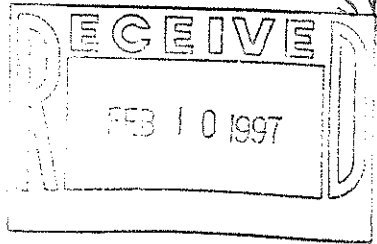


6404  
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Stevenson  
1996

COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION  
1401 EAST BROAD STREET  
RICHMOND, 23219-1939

DAVID R. GEHR  
COMMISSIONER

EARL T. ROBB  
ENVIRONMENTAL ENGINEER

February 5, 1997

Route 95  
Project: 0095-089-F08-PE101-6404  
0095-089-F09-PE101-6807  
Stafford County  
Potomac and Accokeek Creeks

MEMORANDUM

To: Mr. Bob Pickett  
Attn: Ms. Kim Vanness

Attached is the mussel report that Phil Stevenson completed in November, 1996 for KCI, Technologies, Inc.

Mr. Stevenson found 219 common mussels in Potomac Creek and none in Accokeek Creek. He indicated in the report that the dwarf wedgemussel is not likely to be found in either stream.

Based on these results, no further mussel work will be completed on these projects.

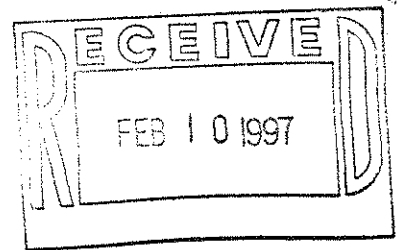
Richard C. Woody II  
Environmental Program Manager

By:

William G. Beuter  
Environmental Program Planner

Attachment

- cc: Ms. Lesa Berlinghoff  
Mr. William Hester  
Mr. Tom Wilcox  
Dr. Richard J. Neves



A Survey for Freshwater Mussel Fauna in  
Potomac Creek and Accokeek Creek,  
Stafford County, Virginia  
Adjacent to Interstate 95 Crossings

Submitted to:

KCI Technologies, Inc.  
8840 Rixlew Lane  
Manassas, VA 22110

KCI Project No. 06-94070  
VDOT Project No. 0095-089-F08  
0095-089-F09

Submitted by:

*Philip H. Stevenson*

Consulting Ecologist  
5251-18 John Tyler Highway, Suite 111  
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Phone (804) 342-0074

November 10, 1996

## Introduction

The Virginia Department of Transportation currently seeks to widen Interstate-95 in Stafford County, Virginia. After review of this project, the United States Fish and Wildlife Service and Virginia's Department of Game and Inland Fisheries (VDGIF) recommended a survey for potential habitat for populations of a listed endangered freshwater mussel, the dwarf wedgemussel, *Alasmidonta heterodon*. Additionally, VDGIF recommended survey for the brook floater, *Alasmidonta varicosa*, a state-listed endangered species. KCI Technologies, Inc., as project planning consultants, requested Philip H. Stevenson to undertake a survey of Potomac Creek and Accokeek Creek to determine the presence of the dwarf wedgemussel and other freshwater mussel species.

## Methods

Potomac Creek and Accokeek Creek in Stafford County, Virginia were surveyed for the presence of rare freshwater mussels. The survey focused on the dwarf wedgemussel, a federally-listed endangered species. The area surveyed extended from 400 meters downstream of the northbound lanes of I-95 upstream to 100 meters above the southbound lanes of I-95. Figure 1 indicates the Accokeek survey area. Figure 2 indicates the Potomac Creek survey area. Each figure is derived from a selected portion of the U.S.

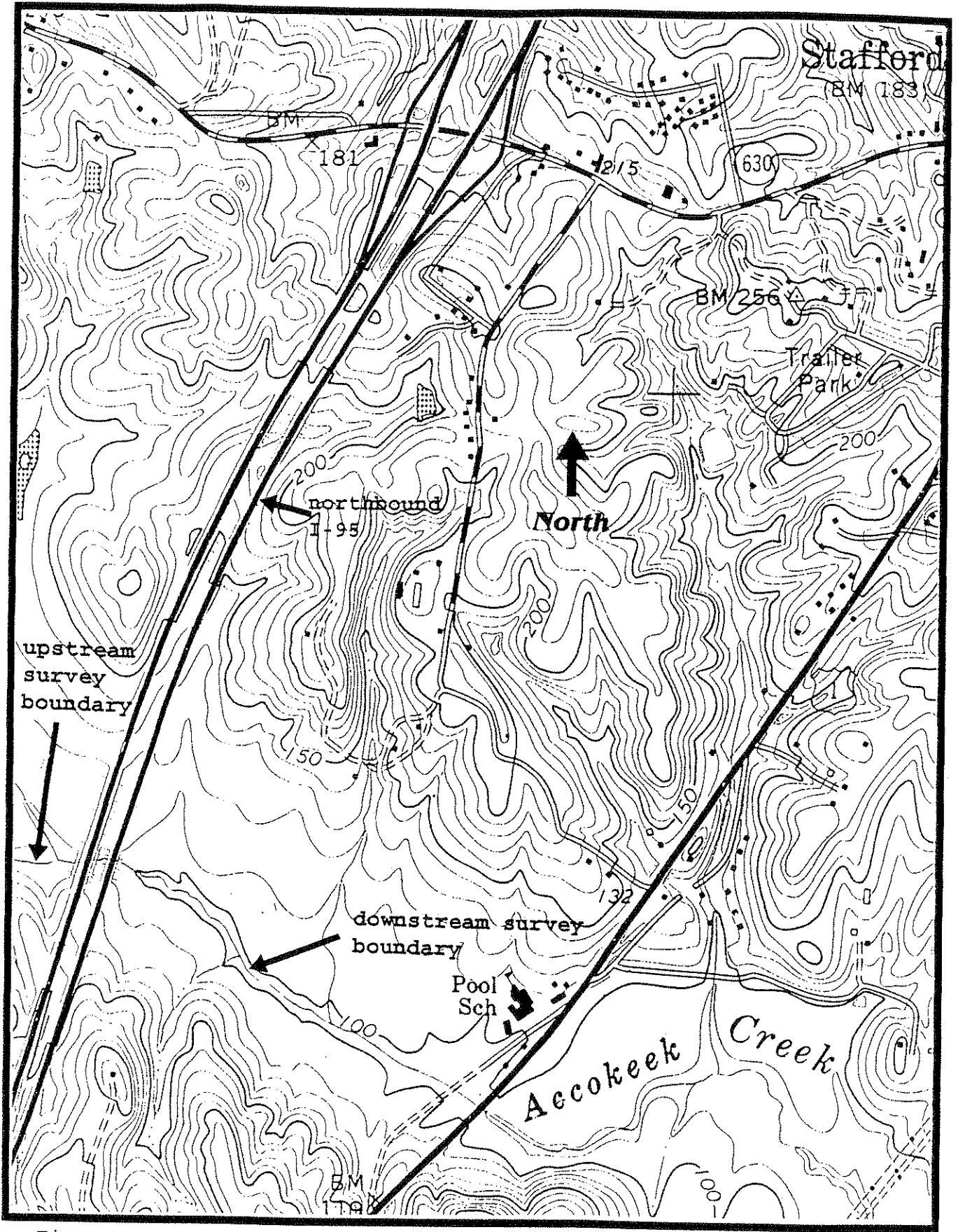


Figure 1. Mussel Survey Site in Accokeek Creek, Stafford County, Virginia (U.S.G.S. Stafford, Va. Quadrangle; 1:12,000)

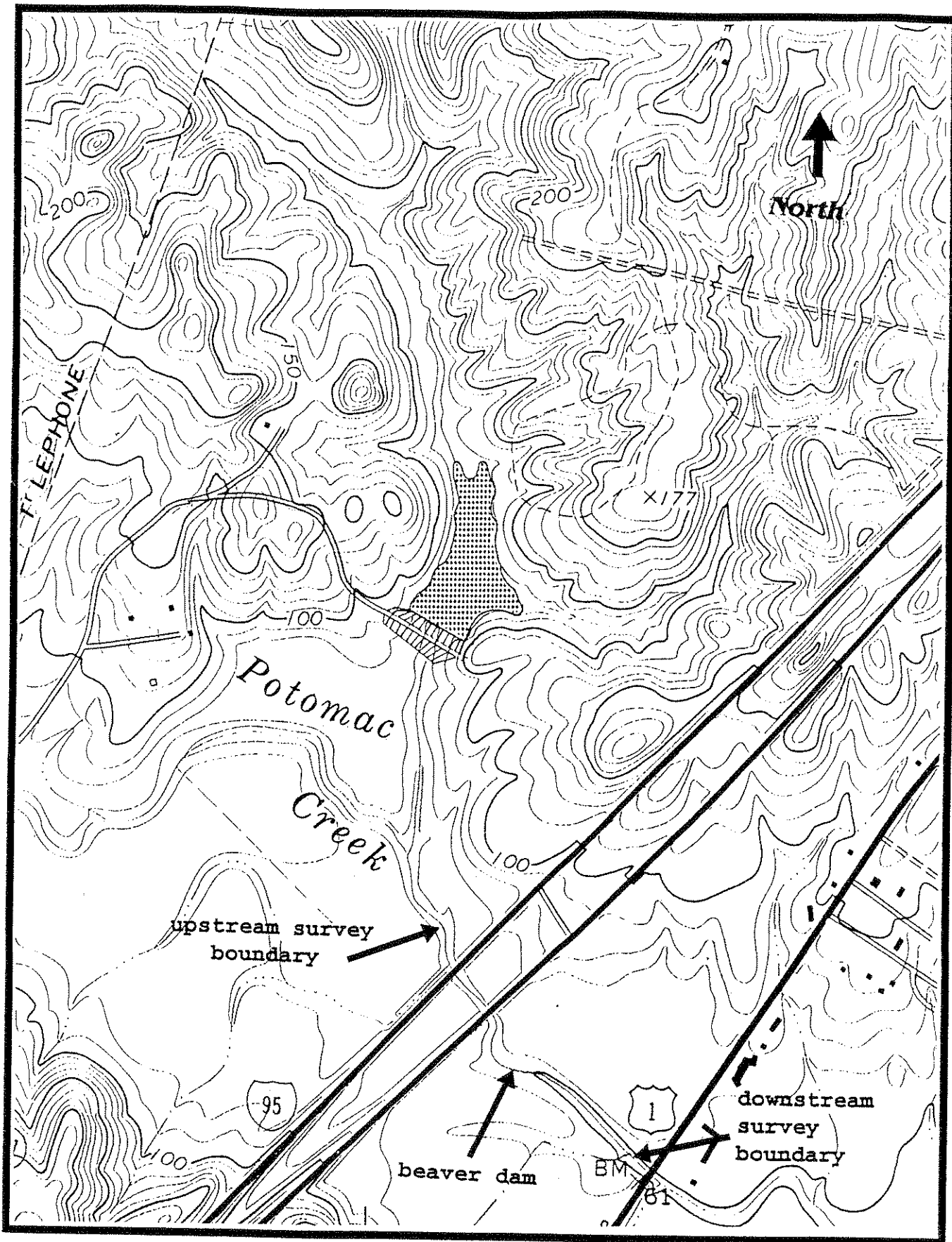


Figure 2. Mussel Survey Site in Potomac Creek, Stafford County, Virginia (U.S.G.S. Stafford, Va. Quadrangle; 1:12,000)

Geological Survey topographic map of the Stafford, Va. 7.5 minute quadrangle. The author added annotations to indicate the approximate site of survey area boundaries and any other relevant features.

The survey focused on the dwarf wedgemussel, a federally-listed endangered species. Intensive searching was largely limited to those areas of habitat which are considered to be significant for the dwarf wedgemussel, generally riffles and sandy run/glide habitats. (Johnson, 1970; Michaelson, 1993). Searching avoided overtly inappropriate habitats such as those with substrates of soft mud or thick detritus. Beaver ponds were generally avoided when encountered as they usually constituted pool habitats with mud substrates. Habitats searched intensively for dwarf wedgemussel overlap those considered to be significant for the brook floater, *Alasmidonta varisosa*. (Clark and Berg, 1959; Johnson, 1970).

Survey methods included snorkeling, waterscoping, handpicking, and raking the substrate. Use of mask and snorkel was generally performed in appropriate habitats over 0.5 meters deep. Waterscoping was generally performed in water that was 0.5 meters deep or shallower. Very shallow water, under 0.1 meter deep, often was searched unaided. An underwater flashlight, a Princeton Tec 600, was used to aid searching in highly shaded areas. Substrate

raking using a garden rake with a screen basket was limited areas of largely sand, fine gravel, or mud substrate. In addition, stream banks and bars were searched for muskrat middens of discarded shells and shells deposited by flood. Field surveys occurred on August 31 and September 1, 1996. Philip H. Stevenson conducted the field survey.

### Results

The survey found four mussel species. Table 1 lists the species found and their federal and state status. No mussels were found in Accokeek Creek. Mussels were found only in Potomac Creek.

Scientific Name	Common Name	Federal Status	State Status
<i>Alasmidonta undulata</i>	triangle floater	None	None
<i>Anodonta cataracta</i>	eastern floater	None	None
<i>Elliptio complanata</i>	eastern elliptio	None	None
<i>Strophitus undulatus</i>	squawfoot	None	None

Table 1. Mussels Found in Potomac Creek  
Stafford County, Virginia

The following sections describe the stream habitats and relevant fauna as revealed by the survey.

#### Accokeek Creek

Accokeek Creek was a well-shaded moderate to low gradient creek, with a stream bed averaging 7-8 meters wide. The actual portion of the bed under water varied from roughly 1 meter in

riffle areas of faster flow to the entire bed width in shallow pool habitats.

The stream habitat largely consisted of pool/glide habitat with short riffles dispersed throughout. Pools generally were 0.1-0.4 meters deep, with very limited deeper spots, almost never over 0.8 meters deep. Riffle zones were very shallow, under 0.1 meter deep. The length of riffle areas was generally short, from 5-10 meters long.

Substrate tended to be predominately sand in the pool and slow-flowing habitats. The major exception was the presence of bedrock exposures in the deepest areas of pools. Very little detritus and mud/silt substrate was observed. Riffle areas generally had a coarser substrate of gravel and small cobbles and were bordered by bars of the same composition.

Stream banks tended to be low, less than one meter high, usually moderately to well vegetated. Trees lined the banks throughout the survey area. The surrounding land was second growth hardwood forest except in the vicinity of I-95. Water visibility was excellent on the day of the survey.

The downstream area surveyed tended to be dominated by long pools with dispersed short riffles along its length. Raking in the sandy substrates here produced only fingernail clams, family



Sphaeriidae. No other mollusks were observed here as was the case throughout the survey area.

The stream habitats changed noticeably in the region of wider undulation of the stream channel. The downstream boundary of this region was located roughly 150 meters upstream of the downstream survey boundary. This region of wider undulation extended upstream from that point to roughly 50 meters downstream of the Interstate 95 Northbound crossing. The stream had a much larger proportion of riffle habitat in relation to other habitats and stream width narrowed somewhat. The pools tended to have sharply defined deep sections, these deep sections being largely bedrock lined. A number of trees fallen in the stream in this area created additional small areas of scoured stream bed.

Accokeek Creek was dominated by a long shallow pool on the downstream side of I-95 northbound. This pool had a nearly pure sand substrate. Raking here produced fingernail clams; however, their abundance seemed lower than further downstream. A short flowing section bounded this long shallow pool on its upstream end. This short flowing section created a transition of the stream from a relatively short, deep pool, bedrock lined in part immediately downstream of I-95 northbound.

The stream flowed through concrete box culverts from a short intervening stretch between the lanes of I-95. The intervening stretch was a long, relatively deep pool with a muddy substrate. Sampling here found no mollusks.

The stretch of Accokeek Creek upstream of I-95 was very similar to that in the higher gradient, more undulating area located downstream of I-95. The stream had narrow gravel and cobble lined riffles. Pools had a coarser substrate than in downstream areas, containing much gravel in addition to sand. Similar to the downstream areas, the deepest sections of pools had a bedrock substrate. Fingernail clams seemed relatively uncommon here.

Fish were present throughout Accokeek Creek in low numbers. I observed cyprinids and darters. The darters were *Etheostom olmstedii*, a documented host for the parasitic glochidial stage of dwarf wedgemussel, (Michaelson, 1993).

#### Potomac Creek

Potomac Creek was a moderate gradient small creek. This creek's bed width was generally 8-9 meters wide. The stream was typically well shaded except adjacent to I-95 and immediately downstream of the highway. Stream habitats varied considerably, generally consisting of relatively narrow riffles 1-2 meters wide

separating much wider and longer sections of pool habitat or glide habitat.

Pools generally were 0.1-0.4 meters deep, with very limited deeper spots, up to one meter deep. Riffle zones were very shallow, roughly 0.1 meter deep. The length of riffle areas was generally short, from 10-15 meters long.

Substrate tended to be predominately gravel/sand in the pool and slow-flowing habitats. The major exception was the presence of bedrock exposures in the deepest areas of pools. Detritus and mud/silt was observed to cover the substrate with a very light layer in some of the quieter pool habitats. Riffle areas generally had a coarser substrate of gravel and small cobbles and were bordered by extensive bars of the same composition.

Stream banks tended to be low, one to two meters high, usually moderately to well vegetated. Trees lined the banks throughout much of the survey area. The surrounding land was second growth hardwood forest generally downstream of I-95. Closer to I-95, the land was partially cleared away from the stream and appeared to be very open hardwoods or old field habitats in part.

Scientific Name	Water search	Bank Search	Total
<i>Alasmidonta undulata</i>	2L/0R	0L/4R	2L/4R
<i>Anodonta cataracta</i>	1L/1R	0L/1R	1L/2R
<i>Elliptio complanata</i>	211L/39R	4L/39R	215L/78R
<i>Strophitus undulatus</i>	1L/1R	0L/5R	1L/6R

Table 2. Mussels Found in Potomac Creek  
Stafford County, Virginia

L=Live, R=Relict shell

Mussels were found throughout the survey area. Table 2 lists the number of individuals found live or as relict specimens. The table reports the specimens found based on the search technique and the search time spent in that effort. Also found throughout the search area was the asiatic clam *Corbicula fluminea*.

The furthest area downstream searched was a moderate pool located adjacent to an intermittent tributary. A moderate population of mussels was found in this pool. The pool depth had a maximum of roughly 0.5 meters along the ascending right side. Most mussels were observed along this right margin.

A moderate sized riffle along the ascending left side bordered the upstream end of this pool. The riffle had a coarser substrate than the pool, with small cobbles predominating. Some gravel and sand was present also. Mussels were moderately common in this riffle. Throughout the survey area, deeper areas of riffle tended

to have small concentrations of mussels. The adjacent bar also had numerous mussel shells on it.

Upstream from this area, Potomac Creek had a long stretch of alternating pool and glide habitat, with a moderately finer substrate, being largely gravel and pebbles. Mussels were distributed throughout in low numbers tending to clump near where water was shallow and flow was faster. The deepest section of the pool here had a bedrock substrate that was largely swept clean of finer particles. Riffle areas at the upstream end of this stretch of creek had a similar concentration of mussels in them as the downstream riffles. Mussel shells, including two live individuals, were found on the bordering gravel bars.

Mussels became progressively less common nearer the beaver dam. The beaver dam itself only slightly raised the level of the stream as there were long deep bedrock-lined pools generally disposed between the dam and I-95. This was overtly inappropriate habitat in the region of the bedrock exposures which constituted the majority of the deeper habitat.

The reach of stream intervening between the lanes of I-95 was a generally cobbly shallow pool area, moderately well-shaded with a modest number of mussels present. I also found several live

*Elimia virginica* snails, family Pleuroceridae, here. The only live specimen of eastern floater was found here also.

The reach upstream of the southbound lanes of I-95 resembled the stream in the lower portion of the survey area. Mussels were relatively uncommon, but were concentrated in a short riffle section circa 40 meters upstream of the bridge. Again, live mussels in addition to shells were found while searching the exposed bar areas.

Potomac Creek seems subject to scouring flood. This is consistent with the bedrock exposures common in the deepest sections of pool areas. Also, the presence of live mussels on dry bar areas indicates that mussels are frequently subject to mortality from such scouring action. Dwarf wedgemussels seem to inhabit streams that have relatively stable substrates, as opposed to the circumstances observed here.

#### Discussion

The dwarf wedgemussel in Virginia recently always has been found in streams containing other species of freshwater mussels. (Riddick, 1973; Stevenson, 1995; Neves, R.J., VPI&SU, pers. comm.). Additionally either fingernail clams, family Sphaeriidae or *Corbicula* occur at these sites also. At the only sites were I have found live dwarf wedgemussels, fingernail clams have been found.

Besides bivalves, I have noticed that snails of either Viviparidae or Pleuroceridae occur in a stream where the dwarf wedgemussels occur, although both snail taxa have much broader distributions.

Accokeek Creek does not appear to support a population of freshwater mussels in the survey area. This is a highly negative factor for the potential occurrence of dwarf wedgemussels. The lack of snail fauna also is consistent with sites that have no populations of dwarf wedgemussel or other rare mussels. While the presence of fingernail clams seems a positive indicator generally, these clams are typical of many headwater areas that do not support freshwater mussels. The presence of a documented host for dwarf wedgemussel also does not itself support any additional evidence of dwarf wedgemussel presence, given that this is one of the most widely distributed fish species in eastern Virginia. This survey result is also consistent with a survey which I performed in Accokeek Creek on October 8, 1993, finding an identical mollusk fauna at the Route 608 crossing, located downstream of Route 1.

Potomac Creek seems highly variable in suitability for freshwater mussels. It supports a moderately good population of freshwater mussels; however, other fauna observations seem to indicate lower quality of the habitat. No viviparid snails were seen. The pleurocerid snail *Elimia virginica* was present in very

low numbers. No fingernail clams were seen and *Corbicula* clams were present and common. These survey results are similar to those of a survey I performed in 1993 at the Route 626 bridge crossing of Potomac Creek, the only difference being the higher number of mussel species found in this site.

The disjunct distribution of fingernail clams and *Corbicula* I have seen in Virginia is well exemplified by these two streams, with only one or the other taxa found in a stream. I also have noticed that very small unionids, while always uncommon, are almost never encountered in streams with *Corbicula* whereas I find them regularly in streams without *Corbicula*. I believe that there is a negative interaction of the asiatic clam and native bivalves, particular small individuals. Given that the dwarf wedgemussel is a small species, the observed current distribution of dwarf wedgemussel favoring *Corbicula*-free streams in Virginia tends to bear this out.

#### Summary

Neither stream survey found either the dwarf wedgemussel, *Alasmidonta heterodon*, or any other protected species. Additionally, the Accokeek Creek survey found no freshwater



mussels. The Potomac Creek survey found four species of freshwater mussel. The species found in order of decreasing abundance are:

eastern elliptio

triangle floater

squawfoot

eastern floater

The lack of any mussel species and no populations of either Pleuroceridae or Viviparidae snails seem to indicate extremely low likelihood of the presence of dwarf wedgemussel or other rare mussel in Accokeek Creek. In Potomac Creek, the presence of freshwater mussels, while positive, is balanced by the lack of fingernail clams, lack of viviparid snails, low numbers of pleurocerid snails, presence of *Corbicula*, and lack of other rare mussel species. It is unlikely that dwarf wedgemussel occurs in Potomac Creek.

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