



# **The Distribution of Submersed Aquatic Vegetation in the Fresh and Oligohaline Tidal Potomac River, 2005**

By Nancy B. Rybicki, Erika M. Justiniano- Vélez, Edward R. Schenk, Julie M. Baldizar and Sarah E. Hunter



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**Cover:** Summer 2005 aerial photo of Dogue Creek and the Potomac River showing  
extensive dark areas of submersed aquatic vegetation.  
Photograph from Virginia Institute of Marine Science,  
[http://www.vims.edu/bio/sav/2005\\_SAV\\_Photo\\_Gallery/pages/126-13\\_sept13-05.htm](http://www.vims.edu/bio/sav/2005_SAV_Photo_Gallery/pages/126-13_sept13-05.htm)

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## Conversion Factors

Multiply	By	To obtain
<b>Length</b>		
inch (in.)	2.54	centimeter (cm)
inch (in.)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
mile, nautical (nmi)	1.852	kilometer (km)
yard (yd)	0.9144	meter (m)
<b>Area</b>		
acre	4,047	square meter (m <sup>2</sup> )
acre	0.4047	hectare (ha)
acre	0.4047	square hectometer (hm <sup>2</sup> )
acre	0.004047	square kilometer (km <sup>2</sup> )
hectare	10000	square meter (m <sup>2</sup> )
hectare	0.01	square kilometer (km <sup>2</sup> )

square foot (ft <sup>2</sup> )	929	square centimeter (cm <sup>2</sup> )
square foot (ft <sup>2</sup> )	0.0929	square meter (m <sup>2</sup> )
square inch (in <sup>2</sup> )	6.452	square centimeter (cm <sup>2</sup> )
square mile (mi <sup>2</sup> )	259	hectare (ha)
square mile (mi <sup>2</sup> )	2.59	square kilometer (km <sup>2</sup> )
square meter (m <sup>2</sup> )	0.000001	square kilometer (km <sup>2</sup> )

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## Introduction

Submersed aquatic vegetation (SAV) is a critical component of the Potomac River ecosystem (Fig. 1). Though SAV provides important habitat for fauna and stabilizes bottom sediment, very dense beds may restrict recreational and commercial navigation. Exotic species of SAV are managed by the Metropolitan Washington Council of Governments Potomac Aquatic Plant Management Program (PAPMP). Selected beds of primarily exotic SAV species that limit navigation are harvested mechanically. The program began in 1986 when approximately 40 acres of plants were harvested from 18 sites (Fig.1, Metropolitan Washington Council of Governments 1987).

Monitoring efforts are an effective means of quantifying the distribution and abundance of the exotic species, *Hydrilla verticillata* (hydrilla) and other SAV species. These annual surveys provide a basis for identifying large-scale changes and trends throughout the ecosystem and allow managers to evaluate the effectiveness of resource management policies based on a reliable scientific foundation (Rybicki and Landwehr, 2007). The U.S. Geological Survey (USGS) has monitored the distribution and composition of SAV beds in the fresh and oligohaline (salinity 0.5 to 5) tidal Potomac River since 1978 using transect sampling (1978 to 1981, 1985 to 1987, and 2002) and shoreline surveys (1983 to 2005). The Government of the District of Columbia has monitored the portion of the Potomac and Anacostia Rivers within Washington DC since 1998 (Rottman, 1999; Ryan, 2005, 2006).

The species of SAV observed in beds in the tidal Potomac River are incorporated into the Virginia Institute of Marine Science (VIMS) annual report on SAV distribution in Chesapeake Bay. The VIMS report and methods are available at <http://www.vims.edu/bio/sav> (Orth et al., 2006). Additional publications concerning SAV distribution in the Potomac River can be found at <http://water.usgs.gov/nrp/proj.bib/sav/wethome.htm>.

## Methods

The study area in the Potomac River was divided into three reaches: 1) upper tidal river (UTR) from Washington, DC to Dogue Creek, VA; 2) lower tidal river (LTR) from Dogue Creek, VA to Quantico, VA; and 3) upper oligohaline estuary (UOE) from Quantico, VA to the downriver side of Maryland Point, MD (Figs. 1 to 5).

Observations of species composition in SAV beds were done by boat at approximately low tide ( $\pm 2$  hrs) so that plants were visible from the water surface. Surveys were conducted between August and October 2005. We identified submersed plants to species level, recorded species composition of each bed, and estimated percent cover of each species within the bed. As in previous years, USGS monitored areas downriver of the Woodrow Wilson Bridge (Interstate 95) while colleagues at the Fisheries Division of the District of Columbia Department of Health (DCDOH) examined Washington DC waters in the tidal Anacostia and Potomac Rivers (Rottman 1999; Ryan 2005).

The monitoring effort in 2005 consisted of a continuous survey of all shoals and SAV beds within the study area (Fig. 1). SAV field beds are the isolated or contiguous SAV beds of different species composition sampled by boat. USGS personnel outlined SAV beds on 1:24,000 scale USGS quadrangle maps indicating location of all observations including unvegetated shoals (see Ruhl et al. 1998). DCDOH personnel used a global positioning system (GPS) to delineate the perimeter or length of beds and to record locations of each field bed. The SAV beds documented by the USGS and DCDOH were then entered into a geographic information system (GIS) to create maps of distribution and abundance. The percent of each species, the Shannon diversity index, and the bed density for each field bed are listed in Table 1. The Shannon diversity index for each field bed is calculated as:

$$\text{Diversity} = -1 * \sum_{v=1}^M ((P_v/100) * \ln (P_v/100)) \quad 1$$

where M represents richness (the total number of species observed) and  $P_v$  represents the proportional coverage (from 0 to 100 percent) of each species. Diversity in each bed can range from 0.00 (if one species is present) to 2.49 (if all 12 species commonly found in the Potomac are present in equal percentages). Field bed observations, classified by the percent cover of *Hydrilla verticillata*, are shown in figures 2 to 4. The species percent cover data shown in Table 1 correspond to field bed locations shown in figures 5 to 11

SAV beds shown in figures 12, 13, and 14 were delineated by VIMS (<http://www.vims.edu/bio/sav/>) based on aerial photographs acquired between August and October, then digitized and classified for ground cover density (from estimates of percent cover). The area and density of each photo-interpreted (PI) bed was determined by VIMS. Density was determined using the Crown Density Scale adapted from Paine (1981). Bed densities range from one to four with one corresponding to less than 10% vegetation coverage, two representing between 10 and 40% coverage, three representing between 41 and 70% coverage and four corresponding to 71 to 100% coverage. The

corresponding field data on species composition. Some beds were visible with air photos but not observed in the field if the area was not navigable due to water depth or obstacles. The VIMS SAV coverage data did not include beds below their detection limit. Therefore beds shown in figures 2 to 4 and figures 12 to 14 do not correspond exactly.

The percent of each species in the three river segments (UTR, LTR, UOE) is summarized in the results section. The area of each species within a VIMS PI bed is computed based on a weighted-average formula. Using GIS software, we aligned each of the field beds with the PI beds to determine the area of each field bed and subsequently to calculate the coverage by species in each PI bed where species data were available. If more than one field observation was made in a PI bed, we sub-divided the PI bed area according to the relative size of each field bed and averaged species data proportionally (weighted average) to determine the percentage of each species in a PI bed and in the cumulative area of the study in each river reach (Rybicki and Landwehr, 2007).

## Results

SAV coverage increased in all three river reaches between 2004 (Rybicki et al., 2007) and 2005 (Figs. 15 and 16). In many beds hydrilla provided > 40% of the coverage (Figs. 2 to 4). The shoreline survey included 291 observations of field beds of various sizes (300 m<sup>2</sup> to 400 km<sup>2</sup>) and density (Table 1). Most of the PAPMD harvest sites in the UTR, LTR, and UOE had 70 to 100 % cover (Figs. 12 to 14) and the beds were comprised of exotic species (Table 1; Figs. 2 to 4). Of the nine species observed in the Potomac River in 2005, three are exotic (hydrilla, *Myriophyllum spicatum* [milfoil], *Najas minor* [naiad]). Hydrilla dominated (> 40% of the coverage) all three river segments. Milfoil was abundant, but did not dominate any river segment. Naiad coverage comprised 13% and 9% of SAV coverage of the UTR and LTR, respectively, while only contributing to 3% of SAV coverage of the UOE. Two native species, *Ceratophyllum demersum* (coontail) and *Vallisneria americana* (wild celery) were abundant but did not dominate any river segment. Coontail coverage was similar in all three segments, ranging from 20% of the UTR to 19% of the LTR and 18% of the UOE. Wild celery comprised 4% of the UTR, 15% of the LTR, and 7% of the UOE SAV coverage. No *Elodea canadensis* (waterweed) was observed, but *Stuckenia pectinata* (sago pondweed) was present. Some species were relatively rare, namely the macroalgae *Chara vulgaris* (muskgrass), *Najas guadalupensis* (southern naiad), and *Heteranthera dubia* (stargrass).

The mean daily river flow for 2005 was 344 m<sup>3</sup>s<sup>-1</sup> and was considered normal, while the last two years were considered high flow. The 25 (low), 50 (median), and 75 (high) percentile of the mean daily flow is 243, 301 and 398 m<sup>3</sup>s<sup>-1</sup>, respectively, at the Washington DC gage (station 01646500) for the period of record (<http://waterdata.usgs.gov/nwis/sw>). The return to normal flow in 2005 may help explain why the SAV increased between 2004 and 2005 in all river segments (Fig 16).

### Upper Tidal Potomac River (UTR)

In the UTR, we found the following nine SAV species, in order from most to least abundant: 44% hydrilla, 20% coontail, 17% milfoil, 13% naiad, 4% wild celery, 1%



southern naiad, and traces of muskgrass, water stargrass, and sago pondweed. Compared to 2004, coontail, milfoil, and naiad coverage increased in 2005, while hydrilla and wild celery coverage decreased considerably.

No SAV was observed in the Anacostia River (Fig. 5), yet a few beds were present there in the past. Bed #267, which is in the Washington Channel, has been perennial for many years. That bed decreased in density between 2004 and 2005.

In Washington DC, in the Potomac River, SAV coverage increased substantially from 2004 to 2005. While hydrilla and wild celery alternated in dominance among beds in 2004, hydrilla dominated most beds in 2005. However, coontail coverage increased substantially in 2005 and naiad, which was not present last year, spread throughout much of the region. Hydrilla coverage was 100% in some DC beds (Table 1).

The Woodrow Wilson Bridge has been under re-construction since 2001 and is expected to be completed by 2010. Dredging, to allow for a barge channel below the bridge and between the bridge and the nearby Maryland shore, was conducted between November and February 2001 (<http://www.wilsonbridge.com>). The dredging caused the destruction of ~34 acres (14 ha) of SAV on the shoals near the Woodrow Wilson Bridge. Seagrass transplantation was conducted in the lower Potomac River as part of a compensatory mitigation to account for the SAV loss (Schenk and Rybicki, 2006). In 2002, except in the dredge path, the SAV on the shoals near the Woodrow Wilson Bridge was dense and extensive (<http://www.vims.edu/bio/sav>) (Orth et al., 2006). In 2003, however, precipitation and river flow were well above average and SAV on these shoals, and elsewhere in Washington DC waters, declined dramatically. The high sediment load and high flows apparently buried or scoured SAV away, or the cloudy conditions and muddy waters reduced available light reaching the bottom and diminished SAV productivity.

In 2005, SAV was abundant near the Woodrow Wilson Bridge for the first time since 2003. Large, dense beds were present at the mouth of Huntington Creek and in the middle of the Potomac River, just upstream of the Woodrow Wilson Bridge (Figs. 6 and 12). Naiad codominated (with hydrilla) in one bed in Huntington Creek and was also found in the Woodrow Wilson Bridge bed (Fig 2; Table 1). Vegetation along the Virginia side of the Potomac River downstream of Huntington Creek was intermittent and consisted mostly of dense hydrilla beds, but naiad was also found in many of these beds. Only trace amounts of milfoil were found in this area (Figs. 2, 3, 12, and 13).

Beds shown in figures 2 (field beds) and 12 (PI beds) do not exactly correspond. Above the Woodrow Wilson Bridge, some beds were only detected in the field. Below the bridge, some beds were only detected in photos.

Many of the beds on the mainstem of the Potomac were dominated by hydrilla but well mixed with other species too (Fig. 3; Table1). In Piscataway Creek (Maryland), hydrilla existed with naiad and coontail while trace amounts of milfoil were found. Beds in Piscataway Creek and Dogue Creek, that were previously dominated by hydrilla, are either dominated by hydrilla or are mixed beds with milfoil, coontail, and hydrilla (Figs. 3 and 7; Table1). Milfoil dominated the beds upstream of Little Huntington Creek (Virginia) and beds along the shoreline south to the lower extent of the UTR (Figs. 3 and 7; Table1). Between 2004 and 2005, there was an increase in coontail, hydrilla, and milfoil along the Maryland shore from Piscataway Creek to the lower extent of the UTR (Figs. 3 and 7; Table1).

The shore just upstream from Little Huntington Creek supported the only traces of chara in the entire study area (Figs. 3 and 7; Table1). Southern naiad was found in many of the beds, including the mouths of Swan Creek, Piscataway Creek, and Dogue Creek (Figs. 3 and 7; Table1). Southern naiad was also found in beds between Little Huntington Creek and Dogue Creek on the Virginia shoreline. It was also present south of Piscataway Creek near the lower reaches of the UTR along the Maryland shoreline. The lower reaches of the UTR had supported the only population of sago pondweed in the study area in 2004 and 2005 (Fig. 7; Table1).

### **Lower Tidal Potomac River (LTR)**

In the LTR we found seven SAV species. The SAV coverage was 45% hydrilla, 19% coontail, 15% wild celery, 10% milfoil, 9% naiad, 1% southern naiad, and < 1% water stargrass. Between 2004 and 2005, the percent of hydrilla, milfoil, and wild celery decreased and coontail increased substantially. Hydrilla was the dominant species and naiad spread throughout much of the LTR, where very little of it was found in 2004 (Fig. 3). In contrast to 2004, stargrass was present and muskgrass was absent in 2005.

Hydrilla was the dominant species in the upstream beds of Gunston Cove, similar to 2004, but along the northern shore of Gunston Cove, a mix of milfoil, hydrilla, and coontail was observed where wild celery dominated last year (Figs. 3 and 7; Table 1). In contrast to 2004, wild celery has shifted from the northern mouth of Gunston Cove to the upstream beds; however, naiad has spread throughout most of the cove where it was not present in 2004. Small populations of southern naiad were found in the narrow fringing downstream beds of the cove, along with milfoil, coontail, wild celery, and hydrilla, which either codominated or altered in dominance (Figs. 3 and 7; Table 1). Across from Gunston Cove and south to Pomonkey Creek, on the Maryland side of the Potomac River, hydrilla dominated in 2005, though wild celery was the dominant species in 2004 (Figs. 3 and 8; Table 1).

Wild celery was the dominant species around Mason Neck, which was observed in 2004, but hydrilla was the dominant species in Pomonkey Creek, where wild celery dominated in 2004. New in 2005 was the presence of water stargrass in Pomonkey Creek. SAV was sparse at Indian Head between Pomonkey Creek and downstream to Mattawoman Creek, and consisted mainly of beds that were dominated by milfoil, which was also observed in 2004 (Figs. 3 and 8; Table 1).

SAV coverage in the Mattawoman Creek increased substantially from 2004. Coontail, wild celery, and hydrilla were abundant in the mouth of the Mattawoman. Milfoil was one of the dominant species in 2004, but that was not observed in 2005, though milfoil coverage spread throughout more of the creek. Hydrilla was the dominant species in the upstream portions of the Mattawoman Creek, but there were occasional beds dominated by coontail. Naiad spread throughout much of the creek in 2005, when very little was present in 2004. Trace amounts of southern naiad were also found in this creek, which were not present in 2004 (Figs. 3 and 8; Table 1).

Chicamuxen Creek was densely vegetated in 2005, with milfoil observed as the dominant species, as was seen in 2004. Chicamuxen Creek is traditionally one of the more diverse beds in the study area, and in 2005 two relatively rare SAV species were found, water stargrass and southern naiad; chara, present in 2004, was not observed. At

the mouth of the Chicamuxen Creek, a bed was dominated by southern naiad (Figs. 3, 8, and 9; Table 1).

Hydrilla was more abundant in Belmont Bay in 2004 and 2005 than in previous years. Upstream in the Occoquan River, hydrilla, wild celery, and naiad occurred in beds where hydrilla, with a trace of southern naiad, was the dominant species in 2004 (Figs. 3 and 8; Table 1). Neabsco Creek and Powells Creek were both dominated by hydrilla in 2005, with some coontail mixed in. Hydrilla was the dominant species along the shore north of Quantico Creek on the Virginia side of the Potomac River. Hydrilla also dominated the upstream beds in the mouth of Quantico Creek and along the upstream side of the creek. Coontail dominated the downstream side of Quantico Creek along with the beds in the downstream mouth of the creek. There was one dominant wild celery bed in the middle of Quantico Creek (Figs. 3, 8, and 9; Table 1).

### **Upper Oligohaline Potomac River Estuary (UOE)**

Eight SAV species were present in 2005 in this study area with the following composition: 42.5% hydrilla, 26% milfoil, 18% coontail, 7% wild celery, 3% naiad, 2% sago pondweed, 1% southern naiad and < 1% stargrass. In 2005, the percentage of milfoil decreased substantially while wild celery, coontail, hydrilla, sago pondweed, and naiad coverage increased compared to previous years. In contrast to 2004, southern naiad and sago pondweed were present in 2005 and waterweed was absent. Hydrilla was the dominant species in many locations along the Virginia side of the Potomac River and milfoil and wild celery were the dominant species along the Maryland side in 2005. However SAV coverage on the Maryland side of the Potomac River was less than coverage on the Virginia side.

Hydrilla and wild celery alternated in dominance along the Maryland side of the Potomac River north of Mallows Bay, where milfoil was the dominant species in 2004 (Figs. 4 and 9; Table 1). SAV in Mallows Bay consisted primarily of hydrilla, but naiad and coontail were also present. Milfoil was the most abundant species in the bay north of Wades Bay (Figs. 4 and 9; Table 1). In Wades Bay wild celery was the dominant species, though small populations of coontail and hydrilla were also present. Wades Bay supported the only populations of sago pondweed and southern naiad on the Maryland side of the Potomac River in the UOE, where one large bed of each was located (Figs. 4 and 10; Table 1).

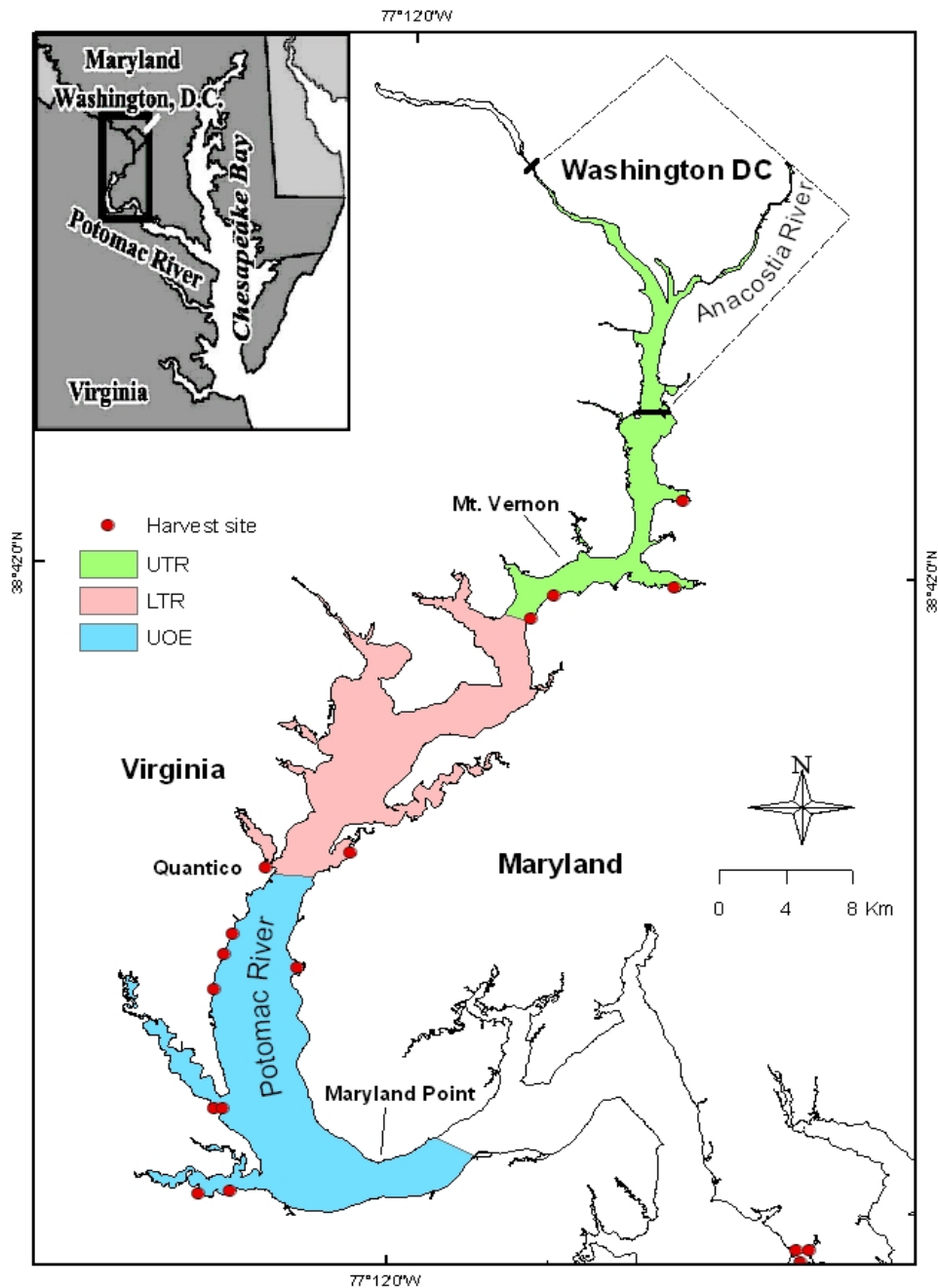
Coontail was the most abundant species in the cove south of Quantico, VA and north of the Chopawamsic Creek. The mouth of the Chopawamsic Creek consisted primarily of coontail, while the inner beds consisted mostly of hydrilla with some milfoil (Figs. 4 and 9; Table 1). The region south of Quantico, along with shoreline beds south of Chopawamsic Creek, supported the only populations of naiad in 2004 but in 2005, naiad was not found in these beds. SAV coverage decreased along the Virginia shoreline between Chopawamsic Creek and Aquia Creek from 2004 to 2005 (Figs. 4, 9, and 10; Table 1). The beds that were present consisted mostly of milfoil, but wild celery, hydrilla, and coontail were also observed there as well (Figs. 4, 9, and 10; Table 1).

On the north shoreline at the mouth of Aquia Creek, two beds contained large populations of sago pondweed (Figs. 4 and 10; Table 1). The rest of the beds were dominated primarily by coontail, along with some smaller populations of the other

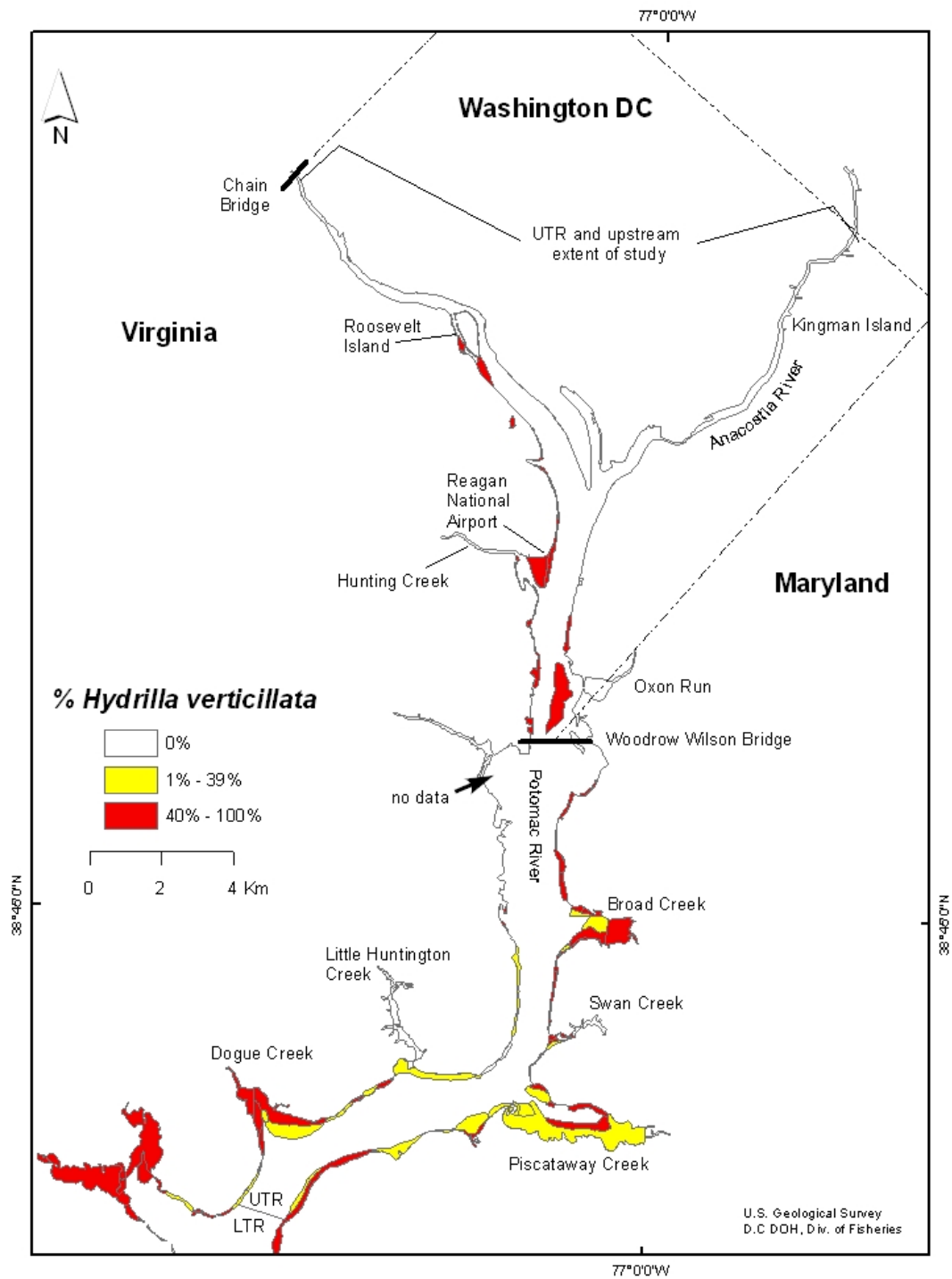
common SAV species and southern naiad. The upstream beds of Aquia Creek and the south shore were dominated by hydrilla (Figs. 4 and 10; Table 1). The south shoreline at the mouth of Aquia Creek along with the cove just below it were dominated by milfoil, as were the beds located along the shore south to the mouth of Potomac Creek. Within Potomac Creek, near the mouth, beds of hydrilla, milfoil, wild celery, and naiad were found (Figs. 4 and 10; Table 1). SAV was not found in the upper reaches of the Potomac Creek, where hydrilla was the only species found in 2004. A bed just south of Potomac Creek supported the only population of water stargrass in this portion of the study area (Figs. 4 and 10; Table 1).

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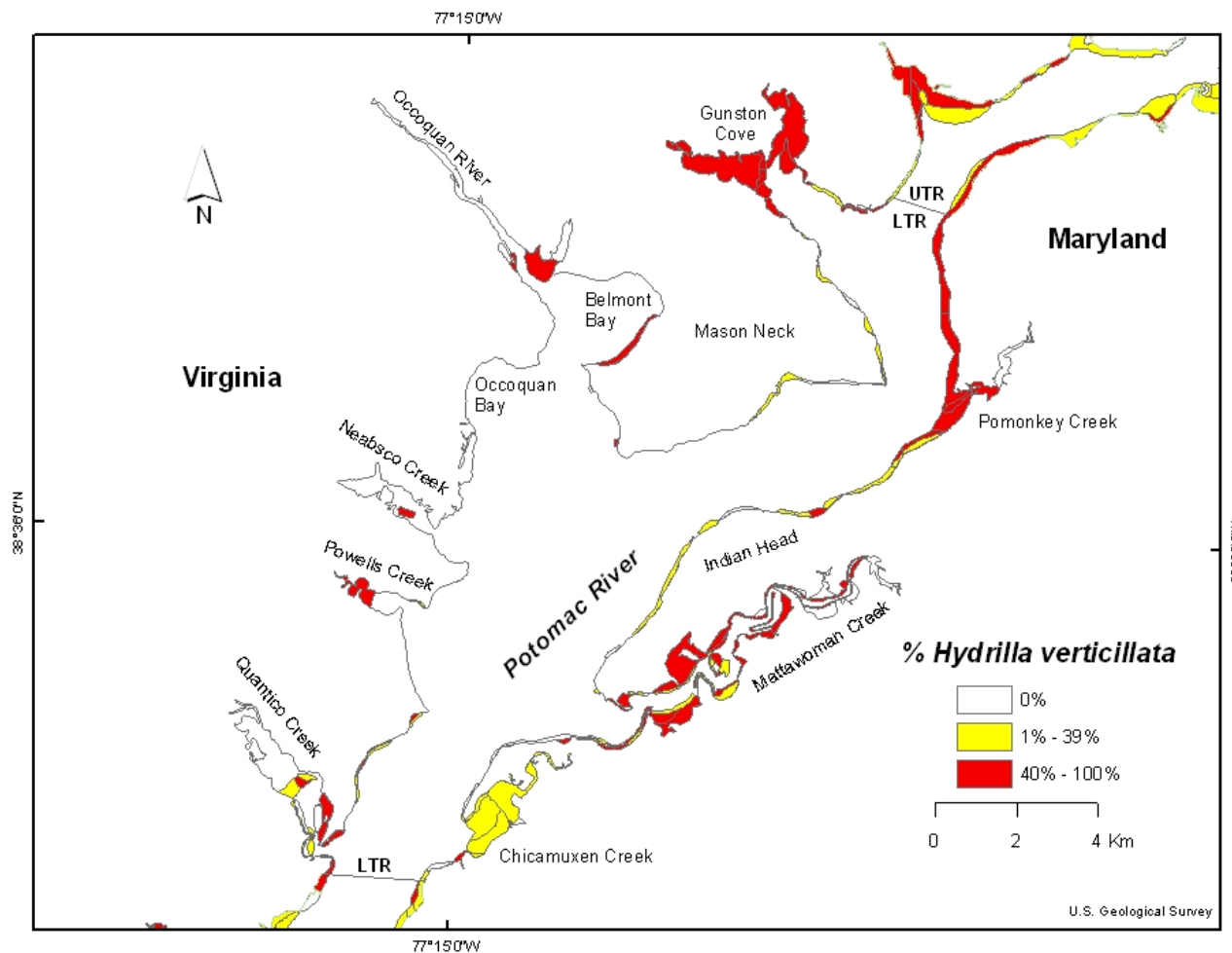
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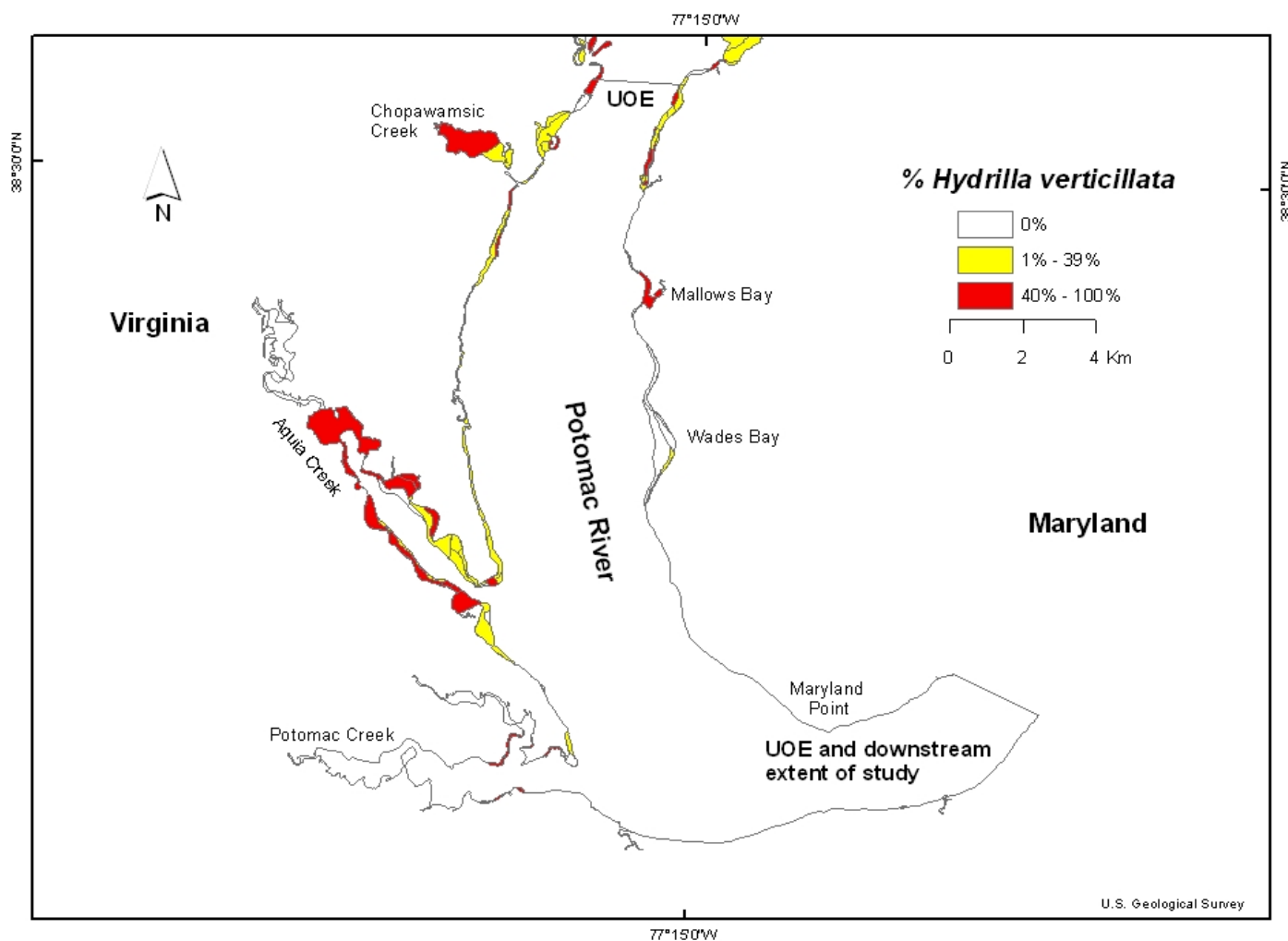
**Figure 1.** Study area showing the three river segments, UTR, upper tidal river, LTR, lower tidal river, and UOE, upper oligohaline estuary of the Potomac River and the locations of the Aquatic Plant Management harvest sites in the tidal Potomac River.



**Figure 2.** Percent cover of hydrilla in SAV beds located in the tidal Potomac River from Washington, DC to Dogue Creek, MD, 2005. UTR is the Upper and LTR is the Lower Tidal river study segment.

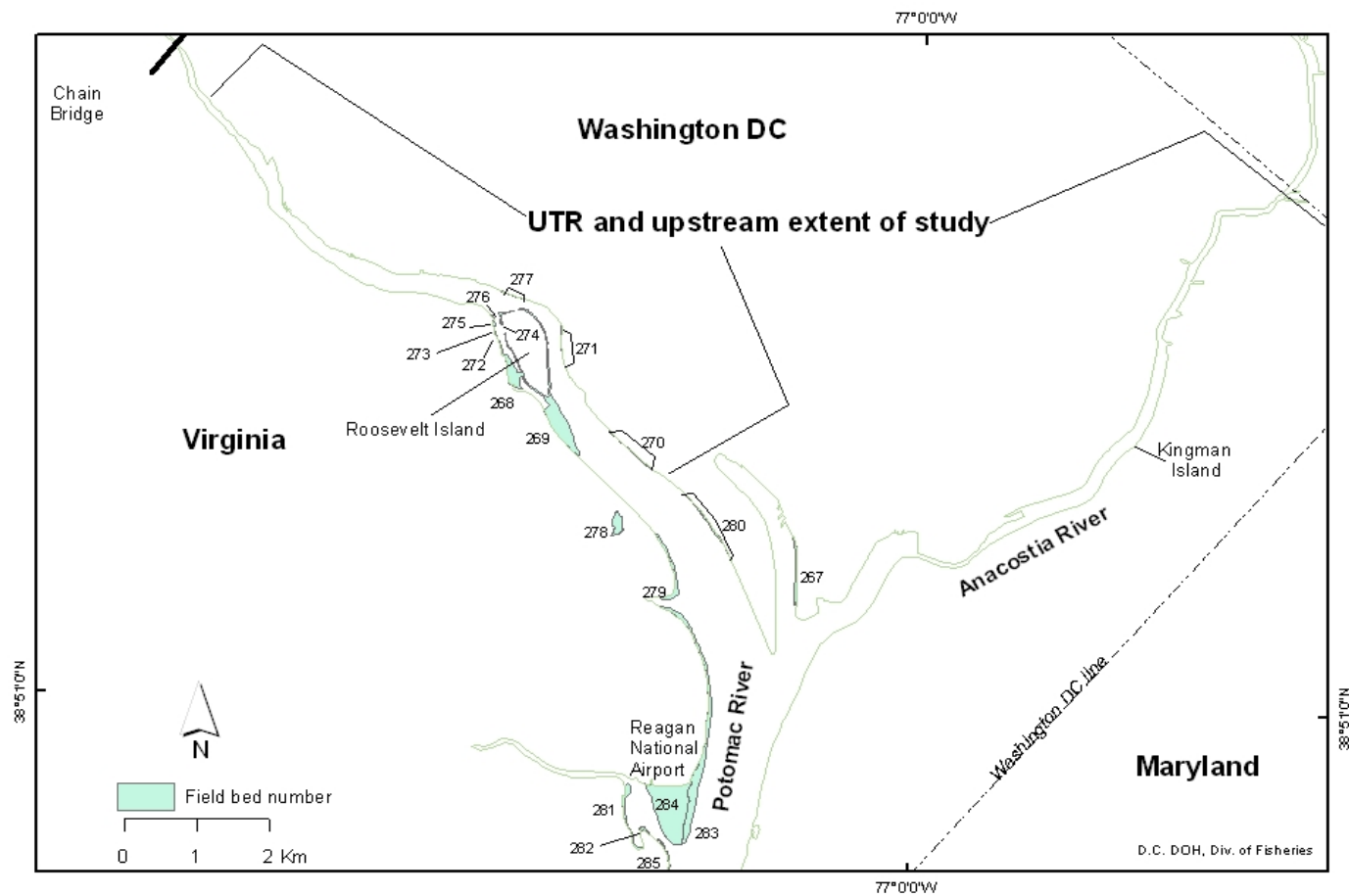


**Figure 3.** Percent cover of hydrilla in SAV beds located in the tidal Potomac River from Dogue Creek, VA to Quantico Creek, VA, 2005. UTR is the Upper and LTR is the Lower Tidal River study segment.

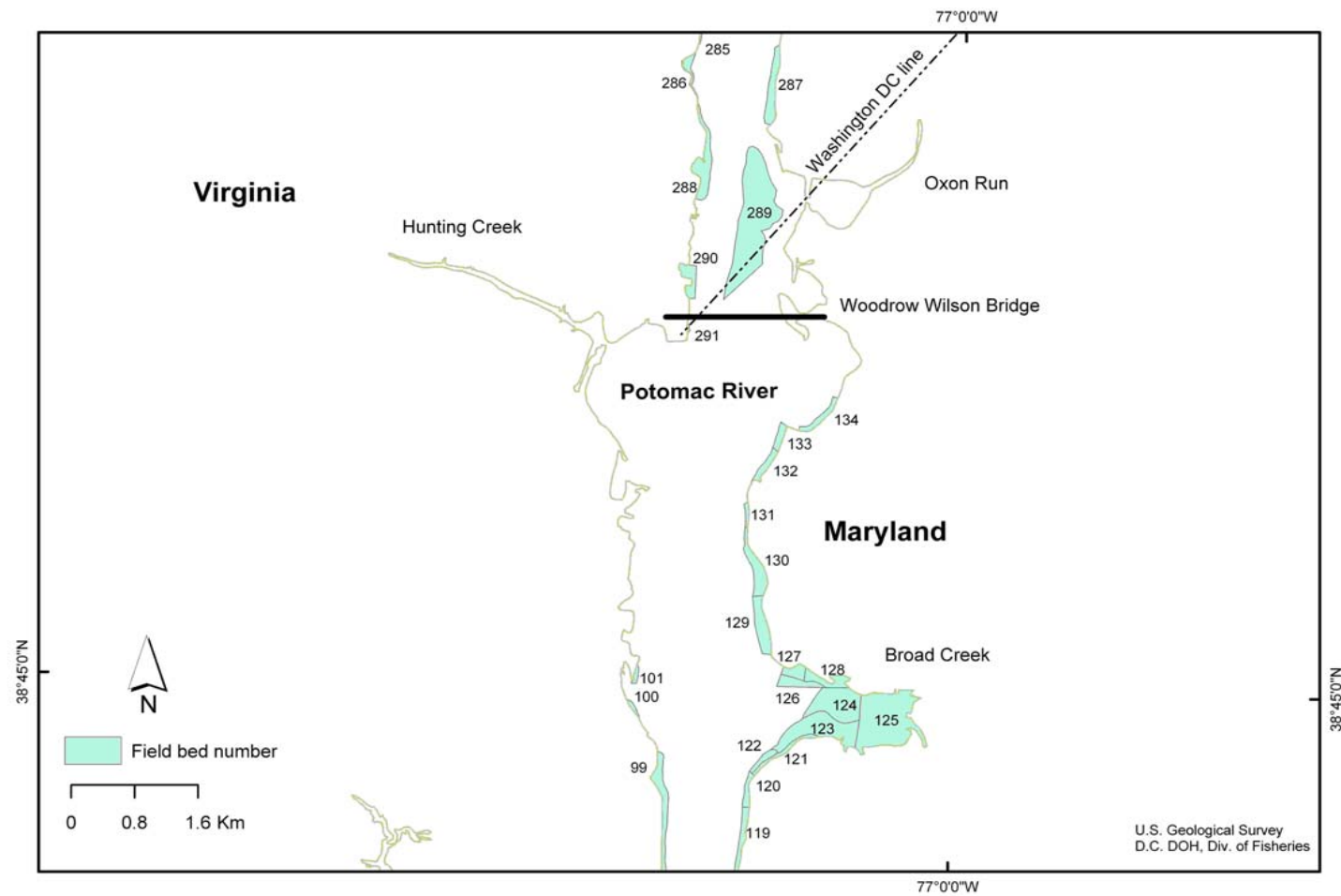


**Figure 4.** Percent cover of hydrilla in SAV beds located in the tidal Potomac River from Chopawamsic Creek, VA to the end of the river segment, 2005. UOE is the Upper Oligohaline Estuary study segment.

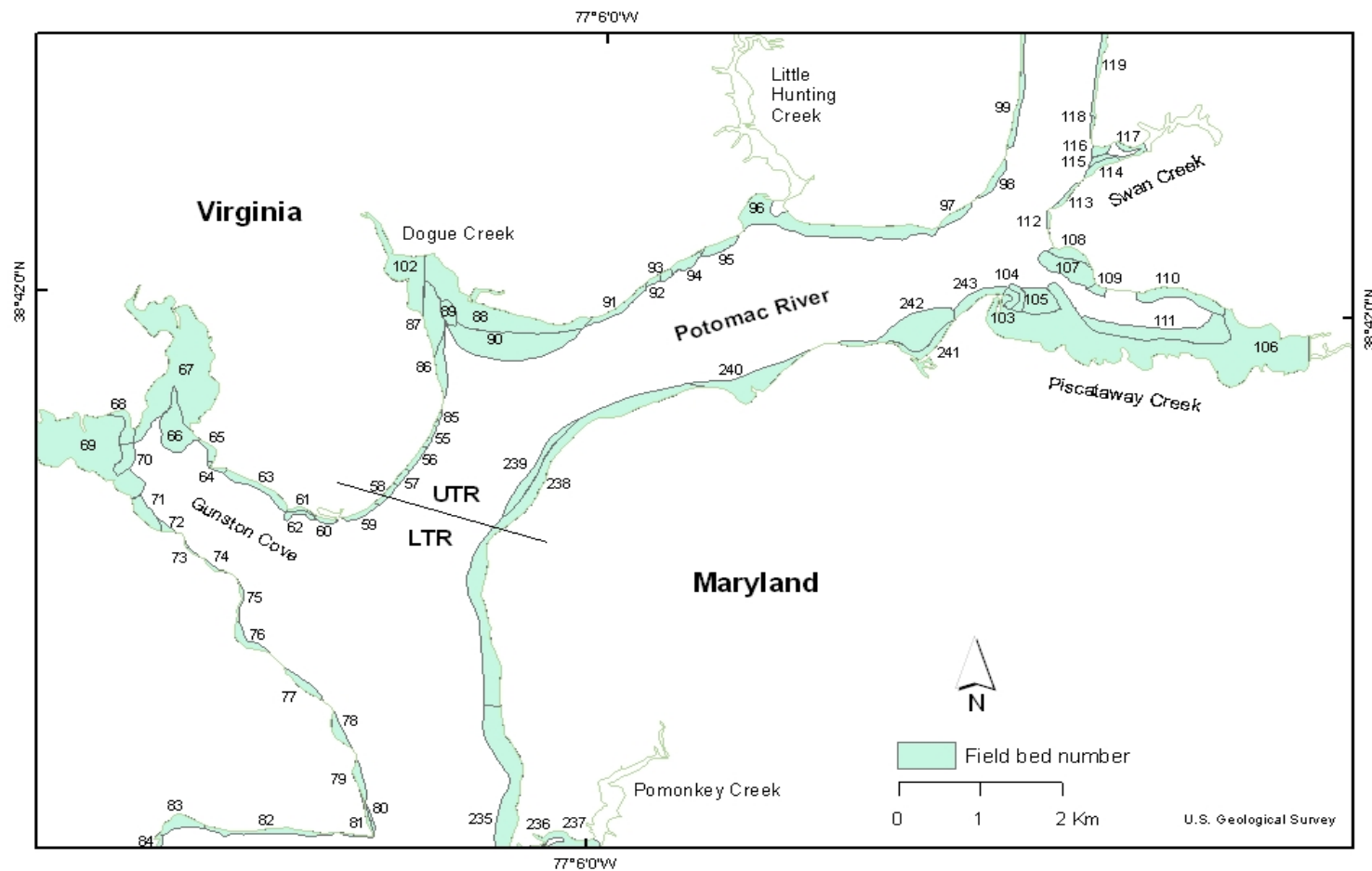




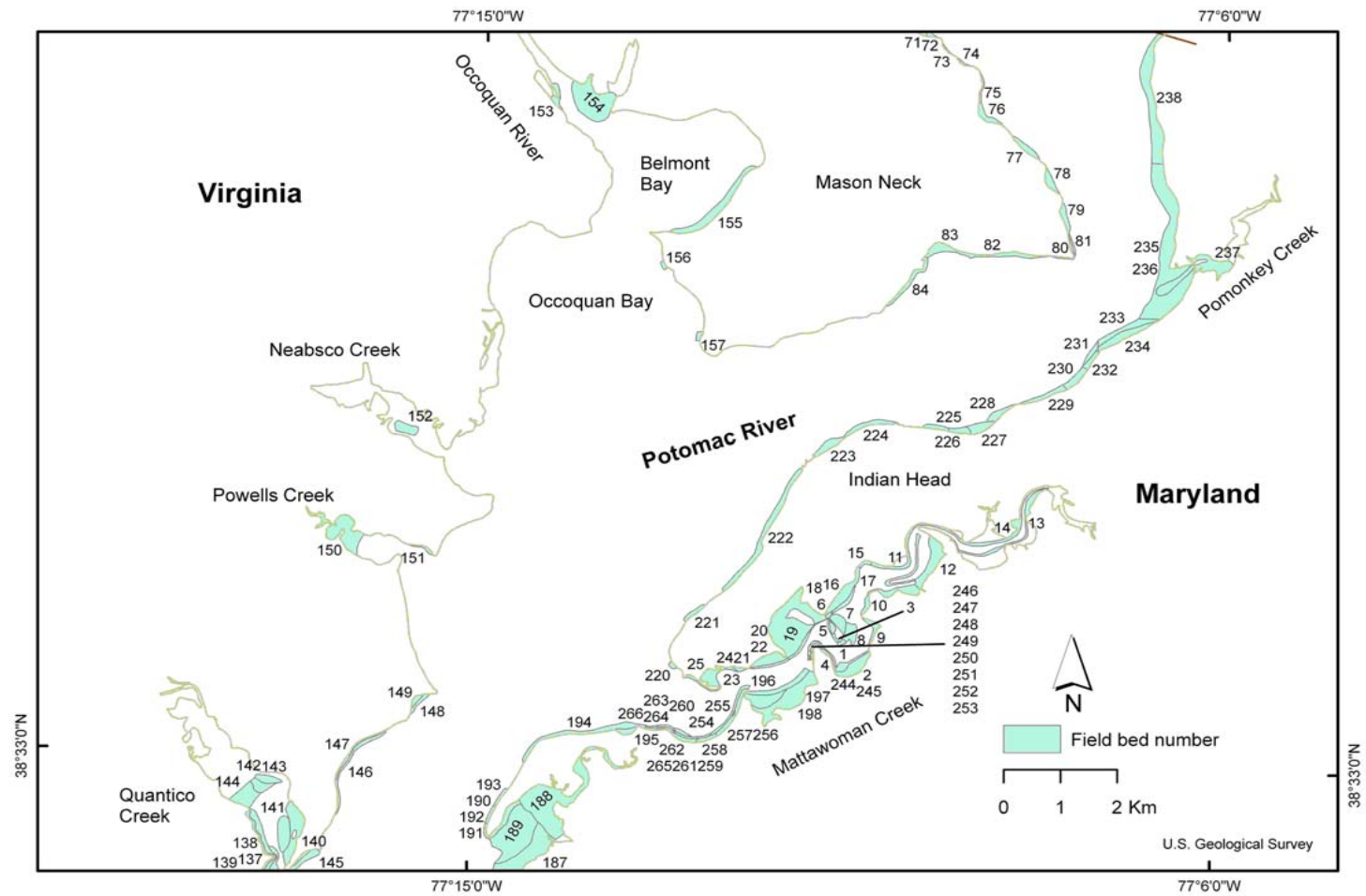
**Figure 5.** Location of each field bed in a continuous shoreline survey of Washington, DC, 2005. UTR is the Upper Tidal River study segment.



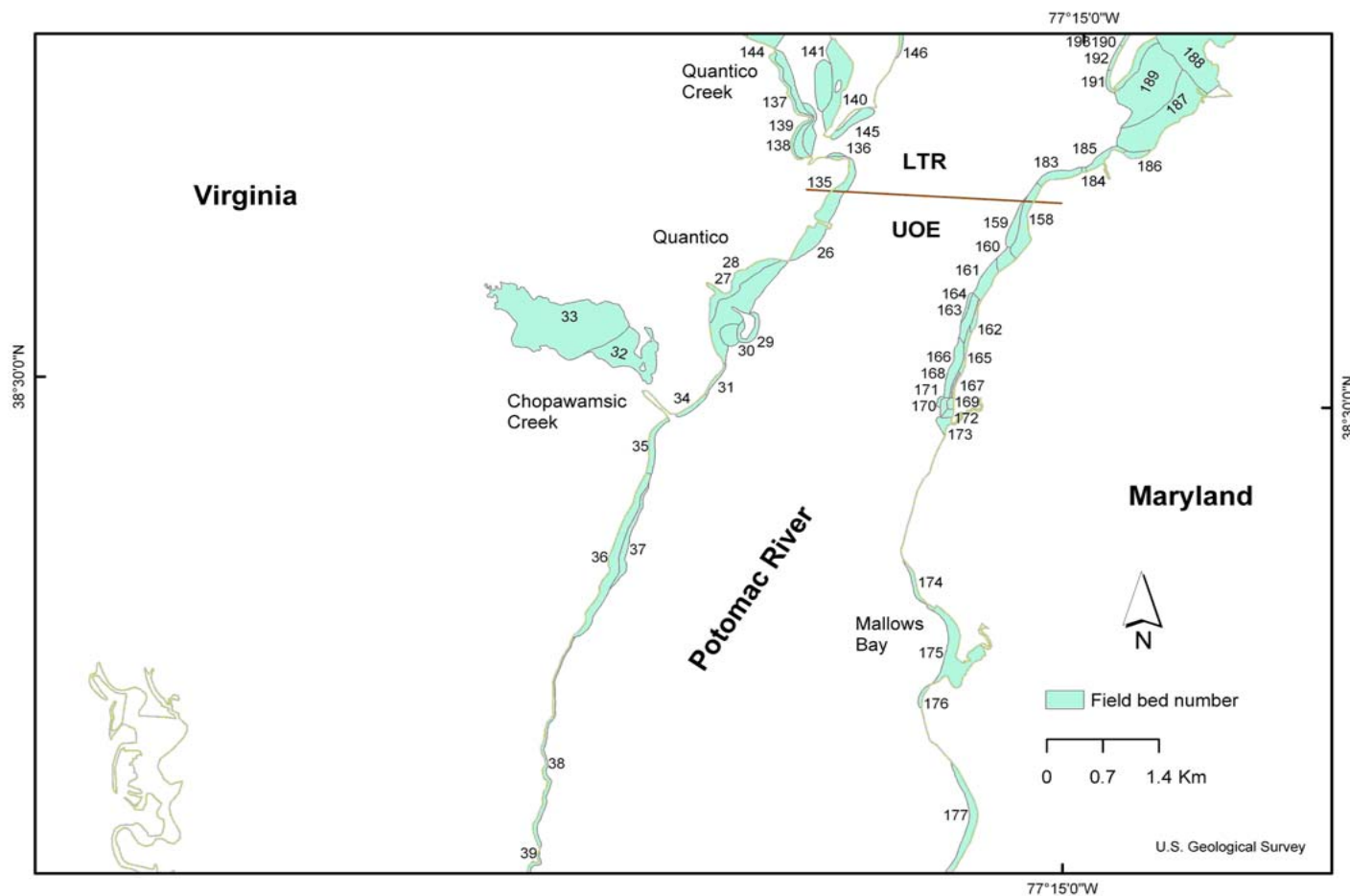
**Figure 6.** Location of each field bed in a continuous shoreline survey from Washington, DC to Broad Creek, MD, 2005.



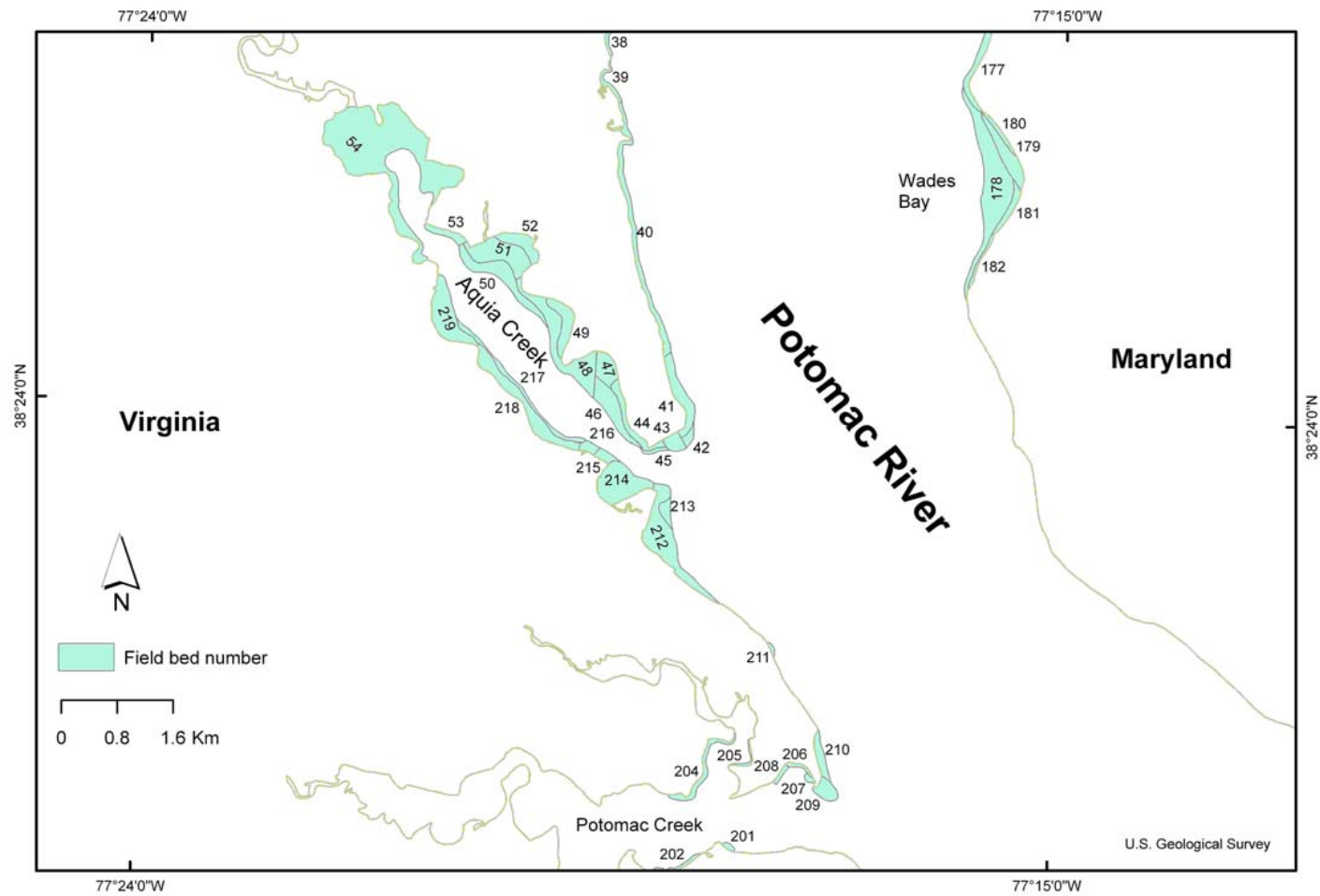
**Figure 7.** Location of each field bed in a continuous shoreline survey from Swan Creek, MD to Gunston Cove, VA, 2005. River segments are the Upper Tidal River (UTR) and Lower Tidal River (LTR).



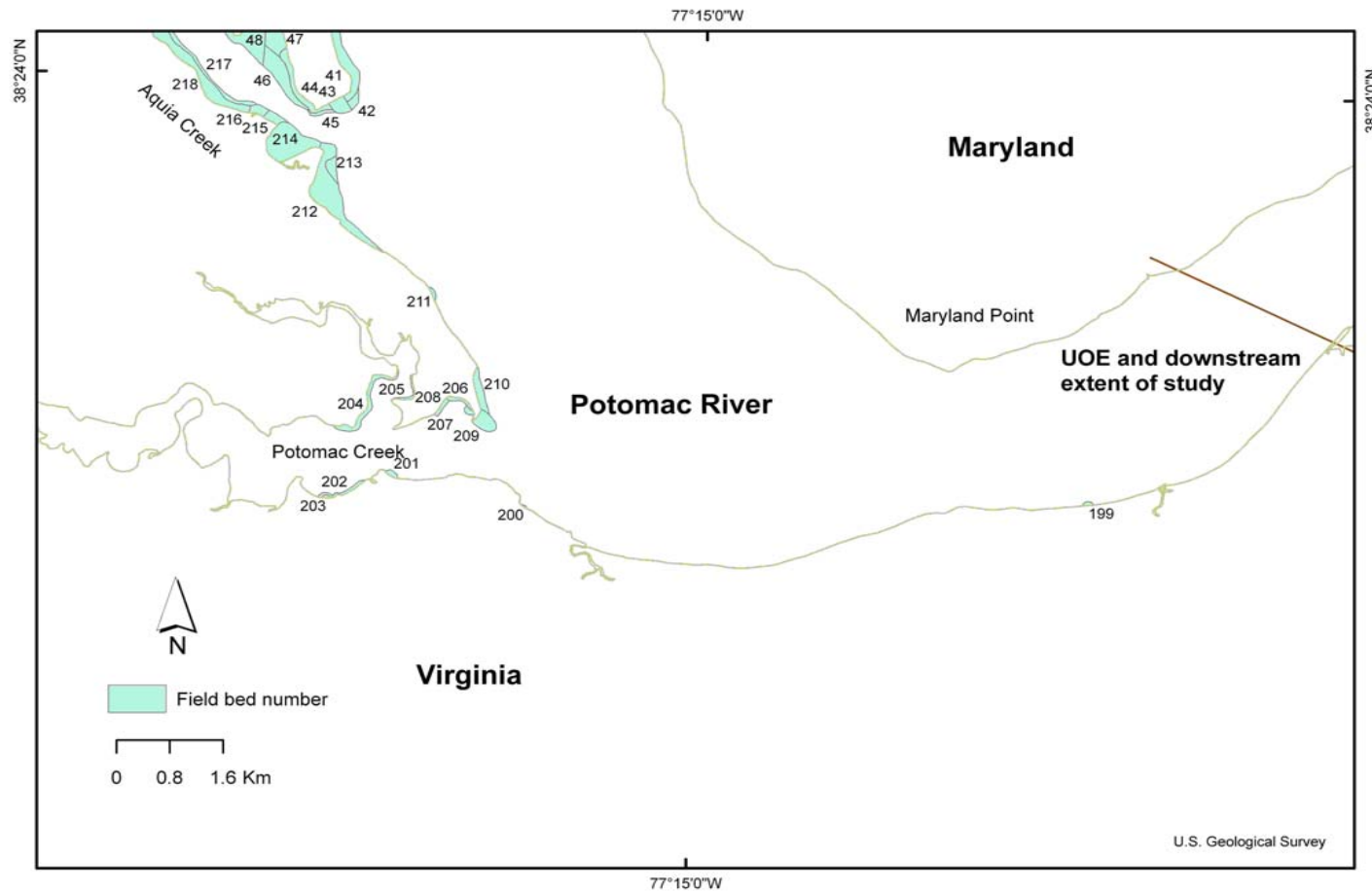
**Figure 8.** Location of each field bed in a continuous shoreline survey from Mason Neck, VA to Quantico Creek, VA, 2005.



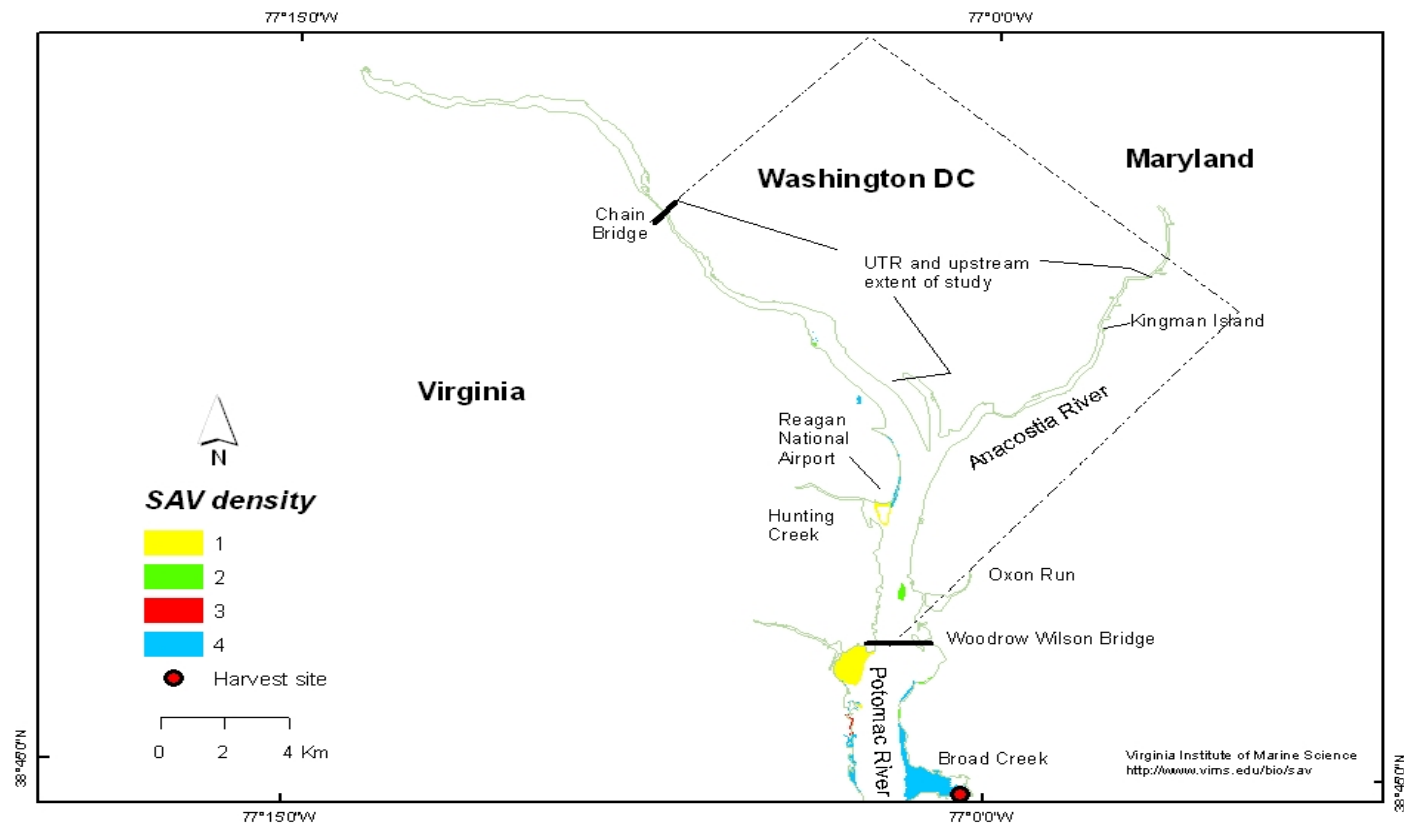
**Figure 9.** Location of each field bed in a continuous shoreline survey near Quantico, VA and Malloes Bay, MD, 2005. River segments are the Lower Tidal River (LTR) and Upper Oligohaline Estuary (UOE).



**Figure 10.** Location of each field bed in a continuous shoreline survey from Wades Bay, MD to Potomac Creek, VA, 2005.

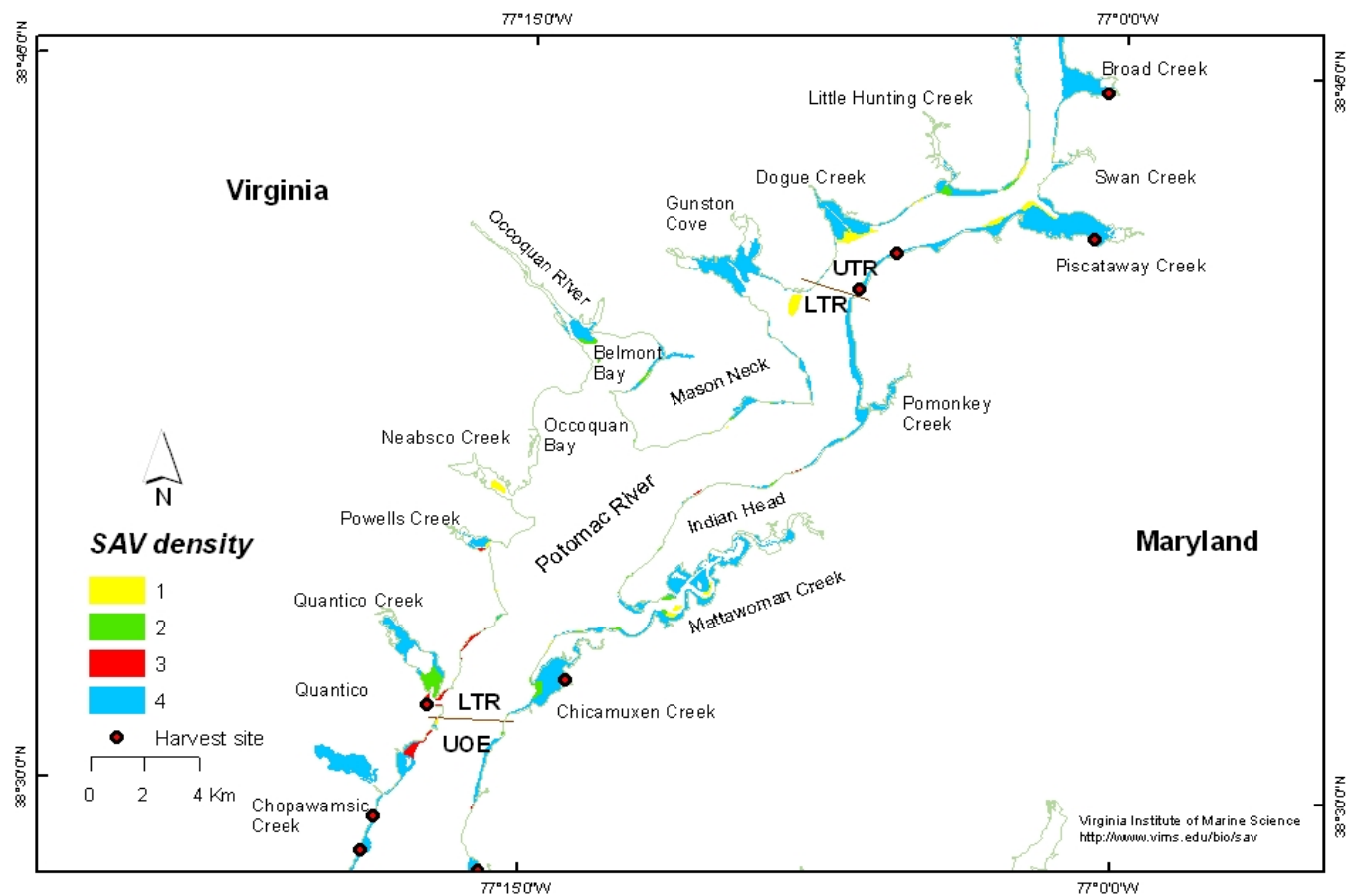


**Figure 11.** Location of each field bed in a continuous shoreline survey from Aquia Creek, VA to the end of the river segment, 2005. UOE is the Upper Oligohaline Estuary river segment.

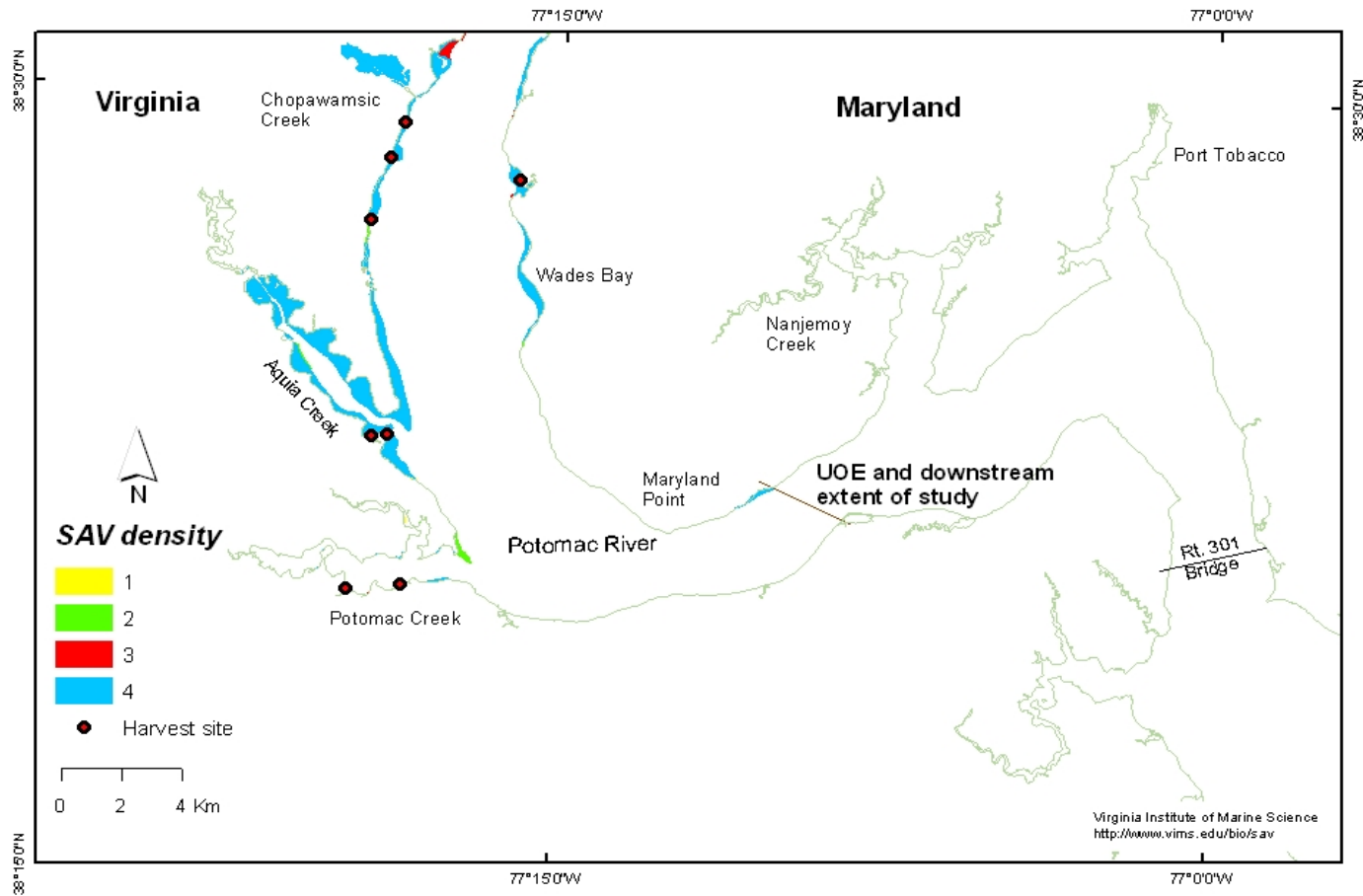


**Figure 12.** Distribution and density of submersed aquatic vegetation and the locations of the Aquatic Plant Management harvest sites in the tidal Potomac River from Washington, DC to Broad Creek, MD, 2005. UTR is the Upper Tidal River study segment.

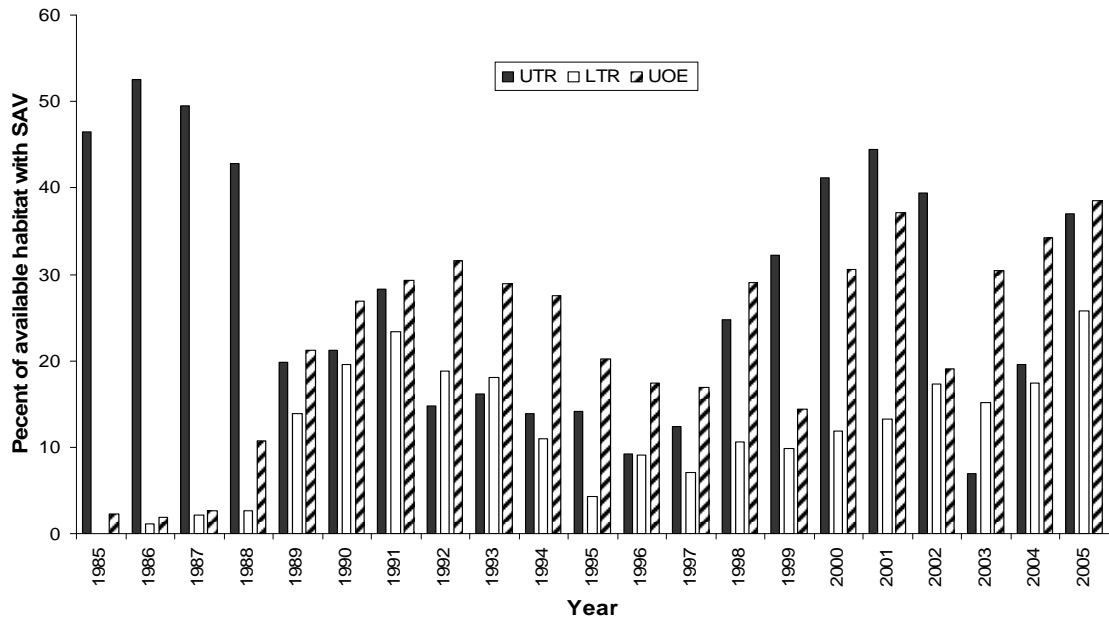




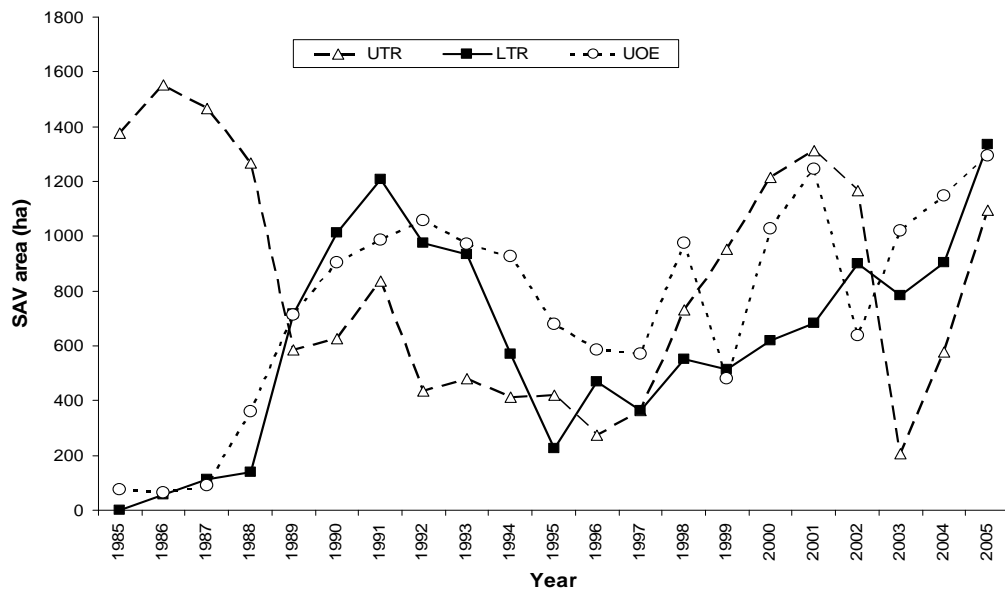
**Figure 13.** Distribution and density of submersed aquatic vegetation and the locations of the Aquatic Plant Management harvest sites in the tidal Potomac River from Broad Creek, MD to Chopawamsic Creek, VA, 2005. The river segments are the Upper Tidal River (UTR), Lower Tidal River (LTR), and the Upper Oligohaline Estuary (UOE).



**Figure 14.** Distribution and density of submersed aquatic vegetation and the locations of the Aquatic Plant Management harvest sites in the tidal Potomac River from Chopawamsic Creek, VA to the downstream extent of the study, 2005. UOE is the Upper Oligohaline Estuary study segment.



**Figure 15.** Percent of available habitat (area less than 2m in depth) that was vegetated in each river segment (UTR, LTR, and UOE) from 1985 to 2005. The UTR, LTR, and UOE have 2956, 5173, and 3,355 hectares of available habitat, respectively.



**Figure 16.** Area occupied by submersed aquatic vegetation (SAV) for each river segment (UTR, LTR, and UOE) from 1985 to 2005. SAV area from Virginia Institute of Marine Science (<http://www.vims.edu/bio/sav/historical.html>) except from US Geological Survey in 1988 (Rybicki and Landwehr, 2007).

**Table 1.** Percent canopy cover of each species and Shannon diversity index for field beds located continuously along the shoreline in the tidal Potomac River, 2005. Field bed numbers correspond to the numbers in Figs. 5 to 11. Density classes are USGS field data based on a Braun-Blanquet crown cover model where: 1 = 1 to 10 %, 2 = 11 to 40 %, 3 = 41 to 70 %, and 4 = 71 to 100 % cover. Percent cover of each species in a bed is abbreviated as: P\_HV (hydrilla), P\_MS (milfoil), P\_VA (wild celery), P\_CD (coontail), P\_NM (naiad), P\_NGU (southern naiad), P\_HD (stargrass), P\_SP (sago pondweed), and P\_CV (muskgrass). USGS is U.S. Geological Survey and DOH is DC Dept. of Health. Div is Shannon diversity index.

Survey date	Field bed number	Data source	USGS quad	Density class	P_HV	P_MS	P_VA	P_CD	P_NM	P_NGU	P_HD	P_SP	P_CV	Div
11/4/2005	1	USGS	Indian Head	4	40.0	5.0	10.0	30.0	15.0	0.0	0.0	0.0	0.0	1.39
11/4/2005	2	USGS	Indian Head	4	20.0	5.0	0.0	40.0	15.0	20.0	0.0	0.0	0.0	1.44
11/4/2005	3	USGS	Indian Head	4	30.0	5.0	0.0	30.0	15.0	20.0	0.0	0.0	0.0	1.48
11/4/2005	4	USGS	Indian Head	4	40.0	5.0	20.0	20.0	15.0	0.0	0.0	0.0	0.0	1.44
11/4/2005	5	USGS	Indian Head	4	20.0	25.0	0.0	30.0	15.0	10.0	0.0	0.0	0.0	1.54
11/4/2005	6	USGS	Indian Head	4	5.0	5.0	85.0	5.0	0.0	0.0	0.0	0.0	0.0	0.59
11/4/2005	7	USGS	Indian Head	4	70.0	5.0	0.0	20.0	5.0	0.0	0.0	0.0	0.0	0.87
11/4/2005	8	USGS	Indian Head	3	35.0	10.0	20.0	35.0	0.0	0.0	0.0	0.0	0.0	1.29
11/4/2004	9	USGS	Indian Head	4	74.0	1.0	10.0	15.0	0.0	0.0	0.0	0.0	0.0	0.78
11/4/2005	10	USGS	Indian Head	4	47.0	5.0	0.0	46.0	2.0	0.0	0.0	0.0	0.0	0.94
11/4/2005	11	USGS	Indian Head	3	95.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.20
11/4/2005	12	USGS	Indian Head	4	60.0	0.0	0.0	35.0	5.0	0.0	0.0	0.0	0.0	0.82
11/4/2005	13	USGS	Indian Head	3	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
11/4/2005	14	USGS	Indian Head	4	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
11/4/2005	15	USGS	Indian Head	2	70.0	0.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.61
11/4/2005	16	USGS	Indian Head	3	45.0	15.0	15.0	15.0	10.0	0.0	0.0	0.0	0.0	1.44
11/4/2005	17	USGS	Indian Head	2	85.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.42
11/4/2005	18	USGS	Indian Head	4	30.0	10.0	0.0	40.0	20.0	0.0	0.0	0.0	0.0	1.28
11/4/2005	19	USGS	Indian Head	4	45.0	10.0	5.0	35.0	5.0	0.0	0.0	0.0	0.0	1.26
11/4/2005	20	USGS	Indian Head	2	5.0	5.0	85.0	0.0	5.0	0.0	0.0	0.0	0.0	0.59
11/4/2005	21	USGS	Indian Head	3	35.0	15.0	35.0	15.0	0.0	0.0	0.0	0.0	0.0	1.30
11/4/2005	22	USGS	Indian Head	4	40.0	10.0	0.0	45.0	5.0	0.0	0.0	0.0	0.0	1.11
11/4/2005	23	USGS	Indian Head	4	0.0	30.0	70.0	0.0	0.0	0.0	0.0	0.0	0.0	0.61

**Table 1 – continued.** Percent canopy cover of each species and Shannon diversity index for field beds located continuously along the shoreline in the tidal Potomac River, 2005. Field bed numbers correspond to the numbers in Figs. 5 to 11. Density classes are USGS field data based on a Braun-Blanquet crown cover model where: 1 = 1 to 10 %, 2 = 11 to 40 %, 3 = 41 to 70 %, and 4 = 71 to 100 % cover. Percent cover of each species in a bed is abbreviated as: P\_HV (hydrilla), P\_MS (milfoil), P\_VA (wild celery), P\_CD (coontail), P\_NM (naiad), P\_NGU (southern naiad), P\_HD (stargrass), P\_SP (sago pondweed), and P\_CV (muskgrass). USGS is U.S. Geological Survey and DOH is DC Dept. of Health. Div is Shannon diversity index.

Survey date	Field bed number	Data source	USGS quad	Density class	P_HV	P_MS	P_VA	P_CD	P_NM	P_NGU	P_HD	P_SP	P_CV	Div
11/4/2005	24	USGS	Indian Head	4	30.0	35.0	0.0	35.0	0.0	0.0	0.0	0.0	0.0	1.10
11/4/2005	25	USGS	Indian Head	4	65.0	20.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.89
11/2/2005	26	USGS	Quantico	3	0.0	30.0	20.0	50.0	0.0	0.0	0.0	0.0	0.0	1.03
11/2/2005	27	USGS	Quantico	4	15.0	25.0	0.0	60.0	0.0	0.0	0.0	0.0	0.0	0.94
11/2/2005	28	USGS	Quantico	3	15.0	10.0	0.0	75.0	0.0	0.0	0.0	0.0	0.0	0.73
11/2/2005	29	USGS	Quantico	3	40.0	40.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	1.05
11/2/2005	30	USGS	Quantico	2	30.0	60.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.90
11/2/2005	31	USGS	Quantico	3	25.0	50.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	1.04
11/2/2005	32	USGS	Quantico	4	30.0	0.0	0.0	70.0	0.0	0.0	0.0	0.0	0.0	0.61
11/2/2005	33	USGS	Quantico	4	70.0	15.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.82
11/2/2005	34	USGS	Widewater	3	20.0	60.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.95
11/2/2005	35	USGS	Widewater	4	90.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.33
11/2/2005	36	USGS	Widewater	4	24.0	71.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.74
11/2/2005	37	USGS	Widewater	3	70.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.61
11/2/2005	38	USGS	Widewater	4	10.0	45.0	0.0	45.0	0.0	0.0	0.0	0.0	0.0	0.95
11/2/2005	39	USGS	Widewater	3	0.0	60.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.67
11/2/2005	40	USGS	Widewater	4	5.0	40.0	17.0	35.0	3.0	0.0	0.0	0.0	0.0	1.29
11/2/2005	41	USGS	Widewater	4	5.0	35.0	15.0	15.0	0.0	0.0	0.0	30.0	0.0	1.45
11/2/2005	42	USGS	Widewater	4	20.0	20.0	10.0	10.0	0.0	0.0	0.0	40.0	0.0	1.47
11/2/2005	43	USGS	Widewater	4	60.0	25.0	5.0	10.0	0.0	0.0	0.0	0.0	0.0	1.03
11/2/2005	44	USGS	Widewater	4	10.0	15.0	10.0	65.0	0.0	0.0	0.0	0.0	0.0	1.03
11/2/2005	45	USGS	Widewater	4	0.0	0.0	60.0	40.0	0.0	0.0	0.0	0.0	0.0	0.67

**Table 1 – continued.** Percent canopy cover of each species and Shannon diversity index for field beds located continuously along the shoreline in the tidal Potomac River, 2005. Field bed numbers correspond to the numbers in Figs. 5 to 11. Density classes are USGS field data based on a Braun-Blanquet crown cover model where: 1 = 1 to 10 %, 2 = 11 to 40 %, 3 = 41 to 70 %, and 4 = 71 to 100 % cover. Percent cover of each species in a bed is abbreviated as: P\_HV (hydrilla), P\_MS (milfoil), P\_VA (wild celery), P\_CD (coontail), P\_NM (naiad), P\_NGU (southern naiad), P\_HD (stargrass), P\_SP (sago pondweed), and P\_CV (muskgrass). USGS is U.S. Geological Survey and DOH is DC Dept. of Health. Div is Shannon diversity index.

Survey date	Field bed number	Data source	USGS quad	Density class	P_HV	P_MS	P_VA	P_CD	P_NM	P_NGU	P_HD	P_SP	P_CV	Div
11/2/2005	46	USGS	Widewater	4	10.0	5.0	0.0	65.0	20.0	0.0	0.0	0.0	0.0	0.98
11/2/2005	47	USGS	Widewater	4	5.0	15.0	0.0	65.0	0.0	15.0	0.0	0.0	0.0	1.00
11/2/2005	48	USGS	Widewater	4	35.0	15.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	1.00
11/2/2005	49	USGS	Widewater	4	40.0	15.0	1.0	1.0	35.0	8.0	0.0	0.0	0.0	1.31
11/2/2005	50	USGS	Widewater	2	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
11/2/2005	51	USGS	Widewater	4	50.0	15.0	0.0	30.0	5.0	0.0	0.0	0.0	0.0	1.14
11/2/2005	52	USGS	Widewater	4	60.0	10.0	0.0	0.0	0.0	30.0	0.0	0.0	0.0	0.90
11/2/2005	53	USGS	Widewater	4	90.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33
11/2/2005	54	USGS	Widewater	4	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
10/28/2005	55	USGS	Mount Vernon	4	25.0	20.0	30.0	25.0	0.0	0.0	0.0	0.0	0.0	1.38
10/28/2005	56	USGS	Fort Belvoir	4	25.0	20.0	30.0	25.0	0.0	0.0	0.0	0.0	0.0	1.38
10/28/2005	57	USGS	Fort Belvoir	4	24.0	1.0	70.0	0.0	0.0	0.0	0.0	5.0	0.0	0.79
10/28/2005	58	USGS	Fort Belvoir	4	20.0	0.0	80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.50
10/28/2005	59	USGS	Fort Belvoir	4	45.0	5.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.86
10/28/2005	60	USGS	Fort Belvoir	4	85.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.42
10/28/2005	61	USGS	Fort Belvoir	4	85.0	0.0	10.0	5.0	0.0	0.0	0.0	0.0	0.0	0.52
10/28/2005	62	USGS	Fort Belvoir	3	60.0	0.0	35.0	5.0	0.0	0.0	0.0	0.0	0.0	0.82
10/28/2005	63	USGS	Fort Belvoir	4	30.0	2.0	0.0	38.0	30.0	0.0	0.0	0.0	0.0	1.17
10/28/2005	64	USGS	Fort Belvoir	4	60.0	0.0	25.0	0.0	15.0	0.0	0.0	0.0	0.0	0.94
10/28/2005	65	USGS	Fort Belvoir	4	70.0	5.0	10.0	10.0	5.0	0.0	0.0	0.0	0.0	1.01
10/28/2005	66	USGS	Fort Belvoir	4	48.0	10.0	2.0	40.0	0.0	0.0	0.0	0.0	0.0	1.03

**Table 1 – continued.** Percent canopy cover of each species and Shannon diversity index for field beds located continuously along the shoreline in the tidal Potomac River, 2005. Field bed numbers correspond to the numbers in Figs. 5 to 11. Density classes are USGS field data based on a Braun-Blanquet crown cover model where: 1 = 1 to 10 %, 2 = 11 to 40 %, 3 = 41 to 70 %, and 4 = 71 to 100 % cover. Percent cover of each species in a bed is abbreviated as: P\_HV (hydrilla), P\_MS (milfoil), P\_VA (wild celery), P\_CD (coontail), P\_NM (naiad), P\_NGU (southern naiad), P\_HD (stargrass), P\_SP (sago pondweed), and P\_CV (muskgrass). USGS is U.S. Geological Survey and DOH is DC Dept. of Health. Div is Shannon diversity index.

Survey date	Field bed number	Data source	USGS quad	Density class	P_HV	P_MS	P_VA	P_CD	P_NM	P_NGU	P_HD	P_SP	P_CV	Div
10/28/2005	67	USGS	Fort Belvoir	4	71.0	2.0	2.0	20.0	5.0	0.0	0.0	0.0	0.0	0.87
10/28/2005	68	USGS	Fort Belvoir	4	55.0	1.0	0.0	44.0	0.0	0.0	0.0	0.0	0.0	0.74
10/28/2005	69	USGS	Fort Belvoir	4	69.0	1.0	0.0	30.0	0.0	0.0	0.0	0.0	0.0	0.66
10/28/2005	70	USGS	Fort Belvoir	4	45.0	5.0	0.0	30.0	20.0	0.0	0.0	0.0	0.0	1.19
10/28/2005	71	USGS	Fort Belvoir	4	60.0	3.0	0.0	20.0	15.0	2.0	0.0	0.0	0.0	1.10
10/28/2005	72	USGS	Fort Belvoir	3	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.69
10/28/2005	73	USGS	Fort Belvoir	1	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.69
10/28/2005	74	USGS	Fort Belvoir	4	30.0	30.0	10.0	30.0	0.0	0.0	0.0	0.0	0.0	1.31
10/28/2005	75	USGS	Fort Belvoir	3	0.0	40.0	0.0	60.0	0.0	0.0	0.0	0.0	0.0	0.67
10/28/2005	76	USGS	Fort Belvoir	4	30.0	15.0	10.0	20.0	15.0	10.0	0.0	0.0	0.0	1.71
10/28/2005	77	USGS	Fort Belvoir	4	0.0	15.0	80.0	5.0	0.0	0.0	0.0	0.0	0.0	0.61
10/28/2005	78	USGS	Fort Belvoir	4	20.0	10.0	70.0	0.0	0.0	0.0	0.0	0.0	0.0	0.80
10/28/2005	79	USGS	Fort Belvoir	4	30.0	2.0	40.0	28.0	0.0	0.0	0.0	0.0	0.0	1.16
10/28/2005	80	USGS	Fort Belvoir	4	25.0	0.0	60.0	15.0	0.0	0.0	0.0	0.0	0.0	0.94
10/28/2005	81	USGS	Fort Belvoir	3	30.0	15.0	55.0	0.0	0.0	0.0	0.0	0.0	0.0	0.97
10/28/2005	82	USGS	Fort Belvoir	4	0.0	5.0	95.0	0.0	0.0	0.0	0.0	0.0	0.0	0.20
10/28/2005	83	USGS	Fort Belvoir	3	5.0	30.0	45.0	15.0	5.0	0.0	0.0	0.0	0.0	1.30
10/28/2005	84	USGS	Fort Belvoir	3	10.0	10.0	80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.64
10/26/2005	85	USGS	Mount Vernon	3	10.0	20.0	65.0	5.0	0.0	0.0	0.0	0.0	0.0	0.98
10/26/2005	86	USGS	Mount Vernon	4	69.5	20.0	0.0	10.0	0.5	0.0	0.0	0.0	0.0	0.83
10/26/2005	87	USGS	Mount Vernon	4	60.0	5.0	0.0	35.0	0.0	0.0	0.0	0.0	0.0	0.82
10/26/2005	88	USGS	Mount Vernon	4	69.0	5.0	1.0	10.0	10.0	5.0	0.0	0.0	0.0	1.06
10/26/2005	89	USGS	Mount Vernon	2	20.0	40.0	20.0	20.0	0.0	0.0	0.0	0.0	0.0	1.33

**Table 1 – continued.** Percent canopy cover of each species and Shannon diversity index for field beds located continuously along the shoreline in the tidal Potomac River, 2005. Field bed numbers correspond to the numbers in Figs. 5 to 11. Density classes are USGS field data based on a Braun-Blanquet crown cover model where: 1 = 1 to 10 %, 2 = 11 to 40 %, 3 = 41 to 70 %, and 4 = 71 to 100 % cover. Percent cover of each species in a bed is abbreviated as: P\_HV (hydrilla), P\_MS (milfoil), P\_VA (wild celery), P\_CD (coontail), P\_NM (naiad), P\_NGU (southern naiad), P\_HD (stargrass), P\_SP (sago pondweed), and P\_CV (muskgrass). USGS is U.S. Geological Survey and DOH is DC Dept. of Health. Div is Shannon diversity index.

Survey date	Field bed number	Data source	USGS quad	Density class	P_HV	P_MS	P_VA	P_CD	P_NM	P_NGU	P_HD	P_SP	P_CV	Div
10/26/2005	90	USGS	Mount Vernon	3	30.0	20.0	20.0	10.0	10.0	10.0	0.0	0.0	0.0	1.70
10/26/2005	91	USGS	Mount Vernon	4	30.0	30.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	1.09
10/26/2005	92	USGS	Mount Vernon	4	80.0	0.0	0.0	10.0	10.0	0.0	0.0	0.0	0.0	0.64
10/26/2005	93	USGS	Mount Vernon	3	50.0	25.0	0.0	10.0	10.0	5.0	0.0	0.0	0.0	1.30
10/26/2005	94	USGS	Mount Vernon	2	20.0	40.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	1.05
10/26/2005	95	USGS	Mount Vernon	4	40.0	20.0	10.0	15.0	0.0	15.0	0.0	0.0	0.0	1.49
10/26/2005	96	USGS	Mount Vernon	4	38.0	30.0	0.0	30.0	0.0	1.0	0.0	0.0	1.0	1.18
10/26/2005	97	USGS	Mount Vernon	2	0.0	80.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.50
10/26/2005	98	USGS	Mount Vernon	1	0.0	80.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.50
10/26/2005	99	USGS	Mount Vernon	4	20.0	60.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.95
10/26/2005	100	USGS	Mount Vernon	3	70.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	0.0	0.61
10/26/2005	101	USGS	Alexandria	3	70.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	0.0	0.61
10/26/2005	102	USGS	Fort Belvoir	4	69.0	5.0	1.0	10.0	10.0	5.0	0.0	0.0	0.0	1.06
10/14/2005	103	USGS	Mount Vernon	3	29.0	1.0	0.0	20.0	50.0	0.0	0.0	0.0	0.0	1.07
10/14/2005	104	USGS	Mount Vernon	2	0.0	20.0	80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.50
10/14/2005	105	USGS	Mount Vernon	3	20.0	20.0	5.0	40.0	15.0	0.0	0.0	0.0	0.0	1.44
10/14/2005	106	USGS	Mount Vernon	4	35.0	10.0	0.0	35.0	20.0	0.0	0.0	0.0	0.0	1.29
10/14/2005	107	USGS	Mount Vernon	3	18.0	40.0	1.0	40.0	0.0	1.0	0.0	0.0	0.0	1.13
10/14/2005	108	USGS	Mount Vernon	4	40.0	30.0	0.0	30.0	0.0	0.0	0.0	0.0	0.0	1.09
10/14/2005	109	USGS	Mount Vernon	4	70.0	0.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	0.61
10/14/2005	110	USGS	Mount Vernon	4	80.0	16.0	0.0	2.0	2.0	0.0	0.0	0.0	0.0	0.63
10/14/2005	111	USGS	Mount Vernon	3	40.0	10.0	0.0	20.0	30.0	0.0	0.0	0.0	0.0	1.28



**Table 1 – continued.** Percent canopy cover of each species and Shannon diversity index for field beds located continuously along the shoreline in the tidal Potomac River, 2005. Field bed numbers correspond to the numbers in Figs. 5 to 11. Density classes are USGS field data based on a Braun-Blanquet crown cover model where: 1 = 1 to 10 %, 2 = 11 to 40 %, 3 = 41 to 70 %, and 4 = 71 to 100 % cover. Percent cover of each species in a bed is abbreviated as: P\_HV (hydrilla), P\_MS (milfoil), P\_VA (wild celery), P\_CD (coontail), P\_NM (naiad), P\_NGU (southern naiad), P\_HD (stargrass), P\_SP (sago pondweed), and P\_CV (muskgrass). USGS is U.S. Geological Survey and DOH is DC Dept. of Health. Div is Shannon diversity index.

Survey date	Field bed number	Data source	USGS quad	Density class	P_HV	P_MS	P_VA	P_CD	P_NM	P_NGU	P_HD	P_SP	P_CV	Div
10/14/2005	112	USGS	Mount Vernon	2	70.0	12.0	3.0	10.0	0.0	5.0	0.0	0.0	0.0	0.99
10/14/2005	113	USGS	Mount Vernon	2	20.0	10.0	10.0	20.0	40.0	0.0	0.0	0.0	0.0	1.47
10/14/2005	114	USGS	Mount Vernon	4	25.0	15.0	0.0	35.0	25.0	0.0	0.0	0.0	0.0	1.35
10/14/2005	115	USGS	Mount Vernon	2	60.0	10.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	0.90
10/14/2005	116	USGS	Mount Vernon	2	50.0	0.0	20.0	20.0	0.0	10.0	0.0	0.0	0.0	1.22
10/14/2005	117	USGS	Mount Vernon	4	80.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.50
10/14/2005	118	USGS	Mount Vernon	2	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.69
10/14/2005	119	USGS	Mount Vernon	4	40.0	40.0	0.5	10.0	9.5	0.0	0.0	0.0	0.0	1.21
10/14/2005	120	USGS	Mount Vernon	4	40.0	10.0	20.0	10.0	20.0	0.0	0.0	0.0	0.0	1.47
10/14/2005	121	USGS	Mount Vernon	4	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
10/14/2005	122	USGS	Mount Vernon	3	30.0	0.0	30.0	20.0	20.0	0.0	0.0	0.0	0.0	1.37
10/14/2005	123	USGS	Mount Vernon	4	60.0	0.0	0.0	30.0	10.0	0.0	0.0	0.0	0.0	0.90
10/14/2005	124	USGS	Mount Vernon	4	32.0	2.0	0.0	34.0	32.0	0.0	0.0	0.0	0.0	1.17
10/14/2005	125	USGS	Mount Vernon	4	85.0	1.0	0.0	10.0	4.0	0.0	0.0	0.0	0.0	0.54
10/14/2005	126	USGS	Alexandria	4	32.0	2.0	0.0	34.0	32.0	0.0	0.0	0.0	0.0	1.17
10/14/2005	127	USGS	Alexandria	4	50.0	0.0	0.0	30.0	20.0	0.0	0.0	0.0	0.0	1.03
10/14/2005	128	USGS	Alexandria	4	80.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.50
10/14/2005	129	USGS	Alexandria	4	80.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.50
10/14/2005	130	USGS	Alexandria	4	70.0	0.0	0.0	20.0	10.0	0.0	0.0	0.0	0.0	0.80
10/14/2005	131	USGS	Alexandria	2	40.0	0.0	50.0	5.0	5.0	0.0	0.0	0.0	0.0	1.01
10/14/2005	132	USGS	Alexandria	2	70.0	0.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	0.61
10/14/2005	133	USGS	Alexandria	4	50.0	0.0	0.0	25.0	25.0	0.0	0.0	0.0	0.0	1.04
10/14/2005	134	USGS	Alexandria	2	60.0	0.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	0.67

**Table 1 – continued.** Percent canopy cover of each species and Shannon diversity index for field beds located continuously along the shoreline in the tidal Potomac River, 2005. Field bed numbers correspond to the numbers in Figs. 5 to 11. Density classes are USGS field data based on a Braun-Blanquet crown cover model where: 1 = 1 to 10 %, 2 = 11 to 40 %, 3 = 41 to 70 %, and 4 = 71 to 100 % cover. Percent cover of each species in a bed is abbreviated as: P\_HV (hydrilla), P\_MS (milfoil), P\_VA (wild celery), P\_CD (coontail), P\_NM (naiad), P\_NGU (southern naiad), P\_HD (stargrass), P\_SP (sago pondweed), and P\_CV (muskgrass). USGS is U.S. Geological Survey and DOH is DC Dept. of Health. Div is Shannon diversity index.

Survey date	Field bed number	Data source	USGS quad	Density class	P_HV	P_MS	P_VA	P_CD	P_NM	P_NGU	P_HD	P_SP	P_CV	Div
10/13/2005	135	USGS	Quantico	4	70.0	10.0	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.94
10/13/2005	136	USGS	Quantico	3	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
10/13/2005	137	USGS	Quantico	4	20.0	0.0	0.0	75.0	5.0	0.0	0.0	0.0	0.0	0.69
10/13/2005	138	USGS	Quantico	4	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.00
10/13/2005	139	USGS	Quantico	4	30.0	0.0	0.0	50.0	20.0	0.0	0.0	0.0	0.0	1.03
10/13/2005	140	USGS	Quantico	3	0.0	0.0	90.0	10.0	0.0	0.0	0.0	0.0	0.0	0.33
10/13/2005	141	USGS	Quantico	4	80.0	0.0	5.0	10.0	5.0	0.0	0.0	0.0	0.0	0.71
10/13/2005	142	USGS	Quantico	2	33.0	0.0	0.0	34.0	33.0	0.0	0.0	0.0	0.0	1.10
10/13/2005	143	USGS	Quantico	3	60.0	0.0	0.0	30.0	10.0	0.0	0.0	0.0	0.0	0.90
10/13/2005	144	USGS	Quantico	1	30.0	0.0	0.0	50.0	20.0	0.0	0.0	0.0	0.0	1.03
10/13/2005	145	USGS	Quantico	3	55.0	20.0	20.0	5.0	0.0	0.0	0.0	0.0	0.0	1.12
10/13/2005	146	USGS	Quantico	3	30.0	5.0	25.0	20.0	20.0	0.0	0.0	0.0	0.0	1.50
10/13/2005	147	USGS	Quantico	3	90.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33
10/13/2005	148	USGS	Quantico	3	10.0	5.0	75.0	5.0	5.0	0.0	0.0	0.0	0.0	0.90
10/13/2005	149	USGS	Quantico	4	50.0	10.0	10.0	0.0	30.0	0.0	0.0	0.0	0.0	1.17
10/13/2005	150	USGS	Quantico	4	60.0	0.0	0.0	10.0	30.0	0.0	0.0	0.0	0.0	0.90
10/13/2005	151	USGS	Quantico	3	15.0	0.0	50.0	5.0	30.0	0.0	0.0	0.0	0.0	1.14
10/13/2005	152	USGS	Quantico	3	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
10/13/2005	153	USGS	Fort Belvoir	3	70.0	0.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	0.61
10/13/2005	154	USGS	Fort Belvoir	3	40.0	0.0	20.0	0.0	40.0	0.0	0.0	0.0	0.0	1.05
10/13/2005	155	USGS	Fort Belvoir	4	70.0	0.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	0.61
10/13/2005	156	USGS	Fort Belvoir	2	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
10/13/2005	157	USGS	Indian Head	4	70.0	20.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.80

**Table 1 – continued.** Percent canopy cover of each species and Shannon diversity index for field beds located continuously along the shoreline in the tidal Potomac River, 2005. Field bed numbers correspond to the numbers in Figs. 5 to 11. Density classes are USGS field data based on a Braun-Blanquet crown cover model where: 1 = 1 to 10 %, 2 = 11 to 40 %, 3 = 41 to 70 %, and 4 = 71 to 100 % cover. Percent cover of each species in a bed is abbreviated as: P\_HV (hydrilla), P\_MS (milfoil), P\_VA (wild celery), P\_CD (coontail), P\_NM (naiad), P\_NGU (southern naiad), P\_HD (stargrass), P\_SP (sago pondweed), and P\_CV (muskgrass). USGS is U.S. Geological Survey and DOH is DC Dept. of Health. Div is Shannon diversity index.

Survey date	Field bed number	Data source	USGS quad	Density class	P_HV	P_MS	P_VA	P_CD	P_NM	P_NGU	P_HD	P_SP	P_CV	Div
10/4/2005	158	USGS	Quantico	4	30.0	20.0	30.0	10.0	10.0	0.0	0.0	0.0	0.0	1.50
10/4/2005	159	USGS	Quantico	3	60.0	20.0	5.0	15.0	0.0	0.0	0.0	0.0	0.0	1.06
10/4/2005	160	USGS	Quantico	3	30.0	0.5	59.5	10.0	0.0	0.0	0.0	0.0	0.0	0.93
10/4/2005	161	USGS	Quantico	4	5.0	30.0	60.0	5.0	0.0	0.0	0.0	0.0	0.0	0.97
10/4/2005	162	USGS	Quantico	3	10.0	0.0	80.0	0.0	0.0	0.0	10.0	0.0	0.0	0.64
10/4/2005	163	USGS	Quantico	4	30.0	25.0	35.0	9.0	1.0	0.0	0.0	0.0	0.0	1.34
10/4/2005	164	USGS	Quantico	4	70.0	1.0	29.0	0.0	0.0	0.0	0.0	0.0	0.0	0.65
10/4/2005	165	USGS	Quantico	2	50.0	20.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	1.03
10/4/2005	166	USGS	Quantico	4	40.0	30.0	20.0	10.0	0.0	0.0	0.0	0.0	0.0	1.28
10/4/2005	167	USGS	Quantico	3	0.0	10.0	90.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33
10/4/2005	168	USGS	Quantico	1	70.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.61
10/4/2005	169	USGS	Widewater	4	15.0	15.0	70.0	0.0	0.0	0.0	0.0	0.0	0.0	0.82
10/4/2005	170	USGS	Widewater	4	29.0	10.0	45.0	10.0	5.0	0.0	1.0	0.0	0.0	1.37
10/4/2005	171	USGS	Widewater	4	30.0	10.0	55.0	5.0	0.0	0.0	0.0	0.0	0.0	1.07
10/4/2005	172	USGS	Widewater	4	69.0	10.0	10.0	5.0	5.0	0.0	1.0	0.0	0.0	1.06
10/4/2005	173	USGS	Widewater	4	10.0	10.0	80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.64
10/4/2005	174	USGS	Widewater	2	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
10/4/2005	175	USGS	Widewater	4	70.0	0.0	0.0	15.0	15.0	0.0	0.0	0.0	0.0	0.82
10/4/2005	176	USGS	Widewater	3	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
10/4/2005	177	USGS	Widewater	4	0.0	70.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.61
10/4/2005	178	USGS	Widewater	3	0.0	10.0	90.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33
10/4/2005	179	USGS	Widewater	4	0.0	15.0	40.0	5.0	0.0	0.0	0.0	40.0	0.0	1.17
10/4/2005	180	USGS	Widewater	3	0.0	5.0	95.0	0.0	0.0	0.0	0.0	0.0	0.0	0.20

**Table 1 – continued.** Percent canopy cover of each species and Shannon diversity index for field beds located continuously along the shoreline in the tidal Potomac River, 2005. Field bed numbers correspond to the numbers in Figs. 5 to 11. Density classes are USGS field data based on a Braun-Blanquet crown cover model where: 1 = 1 to 10 %, 2 = 11 to 40 %, 3 = 41 to 70 %, and 4 = 71 to 100 % cover. Percent cover of each species in a bed is abbreviated as: P\_HV (hydrilla), P\_MS (milfoil), P\_VA (wild celery), P\_CD (coontail), P\_NM (naiad), P\_NGU (southern naiad), P\_HD (stargrass), P\_SP (sago pondweed), and P\_CV (muskgrass). USGS is U.S. Geological Survey and DOH is DC Dept. of Health. Div is Shannon diversity index.

Survey date	Field bed number	Data source	USGS quad	Density class	P_HV	P_MS	P_VA	P_CD	P_NM	P_NGU	P_HD	P_SP	P_CV	Div
10/4/2005	181	USGS	Widewater	4	5.0	15.0	40.0	10.0	0.0	30.0	0.0	0.0	0.0	1.39
10/4/2005	182	USGS	Widewater	4	0.0	90.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33
9/29/2005	183	USGS	Quantico	3	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
9/29/2005	184	USGS	Indian Head	3	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
9/29/2005	185	USGS	Indian Head	4	40.0	10.0	20.0	20.0	10.0	0.0	0.0	0.0	0.0	1.47
9/29/2005	186	USGS	Indian Head	4	20.0	60.0	5.0	10.0	5.0	0.0	0.0	0.0	0.0	1.16
9/29/2005	187	USGS	Indian Head	4	5.0	49.5	0.5	45.0	0.0	0.0	0.0	0.0	0.0	0.88
9/29/2005	188	USGS	Indian Head	4	10.0	50.0	9.0	30.0	0.0	1.0	0.0	0.0	0.0	1.20
9/29/2005	189	USGS	Indian Head	3	10.0	40.0	10.0	35.0	5.0	0.0	0.0	0.0	0.0	1.34
9/29/2005	190	USGS	Indian Head	4	9.0	1.0	0.0	19.0	0.0	70.0	1.0	0.0	0.0	0.87
9/29/2005	191	USGS	Indian Head	4	10.0	15.0	65.0	5.0	0.0	0.0	5.0	0.0	0.0	1.09
9/29/2005	192	USGS	Indian Head	1	0.0	10.0	60.0	20.0	0.0	0.0	10.0	0.0	0.0	1.09
9/29/2005	193	USGS	Indian Head	3	0.0	5.0	95.0	0.0	0.0	0.0	0.0	0.0	0.0	0.20
9/29/2005	194	USGS	Indian Head	2	0.0	25.0	60.0	10.0	0.0	0.0	5.0	0.0	0.0	1.03
9/29/2005	195	USGS	Indian Head	4	50.0	20.0	20.0	5.0	5.0	0.0	0.0	0.0	0.0	1.29
9/29/2005	196	USGS	Indian Head	4	70.0	1.0	0.0	0.0	29.0	0.0	0.0	0.0	0.0	0.65
9/29/2005	197	USGS	Indian Head	4	30.0	10.0	40.0	10.0	10.0	0.0	0.0	0.0	0.0	1.42
9/29/2005	198	USGS	Indian Head	4	45.0	10.0	5.0	25.0	15.0	0.0	0.0	0.0	0.0	1.37
9/28/2005	199	USGS	King George	1	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.00
9/28/2005	200	USGS	Passapatanzy	4	40.0	10.0	0.0	10.0	0.0	0.0	40.0	0.0	0.0	1.19
9/28/2005	201	USGS	Passapatanzy	3	50.0	0.0	0.0	5.0	35.0	10.0	0.0	0.0	0.0	1.09
9/28/2005	202	USGS	Passapatanzy	1	80.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.50
9/28/2005	203	USGS	Passapatanzy	4	80.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.50

**Table 1 – continued.** Percent canopy cover of each species and Shannon diversity index for field beds located continuously along the shoreline in the tidal Potomac River, 2005. Field bed numbers correspond to the numbers in Figs. 5 to 11. Density classes are USGS field data based on a Braun-Blanquet crown cover model where: 1 = 1 to 10 %, 2 = 11 to 40 %, 3 = 41 to 70 %, and 4 = 71 to 100 % cover. Percent cover of each species in a bed is abbreviated as: P\_HV (hydrilla), P\_MS (milfoil), P\_VA (wild celery), P\_CD (coontail), P\_NM (naiad), P\_NGU (southern naiad), P\_HD (stargrass), P\_SP (sago pondweed), and P\_CV (muskgrass). USGS is U.S. Geological Survey and DOH is DC Dept. of Health. Div is Shannon diversity index.

Survey date	Field bed number	Data source	USGS quad	Density class	P_HV	P_MS	P_VA	P_CD	P_NM	P_NGU	P_HD	P_SP	P_CV	Div
9/28/2005	204	USGS	Passapatanzy	3	50.0	1.0	9.0	10.0	30.0	0.0	0.0	0.0	0.0	1.20
9/28/2005	205	USGS	Passapatanzy	3	50.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.69
9/28/2005	206	USGS	Passapatanzy	4	64.5	10.0	0.0	10.0	15.0	0.5	0.0	0.0	0.0	1.05
9/28/2005	207	USGS	Passapatanzy	3	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
9/28/2005	208	USGS	Passapatanzy	4	59.5	10.0	5.0	10.0	15.0	0.0	0.5	0.0	0.0	1.23
9/28/2005	209	USGS	Passapatanzy	1	0.5	96.5	1.0	1.0	0.0	0.0	1.0	0.0	0.0	0.20
9/28/2005	210	USGS	Passapatanzy	4	7.0	79.0	0.0	7.0	7.0	0.0	0.0	0.0	0.0	0.74
9/28/2005	211	USGS	Passapatanzy	1	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.00
9/28/2005	212	USGS	Widewater	4	1.0	96.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.22
9/28/2005	213	USGS	Widewater	4	0.0	44.0	1.0	55.0	0.0	0.0	0.0	0.0	0.0	0.74
9/28/2005	214	USGS	Widewater	4	40.0	40.0	5.0	5.0	9.5	0.0	0.5	0.0	0.0	1.28
9/28/2005	215	USGS	Widewater	4	49.0	40.0	0.5	5.0	5.0	0.0	0.5	0.0	0.0	1.07
9/28/2005	216	USGS	Widewater	4	59.5	30.0	0.5	5.0	5.0	0.0	0.0	0.0	0.0	1.00
9/28/2005	217	USGS	Widewater	3	1.0	87.0	1.0	10.0	1.0	0.0	0.0	0.0	0.0	0.49
9/28/2005	218	USGS	Widewater	4	92.0	2.0	2.0	2.0	2.0	0.0	0.0	0.0	0.0	0.39
9/28/2005	219	USGS	Widewater	4	79.0	20.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.55
9/27/2005	220	USGS	Indian Head	2	5.0	0.0	95.0	0.0	0.0	0.0	0.0	0.0	0.0	0.20
9/27/2005	221	USGS	Indian Head	3	0.0	5.0	95.0	0.0	0.0	0.0	0.0	0.0	0.0	0.20
9/27/2005	222	USGS	Indian Head	1	4.0	85.0	10.0	1.0	0.0	0.0	0.0	0.0	0.0	0.54
9/27/2005	223	USGS	Indian Head	3	10.0	10.0	35.0	35.0	10.0	0.0	0.0	0.0	0.0	1.43
9/27/2005	224	USGS	Indian Head	1	0.0	9.0	90.0	1.0	0.0	0.0	0.0	0.0	0.0	0.36
9/27/2005	225	USGS	Indian Head	3	5.0	10.0	50.0	10.0	10.0	0.0	15.0	0.0	0.0	1.47
9/27/2005	226	USGS	Indian Head	4	15.0	15.0	30.0	5.0	35.0	0.0	0.0	0.0	0.0	1.45

**Table 1 – continued.** Percent canopy cover of each species and Shannon diversity index for field beds located continuously along the shoreline in the tidal Potomac River, 2005. Field bed numbers correspond to the numbers in Figs. 5 to 11. Density classes are USGS field data based on a Braun-Blanquet crown cover model where: 1 = 1 to 10 %, 2 = 11 to 40 %, 3 = 41 to 70 %, and 4 = 71 to 100 % cover. Percent cover of each species in a bed is abbreviated as: P\_HV (hydrilla), P\_MS (milfoil), P\_VA (wild celery), P\_CD (coontail), P\_NM (naiad), P\_NGU (southern naiad), P\_HD (stargrass), P\_SP (sago pondweed), and P\_CV (muskgrass). USGS is U.S. Geological Survey and DOH is DC Dept. of Health. Div is Shannon diversity index.

Survey date	Field bed number	Data source	USGS quad	Density class	P_HV	P_MS	P_VA	P_CD	P_NM	P_NGU	P_HD	P_SP	P_CV	Div
9/27/2005	227	USGS	Indian Head	4	70.0	10.0	5.0	5.0	10.0	0.0	0.0	0.0	0.0	1.01
9/27/2005	228	USGS	Indian Head	1	8.0	90.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.38
9/27/2005	229	USGS	Indian Head	3	17.0	17.0	30.0	1.0	35.0	0.0	0.0	0.0	0.0	1.38
9/27/2005	230	USGS	Indian Head	4	17.0	17.0	30.0	1.0	35.0	0.0	0.0	0.0	0.0	1.38
9/27/2005	231	USGS	Indian Head	4	50.0	4.0	2.0	22.0	20.0	0.0	2.0	0.0	0.0	1.29
9/27/2005	232	USGS	Indian Head	4	30.0	10.0	40.0	0.0	20.0	0.0	0.0	0.0	0.0	1.28
9/27/2005	233	USGS	Port Tobacco	4	52.0	4.0	2.0	22.0	20.0	0.0	0.0	0.0	0.0	1.20
9/27/2005	234	USGS	Port Tobacco	4	30.0	10.0	40.0	0.0	20.0	0.0	0.0	0.0	0.0	1.28
9/27/2005	235	USGS	Mt. Vernon	4	52.0	4.0	2.0	22.0	20.0	0.0	0.0	0.0	0.0	1.20
9/27/2005	236	USGS	Mt. Vernon	4	50.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.69
9/27/2005	237	USGS	Mt. Vernon	4	45.0	0.0	30.0	0.0	0.0	0.0	25.0	0.0	0.0	1.07
9/27/2005	238	USGS	Mt. Vernon	4	48.0	2.0	10.0	10.0	20.0	3.0	7.0	0.0	0.0	1.50
9/27/2005	239	USGS	Mt. Vernon	1	5.0	85.0	0.0	5.0	5.0	0.0	0.0	0.0	0.0	0.59
9/27/2005	240	USGS	Mt. Vernon	4	15.0	20.0	5.0	39.0	20.0	0.0	1.0	0.0	0.0	1.49
9/27/2005	241	USGS	Mt. Vernon	4	40.0	10.0	0.0	10.0	40.0	0.0	0.0	0.0	0.0	1.19
9/27/2005	242	USGS	Mt. Vernon	1	5.0	85.0	0.0	5.0	5.0	0.0	0.0	0.0	0.0	0.59
9/27/2005	243	USGS	Mt. Vernon	4	25.0	5.0	5.0	25.0	25.0	0.0	15.0	0.0	0.0	1.62
9/22/2005	244	USGS	Mattawoman Cr.	4	90.0	1.0	0.0	5.0	4.0	0.0	0.0	0.0	0.0	0.42
9/22/2005	245	USGS	Mattawoman Cr.	4	20.0	5.0	60.0	10.0	5.0	0.0	0.0	0.0	0.0	1.16
9/22/2005	246	USGS	Mattawoman Cr.	4	5.0	0.0	15.0	0.0	80.0	0.0	0.0	0.0	0.0	0.61
9/22/2005	247	USGS	Mattawoman Cr.	4	95.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.20
9/22/2005	248	USGS	Mattawoman Cr.	4	5.0	3.0	30.0	2.0	60.0	0.0	0.0	0.0	0.0	1.00
9/22/2005	249	USGS	Mattawoman Cr.	4	30.0	0.0	0.0	70.0	0.0	0.0	0.0	0.0	0.0	0.61

**Table 1 – continued.** Percent canopy cover of each species and Shannon diversity index for field beds located continuously along the shoreline in the tidal Potomac River, 2005. Field bed numbers correspond to the numbers in Figs. 5 to 11. Density classes are USGS field data based on a Braun-Blanquet crown cover model where: 1 = 1 to 10 %, 2 = 11 to 40 %, 3 = 41 to 70 %, and 4 = 71 to 100 % cover. Percent cover of each species in a bed is abbreviated as: P\_HV (hydrilla), P\_MS (milfoil), P\_VA (wild celery), P\_CD (coontail), P\_NM (naiad), P\_NGU (southern naiad), P\_HD (stargrass), P\_SP (sago pondweed), and P\_CV (muskgrass). USGS is U.S. Geological Survey and DOH is DC Dept. of Health. Div is Shannon diversity index.

Survey date	Field bed number	Data source	USGS quad	Density class	P_HV	P_MS	P_VA	P_CD	P_NM	P_NGU	P_HD	P_SP	P_CV	Div
9/22/2005	250	USGS	Mattawoman Cr.	4	65.0	5.0	20.0	5.0	5.0	0.0	0.0	0.0	0.0	1.05
9/22/2005	251	USGS	Mattawoman Cr.	4	60.0	15.0	20.0	5.0	0.0	0.0	0.0	0.0	0.0	1.06
9/22/2005	252	USGS	Mattawoman Cr.	4	5.0	0.0	30.0	5.0	60.0	0.0	0.0	0.0	0.0	0.97
9/22/2005	253	USGS	Mattawoman Cr.	4	80.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.50
9/22/2005	254	USGS	Mattawoman Cr.	4	88.0	4.0	2.0	5.0	1.0	0.0	0.0	0.0	0.0	0.52
9/22/2005	255	USGS	Mattawoman Cr.	4	70.0	0.0	25.0	5.0	0.0	0.0	0.0	0.0	0.0	0.75
9/22/2005	256	USGS	Mattawoman Cr.	4	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.69
9/22/2005	257	USGS	Mattawoman Cr.	4	30.0	10.0	0.0	50.0	10.0	0.0	0.0	0.0	0.0	1.17
9/22/2005	258	USGS	Mattawoman Cr.	4	48.0	48.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.83
9/22/2005	259	USGS	Mattawoman Cr.	4	0.0	50.0	0.0	35.0	15.0	0.0	0.0	0.0	0.0	1.00
9/22/2005	260	USGS	Mattawoman Cr.	4	30.0	25.0	5.0	40.0	0.0	0.0	0.0	0.0	0.0	1.22
9/22/2005	261	USGS	Mattawoman Cr.	4	0.0	99.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.06
9/22/2005	262	USGS	Mattawoman Cr.	4	75.0	0.0	0.0	20.0	5.0	0.0	0.0	0.0	0.0	0.69
9/22/2005	263	USGS	Mattawoman Cr.	2	0.0	5.0	95.0	0.0	0.0	0.0	0.0	0.0	0.0	0.20
9/22/2005	264	USGS	Mattawoman Cr.	4	20.0	40.0	10.0	20.0	10.0	0.0	0.0	0.0	0.0	1.47
9/22/2005	265	USGS	Mattawoman Cr.	3	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
9/22/2005	266	USGS	Mattawoman Cr.	3	0.0	30.0	70.0	0.0	0.0	0.0	0.0	0.0	0.0	0.61
9/16/2005	267	DOH	Alexandria	1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
9/30/2005	268	DOH	DC West	2	95.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.20
9/28/2005	269	DOH	DC West	2	98.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.10
9/21/2005	270	DOH	DC West	1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
9/21/2005	271	DOH	DC West	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
9/30/2005	272	DOH	DC West	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00

**Table 1 – continued.** Percent canopy cover of each species and Shannon diversity index for field beds located continuously along the shoreline in the tidal Potomac River, 2005. Field bed numbers correspond to the numbers in Figs. 5 to 11. Density classes are USGS field data based on a Braun-Blanquet crown cover model where: 1 = 1 to 10 %, 2 = 11 to 40 %, 3 = 41 to 70 %, and 4 = 71 to 100 % cover. Percent cover of each species in a bed is abbreviated as: P\_HV (hydrilla), P\_MS (milfoil), P\_VA (wild celery), P\_CD (coontail), P\_NM (naiad), P\_NGU (southern naiad), P\_HD (stargrass), P\_SP (sago pondweed), and P\_CV (muskgrass). USGS is U.S. Geological Survey and DOH is DC Dept. of Health. Div is Shannon diversity index.

Survey date	Field bed number	Data source	USGS quad	Density class	P_HV	P_MS	P_VA	P_CD	P_NM	P_NGU	P_HD	P_SP	P_CV	Div
9/30/2005	273	DOH	DC West	3	99.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.06
9/30/2005	274	DOH	DC West	3	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
9/30/2005	275	DOH	DC West	4	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
9/28/2005	276	DOH	DC West	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
9/21/2005	277	DOH	DC West	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
9/28/2005	278	DOH	Alexandria	4	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
9/15/2005	279	DOH	Alexandria Alexandria/	2	98.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.10
9/21/2005	280	DOH	DC West	2	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
10/3/2005	281	DOH	Alexandria	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
10/3/2005	282	DOH	Alexandria	2	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
8/30/2005	283	DOH	Alexandria	2	55.0	0.0	0.0	0.0	45.0	0.0	0.0	0.0	0.0	0.69
10/3/2005	284	DOH	Alexandria	2	90.0	0.0	5.0	0.0	4.0	0.0	1.0	0.0	0.0	0.42
10/3/2005	285	DOH	Alexandria	1	95.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.20
10/4/2005	286	DOH	Alexandria	1	99.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.06
10/13/2005	287	DOH	Alexandria	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
10/17/2005	288	DOH	Alexandria	1	95.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.20
8/29/2005	289	DOH	Alexandria	1	69.5	0.0	0.5	1.0	29.0	0.0	0.0	0.0	0.0	0.68
10/4/2005	290	DOH	Alexandria	1	90.0	0.0	0.0	5.0	5.0	0.0	0.0	0.0	0.0	0.39
10/17/2005	291	DOH	Alexandria	2	50.0	0.0	35.0	15.0	0.0	0.0	0.0	0.0	0.0	1.00