Supplemental Report to a Survey for Freshwater Mussel Fauna in Cedar Run, Fauquier County, Virginia: Descriptive Analysis of Re-assignment of the Identification of a Specimen of the Atlantic Floater (Contract SCS-10-VA-94)

Technical Report to:

U. S. Department of Agriculture
Soil Conservation Service
Culpeper Building, Suite 209
1606 Santa Rosa Road
Richmond, Virginia 23229-5014

(804) 287-1628

Submitted by:

Philip H. Stevenson
Consulting Ecologist
P.O. Box 17144
Richmond, Virginia 23226

(804) 342-0074

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Introduction

The Soil Conservation Service currently seeks to create an impoundment of Cedar Run, Fauquier County, Virginia, near the town of Auburn. For the environmental assessment of the proposed project, the Soil Conservation Service funded a survey to determine the presence of the federally listed-endangered dwarf wedgemussel (*Alasmidonta heterodon*), the state endangered brook floater (*Alasmidonta varicosa*), and other freshwater mussel species (family Unionidae) within and adjacent to the pool area of the proposed reservoir.

The initial survey reported a single live dwarf wedgemussel from within the proposed pool of the reservoir (Stevenson, 1993). A second survey performed in 1994 found no further specimens of Unionidae attributable to the dwarf wedgemussel (Stevenson, 1994). Additionally, the findings of the second survey indicate that the mussel specimen originally designated as a specimen of the dwarf wedgemussel is in error.

Methods

This report provides a descriptive analysis of the specimen of eastern floater (*Anodonta cataracta*) originally designated as a specimen of dwarf wedgemussel (*Alasmidonta heterodon*). I will report the analysis in relation to included photography of specimens of dwarf wedgemussel (*Alasmidonta heterodon*) and eastern floater (*Anodonta cataracta*). All photography was reproduced by color xerography from original figures created using enlargements of original print negatives or negatives prepared from slide photography.

The mussel specimens referenced in this report appear in Figures 1-4. These figures appear on the following pages and illustrate the differences between dwarf wedgemussels, typical eastern floater specimens, and the specimen misidentified in 1993. All figures indicate the dorsal and anterior sides of the specimens. All specimens in a given figure are oriented identically and are three times life size.

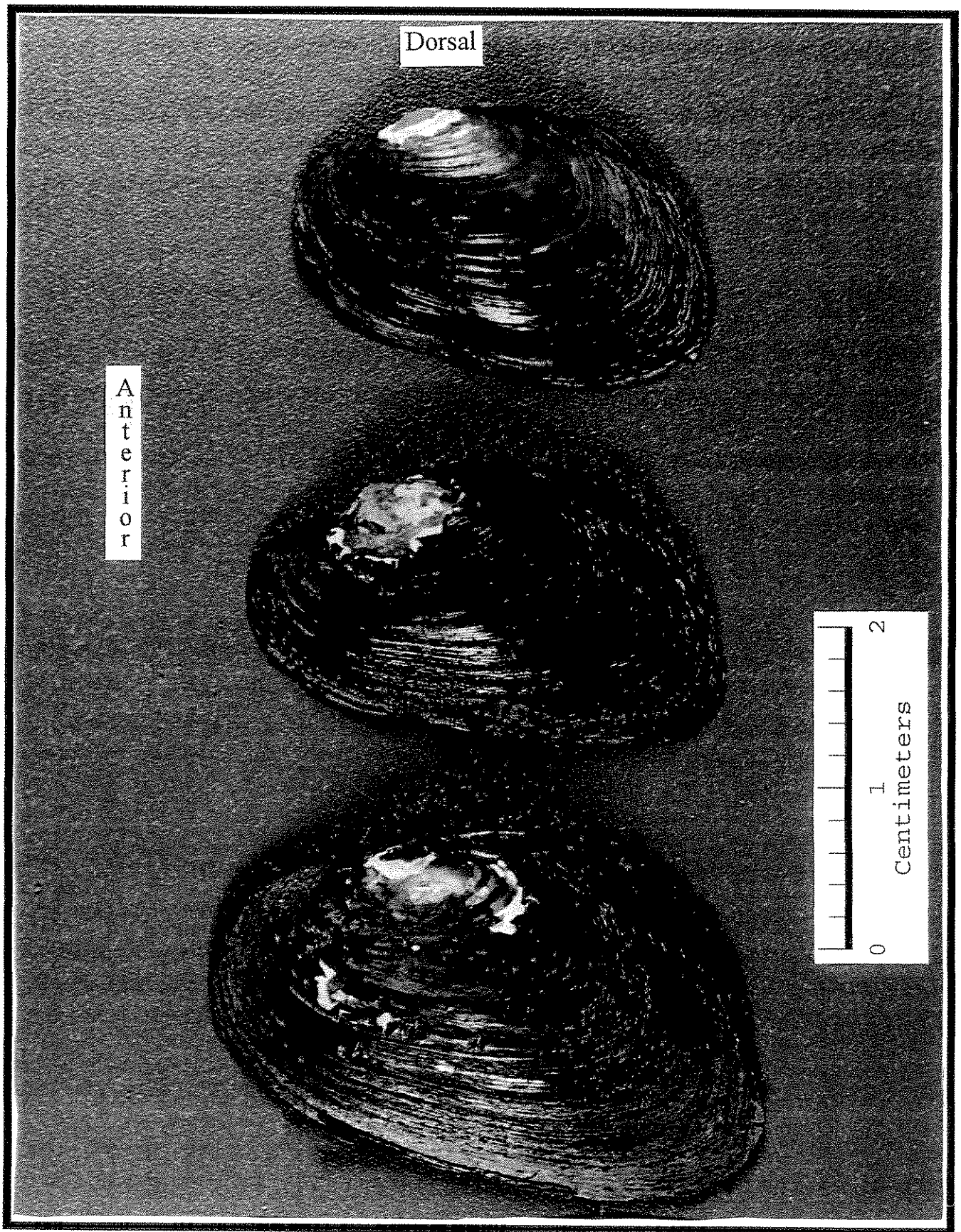

Figure 1. Dwarf Wedgemussel(*Alasmidonta heterodon*), 3X life size.

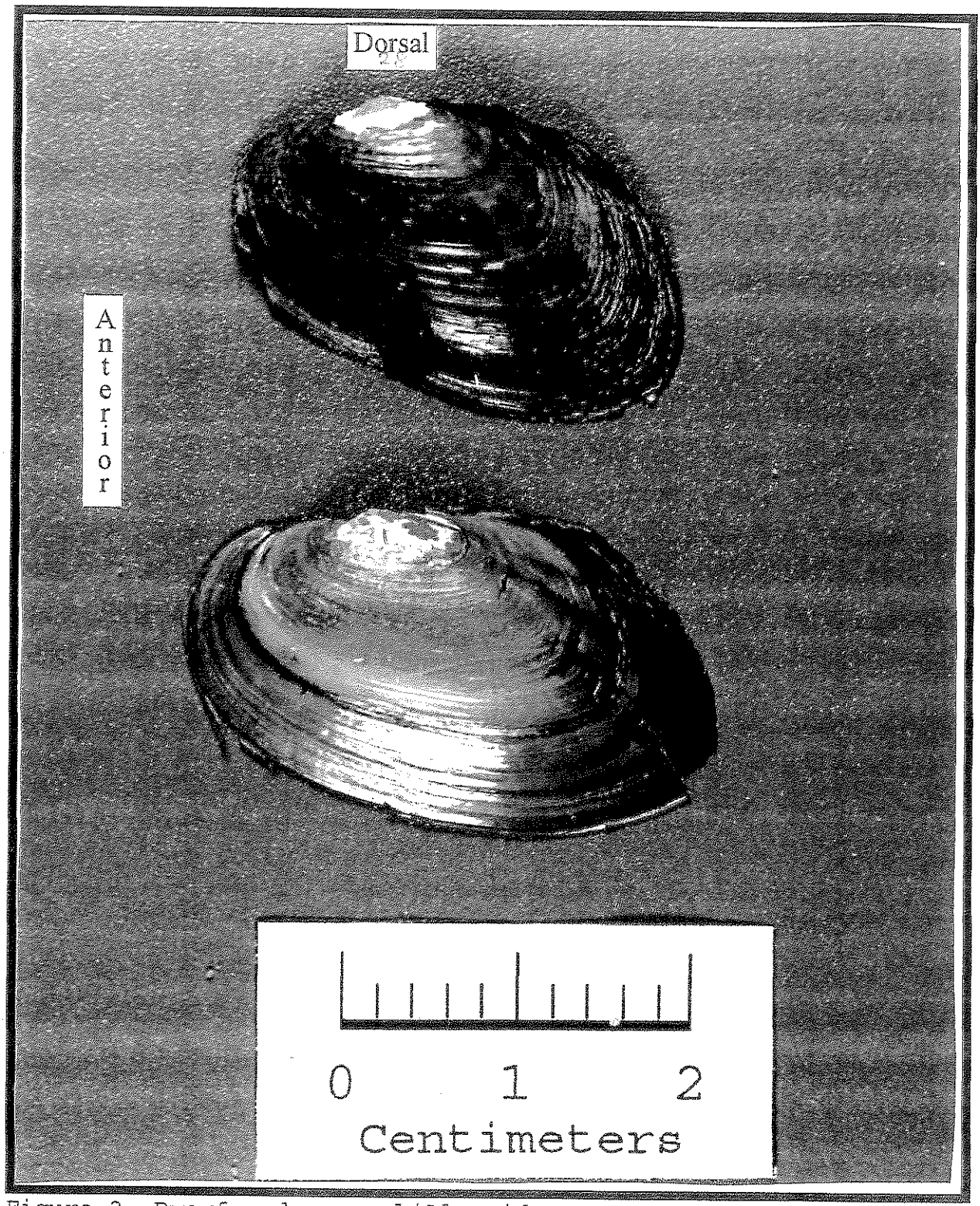

Figure 2. Dwarf wedgemussel(*Alasmidonta heterodon*)(upper specimen) and normal eastern floater(lower specimen) (*Anodonta cataracta*). 3X life size.

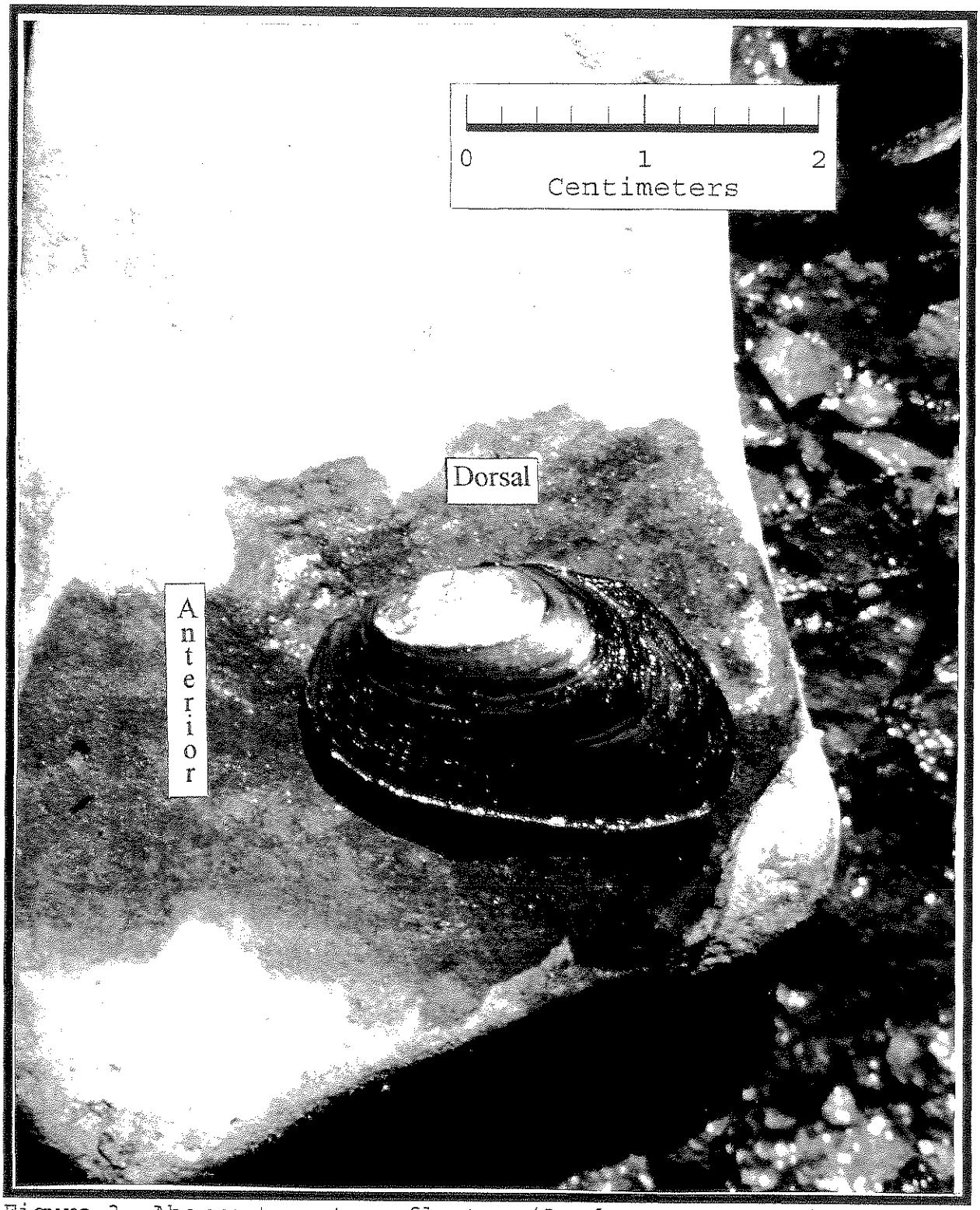

Figure 3. Aberrant eastern floater (*Anodonta cataracta*), misidentified as a dwarf wedgemussel in 1993. 3X life size.

Figure 4. Aberrant eastern floater (*Anodonta cataracta*), smaller specimen, and a normal eastern floater, larger specimen. Note orientation change from earlier figures. specimen. 3X life size.

Discussion and Analysis

Figure 1 shows three dwarf wedgemussels (*Alasmidonta heterodon*). The specimens depict the generalized typical form of the dwarf wedgemussel and its variation. Of particular note, the uppermost specimen is the least typical while the lower two are more typical in shape.

The lowermost specimens each clearly depict the standard shape. One notable feature is the descending ventral margin. This feature combined with the truncated and obliquely descending posterior margin give the shells the characteristic "wedge" shape. Note how the more rounded shape of the uppermost specimen of Figure 1 makes the general wedge shape obscure.

The position and orientation of the umbo is also noteworthy. The umbos of the Figure 1 mussels are the somewhat eroded areas near the dorsal margin. The umbo represents the oldest portion of the valve and is naturally at the center of the generally concentric growth of the valve. The umbos relatively forward position should be noted as well as the somewhat pointed shape. The umbo tends to have somewhat typical shape, position, and orientation for a particular species, species group, or genera.

Another significant feature is the prevalence of green color in the uppermost specimen. Close inspection also reveals a tendency for the ventral margin to be somewhat concave in the anterior portion of both upper specimens. Other features to observe are the roughness of the periostracum (the outer covering of the shell), the number and close spacing of growth rings, and the slightly recurved dorsal margin (partially obscured by the umbo).

Figure 2 shows the uppermost dwarf wedgemussel of Figure 1 with a similar-sized typical specimen of eastern floater (*Anodonta cataracta*). The eastern floater differs markedly from the dwarf wedgemussel. Many features differ from those described earlier.

The eastern floater has a more convexly rounded ventral margin and posterior margin. The furthest extension posteriorly of the shell is more toward the dorsal side than in the wedgemussel. The umbo is also more centrally located along the dorsal margin.

Another feature where the typical eastern floater differs from the dwarf wedgemussel is the smoothness of the shell. There are fewer growth annuli. The shell is a much lighter color that is yellowish and light green. Also, there is a greater sharpness with which the dorsal margin angles to meet the rounded descending posterior margin. The sharp angle is the basis of a slight wing or alation that may be present in larger shells.

Features which are difficult to graphically depict also differ between the two species. The eastern floater is more compressed than the dwarf wedgemussels. The shell is thinner and flexes more when pressed between one's fingers.

The dwarf wedgemussel also will generally have a more distinct posterior ridge and steeper posterior slope than the eastern floater. The posterior ridge is the general area of the shell which extends usually from the umbo to the meeting of the posterior and ventral margins. The posterior slope refers to the area of the shell which slopes from the posterior ridge toward the posterior margin. The form of the posterior ridge and the posterior slope tend to be related to the relative width of the shell and have typical characteristics for many species.

Figure 3 shows the specimen of eastern floater which was misidentified. Figure 4 shows the same specimen alongside a larger and more typically shaped specimen of the eastern floater. Both specimens were found in Cedar Run near the same location on October 5, 1993.

The Figure 3 specimen more closely resembles a dwarf wedgemussel in general shape than a typical eastern floater. The ventral margin is straighter and there is some concavity to the shell along this margin in its anterior portion. The dark green appearance of Figure 3 slightly exaggerates the green of the specimen; nonetheless, the specimen's color and darkness more closely resemble that of the dwarf wedgemussel.

This aberrant specimen seems to have a more anteriorly positioned umbo than typical for eastern floater. The shell seems to have more crowded growth lines. When found, the shell felt more

solid to the touch than what I would expect for the eastern floater. Also, the shell seemed more inflated with a more prominent posterior ridge than recently seen comparably-sized eastern floater shells.

Some features more closely resemble those of the eastern floater. The sharpness of the angle where the dorsal margin meets the posterior margin seems closer to that of the eastern floater than the dwarf wedgemussel. While the growth rings are more closely crowded on the Figure 3 specimen, the periostracum surface seems smoother like that of the eastern floater. The straightness of the dorsal margin concurs more with the eastern floater than the dwarf wedgemussel.

The erosion of the umbo area makes this feature hard to decipher for the Figure 3 specimen. The position does not preclude either species. The umbo's flatness and an interpretation of the umbo as rounded and oriented dorsally seems more consistent with an eastern floater shell than the dwarf wedgemussel.

Additional factors led to the initial identification. I handled very typical eastern floaters of similar and smaller size the prior week while sampling at Cedar Run. As such, this specimen's shape is surprisingly different. As shown in Figure 4, I had discovered a relatively typical eastern floater at the same site. The habitat where the aberrant specimen was found was very rocky lotic habitat, more appropriate in general for dwarf wedgemussel than eastern floater. No similar shells were found which I could compare to the specimen. The specimen never gaped during the time which I observed it in hand and or after returned to the stream. I do not believe that any observations of such would have been definitive inasmuch that detailed color observations of neither species soft parts are available which would definitively separate them. The conditions of my collecting permit would not allow me to collect such a specimen, if I believed it to be a dwarf wedgemussel.

The most significant factor in weighing for a re-identification of the 1993 specimen consisted of finding a similar

specimen with an additional year's growth that resembled that of typical eastern floater. This specimen was discovered during the second survey prompted by the initial survey report. Many features observable on the newly discovered and collected specimen correlate to those which rendered the 1993 aberrant specimen difficult to correctly identify.

The newer specimen exhibited the same darkness of color, crowded growth annuli, and ventral margin concavity as the 1993 specimen. It appears that such features may result from living in faster waters with rocky substrate. The concavity is most likely the result of some shell damage from shifting rock. The darkness of color and the crowding of annuli seem to be the result of stunting of growth.

Another factor consistent with the re-identification of the specimen is the subsequent survey results. The subsequent mussel survey did not reveal any specimens of dwarf wedgemussel. As such, given the increased search effort and an intensive search of the original site of the aberrant specimen, the evidence weighs heavily against the specimen being a dwarf wedgemussel.

All factors considered, the original 1993 report of a dwarf wedgemussel from Cedar Run seems erroneous. The shell morphology, while not wholly inconsistent with the dwarf wedgemussel is neither wholly inconsistent with the eastern floater. The find of another aberrant specimen and the overall fauna survey results are consistent with the original identification being misapplied. The reasonable conclusion from the information is that the 1993 specimen should be reported as an eastern floater.

References

Stevenson, Philip H. 1993. A Survey of the Freshwater Mussel Fauna in Cedar Run, Fauquier County, Virginia (Contract SCS-37-VA-93). Unpublished report to U. S. Department of Agriculture, Soil Conservation Service, Richmond, Virginia.

Stevenson, Philip H. 1994. A Second Survey for Freshwater Mussel Fauna in Cedar Run and Mill Creek, Fauquier County, Virginia (Contract SCS-10-VA-94). Unpublished report to U. S. Department of Agriculture, Soil Conservation Service, Richmond, Virginia.