

RICHARD J. NEVES

Morrisow  
1993

PROCEEDINGS OF AN  
OHIO RIVER FRESHWATER MUSSEL  
SURVEY DESIGN WORKSHOP

FEBRUARY 2, 1993

PARKERSBURG, WV

OHIO RIVER ISLANDS NWR  
P. O. BOX 1811  
PARKERSBURG, WV 26102

LIST OF PARTICIPANTS

<u>Name</u>	<u>Address</u>	<u>Phone</u>
William A. Tolin	U.S. Fish & Wildlife Service FWE-Elkins P. O. Box 1278 Elkins, WV 26241	304-636-6586
Tom Proch	PA Dept. Environmental Resources 400 Waterfront Drive Pittsburgh, PA 15222-4745	412-442-4000
Arthur Bogan	Freshwater Molluscan Research 36 Venus Way Sewell, NJ 08080-1970	609-582-9113
Steven Ahlstedt	Tennessee Valley Authority Aquatic Biology Lab Norris, TN 37828	615-632-1781
Mike Zeto	WV DEP Environmental Enforcement 1356 Hansford Street Charleston, WV 25301	304-558-2497
Craig Stihler	WV DNR Endangered Species Program P. O. Box 67 Elkins, WV 26241	304-637-0245
Wayne L. Davis	KY Dept. Fish & Wildlife Resources #1 Game Farm Road Frankfort, KY 40601	502-564-5448
Scott Morrison	WV DNR District Fish Biologist 6321 Emerson Avenue Parkersburg, WV 26101	304-420-4550
Jerry Wilson Mitch Ellis Patty Morrison Drew Ellis	Ohio River Islands NWR P. O. Box 1811 Parkersburg, WV 26102	304-420-7568
Janet Clayton	WV DNR P. O. Box 67 Elkins, WV 26241	304-637-0245
Barry Passmore	Corps of Engineers 502 8th Street Huntington, WV 25701	304-529-5712

Tom Watters	171 Wells Street Marietta, OH 45750-3461	614-373-9501
Dave Ross	Ohio DNR Division of Wildlife 1840 Belcher Drive Columbus, OH 43224	614-265-6344
Frank A. Borsuk	ORSANCO 5735 Kellogg Avenue Cincinnati, OH 45228	513-231-7719 (FAX) 513-231-7761
Russ A. Dyrland	U. S. Fish & Wildlife Service Patuxent Wildlife Research Center Rt. 197 & Powdermill Road Laurel, MD 20708	301-498-0341 (FAX) 301-498-0295
Ronald Circe'	U.S. Geological Survey 914 National Center Reston, VA 22092	703-648-6518 (FAX) 703-648-6500
Dick Neves	Dept. Fish & Wildlife Coop. Fish & Wildlife Unit Virginia Tech Blacksburg, VA 24061-0321	703-231-5927
Ray Menendez	WV DNR P. O. Box 67 Elkins, WV 26241	304-637-0245

The workshop was called to order at 9:45 a.m., and welcoming remarks were given by Refuge Manager Jerry Wilson. Next came introductions, and each participant discussed his or her affiliation and interest in freshwater mussels. Following the brief introductions, each participant then discussed, in greater detail, his or her particular agency or personal areas of interest regarding Ohio River Mussel Fauna; the scope of any ongoing work with freshwater mussels; freshwater mussel work which he or she will definitely undertake in the future; any freshwater mussel work he or she would like to undertake, and possible funding sources for those.

**PATRICIA MORRISON - OHIO RIVER ISLANDS NATIONAL WILDLIFE REFUGE**

The new Ohio River Islands National Wildlife Refuge was established in 1990, and charged with three broad regional objectives that relate to freshwater mussels: (1) maximize the use of Fish and Wildlife Service lands to restore threatened and endangered species; (2) habitat and population management that perpetuates biodiversity; and (3) maintain or enhance freshwater mussel habitat on Region 5 refuges. The Ohio River Islands Refuge is the only Region 5 refuge with an objective relating to freshwater mussels.

The refuge now owns 8 of the 35 islands in the refuge acquisition area; 6 in the Willow Island Pool, and 2 in the New Cumberland Pool. Refuge staff have established the following refuge specific objectives for freshwater mussels: (1) identify and characterize native mussel populations around the islands;

(2) establish a baseline for monitoring populations and contaminants; (3) monitor colonization of zebra mussels, and their effect on native mussel fauna; and (4) implement a salvage operation of native fauna if necessary.

The refuge will begin baseline work during the spring and summer of 1993. We have prioritized the island study areas by navigation pools so we can keep track of funding and expenses as we go, and stop if necessary. The first five navigation pools prioritized are as follows: (1) the Willow Island Pool and its eleven islands; (2) the New Cumberland Pool and its four islands; (3) the Belleville Pool and its seven islands; (4) the Meldahl Pool and its three islands; and (5) the Racine Pool and its two islands.

We anticipate that Service personnel will conduct the reconnaissance level surveys through walking the shorelines and shallows, handpicking, and brailing to locate potential beds (Level I). We will then use intensive brailing or qualitative diving to delineate the extent of beds (Level II) and then sampling by scuba quadrats for quantitative data (Level III). Level II and Level III work will be done by combination of FWS personnel and possibly USGS or other contract divers. The refuge wants to monitor the following parameters:

- (1) Species composition and diversity;
- (2) Density of individuals;
- (3) Age structure/size/recruitment;
- (4) Document the presence of rare species, if possible;

- (5) A general map of the bed locations; and
- (6) Contaminants(?)

Ideally, we would like to see this group come up with a standardized design and techniques to apply to similar mussel surveys along the Ohio River so that data are comparable from location to location and from year to year. We would also like to see the agreed upon survey design expanded to other areas in the river.

With respect to funding, the refuge has money to commit to surveys this fiscal year, but that money must be spent within the refuge acquisition area, so it is not likely we'll be funding general surveys in the open river. Hopefully other programs, such as the individual states and ORSANCO, may be able to support similar surveys in other areas of the river.

As a result of this workshop, the refuge staff will draft a proposed survey protocol, and circulate the document to all the participants here today for their review and comment. Hopefully, the protocol which results will represent the consensus of this group, and will provide excellent guidance for future mussel survey plans.

BILL TOLIN - ENDANGERED SPECIES SPECIALIST, U. S. FISH AND WILDLIFE SERVICE, ELKINS, WV

Bill discussed three particular areas in which he is involved concerning Ohio River Mussel Fauna. Bill is currently involved in a Section 7 consultation regarding the renovation of Gallipolis Lock and Dam. With the opening of the new locks, the Corps anticipates a two-fold increase in barge traffic. The

endangered pink mucket (Lampsilis abrupta) is known to occur in the ten mile reach of river below Gallipolis Lock and Dam, in the upper Greenup Pool. The Huntington Corps of Engineers is employing a scientist from its Waterways Experiment Station and the TVA to conduct surveys in the upper Greenup Pool, where some of the richest freshwater mussel fauna in the Ohio River are known to occur. During this past October, WES and TVA divers performed timed qualitative dives and intense quantitative sampling to establish a baseline at four randomly selected sites below the Gallipolis Lock and Dam. They collected 180 0.25 square meter quads, over a three to four day period, using four divers, down two at a time, with a hooka setup. The divers had diver-to-surface communication link and diver-to-diver links. The Corps anticipates a spring 1993 progress report. The purpose of the study is to provide quantitative data that can be used to assess the environmental effects of increased commercial navigation resulting from the completion of Gallipolis Lock and Dam. In addition, the information can be used to evaluate the effects of the colonization and spread of the zebra mussel.

Bill is also involved with a Section 7 consultation concerning Dravo Sand & Gravel Company's application for commercial dredging sites in the Willow Island Pool, the Belleville Pool, and Racine Pool of the Ohio River. The resource agencies reviewing the application have told Dravo that it must

conduct freshwater mussel surveys in those areas of the river in which it would like to dredge. Apparently Dr. Taylor from Marshall University has written a proposal to survey a five mile reach in the Willow Island Pool for Dravo this coming year.

One of the key questions which keeps coming up with the Corps of Engineers permit review people and Dravo is "what is a viable population of freshwater mussels sufficient to recommend denial of a dredging site?" General consensus at the workshop was that one mussel per square meter was a good rule of thumb. However, what about just looking at the habitat types sufficient to support populations of mussels? In the Willow Island Pool, in particular, recent evidence indicates that the mussel populations are just now recolonizing and repatriating the pool, so might we be giving away the suitable habitat in areas which may be able to support future populations of native mussel fauna? The problem is that no one has mapped the river bottom sufficiently to be able to determine detailed habitat types.

Ron Circe' from the USGS then discussed the application of a technology involving side scan sonar, which can effectively and efficiently map the river bottom through a non-destructive technique. The side scan sonar takes a 200 meter wide picture of the river bottom at a great resolution, and can identify particular habitat types and bottom types. The equipment is mounted on a boat which travels at a speed of 5 to 8 knots. The USGS has the capability to do this, with cost sharing from other agencies, and may be able to contribute this application, if even



on a pilot scale level, and using a global positioning system (GPS) navigation system in conjunction. This technique leads right in to GIS applications. Ron estimated that the cost of a unit, at the lower end with an analog output would be approximately \$60,000, but that the equipment can also be leased.

Bill Tolin also discussed another Section 7 consultation regarding Gallia Hydropower. Dr. Tom Watters and Heidi Dunn of Ecological Specialists, Inc. have been contracted to locate major beds and populations downstream of the hydropower project. They found the first downstream bed containing the endangered pink mucket, and stopped. There may be some overlap here with Corps studies in the Greenup Pool.

**TOM PROCH - PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES**

The commonwealth of Pennsylvania is using the money it received in a settlement after the Ashland Oil Spill to conduct a 40 mile study along the Ohio River, digitizing map information, river bottom type, using side scan sonar, and bathymetry data. The maps will be ground-truthed in the field by their biologists. The goal is to construct aquatic habitat utilization maps over the next four to five years. The state contracted color infrared low level photography to get a handle on the riverine aquatic beds. The state should have all the information together in a GIS system in the end, using ARC-INFO software.

Refuge staff may be able to provide important ground-truthing data back to the state of Pennsylvania as a result of its mussel surveys to be conducted in the summer of 1993.

**ARTHUR BOGAN - FRESHWATER MOLLUSCAN RESEARCH**

Art was responsible for systematizing the check list of scientific names of Unionids, which will go to press this year. Recent surveys of the Allegheny River in Pennsylvania shows that half of the historic mussel fauna are now gone. There are 28 taxa documented living in the basin, 27 of these have been found in French Creek alone.

Art will also be instructing a class on freshwater bivalve identification in Pennsylvania on May 5 - 7, 1993. He has a flyer if anyone is interested.

The New Jersey Sea Grant Program is also sponsoring work on zebra mussels and the quagga mussel. Yes, sports fans, they are different species!

Art will also be going on a trip to Russia, the Ukraine, and Azerbaijani.

**STEVE AHLSTEDT - TENNESSEE VALLEY AUTHORITY**

Steve did some work for the Corps of Engineers last fall in the Cumberland River at a location where the Corps would like to do some dredging for navigation. The TVA apparently found endangered species there.

Steve has also been involved in a project to evaluate the commercial value of the mussel resource in the Wheeler Reservoir of the Tennessee River. The total value of the mussel stock in the state of Alabama was estimated to be \$23 million. As a result of this evaluation, regulations were strengthened and license fees were raised.

The state of Mississippi is getting ready to open its waters for commercial musseling. The state proposes to issue out-of-state licenses for \$2,000 (allowing 100) and in state licenses at \$750 (allowing 250), all on a lottery system. The state will charge a 10% surtax on the harvest, and hire additional enforcement people to monitor the industry. All waters in Mississippi will be open to commercial musseling with the exception of two streams which are protected due to the presence of endangered species. Season will be closed from September 1 to December 1, and there will be enormous penalties for harvesting undersized or unintended species. They'll take your boat, your car, and fine you on top of that. Harvest levels could be 4,000 to 6,000 pounds per day, and no dredging or rakes are allowed.

Steve advises that additional funding may be available from the Fish and Wildlife Service under the guise of research and investigation into the feasibility of commercial musseling, whereas there is probably not any funding available under the Endangered Species Act.

Steve is also collecting data on age, growth and reproduction of a freshwater mussel bed located 60 miles below Knoxville on the Tennessee River. All of the specimens appear to be old, nonreproducing fauna since the dam was built. The population is going relict, and there is no money to do anything with them.

The Corps of Engineers wants to straighten the approach to a lock chamber in the vicinity of a mussel sanctuary, and proposes to remove and transplant the mussels to another location. Steve raises a number of concerns about transplanting: (1) site selection, as a relatively stable area is necessary; (2) the time of year of transplanting; and (3) the size of the animal being transplanted.

Steve also advises caution in taking a large number of quadrats from any given site during a mussel survey, as this disturbs the area greatly.

There are currently 47 monitoring sites for zebra mussels in the Tennessee River, in all the lock chambers and on or near all commercial mussel beds. Three specimens of zebra mussels were found encrusted on one native mussel shell, and Mytelopsis was also found. Dr. Andrew Miller at the Waterways Experiment Station has a sheet on identifying Mytelopsis.

MIKE ZETO - WV DEPARTMENT OF ENVIRONMENTAL PROTECTION

By virtue of West Virginia Code Section 20-2-59, commercial musseling is permitted on the Ohio River but only to residents of West Virginia and Ohio. The new West Virginia Department of Environmental Protection now handles certifications under Section 401 of the Clean Water Act with respect to Section 404 Dredge and Fill Permits, and also processes Section 402/NPDES permitting

applications. He is now seeing a lot of proposals under the NPDES process to control zebra mussels by representatives of various industries. This may provide an opportunity to gather a lot of useful information from these individuals.

The water quality and instream monitoring work group will participate in flights with the state of Ohio over the Ohio River. Mike's division will also get GPS capabilities (two in the division) to help pinpoint effluent locations and assist in doing survey work.

CRAIG STIHLER AND JANET CLAYTON - WV DIVISION OF NATURAL RESOURCES

The Wildlife Resources Division is not doing much mussel work, and none right now on the Ohio River. Section 6 monies are really tight right now, but there is some endangered species work going on with the Pleurobema clava outside the Ohio River. The Wildlife Section now has the expertise of Janet Clayton to help with mussel work, but they definitely need a better and more reliable source of funding for this type of non-game work. West Virginia does issue scientific collecting permits for any mussel work going on within its borders, so they can keep track of who is doing what.

There is a new emergency regulation now in effect which specifies that it is illegal to possess freshwater mussels or any parts thereof.

During the fall of 1991, Janet Clayton and Dosha \_\_\_\_\_ collected mussel specimens from locations in the Belleville pool near Marietta for contaminant analysis. It was evident that some kind of a die-off had occurred.

Janet Clayton is the contact person in West Virginia for all mussel work, and she would like to receive any and all data on West Virginia bivalves.

WAYNE DAVIS - KENTUCKY DEPARTMENT OF FISH AND WILDLIFE RESOURCES

Kentucky is using Section 6 monies to do mussel work in the Upper Green River. Kentucky has contracted with the state Nature Preserve to investigate the status of Villosa iris in the state. They are also cooperating with the USGS Louisville office in brailing work, analyzing heavy metals deposition in mussel shell layers, and pesticide levels in mussel tissue. These data are coordinated with water quality monitoring stations, including one site on the Ohio River.

Commercial musseling is allowed in Kentucky, but on historic waters only, and no diving is allowed. The state can create mussel sanctuaries to protect endangered species. There are a number of sanctuaries in the state already, including areas within 200 yards below existing dams. The two other sites on the Ohio River are the relocated mussel bed in the Meldahl Pool near Ripley, Ohio, and a section of the Ohio in Ballard County which is still free flowing.

The Mussel Trust Fund is supporting a re-survey of Ohio River mussels up to Foster, Kentucky. This work will update the 1968 Williams Survey and 1981 work by Williams and Schuster.

Dave Berg is undertaking a study to gauge the health of freshwater mussel by analyzing the glucose levels of the specimens by clipping out a small piece of mantle tissue.

With respect to the relocated bed at Ripley, Ohio, Heidi Dunn and her firm will re-survey.

The Louisville District of the Corps of Engineers is undertaking new construction of a metal type wicket dam at Olmstead Lock and Dam, and has received a "may affect" ruling under Section 7 of the Endangered Species Act, primarily due to sediment during construction. Permanent samplers have been placed in the river. The Corps is applying the NAVPAT model for mussels, and looking at the impacts of traffic.

**BARRY PASSMORE - HUNTINGTON DISTRICT, CORPS OF ENGINEERS**

Barry elaborated on the work being done by the Huntington Corps below Gallipolis Locks and Dam to investigate the impact of increased navigation traffic on the freshwater mussels in general, and the endangered pink mucket in particular. The monitoring will continue every two years, and an interagency meeting will be held every spring to discuss the results.

**DR. G. THOMAS WATTERS - ECOLOGICAL SPECIALIST, INC.**

Dr. Watters emphasized the need to come up with a standardized technique for sampling freshwater mussels, as it would help greatly with duplication of techniques in the future

and necessary followup studies. Tom is currently doing mussel work for the State of Ohio, including surveys in the Muskingum River and South Central Ohio.

DAVE ROSS - OHIO DEPARTMENT OF NATURAL RESOURCES, ENDANGERED SPECIES AND WILDLIFE DIVERSITY COORDINATOR

Ohio has no specific mussel work planned for the Ohio River, but has been sponsoring some work in the lower Muskingum River where the fanshell was found. Researchers are trying to duplicate the 1982-83 Stansbery Study in the same area. The mussel fauna of the Muskingum appear to be holding up fairly well except for the areas which were heavily picked by illegal musselers. The ODNR is also doing some work in Northwestern Ohio near Indiana in a small stream called Fish Creek, where they have found the White Cat's Paw and two other federally endangered species. The ODNR is participating in a soil and water conservation cooperative effort with the Federal and state EPA studying non-point source pollution in the drainage.

Tom Watters is also doing a bibliography and literature search on propagation of mussels for recovery purposes, under contract with the ODNR.

Ohio is currently defining its role in mussel conservation, including propagation and relocation efforts. The state Endangered Species and Biological Diversity Program gets additional monies to support this effort.



Dave encouraged this group to bring the issue of freshwater mussels in the Ohio River to the attention of the Ohio River Working Group for Fisheries, which is made up of representatives of West Virginia, Kentucky, Ohio and Indiana.

FRANK BORSUK - ORSANCO

Under the interstate compact under which ORSANCO operates, all aquatic life should be protected. ORSANCO is in the methodology development state for intensive surveys in the Greenup Pool, which was chosen because it involves three EPA regions and three separate states. ORSANCO may be able to fund some side scan sonar work to identify potentially suitable habitat or mussel beds.

ORSANCO conducts regular contaminant analysis on channel catfish, carp, sauger and bass from the Ohio River, looking for PCP's, heavy metals, and chlordane. ORSANCO also has a bulletin board accessible by computer modem hookup that keeps track of zebra mussel sightings along the river.

ORSANCO is also designated as the lead agency, by the EPA, to compile information on environmentally sensitive areas within the Ohio River in order to prepare an area contingency plan in keeping with the statutory requirements of the Oil Pollution Act of 1990. Bill Parsons is the contact person at ORSANCO.

Bud Rollins in the Geology Department at the University of Pittsburgh is doing some work with trace metal analysis using mussels, and can show past environmental history of an area with the data.

Tom Simon at the U.S. EPA Region 5 in Chicago is funding the development of an IBI matrix for mussels or using mussels, which is a type of a score of the health or quality of a particular habitat or environment.

RUSS DYRLAND - U. S. FISH AND WILDLIFE SERVICE, PATUXENT WILDLIFE RESEARCH CENTER

Russ is the Safety Manager and Diving Coordinator for the Service. The Service is very restrictive now with respect to diving, and there is no regional policy in place in Region 5 on diving. Russ is extremely interested in the possibility of cooperative efforts among agencies to facilitate the use of diving as a research tool.

RON CIRCE' - U. S. GEOLOGICAL SURVEY

Ron is encouraged about the possibility of lending assistance to a sister agency and in using the tools which they regularly use in geological investigations, including river and lake bottom studies. Their scientific dive teams at Woods Hole Oceanographic Institute also has a lot of technical equipment as support. The data generated by the side scan sonar equipment must be in a digitized form in order to be used by a GIS system. He described how a side scan sonar can monitor dredging activities, and can actually count the tooth marks made from a particular clam shell bucket. Side scan sonar is also available by lease from certain companies. One of the nice features of side scan sonar is that it can be used outside of the optimum time frame or window which is needed for diving, and the

technique is not dependent on flow. His working group has a crew scheduled on Lake Erie in May, but it might be possible to work out a pilot project here on the Ohio River in April or earlier.

DICK NEVES - VIRGINIA POLYTECHNICAL INSTITUTE, COOPERATIVE FISHERIES UNIT

Dick has been involved in freshwater mussel work for the past 14 years. Some of the areas of work in which he and his unit people are involved are summarized below.

- (1) Cryopreservation. The coop unit is receiving funding from the Mussel Trust Fund to study and evaluate techniques for cryopreservation of gametes and embryos. They've had good success with early embryos, but not the glochidia.
- (2) Life history studies. Graduate students at the coop unit have compiled a number of life history studies, including the dwarf wedge mussel.
- (3) Propagation. Researchers are investigating the feasibility of propagating freshwater mussels without a host fish, using TVA artificial medium. The Anodonta does OK. Studies to develop a food source for juvenile mussels in the laboratory, they have had 70% survival of Villosa iris.  
They are also researching farm pond culture and artificial stream channel propagation of mussels, which interests both endangered species concerns and commercial mussel interests.

The state of Virginia and Fish and Wildlife Service are supporting research into the invasion of zebra mussels, and in ways to try and hold native freshwater mussel in refugia areas in case the zebras begin to decimate the big river native species.

Another area of activity is in public education and outreach, including the development and distribution of the pearly mussel poster and freshwater mussel video which Dick was kind enough to give us a premiere screening during our afternoon break.

#### BRAINSTORMING

During the late afternoon session, after the screening of Dick Neves' freshwater mussel video, participants offered a lot of specific advice and recommendations with respect to survey design strategies, sampling schemes, and equipment recommendations. It was generally agreed that it is difficult, if not impossible, to design a survey specifically to find rare species. The level of effort required over a large river system and the resulting degree of disturbance to the mussel beds would be unacceptable.

Unlike the work being done by the Corps of Engineers in the Greenup Pool, the studies planned by the Fish and Wildlife Service, Ohio River Islands Refuge for this spring and summer are not restricted to mussel beds that were previously identified by others, but rather, we are attempting to conduct a systematic search of areas on and near refuge lands for the presence of freshwater mussel beds. In short, we will be searching for new

beds. For that reason, most agree that some level of reconnaissance work is first necessary, including brailing at regular intervals or time periods, hand picking shallow waters and muskrat middens, and possibly using random ten minute searches with divers. Once a bed or population of mussels is determined to be present, the boundaries or extent of the bed can be fine tuned with brailing and/or diving.

At that point, it was suggested by Steve Ahlstedt that quantitative diving with quadrat excavations be laid out in a stratified random sampling scheme. Then, perhaps, we might want to do qualitative diving work in particular hot spots. Quadrat excavations are necessary in order to be able to collect the smaller shelled species and juveniles which appear to be in the softer substrates and are typically burrowed down in the substrate and therefore not accessible by "feel" or by brailing.

In looking for rare or endangered species, it would be better perhaps to look at diversity of the mussel community and not just the presence or absence of a given species. If you have 10 to 15 different species in a population or community, the habitat is "darn good" and you probably have endangered species there as well.

Most everyone who had an opinion on the subject agreed that a GPS navigation system was a necessity to delineate sample sites and bed locations properly. Apparently the Corps is requiring

GPS to keep track of both brail runs and to map the locations and configurations of mussel beds. It was estimated that a GPS could be acquired for approximately \$6,000, although it is also possible to rent or borrow the equipment as needed.

In discussing the possible use of mussels as an avenue to monitor contaminants, there was a lot of discussion about the outrageous cost for analysis of contaminant information, and a general feeling that mussels are probably not the best indicators for organics and pesticides. A common experience in the room revealed that the cost for running a single sample for a full priority pollutant scan was \$1,200 to \$1,500 per sample. It may be more cost effective to just conduct bottom and suspended sediment analysis to get the same data for baseline and future monitoring.

Dick Neves suggested that we could even get some very useful data from the muskrat middens which we come across during our field work. It was suggested that we note the size class and age class and species of the shells being preyed upon by the muskrats, and can get an indication of what the smallest shells being harvested are.



United States Department of the Interior

FISH AND WILDLIFE SERVICE  
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P.O. BOX 1811  
PARKERSBURG, WV 26102-1811



March 17, 1993

Dr. Richard Neves  
Dept. Fish & Wildlife  
Coop. Fish & Wildlife Unit  
Virginia Tech  
Blacksburg, VA 24061-0321

Dear Dick:

Just a brief note to express our sincere thanks for your attendance at and input into the mussel workshop last month. Enclosed is a draft of the proceedings of the workshop, wherein I attempted to summarize everyone's discussion.

Please review this (especially your own section) and send me your comments, additions, deletions, etc., and forgive me in advance if I omitted a key point or missed something. I was reconstructing and interpreting as best I could from my notes. Go ahead and write on the draft and return it to me. I'll circulate a final to you later to keep.

By the end of March I will also send out a draft of a proposed survey protocol to guide our work this summer, and I would like to have your critical review and input on this as well. As I mentioned in the proceedings, I hope this working group could come up with recommendations for a standardized technique for mussel surveys in the Ohio River which will benefit all resource agencies and institutions.

I look forward to your continuing guidance and advice, and thanks again!

Yours very truly,

Patricia A. Morrison  
Fish & Wildlife Biologist

Enclosure

*Dick -  
a special thanks to you  
for sending the reprints -  
that will help jump-start  
our new library!*