly related to the research.
- 4. Methods There is insufficient description of what was done and how (see text).
- 5. Quantitative quadrats (25 m²) were taken at sites of undefined size. How accurate were these assessments (% of area sampled?)
- 6. It is not believable that the authors mapped "precise habitat of <u>L</u>. <u>higginsi</u>" collected by other researchers as early as 1980. This assumes that habitat characteristics have not changed and that exact locations are known.
- 7. Sampling of abiotic parameters (e.g., water depth, bottom current), if done on different dates, is not directly comparable in statistical analyses. The limited sampling done, relative to total area of each site, was probably of minute consequence. The value (accuracy, precision) of these results are suspect unless the authors make a better case in their Methods.
- 8. The polygon analysis seems to be similar to that used in computing home range of animals. What citation concurs with its use for this analysis?
- 9. Places described in Results are not marked in Figure 1.
- 10. In essence, the results showed that <u>L</u>. <u>higginsi</u> tended to occur at locations with more species than locations with fewer species. This is common knowledge for most rare mussels. Am I missing some result of new significance?
- 11. Half of Discussion is speculation on zebra mussel effects. This topic should be reduced to 2 paragraphs.
- 12. The References section is padded with citations that are not essential. The authors, in their apparent zeal for documentation, have overdone the number of references in the text, especially "grey literature." Eight pages of references for such a brief paper is unwarranted.

THE AMERICAN MIDLAND NATURALIST

Reviewer's Evaluation Sheet

PLEASE RETURN WITH YOUR COMMENTS:

Check	
***************************************	Eigh Scientific merit - requires minor changes (Review of revision not required)
**************************************	Eigh scientific merit - requires major changes (Review of revision required)
	Good scientific merit - acceptable with minor changes (Review of revision <u>not</u> required)
	Good scientific merit - acceptable with major changes (Review of revision required)
`	Acceptable scientific merit - requires minor revision
	Acceptable scientific merit, but too long. (Significance does not justify length)
X	Worth publishing but belongs in a speciality or regional journal not the American Midland Naturalist.
	Questionable scientific merit - not publishable in American Midland Naturalist.
	Not publishable anywhere.