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Nov-1979  
RICHARD J. NEVES

TENNESSEE VALLEY AUTHORITY  
NORRIS, TENNESSEE 37828

TVA  
1979

February 13, 1980

Upper Clinch  
Survey

Mr. Orville Kronk  
Nashville District  
U. S. Corps of Engineers  
P. O. Box 1070  
Nashville, Tennessee 37202

Dear Orville:

TVA biologists surveyed the freshwater mussel fauna of the upper Clinch River in November 1979. One of the purposes of this survey was to examine the reach of the river in Cleveland, Virginia, that would be affected if the proposed sewerline crossing were to be built. The results of this survey as they relate to the Cleveland area are discussed briefly below and are presented in Table 1. A more general discussion of this survey was included in my letter to Richard Biggins dated December 5, 1979, a copy of which was sent to John Case in your office.

Four of our 41 sampling sites were located within one mile of the proposed construction site at Cleveland (CRM 271.5). The most upstream of these sites (CRM 272.0), one-half mile above the construction site, is largely composed of shifting sand and gravel substrate and was found to contain seven species of freshwater mussels. At the construction site (CRM 271.5) nine species of mussels were found in pockets within and around the largely bedrock substrate. The two downstream sites (CRM 270.8 and 270.9) include both sides of the island at that location and represent an area of stable gravel substrate which is excellent mussel habitat. In this area we found a total of 19 species including Fusconaia cuneolus and Fusconaia edgariana, both listed as endangered by the U.S. Fish and Wildlife Service.

As stated in my previous letter about this survey, these two endangered species were found at several sites throughout the 100 mile reach of the river that we examined. Fusconaia cuneolus was found at nine sites from CRM 226.3 to 322.6 and Fusconaia edgariana was found at six sites from CRM 226.3 to 274.5. Combining these records with those from our August 1979 survey from CRM 150 to 220 we have current records of F. cuneolus from 25 sites ranging from CRM 155.7 to 322.6 and 19 current site records for F. edgariana from CRM 184.7 to 274.5. Our survey results also indicate that both of these species are uncommon wherever they occur in this river.

Addressing the proposed sewerline crossing at Cleveland, our survey results indicate that freshwater mussels do occur in the project area but that no specimens of endangered species have been found there.

Mr. Orville Kronk

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Because two endangered species were found one-half mile below the project site, you may need to determine whether sufficient silt would be generated during project construction to affect the endangered species. You might also give some thought to having the project sponsors remove all mussels from the immediate area to be affected by blasting.

I hope these data and associated comments will help you and the Fish and Wildlife Service clarify whether the Corps should issue the 404 permit for this project. If I can be of any further assistance, please give me a call.

Sincerely,

John J. Jenkinson  
Staff Biologist (Endangered Species)  
Fisheries and Aquatic Ecology  
Division of Water Resources

Enclosure

cc (Enclosure):

✓ Mr. Richard Biggins  
U.S. Fish and Wildlife Service  
Region 5 Office  
1 Gateway Center  
Suite 700  
Newton Corner, Massachusetts 02158

Mr. Andrew Moser  
U.S. Fish and Wildlife Service  
Delmarva Office  
1825 Virginia Street  
Annapolis, Maryland 21401

Table 1. Freshwater Mussel Species Collected Alive in the Vicinity of  
Cleveland, Virginia, in November 1979

Species	CRM 270.8	CRM 270.9	CRM 271.4	CRM 272.0
<i>Actinonaias carinata</i>	1	4	2	
* <i>Actinonaias pectorosa</i>	37	13	13	4
<i>Alasmidonta marginata</i>	1			1
<i>Amblema plicata</i>	2	1		
<i>Elliptio dilatatus</i>	3	13	2	
* <i>Fusconaia barnesiana</i>		3		
*+ <i>Fusconaia cuneolus</i>	4	1		
*+ <i>Fusconaia edgariana</i>	2	1		
<i>Fusconaia subrotunda</i>	5	1	2	
<i>Lasmigona costata</i>	70	33	45	6
<i>Lampsilis fasciola</i>	1		2	1
<i>Lampsilis ovata</i>	2			
* <i>Medionidus conradicus</i>	3	17	3	2
* <i>Pleurobema oviforme</i>	1			
<i>Ptychobranthus fasciolaris</i>	2	1	2	
* <i>Ptychobranthus subtentum</i>	2			
<i>Truncilla truncata</i>	1			
<i>Villosa iris</i>	2		1	1
* <i>Villosa perpurpurea</i>				1
* <i>Villosa vanuxemi</i>		1		
Species Total	17	12	9	7
Specimen Total	139	89	72	16

\* Cumberlandian species (9)

+ Endangered species (2)

December 5, 1979

Mr. Richard Biggins  
U.S. Fish and Wildlife Service  
Region 5 Office  
1 Gateway Center  
Suite 700  
Newton Corner, Massachusetts 02158

Dear Dick:

During the month of November 1979, TVA biologists conducted a freshwater mussel survey of approximately 100 miles of the Clinch River from above Clinchport to Cedar Bluff, Virginia. Initially, four field crews attempted to float the entire length of this river reach, however, cold water and air temperatures reduced our coverage to areas accessible by four-wheel drive vehicles. Under either circumstance the field crews used snorkel and wading equipment to search suitable habitat areas for living and fresh muskrat midden mussel shells.

The results of this survey are presented in Tables 1 through 3 and on Figure 1. In general, some mussel species were found to occur at 31 of the 41 areas we sampled (Table 1). In these productive areas we found a total of 30 mussel species (Table 2), of which 28 occurred at the most productive site (Pendleton Island, CRM 226). At each of eleven other sites scattered throughout the river reach, between 10 and 17 species were found while the remaining 9 productive sites yielded fewer than 10 species each.

During the survey we encountered specimens of two Federally-listed endangered species. Fusconaia cuneolus was found at nine sites from the upper to the lower ends of the river reach and Fusconaia edgariana was taken at six sites, all located between Clinchport and Nash Ford (actually between CRM 226.3 and 274.5). Both of these species were represented by four or fewer specimens at each site except Pendleton Island where 41 specimens of F. cuneolus and 8 of F. edgariana were rather small components of the 702 freshwater mussels observed.

Fusconaia cuneolus was also present in the two quantitative samples taken before that sampling process was curtailed by the cold. At CRM 270.9 two specimens of F. cuneolus were found in 20,  $\frac{1}{4}$  square meter quadrat samples (Table 3). An extrapolation from these numbers would indicate

Mr. Richard Biggins  
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that 0.4 specimens of F. cuneolus exist per square meter of good mussel habitat at that site. Similar calculations based upon two specimens of F. cuneolus taken in 37 quadrat samples at CRM 321.8 would lead to an estimate of 0.2 specimens per square meter of good mussel habitat at the more upstream site.

Although this survey was not conducted at a time when an exhaustive examination of all possible freshwater mussel habitats could be made, some indications of faunal and species diversity and distribution can be gained by examining the data we did collect. Figure 1 is a graphic representation of the numbers of species observed in each five-mile interval throughout this 100-mile reach of the Clinch River. The figure illustrates that, with some exceptions, the number of mussel species increases from headwater sites toward those further downstream. This is a phenomenon of freshwater mussel distribution patterns that has been observed many times and it is now considered to be a typical (if not fully understood) feature of mussel faunas in small to moderate size rivers.

The two apparent deviations from this pattern, roughly CRM 230-265 and CRM 300-320, both include some five-mile intervals where we did not sample, but both also include some sampling results that do not fit the expected, steady increase in species numbers from upstream to downstream sites. During our brief stops on the river, we were unable (and unlikely to be able) to determine why more mussel species did not occur in either of these river reaches. The field crews did notice, however, that the river around Richlands, Virginia (CRM 320), showed considerable human impact including one impressive bulldozed hillside and that the Clinch River Steam Plant and its associated mining operations was located just below a relatively productive site (CRM 268.2, 12 species) and above a series of largely or totally unproductive sites (CRM 264.2 and downstream). Much more specific sampling and detailed water quality monitoring would be required to determine whether either of these observations is directly related to the apparent decreases in freshwater mussel diversity.

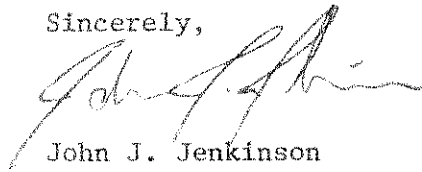
Specifically relating these survey results to endangered species and the proposed diversion channel project at St. Paul, Virginia, these data extend current distribution records for both Fusconaia cuneolus and F. edgariana. Combining the results of our 1979 upper and lower Clinch River surveys, we have current records for F. cuneolus from 25 sites ranging from CRM 155.7 to 322.6. For F. edgariana our records include 19 sites from CRM 184.7 to 274.5. Our survey results also indicate that both of these species are uncommon members of the fauna wherever they occur (i.e. F. cuneolus 2.6 percent and F. edgariana 0.6 percent of upper river total).

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These two surveys have also identified three reaches of the river that do not demonstrate the expected mussel diversity. Two of these areas (CRM 230 to 265 and 300 to 320) presently appear to be impacted by human activity while the third (CRM 150 to 170) may reflect the lack of suitable habitat. It is important to remember, however, that the upper Clinch survey was conducted under less than ideal conditions and involved access point collections rather than floating the entire river reach. As an indication of the caution which should be applied to the over extended use of our November data, the recent survey included one unproductive site in the river reach CRM 250 to 255 (St. Paul area) while a float trip through that same reach this past August yielded 15 species, some locally abundant.

I hope this information and brief analysis will be helpful to you in your continuing evaluation of the St. Paul project and other Clinch River activities. Please feel free to contact me at any time for further clarification or comments about this survey or any of our other programs.

Sincerely,



John J. Jenkinson  
Biologist  
Fisheries and Aquatic Ecology Branch

cc: Mr. John Case  
Corps of Engineers  
P.O. Box 1070  
Nashville, Tennessee 37202

Mr. Charles McConnell  
Wise County Redevelopment  
and Housing Authority  
P.O. Box 177  
Coeburn, Virginia 27230

Upper Clinch River Sample Sites in River Miles  
(CRM) and Number of Species at Each Site, November 1979

<u>Clinch River Mile</u>	<u>Number of Species</u>
✓ 226.3-226.7 (Pendleton Island)	28
233.7	11
237.2	0
238.3	0
238.5	0
241.8	7
243.0	1
246.2	0
249.6	1
253.9	0
261.8	0
264.2	1
268.2 (Carbo)	12
268.3	0
269.4	4
270.2	2
270.8	17
270.9	12
271.4 (Cleveland)	9
272.0	7
274.5	9
276.6	10
278.0	14

15 spp. 8/79  
spell

Clinch River Mile

Number of Species

280.0 (Nash Ford)	11
285.8	11
289.8	8
290.3	3
290.8	4
291.3	2
292.0	11
293.0	9
294.0	6
295.6	9
296.3	10
299.6 (Mouth of Little River)	10
301.0	5
311.2-314.4	0
320.8	0
321.7	6
322.6 (Cedar Bluff) <u>Famulus</u>	2
323.8	0



Table 2. Freshwater mussel species collected from upper Clinch River (CRM 226.3-323.8) along with indications of distribution and abundance.

<u>Species</u>	<u>No. Sites Where Found</u>	<u>Total No. Specimens</u>	<u>River Reach Involved</u>
<u>Actinonaias carinata</u>	9	192	226.3 - 321.7
* <u>Actinonaias pectorosa</u>	25	773	226.3 - 301.0
<u>Alasmidonta marginata</u>	7	12	226.3 - 278.0
<u>Amblyma costata</u>	5	60	226.3 - 270.9
<u>Cyclonaias tuberculata</u>	2	20	226.3 - 241.8
* <u>Dysnomia brevidens</u>	1	5	226.3
* <u>Dysnomia capsaeformis</u>	1	14	226.3
<u>Elliptio dilatatus</u>	18	111	226.3 - 299.6
* <u>Fusconaia barnesiana</u>	10	36	226.3 - 321.7
→ * <u>Fusconaia cuneolus</u>	9	56	226.3 - 322.6
+* <u>Fusconaia edgariana</u>	6	14	226.3 - 274.5
<u>Fusconaia subrotunda</u>	13	75	226.3 - 321.7
<u>Lampsilis fasciola</u>	15	28	226.3 - 296.3
<u>Lampsilis ovata</u>	10	22	226.3 - 296.3
<u>Lasmigona costata</u>	21	408	226.3 - 301.0
<u>Leptodea fragilis</u>	3	6	226.3 - 269.4
<u>Ligumia recta</u>	2	5	226.3 - 233.7
* <u>Medionidus conradicus</u>	17	59	226.3 - 299.6
* <u>Pleurobema oviforme</u>	11	34	226.3 - 299.6
<u>Proptera alata</u>	4	16	226.3 - 264.2
<u>Ptychobranhus fasciolaris</u>	18	58	226.3 - 301.0
* <u>Ptychobranhus subtenum</u>	15	47	226.3 - 321.7
<u>Quadrula cylindrica</u>	2	29	226.3 - 233.7
<u>Quadrula pustulosa</u>	1	1	226.3
<u>Strophitus rugosus</u>	1	1	226.3
<u>Truncilla truncata</u>	2	4	226.3 - 270.8
<u>Villosa iris</u>	16	66	226.3 - 299.6
* <u>Villosa nebulosa</u>	3	11	268.2 - 322.6
* <u>Villosa perpurpurea</u>	2	2	272.0 - 278.0
* <u>Villosa vanuxemensis</u>	4	5	226.3 - 296.3

\*Cumberlandian Forms (12)

+Endangered Species (2)

Table 3. Numbers of specimens observed and density estimates of quantitative samples taken on the upper Clinch River (CRM 226.3-323.8).

<u>Species</u>	CRM 270.9 (20 quadrats)		CRM 321.8 (37 quadrats)	
	Number	per M <sup>2</sup>	Number	per M <sup>2</sup>
<u>Actinonaias carinata</u>	1	0.20	-	-
<u>Actinonaias pectorosa</u>	-	-	1	0.11
<u>Amblema costata</u>	3	0.60	-	-
<u>Elliptio dilatatus</u>	1	0.20	-	-
<u>Fusconaia barnesiana</u>	1	0.20	4	0.43
<u>Fusconaia cuneolus</u>	2	0.40	2	0.22
<u>Fusconaia subrotunda</u>	-	-	4	0.43
<u>Lampsilis fasciola</u>	-	-	1	0.11
<u>Lasmigona costata</u>	11	2.20	-	-
<u>Medionidus conradicus</u>	7	1.40	-	-
<u>Pleurobema oviforme</u>	-	-	1	0.11
<u>Ptychobranhus fasciolaris</u>	-	-	1	0.11
<u>Ptychobranhus subtentum</u>	1	0.20	1	0.11
<u>Villosa iris</u>	-	-	4	0.43
TOTAL	27 (8 species)	5.40	19 (9 species)	2.05

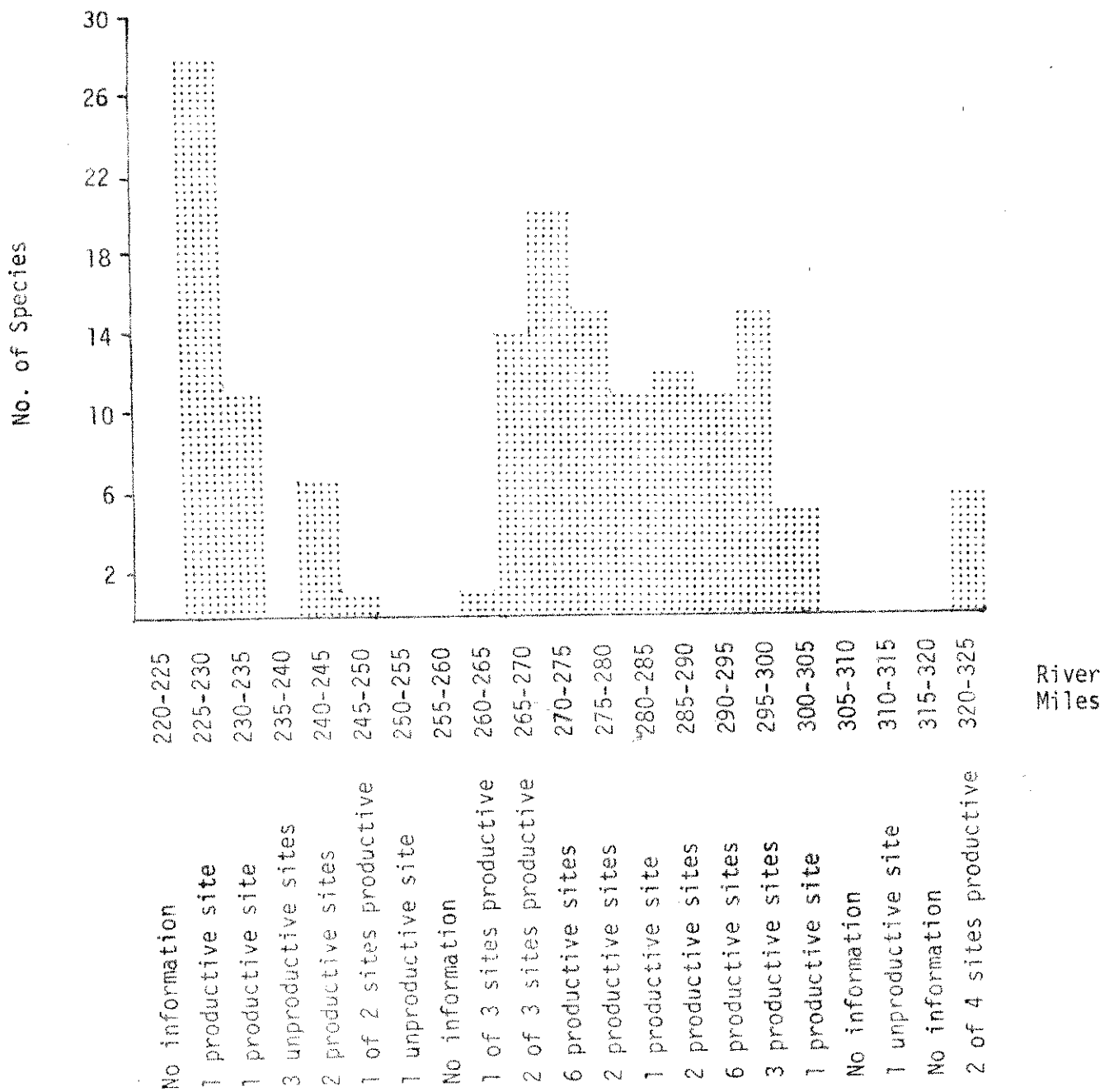


Figure 1. Numbers of freshwater mussel species observed during November 1979 in the upper Clinch River (CRM 226.3-323.8) grouped by five-mile reaches of the river. Also shown are the numbers of collection sites which contributed to each of the values shown.