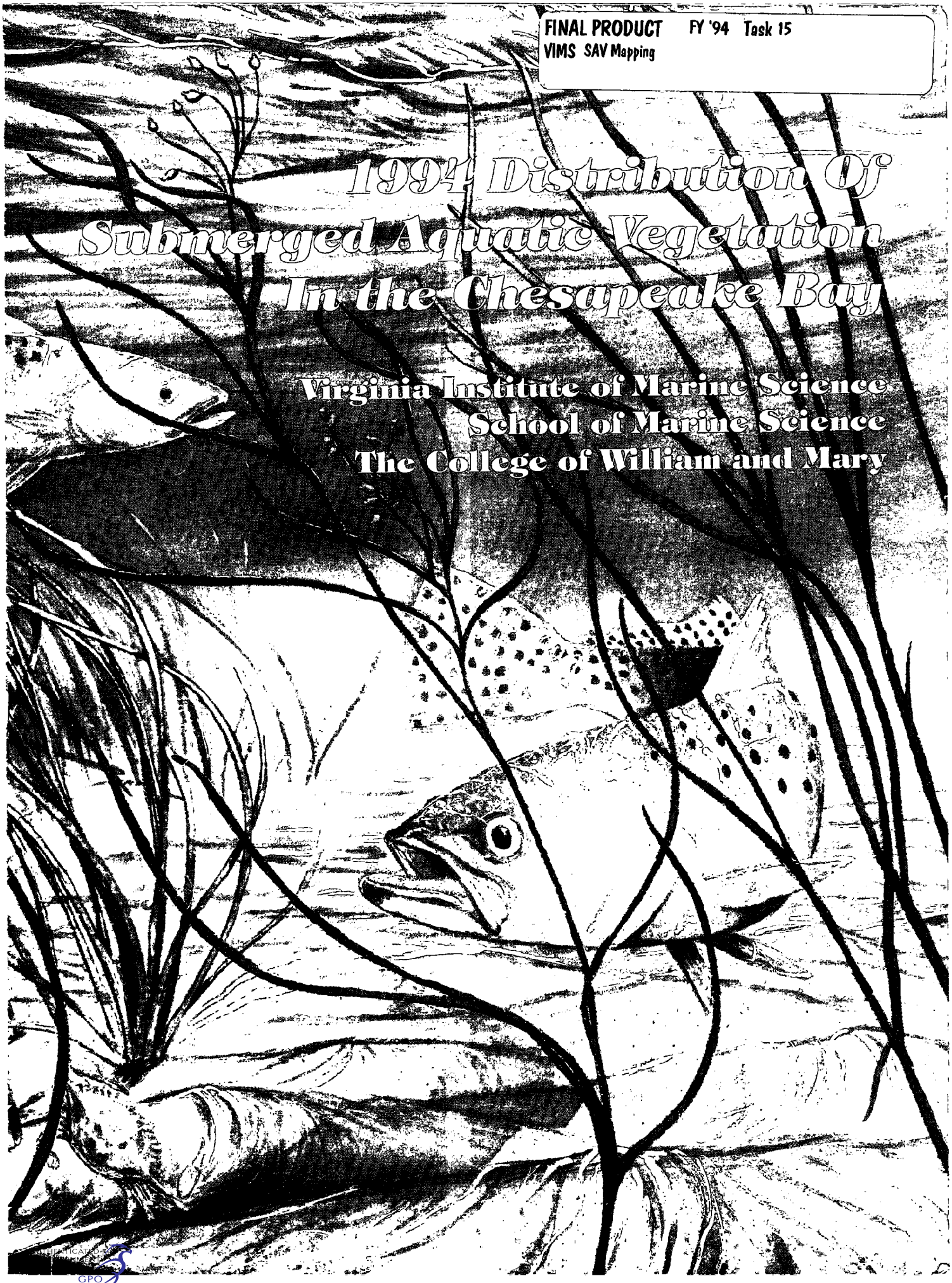
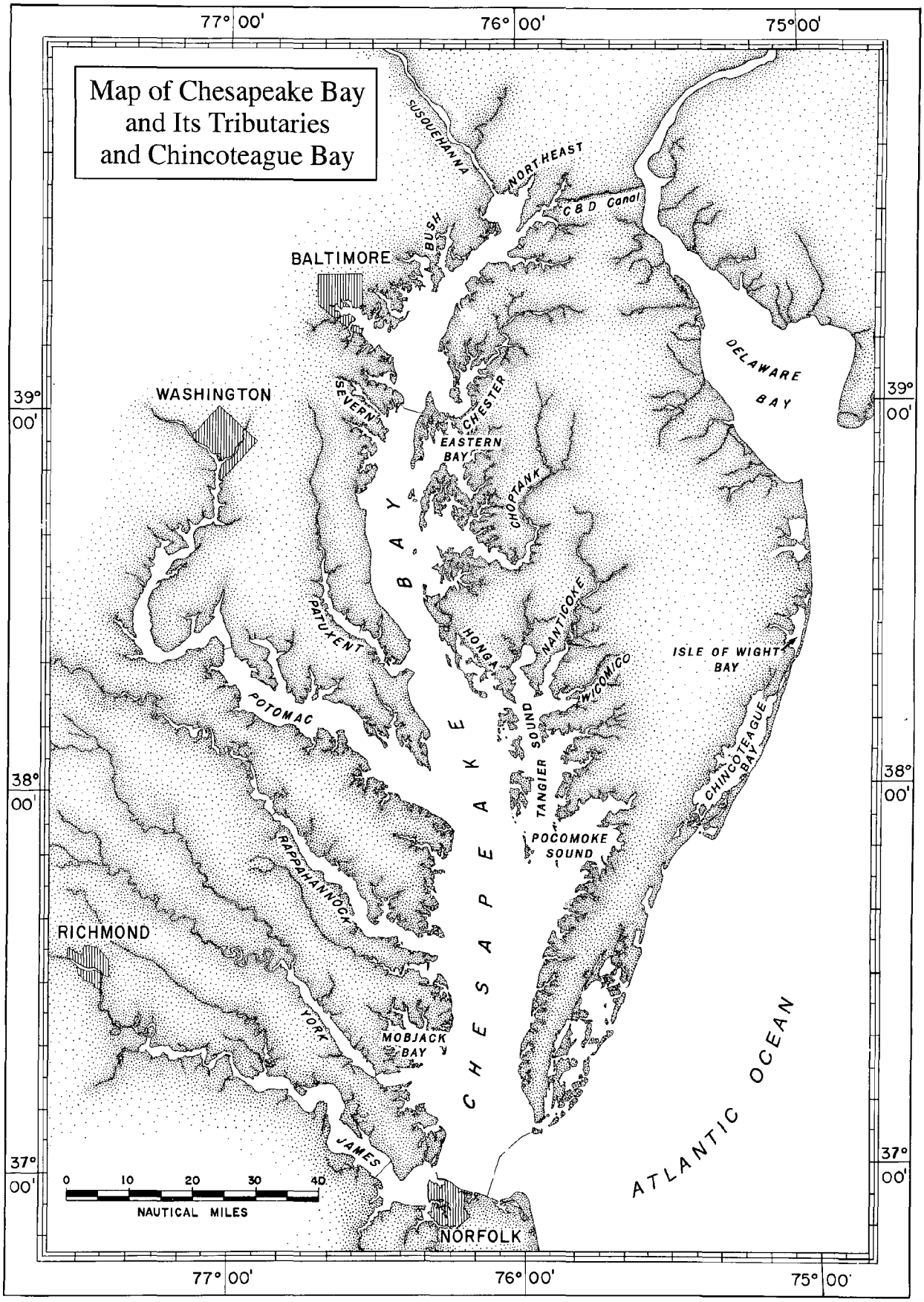
1994 Distribution Of Submerged Aquatic Vegetation In the Chesapeake Bay

Virginia Institute of Marine Science
School of Marine Science
The College of William and Mary




Map of Chesapeake Bay
and Its Tributaries
and Chincoteague Bay
77° 00'
76° 00'
75° 00'
39° 00'
38° 00'
37° 00'
SUSQUEHANNA
NORTHEAST
C & D Canal
BUSH
BALTIMORE
WASHINGTON
SEVERN
CHESTER
EASTERN BAY
CHOPTANK
DELAWARE BAY
PATUXENT
HONGA
NANTICOKE
WICOMICO
ISLE OF WIGHT BAY
POTOMAC
TANGIER SOUND
CHINCOTEAGUE BAY
POCOMOKE SOUND
RAPPAHANNOCK
RICHMOND
YORK
MOBJACK BAY
JAMES
CHESAPEAKE BAY
ATLANTIC OCEAN
NORFOLK
0 10 20 30 40
NAUTICAL MILES

Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay and Tributaries and Chincoteague Bay - 1994

by

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Cover: from an original watercolor painted by Kent Forrest of Gloucester, Virginia.

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EXECUTIVE SUMMARY

The distribution of submerged aquatic vegetation (SAV), principally rooted vascular macrophytes, in the Chesapeake Bay, its tributaries, and Chincoteague Bay, was mapped from black-and-white aerial photographs taken during May to October 1994 at a scale of 1:24,000. SAV bed perimeter information was digitized and stored in a computerized database. Ground-truth information was obtained from the United States Geological Survey (USGS) National Center; United States Environmental Protection Agency (USEPA); Maryland Department of Natural Resources (MD-DNR); United States Fish and Wildlife Service (USFWS); Harford Community College, Maryland; Essex Community College, Maryland; Maryland-National Capital Parks and Planning Commission, Patuxent River Park; Ocean Pines Boat Club, Berlin, Maryland; and the School of Marine Science, Virginia Institute of Marine Science, The College of William and Mary. Citizen support via the U. S. Fish and Wildlife Service and the Chesapeake Bay Foundation provided additional ground-truth information.

In a change from previous SAV distribution and abundance reports in this series, SAV distribution data in this report are presented and discussed based on the segmentation scheme adopted by the Chesapeake Bay Program (U.S. EPA, 1983) and described briefly in the Methods section of this report. A new zonation scheme (Upper, Middle, and Lower zones) for Chesapeake Bay, which accommodates the Chesapeake Bay Program segmentation boundaries, was adapted from that used in previous SAV distribution reports (i.e., Orth *et al.*, 1994) and established by Orth and Moore (1982), then modified by Orth *et al.*, (1989). SAV distribution data for the years 1991-1994 are presented using the Chesapeake Bay Program segmentation scheme in order to consistently follow up the recently published EPA report on trends in SAV (Orth *et al.*, 1995), which covers the years 1971-1991 using the same scheme.

The 1991-1993 data were edgematched using ARC/INFO GIS software, as were the 1994 data, in order to bring separately digitized USGS 7.5 minute topographic quadrangle SAV coverages into one unified coverage for the entire Chesapeake Bay (see Methods). Therefore, 1991-1993 SAV distribution data presented in this report reflect edgematching adjustments, and differ from previously published data for these years derived from separate coverages which were not edgematched (i.e., Orth *et al.*, 1992, 1993, and 1994).

1994 SUMMARY

In 1994, the Chesapeake Bay had 26,484 hectares of SAV, compared with 29,587 hectares in 1993, a decrease of 10%, with 3,854 hectares (15%), 13,373 hectares (50%), and 9,257 hectares (35%) occurring in the Upper, Middle, and Lower Bay zones, respectively (Figures 1 and 2). SAV increased in the Upper zone by 44%, and decreased in the Middle and Lower zones 21% and 8%, respectively, from totals in 1993 (Figure 2). SAV increased in abundance from 1993 levels in all segments in the Upper Bay zone except WT1 (Bush River) and WT4 (Back River), which remained unvegetated. Increases in 1994 for some segments (e.g., TF1 and CB8) of the Middle and Lower zones did not

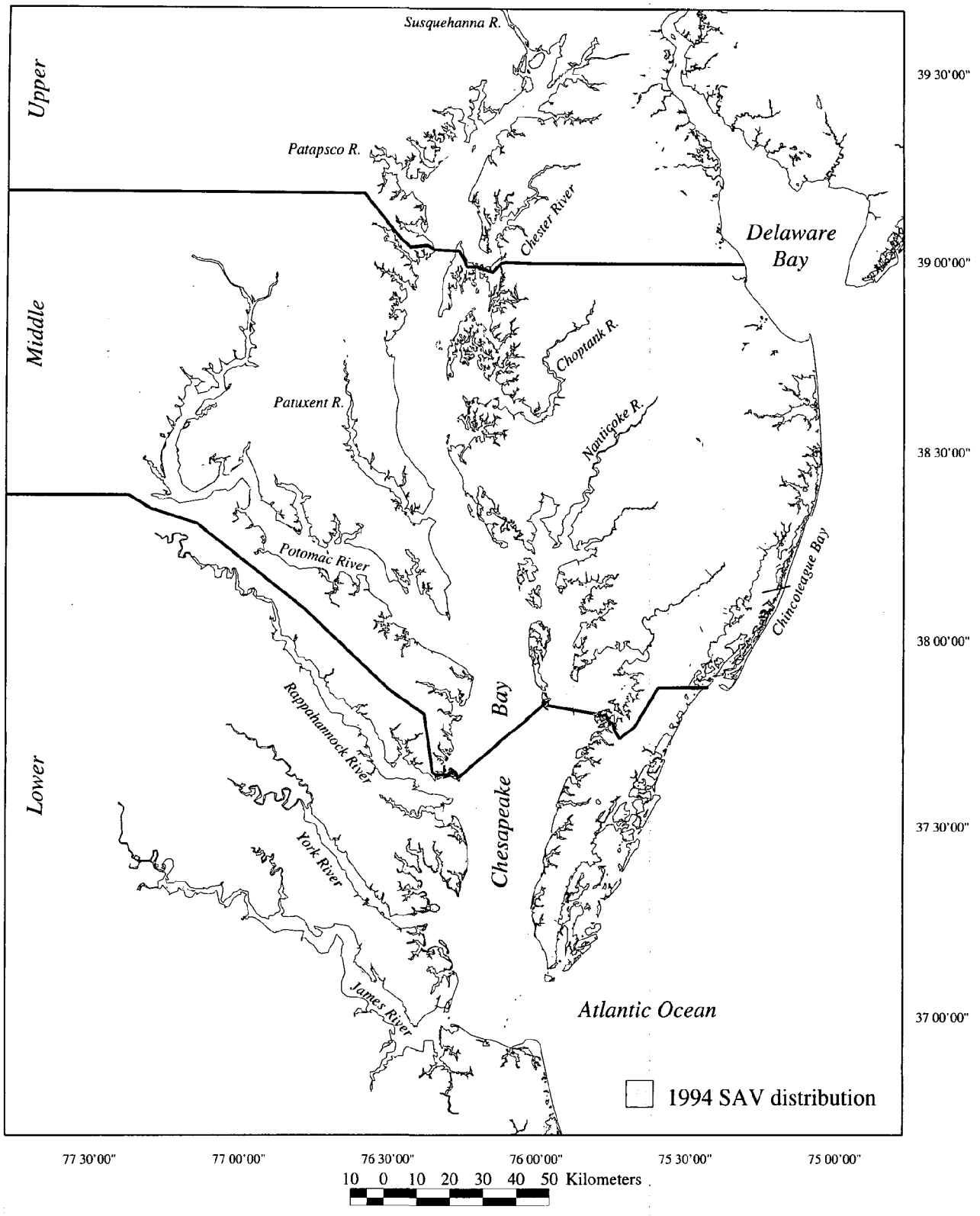

Figure 1: Location of the 1994 SAV beds in Chesapeake Bay (Upper, Middle, and Lower zones), tributaries, and Chincoteague Bay.

Hectares of SAV in Each Zone of Chesapeake Bay and Chincoteaque Bay, 1991-1994

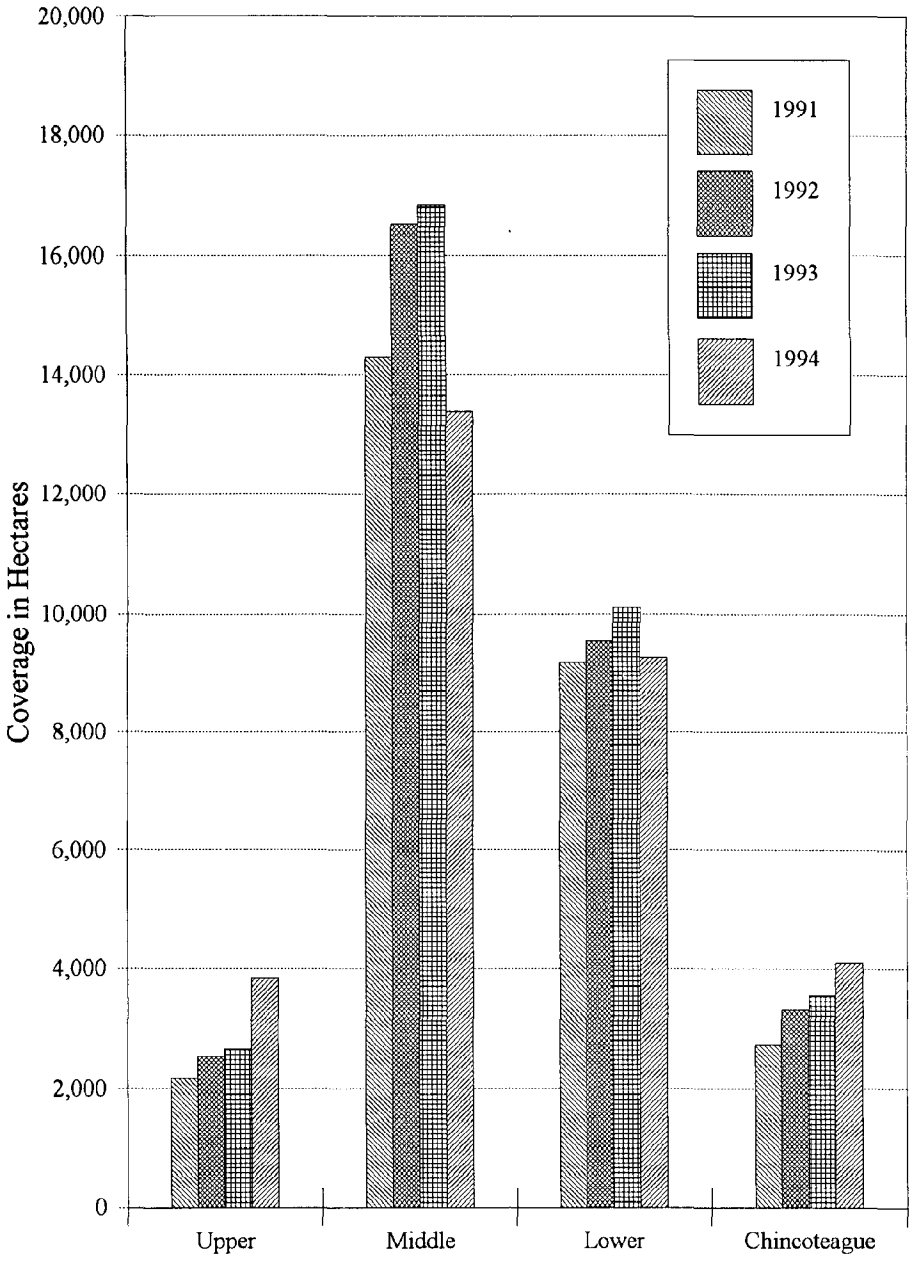

Figure 2. A comparison of the total hectares of SAV for the Upper, Middle, and Lower zones of Chesapeake Bay and Chincoteague Bay for1991-1994. (Refer to Figure 1 and Figure 9 for zone locations.)

offset larger decreases in 1994 in other segments (e.g., CB5, TF2, EE3, CB7, and LE3) of these zones.

In 1994, SAV in the Bay increased, compared with 1993 levels, in twenty segments (Upper zone: CB1, CB2, CB3, WT2, WT3, WT5, WT6, ET1, ET2, ET3, ET4; Middle zone: WT7, WT8, TF1, RET1, LE2, EE1; and Lower zone: CB8, LE4, LE5), decreased in fourteen (Middle zone: CB4, CB5, LE1, TF2, RET2, ET5, ET8, ET9, EE2, EE3; and Lower zone: CB6, CB7, LE3, WE4), and remained unvegetated in eleven (Upper zone: WT1, WT4; Middle zone: ET6, ET7, ET10; and Lower zone: TF3, RET3, TF4, RET4, TF5, RET5). SAV was not detected in 1994 in 14 segments (Upper zone: WT1, WT4; Middle zone: CB4, LE1, ET5, ET6, ET7, ET10; and Lower zone: TF3, RET3, TF4, RET4, TF5, RET5) (Figures 3, 4, and 5) as compared to 16 segments in 1993. [The mainstem upper and middle Rappahannock River, TF3 and RET3, upper and middle York River, TF4 and RET4, and upper and middle James River, TF5 and RET5, have been totally devoid of submerged vegetation for years and are not currently photographed (Methods)]. Five segments (Upper zone: WT5, ET1; and Middle zone: WT7, WT8, RET1), which were unvegetated in 1993, had some SAV detected by photography in 1994 (Figures 3 and 4). Three segments (CB4, LE1, and ET5), all in the Middle zone, which were vegetated in 1993, albeit with relatively small amounts, had no SAV detected in 1994 (Figure 4).

In the Bay in 1994, 36% of SAV was categorized as dense (density class 4, or 70-100% coverage), up slightly from the 1993 amount (32%). The percentage of SAV categorized as moderate (density class 3, or 40-70% coverage) in 1994 (19%) also increased slightly from that in 1993 (18%). The percentage of SAV categorized as sparse (density class 2, or 10-40% coverage) (28%) decreased in 1994 compared with that in 1993 (34%), whereas that categorized as very sparse (density class 1, or 1-10% coverage) (17%) increased slightly in 1994 from that in 1993 (15%).

SAV in the very sparse and sparse classes combined (the 0-40% coverage range) constituted 45% of all SAV in 1994, a decrease from 49% in 1993. Conversely, SAV in the moderate and dense classes combined (the 40-100% coverage range) constituted 55% of all SAV in 1994, an increase from 51% in 1993.

1991 TO 1994 SUMMARY

The total SAV in Chesapeake Bay increased each year from 1991 to 1993, then decreased in 1994. (Figure 2). However, the 1994 level of 26,484 hectares was still 859 hectares greater than the 1991 level of 25,625 hectares. SAV in the Chesapeake Bay increased in all zones each year from 1991 to 1993 (Figure 2), although not all segments within zones exhibited a steadily increasing trend. However, yearly gains in some segments offset losses in others, generally, resulting in increasing zone totals from 1991 through 1993. Then in 1994, the Upper Bay zone total continued to increase (44%) from 2,672 hectares the previous year to 3,854 hectares, the highest level in four years and an increase of 1,696 hectares over 1991 (Figure 2). However, in 1994 the Middle and Lower zone totals both decreased from 1993 levels, 16,825 to 13,373 hectares (21%) and 10,091 to 9,257 hectares (8%), respectively (Figure 2). The 1994 Middle zone total of 13,373 hectares was the lowest level

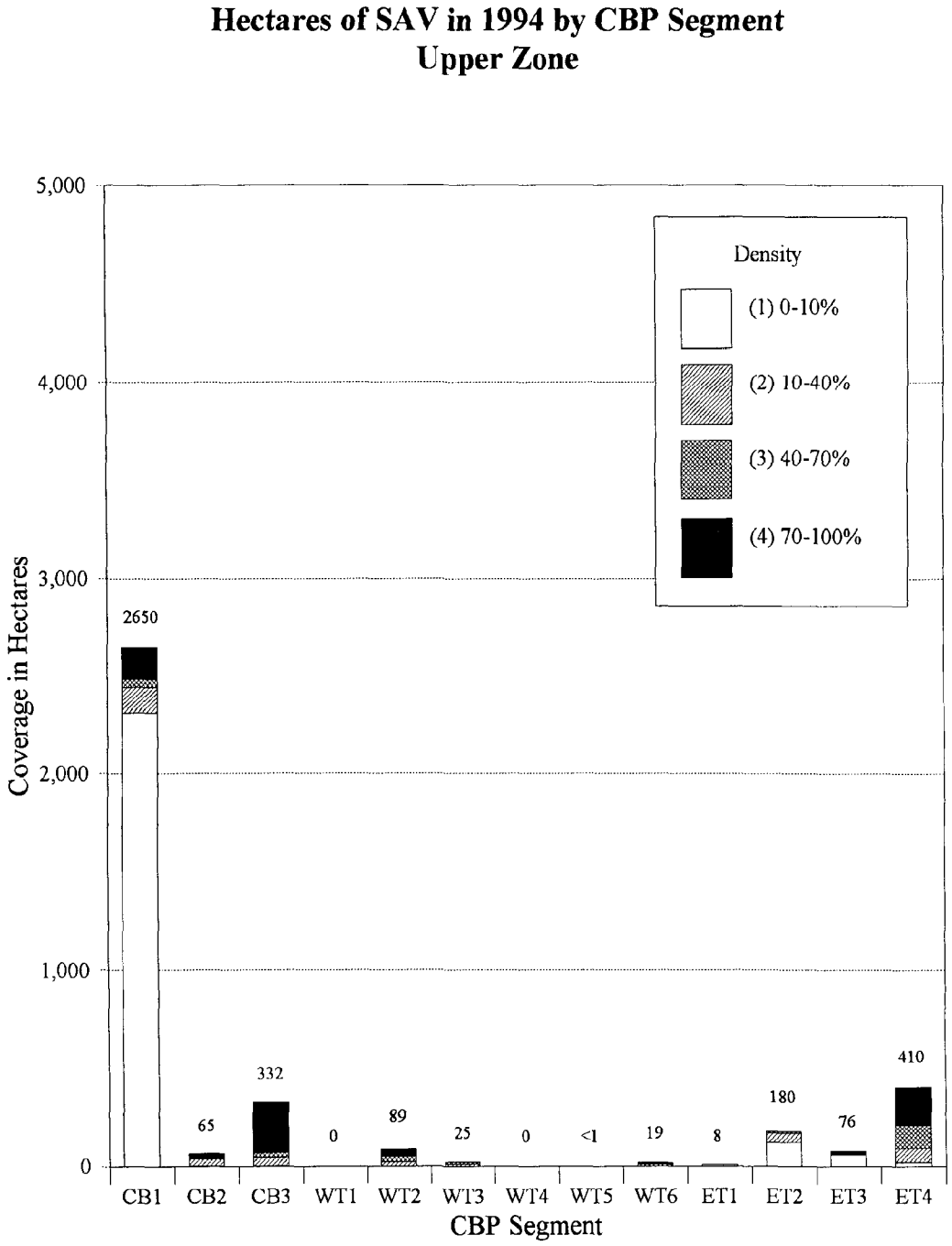

Figure 3. Number of hectares SAV per density class in 1994 by segment in the Upper Bay Zone of Chesapeake Bay (Refer to Figure 9, Table 4, and Appendix B for segment locations and boundaries.)

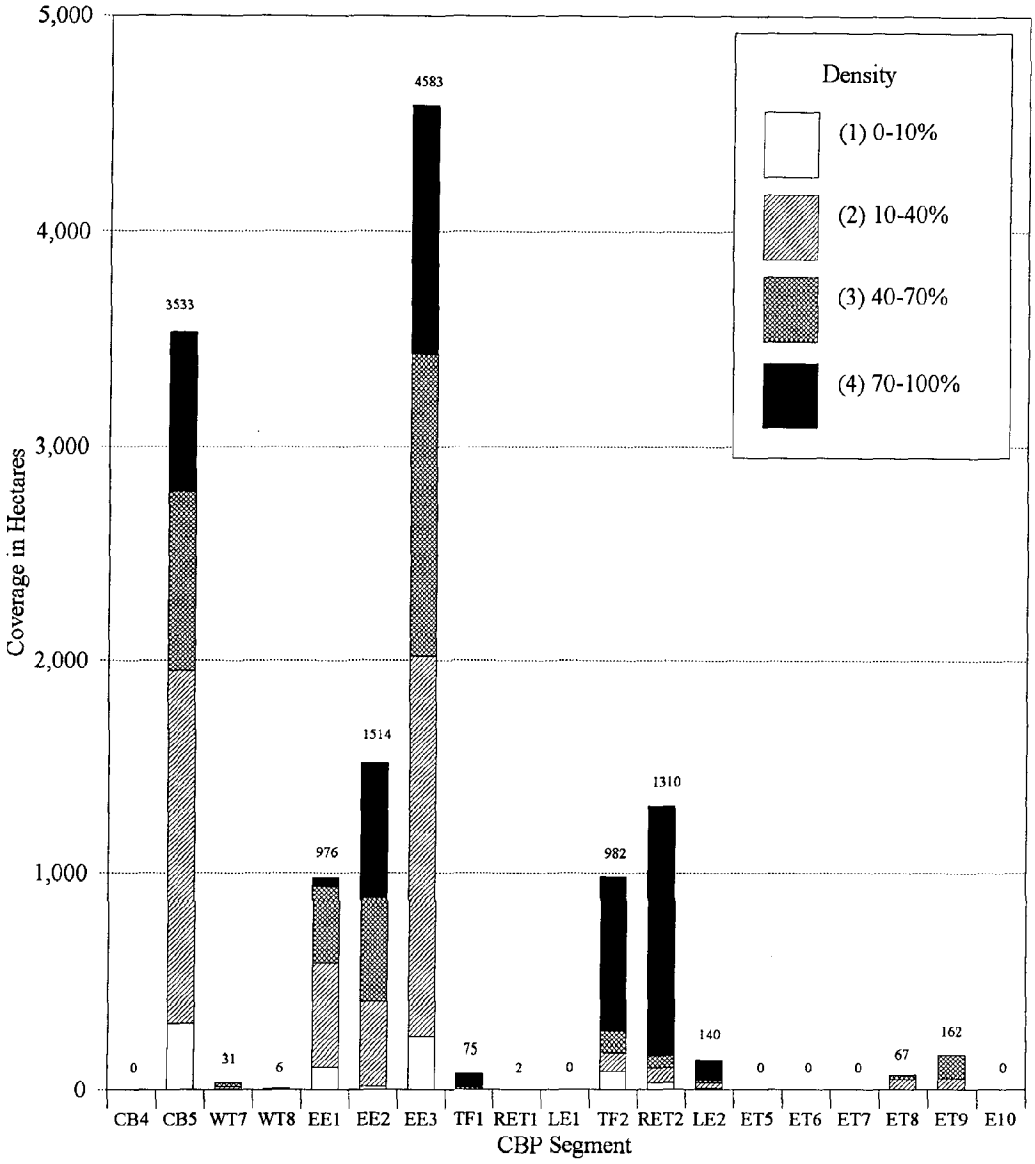

Figure 4. Number of hectares SAV per density class in 1994 by segment in the Middle Bay Zone of Chesapeake Bay (Refer to Figure 9, Table 4, and Appendix B for segment locations and boundaries.)

in four years (a decrease of 921 hectares from 1991; a decrease of 3,452 hectares from the same period's highest level in 1993) (Figure 2). The 1994 Lower zone total of 9,257 hectares, although an 834 hectare decrease from its high for this four-year period in 1993, was still 84 hectares greater than the 1991 level (Figure 2).

In the Bay in 1994, SAV increased over 1991 levels in twenty-three segments (Upper zone: CB1, CB2, CB3, WT2, WT3, WT5, WT6, ET1, ET3, ET4; Middle zone: WT7, WT8, TF1, RET1, LE2, EE1, EE2; and Lower zone: CB6, CB7, CB8, LE4, WE4, LE5), decreased in nine segments (Upper zone: ET2; Middle zone: CB4, CB5, TF2, RET2, ET8, ET9, EE3; and Lower zone: LE3), and remained unvegetated in thirteen segments (Upper zone: WT1, WT4; Middle zone: LE1, ET5, ET6, ET7, ET10; and Lower zone: TF3, RET3, TF4, RET4, TF5, RET5).

In Chesapeake Bay, taken as a whole over the period 1991 to 1994, the percentage of SAV categorized as dense decreased 28%. In 1991, 50% of SAV in the Bay was in density class 4, but in 1994 this percentage was only 36%. The percentage of SAV in this class declined each year from 1991 until 1994, when it increased to 36%, its second highest level in the four-year period. That is a 13% increase from the four-year low in 1993 of 32%. Conversely, in the same four-year period, the percentage of SAV categorized as sparse increased 47%. In 1991, 19% of SAV in the Bay was in density class 2, but by 1994 this percentage was 28%. The percentage of SAV in this class increased each year from 1991 until 1994, when it decreased to 28%, its third highest level in four years. That is an 18% decrease from the four-year high of 34% in 1993.

The percentages of SAV in density classes 1 and 3 also increased from 1991 to 1994, although these increases were not as great as for density class 2. The percentage of SAV in density class 1 increased each year from 1991 to 1994. In 1991, 12% of Bay SAV was categorized as very sparse, but by 1994 this figure was 17%. The percentage of SAV in density class 3 in 1991 was 18%, in 1992 it was 26%, in 1993 it was 18%, and in 1994 it was 19%.

In the Bay from 1991 to 1994, there was a 45% increase in the percentage of SAV in the sparse and very sparse classes combined (the 0-40% coverage range). The percentage of SAV in combined classes 1 and 2 increased from 31% in 1991, to 49% in 1993, but in 1994 there was a decrease to 45% of the SAV. Conversely, there was a 20% decrease in the percentage of SAV in the moderate to dense classes combined (the 40-100% coverage range) from 1991 to 1994. The percentage of SAV in combined classes 3 and 4 decreased from 69% in 1991, to 51% in 1993, then increased in 1994 to 55%.

Upper Bay Zone - 1991 to 1994

The total SAV coverage in the Upper Bay zone increased 44% from 1993 (2,672 hectares) to 1994 (3,854 hectares) (Figure 2). The total SAV level in the Upper Bay zone increased each year from 1991 to 1994, for an overall 79% (1,696 hectares) increase (Figure 2).

SAV in the Upper Bay zone, taken as a percentage of the SAV in the whole Chesapeake Bay,

increased each year since 1991 (Figure 2). It increased less than a percentage point each year from 1991 to 1993, going from 8% to 9%; then in 1994 it jumped to 15% of SAV in the Bay (Figure 2).

Of the thirteen segments comprising this zone, there were increases in SAV abundance over 1993 levels in eleven segments, of which ten had increases in SAV over 1991 levels, also. Of the latter ten segments, eight segments (CB1, CB2, CB3, WT5, WT6, ET1, ET3, and ET4) were at their highest levels since 1991, and two of those segments, the Patapsco River (WT5) and the Northeast River (ET1), had SAV for the first time in this four-year period (Figure 3). The remaining two segments, the Gunpowder River (WT2) and the Middle River (WT3) reached their highest levels for this four-year period in 1992, then decreased in 1993, and rebounded in 1994 to their second highest levels since 1991.

Only one segment (ET2) had less SAV (180 hectares) in 1994 than in 1991 (269 hectares), although this was an increase from its lowest level of 95 hectares in 1993. SAV in 1994 in segment ET2, the Elk and Bohemia Rivers, increased 89% over 1993 (95 to 180 hectares), but this was still less than the four-year high for the period in 1991 of 269 hectares. Two segments, the Bush River (WT1) and the Back River (WT4) were unvegetated in 1994 and 1991. However, WT1 had some vegetation (2.32 hectares) mapped in 1992; whereas, only WT4 had no vegetation mapped in any year for the entire 1991 to 1994 period.

Middle Bay Zone - 1991 to 1994

The amount of SAV in the Middle Bay zone decreased 21%, or 3,452 hectares, from 1993, to a total of 13,373 hectares in 1994, which was the lowest level in four years (Figure 2). The SAV in the Middle Bay zone increased each year from 1991 to 1993, for an overall increase of 18% (2,531 hectares), but the 1994 level was 921 hectares or 6% less than the 1991 level (Figure 2).

SAV in the Middle Bay zone, taken as a percentage of the total SAV in the Chesapeake Bay, declined in 1994 from 1991-1993 levels. In 1991 it was 56% of SAV in the Bay; in 1992 it was 58%; in 1993, 57%; and in 1994 it dropped over 6 percentage points to 50%. [This corresponded to concomitant increases in the other two zones.]

Of the 19 segments comprising this zone, there were increases in 1994 SAV abundance over 1993 levels in six segments (WT7, WT8, TF1, RET1, LE2, and EE1), which were also at their highest levels for the four-year period as well. In addition, three of the latter segments, the Severn River (WT7), the South, Rhode, and West rivers (WT8), and the Middle Patuxent River (RET1), had SAV for the first time in the four-year period (Figure 4). The Upper Patuxent River segment (TF1) was unvegetated in 1991 and 1992 as well, but had 8.78 hectares in 1993.

In the Middle Bay zone in 1994, there were decreases from 1993 levels in ten segments (CB4, CB5, LE1, TF2, RET2, ET5, ET8, ET9, EE2, and EE3). Six of the latter segments (CB4, LE1, ET8, ET9, EE2, and EE3) in 1993 were at their highest levels since 1991. Except segment EE2, the Lower Choptank River, which was still 1,402 hectares higher in 1994 than in 1991, nine of the segments

which decreased from 1993 levels reached their lowest levels for this four-year period in 1994. This included, among others, the Upper and Middle Potomac River segments (TF2 and RET2) and the two segments (CB5 and EE3) encompassing Tangier, Smith, and Bloodsworth islands, which historically had some of the largest SAV beds in the Bay and, proportionately, the greatest amount of SAV in the Bay.

In the Middle Bay zone in 1994, there were six unvegetated segments (CB4, LE1, ET5, ET6, ET7, and ET10) (Figure 4), the latter three of which were unvegetated each year since 1991. The Lower Patuxent River segment (LE1) and the Choptank River (ET5) dropped back to their 1991 unvegetated condition after both had small amounts of SAV recorded in the intervening period. The Middle Central Chesapeake Bay segment, CB4, was vegetated in 1991, as well as in 1992 and 1993.

Lower Bay Zone - 1991 to 1994

The total SAV level in the Lower Bay zone decreased 8% or 834 hectares from 1993 to 1994 (Figure 2). The total SAV level in the Lower Bay zone increased each year, from 1991 to 1993, for an overall increase of 918 hectares or 10% (Figure 2). SAV then decreased in 1994, but this level (9,257 hectares) was still 85 hectares greater than the 1991 level (9,173 hectares) (Figure 2).

SAV in the Lower Bay Zone, as a percentage of the SAV in the entire Chesapeake Bay, declined from the 1991 level of 36%, to 35% in 1994. It dropped to 33% in 1992, then increased in 1993, to 34%, and again in 1994.

Of the thirteen segments comprising this zone, there were increases in 1994 in SAV abundance over 1993 levels in three segments (CB8, LE4, and LE5), which also were at their highest levels in the four years since 1991. In 1994, four segments (CB6, CB7, LE3, and WE4) in the Lower Bay zone, which were consistently increasing each year since 1991, decreased from 1993 levels, which were the highest for the four-year period. In this zone in 1994, only one segment, LE3, the Lower Rappahannock River, decreased to a level (197 hectares) below that of 1991 (315 hectares).

In the Lower Bay zone, six segments (TF3, RET3, TF4, RET4, TF5, and RET5) which comprise the upper and middle segments of three major bay tributaries, the Rappahannock, the York, and the James, remained unvegetated from 1991 to 1994 (Figure 5). These six segments have been unvegetated for years and are no longer photographed (see Methods).

In 1994, SAV levels for six segments (CB6, CB7, CB8, LE4, WE4, and LE5) were higher than their 1991 levels, although three of these segments (CB6, CB7, and WE4) actually decreased from their 1993 levels, which were the highest for the four-year period.

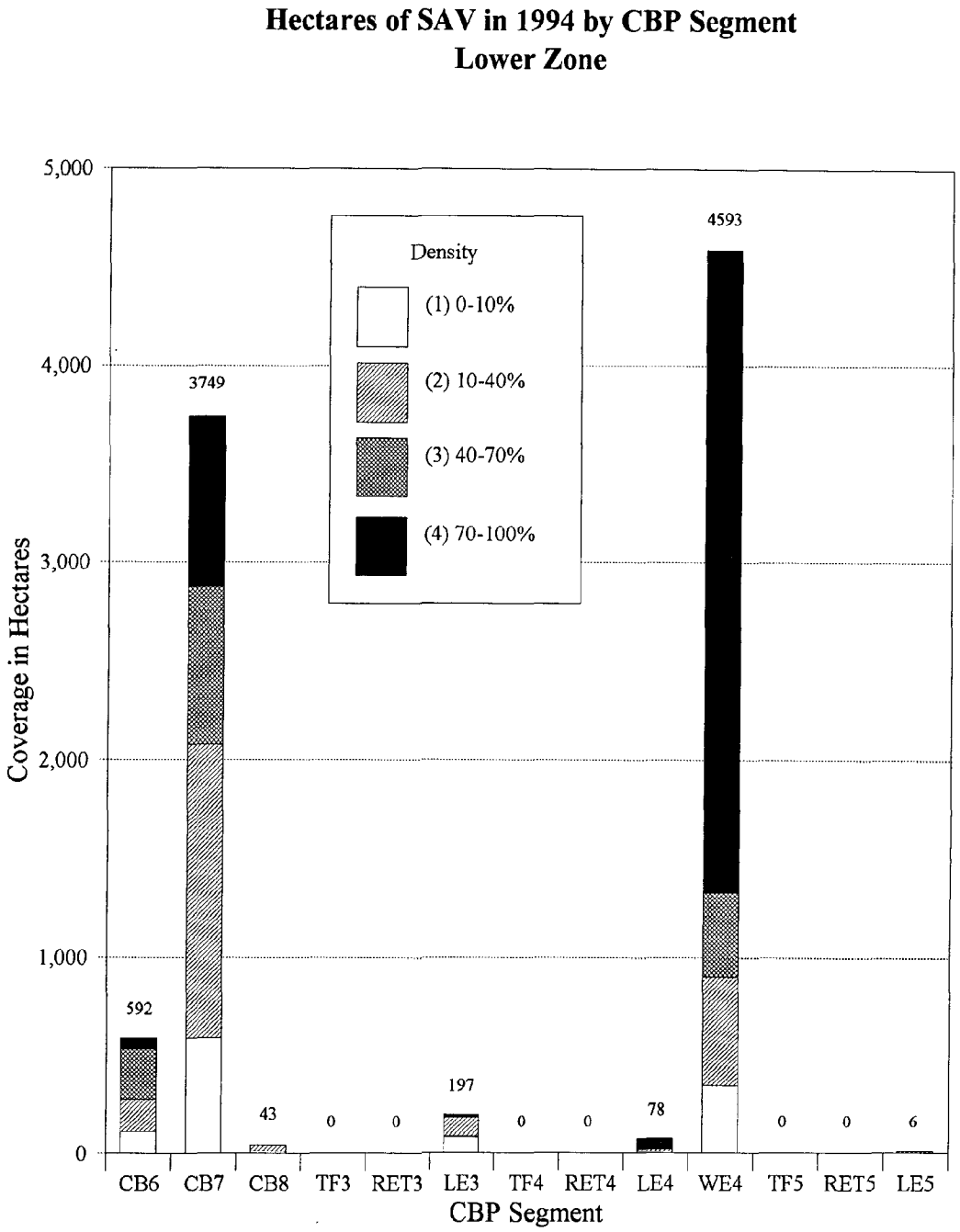

Figure 5. Number of hectares SAV per density class in 1994 by segment in the Lower Bay Zone of Chesapeake Bay (Refer to Figure 9, Table 4, and Appendix B for segment locations and boundaries.)

CHINCOTEAGUE BAY

SAV in the Chincoteague Bay section increased in distribution with 4,117.53 hectares mapped in 1994 compared with 3,576.57 hectares in 1993 (Figures 1 and 2). Most of the SAV in Chincoteague and Sinepuxent bays was located along the eastern sides of both bays behind Assateague Island, the barrier island that forms these bays. Several beds were located along the eastern side of Isle of Wight and Assawoman bays, behind Fenwick Island, the barrier island which forms these bays.

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Acknowledgement would not be complete without commendation for the groups that provided ground truthing of SAV beds, which was used in conjunction with interpretation of the 1994 photography. The USFWS with the Chesapeake Bay Foundation organized citizens to report locations and species composition of grass beds around the bay. Kathryn Reshetiloff of the USFWS was responsible for compiling and tabulating the citizen ground-truth data. Stan Kollar of Harford Community College (HCC), Maryland, Kent Mountford, Senior Scientist with the USEPA, the Essex Community College SAV Work Group, Maryland, and Peter Bergstrom, USFWS, provided ground-truth data for certain specific regions of the Maryland portion of the Bay. Virginia Carter and Nancy Rybicki of the USGS National Center provided ground-truth data for the Potomac River. Michael Naylor and Paul Kazyak of the MD-DNR, Chesapeake Bay Research and Monitoring Division, and the Maryland Patuxent River Park staff, provided ground-truth data for the Patuxent River. Ken Moore, Susan Bogardy, Jill Goodman, and James Fishman of VIMS provided ground-truth data for the lower bay. The Ocean Pines Boat Club of Berlin, Maryland, provided ground truth for Chincoteague, Isle of Wight, Sinepuxent, and Assawoman Bays.

The production of this report required the dedication of numerous scientists, technicians, artists, photographers, and others. The following people deserve a note of thanks: Rich Batiuk and Carin Bisland, USEPA-Chesapeake Bay Program Office; Kathryn Reshetiloff, USFWS; Vincent Pito, MD-DNR; and Christina Pompa, CBF. Peter Bergstrom of the USFWS, Dick Hammerschlag of the U.S. Park Service, and Carin Bisland, with editor Tawna Mertz, of the USEPA also reviewed the draft of this report and provided helpful comments and suggestions for improving the quality of the final product. We are especially grateful to the dedicated VIMS personnel who contributed greatly to the production of this report: Susan Bogardy, Krisna Davis, Carol Hayes, and Christine Wilcox for their tremendous assistance and perservation in digitizing the SAV maps, editing the digital data files, mapping ground-truth information, and for their constant, careful efforts to maintain high quality control; Gerald Harrison and Susan Rollins for grant administration; Wanda Cohen, Kay Stubblefield, Harold Burrell, and Sylvia Motley of the VIMS Publications Center for report production services; and Kent Forrest, artist, for the beautiful watercolor painting used on the cover of the report.

Air Photographics, Inc. conducted the aerial photographic missions and was responsible for the high quality aerial photographs.

SAV SPECIES

The term "submerged aquatic vegetation" (SAV) for the purpose of this report encompasses twenty taxa from ten vascular macrophyte families and three taxa from one freshwater macrophytic algal family, the Characeae. SAV excludes all other algae, both benthic and planktonic, which occur in Chesapeake Bay and its tributaries (Appendix A). Although these other algae do constitute a portion of the SAV biomass in Chesapeake Bay and its tributaries (Humm, 1979), this study did not attempt to identify, delineate, or discuss the algal component of the vegetation nor its relative importance in the flora, except for the Characeae. This is the case, for example, with the benthic marine algae, including many macrophytes, which sometimes co-occur in the same beds as vascular plants, even as epiphytes on vascular plants.

Ten species of submerged aquatic vegetation are commonly found in the Chesapeake Bay and its tributaries. *Zostera marina* (eelgrass) is dominant in the lower reaches of the bay. *Myriophyllum spicatum* (Eurasian watermilfoil), *Potamogeton pectinatus* (sago pondweed), *Potamogeton perfoliatus* (redhead grass), *Zannichellia palustris* (horned pondweed), *Vallisneria americana* (wild celery), *Elodea canadensis* (common elodea), *Ceratophyllum demersum* (coontail), and *Najas guadalupensis* (southern naiad) are less tolerant of high salinities and are found in the middle and upper reaches of the bay (Stevenson and Confer, 1978; Orth *et al.*, 1979; Orth and Moore, 1981, 1983). *Ruppia maritima* (widgeon grass) is tolerant of a wide range of salinities and is found from the bay mouth to the Susquehanna Flats. Approximately 13 other species are only occasionally found. When present, these species occur primarily in the middle and upper reaches of the bay and the tidal rivers (Appendix A). *Hydrilla verticillata* (hydrilla), a recently introduced species, presently dominates SAV beds in the tidal freshwater reaches of the Potomac River. It was also reported again in 1994, in the Susquehanna River and Flats, where its growth was not as widespread as in the Potomac River (Kollar, pers. comm.).

Zostera marina and *R. maritima* are the species reported from Chincoteague Bay.

METHODS

INTRODUCTION

Black-and-white aerial photography at a scale of 1:24,000 was the principal source of information used to assess distribution and abundance of SAV in Chesapeake Bay, its tributaries, and Chincoteague Bay in 1994. There were 1,509 photographs from 139 flight lines which were carefully examined to identify all SAV beds visible on the photography. Outlines of SAV beds were subsequently drawn onto USGS 7.5 minute quadrangles and then digitized, which provided a digital database for analysis of bed areas and locations. Ground-survey information collected in 1994 was tabulated, placed onto the same 7.5 minute quadrangles, and entered into the SAV digital database.

AERIAL PHOTOGRAPHY

The 1994 SAV aerial photography was obtained by Air Photographics (Martinsburg, West Virginia) using a Wild RC-20 camera with a 153 mm (6 inch) focal length Aviogon lens and Agfa Pan 200 film. The camera was mounted in the bottom fuselage of Air Photographics' Piper Aztec, a twin engine reconnaissance aircraft. Photography was acquired at an altitude of approximately 12,000 feet, which yielded 1:24,000 scale photographics.

There were 139 flight lines covering 1,771 miles of shoreline and yielding 1,509 exposures. Flight lines included land features that were necessary to establish control points for accurate mapping (Figure 6). Flight lines to obtain the photography were predetermined by Air Photographics to include all areas known to have SAV, as well as most areas which could potentially have SAV in the middle and upper zones [i.e., all areas where water depths were less than 2 meters at mean low water (mlw)]. In the lower zone, sections of the upper Rappahannock and upper York rivers, and most of the James River were not photographed for analysis because of the continued absence of SAV in these areas as evidenced by ground truth.

Flight lines were prioritized by sections. Flights were timed to occur during the peak growing season of species known to occur in the sections. In addition, specific areas with significant SAV coverage were given priority. Dates of photography for each quadrangle are noted on each map in Appendix B.

General guidelines followed during acquisition of aerial photography (Table 1) address tidal stage, plant growth, sun elevation, water and atmospheric transparency, turbidity, wind, sensor operation, and plotting. Adherence to these guidelines assured acquisition of photography under nearly optimal conditions for detection of SAV, thus insuring accurate photointerpretation. Deviation from any of these guidelines required prior approval by VIMS staff. Quality assurance and calibration procedures were consistently followed. The altimeter was calibrated annually by the Federal Aviation

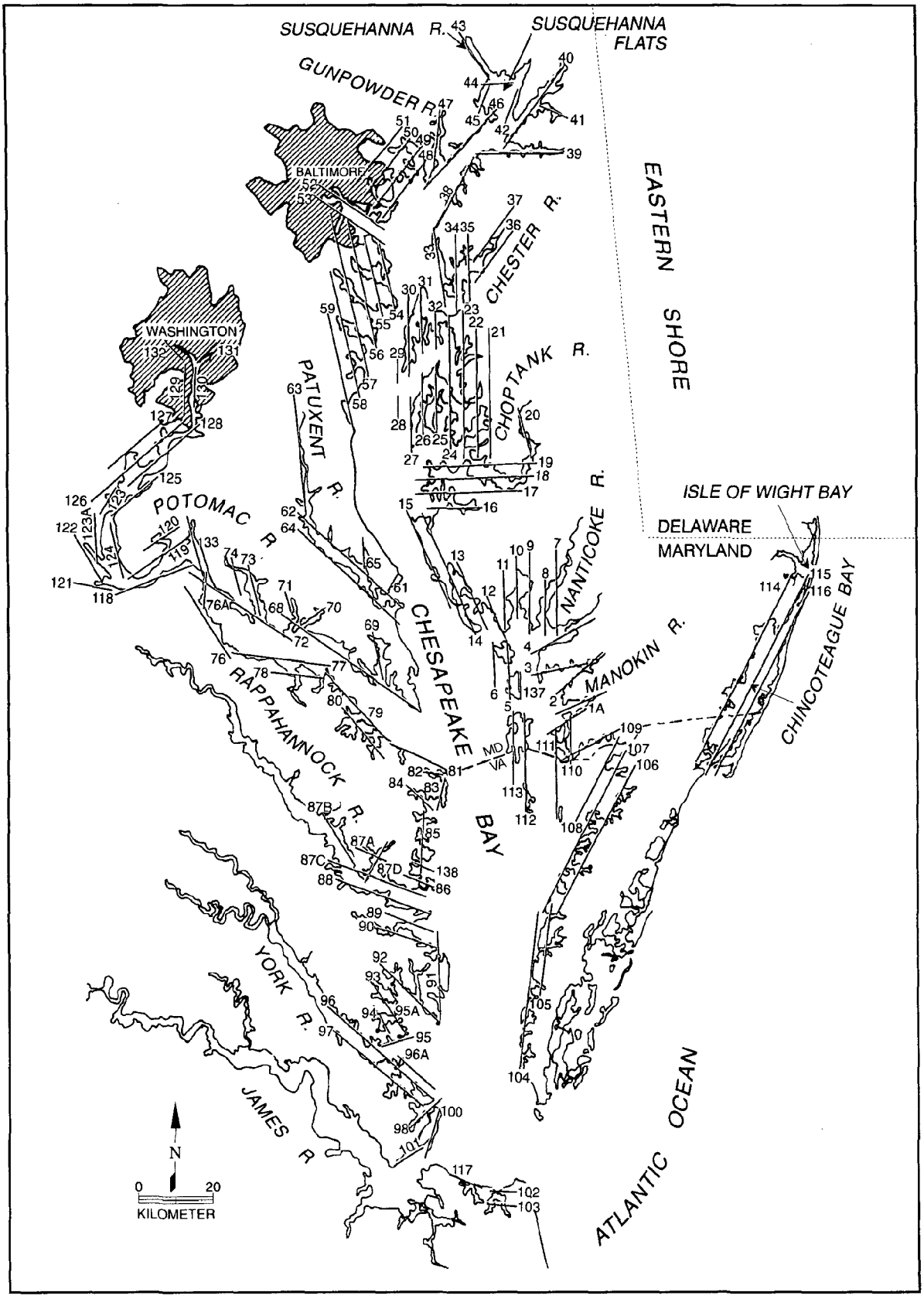

Figure 6. Map of Chesapeake Bay, its tributaries, and of Chincoteague Bay with approximate locations of flight lines for 1994 SAV photography.

TABLE 1

Guidelines Followed During Acquisition of Aerial Photographs.

1. **Tidal Stage** - Photography was acquired at low tide, +/- 0-1.5 ft., as predicted by the National Ocean Survey tables.

2. **Plant Growth** - Imagery was acquired when growth stages ensured maximum delineation of SAV, and when phenologic stage overlap was greatest.

3. **Sun Angle** - Photography was acquired when surface reflection from sun glint did not cover more than 30 percent of frame. Sun angle was generally between 20° and 40° to minimize water surface glitter. At least 60 percent line overlap and 20 percent side lap was used to minimize image degradation due to sun glint.

4. **Turbidity** - Photography was acquired when clarity of water ensured complete delineation of grass beds. This was visually determined from the airplane to insure that SAV could be seen by the observer.

5. **Wind** - Photography was acquired during periods of no or low wind. Off-shore winds were preferred over on-shore winds when wind conditions could not be avoided.

6. **Atmospherics**- Photography was acquired during periods of no or low haze and/or clouds below aircraft. There could be no more than scattered or thin broken clouds, or thin overcast above aircraft, to ensure maximum SAV to bottom contrast.

7. **Sensor Operation** - Photography was acquired in the vertical mode with less than 5 degrees tilt. Scale/altitude/film/focal length combination permitted resolution and identification of one square meter area of SAV (at the surface).

8. **Plotting** - Each flight line included sufficient identifiable land area to assure accurate plotting of grass beds.

Administration. Camera settings were selected by automatic exposure control. Sun angle was measured with a sensor on the plane. Flight lines were plotted on 1:250,000 scale maps to allow for overlap of photography. To minimize image degradation due to sun glint, the camera was equipped with a computer controlled intervalometer which established 60% line overlap and 20% sidelap. An automatic bubble level held the camera to within one degree tilt. The scale/altitude/film/focal length combination was coordinated so that SAV patches of one square meter could be resolved. Ground-level wind speed was monitored hourly. Under normal operating conditions, flights were usually conducted under wind speeds less than 10 mph. Above this speed, wind-generated waves stir bottom sediments which can easily obscure SAV beds in less than one hour. The pilot used experiential knowledge to determine what acceptable level of turbidity would allow complete delineation of SAV beds. During optimum flight conditions the pilot was able to distinguish bottom features such as SAV or algae at low tide. Excessively turbid conditions precluded photography. Determination of optimum cloud cover level was based on pilot experience. Records of this parameter were kept in a flight notebook. Every attempt was made to acquire photographs when there was no cloud cover below 12,000 feet. Cloud cover did not exceed 5% of the area covered by the camera frame. A thin haze layer above 12,000 feet was generally acceptable. Experience with the Chesapeake Bay has shown that optimal atmospheric conditions generally occur two to three days following passage of a cold front, when winds have shifted from north-northwest to south and have moderated to less than 10 mph. Within the guidelines given for prioritizing and executing the photography, the flights were planned to coincide with these atmospheric conditions where possible. All film was processed by Air Photographics. A 9 inch x 9 inch black-and-white contact print was produced for each exposed frame. Each photograph was labeled with the date of acquisition as well as flight line number. Film and photographs were stored under appropriate environmental conditions to prevent degradation.

MAPPING PROCESS

For this analysis, USGS 7.5 minute quadrangle maps were utilized for mapping SAV beds from aerial photography, for digitizing the SAV beds, for mapping ground-truth data, and for compiling SAV bed area measurements. Figure 7 gives locations of 181 quadrangles in the study area which includes all regions with potential for SAV growth. Most quadrangles are sequentially numbered for efficient access to data. The name corresponding to each quadrangle in Figure 7 is listed in Table 2. Identification and delineation of SAV beds by photointerpretation utilized all available information including: knowledge of aquatic grass signatures on film, distribution of SAV in 1994 from aerial photography, 1994 ground-truth information, and aerial site surveys. USGS 7.5 minute quadrangle maps (1:24,000 scale), printed by the Mid-Continent Mapping Center of the National Cartographic Information Center on stable transparent mylar, were used as base maps from which to make copies. Distortion-free, identical copies of these base maps were made at the same scale on stable transparent mylar using a contact print process.

SAV beds from the 1994 aerial photographs were then mapped onto these mylar copies of USGS 7.5 minute quadrangles. Delineation of each SAV bed was facilitated by superimposing the photographic

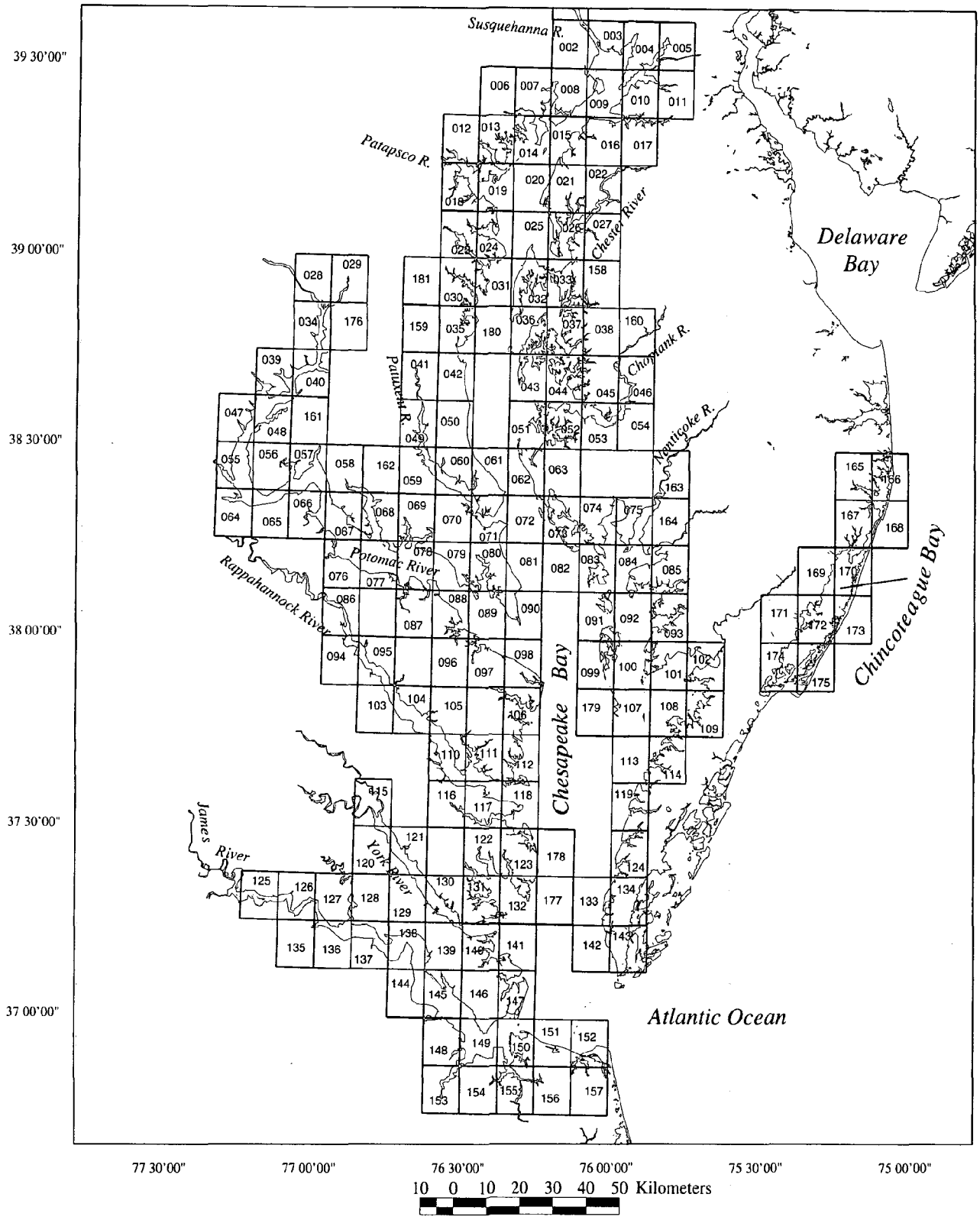

Figure 7: Location of USGS 7.5 minute quadrangles in Chesapeake Bay, its tributaries, and in Chincoteague Bay with corresponding code numbers. (See Table 2 for quad names.)

TABLE 2

List of USGS 7.5 Minute Quadrangles for Chesapeake Bay and Chincoteague Bay SAV Study Areas with Corresponding Code Numbers. (See Figure 7 for Location of Quadrangles. ARC/INFO Generated 7.5 Minute Quadrangles with SAV Beds and Ground Truthing Are Reproduced in Appendix B.)

001. Conowingo Dam, Md.-Pa.
002. Aberdeen, Md.
003. Havre de Grace, Md.
004. North East, Md.
005. Elkton, Md.-Del.
006. White Marsh, Md.
007. Edgewood, Md.
008. Perryman, Md.
009. Spesutie, Md.
010. Earleville, Md.
011. Cecilton, Md.
012. Baltimore East, Md.
013. Middle River, Md.
014. Gunpowder Neck, Md.
015. Hanesville, Md.
016. Betterton, Md.
017. Galena, Md.
018. Curtis Bay, Md.
019. Sparrows Point, Md.
020. Swan Point, Md.
021. Rock Hall, Md.
022. Chestertown, Md.
023. Round Bay, Md.
024. Gibson Island, Md.
025. Love Point, Md.
026. Langford Creek, Md.
027. Centreville, Md.
028. Washington West, Md.-D.C.-Va.
029. Washington East, D.C.-Md.
030. South River, Md.
031. Annapolis, Md.
032. Kent Island, Md.
033. Queenstown, Md.
034. Alexandria, Va.-D.C.-Md.
035. Deale, Md.
036. Claiborne, Md.
037. St. Michaels, Md.
038. Easton, Md.
039. Fort Belvoir, Va.-Md.
040. Mt. Vernon, Md.-Va.
041. Lower Marlboro, Md.
042. North Beach, Md.
043. Tilghman, Md.
044. Oxford, Md.
045. Trappe, Md.
046. Preston, Md.
047. Quantico, Va.-Md.
048. Indian Head, Va.-Md.
049. Benedict, Md.
050. Prince Frederick, Md.
051. Hudson, Md.
052. Church Creek, Md.
053. Cambridge, Md.
054. East New Market, Md.
055. Widewater, Va.-Md.
056. Nanjemoy, Md.
057. Mathias Point, Md.-Va.
058. Popes Creek, Md.
059. Mechanicsville, Md.
060. Broomes Island, Md.
061. Cove Point, Md.
062. Taylors Island, Md.
063. Golden Hill, Md.
064. Passapatanzy, Md.-Va.
065. King George, Va.-Md.
066. Dahlgren, Va.-Md.
067. Colonial Beach North, Md.-Va.
068. Rock Point, Md.

TABLE 2 (continued)

069. Leonardtown, Md.
070. Hollywood, Md.
071. Solomons Island, Md.
072. Barren Island, Md.
073. Honga, Md.
074. Wingate, Md.
075. Nanticoke, Md.
076. Colonial Beach South, Va.-Md.
077. Stratford Hall, Va.-Md.
078. St. Clements Island, Va.-Md.
079. Piney Point, Md.-Va.
080. St. Marys City, Md.
081. Point No Point, Md.
082. Richland Point, Md.
083. Bloodsworth Island, Md.
084. Deal Island, Md.
085. Monie, Md.
086. Champlain, Va.
087. Machodoc, Va.
088. Kinsale, Va.-Md.
089. St. George Island, Va.-Md.
090. Point Lookout, Md.
091. Kedges Straits, Md.
092. Terrapin Sand Point, Md.
093. Marion, Md.
094. Mount Landing, Va.
095. Tappahannock, Va.
096. Lottsburg, Va.
097. Heathsville, Va.-Md.
098. Burgess, Va.-Md.
099. Ewell, Md.-Va.
100. Great Fox Island, Va.-Md.
101. Crisfield, Md.-Va.
102. Saxis, Va.-Md.
103. Dunnsville, Va.
104. Morattico, Va.
105. Lively, Va.
106. Reedville, Va.
107. Tangier Island, Va.
108. Chesconessex, Va.
109. Parksley, Va.
110. Urbanna, Va.
111. Irvington, Va.
112. Fleets Bay, Va.
113. Nandua Creek, Va.
114. Pungoteague, Va.
115. West Point, Va.
116. Saluda, Va.
117. Wilton, Va.
118. Deltaville, Va.
119. Jamesville, Va.
120. Toano, Va.
121. Gressitt, Va.
122. Ware Neck, Va.
123. Mathews, Va.
124. Franktown, Va.
125. Westover, Va.
126. Charles City, Va.
127. Brandon, Va.
128. Norge, Va.
129. Williamsburg, Va.
130. Clay Bank, Va.
131. Achilles, Va.
132. New Point Comfort, Va.
133. Cape Charles, Va.
134. Cheriton, Va.
135. Savedge, Va.
136. Claremont, Va.
137. Surry, Va.
138. Hog Island, Va.
139. Yorktown, Va.
140. Poquoson West, Va.
141. Poquoson East, Va.
142. Elliotts Creek, Va.
143. Townsend, Va.
144. Bacons Castle, Va.
145. Mulberry Island, Va.
146. Newport News North, Va.

TABLE 2 (concluded)

147. Hampton, Va.
148. Benns Church, Va.
149. Newport News South, Va.
150. Norfolk North, Va.
151. Little Creek, Va.
152. Cape Henry, Va.
153. Chuckatuck, Va.
154. Bowers Hill, Va.
155. Norfolk South, Va.
156. Kempsville, Va.
157. Princess Anne, Va.
158. Wye Mills, Md.
159. Bristol, Md.
160. Fowling Creek, Md.
161. Port Tobacco, Md.
162. Charlotte Hall, Md.
163. Mardela Springs, Md.
164. Wetipquin, Md.
165. Selbyville, Md.
166. Assawoman Bay, Md.-Del.
167. Berlin, Md.
168. Ocean City, Md.
169. Public Landing, Md.
170. Tingles Island, Md.
171. Girdle Tree, Md.-Va.
172. Boxiron, Md.-Va.
173. Whittington Point, Md.-Va.
174. Chincoteague West, Va.
175. Chincoteague East, Va.
176. Anacostia, D.C.-Md.
177. East of New Point Comfort, Va.
178. Bethel Beach, Va.
179. Goose Island, Va.
180. Horseshoe Point, Md
181. Bowie, Md.

print with the appropriate mylar quadrangle on a light table. SAV bed boundaries were then traced directly onto the mylar quadrangle with a pencil. Where minor scale differences were evident between a photograph and a quadrangle, or where significant shoreline erosion or accretion had occurred since USGS publication of a map, either a best fit was obtained or shoreline changes were noted on the quadrangle. All photointerpretation of 1994 aerial photography for SAV beds was done by one scientist who also photointerpreted the 1971 to 1993 aerial photographs.

In addition to delineating SAV bed boundaries, an estimate of SAV density within each bed was made by visually comparing each bed to an enlarged Crown Density Scale (Figure 8) similar to those developed for estimating forest tree crown cover from aerial photography (Paine, 1981). Bed density was categorized into one of four classes based on a subjective comparison with the density scale. These were: 1, very sparse (<10% coverage); 2, sparse (10-40%); 3, moderate (40-70%); or 4, dense (70-100%). Either the entire bed or subsections within the bed were assigned a bed density number (1 to 4) corresponding to the above density classes. Some beds were subsectioned to delineate where variations in SAV density occurred. Additionally, each distinct SAV unit (bed or bed subsection) was assigned an identifying two letter designation unique to its map. Subsections were further identified as contiguous beds by the addition of two letters unique to that sequence. These contiguous bed identifications aid the tracking and analysis of single natural bed units that were subsectioned due to variation in SAV density. Coupled with the appropriate SAV map number and year of photography, these two letter designations uniquely identify each SAV bed in the database.

SAV PERIMETER DIGITIZATION AND QUALITY ASSURANCE PROCEDURES

The perimeters of all SAV beds mapped from the aerial photography onto the mylar copies were digitized in ARC/INFO, using an Altek Model 41 tablet, with a resolution of .001 inches (.00254 cm) and an accuracy of .005 inches (.0127 cm). The beds for each quadrangle were digitized twice in two separate ARC/INFO coverages. Each coverage was plotted at an exact scale of 1:24,000 on translucent plotter paper and overlaid on the original mylar for visual checking. In instances where the digitized SAV bed boundaries did not correspond to within 0.5 mm of the original, the bed was re-digitized. Once the SAV outlines on both coverages passed visual inspection, a bed-by-bed comparison of the areas (sq. meters) was made as an additional quality assurance check. Individual beds were rejected and redigitized if they were larger than 0.1 hectare and there was a difference of greater than 5% area between the two coverages, or larger than 1 hectare and there was a difference of greater than 1% area between the two coverages. The bed-by-bed comparison was useful in identifying instances where SAV beds were incorrectly labelled, thus eliminating coding errors.

Prior to each digitization session, the Altek instrument was checked manually against a digitizing standard. This was accomplished by first securing a mylar quadrangle with SAV polygons to the

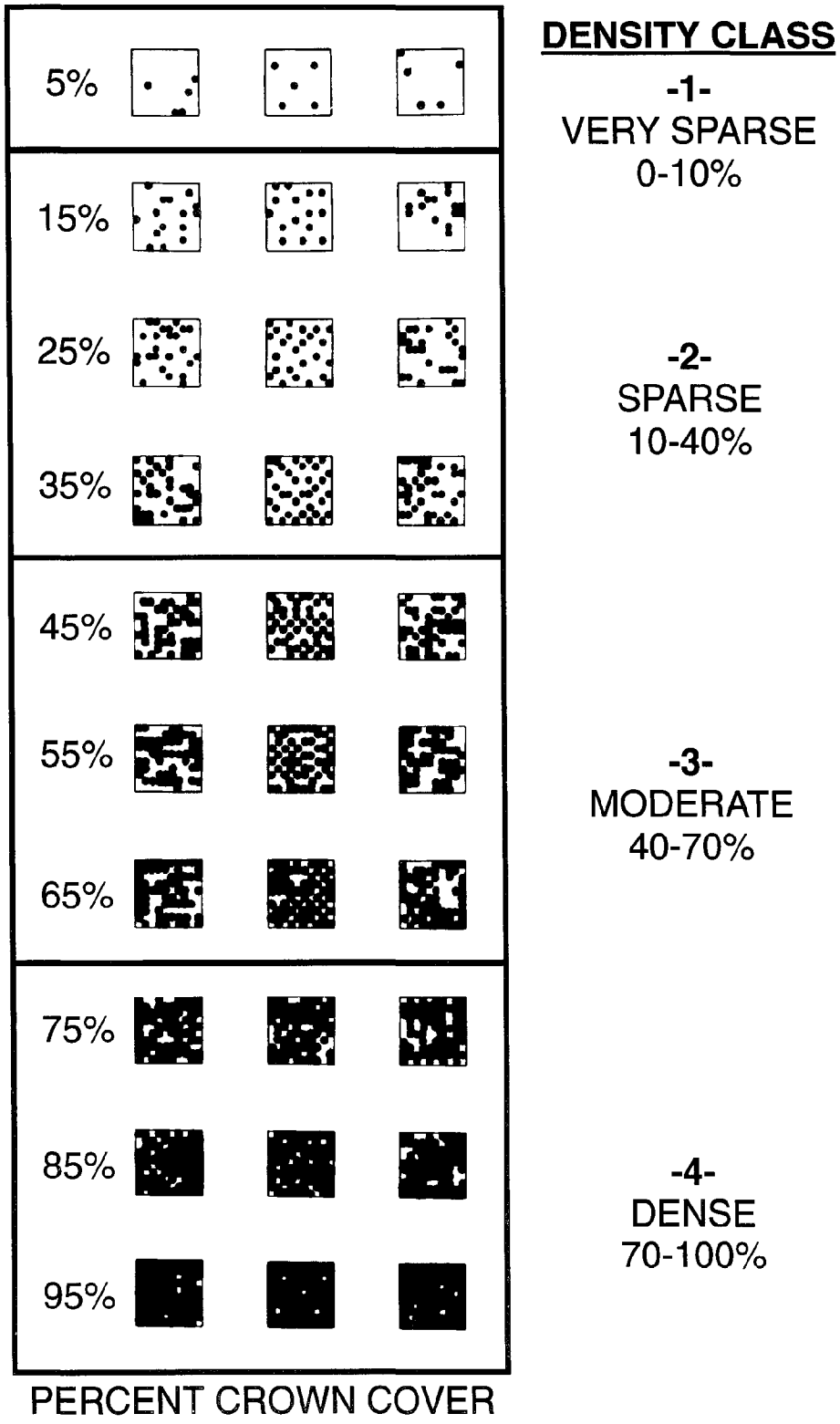

Figure 8. Crown density scale used for estimating density of SAV beds from aerial photography. (Rows of squares with black and white patterns represent three different arrangements of vegetated cover for a given percentage.) *Adapted from Paine, 1981.*

digitizing tablet. The mylar standard was then secured to the same quadrangle and digitized. The digitized area of each standard was compared to the known area of the standard. If a variation between the known and the mean of the observed areas exceeded 1.0%, the maps were redigitized. In addition, the digitized standard was plotted and checked visually against its location on the map to verify positional accuracy.

After all quadrangles were digitized, the resulting digital data was combined to form a single data set for the entire Bay. The quadrangle edges were then scanned to ensure that the SAV polygons were consistent on both sides of the border (edgematching). Inconsistencies were resolved by checking the mylar maps and re-interpreting the photography if necessary.

Maximum accuracy was maintained by exclusively using mylar quadrangles and standards rather than paper ones, which can change scale as a result of changes in air temperature and humidity in the digitizer room.

Standard operating procedures (SOPs) were developed to facilitate orderly and efficient processing of the 1994 SAV maps and the SAV computer files produced from them, and to comply with the need for consistency, quality assurance, and quality control. SOPs developed include: a detailed procedure for digitization of SAV maps; a digitizer log in which all operations were recorded and dated, which was used to guide and record editing operations; and a flow chart used to track progress of all operations.

CALCULATION OF 1991-1994 SAV AREAS

The SAV coverages in Universal Transverse Mercator (UTM), ARC/INFO, Zone 18 format were used to calculate area in square meters for all SAV beds. These areas are reported as USGS 7.5 minute quadrangle, segment, and zone totals in the tables in the Results section. Segment and zone totals were calculated by using an overlay operation of the segment and zone regions on the SAV beds in ARC/INFO. The definition of the segments used in this analysis are provided in Table 3. The 1991-1993 data were also edgematched as above and area totals recomputed.

ORGANIZATIONAL PROCEDURES FOR ANALYSIS AND DISCUSSION

SAV distribution data are presented and discussed based on different segmentation and zonation schemes from those used in the previous SAV distribution and abundance reports. The segmentation scheme used in this report was that adopted by the Chesapeake Bay Program (Flemer *et al.*, 1983) (Tables 3 and 4; Figure 9). The Upper, Middle, and Lower zonation scheme used in the previous reports, as established by Orth and Moore (1982) and modified by Orth *et al.*, (1989) was adapted to the new segmentation scheme. It was followed as closely as possible but, necessarily, had to be

TABLE 3

Chesapeake Bay Program Segment Descriptions

Northern Chesapeake Bay (CB1): head of Bay segment, excluding the Northeast River but including Swan Creek. CB1 adjoins CB2 at a boundary that extends from Sandy Point of Spesutie Island, on the west, to Turkey Point of Elk Neck, on the east, and that lies in the region of maximum penetration of sea salts at the head of the Bay.

Northeast; Elk and Bohemia; and Sassafras rivers (ET1; ET2; ET3): upper eastern shore tributary segments adjoining mainstem Bay segments at their respective mouths. The northermost tributary, ET1, flows into CB1 east of Furnace Bay. The Bohemia River joins the Elk River and together comprise ET2 which flows into CB2 at Turkey Point. ET3 flows into CB2 further south at Grove Point.

Upper Chesapeake Bay and Upper Central Chesapeake Bay (CB2; CB3): upper main stem Bay segments, excluding main tributaries. CB2 includes Romney and Still Pond creeks. The boundary of CB2 with CB3 extends from Robins Point on Gunpowder Neck, through Pooles Island, to south of Fairlee Creek. This boundary demarcates the southern limit of the turbidity maximum and also coincides with the long-term summer average for the 5 ppt salinity contour. CB3 includes Tavern and Swan creeks and the Haven, all east of Swan Point. The boundary of CB3 with CB4 extends from Sandy Point, south of the Magothy River on the east, to Kent Island, below Love Point, and marks both the northern limit of deep water anoxia in Chesapeake Bay and the 10 ppt salinity contour.

Bush; Gunpowder; Middle; Back; and Patapsco rivers (WT1; WT2; WT3; WT4; WT5): upper western shore tributaries segments adjoining mainstem Bay segments at their respective mouths. WT1 adjoins southwestern CB2 south of Abbey Point. WT2 includes Saltpeter and Dundee creeks and adjoins northwestern CB3 at Weir Point. WT3, WT4, and WT5 adjoin middle-western CB3. WT3 includes Seneca Creek which is connected to Saltpeter Creek. WT4 adjoins CB3 at a boundary extending from Cedar Point on the north shore to Swan Point on the south shore and does not include Hawk Cove, west of Hart Island. WT5 adjoins CB3 at the boundary extending from North Point on the north shore, to a point approximately midway between Cedar and Bodkin points on Bodkin Neck on the south shore, and includes Bodkin Creek.

Chester River (ET4): eastern shore tributary segment. ET4 adjoins southeastern CB3 at a boundary extending across the mouth from Kent Island, below Love Point, to Wickes Beach on the western side of Eastern Neck Island.

(continue on next page)

TABLE 3 (continued)

Magothy; Severn; South, Rhode, and West rivers (WT6; WT7; WT8): upper western shore tributary segments adjoining mainstem Bay segments at their respective mouths. WT6 adjoins southwestern CB3 near the boundary with CB4. WT7 includes Lake Ogleton and adjoins northwestern CB4 at a boundary extending from Greenbury Point on the north shore, to Tolly Point on the south shore. WT8 adjoins northwestern CB4 at a boundary extending from Marshy Point on the north shore of the mouth of the South River, to Felicity Cove on the south shore of the mouth of the West River.

Eastern Bay (EE1): eastern shore embayment segment, including Prospect Bay, and the Wye and Miles rivers. The boundary with CB4 extends from Kent Point, through Coaches Island, to Tilghman Island.

Middle Central Chesapeake Bay (CB4): main stem Bay segment, including Whitehall and Herring bays. CB4 extends in the North from Whitehall Bay, western shore, to Kent Island, eastern shore, and in the south from Cove Point, western shore, to Cattail Island, eastern shore. CB4 excludes major tributaries and embayments such as EEI and EE2, the Lower Choptank, which adjoin it on the east, and WT7 and WT8 which adjoin it on the west.

Lower Choptank River; Choptank River (EE2; ET5): eastern shore embayment segment and adjoining tributary segment. EE2 adjoins mainstem Bay segment CB4 at a boundary extending south from Tilghman Island, through James Island, to Oyster Cove at the north end of Taylor Island. EE2 includes Harris, Broad, and Islands creeks, and the Tred Avon River in the north, and Brannock Bay, Slaughter Creek, and the Little Choptank River in the south. The EE2 boundary with ET5 extends across the Choptank River from Castle Haven Point to Chlora Point.

Lower Patuxent River; Middle Patuxent River; and Upper Patuxent River (LE1; RET1; TF1): segments comprising major western shore tributary. LE1, the lower sub-estuary portion, adjoins mainstem Bay segment CB5 at a boundary at the mouth extending from Fishing Point on the south shore, to Drum Point on the north shore. Upstream, RET1, the river-estuarine-transition portion, adjoins LE1 at the turbidity maximum, the boundary extending approximately from Trent Hall Point on the west shore to Sheridan Point on the east shore. Further upstream, TF1, the tidal-fresh portion, adjoins RET1 at a boundary extending approximately from Chalk Point on the west shore to Gods Grace Point on the east shore.

(continue on next page)

TABLE 3 (continued)

Nanticoke; Wicomico; Manokin; Big Annemessex; and Pocomoke rivers (ET6; ET7; ET8; ET9; ET10): eastern shore tributary segments adjoining Tangier Sound (EE3) at their respective mouths. The boundary of ET6 with EE3 extends from Sandy Island on the west shore, to Stump Point Marsh on the east shore. ET7 includes Ellis and Monie bays, and its boundary with EE3 extends from Stump Point Marsh to Long Point on the south shore. ET8 includes Laws Thorofare, and Fishing, Broad, Geanquakin, and St. Peters creeks, on the north shore, and Back, Wolftrap, Broad, Teague, and Mine creeks, on the south shore, and its boundary with EE3 extends from Claw Point on Little Deal Island in the north, to Hazard Point on Hazard Island in the south. ET9 includes Mine, Shirtpond, Flatland, Fords, and Crane coves, and Moon Bay, on the north shore, and Gales, Colbourn, Jones, Dougherty, and Acre creeks, and Joes Cove, on the south shore, and its boundary with EE3 extends from Pat Island on the north shore, to Flatcap Point on Janes Island on the south shore. ET10 includes a small part of eastern Pocomoke Sound, and its boundary with EE3 extends from Pig Point, at the eastern end of Robin Hood Bay on the south shore, to a point directly north on Marumsco Marsh, west, of Fair Island on the north shore.

Tangier Sound (EE3): generally, the area east of Bloodsworth, South Marsh, Smith, and Tangier islands, extending in the north from the head of the Honga River and Fishing Bay, south to Watt's Island and Big Marsh on the eastern shore. EE3 includes the Honga River; Fishing Bay; the Little Annemessex River; the Great Fox Islands; most of Pocomoke Sound; Messongo Creek; Beasley Bay; Halfmoon, Webb, and Savage islands; the northern parts of Big Marsh and Watt's Island; the eastern parts of Tangier, Smith, and South Marsh islands; most of Bloodsworth Island except for the western extremities; and the eastern shores of the Hooper Islands, Gunners Island, and Meekins Neck which form the western bank of the Honga River. EE3 adjoins CB5 at a boundary which extends in the north from Meekins Neck, south through, and roughy bisecting, a series of islands forming the western edge of the Tangier Sound. Specifically, the boundary of EE3 with CB5 extends from Meekins Neck, south through Gunners Island and the Hooper Islands, to Creek Point on Little Hooper Island, southeast to Okahanikan Cove on northern Bloodsworth Island, to Northeast Cove on southwest Bloodsworth Island, southeast to Johnson Cove on northern South Marsh Island, to Sheepshead Harbor on southern South Marsh Island, southeast to the northern tip of Smith Island, to the mouth of Tyler Creek on the southeastern end of Smith Island, directly south to Thorofare Island, and then Goose Island, south to the northen tip of Tangier Island, south to Mailboat Harbor on the southeast end of Tangier Island, east to the middle of Watt's Island and to the western most tip of Big Marsh.

(continue on next page)

TABLE 3 (continued)

Lower Potomac River; Middle Potomac River; and Upper Potomac River (LE2; RET2; TF2): middle western shore tributary segments. The lower sub-estuary, LE2, includes the St. Marys and Wicomico rivers, and Breton and St. Clements bays, on the north shore, and on the south shore, the Coan and Yeocomico rivers, the Lower Machodock, Nomini, Popes, Mattox, and Upper Machodoc creeks, and Currioman Bay. LE2 adjoins CB5, the main stem Bay, at the river mouth at a boundary extending from Point Lookout on the north shore, to Ginny Beach on the south shore. The river-estuarine-transition zone, RET2, includes the Port Tobacco River and Nanjemoy Creek on the north shore, and Aquia and Potomac creeks on the south shore. RET2 adjoins LE2, at a boundary extending from just above Lower Cedar Point on the north shore, to the mouth of Gambo Creek on the south shore. The tidal fresh zone, TF2, includes Mattawoman, Piscataway, and Broad creeks, and the Anacostia River on the east shore, and, on the west shore, Chopawamsic, Quantico, Powells, Neabsco, and Dogue creeks, Occoquan Bay, and Gunston Cove. TF2 adjoins RET2 at a boundary extending from Quantico on the west shore, to Moss Point on the east shore.

Lower Central Chesapeake Bay (CB5): a mid-mainstem segment extending in the north from Cove point, on the western shore, across the Bay to Cattail Island, and south to Windmill Point on the western shore, then northeast to the southern end of Tangier Island. CB5 includes Jerome Creek, above the mouth of the Potomac River, and below the mouth, the Wicomico and Great Wicomico rivers, and Fleets Bay. CB5 adjoins CB4 in the north, CB6 and CB7 in the south, LE1 and LE2 on the west, and EE3 on the east.

Lower Rappahannock River; Middle Rappahannock River; Upper Rappahannock River (LE3; RET3; TF3): lower western shore tributary segments, also including the Piankatank River entering the Bay immediately below the mouth of the Rappahannock River. The lower sub-estuary, LE3, adjoins the mainstem Bay at a boundary at the mouth extending from Fleets Island in the north, to Gwynn Island at the southern edge of the mouth of the Piankatank River. LE3 includes both the entire Piankatank and Corrotoman rivers, the latter a tributary of the Rappahannock. The river-estuarine-transition zone, RET3, adjoins LE3 at a boundary extending on the north shore from Morattico, to McKans Bay on the south shore. The tidal fresh zone, TF3, adjoins RET3 at a boundary extending from Mulberry Point on the north shore, to Jenkins Landing on the south shore.

Western Lower Chesapeake Bay (CB6): a lower mainstem segment whose eastern boundary bisects the lower Bay and adjoins CB7. The western boundary extends in the North from Windmill Point, at the north shore of the mouth of the Rappahannock River, across the

(continue on next page)

TABLE 3 (continued)

Western Lower Chesapeake Bay (CB6) (continued): mouths of Mobjack Bay and the York, Poquoson, and Back rivers (segment WE4), to Northend Point at the south shore of the mouth of the Back River. The northern boundary adjoins CB5. The southern boundary adjoins CB8. CB6 includes Milford Haven, Winter Harbor, and Horn Harbor.

Eastern Lower Chesapeake Bay (CB7): a lower mainstem segment whose western boundary bisects the lower Bay and adjoins CB6. The eastern boundary extends in the north from Big Marsh, south to the middle of the mouth of the Bay. The northern boundary adjoins EE3. The southern boundary adjoins CB8. CB7 includes several tributary creeks and Cherrystone Inlet.

Mobjack Bay (WE4): western shore embayment segment. WE4 adjoins southeastern CB6 at a boundary extending in the north from New Point Comfort, to Northend Point, on the south shore of the mouth of the Back River. WE4 includes the East, North, Ware, Severn, Poquoson, and Back rivers, the Guinea Marshes, Goodwin Island, and the mouth of the York River, to a boundary line extending from approximately west of Allens Island, on the north shore, to west of Thorofare by Goodwin Island, on the south shore.

Lower York River; Middle York River; Upper York River (LE4; RET4; TF4): lower western shore tributary segments. The lower sub-estuary, LE4, adjoins WE4 at a boundary extending from approximately west of Allens Island, on the north shore, to west of Thorofare by Goodwin Island, on the south shore. The river-estuarine-transition zone, RET4, adjoins LE4 at a boundary extending from Purtan Island, on the north shore, to a point on the south shore just below Taskinas Creek. The tidal fresh zone, TF4, adjoins RET4 at points just upstream of the mouths of the Mattaponi and Pamunkey rivers, two tributaries that join to form the York River.

Lower James River; Middle James River; Upper James River (LE5; RET5; TF5): western shore tributary segments comprising the southernmost major river entering the Bay. The sub-estuary, LE5, adjoins the mainstem Bay at the mouth, at a boundary extending from Old Point Comfort, on the north shore, to Willoughby Bay on the south shore. LE5 includes the Elizabeth and Nanesmond rivers. The river-estuarine-transition zone, RET5, adjoins LE5 at a boundary extending from approximately east of Jamestown Island, on the north shore, to Chippokes Plantation State Park, on the south shore. RET5 includes the Chickahominy River. The tidal fresh zone, TF5, adjoins RET5, at a boundary extending from approximately west of Sunken Meadow Creek on the south shore, to an unnamed point on the north shore directly across the river.

(continue on next page)

TABLE 3 (concluded)

Mouth of the Chesapeake Bay (CB8): the southernmost mainstem segment, including Broad and Lynnhaven bays and Little Creek. CB8 adjoins the Atlantic Ocean at the mouth of the Bay at a boundary extending from Cape Henry, on the south shore, to a point approximately midway across the mouth, at the boundary with CB7. CB8 adjoins CB6 and CB7 in the north, and LE5 in the west.

TABLE 4

Chesapeake Bay Program Segments with Salinity Regime and Growing Season (from Orth *et al.*, 1995)

Segment	Name	Salinity Regime	SAV Growing Season
CB1	Northern Chesapeake Bay	Tidal Fresh	Apr.-Oct.
CB2	Upper Chesapeake Bay	Oligohaline	Apr.-Oct.
CB3	Upper Central Chesapeake Bay	Mesohaline	Apr.-Oct.
CB4	Middle Central Chesapeake Bay	Mesohaline	Apr.-Oct.
CB5	Lower Central Chesapeake Bay	Mesohaline	Apr.-Oct.
CB6	Western Lower Chesapeake Bay	Polyhaline	March-May, Sept.-Nov.
CB7	Eastern Lower Chesapeake Bay	Polyhaline	March-May, Sept.-Nov.
CB8	Mouth of the Chesapeake Bay	Polyhaline	March-May, Sept.-Nov.
WT1	Bush River	Oligohaline	Apr.-Oct.
WT2	Gunpowder River	Oligohaline	Apr.-Oct.
WT3	Middle River	Oligohaline	Apr.-Oct.
WT4	Back River	Oligohaline	Apr.-Oct.
WT5	Patapsco River	Mesohaline	Apr.-Oct.
WT6	Magothy River	Mesohaline	Apr.-Oct.
WT7	Severn River	Mesohaline	Apr.-Oct.
WT8	South, Rhode & West Rivers	Mesohaline	Apr.-Oct.
TF1	Upper Patuxent River	Oligohaline	Apr.-Oct.
RET1	Middle Patuxent River	Mesohaline	Apr.-Oct.
LE1	Lower Patuxent River	Mesohaline	Apr.-Oct.
TF2	Upper Potomac River	Tidal Fresh	Apr.-Oct.
RET2	Middle Potomac River	Oligohaline	Apr.-Oct.
LE2	Lower Potomac River	Mesohaline	Apr.-Oct.
TF3	Upper Rappahannock River	Oligohaline	Apr.-Oct.
RET3	Middle Rappahannock River	Mesohaline	Apr.-Oct.
LE3	Lower Rappahannock River	Mesohaline	Apr.-Oct.
TF4	Upper York River	Oligohaline	Apr.-Oct.
RET4	Middle York River	Mesohaline	Apr.-Oct.
LE4	Lower York River	Polyhaline	March-May, Sept.-Nov.
WE4	Mobjack Bay	Polyhaline	March-May, Sept.-Nov.
TF5	Upper James River	Tidal Fresh	Apr.-Oct.
RET5	Middle James River	Oligohaline	Apr.-Oct.
LE5	Lower James River	Mesohaline	Apr.-Oct.
ET1	Northeast River	Oligohaline	Apr.-Oct.
ET2	Elk & Bohemia Rivers	Oligohaline	Apr.-Oct.

SAV

TABLE 4 (concluded)

Segment	Name	Salinity Regime	SAV Growing Season
ET3	Sassafras River	Oligohaline	Apr.-Oct.
ET4	Chester River	Mesohaline	Apr.-Oct.
ET5	Choptank River	Mesohaline	Apr.-Oct.
ET6	Nanticoke River	Mesohaline	Apr.-Oct.
ET7	Wicomico River	Mesohaline	Apr.-Oct.
ET8	Manokin River	Mesohaline	Apr.-Oct.
ET9	Big Annemessex River	Mesohaline	Apr.-Oct.
ET10	Pocomoke River	Mesohaline	Apr.-Oct.
EE1	Eastern Bay	Mesohaline	Apr.-Oct.
EE2	Lower Choptank River	Mesohaline	Apr.-Oct.
EE3	Tangier Sound	Mesohaline	Apr.-Oct.

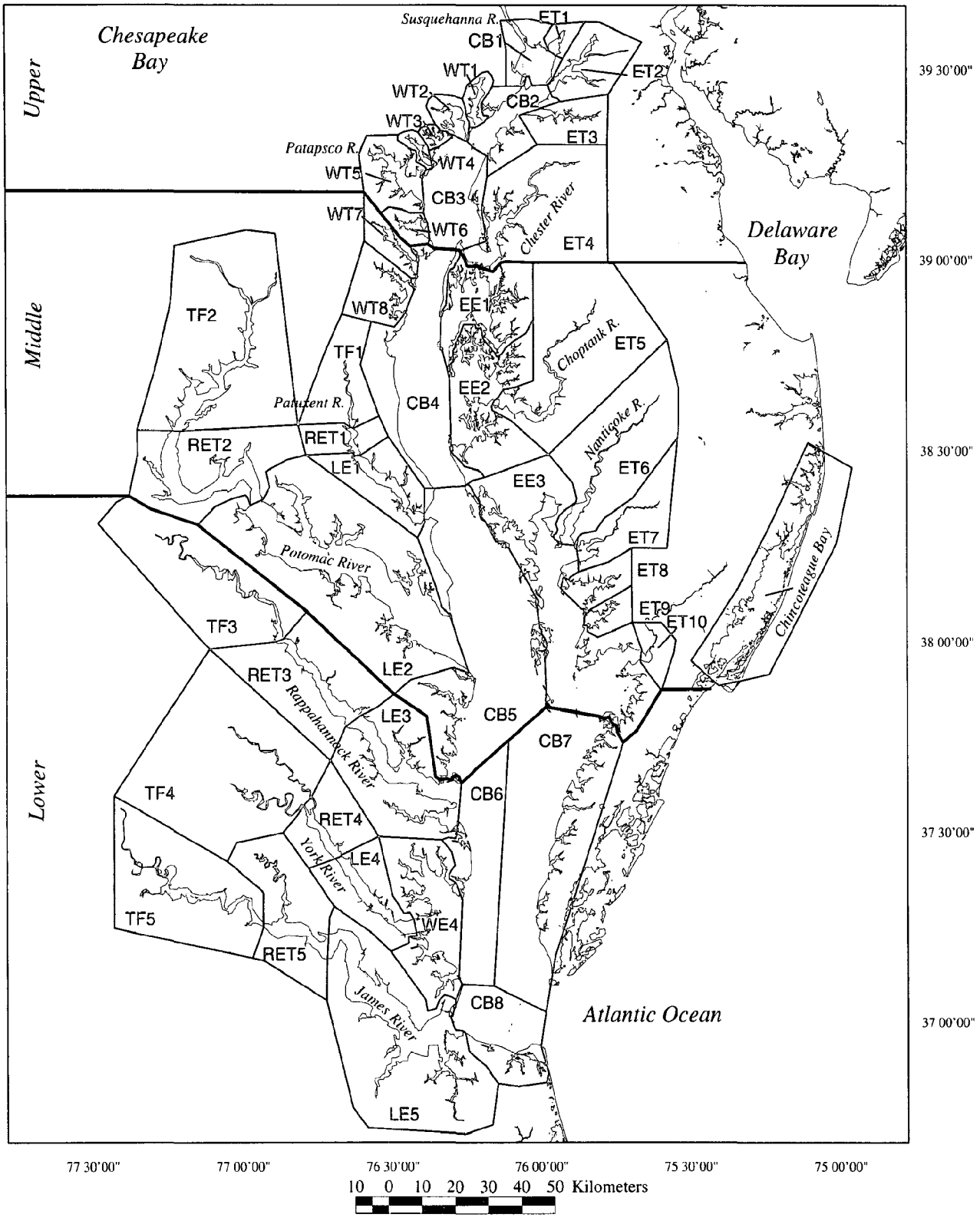

Figure 9: Location of Chincoteague Bay and Chesapeake Bay with Upper, Middle, and Lower zones and the 44 Chesapeake Bay Program segments.

modified to accommodate the new segment boundaries (Figure 9). Data are presented for the years 1991-1994, based on these new segmentation and zonation schemes, in order to follow the trends report (Orth *et al.*, 1995) which covers the years 1971-1991 using the Chesapeake Bay Program segmentation scheme.

The area between the Chesapeake Bay Bridge and the Susquehanna Flats is referred to as the Upper Bay zone. The salinity within each zone roughly coincides with the major salinity zones of estuaries: polyhaline (18-25 °/oo), Lower zone; mesohaline (5-18 °/oo), Middle zone; oligohaline (0.5-5 °/oo), Upper zone. Although the major rivers and smaller tributaries of Chesapeake Bay have their own salinity regimes, the distribution of SAV in each river is discussed within the zone where it connects to the Bay. SAV distribution in Chincoteague Bay is presented and discussed separately from Chesapeake Bay.

GROUND SURVEYS AND OTHER DATABASES

Ground surveys were accomplished by cooperative efforts from a number of agencies and individuals. Although not all areas of the Bay were surveyed, the data did provide valuable supplemental information. The surveys confirmed the existence of some SAV beds mapped from the 1994 aerial photography, as well as SAV beds not visible from the photography because they were too small at 1:24,000 scale. The surveys also provided species data for many of the SAV beds. Ground-survey information supplied to VIMS researchers was included on the SAV distribution and abundance maps reproduced in Appendix B. Each survey was designated by a unique symbol to identify the different methods of sampling. In most cases the symbols on the SAV maps (Appendix B) were enlarged and offset from the actual sampling point to avoid confusion with the mapped SAV bed. Where species information was available, it was included on the map. Because of space limitations on the maps reproduced in Appendix B, occasionally one or more survey points were combined where the information was duplicated. All ground-survey data supplied to VIMS are tabulated in Appendix D.

In Maryland, ground-survey data were obtained in 1994 by VIMS, Stan Kollar of Harford Community College, the USGS National Center, the Maryland DNR, Patuxent River Park staff, and by the Citizens' volunteer survey. The USGS National Center provided ground-survey data for the Potomac River. Patuxent River ground-survey data were obtained by the Maryland-National Capital Parks and Planning Commission Patuxent River Park staff and the Maryland Department of Natural Resources (Naylor and Kazyak, 1995). The Citizens' volunteer survey, including the Ocean Pines Boat Club of Berlin, Maryland, and the Essex Community College SAV group of Baltimore County, Maryland, under the guidance of the USFWS and the Chesapeake Bay Foundation (CBF), identified SAV locations and SAV species when possible throughout various areas of the Chesapeake and Chincoteague bays. Volunteers, who were recruited through press releases, newsletters, and personal letters, were provided with a SAV identification guide, reduced 1992 SAV maps to aid in the location of SAV beds, and data sheets for reporting visits to numerous sites around the bays. USFWS staff mapped the data on copies of 1992 SAV distribution maps (USGS 7.5 minute quads with 1992 SAV

beds). These maps were supplied to VIMS SAV researchers and transferred to the 1994 SAV distribution maps reproduced in Appendix B. Data from the Patuxent River Park staff, and the Citizens' surveys were compiled and tabulated by USFWS. This table became the basis of the much expanded table published in Appendix D.

One 1994 SAV research project being conducted on the Susquehanna Flats by Stan Kollar of Harford Community College, Maryland, also provided data in the form of species presence by estimated percent cover, although these percentages are not reported here.

For those areas in Virginia waters where aerial photographic evidence of SAV beds was inconclusive, photoverification was accomplished by ground-truth surveys. Observations were principally made from small boats and by divers snorkeling over areas indicated from the photographs. In the York, Piankatank, and Rappahannock rivers, where VIMS researchers transplanted SAV (principally eelgrass), transplant sites were also examined carefully by divers for any extant SAV. VIMS scientists also surveyed a number of sites in the Chesapeake Bay as part of an intensive quantitative SAV study (VIMS, unpublished data). Data for Virginia waters were also collected by the Citizens' volunteer survey (compiled by the USFWS). In addition, a great deal of ground-survey information could be extrapolated from earlier studies (Orth *et al.*, 1979; Orth and Moore, 1982). SAV beds in the lower Bay contained primarily one or two species and most areas underwent wide fluctuations in distribution and abundance since the first bay-wide survey in 1978.

Ground-survey data from all sources reported here are presented in Appendix D.

RESULTS

DATA PRESENTATION

In a change from previous SAV distribution and abundance reports in this series, SAV distribution data in this report are presented and discussed based on the segmentation scheme adopted by the Chesapeake Bay Program (U.S. EPA, 1983) and described briefly in the Methods section of this report (Tables 3 and 4; Figure 9). A new zonation scheme (Upper, Middle, and Lower zones) for Chesapeake Bay, which accommodates the Chesapeake Bay Program segmentation boundaries (Figure 9), was adapted from that used in previous SAV distribution reports (i.e., Orth *et al.*, 1994) and established by Orth and Moore (1982), then modified by Orth *et al.* (1989). SAV distribution data for the years 1991-1994 are presented using the Chesapeake Bay Program segmentation scheme in order to consistently follow up the recently published EPA report on trends in SAV (Orth *et al.*, 1995), which covers the years 1971-1991 using the same scheme.

The 1991-1993 data were edgematched using ARC/INFO GIS software, as were the 1994 data, in order to bring separately digitized USGS 7.5 minute topographic quadrangle SAV coverages into one unified coverage for the entire Chesapeake Bay (see Methods). Therefore, 1991-1993 SAV distribution data presented in this report reflect edgematching adjustments, and differ from previously published data for these years derived from separate coverages which were not edgematched (i.e., Orth *et al.*, 1992, 1993, and 1994).

SAV distribution data for 1991-1994 are presented in hectares, by quadrangle (Table 5), by zone (Figure 2), by Chesapeake Bay Program segment and zone (Figures 3, 4, and 5; Table 6), and by quadrangles within segments (Table 7). Distribution data for 1994 by density class are presented in hectares for each segment (Table 8). Distribution data for 1991-1994 by density class are presented in hectares per segment in Appendix E, and in hectares per zone in Table 9. Quadrangle maps annotated with all 1994 SAV beds, and with 1994 ground-truth data, are presented in Appendix B, whereas all ground-truth data for 1994 are also tabulated in Appendix D. The calculated areas for individual SAV beds for each quadrangle are given in square meters in Appendix C.

The 1994 distribution data are summarized and compared with results from 1993 distribution and abundance data. The 1991-1994 SAV distribution data are discussed relative to the Upper, Middle, and Lower Bay zones. The 45 segments of the Chesapeake Bay, and Chincoteague Bay, are then discussed either individually or as combined groups, and the 1994 data are compared with results from 1991-1993 SAV distribution and abundance data. The 1994 distribution of SAV is plotted for each Chesapeake Bay segment, and for Chincoteague Bay. SAV beds are plotted in red; and bold, black lines represent segment boundaries. USGS 7.5 minute quadrangles are represented on these segment plots by a grid of numbered rectangles (refer to Table 2 for quadrangle names listed by VIMS map number). Specific names of rivers, creeks, or points of land, which are not found on the segment plots, are on the quadrangle maps for that segment (Appendix B). Ground-truth data for

TABLE 5

Total Area of SAV in Hectares by USGS 7.5 Minute Quadrangles for 1991-1994.

Quadrangle	1991	1992	1993	1994
001. Conowingo Dam, Md.-Penn.	0	0	0	0
002. Aberdeen, Md.	8.79	15.05	8.27	11.66
003. Havre de Grace, Md.	1,652.52	1,745.62	1,734.70	2,272.49
004. North East, Md.	75.32	126.21	46.18	133.38
005. Elkton, Md.-Del.	24.85	0	0	0
006. White Marsh, Md.	#	0	0	0
007. Edgewood, Md.	#	0.37	0	7.03
008. Perryman, Md.	0	8.06	8.03	2.05
009. Spesutie, Md.	87.16	45.08	46.33	397.21
010. Earleville, Md.	154.79	116.16	53.43	96.76
011. Cecilton, Md.	0	0	0	0
012. Baltimore East, Md.	0	0	0	0
013. Middle River, Md.	5.34	15.98	5.47	9.55
014. Gunpowder Neck, Md.	84.18	155.83	47.81	97.69
015. Hanesville, Md.	4.02	25.98	4.24	2.08
016. Betterton, Md.	0.60	8.06	68.99	52.92
017. Galena, Md.	3.89	2.98	4.48	10.47
018. Curtis Bay, Md.	#	0	0	0.37
019. Sparrows Point, Md.	#	#	0	#
020. Swan Point, Md.	3.81	5.39	17.62	14.70
021. Rock Hall, Md.	9.74	12.28	32.64	38.99
022. Chestertown, Md.	0	0	0	0
023. Round Bay, Md.	#	#	#	31.99
024. Gibson Island, Md.	#	#	13.21	17.88
025. Love Point, Md.	0	0	0	0
026. Langford Creek, Md.	42.04	220.70	518.05	565.09
027. Centreville, Md.	0	0	0	0
028. Washington West, Md.-D.C.-Va.	3.96	9.92	25.22	24.60
029. Washington East, D.C.-Md.	#	0	0.75	0.66
030. South River, Md.	#	#	#	1.69
031. Annapolis, Md.	#	0	#	#
032. Kent Island, Md.	1.57	69.62	154.24	256.80
033. Queenstown, Md.	4.29	87.35	181.49	272.97

(continue on next page)

Table 5 (continued)

Quadrangle	1991	1992	1993	1994
034. Alexandria, Va.-D.C.-Md.	453.72	318.30	336.46	284.63
035. Deale, Md.	#	#	0	4.68
036. Claiborne, Md.	59.47	231.30	426.81	562.24
037. St. Michaels, Md.	3.68	244.27	272.55	433.80
038. Easton, Md.	#	0	0	0
039. Fort Belvoir, Va.-Md.	160.30	129.05	111.35	144.36
040. Mt. Vernon, Va.-Md.	526.05	252.40	236.53	122.48
041. Lower Marlboro, Md.	#	#	8.78	51.61
042. North Beach, Md.	-	0	0	0
043. Tilghman, Md.	12.54	222.45	393.70	336.84
044. Oxford, Md.	6.28	115.30	444.04	330.72
045. Trappe, Md.	0	0	#	7.04
046. Preston, Md.	0	#	0	0
047. Quantico, Va.-Md.	805.39	594.96	599.87	387.81
048. Indian Head, Md.- Va.	355.69	335.88	345.70	254.62
049. Benedict, Md.	#	0	#	1.52
050. Prince Frederick, Md.	-	-	-	0
051. Hudson, Md.	62.85	515.86	567.10	282.71
052. Church Creek, Md.	2.24	105.61	148.97	75.67
053. Cambridge, Md.	0	5.66	4.02	0
054. East New Market, Md.	0	0	0	0
055. Widewater, Va.-Md.	648.09	730.79	623.47	540.33
056. Nanjemoy, Md.	139.82	167.61	88.63	91.78
057. Mathias Point, Md.-Va.	290.34	277.24	252.83	253.19
058. Popes Creek, Md.	20.13	1.30	1.52	1.66
059. Mechanicsville, Md.	0	0	0	0
060. Broomes Island, Md.	#	#	#	#
061. Cove Point, Md.	#	#	#	#
062. Taylors Island, Md.	30.01	62.48	100.11	53.78
063. Golden Hill, Md.	8.90	29.07	65.24	57.77
064. Passapatanzy, Md.-Va.	#	12.24	6.60	62.36
065. King George, Va.-Md.	64.12	74.34	78.99	80.59
066. Dahlgren, Va.-Md.	58.33	33.98	28.57	31.20
067. Colonial Beach North, Va.-Md.	46.62	47.76	49.80	99.78
068. Rock Point, Md.	#	0	#	36.79
069. Leonardtown, Md.	0	0	0	0

(continue on next page)

Table 5 (continued)

Quadrangle	1991	1992	1993	1994
070. Hollywood, Md.	#	0	#	#
071. Solomons Island, Md.	#	#	0.99	#
072. Barren Island, Md.	121.78	431.92	205.92	0
073. Honga, Md.	863.30	1,325.85	1,340.61	797.99
074. Wingate, Md.	460.56	481.06	541.27	503.47
075. Nanticoke, Md.	0	0	0	0
076. Colonial Beach South, Va.-Md.	0	0	#	#
077. Stratford Hall, Va.-Md.	0	0	0	7.69
078. St. Clements Island, Va.-Md.	#	#	#	#
079. Piney Point, Md.-Va.	0	0	0	0
080. St. Mary's City, Md.	0	8.81	12.26	0
081. Point No Point, Md.	-	-	-	-
082. Richland Point, Md.	20.93	45.66	41.02	14.67
083. Bloodsworth Island, Md.	801.46	1,026.02	862.84	555.64
084. Deal Island, Md.	24.35	68.75	77.08	15.02
085. Monie, Md.	7.28	0	7.09	5.58
086. Champlain, Va.	#	-	-	0
087. Machodoc, Va.	0	0	0	0
088. Kinsale, Va.-Md.	0	0	0	0
089. St. George Island, Md.-Va.	1.74	3.08	4.26	0
090. Point Lookout, Md.	0	0	0	0
091. Kedges Straits, Md.	887.24	969.36	902.98	632.43
092. Terrapin Sand Point, Md.	261.29	266.95	232.27	173.01
093. Marion, Md.	305.64	278.38	293.65	236.13
094. Mount Landing, Va.	-	-	-	-
095. Tappahannock, Va.	-	-	-	-
096. Lottsburg, Va.	0	0	0	-
097. Heathsville, Va.-Md.	0	0	0	-
098. Burgess, Va.-Md.	0	#	0	-
099. Ewell, Md.-Va.	2,567.52	2,543.03	2,377.80	1,705.35
100. Great Fox Island, Md.-Va.	1,419.26	1,505.11	1,480.73	1,145.88
101. Crisfield, Md.-Va.	317.70	321.95	340.29	179.13
102. Saxis, Va.-Md.	1.26	2.86	2.10	0
103. Dunnsville, Va.	-	-	-	-
104. Morattico, Va.	0	0	0	-
105. Lively, Va.	0	0	0	-

(continue on next page)

Table 5 (continued)

Quadrangle	1991	1992	1993	1994
106. Reedville, Va.	242.79	302.52	304.16	258.77
107. Tangier Island, Va.	596.28	601.37	572.16	485.79
108. Chesconessex, Va.	1,050.21	1,041.91	1,103.79	1,037.15
109. Parksley, Va.	483.10	461.37	510.70	407.32
110. Urbanna, Va.	5.40	11.25	0	0
111. Irvington, Va.	164.99	165.60	159.94	57.74
112. Fleets Bay, Va.	391.85	475.89	508.92	497.97
113. Nandua Creek, Va.	442.29	472.90	467.08	440.03
114. Pungoteague, Va.	976.09	948.95	1,005.76	879.73
115. West Point, Va.	-	-	-	-
116. Saluda, Va.	0	0	-	0
117. Wilton, Va.	15.96	18.23	44.15	2.44
118. Deltaville, Va.	107.69	142.77	216.86	170.05
119. Jamesville, Va.	621.44	634.16	683.74	553.76
120. Toano, Va.	-	-	-	-
121. Gressitt, Va.	-	-	-	-
122. Ware Neck, Va.	321.71	318.23	313.39	283.95
123. Mathews, Va.	260.75	324.96	396.70	217.49
124. Franktown, Va.	627.39	718.84	767.98	605.08
125. Westover, Va.	#	-	-	-
126. Charles City, Va.	-	-	-	-
127. Brandon, Va.	#	-	-	-
128. Norge, Va.	-	-	-	-
129. Williamsburg, Va.	-	-	-	-
130. Clay Bank, Va.	0	#	0	0
131. Achilles, Va.	1,010.22	1,039.16	1,058.28	1,096.16
132. New Point Comfort, Va.	1,448.78	1,487.39	1,503.08	1,529.07
133. Cape Charles, Va.	362.02	361.13	465.77	482.29
134. Cheriton, Va.	82.80	87.08	96.89	92.24
135. Savedge, Va.	-	-	-	-
136. Claremont, Va.	-	-	-	-
137. Surry, Va.	#	-	-	-
138. Hog Island, Va.	-	-	-	-
139. Yorktown, Va.	0.72	1.15	2.52	4.47
140. Poquoson West, Va.	554.77	581.61	618.35	581.03
141. Poquoson East, Va.	1,151.71	1,161.05	1,181.90	1,154.29

(continue on next page)

Table 5 (continued)

Quadrangle	1991	1992	1993	1994
142. Elliotts Creek, Va.	68.26	112.12	113.53	161.08
143. Townsend, Va.	0.72	0	-	0
144. Bacons Castle, Va.	-	-	-	-
145. Mulberry Island, Va.	-	-	-	-
146. Newport News North, Va.	-	-	-	0
147. Hampton, Va.	381.32	380.70	366.96	346.48
148. Benns Church, Va.	-	-	-	0
149. Newport News South, Va.	-	-	0	0
150. Norfolk North, Va.	-	-	-	0
151. Little Creek, Va.	0	0	0	0
152. Cape Henry, Va.	23.66	19.55	21.22	40.15
153. Chuckatuck, Va.	-	-	-	-
154. Bowers Hill, Va.	-	-	-	-
155. Norfolk South, Va.	-	-	-	-
156. Kempsville, Va.	-	-	-	-
157. Princess Anne, Va.	0	0	-	2.50
158. Wye Mills, Md.	0	0	0	0
159. Bristol, Md.	#	#	#	23.59
160. Fowling Creek, Md.	0	0	-	-
161. Port Tobacco, Md.	12.57	12.52	12.28	0
162. Charlotte Hall, Md.	8.97	0	4.60	7.49
163. Mardela Springs, Md.	0	0	0	0
164. Wetipquin, Md.	0	0	0	0
165. Selbyville, Md.	0	0	0	0
166. Assawoman Bay, Md.-Del.	1.23	7.94	20.35	136.56
167. Berlin, Md.	11.13	10.69	15.49	41.43
168. Ocean City, Md.	17.67	23.57	33.08	44.36
169. Public Landing, Md.	0	0	0	0
170. Tingles Island, Md.	1,066.44	1,180.30	1,189.95	1,241.50
171. Girdle Tree, Md.-Va.	0	0	0	0
172. Boxiron, Md.-Va.	671.92	771.56	816.94	810.23
173. Whittington Point, Md.-Va.	363.71	399.00	451.67	475.95
174. Chincoteague West, Va.	0.55	5.88	13.97	65.12
175. Chincoteague East, Va.	612.98	924.17	1,035.11	1,302.39
176. Anacostia, D.C.-Md.	0	0	0	0
177. East of New Point Comfort, Va.	0.45	9.25	18.52	18.95

(continue on next page)

Table 5 (concluded)

Quadrangle	1991	1992	1993	1994
178. Bethel Beach, Va.	0	1.31	5.39	3.80
179. Goose Island, Va.	227.10	215.82	176.90	162.55
Total SAV - Chesapeake Bay	25,624.78	28,566.07	29,587.47	26,484.38
Total SAV - Chincoteague Bay	2,745.63	3,323.11	3,576.57	4,117.53

- = Indicates quadrangle not photographed and assumed to have no SAV.
0 = Indicates quadrange photographed and no SAV noted.
# = SAV detected by ground truthing only.

TABLE 6

Number of Hectares of SAV in 1991-94 for the CBP Segments of the Chesapeake Bay and for Chincoteague Bay.

Upper Zone

Segment		1991	1992	1993	1994
CB1	Northern Chesapeake Bay	1,680.99	1,785.28	1,770.18	2,649.85
CB2	Upper Chesapeake Bay	31.90	49.57	34.31	65.11
CB3	Upper Central Chesapeake Bay	22.87	176.35	324.15	332.11
WT1	Bush River	0.00	2.32	0.00	0.00
WT2	Gunpowder River	81.64	126.08	46.60	89.25
WT3	Middle River	7.88	45.72	6.67	25.02
WT4	Back River	0.00	0.00	0.00	0.00
WT5	Patapsco River	0.00	0.00	0.00	0.37
WT6	Magothy River	0.00	0.00	13.21	18.54
ET1	Northeast River	0.00	0.00	0.00	7.96
ET2	Elk and Bohemia Rivers	268.96	242.37	94.76	179.86
ET3	Sassafras River	30.10	14.02	75.41	76.24
ET4	Chester River	33.81	78.79	306.20	409.50
	Zone Total	2,158.14	2,520.50	2,671.50	3,853.82

Middle Zone

Segment		1991	1992	1993	1994
CB4	Middle Central Chesapeake Bay	2.26	4.07	4.88	0.00
CB5	Lower Central Chesapeake Bay	4,798.73	5,763.19	5,006.78	3,533.27
WT7	Severn River	0.00	0.00	0.00	31.32
WT8	South, Rhode, and West Rivers	0.00	0.00	0.00	6.36
TF1	Upper Patuxent River	0.00	0.00	8.78	75.19
RET1	Middle Patuxent River	0.00	0.00	0.00	1.52
LE1	Lower Patuxent River	0.00	0.00	0.99	0.00
TF2	Upper Potomac River	2,044.19	1,412.41	1,412.86	982.26
RET2	Middle Potomac River	1,468.34	1,551.67	1,349.09	1,310.23
LE2	Lower Potomac River	83.31	46.10	57.75	139.52
ET5	Choptank River	0.00	5.66	4.02	0.00

(continue on next page)

TABLE 6 (concluded)

Middle Zone (concluded)

Segment		1991	1992	1993	1994
ET6	Nanticoke River	0.00	0.00	0.00	0.00
ET7	Wicomico River	0.00	0.00	0.00	0.00
ET8	Manokin River	114.29	143.42	156.46	66.63
ET9	Big Annemessex River	175.54	176.03	185.62	161.79
ET10	Pocomoke River	0.00	0.00	0.00	0.00
EE1	Eastern Bay	67.93	557.79	733.71	976.14
EE2	Lower Choptank River	111.66	1,071.31	1,888.37	1,513.61
EE3	Tangier Sound	5,427.74	5,783.20	6,015.59	4,575.39
	Zone Total	14,293.98	16,514.84	16,824.91	13,373.26

Lower Zone

Segment		1991	1992	1993	1994
CB6	Western Lower Chesapeake Bay	552.82	660.83	756.69	592.33
CB7	Eastern Lower Chesapeake Bay	3,724.53	3,868.50	4,183.80	3,748.74
CB8	Mouth of the Chesapeake Bay	23.66	19.55	21.22	42.65
TF3	Upper Rappahannock River	0.00	0.00	0.00	0.00
RET3	Middle Rappahannock River	0.00	0.00	0.00	0.00
LE3	Lower Rappahannock River	314.78	343.37	413.47	196.51
TF4	Upper York River	0.00	0.00	0.00	0.00
RET4	Middle York River	0.00	0.00	0.00	0.00
LE4	Lower York River	65.64	66.79	76.55	78.29
WE4	Mobjack Bay	4,488.49	4,568.19	4,635.34	4,592.67
TF5	Upper James River	0.00	0.00	0.00	0.00
RET5	Middle James River	0.00	0.00	0.00	0.00
LE5	Lower James River	2.74	3.50	4.01	6.10
	Zone Total	9,172.66	9,530.73	10,091.07	9,257.30
	Total for Chesapeake Bay	25,624.78	28,566.07	29,587.47	26,484.38
	Total for Chincoteague Bay	2,745.63	3,323.11	3,576.57	4,117.53

TABLE 7

Number of Hectares of SAV in 1994 for each USGS 7.5 Minute Quadrangle of the CBP Segments of Chesapeake Bay, and of Chincoteague Bay.

Segment	Quadrangle	1991	1992	1993	1994
CB1	Aberdeen, Md. (2)	8.79	15.05	8.27	11.66
	Havre de Grace, Md. (3)	1,652.52	1,745.62	1,734.70	2,272.49
	North East, Md. (4)	0.00	0.00	0.00	0.00
	Perryman, Md. (8)	0.00	0.00	1.17	0.00
	Spesutie, Md. (9)	19.68	24.61	26.04	365.70
	Earleville, Md. (10)	0.00	0.00	0.00	0.00
	Total (hectares)	1,680.99	1,785.28	1,770.18	2,649.85
	Total (acres)	4,153.73	4,411.43	4,374.11	6,547.79
CB2	Perryman, Md. (8)	0.00	6.12	6.86	2.05
	Spesutie, Md. (9)	27.44	11.89	18.36	19.66
	Earleville, Md. (10)	0.44	0.00	4.85	41.32
	Gunpowder Neck, Md. (14)	0.00	0.00	0.00	0.00
	Hanesville, Md. (15)	4.02	25.98	4.24	2.08
	Betterton, Md. (16)	0.00	5.59	0.00	0.00
	Rock Hall, Md. (21)	0.00	0.00	0.00	0.00
	Total (hectares)	31.90	49.57	34.31	65.11
	Total (acres)	78.81	122.50	84.79	160.88
CB3	Middle River, Md. (13)	0.00	0.00	0.00	0.00
	Gunpowder Neck, Md. (14)	0.00	0.00	0.00	0.00
	Hanesville, Md. (15)	0.00	0.00	0.00	0.00
	Sparrows Point, Md. (19)	0.00	0.00	0.00	0.00
	Swan Point, Md. (20)	3.81	5.39	17.62	14.70
	Rock Hall, Md. (21)	6.50	12.28	22.23	24.56
	Gibson Island, Md. (24)	0.00	0.00	0.00	0.00
	Love Point, Md. (25)	0.00	0.00	0.00	0.00
	Langford Creek, Md. (26)	12.56	158.67	284.30	292.85
	Total (hectares)	22.87	176.35	324.15	332.11
	Total (acres)	56.51	435.76	800.98	820.65

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TABLE 7 (continued)

Segment	Quadrangle	1991	1992	1993	1994
CB4	Gibson Island, Md. (24)	0.00	0.00	0.00	0.00
	Love Point, Md. (25)	0.00	0.00	0.00	0.00
	Annapolis, Md. (31)	0.00	0.00	0.00	0.00
	Kent Island, Md. (32)	0.00	0.00	0.00	0.00
	Deale, Md. (35)	0.00	0.00	0.00	0.00
	Claiborne, Md. (36)	0.00	0.00	0.00	0.00
	Lower Marlboro, Md. (41)	0.00	0.00	0.00	0.00
	North Beach, Md. (42)	0.00	0.00	0.00	0.00
	Tilghman, Md. (43)	0.00	0.00	0.00	0.00
	Prince Frederick, Md. (50)	0.00	0.00	0.00	0.00
	Hudson, Md. (51)	2.26	4.07	4.88	0.00
	Broomes Island, Md. (60)	0.00	0.00	0.00	0.00
	Cove Point, Md. (61)	0.00	0.00	0.00	0.00
	Taylors Island, Md. (62)	0.00	0.00	0.00	0.00
	Golden Hill, Md. (63)	0.00	0.00	0.00	0.00
	Bristol, Md. (159)	0.00	0.00	0.00	0.00
	Total (hectares)	2.26	4.07	4.88	0.00
	Total (acres)	5.58	10.05	12.06	0.00
CB5	Cove Point, Md. (61)	0.00	0.00	0.00	0.00
	Taylors Island, Md. (62)	0.00	4.32	0.00	0.00
	Solomons Island, Md. (71)	0.00	0.00	0.00	0.00
	Barren Island, Md. (72)	121.78	431.92	205.92	0.00
	Honga, Md. (73)	98.38	412.76	215.63	0.00
	St. Marys City, Md. (80)	0.00	0.00	0.00	0.00
	Point No Point, Md. (81)	0.00	0.00	0.00	0.00
	Richland Point, Md. (82)	14.68	39.37	36.69	10.43
	Bloodsworth Island, Md. (83)	390.05	535.47	432.43	351.35
	St. George Island, Md.-Va. (89)	0.00	0.00	0.00	0.00
	Point Lookout, Md. (90)	0.00	0.00	0.00	0.00
	Kedges Straits, Md. (91)	619.72	681.64	635.10	457.21
	Heathsville, Va.-Md. (97)	0.00	0.00	0.00	0.00
	Burgess, Va.-Md. (98)	0.00	0.00	0.00	0.00
	Ewell, Md.-Va. (99)	2,564.41	2,539.82	2,374.56	1,703.42
	Great Fox Island, Md.-Va. (100)	44.28	40.39	40.25	25.33
	Lively, Va. (105)	0.00	0.00	0.00	0.00

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TABLE 7 (continued)

Segment	Quadrangle	1991	1992	1993	1994
	Reedville, Va. (106)	242.79	302.52	304.16	258.77
	Tangier Island, Va. (107)	83.69	83.29	76.23	66.25
	Irvington, Va. (111)	0.00	0.00	0.00	0.00
	Fleets Bay, Va. (112)	391.85	475.89	508.92	497.97
	Deltaville, Va. (118)	0.00	0.00	0.00	0.00
	Goose Island, Va. (179)	227.10	215.82	176.90	162.55
	Total (hectares)	4,798.73	5,763.19	5,006.78	3,533.27
	Total (acres)	11,857.66	14,240.85	12,371.76	8,730.71
CB6	Fleets Bay, Va. (112)	0.00	0.00	0.00	0.00
	Deltaville, Va. (118)	13.76	31.40	48.06	46.28
	Mathews, Va. (123)	180.46	243.50	306.27	159.95
	New Point Comfort, Va. (132)	358.15	375.37	378.45	363.36
	Poquoson East, Va. (141)	0.00	0.00	0.00	0.00
	Hampton, Va. (147)	0.00	0.00	0.00	0.00
	East of New Point Comfort, Va. (177)	0.45	9.25	18.52	18.95
	Bethel Beach, Va. (178)	0.00	1.31	5.39	3.80
	Total (hectares)	552.82	660.83	756.69	592.33
	Total (acres)	1,366.01	1,631.69	1,869.77	1,463.66
CB7	Tangier Island, Va. (107)	76.15	71.14	71.04	66.25
	Chesconessex, Va. (108)	467.36	462.19	512.01	468.27
	Nandua Creek, Va. (113)	442.29	472.90	467.08	440.03
	Pungoteague, Va. (114)	976.09	948.95	1,005.76	879.73
	Jamesville, Va. (119)	621.44	634.16	683.74	553.76
	Franktown, Va. (124)	627.39	718.84	767.98	605.08
	Cape Charles, Va. (133)	362.02	361.13	465.77	482.29
	Cheriton, Va. (134)	82.80	87.08	96.89	92.24
	Elliotts Creek, Va. (142)	68.26	112.12	113.53	161.08
	Townsend, Va. (143)	0.72	0.00	0.00	0.00
	Goose Island, Va. (179)	0.00	0.00	0.00	0.00
	Total (hectares)	3,724.53	3,868.50	4,183.80	3,748.74
	Total (acres)	9,203.32	9,559.06	10,338.17	9,263.13

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TABLE 7 (continued)

Segment	Quadrangle	1991	1992	1993	1994
CB8	Hampton, Va. (147)	0.00	0.00	0.00	0.00
	Norfolk North, Va. (150)	0.00	0.00	0.00	0.00
	Little Creek, Va. (151)	0.00	0.00	0.00	0.00
	Cape Henry, Va. (152)	23.66	19.55	21.22	40.15
	Kempsville, Va. (156)	0.00	0.00	0.00	0.00
	Princess Anne, Va. (157)	0.00	0.00	0.00	2.50
	Total (hectares)	23.66	19.55	21.22	42.65
	Total (acres)	58.47	48.31	52.43	105.39
WT1	Edgewood, Md. (7)	0.00	0.37	0.00	0.00
	Perryman, Md. (8)	0.00	1.94	0.00	0.00
	Gunpowder Neck, Md. (14)	0.00	0.00	0.00	0.00
	Hanesville, Md. (15)	0.00	0.00	0.00	0.00
	Total (hectares)	0.00	2.32	0.00	0.00
	Total (acres)	0.00	5.73	0.00	0.00
WT2	White Marsh, Md. (6)	0.00	0.00	0.00	0.00
	Edgewood, Md. (7)	0.00	0.00	0.00	7.03
	Middle River, Md. (13)	2.95	2.86	0.00	0.00
	Gunpowder Neck, Md. (14)	78.69	123.22	46.60	82.23
	Total (hectares)	81.64	126.08	46.60	89.25
	Total (acres)	201.74	311.54	115.15	220.54
WT3	Middle River, Md. (13)	2.39	13.12	5.47	9.55
	Gunpowder Neck, Md. (14)	5.49	32.60	1.21	15.47
	Total (hectares)	7.88	45.72	6.67	25.02
	Total (acres)	19.47	112.98	16.49	61.81
WT4	Baltimore East, Md. (12)	0.00	0.00	0.00	0.00
	Middle River, Md. (13)	0.00	0.00	0.00	0.00
	Sparrows Point, Md. (19)	0.00	0.00	0.00	0.00
	Total (hectares)	0.00	0.00	0.00	0.00
	Total (acres)	0.00	0.00	0.00	0.00

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TABLE 7 (continued)

Segment	Quadrangle	1991	1992	1993	1994
WT5	Baltimore East, Md. (12)	0.00	0.00	0.00	0.00
	Middle River, Md. (13)	0.00	0.00	0.00	0.00
	Curtis Bay, Md. (18)	0.00	0.00	0.00	0.37
	Sparrows Point, Md. (19)	0.00	0.00	0.00	0.00
	Round Bay, Md. (23)	0.00	0.00	0.00	0.00
	Gibson Island, Md. (24)	0.00	0.00	0.00	0.00
	Total (hectares)	0.00	0.00	0.00	0.37
	Total (acres)	0.00	0.00	0.00	0.92
WT6	Round Bay, Md. (23)	0.00	0.00	0.00	0.67
	Gibson Island, Md. (24)	0.00	0.00	13.21	17.88
	Total (hectares)	0.00	0.00	13.21	18.54
	Total (acres)	0.00	0.00	32.63	45.82
WT7	Curtis Bay, Md. (18)	0.00	0.00	0.00	0.00
	Round Bay, Md. (23)	0.00	0.00	0.00	31.32
	Gibson Island, Md. (24)	0.00	0.00	0.00	0.00
	South River, Md. (30)	0.00	0.00	0.00	0.00
	Annapolis, Md. (31)	0.00	0.00	0.00	0.00
	Total (hectares)	0.00	0.00	0.00	31.32
	Total (acres)	0.00	0.00	0.00	77.39
WT8	Round Bay, Md. (23)	0.00	0.00	0.00	0.00
	South River, Md. (30)	0.00	0.00	0.00	1.69
	Annapolis, Md. (31)	0.00	0.00	0.00	0.00
	Deale, Md. (35)	0.00	0.00	0.00	4.68
	Bristol, Md. (159)	0.00	0.00	0.00	0.00
	Total (hectares)	0.00	0.00	0.00	6.36
	Total (acres)	0.00	0.00	0.00	15.73

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TABLE 7 (continued)

Segment	Quadrangle	1991	1992	1993	1994
TF1	Deale, Md. (35)	0.00	0.00	0.00	0.00
	Lower Marlboro, Md. (41)	0.00	0.00	8.78	51.61
	North Beach, Md. (42)	0.00	0.00	0.00	0.00
	Benedict, Md. (49)	0.00	0.00	0.00	0.00
	Prince Frederick, Md. (50)	0.00	0.00	0.00	0.00
	Bristol, Md. (159)	0.00	0.00	0.00	23.59
	Total (hectares)	0.00	0.00	8.78	75.19
	Total (acres)	0.00	0.00	21.69	185.80
RET1	Benedict, Md. (49)	0.00	0.00	0.00	1.52
	Prince Frederick, Md. (50)	0.00	0.00	0.00	0.00
	Mechanicsville, Md. (59)	0.00	0.00	0.00	0.00
	Broomes Island, Md. (60)	0.00	0.00	0.00	0.00
	Charlotte Hall, Md. (162)	0.00	0.00	0.00	0.00
	Total (hectares)	0.00	0.00	0.00	1.52
	Total (acres)	0.00	0.00	0.00	3.76
LE1	Prince Frederick, Md. (50)	0.00	0.00	0.00	0.00
	Mechanicsville, Md. (59)	0.00	0.00	0.00	0.00
	Broomes Island, Md. (60)	0.00	0.00	0.00	0.00
	Cove Point, Md. (61)	0.00	0.00	0.00	0.00
	Leonardtown, Md. (69)	0.00	0.00	0.00	0.00
	Hollywood, Md. (70)	0.00	0.00	0.00	0.00
	Solomons Island, Md. (71)	0.00	0.00	0.99	0.00
	Charlotte Hall, Md. (162)	0.00	0.00	0.00	0.00
	Total (hectares)	0.00	0.00	0.99	0.00
	Total (acres)	0.00	0.00	2.46	0.00
TF2	Washington West, Md.-D.C.-Va. (28)	3.96	9.92	25.22	24.60
	Washington East, D.C.-Md. (29)	0.00	0.00	0.75	0.66
	Alexandria, Va.-D.C.-Md. (34)	453.72	318.30	336.46	284.63
	Fort Belvoir, Va.-Md. (39)	160.30	129.05	111.35	144.36
	Mt. Vernon, Va.-Md. (40)	526.05	252.40	236.53	122.48
	Quantico, Va.-Md. (47)	532.11	354.34	344.58	150.92
	Indian Head, Md.- Va. (48)	355.69	335.88	345.70	254.62
	Port Tobacco, Md. (161)	12.35	12.52	12.28	0.00

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TABLE 7 (continued)

Segment	Quadrangle	1991	1992	1993	1994
	Anacostia, D.C.-Md. (176)	0.00	0.00	0.00	0.00
	Total (hectares)	2,044.19	1,412.41	1,412.86	982.26
	Total (acres)	5,051.19	3,490.06	3,491.18	2,427.17
RET2	Quantico, Va.-Md. (47)	273.27	240.62	255.29	236.89
	Indian Head, Md.- Va. (48)	0.00	0.00	0.00	0.00
	Widewater, Va.-Md. (55)	648.09	730.79	623.47	540.33
	Nanjemoy, Md. (56)	139.82	167.61	88.63	91.78
	Mathias Point, Md.-Va. (57)	290.34	277.24	252.83	253.19
	Popes Creek, Md. (58)	0.75	1.30	1.52	1.66
	Passapatanzy, Md.-Va. (64)	0.00	12.24	6.60	62.36
	King George, Va.-Md. (65)	64.12	74.34	78.99	80.59
	Dahlgren, Va.-Md. (66)	35.87	31.78	26.76	26.74
	Colonial Beach North, Va.-Md. (67)	15.86	15.76	14.99	16.69
	Port Tobacco, Md. (161)	0.22	0.00	0.00	0.00
	Charlotte Hall, Md. (162)	0.00	0.00	0.00	0.00
	Total (hectares)	1,468.34	1,551.67	1,349.09	1,310.23
	Total (acres)	3,628.26	3,834.18	3,333.60	3,237.59
LE2	Popes Creek, Md. (58)	19.37	0.00	0.00	0.00
	Mechanicsville, Md. (59)	0.00	0.00	0.00	0.00
	King George, Va.-Md. (65)	0.00	0.00	0.00	0.00
	Dahlgren, Va.-Md. (66)	22.46	2.20	1.81	4.47
	Colonial Beach North, Va.-Md. (67)	30.76	32.00	34.81	83.08
	Rock Point, Md. (68)	0.00	0.00	0.00	36.79
	Leonardtown, Md. (69)	0.00	0.00	0.00	0.00
	Hollywood, Md. (70)	0.00	0.00	0.00	0.00
	Solomons Island, Md. (71)	0.00	0.00	0.00	0.00
	Colonial Beach South, Va.-Md. (76)	0.00	0.00	0.00	0.00
	Stratford Hall, Va.-Md. (77)	0.00	0.00	0.00	7.69
	St. Clements Island, Va.-Md. (78)	0.00	0.00	0.00	0.00
	Piney Point, Md.-Va. (79)	0.00	0.00	0.00	0.00
	St. Marys City, Md. (80)	0.00	8.81	12.26	0.00
	Champlain, Va. (86)	0.00	0.00	0.00	0.00
	Machodoc, Va. (87)	0.00	0.00	0.00	0.00
	Kinsale, Va.-Md. (88)	0.00	0.00	0.00	0.00

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TABLE 7 (continued)

Segment	Quadrangle	1991	1992	1993	1994
	St. George Island, Md.-Va. (89)	1.74	3.08	4.26	0.00
	Point Lookout, Md. (90)	0.00	0.00	0.00	0.00
	Lottsburg, Va. (96)	0.00	0.00	0.00	0.00
	Heathsville, Va.-Md. (97)	0.00	0.00	0.00	0.00
	Burgess, Va.-Md. (98)	0.00	0.00	0.00	0.00
	Lively, Va. (105)	0.00	0.00	0.00	0.00
	Charlotte Hall, Md. (162)	8.97	0.00	4.60	7.49
	Total (hectares)	83.31	46.10	57.75	139.52
	Total (acres)	205.85	113.91	142.70	344.76
TF3	Passapatanzy, Md.-Va. (64)	0.00	0.00	0.00	0.00
	King George, Va.-Md. (65)	0.00	0.00	0.00	0.00
	Colonial Beach South, Va.-Md. (76)	0.00	0.00	0.00	0.00
	Champlain, Va. (86)	0.00	0.00	0.00	0.00
	Mount Landing, Va. (94)	0.00	0.00	0.00	0.00
	Total (hectares)	0.00	0.00	0.00	0.00
	Total (acres)	0.00	0.00	0.00	0.00
RET3	Champlain, Va. (86)	0.00	0.00	0.00	0.00
	Machodoc, Va. (87)	0.00	0.00	0.00	0.00
	Mount Landing, Va. (94)	0.00	0.00	0.00	0.00
	Tappahannock, Va. (95)	0.00	0.00	0.00	0.00
	Lottsburg, Va. (96)	0.00	0.00	0.00	0.00
	Dunnsville, Va. (103)	0.00	0.00	0.00	0.00
	Morattico, Va. (104)	0.00	0.00	0.00	0.00
	Lively, Va. (105)	0.00	0.00	0.00	0.00
	Total (hectares)	0.00	0.00	0.00	0.00
	Total (acres)	0.00	0.00	0.00	0.00
LE3	Morattico, Va. (104)	0.00	0.00	0.00	0.00
	Lively, Va. (105)	0.00	0.00	0.00	0.00
	Urbanna, Va. (110)	5.40	11.25	0.00	0.00
	Irvington, Va. (111)	164.99	165.60	159.94	57.74
	Fleets Bay, Va. (112)	0.00	0.00	0.00	0.00
	Saluda, Va. (116)	0.00	0.00	0.00	0.00

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TABLE 7 (continued)

Segment	Quadrangle	1991	1992	1993	1994
	Wilton, Va. (117)	15.96	18.23	44.15	2.44
	Deltaville, Va. (118)	93.93	111.38	168.81	123.77
	Ware Neck, Va. (122)	0.00	0.00	0.00	0.00
	Mathews, Va. (123)	34.50	36.91	40.57	12.56
	Total (hectares)	314.78	343.37	413.47	196.51
	Total (acres)	777.82	848.47	1,021.68	485.58
TF4	Dunnsville, Va. (103)	0.00	0.00	0.00	0.00
	West Point, Va. (115)	0.00	0.00	0.00	0.00
	Toano, Va. (120)	0.00	0.00	0.00	0.00
	Total (hectares)	0.00	0.00	0.00	0.00
	Total (acres)	0.00	0.00	0.00	0.00
RET4	West Point, Va. (115)	0.00	0.00	0.00	0.00
	Saluda, Va. (116)	0.00	0.00	0.00	0.00
	Toano, Va. (120)	0.00	0.00	0.00	0.00
	Gressitt, Va. (121)	0.00	0.00	0.00	0.00
	Total (hectares)	0.00	0.00	0.00	0.00
	Total (acres)	0.00	0.00	0.00	0.00
LE4	Toano, Va. (120)	0.00	0.00	0.00	0.00
	Gressitt, Va. (121)	0.00	0.00	0.00	0.00
	Norge, Va. (128)	0.00	0.00	0.00	0.00
	Williamsburg, Va. (129)	0.00	0.00	0.00	0.00
	Clay Bank, Va. (130)	0.00	0.00	0.00	0.00
	Achilles, Va. (131)	49.04	48.88	51.12	52.46
	Hog Island, Va. (138)	0.00	0.00	0.00	0.00
	Yorktown, Va. (139)	0.72	1.15	2.52	4.47
	Poquoson West, Va. (140)	15.89	16.75	22.91	21.37
	Total (hectares)	65.64	66.79	76.55	78.29
	Total (acres)	162.20	165.03	189.16	193.46

(continue on next page)

TABLE 7 (continued)

Segment	Quadrangle	1991	1992	1993	1994
WE4	Ware Neck, Va. (122)	321.71	318.23	313.39	283.95
	Mathews, Va. (123)	45.80	44.55	49.86	44.98
	Achilles, Va. (131)	961.18	990.27	1,007.16	1,043.70
	New Point Comfort, Va. (132)	1,090.64	1,112.01	1,124.63	1,165.71
	Poquoson West, Va. (140)	538.88	564.86	595.44	559.66
	Poquoson East, Va. (141)	1,151.71	1,161.05	1,181.90	1,154.29
	Newport News North, Va. (146)	0.00	0.00	0.00	0.00
	Hampton, Va. (147)	378.58	377.21	362.96	340.38
	Total (hectares)	4,488.49	4,568.19	4,635.34	4,592.67
	Total (acres)	11,091.05	11,288.01	11,453.92	11,348.49
TF5	Westover, Va. (125)	0.00	0.00	0.00	0.00
	Charles City, Va. (126)	0.00	0.00	0.00	0.00
	Brandon, Va. (127)	0.00	0.00	0.00	0.00
	Savedge, Va. (135)	0.00	0.00	0.00	0.00
	Claremont, Va. (136)	0.00	0.00	0.00	0.00
	Total (hectares)	0.00	0.00	0.00	0.00
	Total (acres)	0.00	0.00	0.00	0.00
RET5	Toano, Va. (120)	0.00	0.00	0.00	0.00
	Charles City, Va. (126)	0.00	0.00	0.00	0.00
	Brandon, Va. (127)	0.00	0.00	0.00	0.00
	Norge, Va. (128)	0.00	0.00	0.00	0.00
	Williamsburg, Va. (129)	0.00	0.00	0.00	0.00
	Claremont, Va. (136)	0.00	0.00	0.00	0.00
	Surry, Va. (137)	0.00	0.00	0.00	0.00
	Hog Island, Va. (138)	0.00	0.00	0.00	0.00
	Bacons Castle, Va. (144)	0.00	0.00	0.00	0.00
	Total (hectares)	0.00	0.00	0.00	0.00
	Total (acres)	0.00	0.00	0.00	0.00
LE5	Williamsburg, Va. (129)	0.00	0.00	0.00	0.00
	Hog Island, Va. (138)	0.00	0.00	0.00	0.00
	Yorktown, Va. (139)	0.00	0.00	0.00	0.00

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TABLE 7 (continued)

Segment	Quadrangle	1991	1992	1993	1994
	Poquoson West, Va. (140)	0.00	0.00	0.00	0.00
	Bacons Castle, Va. (144)	0.00	0.00	0.00	0.00
	Mulberry Island, Va. (145)	0.00	0.00	0.00	0.00
	Newport News North, Va. (146)	0.00	0.00	0.00	0.00
	Hampton, Va. (147)	2.74	3.50	4.01	6.10
	Benns Church, Va. (148)	0.00	0.00	0.00	0.00
	Newport News South, Va. (149)	0.00	0.00	0.00	0.00
	Norfolk North, Va. (150)	0.00	0.00	0.00	0.00
	Little Creek, Va. (151)	0.00	0.00	0.00	0.00
	Chuckatuck, Va. (153)	0.00	0.00	0.00	0.00
	Bowers Hill, Va. (154)	0.00	0.00	0.00	0.00
	Norfolk South, Va. (155)	0.00	0.00	0.00	0.00
	Kempsville, Va. (156)	0.00	0.00	0.00	0.00
	Total (hectares)	2.74	3.50	4.01	6.10
	Total (acres)	6.76	8.64	9.90	15.08
ET1	Havre de Grace, Md. (3)	0.00	0.00	0.00	0.00
	North East, Md. (4)	0.00	0.00	0.00	7.96
	Total (hectares)	0.00	0.00	0.00	7.96
	Total (acres)	0.00	0.00	0.00	19.67
ET2	North East, Md. (4)	75.32	126.21	46.18	125.42
	Elkton, Md.-Del. (5)	24.85	0.00	0.00	0.00
	Spesutie, Md. (9)	15.35	0.00	0.00	0.00
	Earleville, Md. (10)	153.44	116.16	48.58	54.44
	Cecilton, Md. (11)	0.00	0.00	0.00	0.00
	Total (hectares)	268.96	242.37	94.76	179.86
	Total (acres)	664.59	598.89	234.15	444.44

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TABLE 7 (continued)

Segment	Quadrangle	1991	1992	1993	1994
ET3	Spesutie, Md. (9)	24.69	8.57	1.94	11.85
	Earleville, Md. (10)	0.91	0.00	0.00	1.00
	Cecilton, Md. (11)	0.00	0.00	0.00	0.00
	Betterton, Md. (16)	0.60	2.47	68.99	52.92
	Galena, Md. (17)	3.89	2.98	4.48	10.47
	Total (hectares)	30.10	14.02	75.41	76.24
	Total (acres)	74.37	34.64	186.34	188.39
ET4	Hanesville, Md. (15)	0.00	0.00	0.00	0.00
	Betterton, Md. (16)	0.00	0.00	0.00	0.00
	Galena, Md. (17)	0.00	0.00	0.00	0.00
	Rock Hall, Md. (21)	3.24	0.00	10.41	14.43
	Chestertown, Md. (22)	0.00	0.00	0.00	0.00
	Love Point, Md. (25)	0.00	0.00	0.00	0.00
	Langford Creek, Md. (26)	29.48	62.02	233.74	272.24
	Centreville, Md. (27)	0.00	0.00	0.00	0.00
	Kent Island, Md. (32)	0.00	0.00	1.56	4.48
	Queenstown, Md. (33)	1.09	16.77	60.49	118.35
	Wye Mills, Md. (158)	0.00	0.00	0.00	0.00
	Total (hectares)	33.81	78.79	306.20	409.50
	Total (acres)	83.54	194.69	756.63	1,011.87
ET5	Easton, Md. (38)	0.00	0.00	0.00	0.00
	Oxford, Md. (44)	0.00	0.00	0.00	0.00
	Trappe, Md. (45)	0.00	0.00	0.00	0.00
	Preston, Md. (46)	0.00	0.00	0.00	0.00
	Church Creek, Md. (52)	0.00	0.00	0.00	0.00
	Cambridge, Md. (53)	0.00	5.66	4.02	0.00
	East New Market, Md. (54)	0.00	0.00	0.00	0.00
	Wye Mills, Md. (158)	0.00	0.00	0.00	0.00
	Fowling Creek, Md. (160)	0.00	0.00	0.00	0.00
	Total (hectares)	0.00	5.66	4.02	0.00
	Total (acres)	0.00	13.98	9.94	0.00

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TABLE 7 (continued)

Segment	Quadrangle	1991	1992	1993	1994
ET6	East New Market, Md. (54)	0.00	0.00	0.00	0.00
	Nanticoke, Md. (75)	0.00	0.00	0.00	0.00
	Deal Island, Md. (84)	0.00	0.00	0.00	0.00
	Mardela Springs, Md. (163)	0.00	0.00	0.00	0.00
	Wetipquin, Md. (164)	0.00	0.00	0.00	0.00
	Total (hectares)	0.00	0.00	0.00	0.00
	Total (acres)	0.00	0.00	0.00	0.00
ET7	Nanticoke, Md. (75)	0.00	0.00	0.00	0.00
	Deal Island, Md. (84)	0.00	0.00	0.00	0.00
	Monie, Md. (85)	0.00	0.00	0.00	0.00
	Wetipquin, Md. (164)	0.00	0.00	0.00	0.00
	Total (hectares)	0.00	0.00	0.00	0.00
	Total (acres)	0.00	0.00	0.00	0.00
ET8	Deal Island, Md. (84)	24.35	68.75	75.70	14.81
	Monie, Md. (85)	7.28	0.00	7.09	5.58
	Terrapin Sand Point, Md. (92)	0.31	2.10	1.75	1.83
	Marion, Md. (93)	82.36	72.57	71.93	44.42
	Total (hectares)	114.29	143.42	156.46	66.63
	Total (acres)	282.42	354.40	386.62	164.65
ET9	Marion, Md. (93)	175.54	176.03	185.62	161.79
	Total (hectares)	175.54	176.03	185.62	161.79
	Total (acres)	433.75	434.96	458.67	399.79
ET10	Saxis, Va.-Md. (102)	0.00	0.00	0.00	0.00
	Total (hectares)	0.00	0.00	0.00	0.00
	Total (acres)	0.00	0.00	0.00	0.00
EE1	Love Point, Md. (25)	0.00	0.00	0.00	0.00
	Kent Island, Md. (32)	1.57	69.62	152.68	252.32
	Queenstown, Md. (33)	3.20	70.59	121.01	154.62
	Claiborne, Md. (36)	59.47	203.95	284.35	281.74
	St. Michaels, Md. (37)	3.68	210.37	175.68	287.46
	Easton, Md. (38)	0.00	0.00	0.00	0.00

(continue on next page)

TABLE 7 (continued)

Segment	Quadrangle	1991	1992	1993	1994
	Tilghman, Md. (43)	0.00	3.25	0.00	0.00
	Oxford, Md. (44)	0.00	0.00	0.00	0.00
	Wye Mills, Md. (158)	0.00	0.00	0.00	0.00
	Total (hectares)	67.93	557.79	733.71	976.14
	Total (acres)	167.86	1,378.31	1,813.01	2,412.05
EE2	Claiborne, Md. (36)	0.00	27.34	142.46	280.50
	St. Michaels, Md. (37)	0.00	33.89	96.87	146.33
	Easton, Md. (38)	0.00	0.00	0.00	0.00
	Tilghman, Md. (43)	12.54	219.20	393.70	336.84
	Oxford, Md. (44)	6.28	115.30	444.04	330.72
	Trappe, Md. (45)	0.00	0.00	0.00	7.04
	Hudson, Md. (51)	60.59	511.79	562.22	282.71
	Church Creek, Md. (52)	2.24	105.61	148.97	75.67
	Cambridge, Md. (53)	0.00	0.00	0.00	0.00
	Taylors Island, Md. (62)	30.01	58.17	100.11	53.78
	Golden Hill, Md. (63)	0.00	0.00	0.00	0.00
	Total (hectares)	111.66	1,071.31	1,888.37	1,513.61
	Total (acres)	275.91	2,647.20	4,666.15	3,740.13
EE3	Taylors Island, Md. (62)	0.00	0.00	0.00	0.00
	Golden Hill, Md. (63)	8.90	29.07	65.24	57.77
	Honga, Md. (73)	764.92	913.10	1,124.98	797.99
	Wingate, Md. (74)	460.56	481.06	541.27	503.47
	Nanticoke, Md. (75)	0.00	0.00	0.00	0.00
	Richland Point, Md. (82)	6.25	6.29	4.33	4.24
	Bloodsworth Island, Md. (83)	411.41	490.55	430.41	204.29
	Deal Island, Md. (84)	0.00	0.00	1.38	0.21
	Kedges Straits, Md. (91)	267.53	287.72	267.88	175.22
	Terrapin Sand Point, Md. (92)	260.98	264.85	230.52	171.19
	Marion, Md. (93)	47.75	29.78	36.10	29.91
	Ewell, Md.-Va. (99)	3.11	3.21	3.24	1.93
	Great Fox Island, Md.-Va. (100)	1,374.97	1,464.73	1,440.48	1,120.55
	Crisfield, Md.-Va. (101)	317.70	321.95	340.29	179.13
	Saxis, Va.-Md. (102)	1.26	2.86	2.10	0.00
	Tangier Island, Va. (107)	436.44	446.94	424.89	353.30

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TABLE 7 (concluded)

Segment	Quadrangle	1991	1992	1993	1994
	Chesconessex, Va. (108)	582.85	579.72	591.78	568.88
	Parksley, Va. (109)	483.10	461.37	510.70	407.32
	Pungoteague, Va. (114)	0.00	0.00	0.00	0.00
	Total (hectares)	5,427.74	5,783.20	6,015.59	4,575.39
	Total (acres)	3,411.94	14,290.29	14,864.52	11,301.21
Chincoteague					
	Selbyville, Md. (165)	0.00	0.00	0.00	0.00
	Assawoman Bay, Md.-Del. (166)	1.23	7.94	20.35	136.56
	Berlin, Md. (167)	11.13	10.69	15.49	41.43
	Ocean City, Md. (168)	17.67	23.57	33.08	44.36
	Public Landing, Md. (169)	0.00	0.00	0.00	0.00
	Tingles Island, Md. (170)	1,066.44	1,180.30	1,189.95	1,241.50
	Girdle Tree, Md.-Va. (171)	0.00	0.00	0.00	0.00
	Boxiron, Md.-Va. (172)	671.92	771.56	816.94	810.23
	Whittington Point, Md.-Va. (173)	363.71	399.00	451.67	475.95
	Chincoteague West, Va. (174)	0.55	5.88	13.97	65.12
	Chincoteague East, Va. (175)	612.98	924.17	1,035.11	1,302.39
	Total (hectares)	2,745.63	3,323.11	3,576.57	4,117.53
	Total (acres)	6,784.46	8,211.40	8,837.71	10,166.73

TABLE 8

Number of Square Meters of SAV in 1994 by Density Class for the CBP Segments of Chesapeake Bay and for Chincoteague Bay.

Segment		Class 1	Class 2	Class 3	Class 4	Total
CB1	Northern Chesapeake Bay	2311.15	132.90	43.55	162.25	2,649.85
CB2	Upper Chesapeake Bay	2.49	34.92	4.36	23.34	65.11
CB3	Upper Central Chesapeake Bay	2.42	46.11	20.85	262.73	332.11
CB4	Middle Central Chesapeake Bay	0.00	0.00	0.00	0.00	0.00
CB5	Lower Central Chesapeake Bay	299.85	1662.33	839.08	732.02	3,533.27
CB6	Western Lower Chesapeake Bay	108.91	168.16	257.99	57.28	592.33
CB7	Eastern Lower Chesapeake Bay	591.30	1489.50	795.01	872.93	3,748.74
CB8	Mouth of the Chesapeake Bay	13.17	29.48	0.00	0.00	42.65
WT1	Bush River	0.00	0.00	0.00	0.00	0.00
WT2	Gunpowder River	0.12	24.37	25.51	39.25	89.25
WT3	Middle River	0.00	11.68	13.34	0.00	25.02
WT4	Back River	0.00	0.00	0.00	0.00	0.00
WT5	Patapsco River	0.00	0.37	0.00	0.00	0.37
WT6	Magothy River	1.31	6.73	8.65	1.84	18.54
WT7	Severn River	3.91	10.72	16.70	0.00	31.32
WT8	South, Rhode & West Rivers	0.00	5.48	0.89	0.00	6.36
TF1	Upper Patuxent River	0.00	0.00	13.41	61.79	75.19
RET1	Middle Patuxent River	0.00	0.00	1.52	0.00	1.52
LE1	Lower Patuxent River	0.00	0.00	0.00	0.00	0.00
TF2	Upper Potomac River	86.72	86.70	94.03	714.81	982.26
RET2	Middle Potomac River	32.45	68.93	59.29	1149.57	1,310.23
LE2	Lower Potomac River	6.75	25.13	12.11	95.52	139.52
TF3	Upper Rappahannock River	0.00	0.00	0.00	0.00	0.00
RET3	Middle Rappahannock River	0.00	0.00	0.00	0.00	0.00
LE3	Lower Rappahannock River	81.57	99.88	11.11	3.96	196.51
TF4	Upper York River	0.00	0.00	0.00	0.00	0.00
RET4	Middle York River	0.00	0.00	0.00	0.00	0.00
LE4	Lower York River	9.39	8.50	0.00	60.40	78.29
WE4	Mobjack Bay	348.00	555.48	426.44	3262.76	4,592.67

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TABLE 8 (concluded)

Segment		Class 1	Class 2	Class 3	Class 4	Total
TF5	Upper James River	0.00	0.00	0.00	0.00	0.00
RET5	Middle James River	0.00	0.00	0.00	0.00	0.00
LE5	Lower James River	0.00	0.00	6.10	0.00	6.10
ET1	Northeast River	5.97	0.00	1.99	0.00	7.96
ET2	Elk & Bohemia Rivers	126.10	44.70	9.06	0.00	179.86
ET3	Sassafras River	60.27	4.52	0.00	11.44	76.24
ET4	Chester River	19.96	74.54	114.59	200.41	409.50
ET5	Choptank River	0.00	0.00	0.00	0.00	0.00
ET6	Nanticoke River	0.00	0.00	0.00	0.00	0.00
ET7	Wicomico River	0.00	0.00	0.00	0.00	0.00
ET8	Manokin River	0.00	51.39	15.25	0.00	66.63
ET9	Big Annemessex River	0.00	55.44	106.36	0.00	161.79
ET10	Pocomoke River	0.00	0.00	0.00	0.00	0.00
EE1	Eastern Bay	103.55	480.67	350.98	40.94	976.14
EE2	Lower Choptank River	15.81	390.36	475.56	631.89	1,513.61
EE3	Tangier Sound	246.94	1795.93	1416.68	1115.84	4,575.39
	Chincoteague Bay	60.60	511.27	1,282.61	2,263.04	4,117.53

TABLE 9

Total Area of SAV in Hectares by Density Class for the Three Zones of Chesapeake Bay and for Chincoteague Bay for 1991-1994, including the Percentage of the Zone Total.

1991	Class 1		Class 2		Class 3		Class 4		Total
Upper	1,713.44	79%	184.10	9%	132.15	6%	128.45	6%	2,158.14
Middle	639.22	4%	2,508.83	18%	2,796.39	20%	8,349.53	58%	14,293.98
Lower	848.28	9%	2,164.99	24%	1,764.88	19%	4,394.51	48%	9,172.66
Total	3,200.93	12%	4,857.92	19%	4,693.42	18%	12,872.50	50%	25,624.78
Chincoteague	130.92	5%	114.39	4%	662.35	24%	1,837.98	67%	2,745.63

1992	Class 1		Class 2		Class 3		Class 4		Total
Upper	1,905.08	76%	235.52	9%	216.33	9%	163.57	6%	2,520.50
Middle	1,003.32	6%	4,537.32	27%	5,860.43	35%	5,113.77	31%	16,514.84
Lower	924.01	10%	2,526.62	27%	1,282.29	13%	4,797.81	50%	9,530.73
Total	3,832.41	13%	7,299.46	26%	7,359.05	26%	10,075.15	35%	28,566.07
Chincoteague	58.65	2%	179.53	5%	1,154.88	35%	1,930.05	58%	3,323.11

1993	Class 1		Class 2		Class 3		Class 4		Total
Upper	1,727.78	65%	294.74	11%	325.11	12%	323.87	12%	2,671.50
Middle	1,702.45	10%	6,898.20	41%	3,287.65	20%	4,936.61	29%	16,824.91
Lower	1,092.85	11%	2,839.68	28%	1,821.88	18%	4,336.65	43%	10,091.07
Total	4,523.08	15%	10,032.61	34%	5,434.65	18%	9,597.14	32%	29,587.47
Chincoteague	93.43	3%	941.67	26%	604.85	17%	1,936.62	54%	3,576.57

1994	Class 1		Class 2		Class 3		Class 4		Total
Upper	2,529.82	66%	380.85	10%	241.88	6%	701.26	18%	3,853.82
Middle	795.98	6%	4,633.05	35%	3,401.85	25%	4,542.37	34%	13,373.26
Lower	1,152.34	12%	2,350.99	25%	1,496.65	16%	4,257.32	46%	9,257.30
Total	4,478.14	17%	7,364.89	28%	5,140.39	19%	9,500.96	36%	26,484.38
Chincoteague	60.60	1%	511.27	12%	1,282.61	31%	2,263.04	55%	4,117.53

(continue on next page)

TABLE 9 (concluded)

1991	Classes 1 and 2		Classes 3 and 4		Total
Upper	1,897.54	88%	260.60	12%	2,158.14
Middle	3,148.05	22%	11,145.93	78%	14,293.98
Lower	3,013.26	33%	6,159.39	67%	9,172.66
Total	8,058.85	31%	17,565.92	69%	25,624.78
Chincoteague	245.31	9%	2,500.32	91%	2,745.63
1992	Classes 1 and 2		Classes 3 and 4		Total
Upper	2,140.60	85%	379.90	15%	2,520.50
Middle	5,540.64	34%	10,974.20	66%	16,514.84
Lower	3,450.63	36%	6,080.10	64%	9,530.73
Total	11,131.87	39%	17,434.20	61%	28,566.07
Chincoteague	238.18	7%	3,084.93	93%	3,323.11
1993	Classes 1 & 2		Classes 3 & 4		Total
Upper	2,022.51	76%	648.98	24%	2,671.50
Middle	8,600.64	51%	8,224.26	49%	16,824.91
Lower	3,932.53	39%	6,158.54	61%	10,091.07
Total	14,555.69	49%	15,031.78	51%	29,587.47
Chincoteague	1,035.10	29%	2,541.47	71%	3,576.57
1994	Classes 1 & 2		Classes 3 & 4		Total
Upper	2,910.67	76%	943.15	24%	3,853.82
Middle	5,429.03	41%	7,944.23	59%	13,373.26
Lower	3,503.32	38%	5,753.98	62%	9,257.30
Total	11,843.03	45%	14,641.35	55%	26,484.38
Chincoteague	571.87	14%	3,545.65	86%	4,117.53

1994 are discussed for each Chesapeake Bay Program segment and for Chincoteague Bay.

1994 SUMMARY

In 1994, the Chesapeake Bay had 26,484 hectares of SAV, compared with 29,587 hectares in 1993, a decrease of 10%, with 3,854 hectares (15%), 13,373 hectares (50%), and 9,257 hectares (35%) occurring in the Upper, Middle, and Lower Bay zones, respectively (Figures 1 and 2; Tables 5 and 6). SAV increased in the Upper zone by 44%, and decreased in the Middle and Lower zones 21% and 8%, respectively, from totals in 1993 (Figure 2; Table 6). SAV increased in abundance from 1993 levels in all segments in the Upper Bay zone except WT1 (Bush River) and WT4 (Back River), which remained unvegetated (Table 6). Increases in 1994 for some segments (e.g., TF1 and CB8) of the Middle and Lower zones did not offset larger decreases in 1994 in other segments (e.g., CB5, TF2, EE3, CB7, and LE3) of these zones (Table 6).

In 1994, SAV in the Bay increased, compared with 1993 levels, in twenty segments (Upper zone: CB1, CB2, CB3, WT2, WT3, WT5, WT6, ET1, ET2, ET3, ET4; Middle zone: WT7, WT8, TF1, RET1, LE2, EE1; and Lower zone: CB8, LE4, LE5), decreased in fourteen (Middle zone: CB4, CB5, LE1, TF2, RET2, ET5, ET8, ET9, EE2, EE3; and Lower zone: CB6, CB7, LE3, WE4), and remained unvegetated in eleven (Upper zone: WT1, WT4; Middle zone: ET6, ET7, ET10; and Lower zone: TF3, RET3, TF4, RET4, TF5, RET5) (Table 6). SAV was not detected in 1994 in fourteen segments (Upper zone: WT1, WT4; Middle zone: CB4, LE1, ET5, ET6, ET7, ET10; and Lower zone: TF3, RET3, TF4, RET4, TF5, RET5) (Figures 3, 4, and 5) as compared to sixteen segments in 1993 (Table 6). [The mainstem upper and middle Rappahannock River, TF3 and RET3, upper and middle York River, TF4 and RET4, and upper and middle James River, TF5 and RET5, have been totally devoid of submerged vegetation for years and are not currently photographed (Methods; Figure 6)]. Five segments (Upper zone: WT5, ET1; and Middle zone: WT7, WT8, RET1), which were unvegetated in 1993, had some SAV detected by photography in 1994 (Table 6). Three segments (CB4, LE1, and ET5), all in the Middle zone, which were vegetated in 1993, albeit with relatively small amounts, had no SAV detected in 1994 (Table 6).

In the Bay in 1994, 36% of SAV was categorized as dense (density class 4, or 70-100% coverage), up slightly from the 1993 amount (32%) (Table 9). The percentage of SAV categorized as moderate (density class 3, or 40-70% coverage) in 1994 (19%) also increased slightly from that in 1993 (18%) (Table 9). The percentage of SAV categorized as sparse (density class 2, or 10-40% coverage) (28%) decreased in 1994 compared with that in 1993 (34%), whereas that categorized as very sparse (density class 1, or 1-10% coverage) (17%) increased slightly in 1994 from that in 1993 (15%) (Table 9). SAV in the very sparse and sparse classes combined (the 0-40% coverage range) constituted 45% of all SAV in 1994, a decrease from 49% in 1993 (Table 9). Conversely, SAV in the moderate and dense classes combined (the 40-100% coverage range) constituted 55% of all SAV in 1994, an increase from 51% in 1993 (Table 9).

1991 TO 1994 SUMMARY

The total SAV in Chesapeake Bay increased each year from 1991 to 1993, then decreased in 1994 (Table 6). However, the 1994 level of 26,484 hectares was still 859 hectares greater than the 1991 level of 25,625 hectares (Table 6). SAV in the Chesapeake Bay increased in all zones each year from 1991 to 1993, although not all segments within zones exhibited a steadily increasing trend (Figure 2; Tables 6 and 7). However, yearly gains in some segments offset losses in others, generally, resulting in increasing zone totals from 1991 through 1993 (Table 6). Then in 1994, the Upper Bay zone total continued to increase (44%) from 2,672 hectares the previous year to 3,854 hectares, the highest level in four years and an increase of 1,696 hectares over 1991 (Figure 2; Table 6). However, in 1994 the Middle and Lower zone totals both decreased from 1993 levels, 16,825 to 13,373 hectares (21%) and 10,091 to 9,257 hectares (8%), respectively (Figure 2; Table 6). The 1994 Middle zone total of 13,373 hectares was the lowest level in four years (a decrease of 921 hectares from 1991; a decrease of 3,452 hectares from the same period's highest level in 1993) (Figure 2; Table 6). The 1994 Lower zone total of 9,257 hectares, although an 834 hectare decrease from its high for this four-year period in 1993, was still 84 hectares greater than the 1991 level (Figure 2; Table 6).

In the Bay in 1994, compared with 1991, SAV increased in twenty-three segments (Upper zone: CB1, CB2, CB3, WT2, WT3, WT5, WT6, ET1, ET3, ET4; Middle zone: WT7, WT8, TF1, RET1, LE2, EE1, EE2; and Lower zone: CB6, CB7, CB8, LE4, WE4, LE5), decreased in nine segments (Upper zone: ET2; Middle zone: CB4, CB5, TF2, RET2, ET8, ET9, EE3; and Lower zone: LE3), and was similarly unvegetated in thirteen segments (Upper zone: WT1, WT4; Middle zone: LE1, ET5, ET6, ET7, ET10; and Lower zone: TF3, RET3, TF4, RET4, TF5, RET5) (Tables 6 and 7).

In Chesapeake Bay, taken as a whole over the period 1991 to 1994, the percentage of SAV categorized as dense decreased 28% (Table 9). In 1991, 50% of SAV in the Bay was in density class 4, but in 1994 this percentage was only 36% (Table 9). The percentage of SAV in this class declined each year from 1991 until 1994, when it increased to 36%, its second highest level in the four-year period (Table 9). That is a 13% increase from the four-year low in 1993 of 32% (Table 9). Conversely, in the same four-year period, the percentage of SAV categorized as sparse increased 47% (Table 9). In 1991, 19% of SAV in the Bay was in density class 2, but by 1994 this percentage was 28% (Table 9). The percentage of SAV in this class increased each year from 1991 until 1994, when it decreased to 28%, its third highest level in four years (Table 9). That is an 18% decrease from the four-year high of 34% in 1993 (Table 9).

The percentages of SAV in density classes 1 and 3 also increased from 1991 to 1994, although these increases were not as great as for density class 2 (Table 9). The percentage of SAV in density class 1 increased each year from 1991 to 1994 (Table 9). In 1991, 12% of Bay SAV was categorized as very sparse, but by 1994 this figure was 17% (Table 9). The percentage of SAV in density class 3 in 1991 was 18%, in 1992 it was 26%, in 1993 it was 18%, and in 1994 it was 19% (Table 9). In

the Bay from 1991 to 1994, there was a 45% increase in the percentage of SAV in the sparse and very sparse classes combined (the 0-40% coverage range) (Table 9). The percentage of SAV in combined classes 1 and 2 increased from 31% in 1991, to 49% in 1993, but in 1994 there was a decrease to 45% of the SAV (Table 9). Conversely, there was a 20% decrease in the percentage of SAV in the moderate to dense classes combined (the 40-100% coverage range) from 1991 to 1994 (Table 9). The percentage of SAV in combined classes 3 and 4 decreased from 69% in 1991 to 51% in 1993, then increased in 1994 to 55% (Table 9).

Upper Bay Zone - 1991 to 1994

The total SAV coverage in the Upper Bay zone increased 44% from 1993 (2,672 hectares) to 1994 (3,854 hectares) (Table 6). The total SAV level in the Upper Bay zone increased each year from 1991 to 1994, for an overall 79% (1,696 hectares) increase (Table 6).

SAV in the Upper Bay zone, taken as a percentage of the SAV in the whole Chesapeake Bay, increased each year since 1991 (Table 6). It increased less than a percentage point each year from 1991 to 1993, going from 8% to 9%; then in 1994 it jumped to 15% of SAV in the Bay (Table 6).

Of the thirteen segments comprising this zone, there were increases in SAV abundance over 1993 levels in eleven segments, of which ten had increases in SAV over 1991 levels, also (Table 6). Of the latter ten segments, eight segments (CB1, CB2, CB3, WT5, WT6, ET1, ET3, and ET4) were at their highest levels since 1991, and two of those segments, the Patapsco River (WT5) and the Northeast River (ET1), had SAV for the first time in this four-year period (Tables 6 and 7). The remaining two segments, the Gunpowder River (WT2) and the Middle River (WT3) reached their highest levels for this four-year period in 1992, then decreased in 1993, and rebounded in 1994 to their second highest levels since 1991 (Tables 6 and 7).

Only one segment (ET2) had less SAV (180 hectares) in 1994 than in 1991 (269 hectares), although this was an increase from its lowest level of 95 hectares in 1993 (Tables 6 and 7). SAV in 1994 in segment ET2, the Elk and Bohemia Rivers, increased 89% over 1993 (95 to 180 hectares), but this was still less than the four-year high for the period in 1991 of 269 hectares (Tables 6 and 7). Two segments, the Bush River (WT1) and the Back River (WT4) were unvegetated in 1994 and 1991. However, WT1 had some vegetation (2.32 hectares) mapped in 1992; whereas, only WT4 had no vegetation mapped in any year for the entire 1991 to 1994 period (Tables 6 and 7).

Middle Bay Zone - 1991 to 1994

The amount of SAV in the Middle Bay zone decreased 21%, or 3,452 hectares, from 1993, to a total of 13,373 hectares in 1994, which was the lowest level in four years (Table 6). The SAV in the

Middle Bay zone increased each year from 1991 to 1993, for an overall increase of 18% (2,531 hectares), but the 1994 level was 921 hectares or 6% less than the 1991 level (Table 6).

SAV in the Middle Bay zone, taken as a percentage of the total SAV in the Chesapeake Bay, declined in 1994 from 1991-1993 levels (Table 6). In 1991 it was 56% of SAV in the Bay; in 1992 it was 58%; in 1993, 57%; and in 1994 it dropped over 6 percentage points to 50% (Table 6). [This corresponded to concomitant increases in the other two zones (Table 6).]

Of the nineteen segments comprising this zone, there were increases in 1994 SAV abundance over 1993 levels in six segments (WT7, WT8, TF1, RET1, LE2, and EE1), which were also at their highest levels for the four-year period as well (Tables 6 and 7). In addition, three of the latter segments, the Severn River (WT7), the South, Rhode, and West rivers (WT8), and the Middle Patuxent River (RET1), had SAV for the first time in the four-year period (Tables 6 and 7). The Upper Patuxent River segment (TF1) was unvegetated in 1991 and 1992 as well, but had 8.78 hectares in 1993 (Tables 6 and 7).

In the Middle Bay zone in 1994, there were decreases from 1993 levels in ten segments (CB4, CB5, LE1, TF2, RET2, ET5, ET8, ET9, EE2, and EE3) (Tables 6 and 7). Six of the latter segments (CB4, LE1, ET8, ET9, EE2, and EE3) in 1993 were at their highest levels since 1991 (Tables 6 and 7). Except segment EE2, the Lower Choptank River, which was still 1,402 hectares higher in 1994 than in 1991, nine of the segments which decreased from 1993 levels reached their lowest levels for this four-year period in 1994 (Tables 6 and 7). This included, among others, the Upper and Middle Potomac River segments (TF2 and RET2) and the two segments (CB5 and EE3) encompassing Tangier, Smith, and Bloodsworth islands, which historically had some of the largest SAV beds in the Bay and, proportionately, the greatest amount of SAV in the Bay (Tables 6 and 7).

In the Middle Bay zone in 1994, there were six unvegetated segments (CB4, LE1, ET5, ET6, ET7, and ET10), the latter three of which were unvegetated each year since 1991 (Tables 6 and 7). The Lower Patuxent River segment (LE1) and the Choptank River (ET5) dropped back to their 1991 unvegetated condition after both had small amounts of SAV recorded in the intervening period (Tables 6 and 7). The Middle Central Chesapeake Bay segment, CB4, was vegetated in 1991, as well as in 1992 and 1993 (Tables 6 and 7).

Lower Bay Zone - 1991 to 1994

The total SAV level in the Lower Bay zone decreased 8% or 834 hectares from 1993 to 1994 (Table 6). The total SAV level in the Lower Bay zone increased each year, from 1991 to 1993, for an overall increase of 918 hectares or 10%. SAV then decreased in 1994, but this level (9,257 hectares) was still 85 hectares greater than the 1991 level (9,173 hectares) (Table 6).

SAV

SAV in the Lower Bay Zone, as a percentage of the SAV in the entire Chesapeake Bay, declined from the 1991 level of 36%, to 35% in 1994 (Table 6). It dropped to 33% in 1992, then increased in 1993, to 34%, and again in 1994 (Table 6).

Of the thirteen segments comprising this zone, there were increases in 1994 in SAV abundance over 1993 levels in three segments (CB8, LE4, and LE5), which also were at their highest levels in the four years since 1991 (Tables 6 and 7). In 1994, four segments (CB6, CB7, LE3, and WE4) in the Lower Bay zone, which were consistently increasing each year since 1991, decreased from 1993 levels, which were the highest for the four-year period (Tables 6 and 7). In this zone in 1994, only one segment, LE3, the Lower Rappahannock River, decreased to a level (197 hectares) below that of 1991 (315 hectares) (Table 6).

In the Lower Bay zone, six segments (TF3, RET3, TF4, RET4, TF5, and RET5) which comprise the upper and middle segments of three major bay tributaries, the Rappahannock, the York, and the James, remained unvegetated from 1991 to 1994 (Tables 6 and 7). These six segments have been unvegetated for years and are no longer photographed (see Methods).

In 1994, SAV levels for six segments (CB6, CB7, CB8, LE4, WE4, and LE5) were higher than their 1991 levels, although three of these segments (CB6, CB7, and WE4) actually decreased from their 1993 levels, which were the highest for the four-year period (Tables 6 and 7).

DISCUSSION OF CBP SEGMENTS ARRANGED WITHIN ZONES

Upper Bay Zone

NORTHERN CHESAPEAKE BAY (CB1)

The amount of SAV in this segment increased 58% since 1991, to 2,649.85 hectares in 1994 (Tables 6 and 7). The biggest increase (50%) occurred between 1993 and 1994 (Tables 6 and 7).

Since 1991, the Northern Chesapeake Bay segment (CB1) consistently had the largest percentage of SAV in the Upper Bay zone (Tables 6 and 7). In 1994, 69% (2,649.85 hectares) of the SAV in this zone was in segment CB1 (Table 6). This is an increase from the 1993 level, when 66% of SAV in the Upper Bay zone (or 1770.18 hectares) was in CB1; however, this is a decrease from 71% in 1992 and from 78% in 1991 (Tables 6 and 7). These decreases reflect concomitant increases in SAV abundance in other segments of this zone, primarily CB2, CB3, WT3, WT6, ET1, ET3, and ET4 (Table 6).

In the Northern Chesapeake Bay segment in 1994 , 87% of all SAV beds were classified as very sparse (0-10% coverage); 5% were sparse (10-40% coverage); 2% were moderate (40-70%

coverage); whereas 6% of beds were classified as dense (70-100% coverage) (Table 8; Figure 3, Appendix E). In this segment in 1993, 86% was very sparse, 4% was sparse, 3% was moderate, 8% was dense (Appendix E). Although there was a slight decline in the percentage of SAV in density class 1 from the 1991 level (89%), this was essentially the same pattern of density distributions recorded since 1991: class 1 constituting more than 80% of the SAV in this segment and lesser amounts distributed in the other three density classes (Appendix E). The percentage of SAV in density class 2, and in density class 3, although still small in 1994, has increased slightly from 1991 (Appendix E). The percentage of density class 4, also small in 1994, has decreased slightly from that in 1991 (Appendix E).

SAV beds were located in six main areas: 1) sparse to dense fringing beds in the Susquehanna River from Robert Island to the river mouth at Havre de Grace on the west side; to Stump Point at the mouth of Mill Creek on the east side; and in Mill Creek, Furnace Bay, Baker Cove, and at High Point; 2) a large area of very sparse SAV located in the broad shoal area at the Susquehanna River mouth; 3) very sparse to dense beds fringing the shore from Concord Point south to Swan Creek; 4) a large area of predominately very sparse beds located south of Havre de Grace to east of Battery Island; 5) small, fringing beds of very sparse to moderate density in the Spesutie Narrows; and 6) a new 38.6 hectare SAV area east of Spesutie Island (Figure 10; Appendix B, Maps 2, 3, and 9). The SAV beds listed under number 4, above (the predominately very sparse areas south of Havre de Grace to east of Battery Island), constituting approximately 680 hectares, were mostly new for 1994 and represent 26% of the SAV in CB1 in 1994, as well as 77% of the increase in total abundance over 1993 (Tables 6 and 7; Figure 10; Appendix B, Maps 3 and 9; Appendix C, Map 3, Bed BA1, and Map 9, Beds ZA1 and BA1).

A total of eight species of SAV (*H. verticillata, M. spicatum, C. demersum, Heteranthera dubia, Vallisneria americana, Najas minor, Najas gracillima, E. canadensis*), plus an unknown species, were reported for 1994 on Maps 2, 3, and 9 (Appendices B and D), either by Stan Kollar of Harford Community College or the Citizens' Survey. *Hydrilla* was reported extending from Robert Island in the Susquehanna River, to the Spesutie Narrows, and to Furnace Bay and the Susquehanna Flats (Appendices B and D, Maps 2, 3, and 9) .

NORTHEAST, ELK AND BOHEMIA, AND SASSAFRAS RIVERS (ET1, ET2, ET3)

These three segments together contained 7% of the SAV in this zone in 1994, approximately half of the 1991 figure (14%) (Tables 6 and 7). Since 1991, segments ET1, ET2 and ET3 have had the majority of their SAV classified as very sparse and sparse (Appendix E). Principal locations of beds were in the Elk River and the lower Sassafras River (Figure 11). Very little SAV was mapped in the Bohemia River. Much of the increase was in the Elk River (Figure 11).

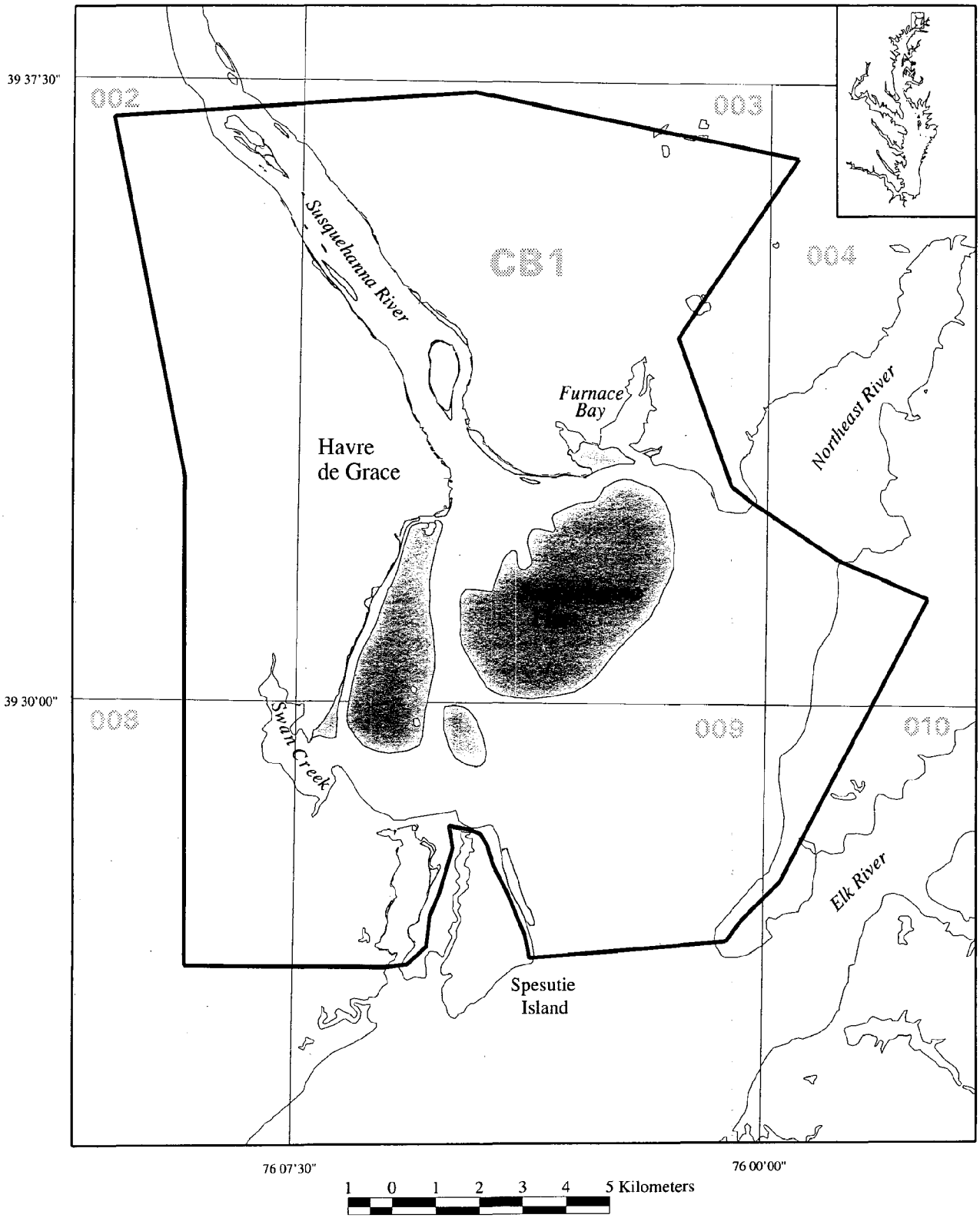

Figure 10: Distribution of SAV in the Northern Chesapeake Bay (Segment CB1) in 1994.

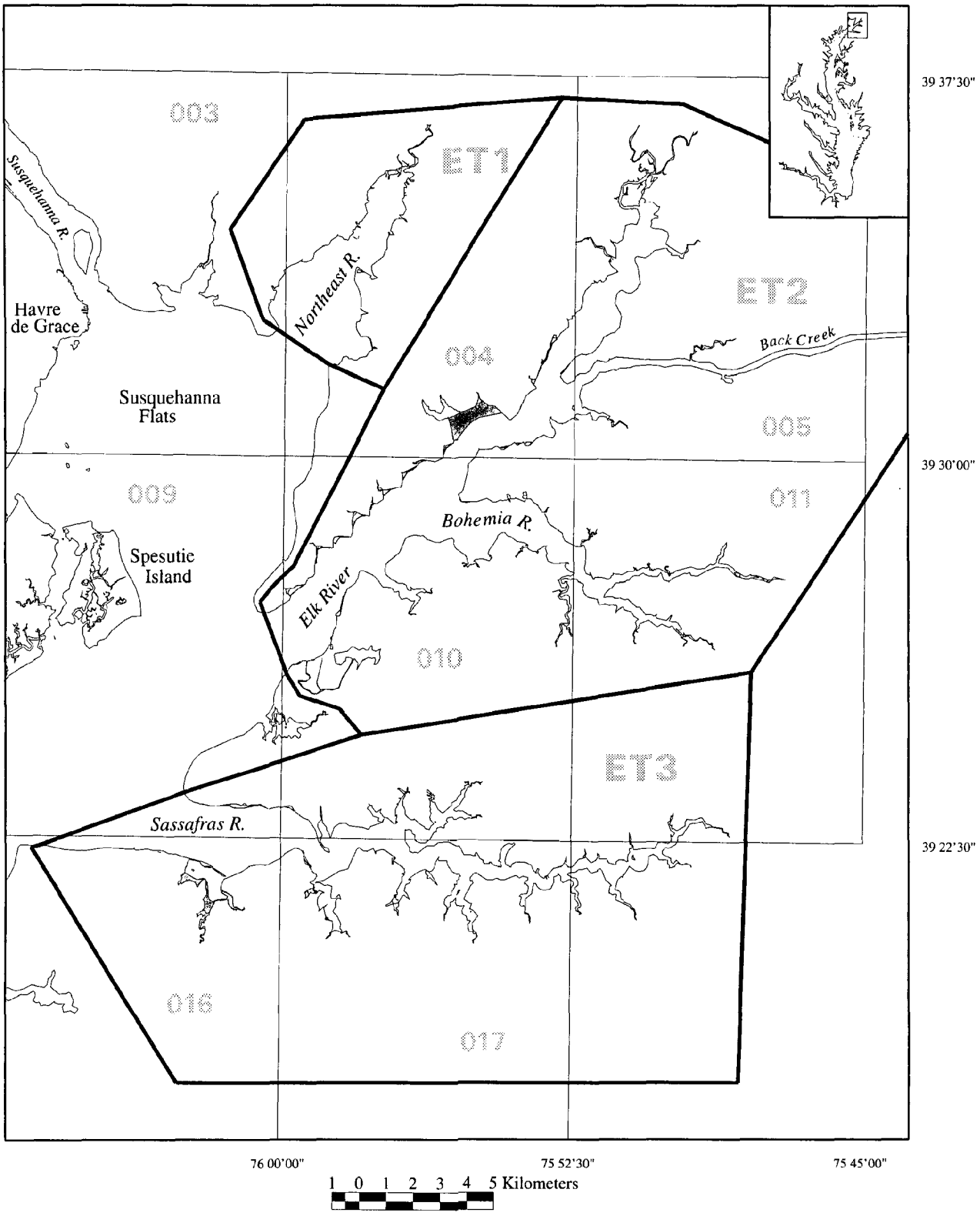

Figure 11: Distribution of SAV in the Northeast, Elk and Bohemia, and Sassafras Rivers (Segments ET1, ET2, ET3) in 1994.

Northeast River (ET1)

In 1994, SAV mapped was mapped in the Northeast River segment (ET1) for the first time since 1991 (Tables 6 and 7; Figure 11; Appendix B, Map 4). There were 7.96 hectares, of which 5.97 hectares (75%) were classified as very sparse and 1.99 hectares (25%) were classified as moderate (Tables 6- 8; Appendix E). Only one ground-truth site was surveyed in ET1 for 1994. *M. spicatum* was reported there by Stan Kollar of Harford Community College (Appendices B and D, Map 4).

Elk and Bohemia Rivers (ET2)

The Elk and Bohemia Rivers segment (ET2) had 179.86 hectares in 1994 (Tables 6 and 7; Figure 11; Appendix B, Maps 4 and 10), an increase of 90% from the 1993 level (94.76 hectares) (Tables 6 and 7). However, this was still less than the 1991 level of 268.96 hectares (Tables 6 and 7). Segment ET2 had 70% of SAV in 1994 classified as very sparse, 25% as sparse, 5% as moderate, and none classified as dense (Table 8; Appendix E).

Several sites on both shores in the Elk River were surveyed by Stan Kollar, by the EPA, and by the Citizens' survey in 1994 which all reported *M. spicatum* and *V. americana.* In addition, Stan Kollar also reported *P. pectinatus* and *Potamogeton crispus* on the north shore, and *M. spicatum* from Town Point at the mouth of the Bohemia River on the south shore in 1994 (Appendices B and D, Maps 4 and 10).

Sassafras River (ET3)

In 1994, the Sassafras River segment (ET3) had a four-year high of 76.24 hectares, only a slight increase over the 1993 level, but a 153% increase over the 1991 level (Tables 6 and 7; Figure 11, Appendix B, Maps 9, 10, 16, and 17). Segment ET3 had 79% of the SAV classified as very sparse, 6% as sparse, 0% as moderate, and 15% classified as dense (Table 8; Appendix E).

In 1994 Stan Kollar reported *M. spicatum* from the north shore of the Sassafras River, and *M. spicatum* and *V. americana* from the south shore. The Citizens surveyed one site in ET3 and reported an unidentified species of SAV from McGill Creek, off of Back Creek (Appendices B and D, Maps 9, 10, 16, and 17).

UPPER CHESAPEAKE BAY AND UPPER CENTRAL CHESAPEAKE BAY (CB2, CB3)

Upper Chesapeake Bay (CB2)

The Upper Chesapeake Bay segment (CB2) contained 2% or 65.11 hectares of the SAV in this zone in 1994, of which 54% was classified as sparse and 36% is classified as dense (Tables 6-8; Appendix E). This is an increase in both total abundance and in the percentage classified as dense over levels in 1991, 1992, and 1993 (Tables 6-8; Appendix E). Specifically, in 1993 there were 34.31 hectares

mapped with only 5% classified as dense; in 1992 there was somewhat more SAV (49.57 hectares) but with none classified as dense; and in 1991 the total abundance of CB2 was a four-year low of 31.90 hectares, again with none classified as dense (Tables 6 and 7; Appendix E). SAV was mapped from the lower Spesutie Narrows and Little Romney, Romney, and Delph creeks on the western shore of the bay; and Pond, Still Pond, and Fairlee creeks, on the eastern shore of the bay (Figure 12; Appendix B, Maps 8, 9, 10, and 15).

In 1994, only *M. spicatum* was reported from groundtruthing by Stan Kollar, at one site near Bear Point and the Spesutie Narrows (Appendices B and D, Map 9). The Citizens' survey reported *M. spicatum* and *P. crispus* from Still Pond Creek (Appendices B and D, Map 15).

Upper Central Chesapeake Bay (CB3)

The Upper Central Chesapeake Bay segment (CB3) contained 9% or 332.11 hectares of the SAV in this zone in 1994, 79% of which was classified as dense (Tables 6-8; Appendix E). The total abundance in 1994 was similar to that in 1993 (324.15 hectares), when, however, only 56% of SAV was classified as dense (Tables 6 and 7; Appendix E). The 1994 levels contrasted with 1991 when CB3 had only 1% or 22.87 hectares of SAV in the zone, 76% of which was sparse and only 15% was dense (Tables 6 and 7; Appendix E). SAV was mapped only from the eastern shore of CB3: from Swan Creek, The Haven, and Rock Hall Harbor, all east of Swan Point; Huntingfield Creek on the northern end of Eastern Neck; and the western shore of Eastern Neck, south to Calfpasture Cove on Eastern Neck Island (Figure 12; Appendix B, Maps 20, 21, and 26).

In 1994, VIMS and Citizens' surveys reported *R. maritima, P. perfoliatus, M. spicatum,* and *Z. palustris* in this segment (Appendices B and D, Maps 13, 19, and 26). From the western shore the Citizens' survey reported *M. spicatum* from Brown's Creek, and *M. spicatum* and *Z. palustris* from Shallow Creek (Appendices B and D, Maps 13 and 19). From the eastern shore of CB3, VIMS reported *R. maritima, P. perfoliatus,* and *M. spicatum* from the large SAV bed adjacent to the west side of Eastern Neck (Appendices B and D, Map 26)

BUSH, GUNPOWDER, MIDDLE, BACK, AND PATAPSCO RIVERS (WT1, WT2, WT3, WT4, WT5)

Bush River (WT1) and Back River (WT4)

No SAV was reported in the Bush (WT1) or Back (WT4) river segments in 1994, the same as in 1991 and in 1993 (Tables 6 and 7). Only the Bush River segment had some SAV (2.32 hectares, density class 3) in 1992 (Tables 6 and 7; Appendix E). Ground-survey data for 1994 for WT1 from the Citizens' survey cited *C. demersum, M. spicatum,* and *V. americana* in Otter Point Creek (Appendices B and D, Map 7).

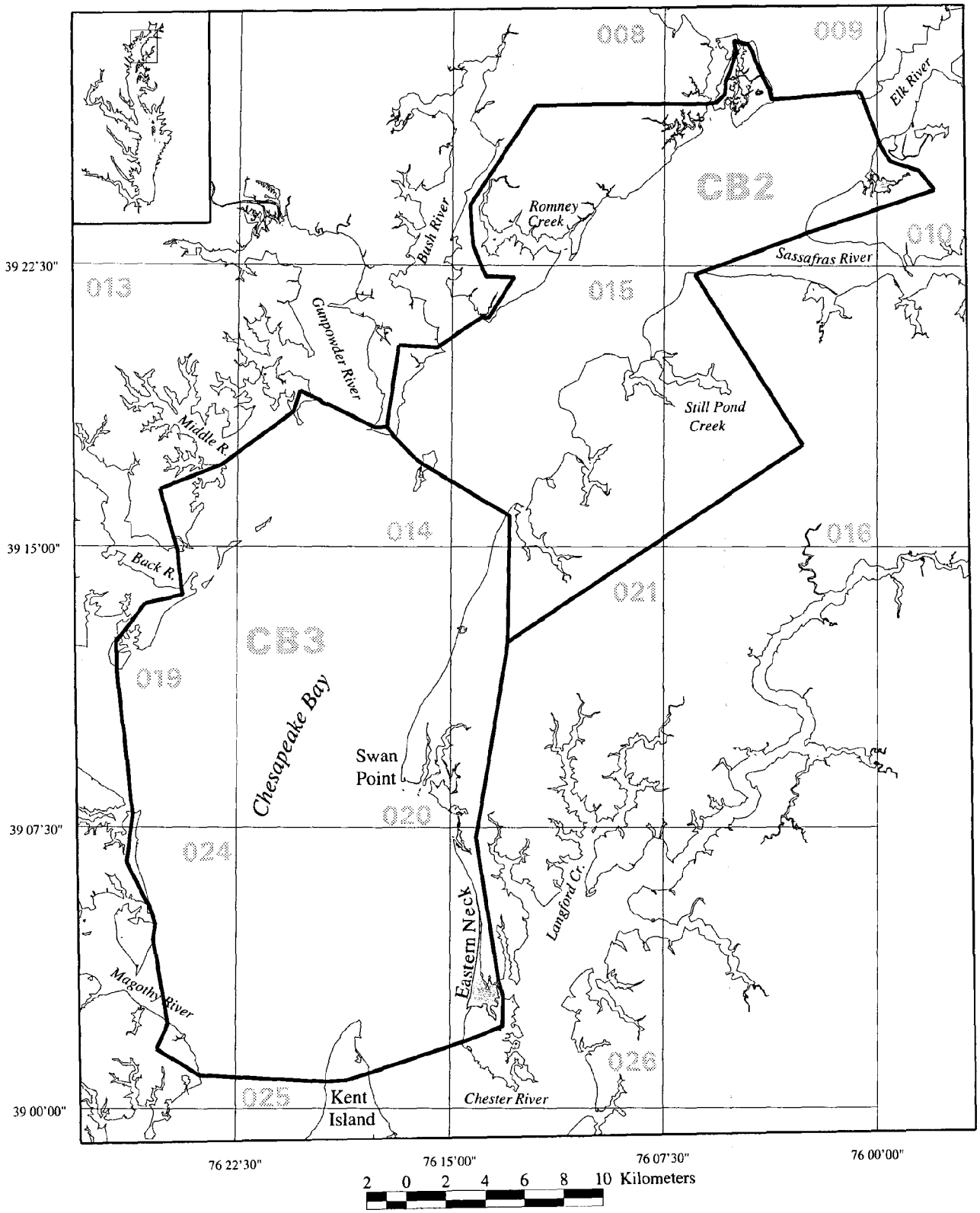

Figure 12: Distribution of SAV in the Upper Chesapeake Bay and Upper Central Chesapeake Bay (Segments CB2, CB3) in 1994.

Patapsco River (WT5)

Although no SAV was reported in the Patapsco River segment (WT5) during 1991-1993, in 1994 there was less than a hectare (0.37 hectares; density class 2) of SAV mapped from aerial photography (Tables 6, 7, and 8; Appendix E). The SAV in segment WT5 was located in the mouth of Rock Creek, a tributary entering at the mouth of the Patapsco River (Figure 13; Appendices B and C, Map 18). There was no ground-truth data for WT5 in 1994.

Gunpowder River (WT2) and Middle River (WT3)

The Gunpowder and Middle river segments (WT2 and WT3, respectively) were vegetated each year, 1991-1994 (Tables 6 and 7). The SAV increased in 1994 in both segments over 1993 levels, however; 1994 levels were still less than the four-year highs in 1992 (Tables 6 and 7). Specifically, the Gunpowder River segment had 89.25 hectares in 1994, a 92% increase over the amount in 1993 (46.60 hectares), although this was still 36.83 hectares less than the 1992 level of 126.08 hectares (Tables 6 and 7). However, 44% of the SAV in 1994 was classified as Class 4 (dense), a significant increase in density over the previous three years (1991 and 1993 had 0% Class 4 density; 1992 had 11%) (Table 8; Appendix E). Similarly, the Middle River segment increased from 6.67 hectares in 1993 to 25.02 hectares in 1994, although this was still 20.70 hectares less than the 1992 level of 45.72 hectares (Tables 6 and 7). There was no SAV classified as dense in the years 1991-1994, however, 53% was classified as moderate in 1994, a significant increase over 1993 when 0% was classified as moderate (Table 8; Appendix E).

In 1994, in segment WT2, SAV was located in the Gunpowder River at the mouth of the Gunpowder Falls, along the Gunpowder Neck shore, and in Dundee and Saltpeter creeks, two tributaries near the mouth (Figure 13; Appendix B, Maps 7 and 14). In 1993 SAV was noticeably reduced in Saltpeter Creek from that in 1992 (Orth *et al.*, 1994; 1993), but in 1994 (Figure 13) there was some recovery of those beds. In 1994, Stan Kollar reported *M. spicatum* and *V. americana* at the mouth of Gunpowder Falls (Appendices B and D, Map 7). Also, Stan Kollar and Essex Community College reported *M. spicatum, V. americana, E. canadensis, C. demersum*, and *Chara* from Dundee Creek, and reported *M. spicatum, E. canadensis,* and *C. demersum* from Saltpeter Creek (Appendices B and D, Map 14).

In 1994, in segment WT3, SAV was located in the Middle River, in Seneca Creek, and in Hawthorn Cove at the mouth of Seneca Creek (Figure 13; Appendix B, Maps 13 and 14). In 1993, SAV in Seneca Creek, as with Saltpeter Creek in segment WT2 with which it is connected, was noticeably reduced from that in 1992 (Orth *et al.*, 1993; 1992). In fact it was absent from Seneca Creek in 1993 except for one fringing bed in Hawthorn Cove (Orth *et al.*, 1994). However, as with Saltpeter Creek, in 1994 there was some recovery of SAV beds (Figure 13). In 1994, *M. spicatum* and *R. maritima* were reported from the Middle River by Citizens (Appendices B and D, Map 13). Also, Stan Kollar reported *M. spicatum, E. canadensis, V. americana, C. demersum, Najas guadalupensis,* and

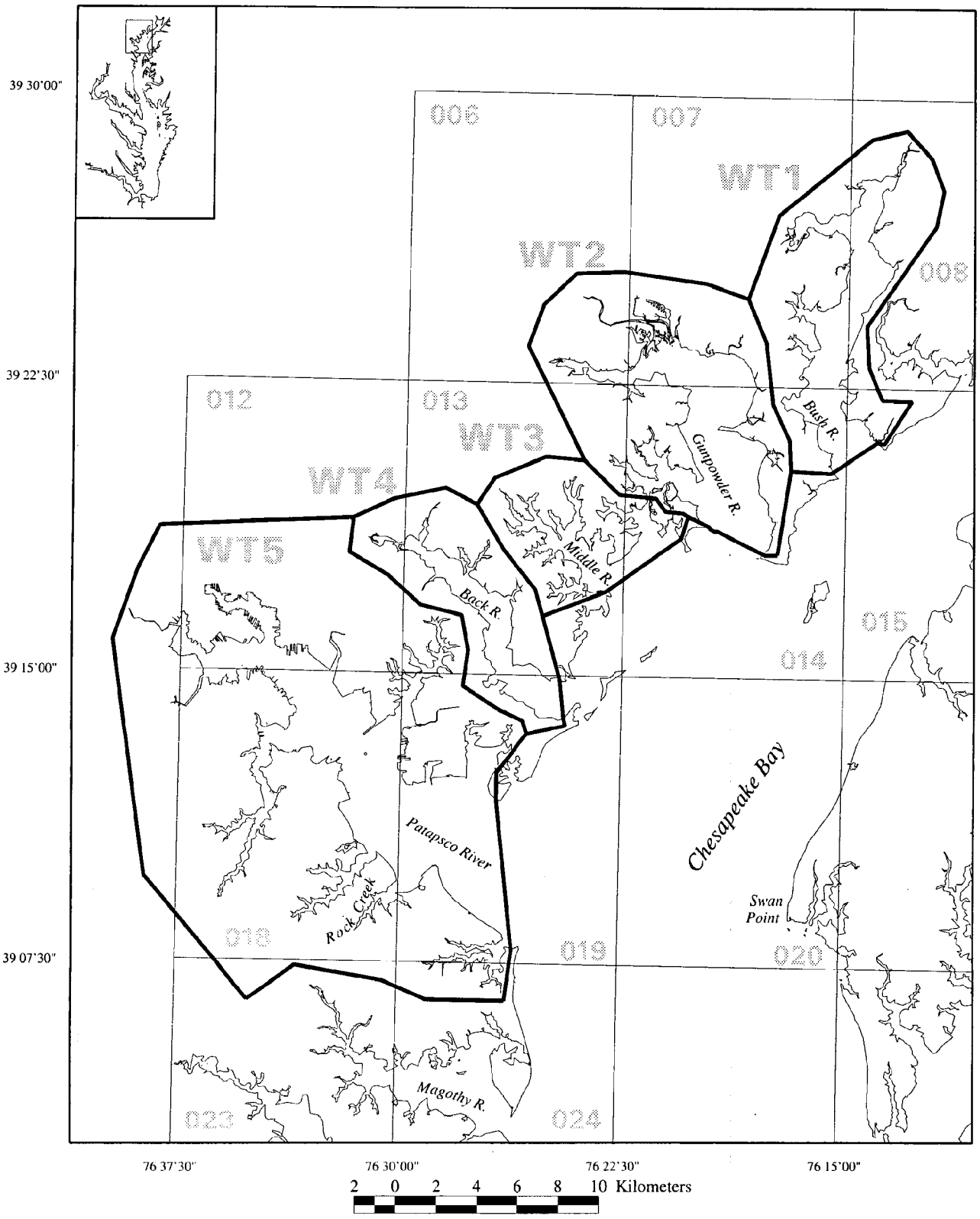

Figure 13: Distribution of SAV in the Bush, Gunpowder, Middle, Back, and Patapsco Rivers (Segments WT1, WT2, WT3, WT4, WT5) in 1994.

P. perfoliatus from the Seneca Creek and Hawthorn Cove area (Appendices B and D, Map 14).

CHESTER RIVER (ET4)

In the Chester River Segment (ET4), SAV abundance (409.50 hectares) was up 103.3 hectares from 1993 (Tables 6 and 7). There were only 33.81 hectares of SAV in the Chester River segment in 1991 (Tables 6 and 7). The Chester River segment contained 11% of SAV in this zone, up from 2% in 1991 (Table 6). In this segment in 1994, 49% of the total coverage of SAV was dense (class 4), 28% was moderate (class 3), 18% was sparse (class 2), and 5% was very sparse (class 1) (Table 8; Appendix E). There was a notable increase in SAV classified as dense since 1991, when only 7% was dense (Appendix E). Most of the SAV was located adjacent to Eastern Neck and Eastern Neck Island, especially near Eastern Neck Narrows, and in Church, Grays Inn, Langford, and Queenstown creeks, tributaries entering the Chester River (Figure 14; Appendix B, Maps 21, 26, 32, and 33). In 1994, the Citizens cited *M. spicatum*, *P. perfoliatus*, and *Z. palustris* on the south shore of the Chester River (Appendices B and D, Map 33).

MAGOTHY RIVER (WT6)

There were 18.54 hectares of SAV reported in WT6 in 1994, 47% of which was classified as moderate and 10% was classified as dense (Tables 6-8; Appendix E). This is an increase in both distribution and abundance compared to 1993 when 13.21 hectares were reported, 5% of which was classified as moderate and 0% was classified as dense (Tables 6 and 7; Appendix E). In 1993, SAV was mapped in the Magothy River (WT6) for the first time since last reported in 1987 (Orth *et al.*, 1994).

SAV was located primarily near Ulmsteads Point, on the south shore; and on the north shore: adjacent to Dobbins Island at the mouth of Sillery Bay; along the east shore of Sillery Bay; in Cornfield Creek; and in the Magothy Narrows, around parts of Gibson Island (Figure 15; Appendix B, Maps 23 and 24).

Five species were reported by the Citizens' survey in 1994: *Potomageton perfoliatus*, *Z. palustris*, *R. maritima*, *V. americana*, and *P. pectinatus* (Appendices B and D, Maps 23 and 24). *Zannichellia palustris* and *P. perfoliatus* were reported from the headwaters to the Magothy Narrows, whereas *P. pectinatus* and *R. maritima* were reported from approximately the middle river portion to the Narrows (Appendices B and D, Maps 23 and 24). *Vallisneria americana* was reported only from two sites, one in the Narrows and one in Cornfield Creek which flows into the Narrows (Appendices B and D, Map 24).

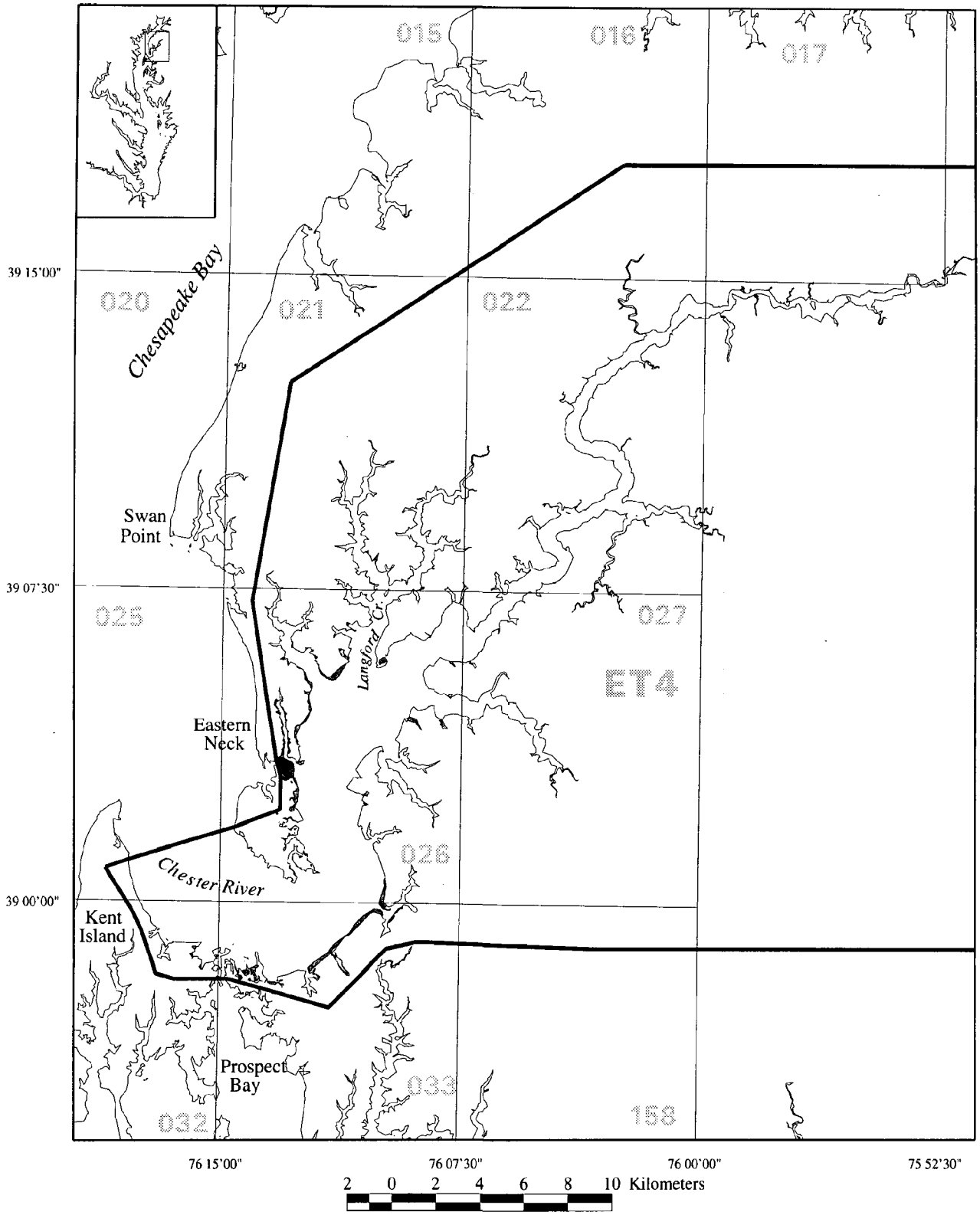

Figure 14: Distribution of SAV in the Chester River (Segment ET4) in 1994.

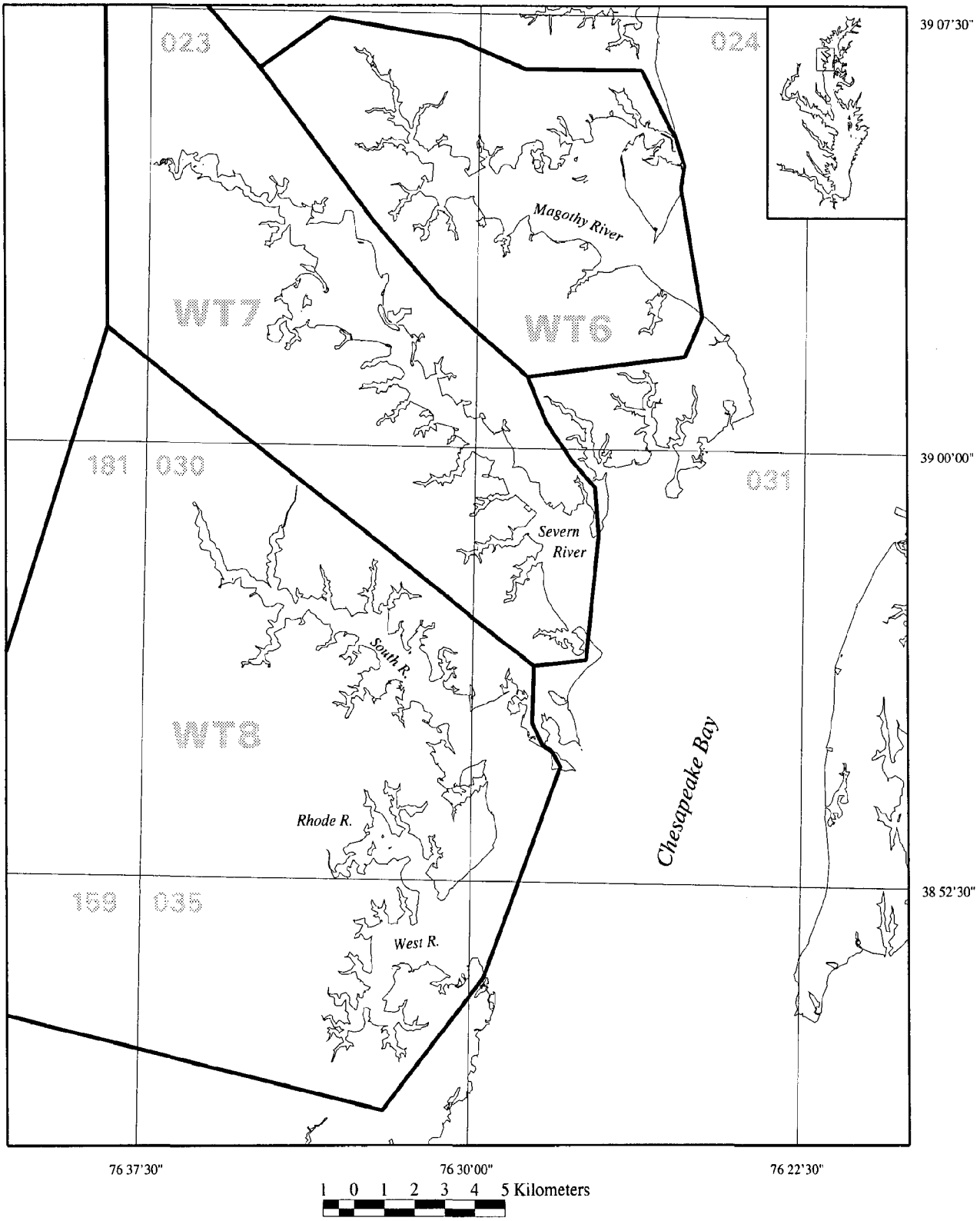

Figure 15: Distribution of SAV in the Magothy, Severn, and South, Rhode, and West Rivers (Segments WT6, WT7, WT8) in 1994.

Middle Bay Zone

SEVERN AND SOUTH, RHODE, AND WEST RIVERS (WT7, WT8)

Severn River (WT7)

In the Severn River segment (WT7) in 1994, there were 31.32 hectares of SAV reported, compared with 0.0 hectares reported during 1991- 1993 (Tables 6 and 7). In this segment in 1994, no SAV was classified as dense, but 53% was classified as moderate, 34% was sparse, and 12% was very sparse (Table 8; Appendix E). The SAV was located primarily from Round Bay downstream to Asquith Creek (Figure 15; Appendix B, Map 23). In 1994, Citizens and VIMS provided species information for WT7: *R. maritima, P. perfoliatus, Z. palustris,* and an unknown species were reported (Appendices B and D). There was no ground-truth data from the headwaters portion. *Ruppia maritima* and *P. perfoliatus* were generally found in the, middle portion, whereas *Z. palustris* was found in the lower third portion and near the mouth (Appendices B and D, Maps 23 and 31).

South, Rhode, and West Rivers (WT8)

In the South, Rhode, and West rivers segment (WT8) in 1994, there were 6.36 hectares of SAV reported, compared to 0.0 hectares reported 1991- 1993 (Tables 6 and 7). The majority (86%) was classified as sparse and the rest (14%) was moderate (Table 8; Appendix E). The SAV was located primarily in the South River at the mouths of Aberdeen and Brewer creeks, and at the mouth of the West River in Parish Creek (Figure 15; Appendix B, Maps 30 and 35). No SAV was mapped from the Rhode River in 1994, as in 1991-1993 (Figure 15). In 1994, the Citizens' survey found *Z. palustris* and *R. maritima* at numerous locations in the South and Rhode rivers and an unknown species was also cited (Appendices B and D, Maps 30, 31, and 35).

EASTERN BAY (EE1)

In the Eastern Bay segment (EE1), there were 976.14 hectares of SAV reported in 1994, compared with 733.71 hectares of SAV reported in 1993 (Tables 6 and 7). SAV increased each year from 1991-1994 in this area (Tables 6, and 7). Only 67.93 hectares were reported in 1991 (Tables 6 and 7). Most of the increases occurred in Warehouse Creek of Eastern Bay, in Marshy and Kirwan creeks of Prospect Bay, and in the Miles River (Figure 16; Appendix B, Maps 32, 33, 36, and 37). In this segment in 1994, 4% of SAV was dense, 36% was moderate, 49% was sparse, and 11% was very sparse (Table 8; Appendix E). Contrast this with 1993, when 2% was dense, 17% was moderate, 12% was sparse, and 69% was very sparse (Table 8; Appendix E).

Most of the SAV in segment EE1 was located in the lower Miles River; Wye River; Cox Creek; Eastern, Prospect, and Crab Alley bays; Parson Island; Piney Neck; and between Harbor Cove and Tilghman Point of Eastern Bay (Figure 16). In 1994, VIMS, the EPA, and the Citizens provided

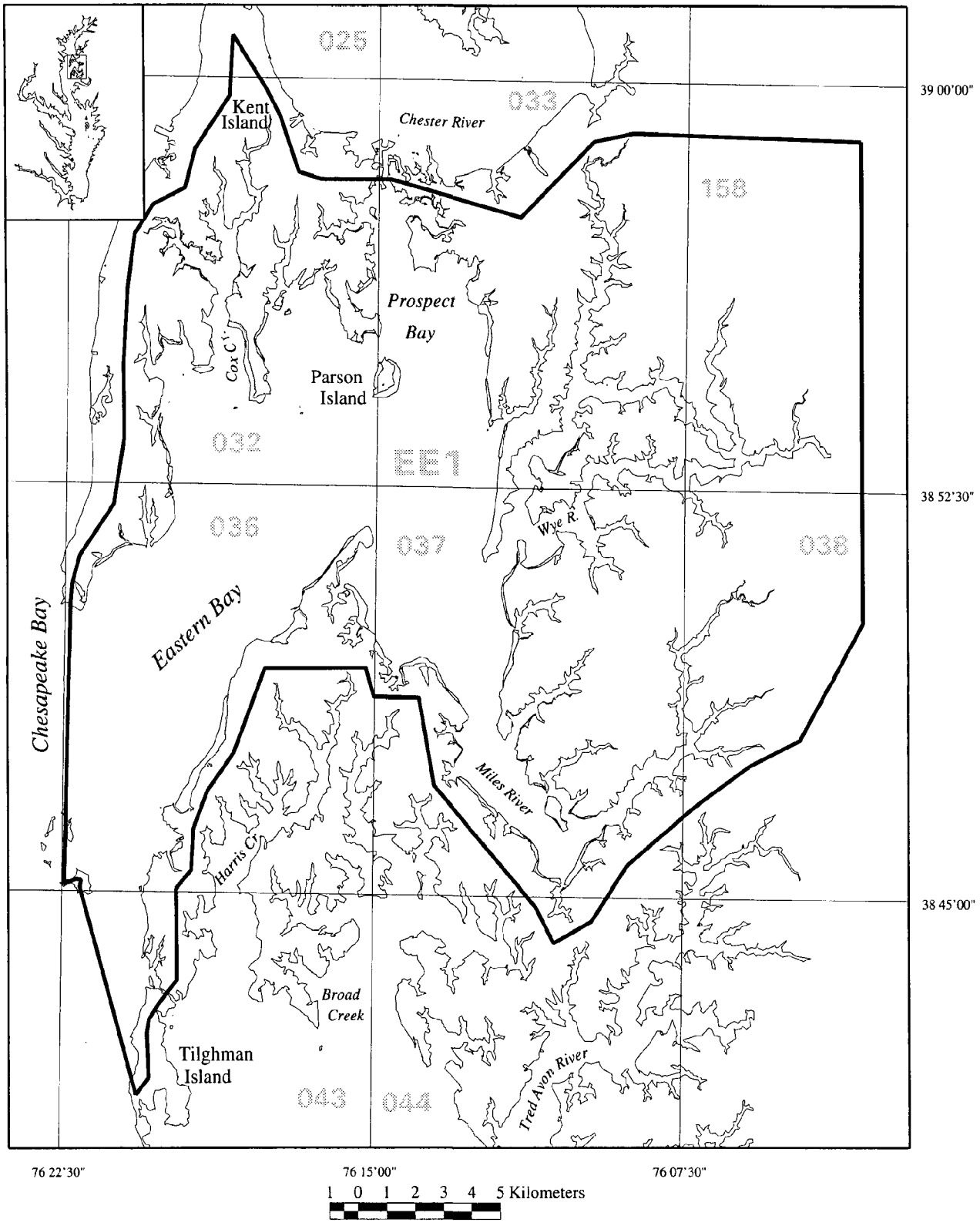

Figure 16: Distribution of SAV in the Eastern Bay (Segment EE1) in 1994.

ground-truth data for EE1 (Appendices B and D, Maps 32, 33, 36, and 37). Prospect Bay had two sites with *Z. palustris*; Parson Island and Turkey Point each had one site with both *R. maritima* and *Z. palustris*; Tilghman Creek, the Miles River, and Kent Island had several sites with *Z. marina, R. maritima,* and *Z. palustris* (Appendices B and D, Maps 32, 33, 36, and 37).

MIDDLE CENTRAL CHESAPEAKE BAY (CB4)

In the Middle Central Chesapeake Bay segment (CB4), there was no SAV mapped in 1994 compared with 4.88 hectares of SAV reported in 1993, which was the high for the 1991-1994 period (Tables 6 and 7; Figure 17). The only ground-truth data for 1994 from CB4 was *Zannichellia palustris* reported from two creeks flowing into CB4 in the area on the western shore between the mouths of the Severn and South rivers (Appendices B and D, Map 31).

CHOPTANK RIVER AND LOWER CHOPTANK RIVER (ET5, EE2)

Choptank River (ET5)

In the Choptank River segment (ET5), there was no SAV mapped in 1994, as in 1991, compared with 4.02 hectares of very sparse SAV reported in 1993 and 5.66 hectares sparse SAV in 1992 (Tables 6 and 7; Figure 18; Appendix E). There was no groundtruth-data for this segment in 1994.

Lower Choptank River (EE2)

There was a decrease in the amount of SAV in the Lower Choptank River segment (EE2) from 1993 to 1994 (Tables 6 and 7). There were 1,513.61 hectares of SAV mapped in 1994 (Tables 5 and 7; Appendices B and C, Maps 36, 37, 43, 44, 45, 51, 52, and 62) compared with 1,888.37 hectares of SAV reported in 1993 (Tables 6 and 7). However, the 1994 level was still 1,401.95 hectares more than the 1991 total of 111.66 hectares and 442.30 hectares greater than the 1992 total of 1,071.31 hectares (Tables 6 and 7). Also, from 1991 to 1993, there was very little SAV classified as dense in segment EE2 (0% in 1991; 1% in 1992; and 4% in 1993) (Appendix E). However, in 1994, 42% of the total coverage of SAV was dense; 31% was moderate; 26% was sparse; and 1% was very sparse (Table 8; Figures 2 and 4). Although there was a decline of 375 hectares from 1993, many areas off the Choptank River, from Tilghman Island to the Tred Avon River, showed increases in SAV and also in density class: Harris, Broad, Leadenham, Grace, San Domingo, Cummings, Waterhole, Edge, and Solitude creeks; and Briary Cove. SAV was detected by photography in Trippe Creek for the first time since 1985 (Map 45). There was also an increase in fringing beds in Slaughter Creek and Slaughter Creek Broads (Map 62). The decrease in SAV was noted in Trippe and Brannock bays; Irish Creek; and near Todds Point (Maps 44 and 51). SAV was completely absent in 1994 in Brooks Creek; Hooper Neck; James Island; Hudson and Back creeks; and Casson Point, making the Little Choptank River devoid of SAV for 1994 (Figure 18).

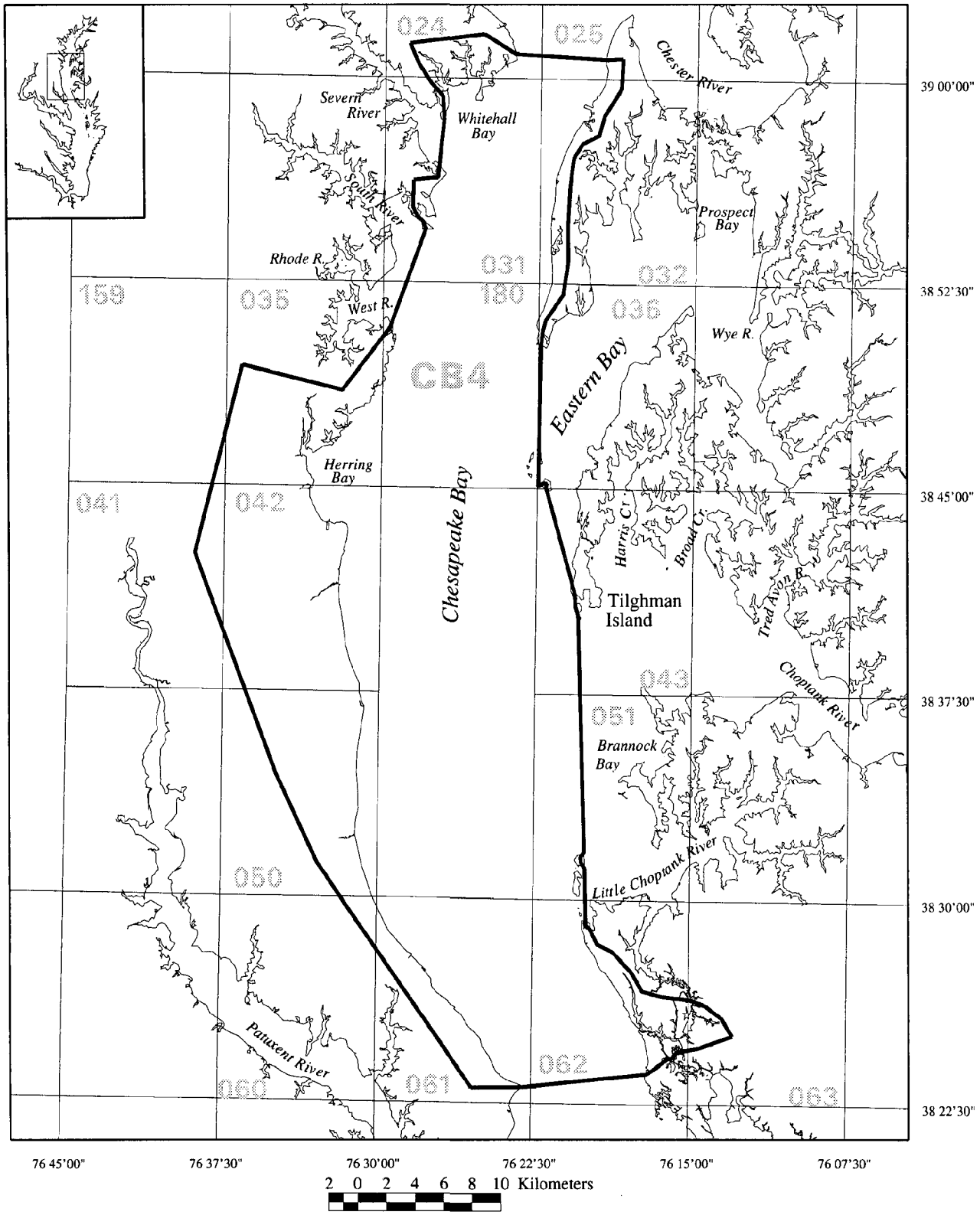

Figure 17: Distribution of SAV in the Middle Central Chesapeake Bay (Segment CB4) in 1994.

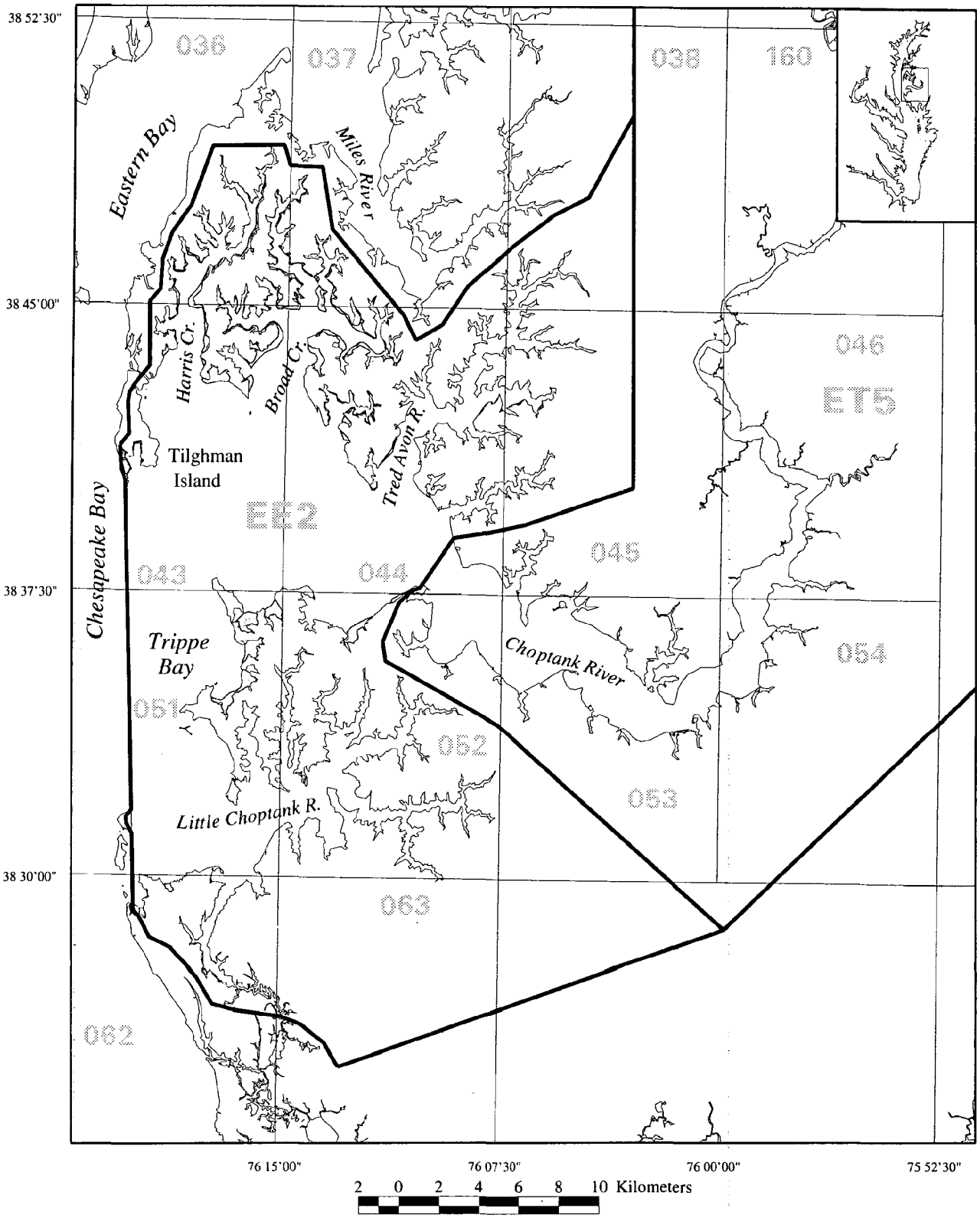

Figure 18: Distribution of SAV in the Choptank River (Segments EE2, ET5) in 1994.

In 1994, *R. maritima* and *Z. palustris* were reported from EE2 by VIMS and Citizens' surveys (Appendices B and D, Maps 36, 37, 43, 44, 51, and 52). Both these species were reported from Tilghman Island and the creeks in the northern portion of the segment, whereas only *R. maritima* was reported from Trippe Bay, and only *Z. palustris* was reported from the Little Choptank River in the southern portion.

PATUXENT RIVER (LE1, RET1, TF1)

In the Patuxent River (LE1, RET1, TF1), there was an increase of SAV reported in 1994, primarily in the Upper Patuxent River segment (TF1) (Tables 6 and 7).

Upper Patuxent River (TF1)

In the Upper Patuxent River, there were 75.19 hectares of SAV reported in 1994 compared with 8.78 hectares reported in 1993 (Tables 6 and 7). No SAV was mapped in either 1991 or 1992 (Tables 6 and 7). In this segment in 1994, 82% of SAV was classified as dense and the remainder was moderate, contrasted with 1993, when 100% was sparse (Appendix E). The SAV beds were located below Waysons Corner (Route 4 Bridge) to north of Lower Marlboro (Figure 19; Appendix B, Maps 41 and 159). The Bristol quadrangle (Map 159) had SAV by photography for the first time since 1985 (Appendix B; Orth *et al.*, 1986, 1987, 1989, 1991). In 1994, ground truth from the MD-DNR (Naylor and Kazyak, 1995), the Patuxent River Park, and the Citizens' surveys reported *C. demersum, E. canadensis, H. verticillata, N. guadalupensis, N. gracillima, N. minor, P. crispus, Potamogeton pusillus, Z. palustris, V. americana,* and an unidentified species, primarily in the upper half of TF1 (Appendices B and D, Maps 41, 49, 159).

Middle Patuxent River (RET1)

In the Middle Patuxent River segment (RET1), there were 1.52 hectares in 1994, compared with 1991-1993 in which no SAV was mapped (Tables 6 and 7). All the SAV in this segment in 1994 was classified as moderate (Table 8) and occurred in Swanson Creek (Figure 19; Appendix B, Map 49). There was no ground-truth information for RET1 in 1994.

Lower Patuxent River (LE1)

In the Lower Patuxent River segment (LE1), the amount of SAV decreased from 0.99 hectares reported in 1993, to 0.0 hectares reported in 1994 (Tables 6 and 7; Figure 19). In 1994, the EPA and the Citizens surveyed LE1 sites and reported *Z. palustris, R. maritima, M. spicatum,* and *P. pectinatus* (Appendices B and D, Maps 60, 61, 70, and 71). Specifically, *Z. palustris* was reported from Battle and Osbourne creeks, and Petersons Point, on the north shore; *V. americana* and *P. pectinatus* were also reported from Battle Creek; *Z. palustris* and *R. maritima* were reported from Cuckold Creek, and *M. spicatum* and *P. pectinatus* from Green Holly Pond, both on the south shore.

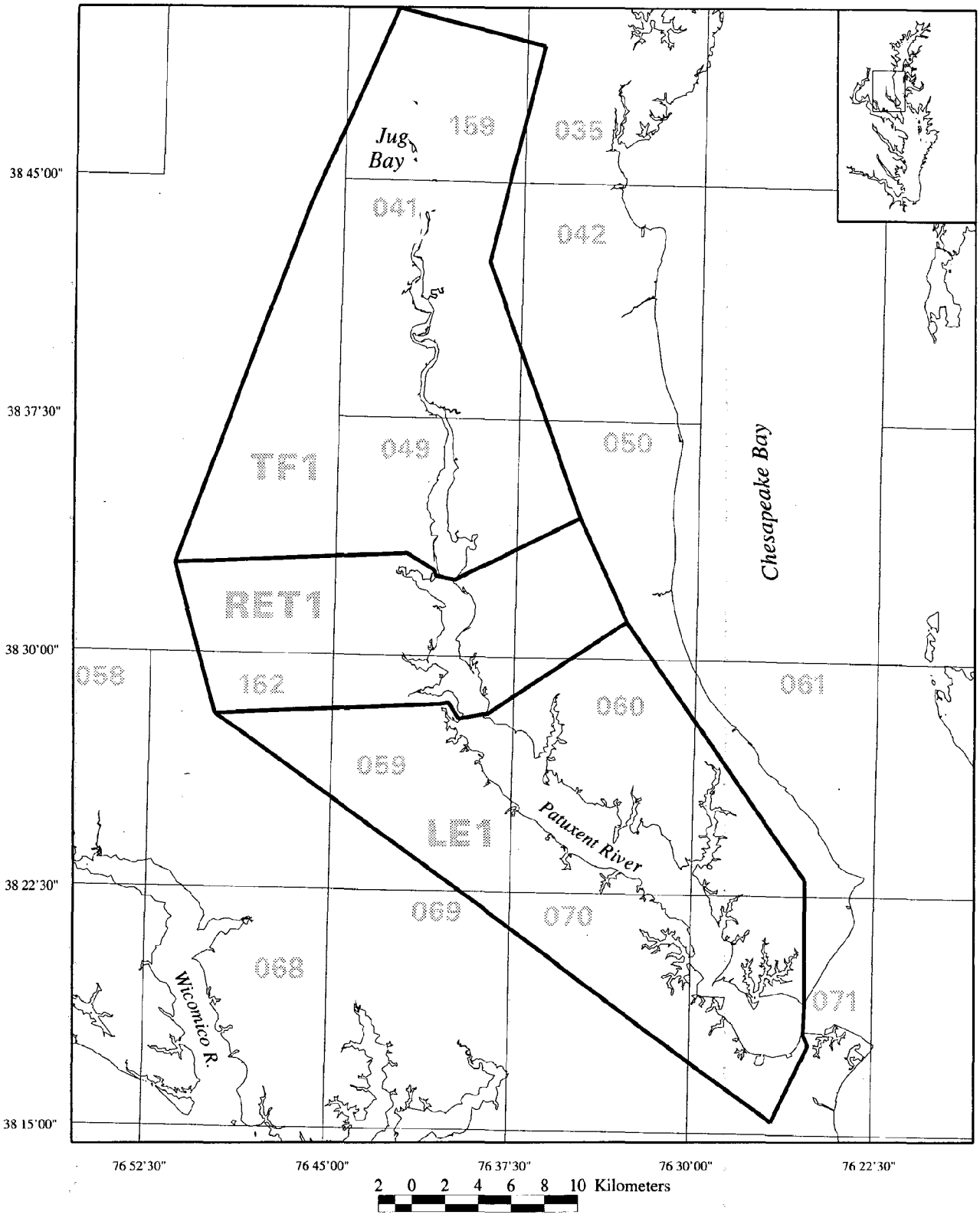

Figure 19: Distribution of SAV in the Patuxent River (Segments LE1, RET1, TF1) in 1994.

NANTICOKE, WICOMICO, MANOKIN, BIG ANNEMESSEX, AND POCOMOKE RIVERS (ET6, ET7, ET8, ET9, ET10)

Nanticoke River (ET6), Wicomico River (ET7), and Pocomoke River (ET10)

The Nanticoke (ET6), Wicomico (ET7), and Pocomoke (ET10) river segments remained unvegetated in 1994, as in the years 1991-1993 (Tables 6 and 7). There was no ground-truth data for these segments in 1994.

Manokin River (ET8) and Big Annemessex River (ET9)

SAV declined in both in the Manokin (ET8) and Big Annemessex rivers (ET9) in 1994 (Tables 6 and 7; Appendix B, Maps 84, 85, 92, and 93). In the Manokin River segment (ET8) there was an increase in SAV each year until 1994, up from 114.29 hectares in 1991 (Tables 6 and 7). In 1994, there was a decrease to 66.63 hectares from the four-year high level of 156.46 hectares of SAV reported in 1993 (Tables 6 and 7). There was a similar pattern in the Big Annemessex River segment (ET9). SAV increased each year from 175.54 hectares in 1991 until 1994, which had 161.79 hectares, compared with the four-year high level of 185.62 hectares observed in 1993 (Tables 6 and 7).

In the Manokin River segment (ET8), decreases in SAV occurred in three quads, primarily in Big Sound; Fishing and Goose creeks; and Drum Point Cove (Figure 20; Appendix B, Maps 84, 85, and 93). Also, SAV was absent from Letter Cove in 1994 (Map 92), but was present in Mine Creek and Laws Thorofare (Maps 84 and 93). In the Big Annemessex River segment (ET9) most of the SAV occurred in Crane, Fords, Flatland, and Shirtpond Coves; and in Acre, Daugherty, and Jones creeks (Appendix B, Map 93). In both these segments from 1991-1994 , most of the SAV was classified as moderate and sparse with little to no SAV classified as dense or very sparse (Table 8; Appendix E). In 1994 there was ground-truth data from ET8 only: *R. maritima* was reported from sites on the north shore of the Manokin River, in Fishing and Big Sound creeks, and in Laws Thorofare (Appendices B and D, Map 84).

TANGIER SOUND (EE3)

In the Tangier Sound segment (EE3) in 1994, there was a decrease of SAV, and the level reported was the lowest in the four years, 1991-1994 (Tables 6 and 7). There were 4,575.39 hectares of SAV in 1994, compared with 6,015.59 hectares of SAV in 1993; 5,783.20 hectares in 1992; and 5,427.74 hectares in 1991 (Tables 6 and 7). There was also a decline in the percentage of SAV classified as dense and moderate over the four years. In 1991, 59% of SAV was classified as dense; whereas, only 24% was dense in 1994 and the percentage of SAV in classes 3 and 4 combined decreased from 80% in 1991 to 55% in 1994 (Table 8; Appendix E). SAV was present mainly in the Honga River; the eastern side of Smith and Tangier islands; the area between Great Fox Island and Cedar Island; and Big Marsh (Figure 21; Appendix B, Maps 63, 73, 74, 82, 83, 84, 91, 92, 93, 99, 100, 101, 107, 108,

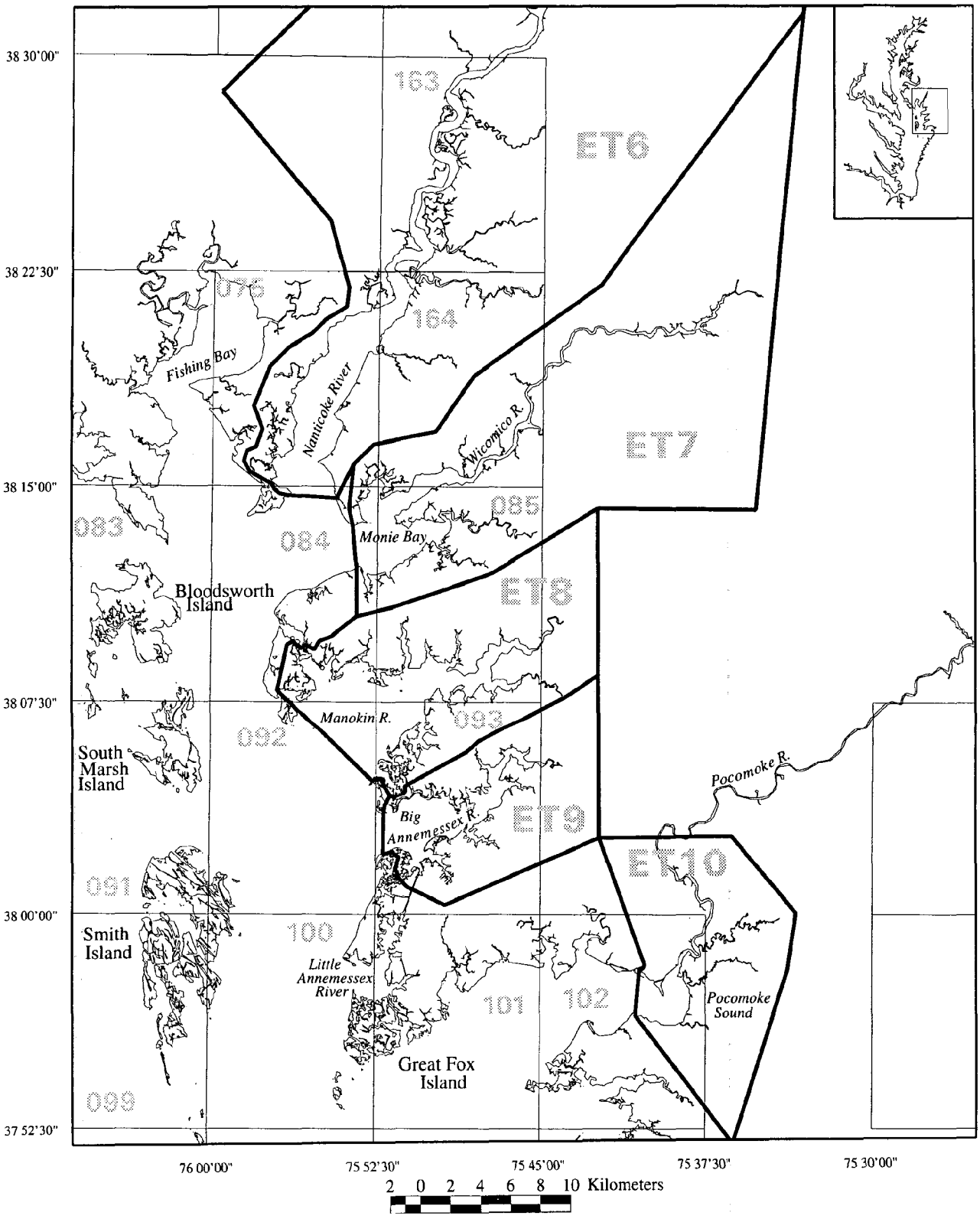

Figure 20: Distribution of SAV in the Nanticoke, Wicomico, Manokin, Big Annemessex, and Pocomoke Rivers (Segments ET6, ET7, ET8, ET9, ET10) in 1994.

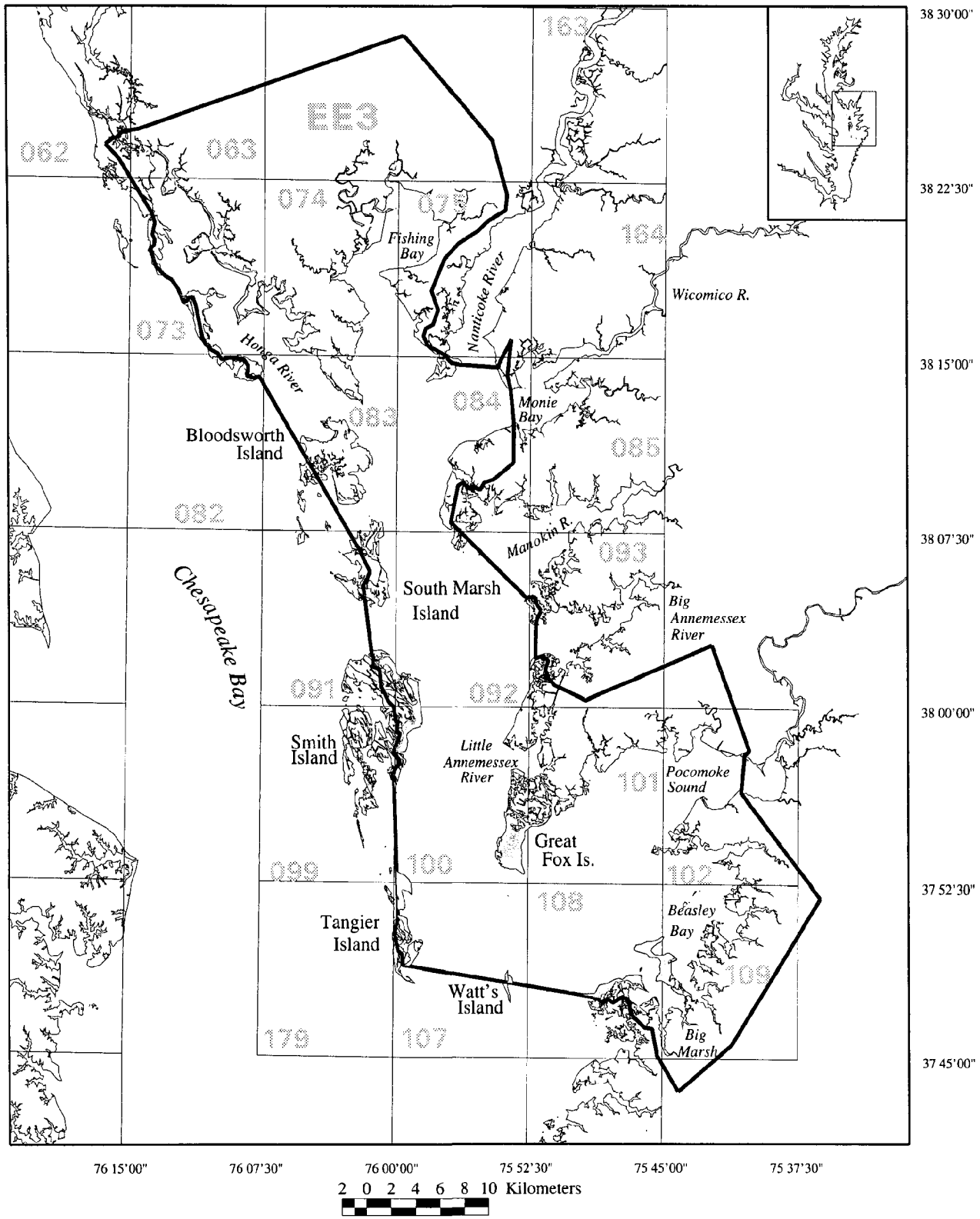

Figure 21: Distribution of SAV in the Tangier Sound (Segment EE3) in 1994.

and 109). The majority of the decline from 1993 occurred in eight quadrangles: Honga (Map 73) - 326.99 hectares; Bloodsworth Island (Map 83) - 226.12 hectares; Kedges Straits (Map 91) - 92.66 hectares; Great Fox Island (Map 100) - 319.93 hectares; Crisfield (Map 101) - 161.16 hectares; Tangier Island (Map 107) - 71.59 hectares; Terrapin Sand Point (Map 92) - 59.33 hectares; and Parksley (Map 109) - 103.38 hectares (Table 7). SAV decreased on the western shore of the Honga River; in Okahanikan, Piney Island, and Hopkins coves; at Hope Point South; at South Marsh Island; in Plungers and Back coves; in Sheepshead Harbour; at Cedar, Janes, Smith, Thorofare, Goose, Tangier, and Jacks islands; at Simpson Point; and at Byrds Marsh. SAV was absent in 1994 in Tigs and Great coves; on the western side of Little Deal Island; and at James, Big, and Jobes islands. In 1994, VIMS reported *R. maritima* in the Honga River (Appendices B and D, Maps 73 and 74).

POTOMAC RIVER (LE2, RET2, TF2)

Overall, the Potomac River had a 32% decline in SAV since 1991 (Tables 6 and 7). Altogether in the Potomac River (LE2, RET2, TF2), the total amount of SAV decreased from 3,595.84 hectares in 1991; to 3,010.18 hectares in 1992; to 2,819.7 hectares in 1993; and to 2,432.01 hectares reported in 1994 (Tables 6 and 7).

Lower Potomac River (LE2)

In 1994, the Lower Potomac River segment (LE2) had a 67% increase over the 1991 level of 83.31 hectares (Tables 6 and 7). In segment LE2, the amount of SAV increased from 57.75 hectares of SAV reported in 1993, to 139.52 hectares of SAV reported in 1994 (Tables 6 and 7). In 1994, 68% of the total coverage of SAV was dense, 9% was moderate, 18% was sparse, and 5% was very sparse (Table 8; Appendix E). This was a 79% increase of SAV coverage in density class 4 from the 1991 level of 38% (Appendix E). Most of the changes occurred in Cuckold Creek (Map 67) and in the Wicomico River (Map 68) (Figure 22). This was the first time SAV was indicated from aerial photography for Maps 68 and 77 since 1985 and 1984, respectively (Orth *et al.*, 1986, 1987, 1989, 1991). Several beds were noted in Machodoc, Rosier, and Goldman creeks, and below Lower Cedar Point (Maps 66 and 67). New beds were seen in the Wicomico River from Budds Creek to Bluff Point on the eastern side from below Stoddard Point to Rock Point on the western side, and in St. Catherine Sound (Appendix B, Maps 68, 77, and 162).

In 1994, the Patuxent River Park survey reported *M. spicatum*, *Z. marina*, *Z. palustris*, *E. canadensis*, and *P. perfoliatus* in Cuckold Creek on the north shore; Citizens reported *M. spicatum*, *P. perfoliatus*, and *Z. palustris* in Popes Creek, and *Z. palustris* in Lower Machodoc Creek on the south shore (Appendices B and D, Maps 67, 76, and 78).

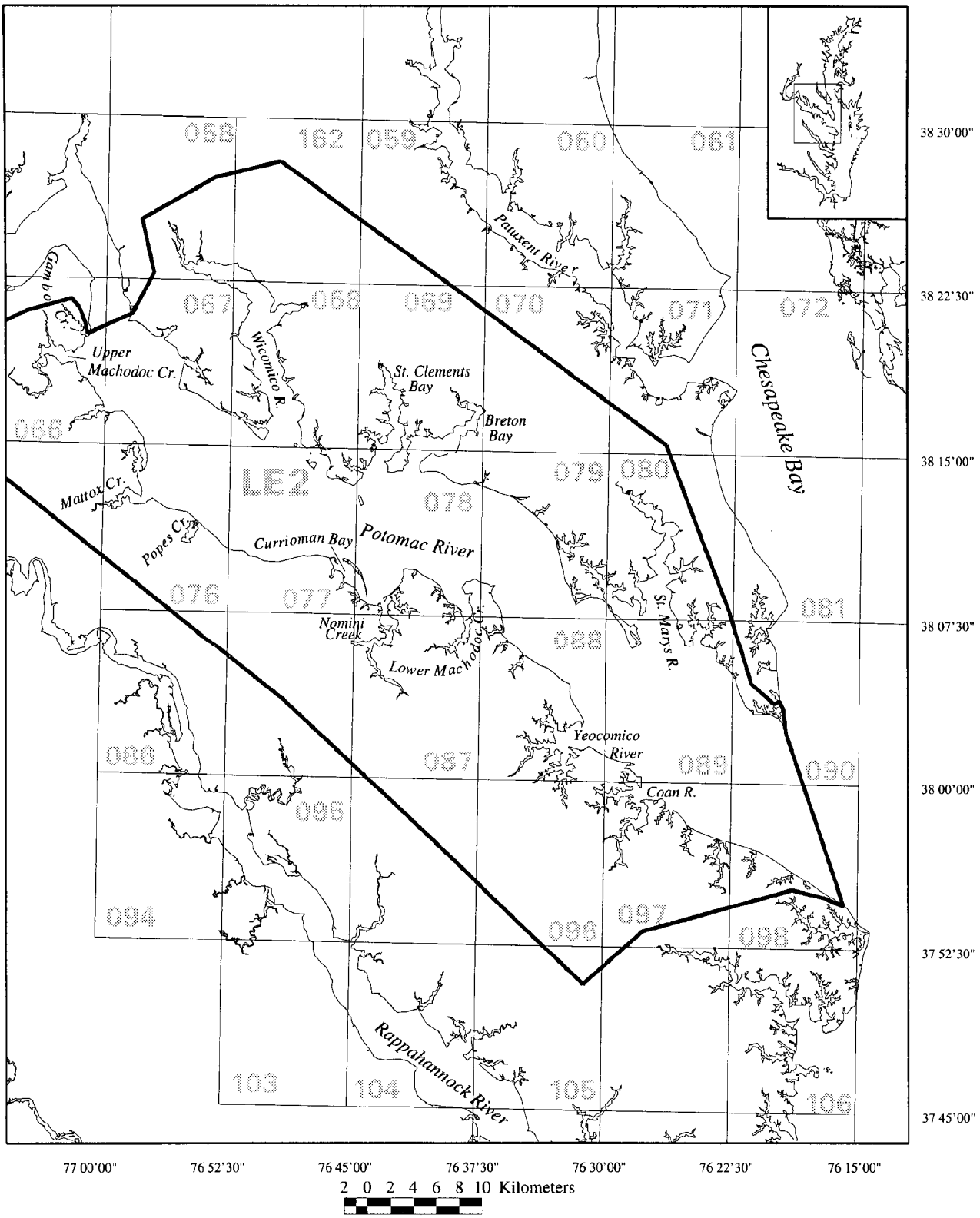

Figure 22: Distribution of SAV in the Lower Potomac River (Segment LE2) in 1994.

Middle Potomac River (RET2)

In the Middle Potomac River segment (RET2), SAV decreased from 1,349.09 hectares reported in 1993 to 1,310.23 hectares in 1994 (Tables 6 and 7). This also is a decrease from the 1991 level (1,468.34 hectares) and from the four-year high 1992 level (1,551.67 hectares) (Tables 6 and 7). The percentage of SAV classified as dense, however, increased in 1994 to the four-year high of 88% (Table 8; Appendix E). SAV was located in Maps 47, 55, 56, 57, 58, 64, 65, 66, and 67 (Figure 23; Appendix B).

SAV was abundant in the mainstem Potomac River; in Chopawamsic, Aquia, Nanjemoy, Burgess and Goose creeks; and in the Port Tobacco River (Figure 23). Some decreases occurred on the eastern side of the mainstem, mainly on the Widewater quadrangle (Map 55). New SAV beds were located on the Passapatanzy quadrangle (Map 64) at Pratts and Marlboro Points, and Potomac Creek. SAV also increased in Accokeek Creek, a tributary of Potomac Creek (Figure 23; Map 64).

In 1994, the USGS, VIMS, and Citizens' surveys reported ground-truth information for RET2: *M. spicatum, H. verticillata, H. dubia, V. americana, P. perfoliatus P. pectinatus, C. demersum, N. minor,* and *N. guadalupensis* were reported from numerous sites along both shores; *H. verticillatta* was reported, usually with other species, from the TF2 line, to Potomac Creek on the south shore, and to the Port Tobacco River on the north shore (Appendices B and D, Maps 47, 55, 57, 64, and 66).

Upper Potomac River (TF2)

The Upper Potomac River segment (TF2) SAV distribution decreased over the past four years. In segment TF2, 982.26 hectares of SAV were reported in 1994 compared with 1,412.86 hectares in 1993; 1,412.41 hectares in 1992; and 2,044.19 hectares in 1991 (Tables 6 and 7). The percentage of SAV classified as dense decreased from 1991, the year with the highest percentage (78%); however, all three remaining years had over 70% dense SAV (Table 8; Appendix E).

SAV was located in Maps 28, 29, 34, 39, 40, 47, and 48 (Appendix B). Decreases in SAV levels occurred on both sides of the Potomac River mainstem (Figure 23). The decline was visible from Piscataway Creek (Map 40) to Chicamuxen Creek (Map 48) on the eastern side (Figure 23). On the western side of the Potomac, SAV decreases occurred from below Woodrow Wilson Memorial Bridge to Hog Island (Map 34), and from Neabsco Creek to Quantico Creek (Map 47) (Figure 23). SAV was totally absent from the Port Tobacco quadrangle (Map 161) in 1994 for the first time since 1984 (Figure 23) (Orth *et al.*, 1985). Some increases were seen in the Occoquan River and in Belmont Bay (Figure 23; Map 39).

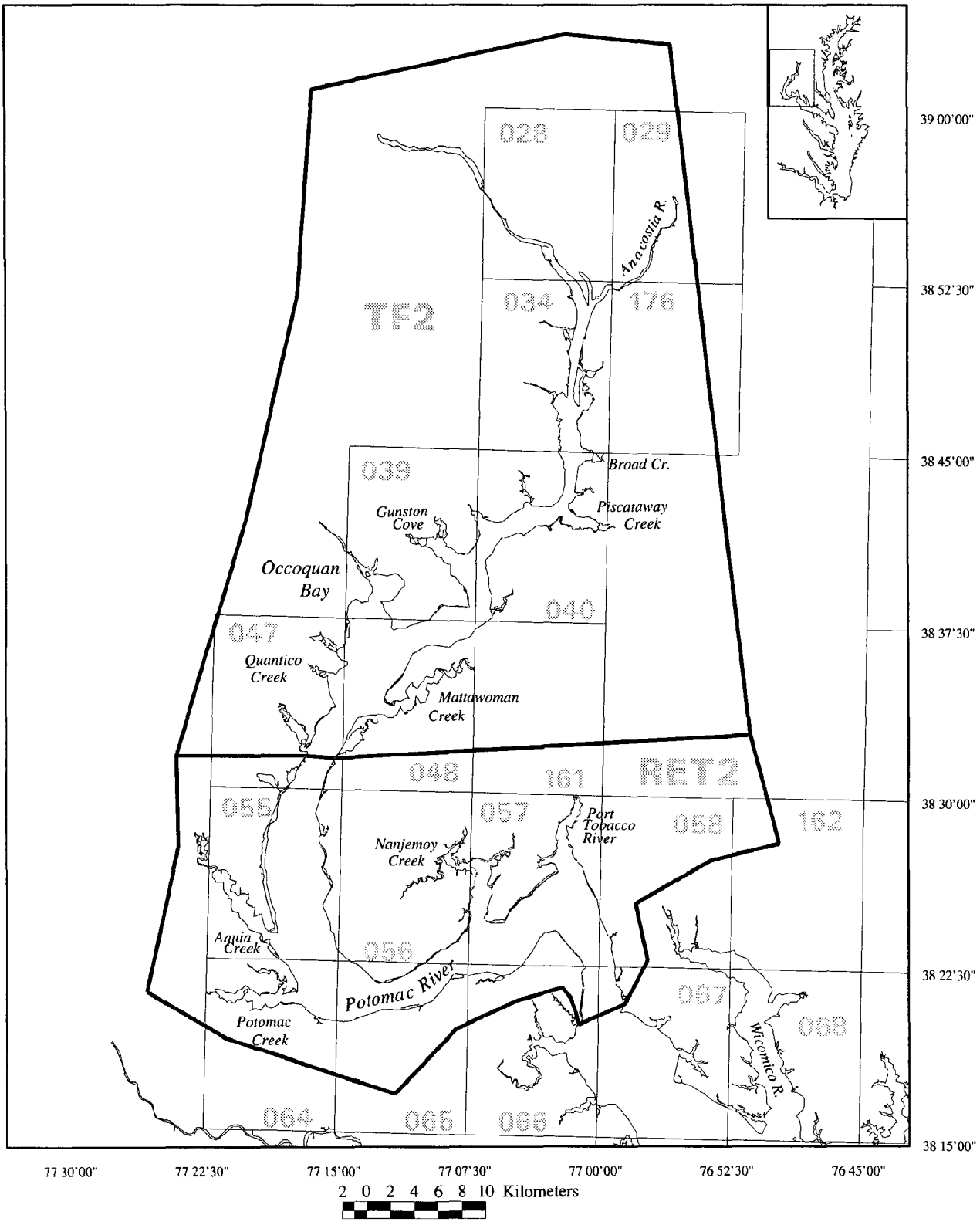

Figure 23: Distribution of SAV in the Middle and Upper Potomac River (Segments TF2, RET2) in 1994.

In 1994, ground-truth data from the USGS for TF2 cited *M. spicatum, V. americana, H. verticillata, H. dubia, C. demersum, N. guadalupensis,* and *N. minor* from numerous locations along both shores; *H. verticillata* was reported, usually with other species, extending from D.C. in the north to the RET2 boundary in the south (Appendices B and D, Maps 28, 29, 34, 39, 40, 47, and 48).

LOWER CENTRAL CHESAPEAKE BAY (CB5)

In the Lower Central Chesapeake Bay segment (CB5) in 1994, the amount of SAV decreased from 5,006.78 hectares of SAV reported in 1993, to 3,533.27 hectares (Tables 6 and 7). This was also the lowest level of the 1991-1994 period (Tables 6 and 7). The percentage of dense SAV in 1994 also decreased from 1991 when 48% of SAV was classified as dense, although 1992 was the lowest (17%) (Appendix E). In 1994, only 21% of SAV was classified as dense, 24% was moderate, 47% was sparse, and 8% was very sparse (Table 8; Appendix E). However, the percentages of SAV in classes 3 and 4 combined for each year show 1994 (45%) increased over 1993 (37%) (Appendix E).

SAV beds were abundant at Ingram Cove; in Prentice, Dividing, Henry, Indian, and Dymer creeks; in Little and Fleets bays; and at Goose Island (Figure 24; Appendix B, Maps 82, 83, 91, 99, 100, 106, 107, 112, and 179). Decreases occurred at Adam, Holland, Spring, and Thorofare islands (Maps 83 and 100); in Johnson, Pry, Frog Point, Lighting Knot coves (Map 91); and at Dameron Marsh (Map 106). A decrease of 671.14 hectares occurred in the Ewell quadrangle (Map 99; Table 7), primarily at Smith Island, Hog Neck, Tyler Creek, and South Point Marsh. SAV was also absent in 1994 from the western side of Tangier Island (Figure 24).

In 1994 all ground-truth data was reported from the western shore of segment CB5, by the EPA and Citizens: *Z. palustris* and *R. maritima* were reported at one site near Drum Point, north of the mouth of the Patuxent River; *R. maritima* and *Z. marina* were reported at numerous sites in Fleets Bay and in Ingram Bay at the mouth of the Great Wicomico River; *R. maritima* was reported at the mouth of Prentice Creek (Appendices B and D, Maps 71, 106, and 112).

Lower Bay Zone

RAPPAHANNOCK RIVER (LE3, RET3, TF3)

The amount of SAV decreased in the Rappahannock River (LE3, RET3, TF3) in 1994 in LE3, the lower Rappahannock River, the only segment to have SAV (Tables 6 and 7).

Upper Rappahannock River (TF3) and Middle Rappahannock River (RET3)

The Upper Rappahannock River segment (TF3) and Middle Rappahannock River segment (RET3) had no SAV reported in 1991-1994 (Tables 6 and 7; Figure 25), nor was there any ground-truth data reported in 1994 for these two segments.

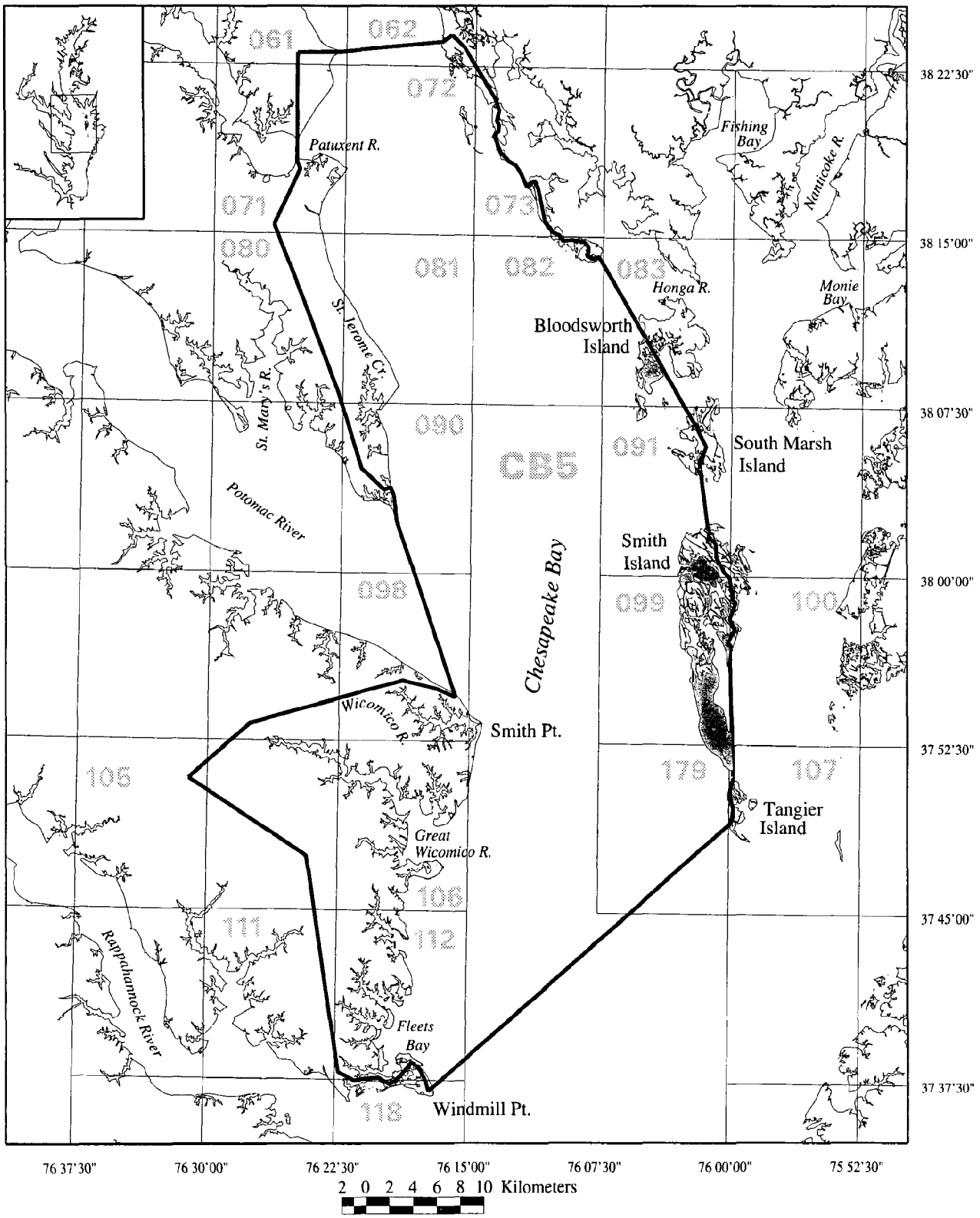

Figure 24: Distribution of SAV in the Lower Chesapeake Bay (Segment CB5) in 1994.

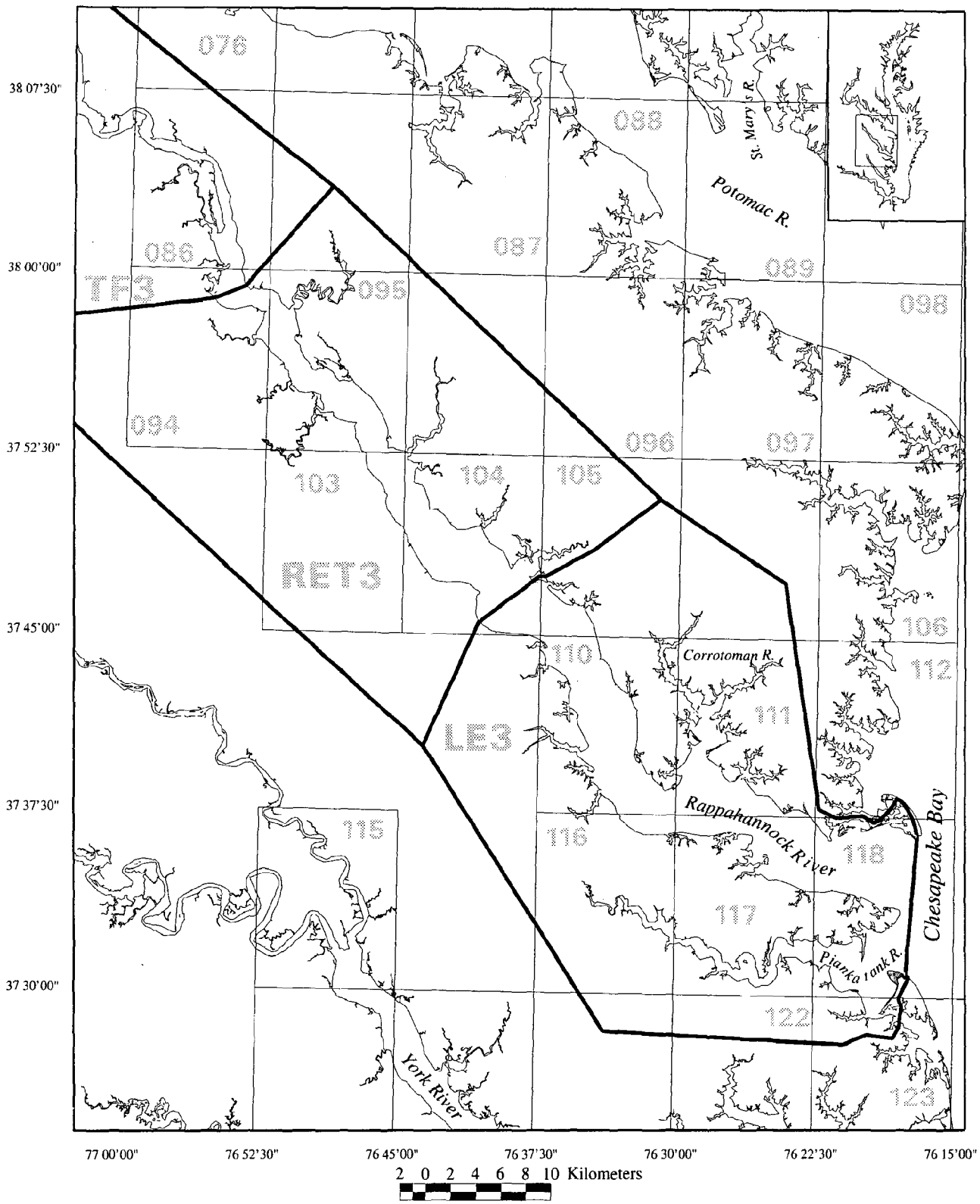

Figure 25: Distribution of SAV in the Rappahannock River (Segments LE3, RET3, TF3) in 1994.

Lower Rappahannock River (LE3)

In the Lower Rappahannock River segment (LE3), the amount of SAV decreased from the four-year high of 413.47 hectares reported in 1993, to 196.51 hectares of SAV reported in 1994 (Tables 6 and 7). This was also lower than the 1991 level of 314.78 hectares and the 1992 level of 343.37 hectares (Tables 6 and 7). The percentage of SAV classified as dense also decreased each year since 1991, from 30% that year to 2% in 1994 (Appendix E). The percentage of SAV classified as moderate underwent a similar decrease after 1991, from 25% that year to 6% in 1994 (Appendix E). In 1994, 93% of the remaining SAV fell in the very sparse and sparse classes combined (the 0-40% coverage range) (Appendix E). In fact, the very sparse class had the largest increase, from 0.0% in 1991 to 42% in 1994 (Appendix E).

In this segment (LE3), many of the 1994 beds were reduced in size compared with 1993 (Figure 25). A major decline of SAV beds occurred in both the Rappahannock and Piankatank rivers. Only seven beds were seen in the Rappahannock River, at Carter and Mosquito creeks, Windmill Point, and Parrot Island (Maps 111, 117, and 118). The Piankatank River had only one bed in 1994 (Map 118). SAV also decreased in Mosquito Creek, Hills Bay, and Milford Haven (Maps 118 and 123). SAV was present in 1994 at Gwynns Island (Maps 118 and 123), and in the Corrotoman River (Map 111), but was absent altogether in the Eastern Branch of Corrotoman River.

In 1994, *R. maritima* and *Z. marina* were reported from LE3 by VIMS; *R. maritima* was reported from the Corrotoman River and from Carter Creek on the north shore; *Z. marina* and *R. maritima* were reported from the mouth of the Piankatank River and the western shore of Gwynns Island (Appendices B and D, Maps 111 and 118).

WESTERN LOWER CHESAPEAKE BAY (CB6)

In the Western Lower Chesapeake Bay segment (CB6), there was a decrease in SAV from 756.69 hectares of SAV reported in 1993 to 592.33 hectares of SAV reported in 1994, but this was still higher than the 1991 four-year low of 552.82 hectares (Tables 6 and 7). The percentage of SAV classified as dense decreased each year after 1991, when there was 55%, compared with 1994, when there was 10% (Table 8; Appendix E). The percentages of SAV in classes 1, 2, and 3 increased from 1991-1994 (Appendix E).

In the Western Lower Bay, SAV beds were abundant from New Point Comfort to north of Horn Harbor at Potato Neck (Figure 26; Appendix B, Map 132). Beds were also present at Windmill Point and Gwynn Island as in 1993 (Figure 26; Appendix B, Maps 118, 123, 177, and 178). Most of the decline in acreage for CB6 occurred in the Mathews quadrangle (Map 123). Mathews had 146.32 hectares less in 1994 than in 1993 (Table 7). The apparent decreases were at Milford Haven, The Hole in the Wall, Whites Creek, and Winter Harbor.

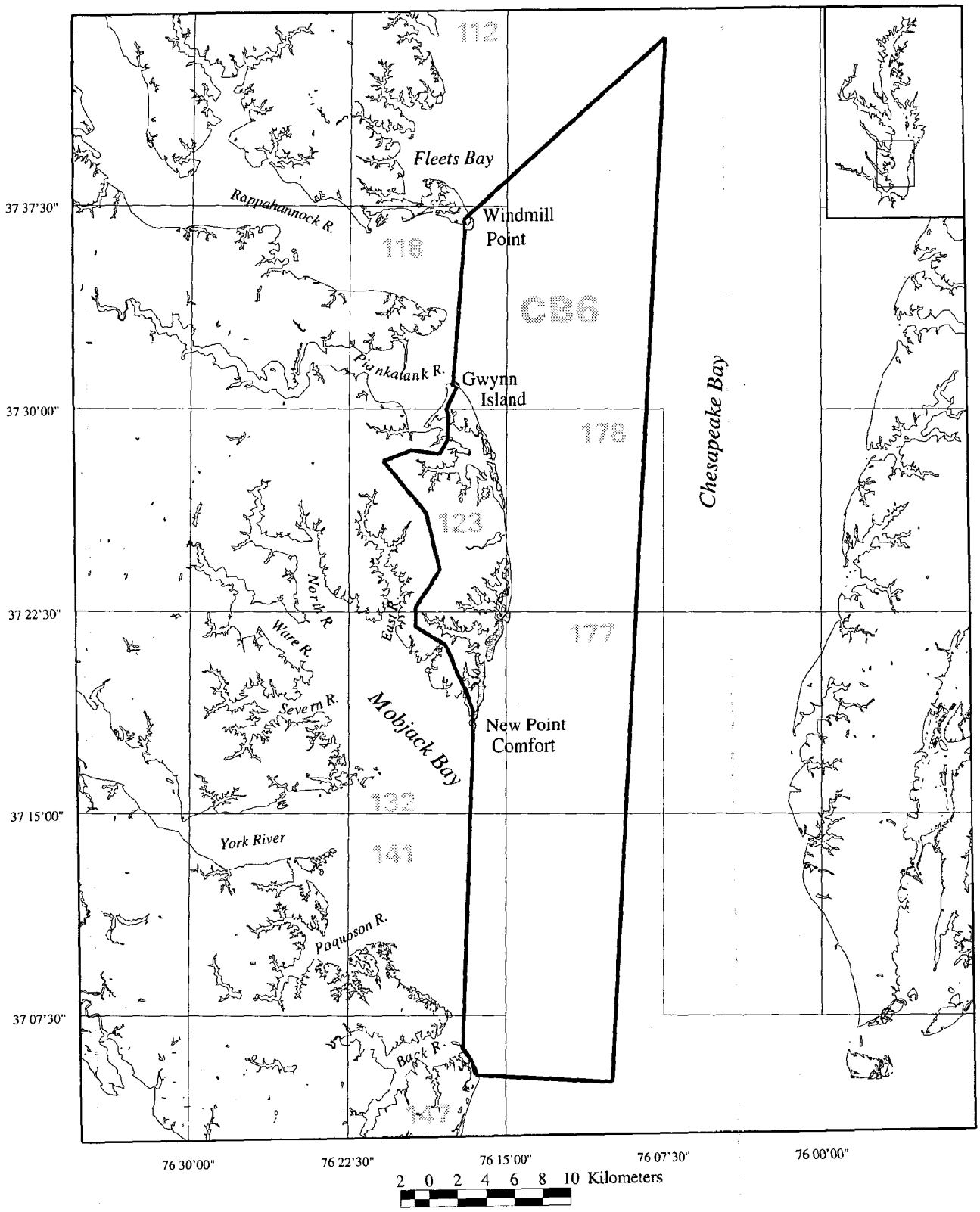

Figure 26: Distribution of SAV in the Western Lower Chesapeake Bay (Segment CB6) in 1994.

In 1994, VIMS reported groundtruth data from a few sites on the western boundary of CB6; *Z. marina* was reported both at Windmill Point and at Gwynn Island; *R. maritima* and *Z. marina* were reported from The Hole In The Wall, south of Gwynn Island (Appendices B and D, Maps 118 and 123).

EASTERN LOWER CHESAPEAKE BAY (CB7)

In the Eastern Lower Chesapeake Bay segment (CB7), there was a decrease in SAV, from the four-year high of 4,183.80 hectares of SAV reported in 1993, to 3,748.74 hectares of SAV reported in 1994, although this was still an increase over the four-year low 1991 level of 3,724.53 hectares (Tables 6 and 7). The percentage of SAV classified as dense decreased each year from 1991 to 1994 (41% to 23%); whereas all the other three classes increased from 1991 levels (Appendix E).

Large beds persisted at the mouth of Cherrystone Inlet near Cape Charles and at the mouths of Mattawoman, Hungars, Nassawadox, Occohannock, Craddock, Nandua, Pungoteague, Onancock, and Chesconessex creeks (Figure 27; Appendix B, Maps 108, 113, 114, 119, 124, 133, 134, and 142). Although some creeks continued to have large beds at the mouth, they showed a reduction in SAV in other areas of the creeks: Nassawadox, Church, Hungars, Mattawoman, Onancock, Back, Nandua, and Craddock creeks. Large, dense beds also occurred at the Big Marsh area near Chesconessex Creek (Map 108). Elliotts Creek (Map 142) and Cape Charles (Map 133) were the only quadrangles which showed increases in this segment (Map 142) (Table 7). There was no SAV from Pond Drain below Elliotts Creek (Map 142), to Fisherman Island at the mouth of Chesapeake Bay. SAV beds also were mapped at Cod Harbor of Tangier Island and at Watts Island (Map 107).

In 1994, the Citizens' survey reported *R. maritima* at Nassawadox Point and Nassawadox Creek; VIMS reported *R. maritima* and *Z. marina* from Cherrystone Inlet (Appendices B and D, Maps 124 and 133).

MOBJACK BAY (WE4)

In the Mobjack Bay segment (WE4), there was a slight decrease in SAV from 4,635.34 hectares reported in 1993 to 4,592.67 hectares reported in 1994, but this was still higher than the 1991-1992 levels (Tables 6 and 7). The percentage of SAV classified as dense in segment WE4 increased from 54% in 1991 to 71% in 1994 (Appendix E).

SAV beds were abundant along the entire shoreline of Mobjack Bay, as well as in the lower reaches of the tributaries: Severn, Ware, North, East, Poquoson, York, and Back rivers. The Mobjack Bay area continued to harbor some of the more extensive SAV beds on the western shore of the lower Chesapeake Bay (Figure 28, Appendix B, Maps 122, 123, 131, 132, 140, 141, and 147).

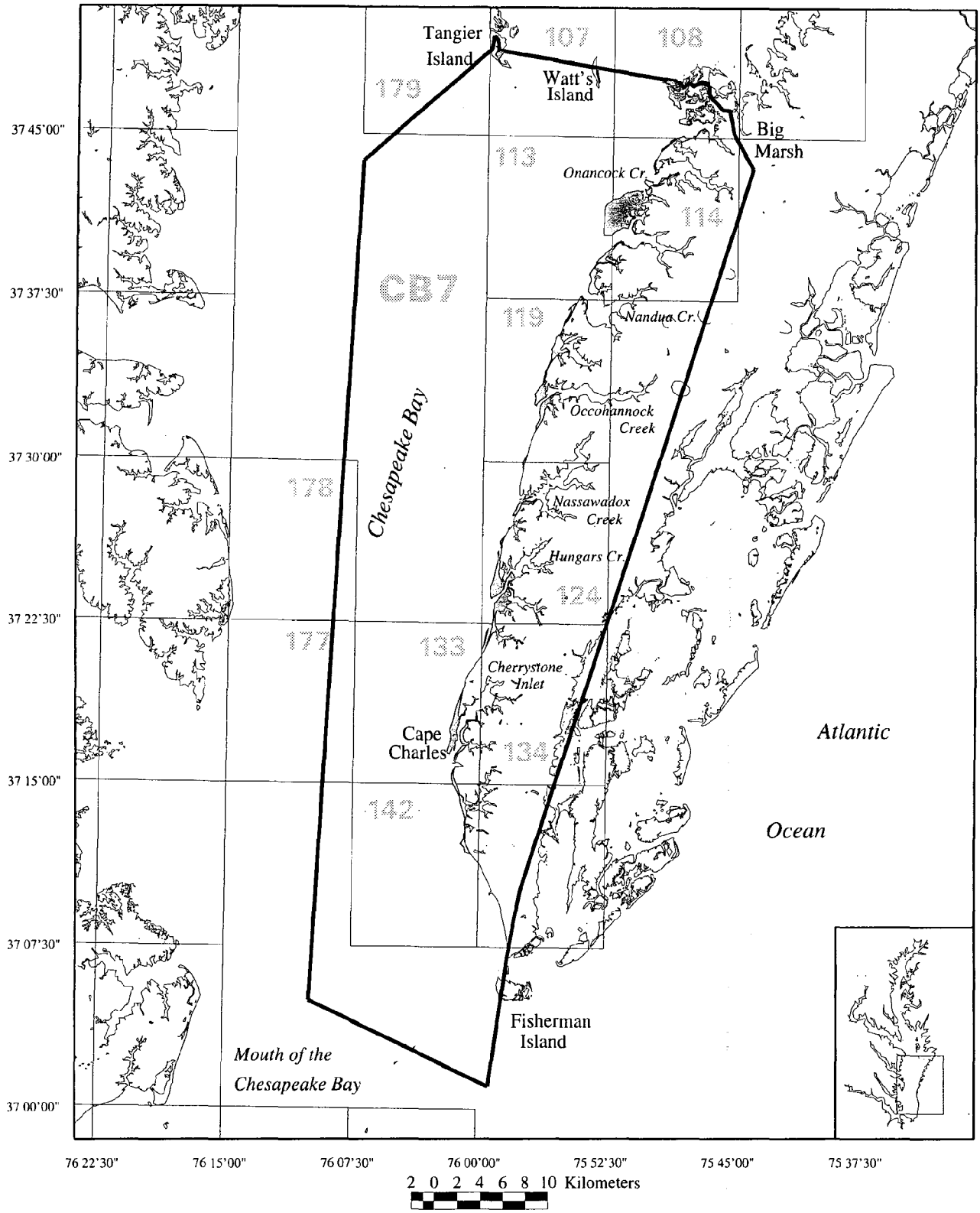

Figure 27: Distribution of SAV in the Eastern Lower Chesapeake Bay (Segment CB7) in 1994.

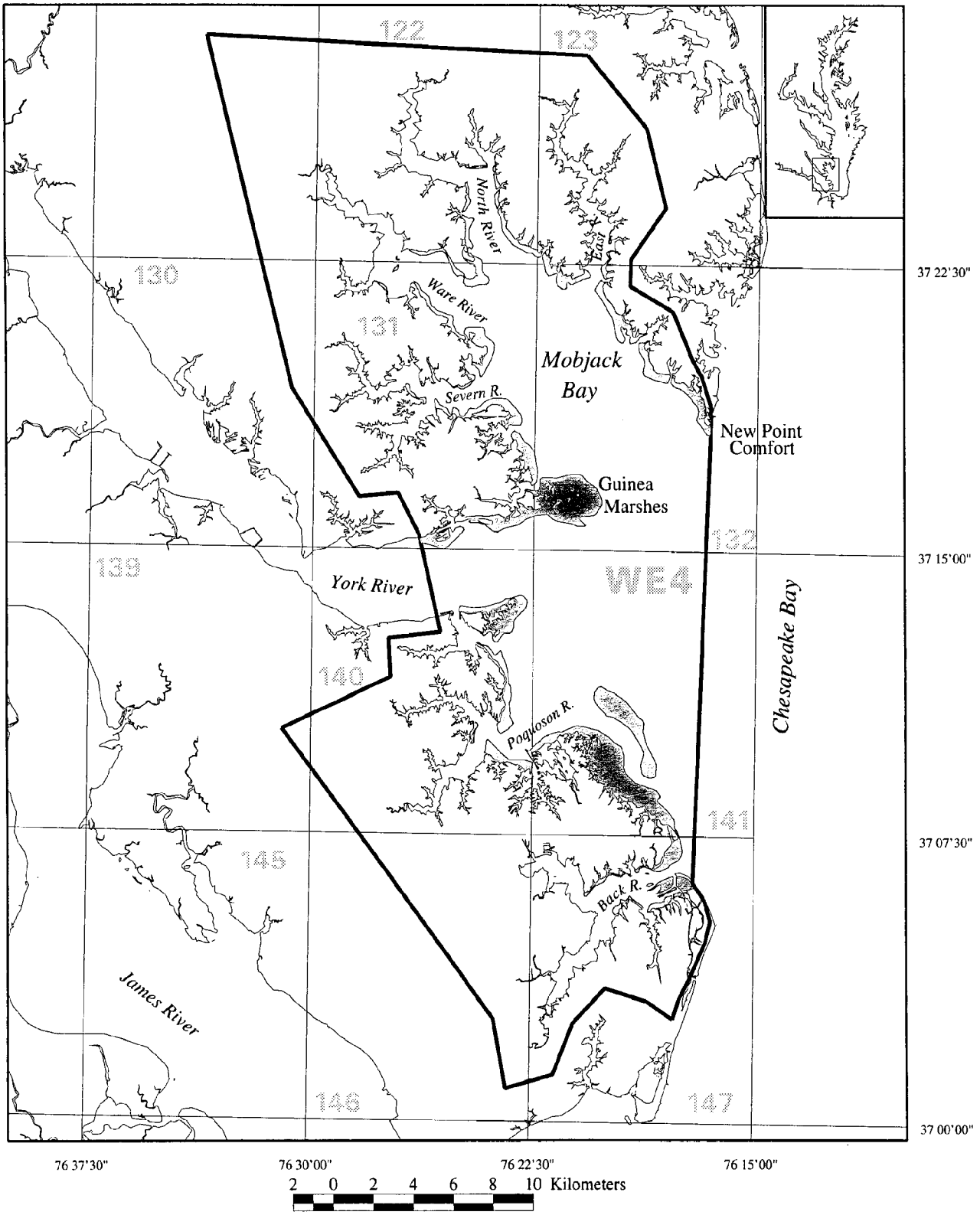

Figure 28: Distribution of SAV in the Mobjack Bay (Segment WE4) in 1994.

In 1994, *Z. marina* and *R. maritima* were reported by VIMS and Citizens' surveys from Maps 131, 132, and 140 in segment WE4 (Appendices B and D). Specifically, *R. maritima* alone was reported from the East River on the north shore of Mobjack Bay; *Z. marina* alone was reported from the Ware River on the south shore of Mobjack Bay; *R. maritima* and *Z. marina* together were reported from the north shore of Mobjack Bay adjacent to the East River and Pepper, Davis, and Harper creeks; *R. maritima* and *Z. marina* together were also reported from the south shore of Mobjack Bay (Ware Neck to the Guinea Marshes), from the north shore of the mouth of the York River (Big Island to the Perrin River), and from the south shore of the mouth of the York River (the Goodwin Islands) (Appendices B and D, Maps 131, 132, and 140).

YORK RIVER (LE4, RET4, TF4)

Altogether, in the York River (LE4, RET4, TF4), there was a slight increase of SAV reported for 1994 and that was from LE4, the only segment of the three to have any SAV (Tables 6 and 7).

Lower York River (LE4)

The number of hectares of SAV in the Lower York River segment (LE4) increased slightly each year from 65.64 hectares in 1991, to 66.79 hectares in 1992, to 76.55 hectares in 1993, to 78.29 hectares in 1994 (Tables 6 and 7). This segment continued to have the majority of its SAV classified as dense from 1991-1994 and although there was a slight decrease from the 1993 level of 86% to 77% in 1994, this was still higher than the 1991 level of 60% (Appendix E). There was no SAV classified as moderate in 1994 (Appendix E).

In the lower York River (LE4), sparse SAV was documented for a portion of the south shore of the York River, downstream from Yorktown, for the second year in a row (Figure 29; Appendix B, Maps 139 and 140). Dense SAV beds were located principally along the north shore from the Coleman Bridge to the mouth of the river (Appendix B, Maps 131, 139, and 140). SAV beds were absent upstream of the Coleman Bridge along the south shore except for three small beds (Figure 29; Appendix B, Map 139, beds AA1, BA2, and CA1). SAV persisted along the south shore after being documented in 1993 for the first time since 1971, from Yorktown to the Coast Guard pier (Orth and Gordon, 1975; Orth et al, 1994).

In 1994, *Z. marina* was noted by VIMS staff (Maps 139 and 140, Appendices B and D). Specifically, *Z. marina* was reported on the north shore of the York River at Gloucester Point, east of the Coleman Bridge, and along the south shore adjacent to the U.S. Naval Supply Center and to Yorktown (Appendices B and D, Maps 139 and 140).

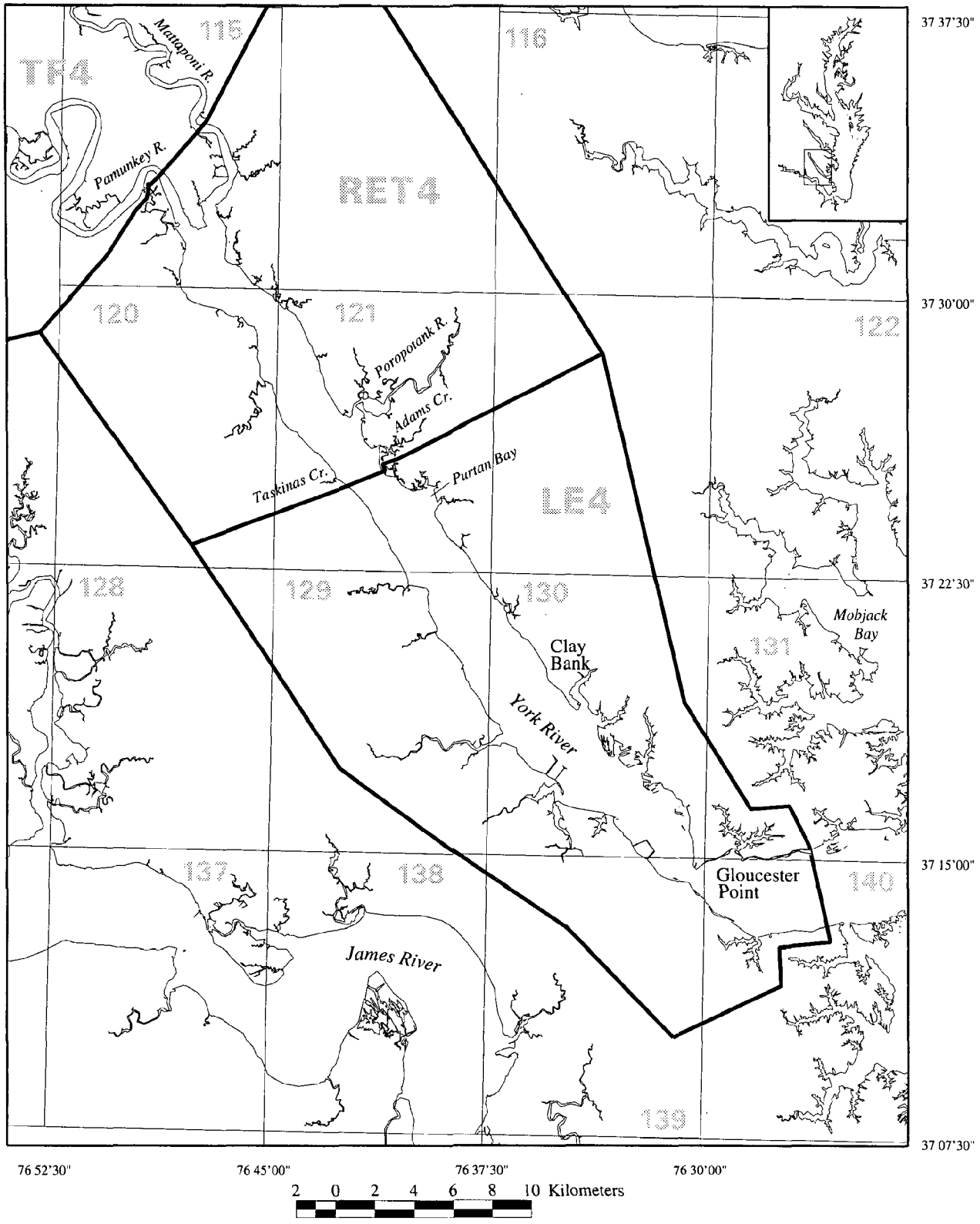

Figure 29: Distribution of SAV in the York River (Segments LE4, RET4, TF4) in 1994.

The Upper York River (TF4) and Middle York River (RET4)

The Upper York segment (TF4) and Middle York segment (RET4) reported no SAV from 1991-1994 (Tables 6 and 7; Figure 29). There was no ground-truth information reported for these two segments in 1994.

JAMES RIVER (LE5, RET5, TF5)

There was a slight increase of SAV in the James River (LE5, RET5, TF5) each year from 1991-1994 (Tables 6 and 7). SAV was mapped only from the Lower James (LE5).

Lower James River (LE5)

SAV increased in the Lower James River segment (LE5), from 4.01 hectares reported in 1993, to 6.10 hectares reported in 1994 (Tables 6 and 7). The percentage of SAV in this segment in 1994 that was classified as dense decreased from 100% in 1993 to 0% in 1994, whereas 100% of the SAV in 1994 was classified as moderate, the same as in 1991-1992 (Table 8; Appendix E). The SAV in this segment was located in a single bed in the mainstem of the river at the mouth of Hampton Creek adjacent to the Veteran's Hospital, as it was in 1991-1993, and continued to remain the only SAV mapped from aerial photography in the James River (Figure 30). This bed consists of *Z. marina* as reported by VIMS (Appendices B, C, and D, Map 147). Citizens survey an unknown species at the mouth of Skiffes Creek (Appendix B and D, Map 139).

Upper James River (TF5) and Middle James River (RET5)

The Upper James River segment (TF5) and Middle James River segment (RET5) reported no SAV for 1991-1994 (Tables 6 and 7, Figure 30). There was no ground-truth information reported from either of these two segments in 1994.

MOUTH OF THE CHESAPEAKE BAY (CB8)

The Mouth of Chesapeake Bay segment (CB8) had an increase of SAV from 21.22 hectares in 1993 to 42.65 hectares in 1994, the highest level from 1991-1994 (Tables 6 and 7). There was no SAV classified as dense from 1991-1994, nor was there any classified as moderate in 1994, which was a decline from 1993 when 33% was moderate (Appendix E). In 1994, 69% of the SAV was classified as sparse, and 31% was very sparse (Table 8; Appendix E).

SAV was present in Linkhorn Bay for the first time since 1990 on both Cape Henry and Princess Anne quadrangles (Figure 31; Appendix B, Maps 152 and 157) (Orth *et al.*, 1991). SAV was also abundant in Broad Bay (Figure 31, Map 152).

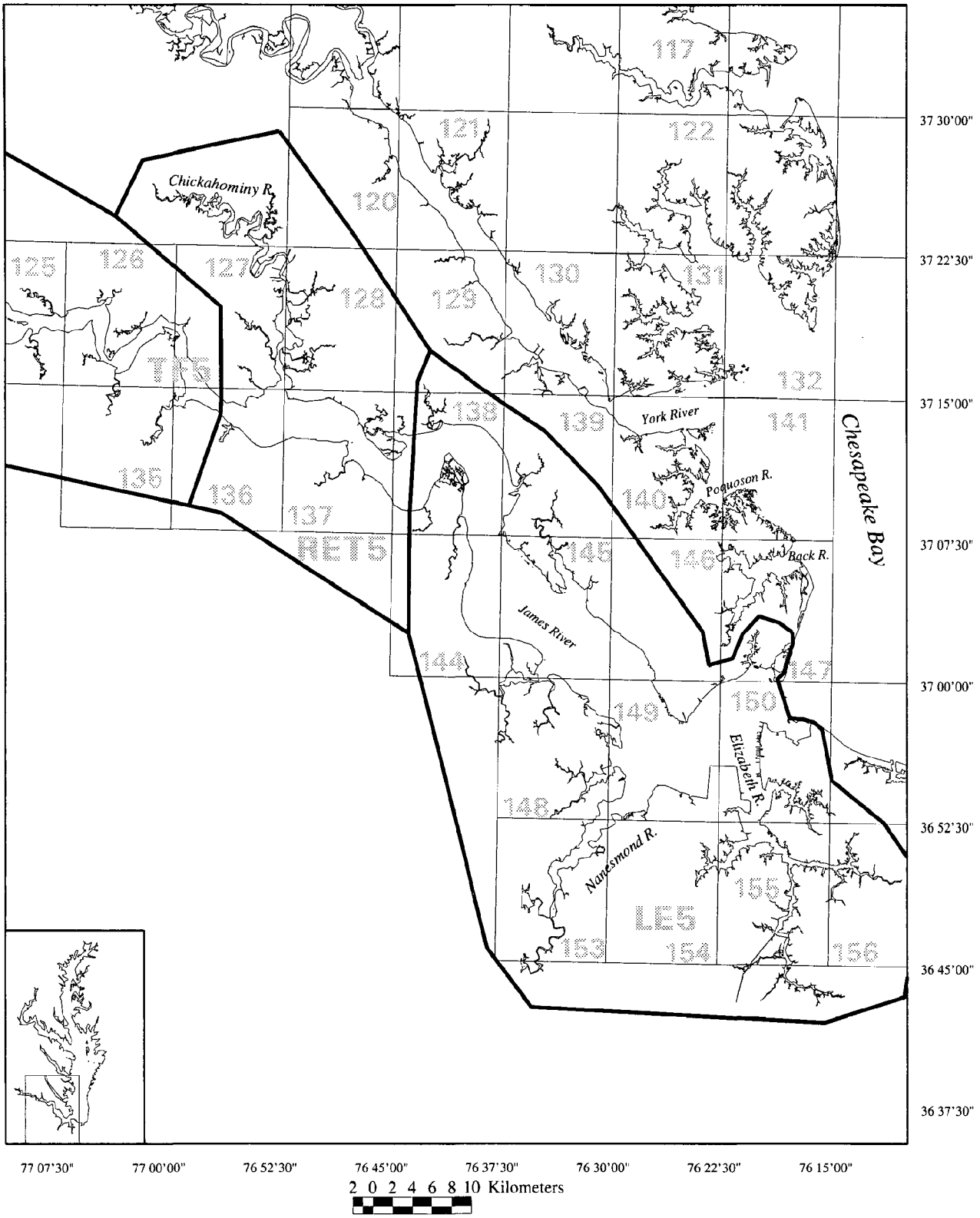

Figure 30: Distribution of SAV in the James River (Segments LE5, RET5, TF5) in 1994.

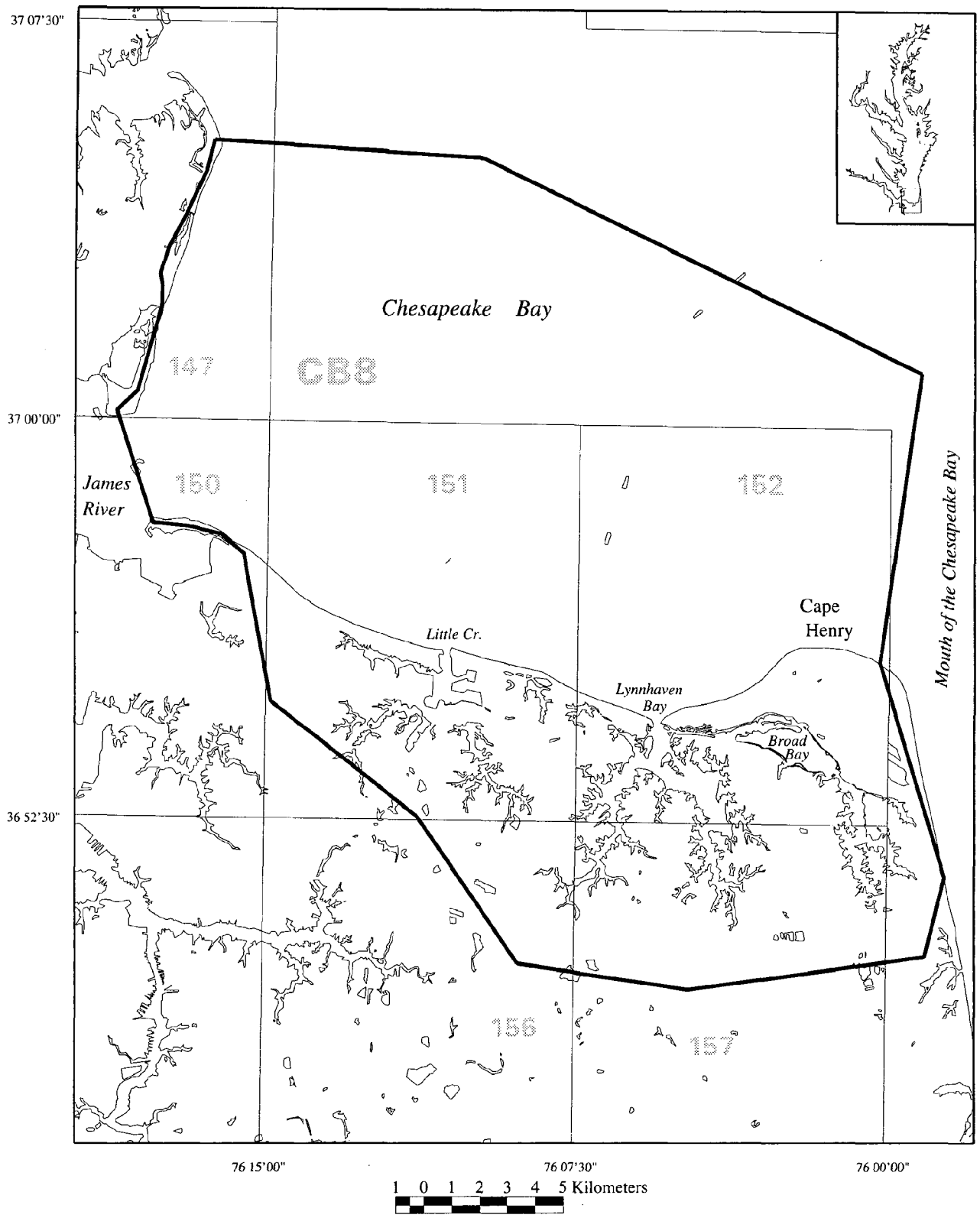

Figure 31: Distribution of SAV in the Mouth of the Chesapeake Bay (Segment CB8) in 1994.

VIMS and Citizens' surveys found *R. maritima* and *Z. marina* in Broad Bay, and VIMS staff noted *R. maritima* in Linkhorn Bay (Appendices B and D, Maps 152 and 157).

CHINCOTEAGUE BAY

SAV in the Chincoteague section increased each year from 1991 to 1994 (Tables 6 and 7). There was a 1,371.90 hectares (50%) increase in this four year period.

There were 4,117.53 hectares of SAV identified from the Eastern Shore of Virginia and Maryland in 1994 compared with 3,576.57 hectares reported in 1993 (Tables 6 and 7). Chincoteague and Sinepuxent bays had 3,979.31 hectares, and a small amount (138.22 hectares) was present in Isle of Wight and Assawoman bays (Tables 5-7; Figure 32; Appendix B and C, Maps 166, 167, 168, 170, 172, 173, 174, and 175). Most of the SAV in Chincoteague and Sinepuxent bays was located along the eastern sides of both bays behind Assateague Island, the barrier island that forms these bays. Several beds were located along the eastern side of Isle of Wight and Assawoman bays, behind Fenwick Island, the barrier island which forms these bays. In this segment in 1994, 55% of the total coverage was mapped as dense (class 4), 31% as moderate (class 3), 12% as sparse (class 2), and 1% as very sparse (class 1) (Table 9; Appendix E). The density distribution has remained somewhat similar from 1991 to 1994: in all four years the largest percentage of SAV was classified as dense, 54% or above; that classified as very sparse was 5% or under each year (Table 9, Appendix E). The percentages for sparse and moderate SAV were more variable (Table 9, Appendix E). Sparse SAV ranged from 4% and 5% in 1991 and 1992, respectively, to 26% in 1993, and then 12% in 1994 (Table 9). Moderate SAV ranged from 24% in 1991, 35% in 1992, 17% in 1993, and 31% in 1994 (Table 9).

The Citizens' survey found both *Z. marina* and *R. maritima* throughout Chincoteague, Sinepuxent, and Assawoman bays. The Ocean Pines Boat Club also noted these two species in Assawoman Bay (Appendices B and D, Maps 166, 167, 168, 170, 172, 173, and 175).

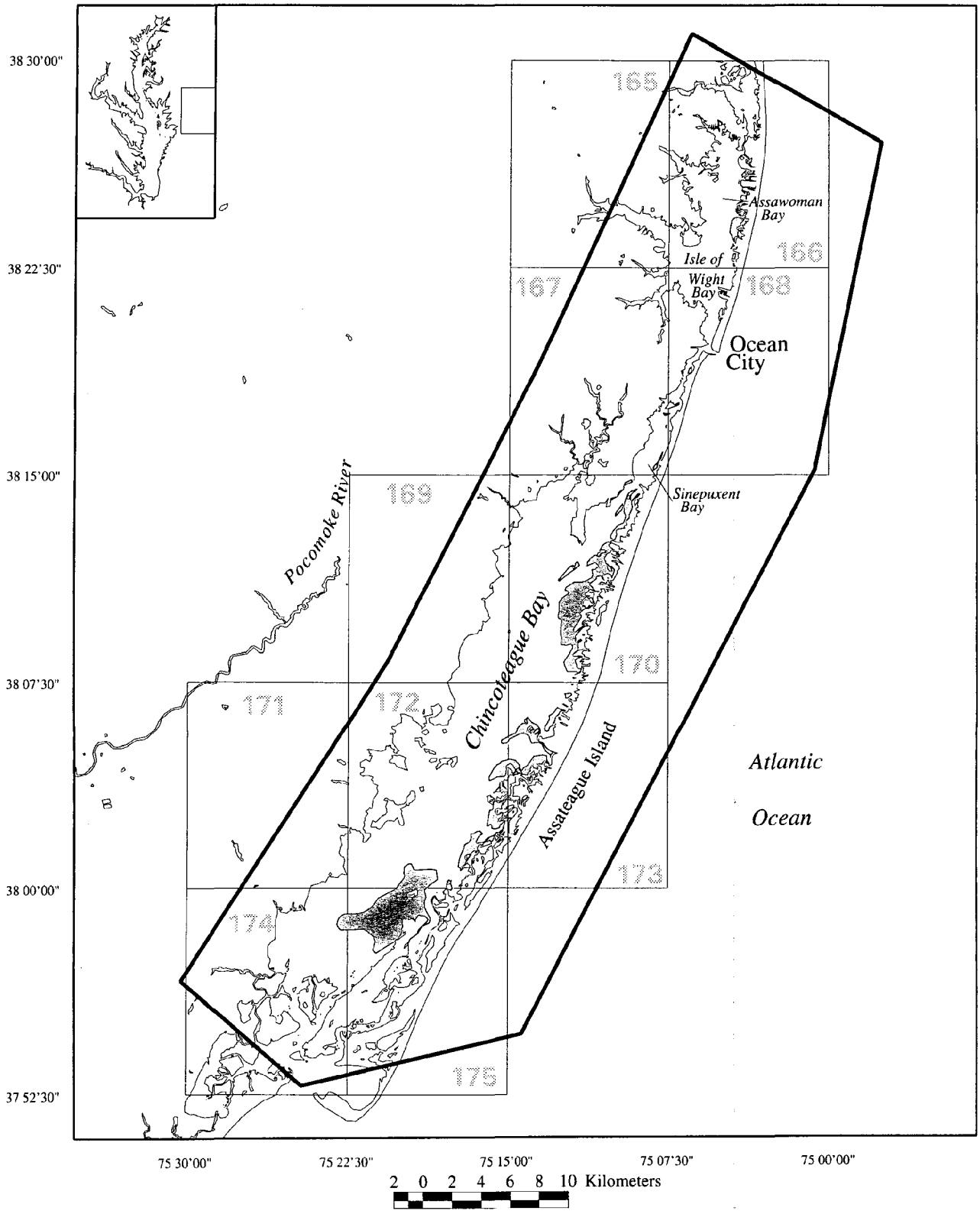

Figure 32: Distribution of SAV in the Chincoteague Bay in 1994.

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APPENDICES

APPENDIX A

APPENDIX A

Species of Submerged Aquatic Plants Found in Chesapeake Bay and Tributaries Exclusive of Marine Algae (Classification and Nomenclature Derived from: Godfrey and Wooten, 1979, 1981; Harvill *et al.*, 1977, 1981; Kartesz and Kartesz, 1980; Radford *et al.*, 1968; Wood and Imahori, 1965, 1964)

Family	Species	Common name
Characeae (muskgrass)	*Chara braunii* Gm.	Muskgrass
	Chara zeylanica Klein. ex Willd., em.	Muskgrass
	Nitella flexilis (L). Ag., em.	Stonewort
Potamogetonaceae (pondweed)	*Potamogeton perfoliatus* L. var. *bupleuroides* (Fernald) Farwell	Redhead grass
	Potamogeton epihydrus	Leafy pondweed
	Potamogeton pectinatus L.	Sago pondweed
	Potamogeton crispus L.	Curly pondweed
	Potamogeton pusillus L.	Slender pondweed
Ruppiaceae	*Ruppia maritima* L.	Widgeon grass
Zannichelliaceae	*Zannichellia palustris* L.	Horned pondweed
Najadaceae	*Najas guadalupensis* (Sprengel) Magnus	Southern naiad
	Najas gracillima (A. Braun) Magnus	Slender naiad
	Najas minor Allioni	no common name
	Najas flexilis (Willd.) Rostk. & Schmidt	Northern naiad
Hydrocharitaceae (frogbit)	*Vallisneria americana* Michaux	Wild celery, tapegrass
	Elodea canadensis (Michaux)	Common elodea
	Egeria densa Planchon	Water-weed
	Hydrilla verticillata (L.f.) Boyle	Hydrilla
Pontederiaceae (pickerelweed)	*Heteranthera dubia* (Jacquin) MacMillian	Water stargrass
Ceratophyllaceae (coontail)	*Ceratophyllum demersum* L.	Coontail
Trapaceae	*Trapa natans* L.	Water chestnut
Haloragaceae (watermilfoil)	*Myriophyllum spicatum* L.	Eurasian watermilfoil
Zosteraceae	*Zostera marina* (L.)	Eelgrass

APPENDIX B

USGS 7.5 Minute Quadrangles for Chesapeake Bay and Chincoteague Bay Showing Distribution, Abundance, and Ground Truthing of SAV in 1994. [Boundaries of Individual SAV Beds Are Delineated by Solid Lines and SAV Beds Are Shaded. Each Bed Is Identified with an Unique Two Letter (AA-ZA, AB-ZB, etc.) and One Number (1-4) Designation. These Numbers Represent the Density Classification Discussed in the Text and Figure 8, i.e., 1 = <10%; 2 = 10-40%; 3 = 40-70%; 4 = 70-100%. Ground Truthing is Represented by Symbols and Species Codes which Are Explained in the Legend. Dashed Lines Represent Chesapeake Bay Program Segment Boundaries. Chesapeake Bay Program Segments Are Identified by Chesapeake Bay Program Segment Code Designations.]

Key for 1994 SAV Maps

SPECIES

Zm *Zostera marina* (eelgrass)

Rm *Ruppia maritima* (widgeon grass)

C *Chara* sp. (muskgrass)

Cd *Ceratophyllum demersum* (coontail)

Ec *Elodea canadensis* (common elodea)

Ed *Egeria densa* (water-weed)

Hd *Heteranthera dubia* (water stargrass)

Hv *Hydrilla verticillata* (hydrilla)

Ms *Myriophyllum spicatum* (Eurasian watermilfoil)

N *Najas* spp. (naiad)

Nfl *Najas flexilis* (northern naiad)

Ngr *Najas gracillima* (slender naiad)

Ngu *Najas guadalupensis* (southern naiad)

Nm *Najas minor*

Pcr *Potamogeton crispus* (curly pondweed)

Pe *Potamogeton epihydrus* (leafy pondweed)

Ppc *Potamogeton pectinatus* (sago pondweed)

Ppf *Potamogeton perfoliatus* (redhead-grass)

Ppu *Potamogeton pusillus* (slender pondweed)

Tn *Trapa natans* (water chestnut)

Va *Vallisneria americana* (wild celery)

Zp *Zannichellia palustris* (horned pondweed)

U Unknown species composition

SURVEY STATIONS

◍ Citizens Field Observation

◗ U.S. EPA

⊠ Essex Community College

✳ Harford Community College

▥ MD. Dept. of Natural Resources

○ Patuxent River Park

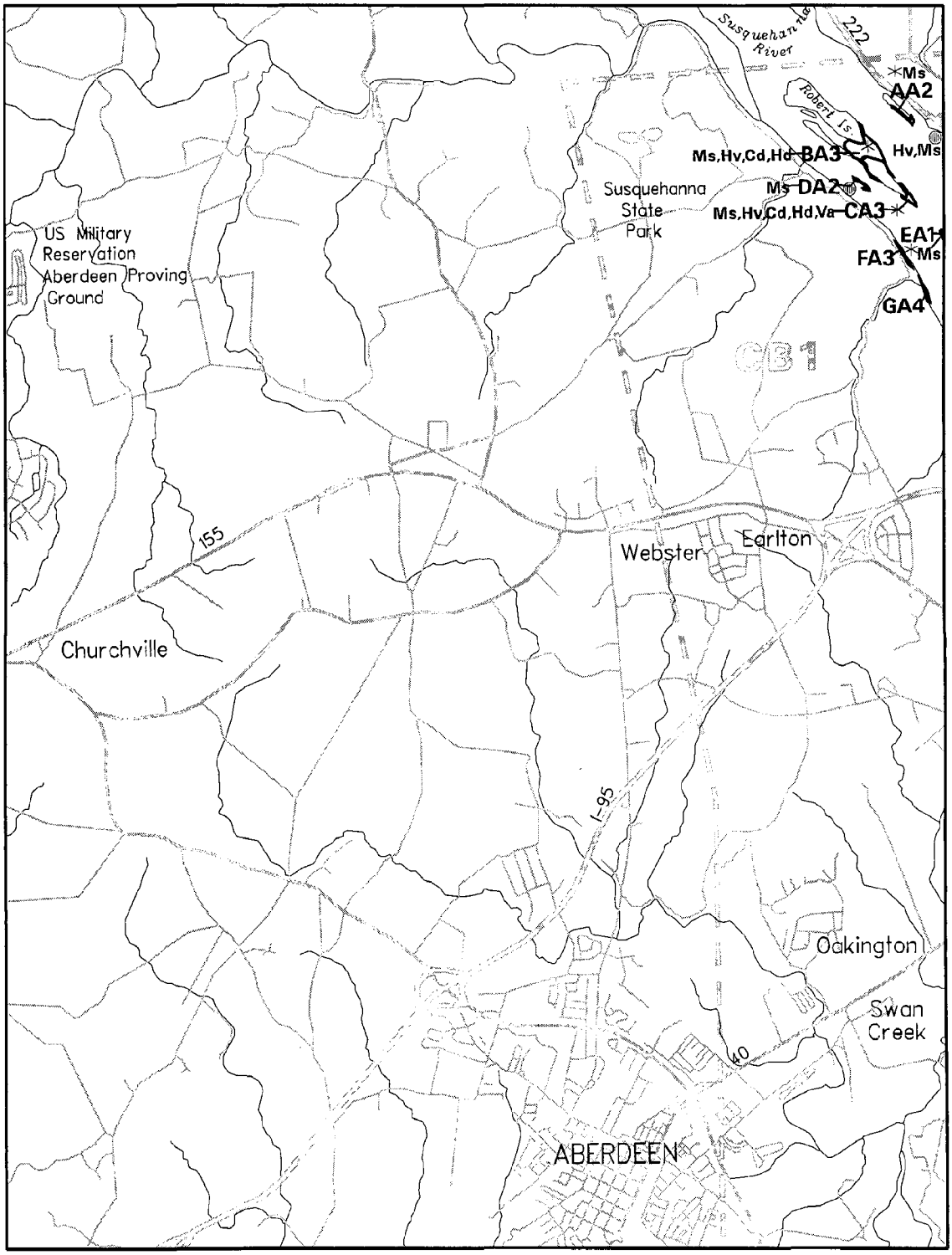
◈ U.S. Geological Survey

⩓ VIMS Field Survey

1994 SAV Beds

Submerged Aquatic Vegetation 1994

Aberdeen, Md. (002)



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Sources: Virginia Institute of Marine Science
U.S. Geological Survey
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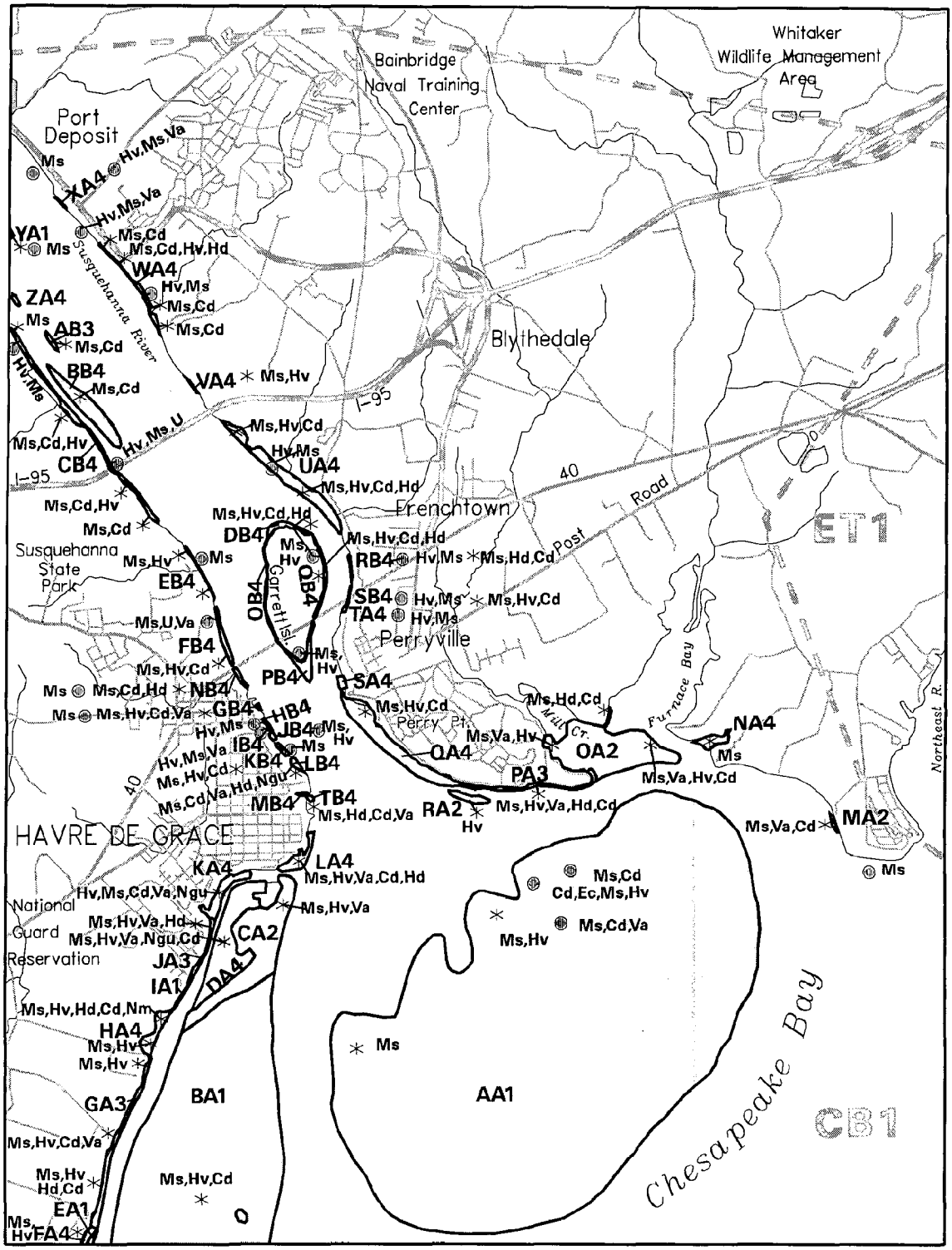
Submerged Aquatic Vegetation 1994

(003) Havre de Grace, Md.



Sources: Virginia Institute of Marine Science
U.S. Geological Survey
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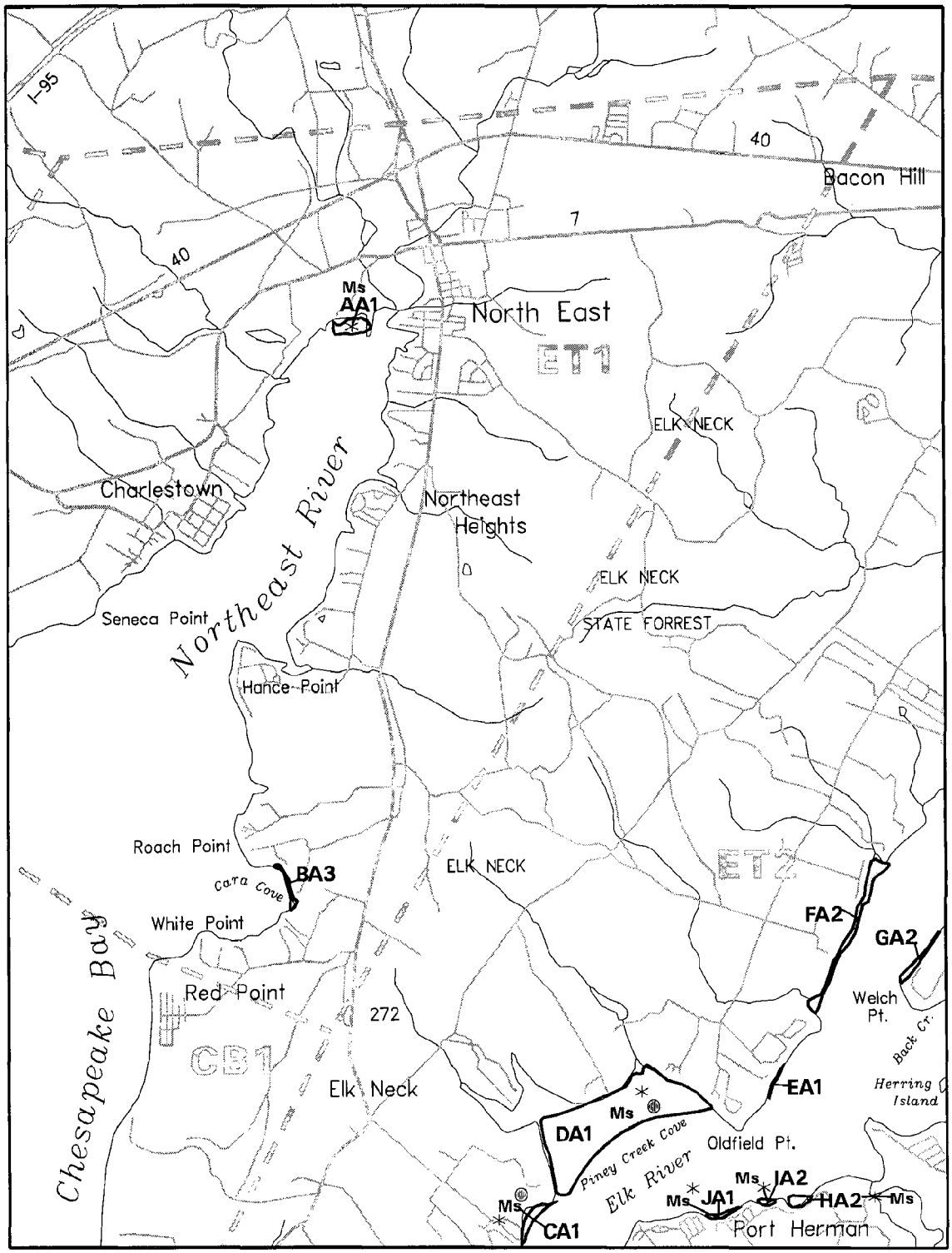
Submerged Aquatic Vegetation 1994

North East, Md. (004)



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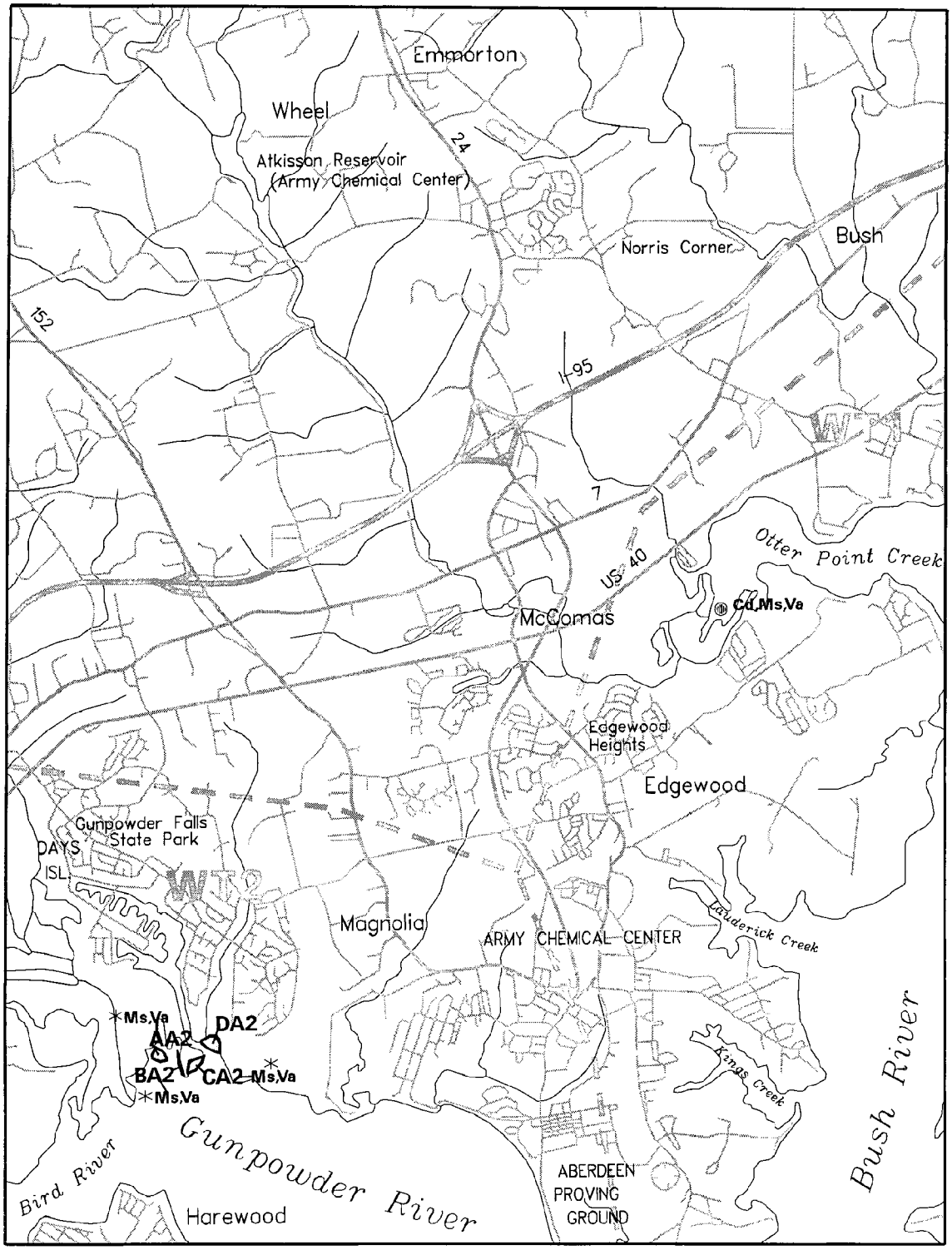
Submerged Aquatic Vegetation 1994

(007) Edgewood, Md.



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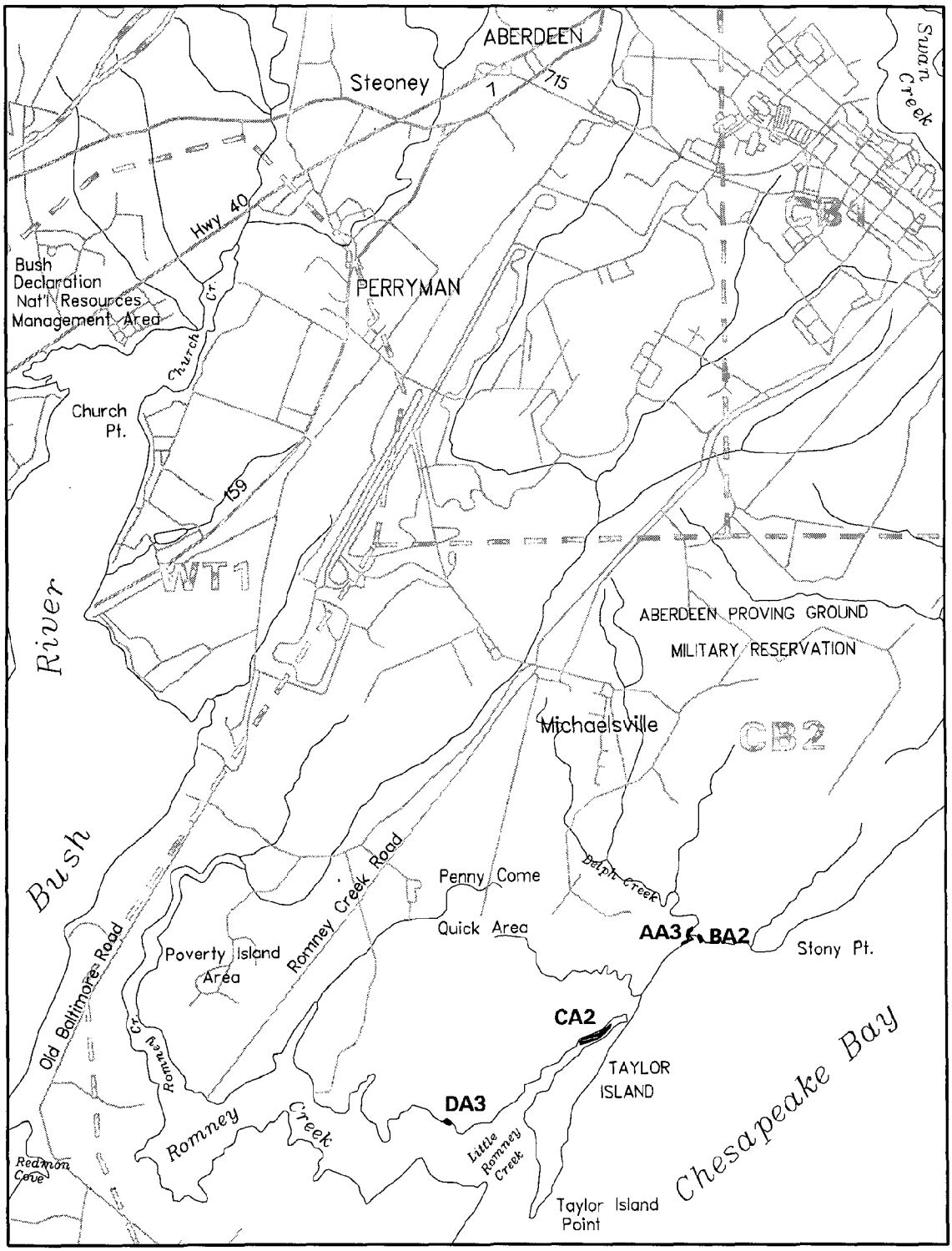
Perryman, Md. (008)



Sources: Virginia Institute of Marine Science
U.S. Geological Survey
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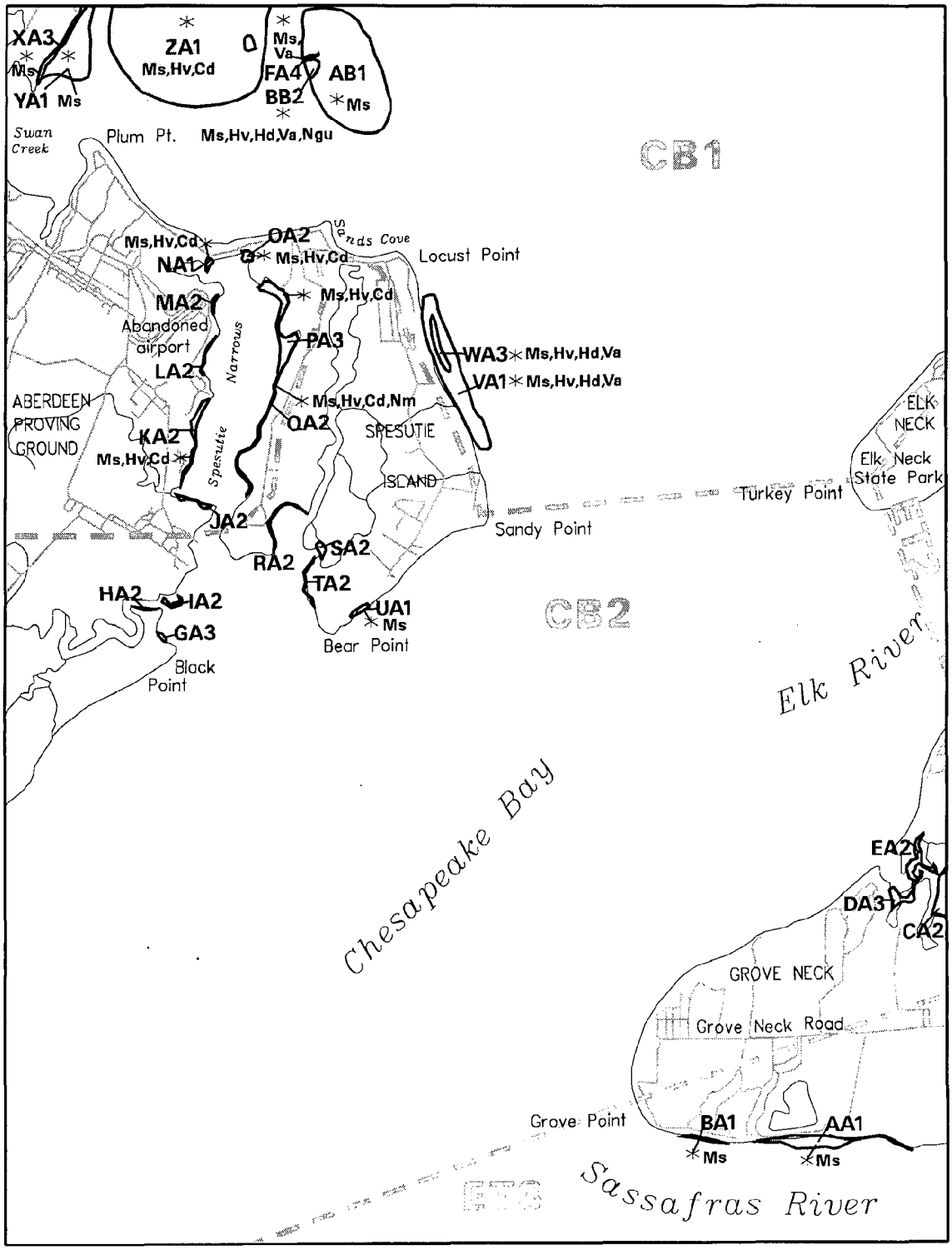
(009) Spesutie, Md.



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Sources: Virginia Institute of Marine Science
U.S. Geological Survey

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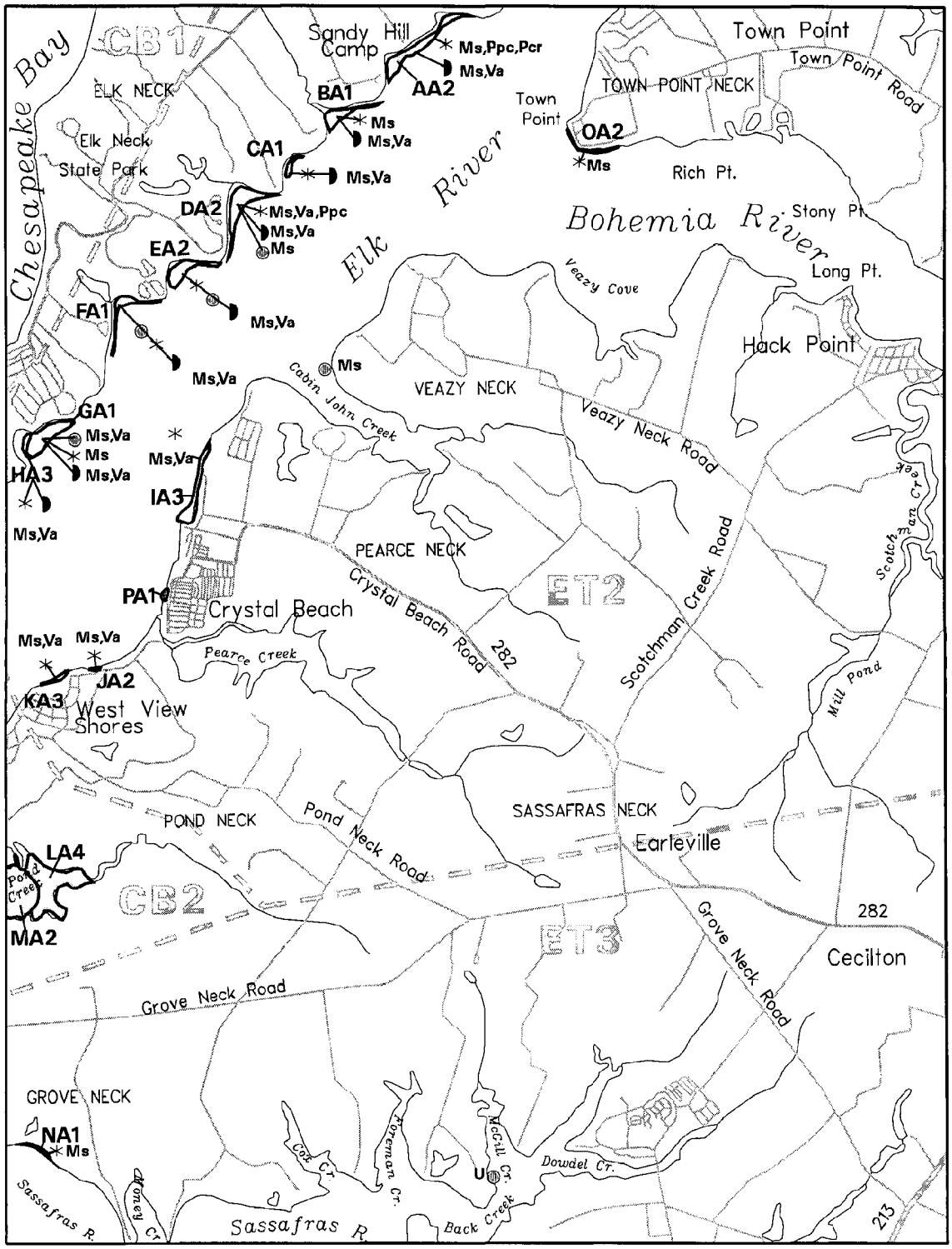
Earleville, Md. (010)



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Sources: Virginia Institute of Marine Science
U.S. Geological Survey

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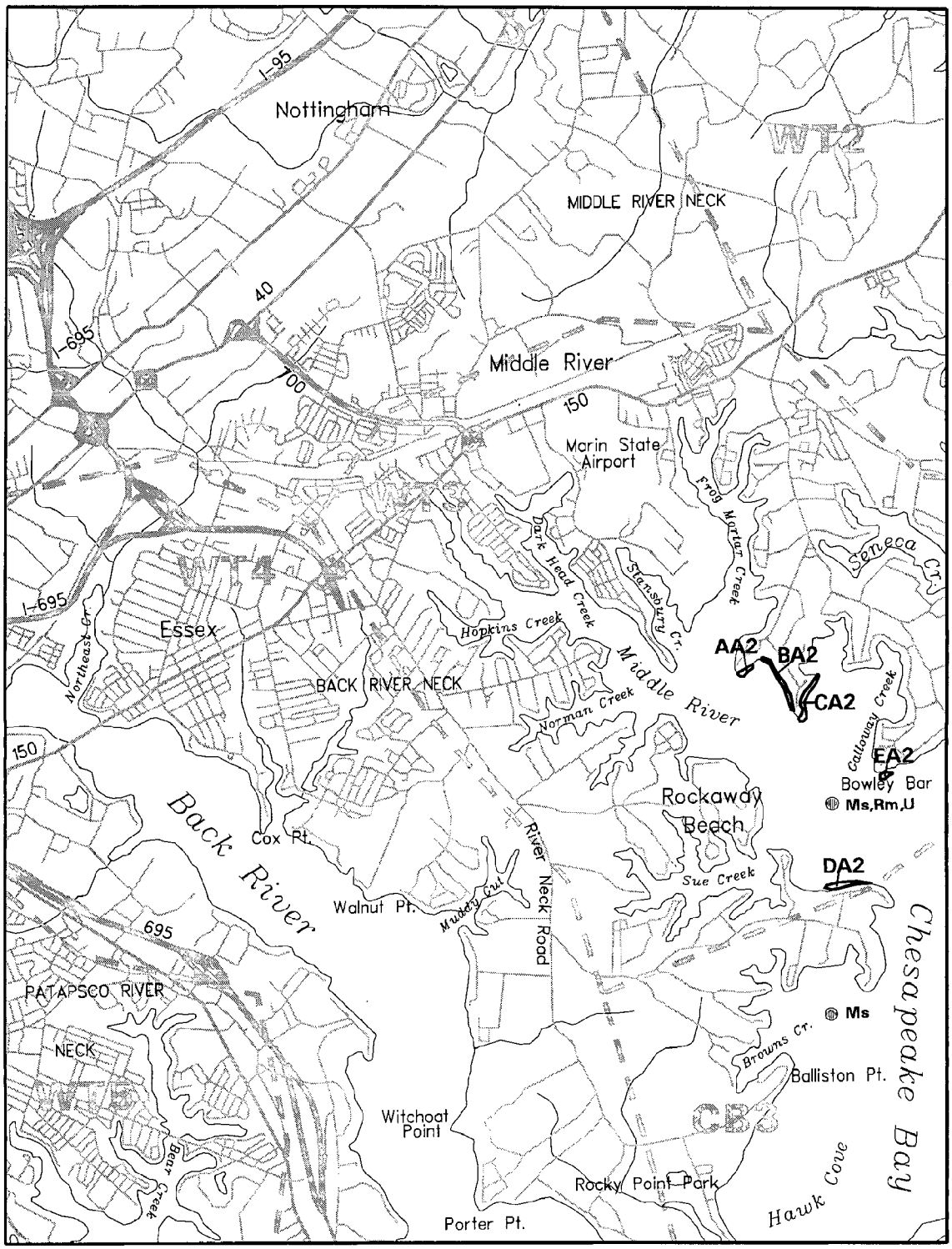
Submerged Aquatic Vegetation 1994

(013) Middle River, Md.



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Sources: Virginia Institute of Marine Science
U.S. Geological Survey
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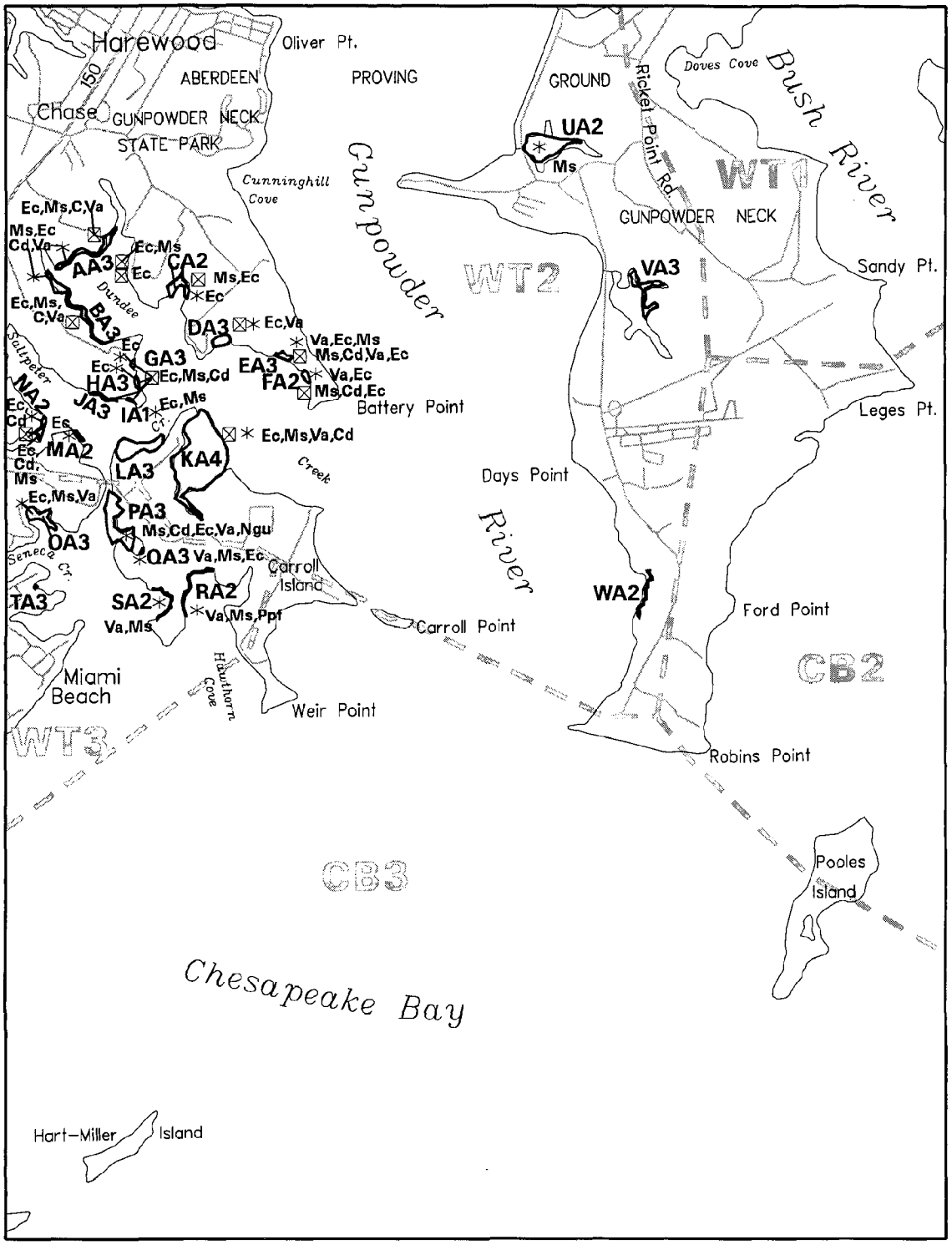
Gunpowder Neck, Md. (014)



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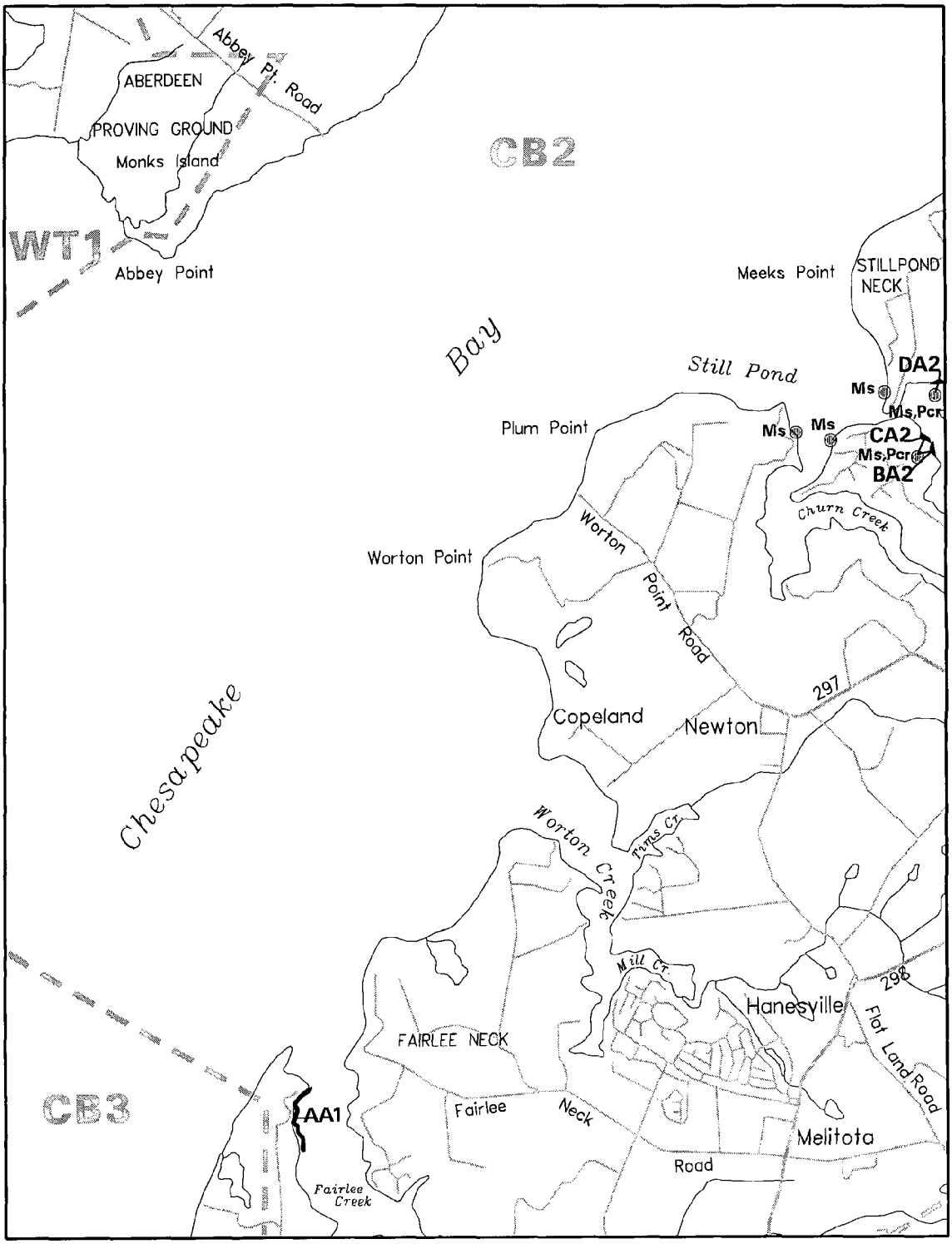
(015) Hanesville, Md.



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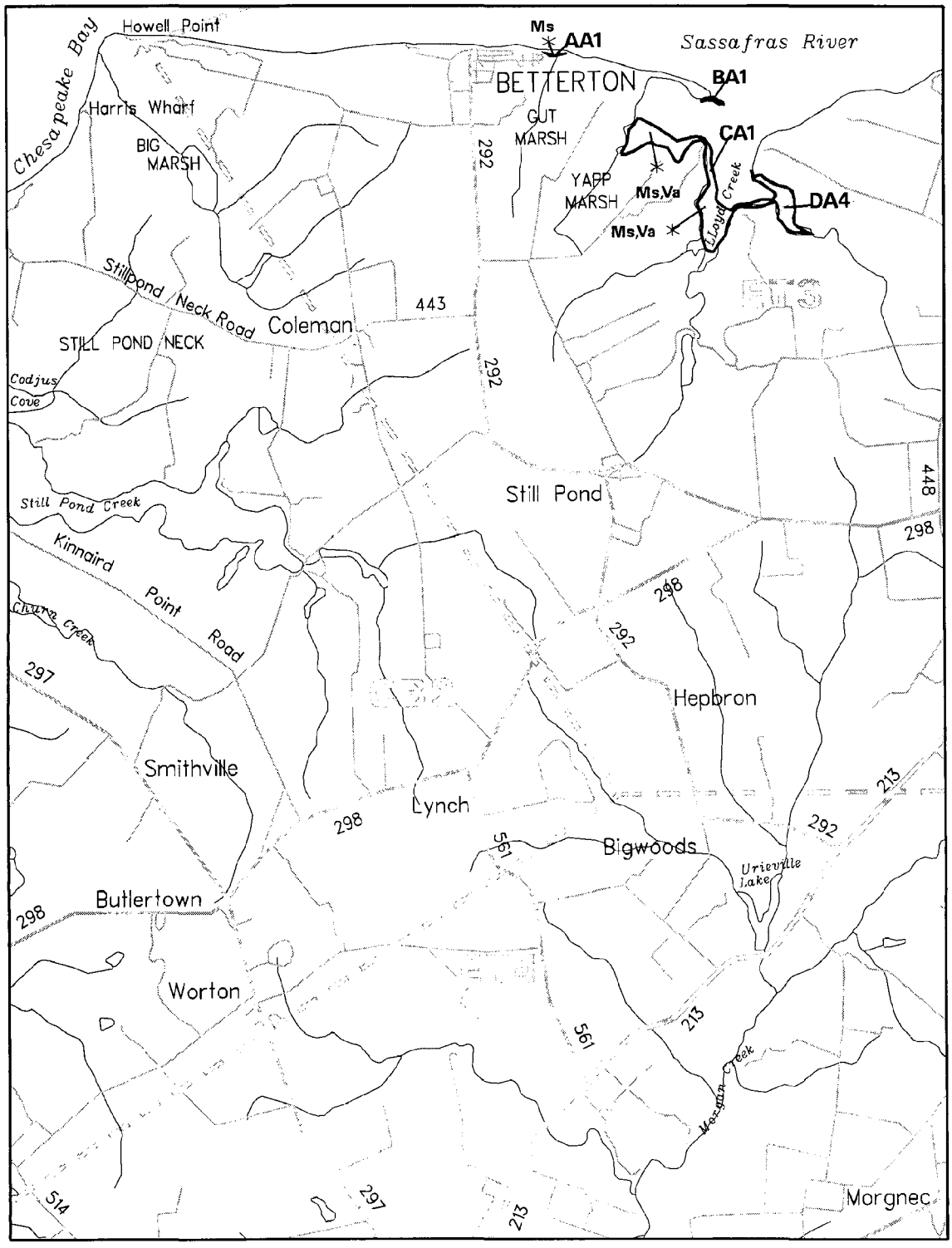
Betterton, Md. (016)



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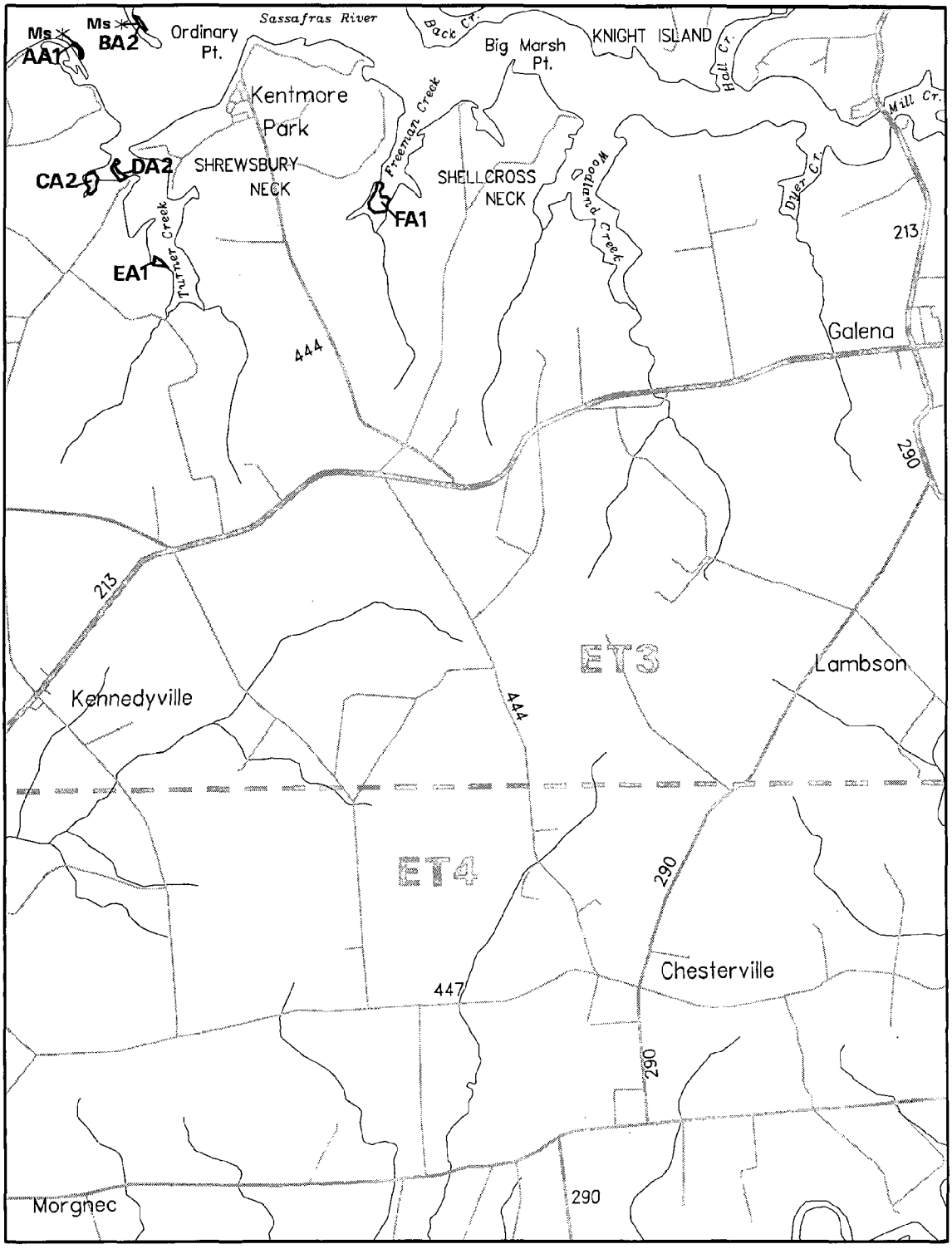
(017) Galena, Md.



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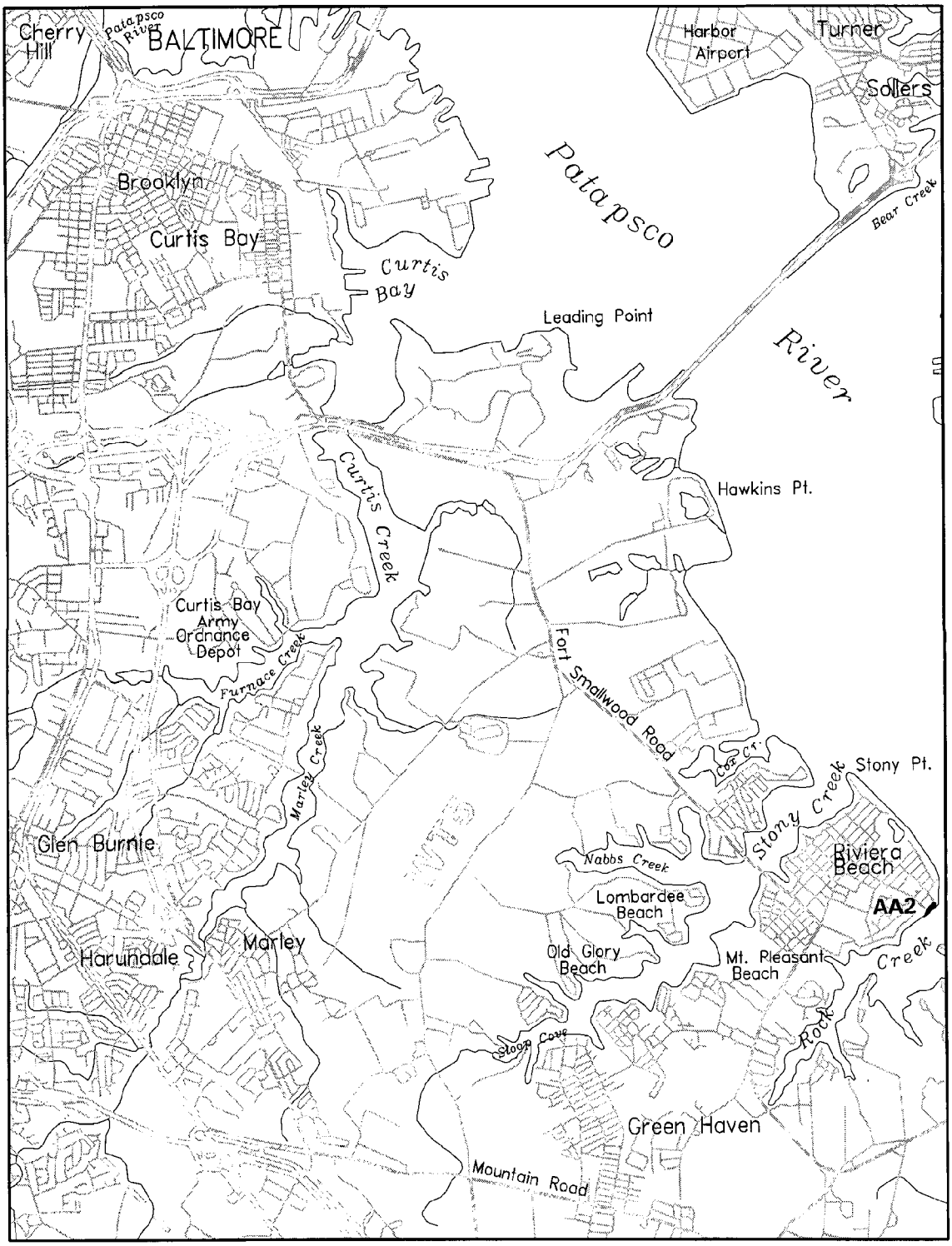
Curtis Bay, Md. (018)



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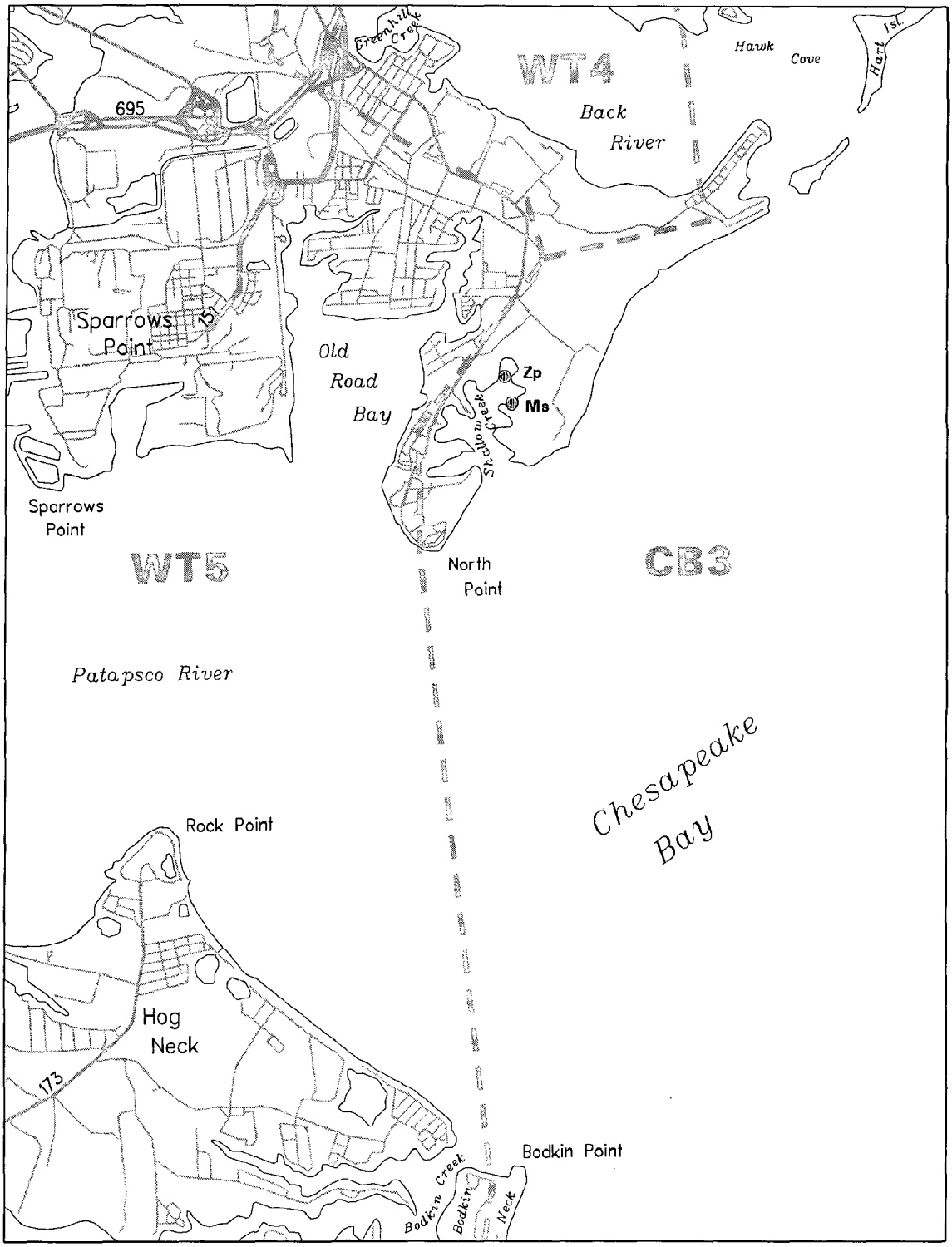
(019) Sparrows Point, Md.



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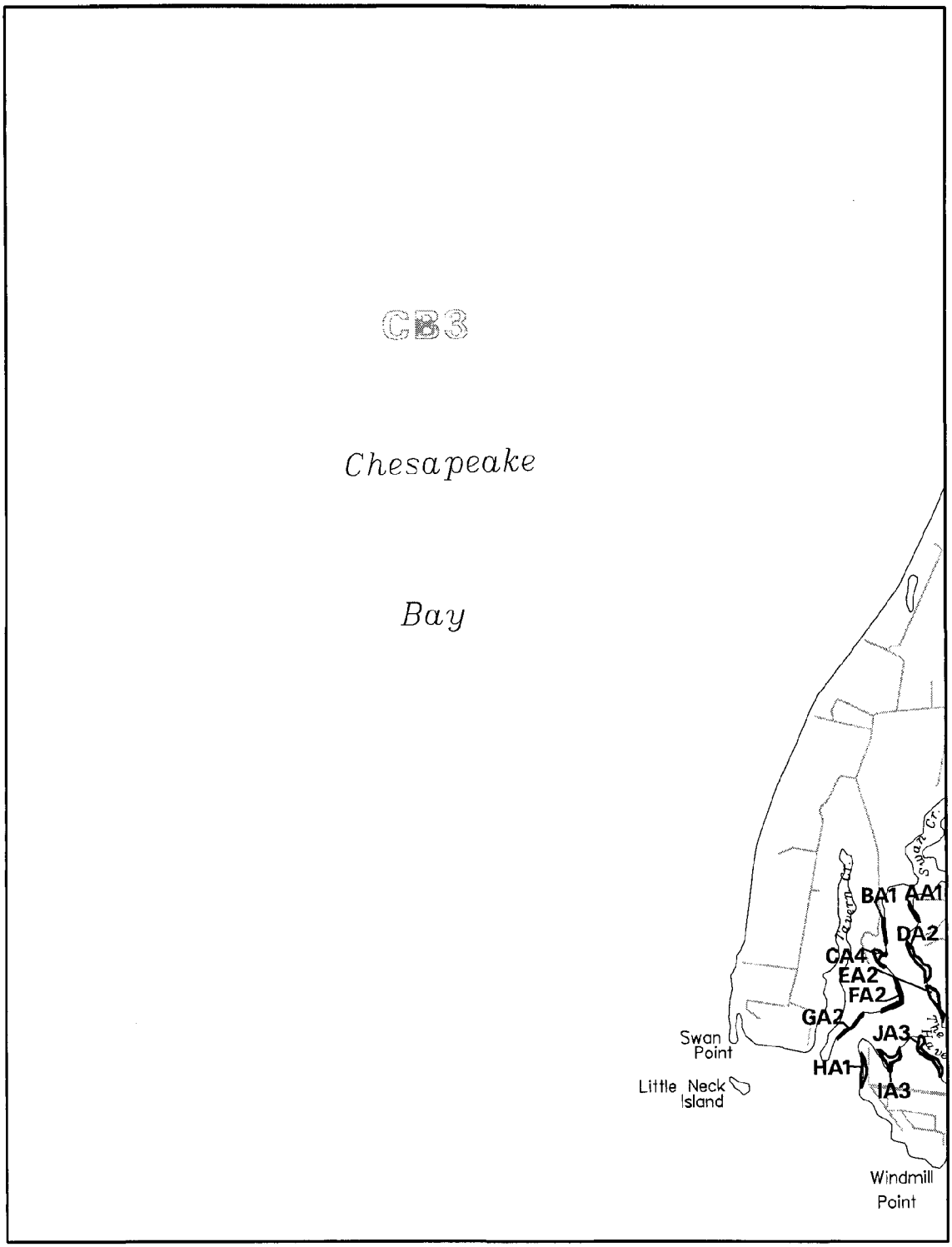
Swan Point, Md. (020)



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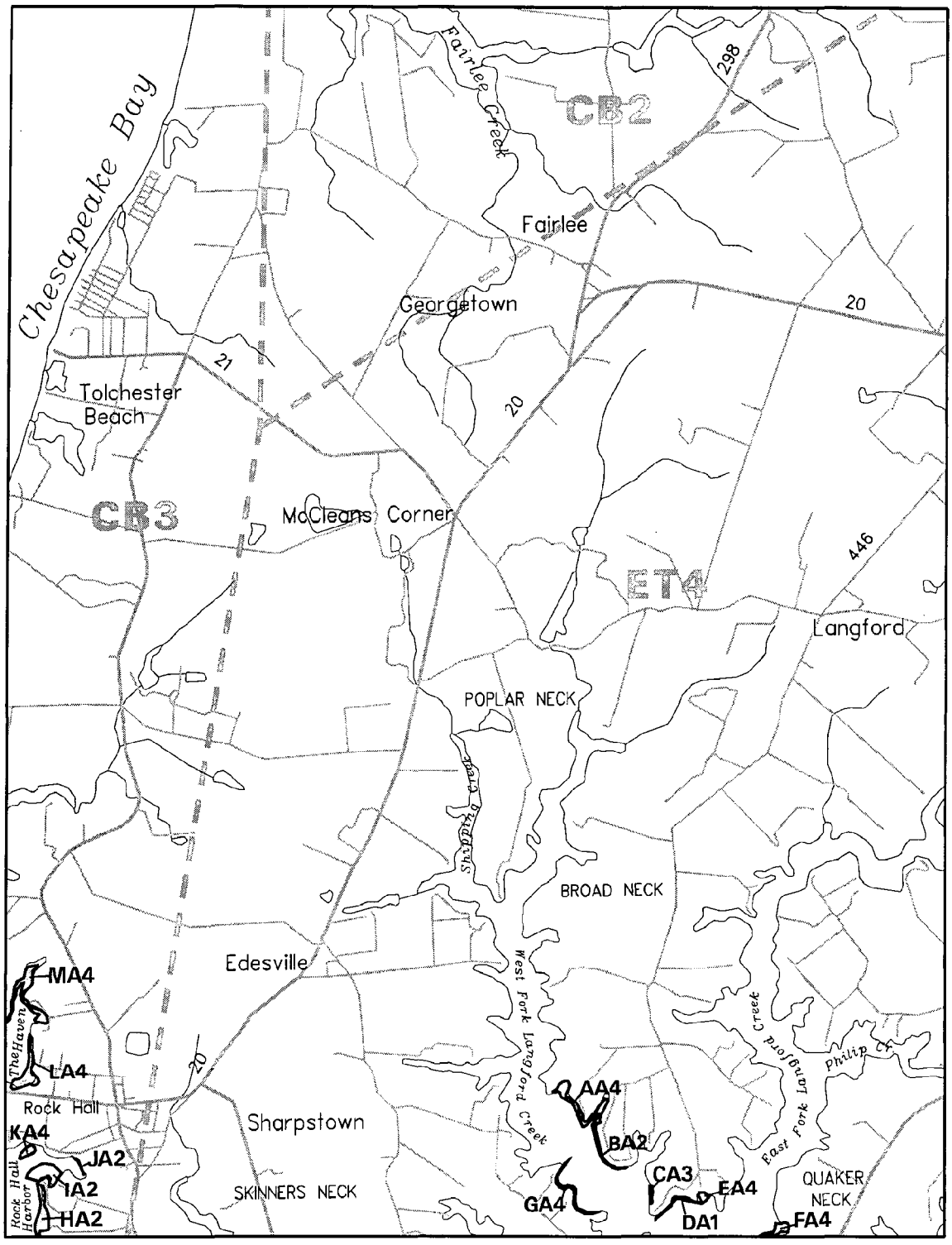
(021) Rock Hall, Md.



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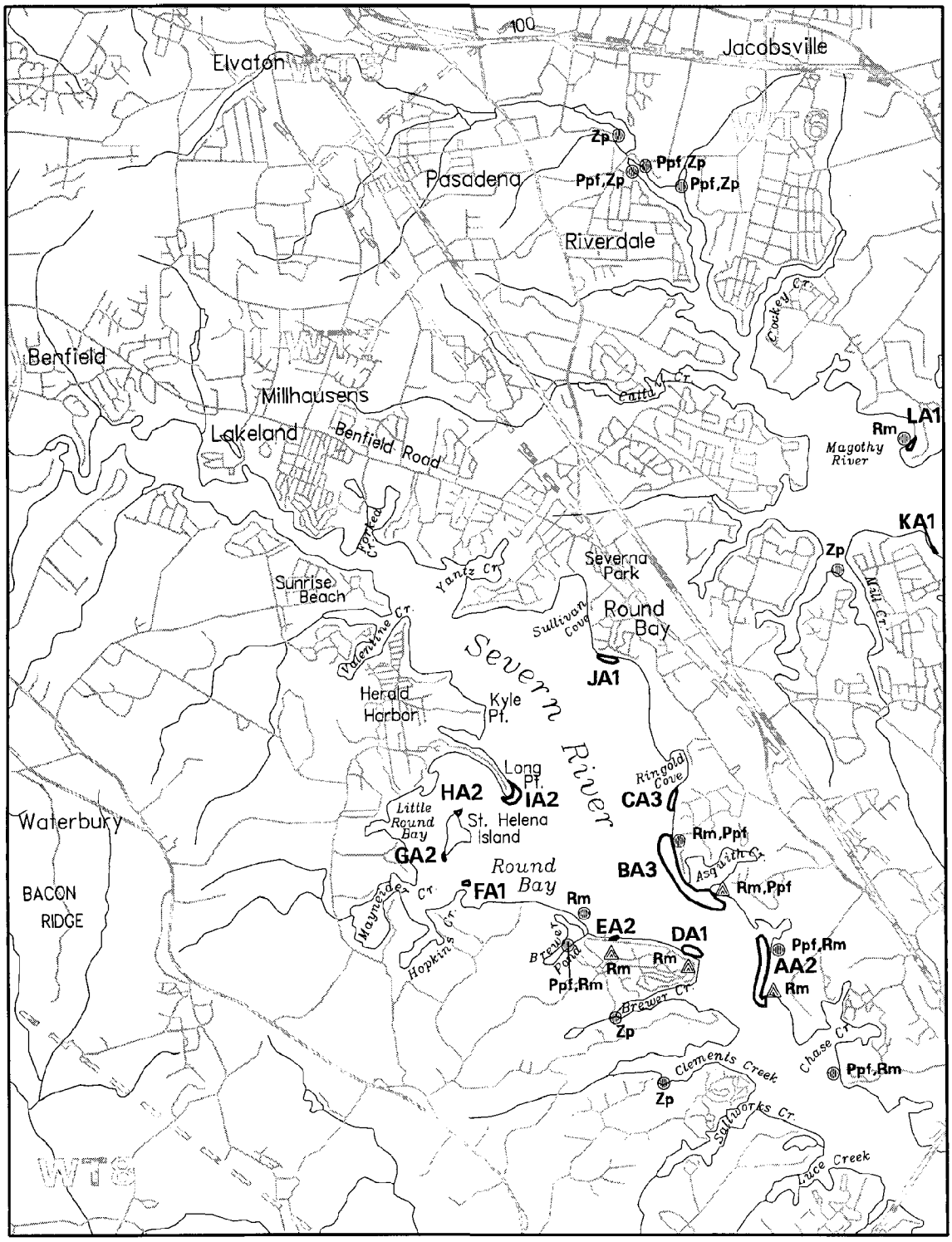
Round Bay, Md. (023)



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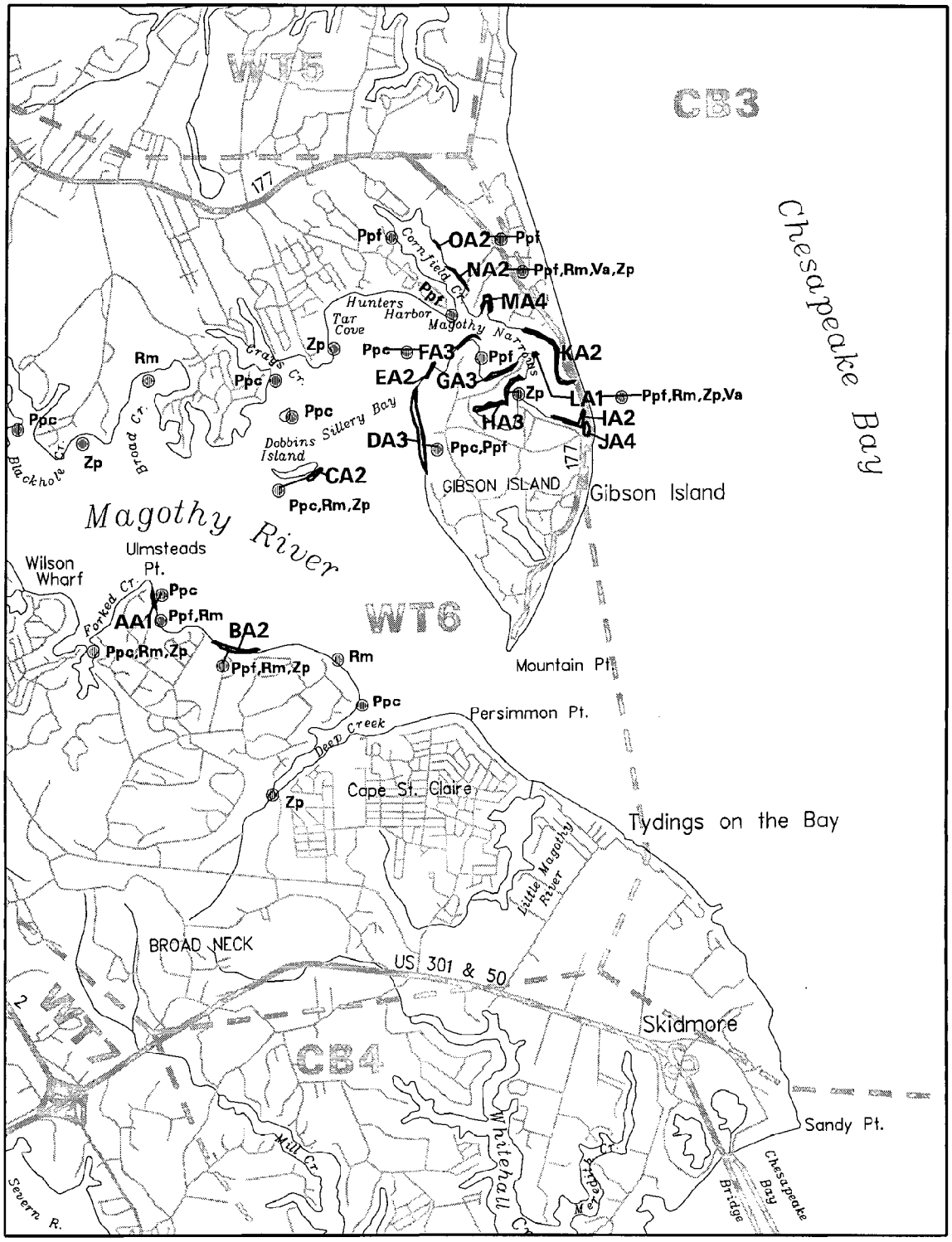
(024) Gibson Island, Md.



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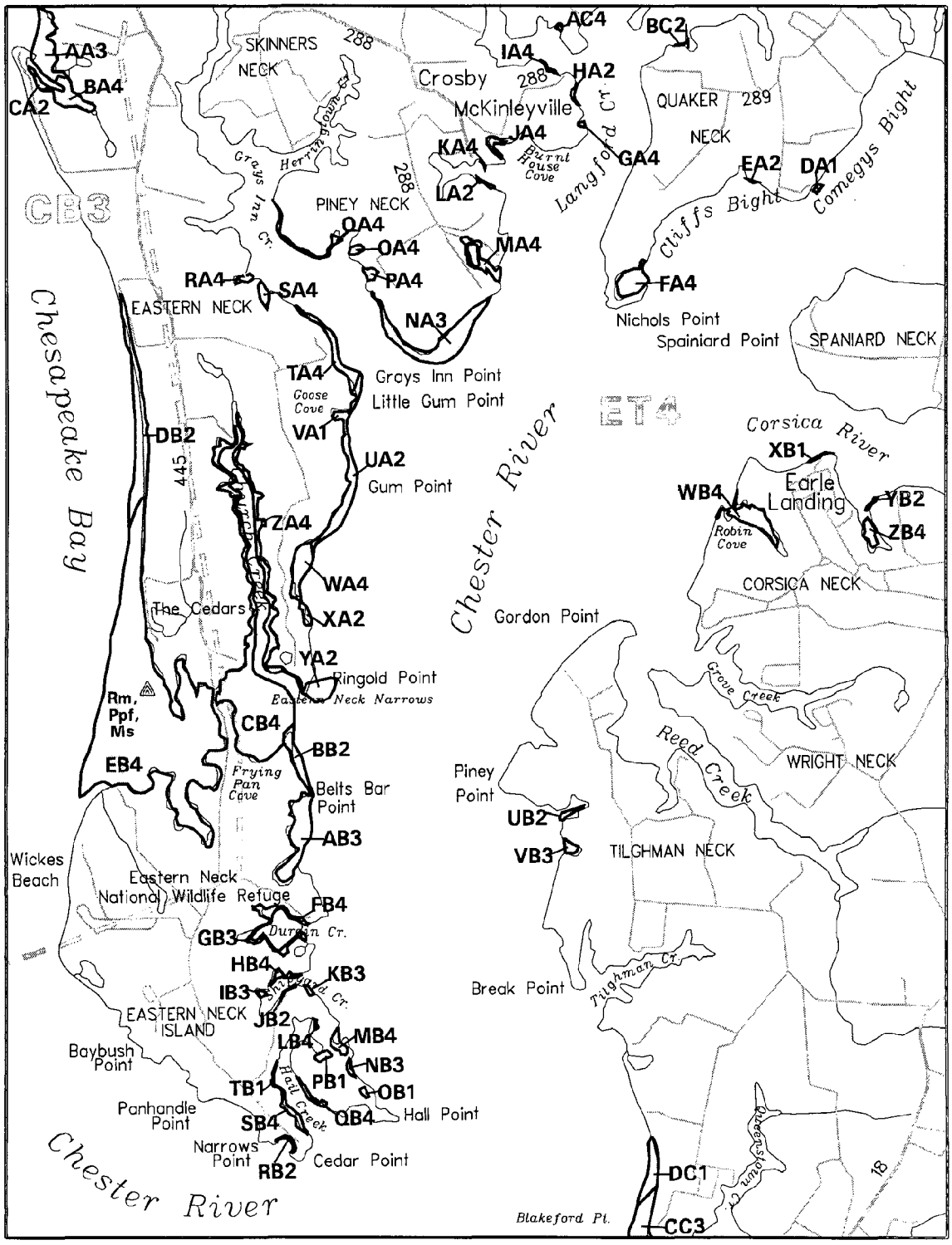
Langford Creek, Md. (026)



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Sources: Virginia Institute of Marine Science
U.S. Geological Survey

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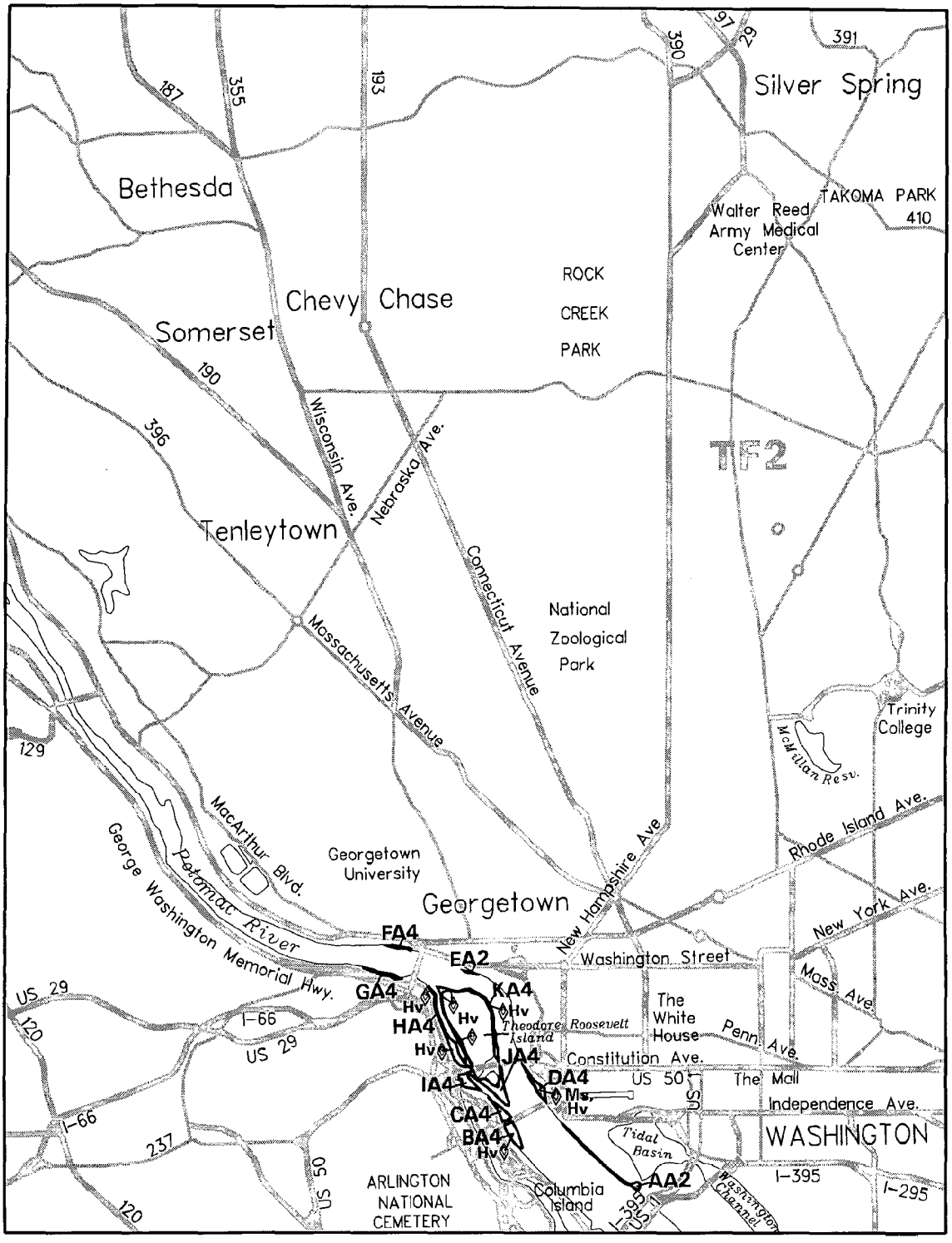
Submerged Aquatic Vegetation 1994

(028) Washington West, Md.– D.C.– Va



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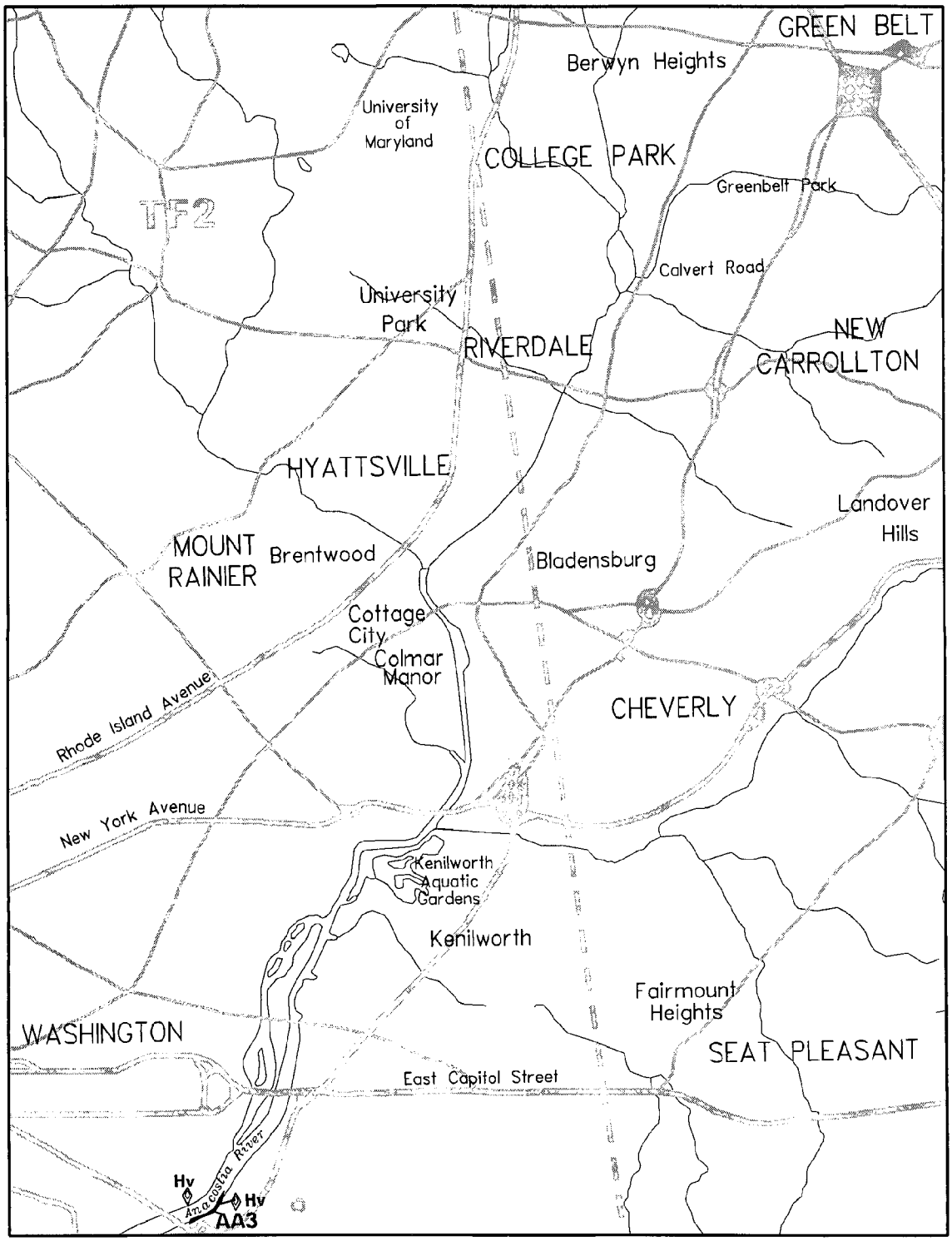
Washington East, D.C.– Md. (029)



Sources: Virginia Institute of Marine Science
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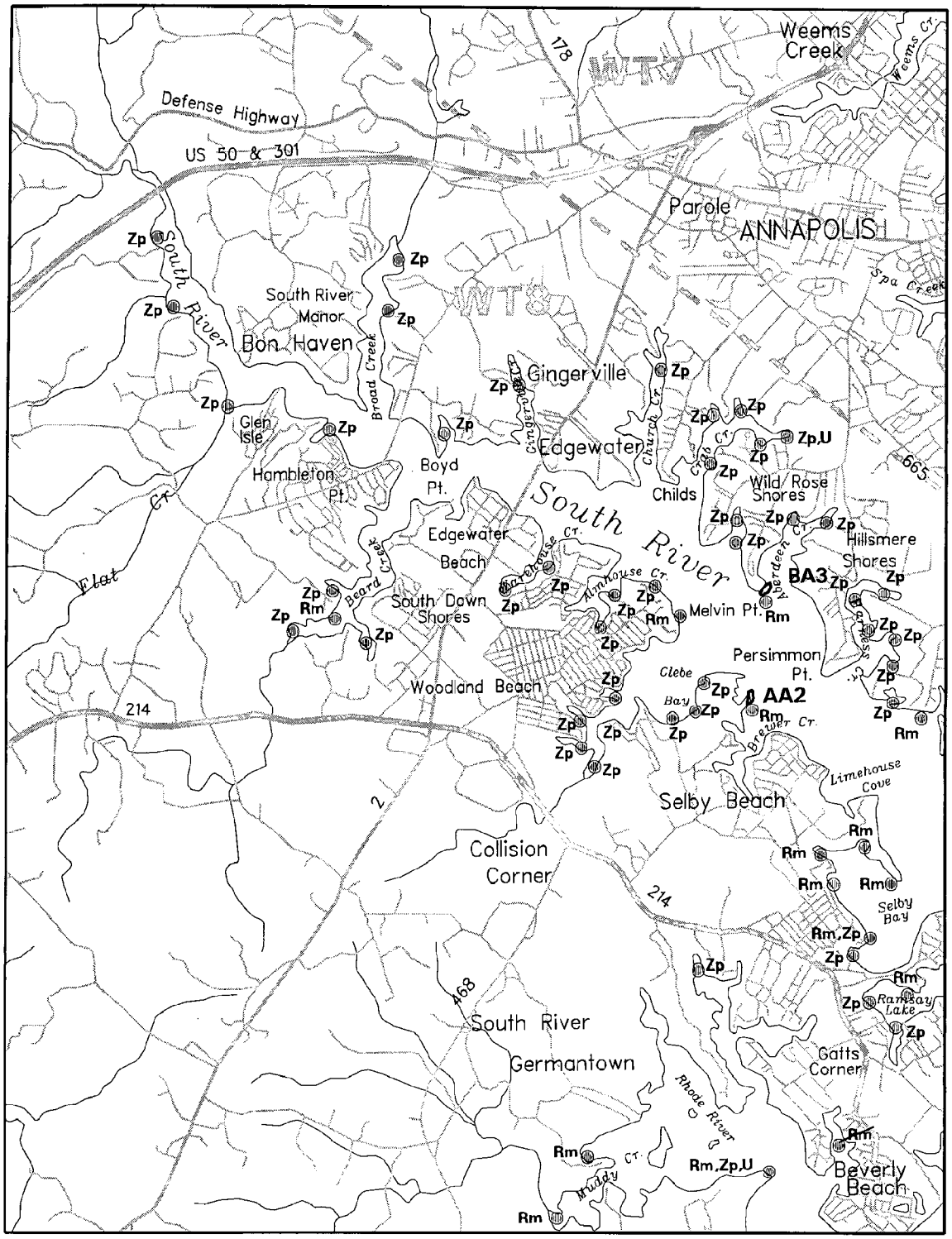
Submerged Aquatic Vegetation 1994

(030) South River, Md.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
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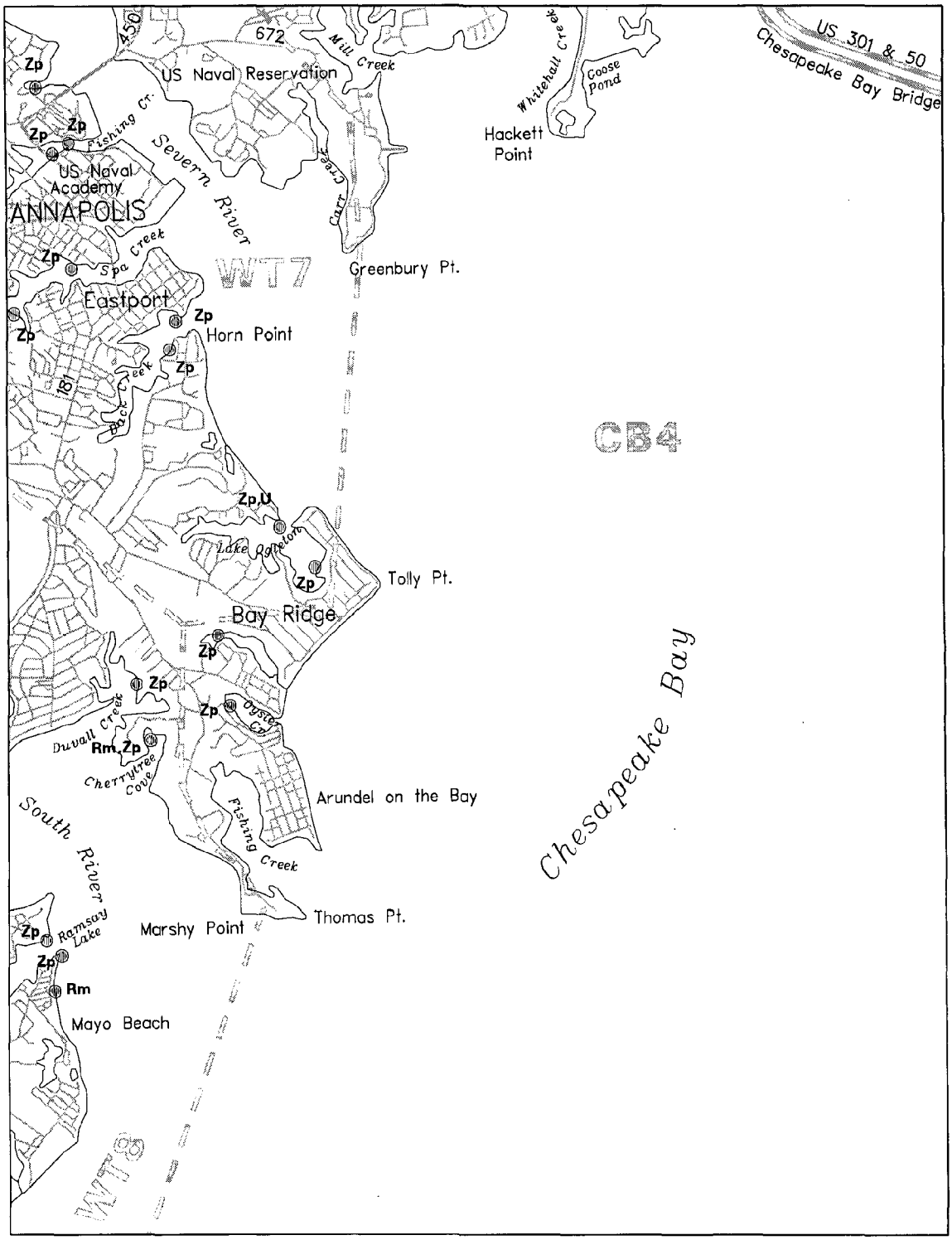
Annapolis, Md. (031)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 09/08/94

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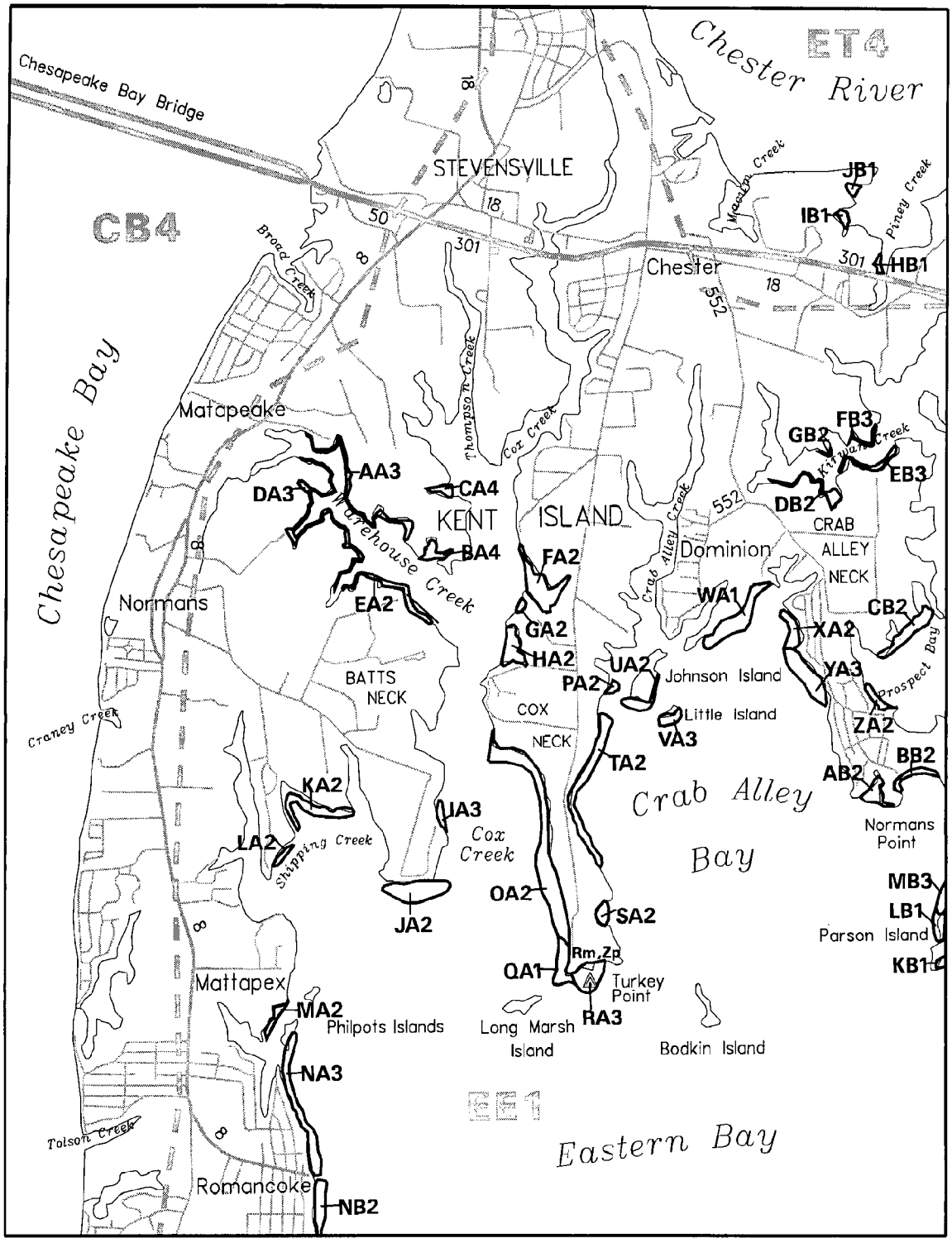
Submerged Aquatic Vegetation 1994

(032) Kent Island, Md.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 07/20/94

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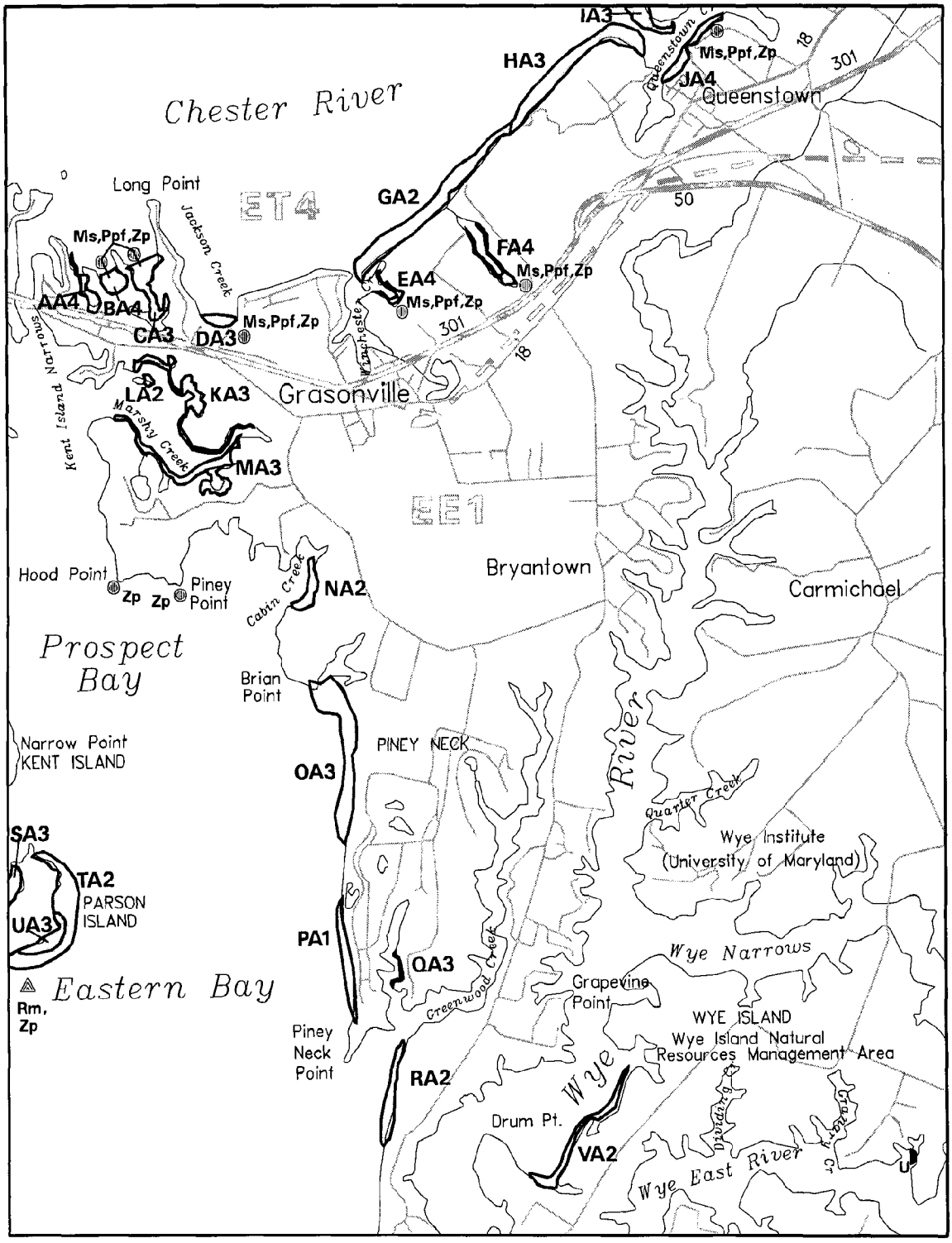
Submerged Aquatic Vegetation 1994

Queenstown, Md. (033)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 07/20/94, 09/08/94

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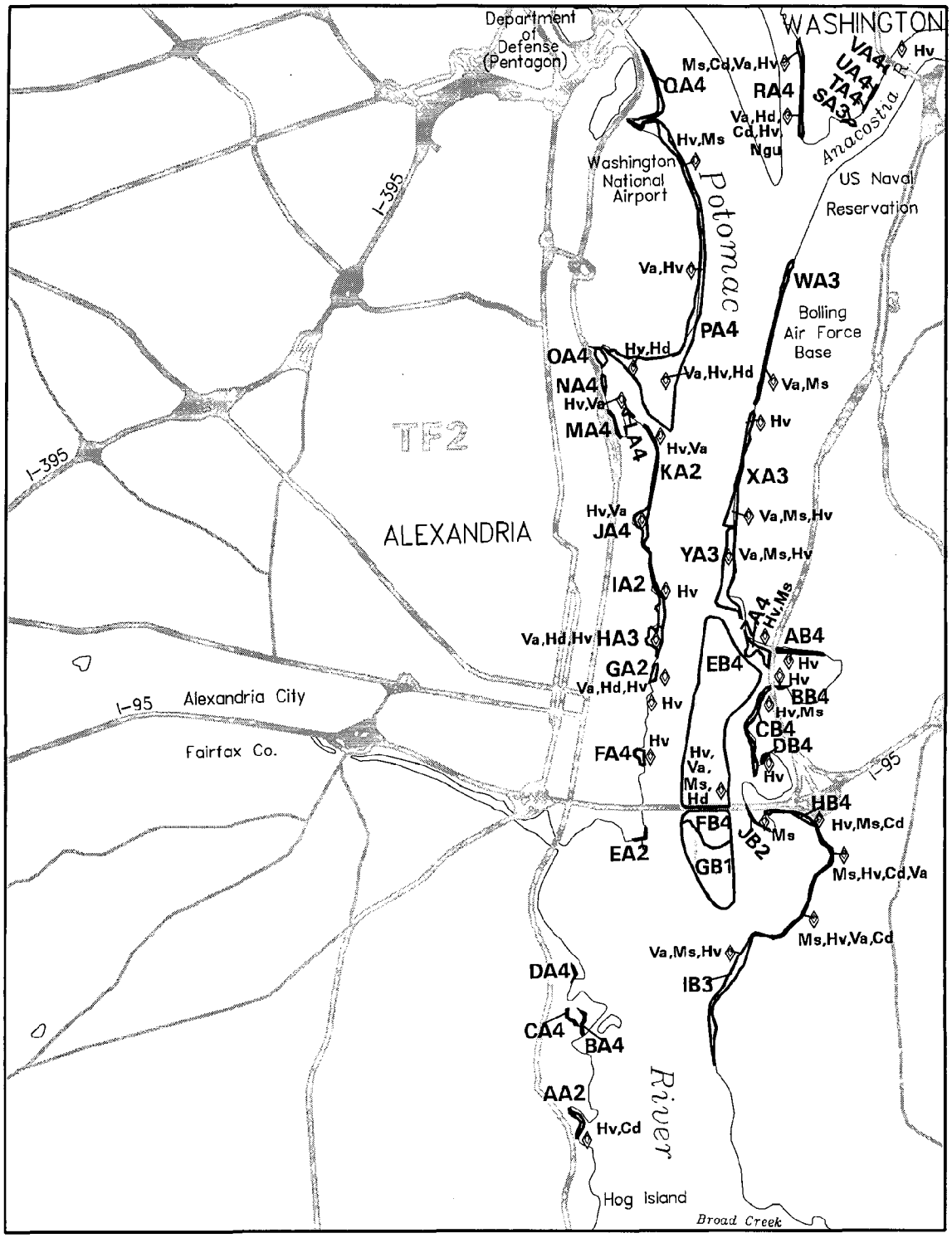
Submerged Aquatic Vegetation 1994

(034) Alexandria, Va.– D.C.– Md.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 08/30/94

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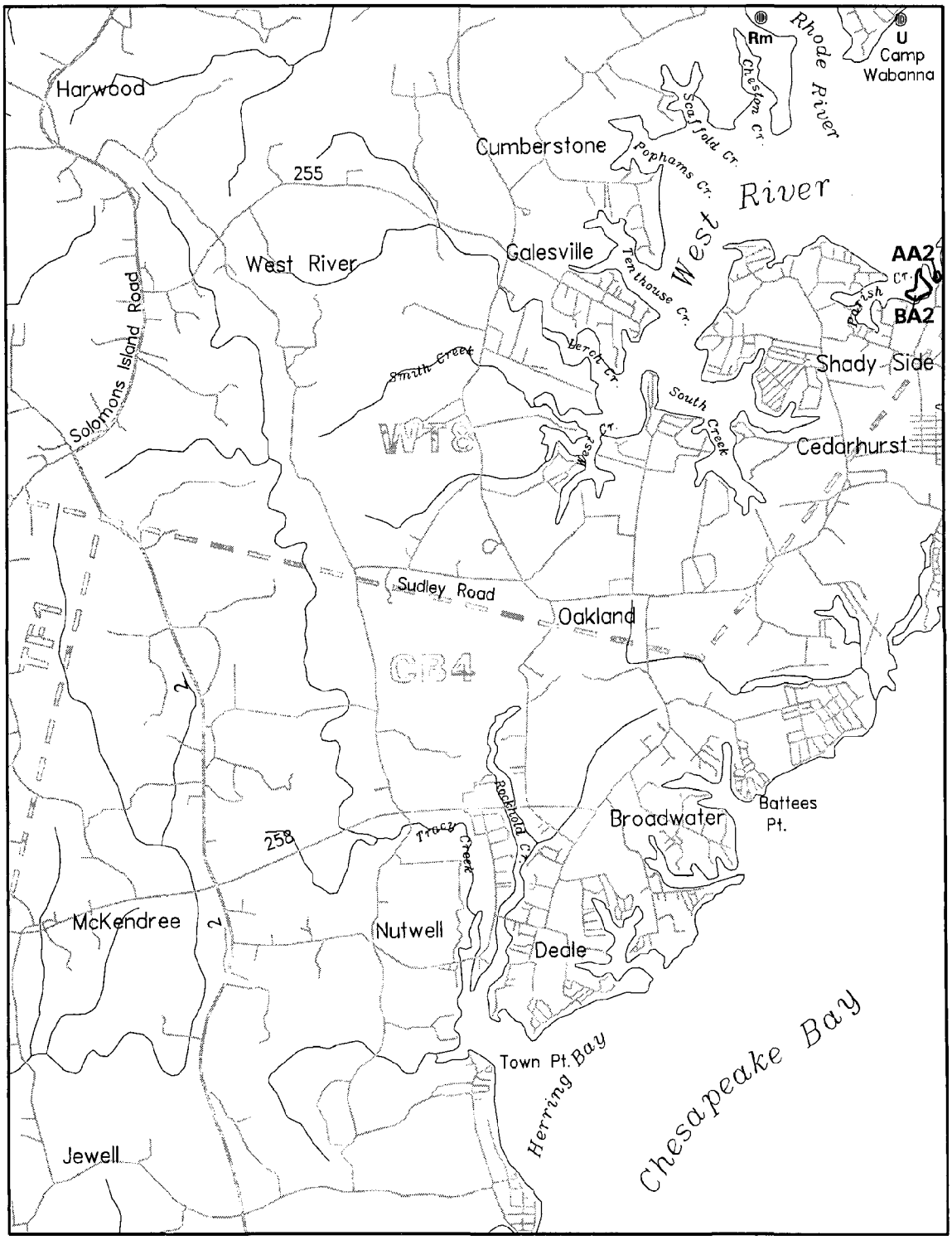
Deale, Md. (035)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 09/12/94

Produced by:
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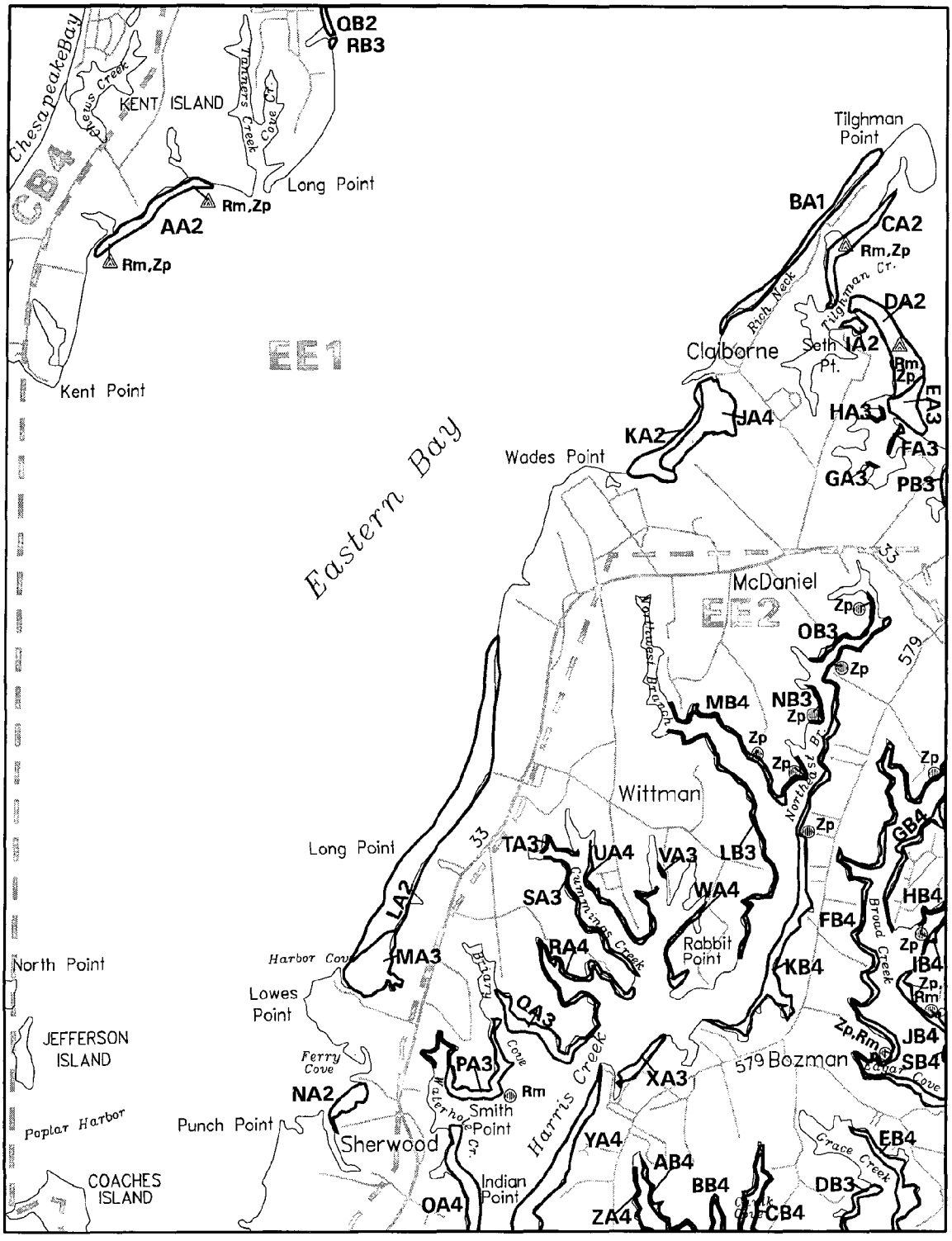
Submerged Aquatic Vegetation 1994

(036) Claiborne, Md.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
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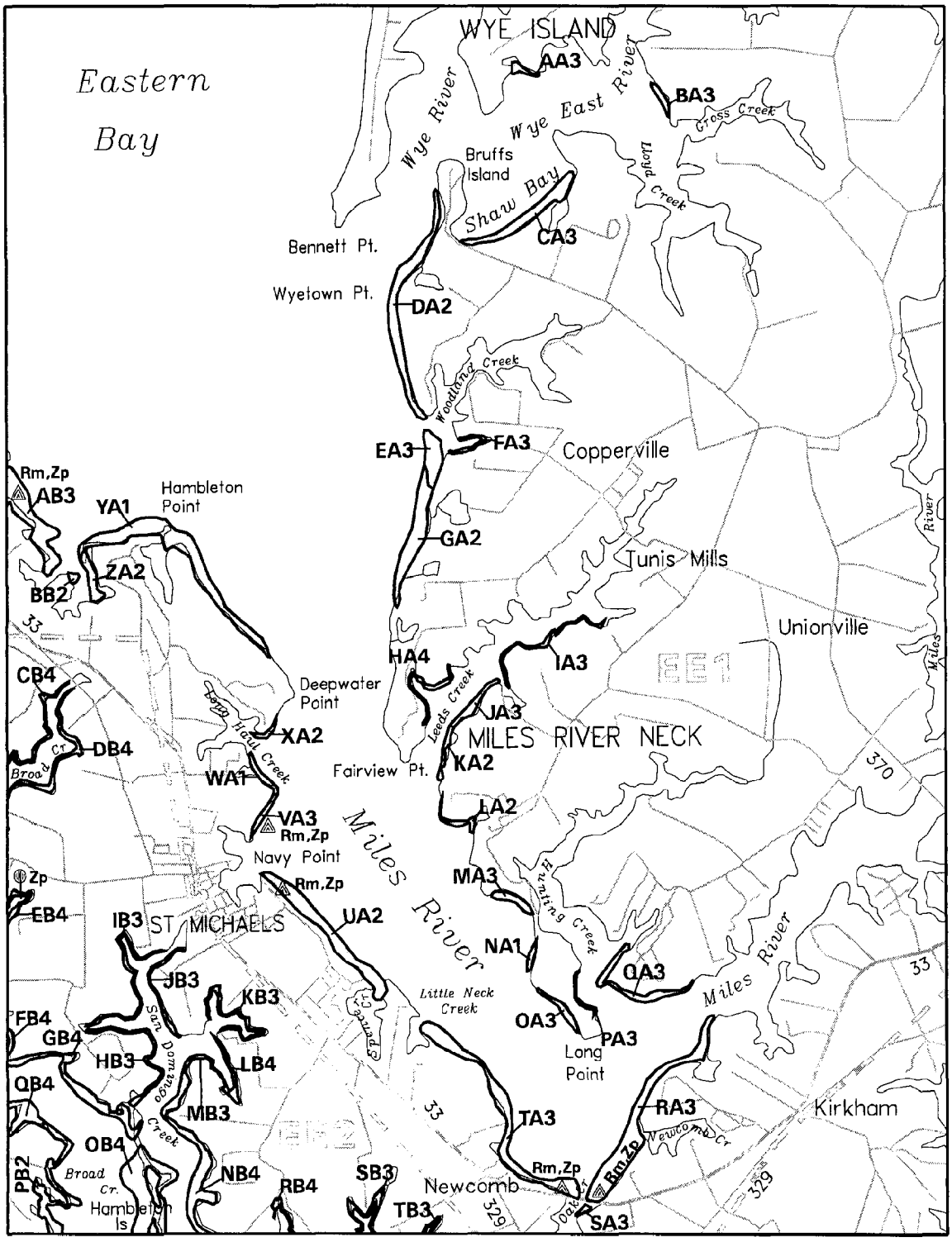
St. Michaels, Md. (037)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey

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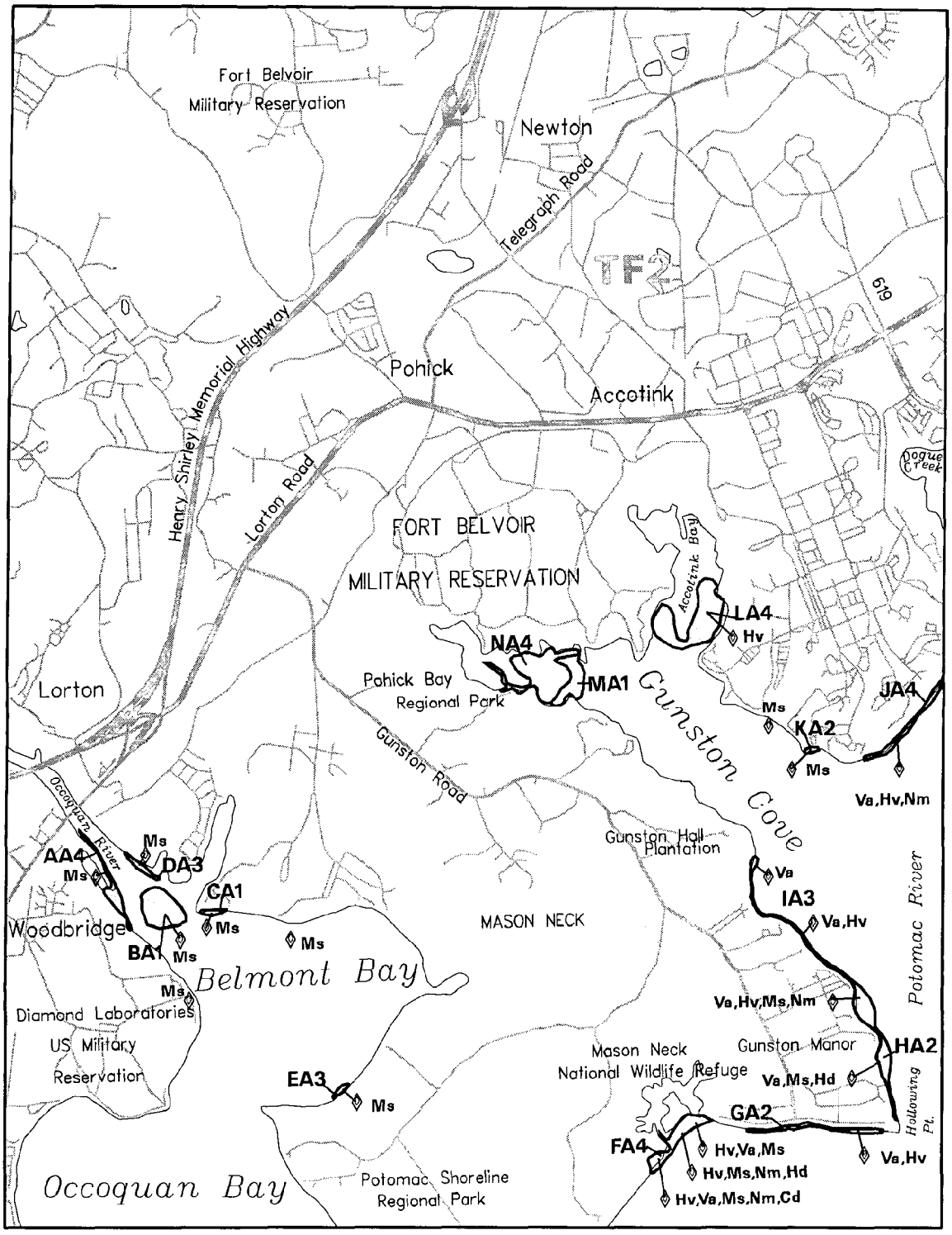
Submerged Aquatic Vegetation 1994

(039) Fort Belvoir, Va.– Md.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
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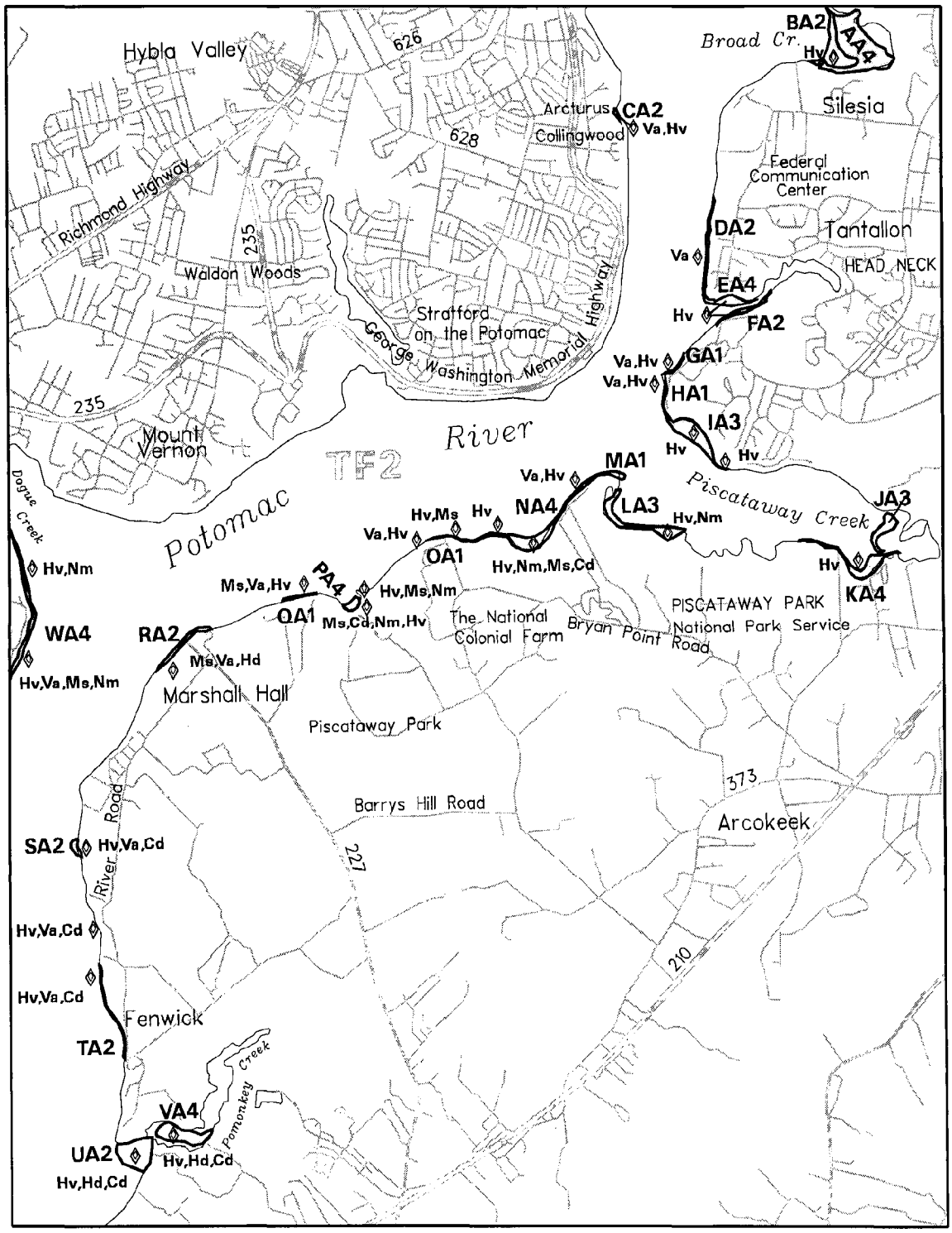
Mt. Vernon, Md.– Va. (040)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 08/30/94

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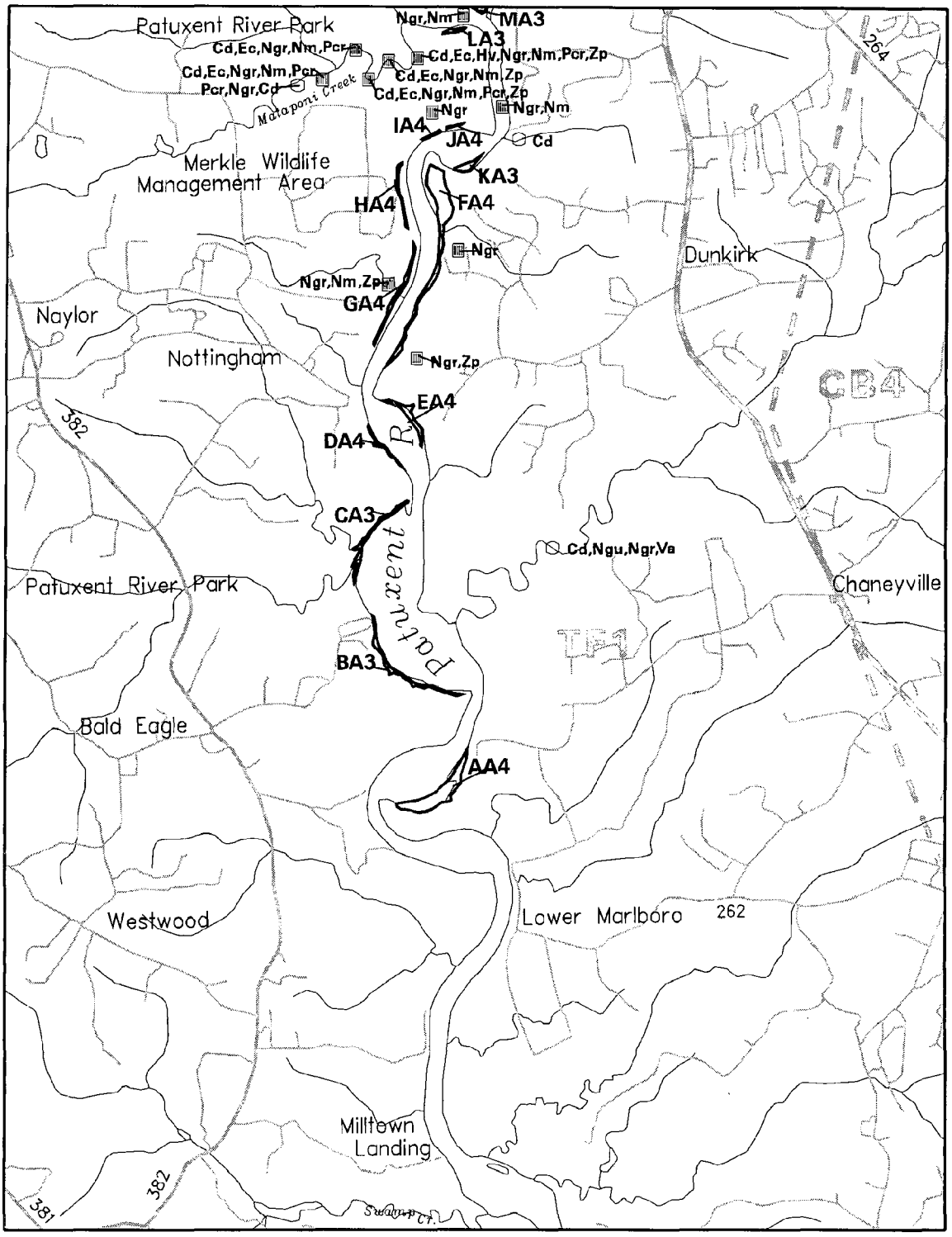
Submerged Aquatic Vegetation 1994

(041) Lower Marlboro, Md.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 07/20/94

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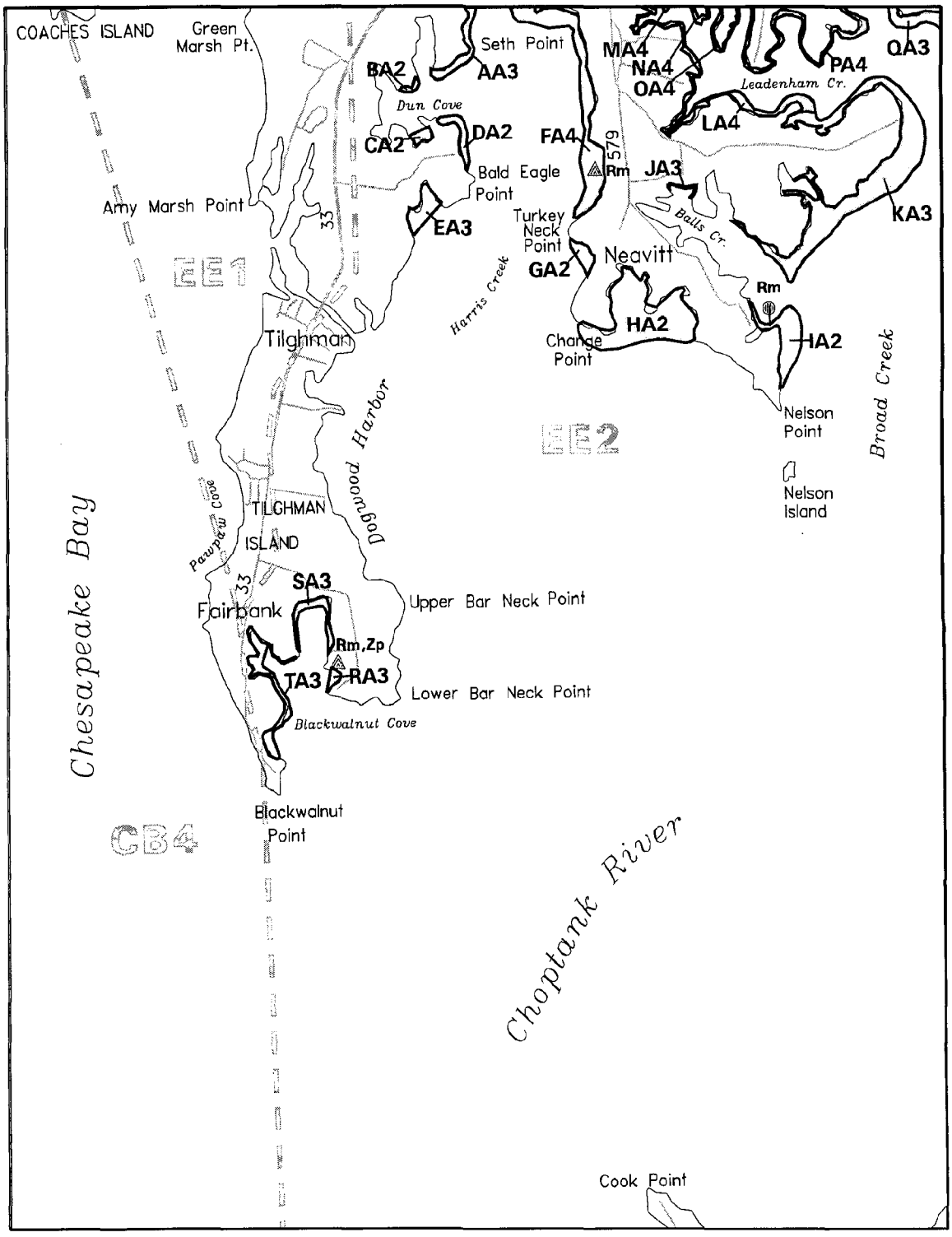
Submerged Aquatic Vegetation 1994

Tilghman, Md. (043)



Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 07/20/94

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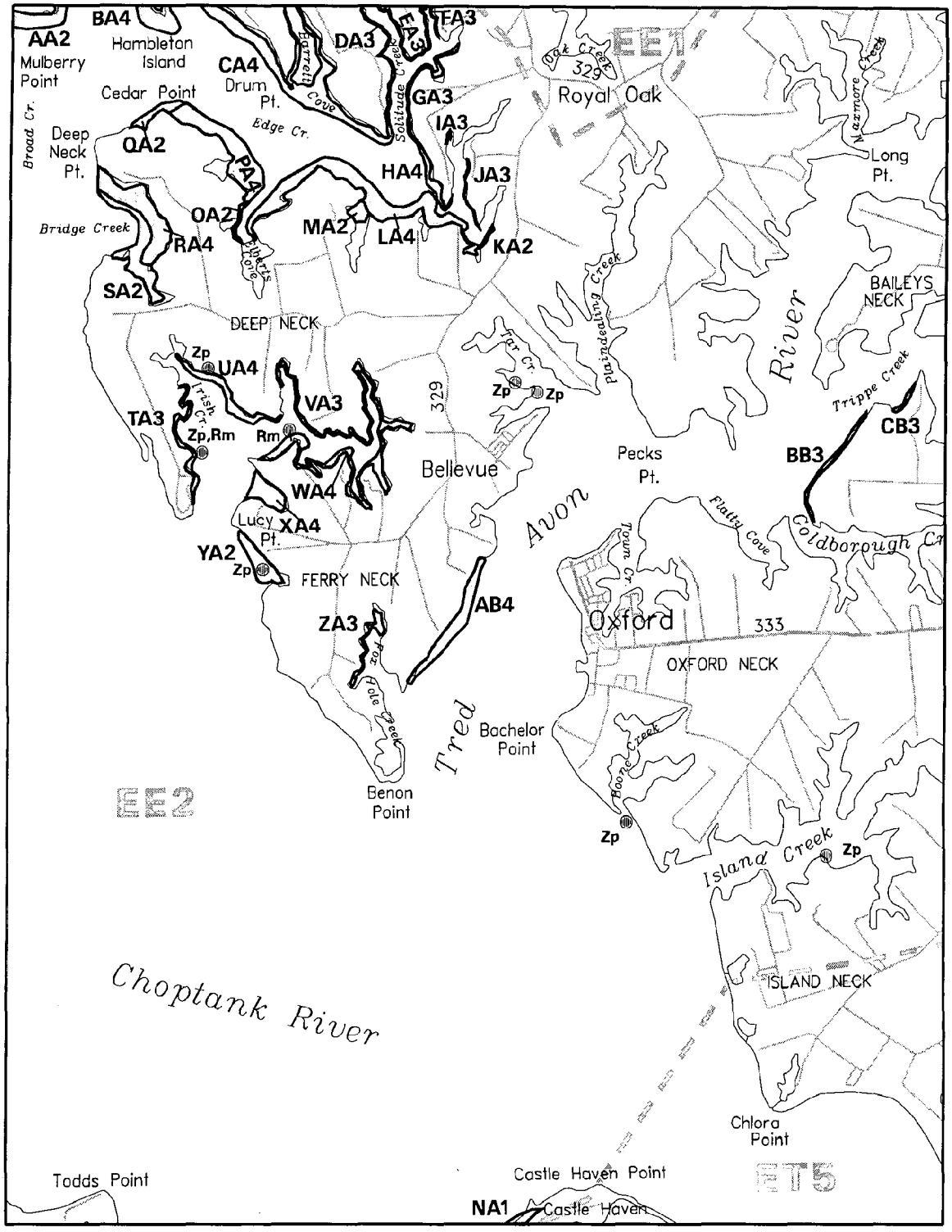
Submerged Aquatic Vegetation 1994

(044) Oxford, Md.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 07/20/94

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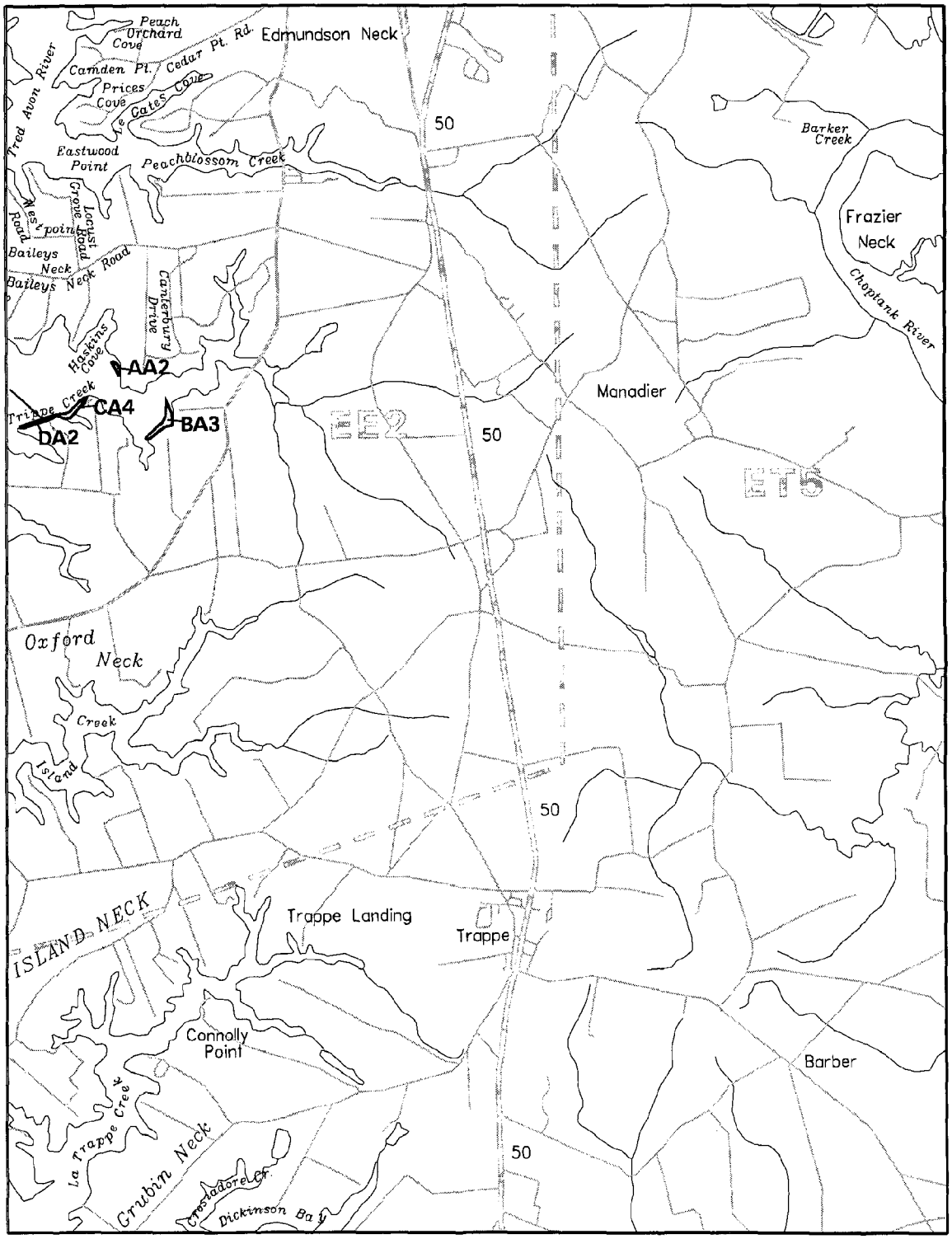
Submerged Aquatic Vegetation 1994

Trappe, Md. (045)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 07/20/94

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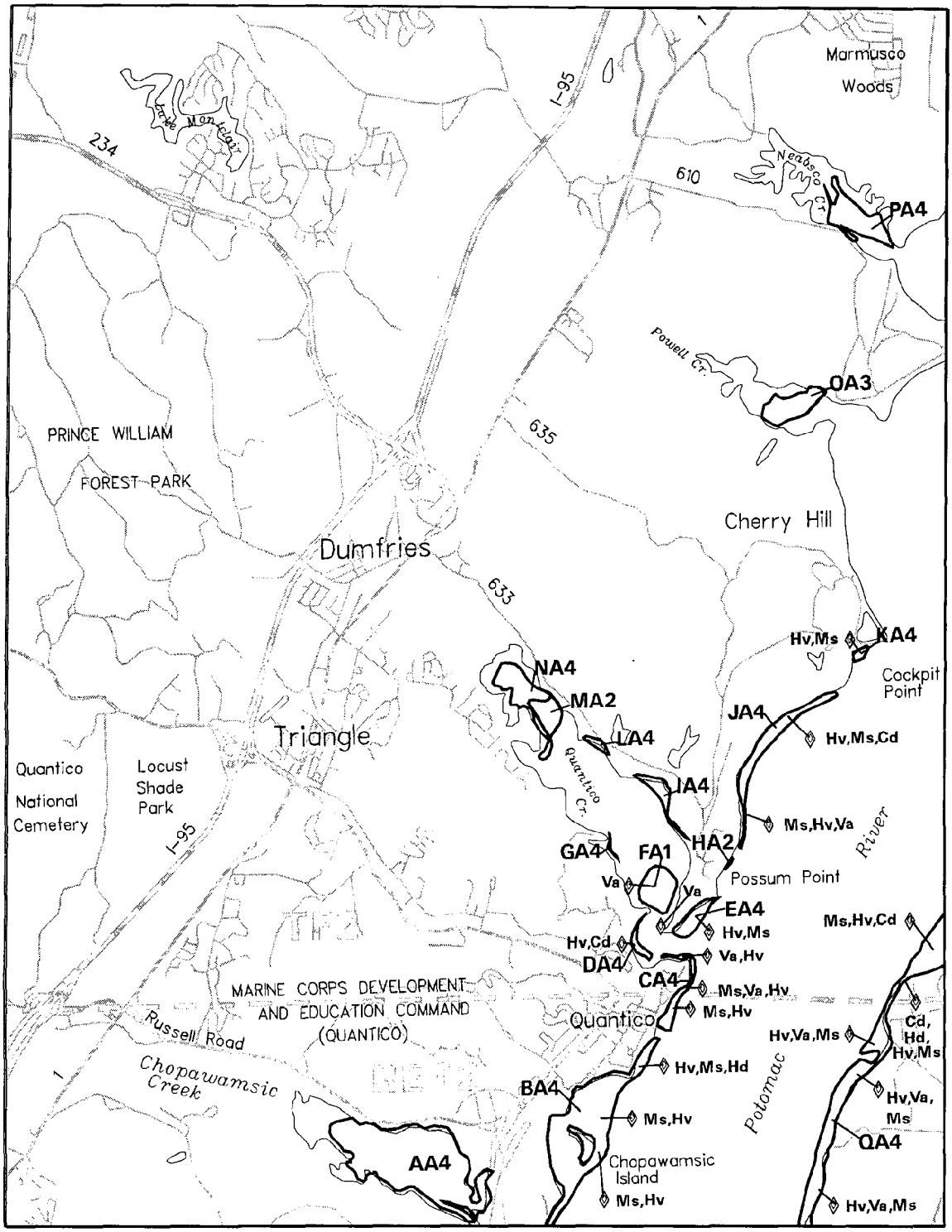
Submerged Aquatic Vegetation 1994

(047) Quantico, Va.– Md.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 08/30/94

Produced by:
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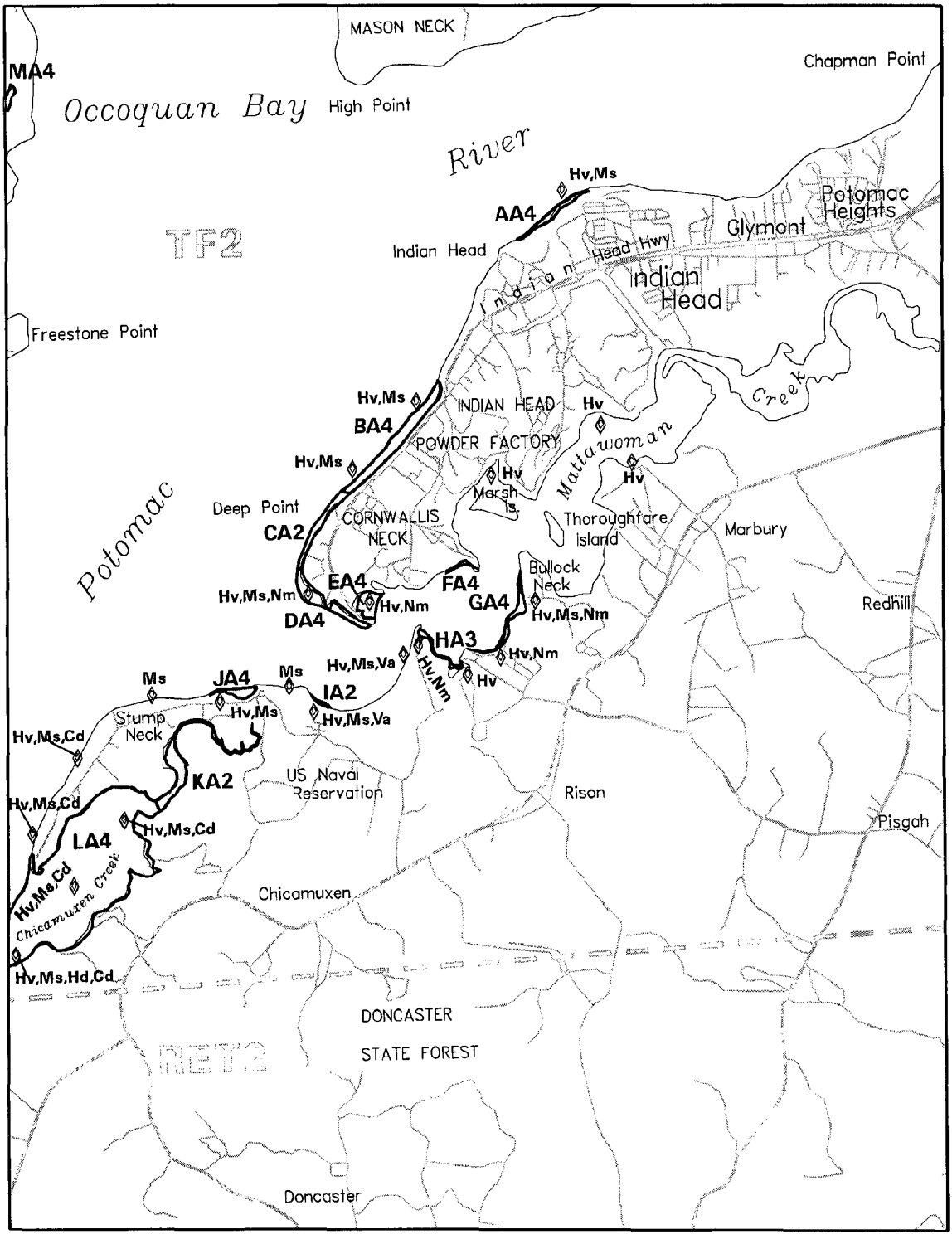
Submerged Aquatic Vegetation 1994

Indian Head, Va.– Md. (048)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 08/30/94

Produced by:
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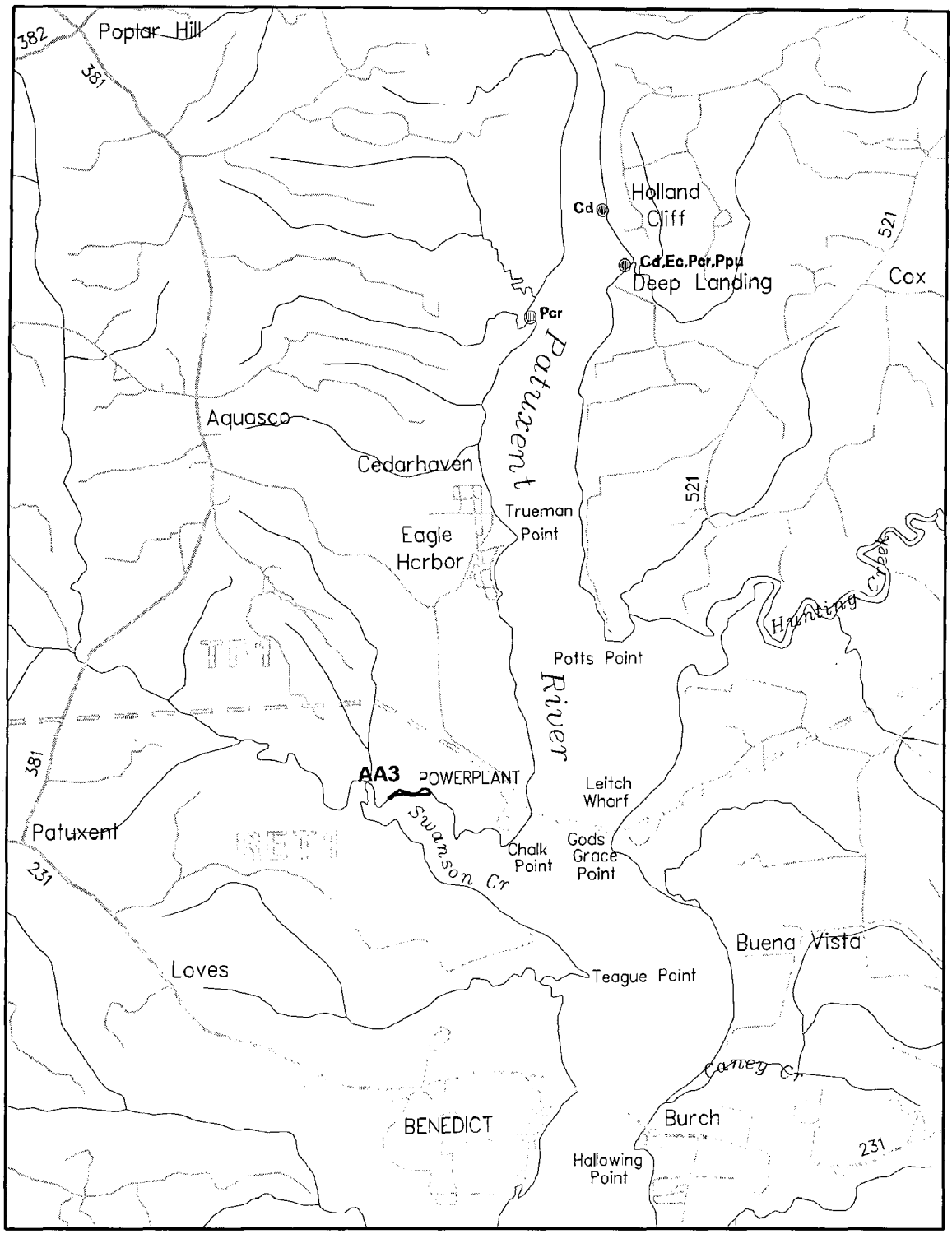
College of William and Mary

Submerged Aquatic Vegetation 1994

(049) Benedict, Md.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 07/20/94

Produced by:
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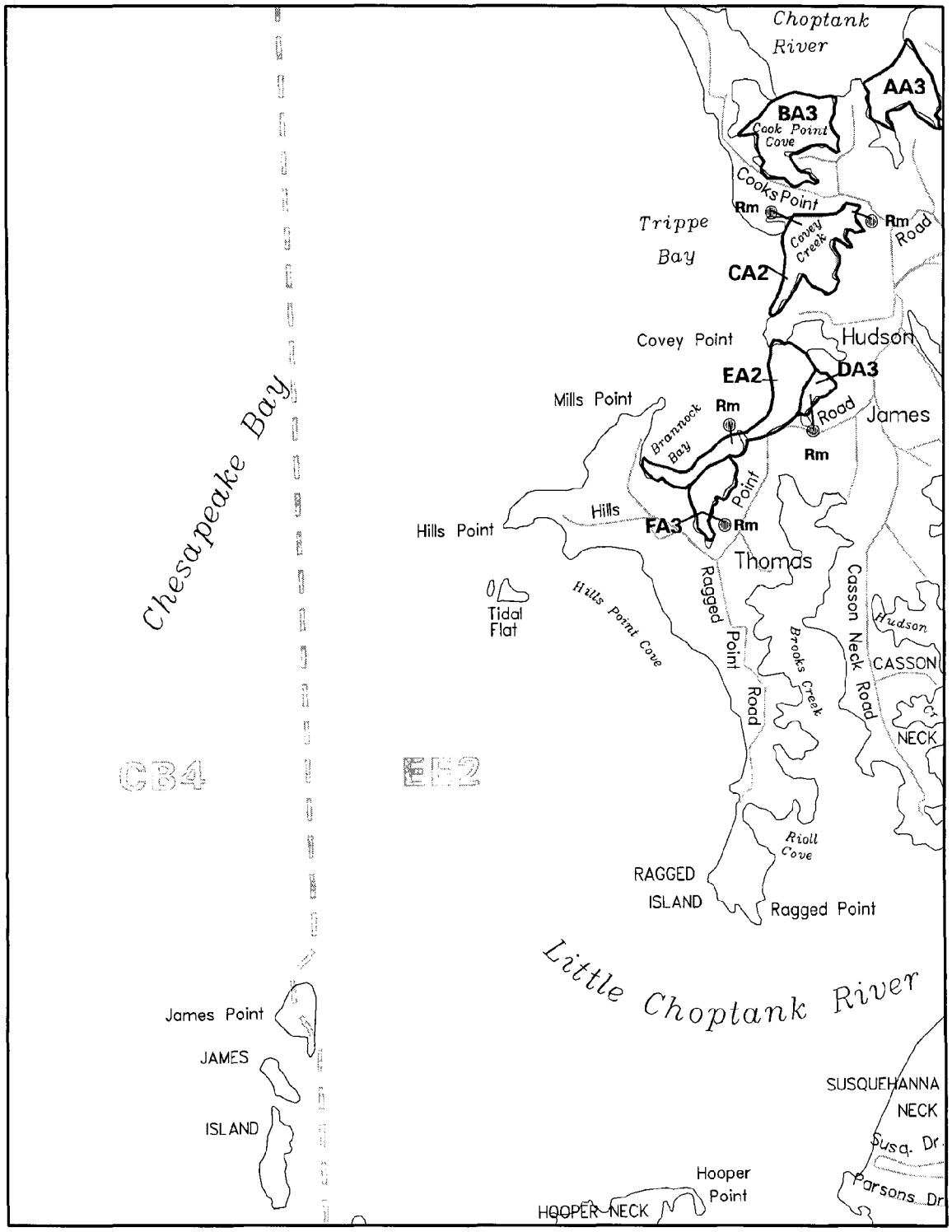
Submerged Aquatic Vegetation 1994

Hudson, Md. (051)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 08/07/94

Produced by:
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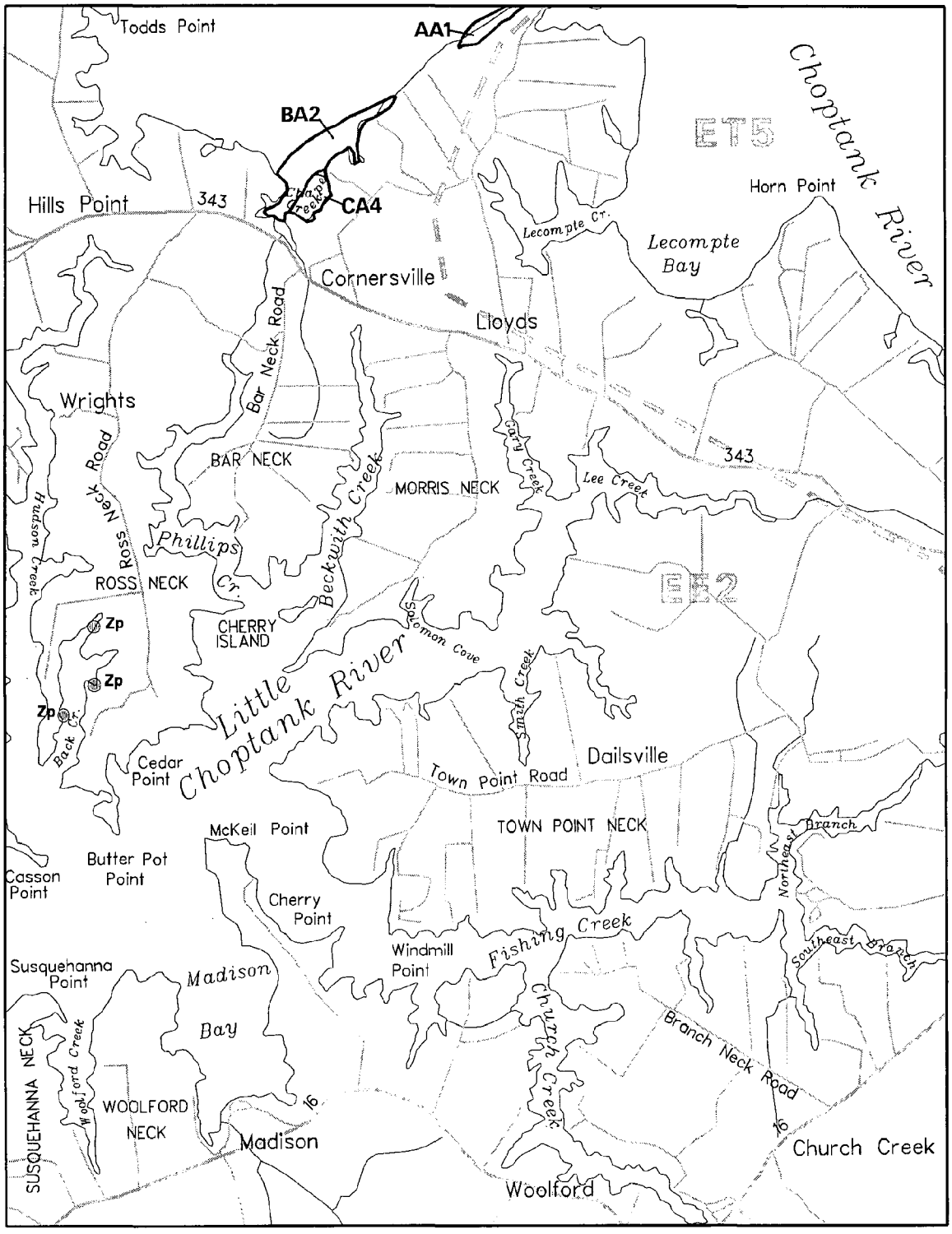
Submerged Aquatic Vegetation 1994

(052) Church Creek, Md.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 08/07/94

Produced by:
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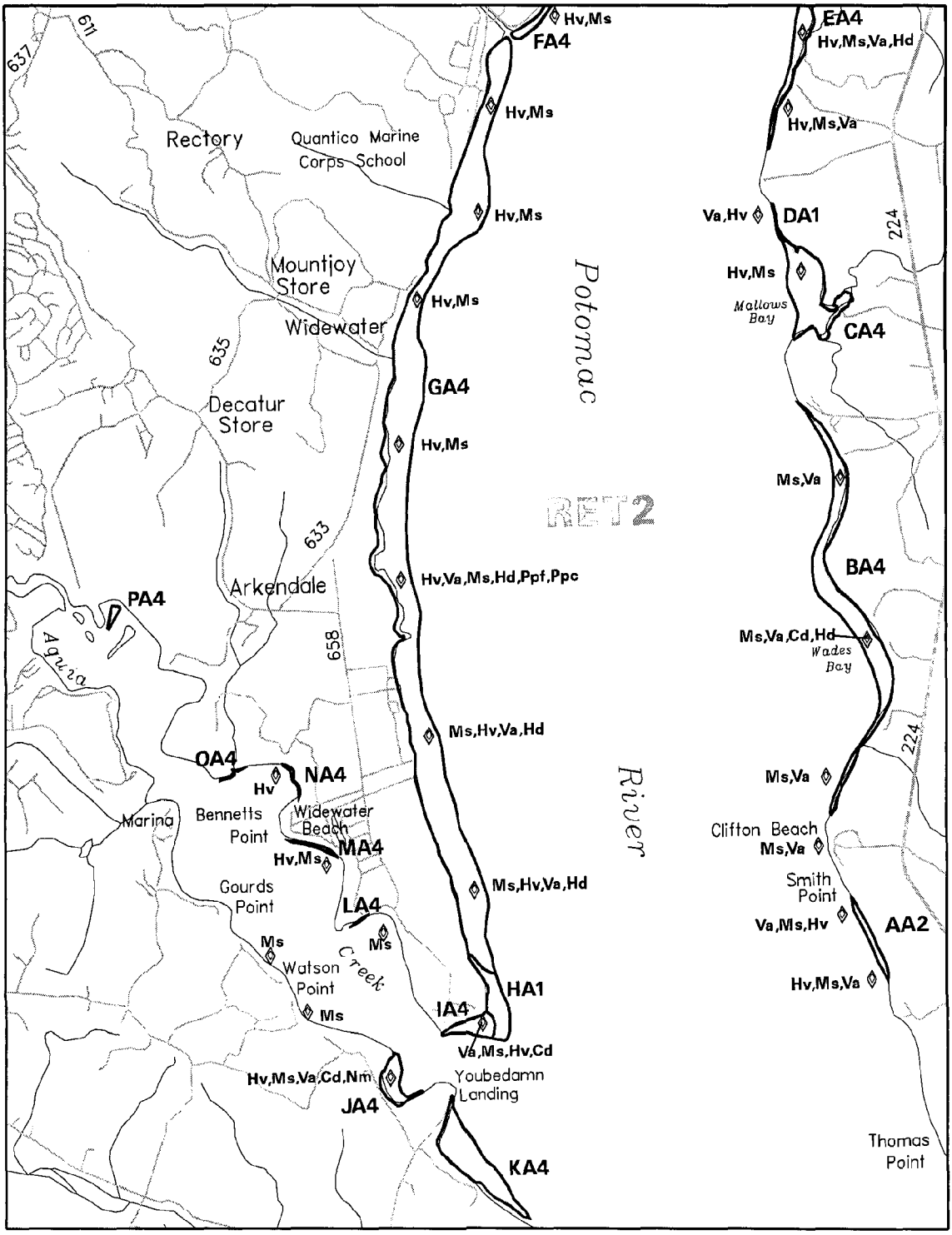
Submerged Aquatic Vegetation 1994

Widewater, Va.– Md. (055)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 08/30/94

Produced by:
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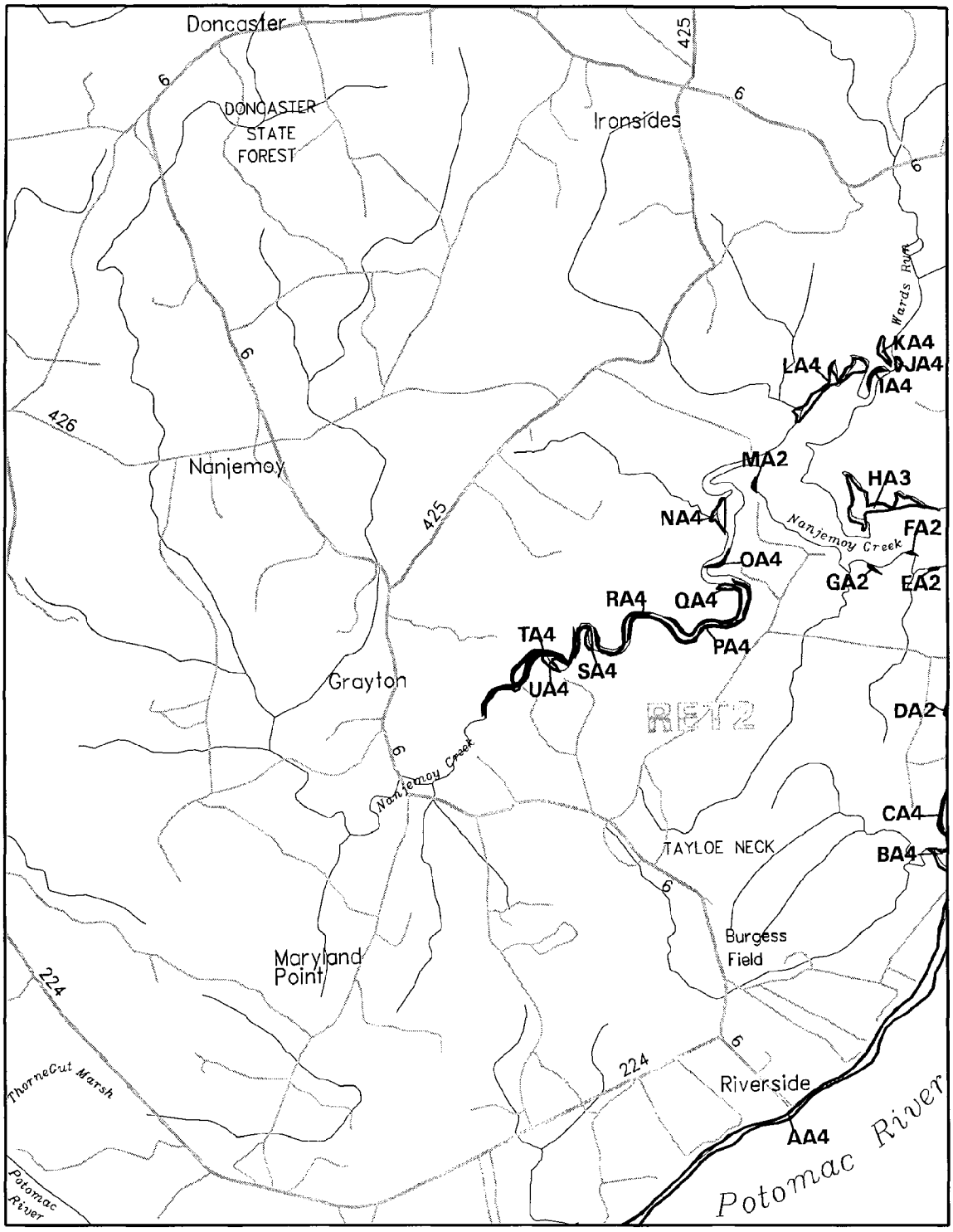
Submerged Aquatic Vegetation 1994

(056) Nanjemoy, Md.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 08/08/94

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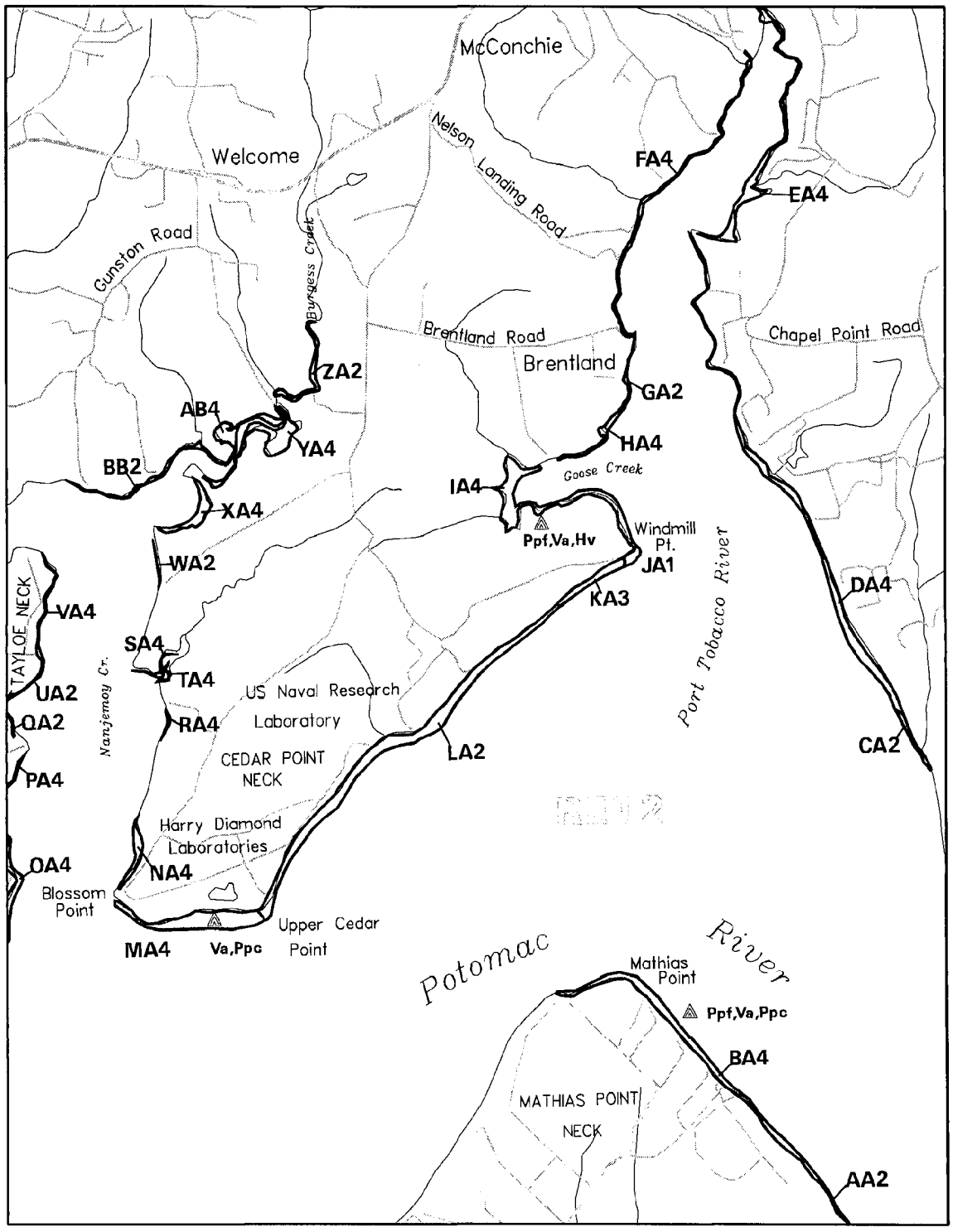
Mathias Point, Md.– Va. (057)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 08/08/94

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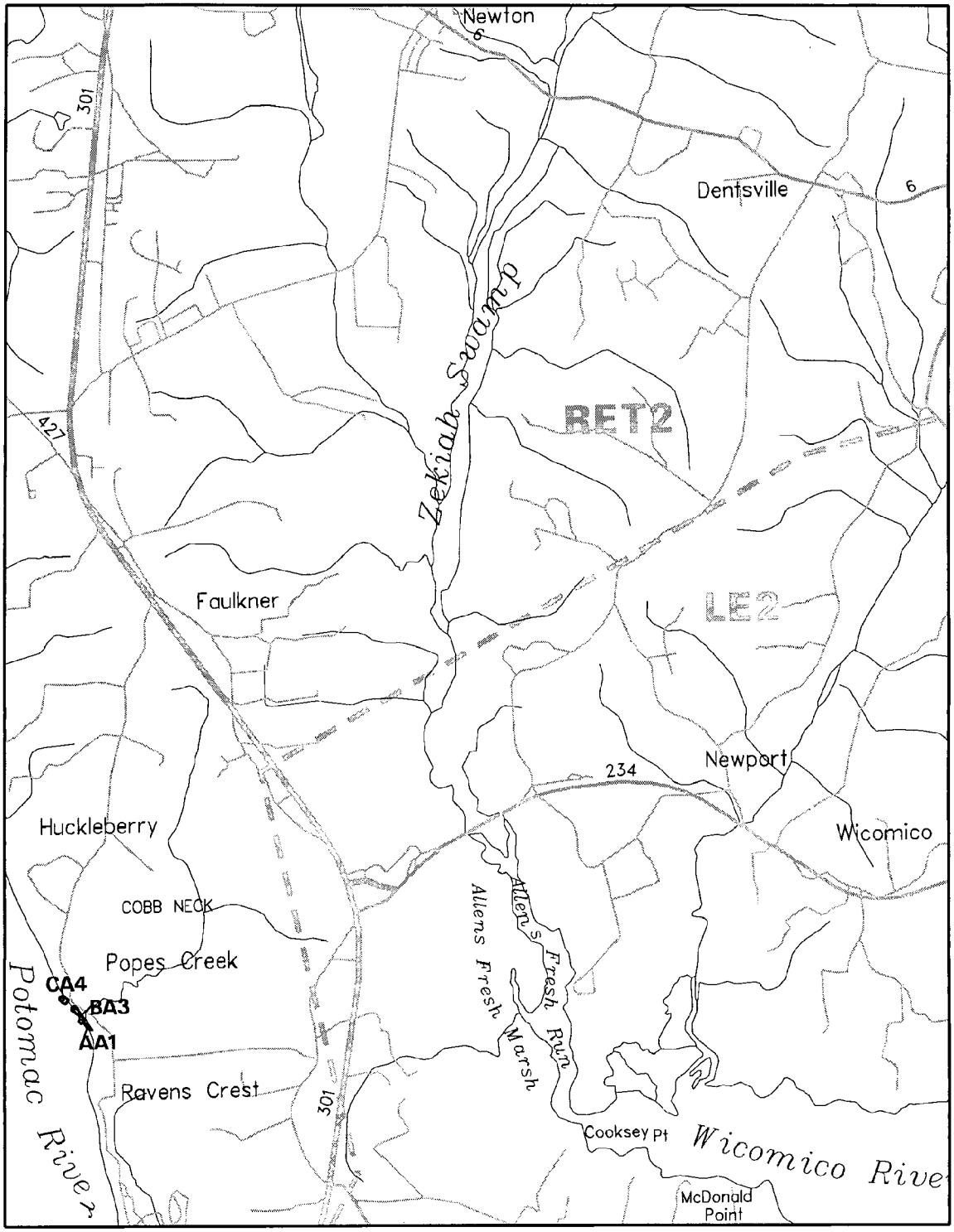
Submerged Aquatic Vegetation 1994

(058) Popes Creek, Md.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 08/08/94

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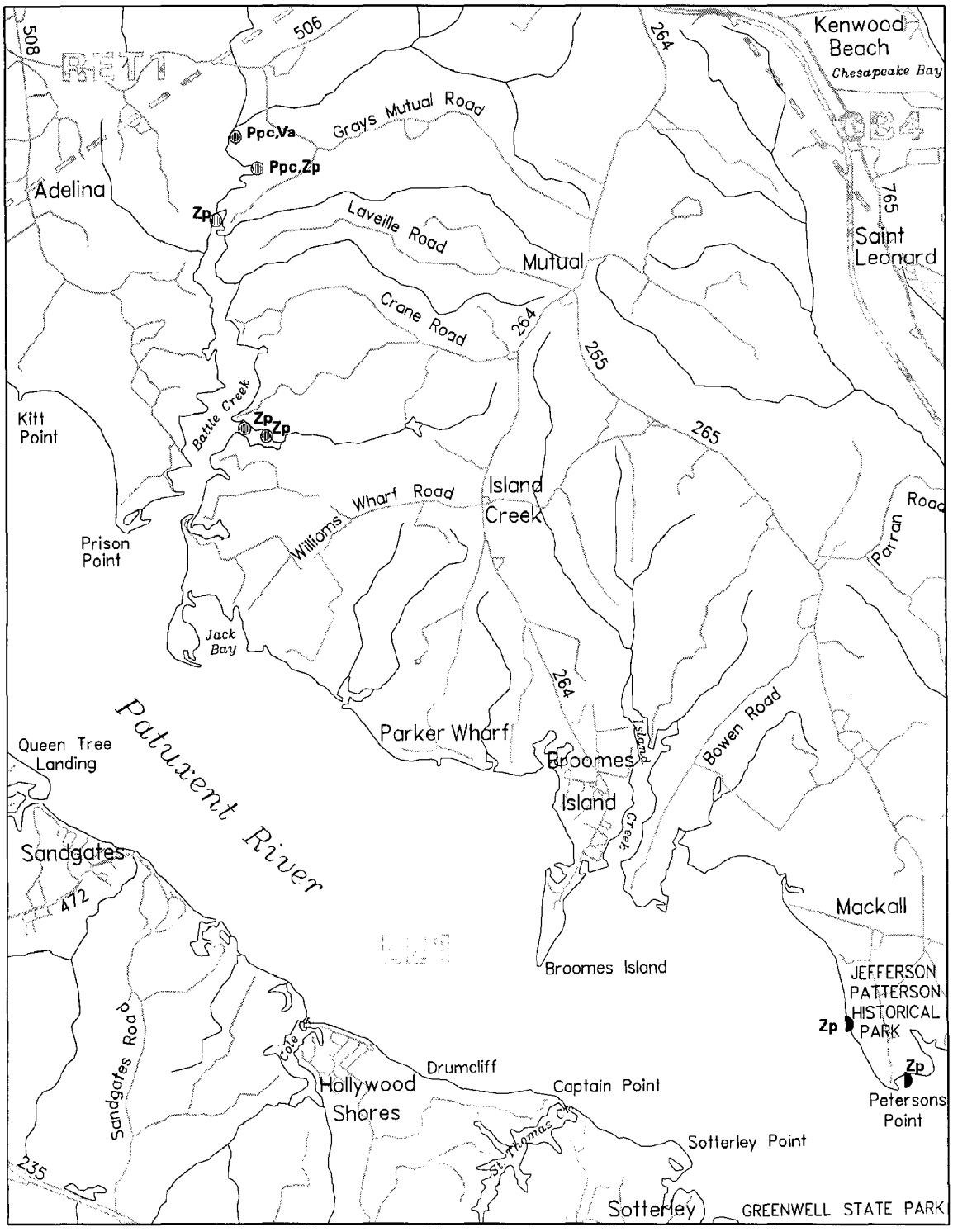
Submerged Aquatic Vegetation 1994

Broomes Island, Md. (060)



Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 07/20/94

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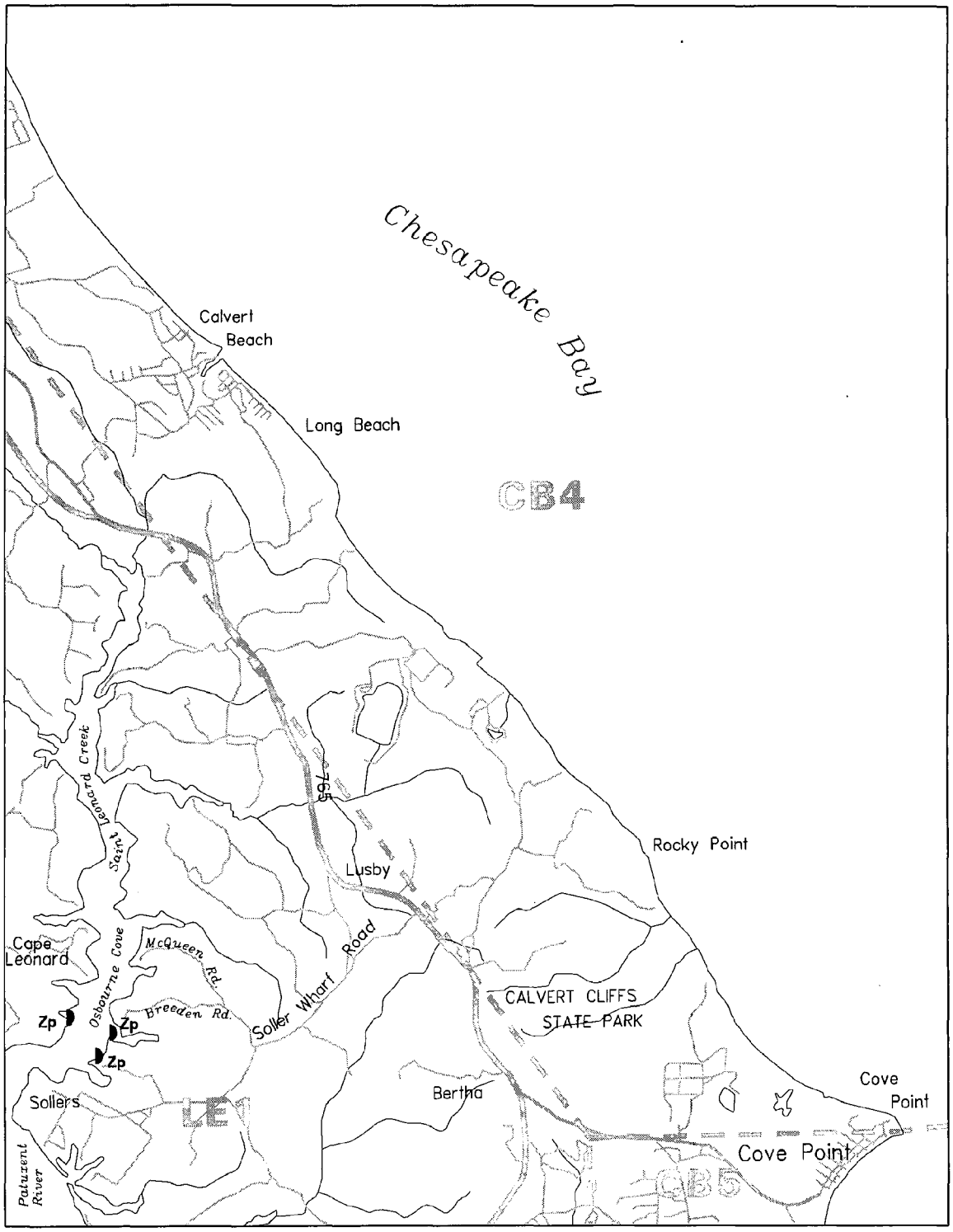
Submerged Aquatic Vegetation 1994

(061) Cove Point, Md.



Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 07/20/94

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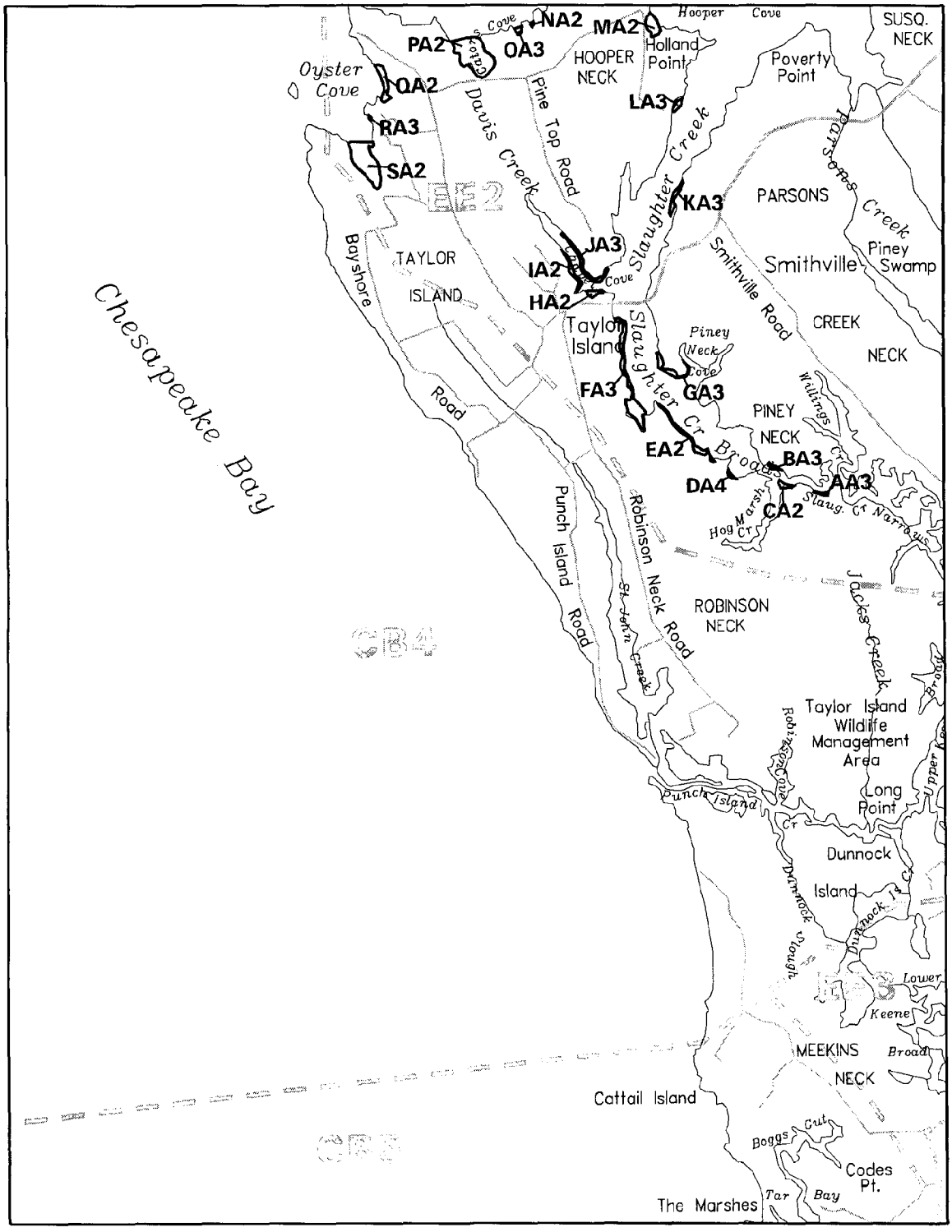
Taylors Island, Md. (062)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/09/94

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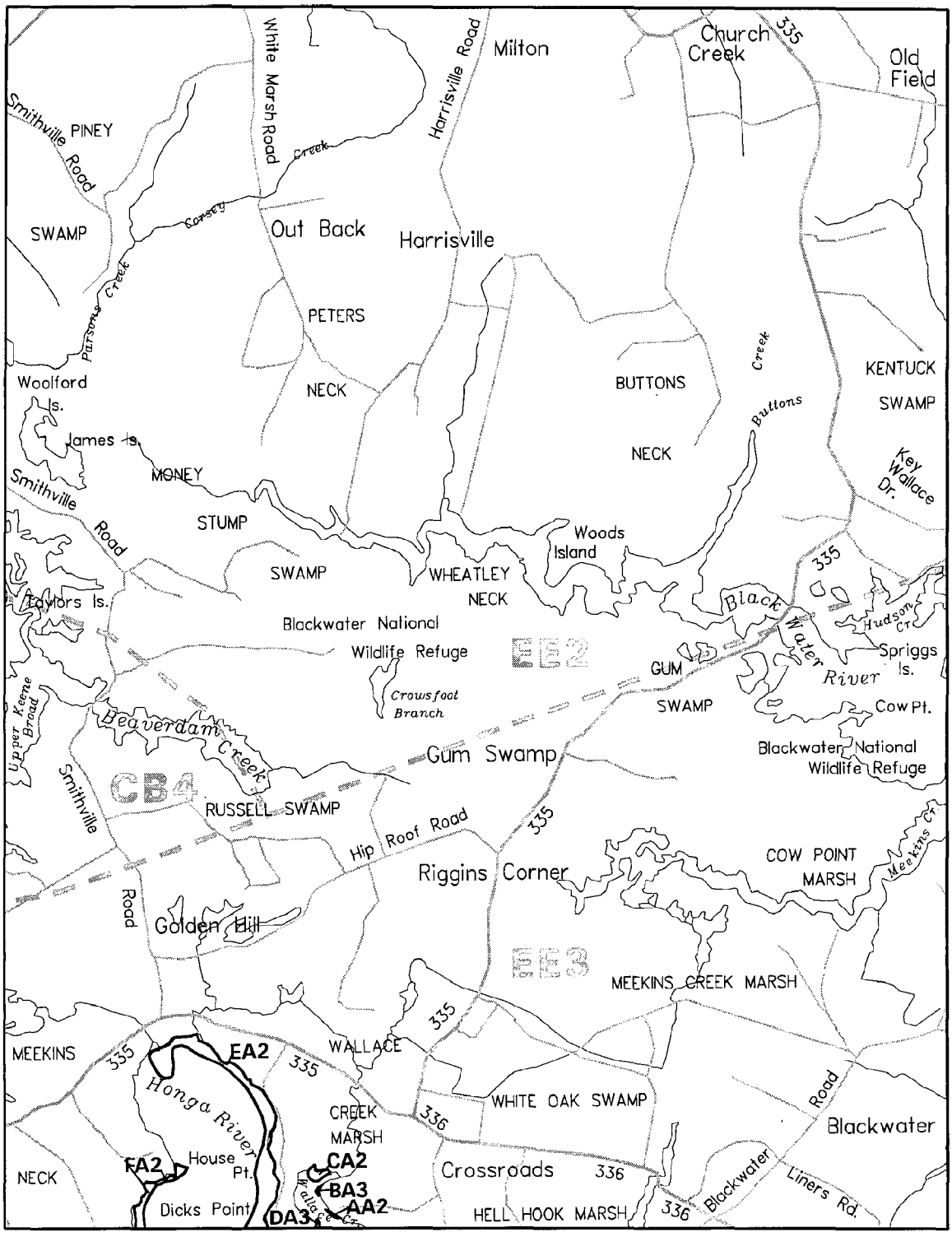
College of William and Mary

Submerged Aquatic Vegetation 1994

(063) Golden Hill, Md.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/09/94

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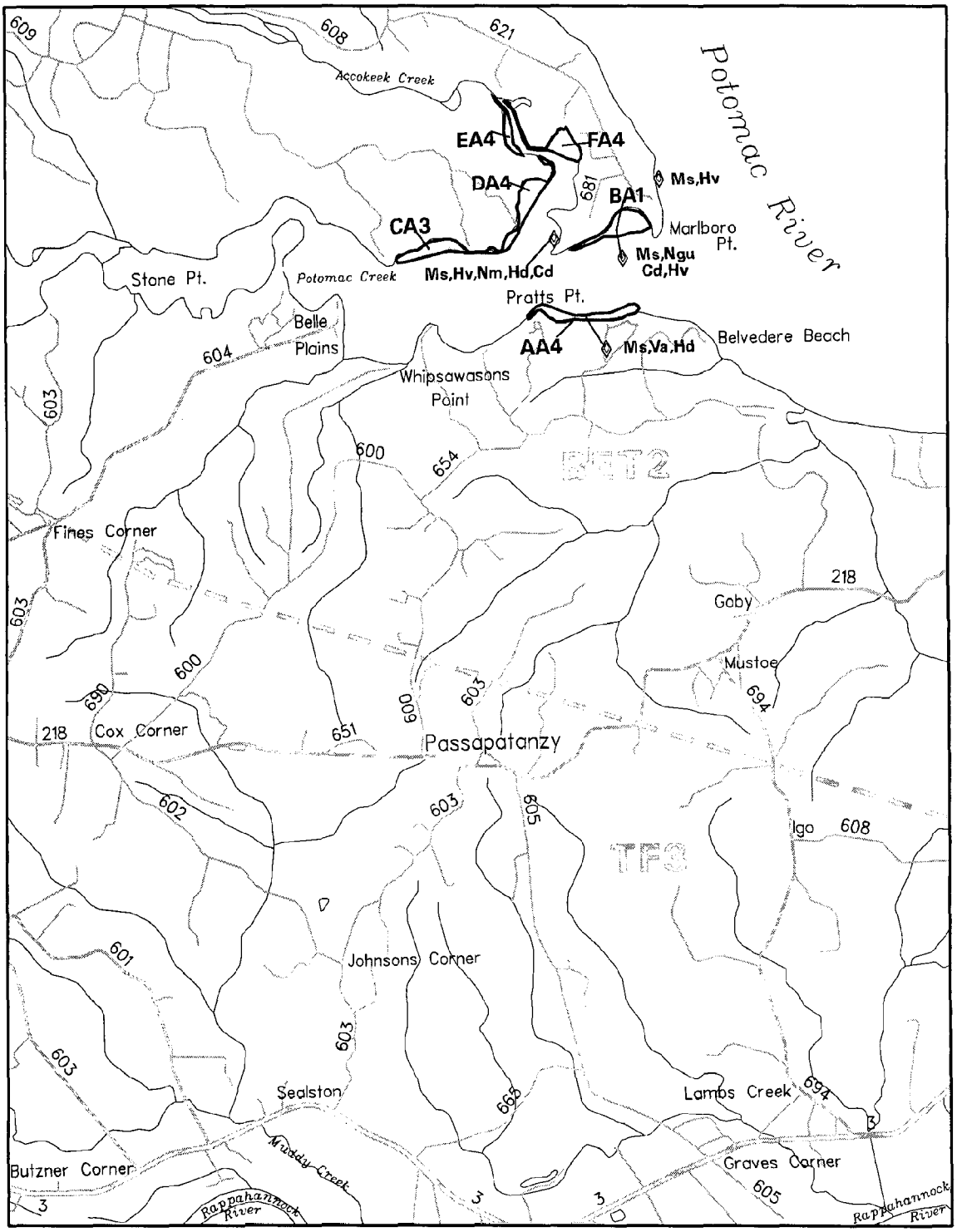
Passapatanzy, Md.– Va. (064)



Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 08/30/94

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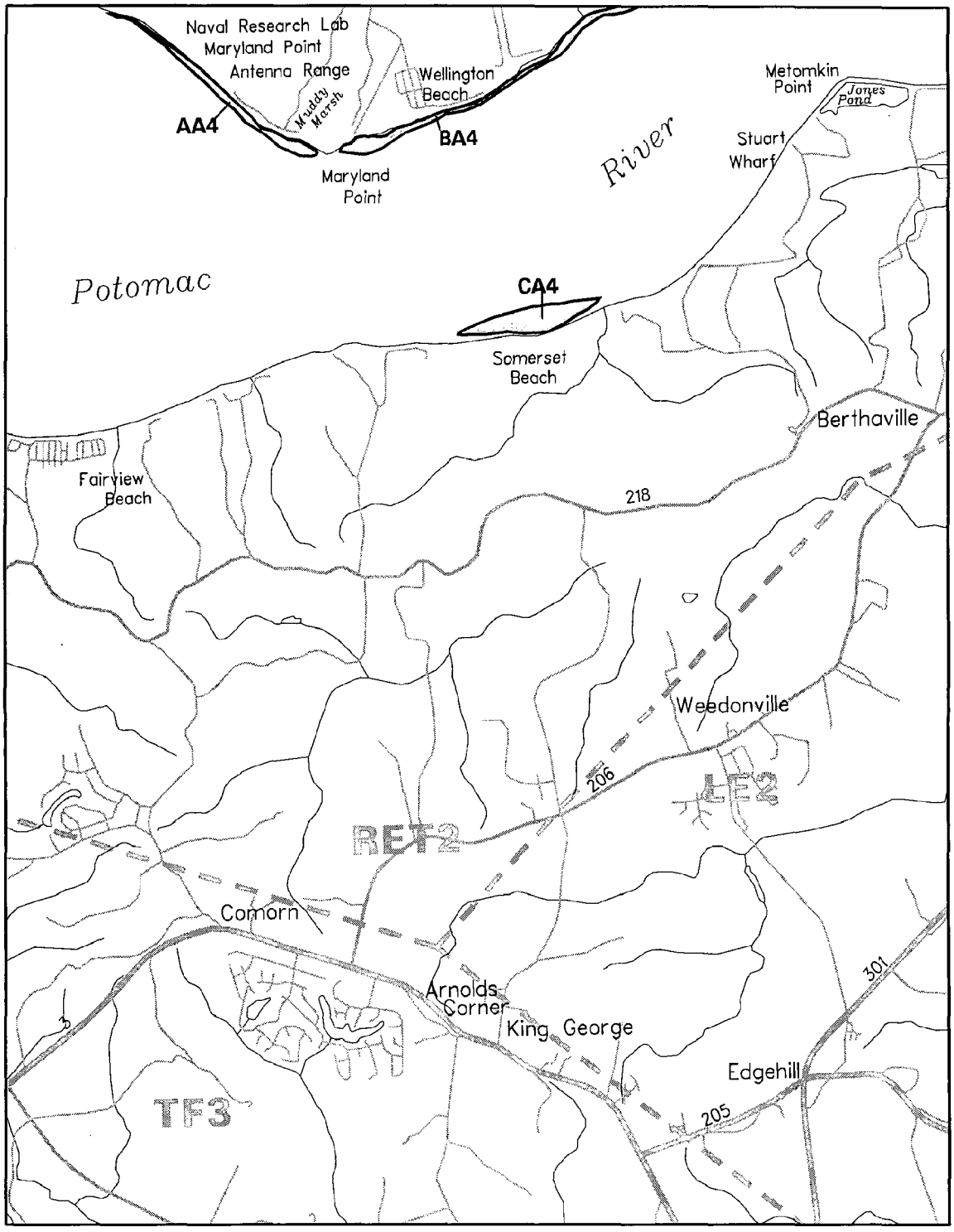
Submerged Aquatic Vegetation 1994

(065) King George, Va.– Md.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 08/08/94

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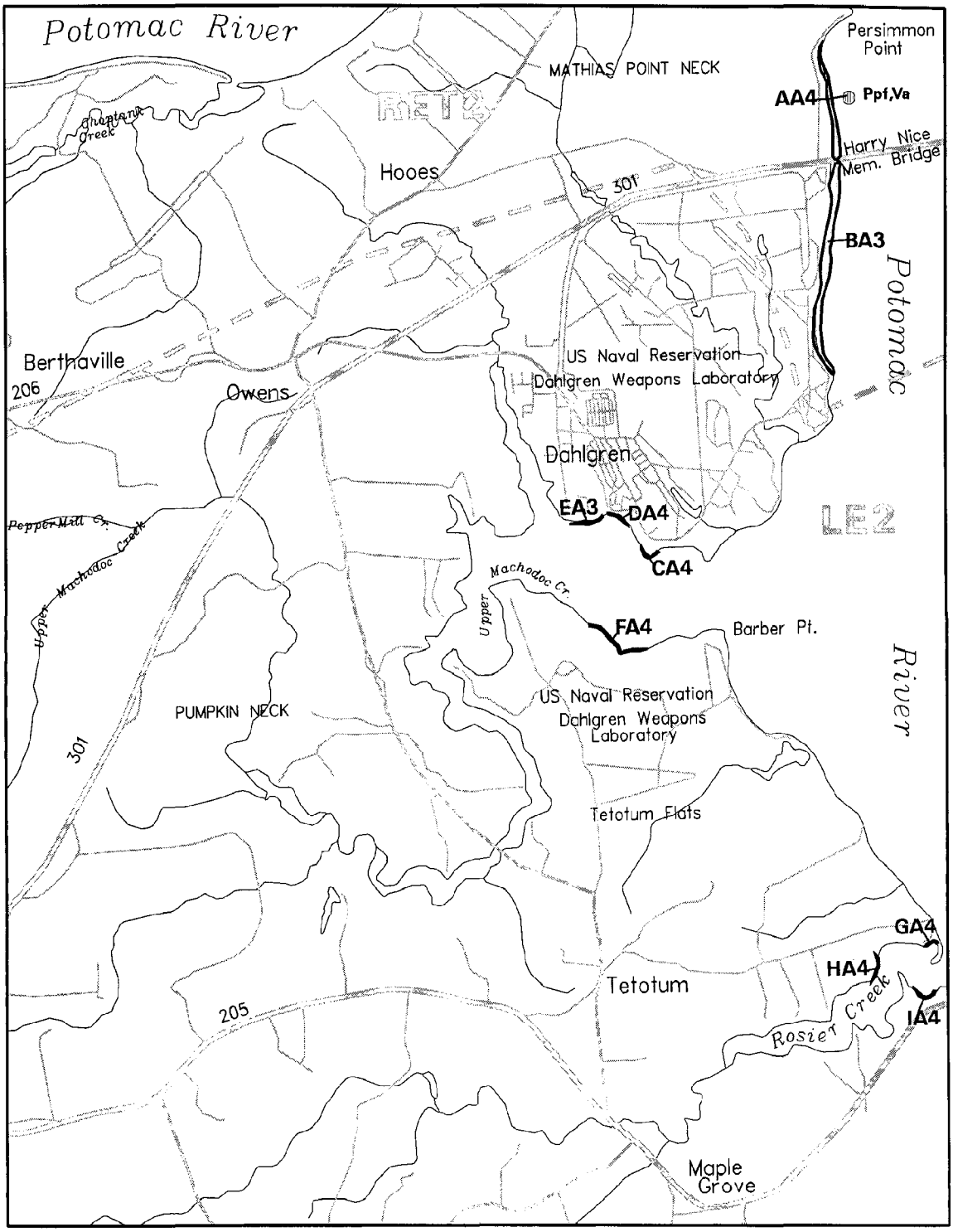
Submerged Aquatic Vegetation 1994

Dahlgren, Va.– Md. (066)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey

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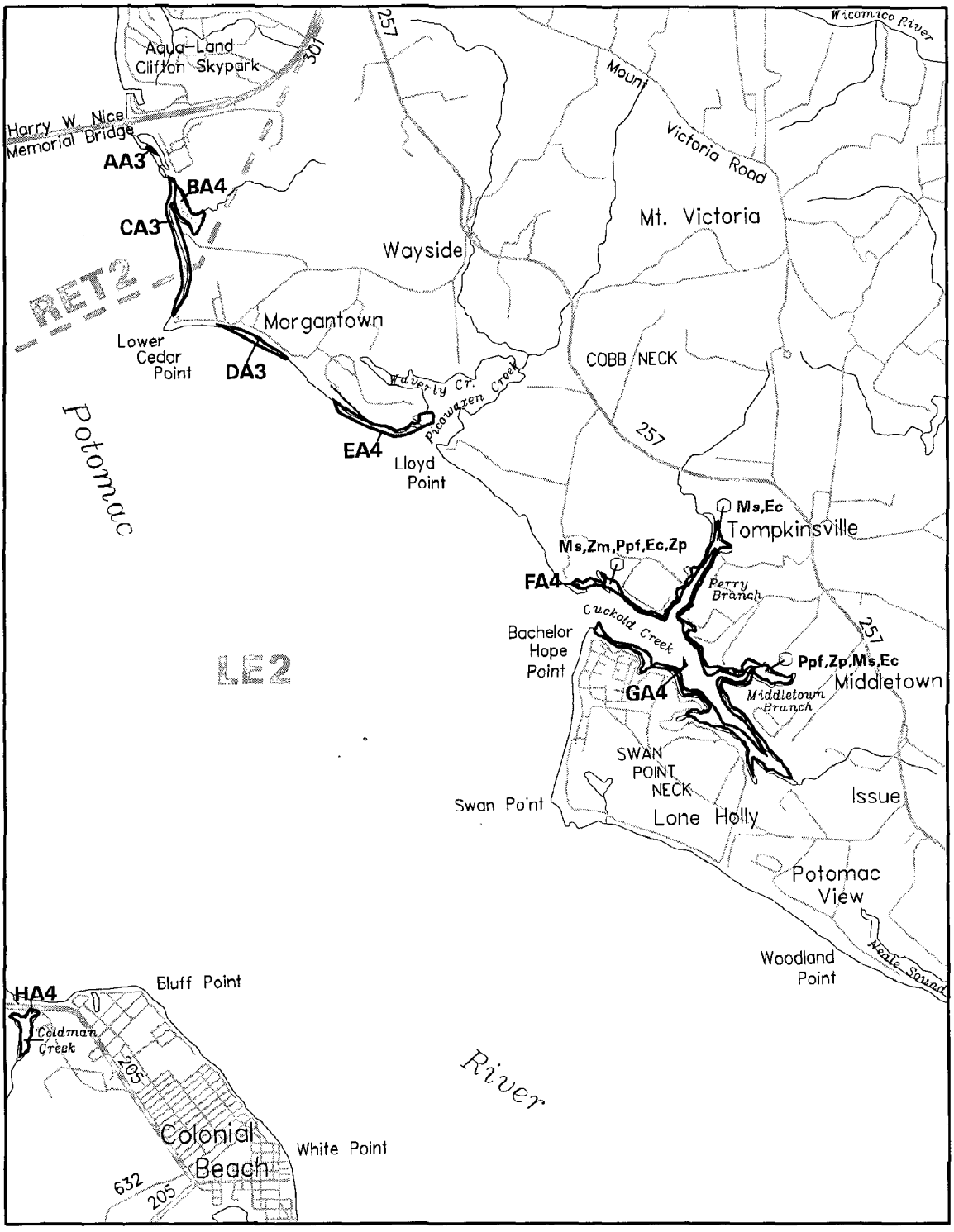
Submerged Aquatic Vegetation 1994

(067) Colonial Beach North, Md.– Va.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 09/07/94

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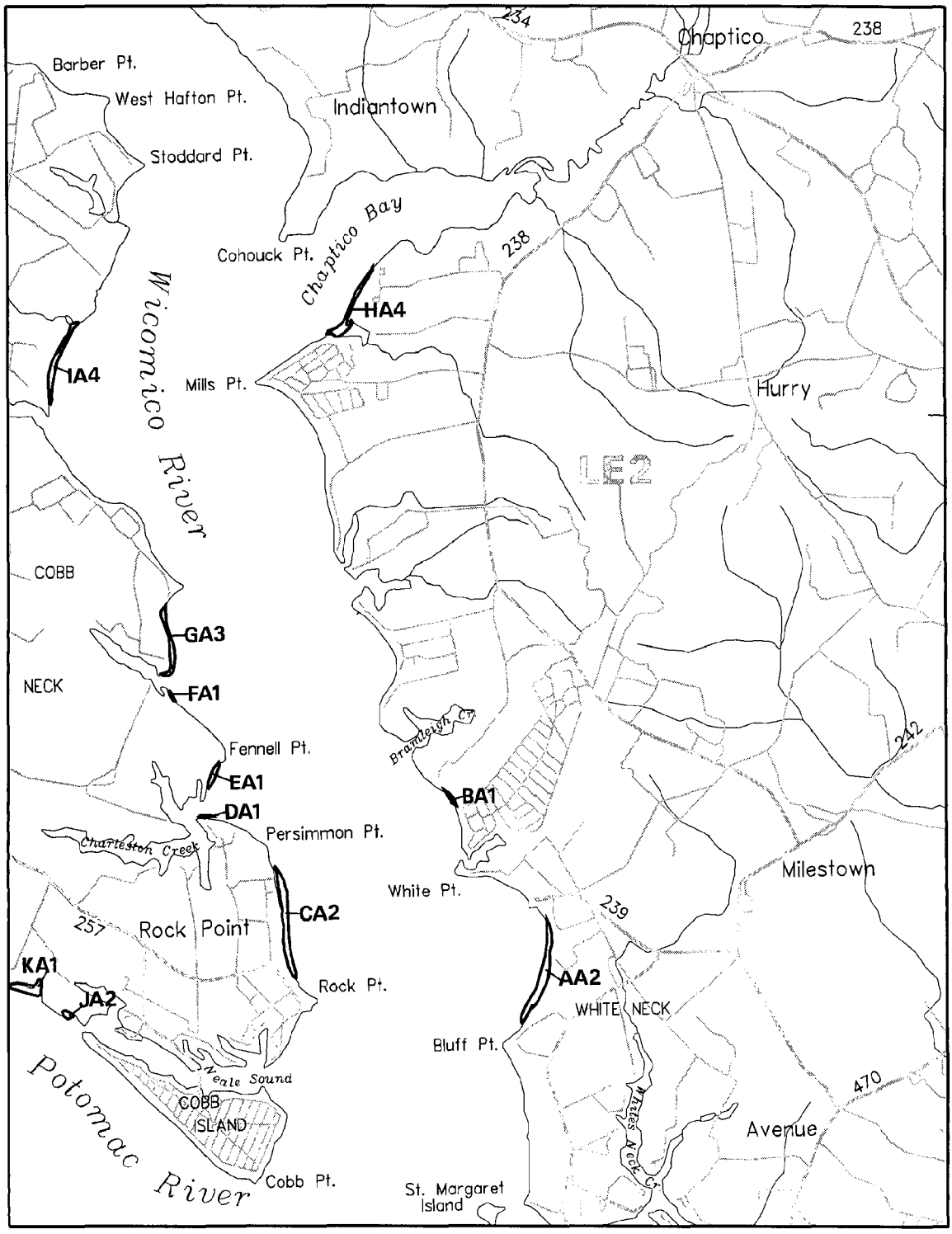
Submerged Aquatic Vegetation 1994

Rock Point, Md. (068)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 08/07/94, 09/07/94

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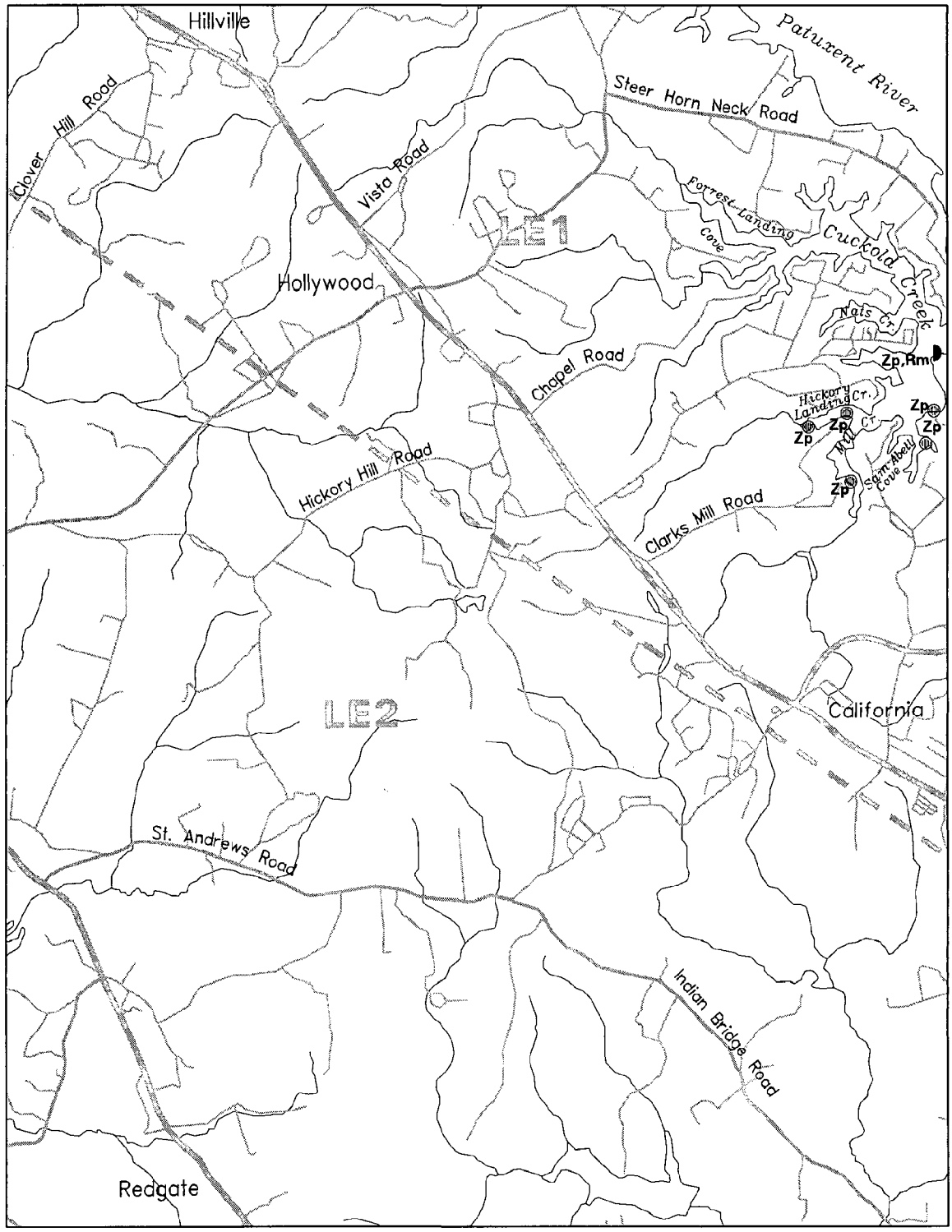
Submerged Aquatic Vegetation 1994

(070) Hollywood, Md.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 07/20/94

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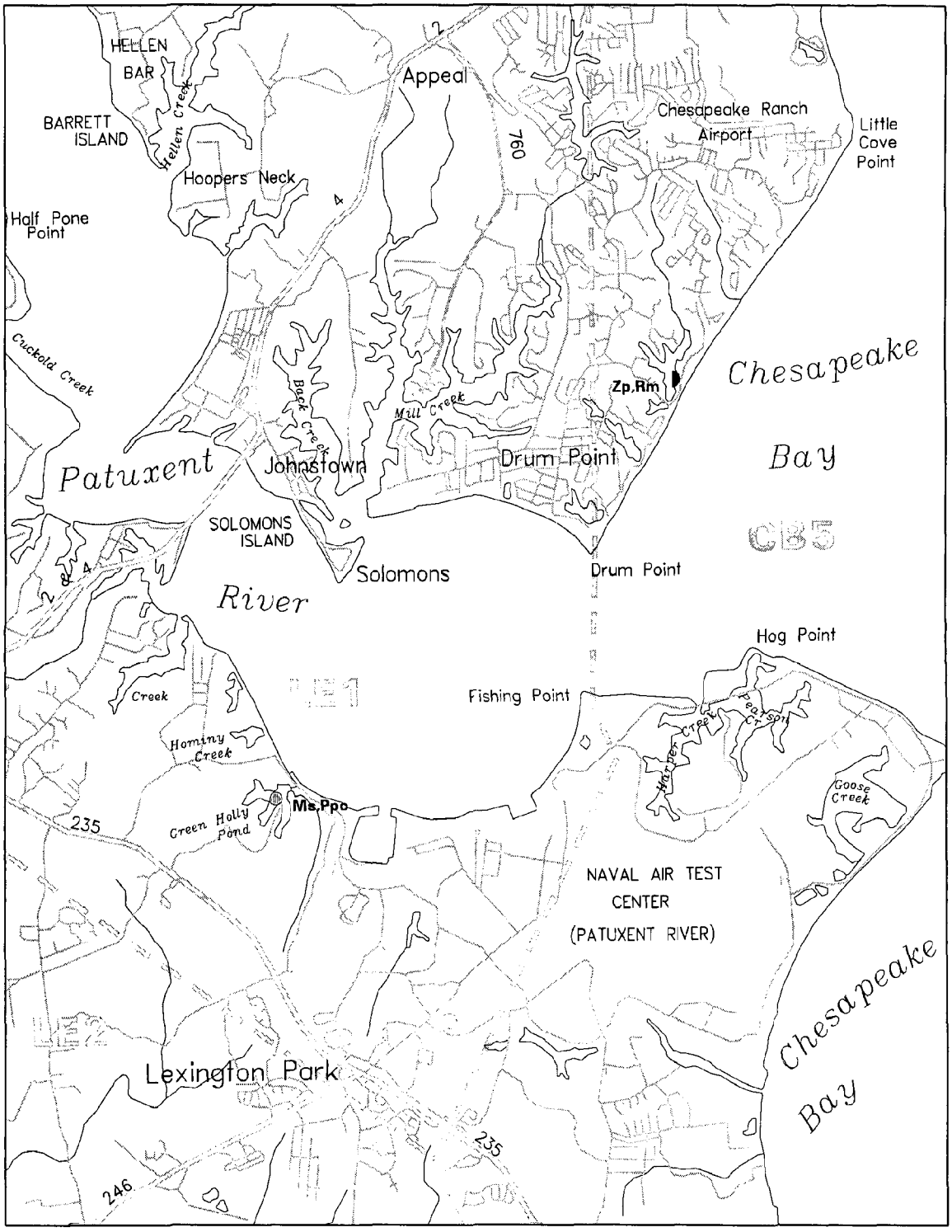
Submerged Aquatic Vegetation 1994

Solomons Island, Md. (071)



Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 07/20/94

Produced by:
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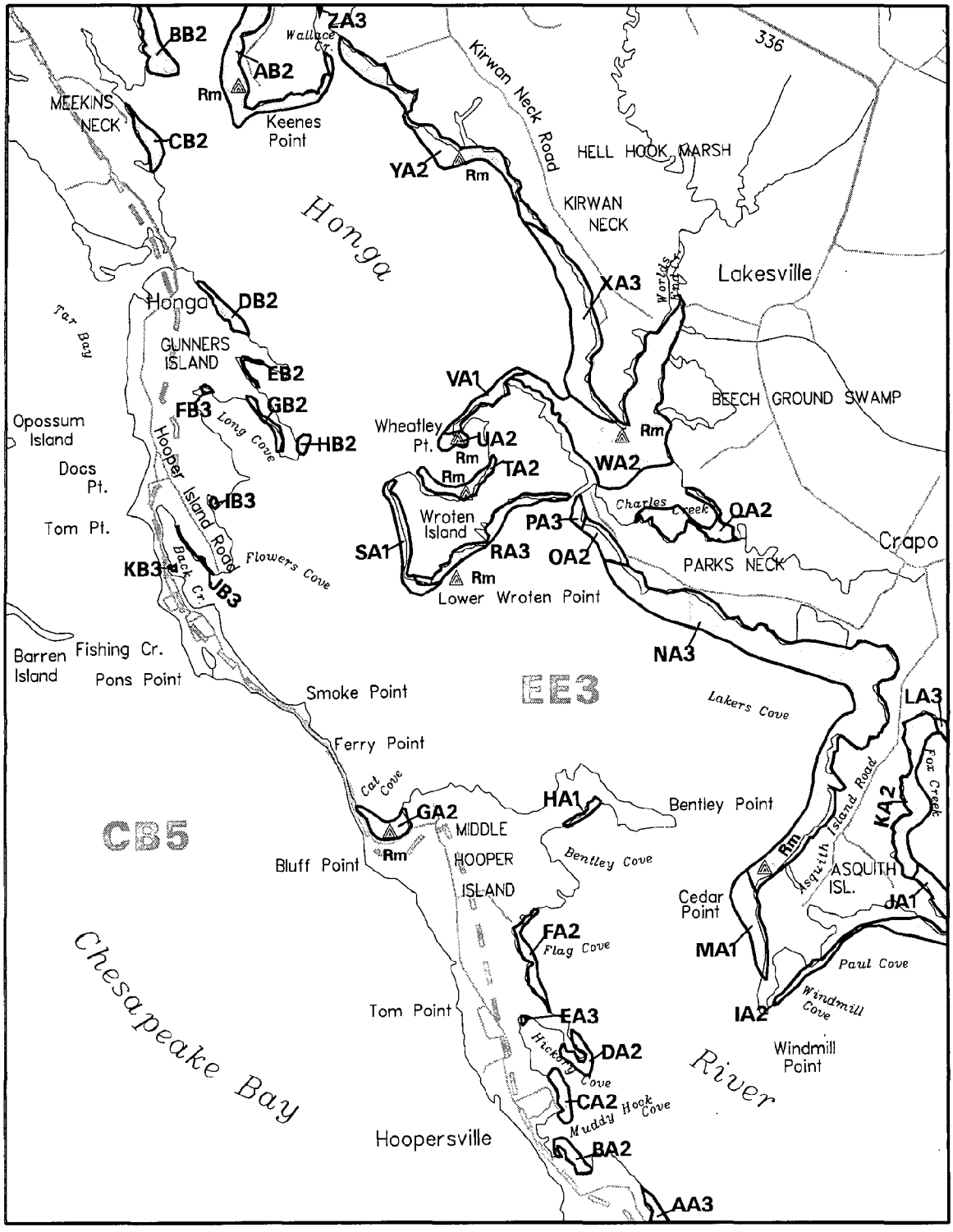
Submerged Aquatic Vegetation 1994

(073) Honga, Md.



Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/09/94

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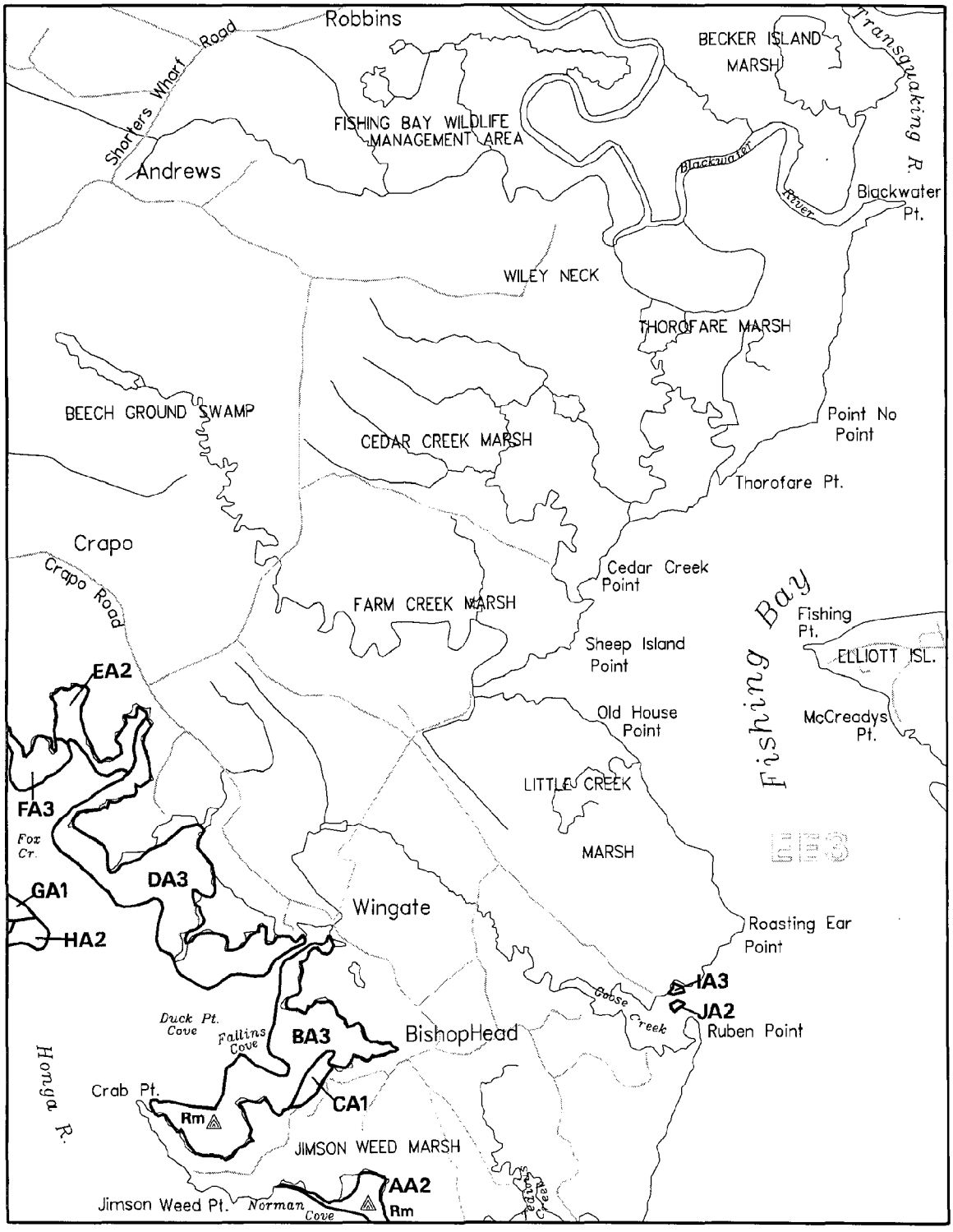
Submerged Aquatic Vegetation 1994

Wingate, Md. (074)



Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/09/94

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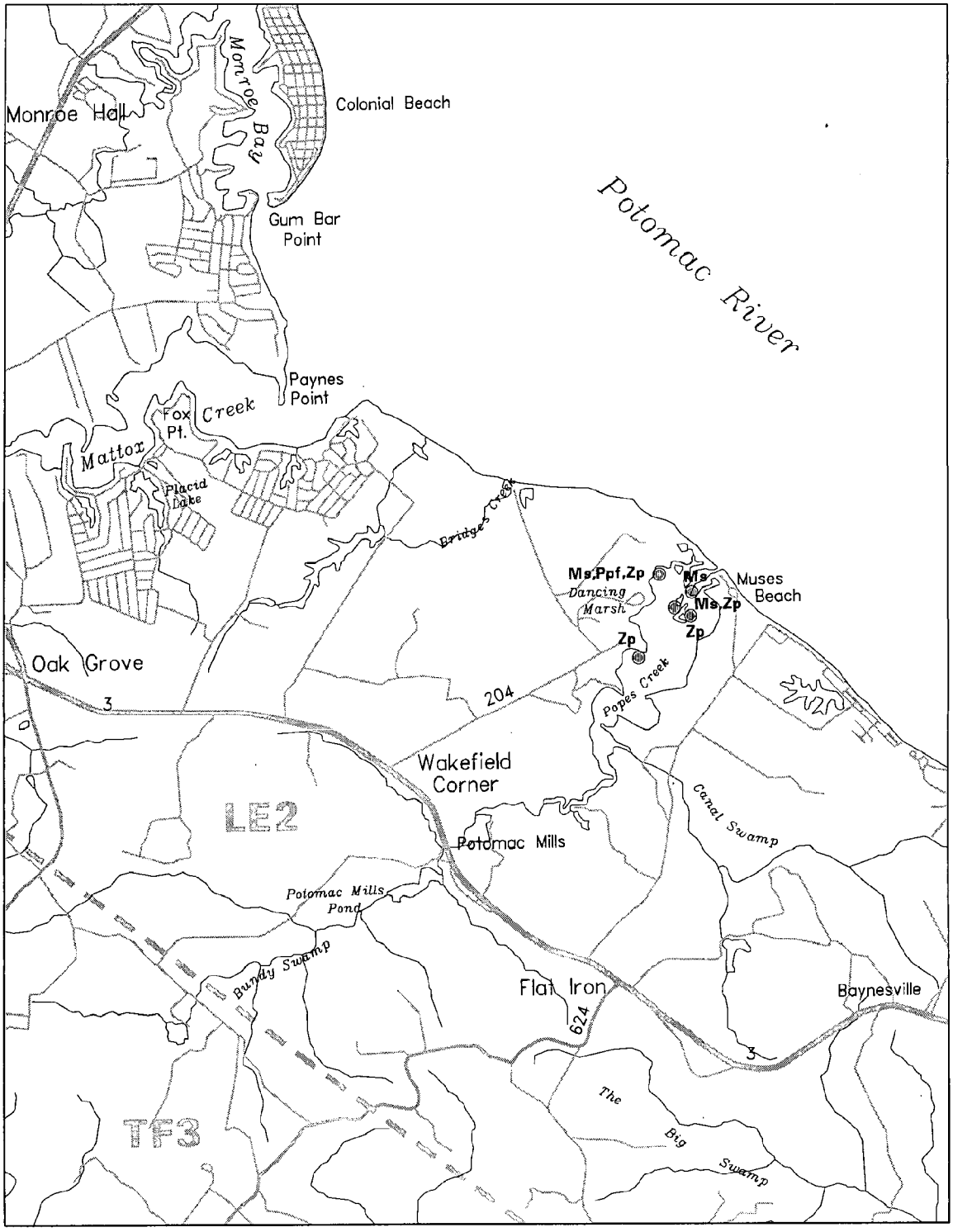
Submerged Aquatic Vegetation 1994

(076) Colonial Beach South, Va.– Md.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 09/07/94

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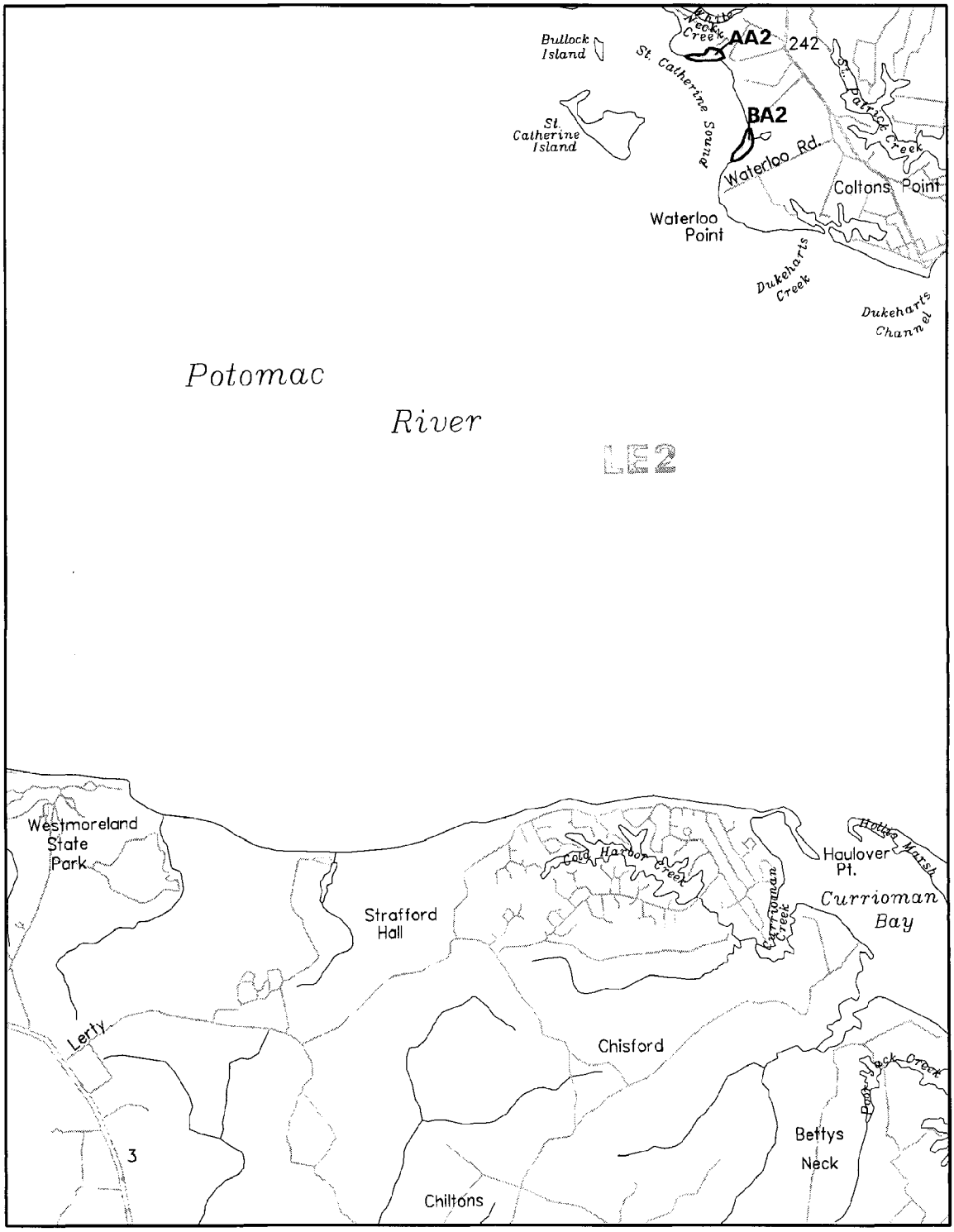
Submerged Aquatic Vegetation 1994

Stratford Hall, Va.– Md. (077)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 09/07/94

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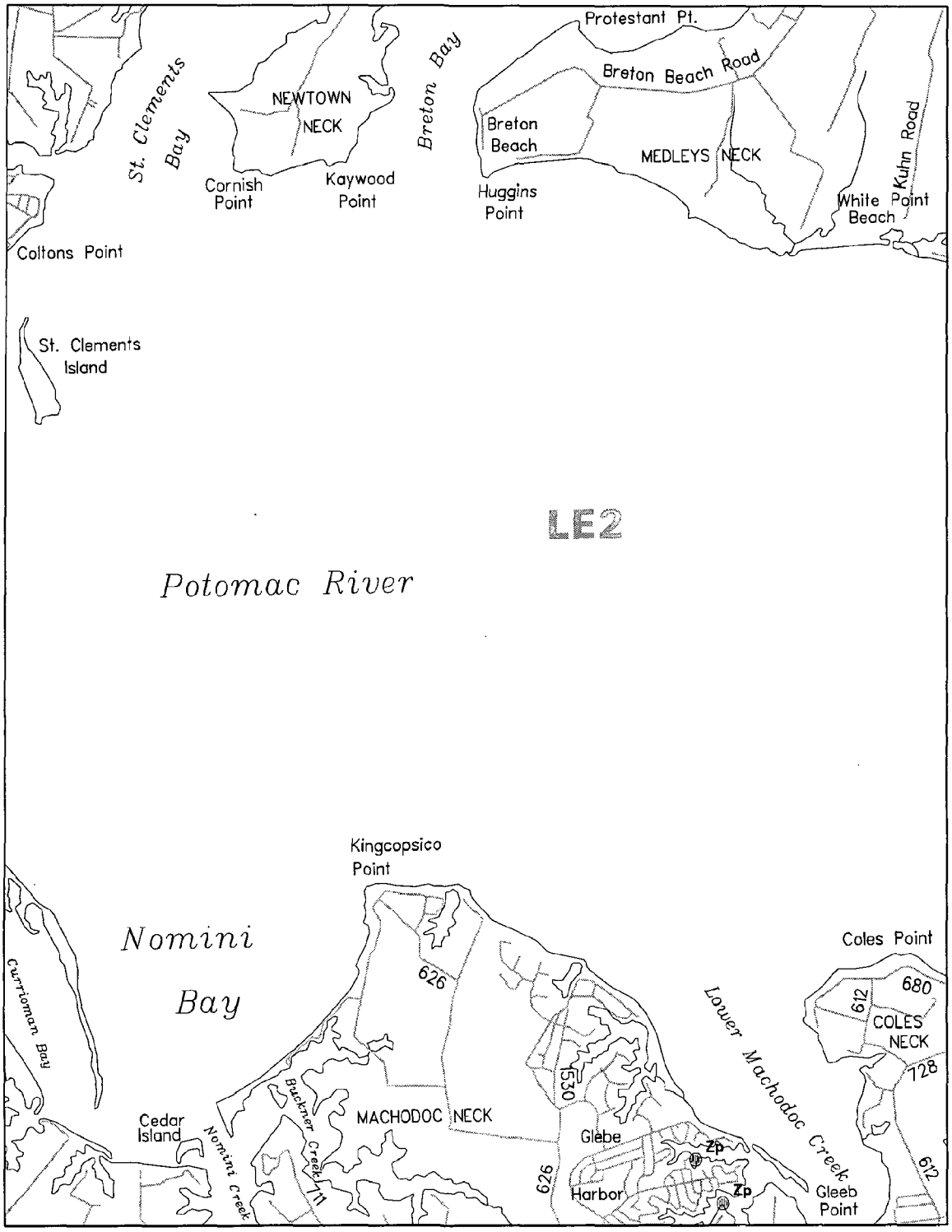
Submerged Aquatic Vegetation 1994

(078) St. Clements Island, Va.– Md.



Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 07/20/94

Produced by:
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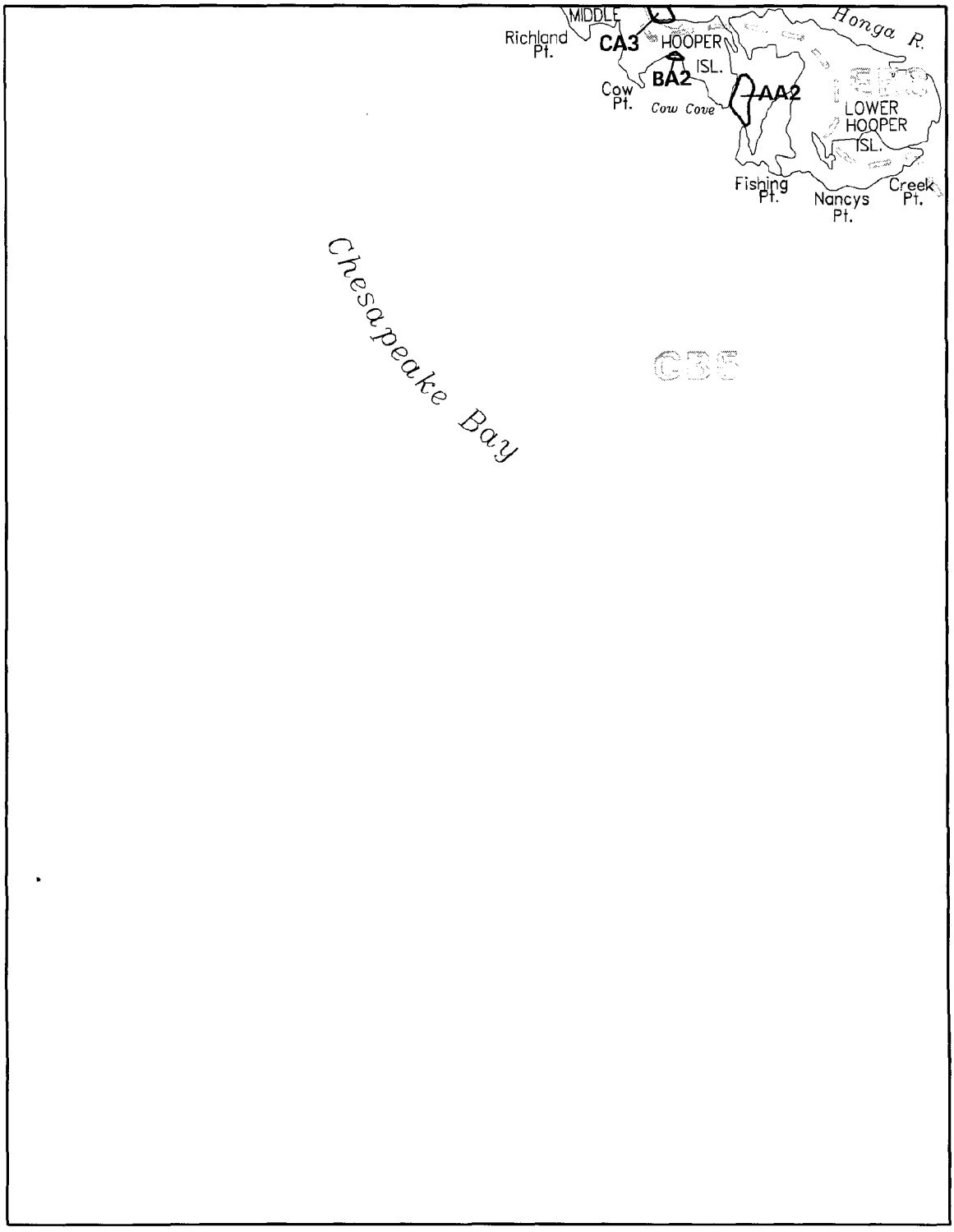
Submerged Aquatic Vegetation 1994

Richland Point, Md. (082)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/09/94

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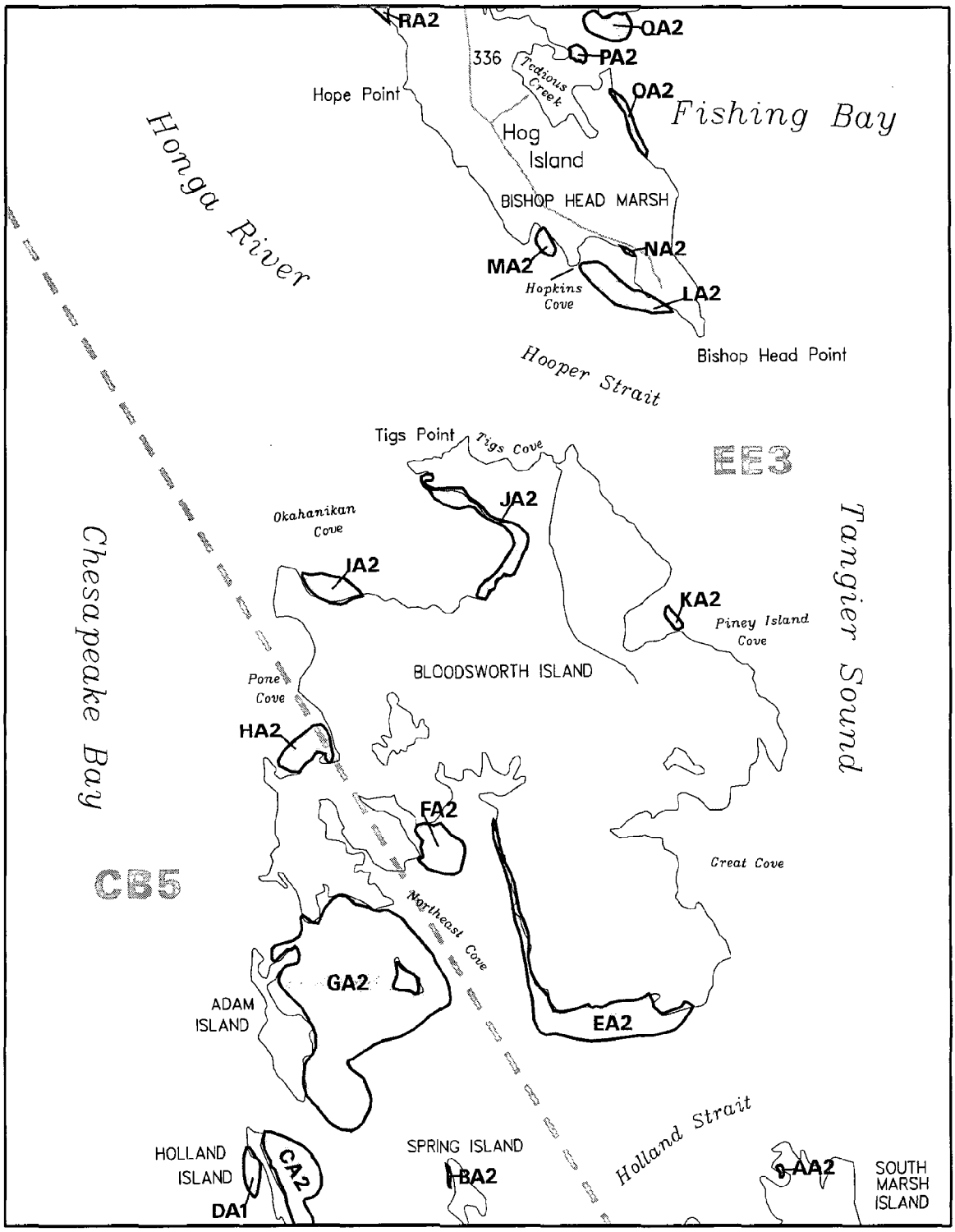
College of William and Mary

Submerged Aquatic Vegetation 1994

(083) Bloodsworth Island, Md.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/09/94, 06/10/94

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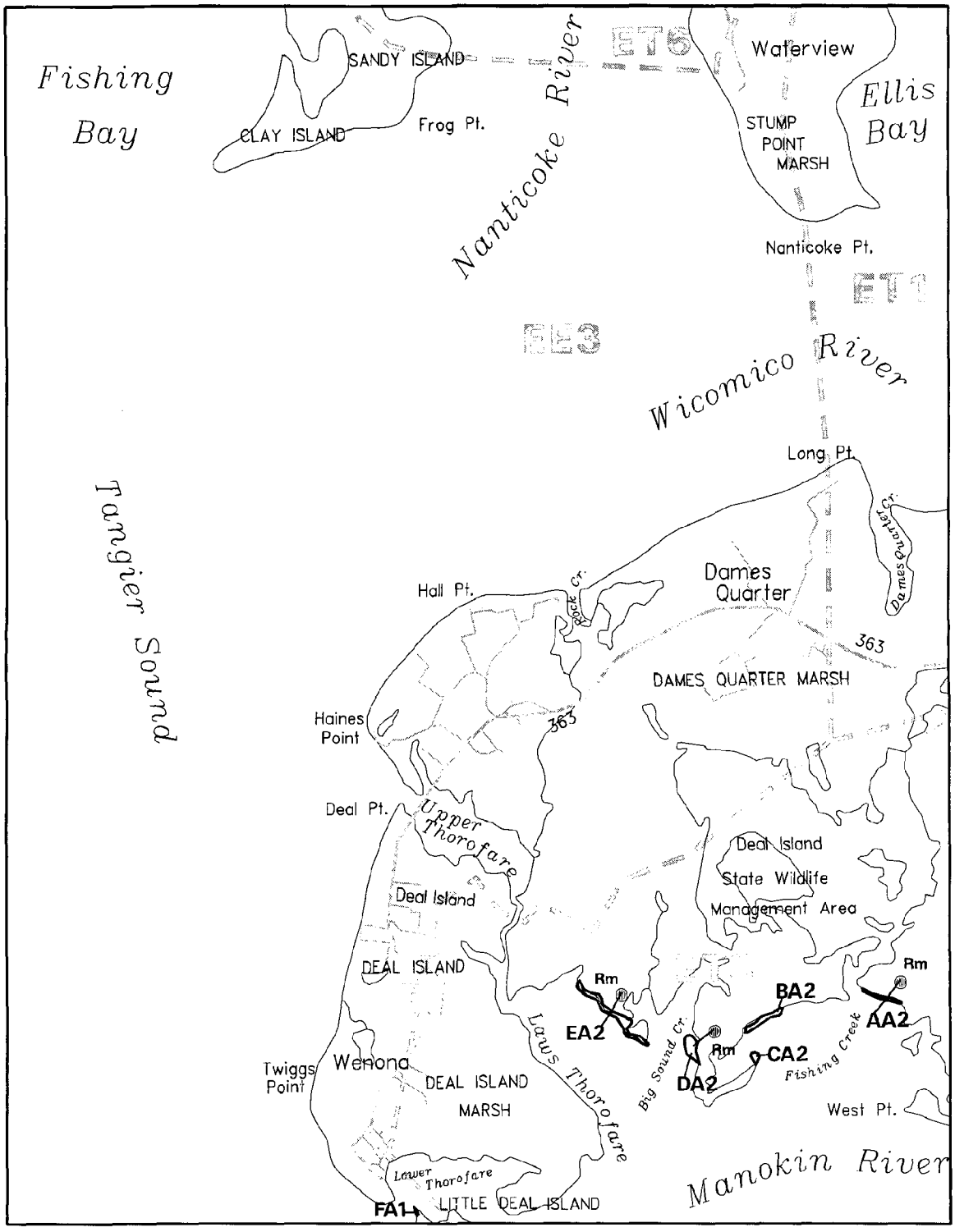
Submerged Aquatic Vegetation 1994

Deal Island, Md. (084)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/09/94

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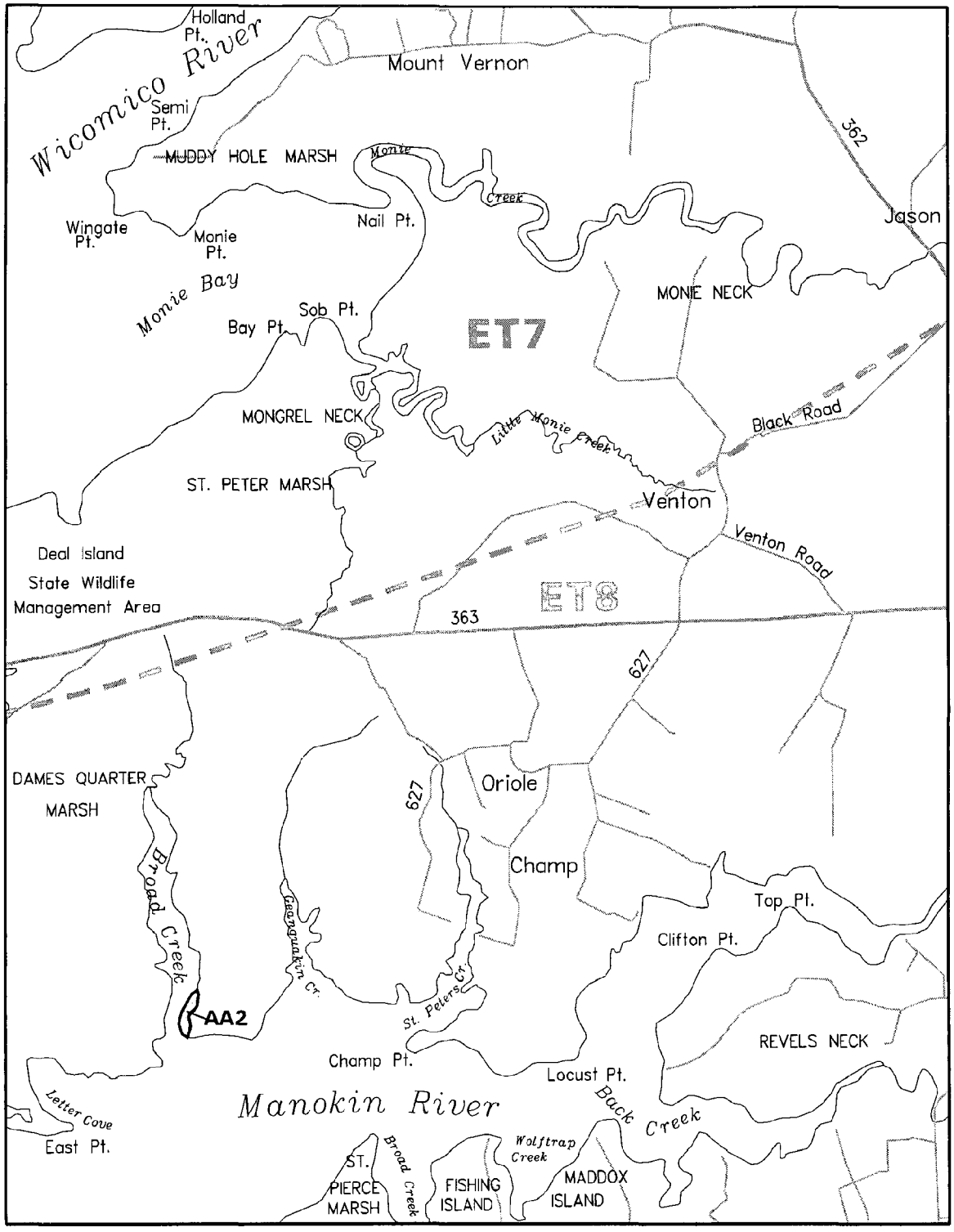
Submerged Aquatic Vegetation 1994

(085) Monie, Md.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/09/94

Produced by:
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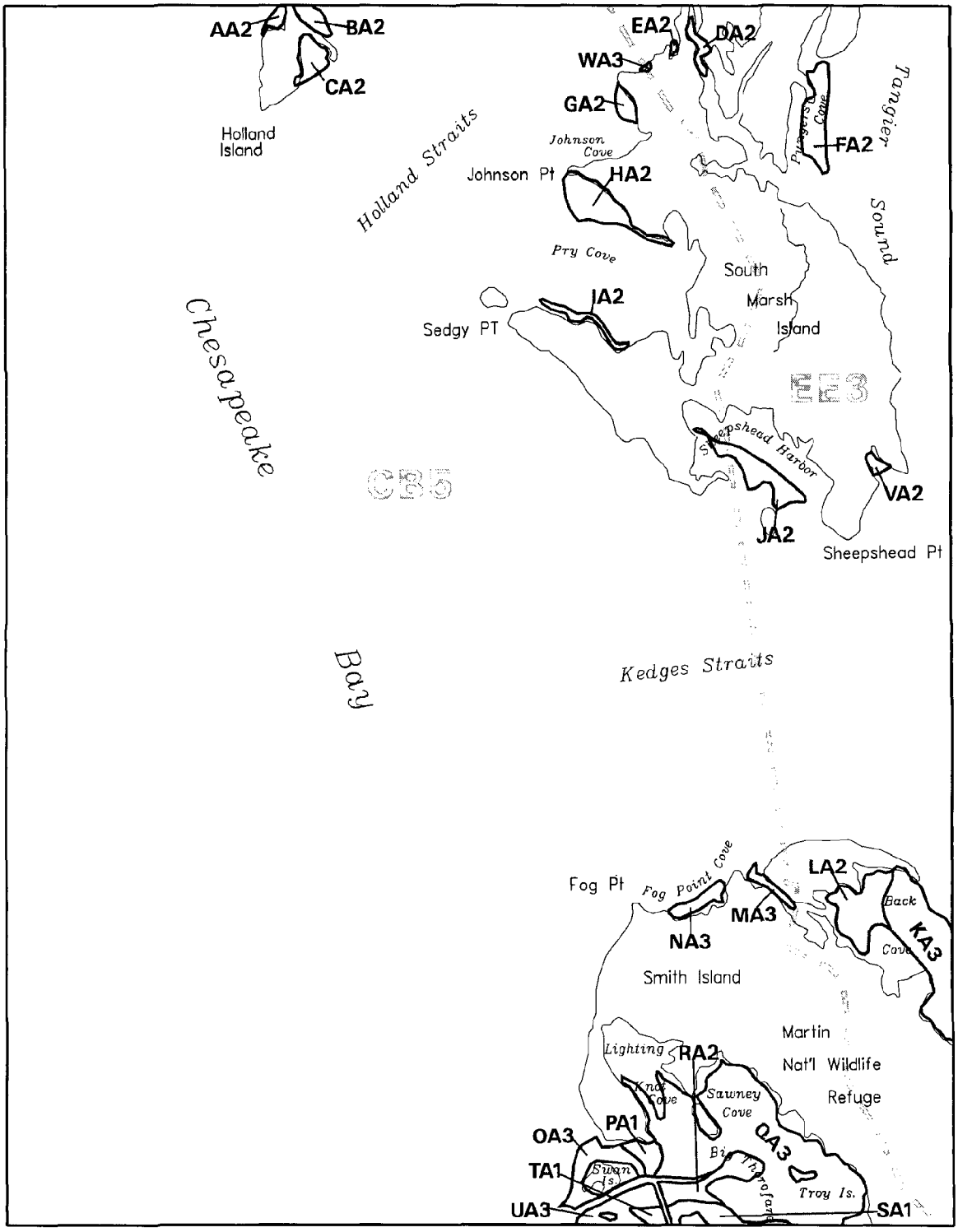
College of William and Mary

Submerged Aquatic Vegetation 1994

Kedges Straits, Md. (091)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/09/94

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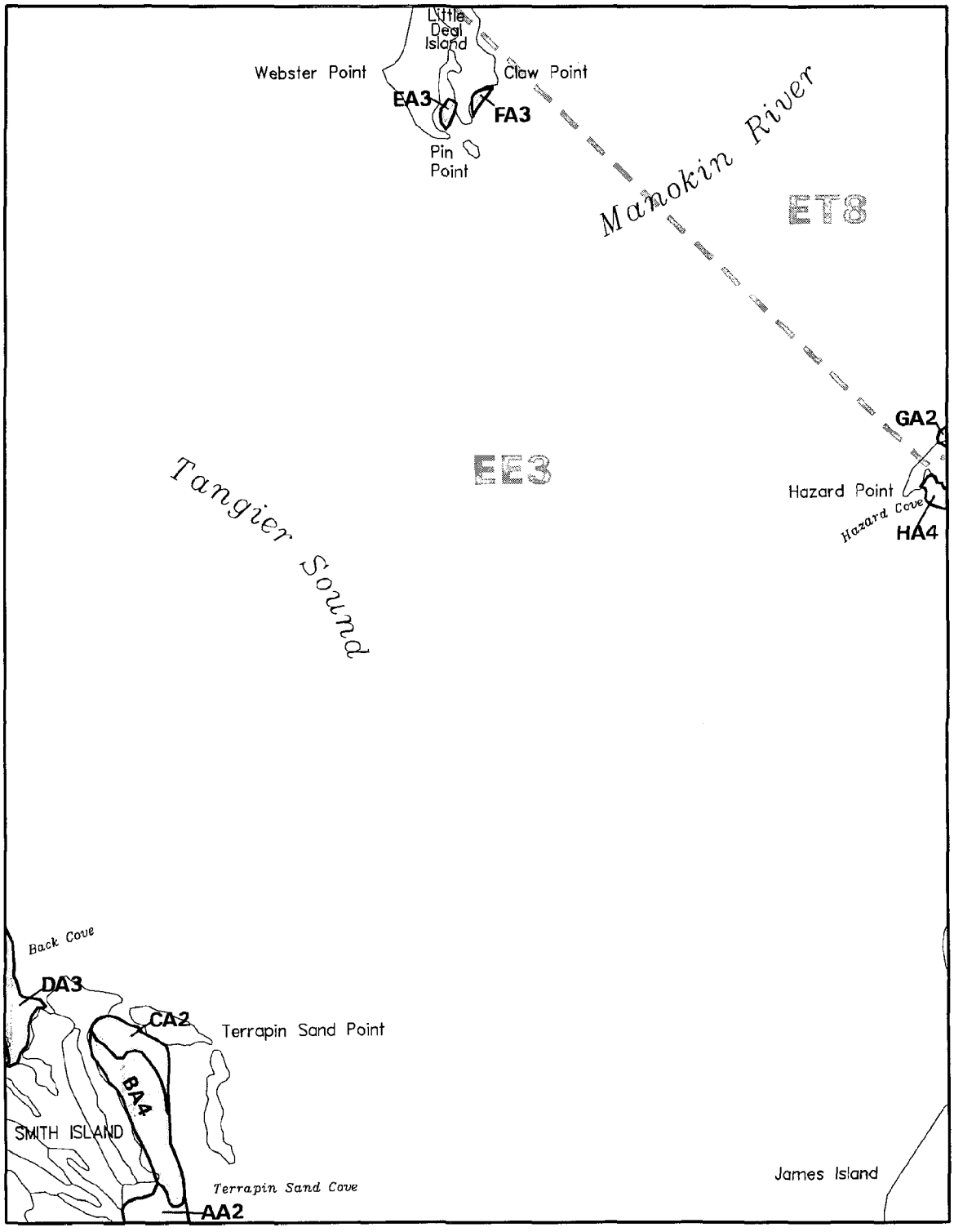
Submerged Aquatic Vegetation 1994

(092) Terrapin Sand Point, Md.



Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/09/94

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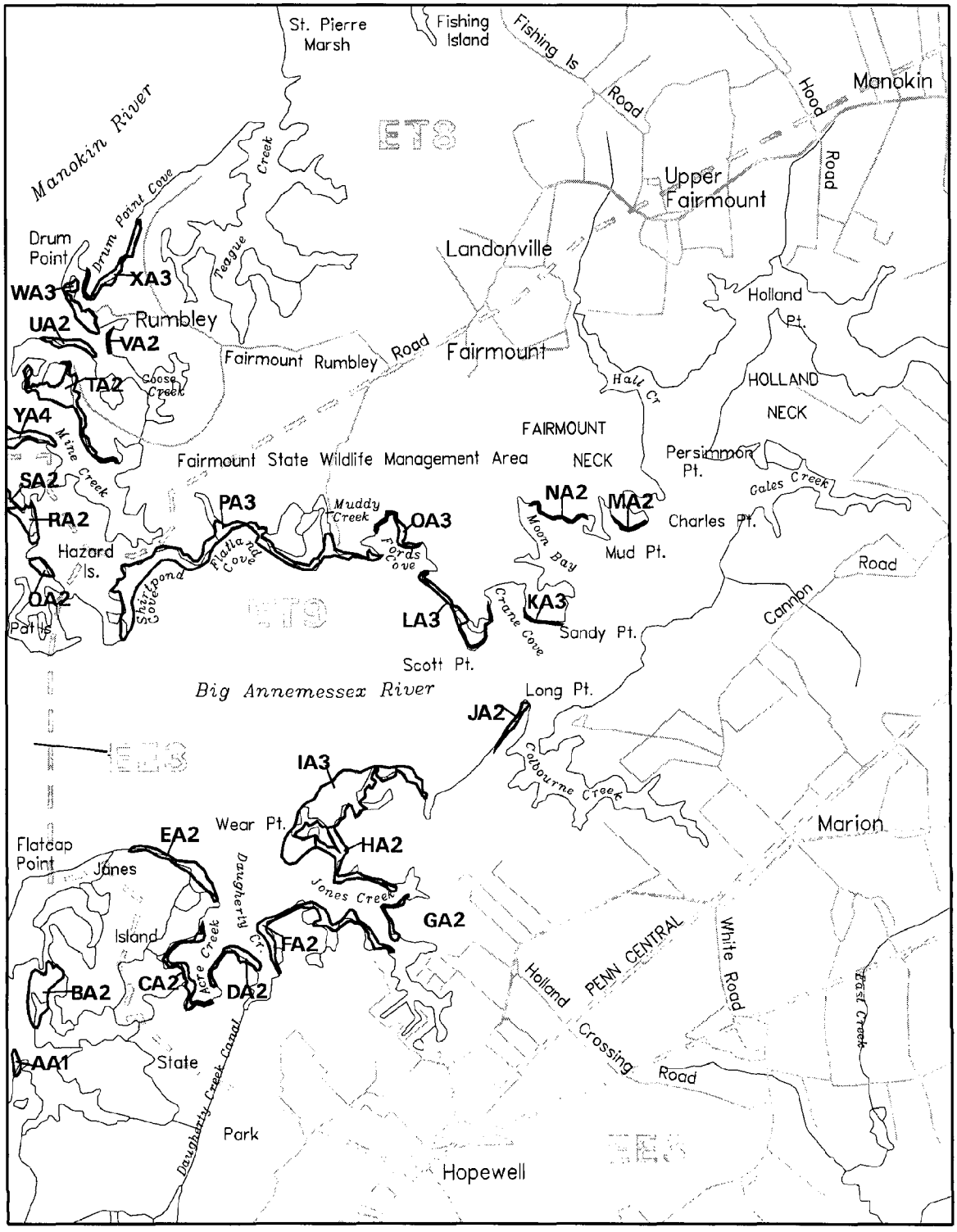
Submerged Aquatic Vegetation 1994

Marion, Md. (093)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 06/09/94

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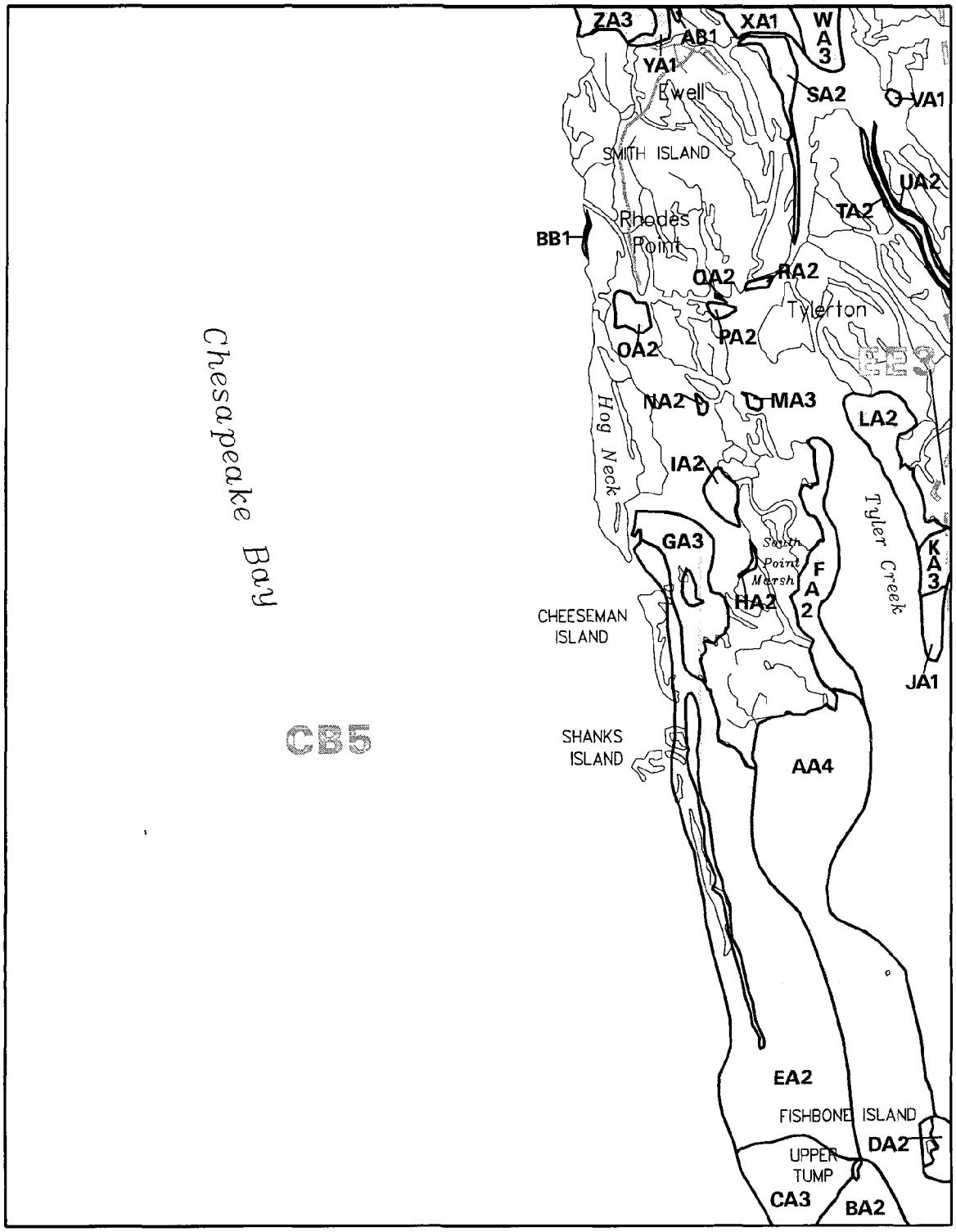
(099) Ewell, Md.– Va.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/09/94

Produced by:
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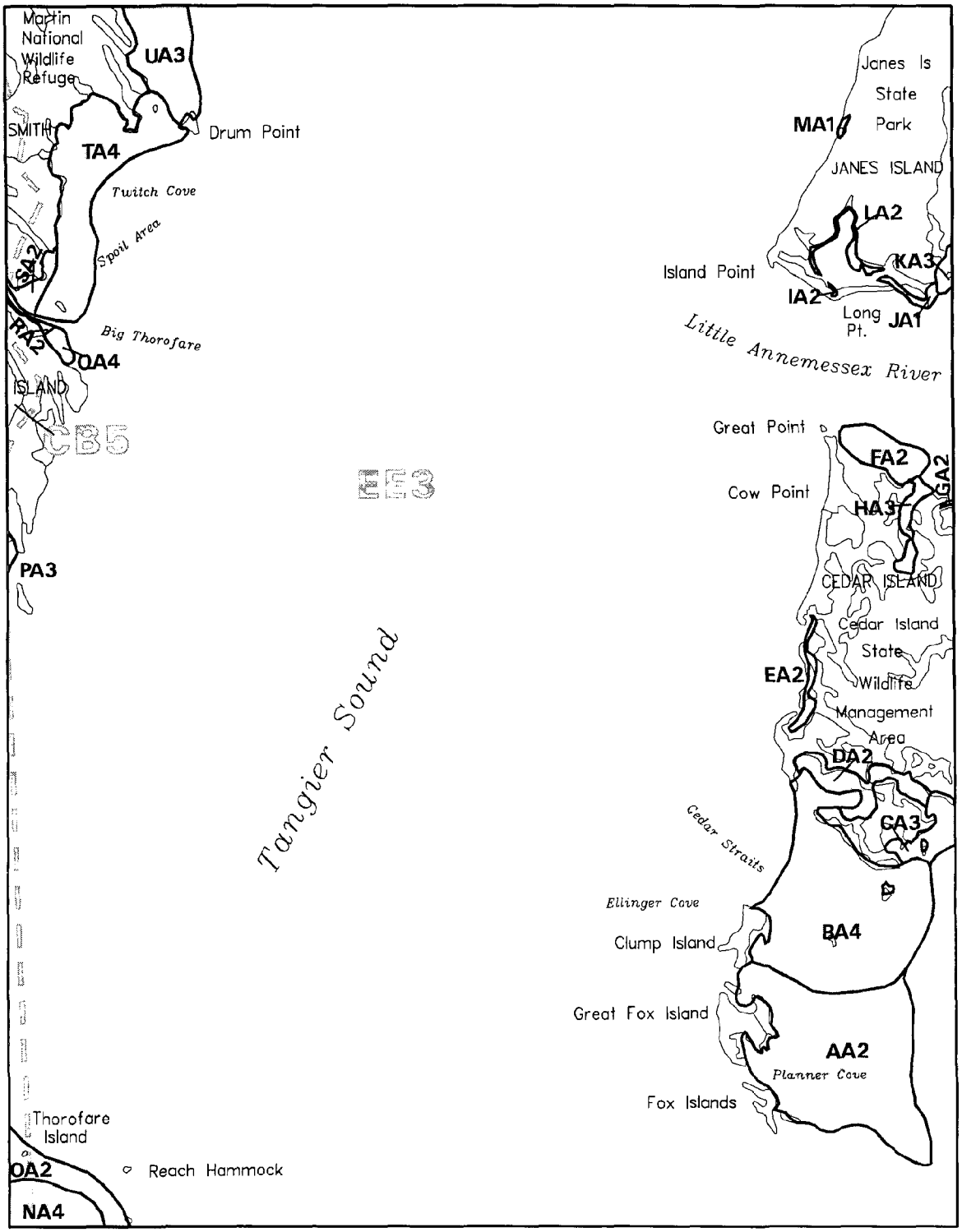
Great Fox Island, Va.– Md. (100)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/09/94

Produced by:
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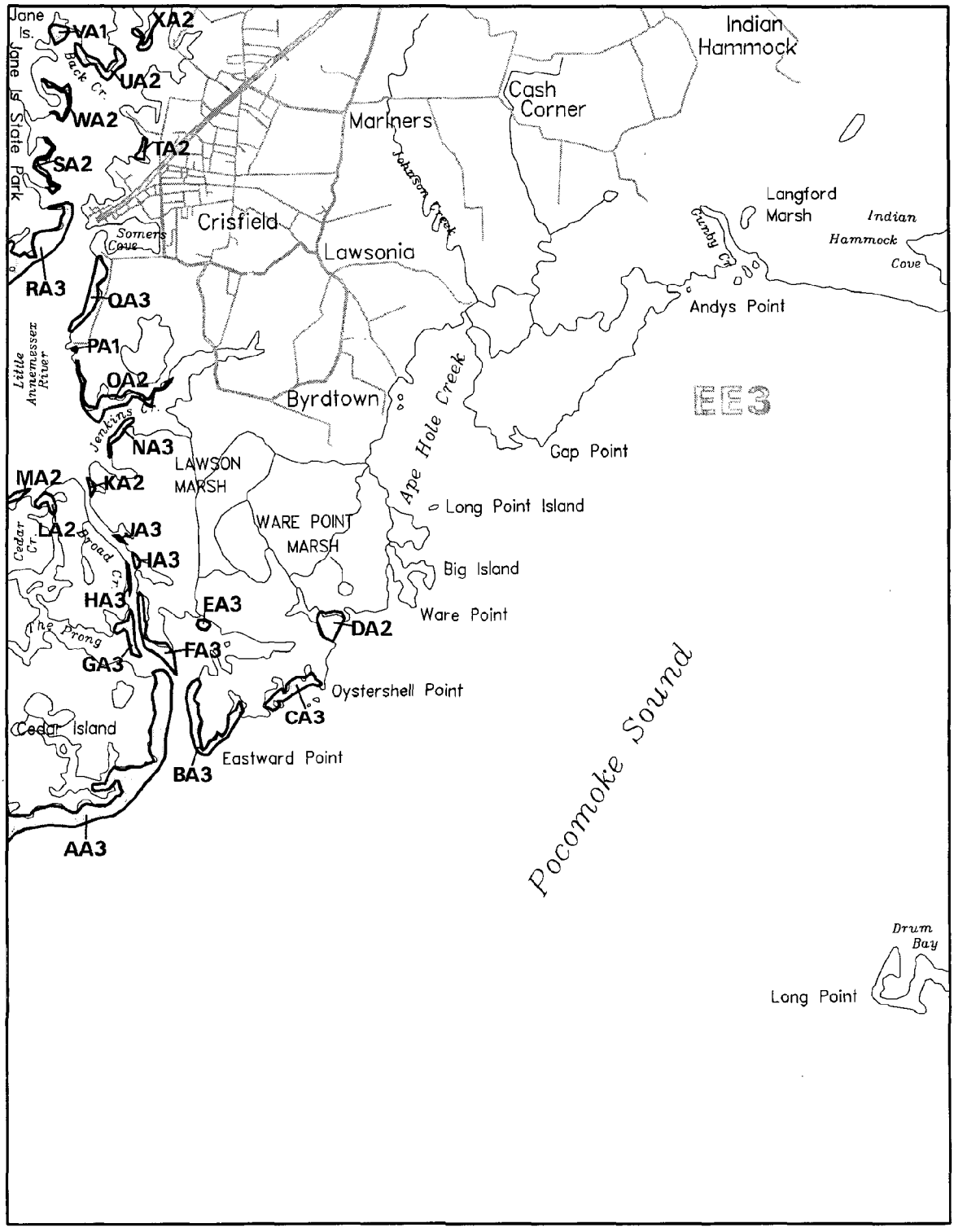
Submerged Aquatic Vegetation 1994

(101) Crisfield, Md.– Va.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/09/94

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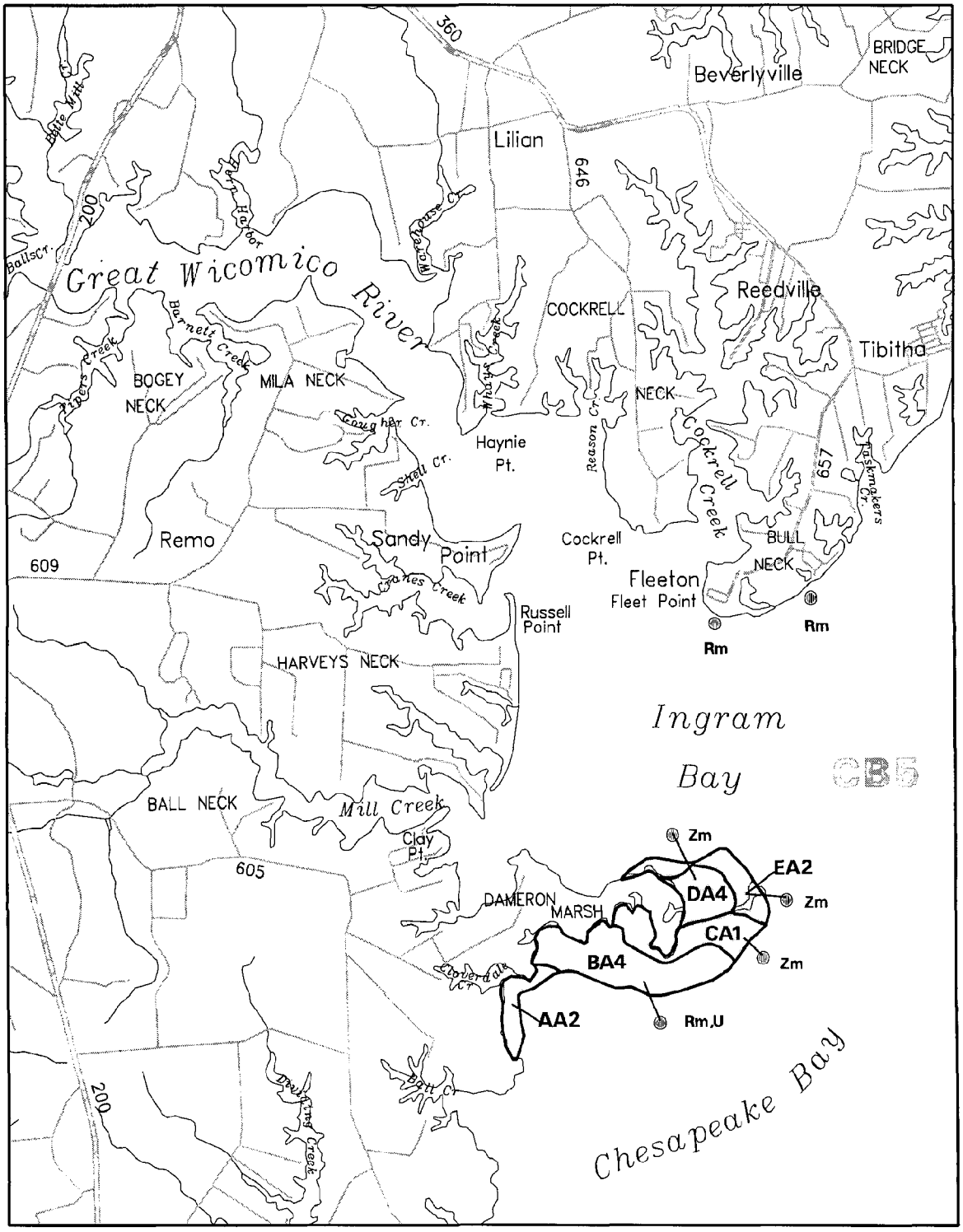
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

Reedville, Va. (106)



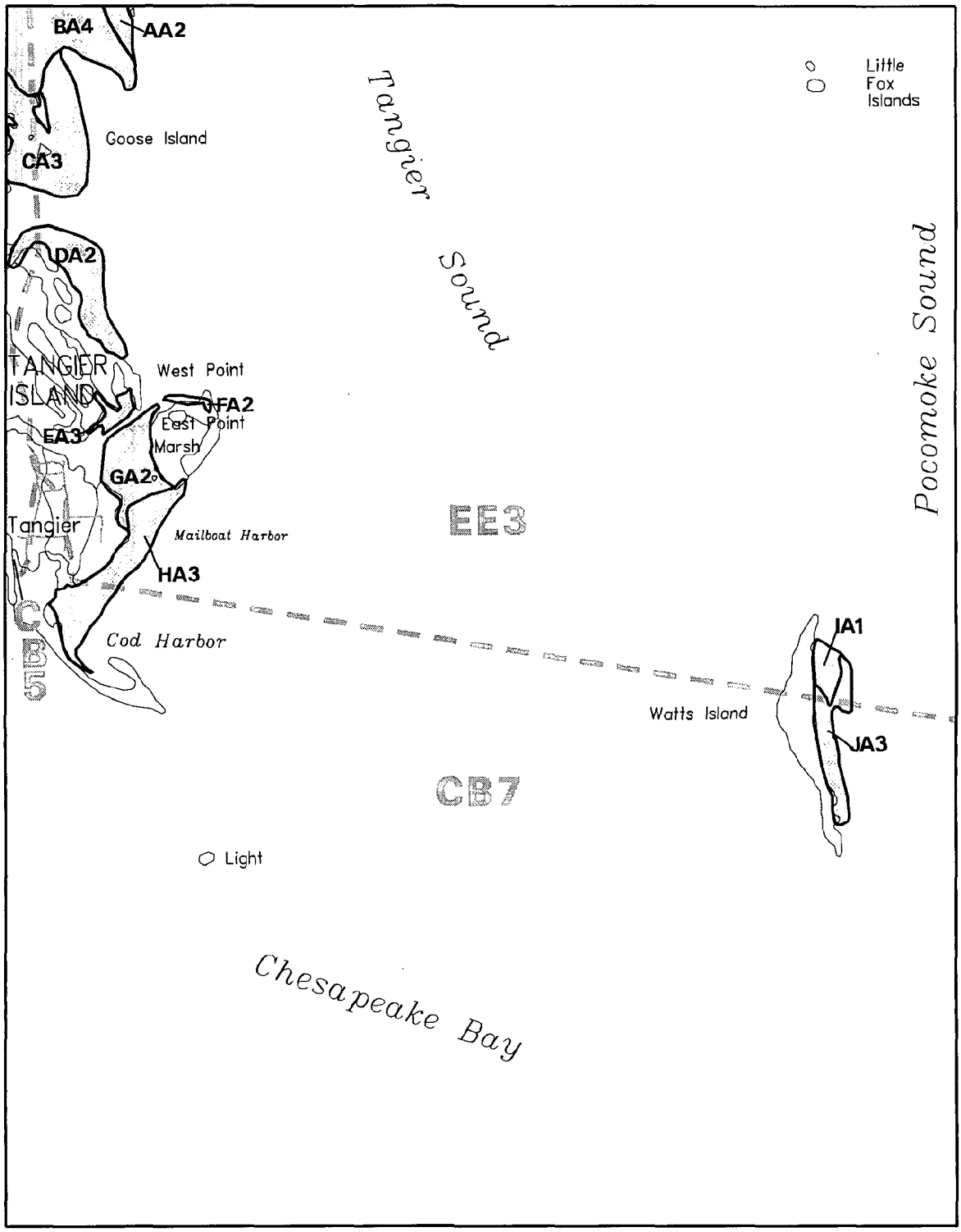
1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 05/29/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

(107) Tangier Island, Va.



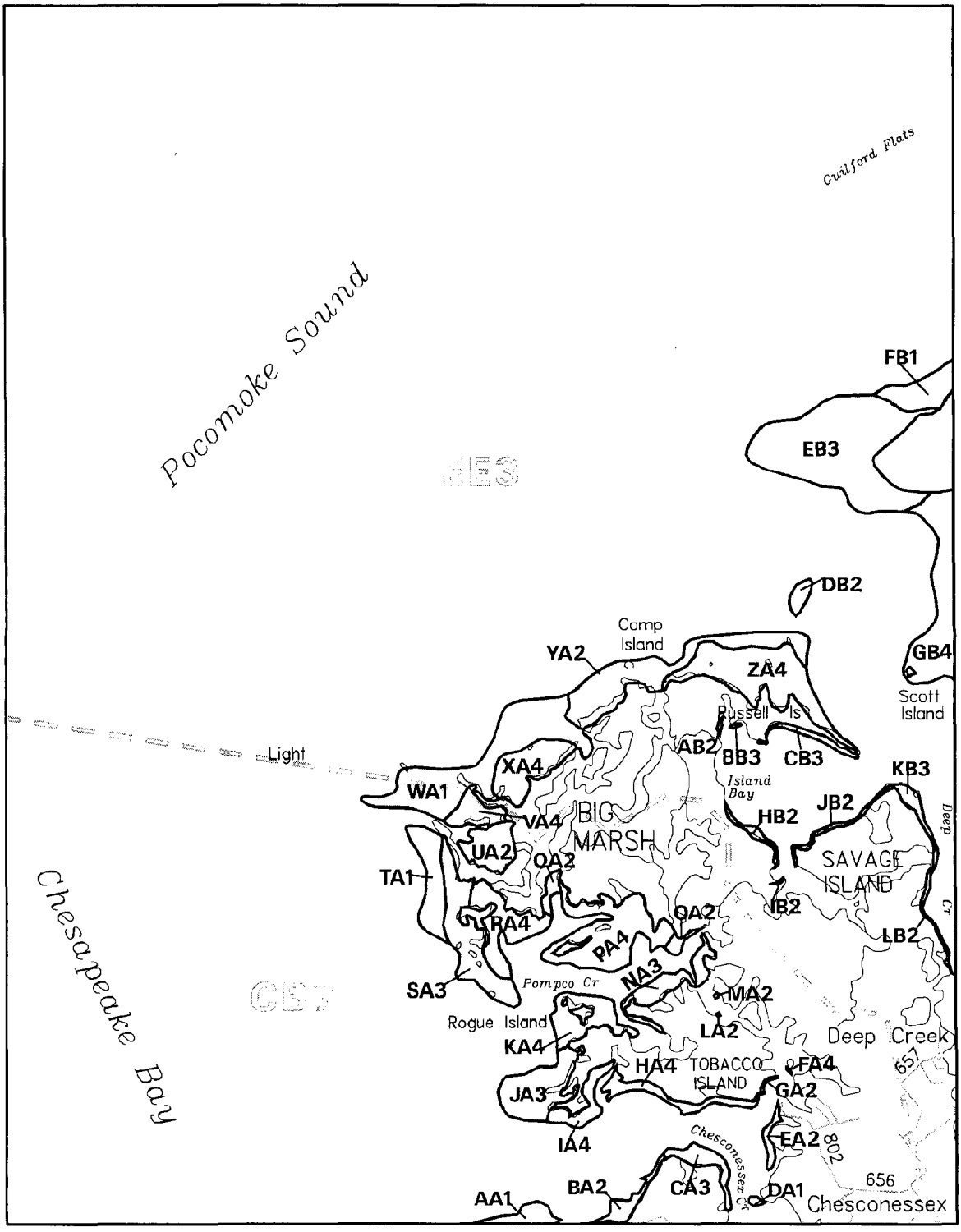
1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/09/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

Chesconessex, Va. (108)



Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 05/24/94

Produced by:
School of Marine Science
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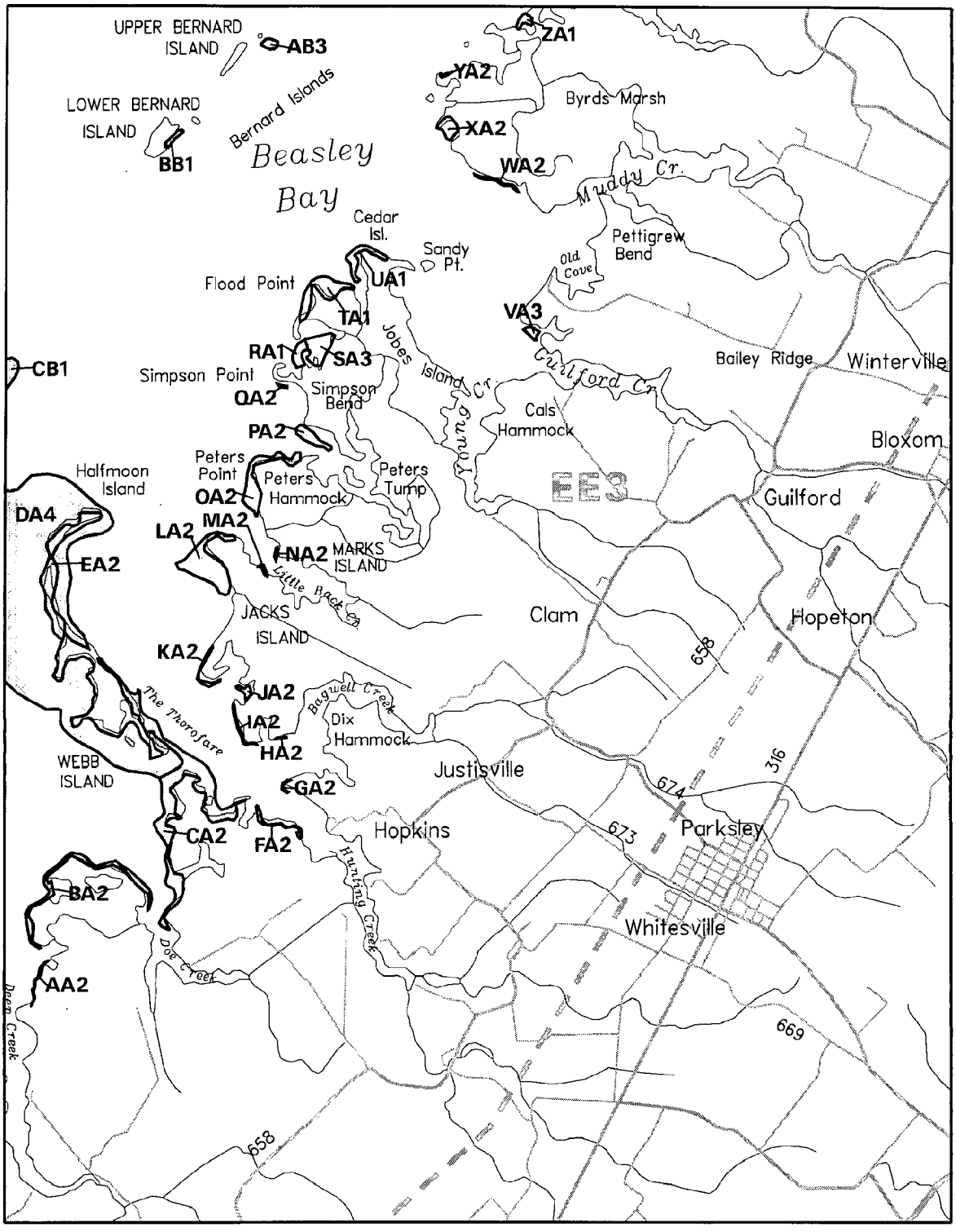
College of William and Mary

Submerged Aquatic Vegetation 1994

(109) Parksley, Va.

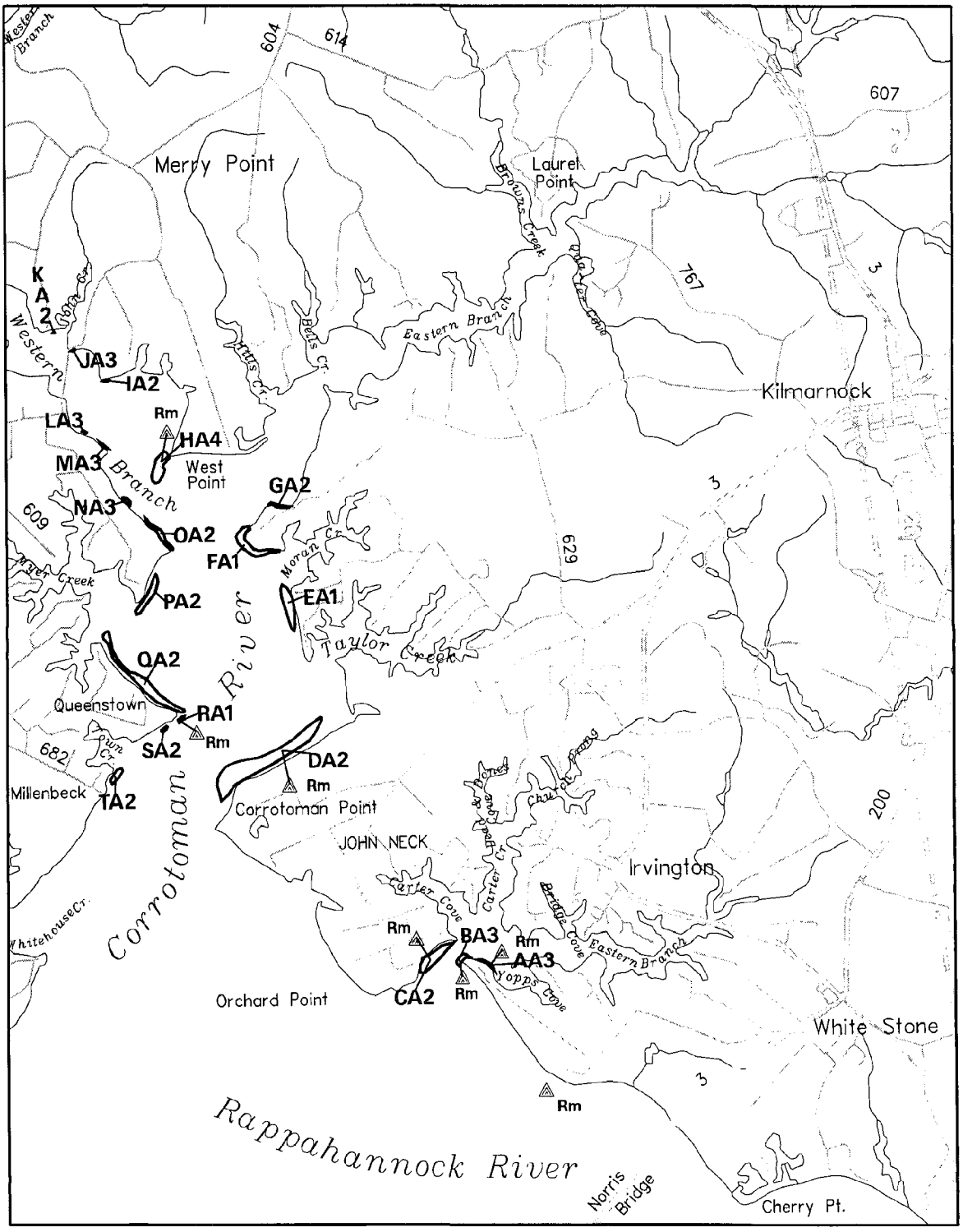


Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 05/24/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

Irvington, Va. (111)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 05/29/94

Produced by:
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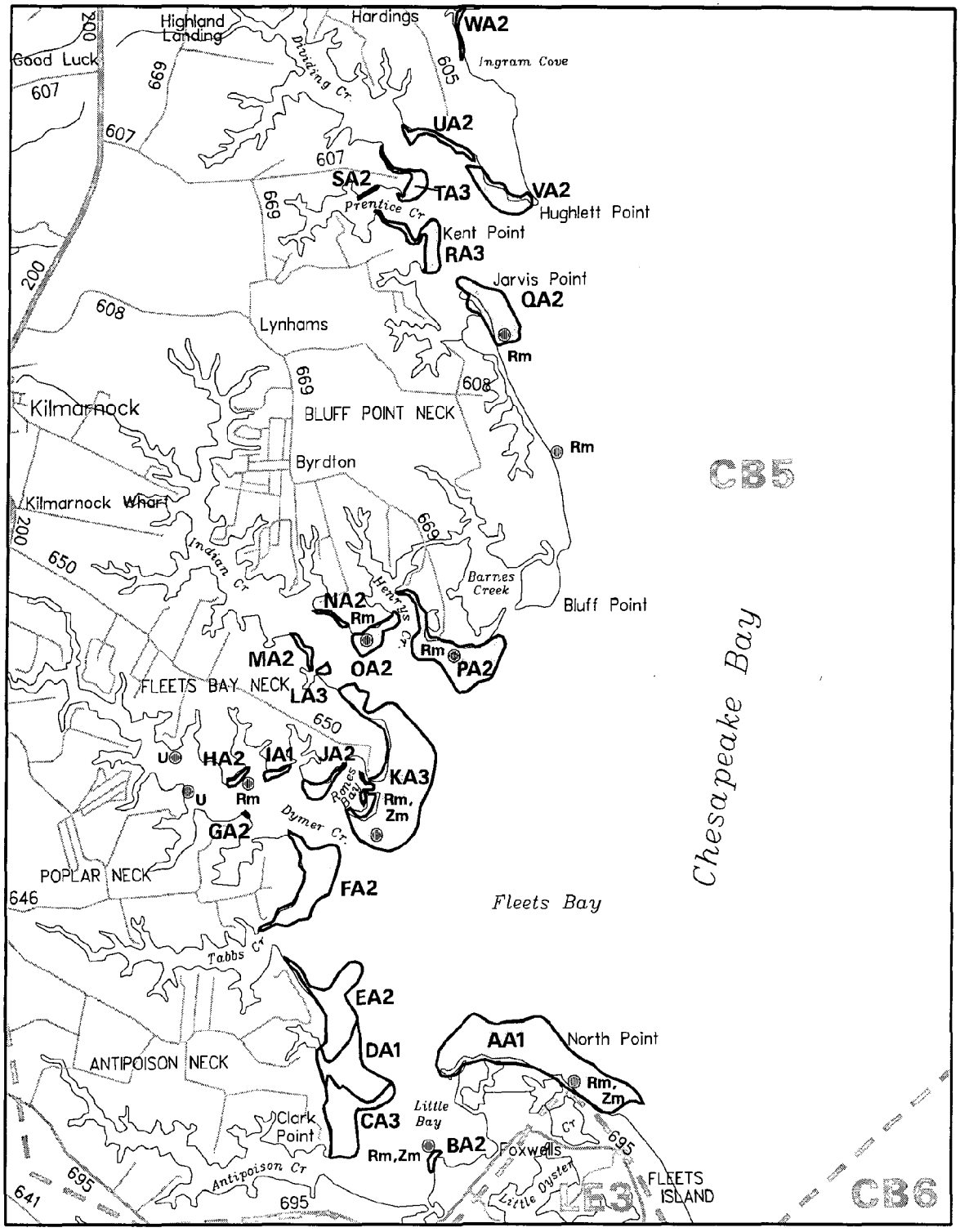
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

(112) Fleets Bay, Va.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/10/94

Produced by:
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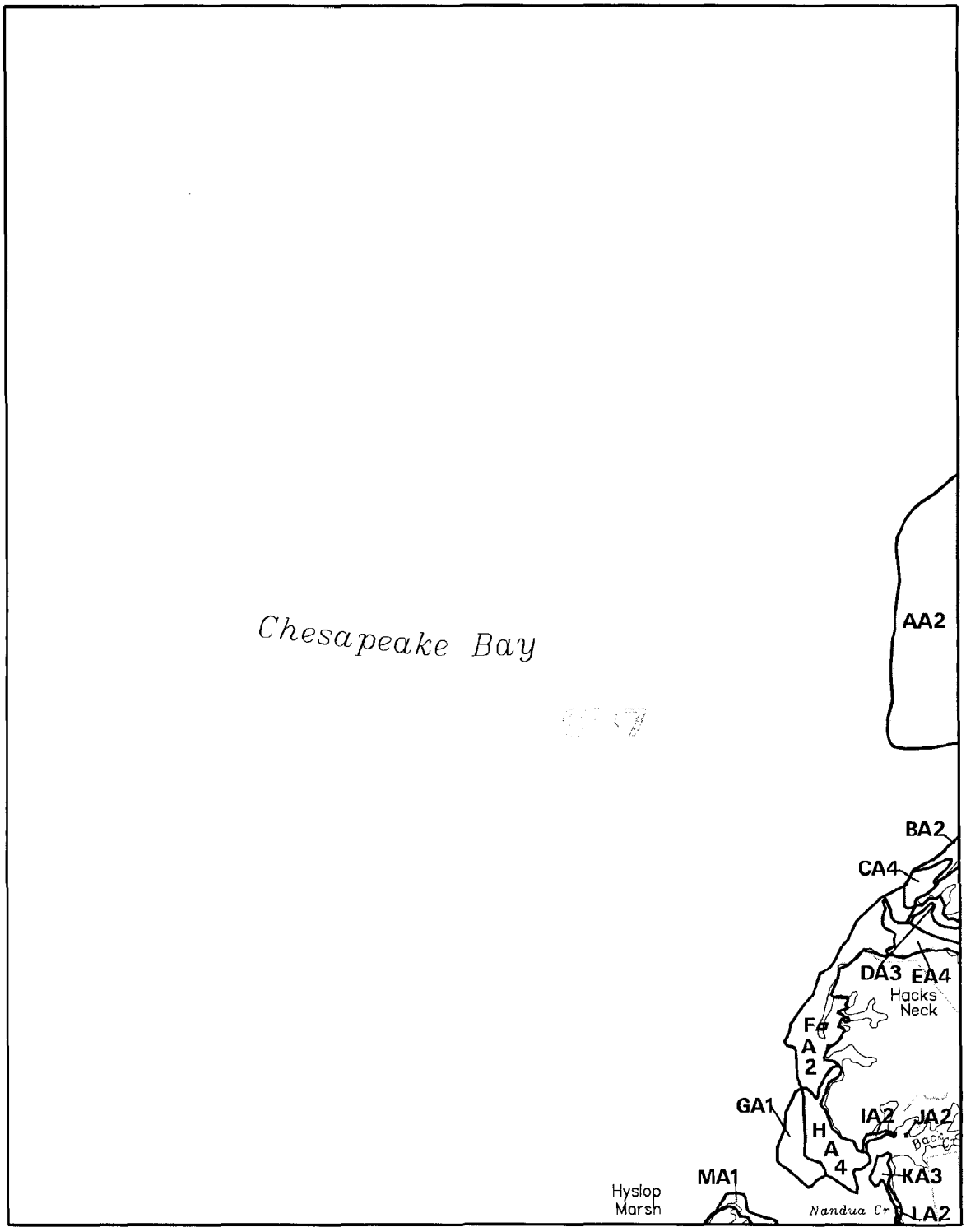
College of William and Mary

Submerged Aquatic Vegetation 1994

Nandua Creek, Va. (113)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 05/24/94

Produced by:
School of Marine Science
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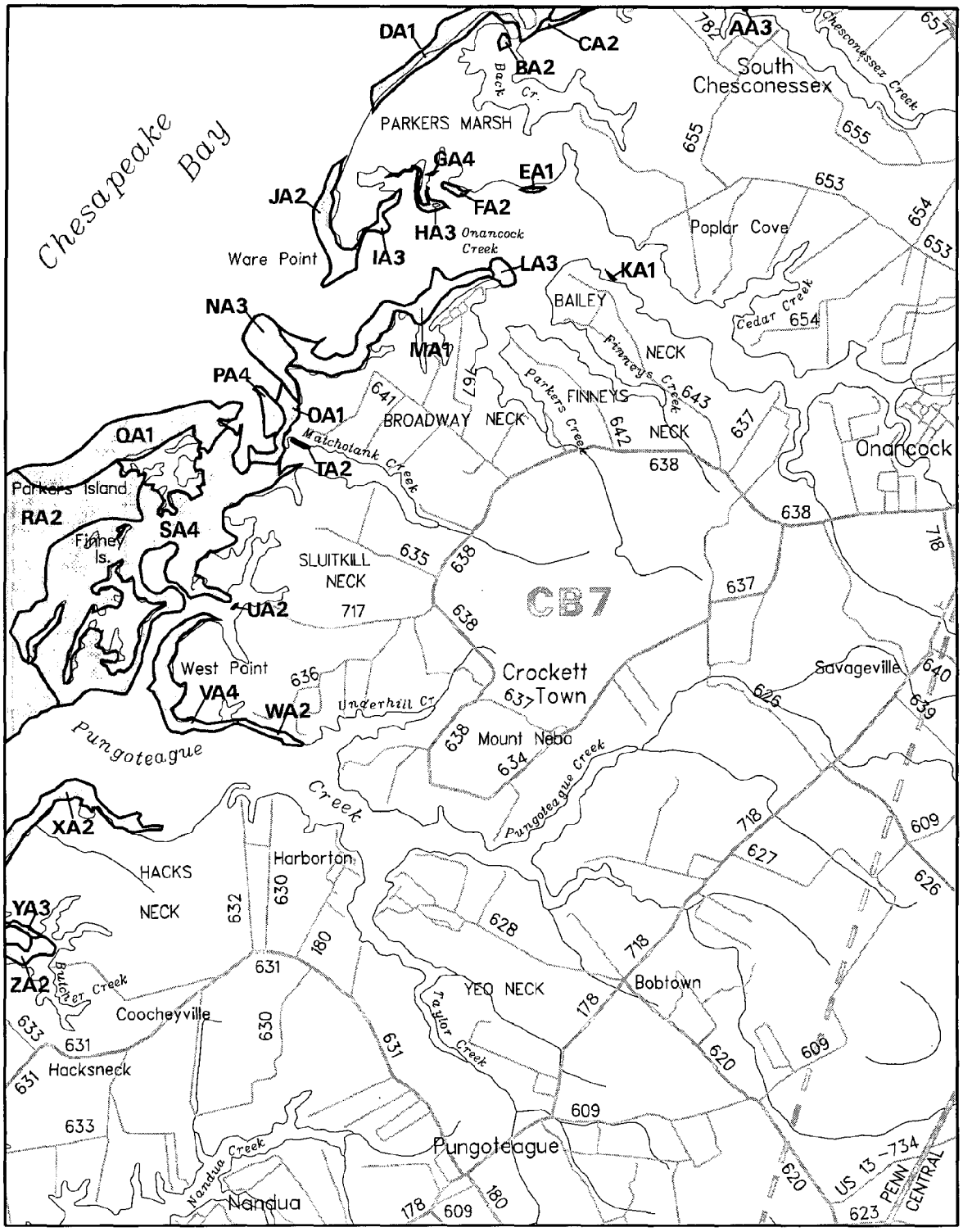
College of William and Mary

Submerged Aquatic Vegetation 1994

(114) Pungoteague, Va.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 05/24/94

Produced by:
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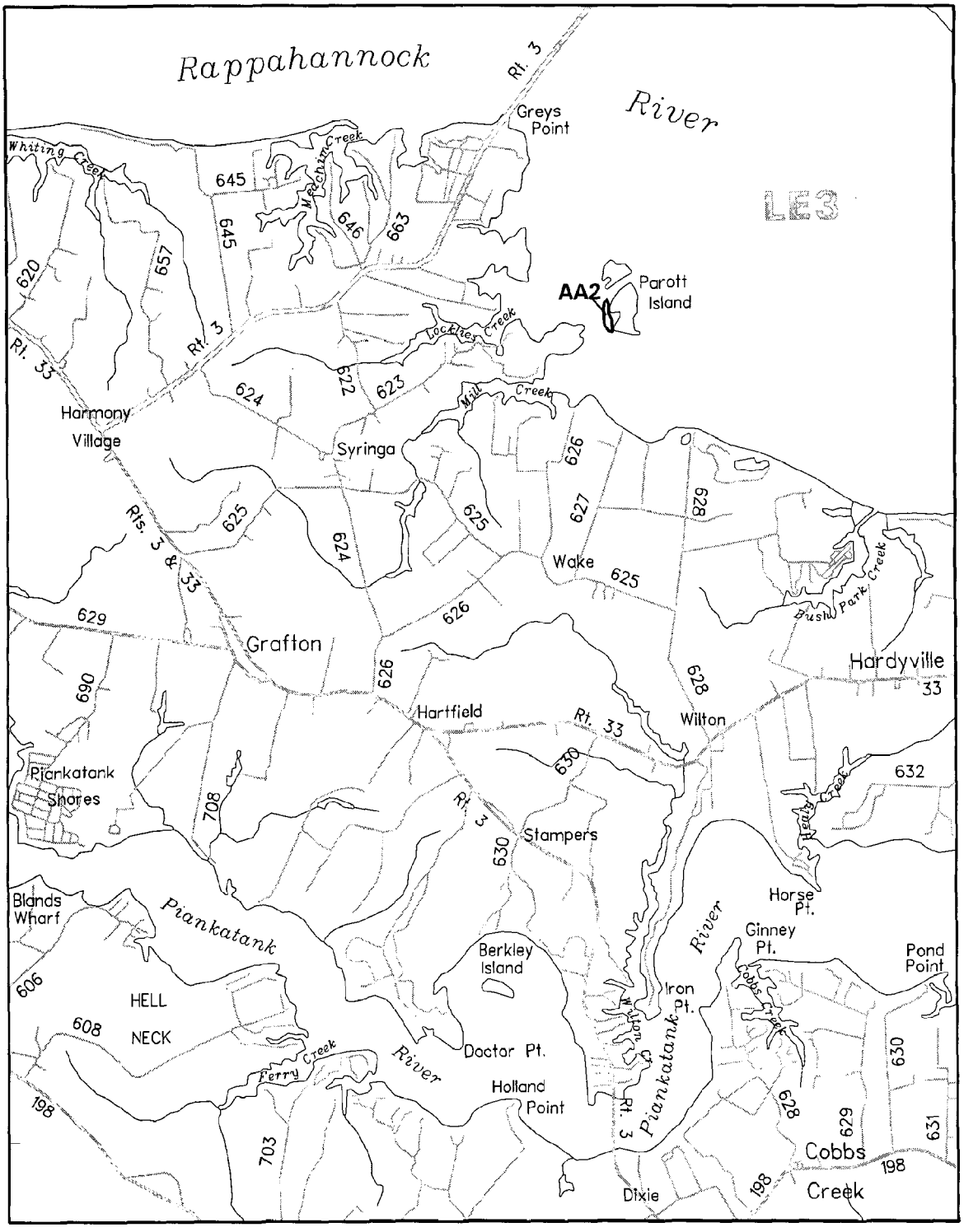
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

Wilton, Va. (117)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 05/24/94

Produced by:
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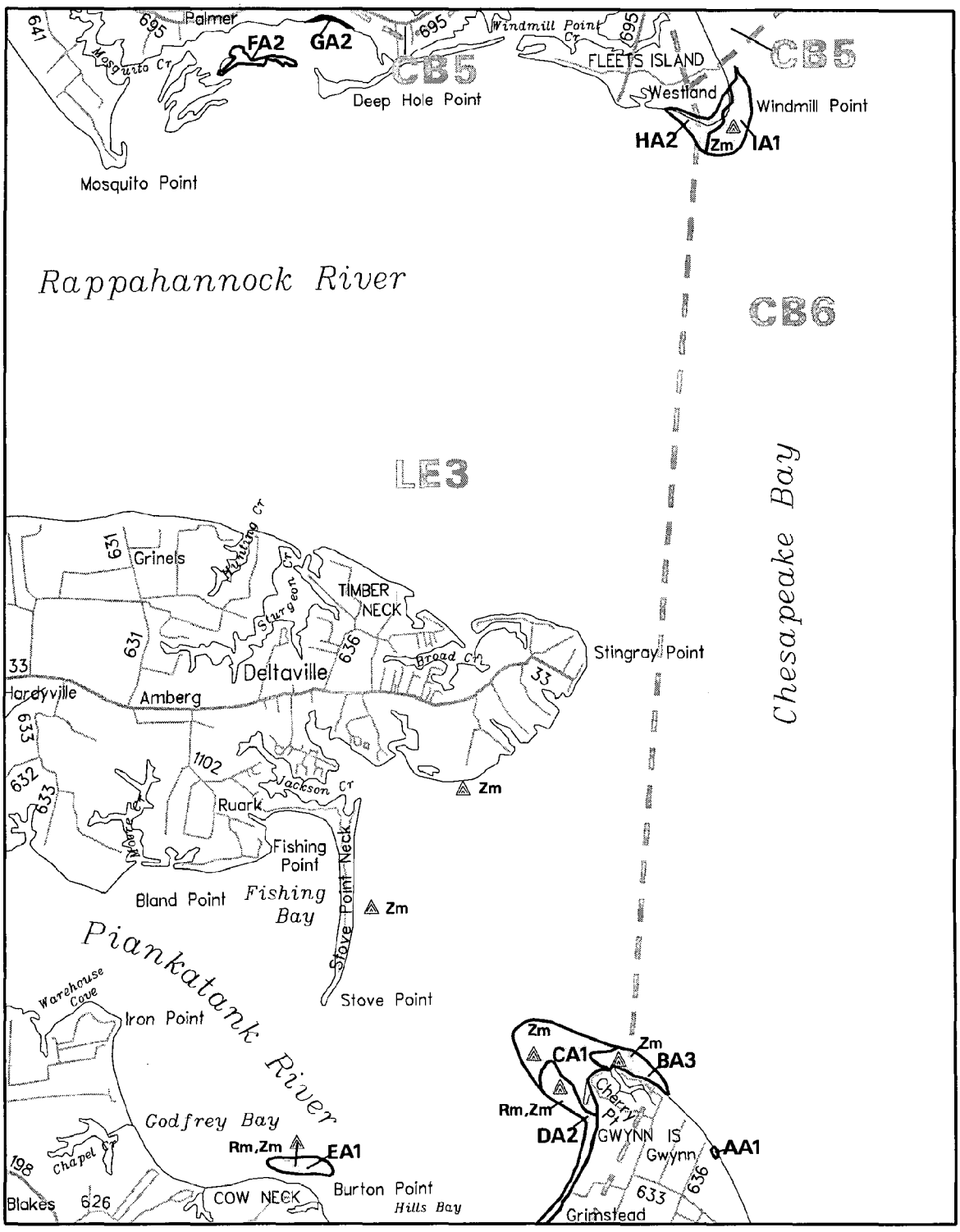
College of William and Mary

Submerged Aquatic Vegetation 1994

(118) Deltaville, Va.



Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 05/24/94

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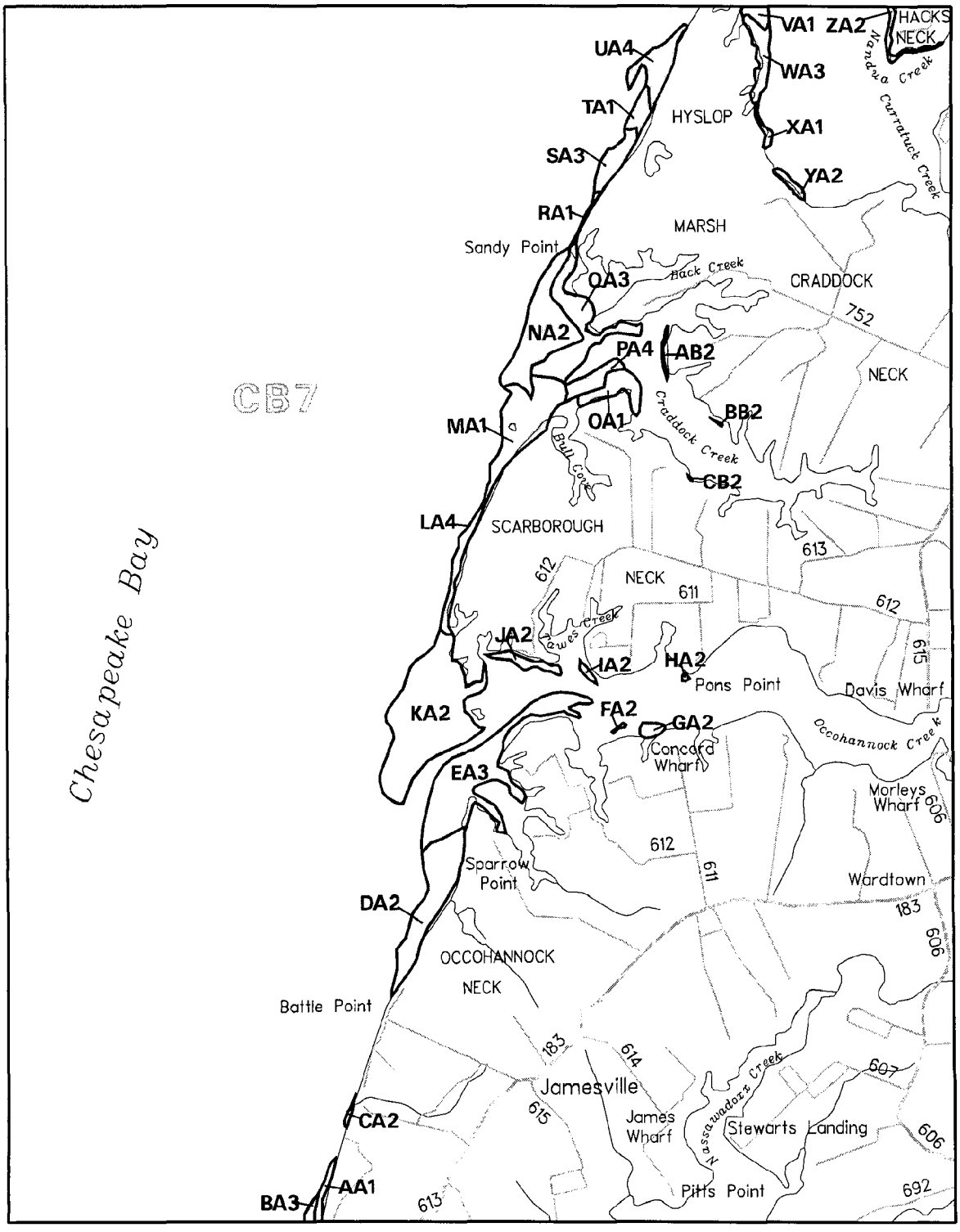
College of William and Mary

Submerged Aquatic Vegetation 1994

Jamesville, Va. (119)



Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 05/24/94

Produced by:
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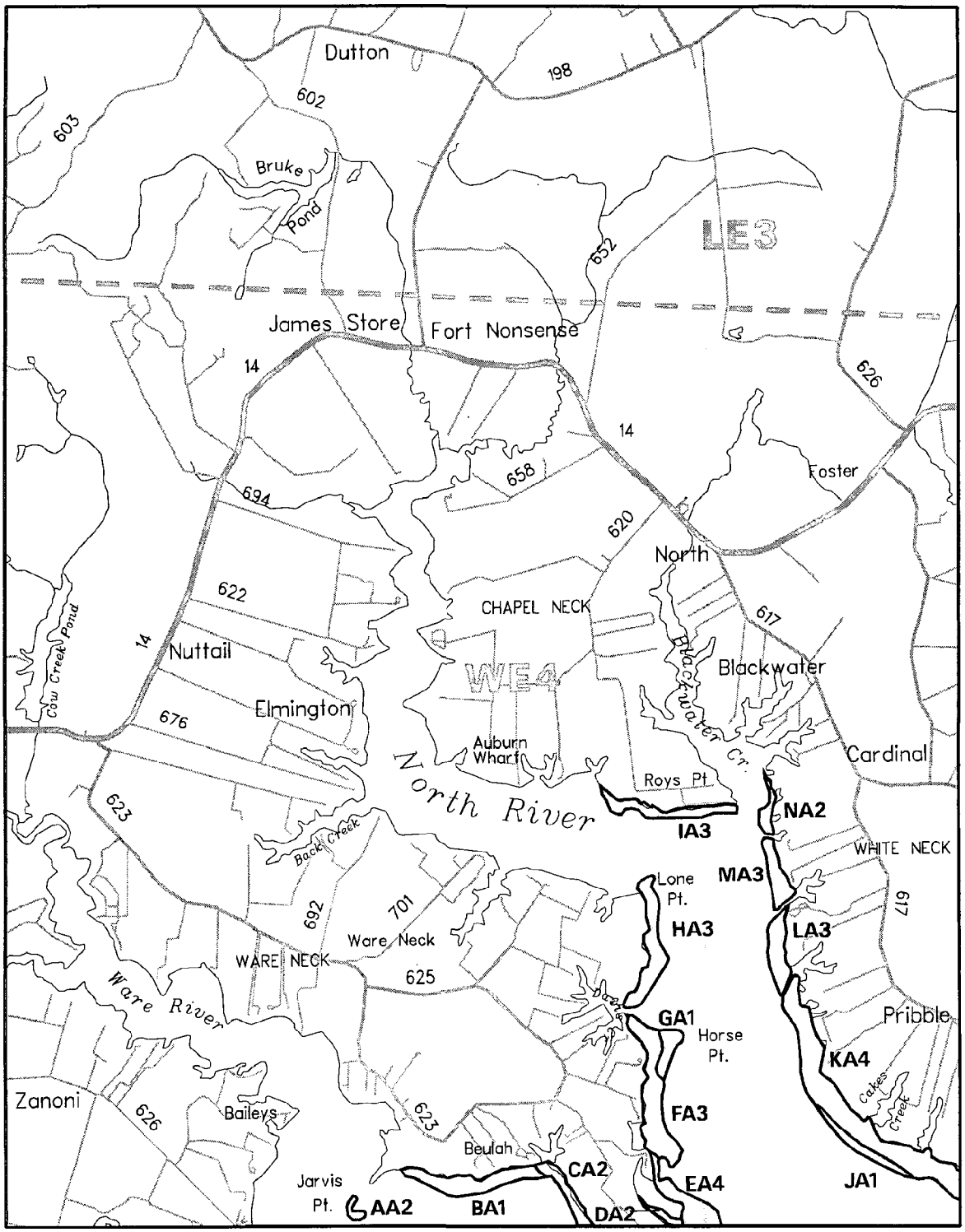
College of William and Mary

Submerged Aquatic Vegetation 1994

(122) Ware Neck, Va.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 05/24/94

Produced by:
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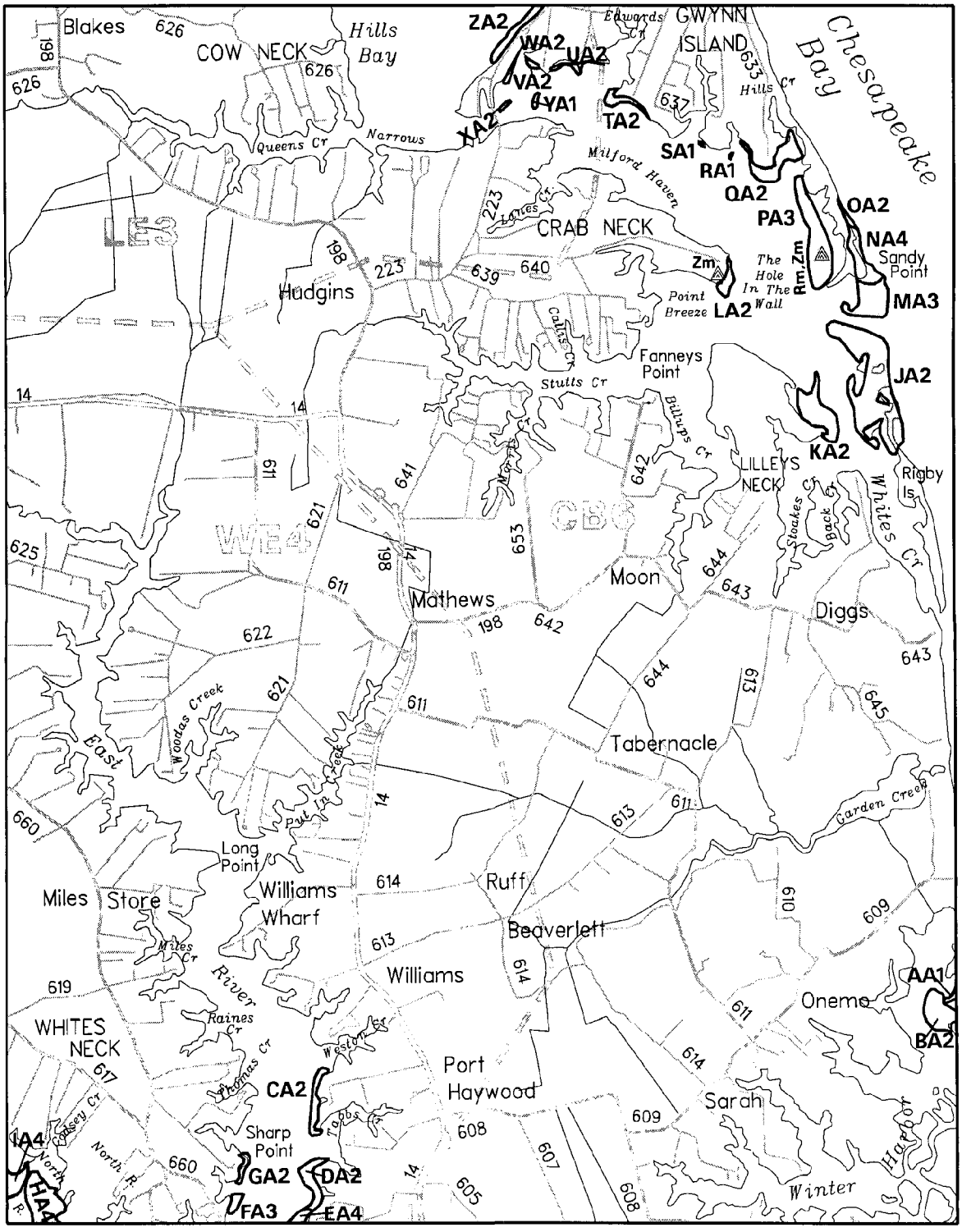
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

Mathews, Va. (123)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 05/24/94

Produced by:
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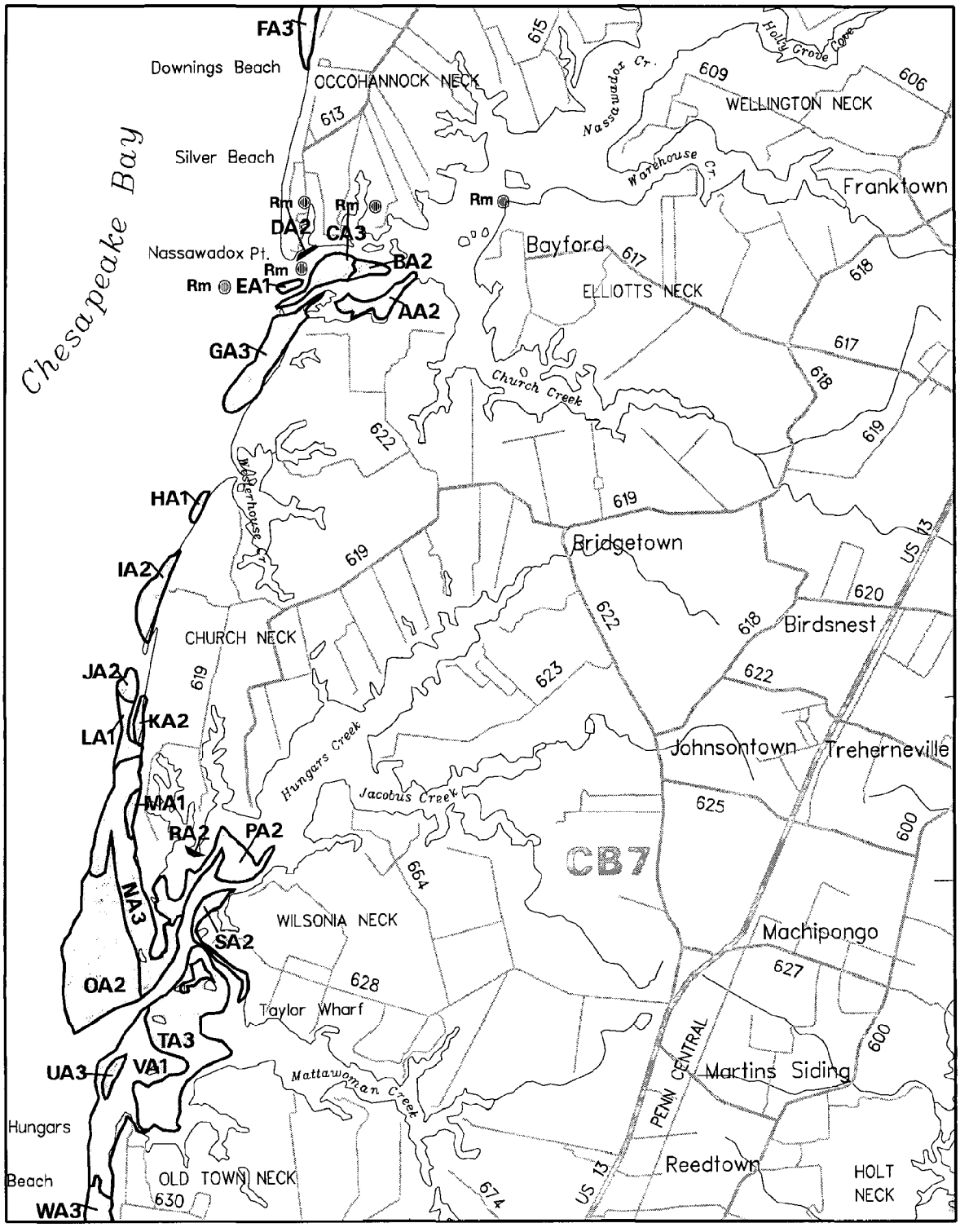
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

(124) Franktown, Va.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 05/24/94

Produced by:
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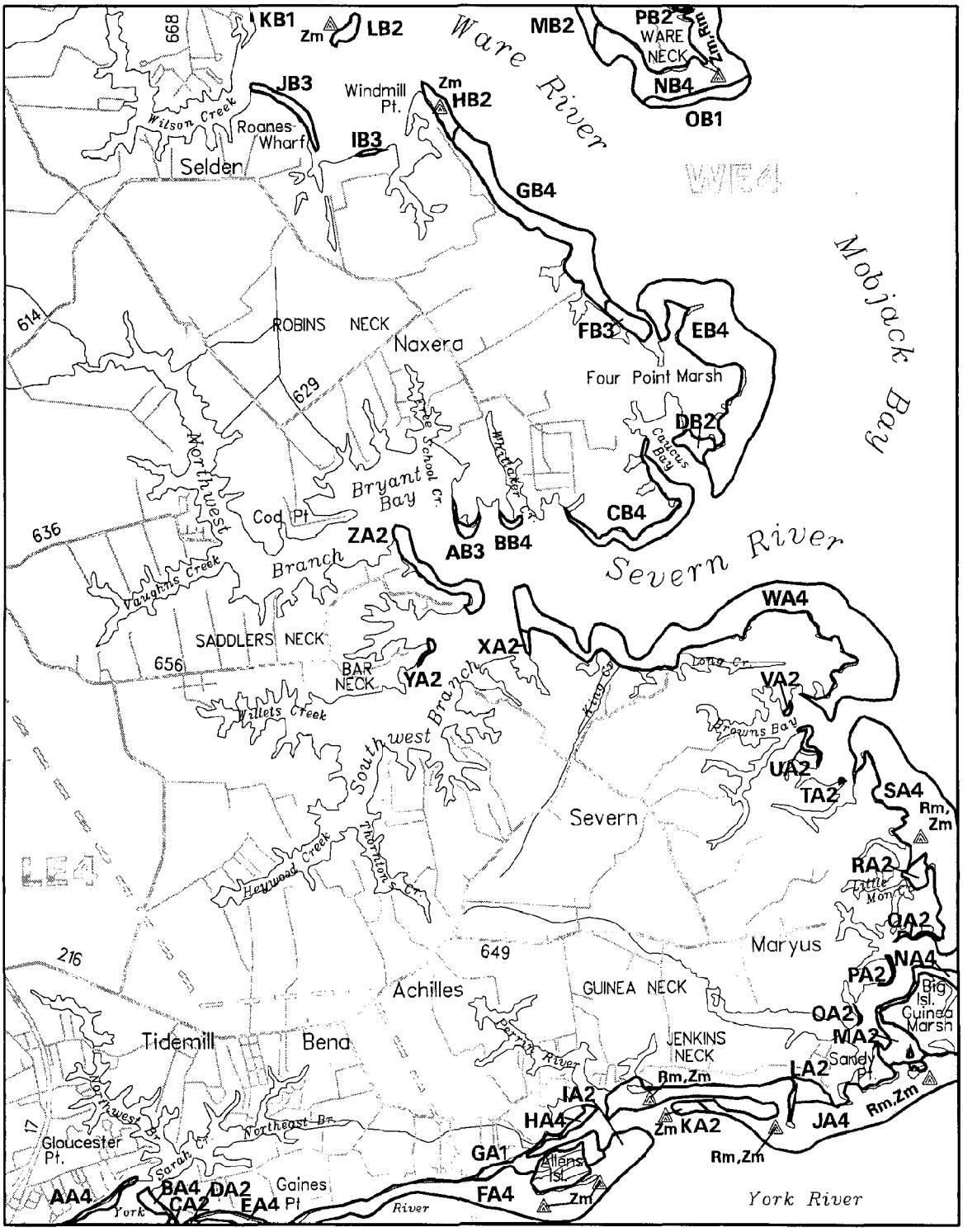
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

Achilles, Va. (131)



1000 0 1000 2000 meters

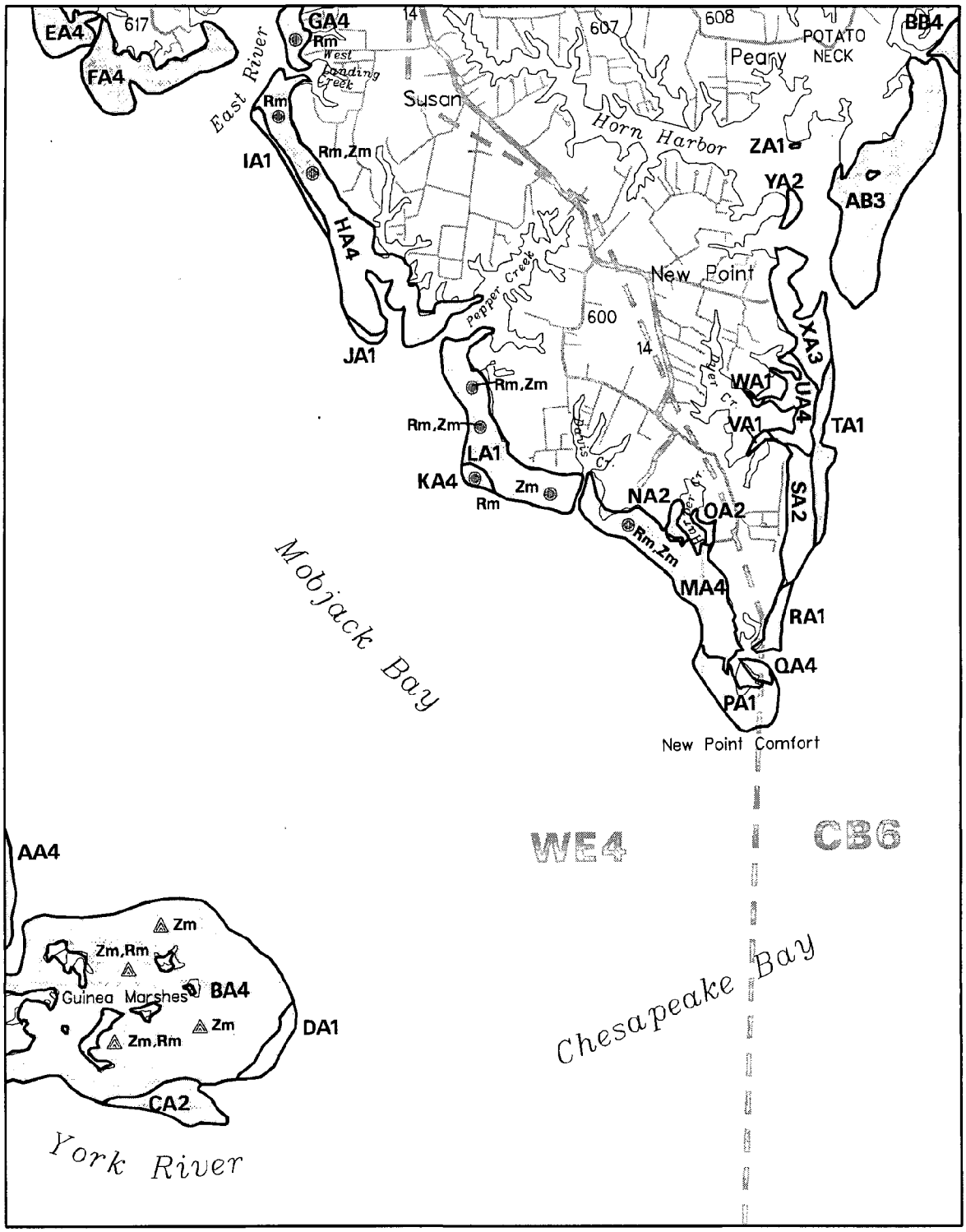
Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 05/24/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

(132) New Point Comfort, Va.



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 05/24/94

Produced by:
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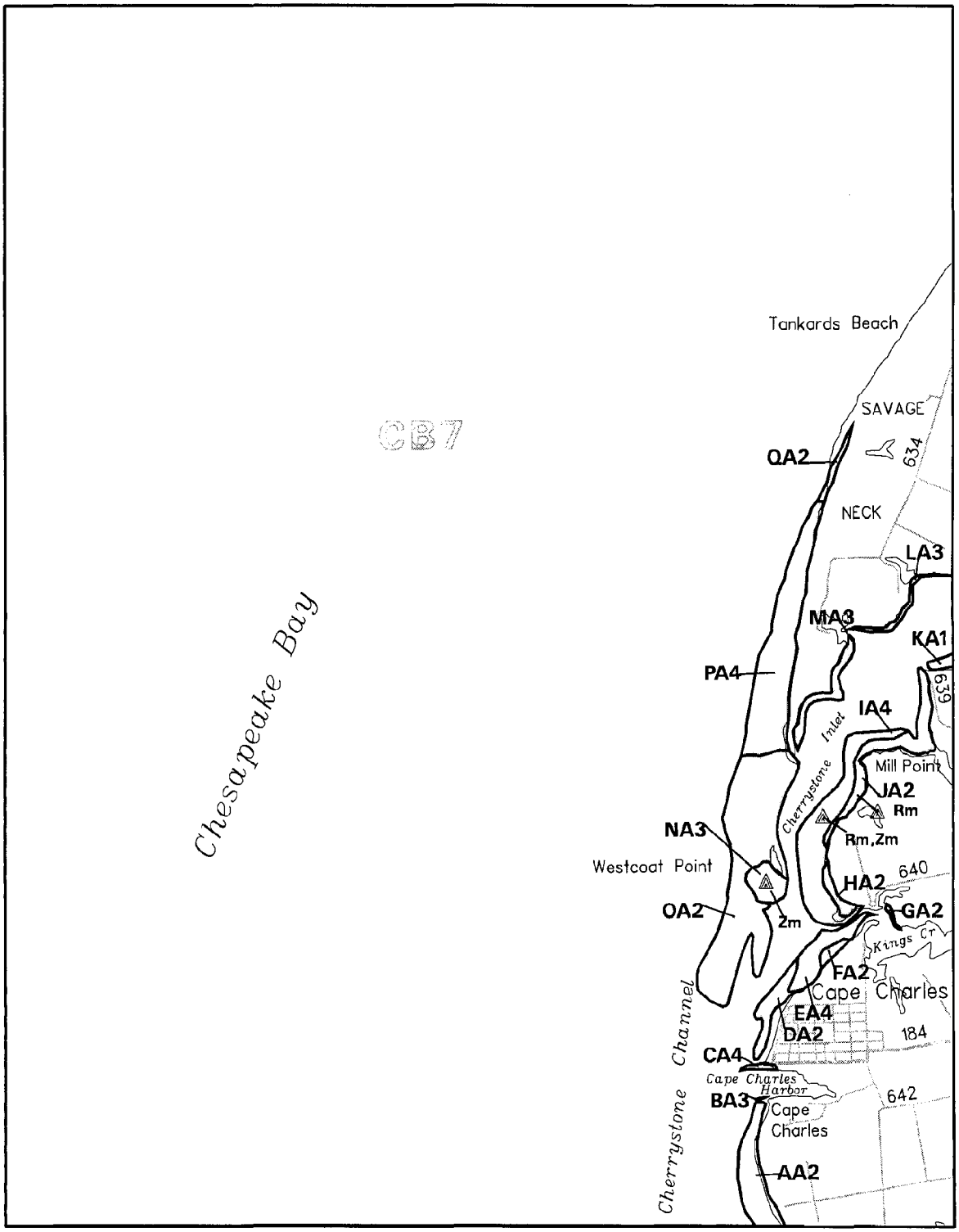
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

Cape Charles, Va. (133)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 05/24/94

Produced by:
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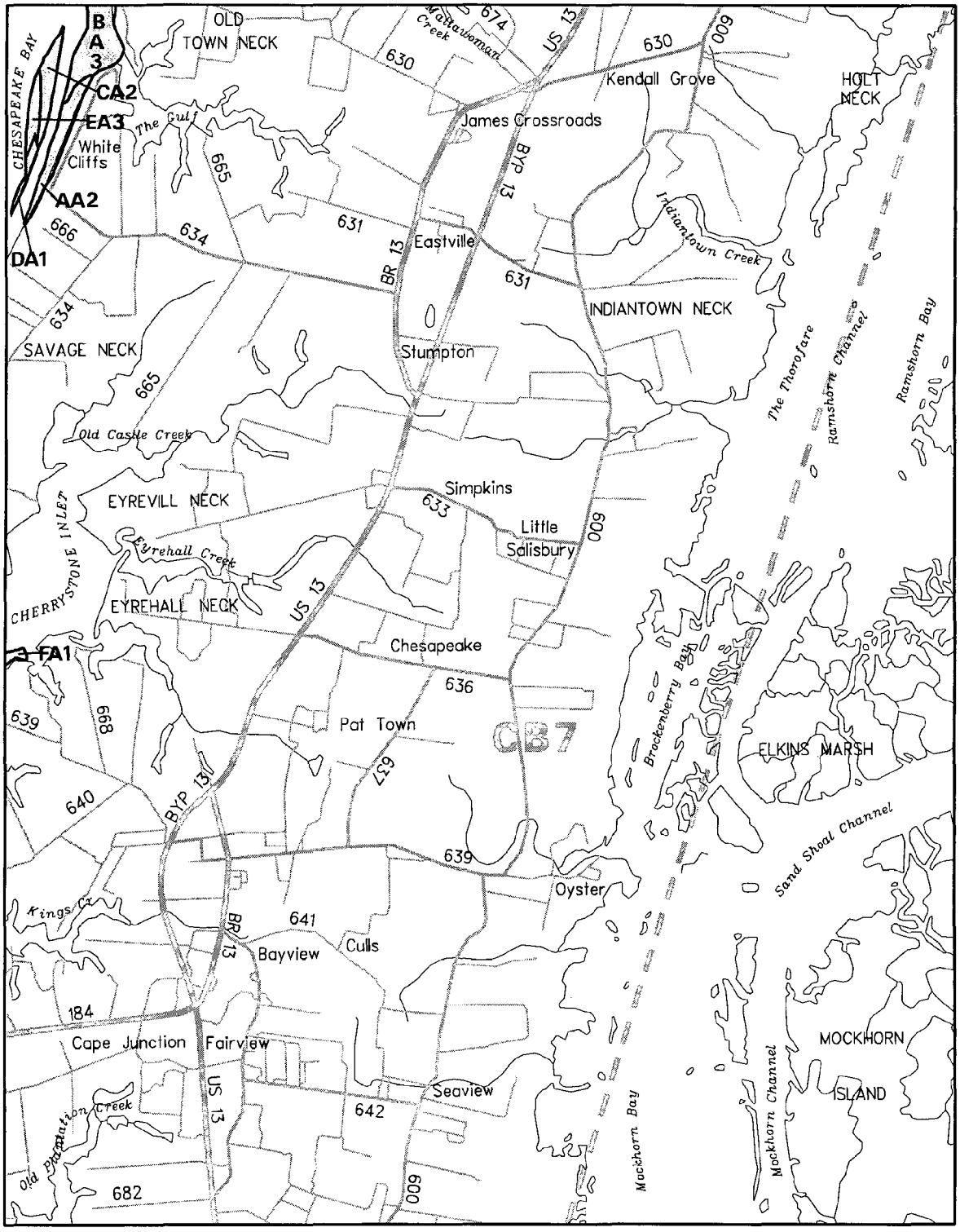
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

(134) Cheriton, Va.



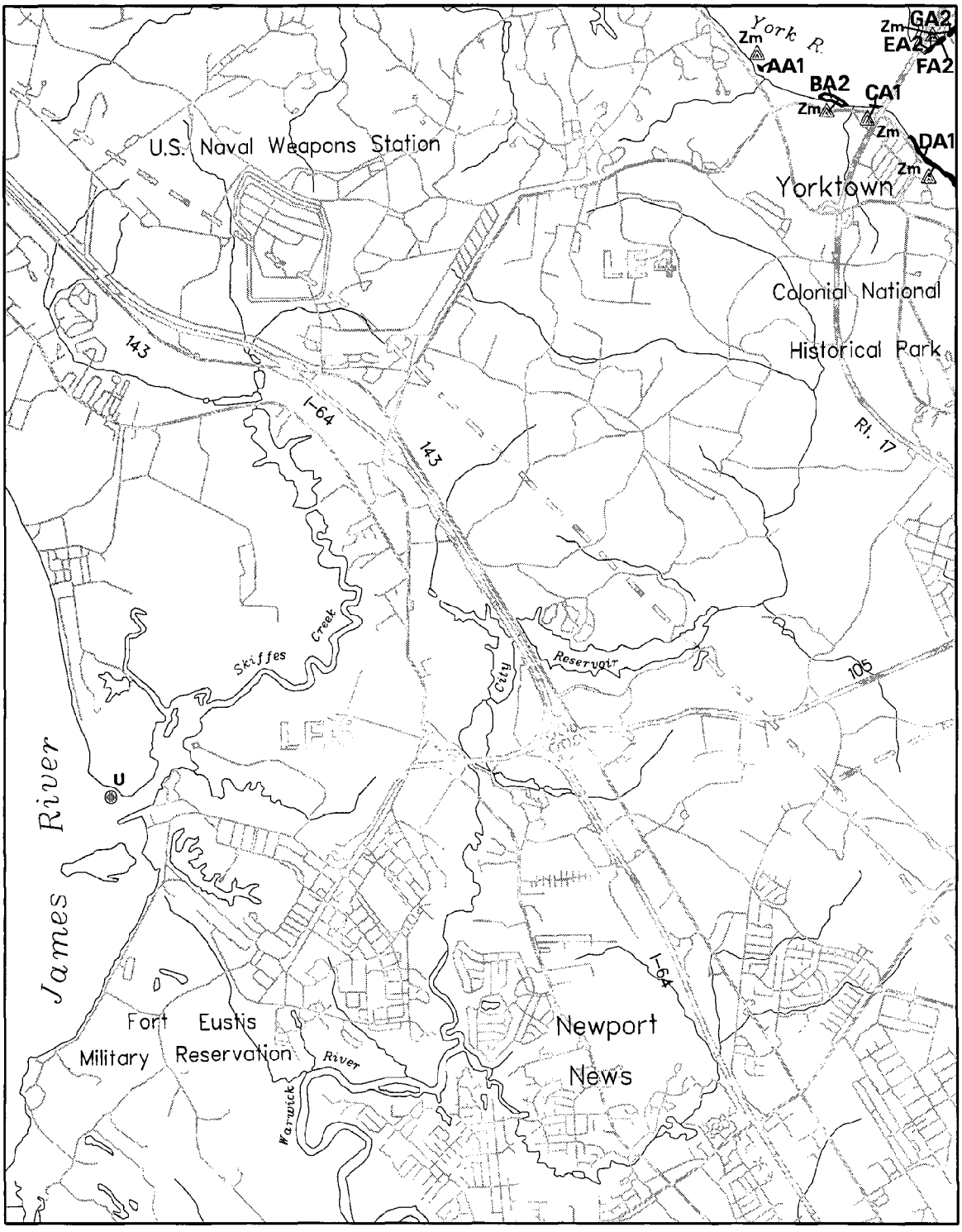
1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 05/24/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

Yorktown, Va. (139)



1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 05/29/94

Produced by:
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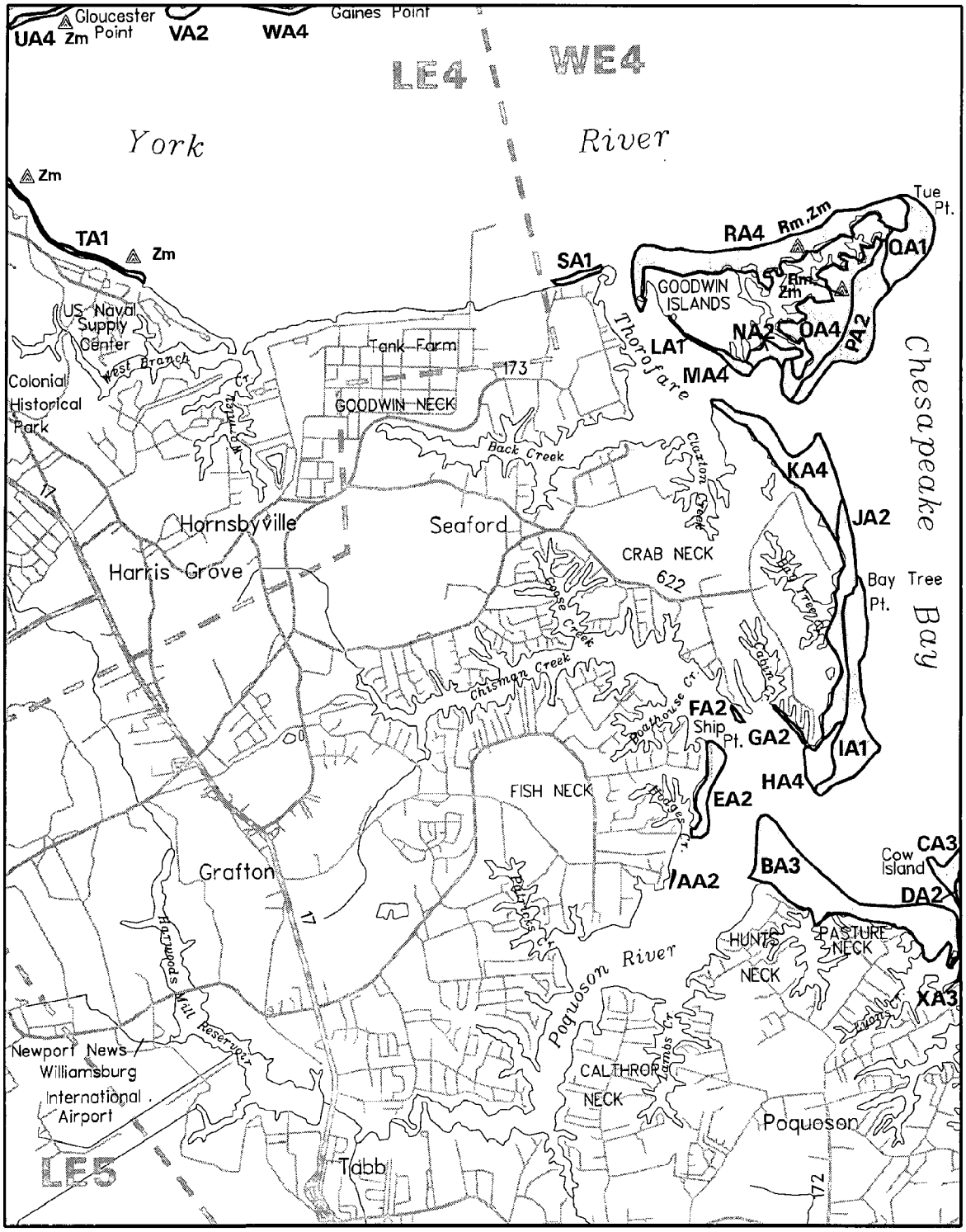
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

(140) Poquoson West, Va.



Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 05/29/94

Produced by:
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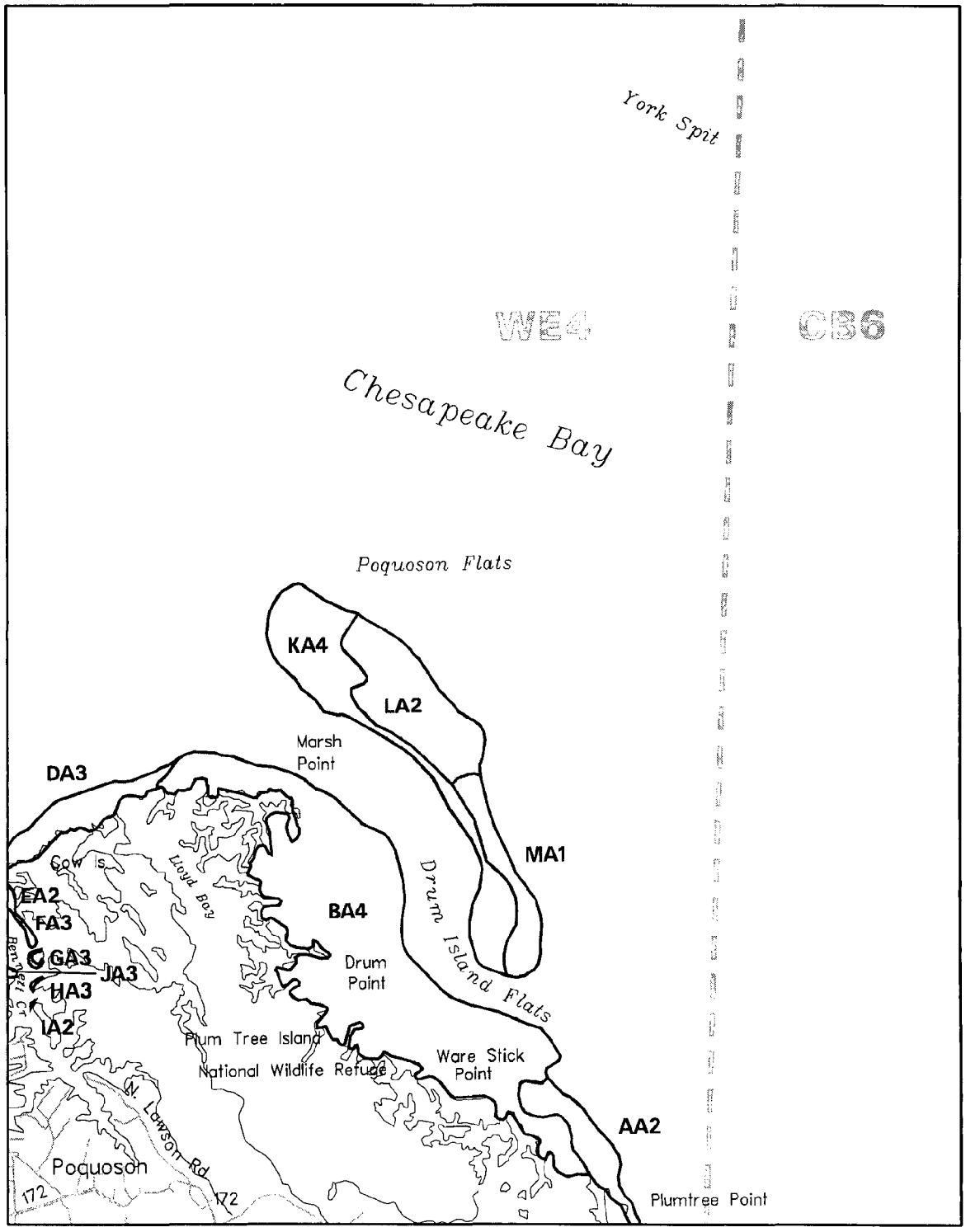
Submerged Aquatic Vegetation 1994

Poquoson East, Va. (141)



Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 05/24/94

Produced by:
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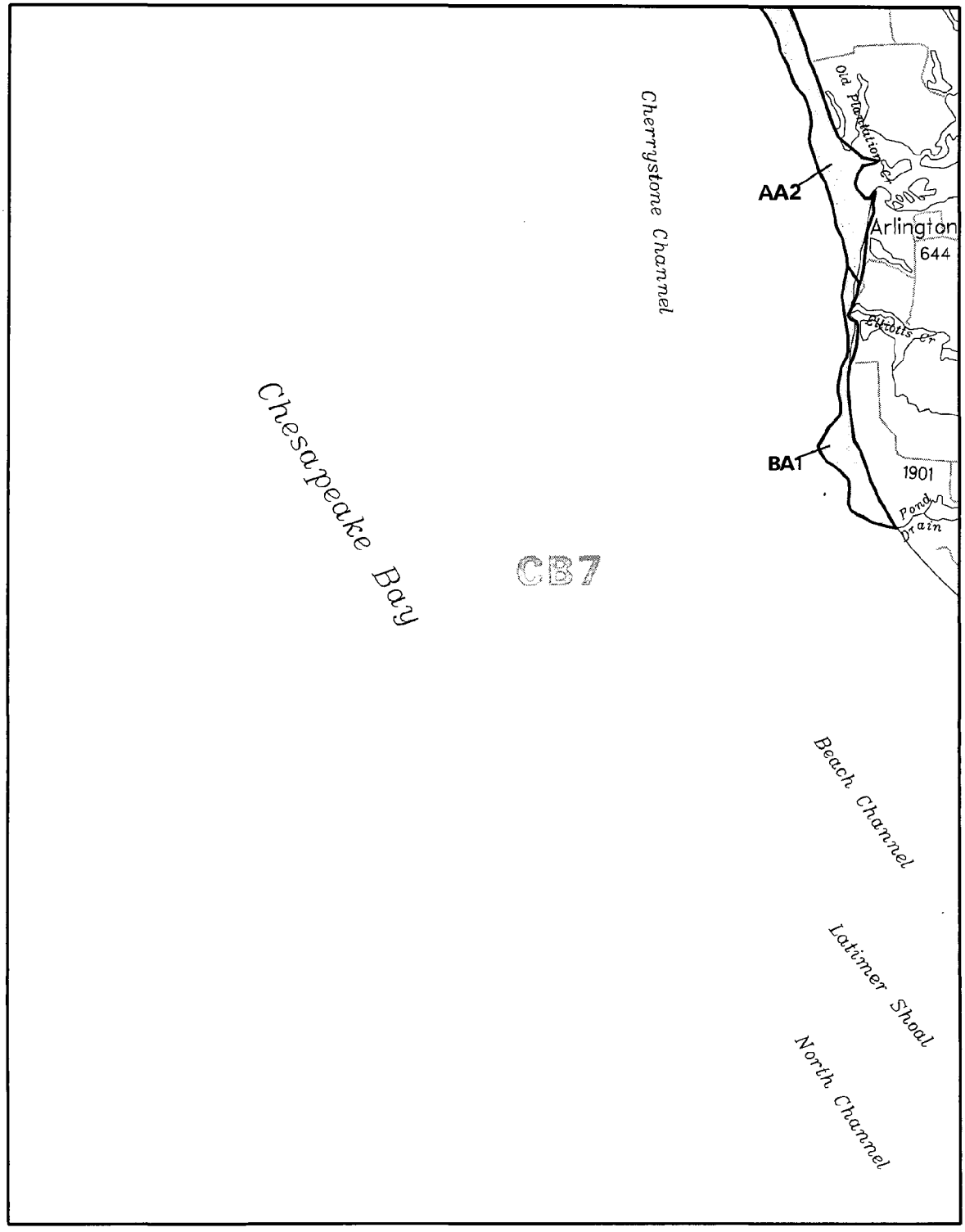
Submerged Aquatic Vegetation 1994

(142) Elliotts Creek, Va.



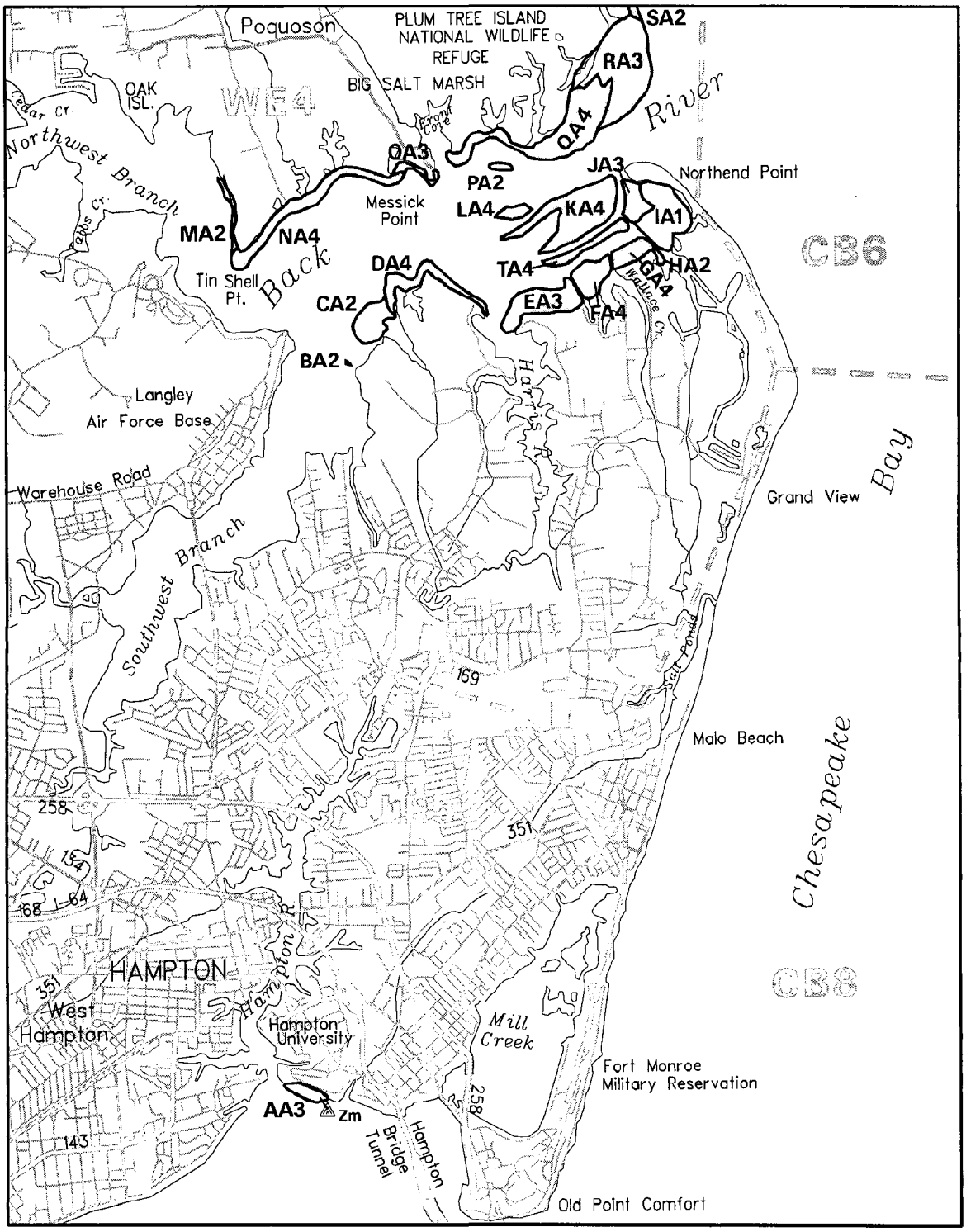
1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 05/24/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

Hampton, Va. (147)



1000 0 1000 2000 meters

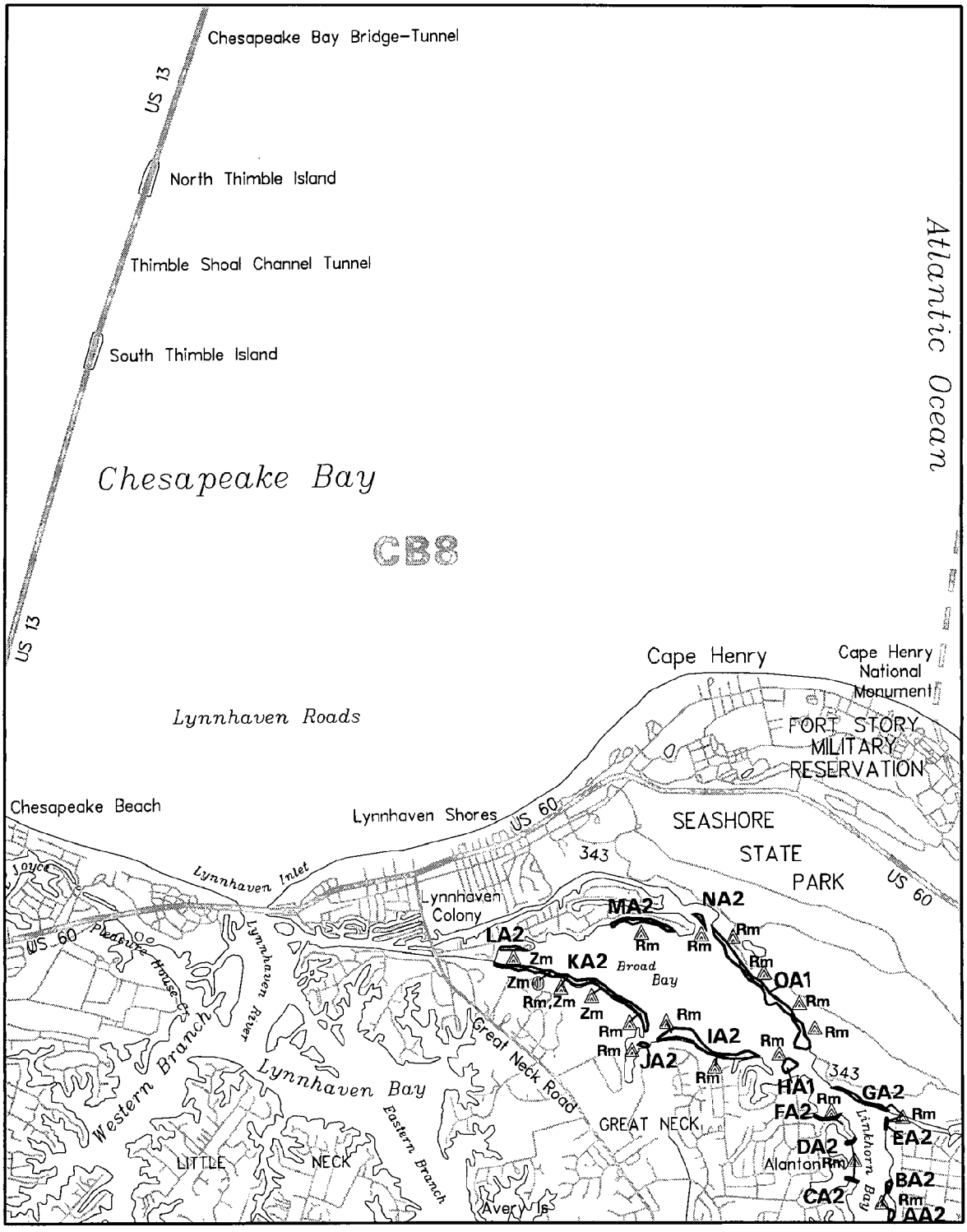
Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 05/29/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

(152) Cape Henry, Va.



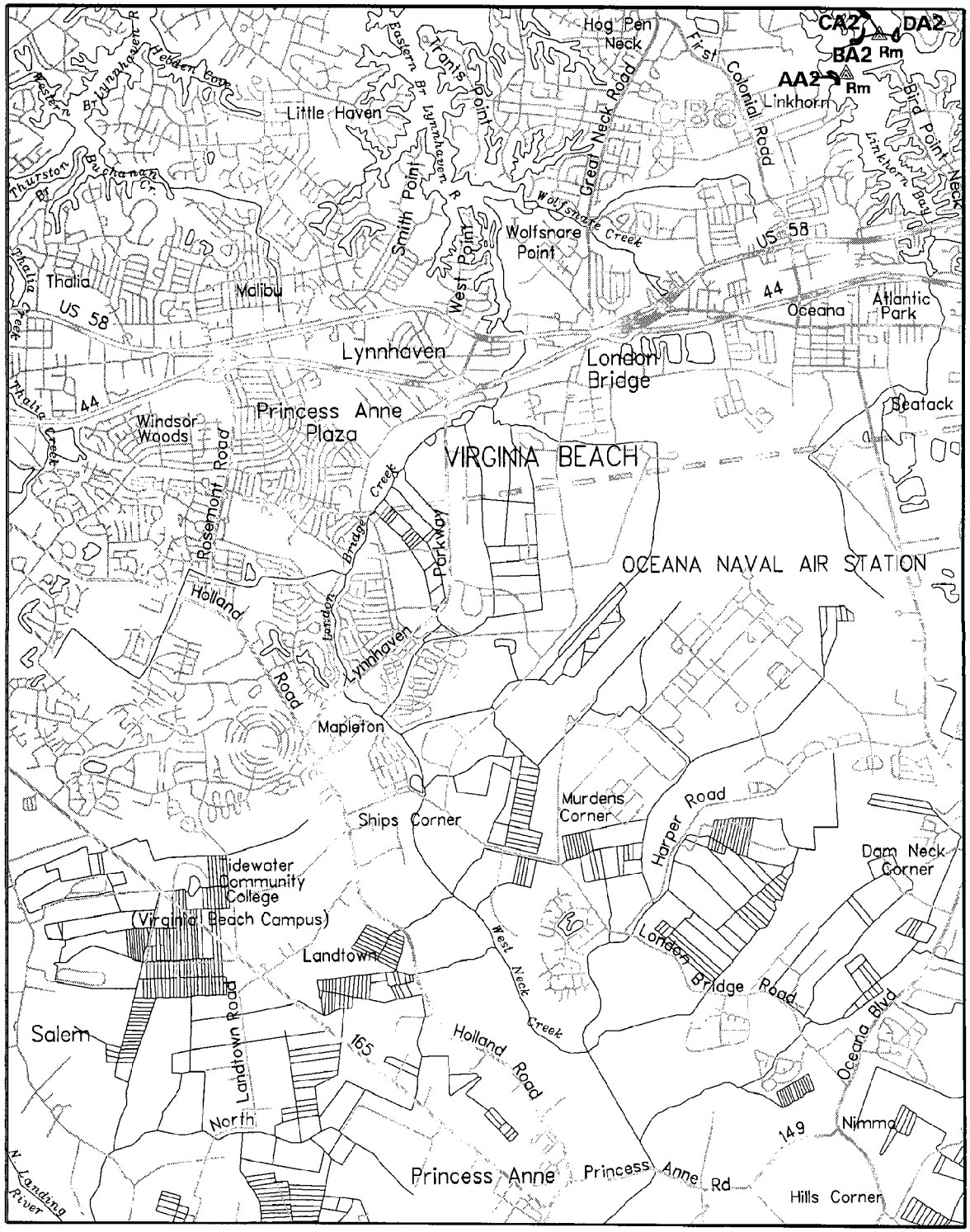
1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 05/29/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

Princess Anne, Va. (157)



1000 0 1000 2000 meters

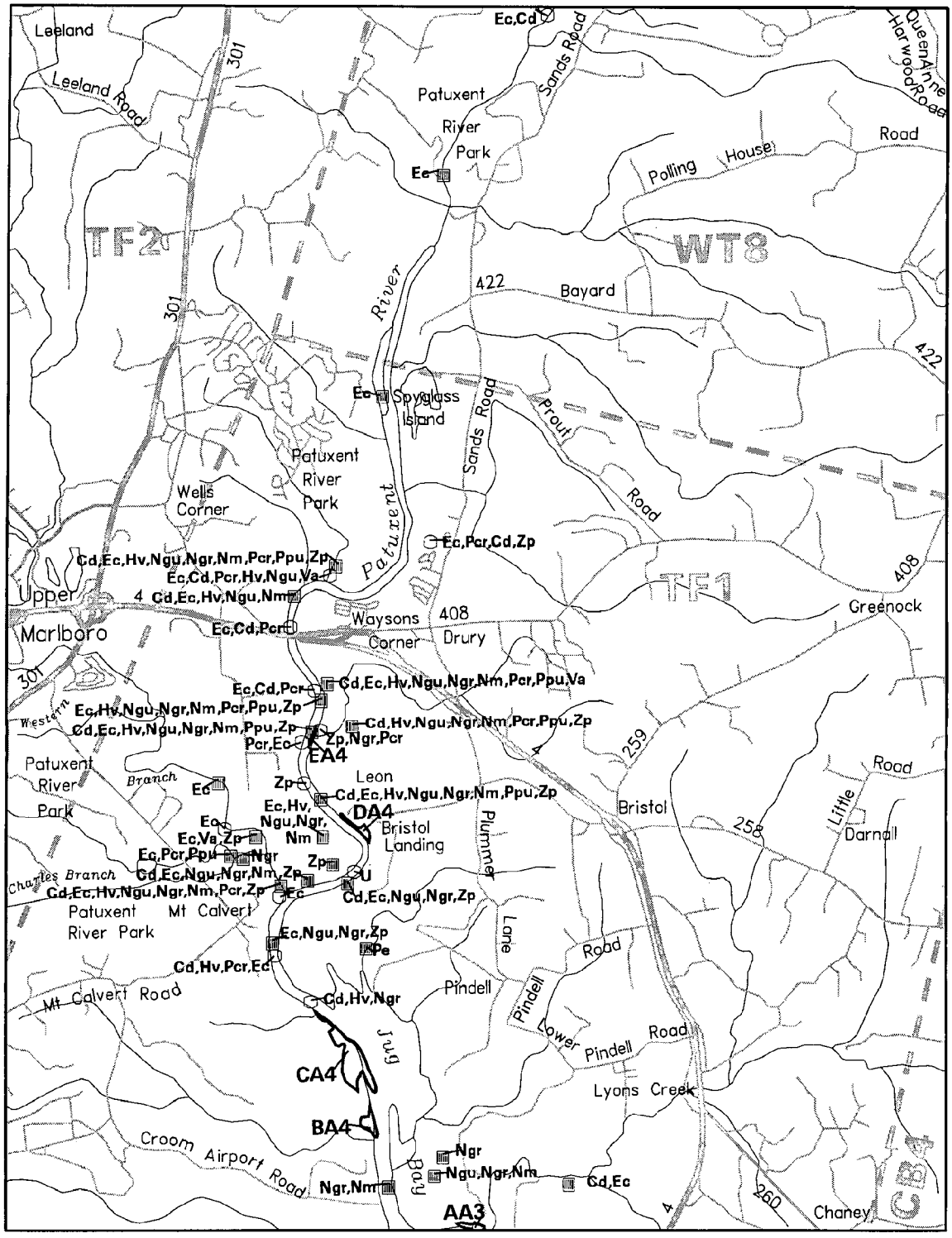
Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 05/29/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

(159) Bristol, Md.



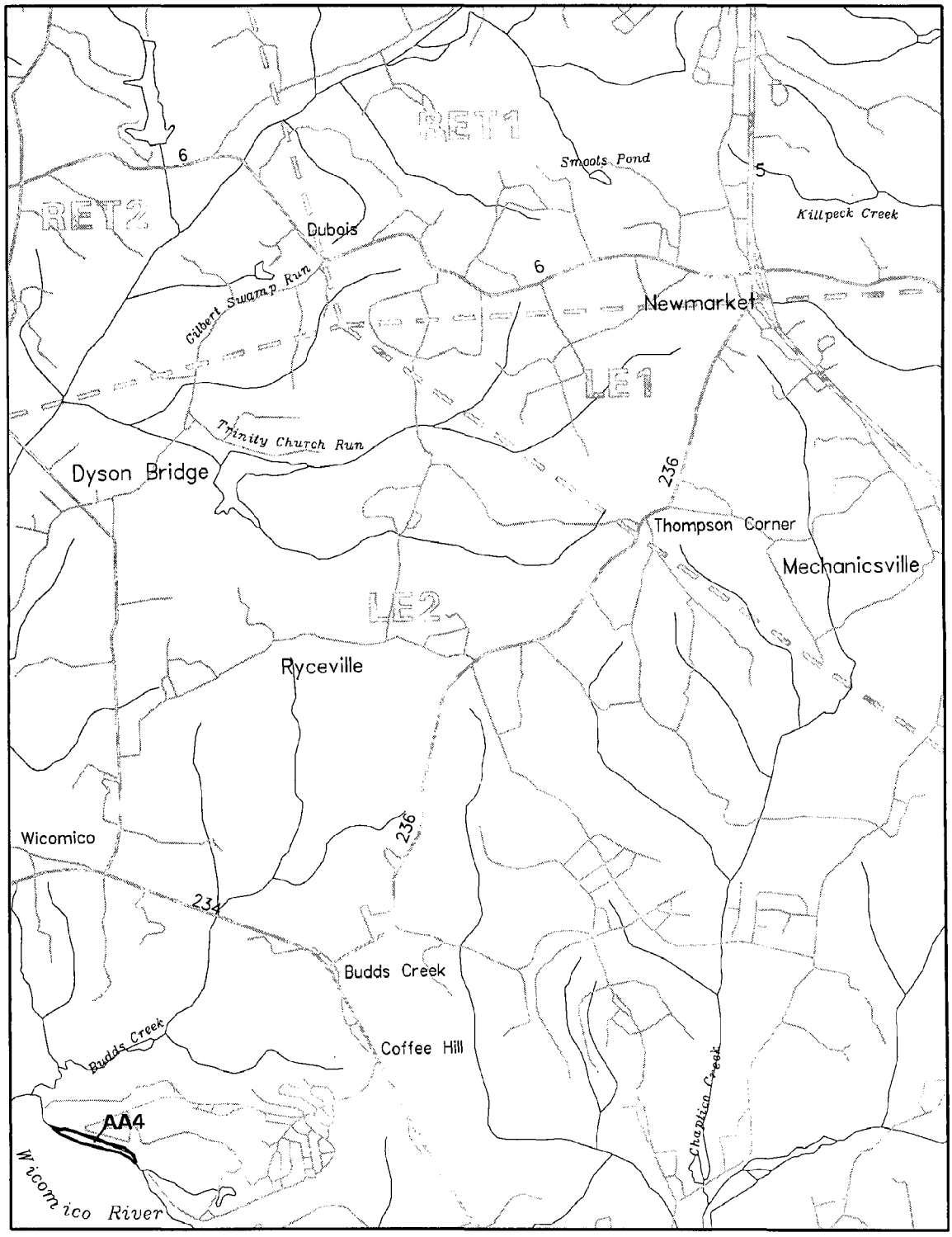
1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 07/20/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

Charlotte Hall, Md. (162)



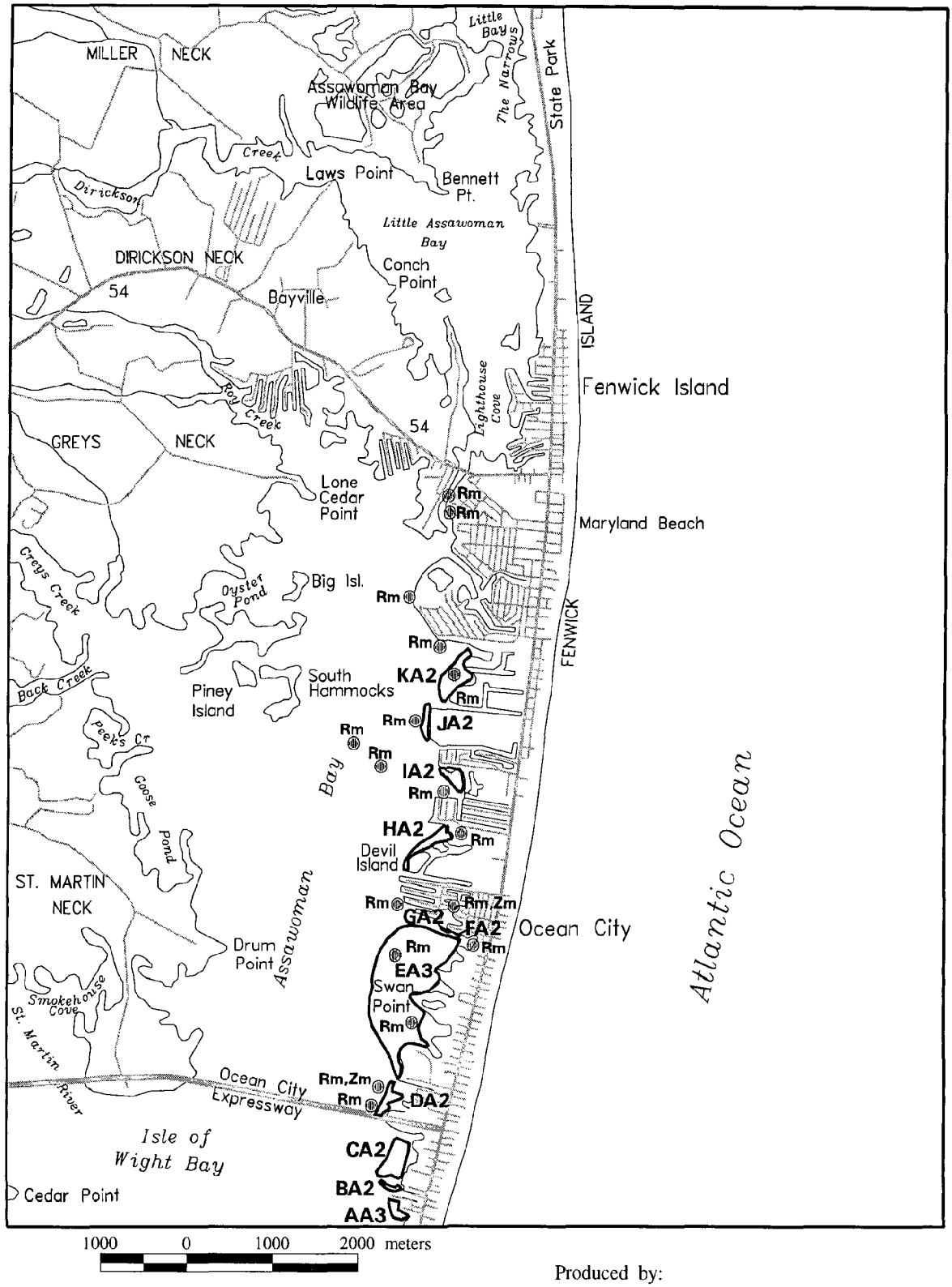
1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 08/07/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

(166) Assawoman Bay, Md.– Del.

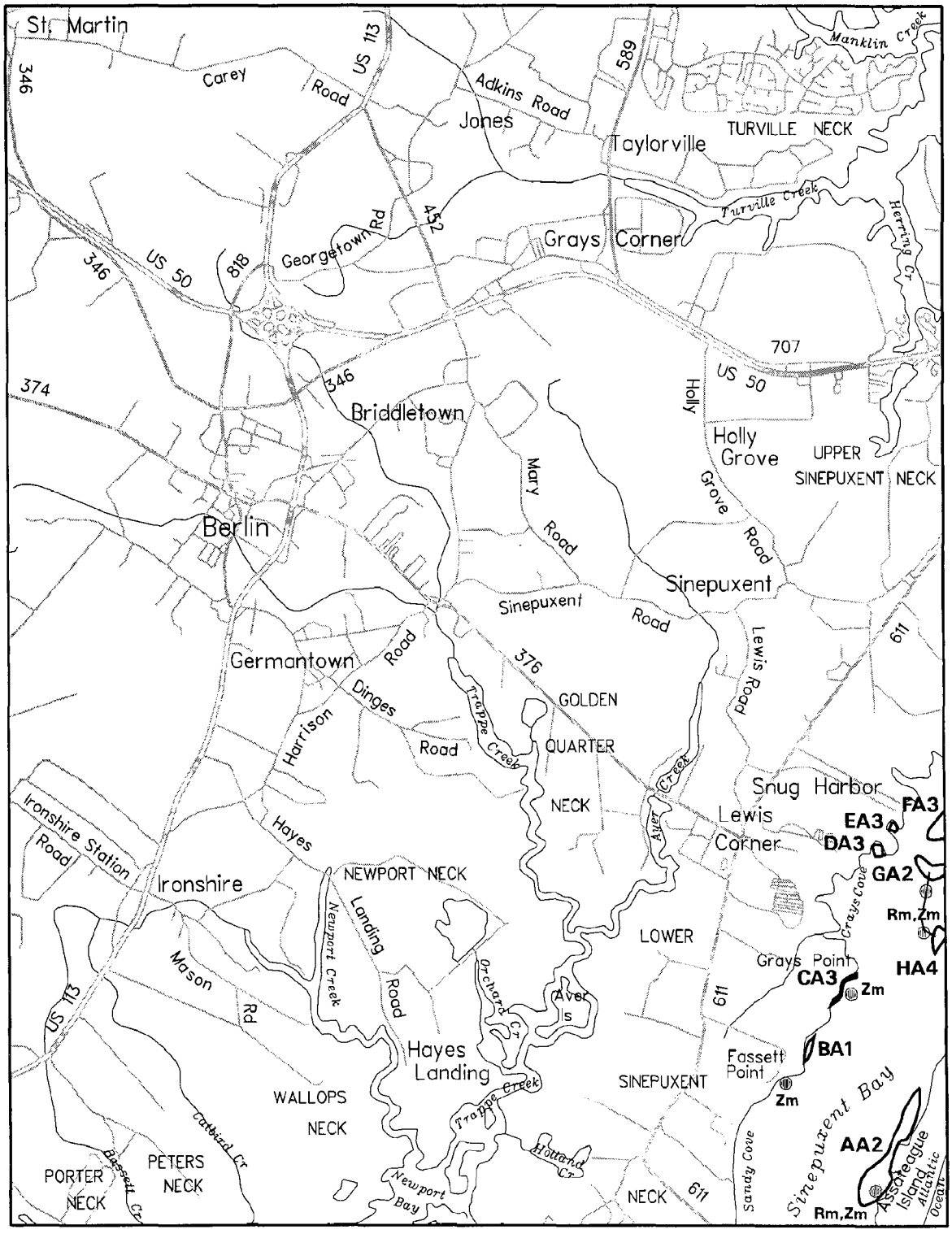


Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/10/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

Berlin, Md. (167)



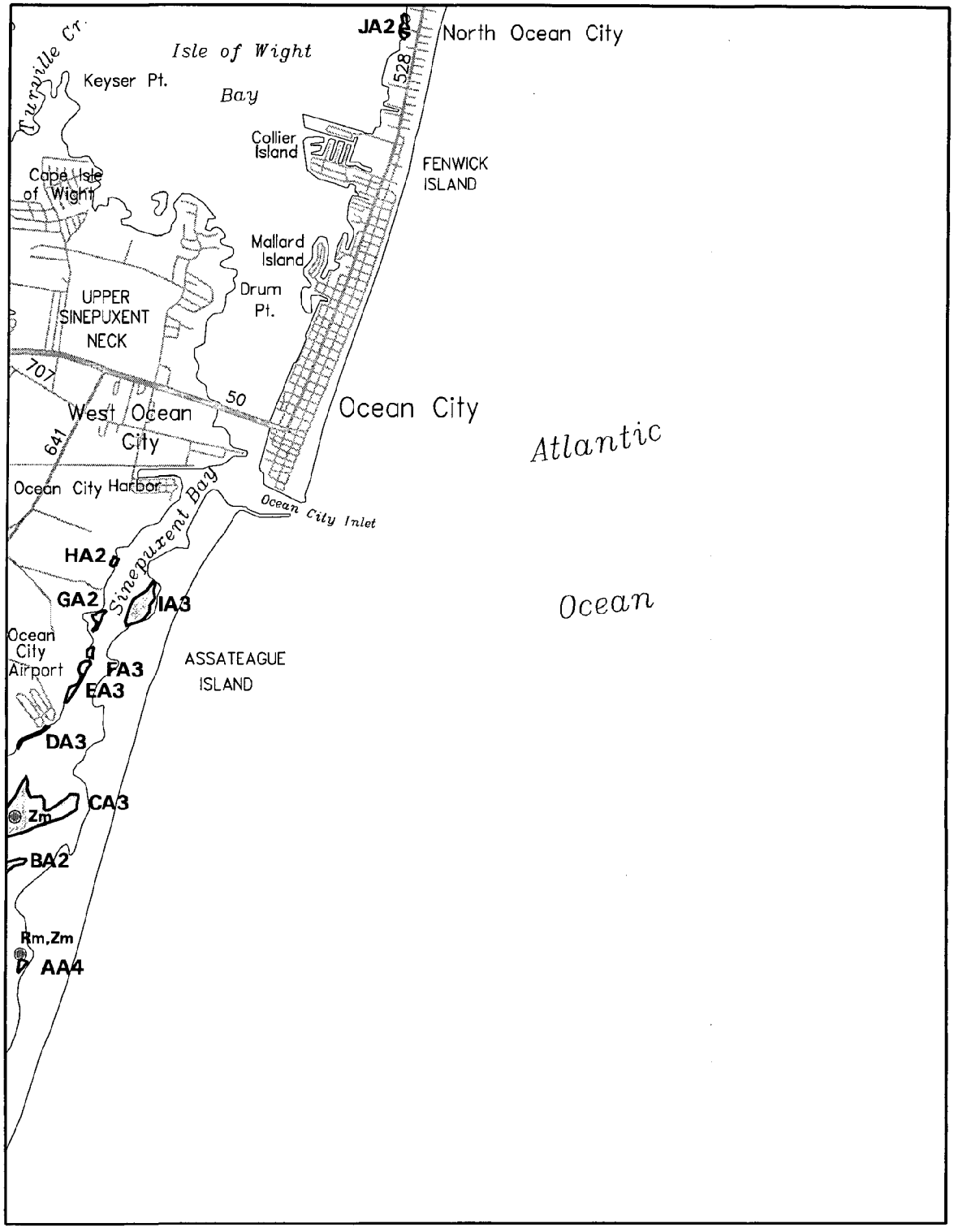
1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/10/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

(168) Ocean City, Md.



Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/10/94

Produced by:
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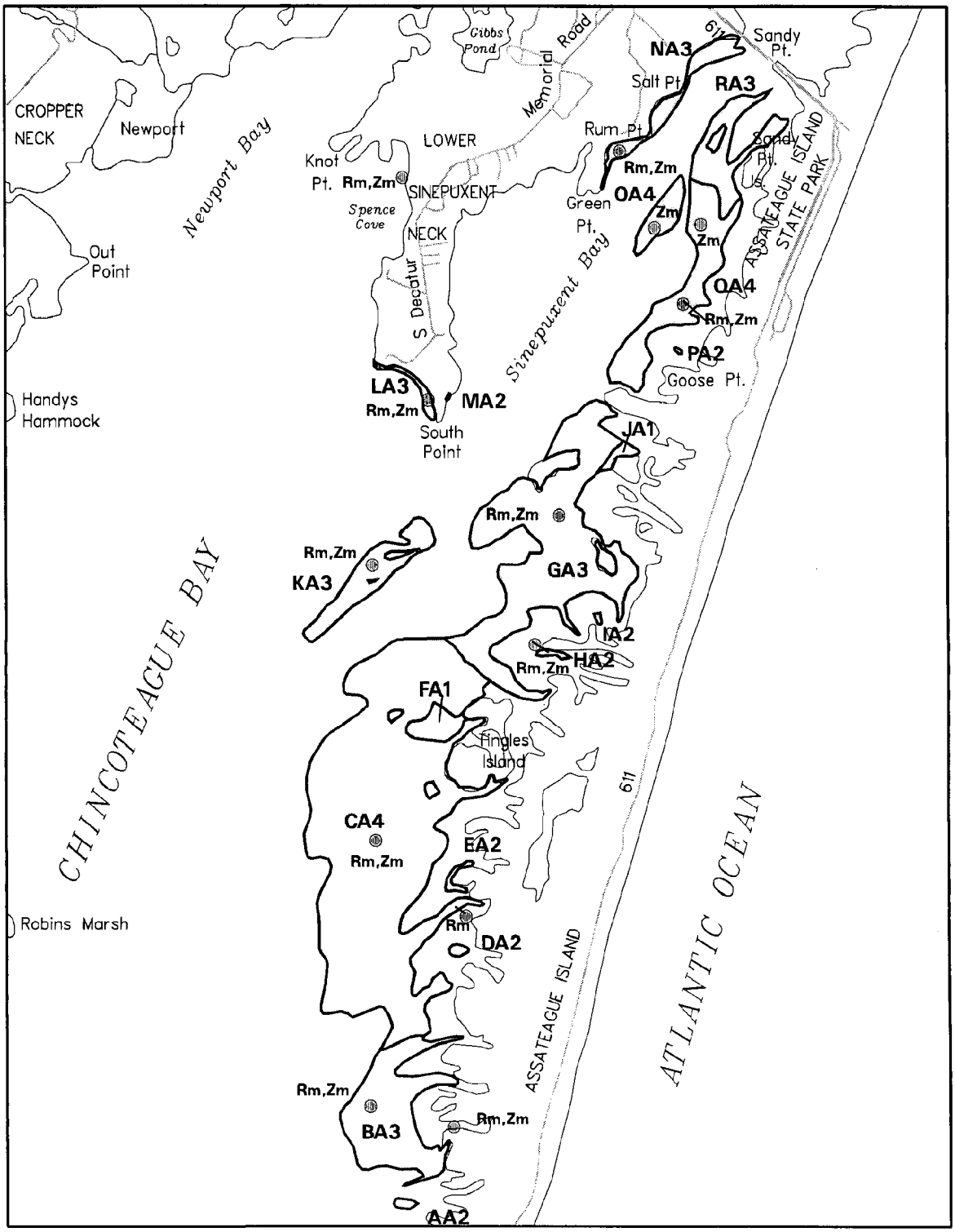
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

Tingles Island, Md. (170)



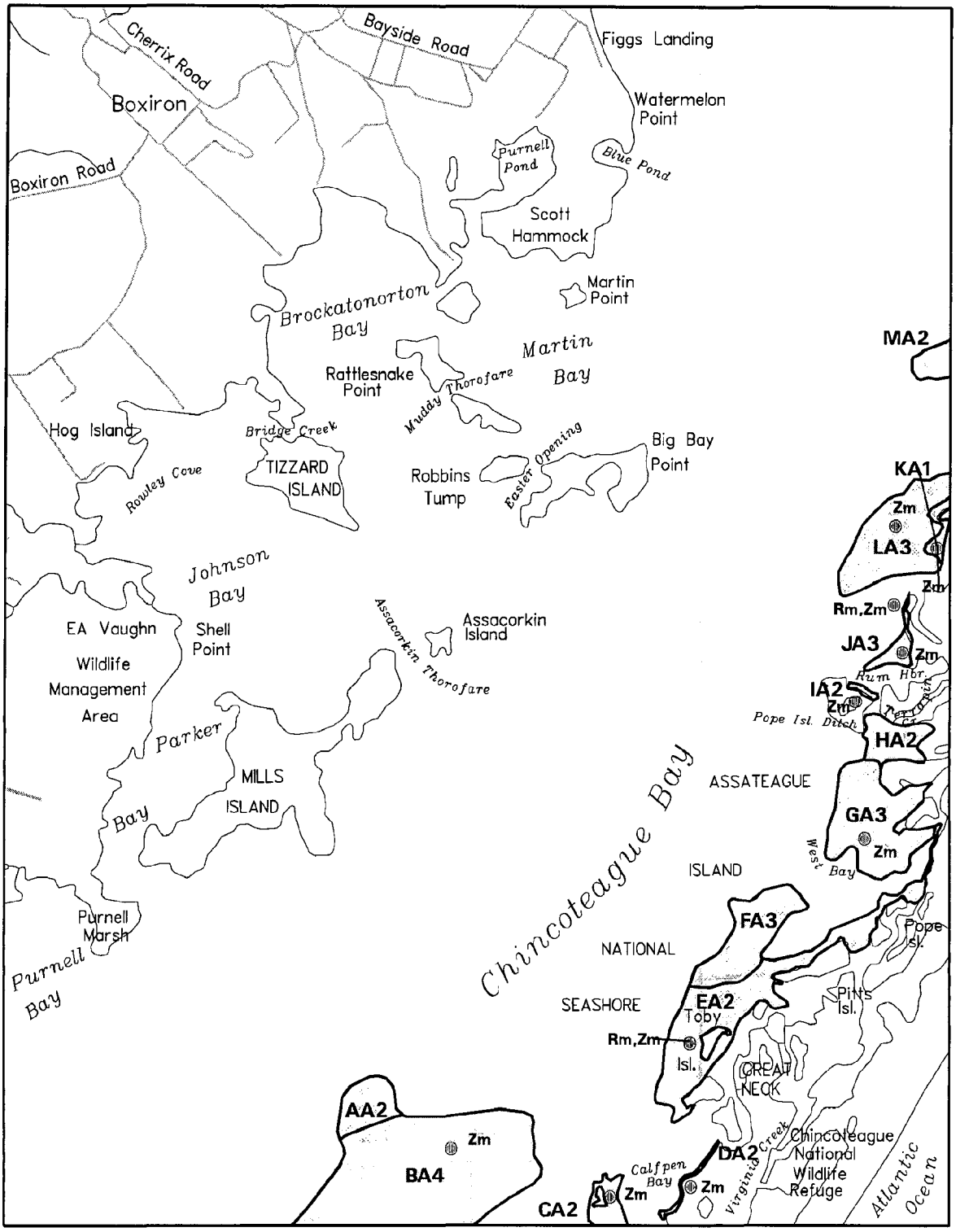
1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/10/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

(172) Boxiron, Md.– Va.



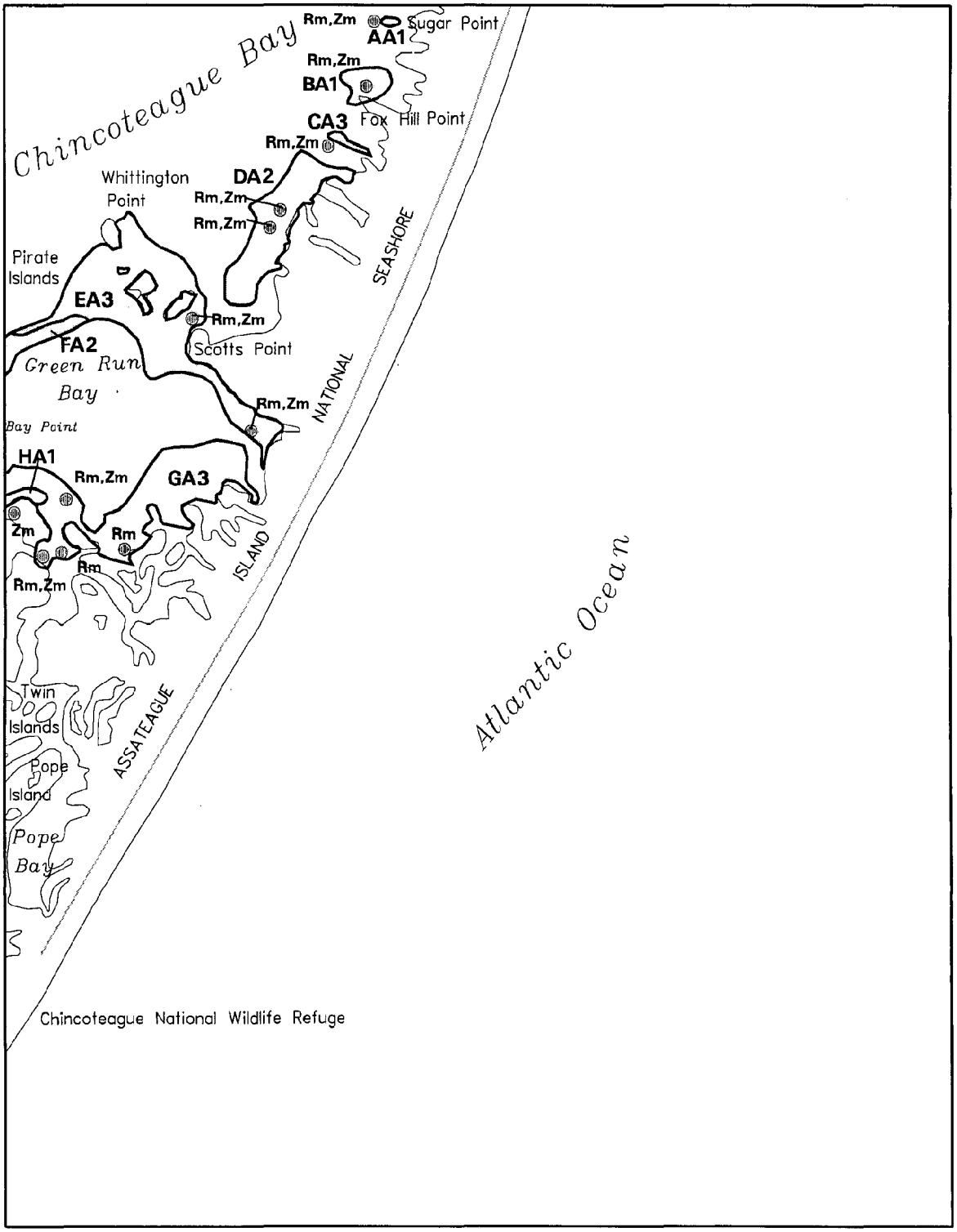
1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/10/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

Whittington Point, Md.– Va. (173)



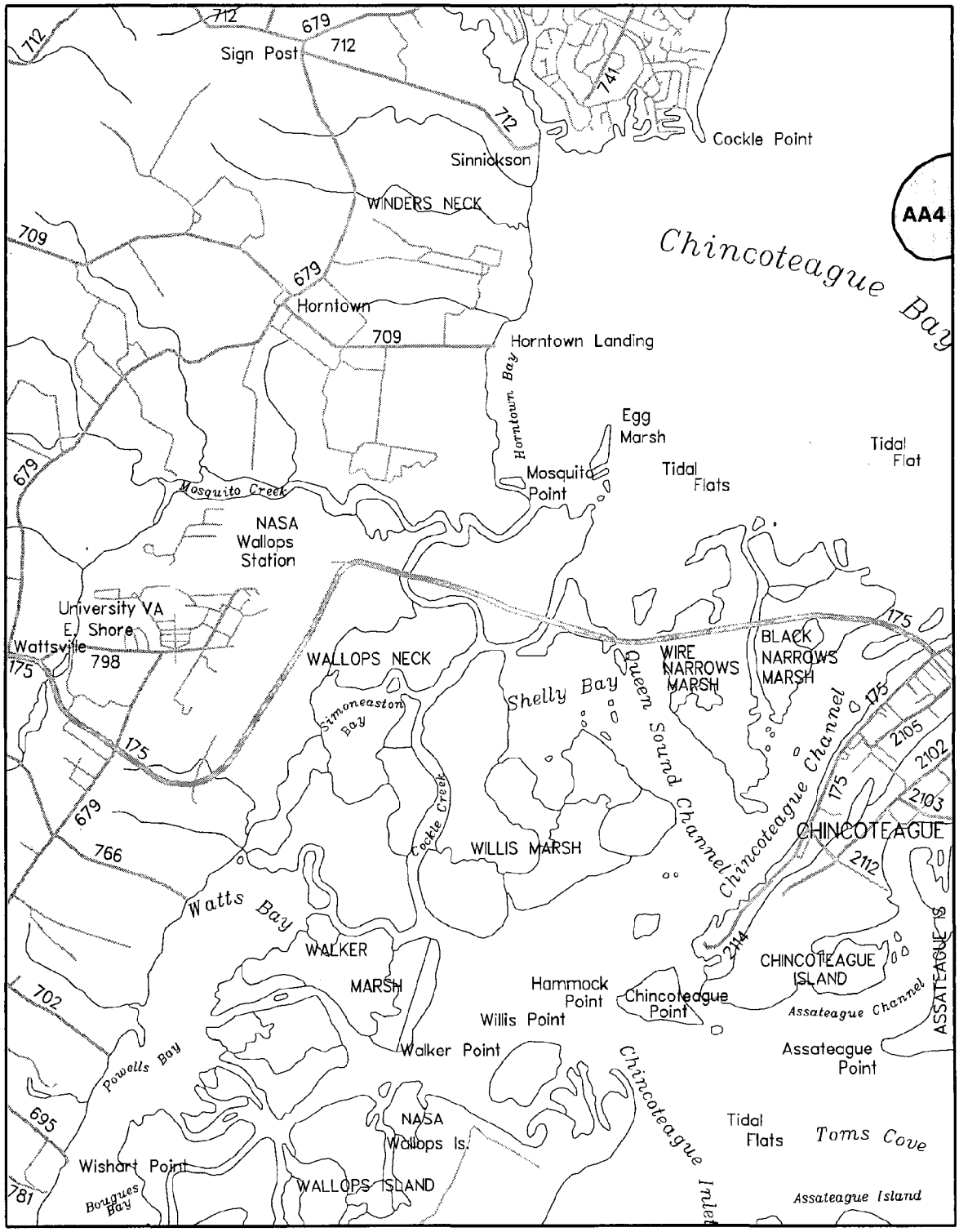
1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/10/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

(174) Chincoteague West, Va.



1000 0 1000 2000 meters

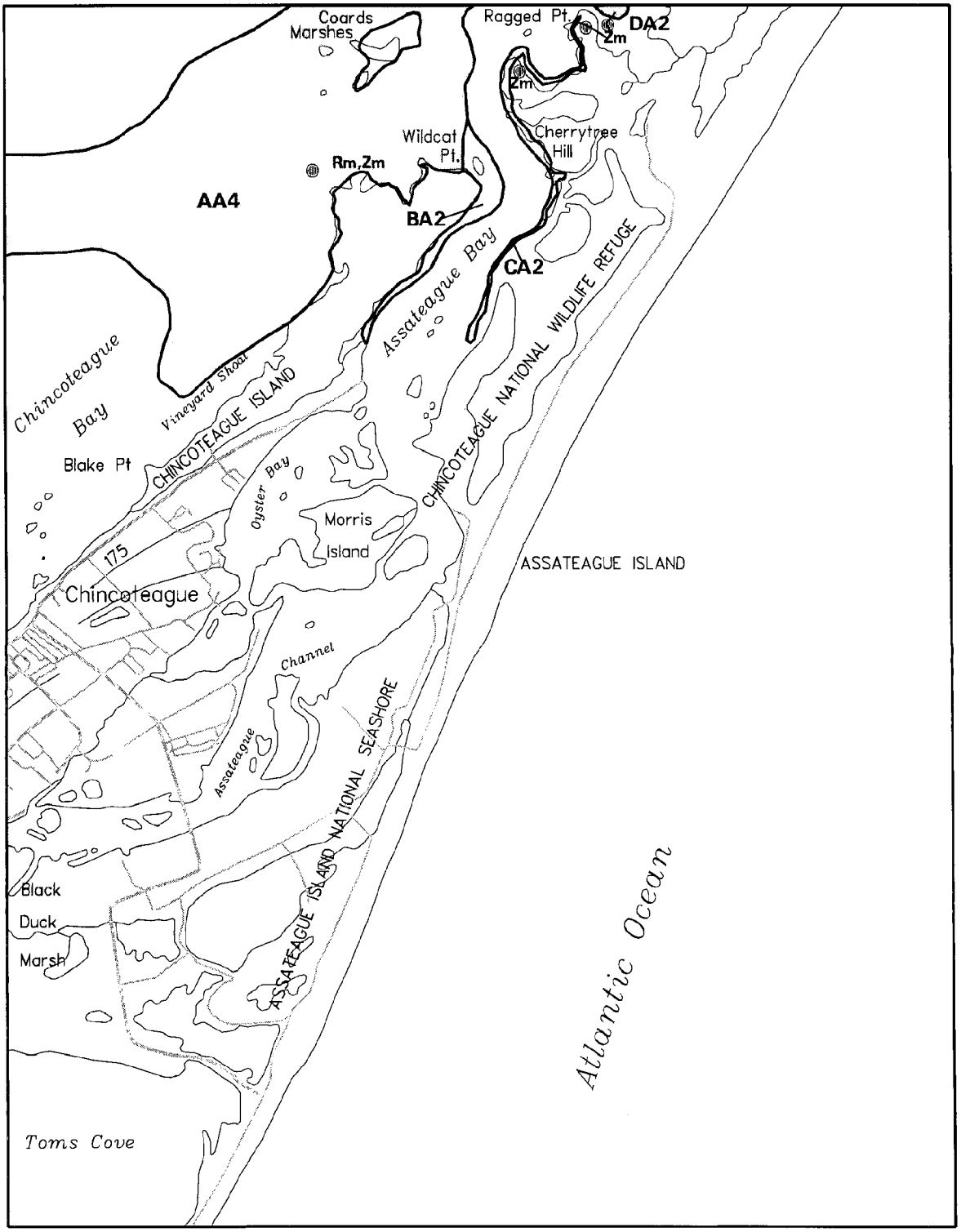
Sources: Virginia Institute of Marine Science
U.S. Geological Survey

Date Flown: 06/10/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

Chincoteague East, Va. (175)



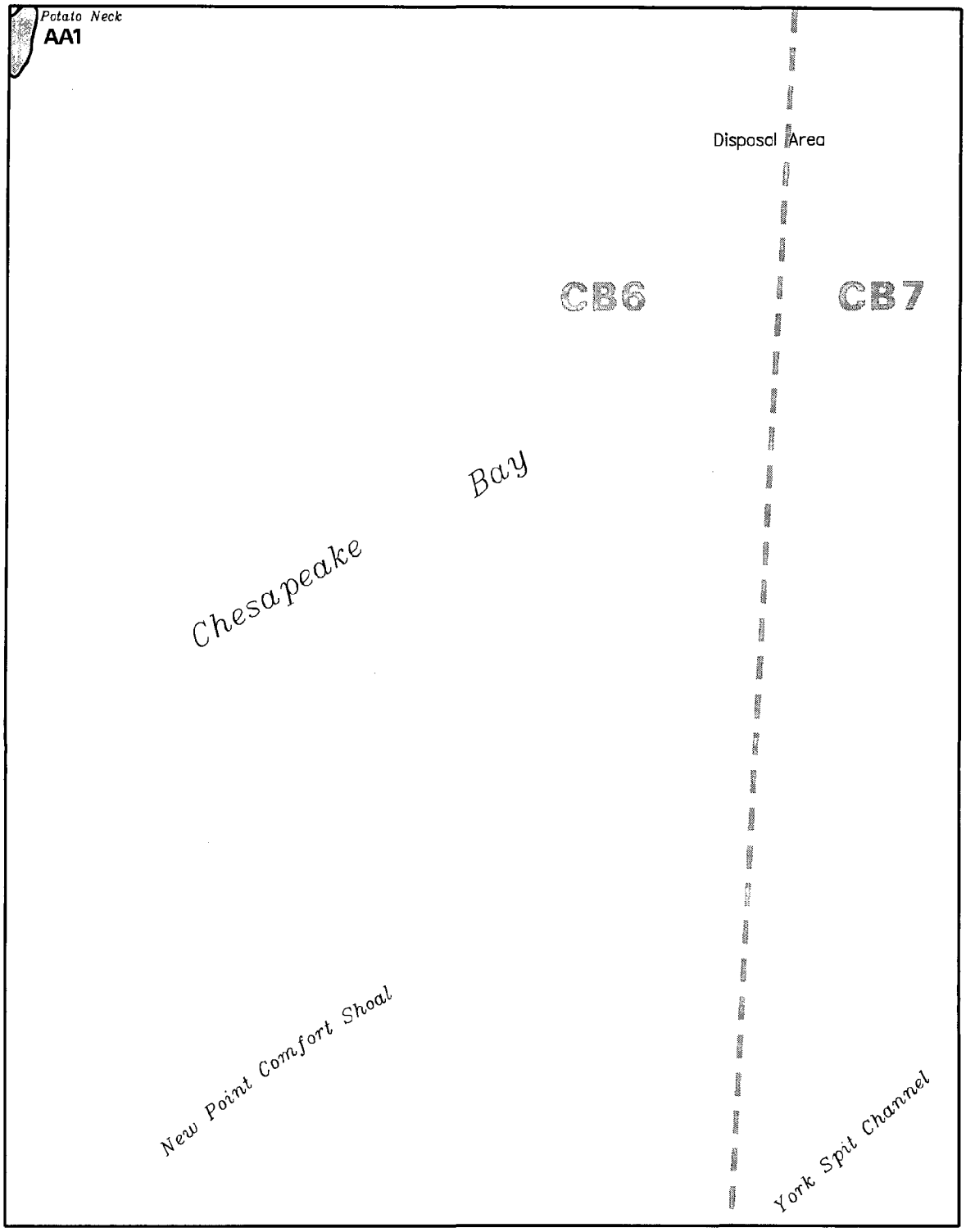
1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/10/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

(177) East of New Point Comfort, Va.



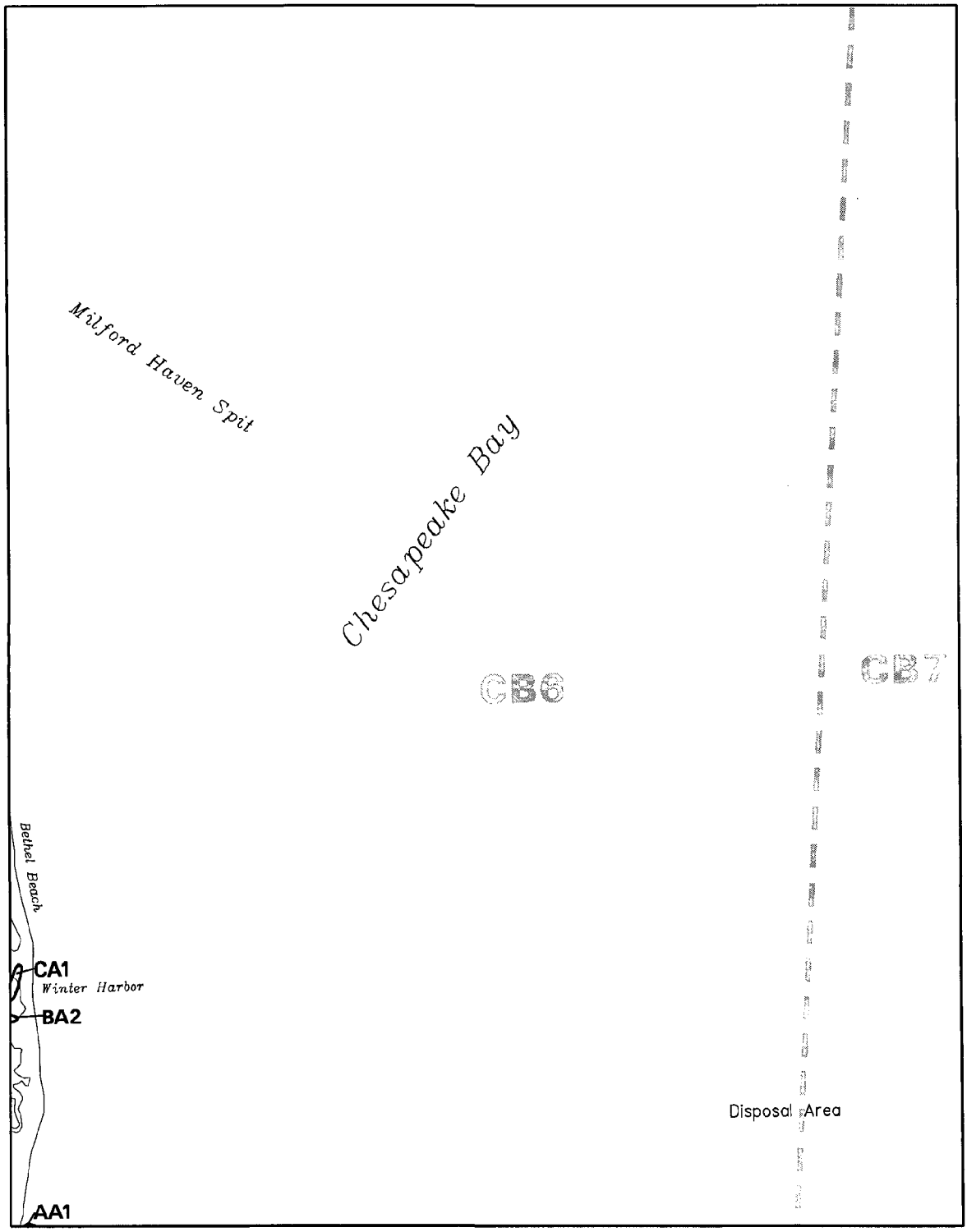
1000 0 1000 2000 meters

Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 05/24/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

Bethel Beach, Va. (178)

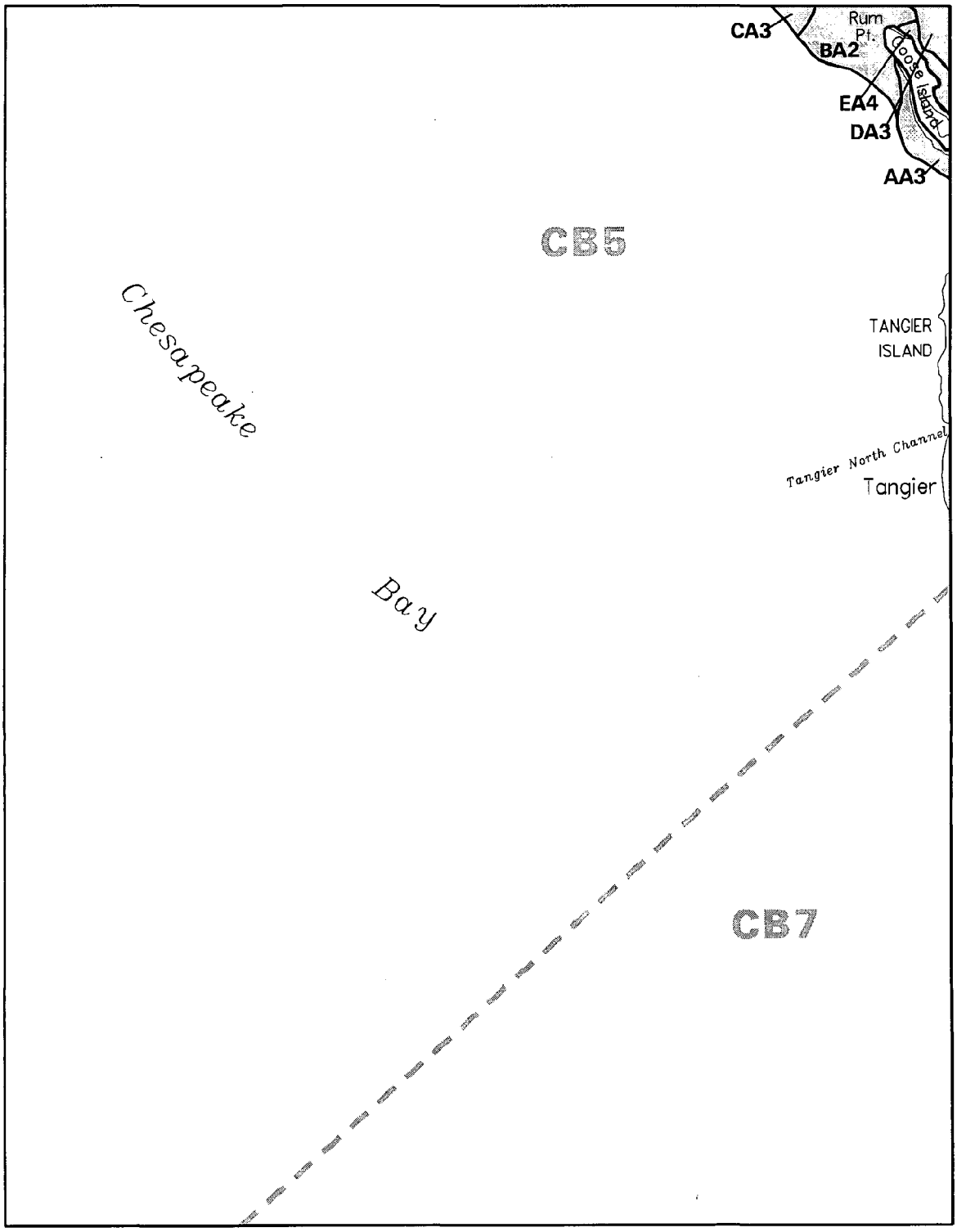


Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 05/24/94

Produced by:
School of Marine Science
Virginia Institute of Marine Science
College of William and Mary

Submerged Aquatic Vegetation 1994

(179) Goose Island, Va.



Sources: Virginia Institute of Marine Science
U.S. Geological Survey
Date Flown: 06/09/94

Produced by:
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Virginia Institute of Marine Science
College of William and Mary

APPENDIX C

Number of Square Meters of SAV for Individual Beds and Totals for Density Categories for Each USGS 7.5 Minute Quadrangle in 1994.

APPENDIX C

Number of Square Meters of SAV for Individual Beds and Totals for Density Categories for Each USGS 7.5 Minute Quadrangle in 1994. [Numbers in Bed Labels (e.g., AA2) Indicate Density Category. See Maps in Appendix B for Location of Each Bed. Quadrangles Are Listed Numerically by VIMS Map Number. Slight Differences (1 Square Meter) in Quadrangle Totals from Density Totals Are Due to Rounding. See Methods and Figure 8 for Explanation of Density Categories.]

Aberdeen, Md. (VIMS Map # 002)

AA2	6,738	CA3	11,268	EA1	3,041	GA4	7,587
BA3	79,119	DA2	4,480	FA3	4,392		

Density (1) 3,041 (2) 11,218 (3) 94,778 (4) 7,587 Total: 116,625

Havre de Grace, Md. (VIMS Map # 003)

AA1	15,703,883	MA2	5,754	YA1	2,651	JB4	5,487
BA1	4,037,938	NA4	38,753	ZA4	5,525	KB4	8,361
CA2	567,576	OA2	583,413	AB3	9,288	LB4	10,909
DA4	393,421	PA3	42,203	BB4	149,259	MB4	4,115
EA1	7,451	QA4	267,108	CB4	94,289	NB4	9,914
FA4	17,053	RA2	35,415	DB4	36,223	OB4	12,849
GA3	91,391	SA4	12,584	EB4	10,082	PB4	54,577
HA4	57,925	TA4	4,841	FB4	25,956	QB4	19,795
IA1	6,128	UA4	185,665	GB4	2,387	RB4	5,534
JA3	22,293	VA4	3,462	HB4	731	SB4	2,093
KA4	73,203	WA4	30,529	IB4	3,803	TB4	4,364
LA4	55,787	XA4	2,913				

Density (1) 19,758,052 (2) 1,192,158 (3) 165,175 (4) 1,609,495 Total: 22,724,880

North East, Md. (VIMS Map # 004)

AA1	59,745	DA1	1,012,990	GA2	26,431	IA2	12,001
BA3	19,875	EA1	6,390	HA2	28,296	JA1	13,915
CA1	38,809	FA2	115,328				

Density (1) 1,131,849 (2) 182,056 (3) 19,875 (4) 0 Total: 1,333,780

SAV

Edgewood, Md. (VIMS Map # 007)

AA2	17,849	BA2	3,550	CA2	19,867	DA2	28,998

Density (1) 0 (2) 70,264 (3) 0 (4) 0 Total: 70,264

Perryman, Md. (VIMS Map # 008)

AA3	3,630	BA2	1,841	CA2	12,614	DA3	2,452

Density (1) 0 (2) 14,455 (3) 6,082 (4) 0 Total: 20,537

Spesutie, Md. (VIMS Map # 009)

AA1	107,964	HA2	3,623	OA2	14,162	VA1	346,547
BA1	10,583	IA2	10,450	PA3	100,420	WA3	39,069
CA2	52,478	JA2	11,367	QA2	28,401	XA3	36,078
DA3	31,125	KA2	34,457	RA2	13,262	YA1	238,739
EA2	46,848	LA2	5,849	SA2	12,856	ZA1	1,760,217
FA4	5,373	MA2	6,489	TA2	8,652	AB1	998,184
GA3	6,361	NA1	6,758	UA1	10,917	BB2	24,915

Density (1) 3,479,908 (2) 273,808 (3) 213,054 (4) 5,373 Total: 3,972,143

Earleville, Md. (VIMS Map # 010)

AA2	91,054	EA2	61,429	IA3	64,078	MA2	179,712
BA1	46,785	FA1	34,515	JA2	3,941	NA1	10,004
CA1	13,168	GA1	86,235	KA3	11,854	OA2	15,354
DA2	93,154	HA3	14,662	LA4	233,449	PA1	8,217

Density (1) 198,924 (2) 444,644 (3) 90,594 (4) 233,449 Total: 967,610

Middle River, Md. (VIMS Map # 013)

AA2	10,498	CA2	28,610	DA2	21,499	EA2	8,460
BA2	26,438						

Density (1) 0 (2) 95,504 (3) 0 (4) 0 Total: 95,504

Gunpowder Neck, Md. (VIMS Map # 014)

AA3	38,341	GA3	4,506	MA2	4,149	SA2	8,895
BA3	47,354	HA3	6,151	NA2	12,445	TA3	1,199
CA2	28,963	IA1	1,243	OA3	33,015	UA2	109,581
DA3	21,971	JA3	6,707	PA3	96,966	VA3	43,299
EA3	10,313	KA4	392,465	QA3	2,182	WA2	10,800
FA2	7,521	LA3	76,442	RA2	12,398		

Density (1) 1,243 (2) 194,752 (3) 388,445 (4) 392,465 Total: 976,905

Hanesville, Md. (VIMS Map # 015)

AA1	13,997	BA2	2,232	CA2	2,414	DA2	2,176

Density (1) 13,997 (2) 6,822 (3) 0 (4) 0 Total: 20,820

Betterton, Md. (VIMS Map # 016)

AA1	2,830	BA1	9,445	CA1	402,465	DA4	114,411

Density (1) 414,739 (2) 0 (3) 0 (4) 114,411 Total: 529,150

Galena, Md. (VIMS Map # 017)

AA1	5,368	CA2	24,807	EA1	8,821	FA1	45,269
BA2	6,895	DA2	13,547				

Density (1) 59,458 (2) 45,249 (3) 0 (4) 0 Total: 104,707

Curtis Bay, Md. (VIMS Map # 018)

AA2	3,732

Density (1) 0 (2) 3,732 (3) 0 (4) 0 Total: 3,732

SAV

Swan Point, Md. (VIMS Map # 020)

AA1	3,399	DA2	22,624	GA2	5,801	IA3	19,457
BA1	4,730	EA2	21,738	HA1	16,078	JA3	25,358
CA4	12,137	FA2	15,716				

Density (1) 24,208 (2) 65,879 (3) 44,815 (4) 12,137 Total: 147,038

Rock Hall, Md. (VIMS Map # 021)

AA4	63,663	EA4	9,958	HA2	50,665	KA4	15,170
BA2	11,702	FA4	21,213	IA2	59,664	LA4	52,491
CA3	5,887	GA4	20,581	JA2	1,608	MA4	66,004
DA1	11,258						

Density (1) 11,258 (2) 123,639 (3) 5,887 (4) 249,082 Total: 389,866

Round Bay, Md. (VIMS Map # 023)

AA2	78,186	DA1	21,231	GA2	2,071	JA1	12,991
BA3	153,012	EA2	3,521	HA2	2,681	KA1	1,427
CA3	13,981	FA1	4,849	IA2	20,691	LA1	5,224

Density (1) 45,721 (2) 107,150 (3) 166,993 (4) 0 Total: 319,863

Gibson Island, Md. (VIMS Map # 024)

AA1	4,323	EA2	4,200	IA2	12,885	MA4	10,291
BA2	13,884	FA3	3,515	JA4	8,146	NA2	3,543
CA2	7,584	GA3	9,687	KA2	24,226	OA2	1,016
DA3	51,306	HA3	21,996	LA1	2,175		

Density (1) 6,498 (2) 67,338 (3) 86,503 (4) 18,437 Total: 178,777

Langford Creek, Md. (VIMS Map # 026)

AA3	163,656	OA4	15,979	CB4	771,714	QB4	16,932
BA4	88,800	PA4	13,251	DB2	266,166	RB2	8,777
CA2	17,131	QA4	34,302	EB4	2,365,215	SB4	33,330
DA1	6,135	RA4	13,341	FB4	37,955	TB1	5,745
EA2	2,204	SA4	22,753	GB3	36,931	UB2	14,472
FA4	85,277	TA4	81,779	HB4	15,153	VB3	16,969
GA4	3,853	UA2	148,886	IB3	5,597	WB4	96,570
HA2	7,233	VA1	24,306	JB2	4,977	XB1	3,888
IA4	5,269	WA4	93,921	KB3	5,278	YB2	4,744
JA4	21,028	XA2	20,000	LB4	2,491	ZB4	31,899
KA4	1,882	YA2	80,657	MB4	28,265	AC4	3,000
LA2	6,821	ZA4	163,955	NB3	9,224	BC2	2,635
MA4	53,809	AB3	177,079	OB1	7,655	CC3	94,854
NA3	239,211	BB2	72,101	PB1	15,402	DC1	80,454

Density (1) 143,583 (2) 656,806 (3) 748,799 (4) 4,101,721 Total: 5,650,910

Washington West, Md.- D.C.- Va (VIMS Map # 028)

AA2	19,202	DA4	16,882	GA4	8,119	JA4	47,172
BA4	28,347	EA2	1,845	HA4	36,155	KA4	44,262
CA4	16,700	FA4	5,858	IA4	21,450		

Density (1) 0 (2) 21,046 (3) 0 (4) 224,945 Total: 245,991

Washington East, D.C.- Md. (VIMS Map # 029)

AA3 6,602

Density (1) 0 (2) 0 (3) 6,602 (4) 0 Total: 6,602

South River, Md. (VIMS Map # 030)

AA2 8,005 BA3 8,890

Density (1) 0 (2) 8,005 (3) 8,890 (4) 0 Total: 16,895

SAV

Kent Island, Md. (VIMS Map # 032)

AA3	79,339	KA2	94,961	UA2	49,062	EB3	31,464
BA4	36,727	LA2	16,358	VA3	32,815	FB3	12,142
CA4	22,347	MA2	27,724	WA1	139,071	GB2	4,579
DA3	91,697	NA3	147,314	XA2	52,084	HB1	12,231
EA2	64,234	OA2	355,173	YA3	120,798	IB1	16,857
FA2	131,103	PA2	13,961	ZA2	29,083	JB1	15,689
GA2	11,410	QA1	74,011	AB2	49,540	KB1	12,101
HA2	77,502	RA3	88,772	BB2	35,818	LB1	40,201
IA3	21,075	SA2	32,200	CB2	87,044	MB3	27,654
JA2	140,271	TA2	164,653	DB2	41,067	NB2	67,851

Density (1) 310,162 (2) 1,545,680 (3) 653,070 (4) 59,073 Total: 2,567,985

Queenstown, Md. (VIMS Map # 033)

AA4	52,104	GA2	360,223	MA3	182,657	RA2	112,028
BA4	62,435	HA3	313,734	NA2	66,981	SA3	45,088
CA3	131,167	IA3	71,263	OA3	360,874	TA2	299,212
DA3	38,677	JA4	81,376	PA1	111,100	UA3	86,307
EA4	22,562	KA3	143,535	QA3	12,055	VA2	116,112
FA4	49,974	LA2	10,217				

Density (1) 111,100 (2) 964,773 (3) 1,385,356 (4) 268,452 Total: 2,729,681

Alexandria, Va.-D.C.- Md. (VIMS Map # 034)

AA2	15,223	JA4	34,492	SA3	5,986	BB4	1,887
BA4	4,716	KA2	19,164	TA4	895	CB4	37,207
CA4	3,643	LA4	5,177	UA4	3,115	DB4	4,108
DA4	2,246	MA4	5,155	VA4	1,058	EB4	1,070,294
EA2	4,460	NA4	5,957	WA3	39,603	FB4	173,118
FA4	13,407	OA4	18,582	XA3	66,637	GB1	337,947
GA2	10,674	PA4	522,733	YA3	115,659	HB4	49,818
HA3	36,711	QA4	29,426	ZA4	31,719	IB3	84,513
IA2	34,725	RA4	39,739	AB4	12,833	JB2	3,634

Density (1) 337,947 (2) 87,880 (3) 349,110 (4) 2,071,327 Total: 2,846,265

Deale, Md. (VIMS Map # 035)

AA2	6,254	BA2	40,498

Density (1) 0 (2) 46,752 (3) 0 (4) 0 Total: 46,752

Claiborne, Md. (VIMS Map # 036)

AA2	158,424	MA3	276,930	XA3	68,387	IB4	17,799
BA1	226,106	NA2	89,644	YA4	329,654	JB4	61,130
CA2	166,603	OA4	173,599	ZA4	21,326	KB4	412,906
DA2	295,874	PA3	178,328	AB4	47,815	LB3	97,347
EA3	140,292	QA3	179,288	BB4	21,872	MB4	95,326
FA3	12,580	RA4	109,273	CB4	57,120	NB3	13,091
GA3	3,458	SA3	60,611	DB3	49,532	OB3	33,633
HA3	6,592	TA3	13,114	EB4	153,754	PB3	19,712
IA2	25,965	UA4	74,286	FB4	366,426	QB2	23,872
JA4	304,922	VA3	5,606	GB4	94,215	RB3	8,118
KA2	173,390	WA4	51,334	HB4	13,271	SB4	4,994
LA2	884,930						

Density (1) 226,106 (2) 1,818,703 (3) 1,166,620 (4) 2,411,021 Total: 5,622,450

St. Michaels, Md. (VIMS Map # 037)

AA3	21,230	MA3	42,512	YA1	382,889	JB3	35,421
BA3	24,466	NA1	19,279	ZA2	58,166	KB3	57,526
CA3	157,063	OA3	37,416	AB3	234,056	LB4	32,997
DA2	245,524	PA3	18,282	BB2	11,005	MB3	26,228
EA3	101,629	QA3	95,562	CB4	46,372	NB4	219,117
FA3	24,794	RA3	359,389	DB4	78,078	OB4	316,208
GA2	203,560	SA3	9,007	EB4	25,631	PB2	165,473
HA4	45,449	TA3	311,571	FB4	13,418	QB4	83,098
IA3	46,671	UA2	245,171	GB4	165,930	RB4	19,179
JA3	48,421	VA3	26,456	HB3	57,025	SB3	48,586
KA2	29,202	WA1	30,770	IB3	62,073	TB3	10,984
LA2	27,779	XA2	17,311				

Density (1) 432,939 (2) 1,003,191 (3) 1,856,365 (4) 1,045,477 Total: 4,337,971

SAV

Fort Belvoir, Va.- Md. (VIMS Map # 039)

AA4	62,111	EA3	10,529	IA3	132,575	LA4	309,274
BA1	175,539	FA4	115,989	JA4	61,521	MA1	109,474
CA1	16,642	GA2	56,296	KA2	9,937	NA4	290,924
DA3	22,626	HA2	70,140				

Density (1) 301,655 (2) 136,374 (3) 165,729 (4) 839,819 Total: 1,443,577

Mt. Vernon, Md.- Va. (VIMS Map # 040)

AA4	274,257	GA1	5,257	MA1	27,703	SA2	12,946
BA2	92,496	HA1	5,996	NA4	78,099	TA2	14,725
CA2	4,904	IA3	96,983	OA1	10,822	UA2	115,470
DA2	23,048	JA3	45,775	PA4	18,165	VA4	91,843
EA4	37,848	KA4	67,557	QA1	7,852	WA4	62,446
FA2	19,210	LA3	81,665	RA2	29,725		

Density (1) 57,629 (2) 312,525 (3) 224,423 (4) 630,215 Total: 1,224,793

Lower Marlboro, Md. (VIMS Map # 041)

AA4	133,007	EA4	32,416	HA4	14,390	KA3	17,225
BA3	43,100	FA4	171,287	IA4	5,254	LA3	7,879
CA3	38,534	GA4	30,791	JA4	2,852	MA3	7,157
DA4	12,165						

Density (1) 0 (2) 0 (3) 113,894 (4) 402,160 Total: 516,054

Tilghman, Md. (VIMS Map # 043)

AA3	87,288	FA4	457,994	KA3	906,516	PA4	147,313
BA2	15,562	GA2	56,667	LA4	219,097	QA3	88,448
CA2	29,802	HA2	669,636	MA4	3,466	RA3	23,626
DA2	63,673	IA2	197,743	NA4	16,326	SA3	74,445
EA3	105,352	JA3	10,293	OA4	33,395	TA3	161,798

Density (1) 0 (2) 1,033,084 (3) 1,457,766 (4) 877,591 Total: 3,368,440

Oxford, Md. (VIMS Map # 044)

AA2	105,703	IA3	4,160	PA4	310,575	WA4	66,822
BA4	114,418	JA3	13,312	QA2	53,931	XA4	98,084
CA4	492,762	KA2	26,738	RA4	276,076	YA2	106,244
DA3	13,895	LA4	467,640	SA2	207,728	ZA3	44,823
EA3	30,191	MA2	38,053	TA3	70,060	AB4	179,148
FA3	7,063	NA1	32,732	UA4	107,711	BB3	52,877
GA3	48,910	OA2	18,713	VA3	255,116	CB3	13,351
HA4	50,373						

Density (1) 32,732 (2) 557,110 (3) 553,758 (4) 2,163,609 Total: 3,307,209

Trappe, Md. (VIMS Map # 045)

AA2	6,448	BA3	30,281	CA4	20,954	DA2	12,746

Density (1) 0 (2) 19,194 (3) 30,281 (4) 20,954 Total: 70,428

Quantico, Va.- Md. (VIMS Map # 047)

AA4	1,141,798	FA1	169,992	JA4	192,160	NA4	199,771
BA4	765,745	GA4	5,262	KA4	18,957	OA3	171,246
CA4	81,167	HA2	2,294	LA4	22,192	PA4	225,480
DA4	31,052	IA4	68,643	MA2	104,881	QA4	588,509
EA4	88,964						

Density (1) 169,992 (2) 107,175 (3) 171,246 (4) 3,429,701 Total: 3,878,115

Indian Head, Va.- Md. (VIMS Map # 048)

AA4	42,945	EA4	62,329	HA3	23,165	KA2	128,555
BA4	172,926	FA4	8,779	IA2	5,387	LA4	1,819,714
CA2	68,071	GA4	47,485	JA4	36,516	MA4	17,887
DA4	112,450						

Density (1) 0 (2) 202,013 (3) 23,165 (4) 2,321,032 Total: 2,546,210

SAV

Benedict, Md. (VIMS Map # 049)

AA3	15,216						
Density (1) 0		(2) 0		(3) 15,216		(4) 0	Total: 15,216

Hudson, Md. (VIMS Map # 051)

AA3	482,611	CA2	632,517	EA2	643,390	FA3	264,921
BA3	693,149	DA3	110,561				
Density (1) 0		(2) 1,275,907		(3) 1,551,243		(4) 0	Total: 2,827,150

Church Creek, Md. (VIMS Map # 052)

AA1	125,336	BA2	483,979	CA4	147,392		
Density (1) 125,336		(2) 483,979		(3) 0		(4) 147,392	Total: 756,707

Widewater, Va.- Md. (VIMS Map # 055)

AA2	57,604	EA4	157,695	IA4	102,650	MA4	15,942
BA4	653,805	FA4	46,375	JA4	118,995	NA4	9,868
CA4	409,180	GA4	3,275,127	KA4	362,601	OA4	3,728
DA1	8,783	HA1	162,888	LA4	2,104	PA4	16,002
Density (1) 171,672		(2) 57,604		(3) 0		(4) 5,174,072	Total: 5,403,347

Nanjemoy, Md. (VIMS Map # 056)

AA4	399,311	GA2	2,058	LA4	88,506	QA4	35,538
BA4	30,106	HA3	131,548	MA2	3,166	RA4	16,166
CA4	11,509	IA4	6,097	NA4	34,780	SA4	20,877
DA2	3,927	JA4	8,769	OA4	5,122	TA4	40,129
EA2	1,432	KA4	18,318	PA4	26,413	UA4	33,261
FA2	796						
Density (1) 0		(2) 11,379		(3) 131,548		(4) 774,902	Total: 917,830

Mathias Point, Md.- Va. (VIMS Map # 057)

AA2	30,350	HA4	52,681	OA4	59,707	VA4	30,363
BA4	244,493	IA4	250,294	PA4	7,392	WA2	5,850
CA2	24,618	JA1	25,885	QA2	3,757	XA4	70,358
DA4	280,074	KA3	69,559	RA4	7,675	YA4	136,957
EA4	165,257	LA2	487,613	SA4	3,718	ZA2	52,804
FA4	94,477	MA4	237,395	TA4	11,170	AB4	116,706
GA2	3,428	NA4	47,440	UA2	4,398	BB2	7,454

Density (1) 25,885 (2) 620,272 (3) 69,559 (4) 1,816,156 Total: 2,531,872

Popes Creek, Md. (VIMS Map # 058)

AA1	1,562	BA3	9,665	CA4	5,386

Density (1) 1,562 (2) 0 (3) 9,665 (4) 5,386 Total: 16,614

Taylors Island, Md. (VIMS Map # 062)

AA3	3,860	FA3	76,265	KA3	14,294	PA2	144,019
BA3	7,364	GA3	22,042	LA3	8,562	QA2	29,064
CA2	3,901	HA2	10,176	MA2	30,813	RA3	1,351
DA4	3,182	IA2	14,539	NA2	1,771	SA2	109,562
EA2	24,960	JA3	26,688	OA3	5,388		

Density (1) 0 (2) 368,805 (3) 165,815 (4) 3,182 Total: 537,803

Golden Hill, Md. (VIMS Map # 063)

AA2	2,571	CA2	27,347	EA2	467,842	FA2	74,690
BA3	2,470	DA3	2,765				

Density (1) 0 (2) 572,450 (3) 5,235 (4) 0 Total: 577,684

Passapatanzy, Md.- Va. (VIMS Map # 064)

AA4	116,784	CA3	91,589	EA4	42,733	FA4	105,201
BA1	125,354	DA4	141,899				

Density (1) 125,354 (2) 0 (3) 91,589 (4) 406,618 Total: 623,561

SAV

King George, Va.- Md. (VIMS Map # 065)

AA4	205,087	BA4	288,717	CA4	312,074		

Density (1) 0 (2) 0 (3) 0 (4) 805,878 Total: 805,878

Dahlgren, Va.- Md. (VIMS Map # 066)

AA4	67,540	DA4	4,658	FA4	14,749	HA4	4,399
BA3	199,811	EA3	5,940	GA4	2,951	IA4	7,372
CA4	4,617						

Density (1) 0 (2) 0 (3) 205,751 (4) 106,287 Total: 312,037

Colonial Beach North, Md.- Va. (VIMS Map # 067)

AA3	2,239	CA3	127,050	EA4	104,057	GA4	1,650
BA4	76,226	DA3	40,880	FA4	583,766	HA4	61,918

Density (1) 0 (2) 0 (3) 170,169 (4) 827,617 Total: 997,786

Rock Point, Md. (VIMS Map # 068)

AA2	84,985	DA1	4,090	GA3	35,722	JA2	8,559
BA1	6,982	EA1	15,314	HA4	45,031	KA1	37,950
CA2	80,868	FA1	3,203	IA4	45,199		

Density (1) 67,539 (2) 174,411 (3) 35,722 (4) 90,230 Total: 367,903

Honga, Md. (VIMS Map # 073)

AA3	46,257	KA2	403,216	TA2	129,576	CB2	100,936
BA2	76,346	LA3	23,379	UA2	57,694	DB2	81,908
CA2	86,414	MA1	238,694	VA1	118,395	EB2	13,807
DA2	86,672	NA3	2,001,179	WA2	1,261,969	FB3	10,044
EA3	5,466	OA2	115,489	XA3	603,719	GB2	46,645
FA2	107,032	PA3	43,557	YA2	540,171	HB2	25,347
GA2	120,613	QA2	240,069	ZA3	3,519	IB3	8,866
HA1	35,665	RA3	212,168	AB2	453,503	JB3	10,057
IA2	235,677	SA1	163,147	BB2	168,761	KB3	4,189
JA1	99,706						

Density (1) 655,608 (2) 4,351,848 (3) 2,972,399 (4) 0 Total: 7,979,854

Wingate, Md. (VIMS Map # 074)

AA2	230,796	DA3	2,043,223	GA1	63,179	IA3	14,457
BA3	1,714,227	EA2	397,923	HA2	126,186	JA2	12,455
CA1	128,971	FA3	303,291				

Density (1) 192,150 (2) 767,360 (3) 4,075,198 (4) 0 Total: 5,034,709

Stratford Hall, Va.- Md. (VIMS Map # 077)

AA2	37,496	BA2	39,421

Density (1) 0 (2) 76,917 (3) 0 (4) 0 Total: 76,917

Richland Point, Md. (VIMS Map # 082)

AA2	94,410	BA2	9,913	CA3	42,370

Density (1) 0 (2) 104,323 (3) 42,370 (4) 0 Total: 146,693

SAV

Bloodsworth Island, Md. (VIMS Map # 083)

AA2	7,218	FA2	243,062	KA2	26,732	OA2	61,910
BA2	7,277	GA2	2,852,001	LA2	234,167	PA2	29,249
CA2	407,803	HA2	194,652	MA2	46,491	QA2	140,755
DA1	79,899	IA2	153,611	NA2	7,182	RA2	18,533
EA2	774,945	JA2	270,878				

Density (1) 79,899 (2) 5,476,466 (3) 0 (4) 0 Total: 5,556,365

Deal Island, Md. (VIMS Map # 084)

AA2	14,711	CA2	10,124	EA2	63,220	FA1	2,107
BA2	25,576	DA2	34,463				

Density (1) 2,107 (2) 148,094 (3) 0 (4) 0 Total: 150,200

Monie, Md. (VIMS Map # 085)

AA2 55,765

Density (1) 0 (2) 55,765 (3) 0 (4) 0 Total: 55,765

Kedges Straits, Md. (VIMS Map # 091)

AA2	43,799	GA2	71,574	MA3	58,046	SA1	183,672
BA2	84,774	HA2	323,961	NA3	102,868	TA1	60,391
CA2	139,479	IA2	77,276	OA3	250,715	UA3	246,213
DA2	66,708	JA2	254,235	PA1	109,042	VA2	35,911
EA2	10,417	KA3	749,098	QA3	2,513,365	WA3	9,030
FA2	282,597	LA2	380,949	RA2	270,156		

Density (1) 353,105 (2) 2,041,835 (3) 3,929,336 (4) 0 Total: 6,324,275

Terrapin Sand Point, Md. (VIMS Map # 092)

AA2	216,452	CA2	309,304	EA3	38,520	GA2	18,260
BA4	752,366	DA3	288,136	FA3	32,802	HA4	74,303

Density (1) 0 (2) 544,017 (3) 359,457 (4) 826,669 Total: 1,730,143

Marion, Md. (VIMS Map # 093)

AA1	20,049	HA2	107,039	NA2	15,310	TA2	174,226
BA2	159,802	IA3	506,328	OA3	39,766	UA2	45,228
CA2	71,551	JA2	23,885	PA3	446,269	VA2	6,243
DA2	57,088	KA3	6,875	QA2	32,237	WA3	77,051
EA2	92,965	LA3	64,315	RA2	72,707	XA3	75,407
FA2	150,448	MA2	8,824	SA2	66,075	YA4	14,307
GA2	27,264						

Density (1) 20,049 (2) 1,110,889 (3) 1,216,010 (4) 14,307 Total: 2,361,255

Ewell, Md.- Va. (VIMS Map # 099)

AA4	5,323,362	HA2	18,171	OA2	144,879	VA1	23,003
BA2	438,567	IA2	168,567	PA2	42,744	WA3	323,580
CA3	976,040	JA1	173,236	QA2	3,283	XA1	280,536
DA2	167,543	KA3	227,497	RA2	29,537	YA1	98,386
EA2	5,411,201	LA2	690,120	SA2	288,717	ZA3	285,370
FA2	829,524	MA3	25,446	TA2	77,041	AB1	12,150
GA3	899,565	NA2	19,125	UA2	61,902	BB1	14,447

Density (1) 601,757 (2) 8,390,921 (3) 2,737,497 (4) 5,323,362 Total: 17,053,537

Great Fox Island, Va.- Md. (VIMS Map # 100)

AA2	3,065,014	GA2	5,942	LA2	86,021	QA4	78,289
BA4	3,031,568	HA3	156,835	MA1	15,862	RA2	25,195
CA3	299,083	IA2	5,035	NA4	486,926	SA2	157,604
DA2	417,315	JA1	67,846	OA2	462,010	TA4	1,714,578
EA2	103,282	KA3	78,115	PA3	32,118	UA3	784,526
FA2	385,624						

Density (1) 83,707 (2) 4,713,043 (3) 1,350,676 (4) 5,311,360 Total: 11,458,787

SAV

Crisfield, Md.- Va. (VIMS Map # 101)

AA3	617,048	GA3	50,532	MA2	16,254	SA2	30,778
BA3	146,531	HA3	5,790	NA3	30,849	TA2	14,850
CA3	85,106	IA3	7,872	OA2	109,688	UA2	23,965
DA2	73,563	JA3	3,732	PA1	2,822	VA1	35,748
EA3	12,853	KA2	7,974	QA3	88,245	WA2	77,011
FA3	86,493	LA2	30,846	RA3	205,880	XA2	26,902

Density (1) 38,570 (2) 411,832 (3) 1,340,932 (4) 0 Total: 1,791,334

Reedville, Va. (VIMS Map # 106)

AA2	251,169	CA1	549,990	DA4	347,599	EA2	401,650
BA4	1,037,290						

Density (1) 549,990 (2) 652,819 (3) 0 (4) 1,384,889 Total: 2,587,698

Tangier Island, Va. (VIMS Map # 107)

AA2	110,052	DA2	632,917	GA2	537,336	IA1	166,915
BA4	968,490	EA3	108,878	HA3	795,364	JA3	392,591
CA3	1,100,386	FA2	45,017				

Density (1) 166,915 (2) 1,325,322 (3) 2,397,219 (4) 968,490 Total: 4,857,945

Chesconessex, Va. (VIMS Map # 108)

AA1	126,375	KA4	323,817	UA2	264,447	DB2	66,803
BA2	108,317	LA2	1,229	VA4	175,482	EB3	1,576,863
CA3	145,522	MA2	2,726	WA1	1,072,957	FB1	265,676
DA1	14,672	NA3	255,958	XA4	387,544	GB4	703,042
EA2	55,580	OA2	40,578	YA2	741,912	HB2	54,172
FA4	1,439	PA4	737,653	ZA4	825,585	IB2	2,685
GA2	11,042	QA2	61,179	AB2	5,922	JB2	55,204
HA4	185,884	RA4	395,475	BB3	4,703	KB3	84,998
IA4	172,452	SA3	553,710	CB3	65,357	LB2	48,346
JA3	454,361	TA1	321,861				

Density (1) 1,801,541 (2) 1,520,141 (3) 3,141,473 (4) 3,908,373 Total: 10,371,528

Parksley, Va. (VIMS Map # 109)

AA2	6,621	IA2	9,217	PA2	41,825	WA2	12,708
BA2	110,630	JA2	13,106	QA2	2,643	XA2	39,746
CA2	494,234	KA2	15,412	RA1	33,379	YA2	2,322
DA4	2,506,103	LA2	191,803	SA3	77,898	ZA1	18,294
EA2	112,238	MA2	5,462	TA1	102,612	AB3	18,228
FA2	17,188	NA2	4,458	UA1	51,083	BB1	14,757
GA2	4,388	OA2	115,936	VA3	14,296	CB1	35,237
HA2	1,339						

Density (1) 255,362 (2) 1,201,276 (3) 110,422 (4) 2,506,103 Total: 4,073,162

Irvington, Va. (VIMS Map # 111)

AA3	4,605	FA1	44,077	KA2	134	PA2	31,789
BA3	9,069	GA2	5,467	LA3	1,359	QA2	79,003
CA2	47,633	HA4	39,556	MA3	2,334	RA1	3,227
DA2	225,193	IA2	1,002	NA3	4,516	SA2	2,484
EA1	44,958	JA3	1,109	OA2	17,432	TA2	12,474

Density (1) 92,261 (2) 422,613 (3) 22,992 (4) 39,556 Total: 577,422

Fleets Bay, Va. (VIMS Map # 112)

AA1	1,075,977	GA2	2,963	MA2	27,383	SA2	6,863
BA2	17,019	HA2	19,213	NA2	17,793	TA3	87,746
CA3	330,578	IA1	22,400	OA2	112,868	UA2	63,230
DA1	315,323	JA2	63,020	PA2	445,191	VA2	171,281
EA2	357,755	KA3	1,035,335	QA2	278,353	WA2	20,377
FA2	361,895	LA3	13,049	RA3	134,054		

Density (1) 1,413,700 (2) 1,965,203 (3) 1,600,763 (4) 0 Total: 4,979,667

Nandua Creek, Va. (VIMS Map # 113)

AA2	2,071,188	EA4	214,265	HA4	452,531	KA3	75,075
BA2	79,810	FA2	889,808	IA2	25,693	LA2	9,492
CA4	130,280	GA1	285,998	JA2	295	MA1	87,458
DA3	78,371						

Density (1) 373,456 (2) 3,076,286 (3) 153,446 (4) 797,077 Total: 4,400,265

SAV

Pungoteague, Va. (VIMS Map # 114)

AA3	1,111	HA3	49,491	OA1	152,140	UA2	1,048
BA2	18,429	IA3	67,426	PA4	101,795	VA4	355,726
CA2	38,120	JA2	265,521	QA1	928,775	WA2	62,376
DA1	464,412	KA1	1,897	RA2	1,719,833	XA2	327,848
EA1	11,088	LA3	62,420	SA4	3,169,140	YA3	24,770
FA2	21,375	MA1	557,277	TA2	7,143	ZA2	100,190
GA4	608	NA3	287,309				

Density (1) 2,115,589 (2) 2,561,883 (3) 492,528 (4) 3,627,269 Total: 8,797,269

Wilton, Va. (VIMS Map # 117)

AA2 24,366

Density (1) 0 (2) 24,366 (3) 0 (4) 0 Total: 24,366

Deltaville, Va. (VIMS Map # 118)

AA1	7,468	DA2	289,216	FA2	77,414	HA2	160,562
BA3	174,207	EA1	126,745	GA2	10,306	IA1	266,724
CA1	587,830						

Density (1) 988,767 (2) 537,497 (3) 174,207 (4) 0 Total: 1,700,471

Jamesville, Va. (VIMS Map # 119)

AA1	50,188	IA2	20,397	PA4	123,798	WA3	152,013
BA3	27,783	JA2	77,824	QA3	445,721	XA1	30,675
CA2	12,414	KA2	1,202,666	RA1	20,355	YA2	40,856
DA2	502,779	LA4	126,317	SA3	145,987	ZA2	50,487
EA3	864,634	MA1	497,892	TA1	86,841	AB2	14,640
FA2	6,116	NA2	556,025	UA4	213,809	BB2	1,912
GA2	39,803	OA1	162,112	VA1	56,489	CB2	1,259
HA2	5,831						

Density (1) 904,553 (2) 2,533,010 (3) 1,636,139 (4) 463,924 Total: 5,537,625

Ware Neck, Va. (VIMS Map # 122)

AA2	30,798	EA4	197,509	IA3	181,876	LA3	164,231
BA1	268,631	FA3	392,447	JA1	102,349	MA3	137,270
CA2	116,745	GA1	91,016	KA4	795,463	NA2	62,764
DA2	36,929	HA3	261,435				

Density (1) 461,996 (2) 247,236 (3) 1,137,260 (4) 992,972 Total: 2,839,464

Mathews, Va. (VIMS Map # 123)

AA1	10,400	HA4	180,759	OA2	14,595	UA2	20,995
BA2	121,691	IA4	55,306	PA3	250,746	VA2	9,764
CA2	61,381	JA2	569,872	QA2	128,580	WA2	10,575
DA2	81,234	KA2	162,098	RA1	1,858	XA2	7,099
EA4	25,171	LA2	38,294	SA1	2,815	YA1	8,853
FA3	22,731	MA3	148,767	TA2	40,607	ZA2	68,351
GA2	23,268	NA4	109,139				

Density (1) 23,926 (2) 1,358,403 (3) 422,244 (4) 370,375 Total: 2,174,947

Franktown, Va. (VIMS Map # 124)

AA2	154,897	GA3	363,438	MA1	51,941	SA2	140,322
BA2	65,790	HA1	36,369	NA3	892,355	TA3	1,060,348
CA3	175,091	IA2	179,716	OA2	1,171,225	UA3	57,946
DA2	6,818	JA2	66,038	PA2	381,090	VA1	828,309
EA1	26,034	KA2	50,066	RA2	6,134	WA3	110,706
FA3	110,932	LA1	115,255				

Density (1) 1,057,908 (2) 2,222,096 (3) 2,770,816 (4) 0 Total: 6,050,820

SAV

Achilles, Va. (VIMS Map # 131)

AA4	64,715	LA2	91,041	WA4	1,881,841	GB4	585,356
BA4	55,556	MA2	197,735	XA2	18,413	HB2	100,144
CA2	6,068	NA4	61,595	YA2	16,479	IB3	12,996
DA2	7,615	OA2	2,858	ZA2	213,588	JB3	100,809
EA4	75,723	PA2	11,270	AB3	41,670	KB1	946
FA4	1,204,757	QA2	18,787	BB4	23,239	LB2	58,434
GA1	123,314	RA2	67,340	CB4	324,612	MB2	65,651
HA4	45,110	SA4	1,192,691	DB2	84,244	NB4	825,083
IA2	92,549	TA2	2,860	EB4	1,427,278	OB1	150,420
JA4	1,519,341	UA2	31,546	FB3	98,359	PB2	5,875
KA2	46,925	VA2	6,741				

Density (1) 274,680 (2) 1,146,164 (3) 253,835 (4) 9,286,897 Total: 10,961,575

New Point Comfort, Va. (VIMS Map # 132)

AA4	110,178	HA4	1,545,584	OA2	41,928	VA1	28,836
BA4	5,348,695	IA1	119,562	PA1	452,158	WA1	14,252
CA2	376,581	JA1	47,299	QA4	60,983	XA3	522,738
DA1	186,610	KA4	1,020,403	RA1	138,488	YA2	56,429
EA4	308,508	LA1	73,719	SA2	441,807	ZA1	4,832
FA4	827,733	MA4	1,015,730	TA1	298,217	AB3	1,571,546
GA4	174,571	NA2	63,910	UA4	337,607	BB4	101,782

Density (1) 1,363,973 (2) 980,654 (3) 2,094,284 (4) 10,851,773 Total: 15,290,684

Cape Charles, Va. (VIMS Map # 133)

AA2	351,843	FA2	43,392	JA2	335,176	NA3	161,380
BA3	1,748	GA2	12,035	KA1	34,629	OA2	1,538,026
CA4	21,388	HA2	70,421	LA3	57,898	PA4	965,409
DA2	167,851	IA4	649,949	MA3	140,991	QA2	50,044
EA4	220,707						

Density (1) 34,629 (2) 2,568,788 (3) 362,016 (4) 1,857,453 Total: 4,822,886

Cheriton, Va. (VIMS Map # 134)

AA2	220,642	CA2	160,438	EA3	102,393	FA1	26,318
BA3	362,719	DA1	49,939				

Density (1) 76,257 (2) 381,080 (3) 465,112 (4) 0 Total: 922,449

Yorktown, Va. (VIMS Map # 139)

AA1	982	CA1	572	EA2	634	GA2	3,084
BA2	17,513	DA1	17,722	FA2	4,171		

Density (1) 19,276 (2) 25,401 (3) 0 (4) 0 Total: 44,677

Poquoson West, Va. (VIMS Map # 140)

AA2	3,366	GA2	20,038	MA4	55,554	SA1	37,356
BA3	1,042,321	HA4	160,897	NA2	93,393	TA1	74,623
CA3	97,726	IA1	602,979	OA4	633,399	UA4	47,025
DA2	11,279	JA2	398,751	PA2	475,482	VA2	45,895
EA2	157,143	KA4	552,752	QA1	344,457	WA4	46,140
FA2	11,791	LA1	10,021	RA4	886,029	XA3	1,870

Density (1) 1,069,436 (2) 1,217,137 (3) 1,141,918 (4) 2,381,796 Total: 5,810,288

Poquoson East, Va. (VIMS Map # 141)

AA2	608,494	EA2	26,420	HA3	6,906	KA4	1,839,264
BA4	6,263,533	FA3	23,859	IA2	1,502	LA2	1,476,868
DA3	622,203	GA3	16,212	JA3	9,483	MA1	648,157

Density (1) 648,157 (2) 2,113,284 (3) 678,664 (4) 8,102,797 Total: 11,542,902

Elliotts Creek, Va. (VIMS Map # 142)

AA2	1,006,774	BA1	604,035

Density (1) 604,035 (2) 1,006,774 (3) 0 (4) 0 Total: 1,610,808

SAV

Hampton, Va. (VIMS Map # 147)

AA3	61,018	FA4	139,325	KA4	453,433	PA2	19,568
BA2	1,793	GA4	95,691	LA4	46,537	QA4	534,789
CA2	154,310	HA2	12,617	MA2	39,509	RA3	624,269
DA4	170,086	IA1	313,824	NA4	279,463	SA2	14,411
EA3	260,373	JA3	105,024	OA3	40,314	TA4	98,484

Density (1) 313,824 (2) 242,208 (3) 1,090,998 (4) 1,817,807 Total: 3,464,838

Cape Henry, Va. (VIMS Map # 152)

AA2	5,647	EA2	3,805	IA2	81,921	MA2	30,208
BA2	6,948	FA2	6,975	JA2	4,457	NA2	6,101
CA2	3,574	GA2	18,531	KA2	86,229	OA1	113,875
DA2	3,405	HA1	17,846	LA2	12,027		

Density (1) 131,721 (2) 269,829 (3) 0 (4) 0 Total: 401,550

Princess Anne, Va. (VIMS Map # 157)

AA2	6,269	BA2	7,319	CA2	4,481	DA2	6,897

Density (1) 0 (2) 24,966 (3) 0 (4) 0 Total: 24,966

Bristol, Md. (VIMS Map # 159)

AA3	20,187	CA4	159,538	DA4	20,702	EA4	3,459
BA4	31,997						

Density (1) 0 (2) 0 (3) 20,187 (4) 215,695 Total: 235,882

Charlotte Hall, Md. (VIMS Map # 162)

AA4	74,853

Density (1) 0 (2) 0 (3) 0 (4) 74,853 Total: 74,853

Assawoman Bay, Md.-Del. (VIMS Map # 166)

AA3	27,334	DA2	44,190	GA2	1,995	JA2	28,305
BA2	12,582	EA3	938,566	HA2	58,078	KA2	109,764
CA2	100,796	FA2	737	IA2	43,263		

Density (1) 0 (2) 399,709 (3) 965,900 (4) 0 Total: 1,365,609

Berlin, Md. (VIMS Map # 167)

AA2	236,357	CA3	12,895	EA3	7,214	GA2	55,055
BA1	16,293	DA3	14,644	FA3	42,894	HA4	29,015

Density (1) 16,293 (2) 291,411 (3) 77,646 (4) 29,015 Total: 414,366

Ocean City, Md. (VIMS Map # 168)

AA4	8,575	DA3	8,652	GA2	14,316	IA3	83,361
BA2	17,786	EA3	27,741	HA2	6,210	JA2	16,704
CA3	252,664	FA3	7,581				

Density (1) 0 (2) 55,015 (3) 380,000 (4) 8,575 Total: 443,590

Tingles Island, Md. (VIMS Map # 170)

AA2	26,246	FA1	178,637	KA3	510,269	OA4	218,227
BA3	1,171,030	GA3	2,567,413	LA3	67,336	PA2	4,485
CA4	5,820,521	HA2	24,270	MA2	2,701	QA4	891,380
DA2	24,489	IA2	8,233	NA3	296,713	RA3	511,488
EA2	36,952	JA1	54,613				

Density (1) 233,251 (2) 127,375 (3) 5,124,249 (4) 6,930,128 Total: 12,415,003

Boxiron, Md.- Va. (VIMS Map # 172)

AA2	338,114	EA2	1,350,064	HA2	317,581	KA1	94,972
BA4	2,823,562	FA3	671,639	IA2	27,905	LA3	952,989
CA2	174,981	GA3	1,030,277	JA3	126,749	MA2	152,107
DA2	41,205						

Density (1) 94,972 (2) 2,401,957 (3) 2,781,654 (4) 2,823,562 Total: 8,102,144

SAV

Whittington Point, Md.- Va. (VIMS Map # 173)

AA1	18,769	CA3	40,415	EA3	1,846,845	GA3	1,609,402
BA1	183,776	DA2	820,528	FA2	180,735	HA1	58,941

Density (1) 261,486 (2) 1,001,263 (3) 3,496,662 (4) 0 Total: 4,759,410

Chincoteague West, Va. (VIMS Map # 174)

AA4 651,243

Density (1) 0 (2) 0 (3) 0 (4) 651,243 Total: 651,243

Chincoteague East, Va. (VIMS Map # 175)

AA4	12,187,904	BA2	454,903	CA2	338,732	DA2	42,363

Density (1) 0 (2) 835,999 (3) 0 (4) 12,187,904 Total: 13,023,903

East of New Point Comfort, Va. (VIMS Map # 177)

AA1 189,483

Density (1) 189,483 (2) 0 (3) 0 (4) 0 Total: 189,483

Bethel Beach, Va. (VIMS Map # 178)

AA1	2,908	BA2	5,104	CA1	29,971

Density (1) 32,879 (2) 5,104 (3) 0 (4) 0 Total: 37,983

Goose Island, Va. (VIMS Map # 179)

AA3	311,499	CA3	96,046	DA3	157,146	EA4	218,543
BA2	842,302						

Density (1) 0 (2) 842,302 (3) 564,690 (4) 218,543 Total: 1,625,535

APPENDIX D

1994 Submerged Aquatic Vegetation Ground-Survey Data Listed by USGS 7.5 Minute Quadrangle and by 1994 Bed.

KEY

* Abbreviations under column "Species" are as follows:

Zm	-	*Zostera marina* (eelgrass)
Rm	-	*Ruppia maritima* (widgeon grass)
C	-	*Chara* sp. (muskgrass)
Cd	-	*Ceratophyllum demersum* (coontail)
Ec	-	*Elodea canadensis* (common elodea)
Ed	-	*Egeria densa* (water-weed)
Hd	-	*Heteranthera dubia* (water stargrass)
Hv	-	*Hydrilla verticillata* (hydrilla)
Ms	-	*Myriophyllum spicatum* (Eurasian watermilfoil)
N	-	*Najas* spp. (naiad)
Nfl	-	*Najas flexilis* (northern naiad)
Ngr	-	*Najas gracillima* (slender naiad)
Ngu	-	*Najas guadalupensis* (southern naiad)
Nm	-	*Najas minor* (no common name)
Pcr	-	*Potamogeton crispus* (curly pondweed)
Pe	-	*Potamogeton epihydrus* (leafy pondweed)
Ppc	-	*Potamogeton pectinatus* (sago pondweed)
Ppf	-	*Potamogeton perfoliatus* (redhead-grass)
Ppu	-	*Potamogeton pusillus* (slender pondweed)
Tn	-	*Trapa natans* (water chestnut)
Va	-	*Vallisneria americana* (wild celery)
Zp	-	*Zannichellia palustris* (horned pondweed)
U	-	Unknown species composition

** Abbreviations under column "Surveyor" are as follows:

Citizen	-	Citizens' Survey
Essex	-	Essex Community College
EPA	-	United States Environmental Protection Agency
Harford	-	Harford Community College
MD-DNR	-	Maryland Department of Natural Resources
Ocean Pines	-	Ocean Pines Boat Club
PRP	-	Patuxent River Park Staff
USFWS	-	United States Fish and Wildlife Service
USGS	-	United States Geological Survey
VIMS	-	Virginia Institute of Marine Science

APPENDIX D

1994 Submerged Aquatic Vegetation Ground-Survey Data Listed by USGS 7.5 Minute Quadrangle

Quad	1994 Bed	Species*	Surveyor**	Survey Date
002	AA2	Ms	Harford	09/20/94
	BA3	Ms, Hv, Cd, Hd	Harford	09/20/94
	CA3	Ms, Hv, Cd, Hd, Va	Harford	09/20/94
	DA2	Ms	Citizen	10/08/94
	EA1	Ms	Harford	09/20/94
	Susquehanna River	Hv, Ms	Citizen	10/08/94
003	AA1	Ms, Cd	Citizen	07/23/94
	AA1	Cd, Ec, Ms, Hv	Citizen	09/17/94
	AA1	Ms, Cd, Va	Citizen	08/26/94
	AA1 north	Ms, Hv	Harford	09/05/94
	AA1 south	Ms	Harford	08/27/94
	AB3	Ms, Cd	Harford	09/20/94
	BA1	Ms, Hv, Cd	Harford	09/04/94
	BB4	Ms, Cd	Harford	09/20/94
	CA2	Ms, Hv, Va	Harford	09/04/94
	CB4	Hv, Ms	Citizen	10/08/94
	CB4	Hv, Ms, U	Citizen	10/08/94
	CB4 north	Ms	Harford	09/20/94
	CB4 north-middle	Ms, Cd, Hv	Harford	09/20/94
	CB4 south	Ms, Cd	Harford	09/20/94
	CB4 south-middle	Ms, Cd, Hv	Harford	09/20/94
	Carpenter Point	Ms	Citizen	09/10/94
	DA4	Ms, Hv, Va, Ngu, Cd	Harford	09/04/94
	DB4 east	Ms, Hv, Cd	Harford	09/20/94
	DB4 north	Hv, Ms	Citizen	09/20/94
	DB4 west	Ms, Cd, Hd	Harford	09/20/94
	EB4	Ms	Citizen	10/08/94
	EB4 north	Ms, Hv	Harford	09/20/94
	EB4 south	Ms, Hv, Cd	Harford	09/20/94
	FA4	Ms, Hv	Harford	09/04/94
	FB4	Ms, U, Va	Citizen	10/08/94
	FB4	Ms, Hv, Cd	Harford	09/04/94
	GA3 middle	Ms, Hv, Cd, Va	Harford	09/04/94
	GA3 north	Ms, Hv	Harford	09/04/94

SAV

Quad	1994 Bed	Species*	Surveyor**	Survey Date
003	GA3 south	Ms, Hv, Hd, Cd	Harford	09/04/94
	GB3	Ms	Citizen	10/08/94
	GB3	Ms, Hv, Cd, Va	Harford	09/04/94
	HA4 north	Ms, Hv, Hd, Cd, Nm	Harford	09/04/94
	HA4 south	Ms, Hv, Cd, Hd	Harford	09/04/94
	HB4	Hv, Ms	Citizen	10/08/94
	IB4	Hv, Ms, Va	Citizen	10/08/94
	JA3 north	Ms, Hv, Hd, Va	Harford	09/04/94
	JA3 south	Ms, Hv, Hd	Harford	09/04/94
	JB4	Hv, Ms	Citizen	10/08/94
	KA4	Hv, Ms, Cd, Va, Ngu	Harford	09/04/94
	KB4	Ms, Hv, Cd	Harford	09/04/94
	KB4	Ms	Citizen	10/08/94
	LA4 north	Ms, Hd, Cd, Va	Harford	09/04/94
	LA4 south	Ms, Hv, Va, Cd	Harford	09/04/94
	LB4	Ms, Cd, Va, Hd, Ngu	Harford	09/04/94
	MA2	Ms, Va, Cd	Harford	10/05/94
	NA4	Ms	Harford	10/05/94
	NB4	Ms, Cd, Hd	Harford	09/04/94
	NB4	Ms	Citizen	10/08/94
	OA2 Mill Creek	Ms, Va, Hv	Harford	10/05/94
	OA2 east	Ms, Va, Hv, Cd	Harford	10/05/94
	OA2 north	Ms, Hd, Cd	Harford	10/05/94
	PA3 Stump Point	Ms, Va	Harford	10/05/94
	PA3 middle	Ms, Hv, Va, Hd, Cd	Harford	10/05/94
	PA3 west	Ms, Hv	Harford	08/27/94
	PB4	Ms, Hd, Cd	Harford	09/20/94
	PB4	Hv, Ms	Citizen	10/08/94
	Port Deposit, north	Ms	Citizen	10/08/94
	Port Deposit, south	Hv, Ms, Va	Citizen	10/08/94
	QA4	Ms, Hv, Cd	Harford	09/20/94
	QB4	Hv, Ms	Citizen	10/08/94
	QB4	Ms, Hv, Cd, Hd	Harford	09/20/94
	RA2	Hv	Harford	09/20/94
	RB4	Hv, Ms	Citizen	10/08/94
	SB4	Hv, Ms	Citizen	10/08/94
	SB4	Ms, Hv, Cd	Harford	09/20/94
	TA4	Hv, Ms	Citizen	10/08/94
	TB4	Ms, Hd, Cd, Va	Harford	09/04/94
	UA4	Hv, Ms	Citizen	10/08/94

Quad	1994 Bed	Species*	Surveyor**	Survey Date
003	UA4 north	Ms, Hv, Cd	Harford	09/20/94
	UA4 south	Ms, Hv, Cd, Hd	Harford	09/20/94
	VA4	Ms, Hv	Harford	09/20/94
	WA4	Hv, Ms	Citizen	10/08/94
	WA4 north	Ms, Cd	Harford	09/20/94
	WA4 north-middle	Ms, Cd, Hv, Hd	Harford	09/20/94
	WA4 south	Ms, Cd	Harford	09/20/94
	WA4 south-middle	Ms, Cd	Harford	09/20/94
	XA4	Hv, Ms, Va	Citizen	10/08/94
	YA1	Ms	Harford	09/20/94
	YA1	Ms	Citizen	10/08/94
004	AA1	Ms	Harford	09/04/94
	CA1	Ms	Citizen	08/08/94
	CA1	Ms	Harford	09/04/94
	DA1	Ms	Harford	09/04/94
	DA1	Ms	Citizen	08/08/94
	HA2	Ms	Harford	09/04/94
	IA2	Ms	Harford	09/04/94
	JA1	Ms	Harford	09/04/94
007	AA2	Ms, Va	Harford	10/04/94
	BA2	Ms, Va	Harford	10/04/94
	CA2	Ms, Va	Harford	10/04/94
	Otter Point Creek	Cd, Ms, Va	Citizen	09/06/94
009	AA1	Ms	Harford	09/04/94
	AB1	Ms	Harford	09/04/94
	BA1	Ms	Harford	09/04/94
	BB2	Ms, Hv, Hd, Va, Ngu	Harford	09/04/94
	FA4	Ms, Hv	Harford	09/04/94
	KA2	Ms, Hv, Cd	Harford	09/17/94
	NA1	Ms, Hv, Cd	Harford	09/17/94
	OA2	Ms, Hv, Cd	Harford	09/17/94
	PA3	Ms, Hv, Cd	Harford	09/17/94
	QA2	Ms, Hv, Cd, Nm	Harford	09/17/94
	UA1	Ms	Harford	09/04/94
	VA1	Ms, Hv, Hd, Va	Harford	09/04/94
	WA3	Ms, Hv, Hd, Va	Harford	09/04/94
	XA3	Ms	Harford	09/04/94

SAV

Quad	1994 Bed	Species*	Surveyor**	Survey Date
009	YA1	Ms	Harford	09/04/94
	ZA1	Ms, Hv, Cd	Harford	09/04/94
010	AA2	Ms, Va	EPA	07/04/94
	AA2 north	Ms, Ppc, Pcr	Harford	09/04/94
	AA2 south	Ms	Harford	09/04/94
	BA1	Ms	Harford	09/04/94
	BA1	Ms, Va	EPA	07/04/94
	CA1	Ms, Va	Harford	09/04/94
	CA1	Ms, Va	EPA	07/04/94
	Cabin John Creek	Ms	Citizen	08/08/94
	DA2	Ms	Citizen	08/08/94
	DA2	Ms, Va	EPA	07/04/94
	DA2 south	Ms, Va, Ppc	Harford	09/04/94
	EA2	Ms, Va	Harford	09/04/94
	EA2	Ms, Va	Citizen	08/08/94
	EA2	Ms, Va	EPA	07/04/94
	FA1	Ms, Va	EPA	07/04/94
	FA1	Ms, Va	Citizen	07/04/94
	FA1	Ms, Va	Harford	09/04/94
	GA1	Ms, Va	EPA	07/04/94
	GA1 north	Ms, Va	Citizen	08/08/94
	GA1 south	Ms	Harford	09/04/94
	HA3	Ms, Va	Harford	09/04/94
	HA3	Ms, Va	EPA	07/04/94
	IA3	Ms, Va	Harford	09/04/94
	JA2	Ms, Va	Harford	09/04/94
	KA3	Ms, Va	Harford	09/04/94
	McGill Creek	U	Citizen	08/16/94
	NA1 north	Ms	Harford	09/04/94
	OA2	Ms	Harford	09/04/94
013	Breezy Point Beach	Ms	Citizen	04/08/94
	Galloway Creek	Ms, Rm, U	Citizen	04/08/94
014	AA3	Ms, Ec, Va, C	Essex	07/25/94
	AA3	Ec	Essex	08/30/94
	AA3	Ms, Ec, Va, Cd	Harford	10/04/94
	AA3	Ec, Ms, Va	Essex	07/25/94, 10/07/94
	AA3 east	Ec	Essex	10/07/94

Quad	1994 Bed	Species*	Surveyor**	Survey Date
014	AA3 east	Ec, Va	Essex	08/30/94
	AA3 west	Ec, Va	Essex	08/30/94
	BA3	Ec	Essex	08/30/94
	BA3	Ms, Ec, Va	Essex	07/25/94, 10/07/94
	BA3	Ec, Va, Ms, C	Essex	07/25/94
	BA3	Ms, Ec, Va, Cd	Harford	10/04/94
	CA2	Ec	Essex	08/30/94, 10/07/94
	CA2	Ms, Ec	Essex	4/30, 5/20, 07/25/94
	CA2	Ec	Harford	10/04/94
	DA3	Ec, Va	Essex	09/23/94
	DA3	Va	Essex	07/26/94
	DA3	Ec, Va	Harford	10/04/94
	Dundee Creek	Ec, Ms	Essex	07/04/94, 07/29/94
	Dundee Creek	Ec	Essex	10/01/94
	EA3	Cd, Ms	Essex	06/24/94
	EA3	Va, Ec, Ms	Harford	10/04/94
	EA3	Va	Essex	07/26/94
	EA3	Ec	Essex	08/23/94, 09/23/94
	FA2	Va, Ec	Harford	10/04/94
	FA2	Ec	Essex	08/23/94
	FA2	Cd, Ms	Essex	06/24/94
	GA3	Ec	Harford	10/04/94
	GA3	Ms	Essex	06/24/94
	GA3	Ec, Ms	Essex	07/26/94, 09/23/94
	GA3	Ms, Cd, Ec	Essex	08/23/94
	HA3	Ms	Essex	06/24/94
	HA3	Ms	Essex	07/26/94, 09/23/94
	HA3	Ms, Ec, Cd	Essex	08/23/94
	HA3	Ec	Harford	10/04/94
	IA1	Ms, Cd, Ec	Essex	08/23/94
	IA1	Ms	Essex	06/24/94
	IA1	Ec, Ms	Essex	07/26/94, 09/23/94
	IA1	Ec, Ms	Harford	10/04/94
	JA3	Ec, Ms, Cd	Essex	08/23/94
	JA3	Ec, Ms, Cd	Harford	10/04/94
	JA3	Ms	Essex	06/24/94
	JA3	Ec, Ms	Essex	07/26/94, 09/23/94
	KA4	Ec, Ms, Cd, Va	Essex	07/26/94
	KA4	Ec, Ms, Va	Essex	06/24/94
	KA4	Ec, Ms	Essex	08/23/94, 09/23/94

SAV

Quad	1994 Bed	Species*	Surveyor**	Survey Date
014	KA4	Ec, Ms, Va, Cd	Harford	10/04/94
	MA2	Ec	Harford	10/04/94
	NA2	Ec, Cd	Harford	10/04/94
	NA2	Ec, Ms	Essex	08/23/94, 09/23/94
	NA2	Cd, Ms	Essex	06/24/94
	NA2	Ec, Ms, Cd	Essex	07/26/94
	OA3	Ec, Ms, Va	Harford	10/04/94
	PA3 middle	Va, Ms, Cd, Ngu	Harford	10/04/94
	PA3 north	Ms, Ec, Cd	Harford	10/04/94
	PA3 south	Va, Ms, Ec	Harford	10/04/94
	QA3	Va, Ms, Ec	Harford	10/04/94
	RA2	Va, Ms, Ppf	Harford	10/04/94
	SA2	Va, Ms	Harford	10/04/94
	UA2	Ms	Harford	10/04/94
015	BA2	Ms, Pcr	Citizen	07/30/94
	CA2	Ms, Pcr	Citizen	07/30/94
	DA2	Ms, Pcr	Citizen	07/30/94
	Kinnaird Point	Ms	Citizen	07/30/94
	Rocky Point	Ms	Citizen	07/30/94
	Still Pond	Ms	Citizen	07/30/94
016	AA1	Ms	Harford	09/04/94
	CA1 north	Ms, Va	Harford	09/04/94
	CA1 south	Ms, Va	Harford	09/04/94
017	AA1	Ms	Harford	09/04/94
	BA2	Ms	Harford	09/04/94
019	Shallow Creek, north	Zp	Citizen	06/23/94
	Shallow Creek, south	Ms	Citizen	06/23/94
023	AA2 north	Rm	Citizen	11/06/94
	AA2 south	Rm	VIMS	09/09/94
	BA3	Rm, Ppf	Citizen	08/01/94
	BA3	Rm, Ppf	VIMS	09/09/94
	Beachwood Grove	Ppf, Zp	Citizen	05/25/94
	Breezy Point	Zp	Citizen	09/09/94
	Brewer Creek	Zp	Citizen	08/07/94
	Brewer Pond, north	Rm	Citizen	09/06/94

Quad	1994 Bed	Species*	Surveyor**	Survey Date
023	Brewer Pond, south	Ppf, Rm	Citizen	09/06/94
	Chase Creek	Ppf, Rm	Citizen	09/06/94
	Clements Creek	Zp	Citizen	08/06/94
	DA1	Rm	VIMS	09/09/94
	EA2	Rm	VIMS	09/09/94
	LA1	Rm	Citizen	06/07/94
	Royal Beach, east	Ppf, Zp	Citizen	05/25/94
	Royal Beach, west	Ppf, Zp	Citizen	05/25/94
	Upper Magothy River	Zp	Citizen	06/07/94
024	AA1	Ppc	Citizen	06/07/94
	Adams Point	Ppc	Citizen	06/07/94
	BA2	Ppf, Rm, Zp	Citizen	06/07/94
	Bayberry	Ppf, Rm	Citizen	07/08/94
	Blackhole Creek	Ppc	Citizen	06/07/94
	Broad Creek	Rm	Citizen	06/07/94
	CA2	Ppc, Rm, Zp	Citizen	06/07/94
	Chest Neck	Zp	Citizen	06/07/94
	Cornfield Creek	Ppf	Citizen	06/07/94
	DA3	Ppc, Ppf	Citizen	06/07/94
	Deep Creek	Zp	Citizen	06/07/94
	FA3	Ppf	Citizen	06/07/94
	Forked Creek	Ppc, Rm, Zp	Citizen	06/07/94
	Grays Creek	Ppc	Citizen	06/07/94
	HA3	Zp	Citizen	06/07/94
	Holland Point	Ppf	Citizen	06/07/94
	Little Island	Ppc	Citizen	06/07/94
	Long Point	Ppf	Citizen	06/07/94
	NA2	Ppf, Rm, Va, Zp	Citizen	08/29/94
	OA2	Ppf	Citizen	06/07/94
	Purdy Point	Ppf, Rm, Va, Zp	Citizen	08/29/94
	Shore Acres	Rm	Citizen	07/08/94
	Tar Cove	Zp	Citizen	06/07/94
026	EB4	Rm, Ppf, Ms	VIMS	07/18/94
028	BA4	Hv	USGS	10/04/94
	DA4	Hv, Ms	USGS	10/04/94
	HA4 north	Hv	USGS	10/04/94
	HA4 south	Hv	USGS	10/04/94

SAV

Quad	1994 Bed	Species*	Surveyor**	Survey Date
028	KA4 northeast	Hv	USGS	10/04/94
	KA4 northwest	Hv	USGS	10/04/94
	KA4 southeast	Hv	USGS	10/04/94
	KA4 southwest	Hv	USGS	10/04/94
029	AA3	Hv	USGS	10/04/94
	Penn Central	Hv	USGS	10/04/94
030	AA2	Rm	Citizen	09/06/94
	Aberdeen Creek, east	Zp	Citizen	09/06/94
	Aberdeen Creek, west	Zp	Citizen	09/06/94
	Almhouse Creek, north	Zp	Citizen	09/06/94
	Almhouse Creek, south	Zp	Citizen	09/06/94
	BA3	Rm	Citizen	09/06/94
	Bear Neck Creek	Zp	Citizen	09/06/94
	Beards Creek, east	Rm	Citizen	09/06/94
	Beards Creek, north	Zp	Citizen	09/06/94
	Beards Creek, south	Zp	Citizen	09/06/94
	Beards Creek, west	Zp	Citizen	09/06/94
	Boyd Point	Zp	Citizen	09/06/94
	Broad Creek, north	Zp	Citizen	09/06/94
	Broad Creek, south	Zp	Citizen	09/06/94
	Cadle Creek	Rm	Citizen	09/06/94
	Church Creek	Zp	Citizen	09/06/94
	Crab Creek, east	Zp, U	Citizen	06/24/94
	Crab Creek, north	Zp	Citizen	09/06/94
	Crab Creek, southeast	Zp	Citizen	09/06/94
	Crab Creek, southwest	Zp	Citizen	09/06/94
	Crab Creek, west	Zp	Citizen	09/06/94
	Ferry Point	Zp	Citizen	09/06/94
	Fox Creek	Rm	Citizen	09/06/94
	Gingerville Creek	Zp	Citizen	09/06/94
	Glebe Bay, north	Zp	Citizen	09/06/94
	Glebe Bay, south	Zp	Citizen	09/06/94
	Glebe Creek, north	Zp	Citizen	09/06/94
	Glebe Creek, northeast	Zp	Citizen	09/06/94
	Glebe Creek, south	Zp	Citizen	09/06/94
	Glebe Creek, southeast	Zp	Citizen	09/06/94
	Glebe Heights	Zp	Citizen	09/06/94
	Glen Isle	Zp	Citizen	09/06/94

Quad	1994 Bed	Species*	Surveyor**	Survey Date
030	Hambleton	Zp	Citizen	09/06/94
	Harness Creek	Zp	Citizen	09/06/94
	Harness Creek, east	Zp	Citizen	09/06/94
	Harness Creek, south	Zp	Citizen	09/06/94
	Harness Creek, west	Zp	Citizen	09/06/94
	Hill Point, west	Rm	Citizen	09/06/94
	Hillsmere Shores, north	Zp	Citizen	09/06/94
	Hillsmere Shores, south	Zp	Citizen	09/06/94
	Larrimore Point, north	Zp	Citizen	06/19/94
	Larrimore Point, south	Rm	Citizen	09/06/94
	Locust Point	Rm, Zp, U	Citizen	09/06/94
	Long Point	Rm	Citizen	09/06/94
	Muddy Creek	Rm	Citizen	09/06/94
	Pooles Gut	Zp	Citizen	09/06/94
	Ramsay Lake	Rm	Citizen	09/06/94
	Selby Bay, east	Rm	Citizen	09/06/94
	Selby Bay, west	Rm	Citizen	09/06/94
	Selby Beach, north	Rm	Citizen	09/06/94
	Selby Beach, south	Rm, Zp	Citizen	09/06/94
	South River Park	Zp	Citizen	09/06/94
	South River, north	Zp	Citizen	09/06/94
	South River, south	Zp	Citizen	09/06/94
	Turkey Point, north	Zp	Citizen	09/06/94
	Turkey Point, south	Zp	Citizen	09/06/94
	Warehouse Creek	Zp	Citizen	09/06/94
	Wild Rose Shores	Zp	Citizen	09/06/94
031	Back Creek, north	Zp	Citizen	05/15/94
	Back Creek, south	Zp	Citizen	05/15/94
	Black Walnut Creek	Zp	Citizen	05/15/94
	Cherrytree Cove	Rm, Zp	Citizen	05/15/94
	College Creek, north	Zp	Citizen	05/15/94
	College Creek, south	Zp	Citizen	05/15/94
	Duvall Creek	Zp	Citizen	05/15/94
	Lake Ogleton, north	Ppu, Zp	Citizen	06/24/94
	Lake Ogleton, south	Zp	Citizen	05/15/94
	Meadow Point	Zp	Citizen	05/15/94
	Oyster Creek	Zp	Citizen	05/15/94
	Ramsey Lake, north	Zp	Citizen	05/15/94
	Ramsey Lake, south	Zp	Citizen	05/15/94

SAV

Quad	1994 Bed	Species*	Surveyor**	Survey Date
031	Shoreham Beach	Rm	Citizen	09/06/94
	Spa Creek, north	Zp	Citizen	05/15/94
	Spa Creek, south	Zp	Citizen	05/15/94
032	RA3	Rm, Zp	VIMS	07/19/94
033	BA4	Ms, Ppf, Zp	Citizen	07/15/94
	CA3	Ms, Ppf, Zp	Citizen	07/15/94
	CA3	Ms, Ppf, Zp	Citizen	07/15/94
	DA3	Ms, Ppf, Zp	Citizen	07/15/94
	EA4	Ms, Ppf, Zp	Citizen	07/15/94
	FA4	Ms, Ppf, Zp	Citizen	07/15/94
	Hood Point	Zp	Citizen	06/28/94
	JA4	Ms, Ppf, Zp	Citizen	07/15/94
	Piney Point	Zp	Citizen	06/28/94
	TA2	Rm, Zp	VIMS	07/19/94
	Wye East River	U	EPA	06/09/94
034	AA2	Hv, Cd	USGS	10/12/94
	AB4	Hv	USGS	10/13/94
	BB4	Hv	USGS	10/13/94
	CB4	Hv, Ms	USGS	10/13/94
	CB4	Hv	USGS	10/13/94
	DB4	Hv	USGS	10/13/94
	EB4	Hv, Va, Ms, Hd	USGS	10/13/94
	FA4	Hv	USGS	10/12/94
	GA2	Va, Hd, Hv	USGS	10/12/94
	HA3 north	Hv	USGS	10/12/94
	HA3 south	Va, Hd, Hv	USGS	10/12/94
	HB4 middle	Ms, Hv, Cd, Va	USGS	10/13/94
	HB4 north	Hv, Ms, Cd	USGS	10/13/94
	HB4 south	Ms, Hv, Va, Cd	USGS	10/13/94
	IB3	Va, Ms, Hv	USGS	10/13/94
	JA4	Hv, Va	USGS	10/12/94
	JB2	Ms	USGS	10/13/94
	KA2	Hv, Va	USGS	10/12/94
	LA4	Hv, Va	USGS	10/12/94
	PA4 middle	Va, Hv	USGS	10/12/94
	PA4 north	Hv, Ms	USGS	10/12/94
	PA4 south	Va, Hv, Hd	USGS	10/12/94

Quad	1994 Bed	Species*	Surveyor**	Survey Date
034	PA4 west	Hv, Hd	USGS	10/12/94
	RA4 north	Ms, Cd, Va, Hv	USGS	10/14/94
	RA4 south	Va, Hd, Cd, Hv, Ngu	USGS	10/14/94
	Torpedo	Hv	USGS	10/12/94
	WA3	Va, Ms	USGS	10/13/94
	Washington Navy Yard	Hv	USGS	10/14/94
	XA3	Va, Ms, Hv	USGS	10/13/94
	YA3	Va, Ms, Hv	USGS	10/13/94
	Yacht Basin	Hv	USGS	10/13/94
	ZA4	Hv, Ms	USGS	10/13/94
035	Camp Wabanna	U	Citizen	09/10/94
	Rhode River	Rm	Citizen	09/12/94
036	AA2	Rm, Zp	VIMS	07/19/94
	AA2	Rm, Zp	VIMS	07/19/94
	CA2	Rm, Zp	VIMS	07/19/94
	DA2	Rm, Zp	VIMS	07/19/94
	FB4 north	Zp	Citizen	07/10/94
	FB4 south	Zp, Rm	Citizen	07/10/94
	HB4	Zp	Citizen	07/10/94
	IB4	Zp	Citizen	07/10/94
	JB4	Zp, Rm	Citizen	07/10/94
	KB4 north	Zp	Citizen	06/09/94
	KB4 south	Zp	Citizen	06/09/94
	MB4 east	Zp	Citizen	06/09/94
	MB4 west	Zp	Citizen	06/09/94
	NB3	Zp	Citizen	06/09/94
	OB3	Zp	Citizen	06/09/94
	PA3	Rm	Citizen	09/05/94
037	AB3	Rm, Zp	VIMS	07/19/94
	EB4	Zp	Citizen	07/10/94
	RA3	Rm, Zp	VIMS	07/19/94
	TA3	Rm, Zp	VIMS	07/19/94
	UA2	Rm, Zp	VIMS	07/19/94
	VA3	Rm, Zp	VIMS	07/19/94
039	AA4	Ms	USGS	10/06/94
	BA1	Ms	USGS	10/06/94

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Quad	1994 Bed	Species*	Surveyor**	Survey Date
039	Belmont Bay	Ms	USGS	10/06/94
	CA1	Ms	USGS	10/06/94
	DA3	Ms	USGS	10/06/94
	EA3	Ms	USGS	10/06/94
	FA4 middle	Hv, Va, Ms	USGS	09/30/94
	FA4 north	Hv, Va, Ms, Nm, Cd	USGS	09/30/94
	FA4 south	Hv, Ms, Nm, Hd	USGS	09/30/94
	GA2	Va, Hv	USGS	09/30/94
	Gunston Cove	Ms	USGS	09/30/94
	HA2	Va, Ms, Hd	USGS	09/30/94
	IA3 middle	Va, Hv	USGS	09/30/94
	IA3 north	Va	USGS	09/30/94
	IA3 south	Va, Hv, Ms, Nm	USGS	09/30/94
	JA4	Va, Hv, Nm	USGS	09/30/94
	KA2	Ms	USGS	09/30/94
	LA4	Hv	USGS	09/30/94
	Taylors Point	Ms	USGS	10/06/94
040	BA2	Hv	USGS	10/13/94
	CA2	Va, Hv	USGS	10/12/94
	DA2	Va	USGS	10/13/94
	EA4	Hv	USGS	10/13/94
	FA2	Hv	USGS	10/13/94
	GA1	Va, Hv	USGS	10/13/94
	HA1	Va, Hv	USGS	10/13/94
	IA3 north	Hv	USGS	10/13/94
	IA3 south	Hv	USGS	10/13/94
	KA4	Hv	USGS	10/03/94
	LA3	Hv, Nm	USGS	10/03/94
	MA1	Va, Hv	USGS	10/03/94
	NA4 east	Hv, Nm, Ms, Cd	USGS	10/03/94
	NA4 west	Hv	USGS	10/03/94
	OA1	Hv, Ms	USGS	10/03/94
	PA4 north	Ms, Cd, Nm, Hv	USGS	10/03/94
	PA4 south	Hv, Cd, Ms	USGS	10/03/94
	QA1	Ms, Va, Hv	USGS	10/03/94
	RA2	Ms, Va, Hd	USGS	10/03/94
	River Road	Hv, Va, Cd	USGS	10/04/94
	SA2	Hv, Va, Cd	USGS	10/04/94
	TA2 south	Hv, Va, Cd	USGS	10/04/94

Quad	1994 Bed	Species*	Surveyor**	Survey Date
040	National Colonial Farm, N	Va, Hv	USGS	10/03/94
	National Colonial Farm, S	Hv, Ms, Nm	USGS	10/03/94
	UA2	Hv, Hd, Cd	USGS	10/04/94
	VA4 north	Hv, Hd, Cd	USGS	10/04/94
	VA4 south	Hv, Hd, Cd	USGS	10/04/94
	WA4 north	Hv, Nm	USGS	09/30/94
	WA4 south	Hv, Va, Ms, Nm	USGS	09/30/94
041	Hall Creek	Cd, Ngu, Ngr, Va	PRP	08/30/94
	Kings Branch	Cd	PRP	08/30/94
	Mataponi Creek	Pcr, Ngr, Cd	PRP	08/30/94
	Patuxent River	Ngr, Nm	MD-DNR	06/02/94-10/05/94
	Patuxent River	Cd, Ec, Ngr, Nm, Pcr	MD-DNR	06/02/94-10/05/94
	Patuxent River	Cd, Ec, Hv, Ngr, Nm, Pcr, Zp	MD-DNR	06/02/94-10/05/94
	Patuxent River	Cd, Ec, Ngr, Nm, Zp	MD-DNR	06/02/94-10/05/94
	Patuxent River	Cd, Ec, Ngr, Nm, Pcr	MD-DNR	06/02/94-10/05/94
	Patuxent River	Cd, Ec, Ngr, Nm, Pcr, Zp	MD-DNR	06/02/94-10/05/94
	Patuxent River	Ngr, Nm	MD-DNR	06/02/94-10/05/94
	Patuxent River	Ngr	MD-DNR	06/02/94-10/05/94
	Patuxent River	Ngr	MD-DNR	06/02/94-10/05/94
	Patuxent River	Ngr, Nm, Zp	MD-DNR	06/02/94-10/05/94
	Patuxent River	Ngr, Zp	MD-DNR	06/02/94-10/05/94
043	FA4	Rm	VIMS	07/20/94
	IA2	Rm	Citizen	06/09/94
	RA3	Rm, Zp	VIMS	07/19/94
044	Boone Creek	Zp	Citizen	06/01/94
	Island Creek	Zp	Citizen	07/01/94
	TA3	Zp, Rm	Citizen	07/01/94
	Tar Creek, north	Zp	Citizen	07/01/94
	Tar Creek, south	Zp	Citizen	06/20/94
	UA4	Zp	Citizen	07/01/94
	WA4	Rm	Citizen	07/01/94
	YA2	Zp	Citizen	07/01/94
047	BA4 middle	Ms, Hv	USGS	04/10/94
	BA4 north	Hv, Ms, Hd	USGS	04/10/94

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Quad	1994 Bed	Species*	Surveyor**	Survey Date
047	BA4 south	Ms, Hv	USGS	04/10/94
	CA4 middle	Ms, Va, Hv	USGS	04/10/94
	CA4 north	Va, Hv	USGS	04/10/94
	CA4 south	Ms, Hv	USGS	04/10/94
	DA4	Hv, Cd	USGS	04/10/94
	EA4	Hv, Ms	USGS	04/10/94
	FA1	Va	USGS	04/10/94
	Fredericksburg	Va	USGS	04/10/94
	JA4 north	Hv, Ms, Cd	USGS	04/10/94
	JA4 south	Ms, Hv, Va	USGS	04/10/94
	KA4	Hv, Ms	USGS	04/10/94
	QA4 Goose Bay	Hv, Va, Ms	USGS	04/10/94
	QA4 Moss Point	Hv, Ms, Cd, Hd	USGS	04/10/94
	QA4 middle	Hv, Va, Ms	USGS	04/10/94
	QA4 north	Ms, Hv, Cd	USGS	04/10/94
	QA4 south	Hv, Va, Ms	USGS	04/10/94
048	AA4	Hv, Ms	USGS	10/04/94
	BA4 north	Hv, Ms	USGS	10/04/94
	BA4 south	Hv, Ms	USGS	10/04/94
	DA4 east	Hv, Ms, Nm	USGS	10/04/94
	DA4 west	Hv, Ms, Nm	USGS	10/04/94
	EA4	Hv, Nm	USGS	10/04/94
	GA4 north	Hv, Ms, Nm	USGS	10/04/94
	GA4 south	Hv, Nm	USGS	10/04/94
	HA3 north	Hv, Nm	USGS	10/04/94
	HA3 south	Hv	USGS	10/04/94
	Hog Island	Hv	USGS	10/04/94
	IA2	Hv, Ms, Va	USGS	10/04/94
	JA4	Hv, Ms	USGS	10/04/94
	LA4 Linton Point	Hv, Ms, Cd	USGS	10/04/94
	LA4 Point Landing	Hv, Ms, Cd	USGS	10/04/94
	LA4 Poseys Wharf	Hv, Ms, Cd	USGS	10/04/94
	LA4 Tidal Flat	Hv, Ms, Cd	USGS	10/04/94
	LA4 north	Hv, Ms, Cd	USGS	10/04/94
	LA4 south	Hv, Ms, Hd, Cd	USGS	10/04/94
	Mattawoman Creek	Hv, Ms, Va	USGS	10/04/94
	Piling	Hv	USGS	10/04/94
	Stump Neck, middle	Hv, Ms, Cd	USGS	10/04/94
	Stump Neck, north	Ms	USGS	10/04/94

Quad	1994 Bed	Species*	Surveyor**	Survey Date
048	Stump Neck, south	Hv, Ms, Cd	USGS	10/04/94
	Tidal Flat Piling	Hv	USGS	10/04/94
	U.S. Naval Reservation	Ms	USGS	10/04/94
049	Deep Landing	Cd, Ec, Pcr, Ppu	Citizen	07/04/94
	Holland Cliff	Cd	Citizen	07/18/94
	Patuxent River	Pcr	Citizen	07/27/94
051	CA2 east	Rm	Citizen	08/14/94
	CA2 west	Rm	Citizen	08/14/94
	DA3	Rm	Citizen	08/14/94
	EA2	Rm	Citizen	08/14/94
	FA3	Rm	Citizen	08/14/94
052	Back Creek, east	Zp	Citizen	06/22/94
	Back Creek, north	Zp	Citizen	06/22/94
	Back Creek, west	Zp	Citizen	06/22/94
055	AA2 north	Va, Ms, Hv	USGS	10/07/94
	AA2 south	Hv, Ms, Va	USGS	10/07/94
	Aquia Creek	Ms	USGS	10/05/94
	BA4 middle	Ms, Va, Cd, Hd	USGS	10/07/94
	BA4 north	Ms, Va	USGS	10/07/94
	BA4 south	Ms, Va	USGS	10/07/94
	CA4	Hv, Ms	USGS	10/07/94
	DA1	Va, Hv	USGS	10/07/94
	EA4 middle	Hv, Ms, Va	USGS	10/07/94
	EA4 north	Hv, Ms, Va, Hd	USGS	10/07/94
	EA4 south	Hv, Ms, Va	USGS	10/07/94
	FA4 north	Hv, Ms	USGS	10/05/94
	FA4 south	Hv, Ms	USGS	10/05/94
	GA4 Clifton Point	Hv, Ms	USGS	10/05/94
	GA4 north I	Hv, Ms	USGS	10/05/94
	GA4 north II	Hv, Ms	USGS	10/05/94
	GA4 south I	Hv, Ms	USGS	10/05/94
	GA4 south II	Hv, Va, Ms, Hd, Ppf, Ppc	USGS	10/05/94
	GA4 south III	Ms, Hv, Va, Hd	USGS	10/05/94
	GA4 south IV	Ms, Hv, Va, Hd	USGS	10/05/94
	IA4	Va, Ms, Hv, Cd	USGS	10/05/94

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Quad	1994 Bed	Species*	Surveyor**	Survey Date
055	JA4	Hv, Ms, Va, Cd, Nm	USGS	10/05/94
	MA4	Hv, Ms	USGS	10/05/94
	NA4	Hv	USGS	10/05/94
	Smith Point	Ms, Va	USGS	10/07/94
	Watsons Point, north	Ms	USGS	10/05/94
	Watsons Point, south	Ms	USGS	10/05/94
057	BA4	Ppf, Va, Ppc	VIMS	08/04/94
	IA4	Ppf, Va, Hv	VIMS	08/04/94
	MA4	Va, Ppc	VIMS	08/04/94
060	Battle Creek	Zp	Citizen	08/06/94
	Cyprus Swamp, north	Ppc, Va	Citizen	08/06/94
	Cyprus Swamp, south	Ppc, Zp	Citizen	08/06/94
	Jefferson Historical Park	Zp	EPA	10/14/94
	Long Cove, east	Zp	Citizen	07/09/94
	Long Cove, west	Zp	Citizen	07/09/94
	Peterson's Point	Zp	EPA	05/94
061	Osbourne Cove	Zp	EPA	05, 06, 10/94
	Saw Pit Cove	Zp	EPA	05/94
	St. Leonard Creek	Zp	EPA	05/94
064	BA1	Ms, Cd, Ngu, Hv	USGS	10/05/94
	Bull Bluff	Ms, Va, Hd	USGS	10/05/94
	Indian Point	Ms, Hv, Nm, Hd, Cd	USGS	10/05/94
	Potomac River	Ms, Hv	USGS	10/05/94
066	AA4	Ppf, Va	Citizen	07/13/94
067	FA4 east	Ppf, Zp, Ms, Ec	PRP	06/08/94
	FA4 north	Ms, Ec	PRP	06/08/94
	FA4 west	Ms, Zm, Ppf, Ec, Zp	PRP	06/08/94
070	Clarks Landing, south	Zp, Rm	EPA	05, 06/94
	Hickory Landing Cr., east	Zp	Citizen	06/26/94
	Hickory Landing Cr., west	Zp	Citizen	06/26/94
	Mill Creek	Zp	Citizen	06/26/94
	Sam Abell Cove, north	Zp	Citizen	06/26/94
	Sam Abell Cove, south	Zp	Citizen	06/26/94

Quad	1994 Bed	Species*	Surveyor**	Survey Date
071	Fishing Creek	Zp, Rm	EPA	10/28/94
	Green Holly Pond	Ms, Ppc	Citizen	07/31/94
073	AB2	Rm	VIMS	07/21/94
	GA2	Rm	VIMS	07/21/94
	NA3	Rm	VIMS	08/30/94
	RA3	Rm	VIMS	07/21/94
	TA2	Rm	VIMS	07/21/94
	UA2	Rm	VIMS	07/21/94
	WA2	Rm	VIMS	07/21/94
	YA2	Rm	VIMS	08/30/94
074	AA2	Zm	VIMS	08/30/94
	BA3	Zm	VIMS	08/30/94
076	Burnt House Point	Zp	Citizen	05/28/94
	Duck Hall Point	Ms, Zp	Citizen	05/28/94
	Great Island	Zp	Citizen	05/28/94
	Longwood Swamp	Ms, Ppf, Zp	Citizen	05/28/94
	Muses Beach	Ms	Citizen	05/28/94
078	Aimes Creek	Zp	Citizen	06/16/94
	Weatherall Creek	Zp	Citizen	06/16/94
084	AA2	Rm	Citizen	06/29/94
	DA2	Rm	Citizen	09/23/94
	EA2	Rm	Citizen	09/23/94
106	BA4	Rm, U	Citizen	08/08/94
	Bull Neck	Rm	Citizen	06/08/94
	CA1	Zm	Citizen	08/08/94
	DA4	Zm	Citizen	08/08/94
	EA2	Zm	Citizen	08/07/94
	Fleet Point	Rm	Citizen	06/08/94
111	AA3	Rm	VIMS	06/21/94
	BA3	Rm	VIMS	06/21/94
	CA2	Rm	VIMS	06/21/94
	DA2	Rm	VIMS	06/21/94
	HA4	Rm	VIMS	06/21/94

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Quad	1994 Bed	Species*	Surveyor**	Survey Date
111	RA1	Rm	VIMS	06/21/94
112	AA1	Rm, Zm	Citizen	06/14/94
	BA2	Rm, Zm	Citizen	06/14/94
	Bluff Point Neck	Rm	Citizen	09/08/94
	Dymer Creek	U	Citizen	06/14/94
	HA2	Rm	Citizen	06/14/94
	Johnson Cove	U	Citizen	06/14/94
	KA3	Rm, Zm	Citizen	06/14/94
	OA2	Rm	Citizen	09/08/94
	PA2	Rm	Citizen	09/08/94
	QA2	Rm	Citizen	09/08/94
118	BA3	Zm	VIMS	06/22/94
	CA1	Zm	VIMS	06/22/94
	DA2	Rm, Zm	VIMS	06/22/94
	EA1	Rm, Zm	VIMS	06/22/94
	IA1	Zm	VIMS	09/15/94
	Stingray Point	Zm	VIMS	06/22/94
	Stove Point Neck	Zm	VIMS	06/22/94
123	LA2	Zm	VIMS	06/23/94
	PA3	Rm, Zm	VIMS	06/23/94
124	CA3	Rm	Citizen	07/03/94
	DA2	Rm	Citizen	07/03/94
	EA1	Rm	Citizen	07/03/94
	Nassawadox Creek	Rm	Citizen	07/03/94
	Nassawadox Point	Rm	Citizen	07/03/94
131	FA4 east	Zm	VIMS	06/16/94
	FA4 west	Zm	VIMS	06/16/94
	HB2	Zm	VIMS	06/09/94
	JA4 east	Rm, Zm	VIMS	05/27/94
	JA4 middle	Rm, Zm	VIMS	05/27/94
	JA4 west	Rm, Zm	VIMS	05/27/94
	KA2	Zm	VIMS	05/27/94
	LB2	Zm	VIMS	06/09/94
	NB4	Zm, Rm	VIMS	06/09/94
	SA4	Rm, Zm	VIMS	06/30/94

Quad	1994 Bed	Species*	Surveyor**	Survey Date
132	BA4 northwest	Zm, Rm	VIMS	05/27/94
	BA4 southeast	Zm	VIMS	05/27/94
	BA4 southwest	Zm, Rm	VIMS	05/27/94
	BA4 north	Zm	VIMS	05/27/94
	GA4	Rm	Citizen	08/30/94
	HA4 middle	Rm, Zm	Citizen	08/07/94
	HA4 north	Rm	Citizen	08/07/94
	KA4 north	Rm, Zm	Citizen	08/07/94
	KA4 south	Rm, Zm	Citizen	08/09/94
	KA4 south	Zm	Citizen	08/09/94
	LA1	Rm	Citizen	08/09/94
	MA4	Rm, Zm	Citizen	08/09/94
133	IA4	Rm, Zm	VIMS	08/20/94
	JA2	Rm	VIMS	08/20/94
	NA3	Zm	VIMS	08/20/94
139	AA1	Zm	VIMS	07/17/94
	BA2	Zm	VIMS	07/17/94
	CA1	Zm	VIMS	07/17/94
	DA1	Zm	VIMS	07/17/94
	EA2	Zm	VIMS	07/17/94
	FA2	Zm	VIMS	07/17/94
	GA2	Zm	VIMS	07/17/94
	James River	U	Citizen	08/06/94
140	OA4	Rm, Zm	VIMS	06/24/94
	RA4	Rm, Zm	VIMS	06/24/94
	TA1 north	Zm	VIMS	07/17/94
	TA1 south	Zm	VIMS	07/17/94
	UA4	Zm	VIMS	07/17/94
147	AA3	Zm	VIMS	07/05/94
152	AA2	Rm	VIMS	06/20/94
	BA2	Rm	VIMS	06/20/94
	CA2	Rm	VIMS	06/20/94
	EA2	Rm	VIMS	06/20/94
	DA2	Rm	VIMS	06/20/94
	FA2	Rm	VIMS	06/20/94

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Quad	1994 Bed	Species*	Surveyor**	Survey Date
152	GA2	Rm	VIMS	06/20/94
	HA1	Rm	VIMS	06/20/94
	IA2 east	Rm	VIMS	06/20/94
	IA2 middle	Rm	VIMS	06/20/94
	IA2 west	Rm	VIMS	06/20/94
	JA2	Rm	VIMS	06/20/94
	KA2	Zm	VIMS	06/20/94
	KA2 Dey Cove	Rm	VIMS	06/20/94
	KA2 east	Zm	VIMS	06/20/94
	KA2 east-middle	Zm	VIMS	06/20/94
	KA2 middle	Rm, Zm	VIMS	06/20/94
	KA2 west	Zm	VIMS	06/20/94
	KA2 west-middle	Zm	Citizen	11/01/94
	LA2	Zm	VIMS	06/20/94
	MA2 east	Rm	VIMS	06/20/94
	MA2 middle	Rm	VIMS	06/20/94
	MA2 west	Rm	VIMS	06/20/94
	NA2	Rm	VIMS	06/20/94
	OA1 north	Rm	VIMS	06/20/94
	OA1 north-middle	Rm	VIMS	06/20/94
	OA1 south	Rm	VIMS	06/20/94
	OA1 south-middle	Rm	VIMS	06/20/94
157	AA2	Rm	VIMS	06/20/94
	BA2	Rm	VIMS	06/20/94
	CA2	Rm	VIMS	06/20/94
	DA2	Rm	VIMS	06/20/94
159	Across from EA4	Pcr, Ec	PRP	06/24/94
	Back Channel	Ec, Cd, Pcr, Hv, Ngu, Va	PRP	06/24/94
	Bristol Landing	Zp	PRP	06/24/94
	EA4	Zp, Ngr, Pcr	PRP	06/24/94
	Hills Bridge	Ec, Cd, Pcr	PRP	06/24/94
	Jackson Landing	Cd, Hv, Ngr	PRP	06/24/94
	Mill Creek	Ec, Cd, Pcr	PRP	06/24/94
	Old Railroad Grade	Cd, Hv, Pcr, Ec	PRP	06/24/94
	Patuxent River	Cd	MD-DNR	06/02/94-10/05/94
	Patuxent River	Ec	MD-DNR	06/02/94-10/05/94
	Patuxent River	Ec	MD-DNR	06/02/94-10/05/94

Quad	1994 Bed	Species*	Surveyor**	Survey Date
159	Patuxent River	Cd, Ec, Hv, Ngu, Ngr, Nm, Pcr, Ppu, Zp	MD-DNR	06/02/94-10/05/94
	Patuxent River	Cd, Ec, Hv, Ngu, Nm	MD-DNR	06/02/94-10/05/94
	Patuxent River	Cd, Ec, Hv, Ngu, Ngr, Nm, Pcr, Ppu, Va	MD-DNR	06/02/94-10/05/94
	Patuxent River	Ec, Hv, Ngu, Ngr, Nm, Pcr, Ppu, Zp	MD-DNR	06/02/94-10/05/94
	Patuxent River	Cd, Hv, Ngu, Ngr, Nm, Pcr, Ppu, Zp	MD-DNR	06/02/94-10/05/94
	Patuxent River	Cd, Ec, Hv, Ngu, Ngr, Nm, Ppu, Zp	MD-DNR	06/02/94-10/05/94
	Patuxent River	Ec	MD-DNR	06/02/94-10/05/94
	Patuxent River	Cd, Ec, Hv, Ngu, Ngr, Nm, Ppu, Zp	MD-DNR	06/02/94-10/05/94
	Patuxent River	Ec, Va, Zp	MD-DNR	06/02/94-10/05/94
	Patuxent River	Ec, Hv, Ngu, Ngr, Nm	MD-DNR	06/02/94-10/05/94
	Patuxent River	Ec, Pcr, Ppu	MD-DNR	06/02/94-10/05/94
	Patuxent River	Ngr	MD-DNR	06/02/94-10/05/94
	Patuxent River	Zp	MD-DNR	06/02/94-10/05/94
	Patuxent River	Cd, Ec, Ngu, Ngr, Nm, Zp	MD-DNR	06/02/94-10/05/94
	Patuxent River	Cd, Ec, Ngu, Ngr, Zp	MD-DNR	06/02/94-10/05/94
	Patuxent River	Cd, Ec, Hv, Ngu, Ngr, Nm, Pcr, Zp	MD-DNR	06/02/94-10/05/94
	Patuxent River	Ec, Ngu, Ngr, Zp	MD-DNR	06/02/94-10/05/94
	Patuxent River	Pe	MD-DNR	06/02/94-10/05/94
	Patuxent River	Ngr	MD-DNR	06/02/94-10/05/94
	Patuxent River	Ngu, Ngr, Nm	MD-DNR	06/02/94-10/05/94
	Patuxent River	Ngr, Nm	MD-DNR	06/02/94-10/05/94
	Patuxent River	Cd, Ec	MD-DNR	06/02/94-10/05/94
	Railroad Creek	U	PRP	06/24/94
	Sands Road, north	Ec, Cd	PRP	06/24/94
	Trailer Park	Ec, Pcr, Cd, Zp	PRP	06/24/94
	Western Branch, north	Ec	PRP	06/24/94
	Western Branch, south	Ec	PRP	06/24/94
166	Assawoman Bay	Rm	Citizen	07/27/94
	DA2 north	Rm, Zm	Ocean Pines	07/27/94
	DA2 south	Rm	Citizen	07/27/94
	EA3 north	Rm	Citizen	06/27/94

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Quad	1994 Bed	Species*	Surveyor**	Survey Date
166	EA3 northeast	Rm	Ocean Pines	07/27/94
	EA3 south	Rm	Citizen	07/27/94
	EA3 southeast	Rm	Ocean Pines	07/27/94
	HA2 north	Rm	Ocean Pines	07/27/94
	HA2 south	Rm	Citizen	08/03/94
	Horse Island, west	Rm	Citizen	07/27/94
	IA2	Rm	Ocean Pines	08/03/94
	JA2 north	Rm	Ocean Pines	07/27/94
	JA2 south	Rm	Citizen	07/27/94
	KA2 north	Rm	Ocean Pines	07/27/94
	KA2 south	Rm	Citizen	07/27/94
	North of Trailer Park	Rm	Citizen	07/27/94
	Ocean City, east	Rm	Citizen	06/27/94
	Ocean City, north	Rm, Zm	Citizen	06/27/94
	Ocean City, west	Rm	Citizen	08/03/94
	South of Trailer Park	Rm	Citizen	07/27/94
	The Ditch, north	Rm	Ocean Pines	07/27/94
	The Ditch, south	Rm	Citizen	07/27/94
167	AA2	Rm, Zm	Citizen	09/08/94
	CA3	Zm	Citizen	06/30/94
	Fassett Point	Zm	Citizen	09/08/94
	GA2	Rm, Zm	Citizen	09/08/94
	HA4	Rm, Zm	Citizen	06/30/94
168	AA4	Rm, Zm	Citizen	06/30/94
	CA3	Zm	Citizen	06/17/94
170	BA3	Rm, Zm	Citizen	09/14/94
	CA4 east	Rm	Citizen	07/06/94
	CA4 west	Rm, Zm	Citizen	06/28/94
	GA3	Rm, Zm	Citizen	06/28/94
	HA2	Rm, Zm	Citizen	09/08/94
	KA3	Rm, Zm	Citizen	06/28/94
	LA3	Rm, Zm	Citizen	07/06/94
	NA3	Rm, Zm	Citizen	06/30/94
	OA4	Zm	Citizen	07/01/94
	QA4 north	Zm	Citizen	07/01/94
	QA4 south	Rm, Zm	Citizen	09/08/94
	Spence Cove	Rm, Zm	Citizen	07/06/94

Quad	1994 Bed	Species*	Surveyor**	Survey Date
170	Tidal Flat	Rm, Zm	Citizen	07/01/94
172	BA4	Zm	Citizen	06/23/94
	CA2	Zm	Citizen	06/23/94
	DA2	Zm	Citizen	06/23/94
	EA2	Rm, Zm	Citizen	06/23/94
	GA3	Zm	Citizen	06/23/94
	IA2	Zm	Citizen	06/23/94
	JA3	Rm, Zm	Citizen	07/01/94
	JA3	Zm	Citizen	07/01/94
	KA1	Zm	Citizen	07/01/94
	LA3	Zm	Citizen	07/01/94
173	AA1	Rm, Zm	Citizen	07/01/94
	BA1	Rm, Zm	Citizen	09/13/94
	CA3	Rm, Zm	Citizen	07/01/94
	DA2	Rm, Zm	Citizen	07/01/94
	DA2	Rm, Zm	Citizen	09/13/94
	EA3 north	Rm, Zm	Citizen	07/01/94
	EA3 south	Rm, Zm	Citizen	07/01/94
	GA3 east	Rm	Citizen	07/01/94
	GA3 north	Rm, Zm	Citizen	07/01/94
	GA3 south	Rm, Zm	Citizen	07/01/94
	GA3 southeast	Rm	Citizen	07/01/94
	HA1	Zm	Citizen	07/01/94
175	AA4	Rm, Zm	Citizen	09/09/94
	CA2 north	Zm	Citizen	06/23/94
	CA2 south	Zm	Citizen	06/23/94
	DA2	Zm	Citizen	06/23/94

APPENDIX E

Total Area of SAV in Hectares by Density Class for the Chesapeake Bay Program Segments of Chesapeake Bay and for Chincoteague Bay for 1991-1994, with the Percentage of the Segment Total Shown.

APPENDIX E

Total Area of SAV in Hectares by Density Class for the CBP Segments of Chesapeake Bay and for Chincoteague Bay for 1991-1994, with the Percentage of the Segment Total Shown.

Upper Zone

CB1	Class 1		Class 2		Class 3		Class 4		Total
1991	1,497.36	89%	49.43	3%	11.53	1%	122.68	7%	1,680.99
1992	1,587.82	89%	27.68	2%	27.31	2%	142.47	8%	1,785.28
1993	1,517.54	86%	69.13	4%	45.96	3%	137.55	8%	1,770.18
1994	2,311.15	87%	132.90	5%	43.55	2%	162.25	6%	2,649.85

CB2	Class 1		Class 2		Class 3		Class 4		Total
1991	1.26	4%	25.77	81%	4.87	15%	0.00	0%	31.90
1992	29.17	59%	10.97	22%	9.43	19%	0.00	0%	49.57
1993	0.70	2%	24.78	72%	7.16	21%	1.68	5%	34.31
1994	2.49	4%	34.92	54%	4.36	7%	23.34	36%	65.11

CB3	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	17.28	76%	2.23	10%	3.36	15%	22.87
1992	63.52	36%	38.03	22%	70.20	40%	4.60	3%	176.35
1993	68.21	21%	63.68	20%	11.01	3%	181.25	56%	324.15
1994	2.42	1%	46.11	14%	20.85	6%	262.73	79%	332.11

WT1	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	0.00	0%	2.32	100%	0.00	0%	2.32
1993	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1994	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00

WT2	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	4.62	6%	77.02	94%	0.00	0%	81.64
1992	0.00	0%	32.82	26%	79.74	63%	13.52	11%	126.08
1993	0.72	2%	23.54	51%	22.35	48%	0.00	0%	46.60
1994	0.12	0%	24.37	27%	25.51	29%	39.25	44%	89.25

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WT3	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	4.84	61%	3.04	39%	0.00	0%	7.88
1992	0.00	0%	33.51	73%	12.22	27%	0.00	0%	45.72
1993	2.40	36%	4.27	64%	0.00	0%	0.00	0%	6.67
1994	0.00	0%	11.68	47%	13.34	53%	0.00	0%	25.02

WT4	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1993	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1994	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00

WT5	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1993	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1994	0.00	0%	0.37	100%	0.00	0%	0.00	0%	0.37

WT6	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1993	0.00	0%	12.49	95%	0.72	5%	0.00	0%	13.21
1994	1.31	7%	6.73	36%	8.65	47%	1.84	10%	18.54

ET1	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1993	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1994	5.97	75%	0.00	0%	1.99	25%	0.00	0%	7.96

ET2	Class 1		Class 2		Class 3		Class 4		Total
1991	189.00	70%	79.95	30%	0.00	0%	0.00	0%	268.96
1992	220.31	91%	19.54	8%	2.52	1%	0.00	0%	242.37
1993	57.81	61%	19.50	21%	15.24	16%	2.21	2%	94.76
1994	126.10	70%	44.70	25%	9.06	5%	0.00	0%	179.86

ET3	Class 1		Class 2		Class 3		Class 4		Total
1991	25.82	86%	0.39	1%	3.89	13%	0.00	0%	30.10
1992	0.00	0%	9.17	65%	1.88	13%	2.98	21%	14.02
1993	59.64	79%	3.49	5%	11.10	15%	1.19	2%	75.41
1994	60.27	79%	4.52	6%	0.00	0%	11.44	15%	76.24

ET4	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	1.82	5%	29.57	87%	2.42	7%	33.81
1992	4.26	5%	63.81	81%	10.72	14%	0.00	0%	78.79
1993	20.76	7%	73.86	24%	211.58	69%	0.00	0%	306.20
1994	19.96	5%	74.54	18%	114.59	28%	200.41	49%	409.50

Middle Zone

CB4	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.29	13%	1.97	87%	0.00	0%	2.26
1992	0.00	0%	4.07	100%	0.00	0%	0.00	0%	4.07
1993	0.00	0%	4.88	100%	0.00	0%	0.00	0%	4.88
1994	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00

CB5	Class 1		Class 2		Class 3		Class 4		Total
1991	117.89	2%	1,167.14	24%	1,207.32	25%	2,306.38	48%	4,798.73
1992	268.87	5%	1,642.93	29%	2,851.09	49%	1,000.30	17%	5,763.19
1993	506.96	10%	2,661.13	53%	607.12	12%	1,231.58	25%	5,006.78
1994	299.85	8%	1,662.33	47%	839.08	24%	732.02	21%	3,533.27

WT7	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1993	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1994	3.91	12%	10.72	34%	16.70	53%	0.00	0%	31.32

WT8	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1993	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1994	0.00	0%	5.48	86%	0.89	14%	0.00	0%	6.36

TF1	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1993	0.00	0%	8.78	100%	0.00	0%	0.00	0%	8.78
1994	0.00	0%	0.00	0%	13.41	18%	61.79	82%	75.19

KET1	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1993	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1994	0.00	0%	0.00	0%	1.52	100%	0.00	0%	1.52

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LE1	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1993	0.00	0%	0.00	0%	0.99	100%	0.00	0%	0.99
1994	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00

TF2	Class 1		Class 2		Class 3		Class 4		Total
1991	79.91	4%	252.69	12%	119.77	6%	1,591.82	78%	2,044.19
1992	27.35	2%	196.90	14%	157.32	11%	1,030.84	73%	1,412.41
1993	61.47	4%	100.77	7%	194.38	14%	1,056.23	75%	1,412.86
1994	86.72	9%	86.70	9%	94.03	10%	714.81	73%	982.26

RET2	Class 1		Class 2		Class 3		Class 4		Total
1991	119.35	8%	63.29	4%	134.87	9%	1,150.83	78%	1,468.34
1992	9.10	1%	462.15	30%	104.11	7%	976.32	63%	1,551.67
1993	34.46	3%	115.14	9%	112.70	8%	1,086.80	81%	1,349.09
1994	32.45	2%	68.93	5%	59.29	5%	1,149.57	88%	1,310.23

LE2	Class 1		Class 2		Class 3		Class 4		Total
1991	17.46	21%	9.26	11%	24.69	30%	31.89	38%	83.31
1992	0.00	0%	27.06	59%	19.03	41%	0.00	0%	46.10
1993	0.00	0%	19.74	34%	31.05	54%	6.95	12%	57.75
1994	6.75	5%	25.13	18%	12.11	9%	95.52	68%	139.52

ET5	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	5.66	100%	0.00	0%	0.00	0%	5.66
1993	4.02	100%	0.00	0%	0.00	0%	0.00	0%	4.02
1994	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00

ET6	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1993	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1994	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00

ET7	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1993	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1994	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00

ET8	Class 1		Class 2		Class 3		Class 4		Total
1991	3.67	3%	23.19	20%	68.21	60%	19.22	17%	114.29
1992	9.09	6%	68.75	48%	57.81	40%	7.77	5%	143.42
1993	8.75	6%	81.50	52%	66.21	42%	0.00	0%	156.46
1994	0.00	0%	51.39	77%	15.25	23%	0.00	0%	66.63

ET9	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	60.70	35%	52.40	30%	62.44	36%	175.54
1992	0.00	0%	60.61	34%	101.42	58%	13.99	8%	176.03
1993	10.89	6%	54.52	29%	111.83	60%	8.37	5%	185.62
1994	0.00	0%	55.44	34%	106.36	66%	0.00	0%	161.79

ET10	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1993	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1994	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00

EE1	Class 1		Class 2		Class 3		Class 4		Total
1991	20.32	30%	38.92	57%	2.98	4%	5.71	8%	67.93
1992	309.07	55%	190.48	34%	58.24	10%	0.00	0%	557.79
1993	507.60	69%	85.34	12%	127.98	17%	12.79	2%	733.71
1994	103.55	11%	480.67	49%	350.98	36%	40.94	4%	976.14

EE2	Class 1		Class 2		Class 3		Class 4		Total
1991	1.02	1%	77.59	69%	33.04	30%	0.00	0%	111.66
1992	204.76	19%	574.45	54%	277.87	26%	14.23	1%	1,071.31
1993	343.26	18%	1,114.56	59%	363.88	19%	66.67	4%	1,888.37
1994	15.81	1%	390.36	26%	475.56	31%	631.89	42%	1,513.61

EE3	Class 1		Class 2		Class 3		Class 4		Total
1991	279.59	5%	815.75	15%	1,151.14	21%	3,181.25	59%	5,427.74
1992	175.08	3%	1,304.28	23%	2,233.53	39%	2,070.31	36%	5,783.20
1993	225.03	4%	2,651.83	44%	1,671.51	28%	1,467.22	24%	6,015.59
1994	246.94	5%	1,795.93	39%	1,416.68	31%	1,115.84	24%	4,575.39

Lower Zone

CB6	Class 1		Class 2		Class 3		Class 4		Total
1991	13.70	2%	151.28	27%	81.27	15%	306.57	55%	552.82
1992	35.06	5%	274.61	42%	35.52	5%	315.64	48%	660.83
1993	86.24	11%	181.24	24%	396.37	52%	92.83	12%	756.69
1994	108.91	18%	168.16	28%	257.99	44%	57.28	10%	592.33

SAV

CB7	Class 1		Class 2		Class 3		Class 4		Total
1991	488.01	13%	1,144.02	31%	561.01	15%	1,531.49	41%	3,724.53
1992	446.94	12%	1,469.62	38%	449.82	12%	1,502.12	39%	3,868.50
1993	601.34	14%	1,608.79	38%	664.81	16%	1,308.86	31%	4,183.80
1994	591.30	16%	1,489.50	40%	795.01	21%	872.93	23%	3,748.74

CB8	Class 1		Class 2		Class 3		Class 4		Total
1991	6.20	26%	9.93	42%	7.53	32%	0.00	0%	23.66
1992	0.00	0%	19.23	98%	0.32	2%	0.00	0%	19.55
1993	6.89	32%	7.39	35%	6.94	33%	0.00	0%	21.22
1994	13.17	31%	29.48	69%	0.00	0%	0.00	0%	42.65

TF3	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1993	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1994	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00

RET3	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1993	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1994	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00

LE3	Class 1		Class 2		Class 3		Class 4		Total
1991	0.50	0%	139.85	44%	78.64	25%	95.78	30%	314.78
1992	53.30	16%	124.74	36%	66.89	19%	98.44	29%	343.37
1993	29.61	7%	332.24	80%	12.08	3%	39.54	10%	413.47
1994	81.57	42%	99.88	51%	11.11	6%	3.96	2%	196.51

TF4	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1993	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1994	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00

RET4	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1993	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1994	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00

LE4	Class 1		Class 2		Class 3		Class 4		Total
1991	0.15	0%	8.83	13%	17.15	26%	39.51	60%	65.64
1992	0.00	0%	2.81	4%	6.84	10%	57.13	86%	66.79
1993	4.23	6%	6.19	8%	0.00	0%	66.13	86%	76.55
1994	9.39	12%	8.50	11%	0.00	0%	60.40	77%	78.29

WE4	Class 1		Class 2		Class 3		Class 4		Total
1991	339.72	8%	711.07	16%	1,016.54	23%	2,421.16	54%	4,488.49
1992	388.71	9%	635.59	14%	719.41	16%	2,824.49	62%	4,568.19
1993	364.55	8%	703.82	15%	741.69	16%	2,825.28	61%	4,635.34
1994	348.00	8%	555.48	12%	426.44	9%	3,262.76	71%	4,592.67

TF5	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1993	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1994	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00

RET5	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1992	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1993	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
1994	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00

LE5	Class 1		Class 2		Class 3		Class 4		Total
1991	0.00	0%	0.00	0%	2.74	100%	0.00	0%	2.74
1992	0.00	0%	0.00	0%	3.50	100%	0.00	0%	3.50
1993	0.00	0%	0.00	0%	0.00	0%	4.01	100%	4.01
1994	0.00	0%	0.00	0%	6.10	100%	0.00	0%	6.10

Chincoteague	Class 1		Class 2		Class 3		Class 4		Total
1991	130.92	5%	114.39	4%	662.35	24%	1,837.98	67%	2,745.63
1992	58.65	2%	179.53	5%	1,154.88	35%	1,930.05	58%	3,323.11
1993	93.43	3%	941.67	26%	604.85	17%	1,936.62	54%	3,576.57
1994	60.60	1%	511.27	12%	1,282.61	31%	2,263.04	55%	4,117.53