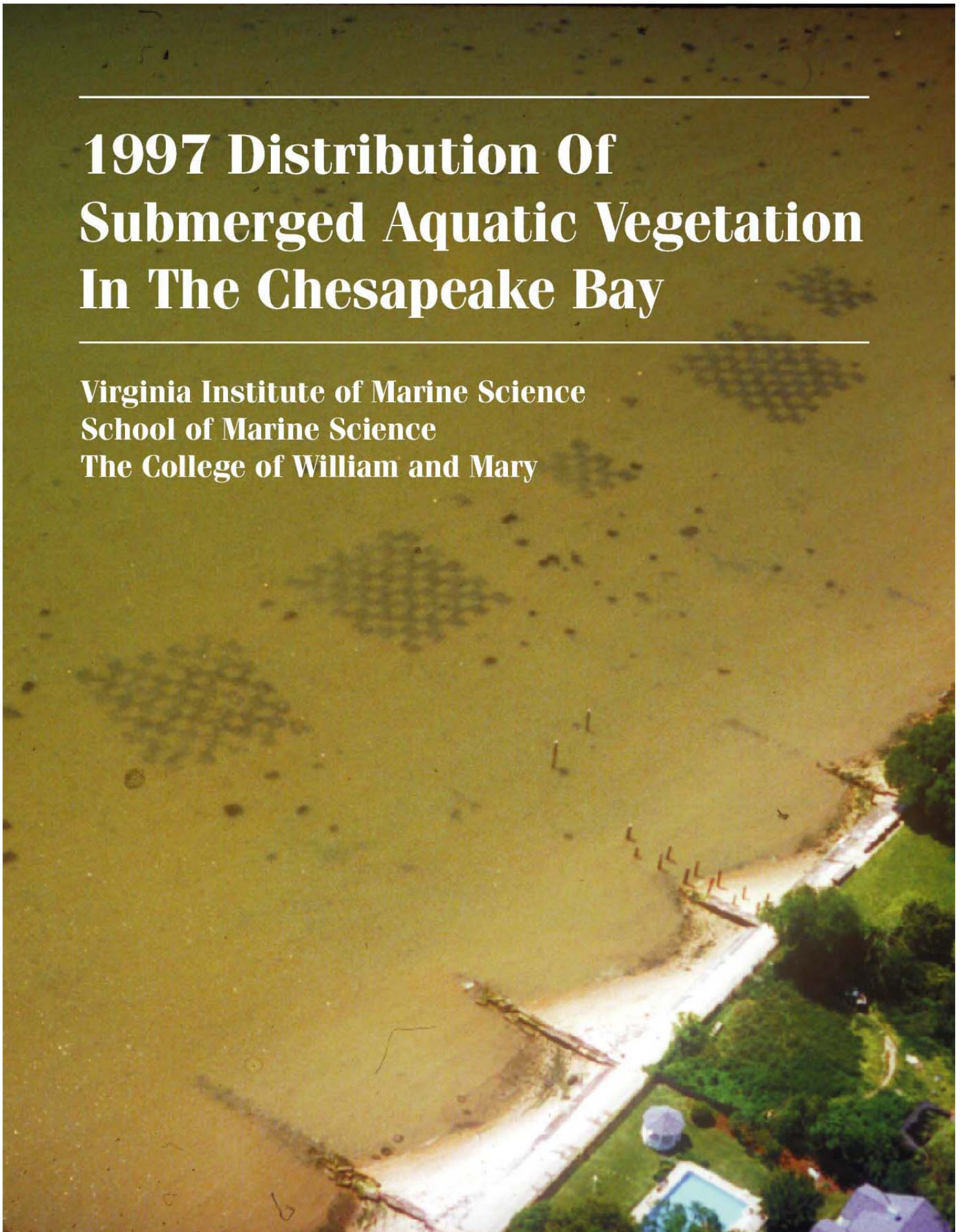


---

# **1997 Distribution Of Submerged Aquatic Vegetation In The Chesapeake Bay**

---

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



# **Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay and Tributaries and the Coastal Bays - 1997**

by

Robert J. Orth, Judith F. Nowak, David J. Wilcox,  
Jennifer R. Whiting, and Leah S. Nagey

College of William and Mary  
School of Marine Science  
Virginia Institute of Marine Science  
Gloucester Point, VA 23062

Funded by: U.S. Environmental Protection Agency (Grant No. CB993267-03-1)

Virginia Department of Environmental Quality  
Coastal Resources Management Program  
National Oceanic and Atmospheric Administration  
(Grant No. NA77OZ0204-01)

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

Maryland Department of Natural Resources  
Coastal Zone Management Program  
National Oceanic and Atmospheric Administration  
(Grant No. NA77OZ0188)

U.S. Fish and Wildlife Service  
(Grant No. 14-48-0005-93-9038)

Allied-Signal Foundation

Final Report Submitted to: U.S. Environmental Protection Agency  
Chesapeake Bay Program Office  
Annapolis, MD 21403

December 1998

VIMS Special Scientific Report Number 138

Cover Photograph: Low-level oblique aerial view taken on May 29, 1997, of an eelgrass (*Zostera marina*) transplant site in the lower James River near the Hampton River. The checkerboard pattern of alternating 2x2 m vegetated (dark) squares and unvegetated (light) squares represents the experimental design of the restoration project (Photo by R. Orth) (Orth *et al.*, in press).



# CONTENTS

	Page
LIST OF TABLES .....	vii
LIST OF FIGURES .....	viii
EXECUTIVE SUMMARY .....	xi
ACKNOWLEDGMENTS .....	xix
SAV SPECIES .....	1
METHODS .....	2
Introduction .....	2
Aerial photography .....	2
Mapping process .....	5
SAV perimeter digitization and quality assurance procedures .....	10
Calculation of 1997 SAV areas .....	12
Organizational procedures for analysis and discussion .....	12
Ground surveys and other databases .....	24
RESULTS .....	26
Data presentation .....	26
Key for 1997 Chesapeake Bay Program segment SAV maps .....	64
1997 Summary .....	64
Chesapeake Bay .....	64
Upper Bay Zone .....	66
Middle Bay Zone .....	67
Lower Bay Zone .....	67
The Delmarva Peninsula Coastal Bay Zone .....	68
Discussion of Chesapeake Bay Program segments arranged within zones .....	69
Upper Bay Zone .....	69
Northern Chesapeake Bay and associated tributary segments .....	69
Northern Chesapeake Bay (CB1TF) .....	69
Northeast River (NORTF) .....	71
Elk and Bohemia Rivers and Chesapeake & Delaware Canal .....	72
Elk River (ELKOH) .....	72
Bohemia River (BOHOH) .....	72
Chesapeake & Delaware Canal (C&DOH) .....	74
Upper Chesapeake Bay and associated tributary segments .....	74
Upper Chesapeake Bay (CB2OH) .....	74

CONTENTS (continued)

Page

RESULTS (continued)

Sassafras River (SASOH) .....	74
Bush River, Gunpowder River, Middle River, and Back River segments .....	77
Bush River (BSHOH), Gunpowder River (GUNOH), Middle River (MIDOH), and Back River (BACOH) .....	77
Bush River (BSHOH) .....	77
Gunpowder River (GUNOH) .....	79
Middle River (MIDOH) .....	80
Back River (BACOH) .....	80
Upper Central Chesapeake Bay and associated tributary segments .....	80
Upper Central Chesapeake Bay (CB3MH) .....	80
Patapsco River (PATMH) .....	81
Magothy River (MAGMH) .....	81
Chester River segments .....	83
Lower Chester River (CHSMH), Middle Chester River (CHSOH), and Upper Chester River (CHSTF) .....	83
Lower Chester River (CHSMH) .....	85
Middle Bay Zone .....	86
Middle Central Chesapeake Bay and associated tributary and bay segments .....	86
Middle Central Chesapeake Bay (CB4MH) .....	86
Eastern Bay (EASMH) .....	86
Choptank River segments .....	89
Mouth of the Choptank River (CHOMH1), Lower Choptank River (CHOMH2), Middle Choptank River (CHOOH), and Upper Choptank River (CHOTF) .....	89
Mouth of the Choptank River (CHOMH1) .....	89
Lower Choptank River (CHOMH2) .....	91
Middle Choptank River (CHOOH) and Upper Choptank River (CHOTF) .....	91
Little Choptank River (LCHMH) .....	91
The Western Tributary segments: Severn, South, Rhode, and West Rivers .....	92
Severn River (SEVMH) .....	92
South River (SOUMH) .....	94
Rhode River (RHDMH) .....	94
West River (WSTMH) .....	95
Lower Central Chesapeake Bay and associated tributary segments .....	95
Lower Central Chesapeake Bay (CB5MH) .....	95
Honga River (HNGMH) .....	97
Fishing Bay (FSBMH) .....	97
Nanticoke River segments .....	97
Lower Nanticoke River (NANMH), Middle Nanticoke River (NANOH), and Upper Nanticoke River (NANTF) .....	97

## RESULTS (continued)

Wicomico River (WICMH) .....	99
Tangier Sound and associated tributary and bay segments .....	99
Tangier Sound and Little Annemessex River (TANMH) .....	99
Manokin River (MANMH) .....	101
Big Annemessex River (BIGMH) .....	101
Pocomoke River segments .....	103
Lower (POCMH), Middle (POCOH), and Upper (POCTF) Pocomoke River ...	103
Lower Pocomoke River (POCMH) .....	103
Middle Pocomoke River (POCOH) and Upper Pocomoke River (POCTF) .....	103
Patuxent River and Western Branch River tributary segments .....	105
Lower Patuxent (PAXMH), Middle Patuxent (PAXOH), & Upper Patuxent (PAXTF) River, and Western Branch River (WBRTF) .....	105
Lower Patuxent River (PAXMH) .....	105
Middle Patuxent River (PAXOH) .....	105
Upper Patuxent River (PAXTF) .....	107
Western Branch River (WBRTF) .....	108
Potomac River and tributary segments .....	108
Lower Potomac (POTMH), Middle Potomac (POTOH), and Upper Potomac (POTTF) River, and Mattawoman (MATTF) and Piscataway (PISTF) Creeks	108
Lower Potomac River (POTMH) .....	112
Middle Potomac River (POTOH) .....	113
Upper Potomac River (POTTF) .....	115
Mattawoman Creek (MATTF) .....	117
Piscataway Creek (PISTF) .....	117
Lower Bay Zone .....	118
Western and Eastern Lower Chesapeake Bay and associated trib and bay segments	118
Western Lower Chesapeake Bay (CB6PH) .....	118
Eastern Lower Chesapeake Bay (CB7PH) .....	120
Rappahannock and Corrotoman River segments .....	121
Lower Rappahannock River (RPPMH) .....	121
Corrotoman River (CRRMH) .....	121
Middle Rappahannock River (RPPOH) and Upper Rappahannock (RPPTF) ...	123
Piankatank River (PIAMH) .....	123
Mobjack Bay (MOBPH) .....	123
York River and tributary segments .....	127
Lower York River (YRKPH) and Middle York River (YRKMH) .....	127
Lower York River (YRKPH) .....	127
Middle York River (YRKMH) .....	129
Mattaponi River segments .....	129

RESULTS (concluded)

Lower Mattaponi River (MPNOH) and Upper Mattaponi River (MPNTF) . . . . . 129

Pamunkey River segments . . . . . 129

Lower Pamunkey River (PMKOH) and Upper Pamunkey River (PMKTF) . . . . . 129

The Mouth of Chesapeake Bay and associated river and bay segments . . . . . 129

Mouth of Chesapeake Bay (CB8PH) . . . . . 129

Lynnhaven and Broad Bays (LYNPH) . . . . . 131

James River and tributary segments . . . . . 131

Mouth of James River (JMSPH), Lower James River (JMSMH), Middle James  
River (JMSOH), and Upper James River (JMSTF) . . . . . 131

Mouth of the James River (JMSPH) . . . . . 134

Elizabeth River and tributary segments . . . . . 134

Lower Elizabeth River (ELIPH) and Lafayette River (LAFMH) . . . . . 134

Middle Elizabeth River (ELIMH), Western Branch of the Elizabeth River  
(WBEMH), South Branch of the Elizabeth River (SBEMH), and Eastern  
Branch of the Elizabeth River (EBEMH) . . . . . 135

Lower James River (JMSMH) . . . . . 135

Middle James River (JMSOH) and Chickahominy River (CHKOH) . . . . . 135

Upper James River (JMSTF) and Appomattox River (APPTF) . . . . . 135

Delmarva Peninsula Coastal Bays Zone . . . . . 136

LITERATURE CITED . . . . . 141

APPENDICES . . . . . 145

A. Species of submerged aquatic plants found in Chesapeake Bay  
and tributaries . . . . . 147

B. USGS 7.5 minute quadrangles for Chesapeake Bay and the Delmarva Peninsula  
Coastal Bays showing distribution, abundance, and groundtruthing of SAV  
in 1997 . . . . . 151

Map Legend . . . . . 152

Quadrangle Locator Key . . . . . 153

C. Number of square meters of SAV for individual beds and totals for  
density categories for each USGS 7.5 minute quadrangle in 1997 . . . . . 277

D. 1997 SAV ground-survey data listed by USGS 7.5 minute quadrangle  
and by 1997 SAV bed . . . . . 305

Key to Appendix D . . . . . 306

## LIST OF TABLES

Number	Page
1	Guidelines followed during acquisition of aerial photographs . . . . . 4
2	List of USGS 7.5 minute quadrangles for Chesapeake Bay and the Delmarva Peninsula Coastal Bays SAV study areas with corresponding code numbers . . . . . 7
3	Chesapeake Bay Program segments with salinity regime . . . . . 14
4	Chesapeake Bay Program segment descriptions . . . . . 17
5	Total area of SAV in hectares by USGS 7.5 minute quadrangles for 1996 and 1997 . . . . . 27
6	Number of hectares of SAV in 1996 and 1997 for the Chesapeake Bay Program segments and the zones of Chesapeake Bay, and for the Delmarva Peninsula Coastal Bays. . . . . 34
7	Number of hectares of SAV in 1996 and 1997 for each USGS 7.5 minute quadrangle of the CBP segments of Chesapeake Bay, and of the Delmarva Peninsula Coastal Bays, with segment totals in hectares and acres. . . . . 37
8	Number of hectares and the percentage of SAV in 1996 and 1997 by density class for the CBP segments of Chesapeake Bay and for the Delmarva Peninsula Coastal Bays. . . . . 57
9	Total area of SAV in hectares by density class for the three zones of Chesapeake Bay and for the Delmarva Peninsula Coastal Bays in 1996 and 1997, including the percentage of the zone total. Total area of SAV in hectares for Density Classes one and two combined and three and four combined, for 1996 and 1997, including percentage of zone totals. . . . . 63



## LIST OF FIGURES

Number	Page
1	Location of the 1997 SAV beds in Chesapeake Bay (Upper, Middle, and Lower zones), its tributaries, and in the Delmarva Peninsula Coastal Bays . . . . . xii
2a	Total hectares of SAV in Chesapeake Bay for 1984-1997 . . . . . xiii
2b	A comparison of the total hectares of SAV for the Upper, Middle, and Lower zones of Chesapeake Bay and the Delmarva Peninsula Coastal Bays for 1996 and 1997 . . . . . xiv
3	Number of hectares of SAV per density class in 1997 by CBP Segment of the Upper Bay zone of Chesapeake Bay. . . . . xv
4	Number of hectares of SAV per density class in 1997 by CBP Segment of the Middle Bay zone of Chesapeake Bay. . . . . xvi
5	Number of hectares of SAV per density class in 1997 by CBP Segment of the Lower Bay zone of Chesapeake Bay. . . . . xvii
6	Map of Chesapeake Bay, its tributaries, and of the Delmarva Peninsula Coastal Bays, with approximate locations of flight lines for 1997 SAV photography . . . . . 3
7	Location of USGS 7.5 minute quadrangles in Chesapeake Bay, its tributaries, and in the Delmarva Peninsula Coastal Bays, with corresponding code numbers . . . . . 6
8	Crown density scale used for estimating density of SAV beds from aerial photography . . . . . 11
9	Location of the 78 Chesapeake Bay Program segments in the Upper, Middle, and Lower Chesapeake Bay zones and of the Delmarva Peninsula Coastal Bays . . . . . 13
10	Key for 1997 Chesapeake Bay Program Segment SAV Maps and Delmarva Peninsula Coastal Bays Map . . . . . 64
11	SAV distribution in the Northern Chesapeake Bay (CB1TF) and the Northeast River (NORTF) in 1997 . . . . . 70
12	SAV distribution in the Elk (ELKOH) and the Bohemia (BOHOH) Rivers, and in the Chesapeake and Delaware Canal (C&DOH) in 1997 . . . . . 73
13	SAV distribution in Upper Chesapeake Bay (CB2OH) in 1997 . . . . . 75

FIGURES (continued)

Number	Page
14 SAV distribution in the Sassafras River (SASOH) in 1997 .....	76
15 SAV distribution in the Bush (BSHOH), the Gunpowder (GUNOH), the Middle (MIDOH), and the Back (BACOH) Rivers in 1997. ....	78
16 SAV distribution in Upper Central Chesapeake Bay (CB3MH), and in the Magothy (MAGMH) and the Patapsco (PATMH) Rivers in 1997 .....	82
17 SAV distribution in the Lower Chester (CHSMH), the Middle Chester (CHSOH), and the Upper Chester (CHSTF) River in 1997 .....	84
18 SAV distribution in Middle Central Chesapeake Bay (CB4MH) and Eastern Bay (EASMH) in 1997 .....	87
19 SAV distribution in the Mouth of the Choptank (CHOMH1), the Lower Choptank (CHOMH2), the Middle Choptank (CHOOH), and the Upper Choptank (CHOTF) River, and in the Little Choptank River (LCHMH) in 1997 .....	90
20 SAV distribution in the Severn (SEVMH), the South (SOUMH), the Rhode (RHDMH), and the West (WSTMH) Rivers in 1997 .....	93
21 SAV distribution in Lower Central Chesapeake Bay (CB5MH) and the Honga River (HNGMH) in 1997 .....	96
22 SAV distribution in Fishing Bay (FSBMH), in the Lower Nanticoke (NANMH), the Middle Nanticoke (NANOH), and the Upper Nanticoke (NANTF) River, and in the Wicomico River (WICMH) in 1997 .....	98
23 SAV distribution in Tangier Sound ( TANMH) in 1997 .....	100
24 SAV distribution in the Manokin River (MANMH) and the Big Annemessex River (BIGMH) in 1997 .....	102
25 SAV distribution in the Lower Pocomoke (POCMH), the Middle Pocomoke (POCOH), and the Upper Pocomoke (POCTF) River in 1997 .....	104
26 SAV distribution in the Upper Patuxent (PAXTF), the Middle Patuxent (PAXOH), and the Lower Patuxent (PAXMH) River, and in the Western Branch River (WBRTF) in 1997 .....	106

FIGURES (concluded)

Number	Page
27 SAV distribution in the Lower Potomac River (POTMH) in 1997 .....	109
28 SAV distribution in the Middle Potomac River ( POTOH) in 1997 .....	110
29 SAV distribution in the Upper Potomac River (POTTF), in Mattawoman Creek (MATTF), and in Piscataway Creek (PISTF) in 1997 .....	111
30 SAV distribution in Western Lower Chesapeake Bay (CB6PH) and Eastern Lower Chesapeake Bay (CB7PH) in 1997 .....	119
31 SAV distribution in the Lower Rappahannock River (RPPMH) and the Corrotoman River (CRRMH) in 1997 .....	122
32 SAV distribution in the Piankatank River (PIAMH) in 1997 .....	124
33 SAV distribution in Mobjack Bay (MOBPH) in 1997 .....	125
34 SAV distribution in the Lower York (YRKPH) and Middle York (YRKMH) River in 1997 .....	128
35 SAV distribution in the Mouth of the Chesapeake Bay (CB8PH), and Lynnhaven and Broad Bays (LYNPH) in 1997 .....	130
36 SAV distribution in the Mouth of the James (JMSPH) and the Lower James (JMSMH) River, and in the Elizabeth River segments (ELIPH, ELIMH, LAFMH, WBEMH, EBEMH, and SBEMH) in 1997 .....	132
37 SAV distribution in the Chickahominy River (CHKOH), Appomattox River (APPTF), Middle James (JMSOH) and Upper James (JMSTF) River, Lower Mattaponi (MPNOH) and Upper Mattaponi (MPNTF) River, and Lower Pamunkey (PMKOH) and Upper Pamunkey (PMKTF) River in 1997 .....	133
38 SAV distribution in the Delmarva Peninsula Coastal Bays in 1997 .....	137

## EXECUTIVE SUMMARY

The distribution of submerged aquatic vegetation (SAV), principally rooted vascular macrophytes in the Chesapeake Bay, its tributaries, and the coastal bays of the Delmarva Peninsula, was mapped from 1,728 black and white aerial photographs. These were taken between May and October 1997, at a scale of 1:24,000, encompassing 141 flight lines covering 1,808 miles of shoreline.

In 1997, 28,032 hectares of SAV were mapped in Chesapeake Bay and its tributaries (Figures 1 and 2a). This was a 9% increase (2,336 hectares) from 1996 levels and represents a second consecutive year of SAV increase following two consecutive years (1994 and 1995) of declining SAV abundance (Figure 2a). The abundance of SAV in 1997 represented 61% of the Tier I goal (46,022 hectares) set by the Chesapeake Executive Council in Directive 93-3 (Figure 2a).

SAV increased in all three geographic zones delineated for Chesapeake Bay. In the Upper Bay zone (from the Susquehanna River, south to the Chester and Magothy rivers - Figure 1), SAV increased to 4,439 hectares, representing 61% of the Tier I goal, an increase of 27% from 1996 (Figure 2b). In the Middle Bay zone (from the Bay Bridge, south to the Rappahannock River and Pocomoke Sound, and including the Potomac River - Figure 1), SAV increased to 14,209 hectares, representing 57% of the Tier I goal, an increase of 8% from 1996 (Figure 2b). In the Lower Bay zone (from the Rappahannock River and Pocomoke Sound areas, south to the mouth of the Bay - Figure 1), SAV increased to 9,383 hectares, representing 68% of the Tier I goal, an increase of 3% from 1996 (Figure 2b).

SAV increased in 33 of the 78 Chesapeake Bay Program segments (Figures 3, 4, and 5). Twenty-one of the segments had increases of 20% or greater from 1996. In the Upper Bay zone (Figure 3), these increases occurred in: the Upper Chesapeake Bay segment (CB2OH), 83 hectares - 299%; the Elk River (ELKOH), 24 hectares - 54%; the Bohemia River (BOHOH), 3 hectares - 20%; the Gunpowder River (GUNOH), 266 hectares - 71%; the Middle River (MIDOH), 86 hectares - 277%; the Chester River (CHSMH), 113 hectares - 36%; and the Magothy River (MAGMH), 16 hectares - 44%. Also notable, in CB1TF, which includes the Susquehanna River/Flats area, SAV increased 343 hectares or 16%. In the Middle Bay zone (Figure 4), increases of 20% or more occurred in the following segments: the South River (SOUMH), 8 hectares - 88%; Middle Central Chesapeake Bay (CB4MH), 20 hectares - 100%; the Lower Patuxent River (PAXMH), 1 hectare - 100%; the Lower Potomac River (POTMH), 264 hectares - 66%; Piscataway Creek (PISTF), a tributary of the Potomac River, 72 hectares - 142%; Eastern Bay (EASMH), 360 hectares - 24%; the Lower Choptank River (CHOMH2), 2 hectares - 100%; the Little Choptank River (LCHMH), 185 hectares - 54%; the Honga River (HNGMH), 268 hectares - 43%; the Manokin River (MANMH), 48 hectares - 602%; and the Big Annemessex River (BIGMH), 55 hectares - 63%. Notable increases also occurred in the Mouth of the Choptank River (CHOMH1), 449 hectares - 19%, and in the Middle Potomac River (POTOH), the oligohaline portion, 170 hectares - 16%. In the Lower Bay zone (Figure 5), the increases occurred in: the Piankatank River (PIAMH), 33 hectares - 23%; the Lower James River (JMSMH), 1 hectare - 100%; and the Mouth of the James River (JMSPH), 57 hectares - 303%.

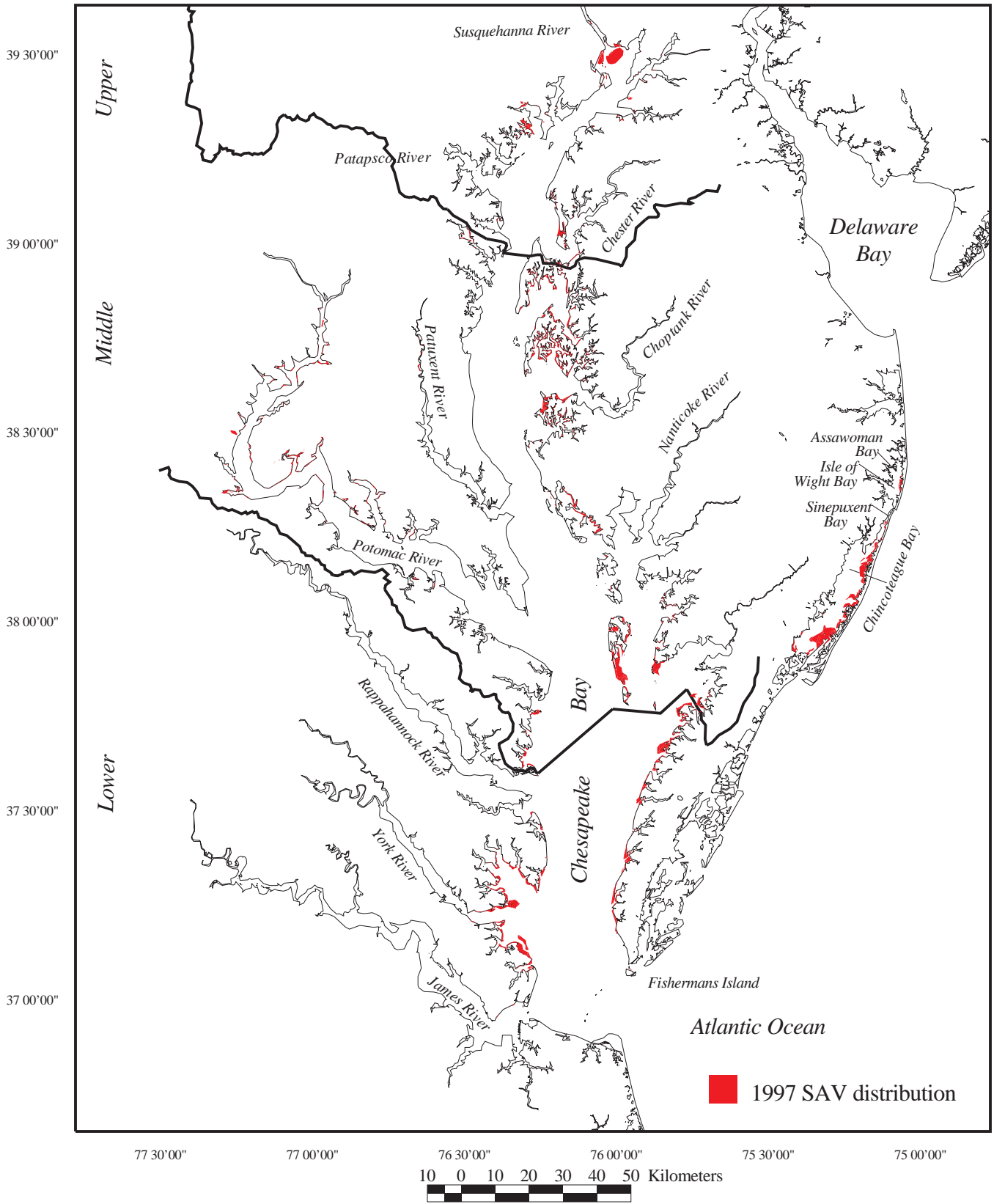


Figure 1: Location of the 1997 SAV beds in Chesapeake Bay (Upper, Middle, and Lower zones), its tributaries, and the Delmarva Peninsula Coastal Bays.

### Hectares of SAV in Chesapeake Bay for 1984-1997

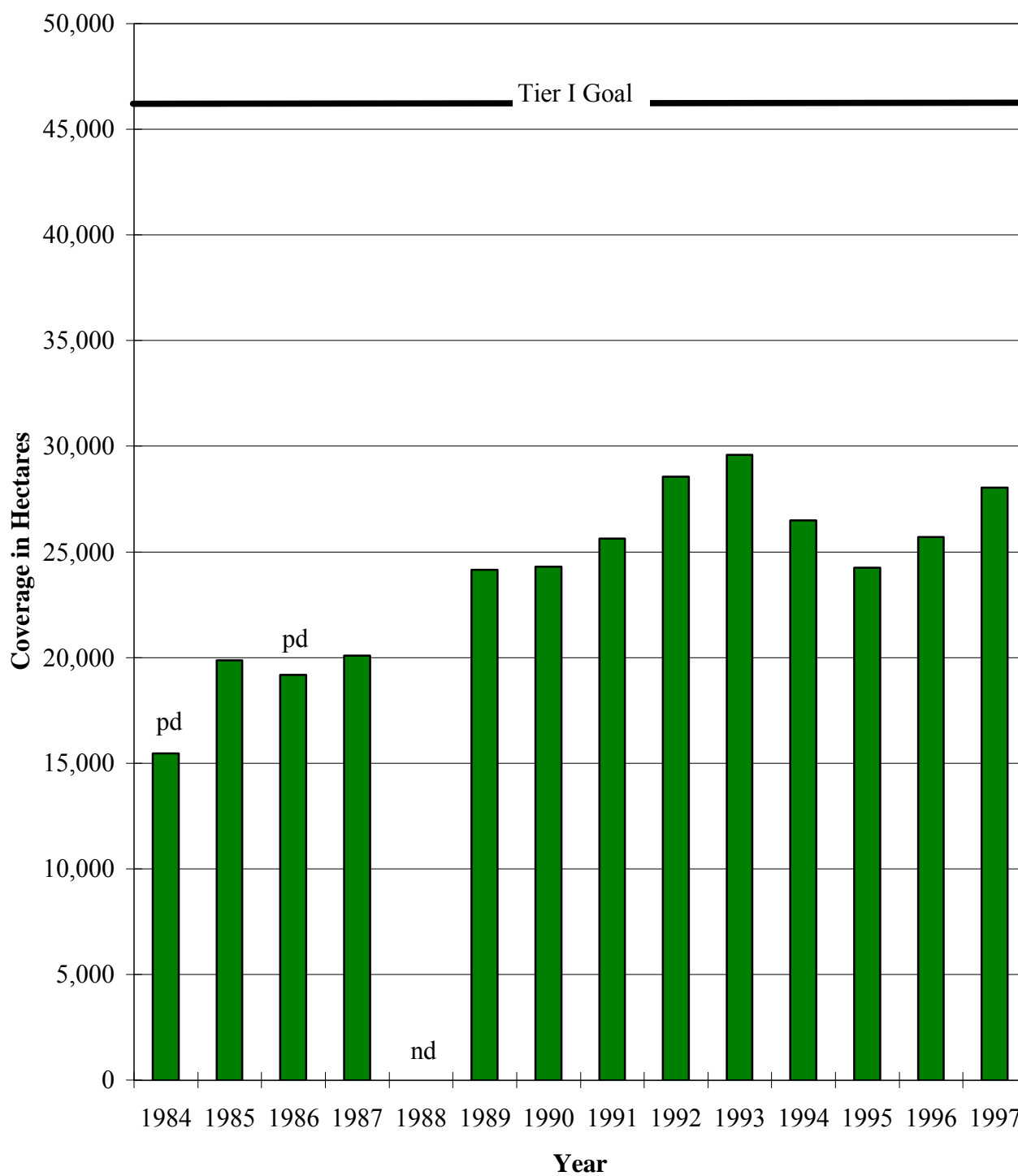


Figure 2a. Total hectares of SAV in Chesapeake Bay for 1984-1997. [(pd-partial data; nd- no data surveyed for that year) See Results section regarding partial data.]

**Hectares of SAV in Each Zone of Chesapeake Bay and the Delmarva Peninsula Coastal Bays for 1996 and 1997**

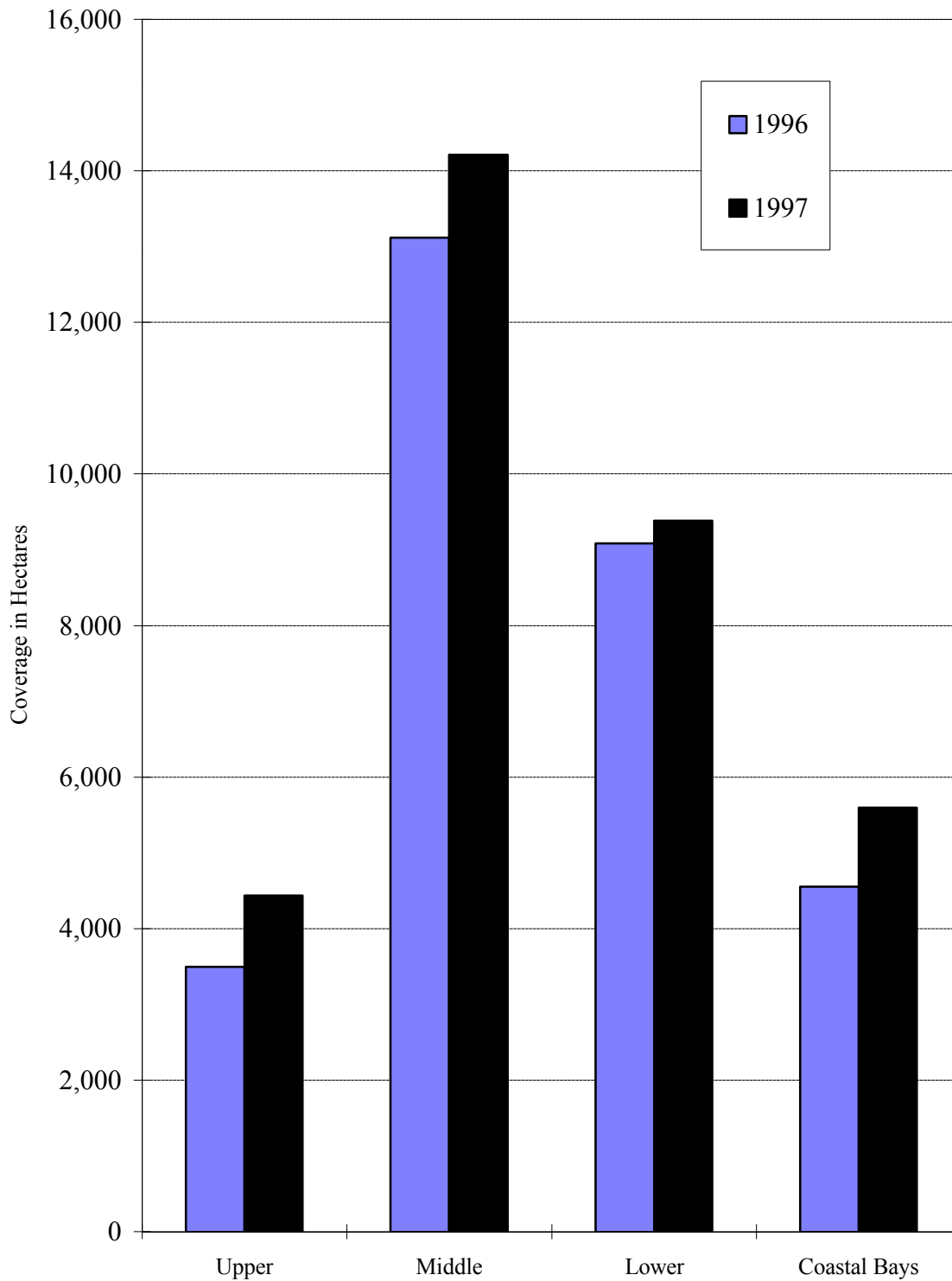


Figure 2b. A comparison of the total hectares of SAV for the Upper, Middle, and Lower zones of Chesapeake Bay and the Delmarva Peninsula Coastal Bays for 1996 and 1997. (Refer to Figure 1 and Figure 9 for zone locations.)

### Hectares of SAV in 1997 by CBP Segment Upper Zone

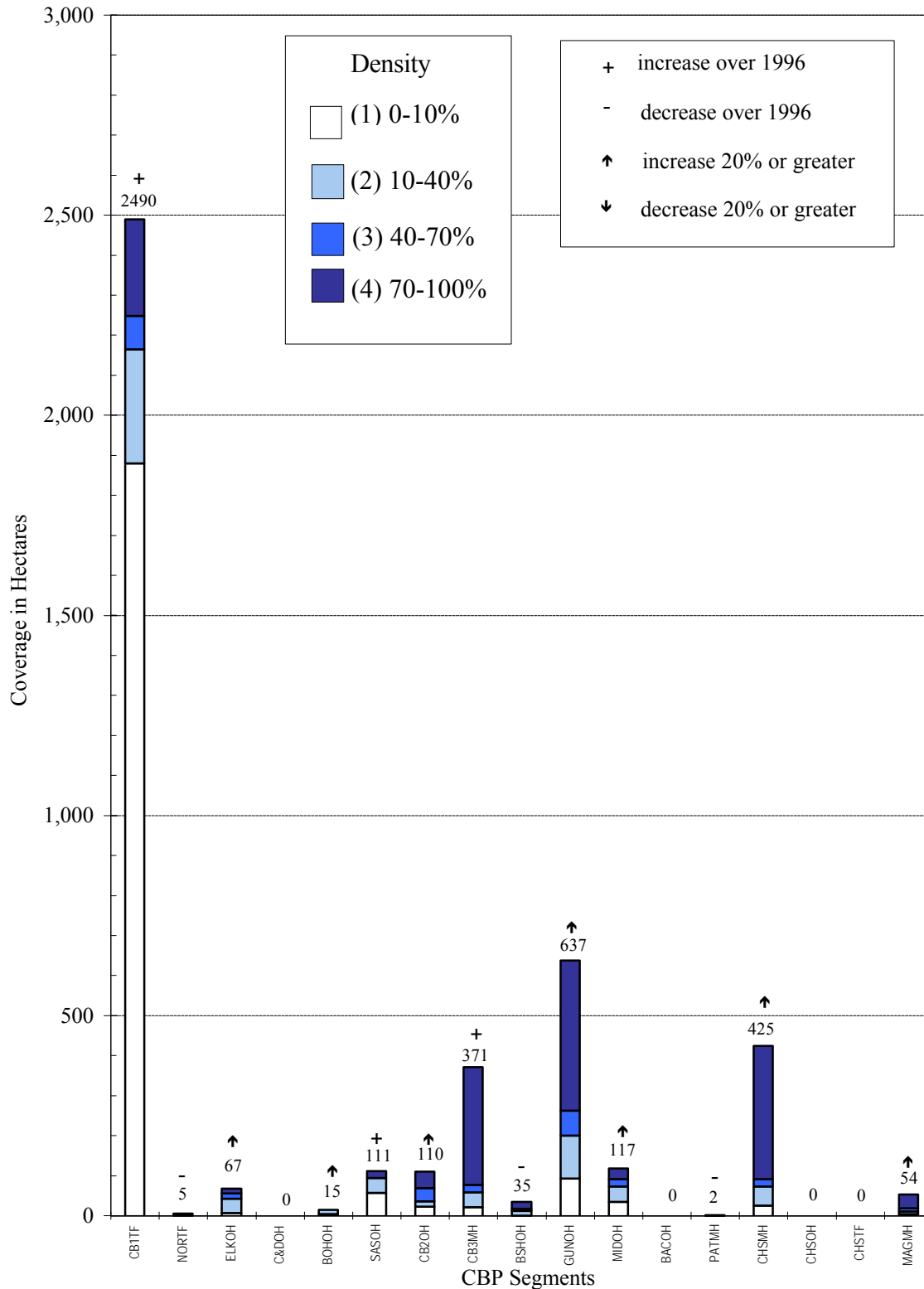


Figure 3. Number of hectares of SAV per density class in 1997 by segment in the Upper Bay Zone of Chesapeake Bay (Refer to Figure 9, Table 4, and Appendix B for segment locations and boundaries.)



### Hectares of SAV in 1997 by CBP Segment Middle Zone

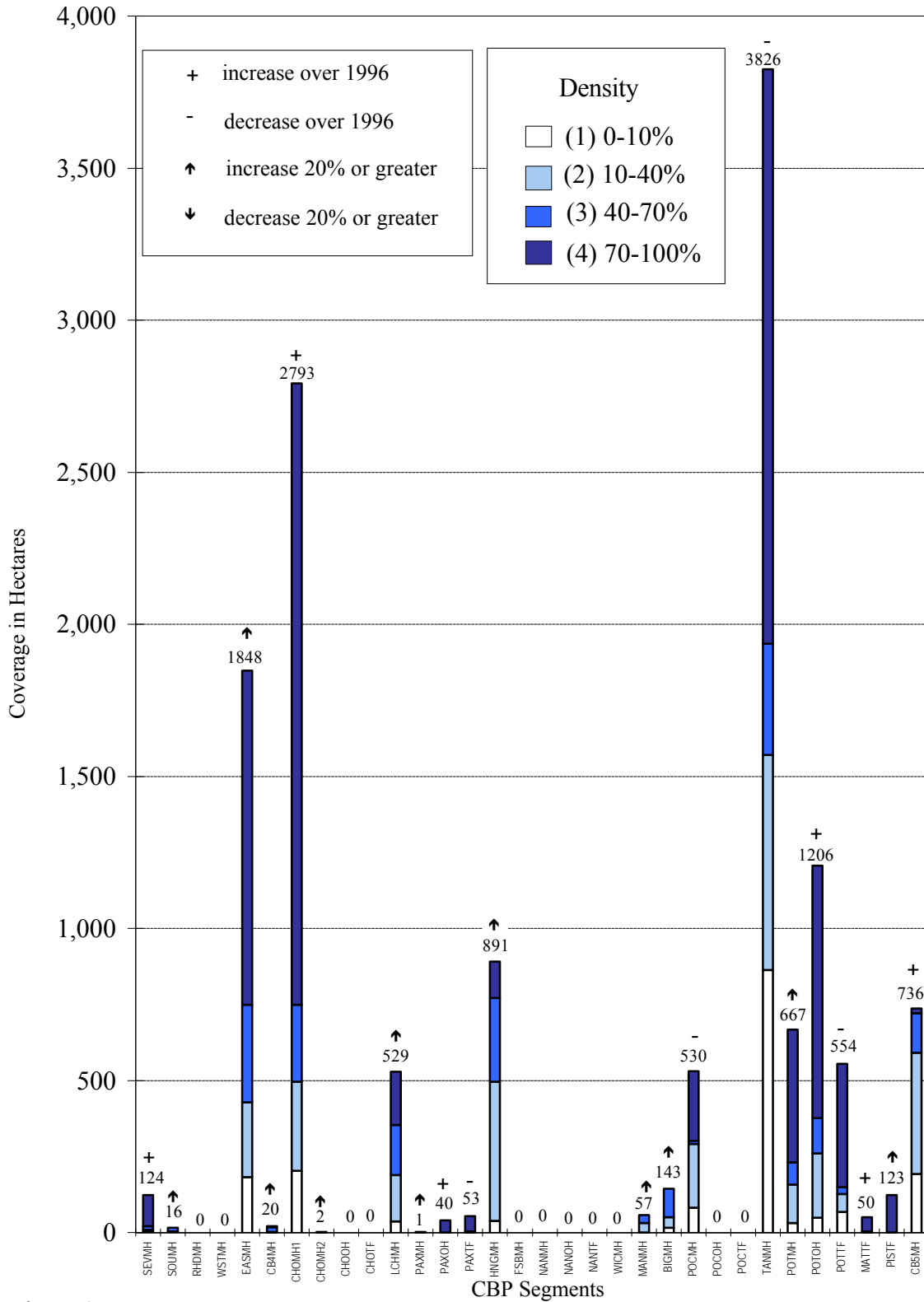


Figure 4. Number of hectares of SAV per density class in 1997 by segment in the Middle Bay Zone of Chesapeake Bay (Refer to Figure 9, Table 4, and Appendix B for segment locations and boundaries.)

### Hectares of SAV in 1997 by CBP Segment

#### Lower Zone

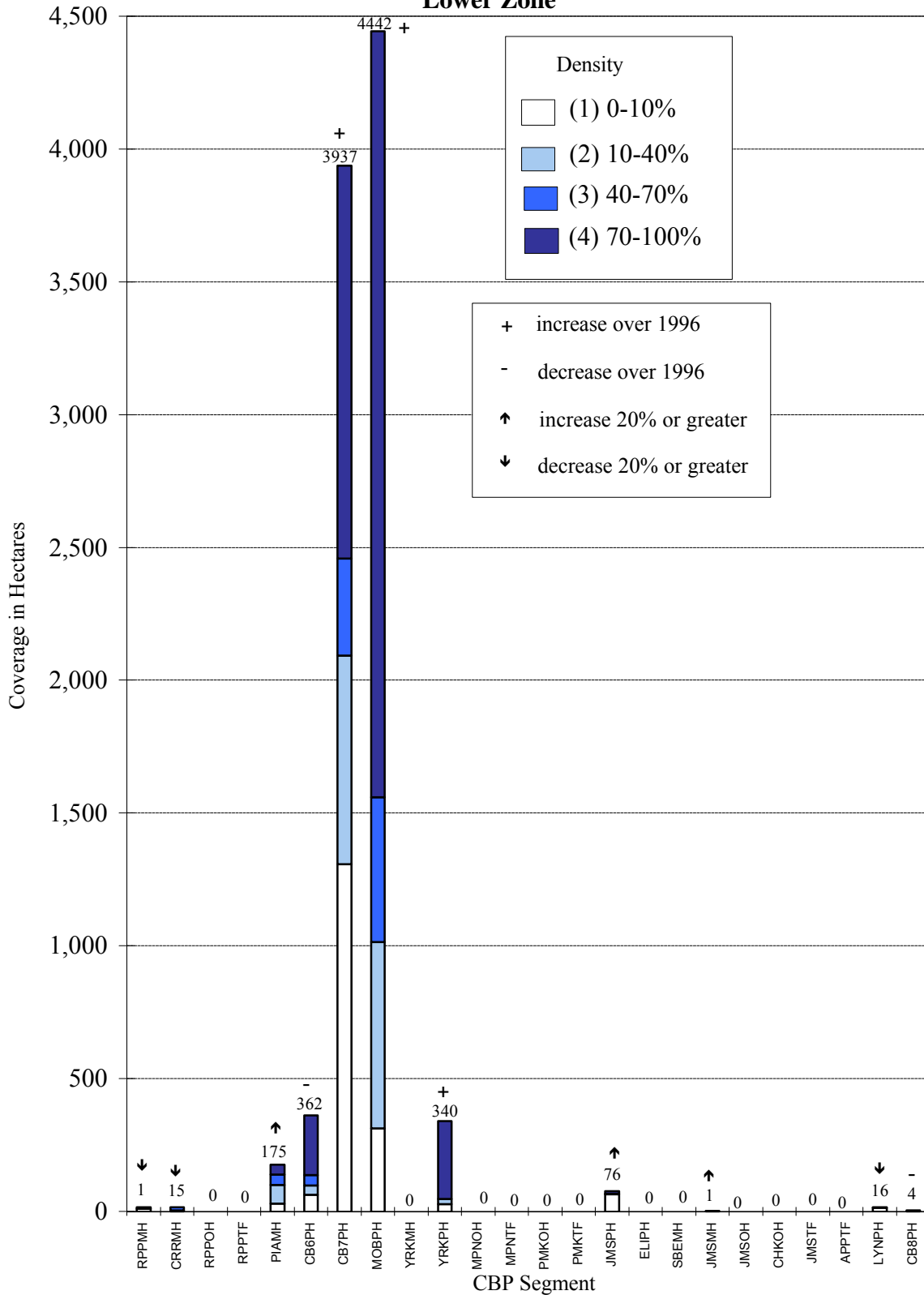


Figure 5. Number of hectares of SAV per density class in 1997 by segment in the Lower Bay Zone of Chesapeake Bay (Refer to Figure 9, Table 4, and Appendix B for segment locations and boundaries).

Notable increases also occurred in the Eastern Lower Chesapeake Bay (CB7PH), 106 hectares - 3%, and in Mobjack Bay (MOBPH), 140 hectares - 3%.

SAV decreased in 12 of the 78 bay and tributary segments. Three of those 12 segments had decreases of 20% or more from 1996, all occurring in the Lower Bay zone (Figure 5): Lower Rappahannock River (RPPMH), 11 hectares - minus 43%; Corrotoman River (CRRMH), 7 hectares - minus 31%; and Lynnhaven Bay (LYNPH), 14 hectares - minus 47%. In the Middle Bay zone, although the Tangier Sound segment (TANMH) did not have a decrease of 20%, the decline of SAV there was notable for two reasons: SAV had declined for the fifth straight year in this segment which contained a significant portion of the entire SAV in Chesapeake Bay (14% of the 1997 Bay total); and the magnitude of SAV decline from 1996 to 1997 (636 hectares - 15% decrease) was much greater than any of the increases in any one segment. An additional notable decrease also occurred in the Lower Pocomoke River (POCMH), 122 hectares - 19% decrease.

SAV was not present or was not sufficiently abundant to be mapped in 28 of the 78 Chesapeake Bay Program segments.

SAV increased in the Delmarva Peninsula coastal bays (Chincoteague, Sinepuxent, Isle of Wight, Assawoman, and Magothy bays) to 5,598 hectares, an increase of 1,042 hectares, or 23%, from 1996. Total hectares for each of the bays were: Chincoteague Bay - 4,917 hectares, compared to 3,988 hectares in 1996; Sinepuxent Bay - 421 hectares, compared to 344 hectares in 1996; Isle of Wight Bay - 80 hectares, compared to 46 hectares in 1996; Assawoman Bay - 180 hectares, compared to 178 hectares in 1996; and Magothy Bay - no SAV was mapped, but SAV was present in small patches which had been planted in 1996. Significant damage to SAV beds was noted here in 1997, which was caused by commercial clam dredging activities (principally in Chincoteague and Sinepuxent bays). These areas were protected in 1998 by state legislation passed for the Maryland portions and by a SAV sanctuary established in Virginia's portion of Chincoteague Bay.

## ACKNOWLEDGMENTS

We gratefully acknowledge the federal and state agencies who financially supported this project: the U. S. Environmental Protection Agency (USEPA); the U. S. Fish and Wildlife Service (USFWS); the Virginia Department of Environmental Quality (VA-DEQ) and the Maryland Department of Natural Resources (MD-DNR) Coastal Resources Management Programs of the National Oceanographic and Atmospheric Administration (NOAA), under the Coastal Zone Management Act of 1972, as amended by the Office of Ocean Coastal Resource Management (OCRM); and the School of Marine Science, Virginia Institute of Marine Science (VIMS), College of William and Mary. Also, we thank the Allied - Signal Foundation for providing a private grant to VIMS in partial support of this work.

Acknowledgments would not be complete without commendation for the groups that provided groundtruthing of SAV beds, which was used in conjunction with interpretation of the 1997 photography. The USFWS, with the Chesapeake Bay Foundation, organized citizens, students, and educators, including the Friends of Mattawoman Creek, Gibson Island Country School, Millersville University, the National Aquarium in Baltimore, Southern Middle School, and the Sherwood Forest Naturalist Program, to report locations and species composition of grass beds around the bay for The SAV Hunt program. The Maryland Patuxent River Park staff also provided ground-truth data for the Patuxent and Potomac rivers through the SAV Hunt. Kathryn Reshetiloff of the USFWS was responsible for compiling and tabulating the SAV Hunt ground-truth data. Stan Kollar of Harford Community College (HCC) in Maryland; Kent Mountford and Marcia Olson of the USEPA; Peter Bergstrom of the USFWS; U.S. Army Environmental Center/U. S. Army Research Laboratory (USAEC/ARL) (Aberdeen Proving Ground); Bob Stankelis of Chesapeake Biological Laboratory (CBL) of University of Maryland; Mike Naylor of MD-DNR; and Dan Stotts of Patuxent Wildlife Research Center (PWRC) provided ground-truth data for specific regions of the Maryland portion of the Bay. Virginia Carter, Nancy Rybicki, and Henry Ruhl of the USGS National Center provided ground-truth data for the Potomac River. Ken Moore, James Fishman, Matthew Harwell, John Parker, Al Lombana, Jennifer Rhode, Helen Woods, Kristin O'Connell, Lee Steider, and Walter Adcock of VIMS Department of Biological Sciences SAV Program, as well as the faculty, staff and students of the VIMS Department of Fisheries Crustacean Ecology program, including Jacques van Montfrans and Mike Seebo, provided ground-truth data for the lower Bay. VIMS, the National Park Service (NPS), and the Ocean Pines Yacht Club (SAV Hunt) provided ground truth for Chincoteague, Isle of Wight, Sinepuxent, Assawoman, and Magothy 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; and Kathryn Reshetiloff and Peter Bergstrom of the USFWS. We are especially grateful to the dedicated VIMS personnel who contributed greatly to the production of this report: Carol Hayes for tremendous assistance and perseverance in digitizing the SAV maps, editing the digital data files, and for constant, careful efforts to maintain high quality control; Jane Lopez, Jerry Harrison, and Connie Motley of the Sponsored Programs office provided grant administration; Suzanne Alexander, Gary Anderson, Steve Clukey, Kathy

Goodwin, Pat Hall, Rob Hayhurst, Kevin Kiley, Buddy Matthews, Newt Munson, and Dave Weiss of Information Technology and Network Services provided computer services; Regina Burrell, Alice Tillage, and Gail Reardon of the Department of Biological Sciences provided secretarial and purchasing services; Sylvia Motley, Eileen Horne, Wanda Cohen, Kay Stubblefield, Harold Burrell, and Bill Jenkins of the VIMS Publications Center provided report production services; Thomas Pierce provided security.

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-one taxa from ten vascular macrophyte families and three taxa from one freshwater macrophytic algal family, the Characeae. The term “SAV” in this report excludes all other algae, both benthic and planktonic, which occur in Chesapeake Bay, its tributaries, and the Delmarva coastal bays (Appendix A). Although these other algae do constitute a portion of the SAV biomass in Chesapeake Bay, its tributaries, and the Delmarva coastal bays (Humm, 1979), this survey 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 many benthic marine algae species, including many macrophytes, which can sometimes co-occur in the same beds with submersed vascular plants, even as epiphytes on submersed vascular plants, and which cannot be differentiated from them in the aerial photography used by this survey.

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 14 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, continues to dominate SAV beds in the tidal freshwater reaches of the Potomac River, although many of the large beds of hydrilla have recently declined. It was also reported again in 1997, in the Susquehanna River and Flats, where its growth was not as widespread as in the Potomac River (Kollar, pers. comm.), as well as the Patuxent river tidal freshwater areas.

*Zostera marina* and *R. maritima* are the species reported from the Delmarva coastal bays.

SAV

## **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 five Delmarva coastal bays in 1997. The Delmarva coastal bays mapped in 1997 includes: Chincoteague, Assawoman, Sinepuxent, Isle of Wight, and Magothy bays, but exclude Fishermans Island. There were 141 flight lines which yielded 1,728 photographs 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, providing a GIS digital database for analysis of bed areas and locations. Ground survey information collected in 1997 was tabulated, then drawn onto the same 7.5 minute quadrangles, and, finally, entered into the VIMS SAV GIS digital database.

### **AERIAL PHOTOGRAPHY**

The 1997 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, mounted in the bottom fuselage of a Piper Aztec, a twin engine reconnaissance aircraft. Photography was acquired from an altitude of approximately 12,000 feet, yielding 1:24,000 scale photographs.

The 141 flight lines, which cover 1,808 miles of shoreline, were numbered and included land features 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, and 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 are noted on each quadrangle in Appendix B.

Guidelines for 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 the guidelines assured acquisition of photography under nearly optimal conditions for detection of SAV, thus insuring accurate photo interpretation. 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 Administration.

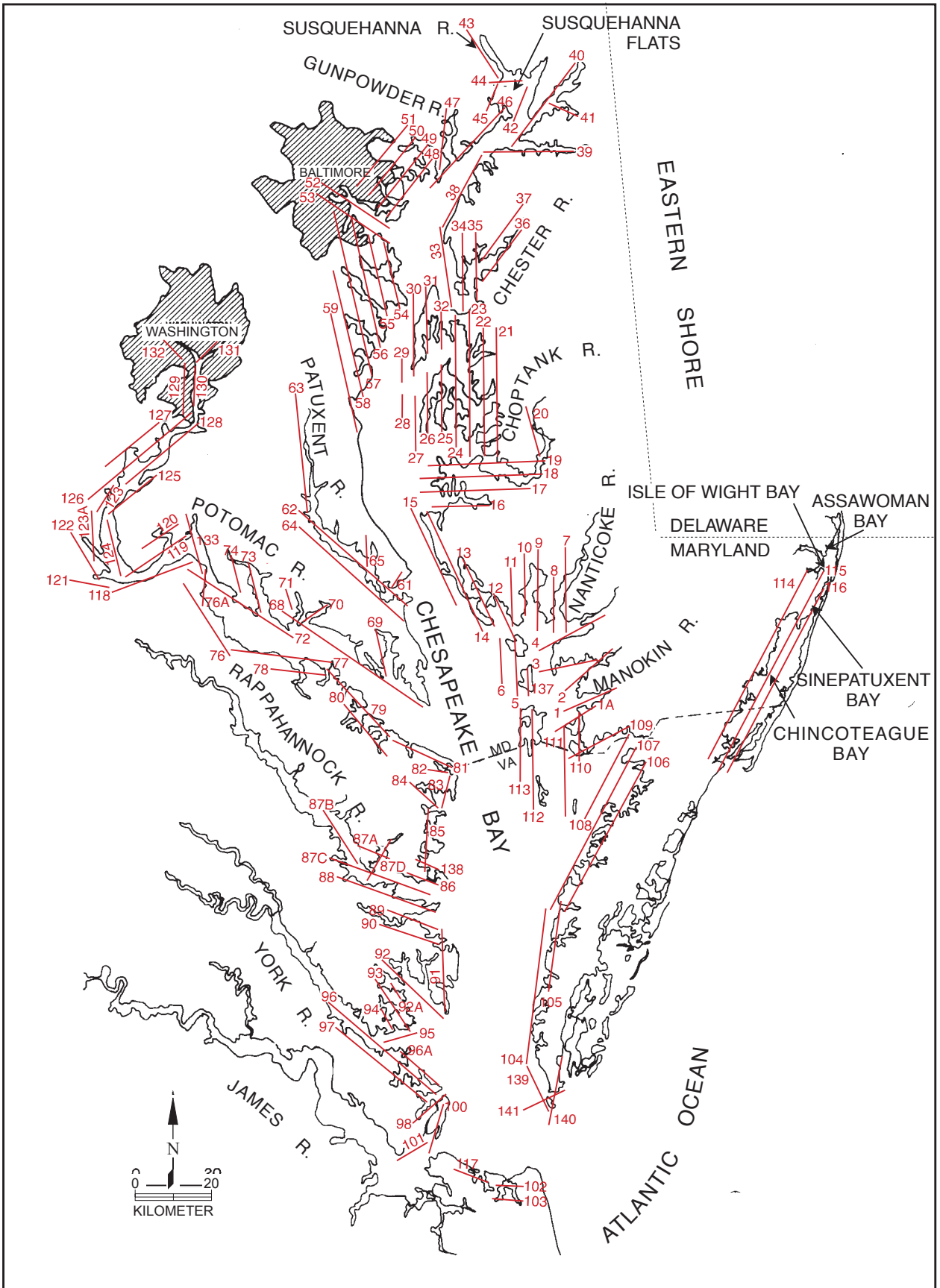


Figure 6. Map of Chesapeake Bay, its tributaries, and of Chincoteague Bay with approximate locations of flight lines for 1997 SAV photography.



**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 were 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. Offshore winds were preferred to onshore 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 contrast to bottom.
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.

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 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 the 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 229 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 photo interpretation utilized all available information including: knowledge of aquatic grass signatures on film, distribution of SAV in 1997 from aerial photography, 1997 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 1997 aerial photographs were mapped onto these mylar copies of USGS 7.5 minute quadrangles. Delineation of each SAV bed was facilitated by superimposing the photographic 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

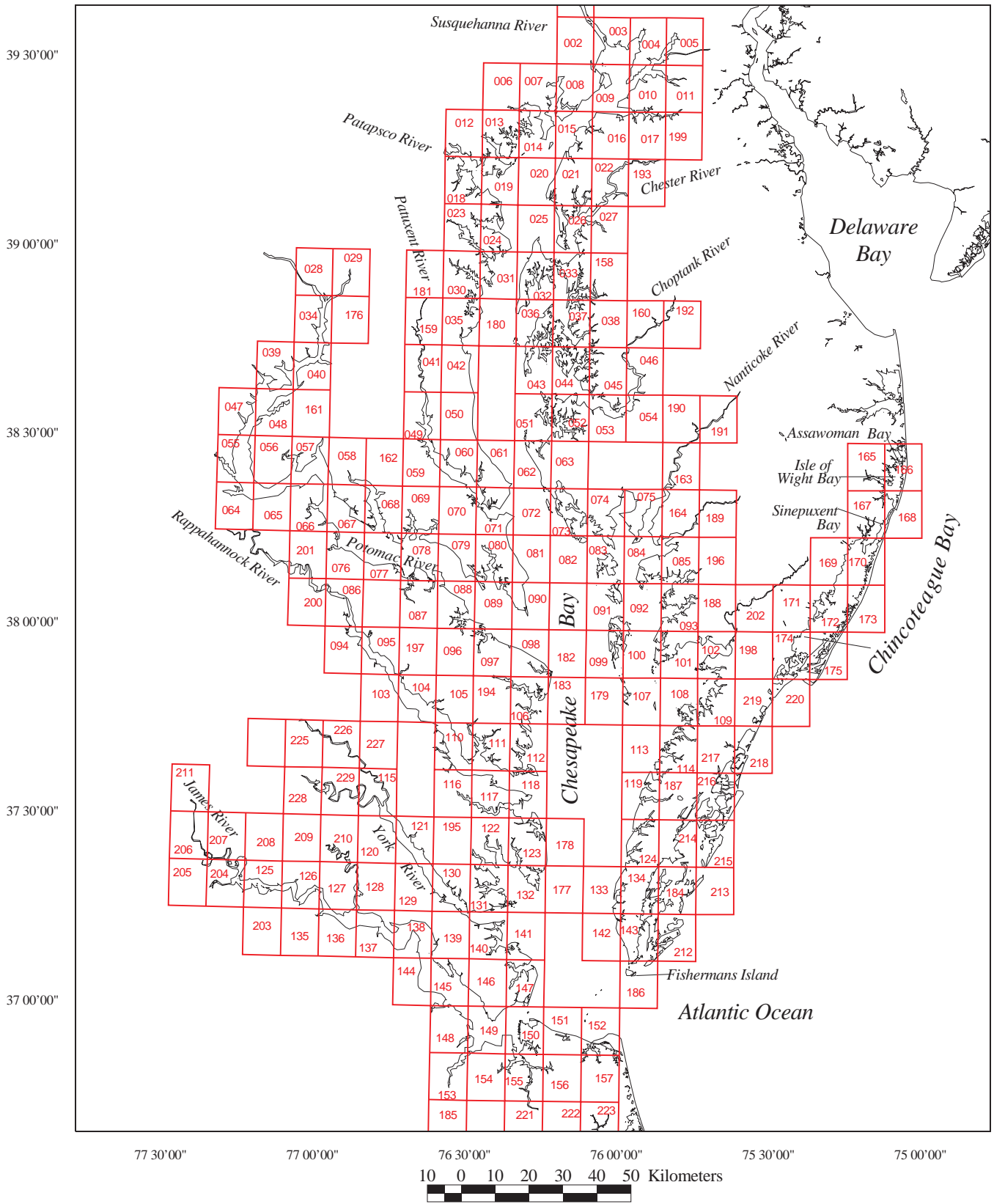


Figure 7: Location of USGS 7.5 minute quadrangles in Chesapeake Bay, its tributaries, and in the coastal bays with corresponding code numbers. (See Table 2 for quad names.)

**TABLE 2**

**List of USGS 7.5 Minute Quadrangles for Chesapeake Bay and the Delmarva Peninsula Coastal Bays 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.	035. Deale, Md.
002. Aberdeen, Md.	036. Claiborne, Md.
003. Havre de Grace, Md.	037. St. Michaels, Md.
004. North East, Md.	038. Easton, Md.
005. Elkton, Md.-Del.	039. Fort Belvoir, Va.-Md.
006. White Marsh, Md.	040. Mt. Vernon, Md.-Va.
007. Edgewood, Md.	041. Lower Marlboro, Md.
008. Perryman, Md.	042. North Beach, Md.
009. Spesutie, Md.	043. Tilghman, Md.
010. Earleville, Md.	044. Oxford, Md.
011. Cecilton, Md.	045. Trappe, Md.
012. Baltimore East, Md.	046. Preston, Md.
013. Middle River, Md.	047. Quantico, Va.-Md.
014. Gunpowder Neck, Md.	048. Indian Head, Va.-Md.
015. Hanesville, Md.	049. Benedict, Md.
016. Betterton, Md.	050. Prince Frederick, Md.
017. Galena, Md.	051. Hudson, Md.
018. Curtis Bay, Md.	052. Church Creek, Md.
019. Sparrows Point, Md.	053. Cambridge, Md.
020. Swan Point, Md.	054. East New Market, Md.
021. Rock Hall, Md.	055. Widewater, Va.-Md.
022. Chestertown, Md.	056. Nanjemoy, Md.
023. Round Bay, Md.	057. Mathias Point, Md.-Va.
024. Gibson Island, Md.	058. Popes Creek, Md.
025. Love Point, Md.	059. Mechanicsville, Md.
026. Langford Creek, Md.	060. Broomes Island, Md.
027. Centreville, Md.	061. Cove Point, Md.
028. Washington West, Md.-D.C.-Va.	062. Taylors Island, Md.
029. Washington East, D.C.-Md.	063. Golden Hill, Md.
030. South River, Md.	064. Passapatanzy, Md.-Va.
031. Annapolis, Md.	065. King George, Va.-Md.
032. Kent Island, Md.	066. Dahlgren, Va.-Md.
033. Queenstown, Md.	067. Colonial Beach North, Md.-Va.
034. Alexandria, Va.-D.C.-Md.	068. Rock Point, Md.

**TABLE 2 (continued)**

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

**TABLE 2 (continued)**

147. Hampton, Va.	186. Fishermans Island, Va,
148. Benns Church, Va.	187. Exmore, Va.
149. Newport News South, Va.	188. Kingston, Md.
150. Norfolk North, Va.	189. Eden, Md.
151. Little Creek, Va.	190. Rhodesdale, Md.
152. Cape Henry, Va.	191. Sharptown, Md.-Del.
153. Chuckatuck, Va.	192. Hobbs, Md.
154. Bowers Hill, Va.	193. Church Hill, Md.
155. Norfolk South, Va.	194. Lancaster, Va.
156. Kempsville, Va.	195. Gloucester, Va.
157. Princess Anne, Va.	196. Princess Anne, Md.
158. Wye Mills, Md.	197. Haynesville, Va.
159. Bristol, Md.	198. Hallwood, Va.-Md.
160. Fowling Creek, Md.	199. Millington, Md.
161. Port Tobacco, Md.	200. Rollins Fork, Va.
162. Charlotte Hall, Md.	201. Loretto, Va.
163. Mardela Springs, Md.	202. Pocomoke City, Md.-Va.
164. Wetipquin, Md.	203. Diputanta North, Va.
165. Selbyville, Md.	204. Hopewell, Va.
166. Assawoman Bay, Md.-Del.	205. Chester, Va.
167. Berlin, Md.	206. Drewrys Bluff, Va.
168. Ocean City, Md.	207. Dutch Gap, Va.
169. Public Landing, Md.	208. Roxbury, Va.
170. Tingles Island, Md.	209. Providence Forge, Va.
171. Girdle Tree, Md.-Va.	210. Walkers, Va.
172. Boxiron, Md.-Va.	211. Richmond, Va.
173. Whittington Point, Md.-Va.	212. Ship Shoal Inlet, Va.
174. Chincoteague West, Va.	213. Great Machipongo Inlet, Va.
175. Chincoteague East, Va.	214. Nassawadox, Va.
176. Anacostia, D.C.-Md.	215. Quimbly Inlet, Va.
177. East of New Point Comfort, Va.	216. Wachapreague, Va.
178. Bethel Beach, Va.	217. Accomax, Va.
179. Goose Island, Va.	218. Metompkin Inlet, Va.
180. Horseshoe Point, Md	219. Bloxom, Va.
181. Bowie, Md.	220. Wallops Island, Va.
182. Smith Point, Va.-Md.	221. Deep Creek, Va.
183. East of Reedville, Va.	222. Fentress, Va.
184. Cobb Island, Va.	223. Pleasant Ridge, Va.
185. Suffolk, Va.	224. Creeds, Va.

**TABLE 2 (concluded)**

- 225. King William, Va.
- 226. King and Queen Courthouse, Va.
- 227. Truhart, Va.
- 228. Tunstall, Va.
- 229. New Kent, Va.

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 photo interpretation of 1997 aerial photography for SAV beds was done by one scientist who also photo interpreted the 1987 to 1996 aerial photographs.

SAV beds were identified and ground truthed with the collaboration of Stan Kollar for the head of the Bay region, including Susquehanna Flats and the Elk, Bohemia, and Sassafras rivers, and with Virginia Carter, Nancy Rybicki, and Henry Ruhl for the Potomac River. Delineation of the large bed on the Havre de Grace map was facilitated by both aerial photography and ground observations.

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 crown cover of forest trees 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 variations of SAV density. Additionally, each distinct SAV bed or bed subsection was assigned an identifying one or two letter designation unique to its map. Subsections were further identified as contiguous beds by addition of one or two letters unique to that sequence. Contiguous bed identifications aided tracking and analysis of single natural bed units subsectioned due to variations of SAV density. Coupled with the appropriate SAV map number and year of photography, these letter designations uniquely identify each SAV bed in the database.

## SAV PERIMETER DIGITIZATION AND QUALITY ASSURANCE PROCEDURES

Perimeters of all SAV beds mapped from aerial photography onto mylar copies were digitized in ARC/INFO, using an Altek Model 41 tablet with a resolution of .001 inches (.00254 cm) and an

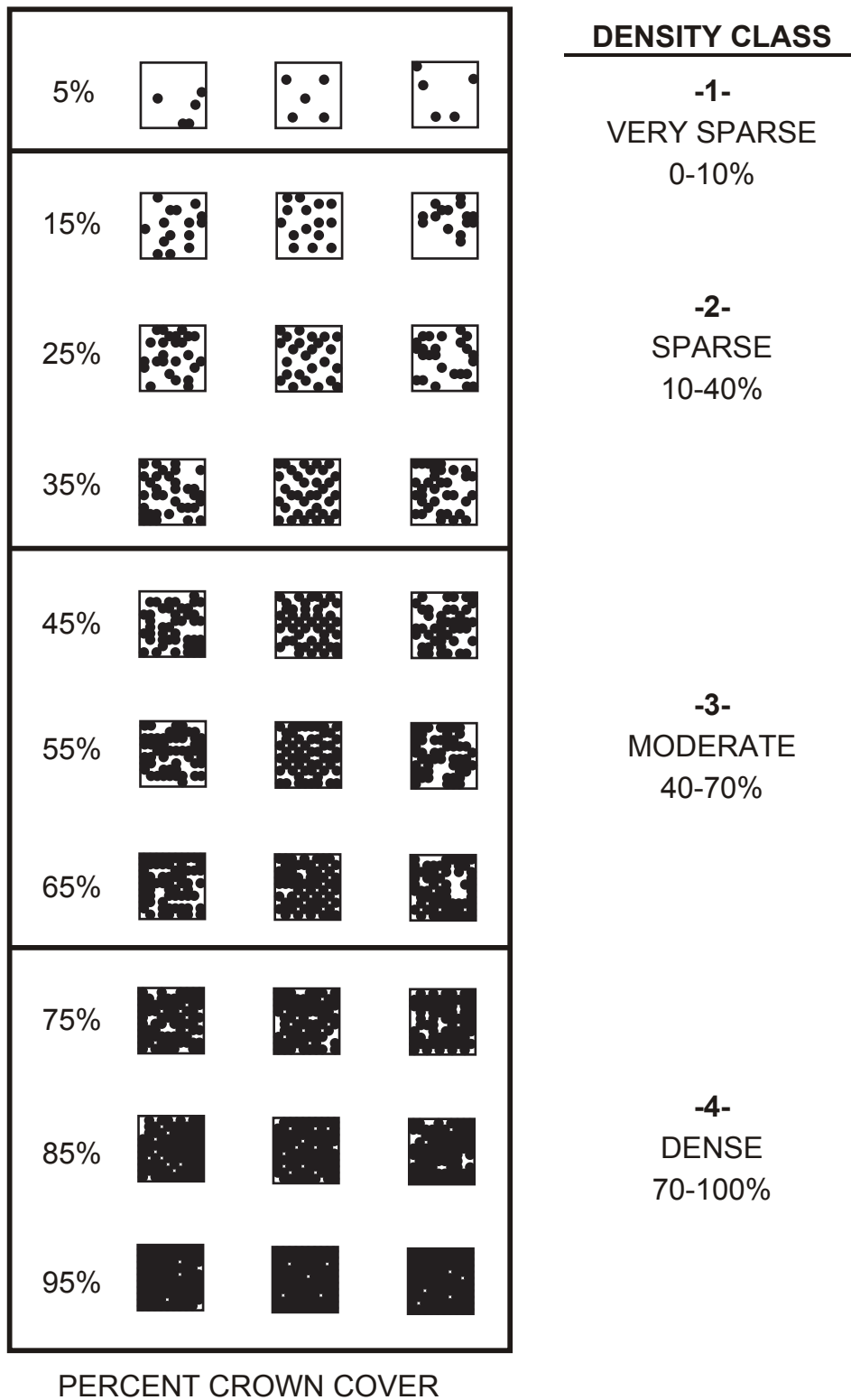


Figure 8. Crown density scale used for estimating density of SAV beds from aerial photography. (Rows of squares with black and white patterns represent three different arrangements of vegetated cover for a given percentage.) *Adapted from Paine, 1981.*



## SAV

accuracy of .005 inches (.0127 cm). Beds for each quadrangle were digitized in a primary ARC/INFO coverage and, as a quality assurance check, in a secondary ARC/INFO coverage. These coverages were overlaid digitally. If the area of a bed that differed between the two copies was more than 1 hectare and made up more than 2% of the bed, or was more than 0.1 hectare and made up more than 10% of the bed, the bed was flagged for additional review. The primary coverage was then plotted at an exact scale of 1:24,000 on translucent plotter paper and overlaid on the original mylar for visual checking of all beds, with additional emphasis on beds flagged by the overlay step. In instances where the digitized SAV bed boundaries did not correspond to within 0.5 mm of the original, the bed was redigitized. The bed-by-bed comparison was useful in identifying registration errors or instances where SAV beds were incorrectly labeled, thus eliminating coding errors.

After all quadrangles were digitized, the resulting digital data was combined to form a single data set for the entire Bay. The quadrangle borders were then scanned (edgematched) to ensure that the SAV polygons were consistent. Inconsistencies were resolved by checking the mylar maps and re-interpreting the photography if necessary. The resulting digital data was added to the VIMS SAV GIS Database containing all previous years' data.

Maximum accuracy was maintained by exclusively using mylar quadrangles, which do not 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 1997 SAV maps and SAV computer files produced from them, and to comply with the need for consistency, quality assurance, and quality control. SOPs included: a detailed procedure for digitization of SAV maps; a digitizer log in which all operations were recorded and dated, used to guide and verify operations; and a flow chart used to track progress of all operations.

## CALCULATION OF 1997 SAV AREAS

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, Chesapeake Bay Program segment, and zone totals in tables in the Results section. Segment and zone totals were calculated using an overlay operation of segment and zone regions on the SAV beds in ARC/INFO.

## ORGANIZATIONAL PROCEDURES FOR ANALYSIS AND DISCUSSION

SAV distribution data are presented and discussed based on new segmentation and zonation schemes from those used in SAV distribution and abundance reports prior to 1997. The segmentation scheme used in this report was tentatively adopted by the Chesapeake Bay Program in 1998 (Figure 9; Tables 3 and 4; DAWG, 1997). The Upper, Middle, and Lower zonation scheme used in previous reports,

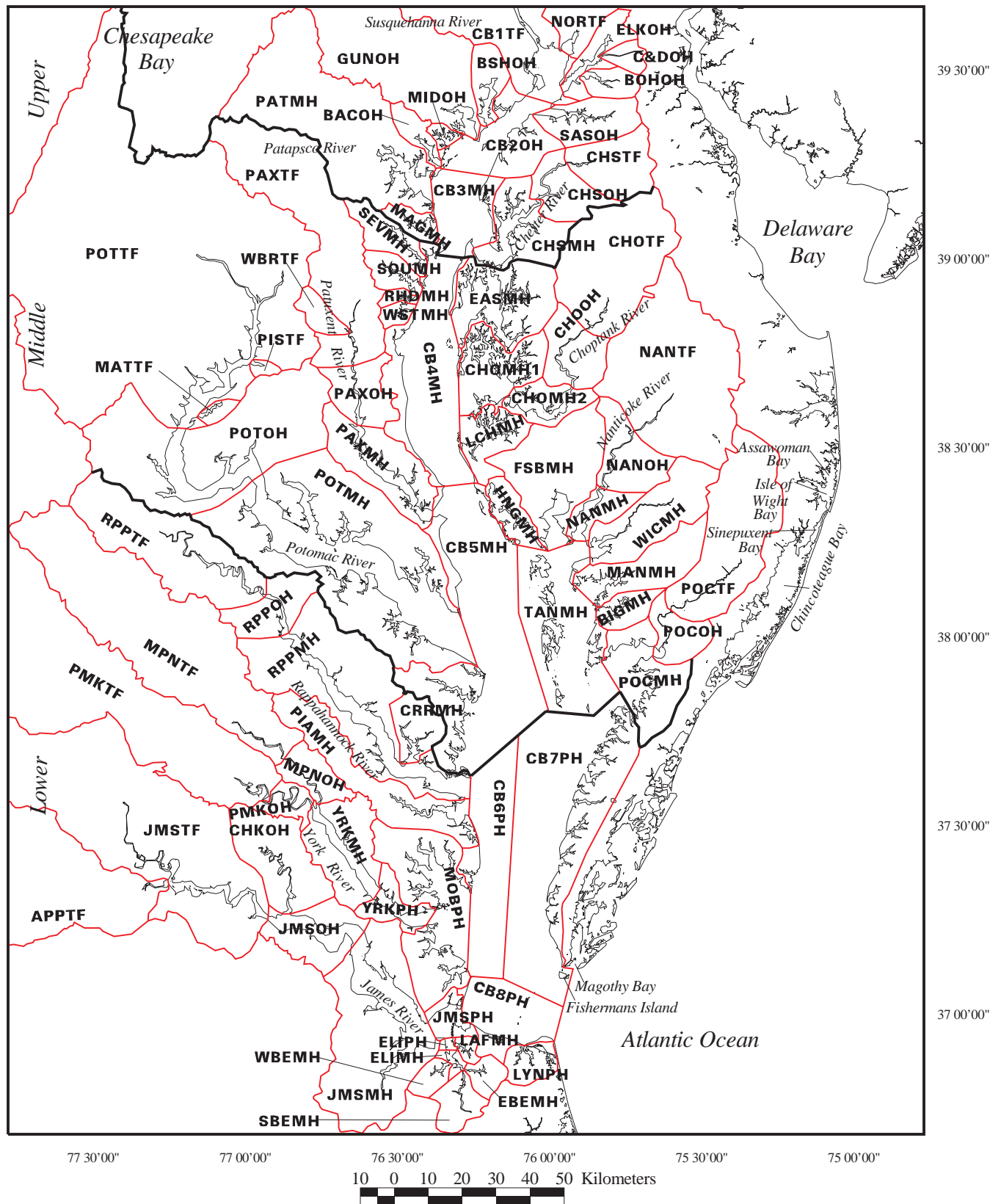


Figure 9: Location of the 78 Chesapeake Bay Program segments in the Upper, Middle, and Lower Chesapeake Bay zones and of the Delmarva Peninsula Coastal Bays.

**TABLE 3****Chesapeake Bay Program Segments with Salinity Regime**

<b>Segment</b>	<b>Name</b>	<b>Salinity Regime</b>
<b>Upper Zone</b>		
CB1TF	Northern Chesapeake Bay	Tidal Fresh
NORTF	Northeast River	Tidal Fresh
ELKOH	Elk River	Oligohaline
BOHOH	Bohemia River	Oligohaline
C&DOH	Chesapeake & Delaware Canal	Oligohaline
CB2OH	Upper Chesapeake Bay	Oligohaline
SASOH	Sassafras River	Oligohaline
BSHOH	Bush River	Oligohaline
GUNOH	Gunpowder River	Oligohaline
MIDOH	Middle River	Oligohaline
BACOH	Back River	Oligohaline
CB3MH	Upper Central Chesapeake Bay	Mesohaline
PATMH	Patapsco River	Mesohaline
MAGMH	Magothy River	Mesohaline
CHSMH	Lower Chester River	Mesohaline
CHSOH	Middle Chester River	Oligohaline
CHSTF	Upper Chester River	Tidal Fresh
<b>Middle Zone</b>		
CB4MH	Middle Central Chesapeake Bay	Mesohaline
EASMH	Eastern Bay	Mesohaline
CHOMH1	Mouth of Choptank River	Mesohaline
CHOMH2	Lower Choptank River	Mesohaline
CHOOH	Middle Choptank River	Oligohaline
CHOTF	Upper Choptank River	Tidal Fresh
LCHMH	Little Choptank River	Mesohaline
SEVMH	Severn River	Mesohaline
SOUHM	South River	Mesohaline
RHDMH	Rhode River	Mesohaline
WSTMH	West River	Mesohaline

(continue on next page)

**TABLE 3 (continued)**

<b>Segment</b>	<b>Name</b>	<b>Salinity Regime</b>
<b>Middle Zone (continued)</b>		
CB5MH	Lower Central Chesapeake Bay	Mesohaline
HNGMH	Honga River	Mesohaline
FSBMH	Fishing Bay	Mesohaline
NANMH	Lower Nanticoke River	Mesohaline
NANOH	Middle Nanticoke River	Oligohaline
NANTF	Upper Nanticoke River	Tidal Fresh
WICMH	Wicomico River	Mesohaline
TANMH	Tangier Sound	Mesohaline
MANMH	Manokin River	Mesohaline
BIGMH	Big Annemessex River	Mesohaline
POCMH	Lower Pocomoke River	Mesohaline
POCOH	Middle Pocomoke River	Oligohaline
POCTF	Upper Pocomoke River	Tidal Fresh
PAXMH	Lower Patuxent River	Mesohaline
PAXOH	Middle Patuxent River	Oligohaline
PAXTF	Upper Patuxent River	Tidal Fresh
WBRTF	Western Branch River	Tidal Fresh
POTMH	Lower Potomac River	Mesohaline
POTOH	Middle Potomac River	Oligohaline
POTTF	Upper Potomac River	Tidal Fresh
MATTF	Mattawoman Creek	Tidal Fresh
PISTF	Piscataway Creek	Tidal Fresh

**Lower Zone**

<b>Segment</b>	<b>Name</b>	<b>Salinity Regime</b>
CB6PH	Western Lower Chesapeake Bay	Polyhaline
CB7PH	Eastern Lower Chesapeake Bay	Polyhaline
RPPMH	Lower Rappahannock River	Mesohaline
RPPOH	Middle Rappahannock River	Oligohaline
RPPTF	Upper Rappahannock River	Tidal Fresh
CRRMH	Corrotoman River	Mesohaline

(continue on next page)

**TABLE 3 (concluded)**

<b>Segment</b>	<b>Name</b>	<b>Salinity Regime</b>
<b>Lower Zone (concluded)</b>		
PIAMH	Piankatank River	Mesohaline
MOBPH	Mobjack Bay	Polyhaline
YRKPH	Lower York River	Polyhaline
YRKMH	Middle York River	Mesohaline
MPNOH	Lower Mattaponi River	Oligohaline
MPNTF	Upper Mattaponi River	Tidal Fresh
PMKOH	Lower Pamunkey River	Oligohaline
PMKTF	Upper Pamunkey River	Tidal Fresh
CB8PH	Mouth of the Chesapeake Bay	Polyhaline
JMSPH	Mouth of James River	Polyhaline
ELIPH	Lower Elizabeth River	Polyhaline
LAFMH	Lafayette River	Mesohaline
ELIMH	Middle Elizabeth River	Mesohaline
WBEMH	Western Branch Elizabeth River	Mesohaline
SBEMH	Southern Branch Elizabeth River	Mesohaline
EBEMH	Eastern Branch Elizabeth River	Mesohaline
JMSMH	Lower James River	Mesohaline
JMSOH	Middle James River	Oligohaline
CHKOH	Chickahominy River	Oligohaline
JMSTF	Upper James River	Tidal Fresh
APPTF	Appomattox River	Tidal Fresh
LYNPH	Lynnhaven & Back Bays	Polyhaline

## TABLE 4

### Chesapeake Bay Program Segment Descriptions

#### Upper Zone

**Northern Chesapeake Bay (CB1TF):** head of Bay segment, excluding the Northeast River but including Swan and Pond creeks. CB1TF adjoins CB2OH at a boundary that extends from Cherry Tree Point, south of Mosquito Creek on the west, to Grove Point of Grove Neck on the east.

**Northeast (NORTF); Elk (ELKOH); Bohemia (BOHOH); Chesapeake & Delaware Canal (C&DOH); and Sassafras (SASOH) rivers:** upper eastern shore tributary segments adjoining main stem Bay segments at their respective mouths. The Northeast River flows into CB1TF east of Furnace Bay. The Bohemia River and the Chesapeake & Delaware Canal join the Elk River which flows into CB1TF at Turkey Point. SASOH flows into CB2OH further south at Grove Point.

**Upper Chesapeake Bay (CB2OH) and Upper Central Chesapeake Bay (CB3MH):** upper main stem Bay segments, excluding main tributaries. CB2OH includes Romney, Delph, Boone, Brown, Worton, Fairlee, and Still Pond creeks; Pooles Island; and Hawks Cove by Hart Island. The boundary of CB2OH with CB3MH extends from Ramona Beach on Patapsco River Neck, to Tolchester Beach. CB3MH includes Tavern and Swan creeks and The Haven, all east of Swan Point, and Huntingfield and Shallow creeks, and Eastern Neck Narrows. The boundary of CB3MH with CB4MH extends from Moss Pond, south of the Magothy River on the east, to Kent Island, at a point above the Memorial Bridge.

**Bush (BSHOH); Gunpowder (GUNOH); Middle (MIDOH); Back (BACOH); Patapsco (PATMH); and Magothy (MAGMH) rivers:** upper western shore tributary segments adjoining main stem Bay segments at their respective mouths. BSHOH adjoins southwestern CB2OH west of Abbey Point. GUNOH includes Saltpeter and Dundee creeks and adjoins northwestern CB2OH at Carroll Point. MIDOH adjoins middle-western CB2OH at Weir Point. MIDOH includes Seneca Creek which is connected to Saltpeter Creek. BACOH adjoins CB3OH 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. PATMH adjoins CB3MH 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. MAGMH adjoins CB3MH at Gibson Island and includes Sillery Bay.

(continue on next page)

**TABLE 4 (continued)****Upper Zone (concluded)**

**Lower, Middle, and Upper Chester River (CHSMH, CHSOH, CHSTF):** eastern shore tributary segments. The Chester River adjoins southeastern CB3MH at a boundary extending across the mouth from Kent Island below Love Point, to Wickes Beach on the western side of Eastern Neck Island.

**Middle Zone**

**Middle Central Chesapeake Bay (CB4MH):** main stem Bay segment, including Whitehall and Herring bays. CB4MH 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. CB4MH excludes major tributaries and embayments which adjoin it on the east and the west. CB4MH also includes the islands of Poplar Harbor at the mouth of Eastern Bay, including Jefferson and Coaches islands.

**Eastern Bay (EASMH):** eastern shore embayment segment, including the eastern side of Kent Island, Prospect Bay, and the Wye and Miles rivers. The boundary with CB4MH extends from Kent Point to Tilghman Island. EASMH does not include the islands of Poplar Harbor at its mouth.

**The Mouth, Lower, Middle, and Upper Choptank River (CHOMH1, CHOMH2, CHOOH, CHOTF); and the Little Choptank River (LCHMH):** eastern shore embayment segment and adjoining tributary segment; adjoins main stem Bay segment CB4MH at a boundary extending south from Tilghman Island, to Oyster Cove at the north end of Taylor Island. CHOMH1 includes Harris, Broad, Irish, Trippe, and Islands creeks; the Tred Avon River; and Trippe Bay. LCHMH includes Brannock Bay, Slaughter Creek, and the Little Choptank River in the south. The CHOMH1 boundary with CHOMH2 extends across the Choptank River from Castle Haven Point to Island Neck.

**Severn (SEVMH); South (SOUMH); Rhode (RHDMH); and West (WSTMH) rivers:** upper western shore tributary segments adjoining main stem Bay segment at their respective mouths. SEVMH includes Lake Ogleton and adjoins northwestern CB4MH at a boundary extending from Greenbury Point on the north shore, to Tolly Point on the south shore. SOUMH, RHDMH, and WSTMH adjoin northwestern CB4MH at a boundary line 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.

(continue on next page)

**TABLE 4 (continued)****Middle Zone (continued)**

**Lower Central Chesapeake Bay (CB5MH):** a mid-main stem 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 a point about 4KM west of the southern end of Tangier Island. In the east, CB5MH includes Tar Bay, Barren Island, and the western side of the Hooper Islands. In the west, CB5MH includes St. Jerome Creek, north of the mouth of the Potomac River, and the Wicomico and Great Wicomico rivers, Dividing Creek, and Fleets Bay to the south. CB5MH adjoins CB4MH in the north, CB6PH and CB7PH in the south, the Patuxent and Potomac rivers on the west, and Tangier Sound on the east.

**Honga (HNGMH); Fishing Bay (FSBMH); and Lower, Middle, and Upper Nanticoke (NANMH, NANO, NANTF); Wicomico (WICMH); Manokin (MANMH); Big Annemessex (BIGMH); Lower, Middle, and Upper Pocomoke (POCMH, POCOH, POCTF) rivers:** eastern shore tributary segments adjoining Tangier Sound (TANMH) at their respective mouths. The boundary of HNGMH with TANMH extends from Nancys Point at the south end of Lower Hooper Island, to Bishop Head Point on Hog Island. The boundary of FSBMH with TANMH extends from Bishop Head Point to the east end of Clay Island. The boundary of NANMH with TANMH extends from Sandy Island on the west shore, to Stump Point Marsh on the east shore. WICMH includes Ellis and Monie bays, and its boundary with TANMH extends from Stump Point Marsh to Long Point on the south shore. WICMH 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 TANMH extends from Claw Point on Little Deal Island in the north, to Hazard Point on Hazard Island in the south. BIGMH 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 TANMH extends from Pat Island on the north shore, to Flatcap Point on Janes Island on the south shore. POCMH includes Pocomoke Sound and Beasley and Robin Hood bays. The boundary of POCMH with TANMH extends from Eastward Point in the north to Custis Point between Doe and Deep creeks, east of Big Marsh in the south. POCOH includes a small part of eastern Pocomoke Sound, and its boundary with POCMH extends from Pig Point, at the eastern end of Robin Hood Bay on the south shore, to a point directly north on Marumsc Marsh, west of Fair Island on the north shore. POCTF begins above Cypress Swamp near Unionville.

(continue on next page)



**TABLE 4 (continued)****Middle Zone (continued)**

**Tangier Sound (TANMH):** generally, the area around Bloodsworth, South Marsh, Smith, and Tangier islands, extending in the north from the mouths of the Honga River and Fishing Bay, to south of Watts Island, north of Big Marsh, and east of Great Fox Islands on the eastern shore. TANMH includes the Little Annemessex River; the Great Fox Islands; western Pocomoke Sound; Watts and Cedar islands.

**Lower, Middle, and Upper Patuxent River (PAXMH, PAXOH, PAXTF); and the Western Branch River (WBRTF):** segments comprising major western shore tributary. PAXMH adjoins main stem Bay segment CB5MH at a boundary extending from Fishing Point on the south shore, to Drum Point on the north shore. Upstream, PAXMH adjoins PAXOH at a boundary extending approximately from Chalk Point on the west shore, to Gods Grace Point on the east shore. PAXOH adjoins PAXTF by Spice Creek. WBRTF adjoins PAXTF above Jug Bay on the west shore by the mouth of the Western Branch River.

**Lower, Middle, and Upper Potomac River (POTMH, POTOH, POTTF); and Mattawoman (MATTF) and Piscataway (PISTF) creeks:** middle western shore tributary segments. POTMH 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 Machodoc, Nomini, Popes, Mattox, and Upper Machodoc creeks, and Currioman Bay. POTMH adjoins CB5MH at a boundary extending from Point Lookout on the north shore, to Ginny Beach on the south shore. POTOH includes the Port Tobacco River and Nanjemoy Creek on the north shore, and Aquia, Potomac, and Chopawamsic creeks on the south shore. POTOH adjoins POTMH at a boundary extending from just above Popes Creek on the north shore, to Mathias Neck on the south shore.

**Lower, Middle, and Upper Potomac River (POTMH, POTOH, POTTF); and Mattawoman (MATTF) and Piscataway (PISTF) creeks:** The tidal fresh zone, POTTF, includes Broad, Pomonkey, and Chicamuxen creeks and the Anacostia River on the east shore, and on the west shore, Quantico, Powells, Neabsco, and Dogue creeks; Occoquan and Belmont bays; Occoquan River; Gunston Cove; and Accotink Bay. POTTF adjoins POTOH at a boundary extending from Quantico on the west shore, to Moss Point on the east shore. MATTF and PISTF adjoin POTTF on the eastern shore below Broad Creek.

(continue on next page)

**TABLE 4 (continued)****Lower Zone**

**Western Lower Chesapeake Bay (CB6PH):** a lower main stem segment whose eastern boundary bisects the lower Bay and adjoins CB7PH. The western boundary extends in the North from Windmill Point at the north shore of the mouth of the Rappahannock River (RPPMH), across the mouth of the Piankatank River (PIAMH), across the mouths of Mobjack Bay and the York, Poquoson, and Back rivers (segment MOBPH), to Northend Point at the south shore of the mouth of the Back River. The northern boundary adjoins CB5MH. The southern boundary adjoins CB8PH. CB6PH includes Winter Harbor and Horn Harbor.

**Eastern Lower Chesapeake Bay (CB7PH):** a lower main stem segment whose western boundary bisects the lower Bay and adjoins CB6PH. The eastern boundary extends in the north from Deep Creek east of Big Marsh, south to the middle of the mouth of the Bay. The northern boundary adjoins CB5MH and TANMH. The southern boundary adjoins CB8PH and bisects the mouth of the Chesapeake Bay. Along its eastern shore CB7PH includes several tributary creeks, Cherrystone Inlet, Fishermans Island, and all of Big Marsh.

**Lower, Middle, and Upper Rappahannock River (RPPMH, RPPOH, RPPTF); and Corrotoman River (CRRMH):** lower western shore tributary segments. RPPMH adjoins the main stem Bay at a boundary across its mouth extending from Windmill Point in the north, to Stingray Point in the south. RPPOH adjoins RPPMH at a boundary extending from Mulberry Point on the north shore, to Jenkins Landing on the south shore. RPPOH adjoins RPPTF at Peedee Creek on the north shore and Hutchinson Swamp on the south shore.

**Piankatank River (PIAMH):** lower western shore tributary segment. Adjoins CB6PH at its mouth along a line from Stingray Point in the north, to Cherry Point on Gwynn Island in the south. PIAMH includes Queens, Stutts, Billups and Whites creeks, and Milford Haven and The Hole in the Wall.

**Mobjack Bay (MOBPH):** western shore embayment segment. MOBPH adjoins southeastern CB6PH at a boundary extending in the north from New Point Comfort, to Northend Point, in the south. MOBPH includes the East, North, Ware, Severn, Poquoson, and Back rivers; the Guinea Marshes; Goodwin Islands; and the mouth of the York River. MOBPH also includes Bay Tree Point, the Poquoson Flats, and Plum Tree Island. MOBPH adjoins YRKPH on its western boundary.

continue on next page)

**TABLE 4 (continued)****Lower Zone (continued)**

**Lower and Middle York River (YRKPH, YRKMH); Lower and Upper Mattaponi River (MPNOH, MPNTF); Lower and Upper Pamunkey River (PMKOH, PMKTF):** lower western shore tributary segments. YRKPH adjoins MOBPH at a boundary extending from approximately west of Hog Island, on the north shore, to west of Thorofare by Goodwin Island, on the south shore. YRKMH adjoins YRKPH at a boundary extending from Blundering Point, north of the mouth of Carter Creek on the north shore, to a point on the south shore below Queens Creek. MPNOH and PMKOH adjoin YRKMH at points just upstream of the mouths of the Mattaponi and Pamunkey rivers, two tributaries that join to form the York River. MPNTF and PMKTF adjoin MPNOH and PMKOH, respectively, and include the head waters of Mattaponi and Pamunkey rivers.

**Mouth of the Chesapeake Bay (CB8PH):** the southernmost main stem segment including Little Creek. CB8PH 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 CB7PH. CB8PH adjoins CB6PH and CB7PH in the north, JMSPH in the west, and LYNPH in the south.

**The Mouth of the James River (JMSPH); the Lower, Middle, and Upper James River (JMSMH, JMSOH, JMSTF):** lower western shore tributary segments comprising the southernmost major river entering the Bay. JMSPH adjoins the main stem Bay at its mouth, at a boundary extending from just north of Old Point Comfort on the north shore, to the end of Willoughby Spit on the south shore. JMSPH adjoins the mouth of the Elizabeth River. JMSPH adjoins JMSMH at a boundary extending from Newport News Point on the north shore, to the US Army Disposal Area on the south shore.

**The Mouth of the James River (JMSPH); the Lower, Middle, and Upper James River (JMSMH, JMSOH, JMSTF) (continued):** JMSMH includes the Warwick, Pagan, and Nanesmond rivers; Lawnes, Chuckatuck, and Skiffes creeks; Mulberry Island (Fort Eustis); and the sewage waste and water treatment plant east of Carters Grove. JMSMH adjoins JMSOH at a boundary extending from Hog Island on the south shore, to Carters Grove on the north shore. JMSOH includes Hog Island, Surry Nuclear Power Plant, Jamestown Island, and the mouth of the Chickahominy River. JMSOH adjoins JMSTF at a boundary extending from Sloop Point on the south shore to Tettington on the north shore. JMSTF includes the rest of the James River to the headwaters, including the mouth of the Appomattox River.

(continue on next page)

**TABLE 4 (continued)****Lower Zone (concluded)**

**Appomattox River (APPTF); Chickahominy River (CHKOH); Lower and Middle Elizabeth River (ELIPH and ELIMH); Lafayette River (LAFMH); Western Branch (WBEMH), Southern Branch (SBEMH), and Eastern Branch (EBEMH) of the Elizabeth River:** western shore tributary segments of the James River watershed. APPTF adjoins JMSTF at City Point by Hopewell. CHKOH adjoins JMSTF between During and Barrets points. ELIPH adjoins JMSTF between Sewells Point Spit and Craney Island Flats. LAFMH adjoins ELIPH on its east shore at Tanners Point. ELIMH adjoins ELIPH between Edgewater on the east and the US Naval Supply Center on the west. ELIMH includes the sewage disposal site at Lamberts Point on the east shore. WBEMH, SBEMH, and EBEMH adjoin ELIMH.

**Lynnhaven Bay (LYNPH):** southernmost tributary segment adjoining CB8PH at its mouth. LYNPH includes the Lynnhaven River; the Western and Eastern branches; and Broad and Linkhorn bays.

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 modified to accommodate the new segment boundaries (Figure 9). Data are presented for 1978-1997, where available, using the new Chesapeake Bay Program segmentation scheme.

The Upper Bay zone includes the Susquehanna River and extends to the Chesapeake Bay Bridge; the Middle Bay zone extends to the southern boundaries of CB5MH, TANMH, and POCMH; the Lower Bay zone extends to the mouth of Chesapeake Bay and includes the James River (Figure 9). The salinity within each zone roughly coincides with the major salinity zones of estuaries: polyhaline (18-25 ‰), Lower zone; mesohaline (5-18 ‰), Middle zone; oligohaline (0.5-5 ‰), 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 the Delmarva coastal bays is presented and discussed separately from Chesapeake Bay. The Delmarva coastal bays zone, for the purpose of discussion in the figures and tables, includes five barrier island bays: Chincoteague, Assawoman, Sinepuxent, Isle of Wight and Magothy bays, but excludes Fishermans Island.

## SAV

### GROUND SURVEYS AND OTHER DATABASES

Ground surveys were accomplished by cooperative efforts from a number of agencies and individuals. Although not all areas of Chesapeake Bay and the Delmarva coastal bays were ground surveyed, the data did provide valuable supplemental information. The ground surveys confirmed the existence of some SAV beds mapped from the 1997 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 digital maps reproduced in Appendix B and included in the VIMS SAV GIS Database. 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 were tabulated in Appendix D.

In Maryland, ground survey data were obtained in 1997 by VIMS; Stan Kollar of Harford Community College; Virginia Carter, Nancy Rybicki, and Henry Ruhl of the USGS National Center; Peter Bergstrom of the USFWS; Kent Mountford and Marcia Olson of the USEPA; Mike Naylor of Maryland Department of Natural Resources (MD-DNR); Bob Stankelis of Chesapeake Bay Laboratories (CBL) of the University of Maryland; U. S. Army Environmental Center/Army Research Laboratory (USAEC/ARL) (Aberdeen Proving Ground); Dan Stotts of Patuxent Wildlife Research Center (PWRC); Patuxent River Park staff; the National Park Service; the U.S. Army Corps of Engineers, Baltimore District (ACOE); and by the Citizens' volunteer survey (The SAV Hunt). The USGS National Center and USFWS provided ground survey data for the Potomac River. Peter Bergstrom provided ground survey data for the Magothy, Severn, Chester, and Choptank rivers. Kent Mountford and Marcia Olson provided species data for Herring Bay. Dan Stotts provided extensive ground data survey for the Chester, Miles, and Choptank rivers, and for Eastern Bay. Patuxent River ground survey data were obtained by the MD-DNR, and Maryland-National Capital Parks and Planning Commission staff at Patuxent River Park. The U.S. Army Environmental Center/Army Research Laboratory staff provided ground truthing for Aberdeen Proving Ground area. The Army Corp of engineers provided species information for Shallow Creek. VIMS, the National Park Service, and the Ocean Pines Yacht Club (SAV Hunt) provided ground truthing for the coastal bays.

The SAV Hunt (Citizens' survey), under the guidance of the USFWS and assisted by the Chesapeake Bay Foundation, included ground truthing by citizens; students and educators at Gibson Island Country School, Millersville University, and Southern Middle School; and members of the Sherwood Forest Naturalist Program, Friends of Mattawoman Creek, and the National Aquarium in Baltimore.

SAV Hunt (Citizens' survey) volunteers identified SAV locations and SAV species throughout Chesapeake Bay and the Delmarva coastal bays. Volunteers recruited through press releases, newsletters, and personal letters, were provided with a SAV identification guide, reduced 1996 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 1996 SAV distribution maps (USGS 7.5 minute quadrangles with 1996 SAV beds). These maps were supplied to VIMS SAV researchers and transferred to the 1997 SAV distribution maps reproduced in Appendix B. Data from the Patuxent River Park staff, and the Citizens' surveys (The SAV Hunt) were compiled and tabulated by USFWS. This table became the basis of the much expanded table published in Appendix D.

One 1997 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, photo verification 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, and James 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-blue crab study (VIMS, unpublished data). Data for Virginia waters were also collected by the Citizens' volunteer survey (The SAV Hunt) and 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 baywide survey in 1978.

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

SAV

## RESULTS

### DATA PRESENTATION

Chesapeake Bay 1997 SAV distribution data and ground-truth data are presented and discussed based on the 1997 Chesapeake Bay Program (CBP) segmentation scheme, as well as on Upper, Middle, and Lower Chesapeake Bay zones (Methods: Figure 9; Tables 3 and 4). In addition, 1997 SAV distribution data and ground-truth data are presented for the Delmarva Peninsula Coastal Bays zone: Chincoteague, Sinepuxent, Assawoman, Isle of Wight, and Magothy bays (Figure 9).

The 1997 SAV bed data were edgematched using ARC/INFO GIS software, as were all the historical SAV bed data, in order to bring separately digitized USGS 7.5 minute topographic quadrangle SAV coverages into one unified coverage for the entire Chesapeake Bay (Methods; VIMS SAV GIS Database; Orth *et al.*, 1996). Therefore, SAV distribution data presented in this report reflect edgematching adjustments, and may differ from previously published data for years derived from separate coverages which were not edgematched (i.e., Orth *et al.*, 1992, 1993, and 1994).

SAV distribution data for 1997 and 1996 are presented in hectares: by quadrangle (Table 5); by Chesapeake Bay zones and by the Delmarva Peninsula Coastal Bays zone (Figure 2); by CBP segment and by zone (Figures 3, 4, and 5; Table 6); by USGS 7.5 minute quadrangles for each CBP segment and for the Delmarva Peninsula Coastal Bays zone (Table 7); by CBP segment and the Delmarva Peninsula Coastal Bays zone (also given in acres) (Table 7). Distribution data for 1997 and 1996 by SAV Density Classes are presented in hectares for each CBP segment (Figures 3, 4, and 5; Table 8) and for the Delmarva Peninsula Coastal Bays zone (Table 8). Distribution data for 1997 and 1996 by Density Classes are presented in hectares for the zones of Chesapeake Bay and for the Delmarva Peninsula Coastal Bays zone (Table 9). Quadrangle maps annotated with all 1997 SAV beds and ground-truth data are presented in Appendix B, and 1997 ground-truth data are also tabulated in Appendix D. The calculated areas for individual 1997 SAV beds for each quadrangle are tabulated in square meters in Appendix C.

The 1997 SAV data are summarized, compared with 1996 data, and are discussed relative to their zones. The seventy-eight CBP segments and the Delmarva Peninsula Coastal Bays zone are discussed, and 1997 data are compared with data from 1996 and other pertinent years. The 1997 distribution of SAV is plotted on maps of each CBP segment and of the Delmarva Peninsula Coastal Bays zone; and distribution data for 1971-1997 are graphed by CBP segment, by year, and by Density Classes in insets within these figures. The following CBP segments are not graphed because they had no SAV beds mapped from 1971-1997: BACOH, CHSOH, CHSTF, CHOOH, CHOTF, RHDMH, NANMH, NANOH, NANTF, WICMH, POCOH, POCTF, WBRTF, RPPOH, RPPTF, ELIPH, ELIMH, LAFMH, WBEMH, EBEMH, SBEMH, JMSOH, JMSTF, APPTF, MPNOH, MPNTF, PMKOH and PMKTF (VIMS SAV GIS Database). (Refer to Table 3 for a list of CBP segment names and abbreviations.) In the CBP segment maps, SAV is red, segment boundaries are

**TABLE 5****Total Area of SAV in Hectares by USGS 7.5 Minute Quadrangles for 1996 and 1997.**

<b>Quadrangle</b>	<b>1996</b>	<b>1997</b>
001. Conowingo Dam, Md.-Pa.	0	0
002. Aberdeen, Md.	8.38	17.06
003. Havre de Grace, Md.	1,984.62	2,307.56
004. North East, Md.	20.09	23.13
005. Elkton, Md.-Del.	0	0
006. White Marsh, Md.	0	0.58
007. Edgewood, Md.	80.44	160.79
008. Perryman, Md.	30.93	30.54
009. Spesutie, Md.	110.76	121.13
010. Earleville, Md.	95.54	120.85
011. Cecilton, Md.	0	0
012. Baltimore East, Md.	0	0
013. Middle River, Md.	12.65	77.18
014. Gunpowder Neck, Md.	339.79	589.84
015. Hanesville, Md.	7.81	33.93
016. Betterton, Md.	54.72	72.96
017. Galena, Md.	32.60	32.59
018. Curtis Bay, Md.	#	#
019. Sparrows Point, Md.	22.65	16.82
020. Swan Point, Md.	37.72	26.73
021. Rock Hall, Md.	30.12	35.90
022. Chestertown, Md.	0	0
023. Round Bay, Md.	113.18	128.46
024. Gibson Island, Md.	36.49	50.82
025. Love Point, Md.	0	0
026. Langford Creek, Md.	454.41	563.50
027. Centreville, Md.	0	0
028. Washington West, Md.-D.C.-Va	#	0.20
029. Washington East, D.C.-Md.	0.37	#
030. South River, Md.	8.71	16.35
031. Annapolis, Md.	#	#
032. Kent Island, Md.	574.14	683.88

(continue on next page)



**TABLE 5 (continued)**

<b>Quadrangle</b>	<b>1996</b>	<b>1997</b>
033. Queenstown, Md.	447.57	527.43
034. Alexandria, Va.-D.C.-Md.	143.30	136.56
035. Deale, Md.	0	0
036. Claiborne, Md.	444.15	661.30
037. St. Michaels, Md.	618.02	717.55
038. Easton, Md.	0	12.45
039. Fort Belvoir, Va.-Md.	250.51	206.77
040. Mt. Vernon, Md.-Va.	145.64	247.05
041. Lower Marlboro, Md.	72.23	69.28
042. North Beach, Md.	0	15.31
043. Tilghman, Md.	481.59	528.07
044. Oxford, Md.	626.19	820.84
045. Trappe, Md.	18.89	40.74
046. Preston, Md.	0	#
047. Quantico, Va.-Md.	215.22	212.27
048. Indian Head, Va.-Md.	111.25	65.82
049. Benedict, Md.	0	0
050. Prince Frederick, Md.	0	-
051. Hudson, Md.	668.88	703.68
052. Church Creek, Md.	368.50	582.34
053. Cambridge, Md.	0	#
054. East New Market, Md.	0	0
055. Widewater, Va.-Md.	214.47	135.00
056. Nanjemoy, Md.	111.00	184.56
057. Mathias Point, Md.-Va.	346.25	443.88
058. Popes Creek, Md.	3.62	35.95
059. Mechanicsville, Md.	0	0
060. Broomes Island, Md.	#	#
061. Cove Point, Md.	#	#
062. Taylors Island, Md.	59.88	51.44
063. Golden Hill, Md.	3.98	9.49
064. Passapatanzy, Md.-Va.	175.14	252.53
065. King George, Va.-Md.	63.84	40.42
066. Dahlgren, Va.-Md.	56.32	93.03
067. Colonial Beach North, Md.-Va.	147.44	197.02

(continue on next page)

TABLE 5 (continued)

Quadrangle	1996	1997
068. Rock Point, Md.	50.77	140.70
069. Leonardtown, Md.	37.79	50.54
070. Hollywood, Md.	0	#
071. Solomons Island, Md.	#	1.02
072. Barren Island, Md.	0	25.15
073. Honga, Md.	301.37	574.79
074. Wingate, Md.	303.88	350.02
075. Nanticoke, Md.	0	0
076. Colonial Beach South, Va.-Md.	0	0
077. Stratford Hall, Va.-Md.	8.76	20.05
078. St. Clements Island, Va.-Md.	62.49	85.71
079. Piney Point, Md.-Va.	0	0
080. St. Marys City, Md.	15.34	18.68
081. Point No Point, Md.	-	-
082. Richland Point, Md.	0	0
083. Bloodsworth Island, Md.	404.52	38.36
084. Deal Island, Md.	#	#
085. Monie, Md.	0	0
086. Champlain, Va.	-	-
087. Machodoc, Va.	12.70	16.81
088. Kinsale, Va.-Md.	1.92	#
089. St. George Island, Va.-Md.	0	#
090. Point Lookout, Md.	0	0
091. Kedges Straits, Md.	458.19	345.52
092. Terrapin Sand Point, Md.	165.16	137.87
093. Marion, Md.	100.97	229.11
094. Mount Landing, Va.	-	-
095. Tappahannock, Va.	-	-
096. Lottsburg, Va.	-	#
097. Heathsville, Va.-Md.	0	#
098. Burgess, Va.-Md.	0	0
099. Ewell, Md.-Va.	1,620.55	1,503.02
100. Great Fox Island, Va.-Md.	1,126.53	1,048.36
101. Crisfield, Md.-Va.	143.15	160.36
102. Saxis, Va.-Md.	2.07	0.83
103. Dunnsville, Va.	-	-

(continue on next page)

**TABLE 5 (continued)**

<b>Quadrangle</b>	<b>1996</b>	<b>1997</b>
104. Morattico, Va.	0	0
105. Lively, Va.	0	0
106. Reedville, Va.	250.92	235.88
107. Tangier Island, Va.	426.53	437.00
108. Chesconessex, Va.	996.94	932.00
109. Parksley, Va.	396.85	340.40
110. Urbanna, Va.	0	0
111. Irvington, Va.	35.57	20.51
112. Fleets Bay, Va.	458.41	431.25
113. Nandua Creek, Va.	387.46	378.30
114. Pungoteague, Va.	852.65	891.14
115. West Point, Va.	-	-
116. Saluda, Va.	0	0
117. Wilton, Va.	0.32	0
118. Deltaville, Va.	99.49	91.66
119. Jamesville, Va.	552.78	546.09
120. Toano, Va.	-	-
121. Gressitt, Va.	-	-
122. Ware Neck, Va.	277.06	257.84
123. Mathews, Va.	145.99	173.64
124. Franktown, Va.	597.48	645.06
125. Westover, Va.	-	-
126. Charles City, Va.	-	-
127. Brandon, Va.	-	-
128. Norge, Va.	-	-
129. Williamsburg, Va.	-	-
130. Clay Bank, Va.	0	0
131. Achilles, Va.	1,117.90	1,197.73
132. New Point Comfort, Va.	1,509.38	1,513.93
133. Cape Charles, Va.	423.61	428.29
134. Cheriton, Va.	87.42	88.31
135. Savedge, Va.	-	-
136. Claremont, Va.	-	-
137. Surry, Va.	-	-
138. Hog Island, Va.	-	-
139. Yorktown, Va.	3.75	5.00

(continue on next page)

**TABLE 5 (continued)**

<b>Quadrangle</b>	<b>1996</b>	<b>1997</b>
140. Poquoson West, Va.	560.47	584.69
141. Poquoson East, Va.	1,137.26	1,185.90
142. Elliotts Creek, Va.	168.51	183.33
143. Townsend, Va.	0	#
144. Bacons Castle, Va.	-	-
145. Mulberry Island, Va.	-	-
146. Newport News North, Va.	-	-
147. Hampton, Va.	319.48	369.03
148. Benns Church, Va.	-	-
149. Newport News South, Va.	3.33	24.52
150. Norfolk North, Va.	-	-
151. Little Creek, Va.	4.40	4.37
152. Cape Henry, Va.	30.26	16.14
153. Chuckatuck, Va.	-	-
154. Bowers Hill, Va.	-	-
155. Norfolk South, Va.	-	-
156. Kempsville, Va.	-	-
157. Princess Anne, Va.	0	-
158. Wye Mills, Md.	0	-
159. Bristol, Md.	27.73	23.95
160. Fowling Creek, Md.	-	-
161. Port Tobacco, Md.	#	0.74
162. Charlotte Hall, Md.	7.13	16.09
163. Mardela Springs, Md.	-	-
164. Wetipquin, Md.	#	-
165. Selbyville, Md.	0	0
166. Assawoman Bay, Md.-Del.	212.15	243.31
167. Berlin, Md.	64.00	73.82
168. Ocean City, Md.	72.36	79.85
169. Public Landing, Md.	0	0
170. Tingles Island, Md.	1,340.24	1,522.43
171. Girdle Tree, Md.-Va.	9.39	15.34
172. Boxiron, Md.-Va.	879.91	1,034.63
173. Whittington Point, Md.-Va.	478.34	567.77
174. Chincoteague West, Va.	85.91	411.88
175. Chincoteague East, Va.	1,413.80	1,649.34

(continue on next page)

**TABLE 5 (continued)**

<b>Quadrangle</b>	<b>1996</b>	<b>1997</b>
176. Anacostia, D.C.-Md.	0.47	0.35
177. East of New Point Comfort, Va.	3.40	0.37
178. Bethel Beach, Va.	1.30	0.78
179. Goose Island, Va.	142.62	137.36
180. Horseshoe Point, Md.	0	0
181. Bowie, Md.	-	-
182. Smith Point, Va.-Md.	0	0
183. East of Reedville, Va.	0	0
184. Cobb Island, Va.	0	0
185. Suffolk, Va.	0	0
186. Fishermans Island, Va.	2.54	21.57
187. Exmore, Va.	0	0
188. Kingston, Md.	0	-
189. Eden, Md.	0	-
190. Rhodesdale, Md.	0	-
191. Sharptown, Md.-Del.	#	-
192. Hobbs, Md.	0	-
193. Church Hill, Md.	0	0
194. Lancaster, Va.	0	-
195. Gloucester, Va.	0	-
196. Princess Anne, Md.	0	0
197. Haynesville, Va.	-	-
198. Hallwood, Va.-Md.	-	-
199. Millington, Md.	0	0
200. Rollins Fork, Va.	-	-
201. Loretto, Va.	-	-
202. Pocomoke City, Md.-Va.	-	-
203. Diputanta North, Va.	-	-
204. Hopewell, Va.	-	-
205. Chester, Va.	-	-
206. Drewrys Bluff, Va.	-	-
207. Dutch Gap, Va.	-	-
208. Roxbury, Va.	-	-
209. Providence Forge, Va.	-	-
210. Walkers, Va.	-	-

(continue on next page)

**TABLE 5 (concluded)**

<b>Quadrangle</b>	<b>1996</b>	<b>1997</b>
211. Richmond, Va.	-	-
212. Ship Shoal Inlet, Va.	-	-
213. Great Machipongo Inlet, Va.	-	-
214. Nassawadox, Va.	-	-
215. Quimbly Inlet, Va.	-	-
216. Wachapreague, Va.	-	-
217. Accomax, Va.	-	-
218. Metompkin Inlet, Va.	-	-
219. Bloxom, Va.	-	-
220. Wallops Island, Va.	-	-
221. Deep Creek, Va.	-	-
222. Fentress, Va.	-	-
223. Pleasant Ridge, Va.	-	-
224. Creeds, Va.	-	-
225. King William, Va.	-	-
226. King and Queen Courthouse, Va.	-	-
227. Truhart, Va.	-	-
228. Tunstall, Va.	-	-
229. New Kent, Va.	-	-
Total for Chesapeake Bay:	25,695.57	28,031.75
Total for the Coastal Bays:	4,556.09	5,598.37

- = Indicates quadrangle not photographed and assumed to have no SAV.

0 = Indicates quadrangle photographed and no SAV noted.

# = SAV detected by ground truthing only.

**TABLE 6**

**Number of Hectares of SAV in 1996 and 1997 for the CBP Segments and the Zones of Chesapeake Bay and for the Delmarva Peninsula Coastal Bays.**

**Upper Zone**

<b>Segment</b>	<b>1996</b>	<b>1997</b>
CB1TF Northern Chesapeake Bay	2,146.77	2,489.99
NORTF Northeast River	5.30	4.98
ELKOH Elk River	43.72	67.44
BOHOH Bohemia River	12.58	15.09
C&DOH Chesapeake & Delaware Canal	0.00	0.00
CB2OH Upper Chesapeake Bay	27.58	110.19
SASOH Sassafras River	100.32	110.78
BSHOH Bush River	39.04	34.95
GUNOH Gunpowder River	371.86	637.36
MIDOH Middle River	31.16	117.37
BACOH Back River	0.00	0.00
CB3MH Upper Central Chesapeake Bay	364.51	370.83
PATMH Patapsco River	2.30	1.93
MAGMH Magothy River	37.15	53.48
CHSMH Lower Chester River	311.80	424.81
CHSOH Middle Chester River	0.00	0.00
CHSTF Upper Chester River	0.00	0.00
Zone Total:	3,494.10	4,439.21

**Middle Zone**

<b>Segment</b>	<b>1996</b>	<b>1997</b>
CB4MH Middle Central Chesapeake Bay	0.00	20.28
EASMH Eastern Bay	1,488.51	1,848.32
CHOMH1 Mouth of the Choptank River	2,343.65	2,792.59
CHOMH2 Lower Choptank River	0.00	1.76
CHOOH Middle Choptank River	0.00	0.00

(continue on next page)

**TABLE 6 (continued)****Middle Zone (continued)**

<b>Segment</b>	<b>1996</b>	<b>1997</b>
CHOTF Upper Choptank River	0.00	0.00
LCHMH Little Choptank River	344.20	529.39
SEVMH Severn River	110.26	123.87
SOUMH South River	8.71	16.35
RHDMH Rhode River	0.00	0.00
WSTMH West River	0.00	0.00
CB5MH Lower Central Chesapeake Bay	710.86	736.07
HNGMH Honga River	623.00	890.51
FSBMH Fishing Bay	0.00	0.00
NANMH Lower Nanticoke River	0.00	0.00
NANOH Middle Nanticoke River	0.00	0.00
NANTF Upper Nanticoke River	0.00	0.00
WICMH Wicomico River	0.00	0.00
TANMH Tangier Sound	4,461.73	3,825.57
MANMH Manokin River	8.04	56.44
BIGMH Big Annemessex River	87.91	143.25
POCMH Lower Pocomoke River	652.09	529.84
POCOH Middle Pocomoke River	0.00	0.00
POCTF Upper Pocomoke River	0.00	0.00
PAXMH Lower Patuxent River	0.00	1.02
PAXOH Middle Patuxent River	36.02	40.08
PAXTF Upper Patuxent River	63.93	53.16
WBRTF Western Branch of the Patuxent River	0.00	0.00
POTMH Lower Potomac River	402.40	666.84
POTOH Middle Potomac River	1,036.65	1,206.26
POTTF Upper Potomac River	647.72	554.11
MATTF Mattawoman Creek	44.08	50.28
PISTF Piscataway Creek	50.89	123.25
Zone Total:	13,120.65	14,209.23

(continue on next page)



**TABLE 6 (concluded)****Lower Zone**

<b>Segment</b>	<b>1996</b>	<b>1997</b>
CB6PH Western Lower Chesapeake Bay	396.20	361.84
CB7PH Eastern Lower Chesapeake Bay	3,831.47	3,937.20
RPPMH Lower Rappahannock River	25.64	14.70
RPPOH Middle Rappahannock River	0.00	0.00
RPPTF Upper Rappahannock River	0.00	0.00
CRRMH Corrotoman River	22.09	15.29
PIAMH Piankatank River	142.26	175.01
MOBPH Mobjack Bay	4,302.83	4,442.49
YRKPH Lower York River	306.87	339.50
YRKMH Middle York River	0.00	0.00
MPNOH Lower Mattaponi River	0.00	0.00
MPNTF Upper Mattaponi River	0.00	0.00
PMKOH Lower Pumunkey River	0.00	0.00
PMKTF Upper Pumunkey River	0.00	0.00
CB8PH Mouth of the Chesapeake Bay	4.40	4.37
LYNPH Lynnhaven & Back Bays	30.26	16.14
JMSPH Mouth of the James River	18.81	75.74
ELIPH Lower Elizabeth River	0.00	0.00
LAFMH Lafayette River	0.00	0.00
ELIMH Middle Elizabeth River	0.00	0.00
WBEMH Western Branch of the Elizabeth River	0.00	0.00
SBEMH South Branch of the Elizabeth River	0.00	0.00
EBEMH Eastern Branch of the Elizabeth River	0.00	0.00
JMSMH Lower James River	0.00	1.05
JMSOH Middle James River	0.00	0.00
CHKOH Chickahominy River	0.00	0.00
JMSTF Upper James River	0.00	0.00
APPTF Appomattox River	0.00	0.00
Zone Total:	9,080.82	9,383.31
Total for Chesapeake Bay:	25,695.57	28,031.75
Total for the Coastal Bays:	4,556.09	5,598.37

TABLE 7

**Number of Hectares of SAV in 1996 and 1997 for each USGS 7.5 Minute Quadrangle of the CBP Segments of Chesapeake Bay, and of the Delmarva Peninsula Coastal Bays with Segment Totals in Hectares and Acres.**

**Upper Zone**

<b>Segment</b>		<b>1996</b>	<b>1997</b>
<b>CB1TF</b>	Conowingo Dam, Md.-Pa. (1)	0.00	0.00
	Aberdeen, Md. (2)	8.38	17.06
	Havre de Grace, Md. (3)	1,984.62	2,307.55
	North East, Md. (4)	0.00	0.00
	Perryman, Md. (8)	2.08	2.01
	Spesutie, Md. (9)	110.18	120.16
	Earleville, Md. (10)	<u>41.52</u>	<u>43.22</u>
	Total (hectares):	2,146.77	2,489.99
	Total (acres):	5,302.52	6,150.28
<b>NORTF</b>	Havre de Grace, Md. (3)	0.00	0.00
	North East, Md. (4)	<u>5.30</u>	<u>4.98</u>
	Total (hectares):	5.30	4.98
	Total (acres):	13.08	12.30
<b>ELKOH</b>	North East, Md. (4)	14.79	18.16
	Elkton, Md.-Del. (5)	0.00	0.00
	Spesutie, Md. (9)	0.00	0.00
	Earleville, Md. (10)	<u>28.93</u>	<u>49.28</u>
	Total (hectares):	43.72	67.44
Total (acres):	107.99	166.57	
<b>BOHOH</b>	Earleville, Md. (10)	12.58	15.09
	Cecilton, Md. (11)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	12.58	15.09
Total (acres):	31.08	37.27	
<b>C&amp;DOH</b>	Elkton, Md.-Del. (5)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00

(continue on next page)

**TABLE 7 (continued)****Upper Zone (continued)**

<b>Segment</b>		<b>1996</b>	<b>1997</b>
<b>CB2OH</b>	Perryman, Md. (8)	20.93	21.01
	Spesutie, Md. (9)	0.00	0.00
	Middle River, Md. (13)	2.67	11.13
	Gunpowder Neck, Md. (14)	0.00	36.74
	Hanesville, Md. (15)	3.89	32.30
	Betterton, Md. (16)	0.09	9.01
	Sparrows Point, Md. (19)	0.00	0.00
	Swan Point, Md. (20)	0.00	0.00
	Rock Hall, Md. (21)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	27.58	110.19
Total (acres):	68.13	272.16	
<b>SASOH</b>	Spesutie, Md. (9)	0.58	0.97
	Earleville, Md. (10)	12.51	13.27
	Cecilton, Md. (11)	0.00	0.00
	Betterton, Md. (16)	54.63	63.95
	Galena, Md. (17)	32.60	32.59
	Millington, Md. (199)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	100.32	110.78
Total (acres):	247.79	273.64	
<b>BSHOH</b>	Edgewood, Md. (7)	7.17	5.38
	Perryman, Md. (8)	7.93	7.53
	Gunpowder Neck, Md. (14)	20.02	20.43
	Hanesville, Md. (15)	<u>3.92</u>	<u>1.62</u>
	Total (hectares):	39.04	34.95
	Total (acres):	96.42	86.34
<b>GUNOH</b>	White Marsh, Md. (6)	0.00	0.58
	Edgewood, Md. (7)	73.27	155.41
	Middle River, Md. (13)	6.14	9.43
	Gunpowder Neck, Md. (14)	<u>292.45</u>	<u>471.93</u>
	Total (hectares):	371.86	637.36
	Total (acres):	918.49	1,574.29

(continue on next page)

**TABLE 7 (continued)****Upper Zone (continued)**

<b>Segment</b>		<b>1996</b>	<b>1997</b>
<b>MIDOH</b>	Middle River, Md. (13)	3.84	56.62
	Gunpowder Neck, Md. (14)	<u>27.32</u>	<u>60.74</u>
	Total (hectares):	31.16	117.37
	Total (acres):	76.98	289.89
<b>BACOH</b>	Baltimore East, Md. (12)	0.00	0.00
	Middle River, Md. (13)	0.00	0.00
	Sparrows Point, Md. (19)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>CB3MH</b>	Sparrows Point, Md. (19)	22.61	16.82
	Swan Point, Md. (20)	37.72	26.73
	Rock Hall, Md. (21)	29.36	30.14
	Gibson Island, Md. (24)	0.00	0.00
	Love Point, Md. (25)	0.00	0.00
	Langford Creek, Md. (26)	274.82	297.15
	Annapolis, Md. (31)	0.00	0.00
	Kent Island, Md. (32)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	364.51	370.83
	Total (acres):	900.35	915.96
<b>PATMH</b>	Baltimore East, Md. (12)	0.00	0.00
	Middle River, Md. (13)	0.00	0.00
	Curtis Bay, Md. (18)	0.00	0.00
	Sparrows Point, Md. (19)	0.04	0.00
	Gibson Island, Md. (24)	<u>2.26</u>	<u>1.93</u>
	Total (hectares):	2.30	1.93
	Total (acres):	5.68	4.77
<b>MAGMH</b>	Round Bay, Md. (23)	2.92	4.60
	Gibson Island, Md. (24)	<u>34.23</u>	<u>48.89</u>
	Total (hectares):	37.15	53.48
	Total (acres):	91.77	132.10

(continue on next page)

**TABLE 7 (continued)****Upper Zone (concluded)**

<b>Segment</b>		<b>1996</b>	<b>1997</b>
<b>CHSMH</b>	Rock Hall, Md. (21)	0.76	5.77
	Chestertown, Md. (22)	0.00	0.00
	Love Point, Md. (25)	0.00	0.00
	Langford Creek, Md. (26)	179.59	266.35
	Centreville, Md. (27)	0.00	0.00
	Kent Island, Md. (32)	3.27	15.03
	Queenstown, Md. (33)	<u>128.19</u>	<u>137.67</u>
	Total (hectares):	311.80	424.81
	Total (acres):	770.16	1,049.28
<b>CHSOH</b>	Betterton, Md. (16)	0.00	0.00
	Chestertown, Md. (22)	0.00	0.00
	Centreville, Md. (27)	0.00	0.00
	Church Hill, Md. (193)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>CHSTF</b>	Galena, Md. (17)	0.00	0.00
	Church Hill, Md. (193)	0.00	0.00
	Millington, Md. (199)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>Middle Zone</b>			
<b>CB4MH</b>	Gibson Island, Md. (24)	0.00	0.00
	Annapolis, Md. (31)	0.00	0.00
	Kent Island, Md. (32)	0.00	4.97
	Deale, Md. (35)	0.00	0.00
	Claiborne, Md. (36)	0.00	0.00
	North Beach, Md. (42)	0.00	15.31
	Tilghman, Md. (43)	0.00	0.00
	Prince Frederick, Md. (50)	0.00	0.00
	Hudson, Md. (51)	0.00	0.00

(continue on next page)

TABLE 7 (continued)

## Middle Zone (continued)

Segment		1996	1997
<b>CB4MH</b> (concluded)	Broomes Island, Md. (60)	0.00	0.00
	Cove Point, Md. (61)	0.00	0.00
	Taylor's Island, Md. (62)	0.00	0.00
	Horseshoe Point, Md. (180)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	20.28
	Total (acres):	0.00	50.09
<b>EASMH</b>	Kent Island, Md. (32)	570.87	663.89
	Queenstown, Md. (33)	319.39	389.77
	Claiborne, Md. (36)	144.28	273.51
	St. Michaels, Md. (37)	453.98	521.16
	Easton, Md. (38)	0.00	0.00
	Oxford, Md. (44)	0.00	0.00
	Wye Mills, Md. (158)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	1,488.51	1,848.32
Total (acres):	3,676.61	4,565.36	
<b>CHOMH1</b>	Claiborne, Md. (36)	299.87	387.78
	St. Michaels, Md. (37)	164.04	196.39
	Easton, Md. (38)	0.00	12.45
	Tilghman, Md. (43)	481.59	528.07
	Oxford, Md. (44)	626.19	820.84
	Trappe, Md. (45)	18.89	40.74
	Hudson, Md. (51)	557.83	568.45
	Church Creek, Md. (52)	<u>195.23</u>	<u>237.87</u>
	Total (hectares):	2,343.65	2,792.59
	Total (acres):	5,788.81	6,897.70
<b>CHOMH2</b>	Oxford, Md. (44)	0.00	0.00
	Trappe, Md. (45)	0.00	0.00
	Preston, Md. (46)	0.00	0.00
	Church Creek, Md. (52)	0.00	1.76
	Cambridge, Md. (53)	0.00	0.00

(continue on next page)

**TABLE 7 (continued)****Middle Zone (continued)**

<b>Segment</b>		<b>1996</b>	<b>1997</b>
<b>CHOMH2</b> (concluded)	East New Market, Md. (54)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	1.76
	Total (acres):	0.00	4.35
<b>CHOOH</b>	Easton, Md. (38)	0.00	0.00
	Trappe, Md. (45)	0.00	0.00
	Preston, Md. (46)	0.00	0.00
	Fowling Creek, Md. (160)	0.00	0.00
	Hobbs, Md. (192)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>CHOTF</b>	Fowling Creek, Md. (160)	0.00	0.00
	Hobbs, Md. (192)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>LCHMH</b>	Hudson, Md. (51)	111.05	135.23
	Church Creek, Md. (52)	173.27	342.71
	Taylor's Island, Md. (62)	<u>59.88</u>	<u>51.44</u>
	Total (hectares):	344.20	529.39
	Total (acres):	850.17	1,307.59
<b>SEVMH</b>	Round Bay, Md. (23)	110.26	123.87
	Gibson Island, Md. (24)	0.00	0.00
	South River, Md. (30)	0.00	0.00
	Annapolis, Md. (31)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	110.26	123.87
	Total (acres):	272.35	305.95
<b>SOUMH</b>	South River, Md. (30)	8.71	16.35
	Annapolis, Md. (31)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	8.71	16.35
	Total (acres):	21.51	40.38

(continue on next page)

**TABLE 7 (continued)****Middle Zone (continued)**

<b>Segment</b>	<b>1996</b>	<b>1997</b>
<b>RHDMH</b>		
South River, Md. (30)	0.00	0.00
Annapolis, Md. (31)	0.00	0.00
Deale, Md. (35)	0.00	0.00
Horseshoe Point, Md. (180)	<u>0.00</u>	<u>0.00</u>
Total (hectares):	0.00	0.00
Total (acres):	0.00	0.00
<b>WSTMH</b>		
Deale, Md. (35)	0.00	0.00
Horseshoe Point, Md. (180)	0.00	0.00
Total (hectares):	<u>0.00</u>	<u>0.00</u>
Total (acres):	0.00	0.00
<b>CB5MH</b>		
Cove Point, Md. (61)	0.00	0.00
Taylor's Island, Md. (62)	0.00	0.00
Solomons Island, Md. (71)	0.00	0.00
Barren Island, Md. (72)	0.00	25.15
Honga, Md. (73)	1.53	43.80
St. Marys City, Md. (80)	0.00	0.00
Point No Point, Md. (81)	0.00	0.00
Richland Point, Md. (82)	0.00	0.00
Point Lookout, Md. (90)	0.00	0.00
Heathsville, Va.-Md. (97)	0.00	0.00
Burgess, Va.-Md. (98)	0.00	0.00
Reedville, Va. (106)	250.92	235.88
Fleets Bay, Va. (112)	458.41	431.25
Deltaville, Va. (118)	0.00	0.00
Goose Island, Va. (179)	0.00	0.00
Smith Point, Va.-Md. (182)	0.00	0.00
East of Reedville, Va. (183)	0.00	0.00
Lancaster, Va. (194)	<u>0.00</u>	<u>0.00</u>
Total (hectares):	710.86	736.07
Total (acres):	1,755.83	1,818.10

(continue on next page)



**TABLE 7 (continued)****Middle Zone (continued)**

<b>Segment</b>		<b>1996</b>	<b>1997</b>
<b>HNGMH</b>	Golden Hill, Md. (63)	3.98	9.49
	Honga, Md. (73)	299.84	530.99
	Wingate, Md. (74)	303.88	350.02
	Richland Point, Md. (82)	0.00	0.00
	Bloodsworth Island, Md. (83)	<u>15.31</u>	<u>0.00</u>
	Total (hectares):	623.00	890.51
	Total (acres):	1,538.81	2,199.55
<b>FSBMH</b>	Wingate, Md. (74)	0.00	0.00
	Nanticoke, Md. (75)	0.00	0.00
	Bloodsworth Island, Md. (83)	0.00	0.00
	Deal Island, Md. (84)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>NANMH</b>	Nanticoke, Md. (75)	0.00	0.00
	Deal Island, Md. (84)	0.00	0.00
	Mardela Springs, Md. (163)	0.00	0.00
	Wetipquin, Md. (164)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>NANOH</b>	Mardela Springs, Md. (163)	0.00	0.00
	Rhodesdale, Md. (190)	0.00	0.00
	Sharptown, Md.-Del. (191)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>NANTF</b>	Rhodesdale, Md. (190)	0.00	0.00
	Sharptown, Md.-Del. (191)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00

(continue on next page)

**TABLE 7 (continued)****Middle Zone (continued)**

<b>Segment</b>		<b>1996</b>	<b>1997</b>
<b>WICMH</b>	Nanticoke, Md. (75)	0.00	0.00
	Deal Island, Md. (84)	0.00	0.00
	Monie, Md. (85)	0.00	0.00
	Wetipquin, Md. (164)	0.00	0.00
	Eden, Md. (189)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>TANMH</b>	Richland Point, Md. (82)	0.00	0.00
	Bloodsworth Island, Md. (83)	389.21	38.36
	Deal Island, Md. (84)	0.00	0.00
	Kedges Straits, Md. (91)	458.19	345.52
	Terrapin Sand Point, Md. (92)	165.16	137.39
	Marion, Md. (93)	5.03	29.89
	Ewell, Md.-Va. (99)	1,620.55	1,503.02
	Great Fox Island, Va.-Md. (100)	1,126.53	1,048.36
	Crisfield, Md.-Va. (101)	127.90	148.66
	Tangier Island, Va. (107)	426.53	437.00
	Chesconessex, Va. (108)	0.00	0.00
	Goose Island, Va. (179)	<u>142.62</u>	<u>137.36</u>
	Total (hectares):	4,461.73	3,825.57
	Total (acres):	11,020.47	9,449.17
<b>MANMH</b>	Deal Island, Md. (84)	0.00	0.00
	Monie, Md. (85)	0.00	0.00
	Terrapin Sand Point, Md. (92)	0.00	0.48
	Marion, Md. (93)	8.04	55.97
	Princess Anne, Md. (196)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	8.04	56.44
	Total (acres):	19.86	139.42
<b>BIGMH</b>	Marion, Md. (93)	87.91	143.25
	Kingston, Md. (188)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	87.91	143.25
	Total (acres):	217.13	353.83

(continue on next page)

**TABLE 7 (continued)****Middle Zone (continued)**

<b>Segment</b>		<b>1996</b>	<b>1997</b>
<b>POCMH</b>	Crisfield, Md.-Va. (101)	15.25	11.69
	Saxis, Va.-Md. (102)	2.07	0.83
	Chesconessex, Va. (108)	242.60	177.76
	Parksley, Va. (109)	392.16	339.55
	Kingston, Md. (188)	0.00	0.00
	Accomax, Va. (217)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	652.09	529.84
	Total (acres):	1,610.66	1,308.70
<b>POCOH</b>	Saxis, Va.-Md. (102)	0.00	0.00
	Kingston, Md. (188)	0.00	0.00
	Hallwood, Va.-Md. (198)	0.00	0.00
	Pocomoke City, Md.-Va. (202)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>POCTF</b>	Girdle Tree, Md.-Va. (171)	0.00	0.00
	Pocomoke City, Md.-Va. (202)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>PAXMH</b>	Benedict, Md. (49)	0.00	0.00
	Mechanicsville, Md. (59)	0.00	0.00
	Broomes Island, Md. (60)	0.00	0.00
	Cove Point, Md. (61)	0.00	0.00
	Hollywood, Md. (70)	0.00	0.00
	Solomons Island, Md. (71)	<u>0.00</u>	<u>1.02</u>
	Total (hectares):	0.00	1.02
	Total (acres):	0.00	2.51
<b>PAXOH</b>	Lower Marlboro, Md. (41)	36.02	40.08
	Benedict, Md. (49)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	36.02	40.08
	Total (acres):	88.98	99.00

(continue on next page)

**TABLE 7 (continued)****Middle Zone (continued)**

<b>Segment</b>		<b>1996</b>	<b>1997</b>
<b>PAXTF</b>	Lower Marlboro, Md. (41)	36.20	29.20
	Bristol, Md. (159)	27.73	23.95
	Bowie, Md. (181)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	63.93	53.16
	Total (acres):	157.90	131.29
<b>WBRTF</b>	Bristol, Md. (159)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>POTMH</b>	Mathias Point, Md.-Va. (57)	10.27	12.87
	Popes Creek, Md. (58)	3.62	35.95
	Mechanicsville, Md. (59)	0.00	0.00
	Broomes Island, Md. (60)	0.00	0.00
	King George, Va.-Md. (65)	0.00	0.00
	Dahlgren, Va.-Md. (66)	44.16	72.42
	Colonial Beach North, Md.-Va. (67)	147.44	197.02
	Rock Point, Md. (68)	50.77	140.70
	Leonardtown, Md. (69)	37.79	50.54
	Colonial Beach South, Va.-Md. (76)	0.00	0.00
	Stratford Hall, Va.-Md. (77)	8.76	20.05
	St. Clements Island, Va.-Md. (78)	62.49	85.71
	Piney Point, Md.-Va. (79)	0.00	0.00
	St. Marys City, Md. (80)	15.34	18.68
	Point No Point, Md. (81)	0.00	0.00
	Machodoc, Va. (87)	12.70	16.81
	Kinsale, Va.-Md. (88)	1.92	0.00
	St. George Island, Va.-Md. (89)	0.00	0.00
	Point Lookout, Md. (90)	0.00	0.00
	Lottsburg, Va. (96)	0.00	0.00
	Heathsville, Va.-Md. (97)	0.00	0.00
	Burgess, Va.-Md. (98)	0.00	0.00
	Charlotte Hall, Md. (162)	<u>7.13</u>	<u>16.09</u>
Total (hectares):	402.40	666.84	
Total (acres):	993.93	1,647.10	

(continue on next page)

**TABLE 7 (continued)****Middle Zone (concluded)**

<b>Segment</b>		<b>1996</b>	<b>1997</b>
<b>POTOH</b>	Quantico, Va.-Md. (47)	124.07	141.39
	Indian Head, Va.-Md. (48)	0.00	0.00
	Widewater, Va.-Md. (55)	214.47	135.00
	Nanjemoy, Md. (56)	111.00	184.56
	Mathias Point, Md.-Va. (57)	335.97	431.01
	Popes Creek, Md. (58)	0.00	0.00
	Passapatanzy, Md.-Va. (64)	175.14	252.53
	King George, Va.-Md. (65)	63.84	40.42
	Dahlgren, Va.-Md. (66)	12.16	20.61
	Port Tobacco, Md. (161)	<u>0.00</u>	<u>0.74</u>
	Total (hectares):	1,036.65	1,206.26
	Total (acres):	2,560.53	2,979.46
<b>POTTF</b>	Washington West, Md.-D.C.-Va (28)	0.00	0.20
	Washington East, D.C.-Md. (29)	0.37	0.00
	Alexandria, Va.-D.C.-Md. (34)	143.30	136.56
	Fort Belvoir, Va.-Md. (39)	250.51	206.77
	Mt. Vernon, Md.-Va. (40)	94.75	123.80
	Quantico, Va.-Md. (47)	91.15	70.87
	Indian Head, Va.-Md. (48)	67.16	15.54
	Port Tobacco, Md. (161)	0.00	0.00
	Anacostia, D.C.-Md. (176)	<u>0.47</u>	<u>0.35</u>
	Total (hectares):	647.72	554.11
Total (acres):	1,599.87	1,368.64	
<b>MATTF</b>	Indian Head, Va.-Md. (48)	<u>44.08</u>	<u>50.28</u>
	Total (hectares):	44.08	50.28
	Total (acres):	108.89	124.19
<b>PISTF</b>	Mt. Vernon, Md.-Va. (40)	<u>50.89</u>	<u>123.25</u>
	Total (hectares):	50.89	123.25
	Total (acres):	125.69	304.42

(continue on next page)

TABLE 7 (continued)

Segment		1996	1997
<b>Lower Zone</b>			
<b>CB6PH</b>	Deltaville, Va. (118)	19.46	5.58
	Mathews, Va. (123)	27.76	17.76
	New Point Comfort, Va. (132)	344.28	337.35
	Hampton, Va. (147)	0.00	0.00
	East of New Point Comfort, Va. (177)	3.40	0.37
	Bethel Beach, Va. (178)	<u>1.30</u>	<u>0.78</u>
	Total (hectares):	396.20	361.84
	Total (acres):	978.62	893.74
	<b>CB7PH</b>	Chesconessex, Va. (108)	754.33
Parksley, Va. (109)		4.69	0.86
Nandua Creek, Va. (113)		387.46	378.30
Pungoteague, Va. (114)		852.65	891.14
Jamesville, Va. (119)		552.78	546.09
Franktown, Va. (124)		597.48	645.06
Cape Charles, Va. (133)		423.61	428.29
Cheriton, Va. (134)		87.42	88.31
Elliotts Creek, Va. (142)		168.51	183.33
Townsend, Va. (143)		0.00	0.00
Fishermans Island, Va. (186)		2.54	21.57
Exmore, Va. (187)		0.00	0.00
Accomax, Va. (217)		<u>0.00</u>	<u>0.00</u>
Total (hectares):		3,831.47	3,937.20
Total (acres):		9,463.72	9,724.87
<b>RPPMH</b>	Mount Landing, Va. (94)	0.00	0.00
	Tappahannock, Va. (95)	0.00	0.00
	Dunnsville, Va. (103)	0.00	0.00
	Morattico, Va. (104)	0.00	0.00
	Lively, Va. (105)	0.00	0.00
	Urbanna, Va. (110)	0.00	0.00
	Irvington, Va. (111)	13.48	5.23
	Fleets Bay, Va. (112)	0.00	0.00

(continue on next page)

**TABLE 7 (continued)****Lower Zone (continued)**

<b>Segment</b>		<b>1996</b>	<b>1997</b>
<b>RPPMH</b> (concluded)	Saluda, Va. (116)	0.00	0.00
	Wilton, Va. (117)	0.00	0.00
	Deltaville, Va. (118)	12.15	9.47
	Haynesville, Va. (197)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	25.64	14.70
	Total (acres):	63.32	36.31
<b>RPPOH</b>	Champlain, Va. (86)	0.00	0.00
	Mount Landing, Va. (94)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>RPPTF</b>	Passapatanzy, Md.-Va. (64)	0.00	0.00
	King George, Va.-Md. (65)	0.00	0.00
	Colonial Beach South, Va.-Md. (76)	0.00	0.00
	Champlain, Va. (86)	0.00	0.00
	Rollins Fork, Va. (200)	0.00	0.00
	Loretto, Va. (201)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>CRRMH</b>	Lively, Va. (105)	0.00	0.00
	Urbanna, Va. (110)	0.00	0.00
	Irvington, Va. (111)	22.09	15.29
	Lancaster, Va. (194)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	22.09	15.29
	Total (acres):	54.55	37.76
<b>PIAMH</b>	Saluda, Va. (116)	0.00	0.00
	Wilton, Va. (117)	0.32	0.00
	Deltaville, Va. (118)	67.89	76.61
	Mathews, Va. (123)	<u>74.05</u>	<u>98.40</u>
	Total (hectares):	142.26	175.01
	Total (acres):	351.37	432.27

(continue on next page)

TABLE 7 (continued)

## Lower Zone (continued)

Segment		1996	1997
<b>MOBPH</b>	Ware Neck, Va. (122)	277.06	257.84
	Mathews, Va. (123)	44.18	57.48
	Achilles, Va. (131)	847.57	904.69
	New Point Comfort, Va. (132)	1,165.10	1,176.58
	Poquoson West, Va. (140)	527.68	543.24
	Poquoson East, Va. (141)	1,137.26	1,185.90
	Newport News North, Va. (146)	0.00	0.00
	Hampton, Va. (147)	<u>303.99</u>	<u>316.76</u>
	Total (hectares):	4,302.83	4,442.49
Total (acres):	10,628.00	10,972.95	
<b>YRKPH</b>	Clay Bank, Va. (130)	0.00	0.00
	Achilles, Va. (131)	270.33	293.04
	Yorktown, Va. (139)	3.75	5.00
	Poquoson West, Va. (140)	<u>32.79</u>	<u>41.45</u>
	Total (hectares):	306.87	339.50
	Total (acres):	757.97	838.55
<b>YRKMH</b>	West Point, Va. (115)	0.00	0.00
	Toano, Va. (120)	0.00	0.00
	Gressitt, Va. (121)	0.00	0.00
	Williamsburg, Va. (129)	0.00	0.00
	Clay Bank, Va. (130)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>MPNOH</b>	West Point, Va. (115)	0.00	0.00
	King & Queen Courthouse, Va. (226)	0.00	0.00
	Truhart, Va. (227)	0.00	0.00
	New Kent, Va. (229)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00

(continue on next page)



**TABLE 7 (continued)****Lower Zone (continued)**

<b>Segment</b>		<b>1996</b>	<b>1997</b>
<b>MPNTF</b>	King William, Va. (225)	0.00	0.00
	King & Queen Courthouse, Va. (226)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>PMKOH</b>	West Point, Va. (115)	0.00	0.00
	New Kent, Va. (229)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>PMKTF</b>	Tunstall, Va. (228)	0.00	0.00
	New Kent, Va. (229)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>CB8PH</b>	Hampton, Va. (147)	0.00	0.00
	Norfolk North, Va. (150)	0.00	0.00
	Little Creek, Va. (151)	4.40	4.37
	Cape Henry, Va. (152)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	4.40	4.37
	Total (acres):	10.86	10.81
<b>LYNPH</b>	Cape Henry, Va. (152)	30.26	16.14
	Kempsville, Va. (156)	0.00	0.00
	Princess Anne, Va. (157)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	30.26	16.14
	Total (acres):	74.74	39.86
<b>JMSPH</b>	Hampton, Va. (147)	15.49	52.27
	Newport News South, Va. (149)	3.33	23.47
	Norfolk North, Va. (150)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	18.81	75.74
	Total (acres):	46.46	187.08

(continue on next page)

**TABLE 7 (continued)****Lower Zone (continued)**

<b>Segment</b>		<b>1996</b>	<b>1997</b>
<b>ELIPH</b>	Norfolk North, Va. (150)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>LAFMH</b>	Norfolk North, Va. (150)	0.00	0.00
	Little Creek, Va. (151)	0.00	0.00
	Norfolk South, Va. (155)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>ELIMH</b>	Norfolk North, Va. (150)	0.00	0.00
	Norfolk South, Va. (155)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>WBEMH</b>	Bowers Hill, Va. (154)	0.00	0.00
	Norfolk South, Va. (155)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>SBEMH</b>	Norfolk South, Va. (155)	0.00	0.00
	Deep Creek, Va. (221)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>EBEMH</b>	Norfolk South, Va. (155)	0.00	0.00
	Kempsville, Va. (156)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00

(continue on next page)

**TABLE 7 (continued)****Lower Zone (continued)**

<b>Segment</b>		<b>1996</b>	<b>1997</b>
<b>JMSMH</b>	Hog Island, Va. (138)	0.00	0.00
	Yorktown, Va. (139)	0.00	0.00
	Bacons Castle, Va. (144)	0.00	0.00
	Mulberry Island, Va. (145)	0.00	0.00
	Newport News North, Va. (146)	0.00	0.00
	Benns Church, Va. (148)	0.00	0.00
	Newport News South, Va. (149)	0.00	1.05
	Chuckatuck, Va. (153)	0.00	0.00
	Bowers Hill, Va. (154)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	1.05
	Total (acres):	0.00	2.58
<b>JMSOH</b>	Claremont, Va. (136)	0.00	0.00
	Surry, Va. (137)	0.00	0.00
	Hog Island, Va. (138)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>CHKOH</b>	Brandon, Va. (127)	0.00	0.00
	Norge, Va. (128)	0.00	0.00
	Claremont, Va. (136)	0.00	0.00
	Surry, Va. (137)	0.00	0.00
	Providence Forge, Va. (209)	0.00	0.00
	Walkers, Va. (210)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00

(continue on next page)

TABLE 7 (continued)

Segment		1996	1997
<b>Lower Zone (concluded)</b>			
<b>JMSTF</b>	Westover, Va. (125)	0.00	0.00
	Charles City, Va. (126)	0.00	0.00
	Brandon, Va. (127)	0.00	0.00
	Savedge, Va. (135)	0.00	0.00
	Claremont, Va. (136)	0.00	0.00
	Diputanta North, Va. (203)	0.00	0.00
	Hopewell, Va. (204)	0.00	0.00
	Chester, Va. (205)	0.00	0.00
	Drewrys Bluff, Va. (206)	0.00	0.00
	Dutch Gap, Va. (207)	0.00	0.00
	Roxbury, Va. (208)	0.00	0.00
	Richmond, Va. (211)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>APPTF</b>	Hopewell, Va. (204)	0.00	0.00
	Chester, Va. (205)	<u>0.00</u>	<u>0.00</u>
	Total (hectares):	0.00	0.00
	Total (acres):	0.00	0.00
<b>Coastal Bays</b>	Franktown, Va. (124)	0.00	0.00
	Cheriton, Va. (134)	0.00	0.00
	Townsend, Va. (143)	0.00	0.00
	Selbyville, Md. (165)	0.00	0.00
	Assawoman Bay, Md.-Del. (166)	212.15	243.31
	Berlin, Md. (167)	64.00	73.82
	Ocean City, Md. (168)	72.36	79.85
	Public Landing, Md. (169)	0.00	0.00
	Tingles Island, Md. (170)	1,340.24	1,522.43
	Girdle Tree, Md.-Va. (171)	9.39	15.34
	Boxiron, Md.-Va. (172)	879.91	1,034.63
Whittington Point, Md.-Va. (173)	478.34	567.77	

(continue on next page)

**TABLE 7 (concluded)**

<b>Segment</b>		<b>1996</b>	<b>1997</b>
<b>Coastal Bays</b> (concluded)	Chincoteague West, Va. (174)	85.91	411.88
	Chincoteague East, Va. (175)	1,413.80	1,649.34
	Cobb Island, Va. (184)	0.00	0.00
	Fishermans Island, Va. (186)	0.00	0.00
	Exmore, Va. (187)	0.00	0.00
	Ship Shoal Inlet, Va. (212)	0.00	0.00
	Great Machipongo Inlet, Va. (213)	0.00	0.00
	Nassawadox, Va. (214)	0.00	0.00
	Quimbly Inlet, Va. (215)	0.00	0.00
	Wachapreague, Va. (216)	0.00	0.00
	Accomax, Va. (217)	0.00	0.00
	Metompkin Inlet, Va. (218)	0.00	0.00
	Bloxom, Va. (219)	0.00	0.00
	Wallops Island, Va. (220)	<u>0.00</u>	<u>0.00</u>
Total (hectares):	4,556.09	5,598.37	
Total (acres):	11,253.55	13,827.97	

**TABLE 8**

**Number of Hectares and the Percentage of SAV in 1996 and 1997 by Density Class for the CBP Segments of Chesapeake Bay and for the Delmarva Peninsula Coastal Bays.**

Segment	Year	Class 1		Class 2		Class 3		Class 4		Total
<b>CB1TF</b>	1996	1,782.35	83%	84.78	4%	70.97	3%	208.66	10%	2,146.77
	1997	1,879.69	75%	285.47	11%	83.14	3%	241.69	10%	2,489.99
<b>NORTF</b>	1996	0.00	0%	0.00	0%	5.30	100%	0.00	0%	5.30
	1997	0.00	0%	0.00	0%	0.00	0%	4.98	100%	4.98
<b>ELKOH</b>	1996	18.92	43%	15.66	36%	4.02	9%	5.11	12%	43.72
	1997	6.18	9%	36.16	54%	13.33	20%	11.77	17%	67.44
<b>BOHOH</b>	1996	8.59	68%	3.99	32%	0.00	0%	0.00	0%	12.58
	1997	4.34	29%	10.75	71%	0.00	0%	0.00	0%	15.09
<b>C&amp;DOH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>CB2OH</b>	1996	0.00	0%	4.47	16%	7.87	29%	15.24	55%	27.58
	1997	22.42	20%	13.62	12%	33.55	30%	40.60	37%	110.19
<b>SASOH</b>	1996	0.94	1%	40.58	40%	10.89	11%	47.90	48%	100.32
	1997	56.94	51%	37.53	34%	0.00	0%	16.32	15%	110.78
<b>BSHOH</b>	1996	3.18	8%	2.42	6%	27.05	69%	6.39	16%	39.04
	1997	0.52	1%	11.23	32%	4.94	14%	18.26	52%	34.95
<b>GUNOH</b>	1996	4.35	1%	71.33	19%	82.17	22%	214.00	58%	371.86
	1997	92.47	15%	108.16	17%	62.47	10%	374.27	59%	637.36
<b>MIDOH</b>	1996	0.76	2%	4.88	16%	16.98	54%	8.54	27%	31.16
	1997	34.67	30%	38.17	33%	19.28	16%	25.24	22%	117.37
<b>BACOH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>CB3MH</b>	1996	33.46	9%	113.06	31%	4.40	1%	213.60	59%	364.51
	1997	21.15	6%	37.29	10%	18.06	5%	294.33	79%	370.83

(continue on next page)

**TABLE 8 (continued)**

<b>Segment</b>	<b>Year</b>	<b>Class 1</b>		<b>Class 2</b>		<b>Class 3</b>		<b>Class 4</b>		<b>Total</b>
<b>PATMH</b>	1996	0.00	0%	0.00	0%	0.04	2%	2.26	98%	2.30
	1997	0.00	0%	0.00	0%	1.93	100%	0.00	0%	1.93
<b>MAGMH</b>	1996	6.37	17%	4.39	12%	13.86	37%	12.54	34%	37.15
	1997	4.00	7%	6.42	12%	7.61	14%	35.46	66%	53.48
<b>CHSMH</b>	1996	43.84	14%	62.55	20%	24.16	8%	181.26	58%	311.80
	1997	25.49	6%	47.03	11%	19.29	5%	333.00	78%	424.81
<b>CHSOH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>CHSTF</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>CB4MH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	1.35	7%	15.31	75%	3.62	18%	20.28
<b>EASMH</b>	1996	94.40	6%	308.95	21%	437.85	29%	647.32	43%	1,488.51
	1997	182.07	10%	246.68	13%	320.14	17%	1,099.44	59%	1,848.32
<b>CHOMH1</b>	1996	164.99	7%	282.79	12%	798.17	34%	1,097.70	47%	2,343.65
	1997	203.41	7%	291.54	10%	254.28	9%	2,043.35	73%	2,792.59
<b>CHOMH2</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	1.76	100%	1.76
<b>CHOOH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>CHOTF</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>LCHMH</b>	1996	13.54	4%	174.84	51%	114.69	33%	41.13	12%	344.20
	1997	36.32	7%	152.40	29%	165.31	31%	175.36	33%	529.39
<b>SEVMH</b>	1996	13.26	12%	15.76	14%	12.58	11%	68.66	62%	110.26
	1997	2.04	2%	6.73	5%	11.46	9%	103.63	84%	123.87

(continue on next page)

**TABLE 8 (continued)**

<b>Segment</b>	<b>Year</b>	<b>Class 1</b>		<b>Class 2</b>		<b>Class 3</b>		<b>Class 4</b>		<b>Total</b>
<b>SOUMH</b>	1996	8.71	100%	0.00	0%	0.00	0%	0.00	0%	8.71
	1997	1.25	8%	1.60	10%	12.16	74%	1.35	8%	16.35
<b>RHDMH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>WSTMH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>CB5MH</b>	1996	174.22	25%	224.89	32%	171.43	24%	140.32	20%	710.86
	1997	192.22	26%	397.99	54%	130.66	18%	15.21	2%	736.07
<b>HNGMH</b>	1996	36.69	6%	292.93	47%	244.27	39%	49.12	8%	623.00
	1997	38.03	4%	457.15	51%	275.49	31%	119.84	13%	890.51
<b>FSBMH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>NANMH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>NANOH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>NANTF</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>WICMH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>TANMH</b>	1996	353.43	8%	1,243.09	28%	1,244.22	28%	1,620.98	36%	4,461.73
	1997	862.79	23%	707.12	18%	366.33	10%	1,889.33	49%	3,825.57
<b>MANMH</b>	1996	0.00	0%	4.89	61%	3.15	39%	0.00	0%	8.04
	1997	0.00	0%	31.75	56%	24.70	44%	0.00	0%	56.44
<b>BIGMH</b>	1996	0.00	0%	19.13	22%	68.78	78%	0.00	0%	87.91
	1997	14.78	10%	35.91	25%	92.56	65%	0.00	0%	143.25
<b>POCMH</b>	1996	118.66	18%	261.15	40%	78.24	12%	194.04	30%	652.09
	1997	81.77	15%	209.02	39%	11.53	2%	227.52	43%	529.84

(continue on next page)



**TABLE 8 (continued)**

<b>Segment</b>	<b>Year</b>	<b>Class 1</b>		<b>Class 2</b>		<b>Class 3</b>		<b>Class 4</b>		<b>Total</b>
<b>POCOH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>POCTF</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>PAXMH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	1.02	100%	0.00	0%	0.00	0%	1.02
<b>PAXOH</b>	1996	0.00	0%	1.55	4%	10.44	29%	24.04	67%	36.02
	1997	0.00	0%	0.00	0%	0.80	2%	39.28	98%	40.08
<b>PAXTF</b>	1996	0.00	0%	2.50	4%	28.78	45%	32.65	51%	63.93
	1997	0.00	0%	1.59	3%	2.33	4%	49.24	93%	53.16
<b>WBRTF</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>POTMH</b>	1996	17.15	4%	67.19	17%	67.16	17%	250.90	62%	402.40
	1997	31.42	5%	125.94	19%	72.63	11%	436.84	66%	666.84
<b>POTOH</b>	1996	58.66	6%	159.28	15%	31.10	3%	787.62	76%	1,036.65
	1997	49.01	4%	211.49	18%	116.19	10%	829.57	69%	1,206.26
<b>POTTF</b>	1996	25.56	4%	222.57	34%	93.19	14%	306.40	47%	647.72
	1997	67.74	12%	59.58	11%	21.15	4%	405.64	73%	554.11
<b>MATTF</b>	1996	5.76	13%	3.39	8%	0.00	0%	34.93	79%	44.08
	1997	0.00	0%	1.10	2%	2.09	4%	47.09	94%	50.28
<b>PISTF</b>	1996	0.00	0%	4.95	10%	45.94	90%	0.00	0%	50.89
	1997	0.00	0%	0.18	0%	0.00	0%	123.07	100%	123.25
<b>CB6PH</b>	1996	73.23	18%	47.44	12%	47.65	12%	227.88	58%	396.20
	1997	63.41	18%	33.58	9%	40.00	11%	224.85	62%	361.84
<b>CB7PH</b>	1996	845.97	22%	1,081.33	28%	747.13	19%	1,157.04	30%	3,831.47
	1997	1,306.35	33%	787.17	20%	363.90	9%	1,479.78	38%	3,937.20
<b>RPPMH</b>	1996	8.33	32%	17.30	68%	0.00	0%	0.00	0%	25.64
	1997	9.73	66%	4.97	34%	0.00	0%	0.00	0%	14.70

(continue on next page)

**TABLE 8 (continued)**

Segment	Year	Class 1		Class 2		Class 3		Class 4		Total
<b>RPPOH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>RPPTF</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>CRRMH</b>	1996	1.20	5%	11.02	50%	9.86	45%	0.00	0%	22.09
	1997	0.00	0%	4.86	32%	10.43	68%	0.00	0%	15.29
<b>PIAMH</b>	1996	0.97	1%	122.86	86%	4.12	3%	14.30	10%	142.26
	1997	29.46	17%	71.13	41%	37.17	21%	37.24	21%	175.01
<b>MOBPH</b>	1996	190.50	4%	615.90	14%	395.63	9%	3,100.80	72%	4,302.83
	1997	312.54	7%	700.68	16%	545.51	12%	2,883.77	65%	4,442.49
<b>YRKPH</b>	1996	11.60	4%	36.91	12%	11.37	4%	246.99	80%	306.87
	1997	27.32	8%	19.06	6%	0.00	0%	293.11	86%	339.50
<b>YRKMH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>MPNOH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>MPNTF</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>PMKOH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>PMKTF</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>CB8PH</b>	1996	0.62	14%	3.77	86%	0.00	0%	0.00	0%	4.40
	1997	0.77	18%	3.60	82%	0.00	0%	0.00	0%	4.37
<b>LYNPH</b>	1996	9.13	30%	15.24	50%	5.89	19%	0.00	0%	30.26
	1997	13.90	86%	1.29	8%	0.95	6%	0.00	0%	16.14
<b>JMSPH</b>	1996	12.69	67%	0.00	0%	0.00	0%	6.12	33%	18.81
	1997	64.12	85%	2.20	3%	0.70	1%	8.72	12%	75.74

(continue on next page)

**TABLE 8 (concluded)**

<b>Segment</b>	<b>Year</b>	<b>Class 1</b>		<b>Class 2</b>		<b>Class 3</b>		<b>Class 4</b>		<b>Total</b>
<b>ELIPH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>LAFMH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>ELIMH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>WBEMH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>SBEMH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>EBEMH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>JMSMH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	1.05	100%	0.00	0%	0.00	0%	1.05
<b>JMSOH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>CHKOH</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>JMSTF</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>APPTF</b>	1996	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
	1997	0.00	0%	0.00	0%	0.00	0%	0.00	0%	0.00
<b>Coastal Bays</b>	1996	197.70	4%	991.03	22%	565.28	12%	2,802.09	62%	4,556.09
	1997	464.91	8%	1,447.66	26%	217.93	4%	3,467.87	62%	5,598.37

**TABLE 9**

**Total Area of SAV in Hectares by Density Class for the Three Zones of Chesapeake Bay and for the Delmarva Peninsula Coastal Bays in 1996 and 1997, Including the Percentage of the Zone Total. Total Area of SAV in Hectares for Density Classes One and Two Combined and Three and Four Combined, for 1996 and 1997, Including Percentage of Zone Totals.**

<b>1996</b>	<b>Class 1</b>		<b>Class 2</b>		<b>Class 3</b>		<b>Class 4</b>		<b>Total</b>
Upper	1,902.76	54%	408.12	12%	267.71	8%	915.51	26%	3,494.10
Middle	1,085.02	8%	3,289.85	25%	3,449.98	26%	5,295.80	40%	13,120.65
Lower	1,154.25	13%	1,951.78	21%	1,221.65	13%	4,753.13	52%	9,080.82
Total	4,142.03	16%	5,649.75	22%	4,939.35	19%	10,964.44	43%	25,695.57

Coastal Bays	197.70	4%	991.03	22%	565.28	12%	2,802.09	62%	4,556.09
--------------	--------	----	--------	-----	--------	-----	----------	-----	----------

<b>1997</b>	<b>Class 1</b>		<b>Class 2</b>		<b>Class 3</b>		<b>Class 4</b>		<b>Total</b>
Upper	2,147.86	48%	631.83	14%	263.60	6%	1,395.91	31%	4,439.21
Middle	1,762.85	12%	2,940.12	21%	1,895.11	13%	7,611.14	54%	14,209.23
Lower	1,827.60	19%	1,629.60	17%	998.65	11%	4,927.46	53%	9,383.31
Total	5,738.32	20%	5,201.54	19%	3,157.37	11%	13,934.52	50%	28,031.75

Coastal Bays	464.91	8%	1,447.66	26%	217.93	4%	3,467.87	62%	5,598.37
--------------	--------	----	----------	-----	--------	----	----------	-----	----------

<b>1996</b>	<b>Class 1 and 2</b>		<b>Class 3 and 4</b>		<b>Total</b>
Upper	2,310.88	66%	1,183.22	34%	3,494.10
Middle	4,374.86	33%	8,745.79	67%	13,120.65
Lower	3,106.04	34%	5,974.78	66%	9,080.82
Total	9,791.78	38%	15,903.79	62%	25,695.57

Coastal Bays	1,188.73	26%	3,367.37	74%	4,556.09
--------------	----------	-----	----------	-----	----------

<b>1997</b>	<b>Class 1 and 2</b>		<b>Class 3 and 4</b>		<b>Total</b>
Upper	2,779.69	63%	1,659.51	37%	4,439.21
Middle	4,702.97	33%	9,506.26	67%	14,209.23
Lower	3,457.20	37%	5,926.11	63%	9,383.31
Total	10,939.86	39%	17,091.89	61%	28,031.75

Coastal Bays	1,912.57	34%	3,685.80	66%	5,598.37
--------------	----------	-----	----------	-----	----------

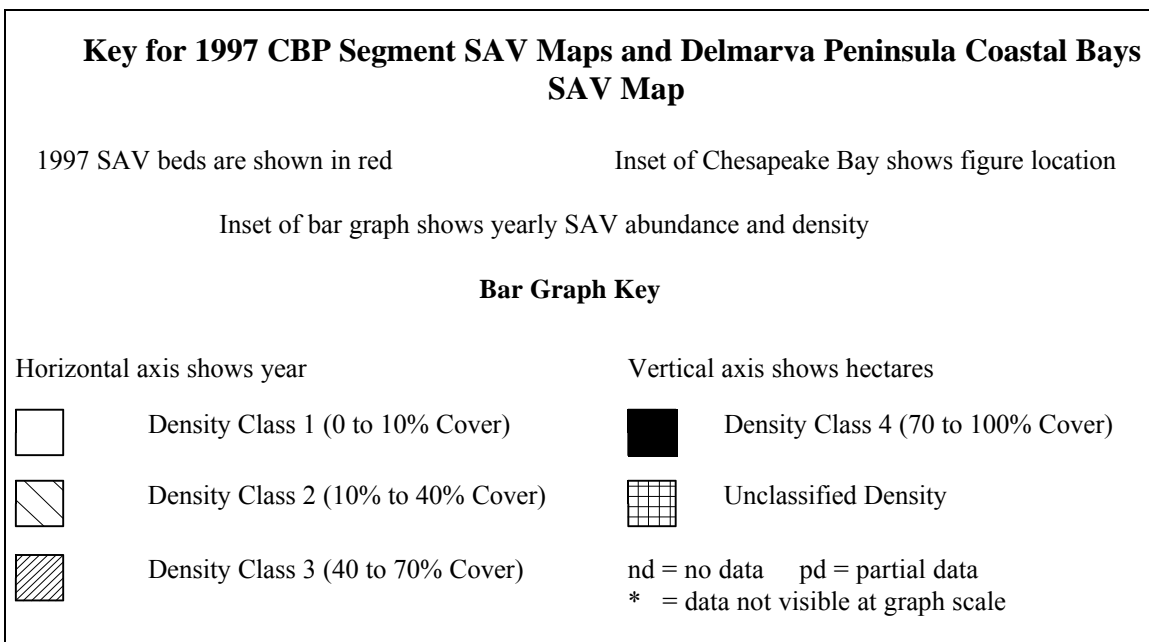


Figure 10. Key for 1997 Chesapeake Bay Program Segment SAV Maps and Delmarva Peninsula Coastal Bays SAV Map.

represented by bold, black lines; and USGS 7.5 minute quadrangles are represented by a grid of numbered rectangles (refer to Table 2 for quadrangle names listed by VIMS map number). Specific place names not found on the CBP segment plots are on quadrangle maps for that segment in Appendix B. A key for the 1997 CBP segment plots is shown in Figure 10. In the graphs of yearly SAV data, “partial data” refers to those instances when data for only a portion of a CBP segment is available for a particular year. SAV bed density classification is explained in the Methods section.

## 1997 SUMMARY

### Chesapeake Bay

SAV in Chesapeake Bay increased 9% in 1997, to a total of 28,031.75 hectares mapped from aerial photography, a 2,336.18 hectare increase from the 25,695.57 hectares mapped in 1996, and the second consecutive year SAV increased following two years of decreasing SAV (1994 and 1995) (Figures 1 and 2b; Table 6; VIMS SAV GIS Database). The 1997 level of SAV achieved 61% of the Tier I goal for Chesapeake Bay (Figures 1 and 2b; Table 6; VIMS SAV GIS Database; CBP). SAV also increased in all three zones of Chesapeake Bay in 1997: 27%, 8%, and 3% in the Upper, Middle, and Lower Bay zones, respectively (Figure 2b; Table 6; VIMS SAV GIS Database).

In 1997, SAV in the Bay increased in thirty-three CBP segments (Upper zone: CB1TF, ELKOH, BOHOH, SASOH, CB2OH, CB3MH, GUNOH, MIDOH, CHSMH, MAGMH; Middle zone: SEVMH, SOUMH, EASMH, CB4MH, CHOMH1, CHOMH2, LCHMH, PAXMH, PAXOH, HNGMH, MANMH, BIGMH, POTMH, POTOH, MATTF, PISTF, CB5MH; and Lower zone: PIAMH, CB7PH, MOBPH, YRKPH, JMSPH, JMSMH) compared to twenty-nine CBP segments in 1996 (Upper zone: CB1TF, BOHOH, CB2OH, CB3MH, BSHOH, GUNOH, MIDOH, PATMH, MAGMH; Middle zone: SEVMH, SOUMH, EASMH, CHOMH1, LCHMH, PAXOH, PAXTF, POTMH, POTOH, POTTF, MATTF, PISTF, CB5MH; and Lower zone: RPPMH, CRRMH, CB7PH, YRKPH, JMSPH, LYNPH, CB8PH) (Figures 3, 4, and 5; Tables 6 and 7; VIMS SAV GIS Database). In 1996 and 1997, twenty-one of the same CBP segments had increases (Tables 6 and 7; VIMS SAV GIS Database).

In 1997, SAV decreased in twelve CBP segments (Upper zone: NORTF, BSHOH, PATMH; Middle zone: PAXTF, POCMH, TANMH, POTTF; Lower zone: RPPMH, CRRMH, CB6PH, LYNPH, CB8PH) compared to thirteen CBP segments in 1996 (Upper zone: NORTF, ELKOH, SASOH, CHSMH; Middle zone: HNGMH, FSBMH, MANMH, BIGMH, POCMH, TANMH; Lower zone: PIAMH, CB6PH, MOBPH) (Figures 3, 4, and 5; Tables 6 and 7; VIMS SAV GIS Database). In 1996 and 1997, four of the same CBP segments had decreases (Tables 6 and 7; VIMS SAV GIS Database).

In 1997, thirty-two CBP segments were unvegetated (Upper zone: C&DOH, BACOH, CHSOH, CHSTF; Middle zone: RHDMMH, WSTMH, CHOOH, CHOTF, FSBMH, NANMH, NANOH, NANTF, WICMH, POCOH, POCTF; and Lower zone: RPPOH, RPPTF, YRKMH, MPNOH, MPNTF, PMKOH, PMKTF, ELIPH, SBEMH, JMSON, CHKOH, JMSTF, APPTF, ELIMH, LAFMH, WBEMH, EBEMH) compared with the same thirty-two CBP segments in 1996, plus four additional ones (Middle zone: CB4MH, CHOMH2, PAXMH, and Lower zone: JMSMH) (Figures 3, 4, and 5; Tables 6 and 7). [The main stem Upper and Middle Rappahannock River (RPPOH and RPPTF), Middle York River (YRKMH), Upper and Lower Mattaponi and Pamunkey rivers (MPNOH, MPNTF, PMKOH, PMKTF), Upper and Middle James River (JMSTF and JMSON), and the Elizabeth River segments have been devoid of SAV for years and are not currently photographed (Methods; Figure 6)]. In 1997, no CBP segments were unvegetated which had been vegetated in 1996; compared to 1996, when one CBP segment (Middle zone: FSBMH), which was vegetated in 1995, was unvegetated in 1996 (Tables 6 and 7; VIMS SAV GIS Database). In 1997, four CBP segments were vegetated which had been unvegetated in 1996 (Middle zone: CB4MH, CHOMH2, PAXMH; and Lower zone: JMSMH), compared to 1996, when two CBP segments were vegetated which had been unvegetated in 1995 (Upper zone: BSHOH and PATMH) (Tables 6 and 7; VIMS SAV GIS Database).

Overall in Chesapeake Bay, SAV classified as dense (Class 4) increased in 1997, although some individual segments had decreases (Tables 8 and 9). In the Bay in 1997, 50% (13,934.52 hectares) of SAV was categorized as dense, compared to 43% (10,964.44 hectares) in 1996 (Table 9). Also, 11% (3,157.37 hectares) was moderate (Class 3) in 1997, compared to 19% (4,939.35 hectares) in

## SAV

1996 (Table 9). The percentage of SAV decreased in 1997 in combined Density Classes 3 and 4, 61% in 1997, compared to 62% in 1996, but in terms of the absolute number of hectares, combined Density Classes 3 and 4 in 1997 had 17,091.89 hectares SAV, or 1,188.10 hectares more than in 1996 (15,903.79 hectares) (Table 9). In the Bay in 1997, 19% (5,201.54 hectares) of SAV was sparse (Class 2) in 1997, compared to 22% (5,649.75 hectares) sparse in 1996; 20% (5,738.32 hectares) was very sparse (Class 1) in 1997, compared to 16% (4,142.03 hectares) very sparse in 1996 (Table 9). SAV in combined Density Classes 1 and 2 increased in 1997, constituting 39% (10,939.86 hectares) of SAV in 1997, compared to 38% (9,791.78 hectares) in 1996 (Table 9).

### Upper Bay Zone

In the Upper Bay zone in 1997, SAV increased 27% (945.11 hectares), to 4,439.21 hectares, 16% of the Bay total, and 61% of the Tier I goal of 7,240.18 hectares (in 1996, SAV increased 169.84 hectares) (Figure 2b; Tables 6 and 7; VIMS SAV GIS Database; CBP). Increases in 1997 for some CBP segments of the Upper zone offset decreases in other CBP segments of this zone (Tables 6 and 7). SAV increased in ten CBP segments in the Upper Bay zone in 1997, decreased in three, and four were unvegetated, compared to 1996, when SAV increased from 1995 levels in nine CBP segments, decreased in four, and four were unvegetated (Figure 3; Tables 6 and 7; VIMS SAV GIS Database). Of the ten CBP segments in the Upper zone with increases of SAV in 1997, seven also increased in 1996 (CB1TF, BOHOH, CB2OH, CB3OH, GUNOH, MIDOH, MAGMH); of the three CBP segments of the Upper Bay zone which decreased in 1997, one also decreased in 1996 (NORTF); and of the four CBP segments of the Upper Bay zone which were unvegetated in 1997, the same four also were unvegetated in 1996 and remained unvegetated from 1995 (C&DOH, BACOH, CHSOH, CHSTF) (Tables 6 and 7; VIMS SAV GIS Database).

In the Upper Bay zone in 1997, SAV classified as dense increased: 31% (1,395.91 hectares) was dense in 1997, compared to 26% (915.51 hectares) dense in 1996 (Table 9). However, SAV classified as moderate decreased: 6% (263.60 hectares) was moderate in 1997, compared to 8% (267.71 hectares) moderate in 1996 (Table 9). In 1997, sparse SAV increased: 14% (631.83 hectares) was classified as sparse in 1997, compared to 12% (408.12 hectares) sparse in 1996 (Table 9). The percentage of SAV classified as very sparse decreased in 1997, but the absolute number of hectares increased: 48% (2,147.86 hectares) was very sparse in 1997, compared to 54% (1,902.76 hectares) very sparse in 1996 (Table 9). The percentage SAV in combined Density Classes 1 and 2 decreased in 1997, but the absolute number of hectares actually increased: SAV in combined Density Classes 1 and 2 constituted 63% (2,779.69 hectares), compared to 66% (2,310.88 hectares) in 1996 (Table 9). SAV in combined Density Classes 3 and 4 increased, constituting 37% (1,659.51 hectares) of SAV in 1997, compared to 34% (1,183.22 hectares) in 1996 (Table 9).

### **Middle Bay Zone**

In the Middle Bay zone in 1997, SAV increased 8% (1,088.58 hectares), to 14,209.23 hectares, 51% of the Bay SAV total, and 57% of the Tier I goal of 25,026.19 hectares (SAV increased 1,082.87 hectares in 1996) (Figure 2b; Table 6; VIMS SAV GIS Database; CBP). Increases in 1997 for some CBP segments of the Middle Bay zone offset decreases in 1997 in other CBP segments of this zone (Tables 6 and 7). In the Middle Bay zone in 1997, there were increases in seventeen CBP segments, decreases in four, and eleven remained unvegetated, compared to 1996, when there were increases from 1995 levels in thirteen CBP segments, decreases in six, and fourteen were unvegetated (Figure 4; Tables 6 and 7; VIMS SAV GIS Database).

In the Middle Bay zone in 1997, SAV classified as dense increased: 54% (7,611.14 hectares) was classified as dense in 1997, compared to 40% (5,295.80 hectares) dense in 1996 (Table 9). Moderate and sparse SAV decreased in 1997: 13% (1,895.11 hectares) was moderate in 1997, compared to 26% (3,449.98 hectares) moderate in 1996; 21% (2,940.12 hectares) was sparse in 1997, compared to 25% (3,289.85 hectares) sparse in 1996 (Table 9). Very sparse SAV increased in 1997: 12% (1,762.85 hectares) was very sparse in 1997, compared to 8% (1,085.02 hectares) very sparse in 1996 (Table 9). Although the percentages of SAV in the combined Classes 1 and 2, and in the combined Classes 3 and 4, in the Middle Bay zone in 1997 were the same as those in 1996, the number of hectares increased: combined Classes 1 and 2 constituted 33% (4,702.97 hectares) of SAV, compared with 33% (4,374.86 hectares) in 1996; combined Classes 3 and 4 constituted 67% (9,506.26 hectares) of SAV in 1997, compared with 67% (8,745.79 hectares) in 1996 (Table 9).

### **Lower Bay Zone**

In 1997, SAV increased 3% (302.49 hectares) in the Lower Bay zone, to 9,383.31 hectares, 33% of the Bay SAV total (SAV increased 191.08 hectares in 1996) (Figure 2b; Table 6). The 1997 Lower Bay zone SAV level was 68% of the Tier I goal of 13,755.17 hectares (VIMS SAV GIS Database; CBP). Increases in 1997 for some CBP segments of the Lower Bay zone offset decreases in 1997 in other CBP segments of this zone (Tables 6 and 7). In the Lower Bay zone in 1997, there were increases in six CBP segments, decreases in five, and seventeen (RPPOH, RPPTF, YRKMH, MPNOH, MPNTF, PMKOH, PMKTF, ELIPH, ELIMH, LAFMH, WBEMH, EBEMH, SBEMH, JMSON, CHKOH, JMSTF, APPTF) remained unvegetated, compared to 1996, when there were increases from 1995 levels in seven CBP segments, decreases in three, and eighteen remained unvegetated (RPPOH, RPPTF, YRKMH, MPNOH, MPNTF, PMKOH, PMKTF, ELIPH, ELIMH, LAFMH, WBEMH, EBEMH, SBEMH, JMSON, JMSON, CHKOH, JMSTF, APPTF) (Figure 5; Tables 6 and 7; VIMS SAV GIS Database).

In the Lower Bay zone in 1997, SAV classified as dense increased: 53% (4,927.46 hectares) was dense in 1997, compared to 52% (4,753.13 hectares) dense in 1996 (Table 9). Moderate and sparse SAV decreased in 1997: 11% (998.65 hectares) was moderate in 1997, compared to 13% (1,221.65



## SAV

hectares) moderate in 1996; 17% (1,629.60 hectares) was sparse in 1997, compared to 21% (1,951.78 hectares) sparse in 1996 (Table 9). Very sparse SAV increased in 1997: 19% (1,827.60 hectares) was very sparse in 1997, compared to 13% (1,154.25 hectares) very sparse in 1996 (Table 9). In the Lower Bay zone in 1997, SAV in combined Classes 3 and 4 decreased in 1997: combined Classes 3 and 4 constituted 63% (5,926.11 hectares) of SAV in 1997, compared to 66% (5,974.78 hectares) in 1996 (Table 9). SAV in combined Classes 1 and 2 increased in 1997, constituting 37% (3,457.20 hectares) of SAV in 1997, compared to 34% (3,106.04 hectares) in 1996 (Table 9).

### **The Delmarva Peninsula Coastal Bays Zone**

In the Delmarva Peninsula Coastal Bays zone in 1997, SAV distribution increased 23% (1,042.28 hectares) over 1996, to 5,598.37 hectares (Tables 6, 7, and 9). In 1997, the percentage of SAV classified as dense (62%) remained the same as in 1996 (62%), however, in terms of the absolute number of hectares, there were 665.78 hectares more in Density Class 4 in 1997 than in 1996 (Tables 8 and 9). The percentage of SAV classified as moderate in 1997 decreased, as well as the absolute number of hectares: 4% (217.93 hectares) was classified as moderate in 1997, compared to 12% (565.28 hectares) in 1996 (Tables 8 and 9). The percentage of SAV in combined Density Classes 3 and 4 decreased in 1997, but the absolute number of hectares increased 318.43 hectares over 1996: combined Density Classes 3 and 4 constituted 66% (3,685.80 hectares) of the SAV in 1997, compared to 74% (3,367.37 hectares) in 1996 (Table 9). The percentages of sparse and very sparse SAV both increased in 1997, as well as the absolute number of hectares for these categories: 26% (1,447.66 hectares) was sparse in 1997, compared to 22% (991.03 hectares) in 1996; and 8% (464.91 hectares) was very sparse in 1997, compared to 4% (197.70 hectares) in 1996 (Table 9). SAV in combined Density Classes 1 and 2 increased in 1997, constituting 34% (1,912.57 hectares) of the SAV in 1997, compared to 26% (1,188.73 hectares) in 1996 (Table 9).

## DISCUSSION OF CBP SEGMENTS ARRANGED WITHIN ZONES

### UPPER BAY ZONE

#### NORTHERN CHESAPEAKE BAY AND ASSOCIATED TRIBUTARY SEGMENTS

##### **Northern Chesapeake Bay (CB1TF)**

Northern Chesapeake Bay (CB1TF) had 2,489.99 hectares of SAV in 1997, 343.22 hectares (16%) more than in 1996 (Figure 11; Tables 6 and 7). The 1997 level is the second highest recorded; the highest level for CB1TF in the survey's history was the 2,710.85 hectares recorded in 1994, which was, however, followed by a 614.22 hectare decrease in 1995 (Figure 11; VIMS SAV GIS Database). The 1997 CB1TF total of SAV was 80% of the Tier I goal of 3,112.24 hectares (Figure 11; CBP). CB1TF had 9% of the SAV in Chesapeake Bay in 1997, compared to 8% in 1996, and had the largest percentage of SAV in the Upper Bay Zone, as in 1996 (56% in 1997; 61% in 1996) (Figure 11).

The density of SAV in CB1TF changed only slightly in 1997: sparse SAV increased seven percentage points while very sparse SAV decreased eight percentage points (Figure 11; Table 8). In 1997, 10% was classified dense, 3% moderate, 11% sparse, and 75% very sparse, compared with 10% dense, 3% moderate, 4% sparse, and 83% very sparse in 1996 (Figure 11; Table 8). CB1TF had essentially the same pattern since 1984: very sparse SAV constituting more than 75%, and lesser amounts distributed in the other three Density Classes (Figure 11; VIMS SAV GIS Database).

SAV beds were located in six main areas of CB1TF: 1) both shores of the Susquehanna River from Robert Island to the mouth; 2) a large, very sparse area in the Susquehanna Flats; 3) the western shore from Concord Point to Swan Creek and Battery Island; 4) east of Stump Point at Mill Creek, Furnace Bay, Baker Cove, High Point, and Carpenter Point; 5) the Aberdeen Proving Ground area, including Swan Creek, both shores of the Spesutie Narrows, and Mosquito and Back creeks, as well as Spesutie Island along Sands Cove, below Locust Point, and above Bear Point; and 6) Pond Creek on the end of Grove Neck on the eastern shore (Figure 11; Appendix B: Maps 2, 3, 8, 9, 10).

In 1997, the areas of largest increase of SAV in CB1TF were on the western shore, in very sparse to sparse beds south and offshore of Havre de Grace between Concord Point and Battery Island, and on the northern shore, in Baker Cove (Figure 11). The increase in the large bed south of Havre de Grace accounted for more than 90% of the increase in this segment. This large, predominately very sparse area was vegetated all the way to the mouth of Swan Creek in 1994, but was unvegetated in 1995 and 1996, and accounted for most of the decrease in 1995 from the 1994 level in CB1TF (Figure 11; VIMS SAV GIS Database). Other, smaller increases occurred: on the western shore, in the north end of Swan Creek and around Spesutie Island; on the northern shore, in the Susquehanna River and at Carpenter Point; and on the eastern shore, in Pond Creek (Figure 11).

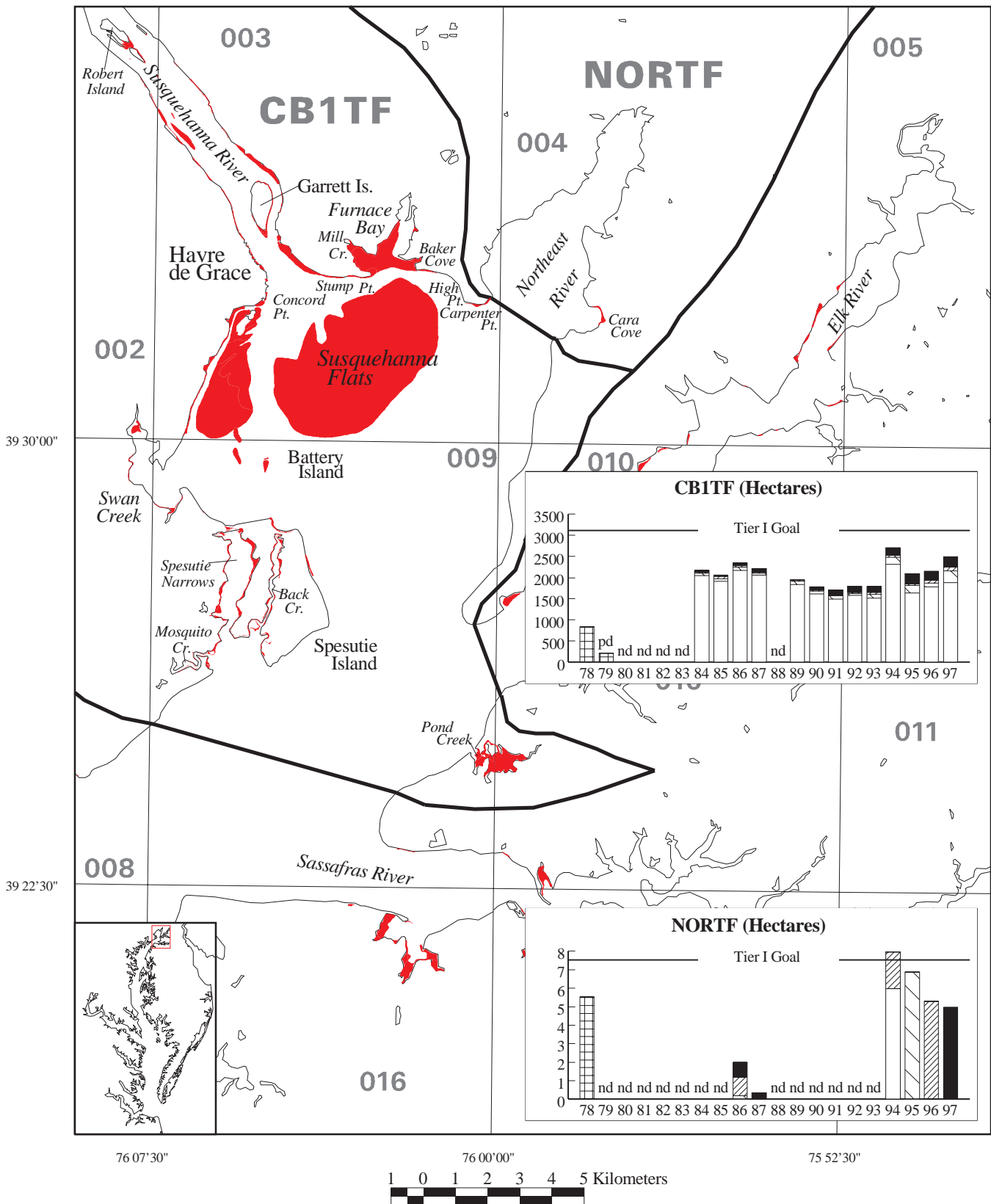


Figure 11: SAV distribution in Northern Chesapeake Bay (CB1TF) and the Northeast River (NORTF) in 1997. (See Figure 10 for key.)

The largest declines occurred: on the eastern side of Furnace Bay; within the moderate to dense SAV area immediately south of Havre de Grace; in Swan Creek and along Swan Creek Point; around Battery Island; and on the eastern side of Spesutie Island south of Locust Point (Figure 11; Appendix B: Maps 3, 8, 9).

Stan Kollar of Harford Community College, the Citizens' survey, and the USAEC/ARL staff of Aberdeen Proving Ground reported eight species in CB1TF in 1997: *M. spicatum*, *H. verticillata*, *C. demersum*, *E. canadensis*, *Heteranthera dubia*, *V. americana*, *Najas minor*, and *Najas flexilis* (Appendices B and D: Maps 2, 3, 4, 8, 9).

Stan Kollar reported the following species: *M. spicatum*, *H. verticillata*, *C. demersum*, and *N. minor* by Robert Island in the Susquehanna River; *M. spicatum*, *C. demersum*, *H. dubia*, *H. verticillata*, *N. minor*, *V. americana*, and *N. flexilis* on both shores of the Susquehanna River; *M. spicatum*, *H. verticillata*, *C. demersum*, *H. dubia*, and *V. americana* south of Havre de Grace; *M. spicatum*, *H. verticillata*, *C. demersum*, *H. dubia*, *V. americana*, *N. minor*, and *N. flexilis* in the Furnace Bay area; *M. spicatum* in the Susquehanna Flats and between High Point and Carpenter Point; *V. americana*, *M. spicatum*, and *H. verticillata* in Pond Creek of Grove Neck; and *M. spicatum*, *V. americana*, and *H. dubia* in the Battery Island area (Appendices B and D: Maps 2, 3, 9).

The USAEC/ARL staff reported: *M. spicatum* in Swan Creek; and *M. spicatum*, *H. verticillata*, *C. demersum*, *N. minor*, and *V. americana* in Spesutie Narrows (Appendices B and D: Maps 8, 9).

The Citizens reported: *E. canadensis*, *H. verticillata*, *M. spicatum*, *C. demersum*, and *V. americana* in the Susquehanna River; *C. demersum*, *M. spicatum*, and *V. americana* in Chesapeake Bay; and *M. spicatum* and *V. americana* at Turkey Point of Elk Neck (Appendices B and D: Maps 2, 3, 4, 9).

### **Northeast River (NORTF)**

In NORTF in 1997, 4.98 hectares of SAV were mapped, a 6% decline from 1996; the 1997 level was 66% of the 7.54 hectare Tier I goal and was 37% less than the highest level recorded by the aerial survey, 7.96 hectares in 1994 (Figure 11; Tables 6 and 7; VIMS SAV GIS Database; CBP).

Although SAV has decreased each year since 1994 (6.86 hectares in 1995; 5.30 hectares in 1996), density of SAV has actually increased each year since then: in 1994, 75% was very sparse and 25% was moderate; nearly 100% was classified as sparse in 1995; 100% was classified as moderate in 1996; and 100% was classified as dense in 1997 (Figure 11; Table 8; VIMS SAV GIS Database).

In NORTF, only one bed was mapped in 1997 as well as in 1996 and 1995, that being at Cara Cove (Figure 11; Appendix B: Map 4; VIMS SAV GIS Database). This bed had also been mapped in 1994 as well, but there was also one additional bed that year near the city of North East (VIMS SAV GIS Database).

## SAV

The Citizens' survey reported *M. spicatum* south of Seneca Point (Appendices B and D: Map 4).

## ELK AND BOHEMIA RIVERS AND CHESAPEAKE & DELAWARE CANAL

### Elk River (ELKOH)

In ELKOH, 67.44 hectares were mapped in 1997, an increase of 54% over 1996, and 15% of the 447.29 hectare Tier I goal (Figure 12; Tables 6 and 7; CBP). The 1997 level was the second lowest, and the 1996 level was the lowest, since the highest level of 355.81 hectares was recorded by the aerial survey in 1990 (Figure 12; VIMS SAV GIS Database).

SAV density also increased in ELKOH in 1997: 17% of the SAV was classified dense, 20% moderate, 54% sparse, and 9% very sparse, compared to 12% dense in 1996, 9% moderate, 36% sparse, and 43% very sparse (Figure 12; Table 8).

In ELKOH, new SAV growth was mapped in coves along the western shore, as in the area of Sandy Hill Camp, and on the eastern shore in Cabin John Creek, along Pearce and Town Point necks, along the shore south of Herring Island, and at Welch Point (Figure 12). Declines were noted in portions of some coves of the western shore and above Welch Point on the eastern shore (Figure 12).

In 1997, five species were reported from ground-truth surveys in ELKOH: Stan Kollar reported *M. spicatum*, *H. verticillata*, and *V. americana* on both the eastern and western shores and *P. pectinatus* as well on the western shore (Appendices B and D: Maps 4 and 10). The Citizens' survey and Stan Kollar reported *M. spicatum* in the area of Town Point Neck on the eastern shore and on the opposite shore in Piney Creek Cove; Citizens also reported *Potamogeton crispus* and *V. americana* in Piney Creek Cove (Appendices B and D: Map 4).

### Bohemia River (BOHOH)

SAV in BOHOH increased 20%, to 15.09 hectares, in 1997, and achieved the highest level in the history of the aerial survey as well as 87% of the Tier I goal of 17.32 hectares (Figure 12; Tables 6 and 7; VIMS SAV GIS Database; CBP).

In 1997, SAV density also increased in BOHOH: 71% was classified sparse and 29% very sparse, compared to 32% sparse and 68% very sparse in 1996 (Figure 12; Table 8).

Largest increases of SAV in BOHOH were on the south shore of the river in Veazy Cove and at the river's mouth, while the largest decreases were on the north shore at Rich Point and at the mouth (Figure 12; Map 10).

Stan Kollar reported *M. spicatum* near Rich Point along Town Point Neck, and *H. verticillata*, *V. americana*, and *M. spicatum* in Veazy Cove (Appendices B and D: Map 10).

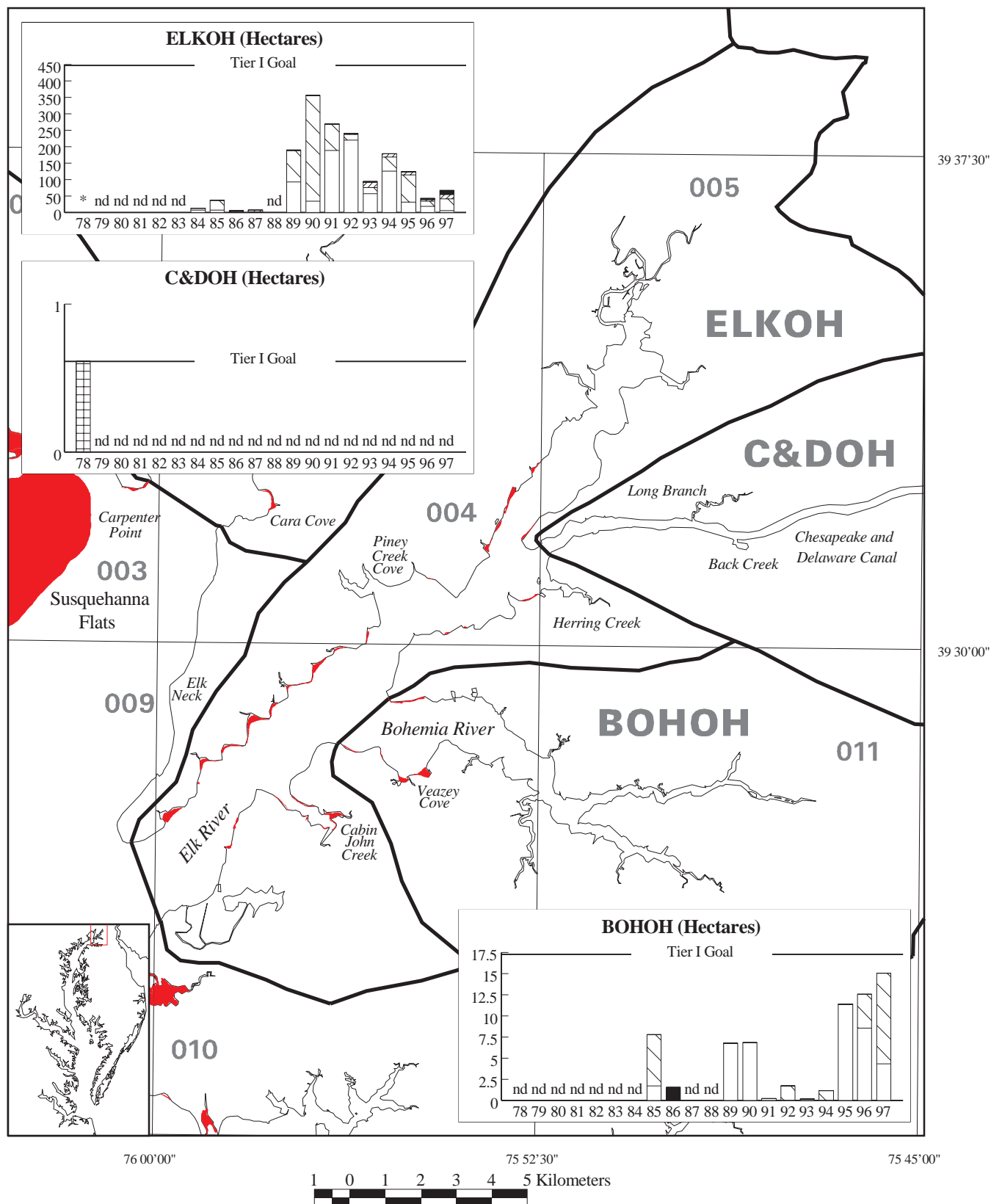


Figure 12: SAV distribution in the Elk and Bohemia Rivers (ELKOH and BOHOH) and the Chesapeake and Delaware Canal (C&DOH) in 1997. (See Figure 10 for key.)

SAV

### **Chesapeake & Delaware Canal (C&DOH)**

The Chesapeake & Delaware Canal, C&DOH, had no SAV mapped in 1997 (Figure 12; Tables 6 and 7). The only SAV ever mapped in C&DOH was the 0.62 hectares in 1978 that established the Tier I goal (Figure 12; VIMS SAV GIS Database; CBP).

There was no ground-truth data reported for C&DOH in 1997 (Appendix D).

## **UPPER CHESAPEAKE BAY AND ASSOCIATED TRIBUTARY SEGMENTS**

### **Upper Chesapeake Bay (CB2OH)**

SAV in CB2OH increased to 110.19 hectares of SAV mapped in 1997, 300% more than in 1996, and the second highest level recorded by the aerial survey (127.49 hectares were mapped in 1985) (Figure 13; Tables 6 and 7; VIMS SAV GIS Database). CB2OH in 1997 had the highest percentage increase of SAV of the segments in the Upper Bay zone, as well as the third highest percentage increase of the segments in the entire Chesapeake Bay, and achieved 41% of the Tier I goal of 266.97 hectares (Figure 13; VIMS SAV GIS Database; CBP).

In 1997, SAV density decreased in CB2OH: 37% was classified as dense, 30% as moderate, 12% as sparse, and 20% as very sparse, compared to 55% dense, 29% moderate, 16% sparse, and 0% very sparse in 1996 (Figure 13; Table 8).

Increases were mapped on the western shore of CB2OH in Delph, Little Romney, Boone, and Browns creeks, and by Fords and Weir points; on the eastern shore of Pooles Island; and on the eastern shore of CB2OH in Fairlee, Churn, and Still Pond creeks and Codjus Cove (Figure 13; Appendix B: Maps 8, 13, 14, 15, 16). Decreases were mapped on the western shore of CB2OH in a cove north of Browns Creek and in Romney Creek (Figure 13; Appendix B: Maps 8, 13).

Seven species were reported from ground-truth surveys: USAEC/ARL staff reported *H. verticillata*, *M. spicatum*, *V. americana*, and *C. demersum* in Romney, Little Romney, and Delph creeks, and *E. canadensis*, *Z. palustris*, *C. demersum*, *M. spicatum*, and *V. americana* by Weir Point; the Citizens' survey reported *M. spicatum* and *P. crispus* in Churn Creek, and *M. spicatum*, *P. crispus*, and *V. americana* in Worton Creek (Appendices B and D: Maps 8, 14, 15).

### **Sassafras River (SASOH)**

SAV in SASOH increased 10% from 1996, to 110.78 hectares in 1997, and achieved 67% of the Tier I goal of 164.71 hectares, surpassed for the only time in the history of the aerial survey in 1995 (Figure 14; Tables 6 and 7; VIMS SAV GIS Database; CBP).

The SAV classified as dense, and that classified as moderate, both decreased in SASOH in 1997: 15%

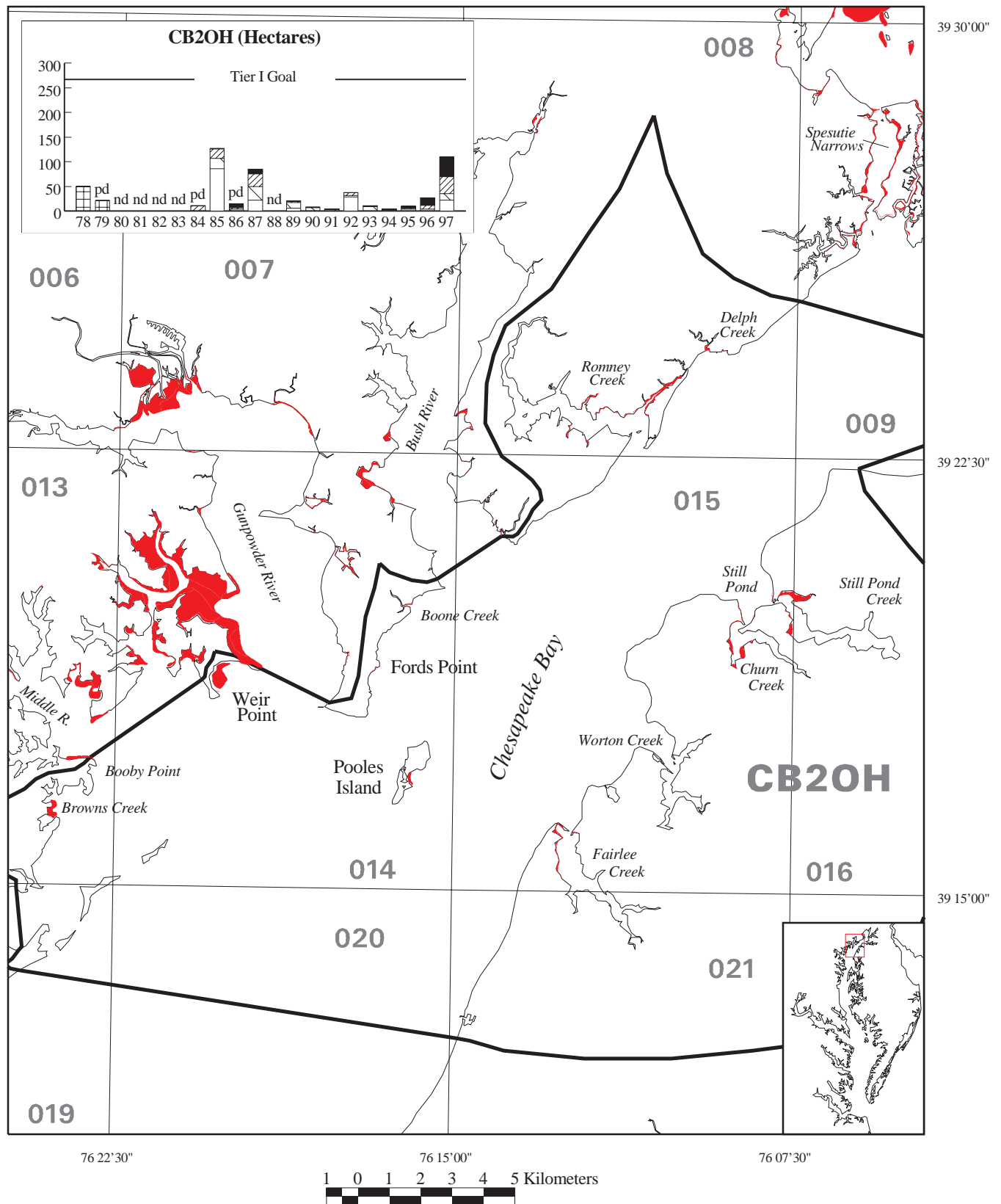


Figure 13: SAV distribution in Upper Chesapeake Bay (CB2OH) in 1997. (See Figure 10 for key.)



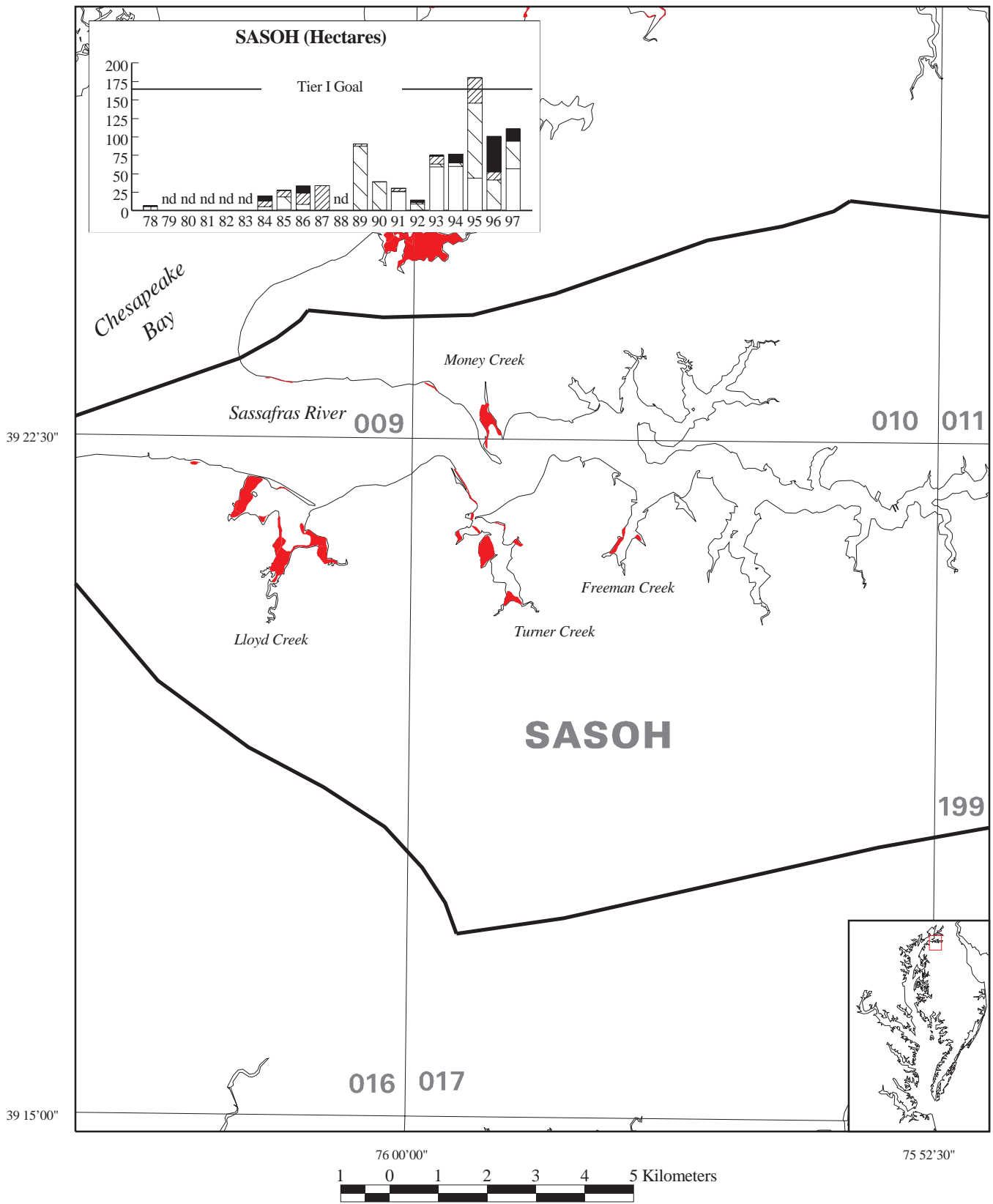


Figure 14: SAV distribution in the Sassafra River (SASOH) in 1997. (See Figure 10 for key.)

was classified as dense, 0% as moderate, 34% as sparse, and 51% as very sparse, compared to 48% dense in 1996, 11% moderate, 40% sparse, and 1% very sparse (Figure 14; Table 8). SAV was concentrated in the lower Sassafras River along both shores, including Money, Lloyd, Turner, and Freeman creeks (Figure 14). Increases were mapped on both shores of the Sassafras River, but increases as well as decreases were mapped in the areas of Money, Lloyd, Freeman, Cox, and Turner creeks, and Yapp and Gut marshes (Figure 14; Appendix B: Maps 9, 10, 16, 17).

In 1997, Stan Kollar reported four species in SASOH: *M. spicatum* along the north shore of the Sassafras River and in Money Creek; *M. spicatum*, *C. demersum*, and *H. verticillata* in the Yapp Marsh area; *M. spicatum*, *C. demersum*, *H. verticillata*, and *V. americana* in the area of Lloyd Creek; *M. spicatum* in Turner Creek; and *M. spicatum*, *V. americana*, and *H. verticillata* in Freeman Creek (Appendices B and D: Maps 9, 10, 16, 17).

## BUSH, GUNPOWDER, MIDDLE, AND BACK RIVER SEGMENTS

### **Bush River (BSHOH), Gunpowder River (GUNOH), Middle River (MIDOH), and Back River (BACOH)**

In the Gunpowder River segment (GUNOH) and Middle River segment (MIDOH) in 1997, SAV was mapped at higher levels than in 1996, with SAV in GUNOH reaching the highest level ever surveyed (Figure 15; Tables 6 and 7; VIMS SAV GIS Database). SAV decreased in the Bush River segment (BSHOH) in 1997, however, the level exceeded the Tier I goal and was the second highest level ever recorded by the survey (Figure 15; Tables 6 and 7; VIMS SAV GIS Database; CBP). The Back River segment (BACOH) had no SAV mapped in 1997, as in every previous year of the aerial survey (Figure 15; Tables 6 and 7; VIMS SAV GIS Database). BSHOH and GUNOH are the only two CBP segments in the Upper Bay zone, and are two of only six CBP segments in Chesapeake Bay, which exceeded their Tier I goals in 1997 (Figure 15; Tables 6 and 7; VIMS SAV GIS Database; CBP). MIDOH had the second highest percentage increase of SAV of all the CBP segments in the Upper Bay zone and the fourth highest percentage increase of SAV of all CBP segments in Chesapeake Bay (Tables 6 and 7).

### **Bush River (BSHOH)**

In the Bush River in 1997, there were 34.95 hectares of SAV mapped, a 10% decline from 1996, when SAV was mapped for the first time since 1992, and when the total SAV surpassed the Tier I goal for the first time in the history of the aerial survey (Figure 15; Tables 6 and 7; VIMS SAV GIS Database). In spite of the decline, the 1997 level was 150% of the Tier I goal of 23.38 hectares (Figure 15; Tables 6 and 7; VIMS SAV GIS Database; CBP).

In 1997, SAV classified as dense increased in BSHOH: 52% was classified as dense, 14% as moderate, 32% as sparse, and 1% as very sparse, compared to 16% dense, 69% moderate, 6% sparse, and 8% very sparse in 1996 (Figure 15; Table 8).

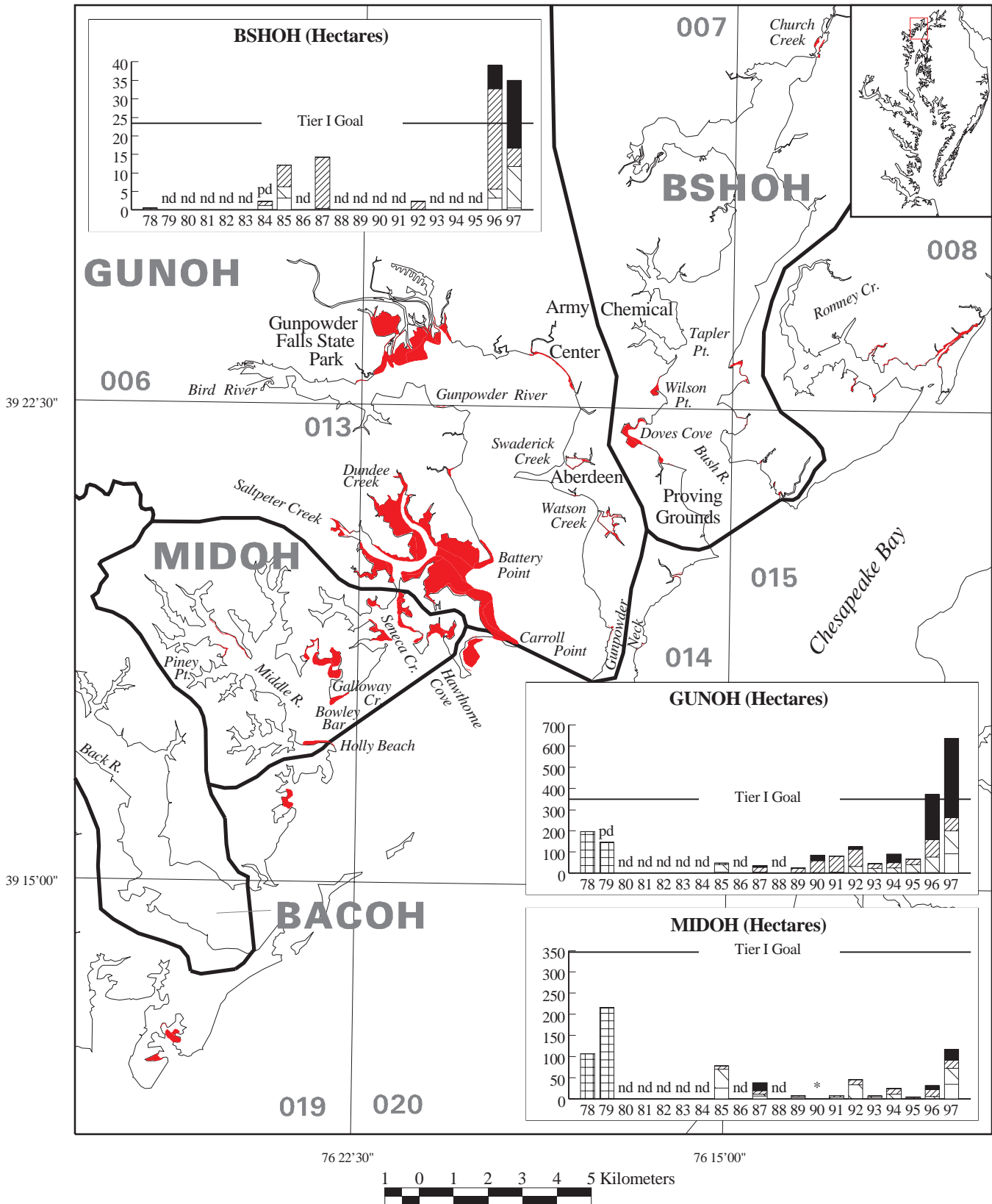


Figure 15: SAV distribution in the Bush, Gunpowder, Middle and Back Rivers (BSHOH, GUNOH, MIDOH, and BACOH) in 1997. BACOH is not graphed as no SAV was mapped from 1971–1997. (See Figure 10 for key.)

Decreases of SAV occurred in Towner, Redmon, and Doves coves, by Wilson Point, in Monks and Church creeks, and along Sandy Point; increases occurred at the mouth of Coopers Creek, along Monks Island, and in portions of Church Creek, as well as portions of Doves, Redmon, and Towner coves (Figure 15: Maps 7, 8, 14, 15).

In 1997, the Aberdeen Proving Ground staff reported nine species of SAV in BSHOH (Appendices B and D: Maps 7, 8, 14, 15). On the south shore, the Aberdeen Proving Ground staff reported: *M. spicatum* in Kings Creek and at the mouth of Coopers Creek; *M. spicatum*, *E. canadensis*, and *C. demersum* in Doves Cove; and *M. spicatum*, *P. crispus*, and *C. demersum* at Wilson Point; and on the north shore, the Aberdeen Proving Ground staff reported: *C. demersum*, *E. canadensis*, *M. spicatum*, *V. americana*, *H. verticillata*, *P. perfoliatus*, and *Z. palustris* in Redmon Cove; *M. spicatum*, *V. americana*, *C. demersum*, *Potamogeton pusillus*, and *Z. palustris* in Abbey Creek; and *M. spicatum* along Monks Island (Appendices B and D: Maps 7, 8, 14, 15).

### **Gunpowder River (GUNOH)**

The 1997 level of 637.36 hectares of SAV mapped was a 71% increase over 1996, and not only surpassed the Tier I goal of 350.21 hectares for the second consecutive year, but also reached the highest amount reported for GUNOH in the history of the aerial survey (Figure 15; Tables 6 and 7; VIMS SAV GIS Database; CBP). In 1997, GUNOH had 14% of the SAV in the Upper Bay zone and 2% of the SAV in the Chesapeake Bay (Tables 6 and 7).

SAV classified as moderate decreased in GUNOH in 1997 while very sparse SAV increased: in 1997, 59% of SAV was dense, 10% moderate, 17% sparse, and 15% very sparse, compared to 58% dense, 22% moderate, 19% sparse, and 1% very sparse in 1996 (Figure 15; Table 8).

Increases in 1997 in GUNOH occurred in the Bird River at the Gunpowder Falls area; on the shoreline west of Aberdeen Proving Ground; in Swaderick, Watson, Dundee, and Saltpeter creeks; along Battery Point and Carroll Island by White Oak and Carroll points; and in Cunningham Cove (Figure 15; Maps 6, 7, 13, 14). Small decreases occurred in other portions of these areas as well (Figure 15; Maps 6, 7, 13, 14).

In 1997, ten species, as well as one unidentified SAV species, were reported from ground-truth surveys in GUNOH (Appendices B and D: Maps 7, 13, 14). On the east shore of GUNOH, the Citizens' survey reported *Z. palustris*, and the Aberdeen Proving Ground staff reported *M. spicatum*, in the area of Gunpowder Falls; the Aberdeen Proving Ground staff reported *M. spicatum*, *V. americana*, *Z. palustris*, *P. crispus*, and *P. perfoliatus* on the shore west of Aberdeen Proving Ground; and the Citizens reported *E. canadensis* in Wright Creek where the Aberdeen Proving Ground staff also reported *M. spicatum*; also on the east shore of GUNOH, the Aberdeen Proving Ground staff reported: *M. spicatum*, *E. canadensis*, *V. americana*, *P. crispus*, and *Najas gracillima* north of Swaderick Creek; *M. spicatum* and *V. americana* along Gunpowder Neck south of Days Point; and *V. americana* at the mouth of the Gunpowder River; on the west shore, the Aberdeen

## SAV

Proving Ground staff reported: *E. canadensis* and *V. americana* at Carroll Point; *M. spicatum*, *E. canadensis*, *V. americana*, *P. pusillus*, *P. perfoliatus*, *C. demersum*, and *N. minor* in the Dundee and Saltpeter creeks area; *V. americana* at Battery Point; and *V. americana*, *M. spicatum*, *P. perfoliatus*, *P. crispus*, and *C. demersum* at Cunninghill Cove; and the Citizens reported an unidentified SAV species as well as *M. spicatum* and *C. demersum* in Railroad Creek (Appendices B and D: Maps 7, 13, 14).

### **Middle River (MIDOH)**

In 1997, MIDOH had 117.37 hectares mapped, a 277% increase from 1996, and 34% of the Tier I goal of 347.54 hectares (Figure 15; Table 6 and 7; VIMS SAV GIS Database; CBP).

In 1997, SAV classified in dense and moderate categories decreased in MIDOH: 22% was classified as dense, 16% as moderate, 33% as sparse, and 30% as very sparse, compared to 27% dense in 1996, 54% moderate, 16% sparse, and 2% very sparse (Figure 15; Table 8).

Noticeable increases occurred in areas where no SAV had been present in 1996, by the mouths of Norman, Hopkins, and Dark Head creeks, in the Galloway creek area, and at the mouth of Middle River (Figure 15; Map 13). Other large increases occurred in Seneca and Saltpeter creeks, and in Hawthorn Cove (Figure 15; Map 14).

In 1997, seven species were reported from ground-truth surveys in MIDOH (Appendices B and D: Maps 13, 14). The Citizens' survey reported *E. canadensis*, *V. americana*, *M. spicatum*, *Z. palustris*, and *P. crispus* in Stansbury Creek, as well as *P. perfoliatus* and *Z. palustris* in Hopkins Creek and two sites in the Middle River (Appendices B and D: Map 13). The Aberdeen Proving Ground staff reported *E. canadensis*, *M. spicatum*, *C. demersum*, and *V. americana* in Saltpeter and Seneca creeks, and *E. canadensis*, *M. spicatum*, and *V. americana* in Hawthorn Cove (Appendices B and D: Map 14).

### **Back River (BACOH)**

No SAV was mapped in BACOH in 1997 (Figure 15; Tables 6 and 7). In fact, SAV has never been mapped in BACOH since the aerial survey began there in 1978 (Figure 15; VIMS SAV GIS Database). There has been no Tier I goal established for BACOH (Figure 15; CBP).

No ground-truth data was reported for BACOH in 1997.

## UPPER CENTRAL CHESAPEAKE BAY AND ASSOCIATED TRIBUTARY SEGMENTS

### **Upper Central Chesapeake Bay (CB3MH)**

SAV in CB3MH increased 2% (6.32 hectares) in 1997, to 370.83 hectares, 53% of the Tier I goal

of 697.59 hectares, and 8% of SAV in the Upper Bay zone (Figure 16; Tables 6 and 7; VIMS SAV GIS Database; CBP). By 1997, SAV in CB3MH had increased for six consecutive years, to the highest level recorded by this survey since 1984, after falling to its lowest level (22.21 hectares) in 1991 (Figure 16; Tables 6 and 7; VIMS SAV GIS Database; CBP).

In 1997, SAV classified as dense in CB3MH increased: 79% was classified as dense, 5% as moderate, 10% as sparse, and 6% as very sparse, compared to 59% dense in 1996, 1% moderate, 31% sparse, and 9% very sparse (Figure 16; Table 8).

For the most part in CB3MH, the SAV distribution in 1997 remained similar to that in 1996, with most locations having both some areas of increases as well as other areas of decreases: on the eastern shore, in the area of Eastern Neck Narrows, in Rock Hall Harbor, in Tavern and Swan creeks, and in The Haven; and on the western shore, in Shallow Creek (Figure 16).

In CB3MH in 1997, six species and one unidentified species each of *Chara* and of *Najas* were reported from ground-truth surveys in the Eastern Neck Narrows: the USFWS reported *P. pectinatus*, *P. perfoliatus*, *Z. palustris*, *M. spicatum*, and *E. canadensis*; the Patuxent Wildlife Research Center reported all the latter species as well as *R. maritima*, an unidentified species of *Chara*, and an unidentified species of *Najas* (Appendices B and D: Map 26).

### **Patapsco River (PATMH)**

SAV decreased 16% in 1997, to 1.93 hectares, 4% of the Tier I goal of 50.22 hectares (Figure 16; Tables 6 and 7; VIMS SAV GIS Database; CBP).

The SAV classified as dense also decreased in PATMH in 1997: 100% was moderate, compared to 2% moderate and 98% dense in 1996 (Figure 16; Table 8).

The decrease of SAV in PATMH occurred in the one bed mapped in 1997, in Ashlar Pond on Bodkin Neck at the mouth of the Patapsco River (Figure 16: Map 24; VIMS SAV GIS Database).

In PATMH in 1997, the Citizens' survey reported *M. spicatum* in Tanyard Cove off of Curtis Creek (Appendices B and D: Map 18).

### **Magothy River (MAGMH)**

In MAGMH, SAV increased 44% from 1996, to 53.48 hectares in 1997, and achieved 23% of the Tier I goal of 236.73 hectares (Figure 16; Tables 6 and 7; VIMS SAV GIS Database; CBP). The 1997 survey year was the fifth consecutive year that SAV was mapped in increasing amounts; no SAV was mapped the four years prior to 1993 (Figure 16; Tables 6 and 7; VIMS SAV GIS Database).

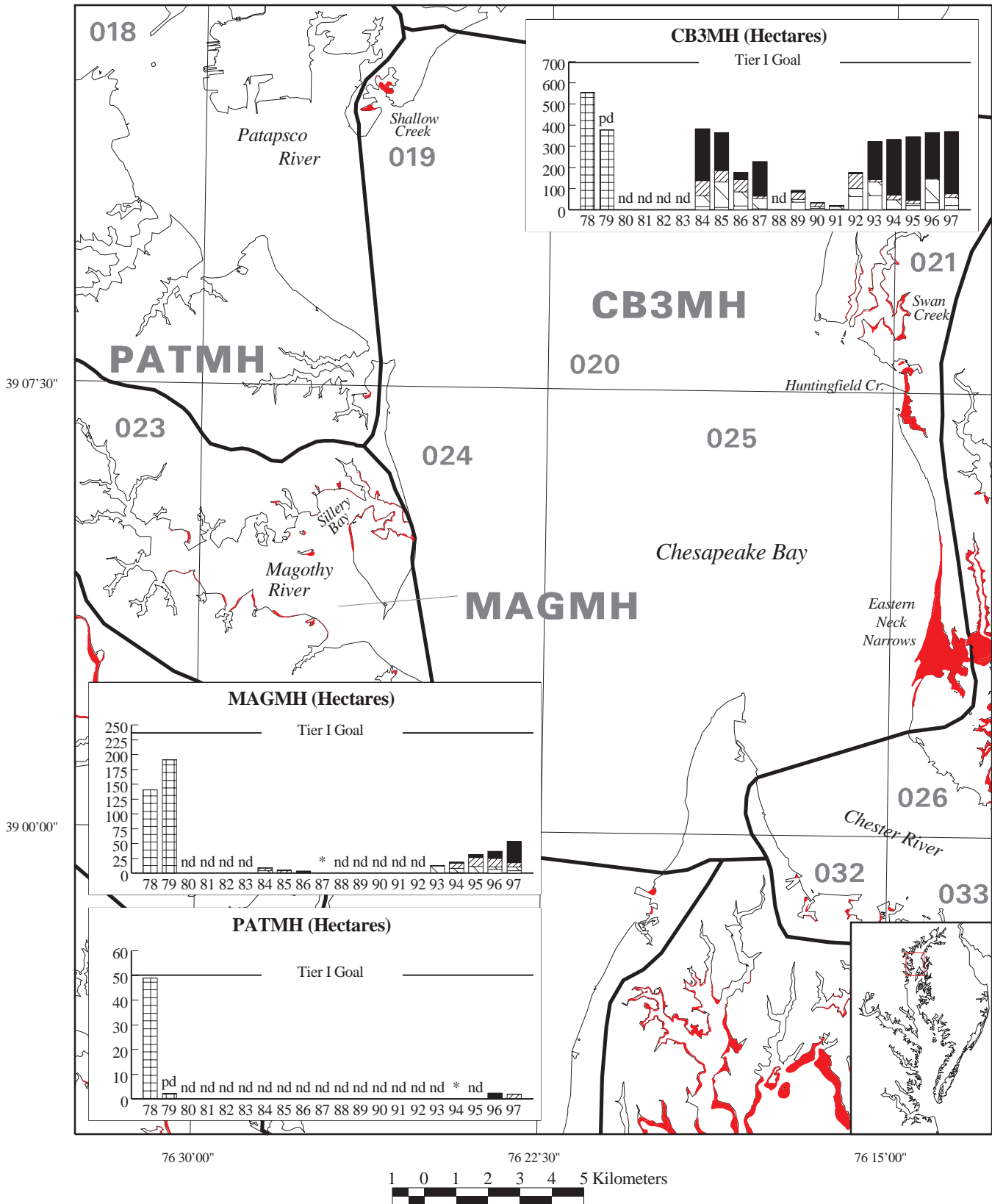


Figure 16: SAV distribution in Upper Central Chesapeake Bay (CB3MH) and the Magothy and Patapsco Rivers (MAGMH and PATMH) in 1997. (See Figure 10 for key.)

In MAGMH in 1997, SAV classified as dense increased: 66% was classified as dense, 14% as moderate, 12% as sparse, 7% as very sparse, compared to 34% dense in 1996, 37% moderate, 12% sparse, and 17% very sparse (Figure 16; Table 8).

In 1997, SAV in MAGMH was mapped principally in the same areas as in the previous three years (Figure 16; VIMS SAV GIS Database). Increases for MAGMH were mapped on both shores: on the north shore, most noticeably west of the mouth of Blackhole Creek and in the Gibson Island area, including Grays and Cornfield creeks, Tar Cove, Little and Dobbins islands, and the Magothy Narrows; on the south shore, the Wilson Wharf area, the mouth of Forked Creek, the shore between Ulmsteads Point and Deep Creek, and in the Little Magothy River (Figure 16; VIMS SAV GIS Database). Decreases were most noticeable at the mouth of Grays Cove, on the east end of Dobbins Island, and portions of the Magothy Narrows (Figure 16; VIMS SAV GIS Database).

In MAGMH in 1997, there were seven species, one unidentified species of *Najas*, and an unidentified SAV species reported from ground-truth surveys (Appendices B and D: Maps 23, 24). The USFWS reported primarily *Z. palustris* upstream, west of the mouth of Mill Creek, with two sightings each of *R. maritima* and *M. spicatum* (Appendices B and D: Map 23). On the south shore, from east of the mouth of Mill Creek to the mouth of Deep Creek, the USFWS reported *Z. palustris*, *P. perfoliatus*, *V. americana*, *R. maritima*, and *P. pectinatus*; and, in the Little Magothy River, *M. spicatum* (Appendices B and D: Maps 23, 24). Also on the south shore, the Citizens' survey reported: *Z. palustris* in Cool Springs Cove; *Z. palustris*, *P. perfoliatus*, and an unidentified SAV species on the west shore of the mouth of Deep Creek; and *M. spicatum* in Deep Creek, in the inlet west of the mouth of Deep Creek, and in the Little Magothy River (Appendices B and D: Map 24). On the north shore, the USFWS reported: *P. pectinatus*, *P. perfoliatus*, and *Z. palustris* in Blackhole Creek; *Z. palustris* in Broad Creek and at Dobbins Island; and *R. maritima*, *P. perfoliatus*, *V. americana*, *M. spicatum*, *E. canadensis*, *P. pectinatus*, *Z. palustris*, and one unidentified species of *Najas* in the Gibson Island area, including the Magothy Narrows and Cornfield Creek (Appendices B and D: Map 24). Also on the north shore, the Citizens' survey reported: *R. maritima* and *M. spicatum* in Park Creek; and *E. canadensis*, *M. spicatum*, *P. perfoliatus*, *V. americana*, and *Z. palustris* in the Magothy Narrows and Cornfield Creek area (Appendices B and D: Map 24).

## CHESTER RIVER SEGMENTS

### **Lower Chester River (CHSMH), Middle Chester River (CHSOH), and Upper Chester River (CHSTF)**

SAV was mapped only in the Lower Chester River (CHSMH) in 1997, and ground-truth data was reported for only CHSMH in 1997 (Figure 17; Tables 6 and 7; VIMS SAV GIS Database). Historically, CHSMH is the only one of the three Chester River segments to have had SAV mapped in this aerial survey, although no SAV was mapped in it either in 1980 or in 1981 (Figure 17; Tables 6 and 7; VIMS SAV GIS Database). Also, no Tier I goal has been established for either the Middle Chester River (CHSOH) or the Upper Chester River (CHSTF) (Figure 17; Tables 6 and 7; VIMS



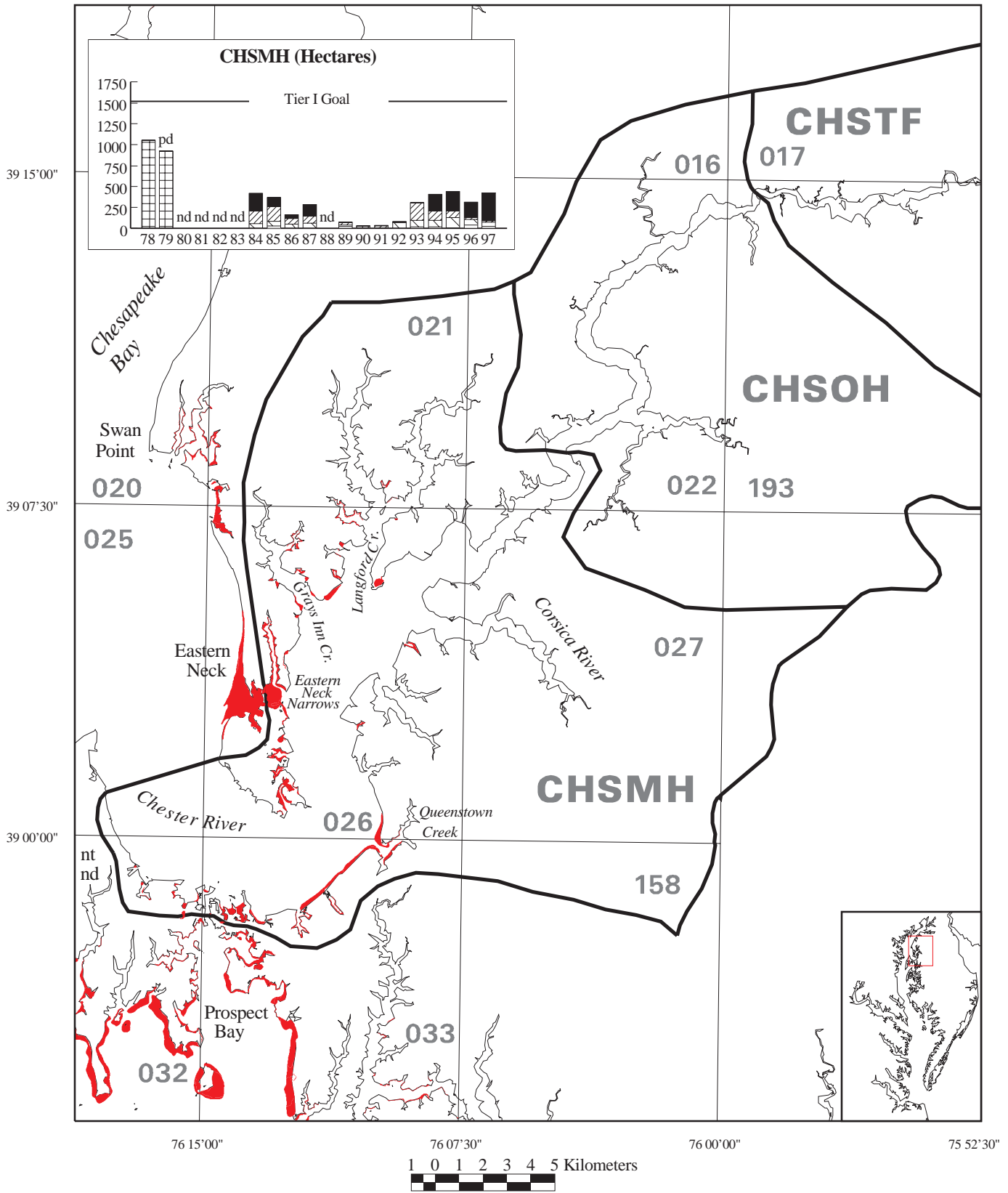


Figure 17: SAV distribution in the Lower (CHSMH), Middle (CHSOH), and Upper Chester (CHSTF) River in 1997. CHSOH and CHSTF are not graphed as no SAV was mapped from 1971–1997. (See Figure 10 for key.)

SAV GIS Database; CBP).

### Lower Chester River (CHSMH)

In 1997, there were 424.81 hectares of SAV mapped in CHSMH, a 36% increase over the 311.80 hectares in 1996, and only 19.39 hectares less than the high mark of 444.20 hectares recorded in 1995 (Figure 17; Tables 6 and 7; VIMS SAV GIS Database). The 1997 level was 28% of the Tier I goal of 1,517.81 hectares and was 2% of the Chesapeake Bay SAV total as well as 10% of the Upper Bay zone SAV total (Figure 17; Tables 6 and 7; VIMS SAV GIS Database; CBP).

In 1997, SAV classified as dense in CHSMH increased: 78% was classified as dense, 5% as moderate, 11% as sparse, and 6% as very sparse, compared to 58% dense in 1996, 8% moderate, 20% sparse, and 14% very sparse (Figure 17; Table 8).

As in 1996, most SAV in CHSMH was located adjacent to Eastern Neck and Eastern Neck Island (especially near Eastern Neck Narrows), and in tributaries entering the Chester River: Church, Grays Inn, Langford, Piney, Macum, Jackson, Winchester, and Queenstown creeks (Figure 17; Appendix B: Maps 21, 26, 32, 33). Increases of SAV were noted in Harrington, Grays Inn, Langford, West Fork Langford, Queenstown, Winchester, Jackson, Piney, Macum, Church, Durdin, Hall, and Shipyard creeks; Grays Inn, Little Gum, Nichols, and Belts Bar points and the area below Piney Point; and Burnt House and Robin coves (Figure 17; Appendix B: Maps 21, 26, 32, 33). The most noticeable decreases were mapped on the shore from Kent Island Narrows to Blakeford Point; along Eastern Neck Island; and in portions of Eastern Neck Narrows and Church Creek (Figure 17; Appendix B: Maps 26, 33).

In CHSMH in 1997, the Patuxent Wildlife Research Center staff, the USFWS, the Maryland DNR, and the Citizens' survey reported unidentified species of *Chara* and *Najas*, and unidentified SAV species as well as the following eight species: *C. demersum*, *E. canadensis*, *M. spicatum*, *P. pectinatus*, *P. perfoliatus*, *R. maritima*, *V. americana*, and *Z. palustris* (Appendices B and D: Maps 21, 26, 32, 33).

In northern CHSMH, the Patuxent Wildlife Research Center staff reported: *R. maritima*, *M. spicatum*, and *E. canadensis* in Grays Inn Creek; *R. maritima*, *P. perfoliatus*, *M. spicatum*, *E. canadensis*, and *V. americana* in West Fork Langford Creek; *R. maritima*, *M. spicatum*, *E. canadensis*, *P. perfoliatus*, and *Z. palustris* in Burnt House Cove and Langford Creek; and *E. canadensis*, *R. maritima*, *M. spicatum*, *Z. palustris*, and *V. americana* at Cliffs Bight (Appendices B and D: Maps 21, 26).

On the eastern shore of CHSMH, the Patuxent Wildlife Research Center staff reported *R. maritima*, *P. perfoliatus*, *P. pectinatus*, *M. spicatum*, *E. canadensis*, and *C. demersum* in Robin Cove on Corsica Neck; *R. maritima*, *P. perfoliatus*, *M. spicatum*, *E. canadensis*, and *Z. palustris* were reported south of Piney Point on Tilghman Neck; and *R. maritima*, *P. perfoliatus*, and *P. pectinatus*

## SAV

were reported north of Queenstown Creek (Appendices B and D: Map 26).

Along the southern shore of the Chester River, the Patuxent Wildlife Research Center staff, the USFWS, and the Citizens reported *R. maritima*, *P. perfoliatus*, *M. spicatum*, *E. canadensis*, *P. pectinatus*, an unidentified species of *Najas*, and unidentified SAV in Queenstown Creek; and the Patuxent Wildlife Research Center staff, the USFWS, the Maryland DNR, and the Citizens reported *R. maritima*, *P. perfoliatus*, *P. pectinatus*, *M. spicatum*, *E. canadensis*, and unidentified SAV from Piney Creek to Queenstown Creek (Appendices B and D: Maps 26, 32, 33).

The Patuxent Wildlife Research Center and the USFWS reported *R. maritima*, *P. perfoliatus*, *P. pectinatus*, *M. spicatum*, *E. canadensis*, *Z. palustris*, and an unidentified species of *Najas* along Eastern Neck Island (Appendices B and D: Map 26). The Patuxent Wildlife Research Center reported: *R. maritima*, *P. perfoliatus*, *M. spicatum*, *E. canadensis*, *Z. palustris*, and unidentified species of *Najas* and *Chara* in the Eastern Neck Narrows; *R. maritima*, *M. spicatum*, *E. canadensis*, and unidentified species of *Najas* and *Chara* in Church Creek; and *R. maritima*, *P. perfoliatus*, and an unidentified species of *Najas* in Goose Cove (Appendices B and D: Map 26).

## MIDDLE BAY ZONE

### MIDDLE CENTRAL CHESAPEAKE BAY AND ASSOCIATED TRIBUTARY AND BAY SEGMENTS

#### Middle Central Chesapeake Bay (CB4MH)

SAV in CB4MH increased from 0 hectares in 1996, to 20.28 hectares in 1997, achieving 13% of the Tier I goal of 152.02 hectares (Figure 18; Tables 6 and 7; VIMS SAV GIS Database; CBP).

In 1997, 18% of the SAV was classified as dense, 75% as moderate, and 7% as sparse (Figure 18; Table 8).

SAV was mapped in Old Colony Cove where the USEPA reported *R. maritima* (Figure 18; Appendices B and D: Map 42, Bed A3). Citizens reported *Z. palustris* in Fishing and Oyster creeks (Appendices B and D: Map 31).

#### Eastern Bay (EASMH)

There were 1,848.32 hectares of SAV mapped in 1997 in EASMH, a 24% increase over 1996 (Figure 18; Tables 6 and 7). SAV has steadily increased each year in the Eastern Bay segment since the 1991 low of 67.93 hectares (Figure 18; VIMS SAV GIS Database). The total hectares of SAV in EASMH in 1997 was 13% of the SAV in the Middle Bay zone, 7% of the SAV in Chesapeake Bay, and 75% of the Tier I goal of 2,479.02 hectares (Figure 18; Tables 6 and 7; VIMS SAV GIS Database; CBP).

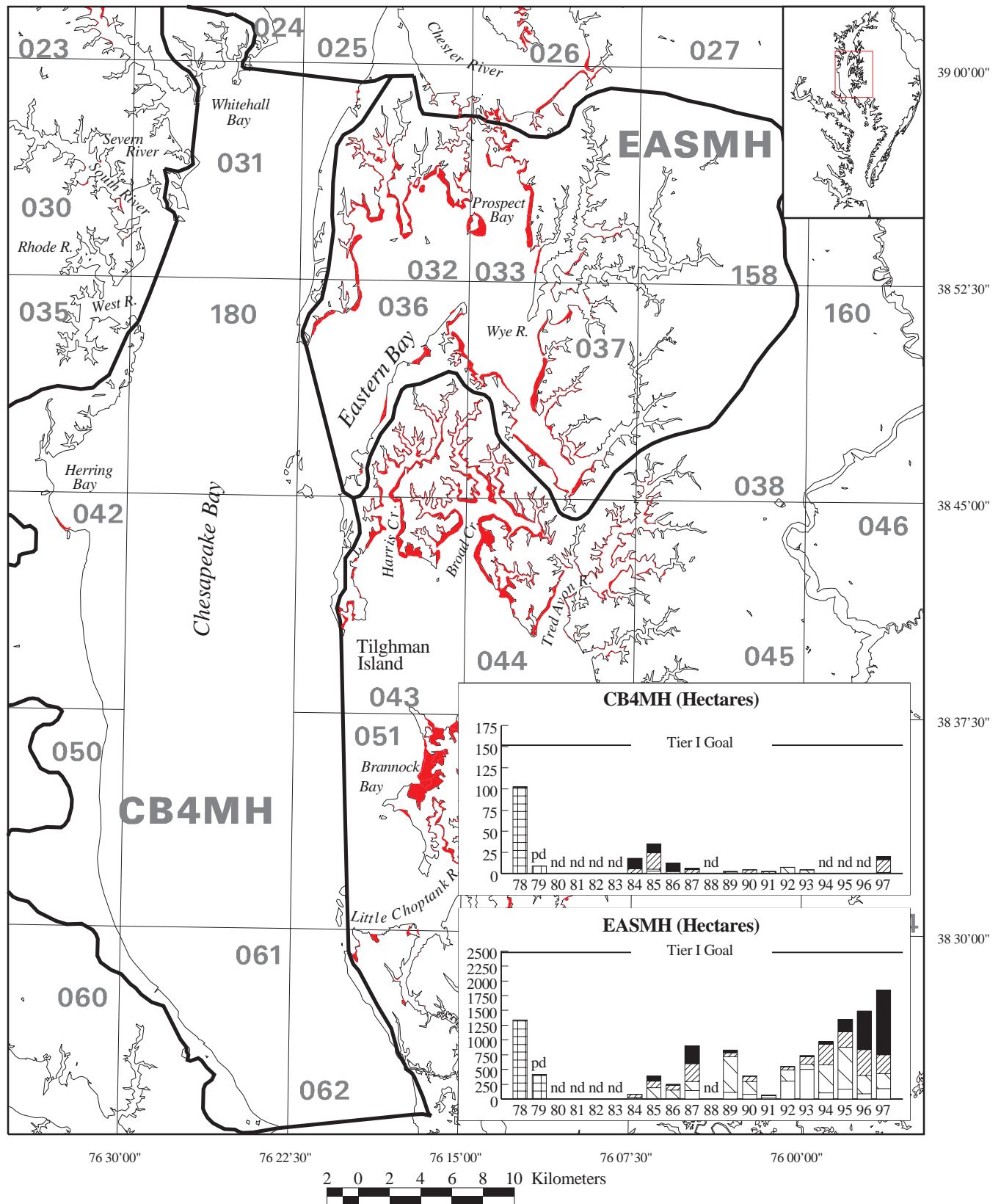


Figure 18: SAV distribution in the Middle Central Chesapeake Bay (CB4MH) and Eastern Bay (EASMH) in 1997. (See Figure 10 for key.)

## SAV

In 1997, SAV density in EASMH increased: 59% was classified as dense, 17% as moderate, 13% as sparse, and 10% as very sparse, compared to 43% dense in 1996, 29% moderate, 21% sparse, and 6% very sparse (Figure 18; Table 8).

In 1997, SAV beds in EASMH persisted in the following locations: the shore and creeks of Kent Island, including Prospect and Crab Alley bays; adjacent to Parson Island and Piney Neck; the lower Miles, Wye East, and Wye rivers; the eastern shore between Wyetown and Fairview points; the shore from Tilghman to Deepwater points; and Eastern Bay at Wades Point (Figure 18; Appendix B: Maps 32, 33, 36, 37). Increases, as well as some decreases, were mapped in most of the latter areas, with increases offsetting decreases in total hectares (Figure 18).

Increases were largest along Kent Island, from Kents Point to the Philpots Islands and in most creeks; along Cox and Crab Alley necks; along the southern and eastern sides of Parson Island; in the Wye River and tributaries, especially Wye Narrows; in the creeks of the lower Miles River; along Hambleton, Tilghman, Wades, and Long points; and at Ferry Cove by Lowes Point (Appendix B: Maps 32, 33, 36, 37).

In EASMH in 1997, seven species were reported from ground-truth surveys (Appendices B and D: Maps 32, 33, 36, 37). The Patuxent Wildlife Research Center reported: *R. maritima* along the eastern shore of Eastern Bay, in Wye East River, in Woodland, Leeds, and Hunting creeks of the Miles River, and in Crab Alley and Cabin creeks; *R. maritima* and *P. pectinatus* at Parson Island and Normans Point; *R. maritima*, *P. perfoliatus*, *M. spicatum*, and *E. canadensis* in Kirwan Creek; *R. maritima*, *M. spicatum*, and *P. perfoliatus* in Warehouse Creek; *R. maritima*, *Z. palustris*, and *P. pectinatus* in Cox and Shipping creeks, in Crab Alley Bay, at Philpots Island, in Prospect Bay, to the east of Kent Island, and along the southern shore of Eastern Bay; *E. canadensis*, *M. spicatum*, *P. pectinatus*, *P. perfoliatus*, *R. maritima*, and *Z. palustris* in Marshy Creek; *R. maritima*, *P. perfoliatus*, *M. spicatum*, and *Z. palustris* in Kent Island Narrows; *R. maritima* and *Z. palustris* to the south of Tilghman Point and in Tilghman, Little Neck, and Newcomb creeks; *R. maritima* and *P. perfoliatus* in the Miles River; and *R. maritima* and *Z. marina* in Long Haul Creek (Appendices B and D: Maps 32, 33, 36, 37).

The Maryland DNR reported *R. maritima*, *P. pectinatus*, and *Z. palustris* in Parson Island, and *M. spicatum*, *P. perfoliatus*, and *R. maritima* in Marshy Creek (Appendices B and D: Maps 32, 33). The USFWS reported *R. maritima*, *M. spicatum*, *Z. palustris*, *P. perfoliatus*, *P. pectinatus*, and *E. canadensis* in Marshy Creek (Appendices B and D: Map 33).

The Citizens reported: *R. maritima* and *P. perfoliatus* in Cox, Thompson, and Warehouse creeks; *E. canadensis*, *M. spicatum*, *P. pectinatus*, *P. perfoliatus*, *R. maritima*, and *Z. palustris* in Marshy Creek; *R. maritima* and *Z. palustris* in Kent Island Narrows; and *R. maritima* in Prospect Bay (Appendices B and D: Maps 32, 33).

## CHOPTANK RIVER SEGMENTS

### **The Mouth of the Choptank River (CHOMH1), Lower Choptank River (CHOMH2), Middle Choptank River (CHOOH), and Upper Choptank River (CHOTF)**

Of the four Choptank River segments, SAV has been mapped only in CHOMH1 and CHOMH2 in the history of the aerial survey (Figure 19; VIMS SAV GIS Database). SAV levels in CHOMH1 increased for four consecutive years beginning in 1994, reaching, in 1997, the highest level in the history of the aerial survey (Figure 19; Tables 6 and 7; VIMS SAV GIS Database). In 1997, SAV was mapped in CHOMH2 for the first time since 1993 (Figure 19; Tables 6 and 7; VIMS SAV GIS Database).

#### **The Mouth of the Choptank River (CHOMH1)**

CHOMH1 had 2,792.59 hectares mapped in 1997, 19% more than in 1996, and 93% of the Tier I goal of 2,990.36 hectares (Figure 19; Tables 6 and 7; VIMS SAV GIS Database; CBP). The 1997 level was 20% of the Middle Bay zone SAV total and 10% of Chesapeake Bay SAV total (Tables 6 and 7).

In 1997, SAV density in CHOMH1 increased: 73% was classified as dense, 9% as moderate, 10% as sparse, and 7% as very sparse, compared to 47% dense in 1996, 34% as moderate, 12% as sparse, and 7% as very sparse (Figure 19; Table 8).

In 1997, SAV beds persisted and mainly increased along the coves and creeks of both the north shore of CHOMH1 (including Tilghman Island, Harris and Broad creeks, and the Tred Avon River) and the south shore of CHOMH1 (including Trippe Bay, Cook Point Cove, and the area from Todds Point to Castle Haven Point (Figure 19).

On the north shore of CHOMH1, noticeable increases were observed in Blackwalnut Cove at the south end of Tilghman Island; in Harris and Broad creeks, and their tributary creeks and coves; in Trippe Creek; and the Tred Avon River and its tributary creeks (Figure 19; Appendix B: Maps 36, 37, 38, 43, 44, 45). Noticeable decreases in beds were mapped along Tilghman Island at the mouth of Blackwalnut Cove, in Dogwood Harbor, and at the mouth and other portions of Harris, Broad, and Edge creeks; in Irish Creek between Deep and Ferry necks; and at Bachelor Point at the mouth of the Tred Avon River and in some of its creeks, especially Tar and Flatley creeks (Figure 19; Appendices B and D: Maps 36, 37, 38, 43, 44, 45).

On the south shore of CHOMH1, increases were mapped from Cook Point to Castle Haven Point; decreases were in Cook Point Cove and Trippe Bay (Figure 19; Appendices B and D: Maps 51, 52).

In CHOMH1 in 1997, three species, and unidentified SAV, were reported from ground-truth surveys: the Patuxent Wildlife Research Center reported *R. maritima* and *Z. palustris* in Broad Creek; and

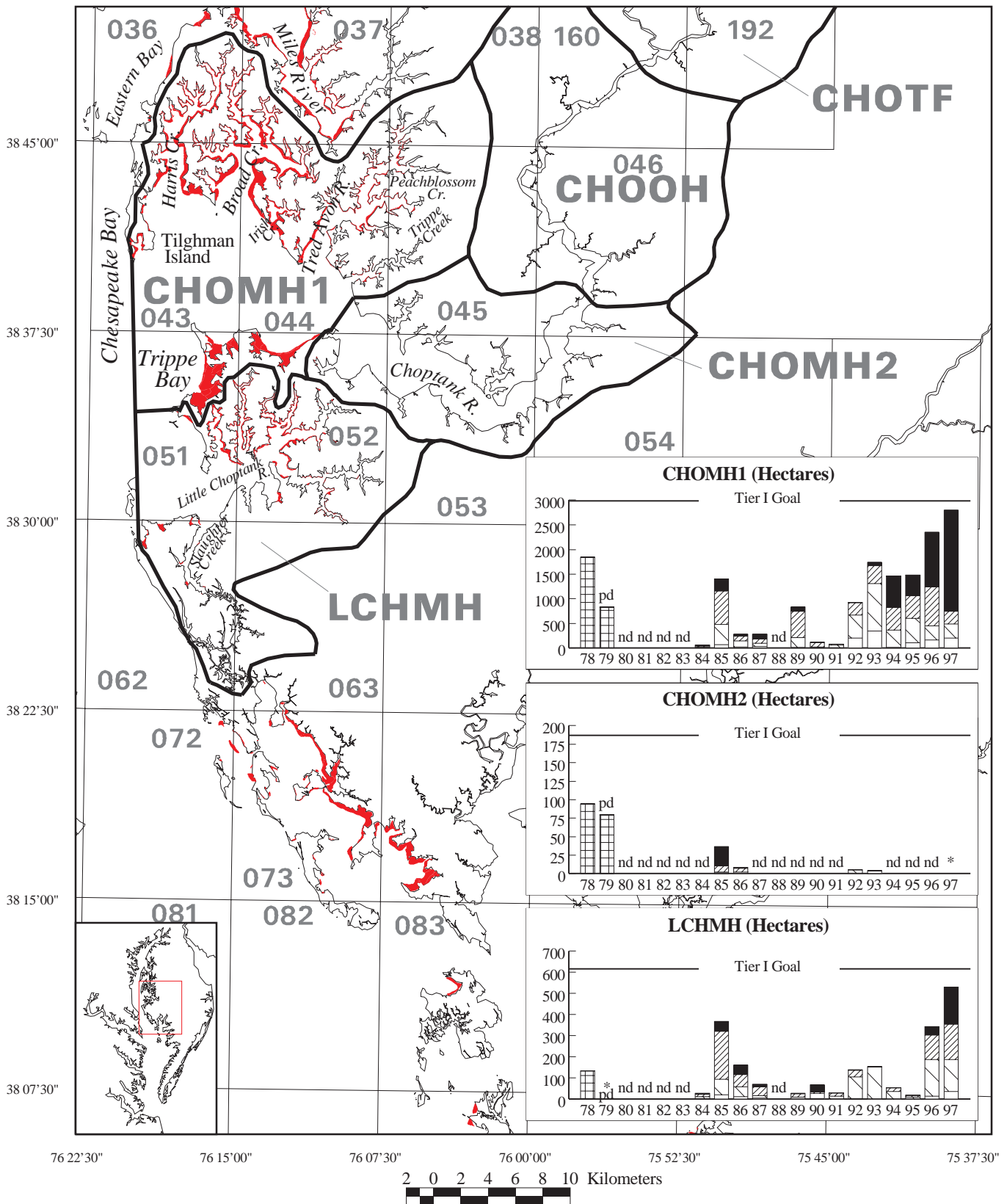


Figure 19: SAV distribution in the Mouth (CHOMH1), the Lower (CHOMH2), the Middle (CHOOH), and the Upper Choptank River (CHOTF) and in the Little Choptank River (LCHMH) in 1997. CHOOH and CHOTF are not graphed as no SAV was mapped from 1971–1997. (See Figure 10 for key.)

they reported *R. maritima* in Harris, Waterhole, Cummings, Northwest, Grace, San Domingo, Leadenham, Balls, Irish, Bridge, Edge, Solitude, Tar, Trippe, Maxmore, Peachblossom, and Chapel creeks; in Todds, Cook Point, Dun, Blackwalnut, Briary, Caulk, Flatley, and Barrett coves; in Dogwood Harbor; at Todds, Cook, and Camden points; and in the Tred Avon River (Appendices B and D: Maps 36, 37, 43, 44, 45, 51, 52). The USFWS also reported *R. maritima* in Waterhole Creek and Blackwalnut Cove (Appendices B and D: Maps 36, 43). The Citizens also reported *R. maritima* in Broad Creek and in the Tred Avon River, as well as an unidentified SAV; an unidentified SAV in Balls Creek and in Brannock Bay; and *P. pectinatus* and *Z. palustris* in Edge Creek (Appendices B and D: Maps 36, 37, 43, 44, 51).

### **Lower Choptank River (CHOMH2)**

In CHOMH2 in 1997, 1.76 hectares were mapped compared to 0 hectares in 1996, achieving 1% of the Tier I goal of 186.95 hectares (Figure 19; Tables 6 and 7; VIMS SAV GIS Database; CBP). Prior to 1997, SAV had not been mapped by the aerial survey since 1993, when there were 4.02 hectares mapped (Figure 19; Tables 6 and 7; VIMS SAV GIS Database; CBP).

Three SAV beds, all classified as dense, were mapped in Lecompte Creek on the south shore of the Choptank River in 1997 (Figure 19; Table 8; Map 52).

The Citizens reported *Z. palustris* in Bolingbroke Creek and west of Chancellor Point in the Choptank River (Appendices B and D: Map 53).

### **Middle Choptank River (CHOOH) and Upper Choptank River (CHOTF)**

No SAV was mapped in either CHOOH or CHOTF in 1997, nor were there any ground-truth data reported, as in all the years of the aerial survey (Figure 19; Tables 6 and 7; VIMS SAV GIS Database). There are no Tier I goals established for either CHOOH or CHOTF (Figure 19; CBP).

Although aerial photography did not show any SAV for CHOOH or CHOTF in 1997, the Citizens' survey reported *Z. palustris* for segment CHOOH in the Choptank River at Bow Knee Point and at the mouth of Hunting Creek (Appendices B and D: Map 46).

### **Little Choptank River (LCHMH)**

LCHMH had 529.39 hectares in 1997, the highest level ever recorded by the aerial survey, a 54% increase over the second highest in 1996, and 86% of the Tier I goal of 616.39 hectares (Figure 19; Tables 6 and 7; VIMS SAV GIS Database; CBP). The SAV recorded for 1997 was 4% of the Middle Bay zone SAV total and 2% of the entire Chesapeake Bay SAV total (Tables 6 and 7).

In 1997, density of SAV increased in LCHMH: 33% was dense, 31% moderate, 29% sparse, 7% very sparse, compared to 12% dense in 1996, 33% moderate, 51% sparse, and 4% very sparse (Figure 19;



## SAV

Table 8).

In 1997 in LCHMH, SAV beds persisted with both areas of increases and areas of decreases in different portions of the beds in Hills Point, Oyster, and Cators coves; at Hooper Point; in Madison Bay; in Slaughter, Brooks, Back, Hudson, Phillips, and Beckwith creeks; and at Cherry Island; and new beds were mapped in the Little Choptank River, including in Solomon Cove and in Brooks, Hudson, Slaughter, Fishing, Church, Smith, Gary, and Lee creeks; and at Holland Point (Figure 19; Maps 51, 52, 62).

In LCHMH in 1997, Citizens reported unidentified SAV in Hills Point Cove and *Z. palustris* in Back Creek (Appendices B and D: Maps 51, 52).

## THE WESTERN TRIBUTARIES: SEVERN, SOUTH, RHODE, AND WEST RIVERS

### Severn River (SEVMH)

SAV in SEVMH in 1997 increased 12% from 1996, to 123.87 hectares, 66% of the Tier I goal of 187.76 hectares (Figure 20; Tables 6 and 7; VIMS SAV GIS Database; CBP). SAV had increased each year for four consecutive years from 1994 to 1997; prior to that, no SAV had been mapped since 1986 (Figure 20; Tables 6 and 7; VIMS SAV GIS Database).

In 1997, SAV density increased in SEVMH: 84% was dense, 9% moderate, 5% sparse, and 2% very sparse, compared to 62% dense in 1996, 11% moderate, 14% sparse, and 12% very sparse (Figure 20; Table 8).

SAV beds persisted on the south shore, from Herald Harbor downstream to Luce Creek, with new beds at the mouths of Saltworks, Hopkins, Clements, Brewer, and Mayneider creeks, and in Little Round Bay; and they persisted on the north shore, from Yantz Creek downstream to Chase Creek, with new beds in Ringold Cove (Figure 20; Appendix B: Map 23). Noticeable increases to SAV beds in SEVMH were mapped on the south shore: in the area of Severn Grove, on the shoreline between Luce and Saltworks creeks; at the mouth of Brewer Creek; on the shoreline near Sherwood Forest; in Round Bay, including around St. Helena Island and in Little Round Bay; on the shoreline from Long Point to Kyle Point and to Herald Harbor; and, on the north shore of the Severn River, at the mouth of Yantz Creek; and on the shoreline from Sullivan Cove to Asquith Creek and to Chase Creek (Figure 20; Map 23). However, noticeable decreases were mapped as well to other portions of these same beds: particularly in the Round Bay area, including on the south shore of St. Helena Island, in little Round Bay; both shores of Long Point to Herald Harbor and at Kyle Point; the shoreline near Sherwood Forest; the mouth of Clements Creek; the shore by Severn Grove; in Sullivan Cove; the mouths of Ringold Cove, Asquith Creek, and Chase Creek; and the shoreline by Joyce (Figure 20; Map 23).

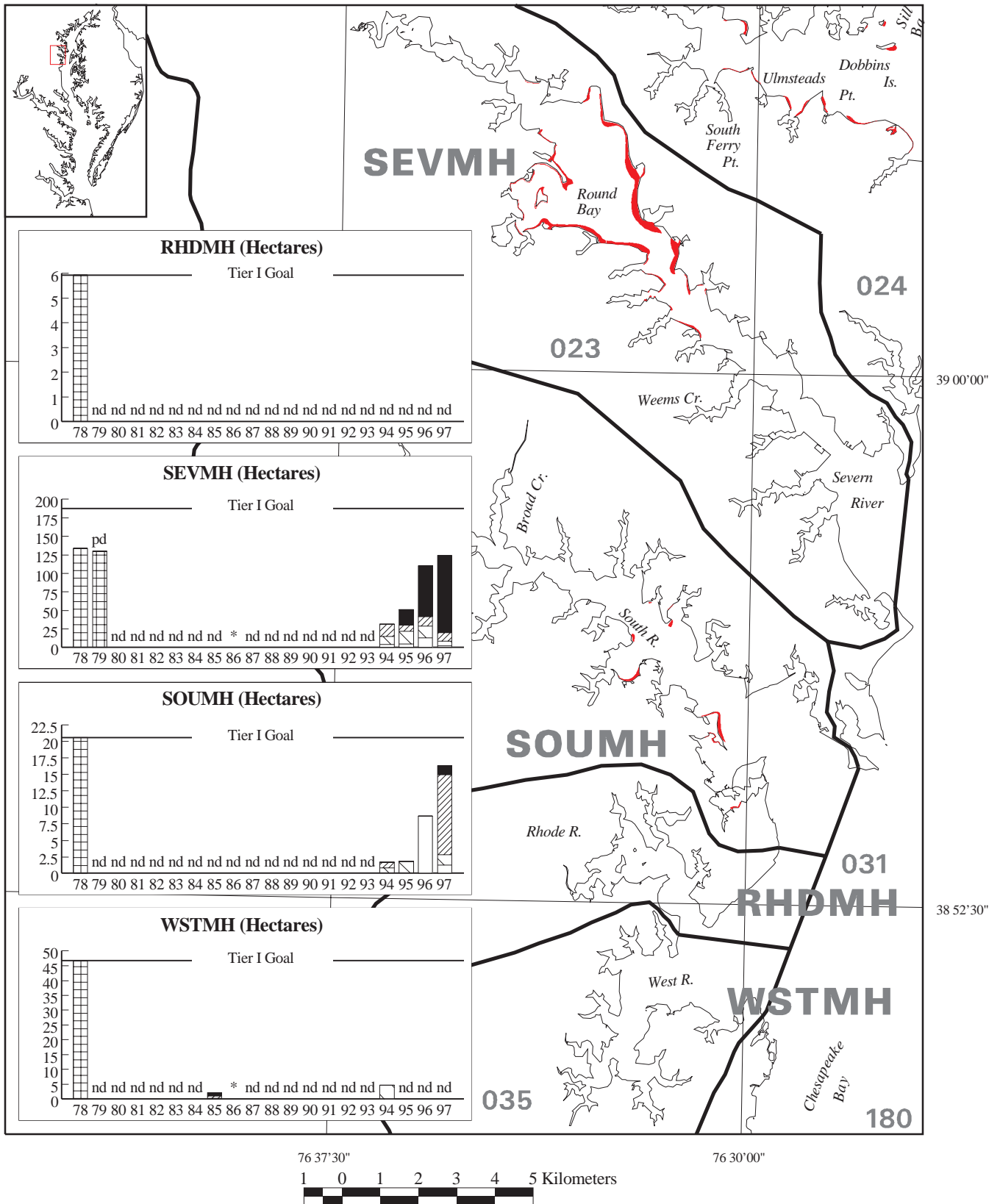


Figure 20: SAV distribution in the Severn and South Rivers (SEVMH and SOUMH) and the Rhode and West Rivers (RHDMH and WSTMH) in 1997. (See Figure 10 for key.)

## SAV

In SEVMH in 1997, five species were reported from ground-truth surveys: Citizens reported *R. maritima* in Sullivan Cove to the west of Kyle and Long points, in Little Round Bay, and in Brewer, Saltworks, Chase, and Asquith creeks; Citizens reported *Z. palustris*, *R. maritima*, *P. perfoliatus*, and *M. spicatum* in Round Bay; the USFWS reported *P. perfoliatus* and *R. maritima* in Asquith Creek, and *R. maritima*, *Z. palustris*, *P. perfoliatus*, and *P. pectinatus* to the south of Sullivan Cove; the MD-DNR reported *R. maritima* and *Z. palustris* at the mouth of Brewer Creek, and *P. perfoliatus* and *R. maritima* in Asquith Creek (Appendices B and D: Map 23).

### **South River (SOUMH)**

SAV in SOUMH in 1997 increased 88% from 1996, to 16.35 hectares, 79% of the Tier I goal of 20.59 hectares (Figure 20; Tables 6 and 7; VIMS SAV GIS Database; CBP). SAV in SOUMH had increased each year for four consecutive years from 1994 to 1997; prior to that, no SAV had been mapped since 1978 (Figure 20; VIMS SAV GIS Database).

In 1997, SAV density in SOUMH increased: 8% was classified as dense, 74% as moderate, 10% as sparse, and 8% as very sparse, compared to 100% very sparse in 1996 (Figure 20; Table 8).

In SOUMH in 1997, SAV persisted in the areas of Limehouse Cove, and Mayo and Melvin points, and increases as well as some decreases were mapped in different portions of these beds; new beds were mapped in the areas of Glebe and Selby bays, Ramsay Lake, and Aberdeen Creek (Figure 20; Map 30). SAV was not mapped in 1996 at the mouth of Aberdeen Creek, although *Z. palustris* and *R. maritima* had been noted there in 1995 and a small bed had been mapped there in 1994 (VIMS SAV GIS Database). The most significant decreases occurred at Cedar Point, where an entire bed mapped in 1996 was not mapped in 1997, and from Melvin Point to the mouth of Almhouse Creek, where the entire shoreline was unvegetated (Figure 20; Map 30).

In SOUMH in 1997, the Citizens reported: *R. maritima* and *Z. palustris* in the South River; in Brewer, Harness, and Pocahontas creeks; in Selby Bay; at Melvin Point; and in the mouth of Glebe Bay; and Citizens also reported: *Z. palustris* in Broad, Gingerville, Church, Crab, Aberdeen, Harness, Glebe, Almhouse, Warehouse, and Beard creeks; in Larkington, Hardestys, and Limehouse coves; in Selby and Glebe bays; and in Ramsey Lake (Appendices B and D: Map 30).

### **Rhode River (RHDMH)**

No SAV was mapped in RHDMH in 1997 or in 1996 (Figure 20; Tables 6 and 7; VIMS SAV GIS Database; CBP). The Tier I goal is 5.92 hectares (Figure 20; VIMS SAV GIS Database; CBP).

Although no SAV was mapped for this segment in 1997, there was one Citizens' survey sighting of *R. maritima* in the area of Beverly Beach (Appendices B and D: Map 30).

### **West River (WSTMH)**

No SAV was mapped in WSTMH in 1997 or in 1996 (Figure 20; Tables 6 and 7). The last survey year SAV was mapped in WSTMH was 1994 when 4.68 hectares were recorded (Figure 20; VIMS SAV GIS Database). The Tier I goal for WSTMH is 46.75 hectares (Figure 20; VIMS SAV GIS Database; CBP).

There was no ground-truth information reported for this segment in 1997 or in 1996.

## **LOWER CENTRAL CHESAPEAKE BAY AND ASSOCIATED TRIBUTARY SEGMENTS**

### **Lower Central Chesapeake Bay (CB5MH)**

In CB5MH in 1997, SAV increased 4% from 1996, to 736.07 hectares, 38% of the Tier I goal of 1,933.24 hectares (Figure 21; Tables 6 and 7; VIMS SAV GIS Database; CBP). The 1997 level is 5% of the Middle Bay zone total SAV and 3% of the Chesapeake Bay total SAV (Figure 21; Tables 6 and 7). The highest previous level was 1,666.81 hectares in 1992 (Figure 21; VIMS SAV GIS Database).

In 1997, SAV density decreased in CB5MH: 2% was dense, 18% moderate, 54% sparse, and 26% very sparse, compared to 20% dense in 1996, 24% moderate, 32% sparse, and 25% very sparse (Figure 21; Table 8).

On the western shore in CB5MH in 1997, SAV beds persisted: in Ingram Bay off Dameron Marsh; in Cloverdale and Dividing creeks; and in Fleets Bay, including Indian and Dymer creeks, and the mouths of Tabbs and Antipoison creeks; in Little Bay; and at North Point (Figure 21; Maps 106, 112). The most significant decreases occurred: to the north of Little Bay, west of North Point; at Fleet Point, north of Ingram Bay; and in Balls Creek (Figure 21; Maps 106, 112). New beds were mapped on the eastern shore along Meekins Neck, including Tar Bay, Barren Island, and Upper Hooper Island, however, the only 1996 bed mapped on the eastern shore, at Tom Point, was not mapped in 1997 (Figure 21; Maps 72, 73).

In CB5MH in 1997, the Citizens reported: *R. maritima* in The Marshes off of Meekins Neck, as well as near Barren Island off Tar Bay; at Fleet Point north of Ingram Bay; in Dymer Creek; and at North Point (Appendices B and D: Maps 72, 106, 112). Citizens also reported *R. maritima* and *Z. marina* in the areas east of Dameron Marsh, and in Ball and Cloverdale creeks (Appendices B and D: Maps 72, 106, 112).

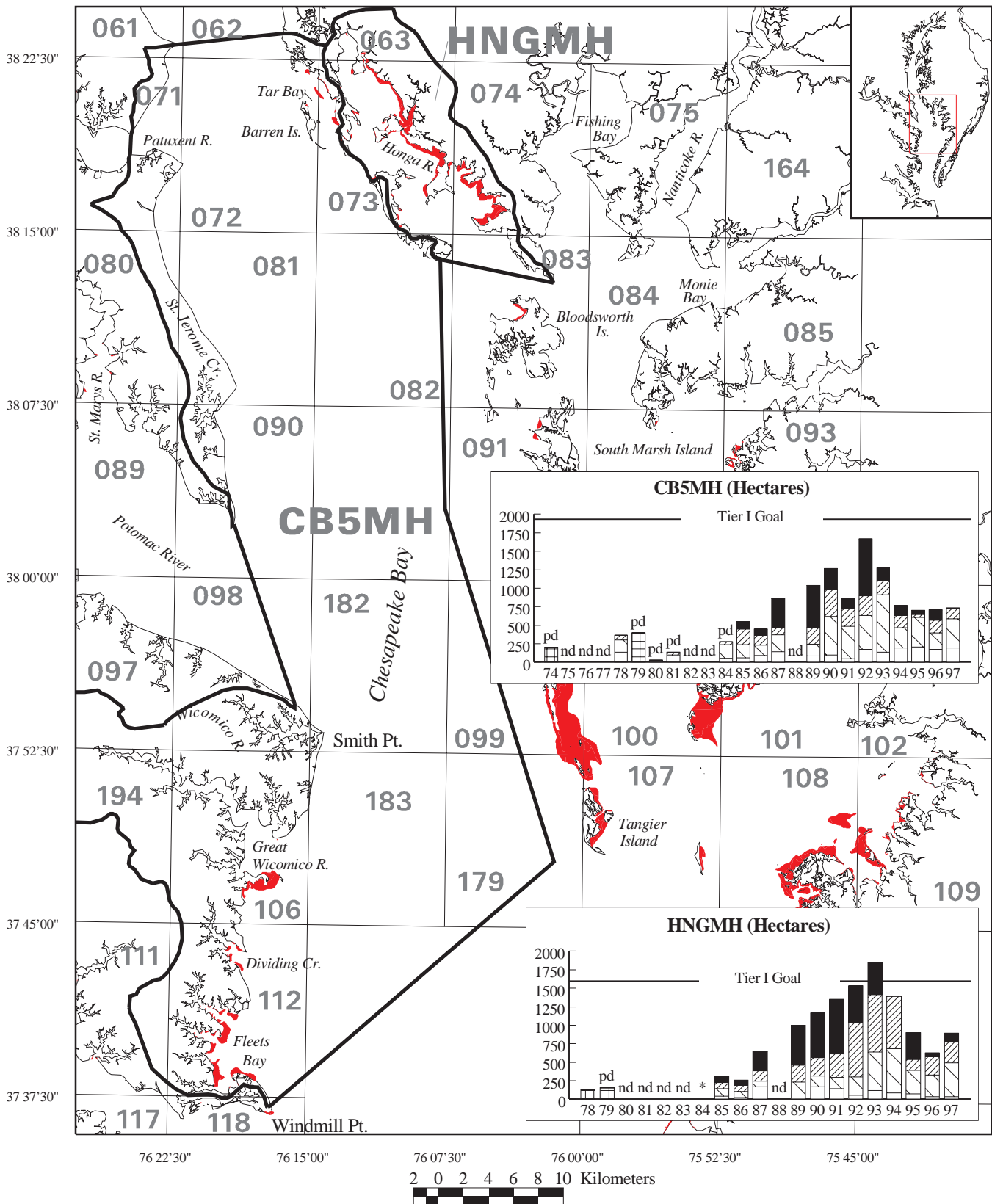


Figure 21: SAV distribution in the Lower Central Chesapeake Bay (CB5MH) and the Honga River (HNGMH) in 1997. (See Figure 10 for key.)

### **Honga River (HNGMH)**

SAV in HNGMH in 1997 increased 43% over 1996, to 890.51 hectares, 56% of the Tier I goal of 1,599.11 hectares, and 6% of the Middle Bay Zone SAV total (Figure 21; Tables 6 and 7; VIMS SAV GIS Database; CBP).

In 1997, SAV density increased in HNGMH: 13% was classified dense, 31% moderate, 51% sparse, and 4% very sparse, compared to 8% dense in 1996, 39% moderate, 47% sparse, and 6% very sparse (Figure 21; Table 8).

On the eastern shore of HNGMH in 1997, SAV beds persisted at Keenes Point; along Kirwan and Parks necks; at Asquith and Wroten islands; and around Duck Point Cove (Figure 21; Maps 73, 74). Areas of increases, and other areas of decreases as well, occurred in the persisting beds in all the latter localities: significant increases were mapped at Keenes Point; Kirwan Neck; Wallace, Worlds End, Fox, and Charles creeks; and in Lakes, Duck Point, and Fallins coves; while significant decreases were mapped at the head of the Honga River; on the east end of Wroten Island; along Parks Neck; and around Duck Point, Norman, and Hopkins coves (Figure 21; Maps 63, 73, 74, 83). On the eastern shore of HNGMH in 1997, new beds were mapped at the head of the Honga River; in Wallace and Fox creeks; around Wroten Island; and at Cedar Point on Asquith Island (Figure 21; Maps 63, 73, 74). On the western shore of HNGMH, many new beds were mapped in 1997 where no SAV had been mapped in 1996: at the south end of Meekins Neck and along Gunners, Upper Hooper, and Middle Hooper islands (Figure 21; Map 73).

No ground-truth information was reported for this segment in 1997.

### **Fishing Bay (FSBMH)**

No SAV was mapped and no ground-truth information was reported for this segment in either 1997 or in 1996 (Figure 22; Tables 6 and 7; VIMS SAV GIS Database).

## **NANTICOKE RIVER SEGMENTS**

### **Lower Nanticoke River (NANMH), Middle Nanticoke River (NANOH), Upper Nanticoke River (NANTF)**

No SAV was mapped for the Nanticoke River segments in 1997 or in any years of the aerial survey, and no ground-truth data was reported for the Nanticoke River segments in 1997 (Figure 22; Tables 6 and 7; VIMS SAV GIS Database). Tier I goals have not been established for NANMH, NANOH, and NANTF (Figure 22; Tables 6 and 7; VIMS SAV GIS Database; CBP).

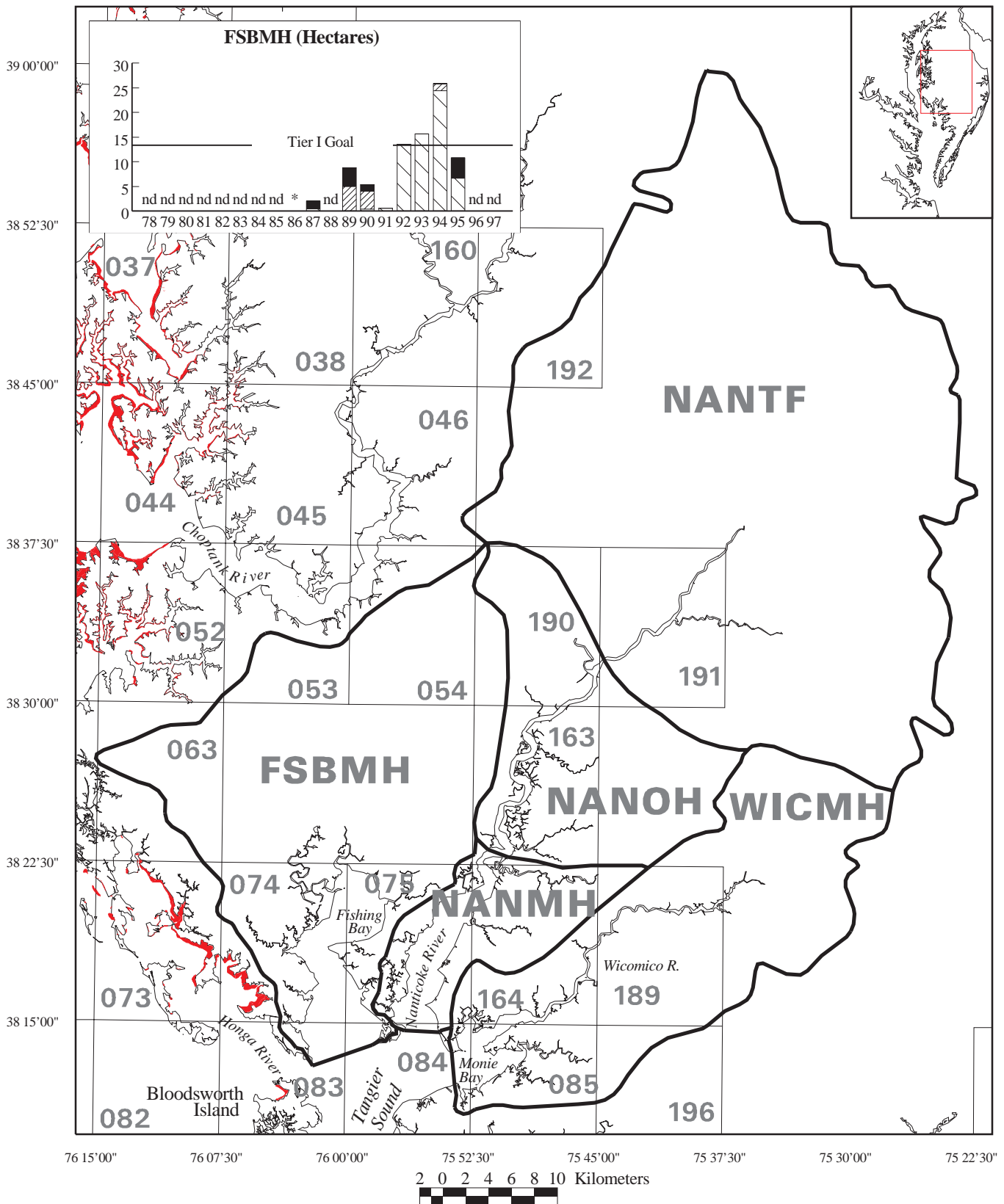


Figure 22: SAV distribution in Fishing Bay (FSBMH), the Lower, Middle, and Upper (NANMH, NANO, NANTF) Nanticoke River, and the Wicomico River (WICMH) in 1997. NANMH, NANO, NANTF, and WICMH are not graphed as no SAV was mapped from 1971–1997. (See Figure 10 for key.)

### **Wicomico River (WICMH)**

No SAV was mapped for WICMH in 1997 or in any years of the aerial survey and no ground-truth data was reported in 1997 (Figure 22; Tables 6 and 7; VIMS SAV GIS Database). No Tier I goals have been established for WICMH (Figure 22; Tables 6 and 7; VIMS SAV GIS Database; CBP).

### **TANGIER SOUND AND ASSOCIATED TRIBUTARY AND BAY SEGMENTS**

#### **Tangier Sound and the Little Annemessex River (TANMH)**

SAV in TANMH in 1997 decreased 14% from 1996, to 3,825.57 hectares, 48% of the Tier I goal of 8,053.10 hectares, 27% of the Middle Bay zone, and 14% of the Bay (Figure 23; Tables 6 and 7; VIMS SAV GIS Database; CBP).

SAV categorized as dense increased in TANMH in 1997, however, very sparse SAV also increased: 49% of SAV was classified dense, 10% moderate, 18% sparse, and 23% very sparse, compared to 36% dense in 1996, 28% moderate, 28% sparse, and 8% very sparse (Figure 23; Table 8).

Although less SAV was mapped in TANMH in 1997 than was mapped there in 1996, the very large SAV beds persisted with notable decreases, and a few small areas of minor increases, around Smith, Tangier, Cedar, and Great Fox Islands; and other, smaller beds persisted at Smith, Bloodsworth, Janes, Hazzard, Little Deal, and Watts islands and in the Little Annemessex River (Figure 23; Tables 6 and 7). The area in TANMH with the largest amount of SAV in 1997 persisted from 1996 but had large decreases in the contiguous beds extending from the southern end of Smith Island to Upper Tump, Fishbone, and Thorofare islands, and to Goose Island and Queen Ridge (Figure 23; Appendix B and C: Maps 99, 100, 107, 179; VIMS SAV GIS Database).

Beds disappeared from most of Bloodsworth and South Marsh islands in 1997 (Figure 23; VIMS SAV GIS Database). Specifically, beds mapped in 1996 were not mapped in the following areas in 1997: the south end of Bloodsworth Island as well as Pone, Tigs, and Piney Island coves; Adams and Holland islands; and Pungers Cove, Muscle Hole, and Sheepshead Harbor on South Marsh Island (Figure 23; VIMS SAV GIS Database). However, there were increases in the one bed persisting at Okahanikan Cove on Bloodsworth Island and in the two beds persisting at Johnson and Pry coves on South Marsh Island (Figure 23; VIMS SAV GIS Database).

SAV beds around Smith Island persisted but were greatly decreased in size in 1997, however, some notable increases were mapped at the northern end of Smith Island in Back, Fog Point, and Terrapin Sand coves; in the Big Thorofare; and in Tyler Creek (Figure 23; VIMS SAV GIS Database).

On Tangier and Watts islands, the beds persisted similar to 1996 but with a few small increases, especially in the Tangier North Channel (Figure 23; VIMS SAV GIS Database).



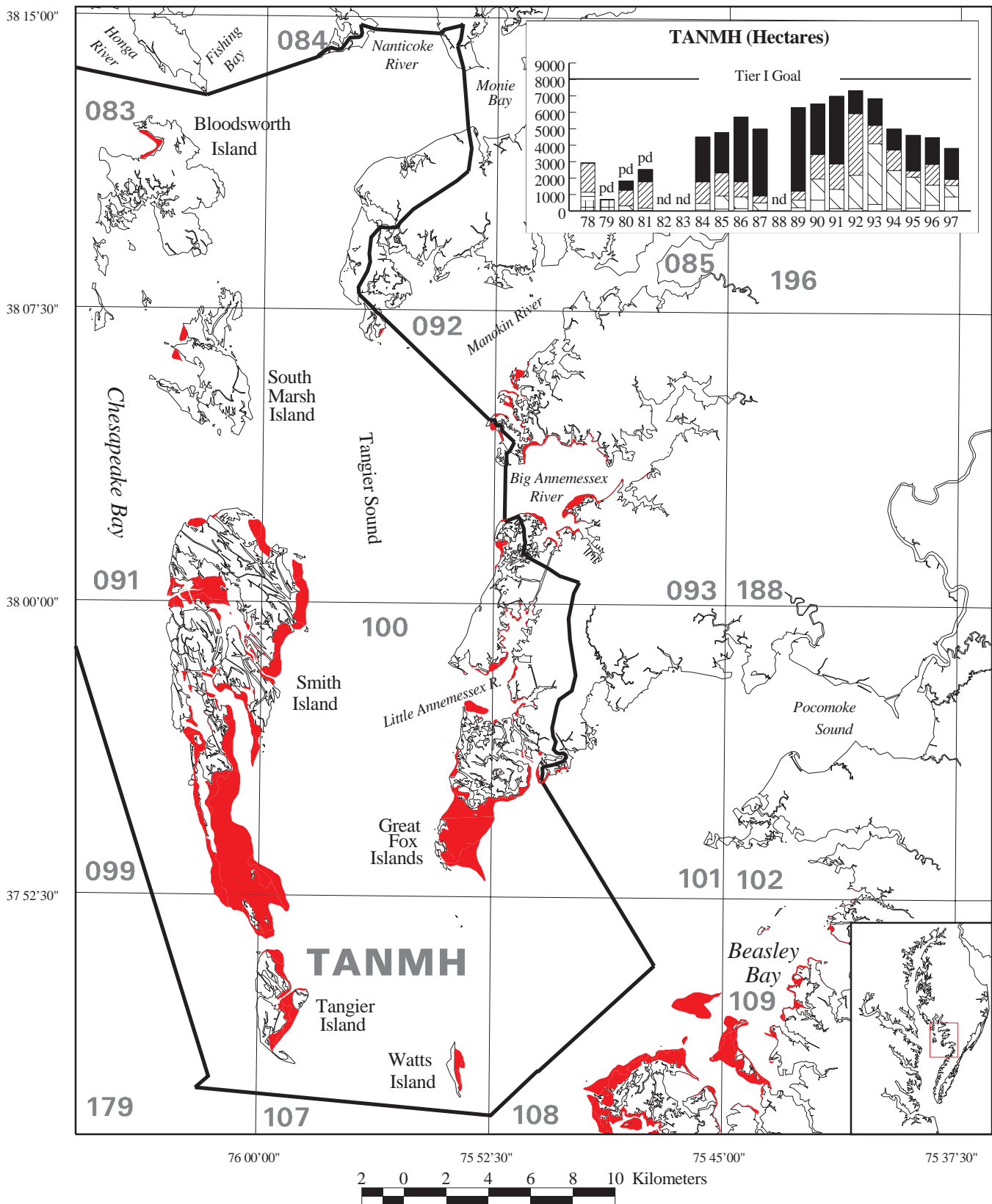


Figure 23: SAV distribution in Tangier Sound (TANMH) in 1997.  
(See Figure 10 for key.)

In the Little Annemessex River, SAV beds mapped in 1996 persisted but with notable increases in 1997, and some new beds were mapped in 1997 in Jenkins, Back, and Daugherty creeks of the Little Annemessex River (Figure 23; VIMS SAV GIS Database).

New beds for TANMH in 1997 were also mapped in the Big Thorofare and near Hog Neck on Smith Island, in Broad Creek by Cedar Island, and at Janes and Hazzard islands (Figure 23).

In 1997, as in 1996, SAV was not mapped in the portion of TANMH on Map 84, the Deal Island quadrangle, including the mouths of the Nanticoke and Wicomico rivers, and the shore from Long Point to Little Deal Island (Figure 23; Table 7; Appendix B; VIMS SAV GIS Database).

In TANMH in 1997, two species were reported from ground-truth surveys: the VIMS Field Survey reported *R. maritima* from Smith Island in Back Cove, Tyler Creek, and Twitch Cove near Drum Point; and from Goose Island (Appendices B and D: Maps 91, 99, 100, 107). VIMS also noted *R. maritima* and *Z. marina* in the large bed in the Cedar Straits by Cedar Island and in the large bed north of Queen Ridge by Goose Island (Appendices B and D: Maps 100, 107). The Citizens' survey reported *Z. marina* in Tyler Creek on Smith Island (Appendices B and D: Map 99).

### **Manokin River (MANMH)**

In MANMH in 1997, SAV increased 602% over 1996, to 56.44 hectares, 0.40% of the Middle Bay zone SAV total, and 20% of the Tier I goal of 276.20 hectares (Figure 24; Table 6 and 7; VIMS SAV GIS Database; CBP).

SAV density increased slightly in 1997 in MANMH: 44% was moderate and 56% sparse, compared to 39% moderate in 1996, and 61% sparse (Figure 24; Table 8).

SAV was mapped only along the south shore of MANMH in 1997 (Figure 24; Appendix B: Maps 92, 93). SAV beds persisted at Drum Point, and at Goose and Mine creeks with significant increases (Figure 24; Appendix B: Map 93). New beds were mapped in Drum Point Cove, and at Goose and Mine creeks (Figure 24; Appendix B: Maps 92, 93).

The Citizens reported *R. maritima* in Laws Thorofare in MANMH in 1997, although no beds were mapped in this area (Appendices B and D: Map 84).

### **Big Annemessex River (BIGMH)**

SAV in 1997 in BIGMH increased 63% over 1996, to 143.25 hectares, 1% of the Middle Bay zone SAV total and 39% of the Tier I goal of 364.52 hectares (Figure 24; Tables 6 and 7; VIMS SAV GIS Database; CBP).

In 1997, SAV density decreased in BIGMH: 65% was moderate, 25% sparse, and 10% very sparse,

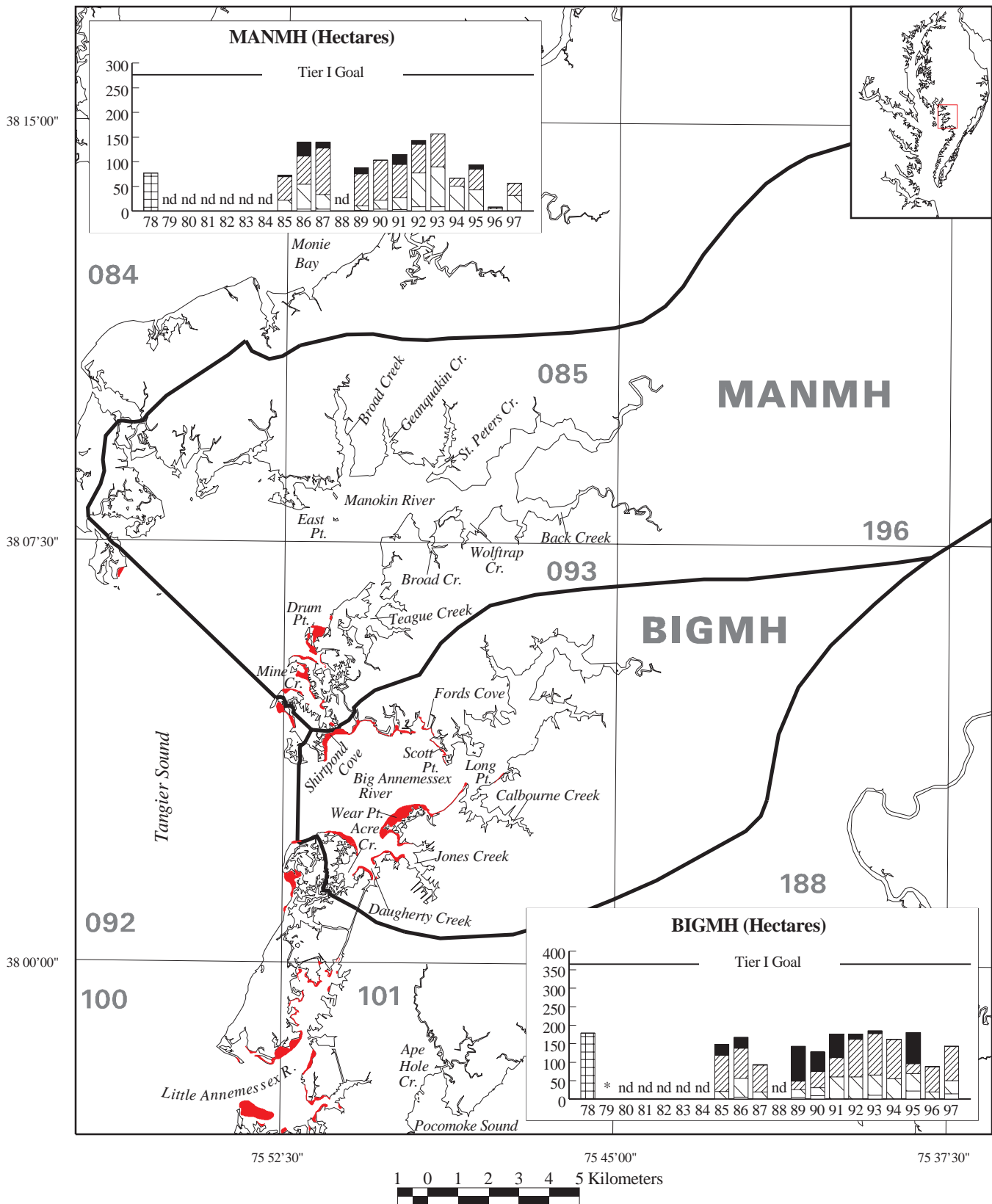


Figure 24: SAV distribution in the Manokin River (MANMH) and the Big Annesmessex River (BIGMH) in 1997. (See Figure 10 for key.)

compared to 78% moderate in 1996 and 22% sparse (Figure 24; Table 8).

SAV beds were mapped in BIGMH in 1997 on the north shore from Shirtpond Cove to Scott Point, persisting with significant increases, as well as some smaller decreases, in Shirtpond, Flatland, and Fords coves (Figure 24; Map 93). New beds were mapped on the north shore in Fords Cove and south to Scott Point (Figure 24; Map 93). On the south shore of BIGMH, SAV was mapped from Flatcap Point to Sandy Point, persisting with significant increases, as well as some smaller decreases, at Janes and Jackson islands, and at Acre, Daugherty, and Jones creeks (Figure 24; Map 93). New beds were mapped at Flatcap, Long, and Sandy points, and at Daugherty and Jones creeks (Figure 24; Map 93).

There was no ground-truth information reported for this segment in 1997.

## POCOMOKE RIVER SEGMENTS

### **Lower Pocomoke River (POCMH), Middle Pocomoke River (POCOH), and Upper Pocomoke River (POCTF)**

The Lower Pocomoke, POCMH, which includes the Pocomoke Sound, was the only CBP segment of the Pocomoke River to have SAV mapped in 1997 (Figure 25; Tables 6 and 7).

#### **Lower Pocomoke River (POCMH)**

SAV in POCMH in 1997 decreased 19% from 1996, to 529.84 hectares, 4% of the Middle Bay zone SAV total and 63% of the Tier I Goal of 840.77 hectares (Figure 25; Tables 6 and 7; VIMS SAV GIS Database; CBP).

SAV density increased in POCMH in 1997: 43% was classified as dense, 2% as moderate, 39% as sparse, and 15% as very sparse, compared to 30% dense in 1996, 12% moderate, 40% sparse, and 18% very sparse (Figure 25; Table 8).

On the northern shore, SAV beds persisted with some decreases to the beds at Oystershell and Eastward points (Figure 25; Appendix B: Map 101). On the southern shore, SAV beds persisted with notable decreases: at Webb, Scott, Halfmoon, Jacks, Marks, Jobs, Cedar, and Lower Bernard islands; in Beasley Bay; in Doe, Little Back, and Cattail creeks; and in the Thorofare (Figure 25; Appendix B: Maps 101, 102, 108, 109). Some small increases were mapped as well in the vicinity of these same beds, however, they did not offset the decreases (Figure 25; Tables 6 and 7). Beds disappeared from Hunting and Bagwell creeks as well as from Upper Bernard Island (Figure 25; Appendix B: Map 109). New beds were mapped at Guilford and Muddy creeks (Figure 25; Appendix B: Maps 101, 102, 108, 109).

VIMS reported *R. maritima* and *Z. marina* at Peters Point in POCMH in 1997 (Appendices B and

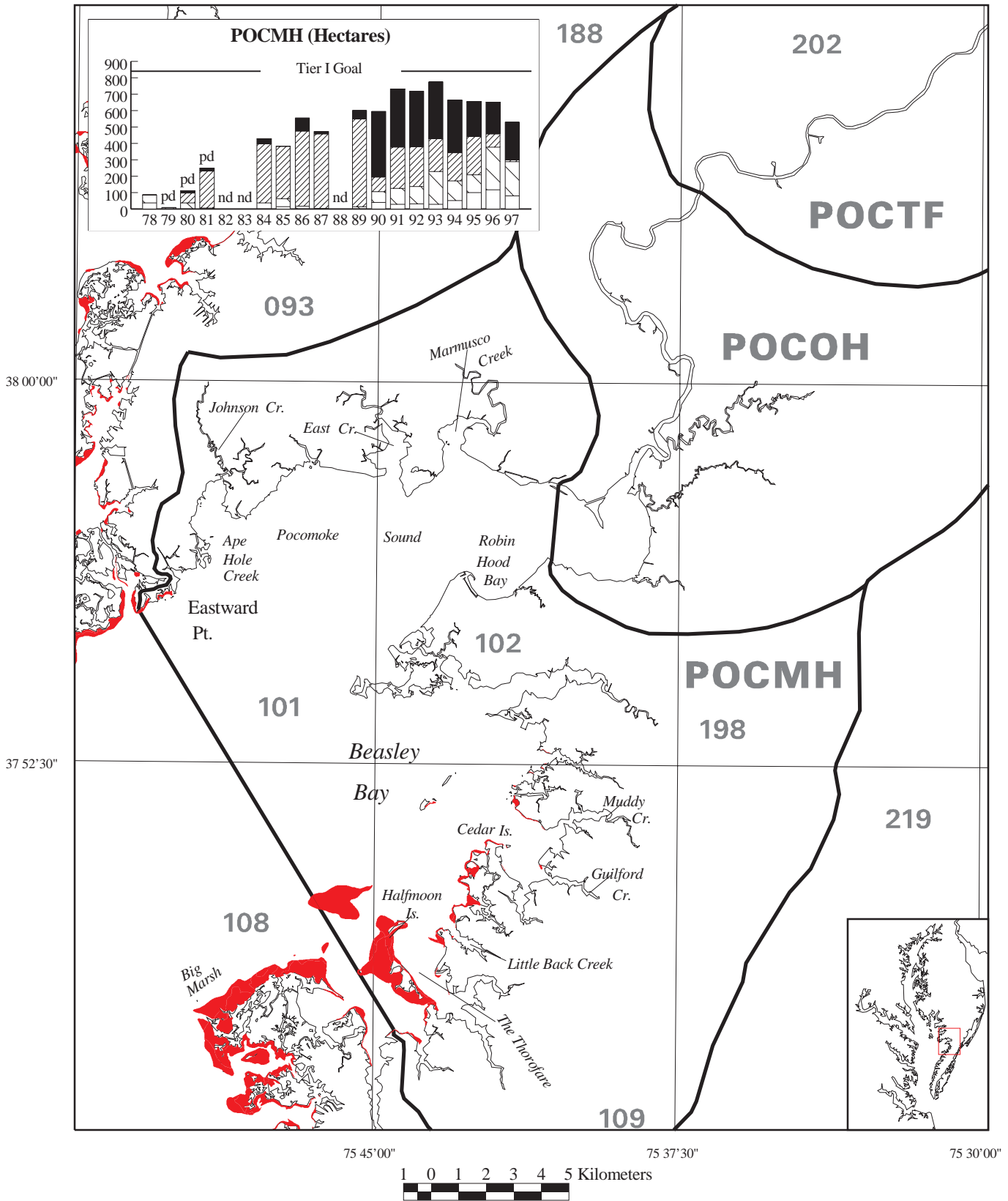


Figure 25: SAV distribution in the Lower (POCMH), Middle (POCOH), and Upper Pocomoke River (POCTF) in 1997. POCOH and POCTF are not graphed as no SAV was mapped from 1971–1997. (See Figure 10 for key.)

D: Map 109, Bed U1).

### **Middle Pocomoke River (POCOH) and Upper Pocomoke River (POCTF)**

No SAV was mapped for POCOH and POCTF in 1997 and no ground-truth information was reported (Figure 25; Tables 6 and 7; VIMS SAV GIS Database). No SAV has been mapped for POCOH or POCTF in the history of the aerial survey (VIMS SAV GIS Database). No Tier I goals have been established for POCOH and POCTF (Figure 25; Tables 6 and 7; VIMS SAV GIS Database; CBP).

### **PATUXENT RIVER AND WESTERN BRANCH RIVER TRIBUTARY SEGMENTS**

#### **Lower Patuxent River (PAXMH), Middle Patuxent River (PAXOH), Upper Patuxent River (PAXTF), and Western Branch River (WBRTF)**

SAV increased in two segments of the Patuxent River (PAXMH, PAXOH) in 1997 and decreased in PAXTF, however, no SAV was mapped in the Western Branch River segment (WBRTF) (Figure 26; Tables 6 and 7).

#### **Lower Patuxent River (PAXMH)**

In PAXMH in 1997, 1.02 hectares were mapped, compared to 1996 and 1995 when there was no SAV recorded (Figure 26; Tables 6 and 7; VIMS SAV GIS Database). The 1997 level was nearly 1% of the Tier I goal of 143.61 hectares, which has never been reached in the years of the aerial survey (Figure 26; VIMS SAV GIS Database; CBP). The highest level of SAV mapped for this segment was recorded in 1985 when 53.74 hectares were mapped (Figure 26; VIMS SAV GIS Database).

All (100%) of the SAV in PAXMH in 1997 was classified as sparse (Figure 26; Table 8).

Only one small SAV bed was mapped in PAXMH in 1997, at the mouth of Hungerford Creek on Hoopers Neck on the north shore, where The University of Maryland reported *P. pectinatus* (Figure 26; Appendices B and D: Map 71, Bed A2).

Citizens reported two additional species for PAXMH: *Z. palustris* on the north shore, in Battle, Saint Leonard, and Cuckold creeks, off Broomes Island at the mouth of Island Creek, and at Petersons Point; and *M. spicatum* on the south shore, in Green Holly Pond (Appendices B and D: Maps 60, 61, 70, 71).

#### **Middle Patuxent River (PAXOH)**

SAV in PAXOH increased 11% from 1996, to 40.08 hectares in 1997, the highest level recorded by

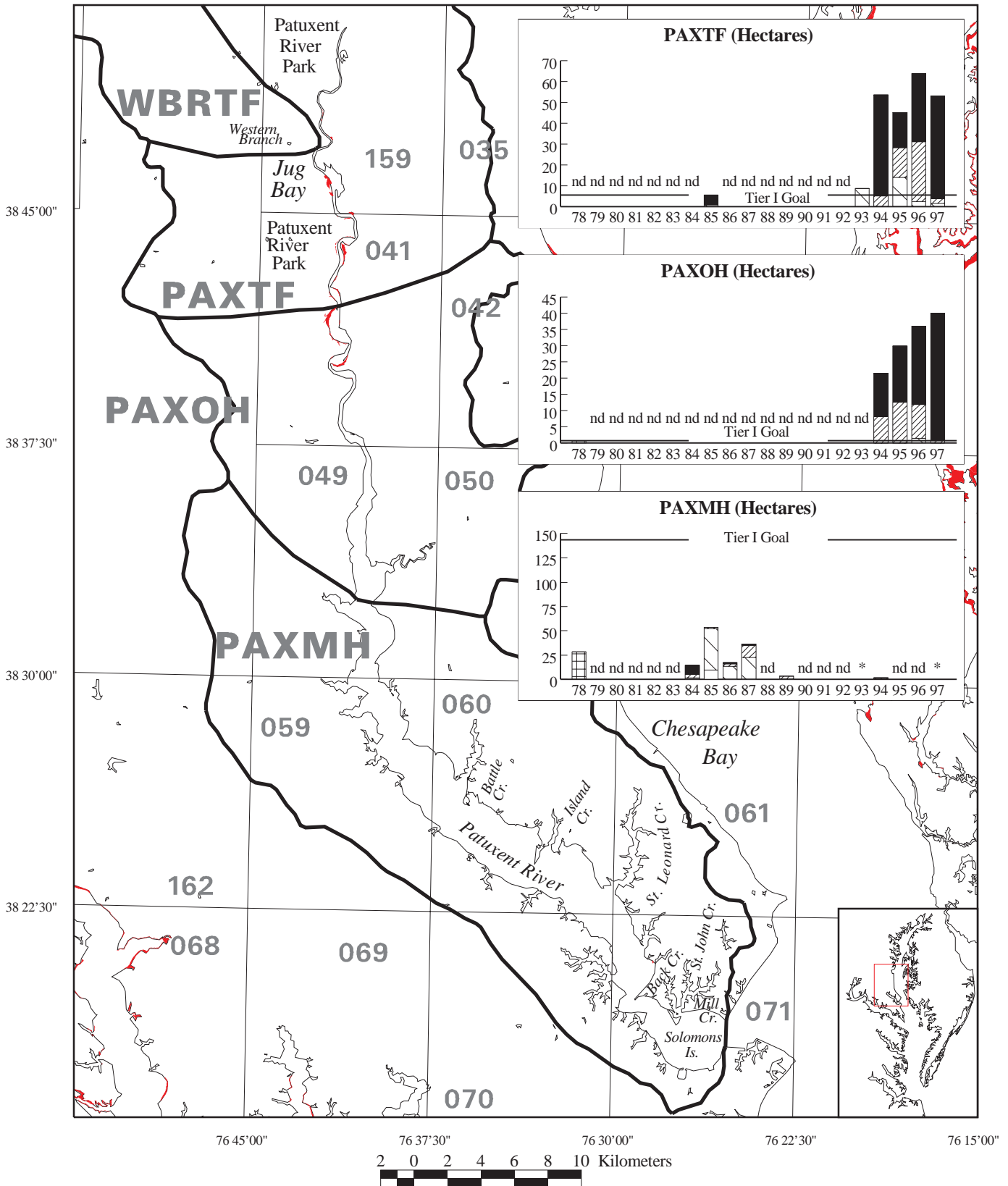


Figure 26: SAV distribution in the Patuxent River (PAXTF, PAXOH, PAXMH) and the Western Branch River (WBRTF) in 1997. WBRTF is not graphed as no SAV was mapped from 1971–1997. (See Figure 10 for key.)

the aerial survey, and well above the Tier I goal of 0.83 hectares (Figure 26; Tables 6 and 7; VIMS SAV GIS Database; CBP). SAV had increased in PAXOH four consecutive years, 1994-97 (Figure 26; VIMS SAV GIS Database).

In 1997, SAV density in PAXOH increased: 98% was classified as dense and 2% as moderate, compared to 67% dense in 1996, 29% moderate, and 4% sparse (Figure 26; Table 8).

SAV beds persisted in 1997 on both shores in the upper reaches of PAXOH, north of Friday Creek where the river broadens; these beds had areas of small increases, as well as some areas of small decreases, but remained basically the same as in 1996 (Figure 26; Map 41; Orth *et al.*, 1997). One bed present at the mouth of Cocktown Creek in 1996 was not mapped in 1997 (Appendices B and D: Map 41; Orth *et al.*, 1997). Three new, small beds were mapped in 1997 (Figure 26; Appendices B and D: Map 41: Beds A3, B3, E4).

In PAXOH in 1997, the MD-DNR, Patuxent River Park, and the Citizens reported seven species and four sightings of unidentified species of *Najas* (Appendices B and D: Map 41). Specifically, from the western shore of the Patuxent River in PAXOH, the MD-DNR reported *N. minor*, unidentified species of *Najas*, and *H. verticillata* from the large bed at the mouth of Spice Creek, and at a site by Milltown Landing; and from the eastern shore of PAXOH, *C. demersum* and unidentified species of *Najas* from new bed E4, and *N. minor* from bed C4 (Appendices B and D: Map 41). Also from the eastern shore, the Patuxent River Park reported *C. demersum*, *N. guadalupensis*, *N. minor*, and *V. americana* in Hall Creek, and the Citizens reported *C. demersum*, *E. canadensis*, *P. crispus*, and *V. americana* in Cocktown Creek (Appendices B and D: Map 41).

### **Upper Patuxent River (PAXTF)**

In PAXTF in 1997, there were 53.16 hectares, a 17% decrease from the high mark of 63.93 hectares mapped in 1996, but still well above the Tier I goal of 5.64 hectares (Figure 26; Tables 6 and 7; VIMS SAV GIS Database; CBP). The 1997 level is the third highest recorded in the years of the aerial survey (Figure 26; VIMS SAV GIS Database). There were 53.73 hectares mapped in 1994; prior to that only two years had SAV mapped: 1993 (8.78 hectares) and 1985 (5.64 hectares) (Figure 26; VIMS SAV GIS Database).

SAV density increased in PAXTF in 1997: 93% was classified dense, 4% moderate, and 3% sparse, compared to 51% dense in 1996, 45% moderate, and 4% sparse (Figure 26; Table 8).

In PAXTF in 1997, SAV beds persisted along both shores, including the large beds in Jug Bay, but noticeable decreases were mapped there as well as in beds located by Iron Pot Landing, by the mouth of Galloway Creek, and by Bristol Landing in the north above Jug Bay; and in beds located from the mouth of Lyons Creek, south on both shores to the vicinity of Kings Creek (Figure 26; Appendix B: Maps 41, 159). SAV disappeared entirely from the western shore, just north of the mouth of Kings Creek; and from the eastern shore, at the mouth of Kings Branch to the mouth of Lyons Creek



## SAV

(Figure 26; Appendix B: Maps 41, 159). A new bed was mapped at the mouth of Mattaponi Creek (Figure 26; Appendix B: Map 41).

In PAXTF in 1997, eight species were reported as well as unidentified species of *Najas* and an unidentified species of SAV (Appendices B and D: Maps 41, 159). The MD-DNR reported *H. verticillata* in Jug Bay; and *Najas* sp. and *H. verticillata* at the mouth of Mattaponi Creek and from the bed on the east shore south of Kings Branch (Appendices B and D: Maps 41, 159). The Citizens' survey also reported *H. verticillata* at the Route 4 bridge crossing and just south of Jug Bay (Appendices B and D: Map 159). The Patuxent River Park reported: *C. demersum*, *E. canadensis*, *H. verticillata*, *N. minor*, *N. guadalupensis*, *P. crispus*, *P. pusillus*, *V. americana*, and an unidentified SAV species north of Jug Bay, from the mouth of Western Branch to the mouth of Owens Branch; *H. verticillata* and *N. minor* in Jugs Bay; *C. demersum*, *E. canadensis*, *H. verticillata*, and *N. minor* in Lyons Creek; and *E. canadensis*, *C. demersum*, *H. verticillata*, *N. minor*, and *P. crispus* in Mattaponi Creek (Appendices B and D: Maps 41, 159).

### **Western Branch River (WBRTF)**

No SAV was mapped in WBRTF in 1997 or in any years of the aerial survey (Figure 26; Tables 6 and 7; VIMS SAV GIS Database). No Tier I goal has been established for WBRTF (Figure 26; CBP).

Five species were reported in 1997 by the Patuxent River Park from WBRTF, in the lower portion of the Western Branch tributary, near the confluence with Horse Tavern Branch and Charles Branch, above the confluence with the Patuxent River: *C. demersum*, *E. canadensis*, *H. verticillata*, *N. minor*, and *Z. palustris* (Figure 26; Appendices B and D: Map 159).

## POTOMAC RIVER AND TRIBUTARY SEGMENTS

### **Lower Potomac River (POTMH), Middle Potomac River (POTOH), Upper Potomac River (POTTF), Mattawoman Creek (MATTF), and Piscataway Creek (PISTF)**

SAV in 1997 in the Potomac River as a whole (CBP segments POTMH, POTOH, POTTF, MATTF, PISTF combined) increased to 2,600.74 hectares, from 2,181.74 hectares in 1996 (Tables 6 and 7; VIMS SAV GIS Database). [The total SAV in 1995 in the Potomac River as a whole was 1,906.33 hectares, which was the lowest level since 1,862.89 hectares were mapped in 1985 (Tables 6 and 7; VIMS SAV GIS Database). The highest total of SAV for the Potomac River as a whole was 3,595.80 hectares mapped in 1991 (VIMS SAV GIS Database).]

In the Potomac River in 1997, SAV levels increased over those in 1996 in all CBP segments except POTTF (Figures 27, 28, 29; Tables 6 and 7). However, changes were complex within CBP segments: for example, SAV increased in POTMH and POTOH in 1997, but there were some quadrangles within these CBP segments where SAV decreased in abundance (Table 7: POTMH, Map 88; POTMH, Maps 55, 65). Also, SAV decreased in POTTF in 1997, but there were some

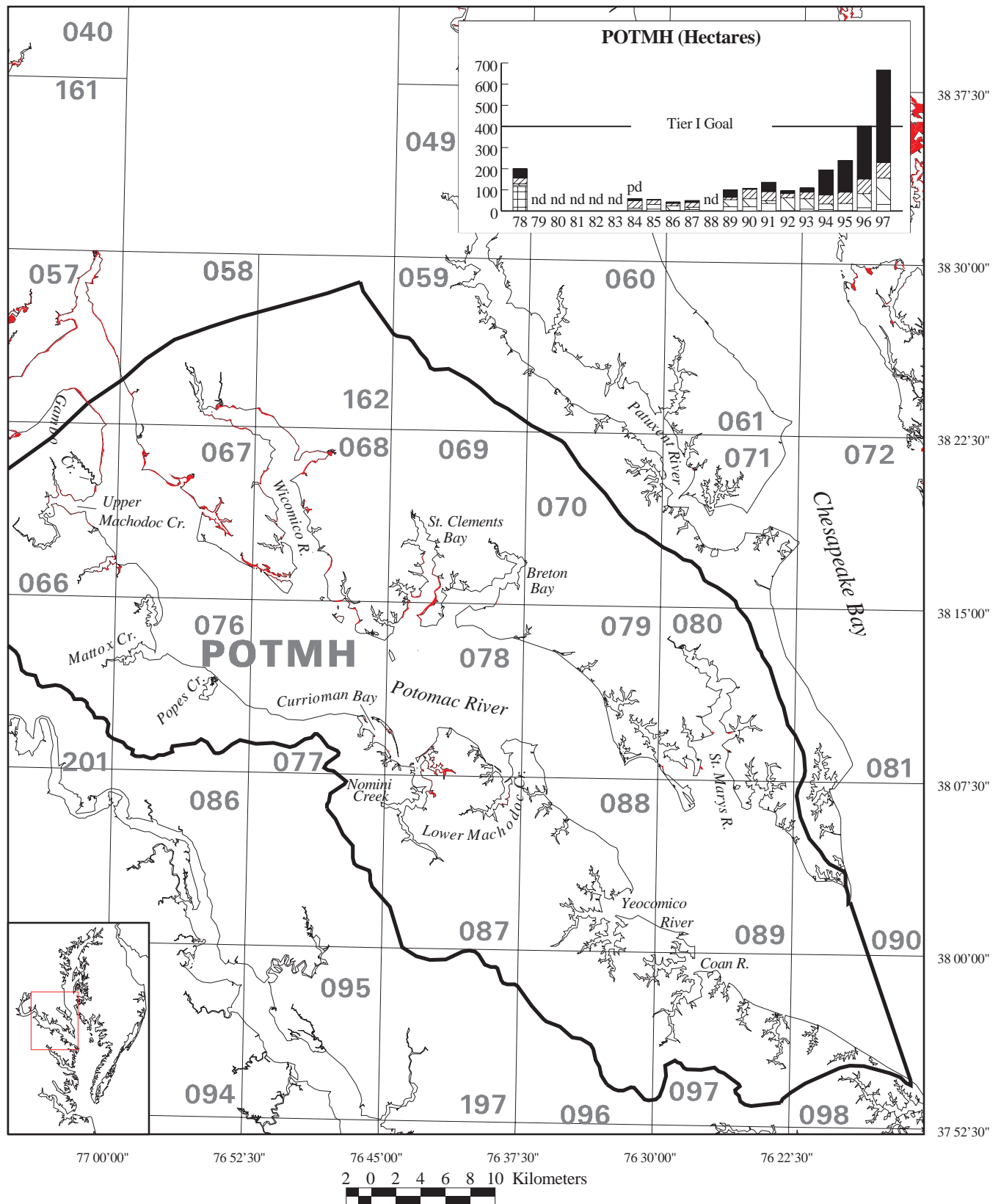


Figure 27: SAV distribution in the Lower Potomac River (POTMH) in 1997. (See Figure 10 for key.)

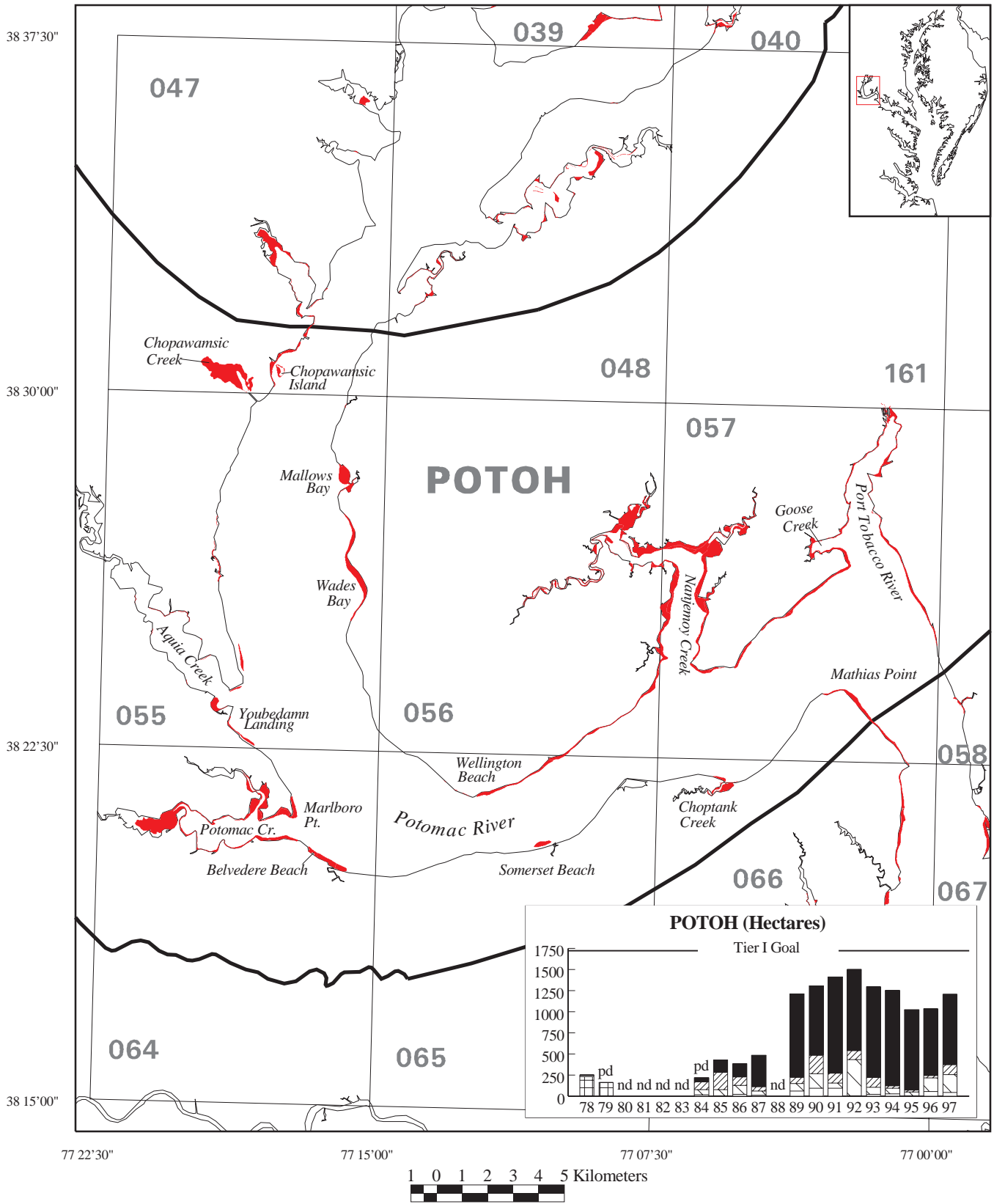


Figure 28: SAV distribution in the Middle Potomac River (POTOH) in 1997.  
(See Figure 10 for key.)

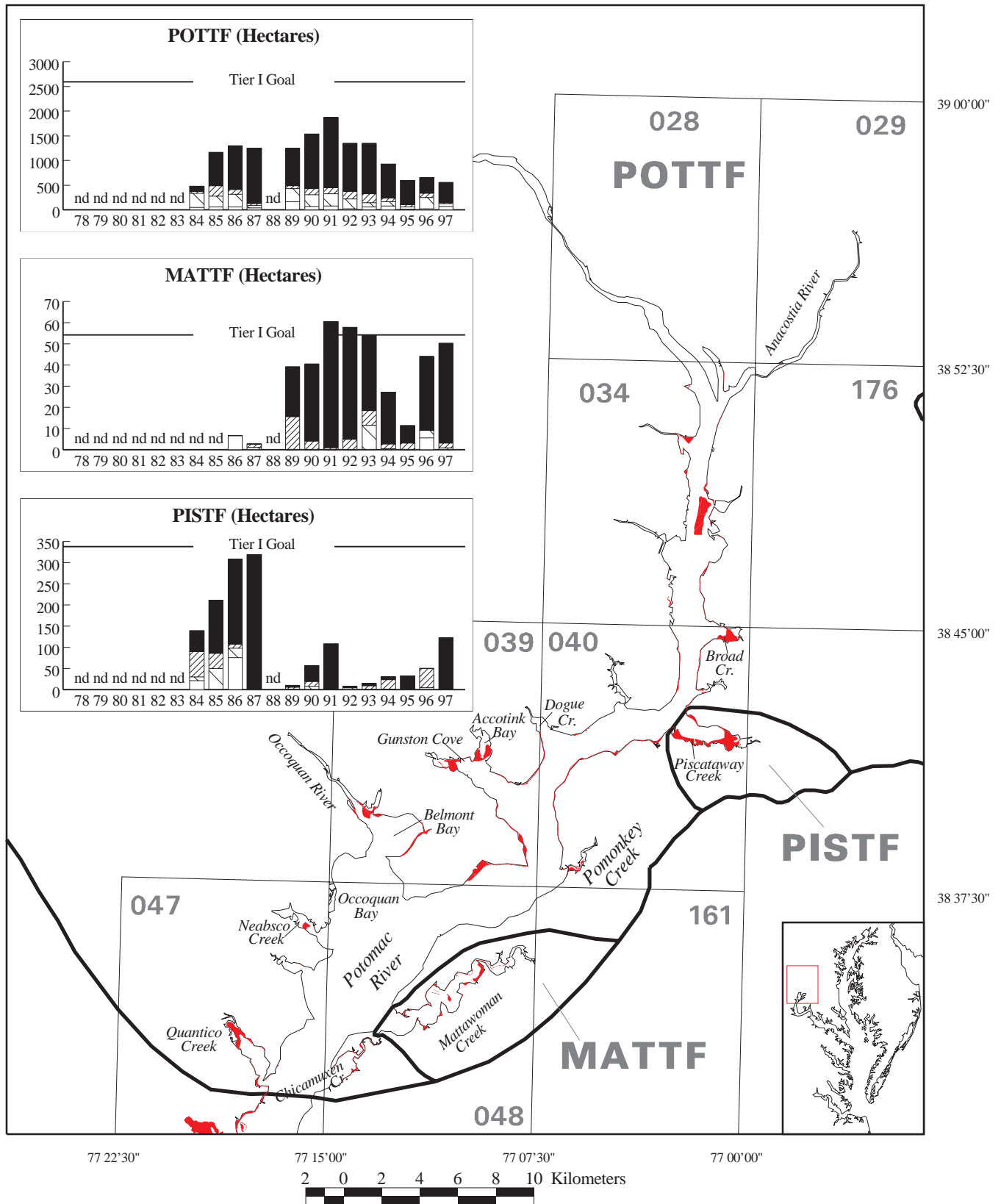


Figure 29: SAV distribution in the Upper Potomac River (POTTF), Mattawoman Creek (MATTF), and Piscataway Creek (PISTF) in 1997. (See Figure 10 for key.)

## SAV

quadrangles within this CBP segment which had increases of SAV (Table 7: POTTF, Maps 28, 40). The density and species composition of SAV beds, as well as their locations, further complicated the picture of SAV changes in the Potomac River (Figures 27, 28, 29; Tables 6, 7, 8; Appendices B, C, D; VIMS SAV GIS Database).

### **Lower Potomac River (POTMH)**

SAV in POTMH in 1997 increased 66% over 1996, to 666.84 hectares, 167% of the Tier I goal of 400.13 hectares, 5% of the Middle Bay zone SAV total, and 2% of the Bay SAV total (Figure 27; Tables 6 and 7; VIMS SAV GIS Database; CBP). This is the second year of the aerial survey that the SAV level in POTMH exceeded the Tier I goal; the 1996 level was 2.27 hectares above the goal (Figure 27; Tables 6 and 7; VIMS SAV GIS Database; CBP). SAV abundance in POTMH increased each year since 1993 and, in 1997, reached the highest level recorded since the aerial survey began (Figure 27; VIMS SAV GIS Database). [The lowest surveyed level of SAV in POTMH was 43.12 hectares in 1986 (Figure 27; VIMS SAV GIS Database).] However, despite increases in abundance and density, SAV is still absent in most areas of POTMH, especially the main stem Potomac River (Figure 27; Tables 6, 7, and 8).

The percentage of SAV classified as dense increased slightly in 1997 in POTMH, however, the percentage of moderate SAV declined while the sparse and very sparse SAV increased: 66% of SAV was classified as dense, 11% as moderate, 19% as sparse, and 5% as very sparse, compared to 62% dense in 1996, 17% moderate, 17% sparse, and 4% very sparse (Figure 27; Table 8).

On the north shore in POTMH in 1997, SAV beds persisted with areas of decreases and areas of increases: by Lower Cedar Point; in Picowaxen and Cuckold creeks; in Neale and St. Catherine sounds; in Captico Bay of the Wicomico River; in St. Clements Bay; and in the St. Marys River including St. George and St. Inigoes creeks (Figure 27; Appendix B: Maps 67, 68, 69, 77, 78). New beds were mapped in 1997 on the north shore: near Lower Cedar, Waverly, Lloyd, and Bachelor Hope points; in Cuckold Creek; in Neale and St. Catherine sounds; in the Wicomico River on both shores, from the mouth north to Cooksey Point, including Chaptico Bay; in Breton Bay; and on both shores of the St. Marys River (Figure 27; Appendix B: Maps 67, 68, 69, 77, 78).

On the south shore in POTMH in 1997, SAV beds persisted with areas of decreases and areas of increases: along Mathias Neck south of Persimmon Point; in Rosier and Goldman creeks; in Hollis Marsh of Currioman Bay; and in Nomini and Buckner creeks (Figure 27; Appendix B: Maps 66, 67, 77, 78). New beds were mapped on the south shore in Upper Machodoc, Buchner, Nomini, and Rosier creeks (Figure 27; Appendix B: Maps 66, 77, 78). Very small areas of decrease were noted north of Upper Machodoc Creek, and one bed mapped in 1996 in Lower Machodoc Creek was not mapped in 1997 (Figure 27; Appendix B: Maps 78, 66).

In POTMH in 1997, eight species and an unidentified species of SAV were reported by the following ground-truth surveys (Appendices B and D: Maps 57, 58, 66, 67, 77, 78, 87, 88, 89, 96, 97).

Along the south shore of the Potomac River in POTMH in 1997, VIMS reported *P. pectinatus* to the north of the Harry Nice Memorial Bridge (Appendices B and D: Map 66). Also on the south shore of POCMH, the USGS reported: *V. americana* along Mathias Point Neck; *V. americana* and *P. perfoliatus* along Persimmon Point north of the Harry Nice Memorial Bridge; *M. spicatum* in Currioman and Poor Jack creeks off Currioman Bay; *Z. palustris* and *M. spicatum* in Currioman Bay, and in Nomini, Buckner, and Lower Machodoc creeks; *Z. palustris* in Glebe Harbor and Glebe Creek off Lower Machodoc Creek, at Lynch Point and in Lodge Creek in the West Yeocomico River, in Judith Sound, and west of Travis point in Kingscote, Glebe, and Cod creeks and the Coan River (Appendices B and D: Maps 57, 66, 67, 77, 78, 87, 88, 89, 96, 97).

Also on the south shore in 1997, the Citizens' survey reported *M. spicatum*, *P. crispus*, *P. pectinatus*, *P. perfoliatus*, and *V. americana* to the north of the Harry Nice Memorial Bridge, and *M. spicatum*, *P. perfoliatus*, and *V. americana* to the south; *P. perfoliatus* and *V. americana* north of the mouth of Upper Machodoc Creek; *P. perfoliatus* in Upper Machodoc Creek; *M. spicatum* at the south end of Nomini Bay; *M. spicatum* and *Z. palustris* in Nomini Creek; and *Z. palustris* in Glebe and Lower Machodoc creeks; and an unidentified SAV in Fleets Cove off Hull Creek (Appendices B and D: Maps 66, 67, 78, 87, 97).

Along the north shore, the USGS reported: *M. spicatum* and *V. americana* north of the Harry Nice Memorial Bridge; and *V. americana* and *P. perfoliatus* at the mouth of Popes Creek (Appendices B and D: Maps 58, 67). Citizens reported: *M. spicatum*, *V. americana*, and *P. perfoliatus* south of the Harry Nice Memorial Bridge; *H. dubia*, *M. spicatum*, and *P. perfoliatus* in Cuckold Creek; and *Z. palustris* to the north of Rose Croft Point in the St. Marys River (Appendices B and D: Maps 67, 80). VIMS reported *R. maritima* in the mouth of St. Inigoes Creek (Appendices B and D: Maps 80).

### **Middle Potomac River (POTOH)**

In 1997 in POTOH, SAV increased for the second consecutive year, to 1,206.26 hectares, 16% more than in 1996, 70% of the Tier I goal of 1,725.78 hectares, 8% of the Middle Bay zone SAV total, and 4% of the Bay SAV total (Figure 28; Tables 6 and 7; VIMS SAV GIS Database; CBP).

In 1997 in POTOH, the percentage of SAV in the dense category decreased, but the absolute number of hectares was actually greater than in 1996: 69% (829.57 hectares) was classified as dense in 1997, 10% as moderate, 18% as sparse, and 4% as very sparse, compared to 76% (787.62 hectares) dense in 1996, 3% moderate, 15% sparse, and 6% very sparse (Figure 28; Table 8).

On the south shore of POTOH in 1997, SAV beds persisted, but with large changes, in Chopawamsic, Potomac, Aquia, and Choptank creeks; along the shore from Quantico to Chopawamsic Island; along the shore south of Widewater to Youbedamn Landing; at Marlboro Point; at Belvedere and Somerset beaches; and at Mathias Point (Figure 28; Appendix B: Maps 47, 55, 57, 64, 65, 66). The largest decreases occurred at Chopawamsic Island; along the shore south of Widewater to Youbedamn Landing; in Aquia Creek; at the mouth of Potomac Creek, west of

## SAV

Marlboro Point; and at the western end of Somerset Beach (Figure 28; Appendix B: Maps 47, 55, 57, 64, 65, 66). The largest increases occurred in Chopawamsic Creek; in Potomac Creek; north of Marlboro Point; at Belvedere Beach; at the eastern end of Somerset Beach; in Choptank Creek; and at Mathias Point (Figure 28; Appendix B: Maps 47, 55, 57, 64, 65, 66).

On the north shore of POTOH in 1997, SAV beds persisted, but also with many changes, in Mallows and Wades Bay; from Maryland Point north to Blossom Point; in Nanjemoy Creek; from Upper Cedar Point to Windmill Point; in the Port Tobacco River; and along the eastern shore at the mouth of the Port Tobacco River (Figure 28; Appendix B: Maps 55, 56, 57, 65). The largest decreases occurred north of Mallows Bay; in Mallows and Wades bays; at Smith Point; from Thomas Point to Maryland Point; from Maryland Point to Blossom Point; on both shores of the mouth of Nanjemoy Creek, from Upper Cedar Point to Windmill Point; and in Goose Creek off the Port Tobacco River (Figure 28; Appendix B: Maps 47, 55, 57, 65). Other smaller decreases occurred in a few areas of Nanjemoy Creek and the Port Tobacco River, but these two tributaries had many more areas with much larger increases (Figure 28; Appendix B: Maps 56, 57).

In POTOH in 1997, twelve species were reported by ground-truth surveys conducted by the USGS, the USFWS, and the Citizens' SAV Hunt (Appendices B and D: Maps 47, 55, 56, 57, 64, 65, 66). *Hydrilla verticillata* was reported extensively by the USGS, either alone or with other species, from both sides of the Potomac River, and in the tributaries and bays, from the border with POTTF, to Potomac Creek on the south shore and to a place above Thomas Point on the north shore (Appendices B and D: Maps 47, 55, 64).

From the south shore of POTOH in 1997, the USGS reported the following species: *H. verticillata* at Quantico; *H. verticillata*, *C. demersum*, and *N. minor* in Chopawamsic Creek and by Chopawamsic Island; *H. verticillata*, *N. minor*, *V. americana*, and *M. spicatum* south of Widewater; *H. verticillata*, *M. spicatum*, *N. minor*, and *C. demersum* in Aquia Creek; *H. verticillata* and *M. spicatum* south of Youbedamn Landing; *M. spicatum* north of Marlboro Point and at Belvedere Beach at the mouth of Potomac Creek; *H. verticillata*, *M. spicatum*, *V. americana*, *N. minor*, and *C. demersum* in Potomac Creek; *V. americana* at Somerset Beach; *M. spicatum* in Choptank Creek; and *V. americana* and *P. perfoliatus* at Mathias Point (Appendices B and D: Maps 47, 55, 57, 64, 65, 66).

From the north shore of POTOH, the USGS reported the following: *V. americana* north of Mallows Bay; *M. spicatum*, *H. verticillata*, and *V. americana* in Mallows Bay; *M. spicatum*, *H. verticillata*, *H. dubia*, and *V. americana* south of Mallows Bay; *M. spicatum*, *N. minor*, *H. verticillata*, *C. demersum*, and *V. americana* in Wades Bay; *V. americana* at Clifton Beach; *C. demersum*, *H. verticillata*, *V. americana*, and *M. spicatum* between Smith and Thomas points; *V. americana* between Thomas and Maryland points; *V. americana* and *M. spicatum* at Maryland Point and Wellington Beach; *V. americana* from north of Wellington Beach to south of Blossom Point; *M. spicatum*, *E. canadensis*, *V. americana*, and *C. demersum* in Nanjemoy Creek; *M. spicatum*, *E. canadensis*, *V. americana*, *C. demersum*, and *P. perfoliatus* in Burgess Creek off Nanjemoy Creek; *V. americana* from the mouth of Nanjemoy Creek east to Upper Cedar Point; *V. americana*, *P.*

*perfoliatus*, *P. pectinatus*, *M. spicatum*, *C. demersum*, and *N. minor* from the Port Tobacco River; and *V. americana*, *P. perfoliatus*, *P. pectinatus*, and *M. spicatum* along the eastern shore from the mouth of the Port Tobacco River, south to the border with POTMH (Appendices B and D: Maps 47, 55, 56, 57, 65).

The USFWS reported: *V. americana* at Maryland Point; *V. americana* and *M. spicatum* at Wellington Beach; *V. americana* north of Wellington Beach, to north of Riverside; *V. americana*, *M. spicatum*, *C. demersum*, and one sighting of *E. canadensis* in Nanjemoy Creek; *V. americana*, *M. spicatum*, *C. demersum*, and one sighting each of *P. pusillus* and *E. canadensis* in Burgess Creek, off Nanjemoy Creek; and one sighting of *V. americana* and *M. spicatum* in Goose Creek, off the Port Tobacco River (Appendices B and D: Maps 56, 57, 65).

The Citizens reported the following: *H. verticillata* and *M. spicatum* north of Chopawamsic Island; *M. spicatum*, *V. americana*, and *H. verticillata* north of Mallows Bay; *H. verticillata* and *M. spicatum* in Mallows Bay; *V. americana* at the mouth of Nanjemoy Creek; *V. americana* to the north of Upper Cedar Point; *P. perfoliatus* and *V. americana* at Windmill Point and at the mouth of Goose Creek, off the Port Tobacco River; *V. americana*, *H. verticillata*, and *M. spicatum* in Goose Creek; *P. pectinatus*, *P. perfoliatus*, and *V. americana* by Brentland, on the western shore of the Port Tobacco River (Appendices B and D: Maps 47, 55, 57).

### **Upper Potomac River (POTTF)**

In 1997 in POTTF, SAV decreased 14% from 1996, to 554.11 hectares, 21% of the Tier I Goal of 2,591.90 hectares, 4% of the Middle Bay zone SAV total, and 2% of the Bay SAV total (Figure 29; Tables 6 and 7; VIMS SAV GIS Database; CBP).

In POTTF, the percentage of SAV in the dense and the very sparse categories increased in 1997: 73% was categorized as dense in 1997, 4% as moderate, 11% as sparse, and 12% as very sparse, compared to 47% dense in 1996, 14% moderate, 34% sparse, and 4% very sparse (Figure 29; Table 8).

SAV in POTTF in 1997 was mapped in the Anacostia River, and on both the eastern and western shores of the Potomac River, from the D.C. area in the northern part of POTTF, to the southern boundary of POTTF at Quantico on the western shore, and at Chicamuxen Creek on the eastern shore (Figure 29; Appendix B: Maps 34, 47, 48). SAV was also mapped in 1997 in the Potomac River above the confluence with the Anacostia River, where no SAV was mapped in 1996, on the eastern shore by the Washington National Airport, and on the western shore opposite Theodore Roosevelt Island (Figure 29; Appendix B: Maps 28, 34).

SAV beds persisted, but with large decreases, in Quantico, Neabsco, Pomonkey, Chicamuxen, and Broad creeks; in the Occoquan River and Belmont Bay; in Gunston Cove and Accotink Bay; along Mason Neck; and in one large bed above the I-95 (Woodrow Wilson) bridge (Figure 29; Appendices



## SAV

B and D: Maps 34, 39, 40, 47, 48). The largest decreases occurred in Quantico, Neabsco, and Chicamuxen creeks; in the Occoquan River and Belmont Bay; in Gunston Cove and Accotink Bay; and around the perimeter of the large bed above the I-95 bridge (Figure 29; Appendices B and D: Maps 34, 39, 47, 48). Beds present in 1996 in the Washington Channel and in the Anacostia River were decreased in 1997 (Figure 29; Appendices B and D: Maps 28, 29, 34).

The largest increases occurred in Belmont Bay; Broad and Pomonkey creeks; the shore by Dogue Creek; the shore north of Pomonkey Creek to the I-95 bridge; and the shore along Alexandria (Appendices B and D: Maps 34, 39, 40).

In POTTF in 1997, ten species were reported as well as fourteen sightings of unidentified species of *Najas* (Appendices B and D: Maps 28, 29, 34, 39, 40, 47, 48, 176).

In 1997, the USGS reported the following species north of the confluence of the Anacostia River in POTTF: *H. verticillata* in the Potomac River to the north and south of Theodore Roosevelt Island, and by the Washington National Airport; *H. verticillata* and *V. americana* south of the US 1 bridge; *V. americana* and *M. spicatum* in the Washington Channel; and *H. verticillata*, *M. spicatum*, and *V. americana* in the Anacostia River (Appendices B and D: Maps 28, 29, 34, 176).

The USGS reported the following from the east shore of POTTF in 1997: *V. americana* by Bolling Air Force Base; *H. verticillata*, *C. demersum*, and *N. minor* in the large bed north of the I-95 bridge; *N. minor*, *H. verticillata*, *V. americana*, *P. pectinatus*, *H. dubia*, and *M. spicatum* south of Bolling Air Force Base, to Broad Creek; *H. verticillata*, *V. americana*, *C. demersum*, *H. dubia*, and *N. minor* in Broad Creek; *H. verticillata*, *V. americana*, *H. dubia*, and *N. minor* from Broad Creek to above Marshall Hall; *H. verticillata*, *V. americana*, and *C. demersum* from Marshall Hall to Pomonkey Creek; *H. verticillata*, *V. americana*, *H. dubia*, *N. minor*, *M. spicatum*, and *C. demersum* along Indian Head, from Chapman Point to Deep Point; *H. verticillata*, *N. minor*, and *V. americana* in Chicamuxen Creek (Appendices B and D: Maps 34, 40, 48).

The USGS reported the following from the west shore of POTTF in 1997: *V. americana*, *N. minor*, *H. verticillata*, and *P. crispus* from Alexandria to Hog Island; *H. verticillata*, *V. americana*, *H. dubia*, *N. minor*, *M. spicatum*, and *P. pectinatus* from Collingwood to Stratford; *H. verticillata*, *V. americana*, *H. dubia*, and *N. minor* in the Dogue Creek area; *H. verticillata*, *C. demersum*, *N. minor*, *M. spicatum*, and *V. americana* in the Gunston Cove area; *H. verticillata*, *V. americana*, *H. dubia*, *M. spicatum*, *C. demersum*, *P. pusillus*, *P. pectinatus*, and *N. minor* along Mason Neck; *H. verticillata*, *V. americana*, *N. minor*, and *M. spicatum* in the Occoquan River and in Belmont Bay; *H. verticillata* in Powell Creek; *H. verticillata*, *V. americana*, and *N. minor* in Quantico Creek (Appendices B and D: Maps 34, 39, 40, 47).

Citizens reported the following from the east shore of POTTF in 1997: *H. verticillata* in the large bed north of the I-95 bridge; *V. americana*, *M. spicatum*, and *H. verticillata* from the I-95 bridge south to Broad Creek; *H. verticillata*, *Najas* sp., and *V. americana* in the Broad Creek area; *V. americana*

from the Head Neck area, Marshall Hall, and Fenwick; *C. demersum*, *H. verticillata*, *V. americana*, *N. minor*, and *Najas* sp. in Pomonkey Creek; *V. americana* at Chapman Point; and *H. verticillata* and *Najas* sp. in Chicamuxen Creek (Appendices B and D: Maps 34, 40, 48).

Citizens reported the following from the west shore of POTTF in 1997: *C. demersum* and *H. verticillata* to the north of Hog Island; *C. demersum*, *E. canadensis*, *H. verticillata*, and *V. americana* were found in the area of Dogue Creek; *H. verticillata*, *Najas* sp., and *C. demersum* in Accotink and Pohick bays; *M. spicatum*, *H. verticillata*, and *V. americana* in Gunston Cove; *H. verticillata*, *M. spicatum*, *Najas* sp., *C. demersum*, and *V. americana* along Mason Neck; *H. verticillata*, *M. spicatum*, *Najas* sp., and *V. americana* on the eastern shore of Belmont Bay (Appendices B and D: Maps 34, 39, 40).

### **Mattawoman Creek (MATTF)**

SAV in MATTF increased 14% over 1996, to 50.28 hectares, 93% of the Tier I goal of 54.33 hectares (Figure 29; Tables 6 and 7; VIMS SAV GIS Database; CBP). The Tier I goal was last exceeded in 1992; 1991 was the first and only other year it was exceeded (Figure 29; VIMS SAV GIS Database; CBP).

In 1997, SAV density in MATTF increased: 94% was dense, 4% moderate, and 2% sparse, compared to 79% dense in 1996, 8% sparse, and 13% very sparse (Figure 29; Table 8).

SAV beds persisted along both shores of Mattawoman Creek, with some areas of increase and some areas of decrease in these beds. Noticeable decreases occurred at the mouth where beds disappeared entirely from both shores. Significant increases were mapped in beds on both shores and especially the bed at Thorofare Island (Appendices B and D: Map 48). New beds were mapped on both shores: on the south shore at Bullock Neck; and on the north shore around Marsh Island; and on the shore up to Indian Head (Appendices B and D: Map 48).

In MATTF in 1997, five species were reported: the USGS reported *H. verticillata*, *V. americana*, *N. minor*, and *C. demersum* along the north shore of Mattawoman Creek, and *H. verticillata*, *V. americana*, *M. spicatum*, and *N. minor* on the south shore, from the mouth to the vicinity of Indian Head (Appendices B and D: Map 48). Upstream of Indian Head, Citizens reported *H. verticillata*, *V. americana*, *C. demersum*, *N. minor*, and *M. spicatum*, including sightings from areas where no SAV was mapped (Appendices B and D: Map 48).

### **Piscataway Creek (PISTF)**

SAV in PISTF in 1997 increased 142% over 1996, to 123.25 hectares, 36% of the Tier I goal of 337.83 hectares (Figure 29; Tables 6 and 7; VIMS SAV GIS Database; CBP). There has been no year in the history of the aerial survey in which the SAV level in PISTF exceeded the Tier I goal; in 1987 there were 319.35 hectares mapped, the highest level recorded by the survey (Figure 29; Tables

## SAV

6 and 7; VIMS SAV GIS Database; CBP).

In 1997 in PISTF, SAV density increased: 100% of the SAV was classified as dense, compared to 90% moderate in 1996, and 10% sparse (Figure 29; Table 8).

SAV beds persisted, with large increases, along both shores in PISTF in 1997, especially the large bed at the head of the creek (Figure 29; Map 40). In these same beds a few small areas of decreases were also mapped, especially at the mouth and the east end of the large bed at the head of the creek (Figure 29; Map 40; Bed M4).

From the north shore, the USGS reported: *V. americana*, *H. dubia*, *H. verticillata*, *C. demersum*, and *N. minor*; and from the south shore, *H. verticillata*, *N. minor*, and *V. americana* (Appendices B and D: Map 40). Citizens reported *H. verticillata* from both shores, and *C. demersum*, *H. verticillata*, and an unidentified species of *Najas* from the large bed at the head of the creek (Appendices B and D: Map 40).

## Lower Bay Zone

### WESTERN LOWER CHESAPEAKE BAY AND ASSOCIATED TRIBUTARY AND BAY SEGMENTS

#### Western Lower Chesapeake Bay (CB6PH)

In 1997 in CB6PH, SAV distribution decreased 9% from 1996, to 361.84 hectares, 4% of the Lower Bay zone SAV total and 71% of the Tier I goal of 511.84 hectares (Figure 30; Tables 6 and 7; VIMS SAV GIS Database; CBP). In 1997, SAV in CB6PH decreased for the fourth consecutive year, from the 1993 high point of 511.93 hectares, which exceeded the Tier I goal, to the lowest level since 1989, when 351.40 hectares were recorded (Figure 30; VIMS SAV GIS Database; CBP).

The percentage of SAV classified as dense increased in 1997 in CB6PH, however, the number of hectares was actually less than in 1996: 62% (224.85 hectares) of SAV was classified as dense compared to 58% (227.88 hectares) dense in 1996 (Figure 30; Table 8). Also in CB6PH, 11% was moderate and 9% was sparse in 1997 compared to 12% moderate and 12% sparse in 1996 (Figure 30; Table 8). The percentage of SAV classified as very sparse was the same (18%) in both 1997 and 1996, however, the actual number of hectares of very sparse SAV in 1997 was less, 63.41 hectares compared to 73.23 hectares in 1996 (Figure 30; Table 8).

Although SAV beds in CB6PH persisted in 1997, areas with decreases were mapped at: Windmill Point on Fleets Island; Sandy Point by Gwynn Island; Winter and Horn harbors; Potato Neck; and New Point Comfort (Figure 30; Appendices B and D: Maps 118, 123, 132). A few small areas of

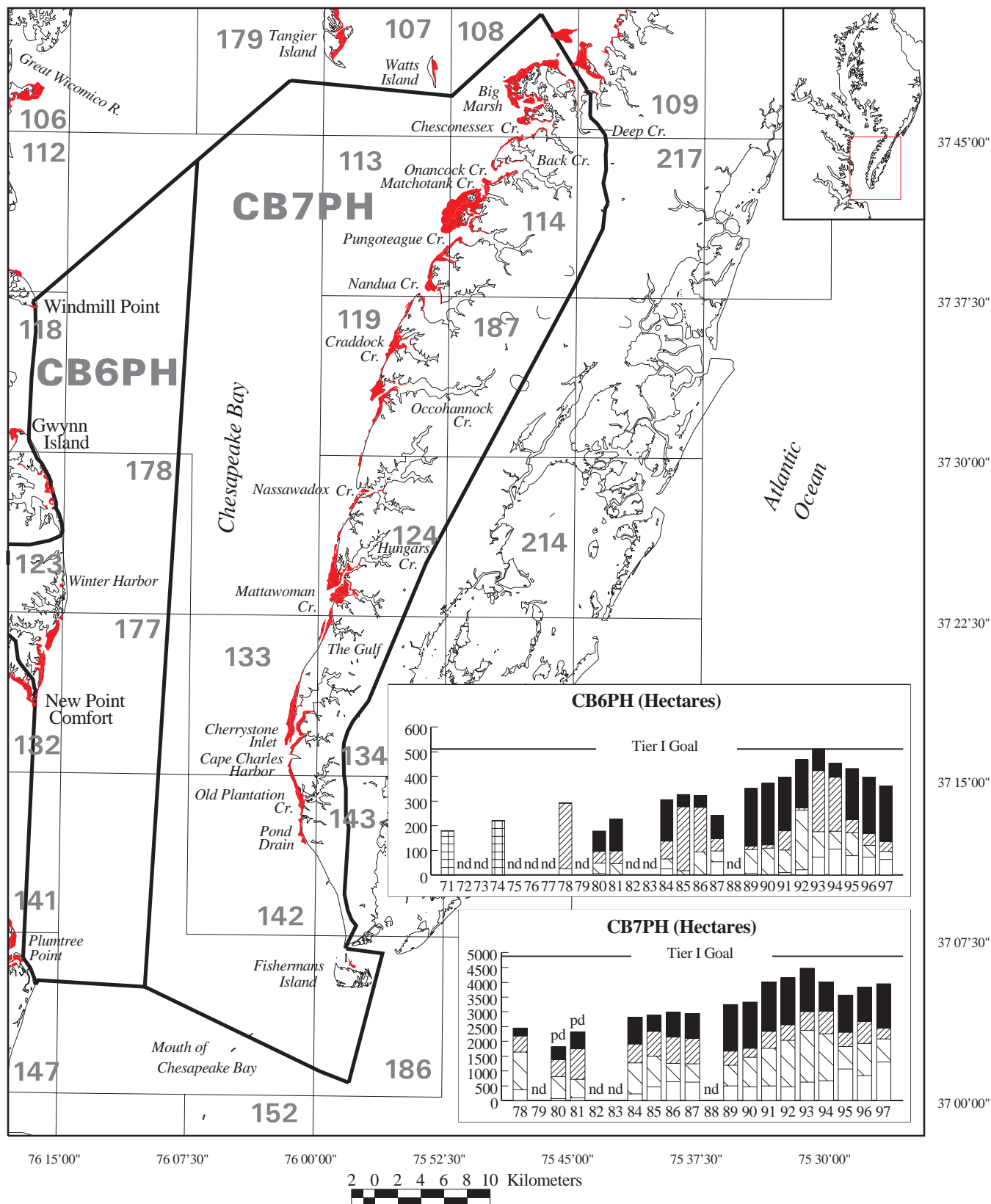


Figure 30: SAV distribution in the Western Lower Chesapeake Bay (CB6PH) and the Eastern Lower Chesapeake Bay (CB7PH) in 1997. (See Figure 10 for key.)

## SAV

increases were also mapped as well near some of the same localities (Windmill and Sandy points; Winter and Horn harbors; Potato Neck; and New Point Comfort), however, these did not offset the total of the decreases at these localities (Figure 30; Appendices B and D: Maps 118, 123, 132).

No ground-truth information was reported for CB6PH in 1997.

### **Eastern Lower Chesapeake Bay (CB7PH)**

SAV in CB7PH in 1997 increased 3%, to 3,937.20 hectares, 81% of the Tier I goal of 4,888.75 hectares, 42% of the Lower Bay zone SAV total, and 14% of the Bay SAV total (Figure 30; Tables 6 and 7; VIMS SAV GIS Database; CBP). SAV in CB7PH increased for the second consecutive year in 1997, after decreasing for two years from the high point of 4,469.51 hectares in 1993 (Figure 30; Tables 6 and 7; VIMS SAV GIS Database).

In 1997 in CB7PH, SAV classified as dense, and that classified as very sparse, both increased: 38% was dense in 1997 compared to 30% dense in 1996; and 33% was very sparse in 1997 compared to 22% very sparse in 1996 (Figure 30; Table 8). Also in 1997, SAV classified as moderate, and that classified as sparse, both decreased: 9% was moderate compared to 19% moderate in 1996; 20% was sparse compared to 28% sparse in 1996 (Figure 30; Table 8).

Large beds persisted at the mouths of creeks and inlets along the shore of CB7PH in 1997: at Savage, Russell, Camp, Rogue, Tobacco, Parkers, and Finney islands; around Big, Parkers, and Hyslop marshes; in Deep, Pompcoc, Chesconessex, Back, Nandua, Onancock, Matchotank, Pungoteague, Curratuck, Craddock, Occohannock, Nassawadox, Pungers, Kings, Old Plantation, and Elliott creeks; at Ware, Sparrow, Sandy, Battle, and Westcoat points; around Hacks, Scarborough, Occohannock, Church, Old Town, and Savage necks; at Downings and Hungars beaches; at the mouth of Westerhouse Creek; at Cape Charles, Cape Charles Harbor, and Cherrystone Inlet; at Pond Drain, The Gulf, and White Cliffs; and in Fishermans Inlet and on the north shore of Fishermans Island in the mouth of the Chesapeake Bay (Figure 30; Appendices B and D: Maps 108, 109, 113, 114, 119, 124, 133, 134, 142, 186). [In 1996, SAV was mapped for the first time in the aerial survey at Fishermans Island (Figure 30; VIMS SAV GIS Database)]. There was no SAV mapped south of Pond Drain to Wise Point on the southern end of the Delmarva Peninsula (Figure 30; Appendix B: Maps 142, 186).

New beds were most evident in the Pompcoc Creek and Tobacco Island area; in Onancock Creek; around Finney Island; in Pungoteague, Nandua, Craddock, Occohannock, Nassawadox, Pungers, Mattawoman, and Old Plantation creeks; in Cherrystone Inlet; and at Fishermans Island and Fishermans Inlet (Figure 30; Appendices B and D: Maps 109, 113, 114, 119, 124, 133, 142, 186).

The VIMS field survey, the Citizens, and the USFWS reported two species in CB7PH in 1997: *Z. marina* and *R. maritima* (Appendices B and D: Maps 108, 114, 119, 124, 133, 134, 142). VIMS

reported *R. maritima* in the area of Big Marsh, Rogue Island, and south of Rogue Island; *Z. marina* and *R. maritima* around Russell Island; *R. maritima* to the east of Parkers Island; *R. maritima* off Craddock Creek; *R. maritima* and *Z. marina* in Occohannock Creek; *R. maritima* and *Z. marina* in Hangars Creek; *R. maritima* and *Z. marina* in the area of Mattawoman Creek; *R. maritima* at the mouth of the Cherrystone Channel; *R. maritima* to the south of White Cliffs; and *Z. marina* at the mouth of Elliotts Creek (Appendices B and D: Maps 108, 114, 119, 124, 133, 134, 142).

The Citizens reported the following: *R. maritima* in Nassawadox Creek; *Z. marina* and *R. maritima* in Mattawoman Creek; and *Z. marina* to the east of Hangars Beach and in Old Town Neck (Appendices B and D: Map 124). The USFWS had reported *Z. marina* and *R. maritima* at the mouth of Kings Creek at Cherrystone Inlet (Appendices B and D: Map 133).

## RAPPAHANNOCK RIVER AND CORROTOMAN RIVER SEGMENTS

### Lower Rappahannock River (RPPMH)

SAV in RPPMH in 1997 decreased 43% from 1996, to 14.70 hectares, 1.5% of the Tier I goal of 999.92 hectares (Figure 31; Tables 6 and 7; VIMS SAV GIS Database; CBP).

SAV density in 1997 in RPPMH increased: 34% was sparse and 66% very sparse, compared to 68% sparse in 1996, and 32% very sparse (Figure 31; Table 8).

SAV beds persisted in RPPMH in 1997 on the northern shore of the Rappahannock River, with large decreases, as well as some areas of slight increases, at Windmill Point, by Mosquito Island, in Sanders Cove, and in Carter and Topps coves at the mouth of Carter Creek; and one bed which was present at Mosquito Point in 1996 was not present in 1997 (Figure 31; VIMS SAV GIS Database). No beds were mapped on the south shore of the Rappahannock River in 1997, as in 1996 (Figure 31; VIMS SAV GIS Database).

VIMS reported *R. maritima* and *Z. palustris* at the mouth of Carter Creek in 1997 (Appendices B and D: Map 111, Bed H1).

### Corrotoman River (CRRMH)

SAV in CRRMH in 1997 decreased 31% from 1996, to 15.29 hectares, 7.0% of the Tier I Goal of 218.56 hectares (Figure 31; Tables 6 and 7; VIMS SAV GIS Database; CBP).

SAV density increased in 1997 in CRRMH: 68% was classified as moderate and 32% as sparse, compared to 45% moderate in 1996, 50% sparse, and 5% very sparse (Figure 31; Table 8).

In the Eastern Branch in CRRMH in 1997, two SAV beds persisted with decreases, one SAV bed (B3) was new, and one bed present in 1996 was not mapped (Figure 31; Appendix B: Map 111; Beds

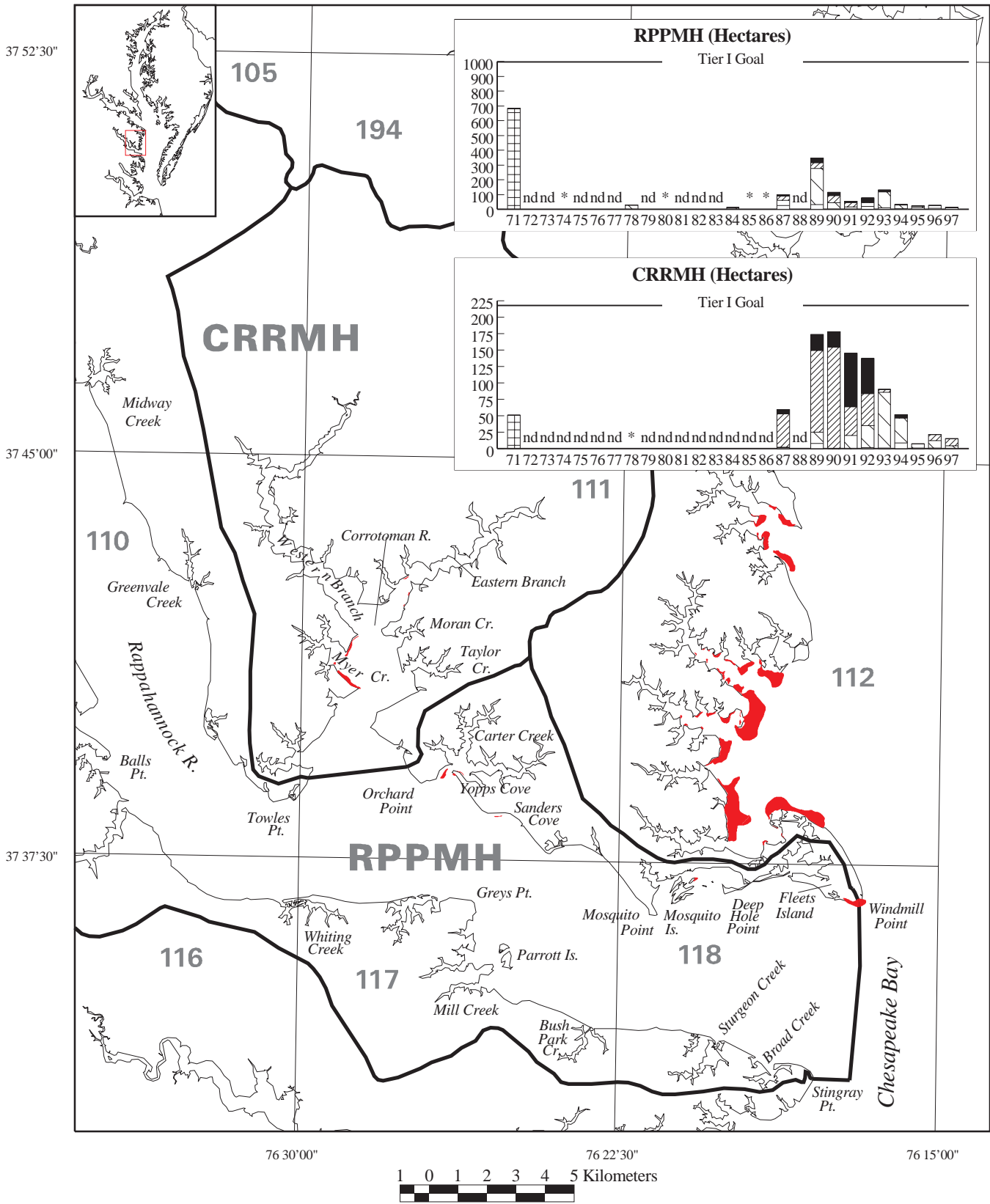


Figure 31: Distribution of SAV in the Lower Rappahannock River (RPPMH) and the Corrotoman River (CRRMH) in 1997. The Middle (RPPOH) and Upper Rappahannock River (RPPTF) are not shown as no SAV was mapped from 1971-1997. (See Figure 10 for key.)

A3, B3, C2). Beds present in 1996 in the Western Branch and in the area south of Corrotoman Point were not mapped in 1997 (Figure 31; VIMS SAV GIS Database). On the western shore of CRRMH, SAV beds persisted, with areas of slight increases as well as areas of decreases, at the mouth of Myers Creek (Figure 31; Appendix B: Map 111).

In CRRMH in 1997, VIMS reported *R. maritima* from the bed east of Queenstown at the mouth of Myers Creek (Appendices B and D: Map 111, Bed F3).

### **Middle Rappahannock River (RPPOH) and Upper Rappahannock River (RPPTF)**

The Middle Rappahannock River (RPPOH) and the Upper Rappahannock River (RPPTF) both had no SAV mapped in 1997 or in any year since the aerial survey began (Figure 31; Tables 6 and 7; VIMS SAV GIS Database). There have been no Tier I goals established for RPPOH and RPPTF (Figure 31; VIMS SAV GIS Database; CBP).

No ground-truth data was reported for RPPOH and RPPTF in 1997.

### **Piankatank River (PIAMH)**

SAV in PIAMH in 1997 increased 23% over 1996, to 175.01 hectares, 22% of the Tier I Goal of 806.85 hectares, 2% of the SAV total for the Lower Bay zone, and 0.62% of the Bay SAV total (Figure 32; Tables 6 and 7; VIMS SAV GIS Database; CBP).

SAV density increased in 1997 in PIAMH: 21% was classified as dense, 21% as moderate, 41% as sparse, and 17% as very sparse, compared to 10% dense in 1996, 3% moderate, 86% sparse, and 1% very sparse (Figure 32; Table 8).

In 1997 in PIAMH, the two SAV beds on the north shore of the Piankatank River persisted, but with large decreases, and the bed mapped in 1996 on the south shore was not mapped in 1997 (Figure 32; VIMS SAV GIS Database). Beds also persisted around Gwynn Island and The Hole In The Wall, with large increases and with some small areas of decreases (Figure 32).

In 1997, VIMS reported *Z. marina* in the bed at Cherry Point at the north end of Gwynn Island, and *Z. marina* and *R. maritima* in the area of Milford Haven on the south end of Gwynn Island (Appendices B and D: Maps 118, 123).

### **Mobjack Bay (MOBPH)**

SAV in 1997 in MOBPH increased 3% over 1996, to 4,442.49 hectares, 80% of the Tier I goal of 5,561.71 hectares, 47% of the Lower Bay zone SAV total, and 16% of the Bay SAV total (Figure 33; Tables 6 and 7; VIMS SAV GIS Database; CBP). MOBPH has continued to have the largest amount of SAV in the Lower Bay zone throughout the history of the aerial survey (Figure 33;



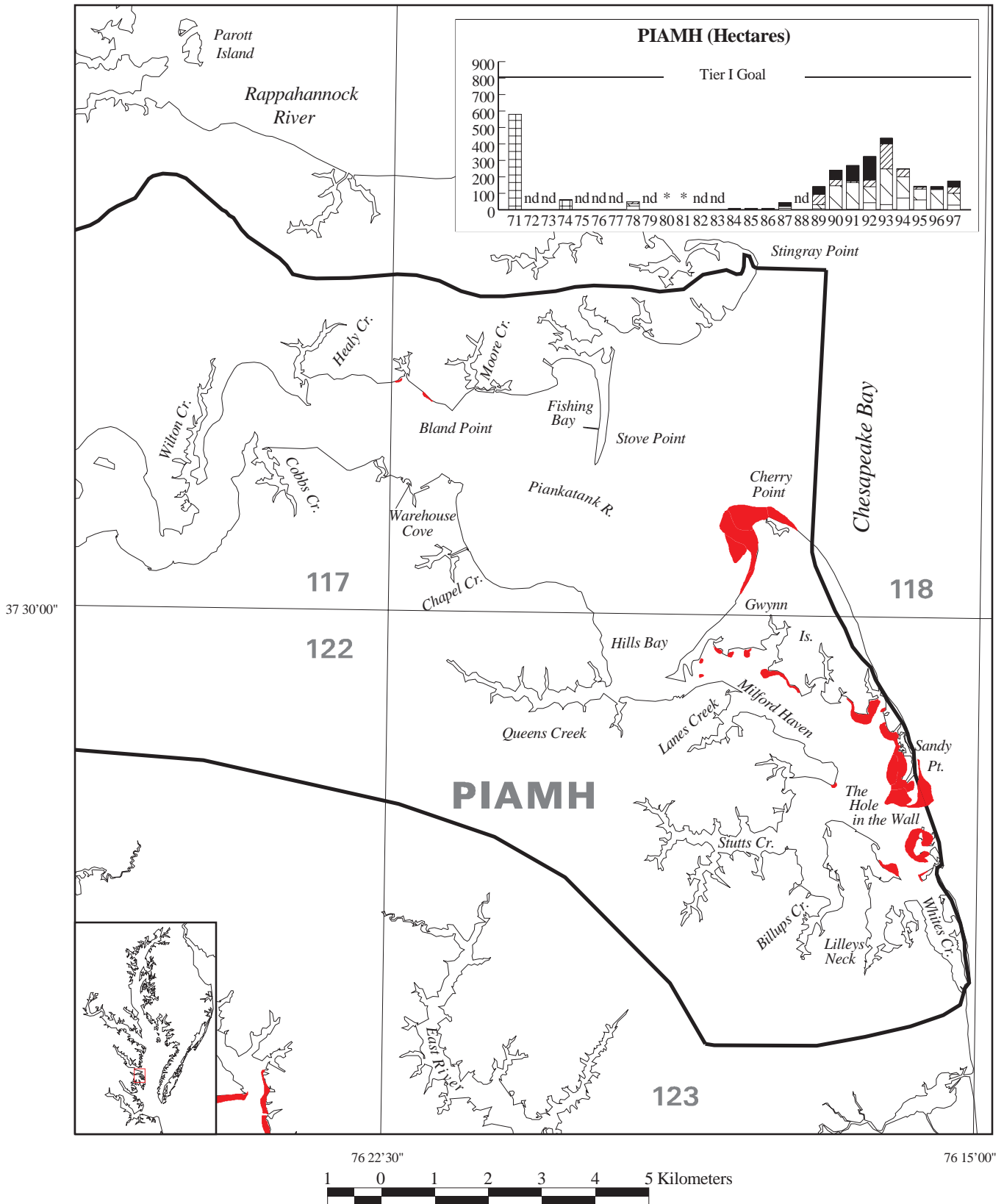


Figure 32: SAV distribution in the Piankatank River (PIAMH) in 1997. (See Figure 10 for key.)

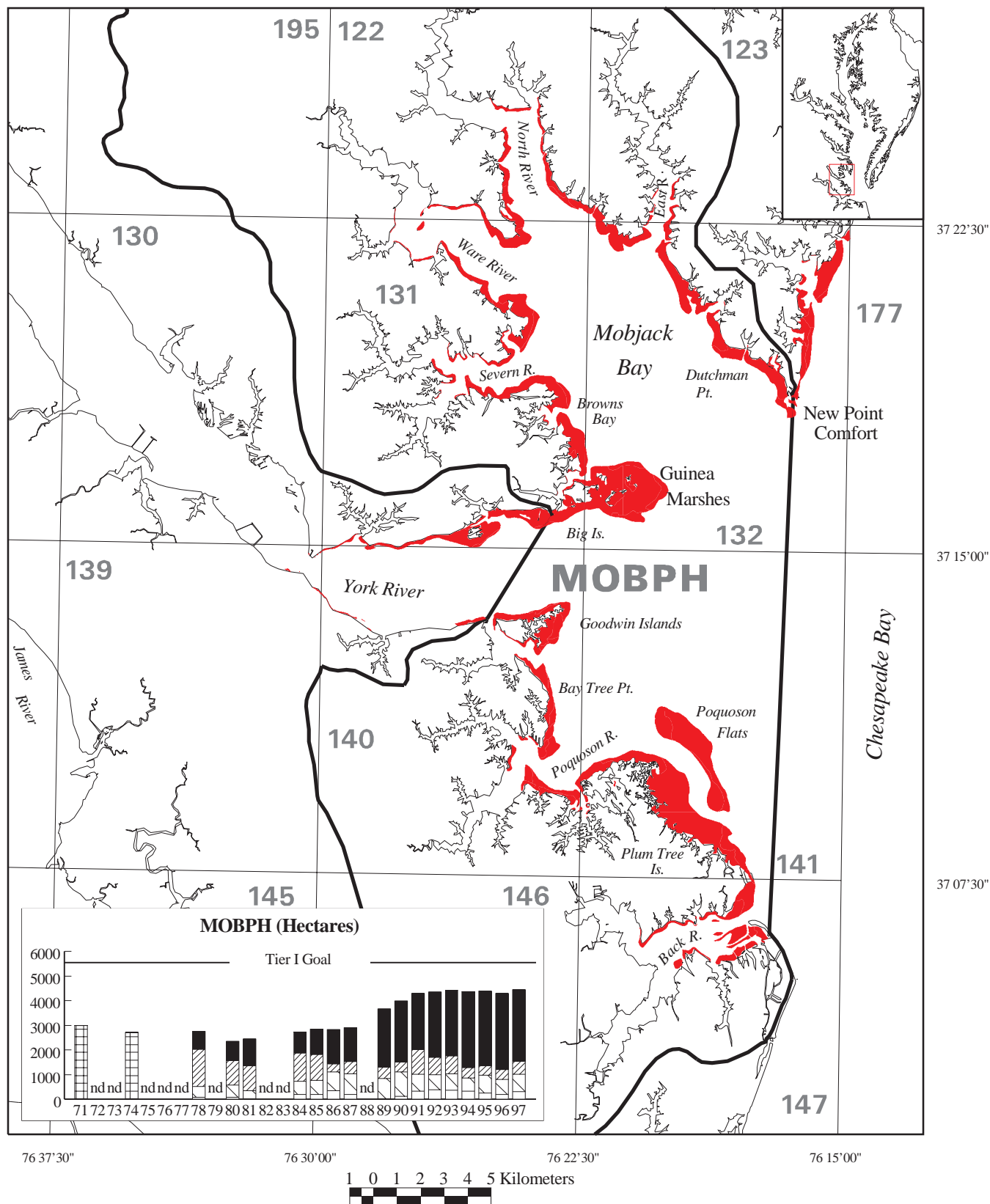


Figure 33: SAV distribution in Mobjack Bay (MOBPH) in 1997. (See Figure 10 for key.)

## SAV

Tables 6 and 7; VIMS SAV GIS Database).

SAV density decreased in 1997 in MOBPH: 65% was classified as dense, 12% as moderate, 16% as sparse, and 7% as very sparse, compared to 72% dense in 1996, 9% moderate, 14% sparse, and 4% very sparse (Figure 33; Table 8).

MOBPH continued in 1997 to have some of the more extensive SAV beds on the western shore of the lower Chesapeake Bay: extending along the entire shoreline of Mobjack Bay; including the Guinea Marshes at the mouth of the York River; as well as the lower reaches of the Severn, Ware, North, East, York, Back, and Poquoson rivers; and including the Poquoson and Drum Island flats (Figure 33; Appendix B: Maps 122, 123, 131, 132, 140, 141, 147).

SAV beds persisted on all shores and tributaries in MOBPH in 1997, with areas of increases and areas of decreases (Figure 33; Tables 6 and 7; Appendices B and D: Maps 122, 123, 131, 132, 140, 141, 147). SAV beds persisted from the North River to Northend Point, with areas of increases and areas of decreases (Figure 33; Tables 6 and 7; Appendices B and D: Maps 122, 131, 140, 141, and 147).

Increases were noted in the North, Ware, Severn, York, Poquoson, and Back rivers; in Ware Neck, Four Point Marsh, and the Guinea Marshes; at Goodwin and Cow islands; at Tue, Bay Tree, Ship, Marsh, and Drum points; and at Poquoson and Drum Island flats (Figure 33; Tables 6 and 7; Appendices B and D: Maps 122, 131, 132, 140, 141, 147).

The largest decreases were noted at Horse Point, Ware Neck, and the Ware River; and smaller areas of decrease were mapped in Four Point Marsh and the mouth of the Northwest Branch in the Severn River, in Guinea Marshes and Sandy Point in the York River, at Goodwin Islands and the bed in the area of Tue Point, at Cow Island, in the Poquoson River (with one bed absent in 1997 which had been present in 1996), at Drum Point and Drum Island Flats, and in Back River (Figure 33; Appendices B and D: Maps 122, 131, 140, 141, 147).

SAV beds also persisted from Backwater Creek to New Point Comfort, with small areas of increase as well as some small areas of decrease (Figure 33; Appendices B and D: Maps 122, 123, 131, 132). Decreases occurred in the area west of Cakes and Goosey creeks; small areas of decrease occurred in the East River, in Pepper Creek, and around the tip of New Point Comfort (Figure 33; Appendices B and D: Maps 122, 123, 132). Increases occurred in the area south of Backwater Creek; at the mouth of Cakes Creek; in Goosey Creek; in East River; in the area of Sharp Point and Weston and Tab. creeks where new SAV beds were mapped; in Pepper Creek, at the mouth of Davis Creek, and the area south of Davis Creek to New Point Comfort (Figure 33; Appendices B and D: Maps 122, 123, 132).

*Ruppia maritima* and *Z. marina* were reported by the VIMS Field Survey and the Citizens' survey from MOBPH in 1997 (Appendices B and D: Maps 131, 132, 140, 141, 147). VIMS researchers sighted *R. maritima* and *Z. marina* in the area of Ware Neck; *R. maritima* on the shore of the Ware

River; *Z. marina* to the north of Caucus Bay; *Z. marina* and *R. maritima* to the south of the Severn River; *Z. marina* in the area of Browns Bay; *Z. marina* and *R. maritima* to the south of Browns Bay; *Z. marina* and *R. maritima* along the western shore of Mobjack Bay; *R. maritima* in Harpers Creek; *R. maritima* and *Z. marina* in the Guinea Marshes; *Z. marina* and *R. maritima* in the area surrounding the Goodwin Islands; *R. maritima* in the area of Drum Point; and *Z. marina* in the Back River (Appendices B and D: Maps 131, 132, 140, 141, 147).

The Citizens' reports were as follows: *R. maritima* on both shores of the East River; *R. maritima* and *Z. marina* in Pepper and Harper creeks, at New Point Comfort, and along the eastern shore of Mobjack Bay (Appendices B and D; Map 132).

## YORK RIVER AND TRIBUTARY SEGMENTS

### Lower York River (YRKPH) and Middle York River (YRKMH)

In the York River in 1997, there was a slight increase of SAV reported from YRKPH, the only York River CBP segment to have had any SAV throughout the history of the aerial survey (Figure 34; Tables 6 and 7; VIMS SAV GIS Database; CBP).

### Lower York River (YRKPH)

SAV in 1997 in YRKPH increased 11% over 1996, to 339.50 hectares, 4% of the Lower Bay zone SAV total, 1% of the Bay SAV total, and 60% of the Tier I goal of 566.98 (Figure 34; Tables 6 and 7; VIMS SAV GIS Database; CBP).

In 1997 in YRKPH, 86% of SAV was classified as dense, 6% as sparse, and 8% as very sparse, compared to 80% classified dense in 1996, 4% moderate, 12% sparse, and 4% very sparse (Figure 34; Table 8).

In 1997 in YRKPH, SAV persisted on the south shore of the York River, downstream from the Coleman Bridge at Yorktown, to Worsley Creek, and at the end of Goodwin Neck near Goodwin Island; and immediately upstream from the bridge, two small beds were mapped (Figure 34; Appendix B: Maps 139, 140; VIMS SAV GIS Database). Along the north shore, beds persisted downstream from the Coleman Bridge at Gloucester Point, to the mouth of the York River; and immediately upstream of the bridge, one small bed was mapped (Figure 34; Appendix B: Maps 130, 131, 139, 140; VIMS SAV GIS Database). Significant increases of SAV occurred in the areas of Aliens Island and Sandy Point on the north shore (Figure 34; Appendix B: Map 131; VIMS SAV GIS Database). Increases also occurred on the southern shore of the York River, along the Yorktown area, and at the mouth of the Thorofare by Goodwin Neck (Figure 34; Appendix B: Maps 139, 140; VIMS SAV GIS Database). Decreases to beds were mapped along both shores: on the north shore, at Gloucester and Gaines points; and on the south shore, along Yorktown (Figure 34; Appendix B: Maps 130, 131, 139, 140; VIMS SAV GIS Database).

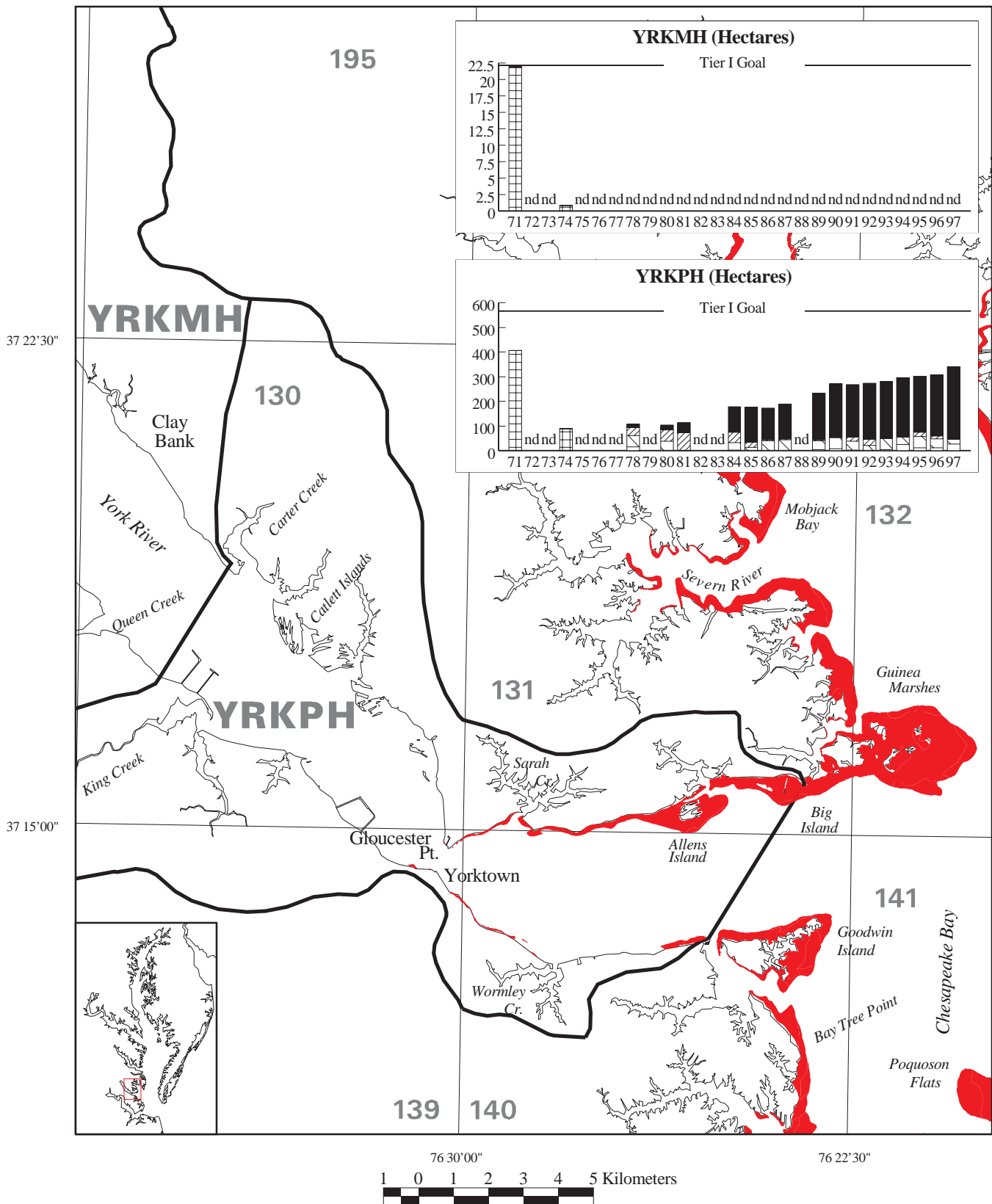


Figure 34: SAV distribution in the Lower (YRKPH) and Middle (YRKMH) York River in 1997. (See Figure 10 for key.)

There were several VIMS sightings of *R. maritima* and *Z. marina* from YRKPH in 1997: *Z. marina* and *R. maritima* were found on the north shore at Aliens Island, and *Z. marina* was found at Sandy Point; on the south shore sightings of *Z. marina* occurred in the two beds upstream of the bridge, and along Yorktown (Appendices B and D: Maps 131, 139, 140).

### **Middle York River (YRKMH)**

No SAV was mapped in YRKMH in 1997, as in 1996 (Figure 34; Tables 6 and 7; VIMS SAV GIS Database). The Tier I goal established for YRKMH is 22.21 hectares (CBP).

No ground-truth information was reported for YRKMH in 1997.

### MATTAPONI RIVER SEGMENTS

#### **Lower Mattaponi River (MPNOH) and Upper Mattaponi River (MPNTF)**

No SAV was mapped in either MPNOH or MPNTF in 1997, as in 1996 (see Figure on page 133; Tables 6 and 7; VIMS SAV GIS Database). No Tier I goals have been established for MPNOH and MPNTF (see Figure on page 133; VIMS SAV GIS Database; CBP).

No ground-truth information was reported for either MPNOH or MPNTF in 1997.

### PAMUNKEY RIVER SEGMENTS

#### **Lower Pamunkey River (PMKOH) and Upper Pamunkey River (PMKTF)**

No SAV was mapped in either PMKOH or PMKTF in 1997, as in 1996 (see Figure on page 133; Tables 6 and 7; VIMS SAV GIS Database). No Tier I goals have been established for PMKOH and PMKTF (see Figure on page 133; Tables 6 and 7; VIMS SAV GIS Database; CBP).

No ground-truth information was reported for either PMKOH or PMKTF in 1997 (Appendices B and D).

### THE MOUTH OF CHESAPEAKE BAY AND ASSOCIATED RIVER AND BAY SEGMENTS

#### **The Mouth of Chesapeake Bay (CB8PH)**

SAV in 1997 in CB8PH decreased 0.55% from 1996, to 4.37 hectares, only 0.05% of the Lower Bay zone SAV total and 0.02% of the Bay SAV total (Figure 35; Tables 6 and 7; VIMS SAV GIS Database; CBP). No Tier I goal has been established for CB8PH (Figure 35; VIMS SAV GIS Database; CBP).

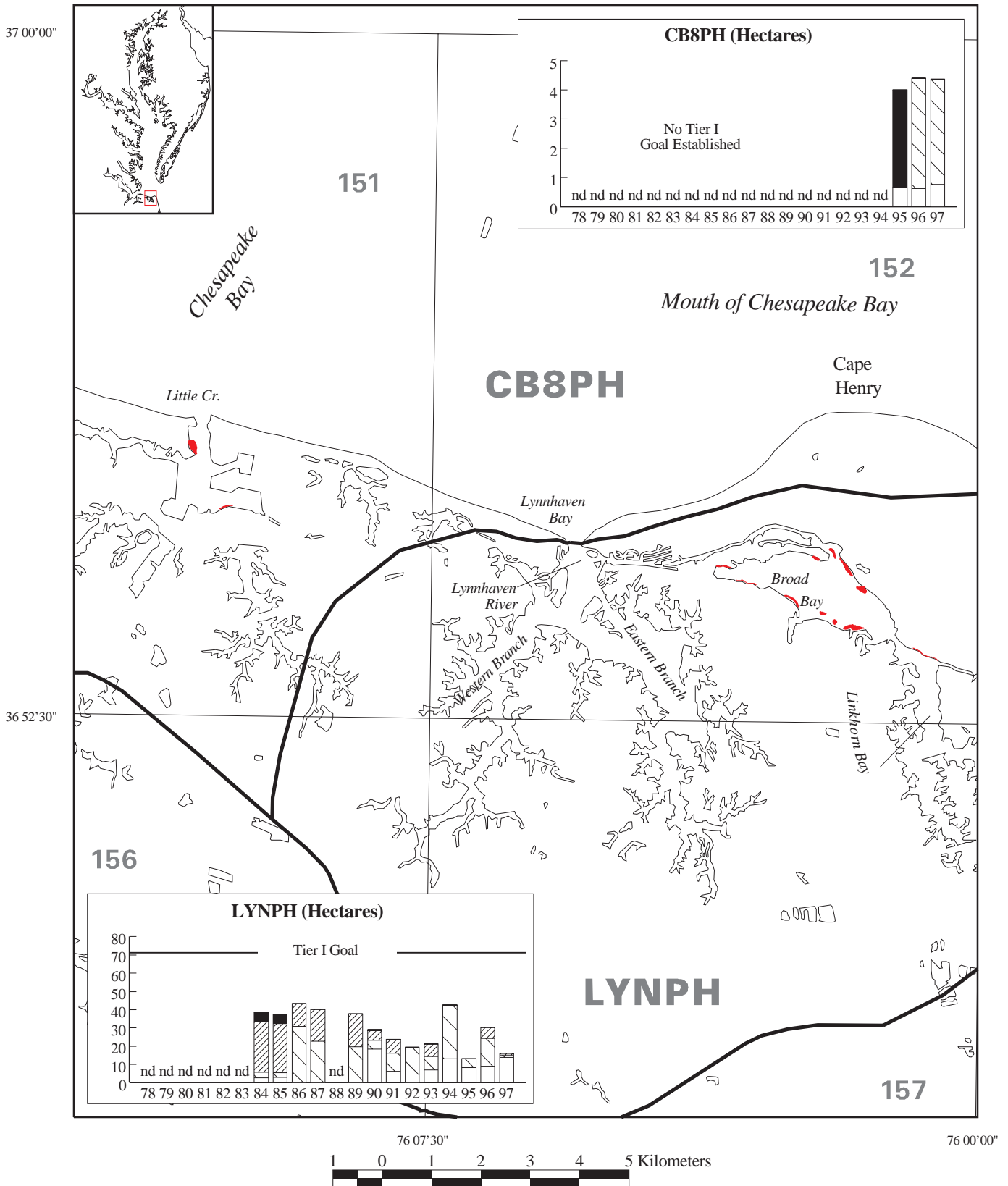


Figure 35: SAV distribution in the Mouth of the Chesapeake Bay (CB8PH) and Lynnhaven and Broad Bays (LYNPH) in 1997. (See Figure 10 for key.)

In 1997 in CB8PH, 82% of SAV was classified as sparse, and 18% as very sparse, compared to 86% sparse in 1996, and 14% very sparse (Figure 35; Table 8).

In 1997 as in 1996, SAV was again mapped only in an inlet of the southern shore of CB8PH and not along the main stem Chesapeake Bay (Figure 35: Map 151; VIMS SAV GIS Database). SAV persisted in 1997 in two beds, one in the Little Creek Channel, and another in Little Creek Cove, for the third consecutive year in the history of the aerial survey (Figure 35: Map 151; VIMS SAV GIS Database; Orth *et al.*, 1996, 1997). [(Re-examination of previous years aerial photography has revealed the SAV signature, which apparently went undetected prior to 1995 primarily because of its isolated location (VIMS SAV GIS Database).]

VIMS found two species in CB8PH in 1997: *Z. marina* was noted in the bed mapped in Little Creek Channel; *R. maritima* and *Z. marina* was noted in the bed mapped in Little Creek Cove (Appendices B and D: Maps 151, 152).

### **Lynnhaven and Broad Bays (LYNPH)**

SAV in 1997 in LYNPH decreased 47% from 1996, to 16.14 hectares, 23% of the Tier I goal of 71.18 hectares (Figure 35; Tables 6 and 7; VIMS SAV GIS Database; CBP).

In 1997 in LYNPH, 6% of SAV was classified as moderate, 8% as sparse, and 86% as very sparse, compared to 19% moderate in 1996, 50% sparse, and 30% very sparse (Figure 35; Table 8).

SAV beds persisted in LYNPH in 1997 with considerable decreases, and a few areas of small increases, in Broad Bay and adjacent Linkhorn Bay, as in 1996: in Broad Bay, SAV beds were mapped on both the north and the south shores; in Linkhorn Bay there was only one bed mapped, on the north shore (Figure 35; Appendix B: Map 152; VIMS SAV GIS Database).

The Citizens reported several sightings of unidentified species of SAV on both shores of Broad Bay and on the north shore of Linkhorn Bay; VIMS had one sighting of *Z. marina* on the north shore of Broad Bay (Appendices B and D: Map 152).

### **JAMES RIVER SEGMENTS AND ASSOCIATED TRIBUTARY SEGMENTS**

#### **Mouth of James River (JMSPH), Lower James River (JMSMH), Middle James River (JMSOH), and Upper James River (JMSTF)**

The Upper James (JMSTF) and the Middle James (JMSOH) had no SAV mapped in 1997, but SAV abundance in the Lower James River (JMSMH) and the Mouth of the James River (JMSPH) increased in 1997 from that in 1996 (Figures 36 and 37; Tables 6 and 7). No SAV was mapped in 1997 in the James River tributary segments (Figures 36 and 37; Tables 6 and 7).



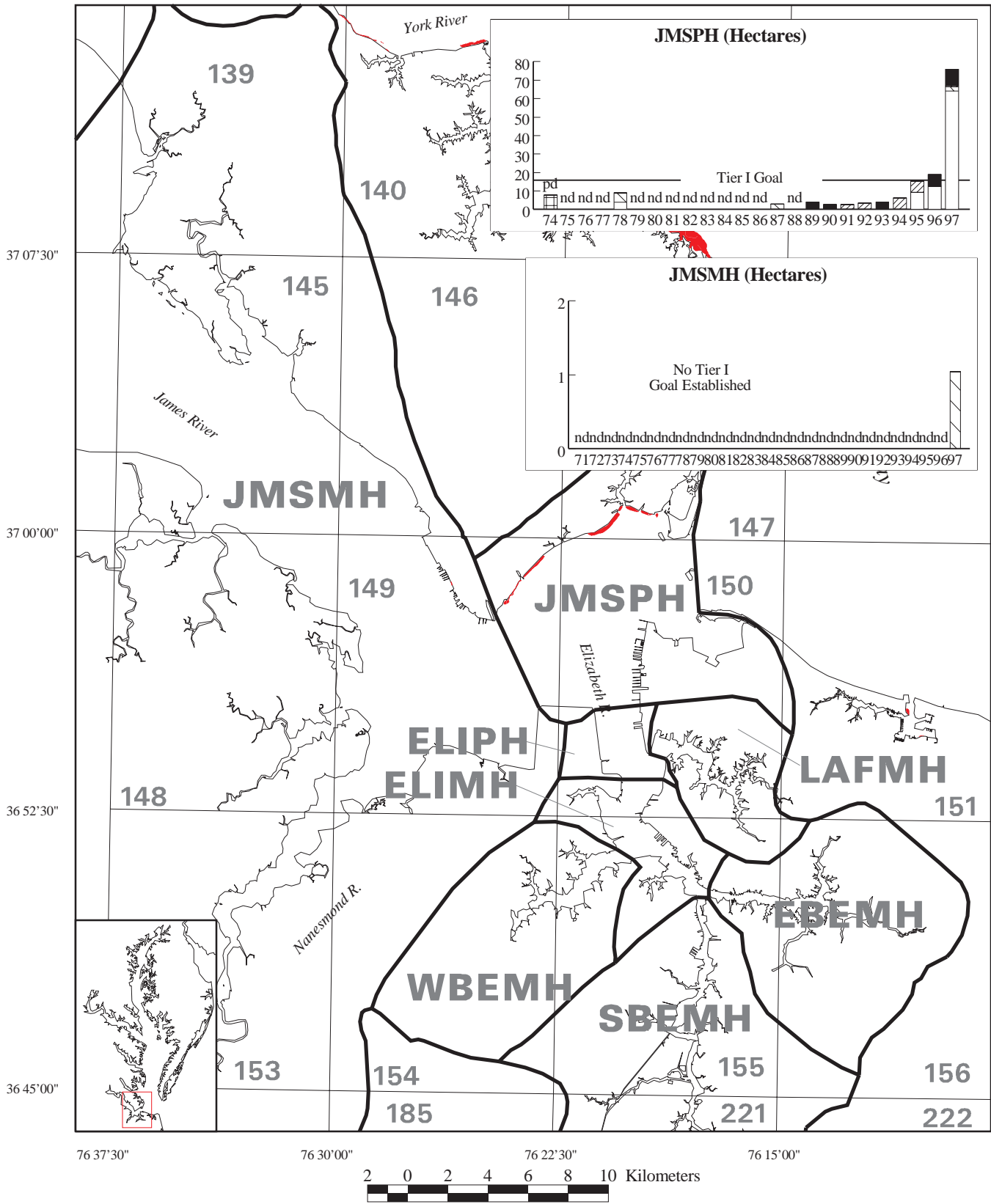


Figure 36: SAV distribution in the Mouth of the James River (JMSPH), the Lower James River (JMSMH), and the Elizabeth River segments (ELIPH, ELIMH, LAFMH, WBEMH, EBEMH, SBEMH) in 1997. The Elizabeth River had no SAV mapped from 1971-1997. (See Figure 10 for key.)

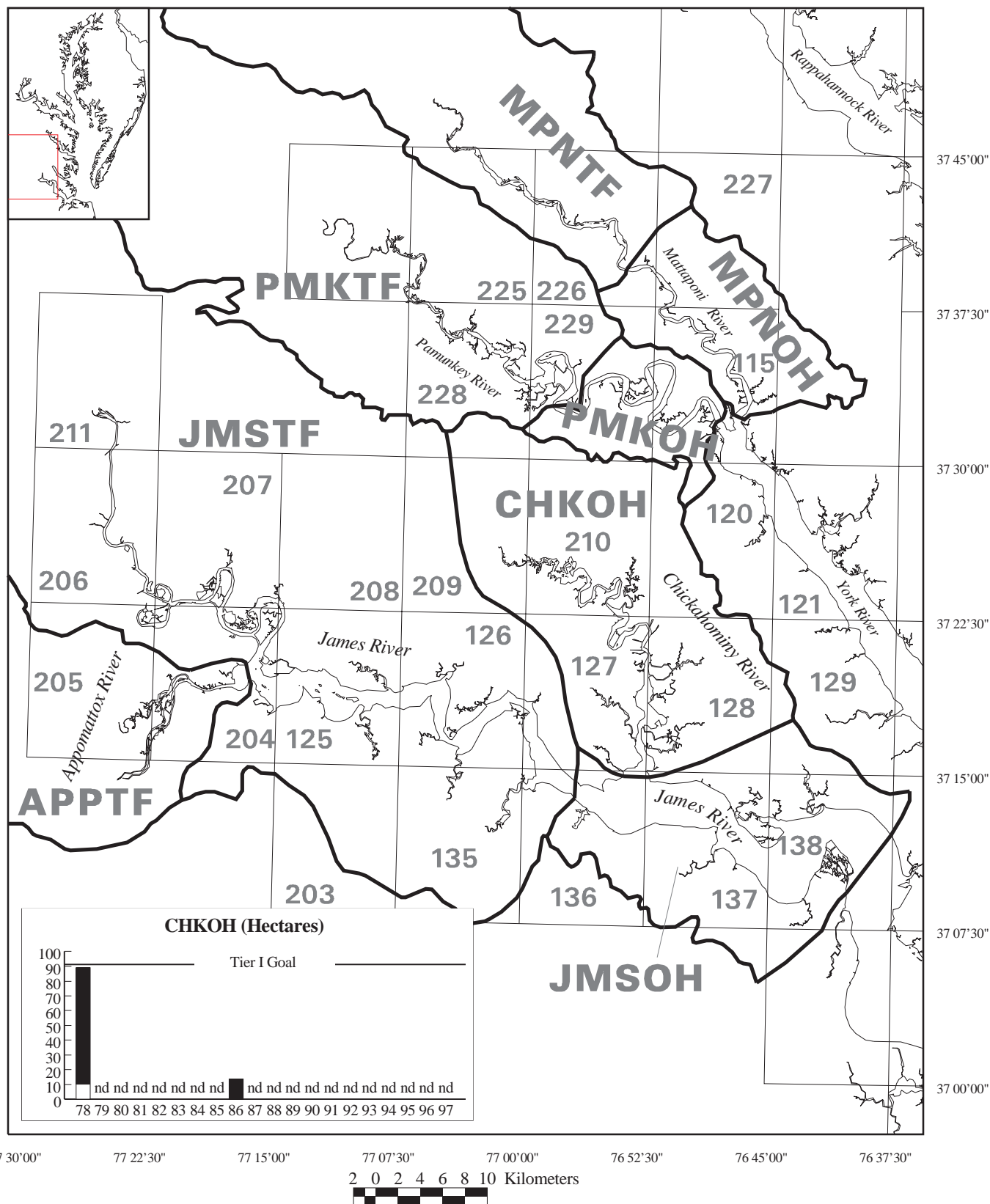


Figure 37: SAV distribution in the Chichominy (CHKOH), Appomattox (APPTF), Middle and Upper James (JMSOH, JMSTF) and the Lower and Upper Mattaponi (MPNOH, MPNTF) and Pamunkey (PMKOH, PMKTF) Rivers in 1997. Historically, only CHKOH has had SAV mapped in the aerial survey. (See Figure 10 for key.)

## SAV

### **Mouth of James River (JMSPH)**

SAV in JMSPH in 1997 increased 303% over 1996, to 75.74 hectares, 0.81% of the Lower Bay zone SAV total, and 477% of the Tier I goal of 15.89 hectares (Figure 36; Tables 6 and 7; VIMS SAV GIS Database; CBP).

In 1997 in JMSPH, 12% of the SAV was classified as dense, 1% as moderate, 3% as sparse, and 85% as very sparse, compared to 33% dense in 1996, and 67% very sparse (Figure 36; Table 8).

SAV beds persisted with significant increases from Newport News Point, east to the Hampton Roads Bridge tunnel (Figure 36; Appendices B and D: Maps 147, 149). The bed between Newport News Point and Salters Creek increased greatly in 1997, and a new bed was mapped east of Salters Creek (Figure 36; Appendices B and D: Map 149). In 1996, in this area, small patches of SAV up to approximately two meters squared, consisting of *Z. marina*, were recorded between Newport News Point and Salters Creek; these patches were estimated to be 2-3 years old, but were not noted in earlier aerial surveys because their small size prohibited detection by the aerial photography (VIMS SAV GIS Database).

Since the baywide survey began in 1978, and until 1995, only one bed had been mapped in the main stem of the James River, at the mouth of Hampton River (VIMS SAV GIS Database; Orth *et al.*, 1996). This bed persisted and increased to four beds by 1996; and a fifth bed was mapped east of the Hampton Bridge in 1997 (Figure 36; VIMS SAV GIS Database; Orth *et al.*, 1997). [Small plots of *Z. marina* were transplanted in this area in the fall of 1994, in the locations of 1997 beds U1 and R1, and off the Hampton River in 1996 and by the Monitor-Merrimac bridge in 1997, as part of the VIMS seagrass restoration program, which is funded by the Virginia Saltwater Recreational License Fund (VIMS SAV GIS Database; Appendices B and D: Map 147).]

In JMSPH in 1997, the VIMS Survey had several reports of *Z. marina* along the Hampton Flats and at the mouth of the Hampton River (Appendices B and D: Maps 147, 149).

### ELIZABETH RIVER AND TRIBUTARY SEGMENTS

#### **Lower Elizabeth River (ELIPH) and Lafayette River (LAFMH)**

No SAV was mapped in either ELIPH or LAFMH in 1997, as in 1996 (Figure 36; Tables 6 and 7; VIMS SAV GIS Database). No Tier I goals have been established for ELIPH and LAFMH (Figure 36; CBP).

No ground-truth information was reported for either ELIPH or LAFMH in 1997.

**Middle Elizabeth River (ELIMH), Western Branch of the Elizabeth River (WBEMH), South Branch of the Elizabeth River (SBEMH), and Eastern Branch of the Elizabeth River (EBEMH)**

No SAV was mapped in ELIMH, WBEMH, SBEMH, or EBEMH in 1997, as in 1996 (Figure 36; Tables 6 and 7; VIMS SAV GIS Database). No Tier I goals have been established for ELIMH, WBEMH, SBEMH, and EBEMH (Figure 36; VIMS SAV GIS Database; CBP).

No ground-truth information was reported for ELIMH, WBEMH, SBEMH, or EBEMH in 1997.

**Lower James River (JMSMH)**

In JMSMH in 1997, where no SAV was present in 1996, 1.05 hectares SAV were mapped in one bed on the northern shore of the Lower James River (Figure 36; Tables 6 and 7; VIMS SAV GIS Database). This figure represent 0.01% of the Lower Bay zone SAV total (Figure 36; Tables 6 and 7; VIMS SAV GIS Database). No Tier I goal has been established for JMSMH (Figure 36; CBP).

All the SAV in 1997 was classified as sparse (Figure 36; Table 8).

There was one VIMS report for *Z. marina* in the bed mapped for the James River in 1997 (Appendices B and D: Map 149; Bed A2).

**Middle James River (JMSOH) and Chickahominy River (CHKOH)**

No SAV was mapped in either JMSOH or CHKOH in 1997, as in 1996 (Figure 37; Tables 6 and 7; VIMS SAV GIS Database). No Tier I goal has been established for JMSOH, however, the Tier I goal for CHKOH is 91.28 hectares (Figure 37; VIMS SAV GIS Database; CBP). CHKOH did have SAV reported in 1986 (13.91 hectares) and 1978 (89.17 hectares) (Figure 37; VIMS SAV GIS Database).

No ground-truth information was reported for either JMSOH or CHKOH in 1997.

**Upper James River (JMSTF) and Appomattox River (APPTF)**

No SAV was mapped in either JMSTF or APPTF in 1997, as in 1996 (Figure 37; Tables 6 and 7; VIMS SAV GIS Database). No Tier I goals have been established for JMSTF and APPTF (Figure 37; CBP).

No ground-truth information was reported for either JMSTF or APPTF in 1997.

## SAV

### **PENINSULA COASTAL BAYS ZONE (The Delmarva Barrier Island Bays)**

The Delmarva Peninsula Coastal Bays zone was reconfigured in 1997 to exclude Fishermans Island at the mouth of the Chesapeake Bay; it includes the following Delmarva barrier island bays: Chincoteague, Sinepuxent, Assawoman, Isle of Wight, and Magothy bays (Figure 38; Methods: Figure 9). There were 5,598.37 hectares of SAV mapped in 1997 in the Delmarva Peninsula Coastal Bays zone, compared to 4,556.09 hectares in 1996 (excluding Fishermans Island), an increase of 1,042.27 hectares or 23% (Figure 38; Tables 6 and 7; VIMS SAV GIS Database). There is no Tier I goal for this zone.

In 1997, SAV increased in each of the component bays of this zone which had SAV in 1996 (Figure 38; VIMS SAV GIS Database). The total hectares for the component bays of this zone in 1997 and 1996 are: Chincoteague Bay, 4,916.78 hectares in 1997, compared to 3,987.86 hectares in 1996; Sinepuxent Bay, 421.40 hectares in 1997, compared to 343.73 hectares in 1996; Assawoman Bay, 180.32 hectares in 1997, compared to 178.16 hectares in 1996; and Isle of Wight Bay, 79.98 hectares in 1997, compared to 46.34 hectares in 1996 (VIMS SAV GIS Database). Magothy Bay had no SAV mapped from aerial photography in 1997 or in 1996, however, VIMS and the Virginia Marine Resources Commission (VMRC) transplanted *Z. marina* to sites in Magothy Bay in 1996 and 1997 (VIMS SAV GIS Database).

Despite the increases in SAV mapped in 1997, significant damage to many SAV beds occurred in 1997 from clam dredging activities in both Virginia and Maryland, resulting in many beds having lower density rankings. The level of destruction was noted in reports to the Virginia Marine Resources Commission (VMRC) (Moore and Orth, 1997) and to the MD-DNR (correspondence to the Secretary of MD-DNR). Consequently, protection was afforded to SAV beds by the creation of a SAV sanctuary in Virginia's Chincoteague Bay, and by legislation in Maryland which prohibits hydraulic dredging in existing SAV beds.

In the Delmarva Coastal Bays zone in 1997, the percentage of SAV classified as dense (62%) remained the same as in 1996 (62%), however, in terms of the absolute number of hectares, in 1997 there were 665.78 hectares more in Density Class 4 than in 1996 (Table 9). The percentage, as well as the absolute number, of hectares of SAV classified as moderate in 1997 decreased: 4% (217.93 hectares) was classified as moderate in 1997, compared to 12% (565.28 hectares) in 1996 (Table 9). The percentage of SAV in combined Density Classes 3 and 4 decreased in 1997, but the absolute number of hectares increased 318.43 hectares over that in 1996: combined Density Classes 3 and 4 constituted 66% (3,685.80 hectares) of the SAV in 1997, compared to 74% (3,367.37 hectares) in 1996 (Table 9). The percentages of sparse and very sparse SAV both increased in 1997, as well as the absolute number of hectares for these categories: 26% (1,447.66 hectares) was sparse in 1997, compared to 22% (991.03 hectares) in 1996; and 8% (464.91 hectares) was very sparse in 1997, compared to 4% (197.70 hectares) in 1996 (Table 9). SAV in combined Density Classes 1 and 2 increased in 1997, constituting 34% (1,912.57 hectares) of the SAV in 1997, compared to 26% (1,188.73 hectares) in 1996 (Table 9).

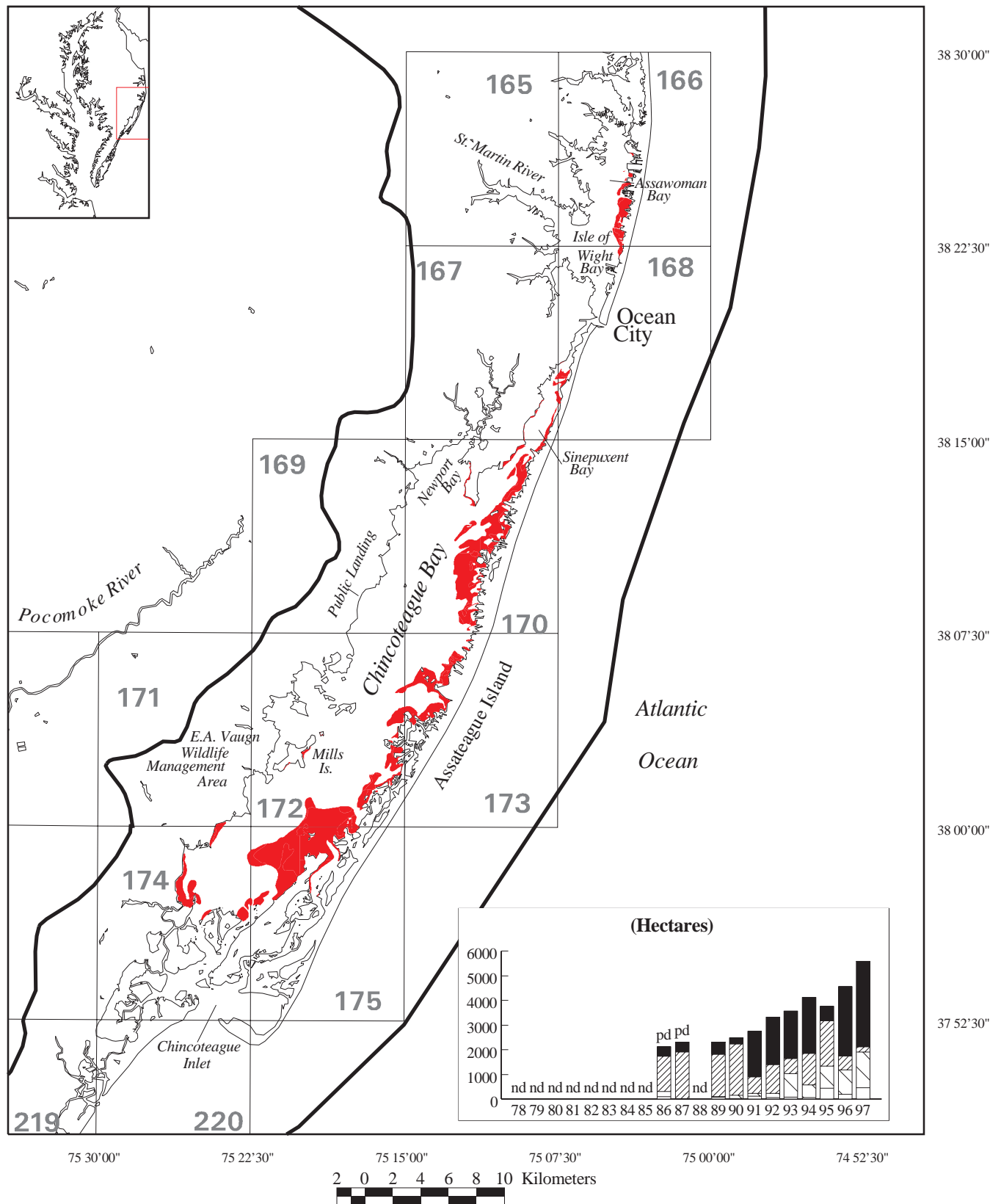


Figure 38: SAV distribution in the Delmarva Peninsula Coastal Bays in 1997. (See Figure 10 for key.)

## SAV

As in 1996, SAV in Chincoteague and Sinepuxent bays was located primarily along the eastern sides of both bays, however, a few beds were mapped for the second consecutive year on the western shores of both Chincoteague and Sinepuxent bays (Figure 38; Appendix B: Maps 166, 167, 168, 170, 171, 172, 173, 174, 175; VIMS SAV GIS Database). SAV beds persisted on the western side of Chincoteague Bay at Horntown Landing, Cockle Point, and the mouth of Powell Creek, with new beds mapped in Hawthorne Bay, Egg Marsh, Wire Narrows Marsh, and Mills and Assacorkin islands (Figure 38; Appendix B: Maps 171, 172, 174; VIMS SAV GIS Database). On the eastern side of Chincoteague Bay, SAV beds persisted and increased in the Coards Marshes area, Great Neck/Toby Island area, the West Bay area, Green Run Bay, Whittington Point, Scotts Point, Fox Hill Point, Sugar Point, Tingles Island area, and Newport Bay along lower Sinepuxent Neck (Figure 38; Appendix B: Maps 170, 172, 173, 174, 175; VIMS SAV GIS Database). On the eastern side of Chincoteague Bay, new beds were mapped at the mouth of Chincoteague Channel (Figure 38; Appendix B: Map 174; VIMS SAV GIS Database).

In Sinepuxent Bay, beds persisted with increases on both shores in the same areas as 1996 (Figure 38; Appendix B: Maps 167, 168, 170; VIMS SAV GIS Database). Increases to beds were especially noticeable at South, Goose, Rum, Fassett, and Sandy points; by the Route 611 Bridge; and in Sandy Cove (Figure 38; Appendix B: Maps 167, 168, 170; VIMS SAV GIS Database). The bed mapped by the Ocean City Airport in 1996 was not mapped in 1997 (Figure 38; Appendix B: Map 168; VIMS SAV GIS Database).

In Isle of Wight and Assawoman bays, beds persisted on the eastern shore along Ocean City (Figure 38; Appendices B and D: Maps 166, 168; VIMS SAV GIS Database). In Isle of Wight Bay, the large bed south of Ocean City Expressway increased significantly, and in Assawoman Bay increases were mapped at Swan Point and Devil Island (Figure 38; Appendices B and D: Maps 166, 168; VIMS SAV GIS Database).

The Citizens' survey (including the Ocean Pines Yacht Club survey), the National Park Service, and VIMS reported two species, *Z. marina* and *R. maritima*, from the coastal bays in 1997 (Appendices B and D: Maps 143, 166, 167, 168, 170, 171, 172, 174, 175).

Citizens reported *R. maritima* along the eastern shores of Assawoman and Isle of Wight bays; *Z. marina* in Assateague Bay by Cherrytree Hill and on Vineyard Shoal; and *R. maritima* and *Z. marina* in Coards Marshes (Appendices B and D: Maps 166, 175).

The National Park Service reported the following species: *R. maritima* above Sandy Point in Sinepuxent Bay; *R. maritima* and *Z. marina* in Sinepuxent Bay around Sandy Point Island; *R. maritima* and *Z. marina* south of Tingles Island off Assateague Island on the eastern shore of Chincoteague Bay; *Z. marina* in Pope Island Ditch and West Bay off Assateague Island; *Z. marina* and *R. maritima* in and around Coards Marshes; *Z. marina* between Ragged and Wildcat points on the eastern shore of Chincoteague Bay; and *Z. marina* and *R. maritima* in Spence Cove off the west side of lower Sinepuxent Neck (Appendices B and D: Maps 167, 168, 170, 172, 175). The NPS also

reported *Z. marina* at Cockle Point on the western shore of Chincoteague Bay (Appendices B and D: Map 174).

The VIMS survey reported *Z. marina* from the western shore of Chincoteague Bay: at the mouth of Powell Creek, in Horntown Bay, at Egg Marsh, at Wire Narrows Marsh, at Cockle Point, and at Mills and Assacorkin islands; and, from the eastern shore of Chincoteague Bay, *R. maritima* and *Z. marina* in the Coards Marshes area (Appendices B and D: Maps 171, 172, 174, 175). VIMS reported *R. maritima* and *Z. marina* on the eastern shore of Assawoman and Isle of Wight bays (Appendices B and D: Map 166). VIMS also reported *Z. marina* at Skidmore Island in Magothy Bay, which was one of the VIMS transplant sites (Appendices B and D: Map 143).



SAV

## LITERATURE CITED

- Anderson, R. R. and R. T. Macomber. 1980. *Distribution of Submersed Vascular Plants, Chesapeake Bay, Maryland*. Final Report to U.S. EPA, Chesapeake Bay Program, Annapolis, MD. Grant No. R805970. 126 pp.
- Batiuk, R. A., R. J. Orth, K. A. Moore, W. C. Dennison, J. C. Stevenson, L. W. Staver, V. Carter, N. B. Rybicki, R. E. Hickman, S. Kollar, S. Bieber, and P. Heasley. 1992. *Chesapeake Bay Submerged Aquatic Vegetation Habitat Requirements and Restoration Targets: A Technical Synthesis*. Chesapeake Bay Program, Annapolis, MD., CBP/TRS 83/92, Contract No. 68-WO-0043. 248 pp.
- Chesapeake Executive Council. 1989. *Submerged Aquatic Vegetation Policy for the Chesapeake Bay and Tidal Tributaries*. Annapolis, MD. July.
- Chesapeake Executive Council. 1990. *Implementation Plan for the Submerged Aquatic Vegetation Policy*. Annapolis, MD. July.
- DAWG. 1997. *Chesapeake Bay Program Analytical Segmentation Scheme for the 1997 Re-evaluation and Beyond*. Chesapeake Bay Program (CBP) Monitoring Subcommittee (MSC) Data Analysis Work Group (DAWG). Draft December 15, 1997 (amended and approved January 29, 1998)
- Environmental Systems Research Institute, Inc. 1989. *Volume I & II, User Guide*. ESRI, Redlands, CA.
- Flemer, David A., G. B. Mackierman, W. Nehlsen, V. K. Tippie, technical coordinators. R. B. Biggs, D. Blaylock, N. H. Burger, L. C. Davidson, D. Haberman, K. S. Price, J. L. Taft, contributing authors. 1983. *Chesapeake Bay: A Profile of Environmental Change*. U.S. EPA, Chesapeake Bay Program, Annapolis, MD. 200 pp. with appendices.
- Godfrey, R. K. and J. W. Wooten. 1981. *Aquatic and Wetland Plants of Southeastern United States: Dicotyledons*. The University of Georgia Press, Athens, GA. 933 pp.
- Godfrey, R. K. and J. W. Wooten. 1979. *Aquatic and Wetland Plants of Southeastern United States: Monocotyledons*. The University of Georgia Press, Athens, GA. 712 pp.
- Harvill, A. M., C. E. Stevens, and D. M. E. Ware. 1977. *Atlas of the Virginia Flora: Part I, Pteridophytes through Monocotyledons*. Virginia Botanical Associates, Farmville, VA. 59 pp.

## SAV

- Harvill, A. M., T. R. Bradley, and C. E. Stevens. 1981. *Atlas of the Virginia Flora: Part II, Dicotyledons*. Virginia Botanical Associates, Farmville, VA. 148 pp.
- Humm, Harold J. 1979. *The Marine Algae of Virginia*. Special Papers in Marine Science, Number 3, Virginia Institute of Marine Science. The University Press of Virginia, Charlottesville, VA. 263 pp.
- Kartesz, J. T. and R. Kartesz. 1980. *A Synonymized Checklist of the Vascular Flora of the United States, Canada and Greenland: Volume II, The Biota of North America*. The University of North Carolina Press, Chapel Hill, NC. 498 pp.
- Moore, K. A. and R. J. Orth. 1997. *Report to the Virginia Marine Resources Commission: Evidence of Widespread Destruction of Submersed Aquatic Vegetation (SAV) From Clam Dredging in Chincoteague Bay, Virginia*. Report to Virginia Marine Resources Commission, Newport News, VA. 7 pp.
- Naylor, Michael and Paul Kazyak. 1995. *Quantitative Characterization of Submerged Aquatic Vegetation Species in Tidal Freshwater Reaches of the Patuxent River Drainage Basin*. Draft prepared for Maryland Department of Natural Resources, Chesapeake Bay Research and Monitoring Division, Annapolis, MD. 45 pp.
- Orth, R. J., M. C. Harwell, and J. R. Fishman. (In press). *A Rapid and Simple Method for Transplanting Eelgrass Using Single, Unanchored Shoots*. Aquatic Botany.
- Orth, R. J. and Hayden Gordon. 1975. *Remote Sensing of Submerged Aquatic Vegetation in the Lower Chesapeake Bay*. Final Report to National Aeronautical and Space Administration, Langley Research Center, Hampton, VA. Contract NAS1-10720. 62 pp.
- Orth, R. J., R. A. Batiuk, and J. F. Nowak. 1994. *Trends in the Distribution, Abundance, and Habitat Quality of Submerged Aquatic Vegetation in Chesapeake Bay and its Tidal Tributaries: 1971 -1991*. Chesapeake Bay Program, Annapolis, MD. CBP/TRS 137/95. EPA 903-R-95-009. 216 pp.
- Orth, R. J. and K. A. Moore. 1981. *Submerged Aquatic Vegetation in the Chesapeake Bay: Past, Present and Future*. pp. 271-283. In: Proc. 46th North American Wildlife and Natural Resources Conf., Wildlife Manage. Inst., Wash., D.C.
- Orth, R. J. and K. A. Moore. 1982. *The Biology and Propagation of *Zostera marina*, eelgrass, in the Chesapeake Bay, Virginia*. Final Report to U.S. EPA, Chesapeake Bay Program, Annapolis, MD. Grant No. R805953. 187 pp.

- Orth, R. J. and K. A. Moore. 1983. *Chesapeake Bay: An Unprecedented Decline in Submerged Aquatic Vegetation*. Science. 222:51-53.
- Orth, R. J. and K. A. Moore. 1984. *Distribution and Abundance of Submerged Aquatic Vegetation in Chesapeake Bay: An Historical Perspective*. Estuaries. 7:531-540.
- Orth, R. J. and K. A. Moore. 1988. *Submerged Aquatic Vegetation in the Chesapeake Bay: A Barometer of Bay Health*. pp. 619-629. In: M. Lynch (Ed.), *Understanding the Estuary: Advances in Chesapeake Bay Res.* Chesapeake Res. Consort. Pub. No. 129. CBP/TRS/24/88.
- Orth, R. J., K. A. Moore, and H. H. Gordon. 1979. *Distribution and Abundance of Submerged Aquatic Vegetation in the Lower Chesapeake Bay, Virginia*. Final Report to U.S. EPA, Chesapeake Bay Program, Annapolis, MD. EPA-600/8-79-029/SAV1. 38 pp.
- Orth, R. J. and J. F. Nowak. 1990. *Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay and Tributaries and Chincoteague Bay - 1989*. Final Report to U.S. EPA., Chesapeake Bay Program, Annapolis, MD. Grant No. X-0034565-01-0,-1. 247 pp.
- Orth, R. J., J. F. Nowak, A. A. Frisch, K. P. Kiley, and J. R. Whiting. 1991. *Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay and Tributaries and Chincoteague Bay - 1990*. Final Report to U.S. EPA, Chesapeake Bay Program, Annapolis, MD. Grant No. X00346502-0. 261 pp.
- Orth, R. J., J. F. Nowak, G. F. Anderson, K. P. Kiley, and J. R. Whiting. 1992. *Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay and Tributaries and Chincoteague Bay - 1991*. Final Report to U.S. EPA, Chesapeake Bay Program, Annapolis, MD. Grant. No. X00346503. 268 pp.
- Orth, R. J., J. F. Nowak, G. F. Anderson, and J. R. Whiting. 1993. *Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay and Tributaries and Chincoteague Bay - 1992*. Final Report to U.S. EPA, Chesapeake Bay Program, Annapolis, MD. Grant No. CB003909-01. 268 pp.
- Orth, R. J., J. F. Nowak, G. F. Anderson, and J. R. Whiting. 1994. *Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay and Tributaries and Chincoteague Bay - 1993*. Final Report to U.S. EPA, Chesapeake Bay Program, Annapolis, MD. Grant No. CB003909-02. 262 pp.
- Orth, R. J., J. F. Nowak, G. F. Anderson, D. J. Wilcox, J. R. Whiting, and L. S. Nagey. 1995. *Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay and Tributaries and Chincoteague Bay - 1994*. Final Report to U.S. EPA, Chesapeake Bay Program, Annapolis, MD. Grant No. CB003909-03. 277 pp.

## SAV

- Orth, R. J., J. F. Nowak, G. F. Anderson, D. J. Wilcox, J. R. Whiting, and L. S. Nagey. 1996. *Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay and Tributaries and Chincoteague Bay - 1995*. Final Report to U.S. EPA, Chesapeake Bay Program, Annapolis, MD. Grant No. CB993267-01-0. 293 pp.
- Orth, R. J., J. F. Nowak, D. J. Wilcox, J. R. Whiting, and L. S. Nagey. 1997. *Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay and Tributaries and the Coastal Bays - 1996*. Final Report to U.S. EPA, Chesapeake Bay Program, Annapolis, MD. Grant No. CB993267-02-1. 300 pp.
- Orth, R. J., J. Simons, R. Allaire, V. Carter, L. Hindman, K. Moore, and N. Rybicki. 1985. *Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay and Tributaries - 1984*. Final Report to U.S. EPA, Coop. Agreement X-003301-01. 155 pp.
- Orth, R. J., J. Simons, J. Capelli, V. Carter, L. Hindman, S. Hodges, K. Moore, and N. Rybicki. 1986. *Distribution of Submerged Vegetation in the Chesapeake Bay and Tributaries - 1985*. Final Report to U.S. EPA. 296 pp.
- Orth, R. J., J. Simons, J. Capelli, V. Carter, A. Frisch, L. Hindman, S. Hodges, K. Moore, and N. Rybicki. 1987. *Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay and Tributaries and Chincoteague Bay - 1986*. Final Report to U.S. EPA. 180 pp.
- Orth, R. J., A. A. Frisch, J. F. Nowak, and K. A. Moore. 1989. *Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay and Tributaries and Chincoteague Bay - 1987*. Final Report to U.S. EPA. 247 pp.
- Paine, David P. 1981. *Aerial Photography and Image Interpretation for Resource Management*. John Wiley & Sons, Inc., New York City, NY. 571 pp.
- Radford, A. E., H. E. Ahles, and C. R. Bell. 1968. *Manual of the Vascular Flora of the Carolinas*. The University of North Carolina Press, Chapel Hill, North Carolina, NC. 1183 pp.
- Stevenson, J. C. and N. Confer. 1978. *Summary of Available Information on Chesapeake Bay Submerged Vegetation*. U.S. Dept. of Interior, Fish and Wildlife Serv. FWS/OBS-78/66. 335 pp.
- Wood, R. D. and K. Imahori. 1965. *A Revision of the Characeae: Volume I, Monograph of the Characeae*. Verlag Von J. Cramer, Weinheim, Germany. 904 pp.
- Wood, R. D. and K. Imarhori. 1964. *A Revision of the Characeae: Volume II, Iconograph of the Characeae*. Verlag Von J. Cramer, Weinheim, Germany. 395 icones with Index.

---

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



# APPENDIX B

---

USGS 7.5 Minute Quadrangles for Chesapeake Bay and the Delmarva Peninsula Coastal Bays Showing Distribution, Abundance, and Ground Truthing of SAV in 1997. [Boundaries of Individual SAV Beds Are Delineated by Solid Lines and SAV Beds Are Shaded. Each Bed Is Identified with an Unique One or Two Letter (A-Z, 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 1997 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* sp. (naiad)  
**Nfl** *Najas flexilis* (northern naiad)  
**Ngr** *Najas gracillima* (slender naiad)  
**Ngu** *Najas guadalupensis* (southern naiad)  
**Nm** *Najas minor*  
**Nt** *Nitella* sp. (muskgrass)  
**Pcr** *Potamogeton crispus* (curly pondweed)  
**Pe** *Potamogeton epihydrus* (leafy pondweed)  
**Pn** *Potamogeton nodosus* (American 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** Unidentified species composition

### SURVEY STATIONS

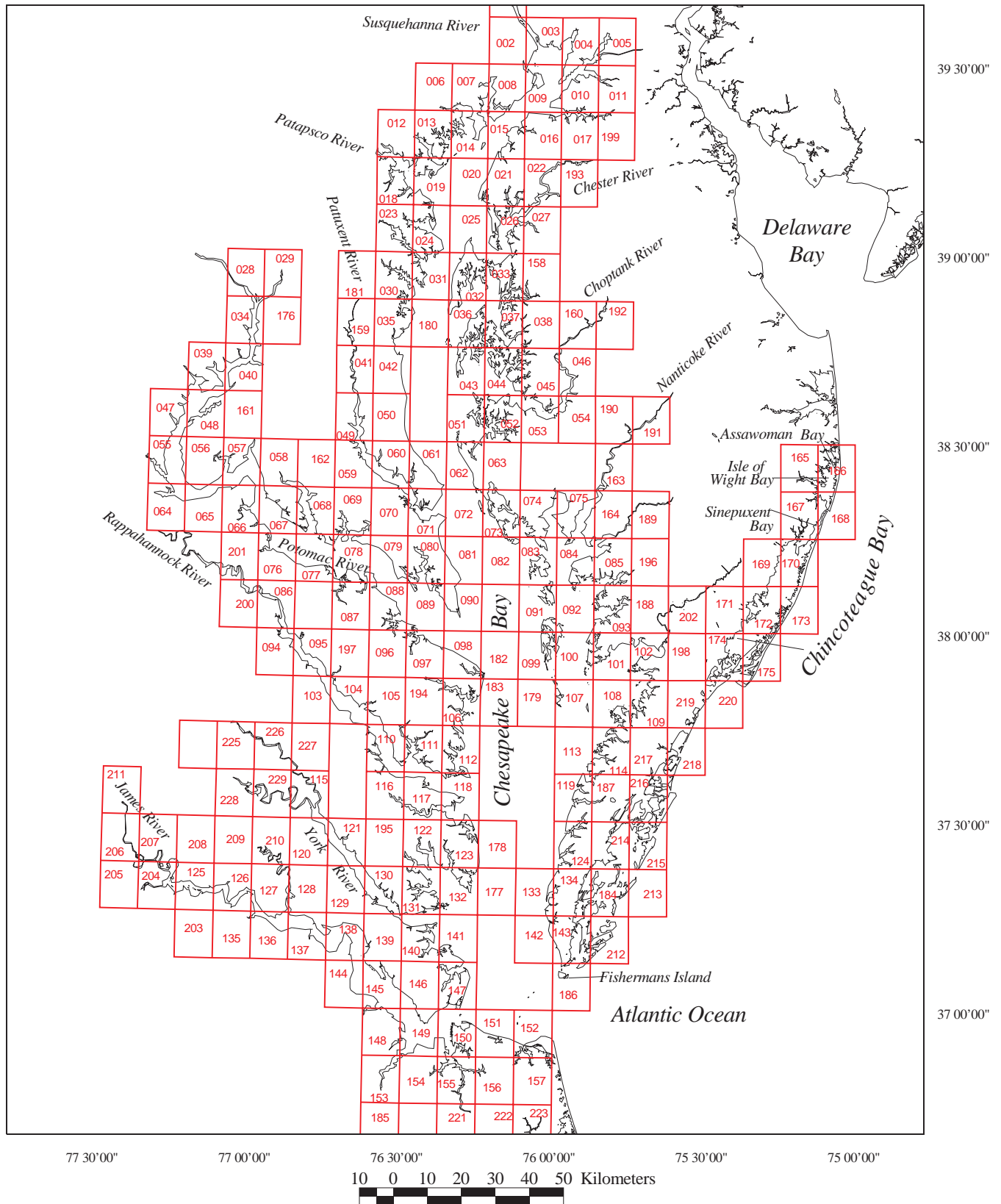
- ▲ Army Corps of Engineers
- ♣ Aberdeen Proving Ground (USAEC/ARL)
- ▼ University of Maryland
- ⊗ Citizens Field Observation
- U.S. Environmental Protection Agency
- \* Harford Community College
- Md. Dept. of Natural Resources
- ‡ Naval Air Station –Patuxent River
- ♠ National Oceanographic Atmospheric Administration
- ▧ National Park Service
- ♥ Patuxent River Park
- ☺ Patuxent Wildlife Research Center
- ★ U.S. Fish and Wildlife Service
- ◇ U.S. Geological Survey
- △ VIMS Field Survey
- ▲ Virginia Marine Resources Commission



### SAV Bed Labels

A,B,C,...,AA,BA,CA,...

- 1 = 0 – 10% density
- 2 = 10 – 40% density
- 3 = 40 – 70% density
- 4 = 70 –100% density

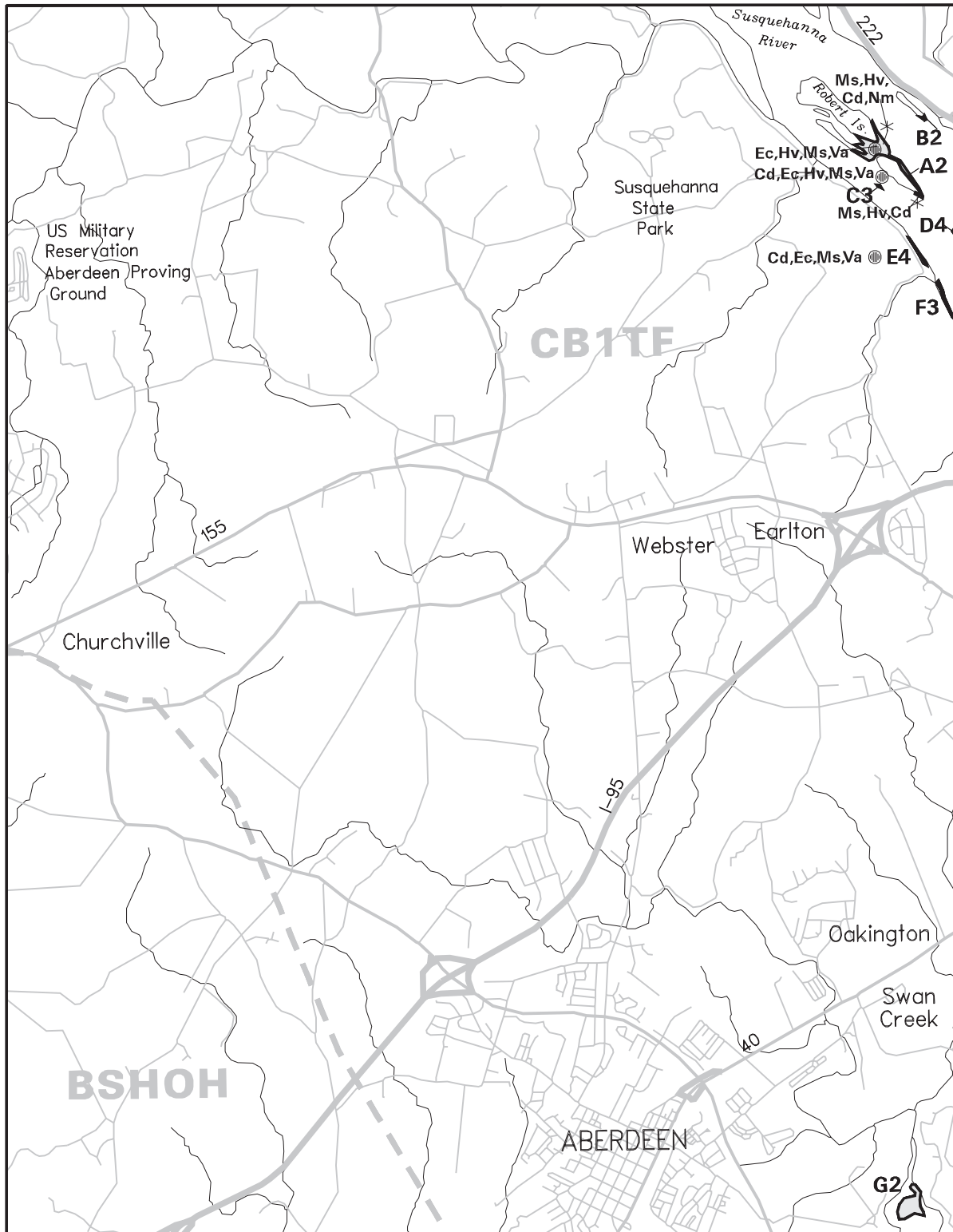


Location of USGS 7.5 minute quadrangles in Chesapeake Bay, its tributaries, and in the coastal bays with corresponding code numbers. (See Table 2 for quad names.)



# Submerged Aquatic Vegetation 1997

Aberdeen, Md. (002)



**Hectares of SAV: 17.06**  
Date Flown: 08/09/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

(003) Havre de Grace, Md.



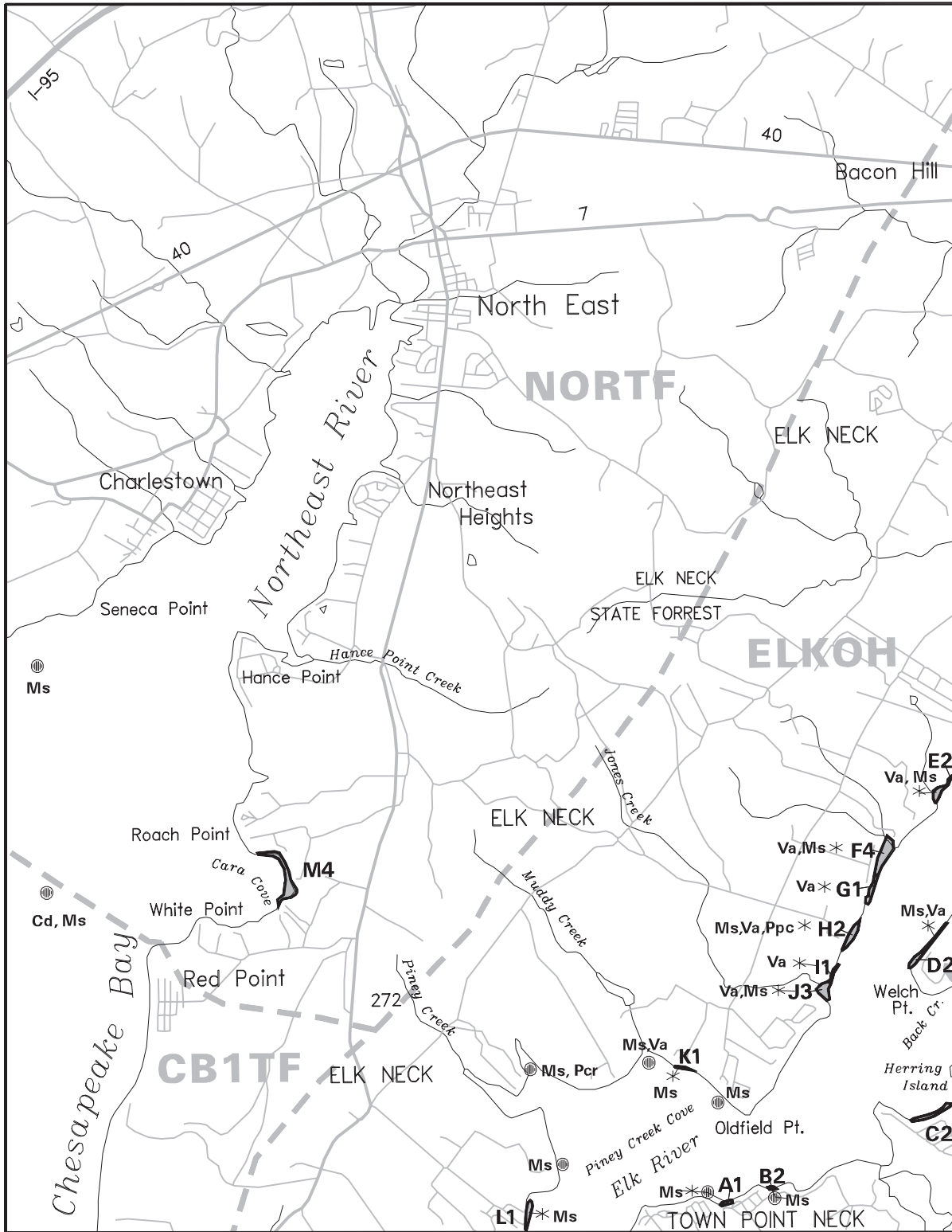
Hectares of SAV: 2,307.56  
 Date Flown: 08/24/97

Sources: School of Marine Science  
 Virginia Institute of Marine Science  
 College of William and Mary  
 U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

North East, Md. (004)



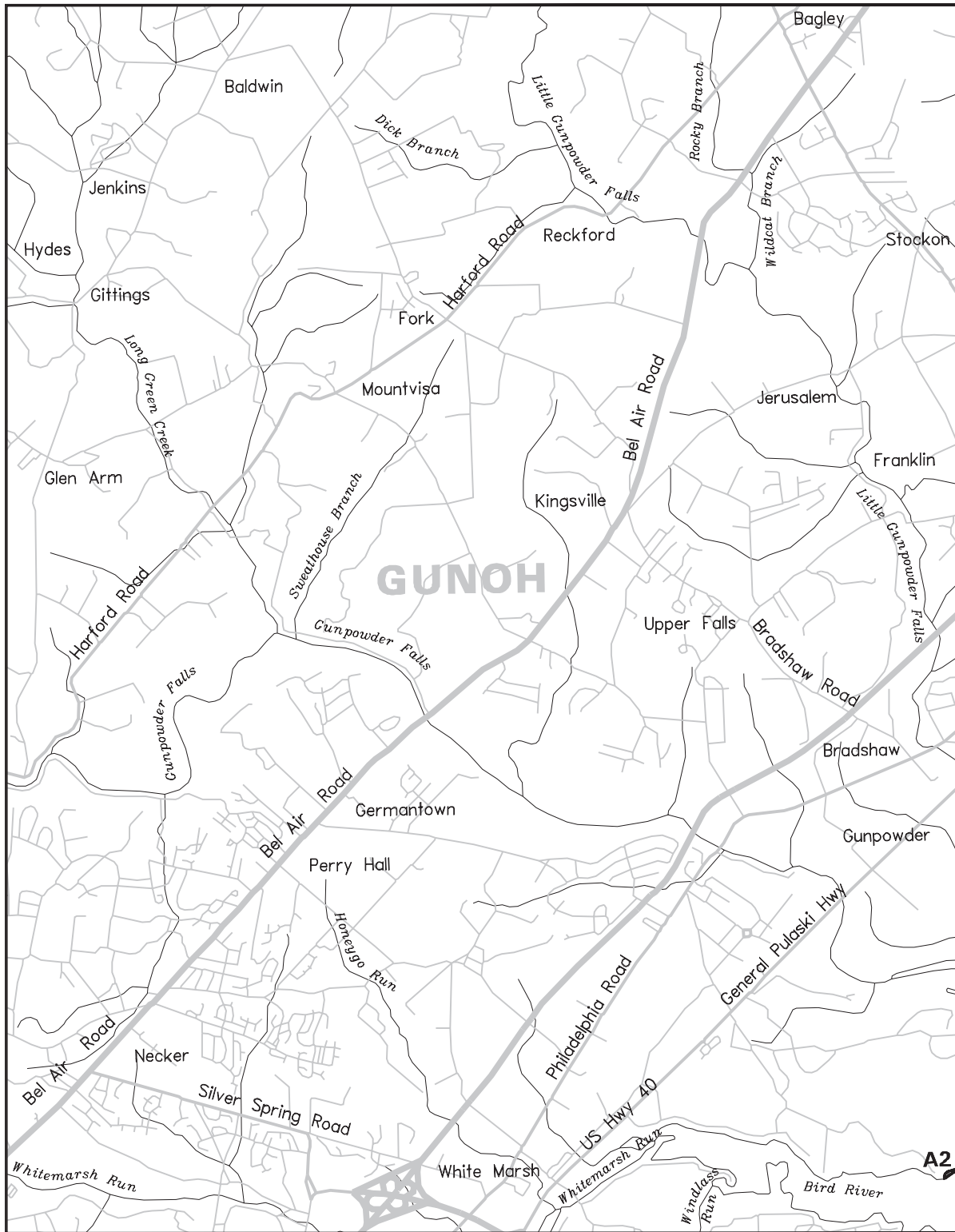
**Hectares of SAV: 23.13**  
Date Flown: 08/09/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(006) White Marsh, Md.

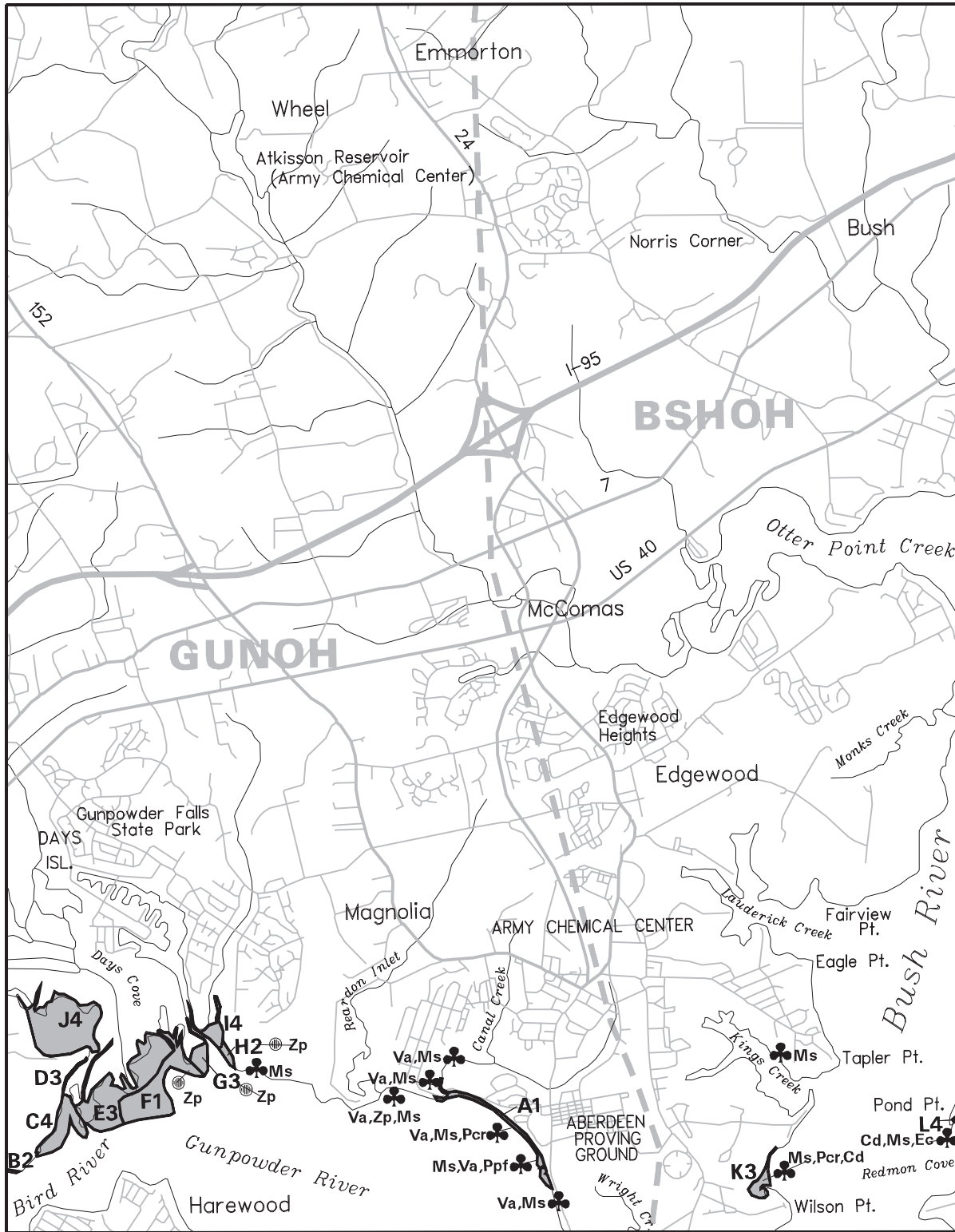


**Hectares of SAV: 0.58**  
Date Flown: 08/24/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

# Submerged Aquatic Vegetation 1997

Edgewood, Md. (007)



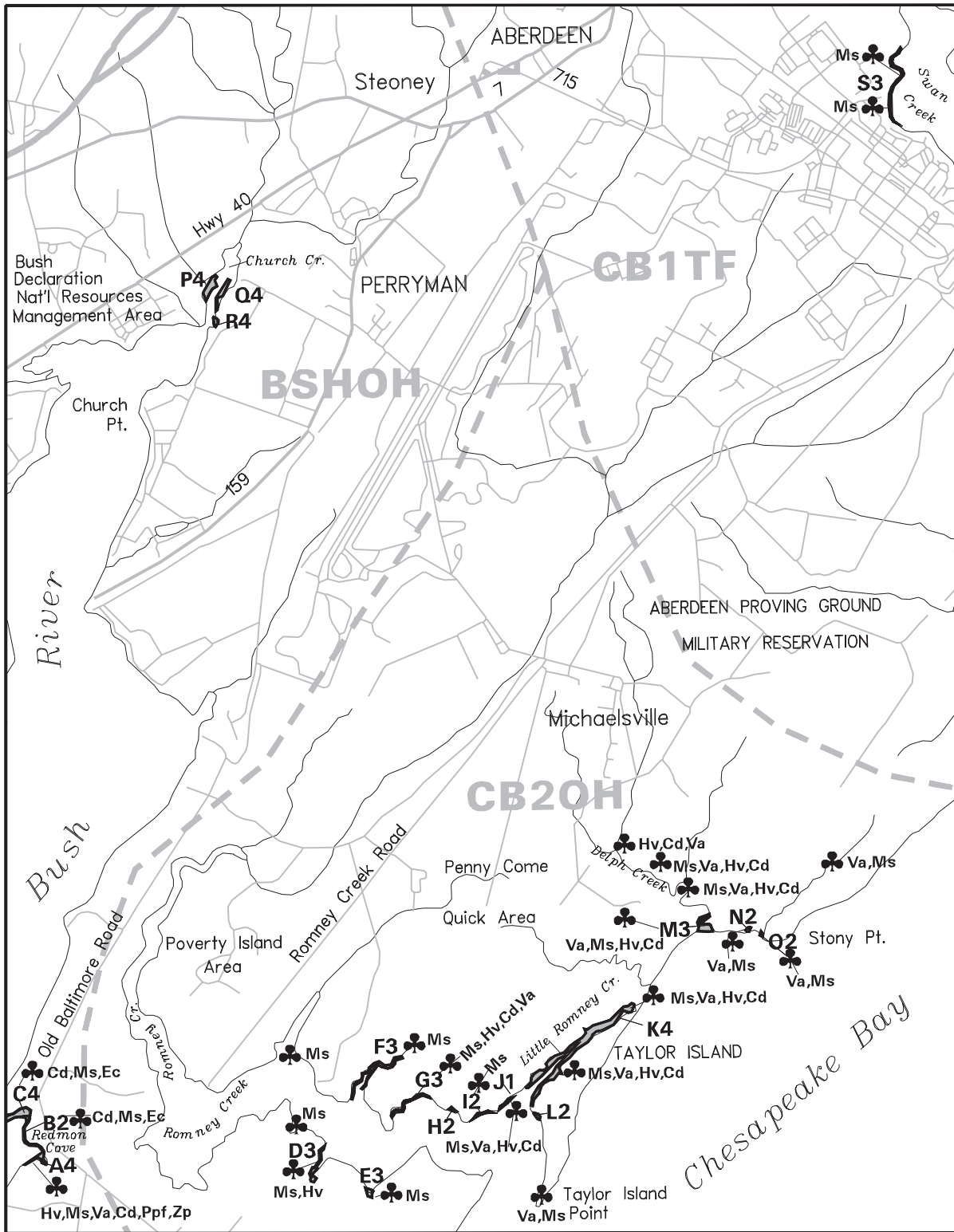
**Hectares of SAV: 160.79**  
Date Flown: 08/24/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(008) Perryman, Md.



Hectares of SAV: 30.54  
Date Flown: 08/24/97

Sources: School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

160 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Spesutie, Md. (009)



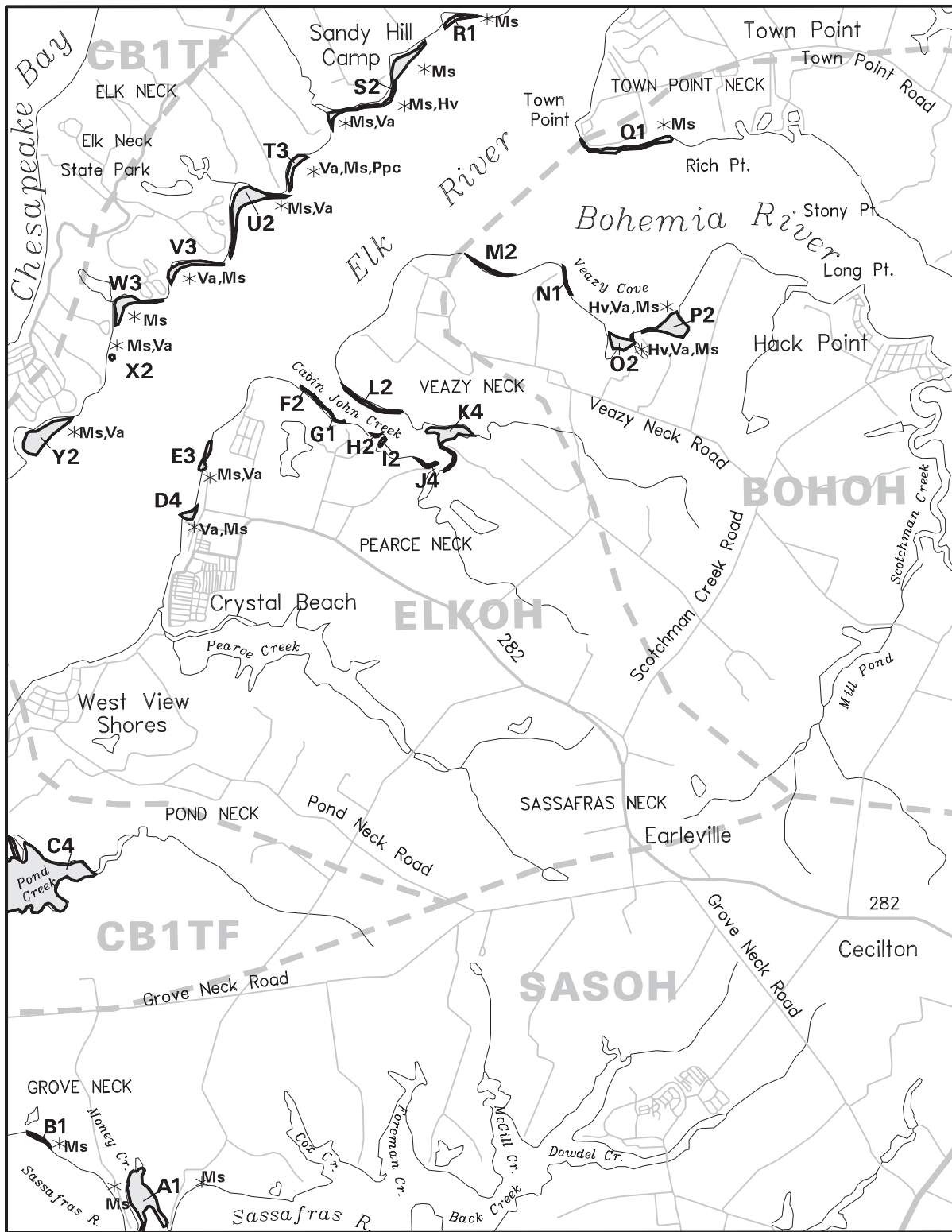
Hectares of SAV: 121.13  
Date Flown: 08/24/97



Sources: School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

# Submerged Aquatic Vegetation 1997

(010) Earleville, Md.



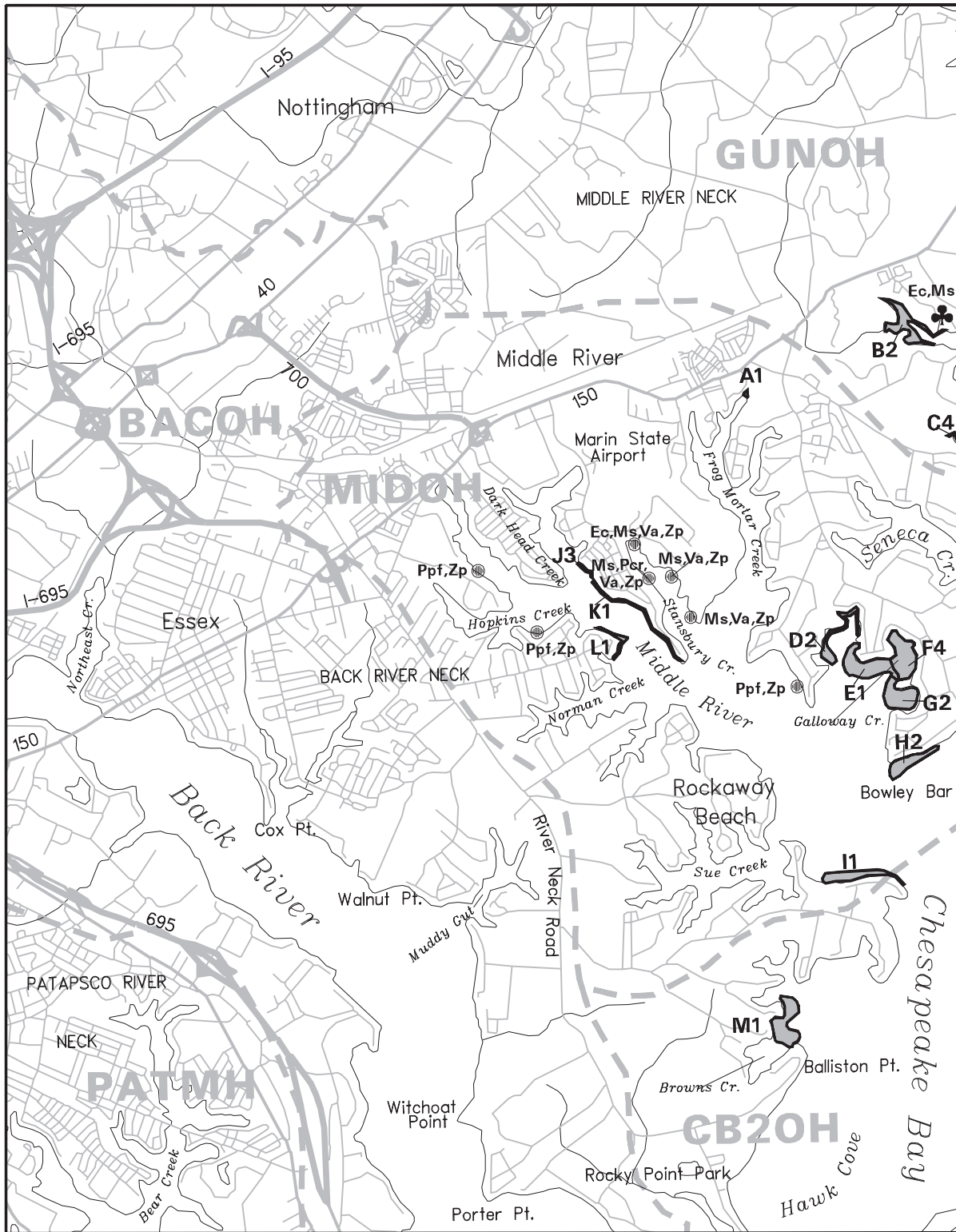
**Hectares of SAV: 120.85**  
Date Flown: 08/09/97, 08/24/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

162 1000 0 1000 2000 meters

# Submerged Aquatic Vegetation 1997

Middle River, Md. (013)



**Hectares of SAV: 77.18**  
Date Flown: 08/24/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary



U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(014) Gunpowder Neck, Md.



**Hectares of SAV: 589.84**

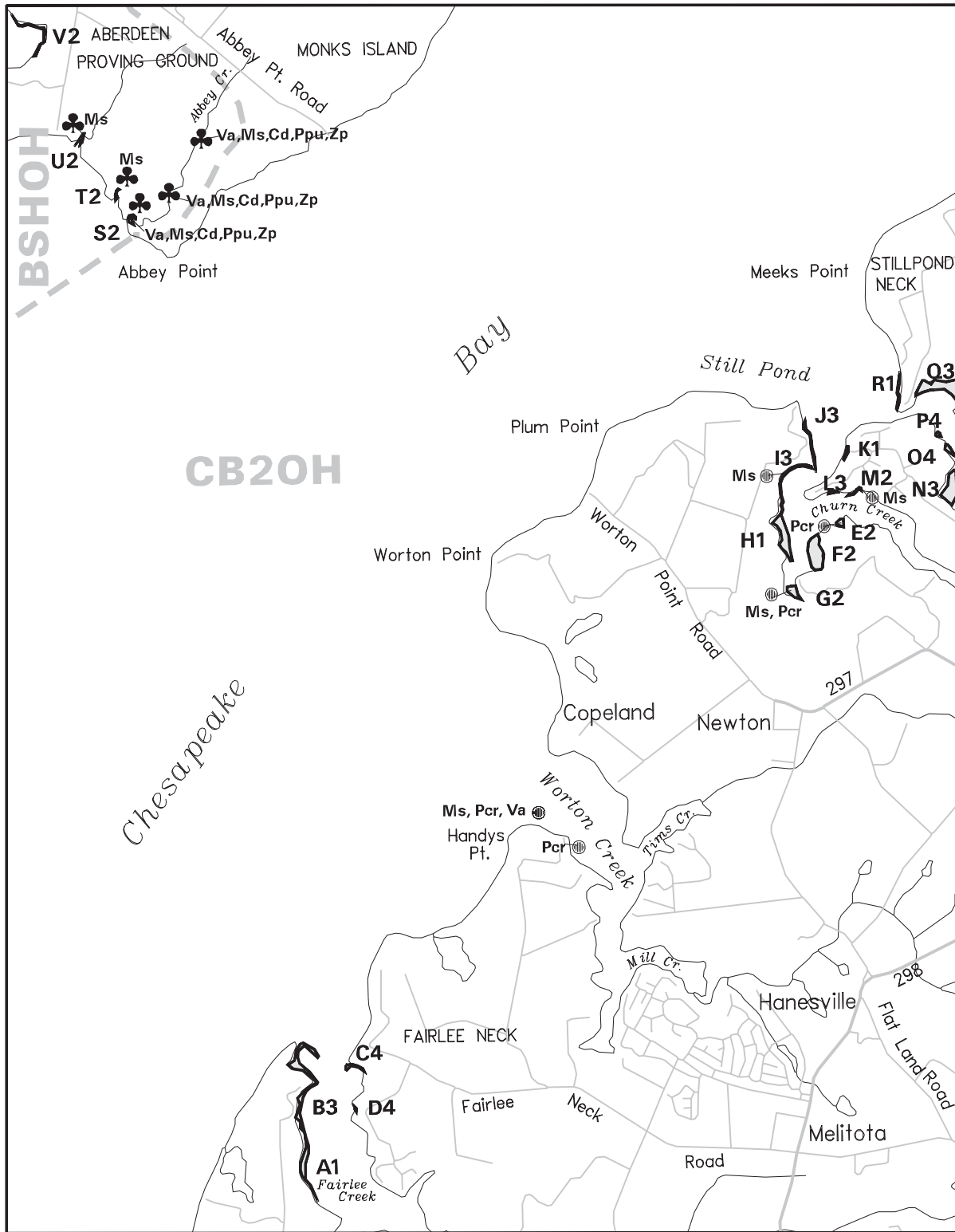
Date Flown: 08/24/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

Hanesville, Md. (015)



**Hectares of SAV: 33.93**

Date Flown: 08/24/97

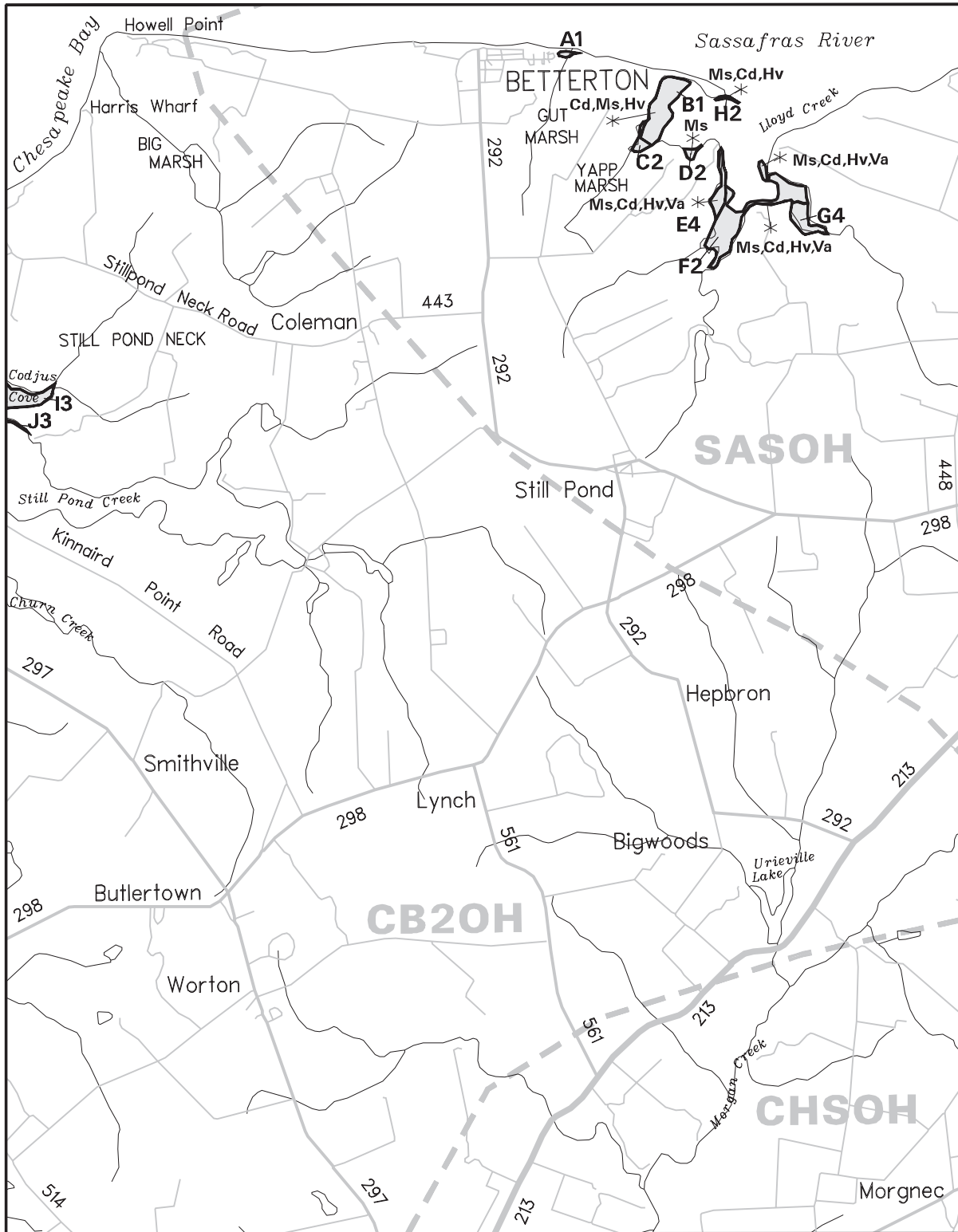
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary

U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(016) Betterton, Md.



**Hectares of SAV: 72.96**  
Date Flown: 08/24/97

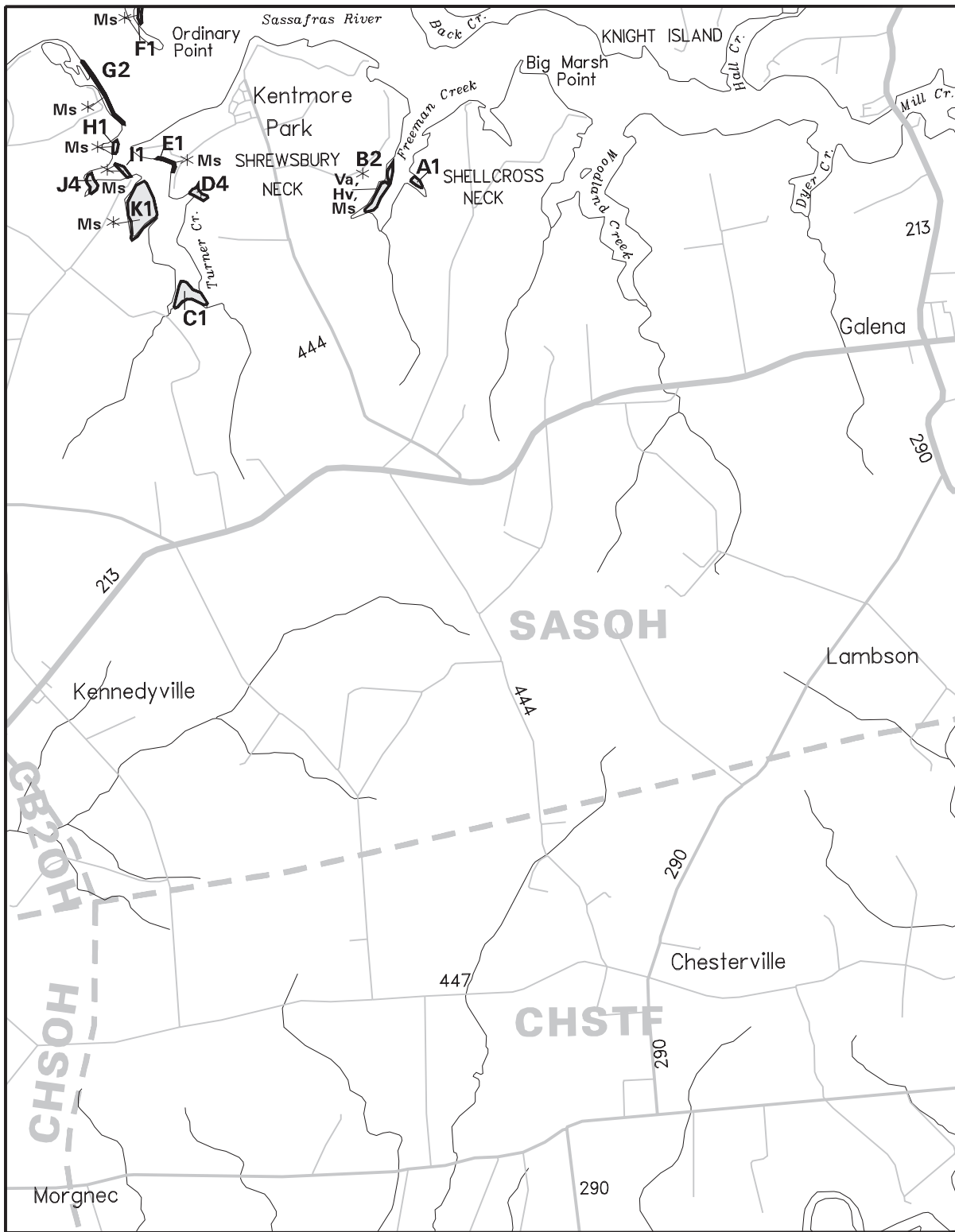
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

166 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Galena, Md. (017)



**Hectares of SAV: 32.59**  
Date Flown: 08/24/97

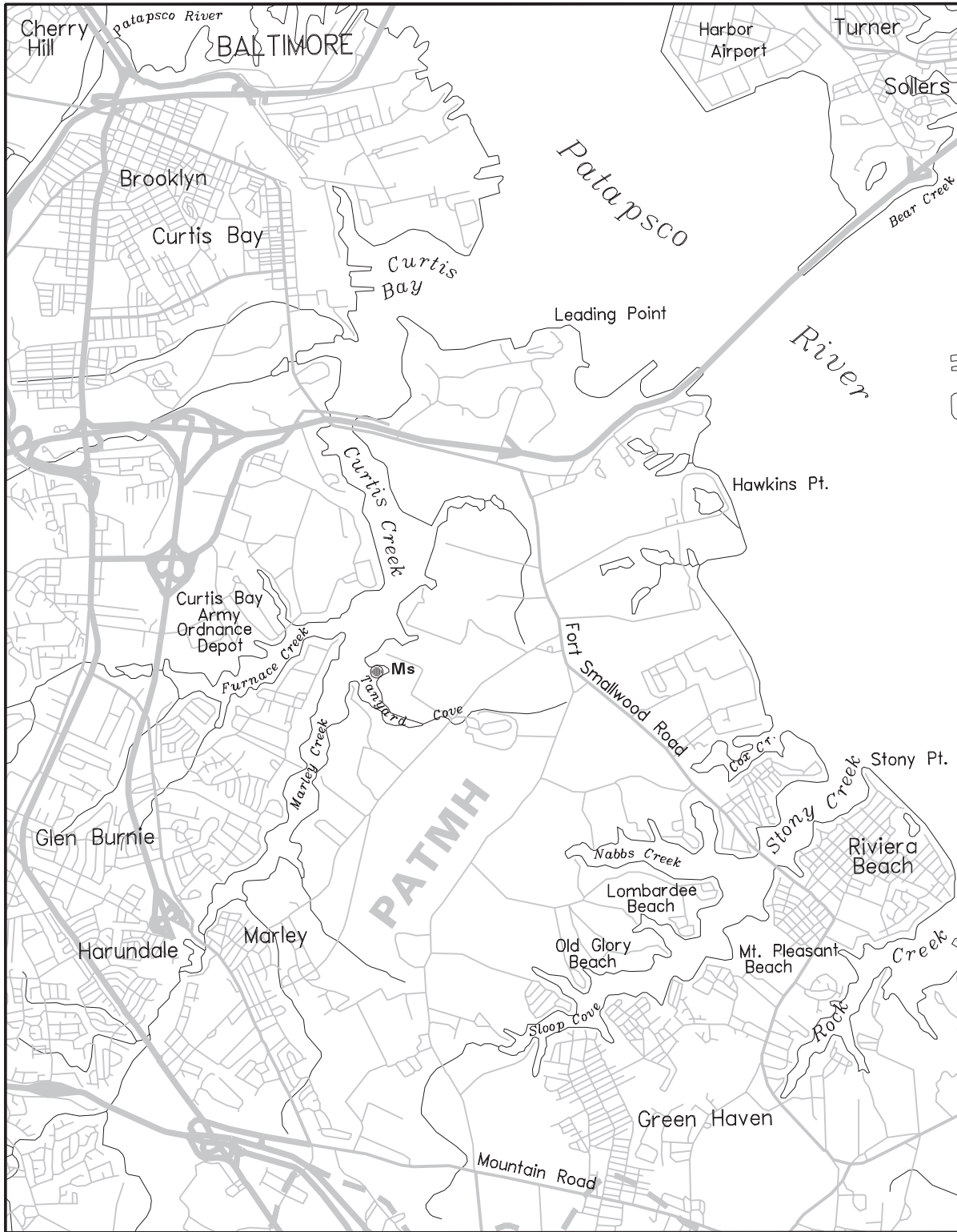
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary



U.S. Geological Survey

# Submerged Aquatic Vegetation 1997

(018) Curtis Bay, Md.



**Hectares of SAV: 0.00**  
Date Flown: 09/22/97

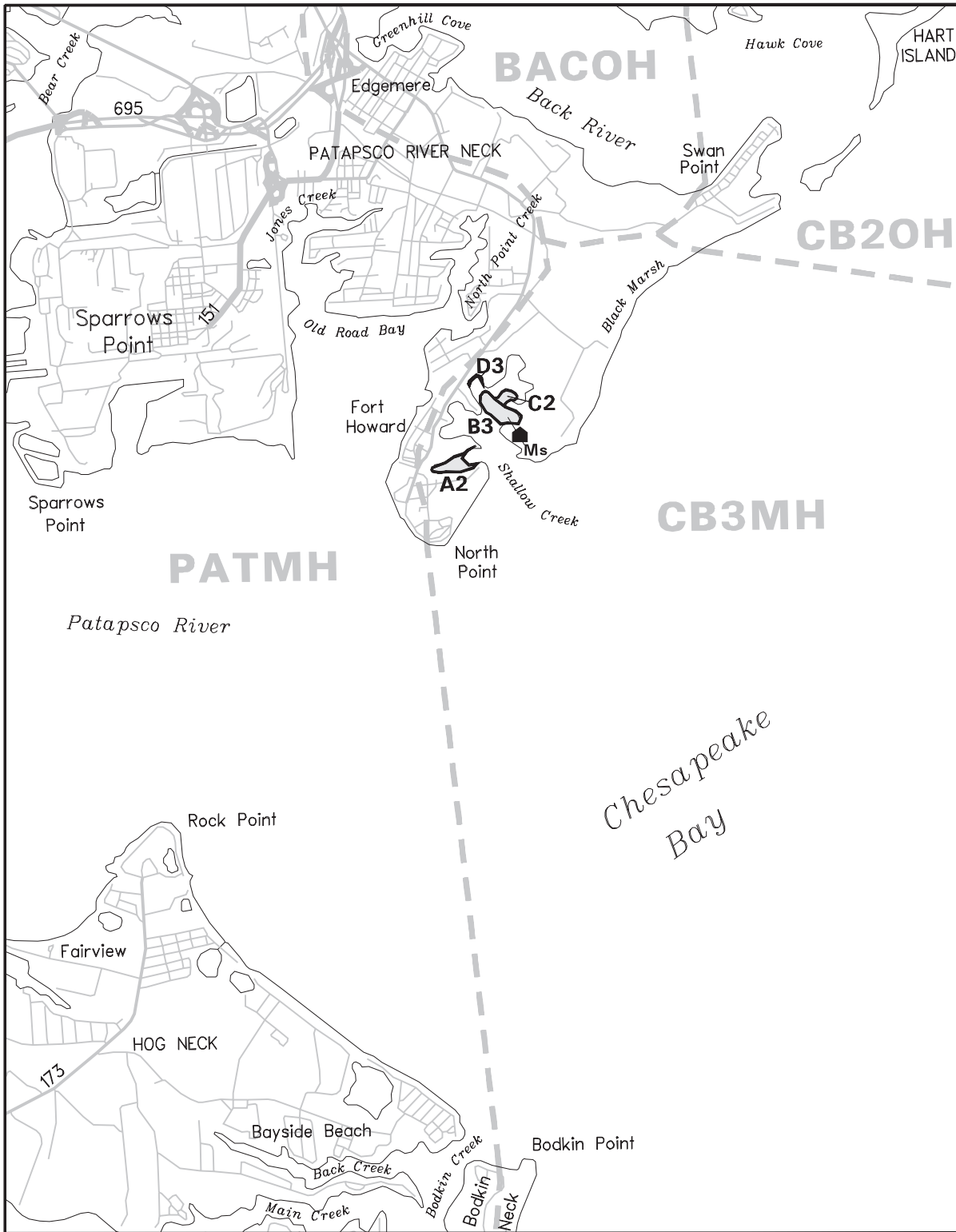
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

168

1000 0 1000 2000 meters

# Submerged Aquatic Vegetation 1997

Sparrows Point, Md. (019)



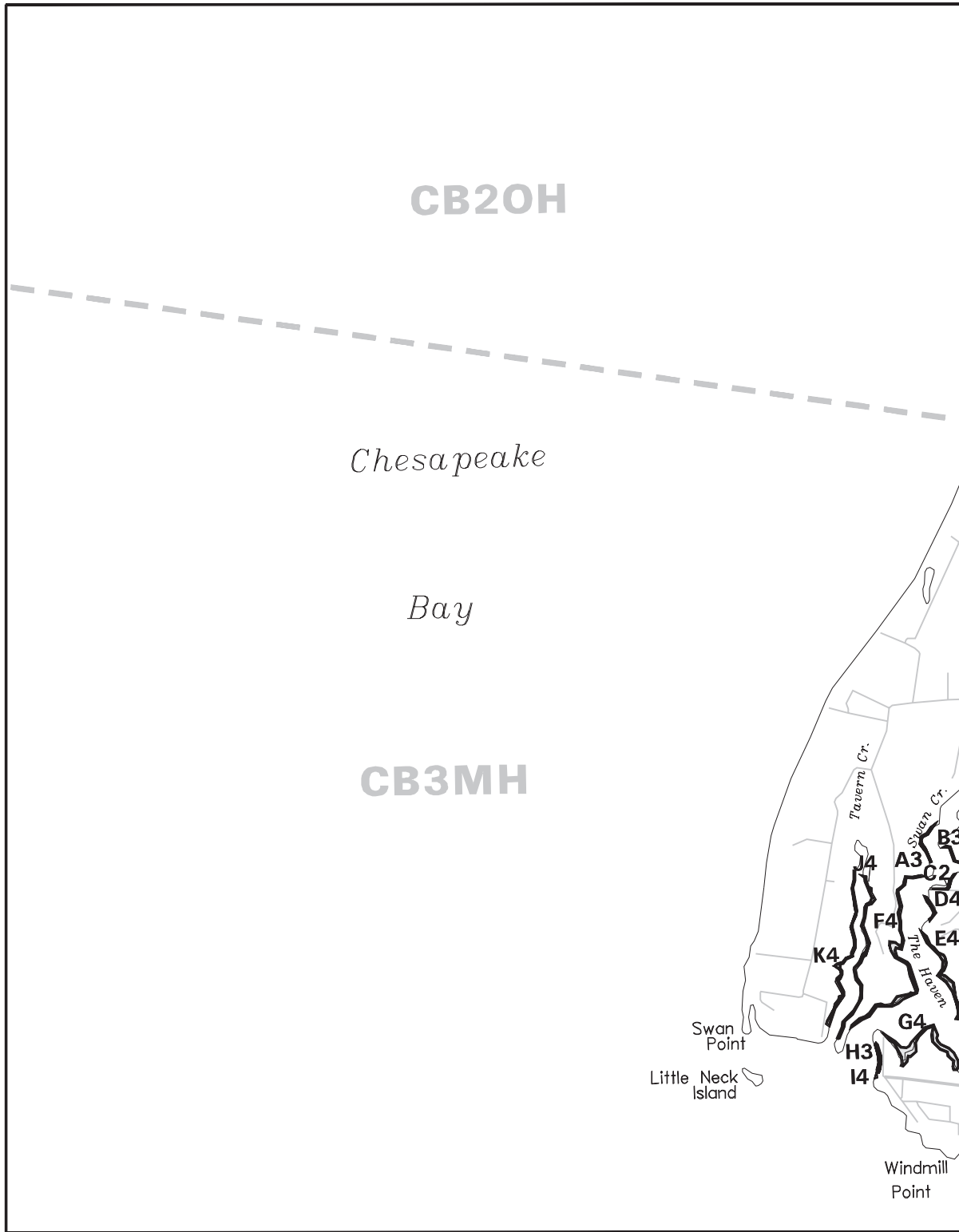
**Hectares of SAV: 16.82**  
Date Flown: 08/24/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(020) Swan Point, Md.



**Hectares of SAV: 26.73**  
Date Flown: 08/24/97

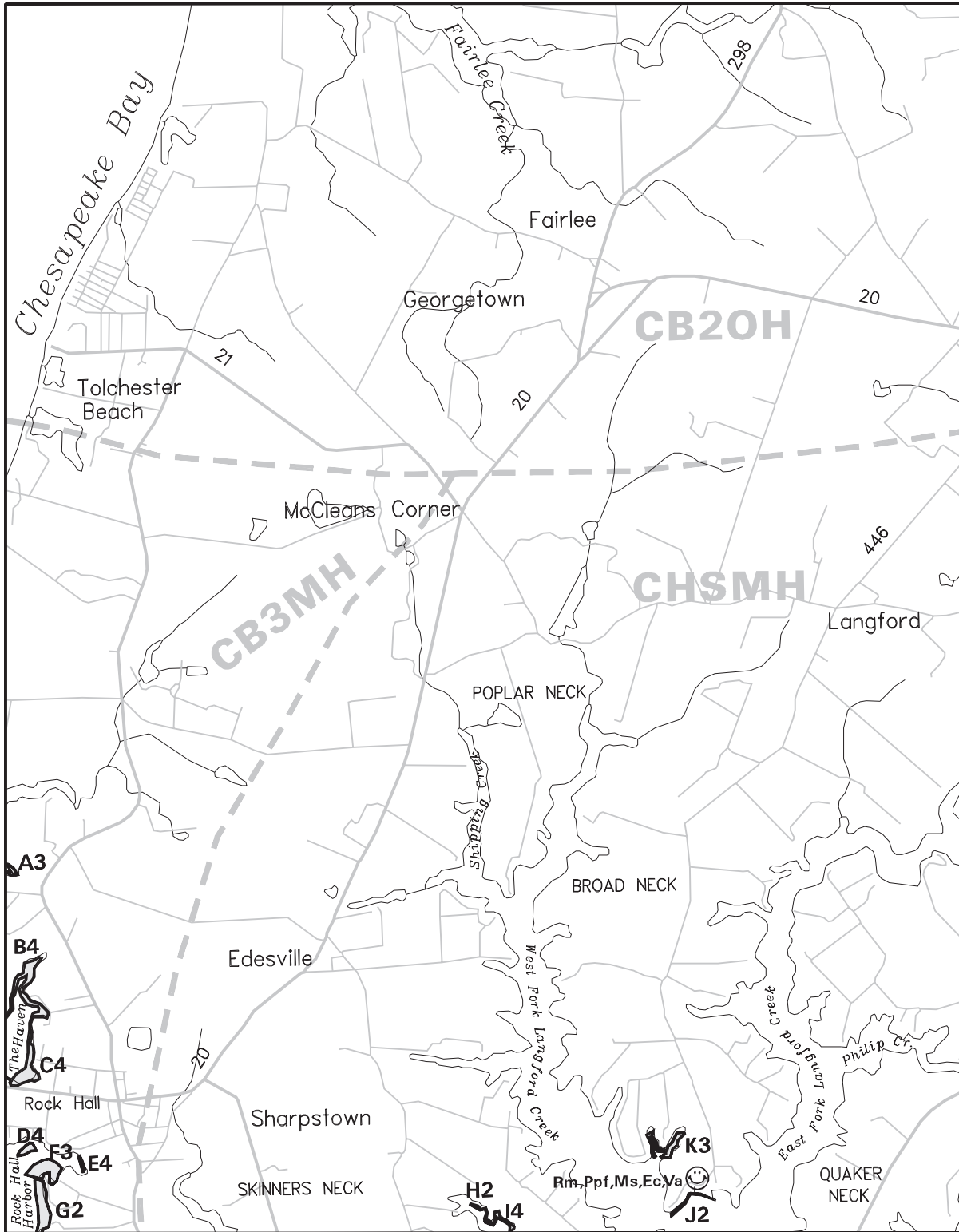
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

170



# Submerged Aquatic Vegetation 1997

Rock Hall, Md. (021)



**Hectares of SAV: 35.90**  
 Date Flown: 08/24/97, 09/26/97

**Sources:** School of Marine Science  
 Virginia Institute of Marine Science  
 College of William and Mary

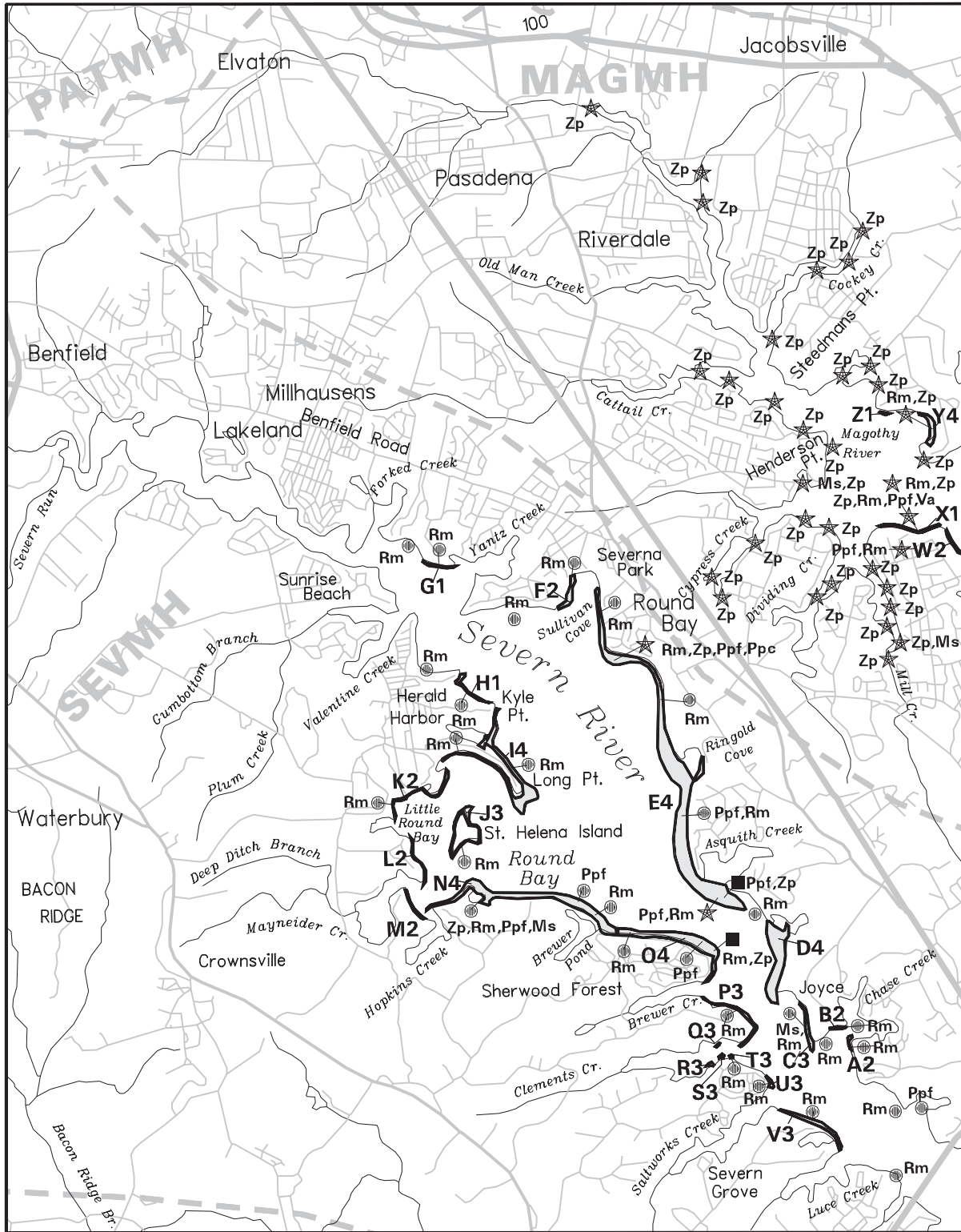


U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(023) Round Bay, Md.



**Hectares of SAV: 128.46**  
Date Flown: 07/31/97, 08/30/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

Gibson Island, Md. (024)



**Hectares of SAV: 50.82**  
Date Flown: 08/30/97

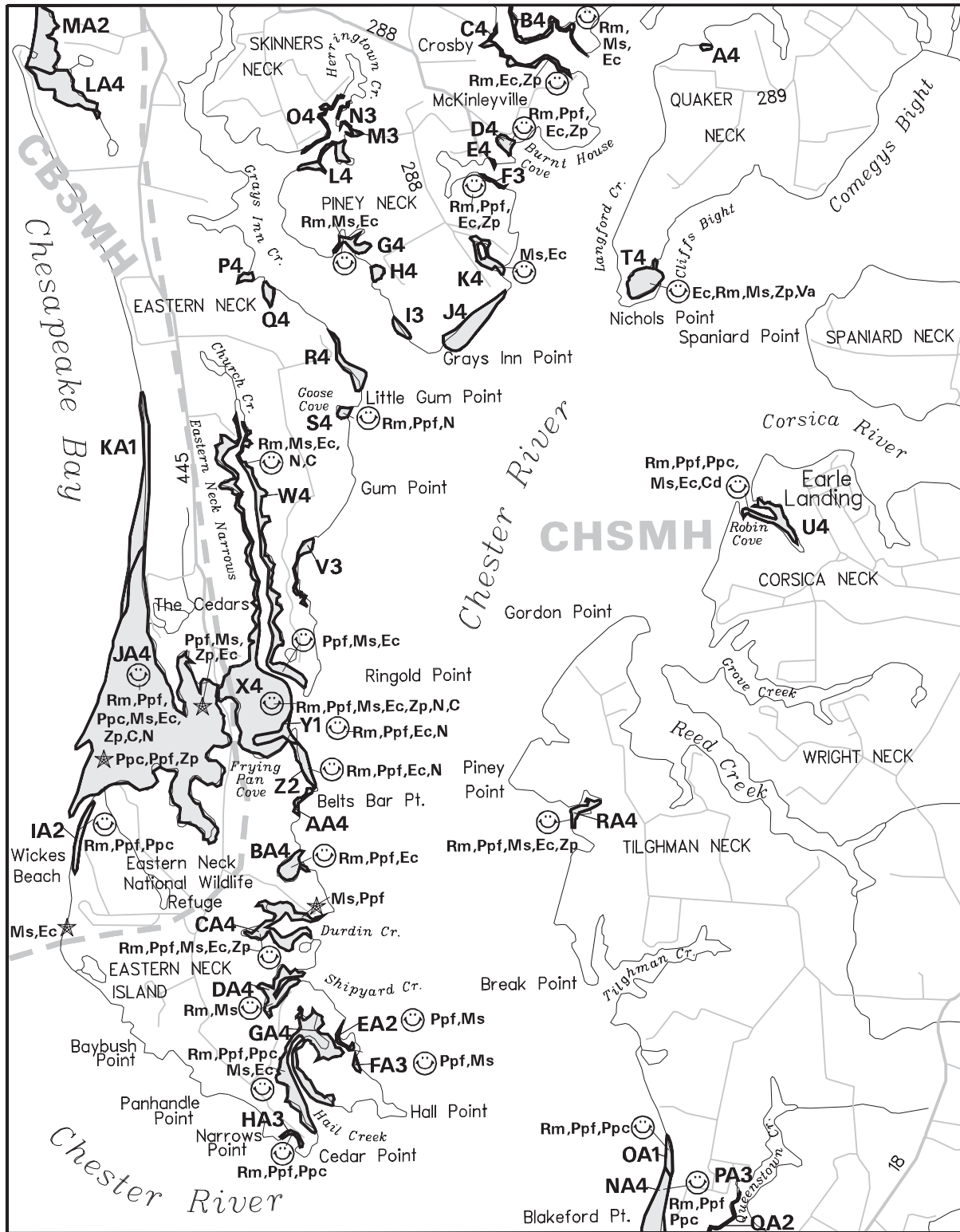
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary



U.S. Geological Survey

# Submerged Aquatic Vegetation 1997

(026) Langford Creek, Md.



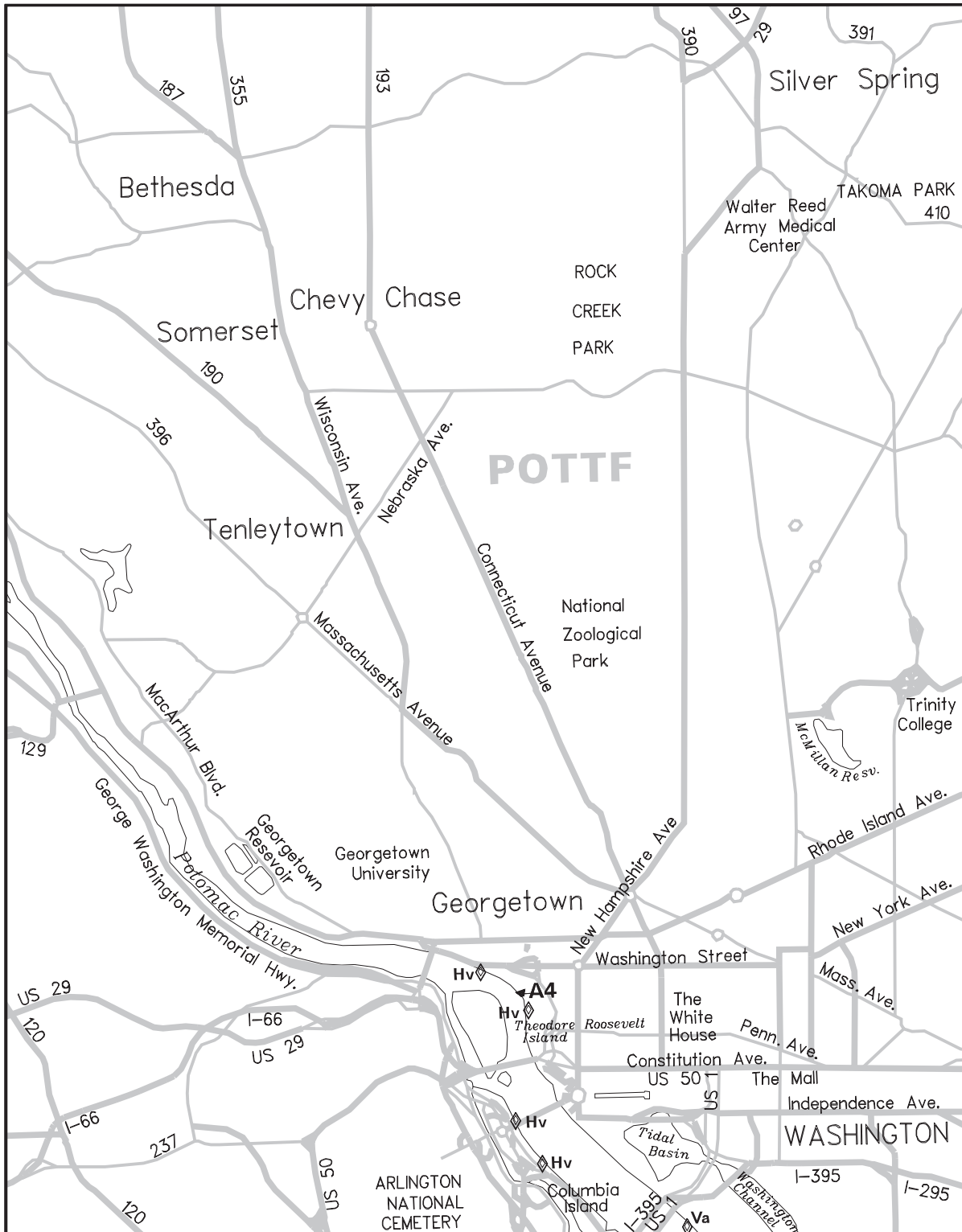
Hectares of SAV: 563.50  
Date Flown: 08/24/97, 09/22/97

Sources: School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

Washington West, Md.–D.C.–Va (028)



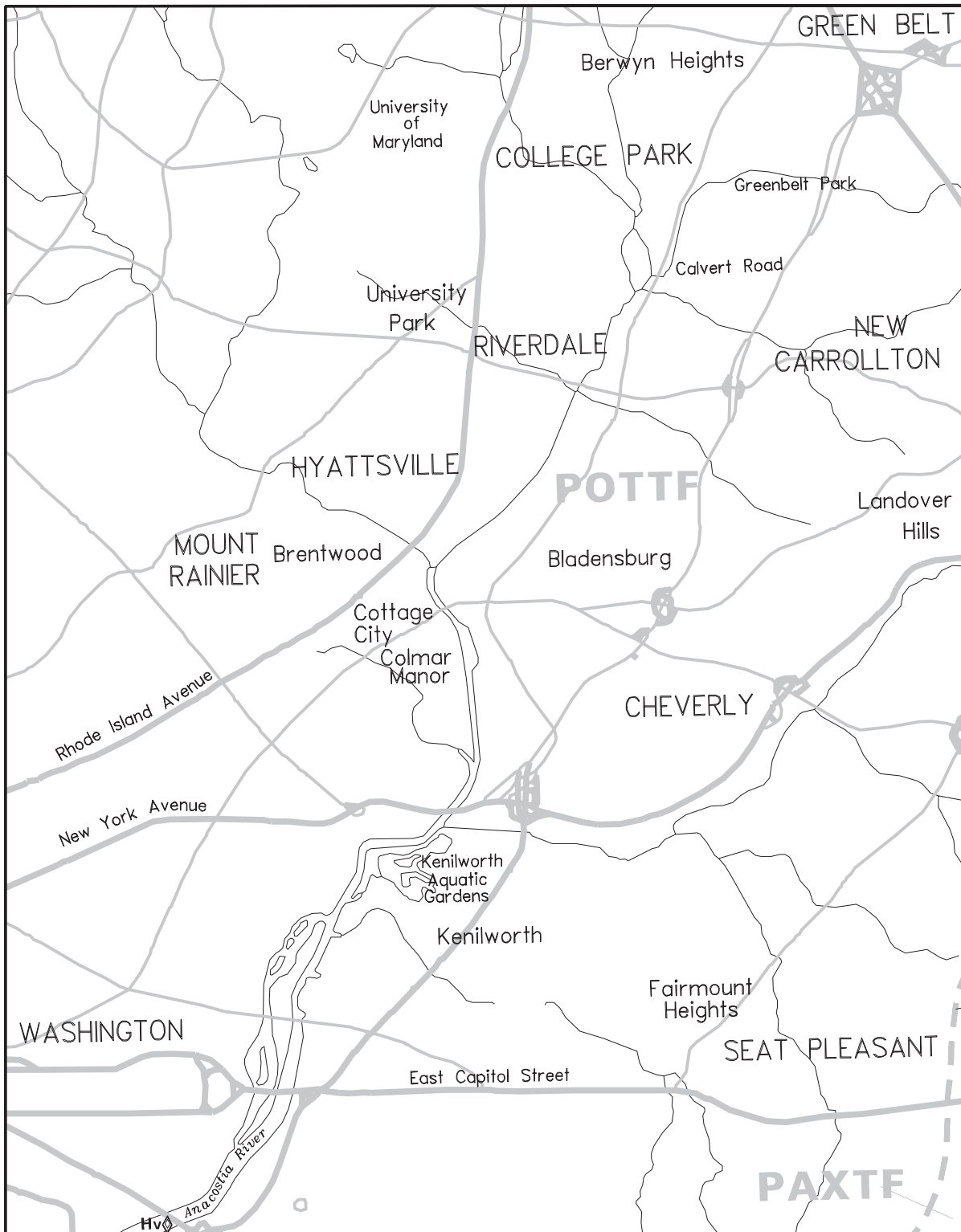
**Hectares of SAV: 0.20**  
Date Flown: 08/23/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(029) Washington East, D.C.–Md.



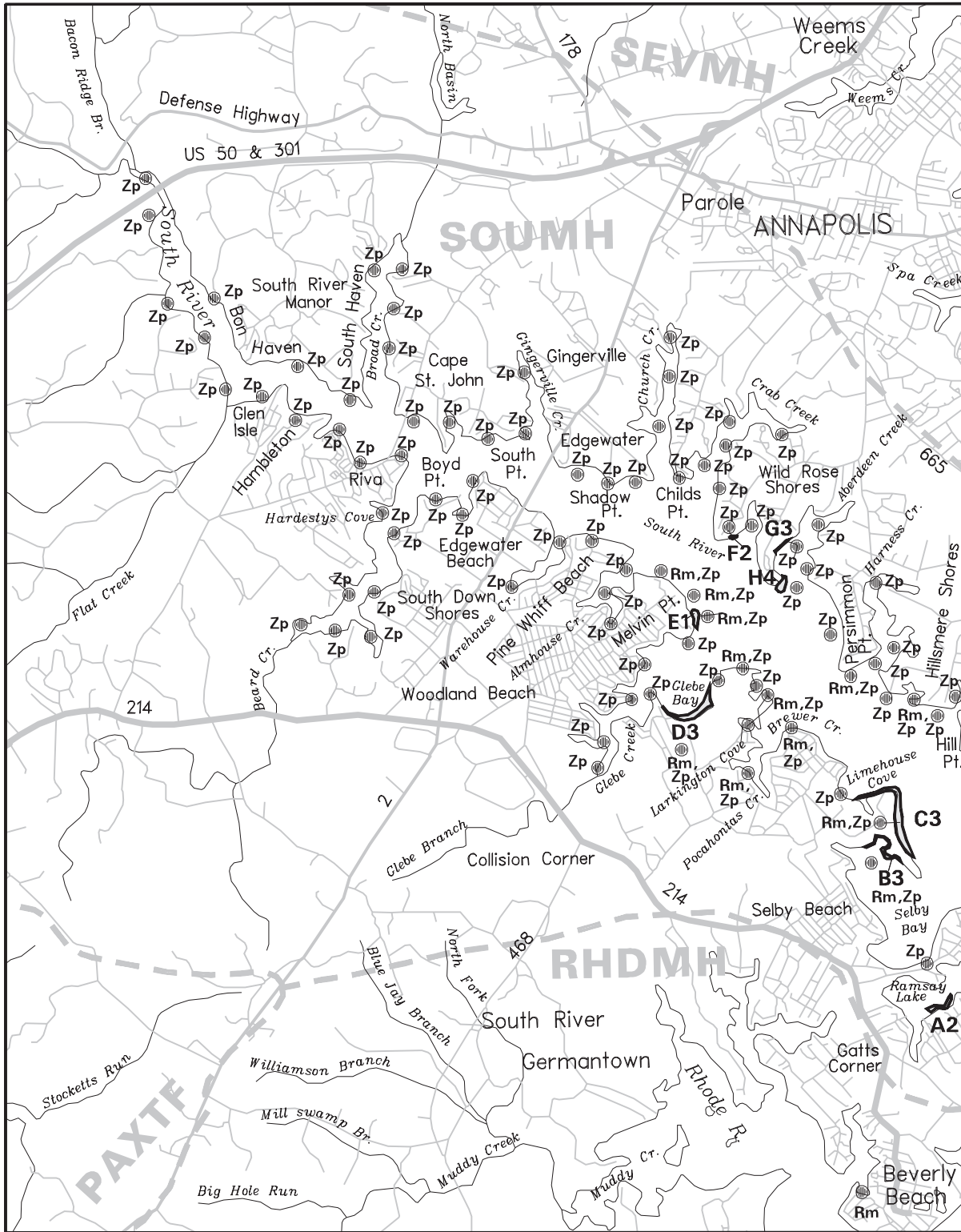
**Hectares of SAV: 0.00**  
Date Flown: 08/23/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

176 1000 0 1000 2000 meters

# Submerged Aquatic Vegetation 1997

South River, Md. (030)



**Hectares of SAV: 16.35**  
Date Flown: 07/31/97

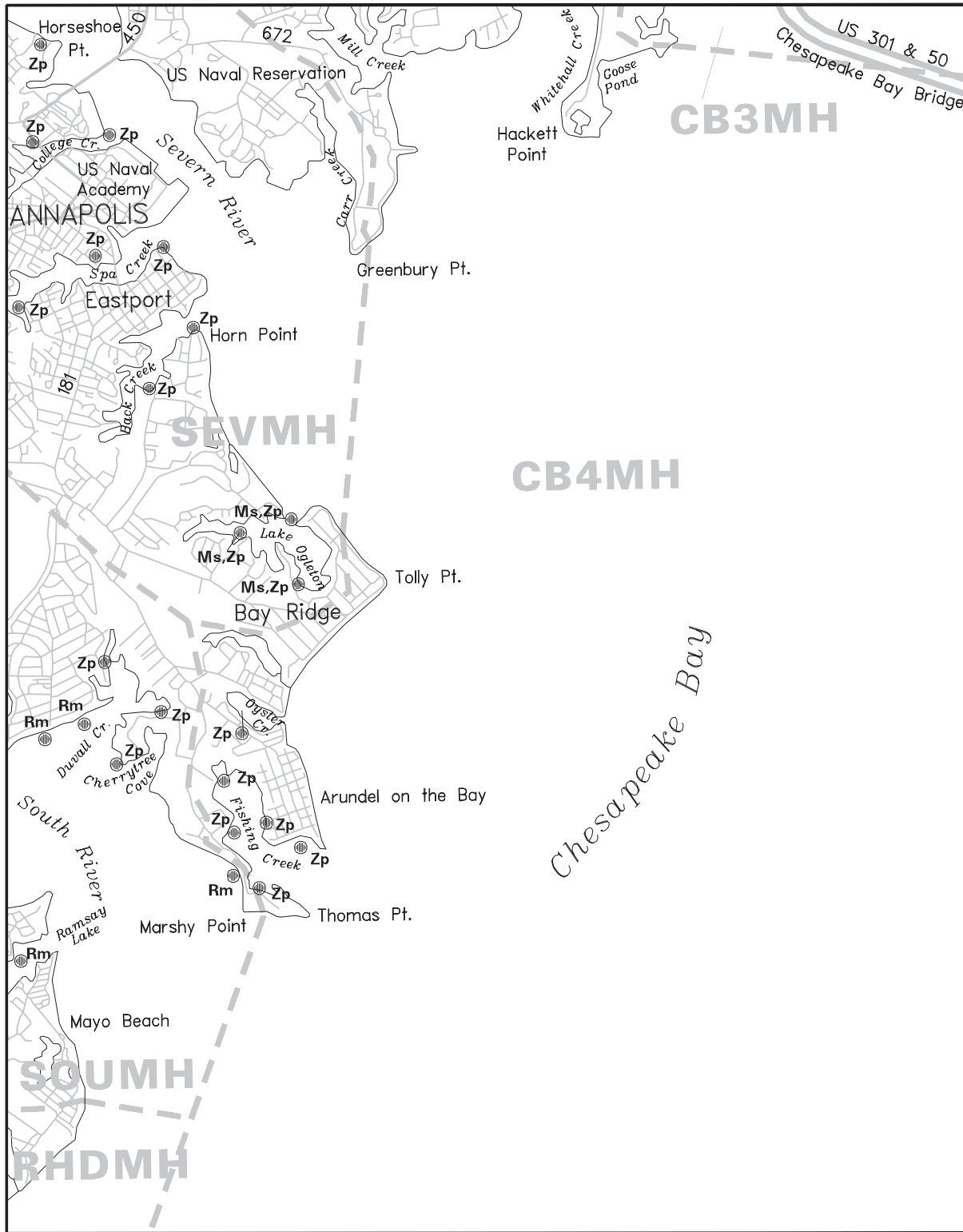
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary

1000 0 1000 2000 meters

U.S. Geological Survey

# Submerged Aquatic Vegetation 1997

(031) Annapolis, Md.



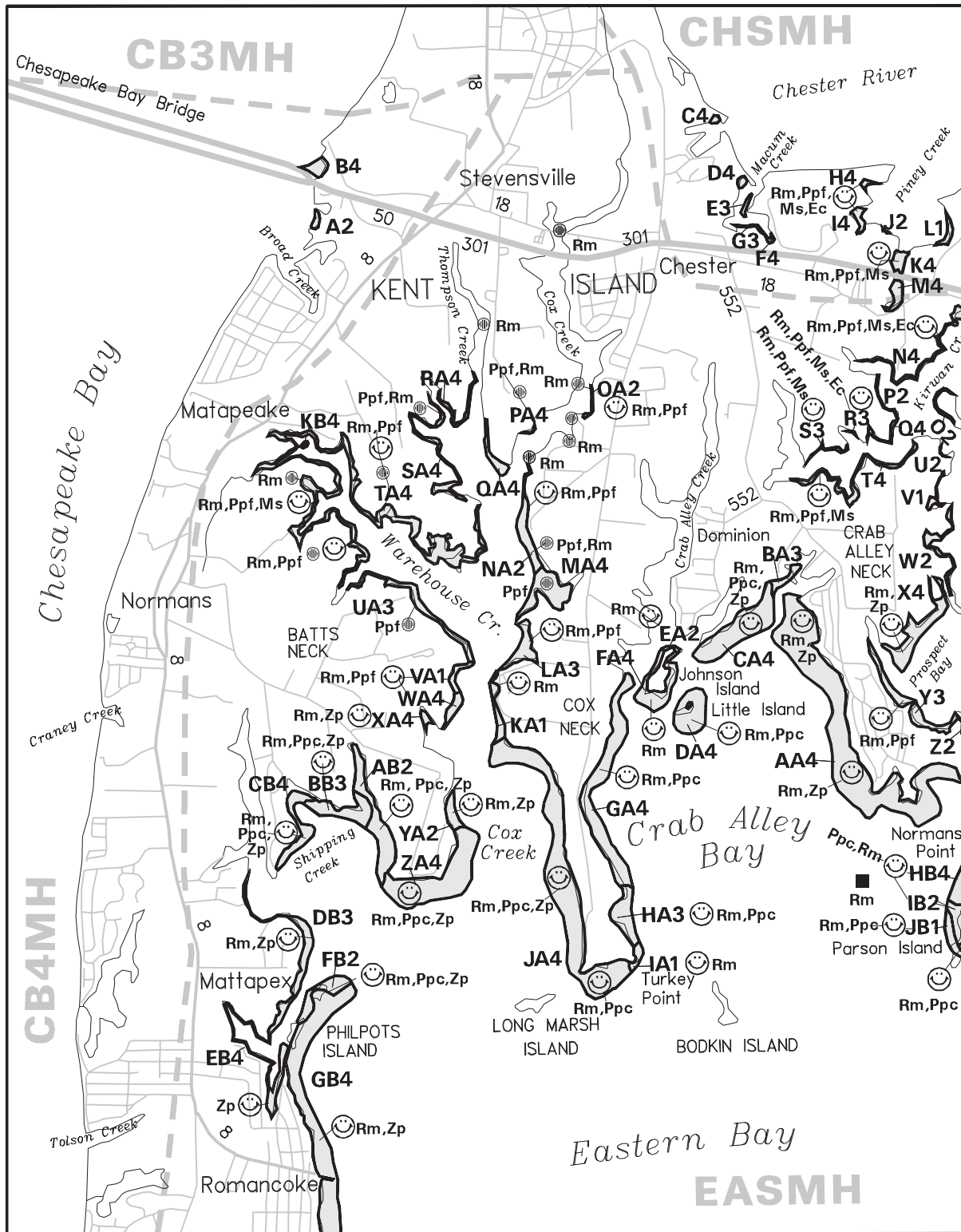
Hectares of SAV: 0.00  
Date Flown: 08/30/97

Sources: School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

178 1000 0 1000 2000 meters

# Submerged Aquatic Vegetation 1997

Kent Island, Md. (032)



Hectares of SAV: 683.88  
Date Flown: 07/31/97

Sources: School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey





# Submerged Aquatic Vegetation 1997

(033) Queenstown, Md.



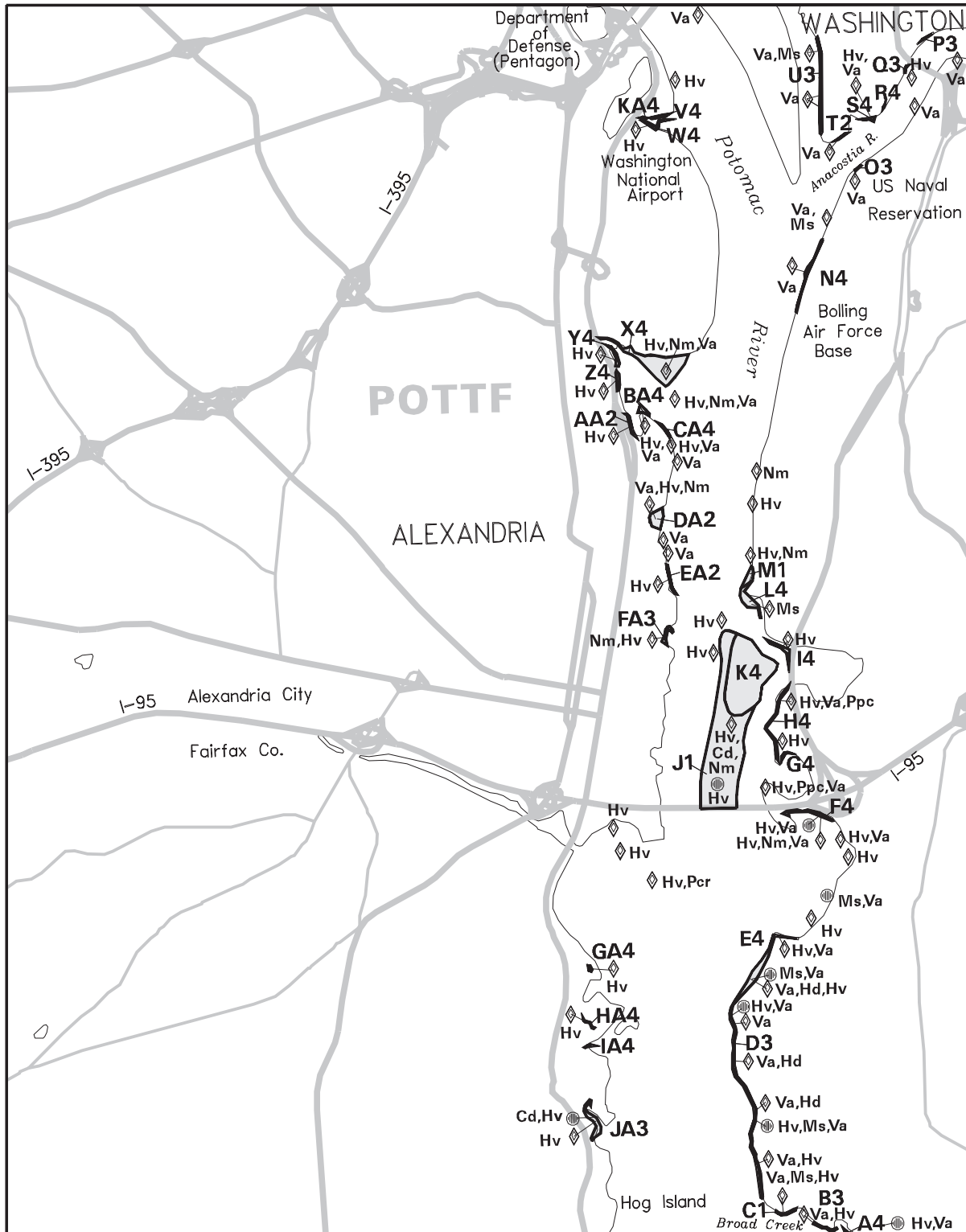
Hectares of SAV: 527.43  
Date Flown: 07/31/97

Sources: School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

Alexandria, Va.–D.C.–Md. (034)



**Hectares of SAV: 136.56**

Date Flown: 08/23/97

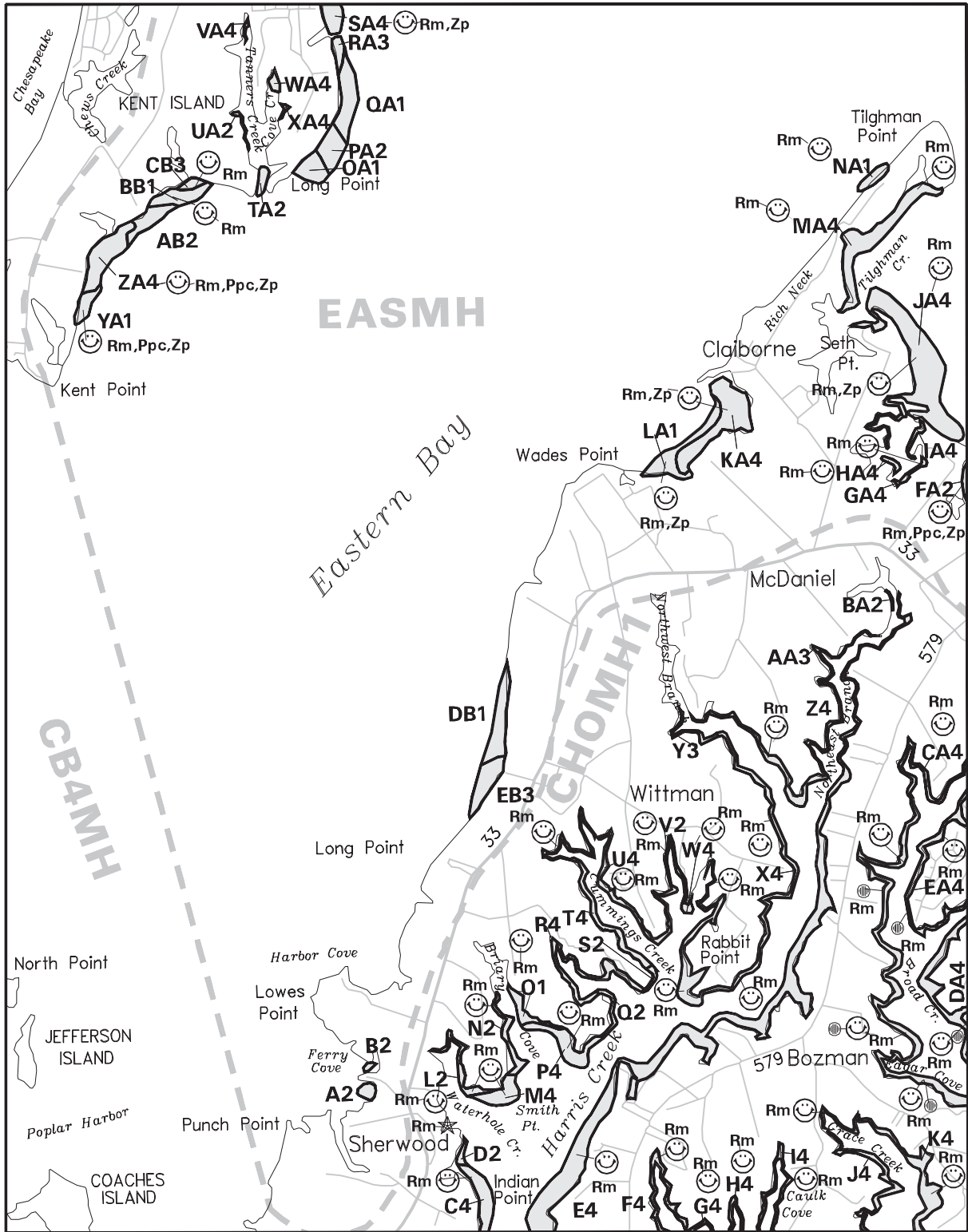


**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary

U.S. Geological Survey

# Submerged Aquatic Vegetation 1997

(036) Claiborne, Md.



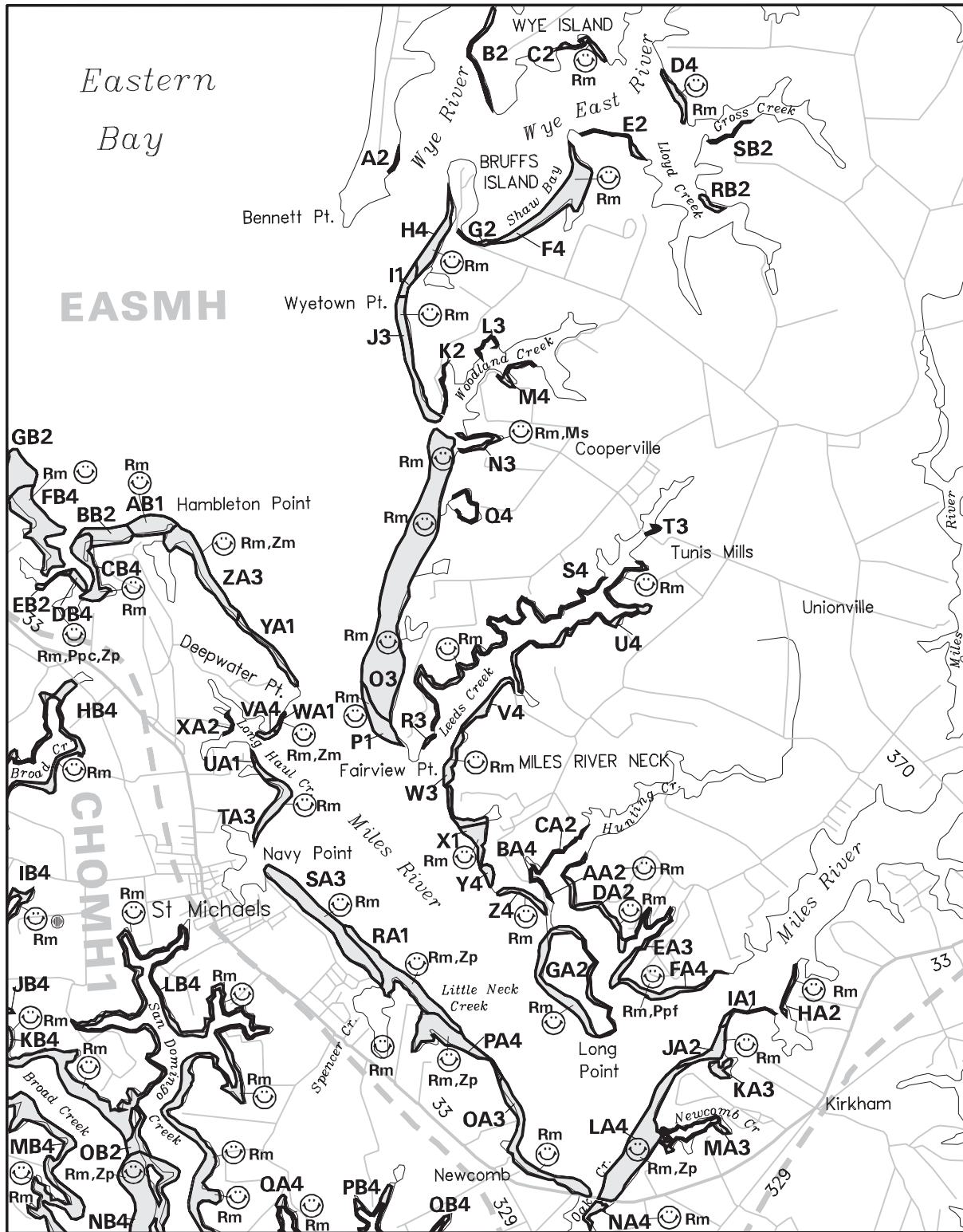
**Hectares of SAV: 661.30**  
 Date Flown: 07/18/97, 07/31/97

**Sources:** School of Marine Science  
 Virginia Institute of Marine Science  
 College of William and Mary  
 U.S. Geological Survey

182 1000 0 1000 2000 meters

# Submerged Aquatic Vegetation 1997

St. Michaels, Md. (037)



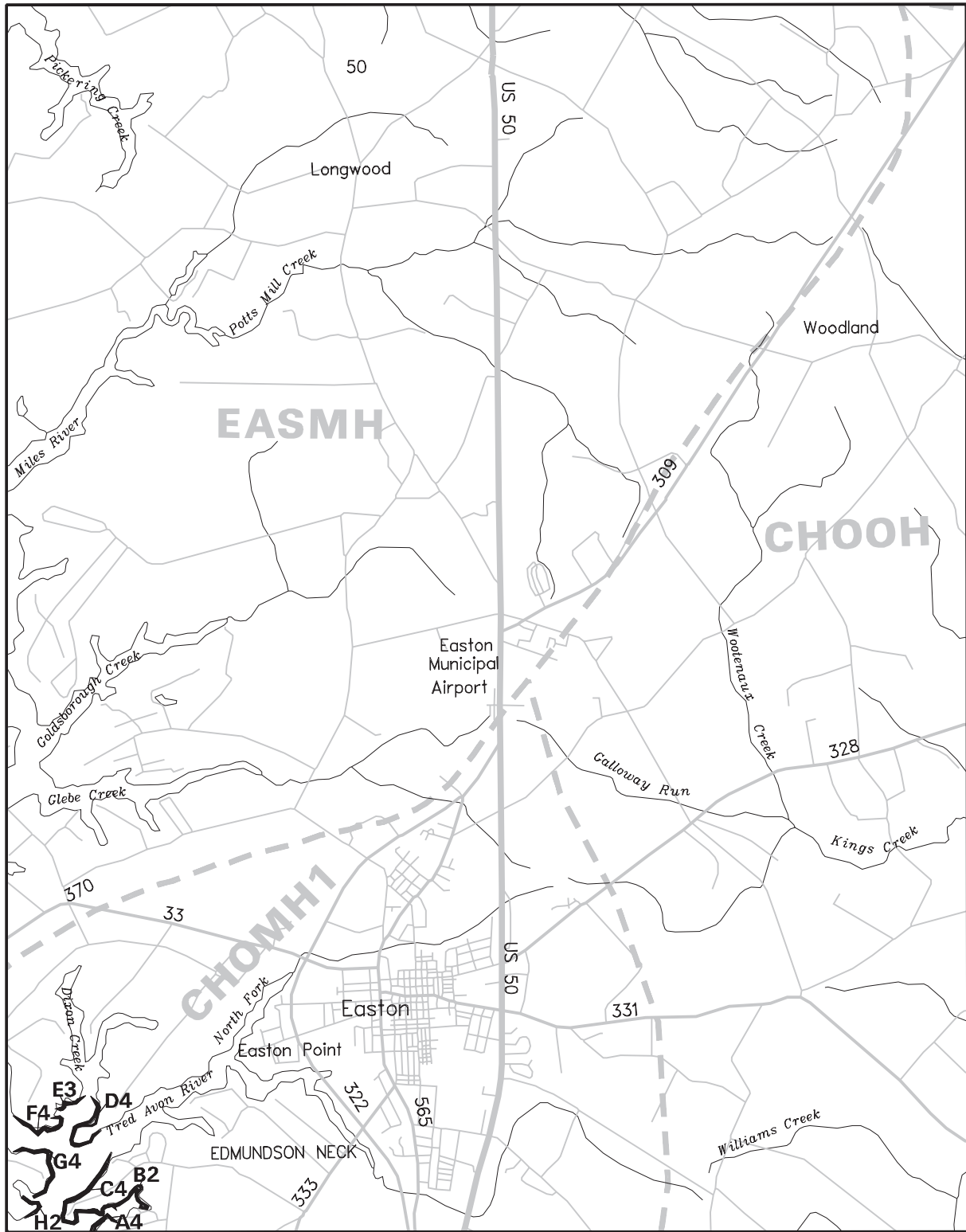
Hectares of SAV: 717.55  
Date Flown: 07/31/97

Sources: School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(038) Easton, Md.



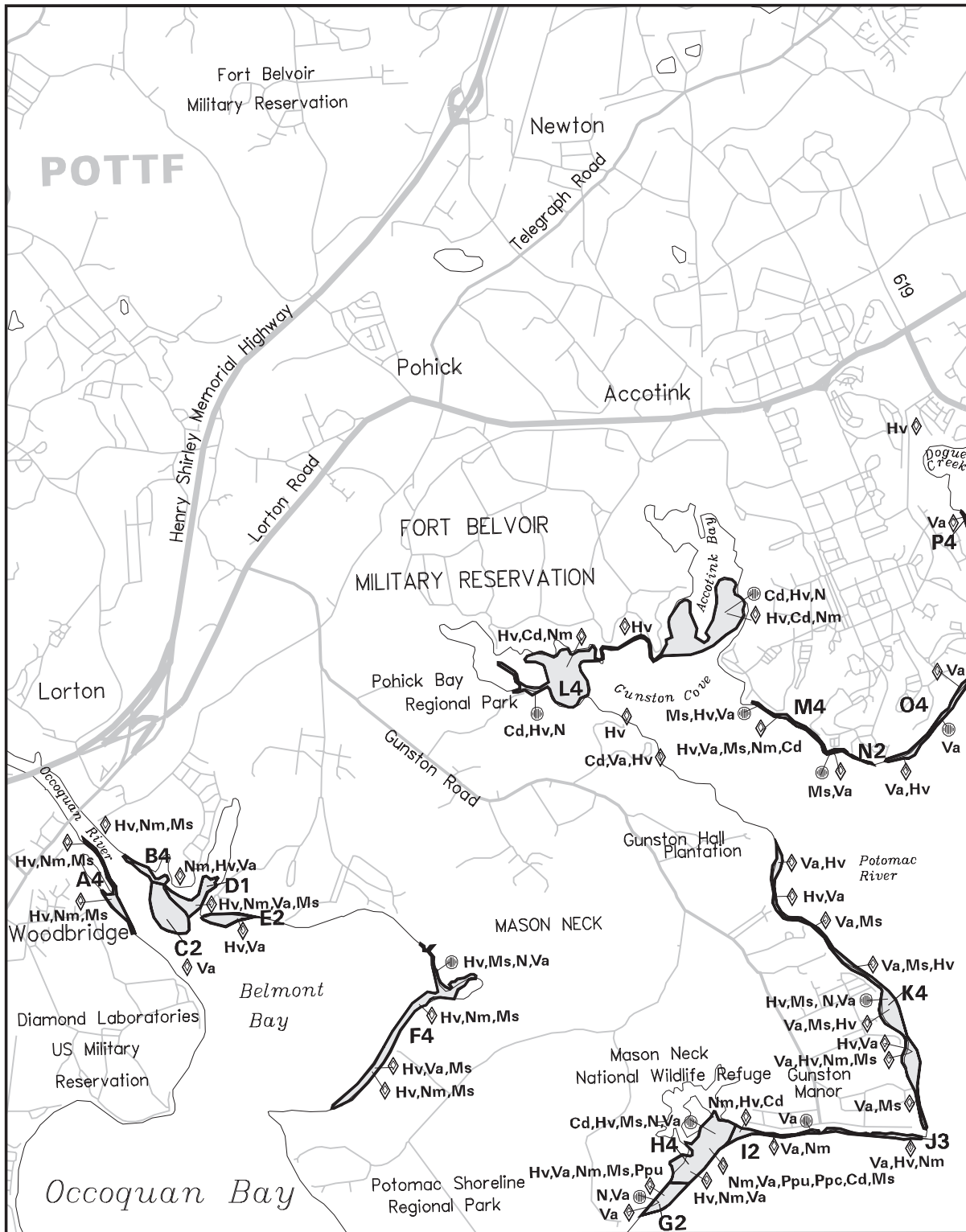
**Hectares of SAV: 12.45**  
Date Flown: 07/31/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

184 1000 0 1000 2000 meters

# Submerged Aquatic Vegetation 1997

Fort Belvoir, Va.–Md. (039)



**Hectares of SAV: 206.77**  
Date Flown: 08/24/97, 09/26/97

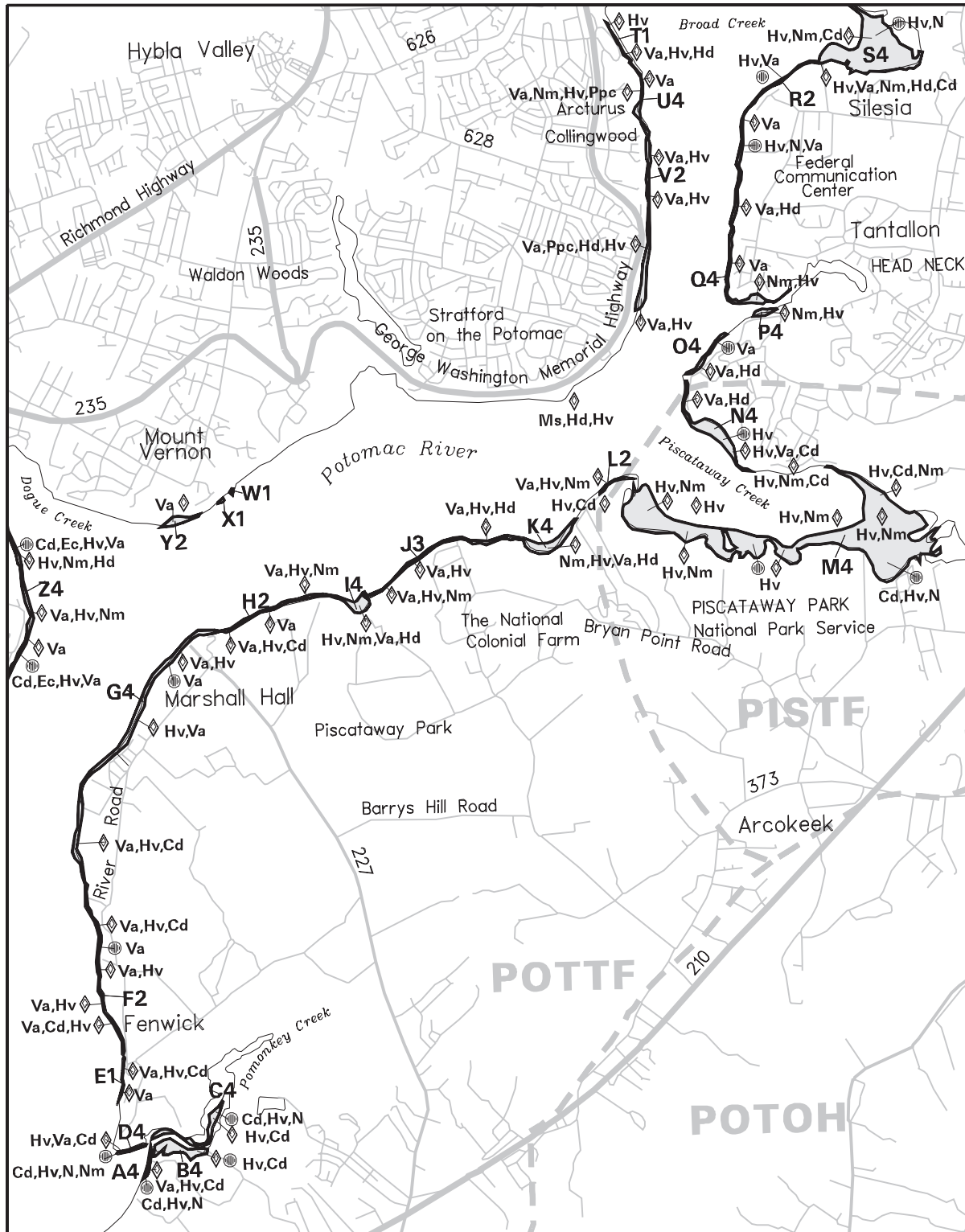
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary



U.S. Geological Survey

# Submerged Aquatic Vegetation 1997

(040) Mt. Vernon, Md.–Va.



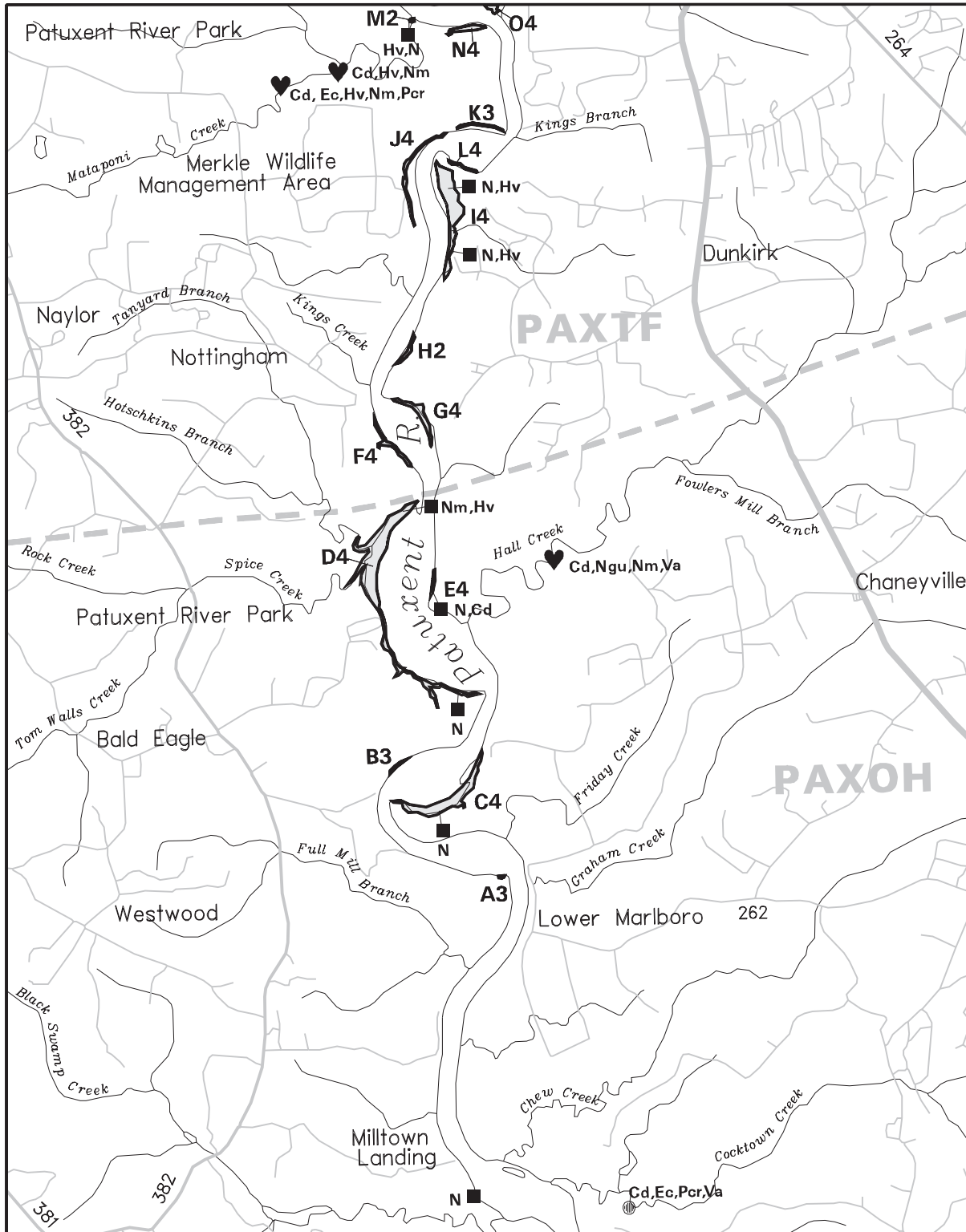
**Hectares of SAV: 247.05**  
Date Flown: 08/24/97, 09/26/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

186 1000 0 1000 2000 meters

# Submerged Aquatic Vegetation 1997

Lower Marlboro, Md. (041)



**Hectares of SAV: 69.28**  
Date Flown: 08/01/97

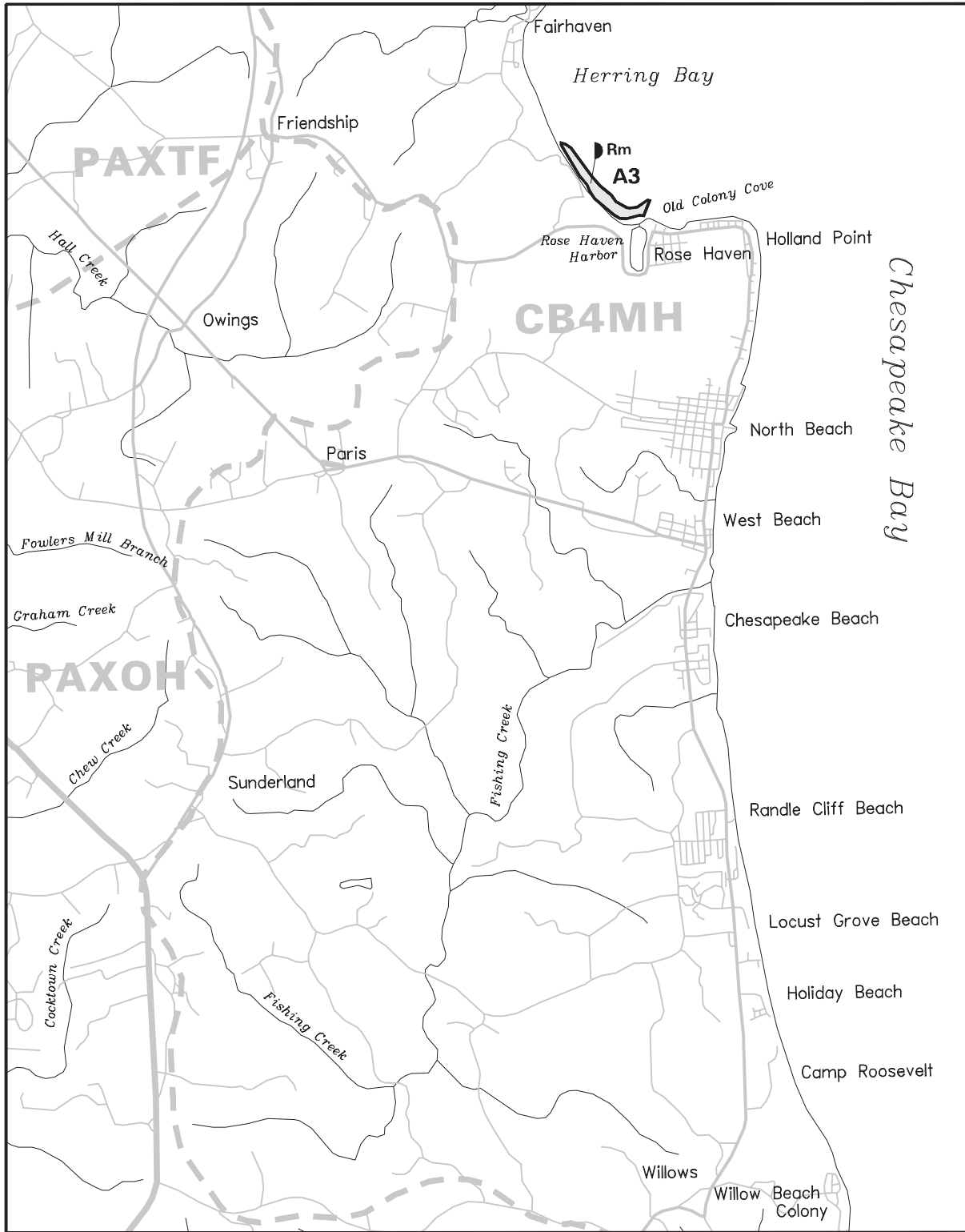
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey





# Submerged Aquatic Vegetation 1997

(042) North Beach, Md.



**Hectares of SAV: 15.31**  
Date Flown: 07/18/97

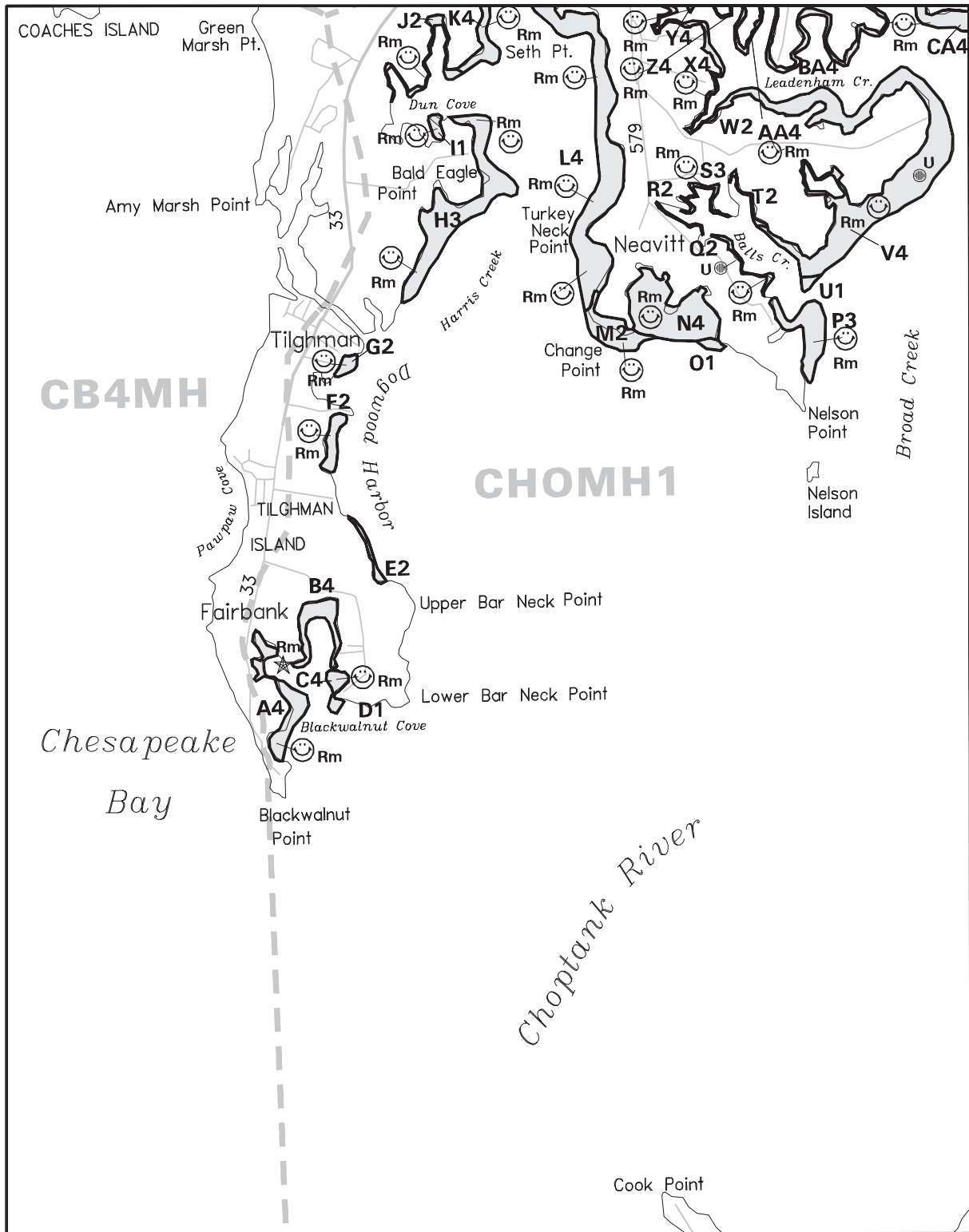
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

188 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Tilghman, Md. (043)



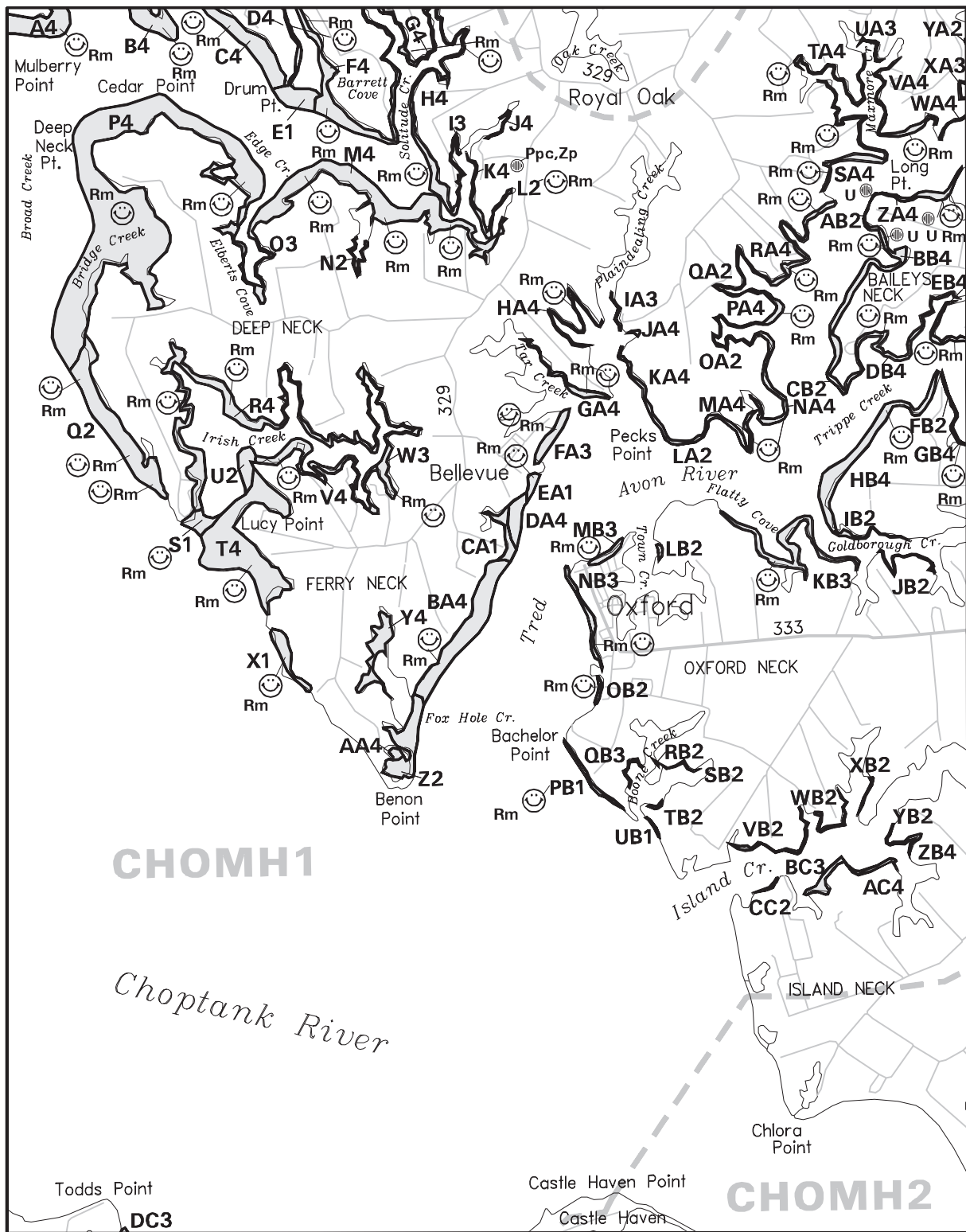
**Hectares of SAV: 528.07**  
Date Flown: 07/18/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(044) Oxford, Md.



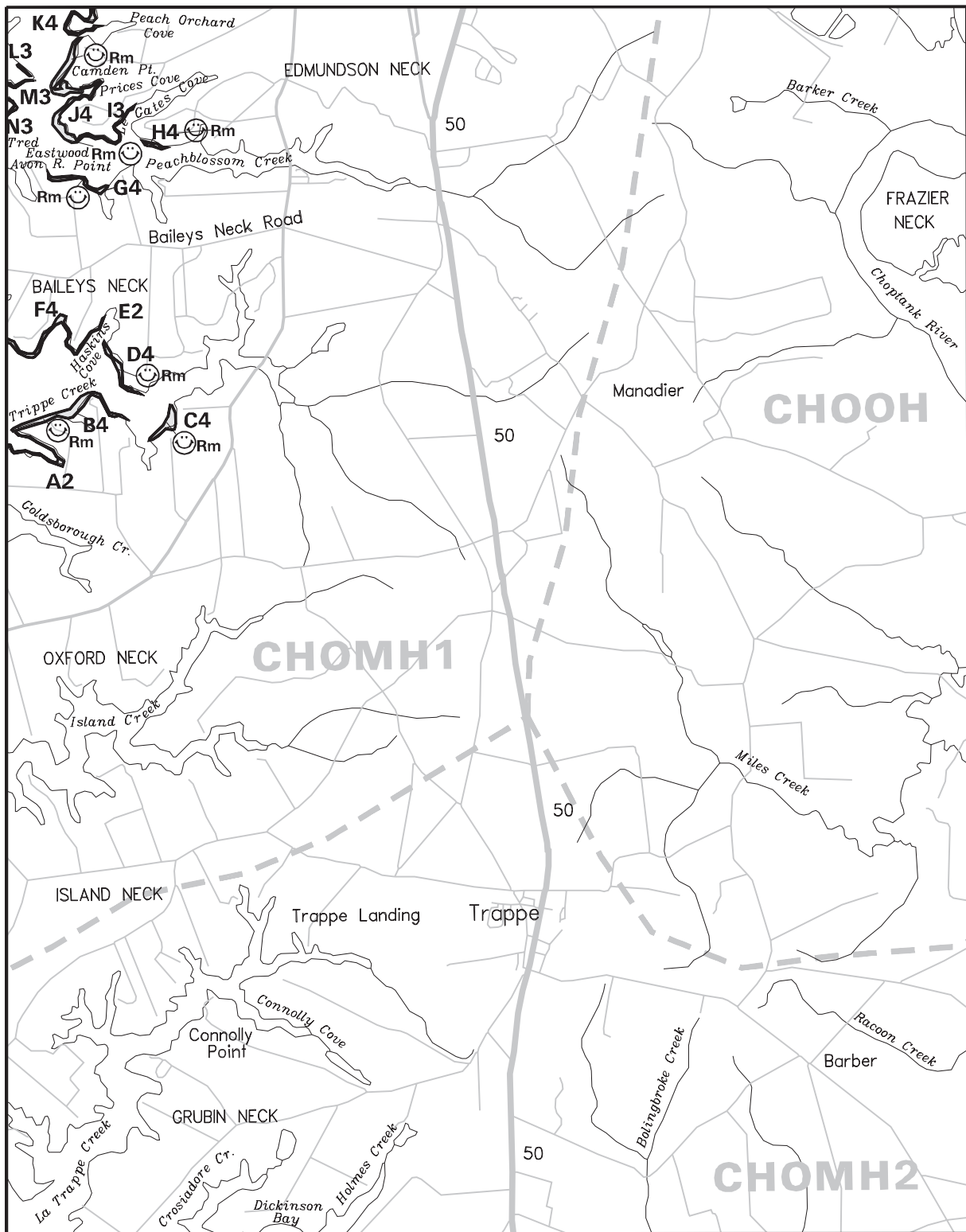
Hectares of SAV: 820.84  
Date Flown: 07/31/97

Sources: School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

190 1000 0 1000 2000 meters

# Submerged Aquatic Vegetation 1997

Trappe, Md. (045)



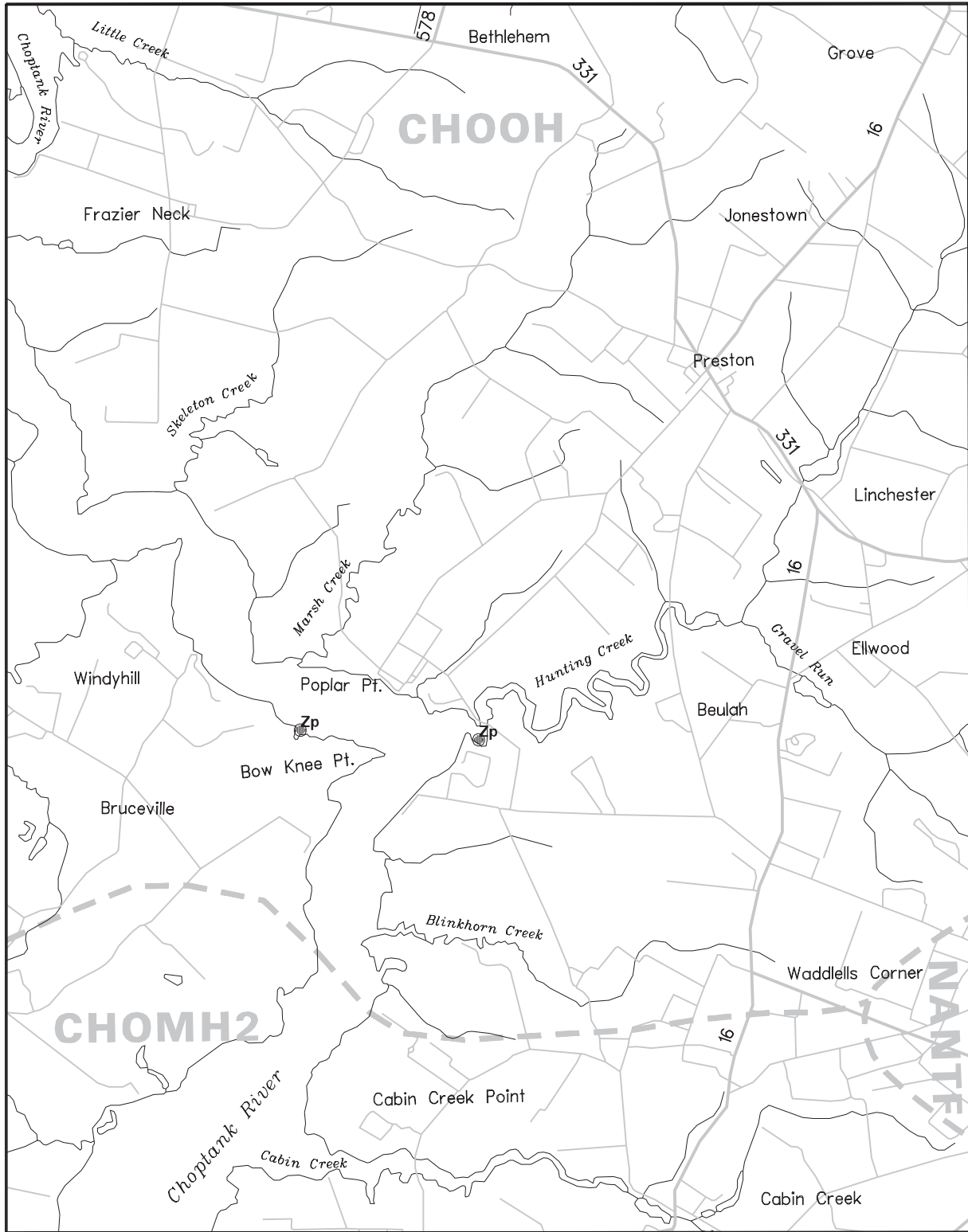
**Hectares of SAV: 40.74**  
Date Flown: 07/31/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(046) Preston, Md.



Hectares of SAV: 0.00  
Date Flown: 08/29/97

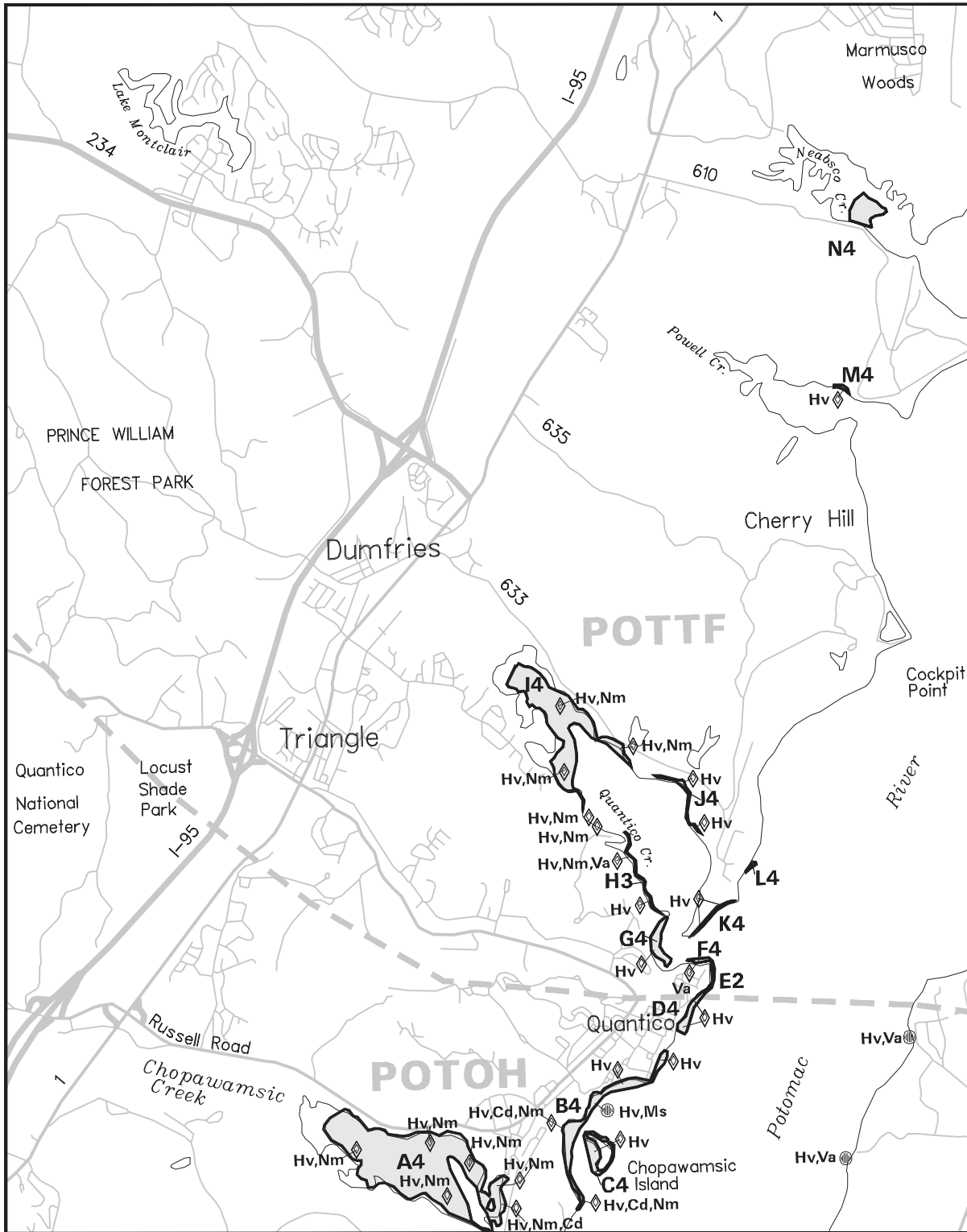
Sources: School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

192 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Quantico, Va.–Md. (047)



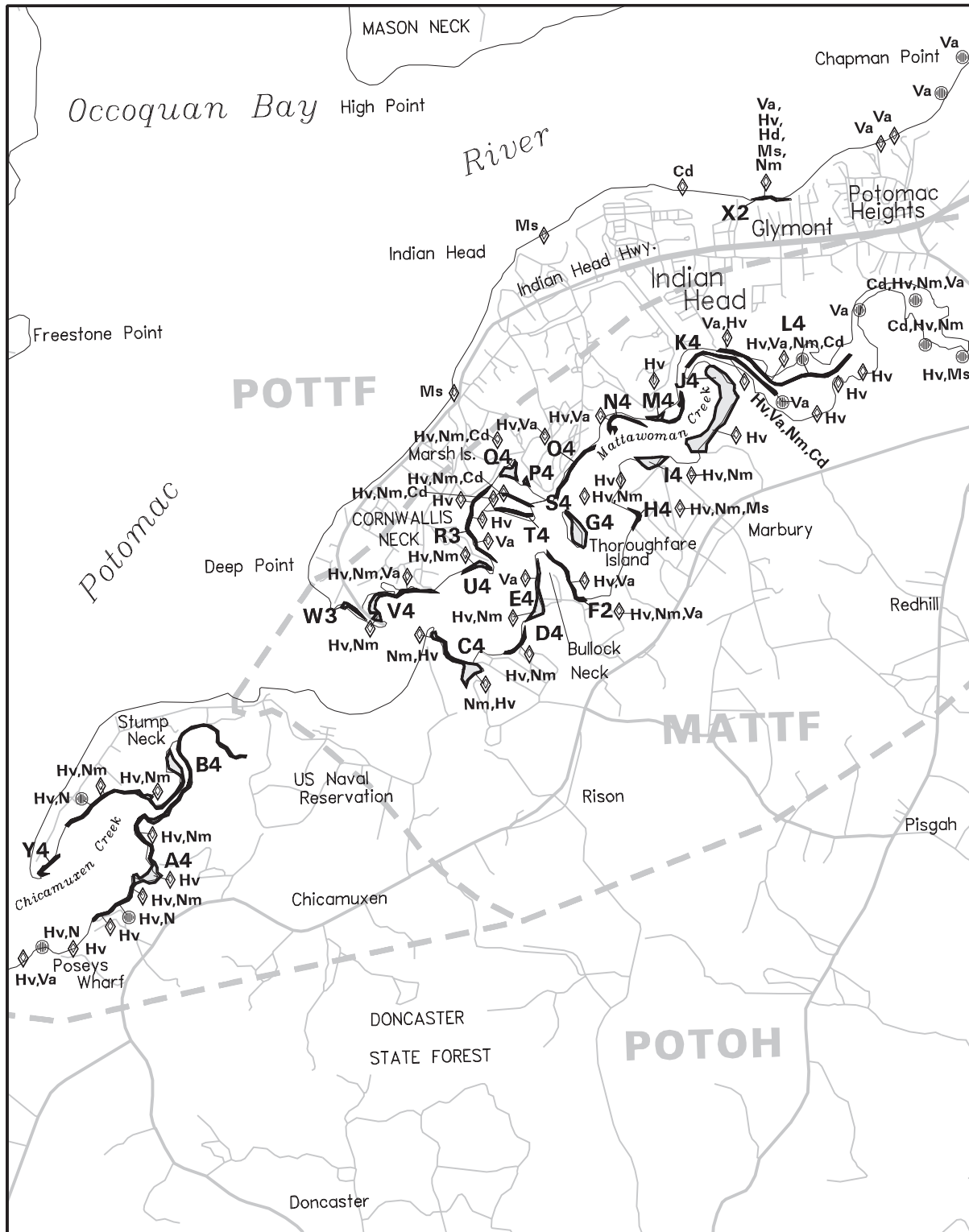
**Hectares of SAV: 212.27**  
Date Flown: 08/24/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(048) Indian Head, Va.–Md.



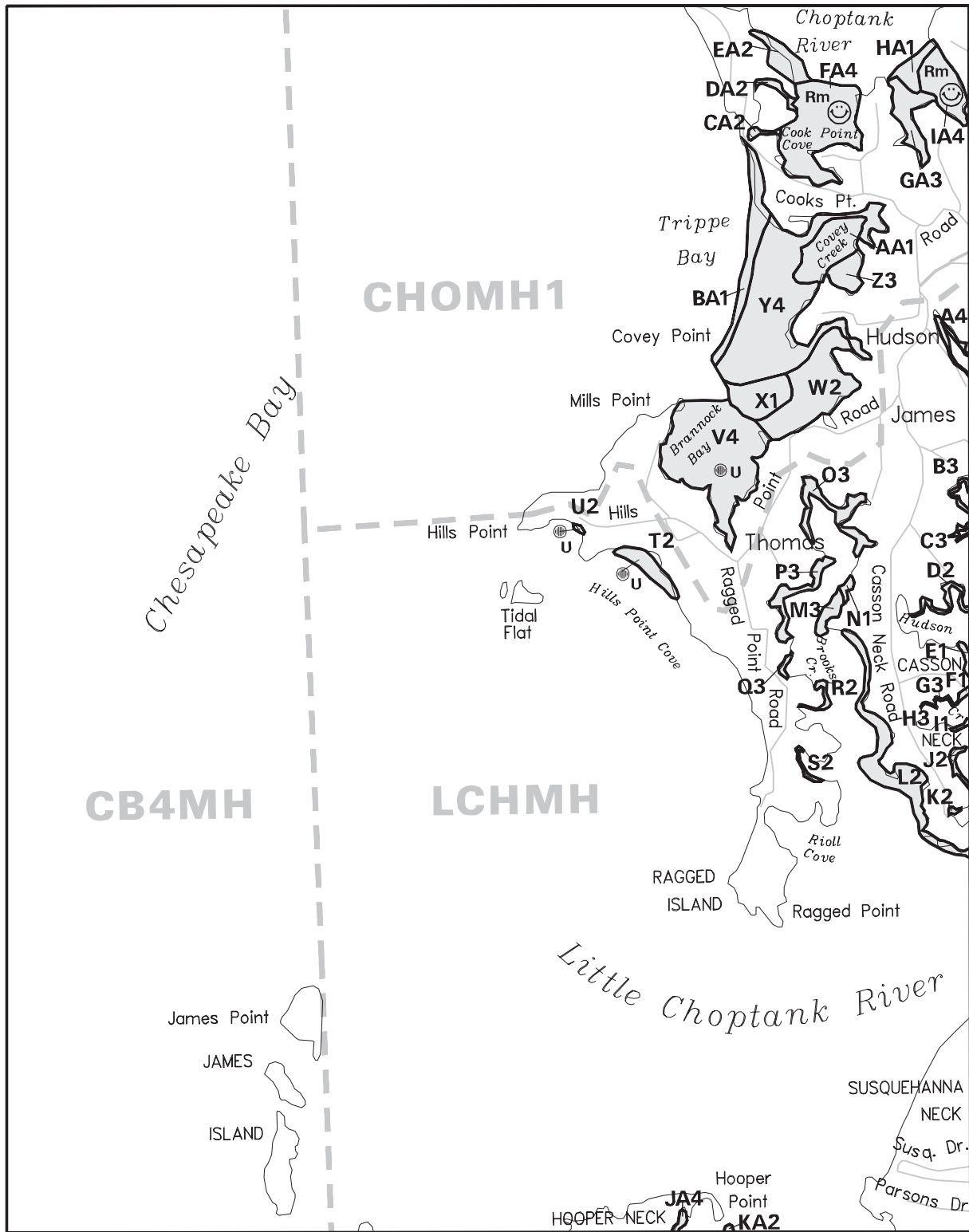
**Hectares of SAV: 65.82**  
Date Flown: 08/24/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

194 1000 0 1000 2000 meters

# Submerged Aquatic Vegetation 1997

Hudson, Md. (051)



**Hectares of SAV: 703.68**  
Date Flown: 07/18/97

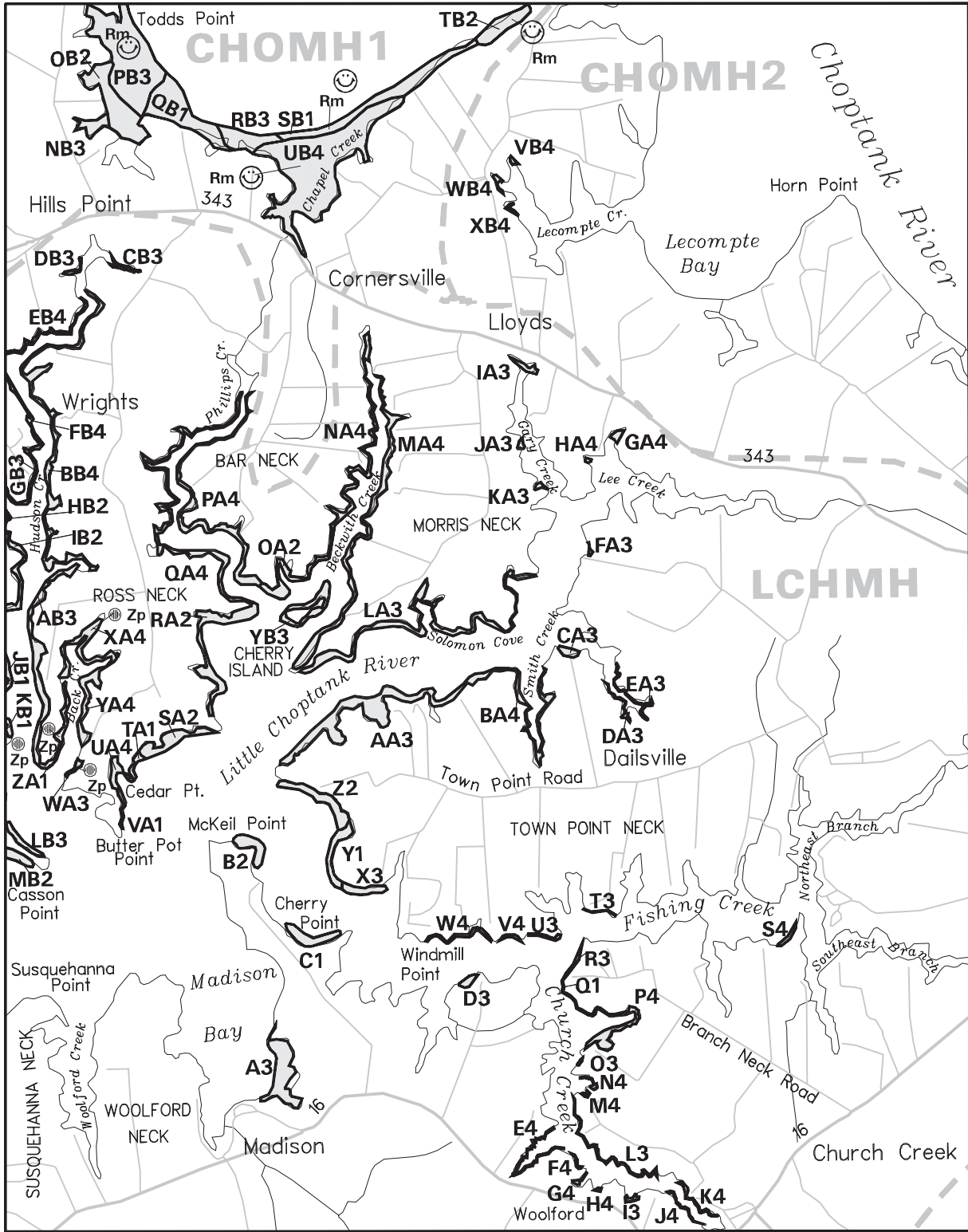
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey





# Submerged Aquatic Vegetation 1997

(052) Church Creek, Md.



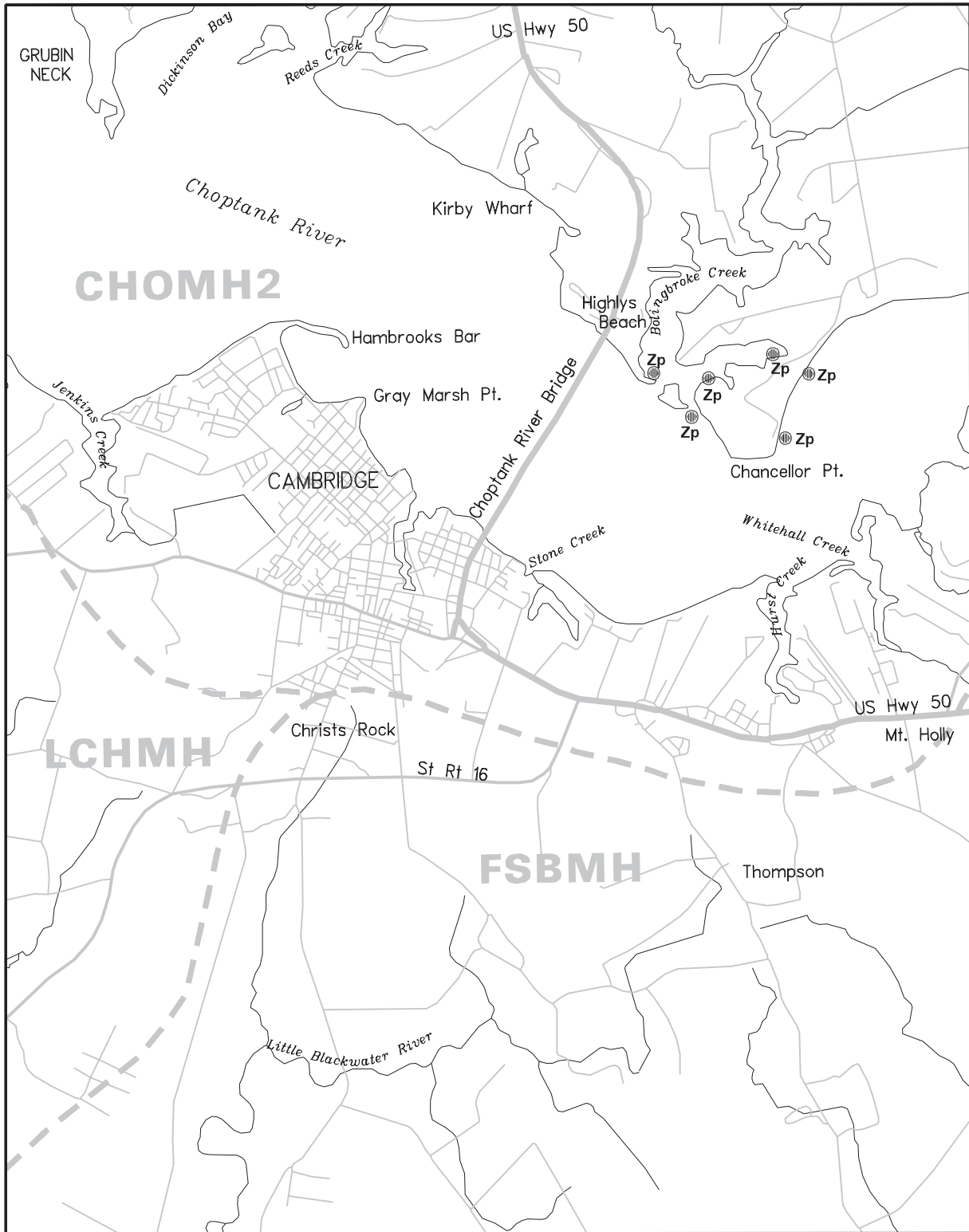
Hectares of SAV: 582.34  
Date Flown: 07/18/97

Sources: School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

Cambridge, Md. (053)



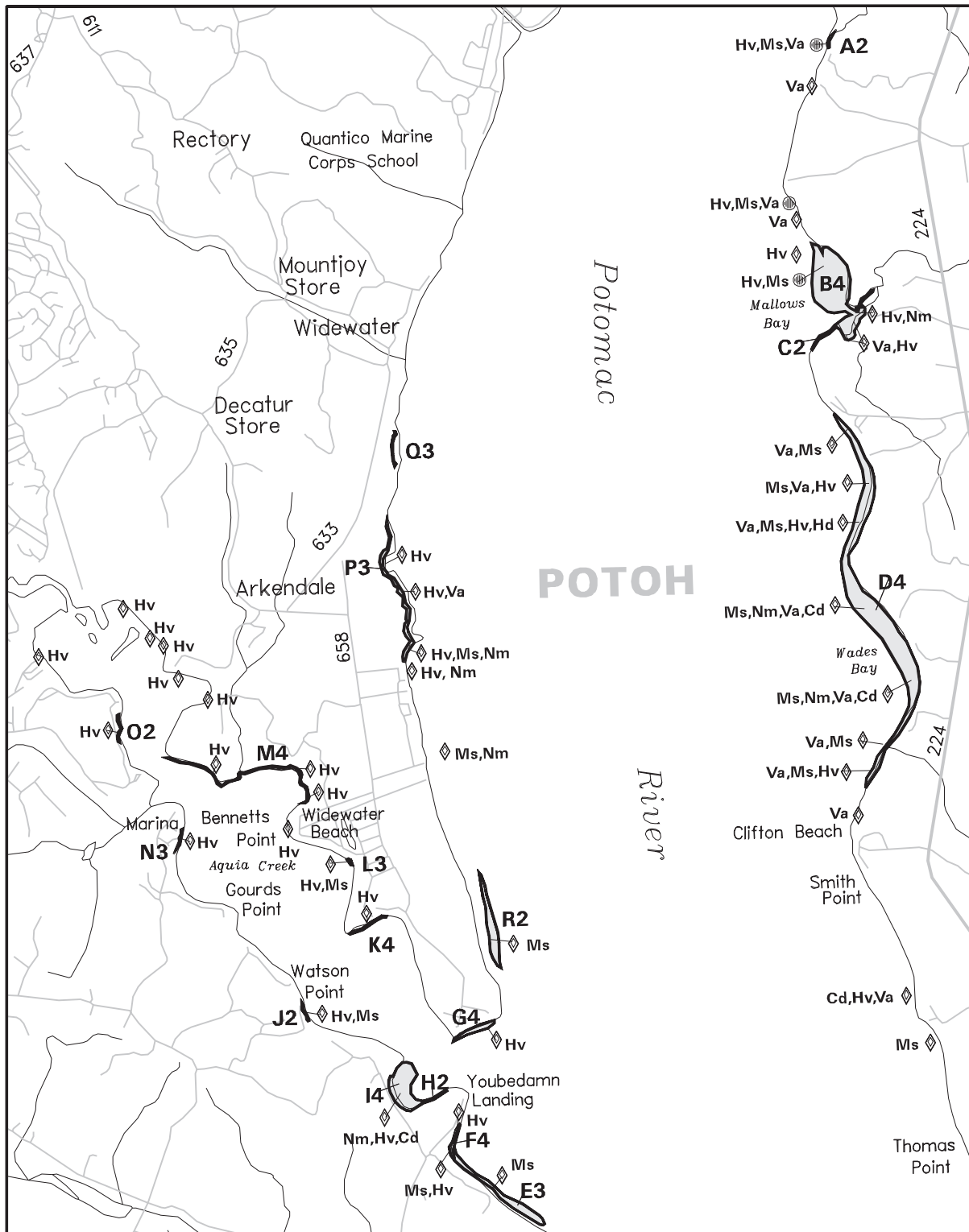
Hectares of SAV: 0.00  
Date Flown: 07/18/97

Sources: School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(055) Widewater, Va.–Md.



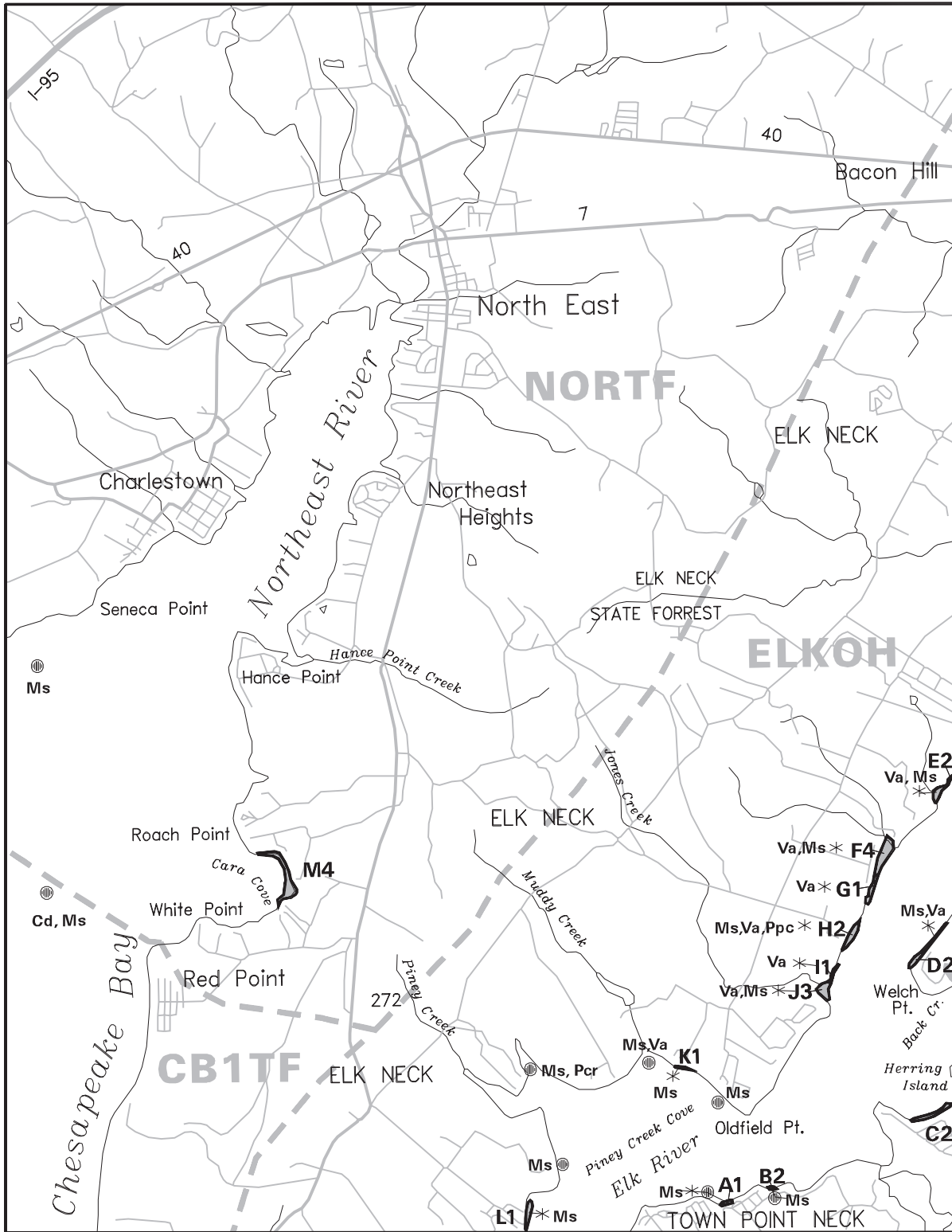
**Hectares of SAV: 135.00**  
 Date Flown: 08/24/97, 07/31/97, 08/30/97

**Sources:** School of Marine Science  
 Virginia Institute of Marine Science  
 College of William and Mary  
 U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

North East, Md. (004)



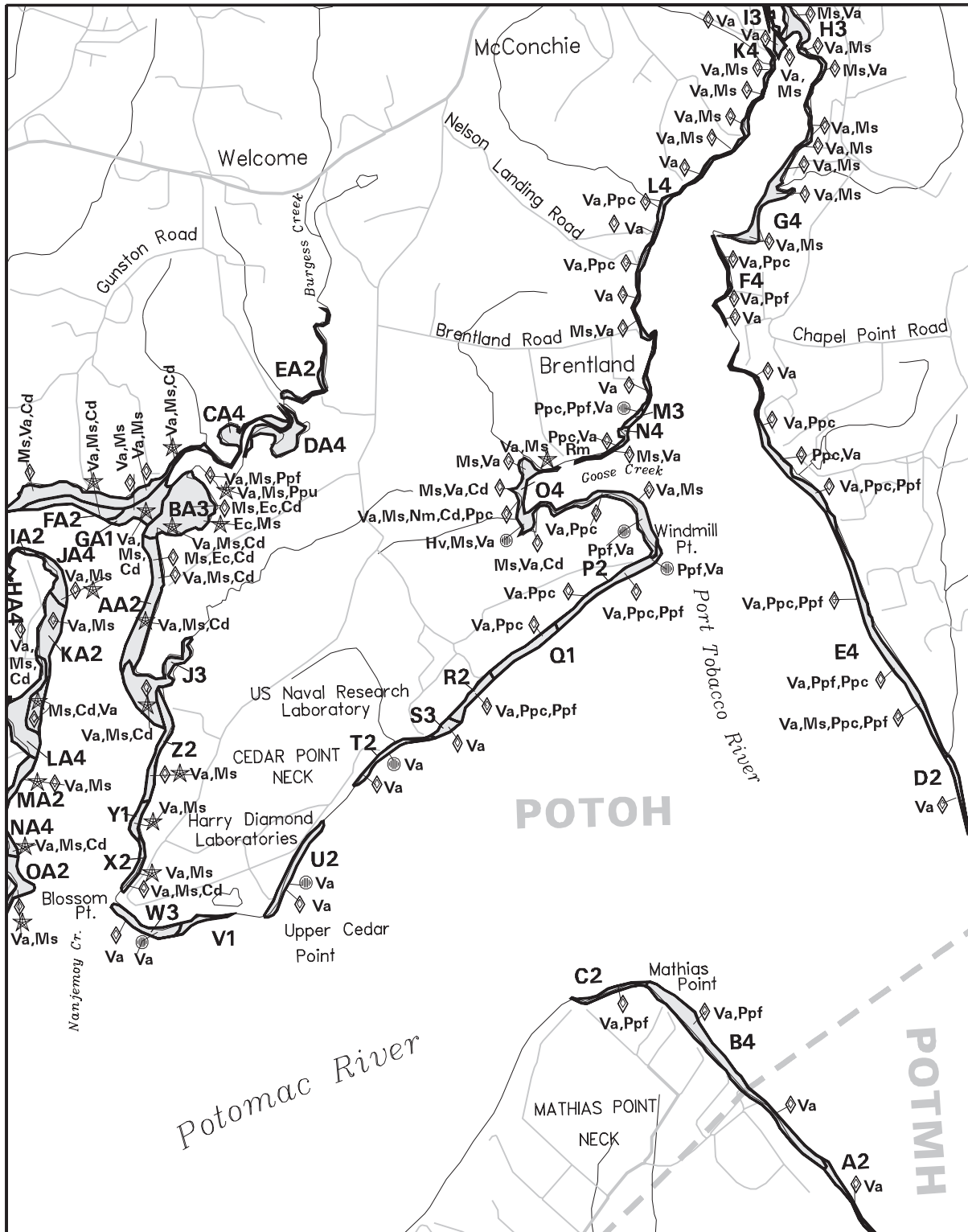
**Hectares of SAV: 23.13**  
Date Flown: 08/09/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(057) Mathias Point, Md.– Va.



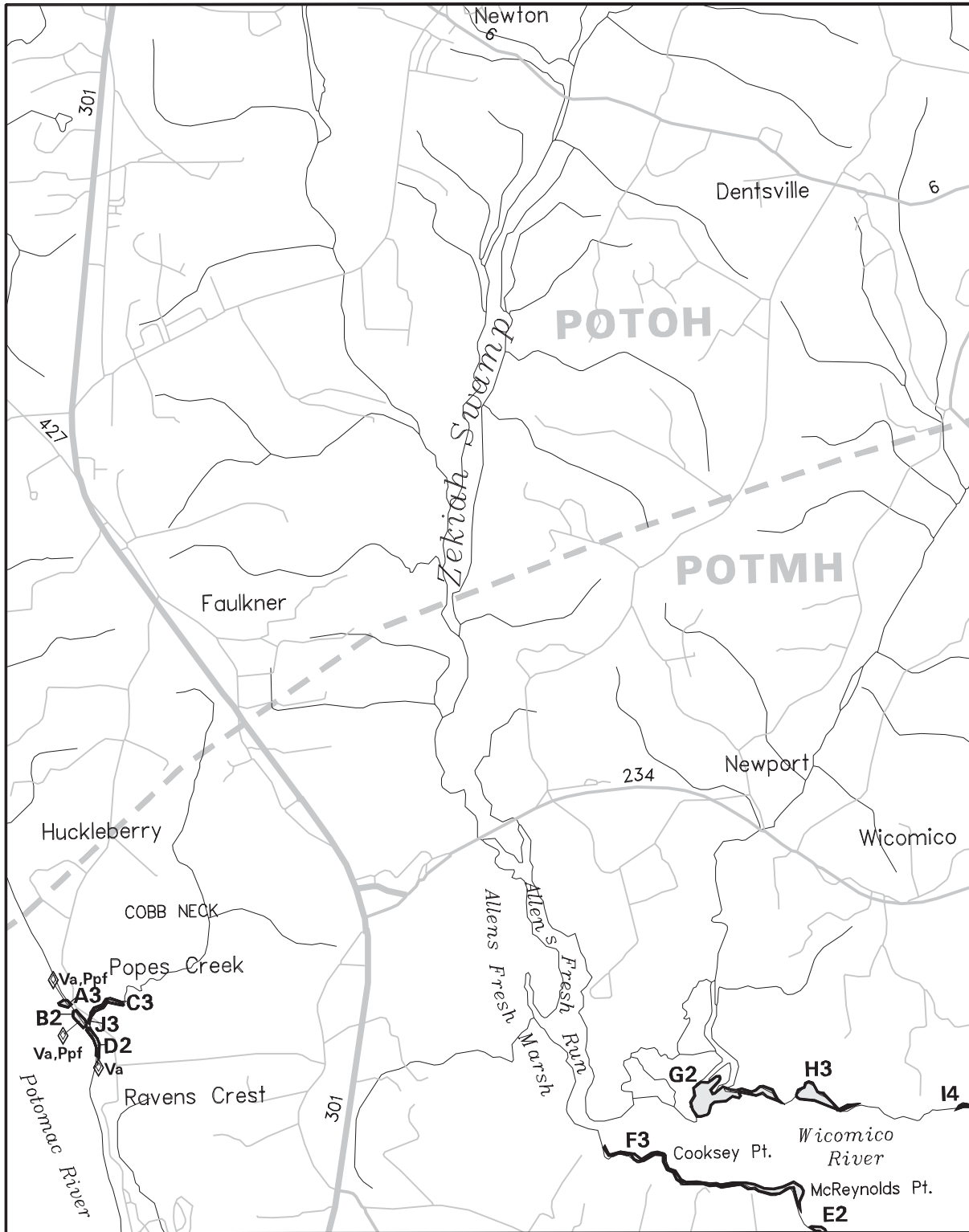
Hectares of SAV: 443.88  
Date Flown: 07/31/97, 08/01/97

Sources: School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

Popes Creek, Md. (058)



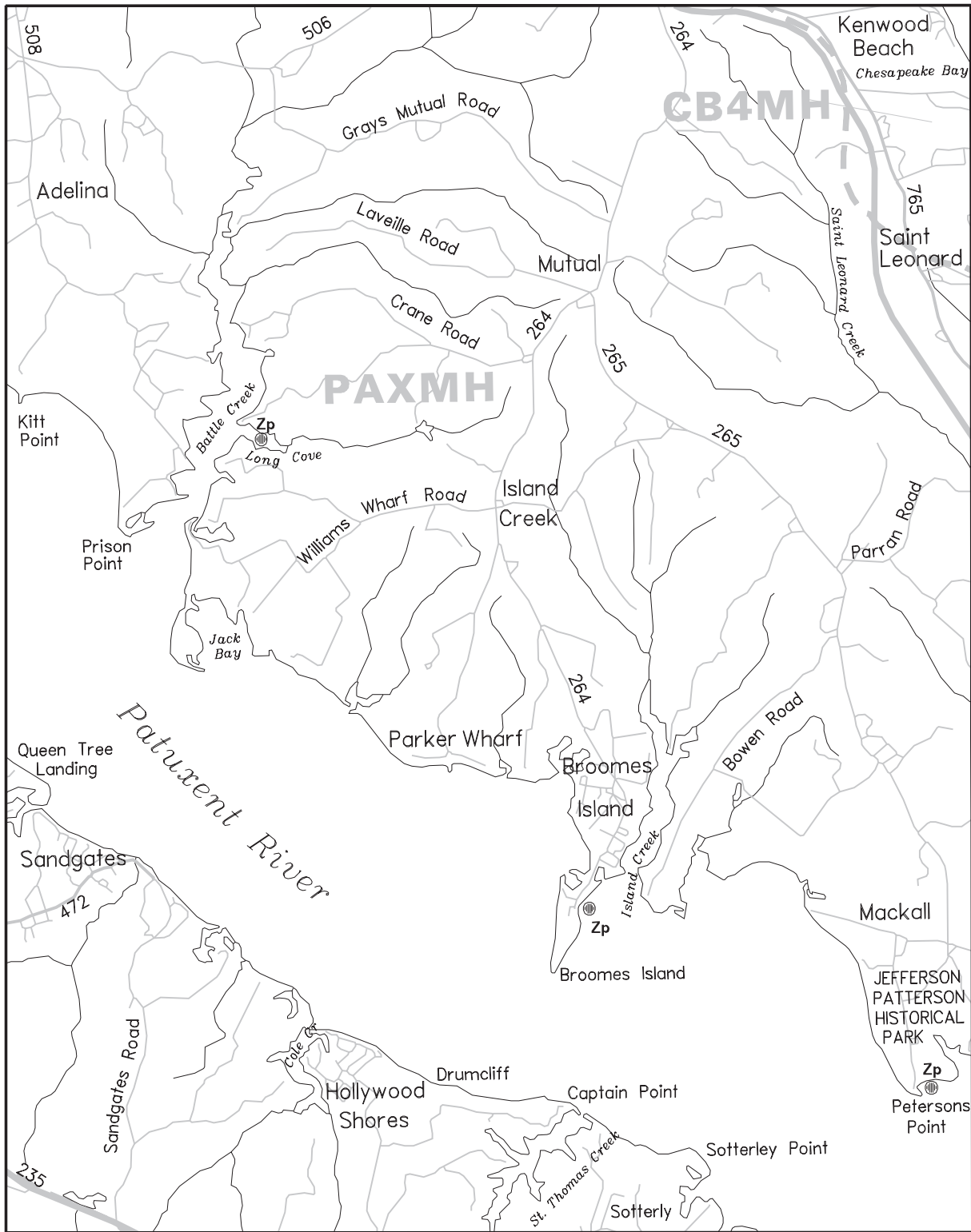
**Hectares of SAV: 35.95**  
Date Flown: 07/31/97, 08/30/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(060) Broomes Island, Md.



Hectares of SAV: 0.00  
Date Flown: 08/01/97

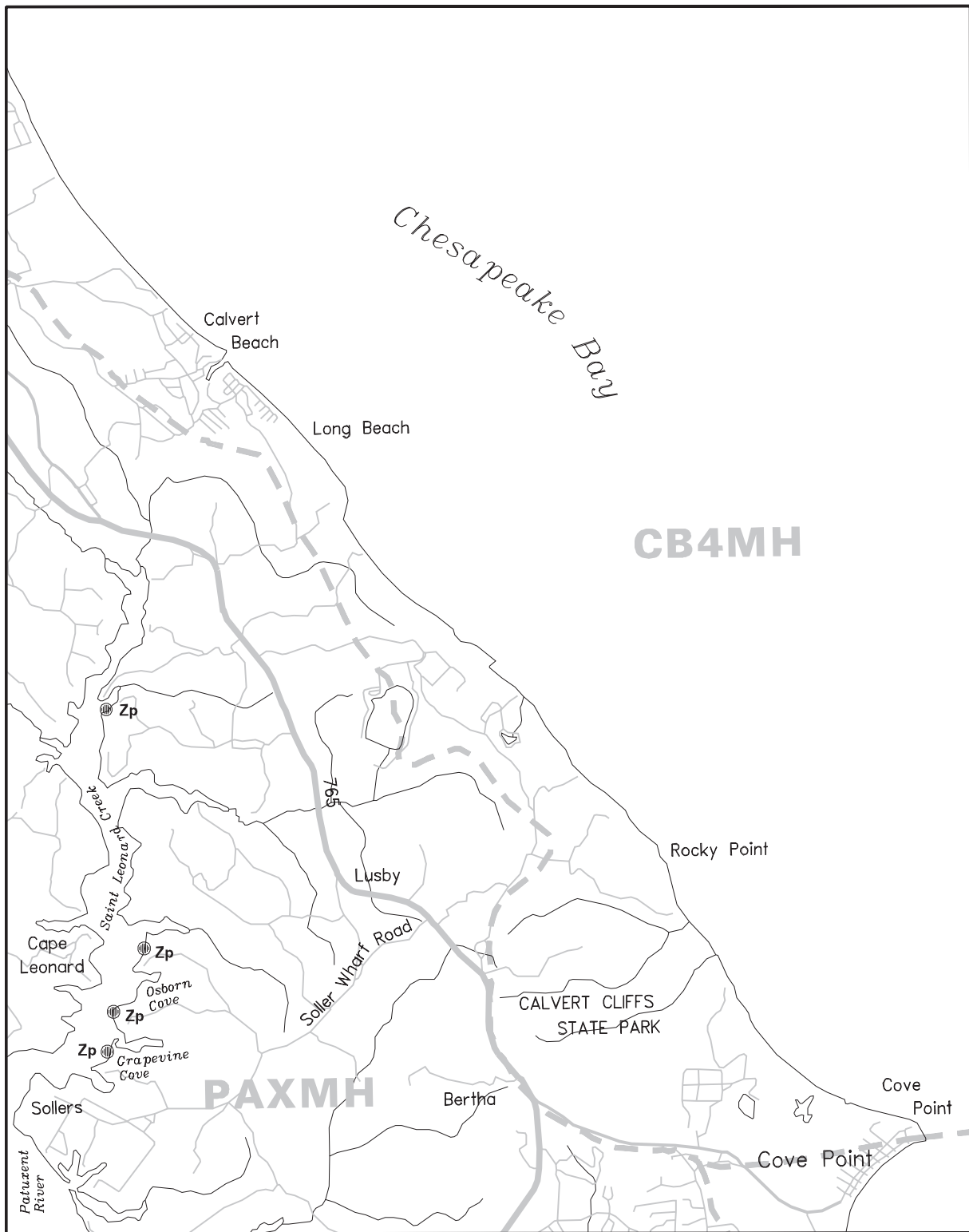
Sources: School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

202 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Cove Point, Md. (061)



**Hectares of SAV: 0.00**  
Date Flown: 08/01/97

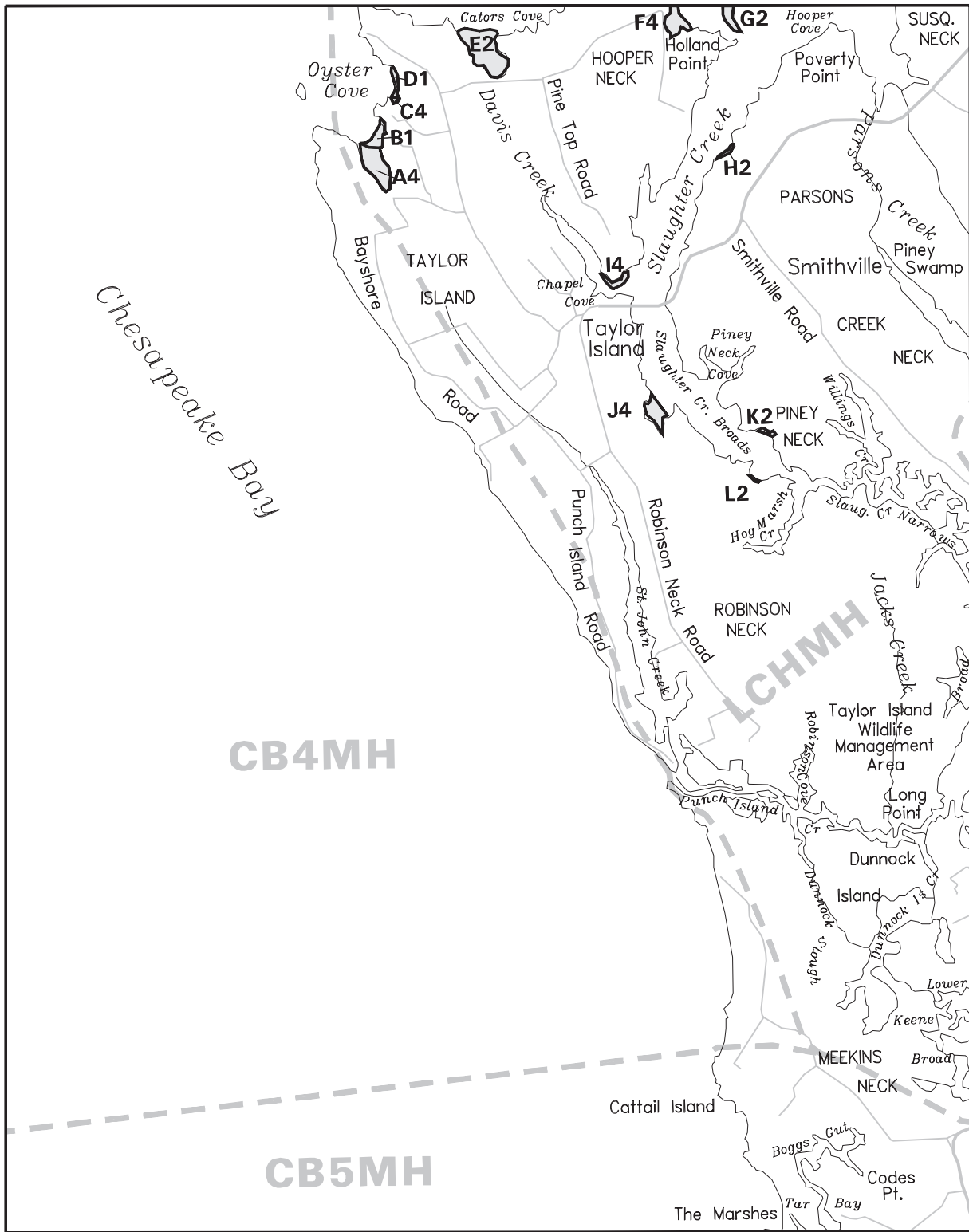
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey





# Submerged Aquatic Vegetation 1997

(062) Taylors Island, Md.



**Hectares of SAV: 51.44**  
Date Flown: 06/23/97

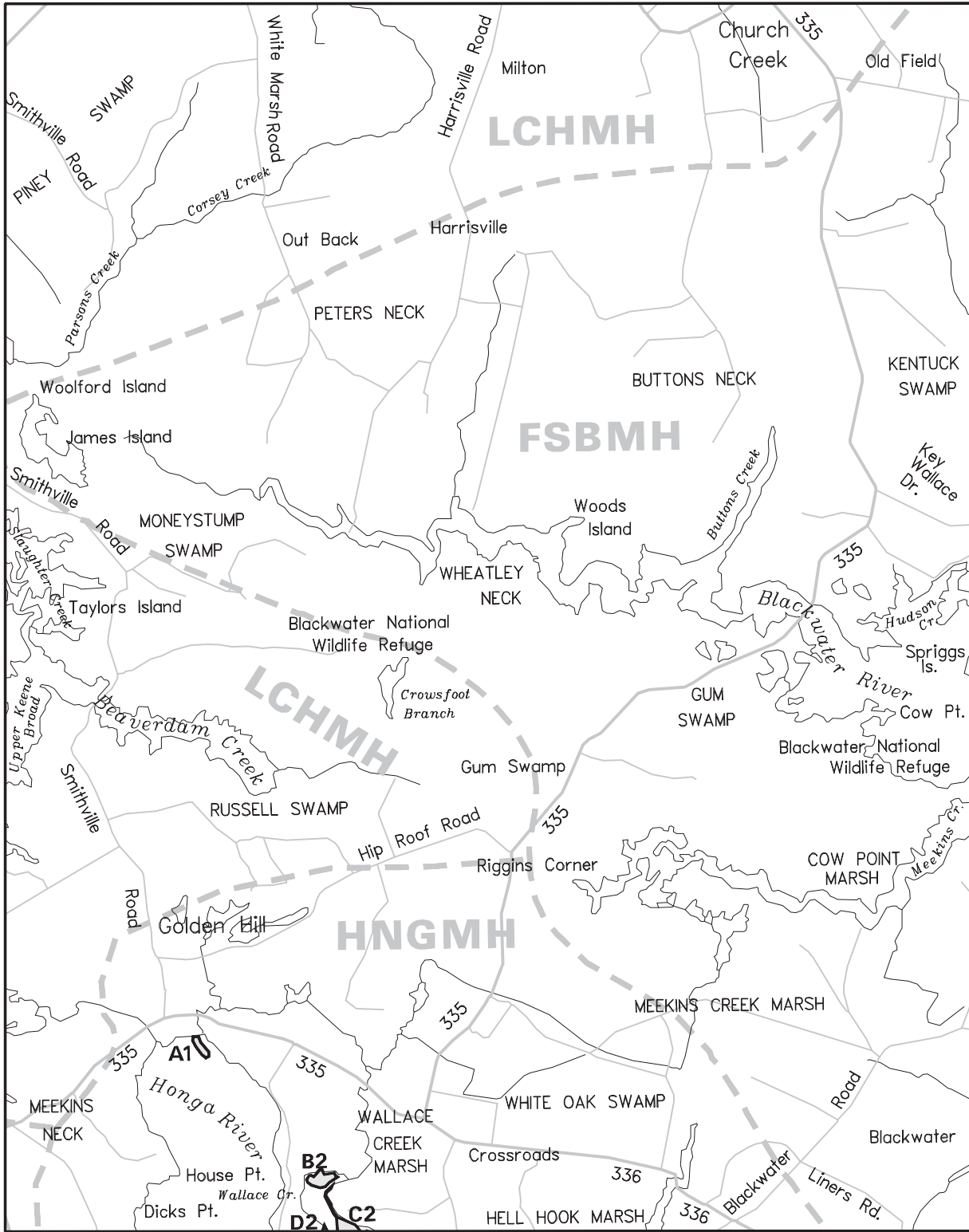
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

204 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Golden Hill, Md. (063)



**Hectares of SAV: 9.49**  
Date Flown: 06/23/97

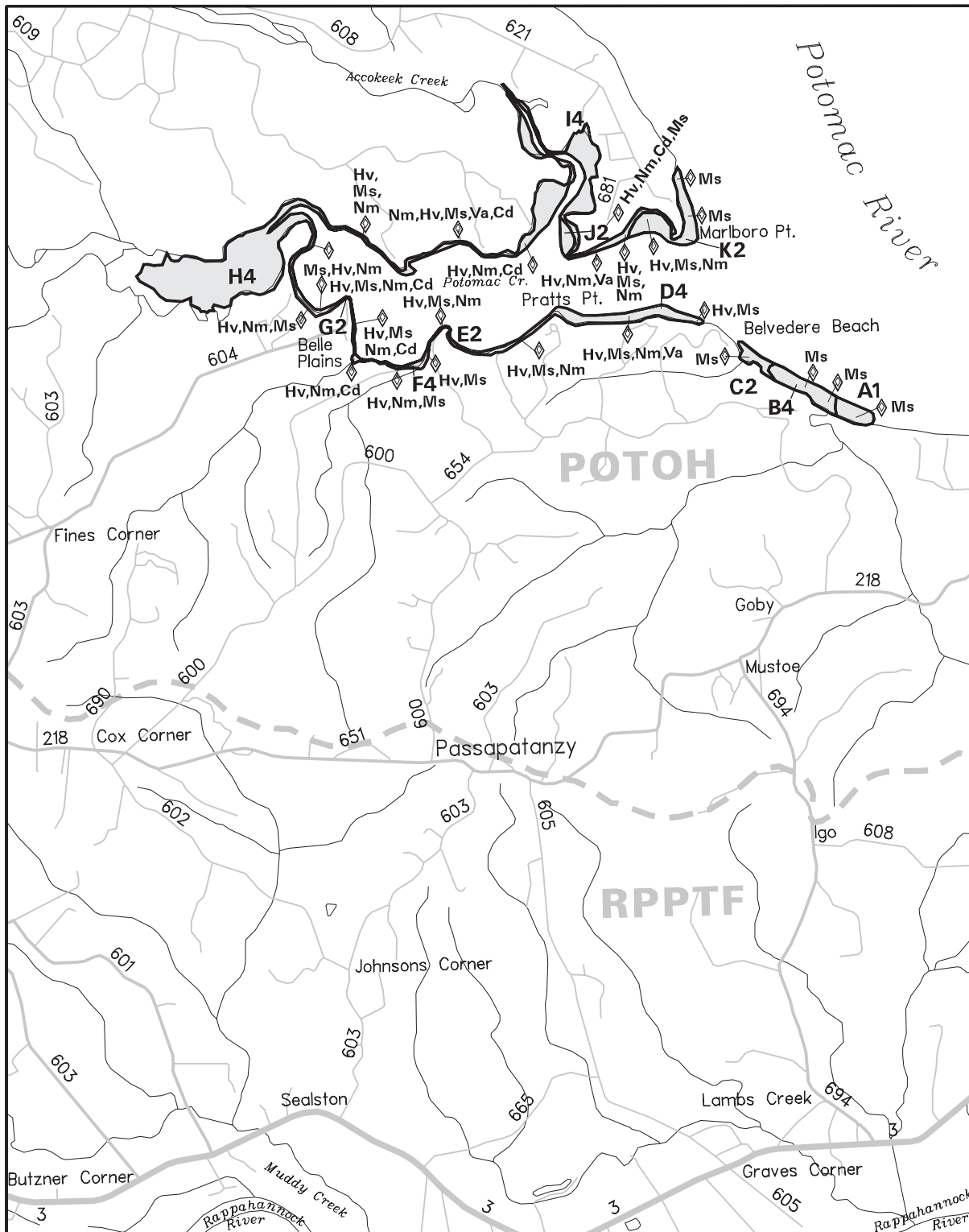
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary



U.S. Geological Survey

# Submerged Aquatic Vegetation 1997

(064) Passapatanzy, Md.–Va.



**Hectares of SAV: 252.53**  
Date Flown: 07/31/97

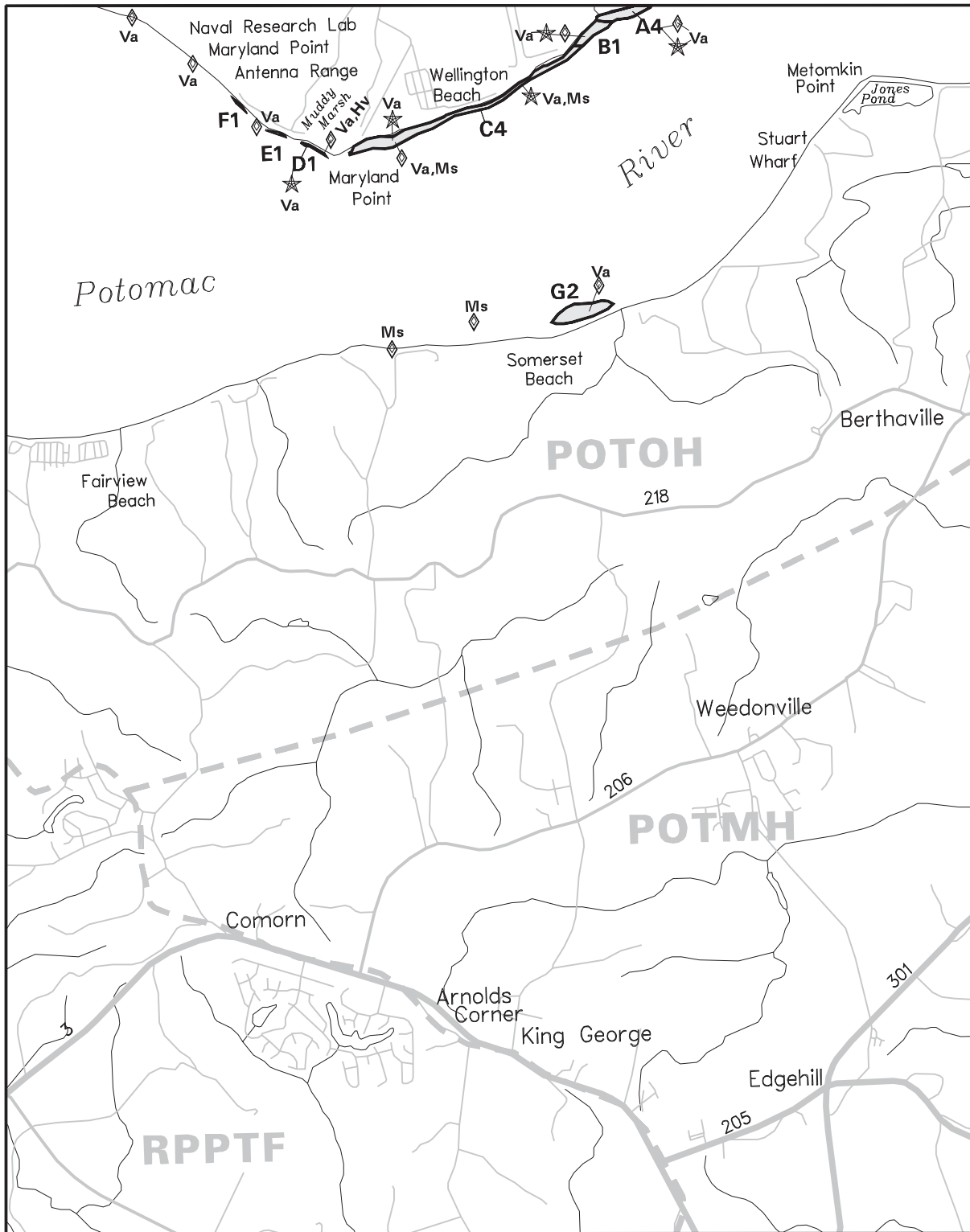
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

206 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

King George, Va.–Md. (065)



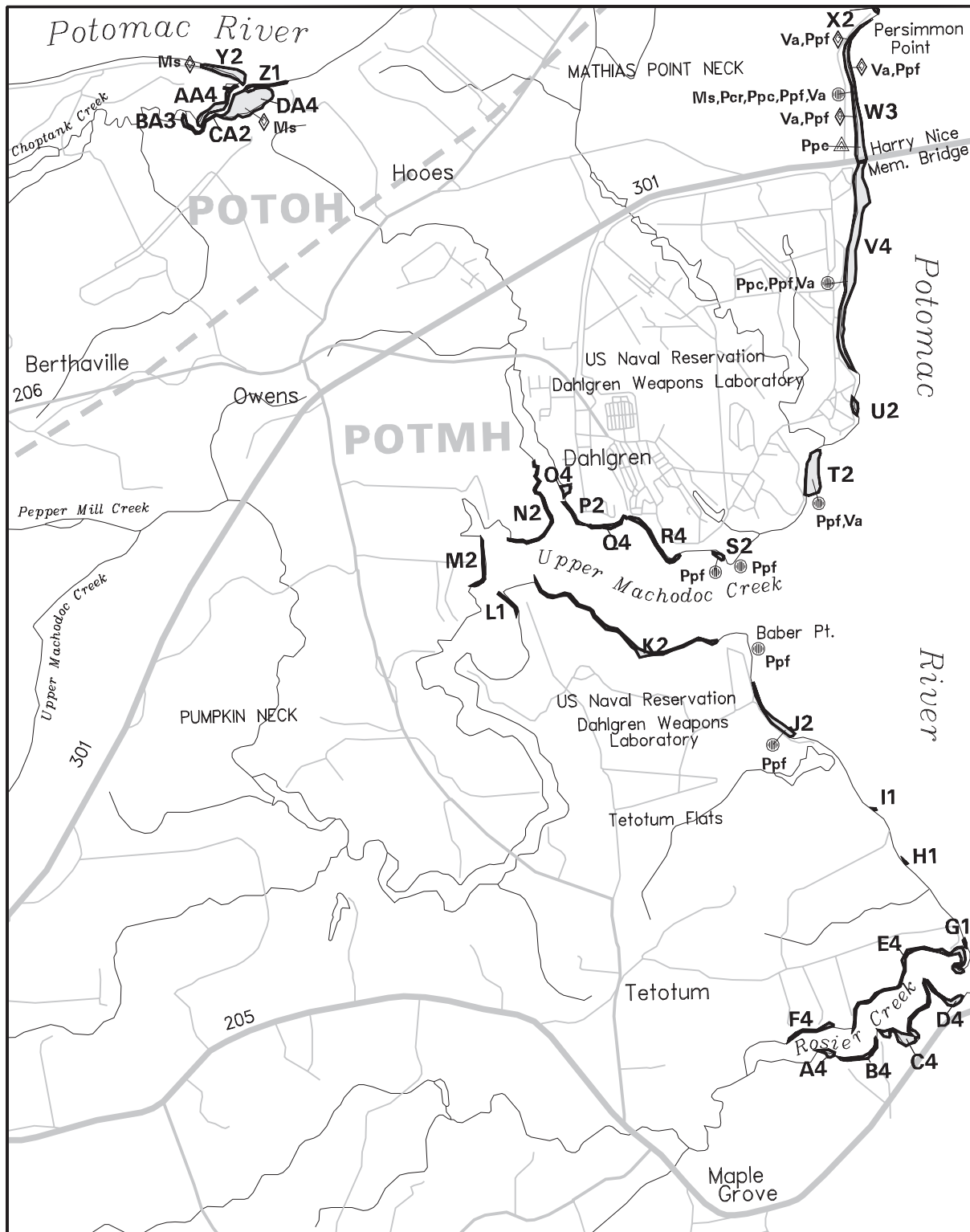
**Hectares of SAV: 40.42**  
Date Flown: 08/01/97



**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

# Submerged Aquatic Vegetation 1997

(066) Dahlgren, Va.–Md.



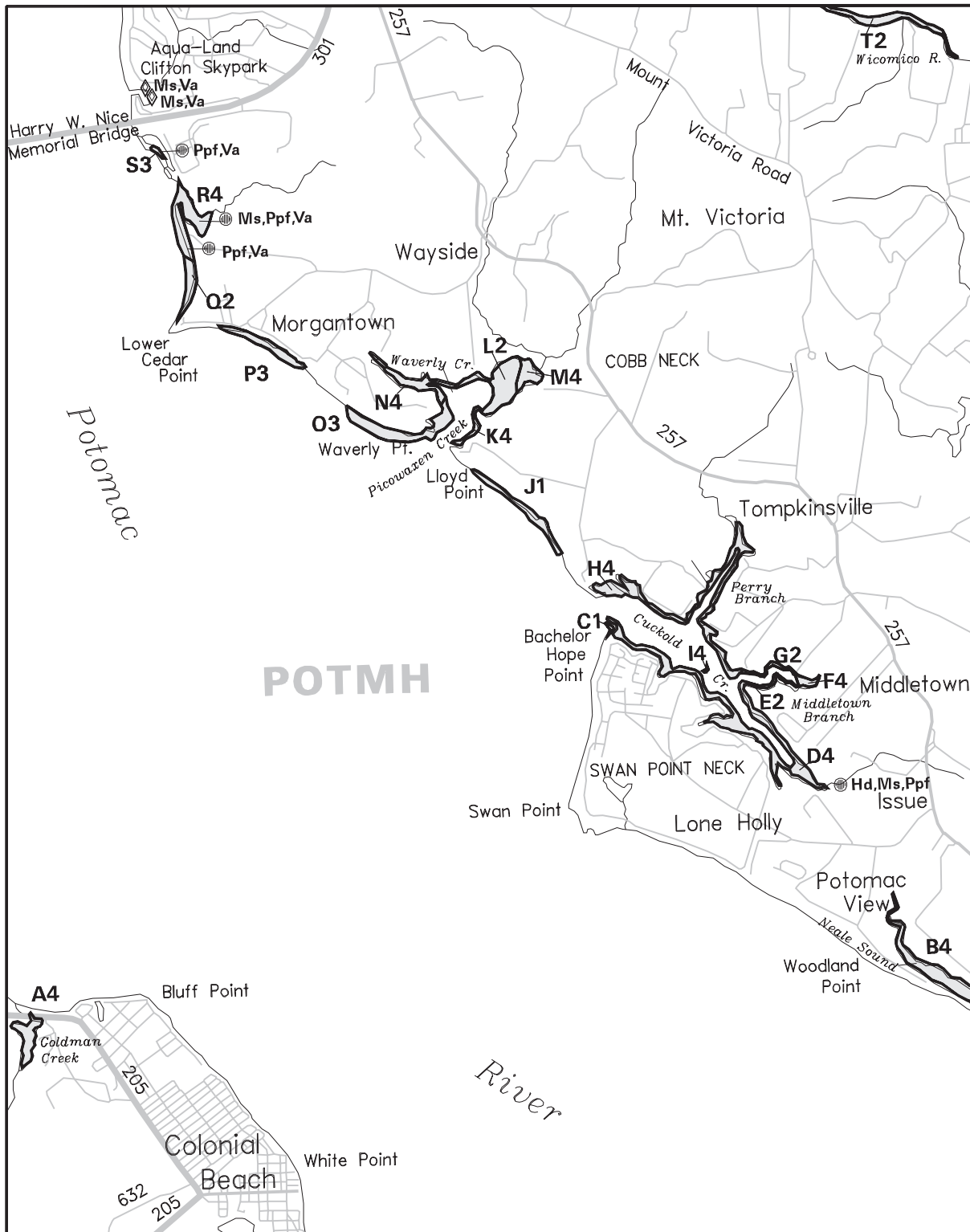
**Hectares of SAV: 93.03**  
 Date Flown: 07/31/97, 08/01/97, 08/30/97

**Sources:** School of Marine Science  
 Virginia Institute of Marine Science  
 College of William and Mary  
 U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

Colonial Beach North, Md.–Va. (067)



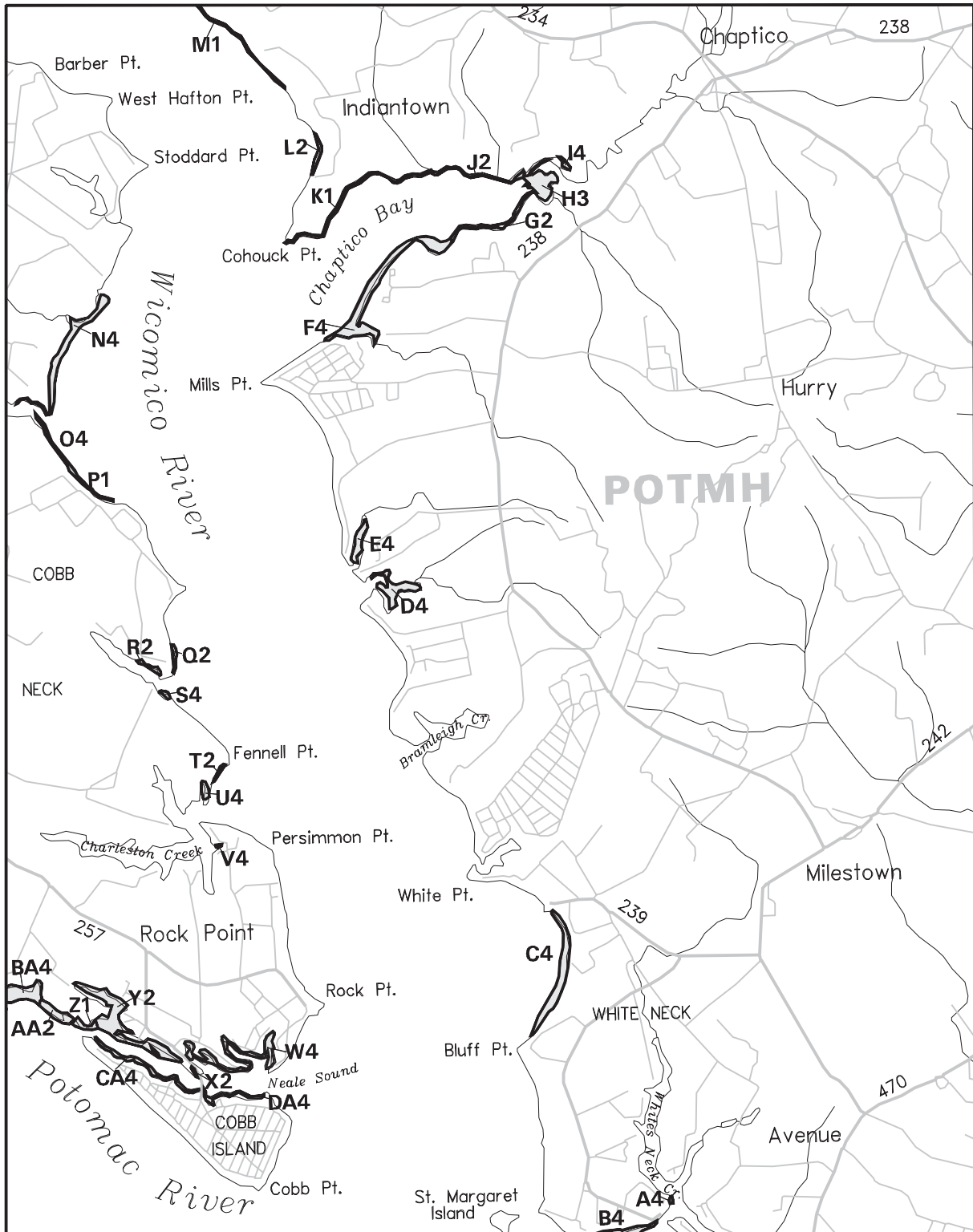
**Hectares of SAV: 197.02**  
Date Flown: 07/31/97, 08/30/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(068) Rock Point, Md.



**Hectares of SAV: 140.70**  
Date Flown: 07/31/97

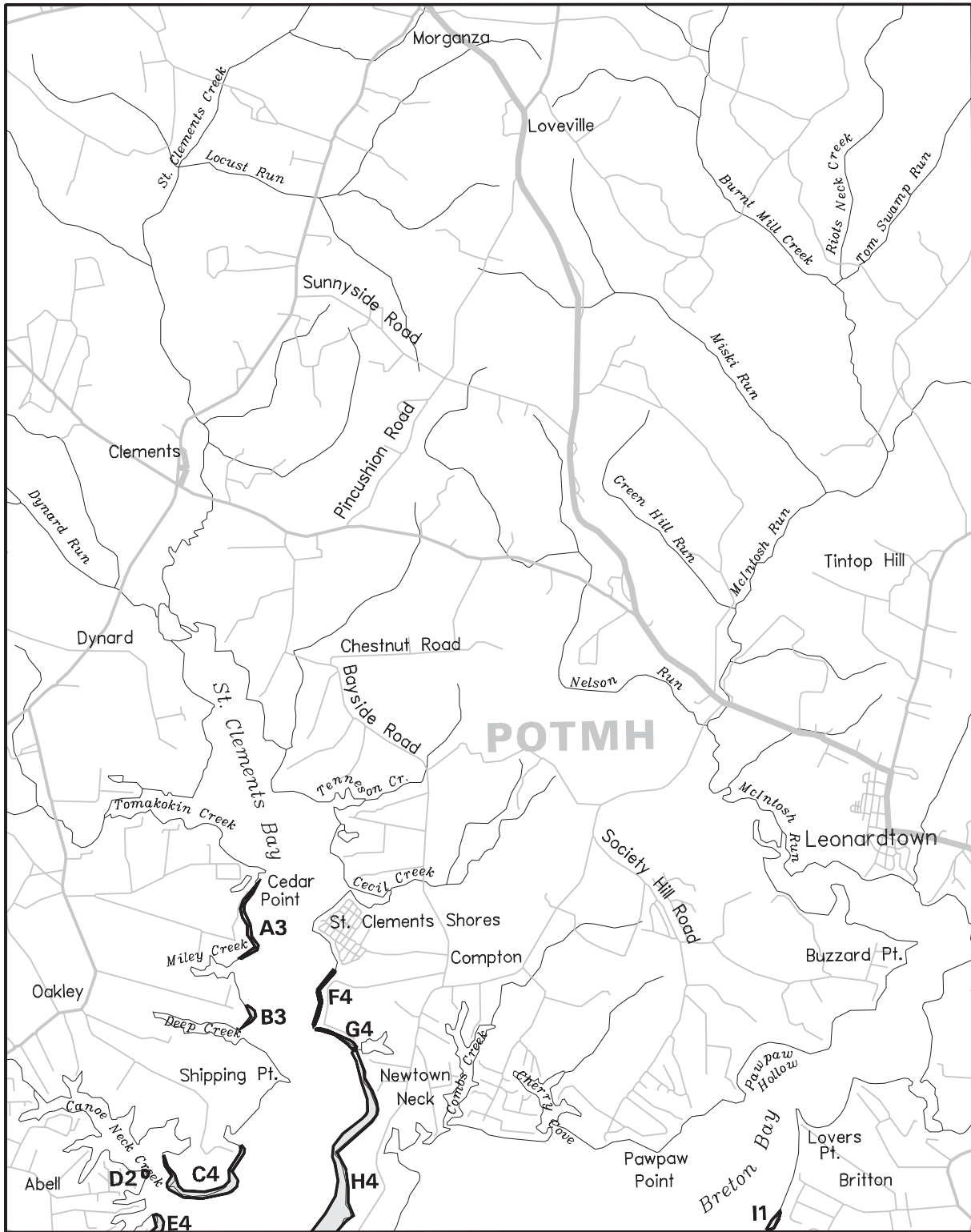
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

210 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Leonardtwn, Md. (069)



**Hectares of SAV: 50.54**  
Date Flown: 07/18/97

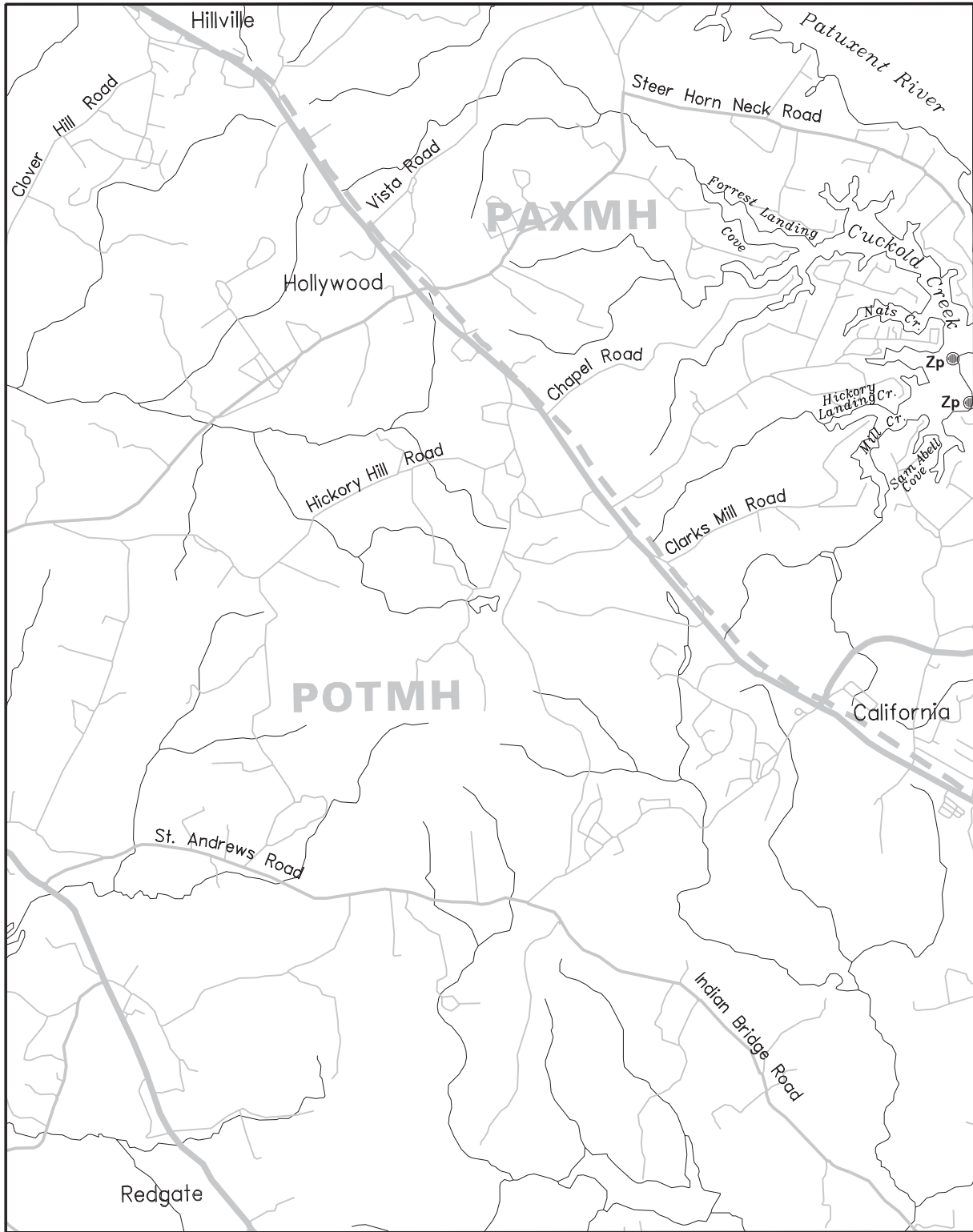
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey





# Submerged Aquatic Vegetation 1997

(070) Hollywood, Md.



**Hectares of SAV: 0.00**  
Date Flown: 08/01/97

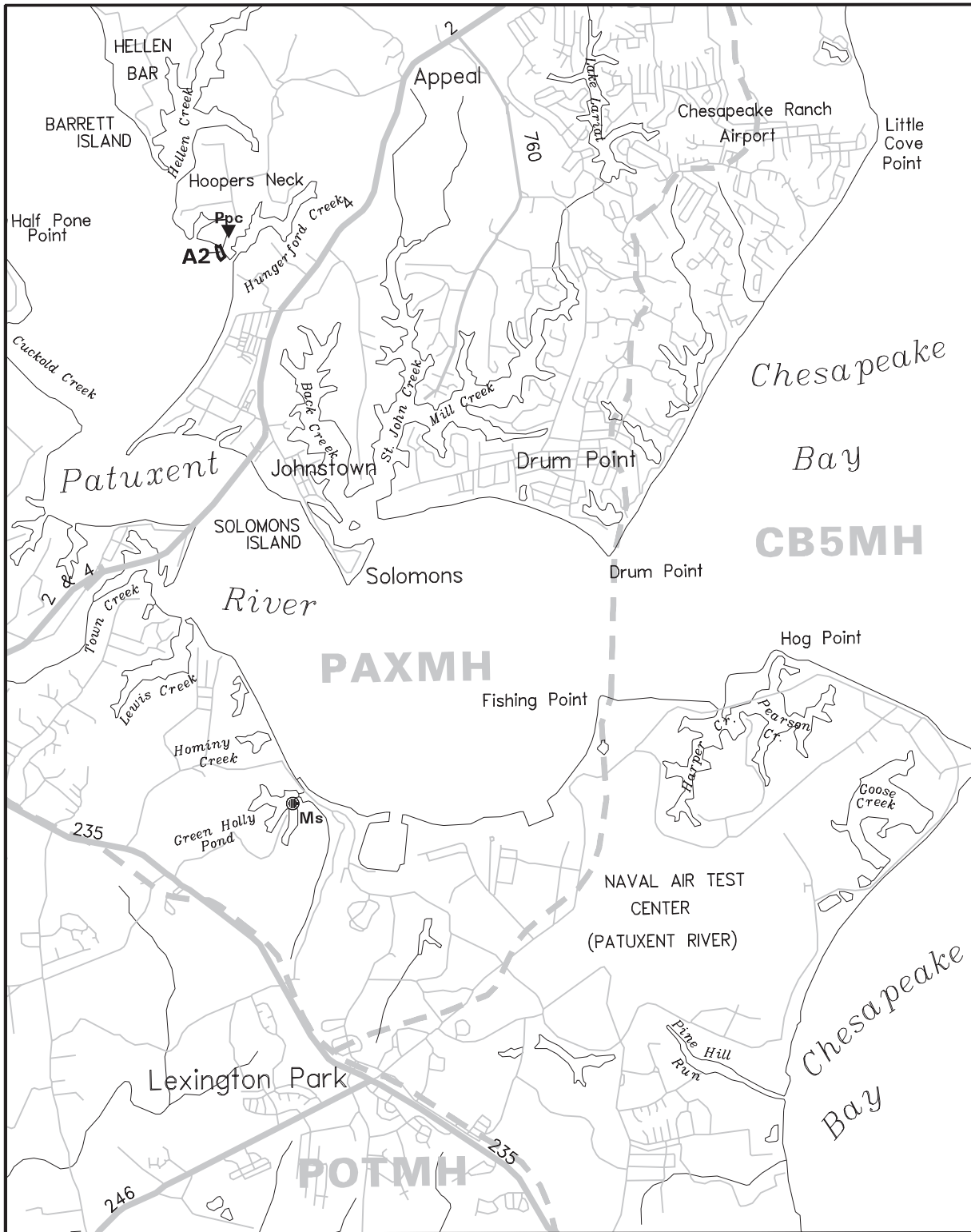
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

212 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Solomons Island, Md. (071)



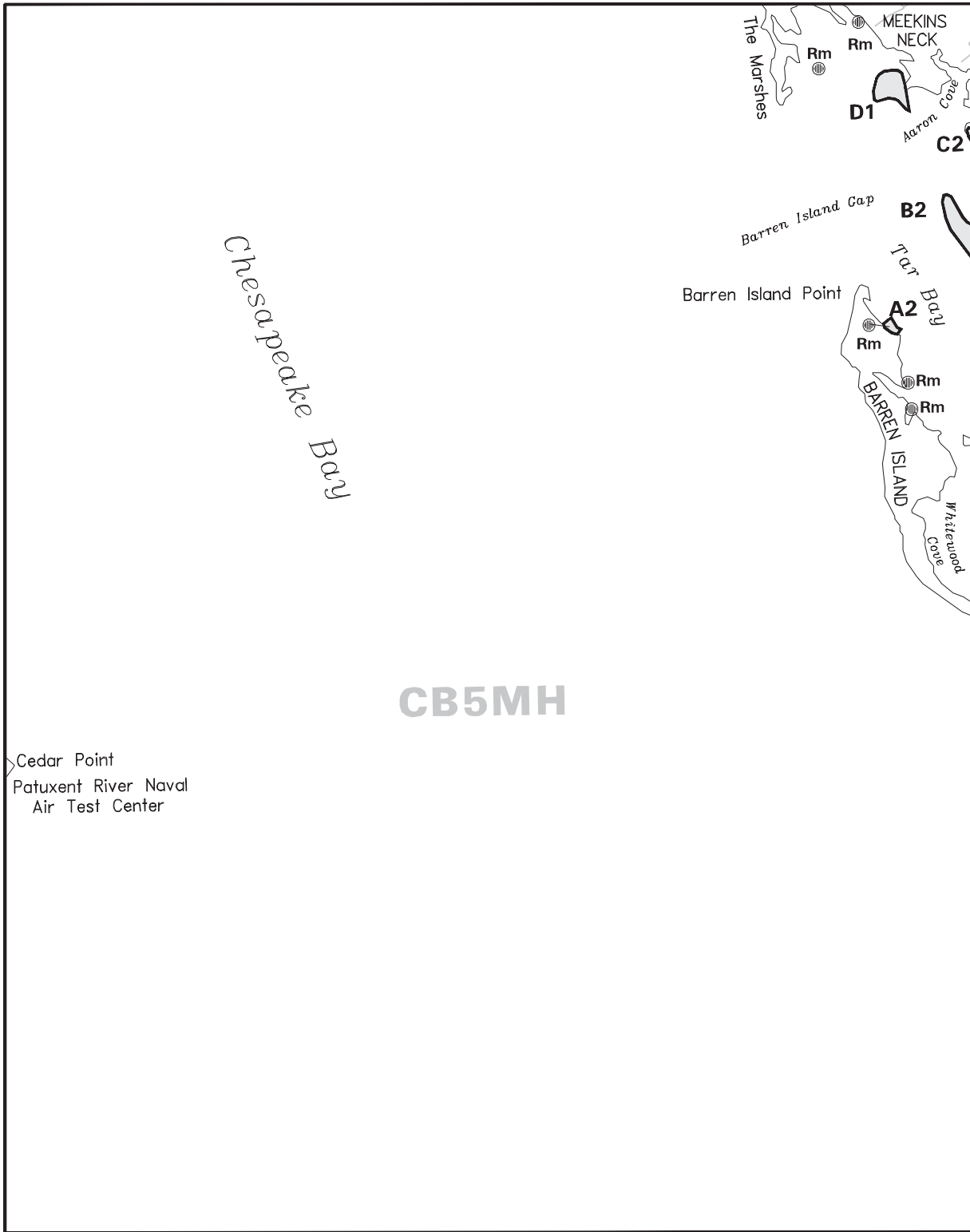
**Hectares of SAV: 1.02**  
Date Flown: 08/01/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(072) Barren Island, Md.



**Hectares of SAV: 25.15**  
Date Flown: 06/23/97

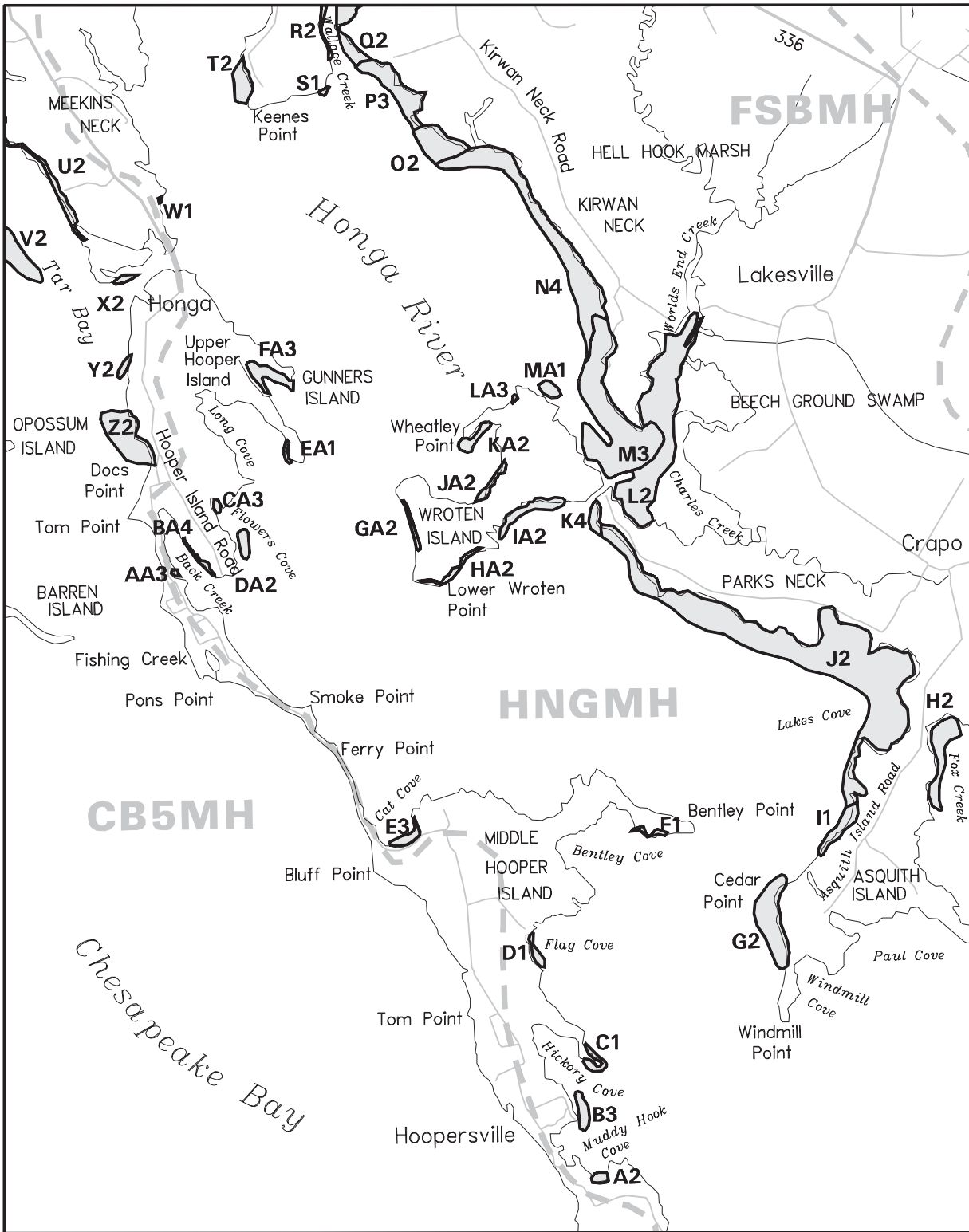
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

214 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Honga, Md. (073)



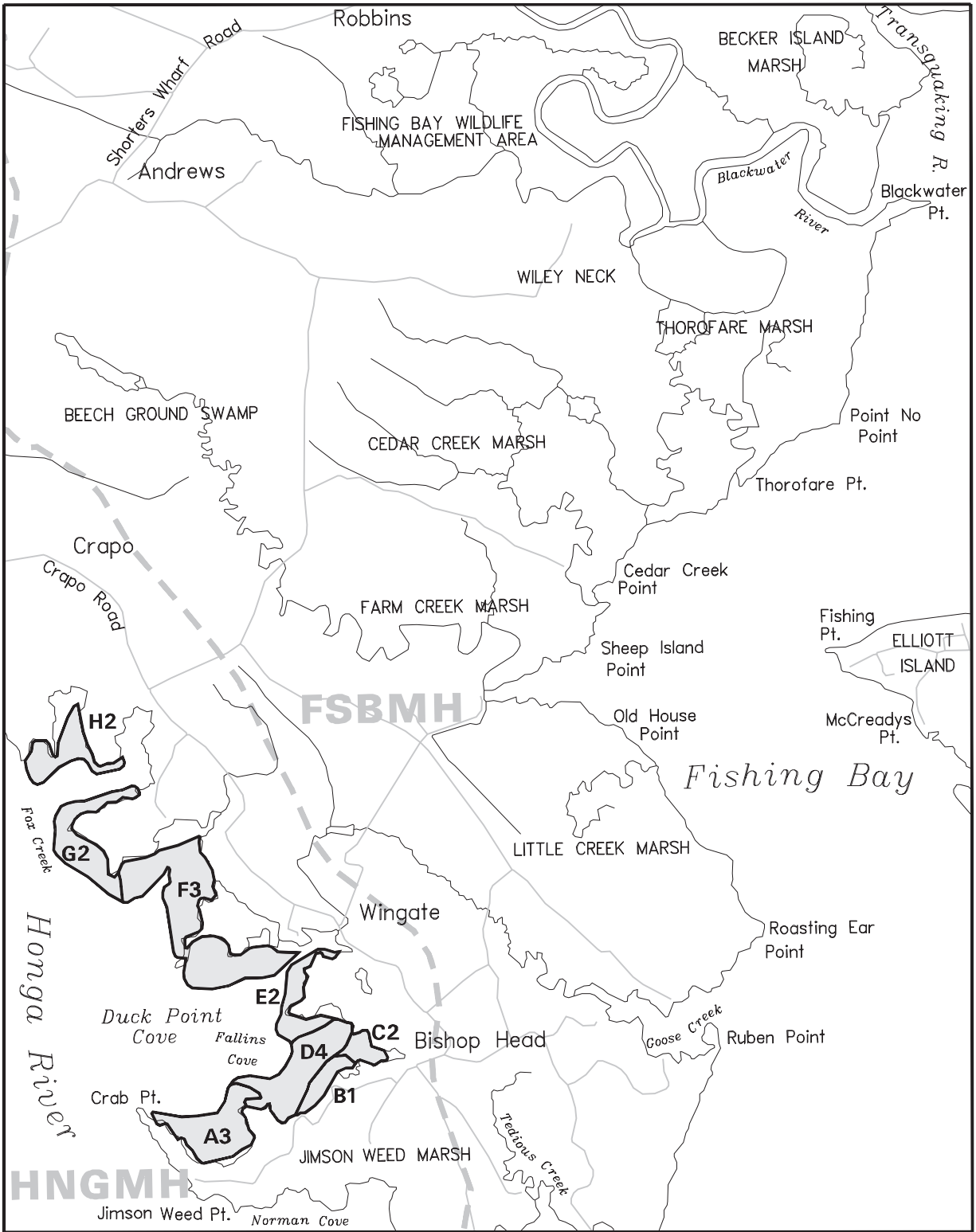
**Hectares of SAV: 574.79**  
Date Flown: 06/23/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(074) Wingate, Md.



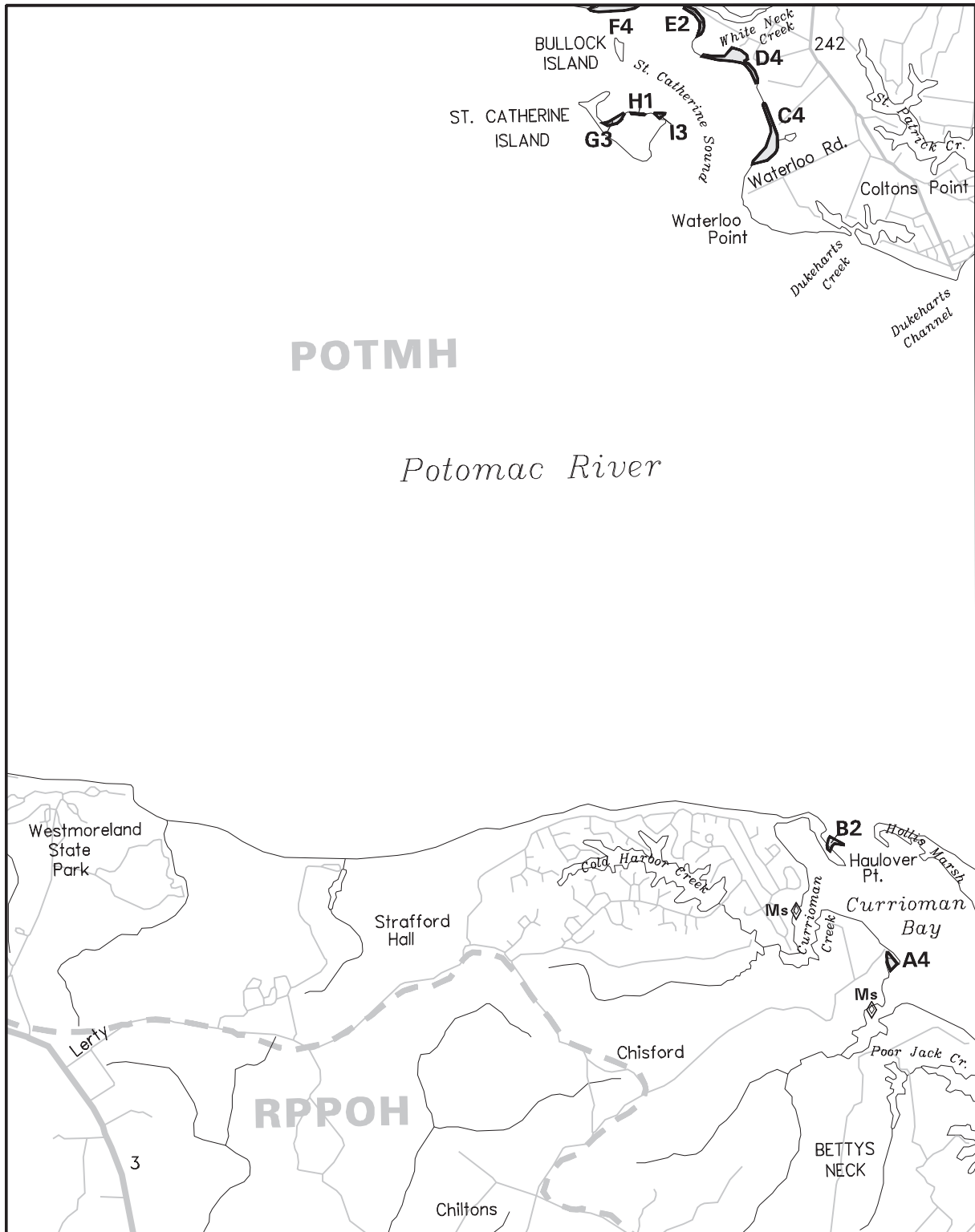
**Hectares of SAV: 350.02**  
Date Flown: 06/09/97, 06/23/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

Stratford Hall, Va.–Md. (077)



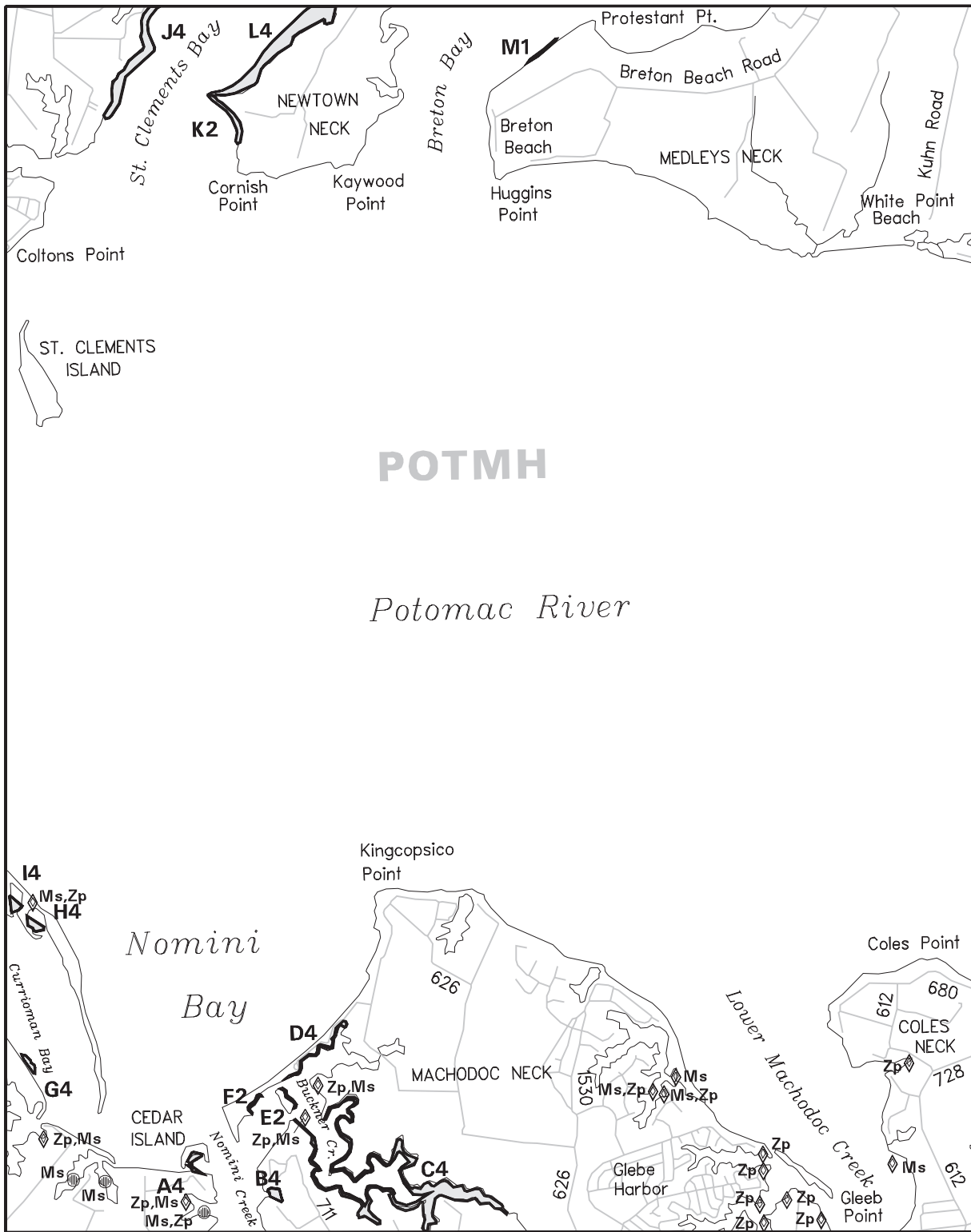
**Hectares of SAV: 20.05**  
 Date Flown: 07/31/97, 08/30/97

**Sources:** School of Marine Science  
 Virginia Institute of Marine Science  
 College of William and Mary  
 U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(078) St. Clements Island, Va.–Md.



**Hectares of SAV: 85.71**  
Date Flown: 07/18/97, 07/31/97

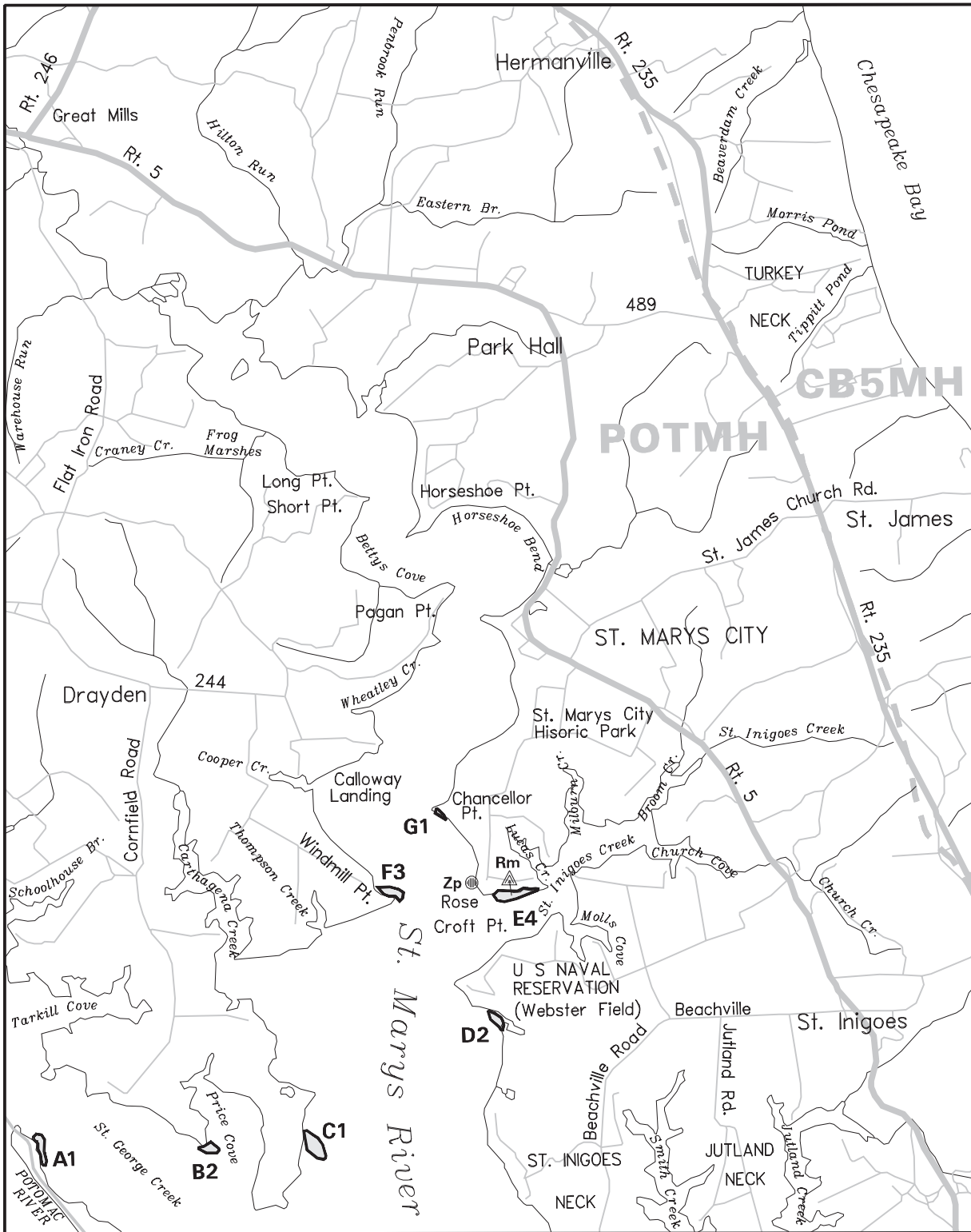
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

218 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

St. Marys City, Md. (080)



**Hectares of SAV: 18.68**

Date Flown: 07/18/97



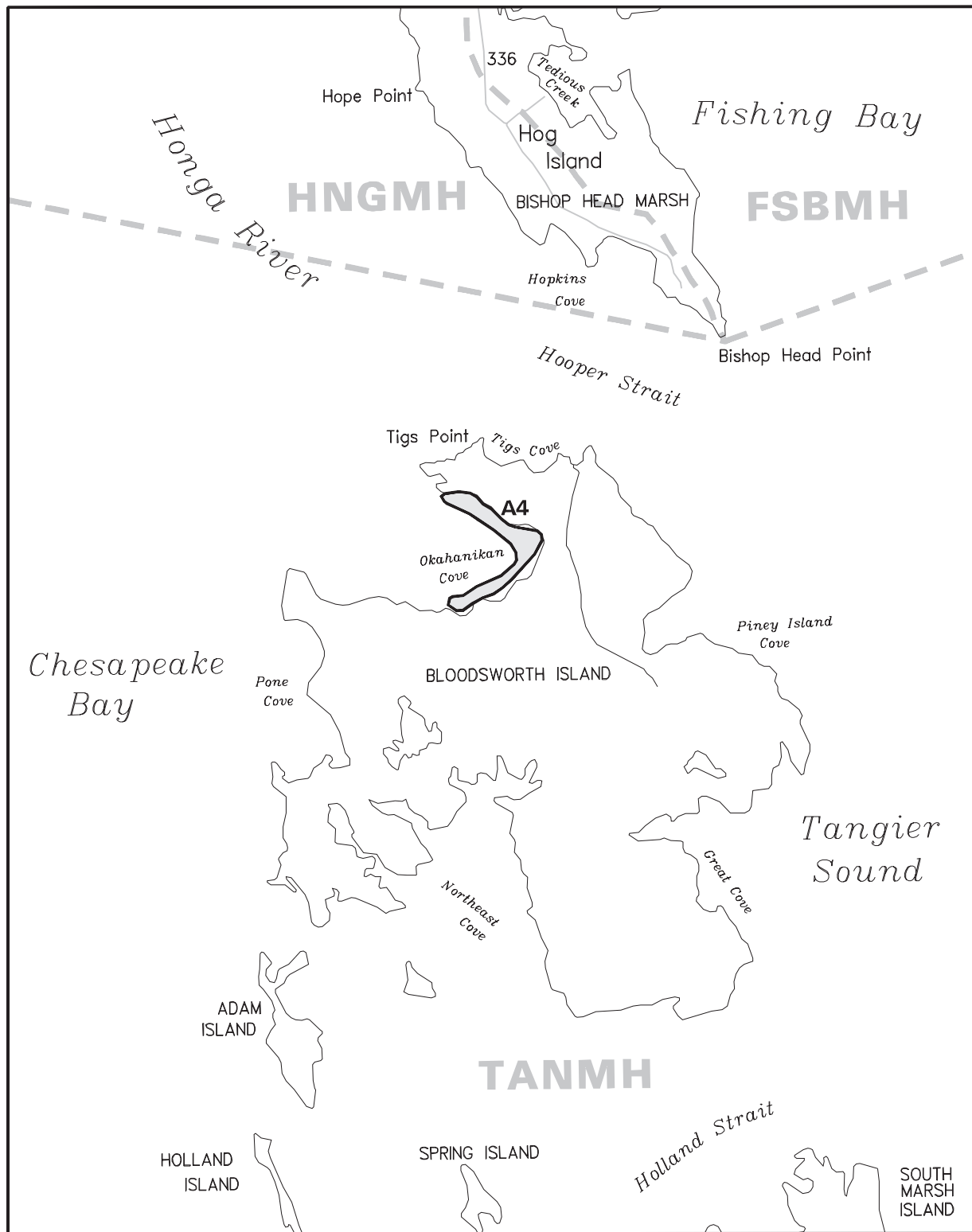
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary

U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(083) Bloodsworth Island, Md.



**Hectares of SAV: 38.36**  
Date Flown: 05/24/97

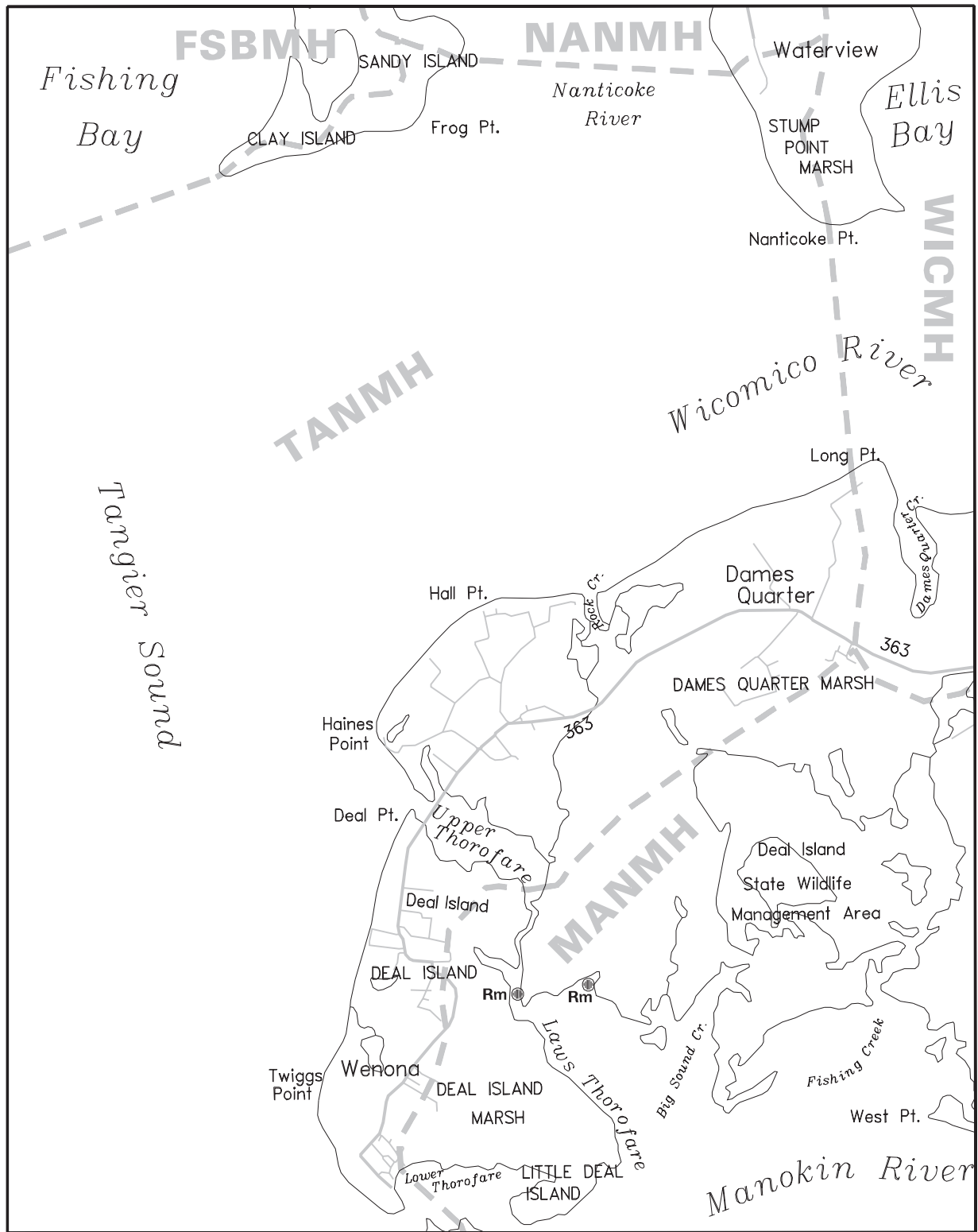
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

220 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Deal Island, Md. (084)



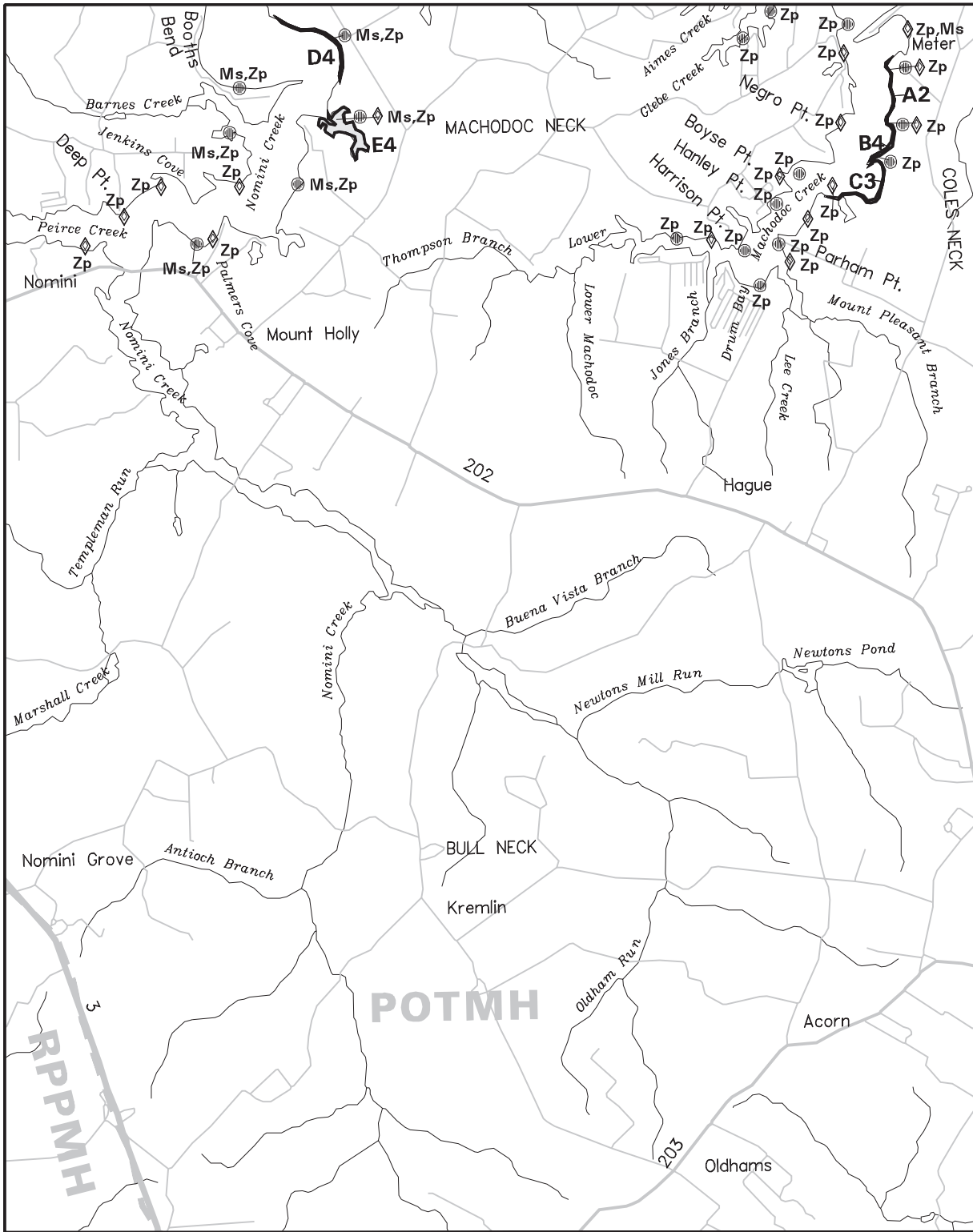
**Hectares of SAV: 0.00**  
Date Flown: 06/09/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(087) Machodoc, Va.



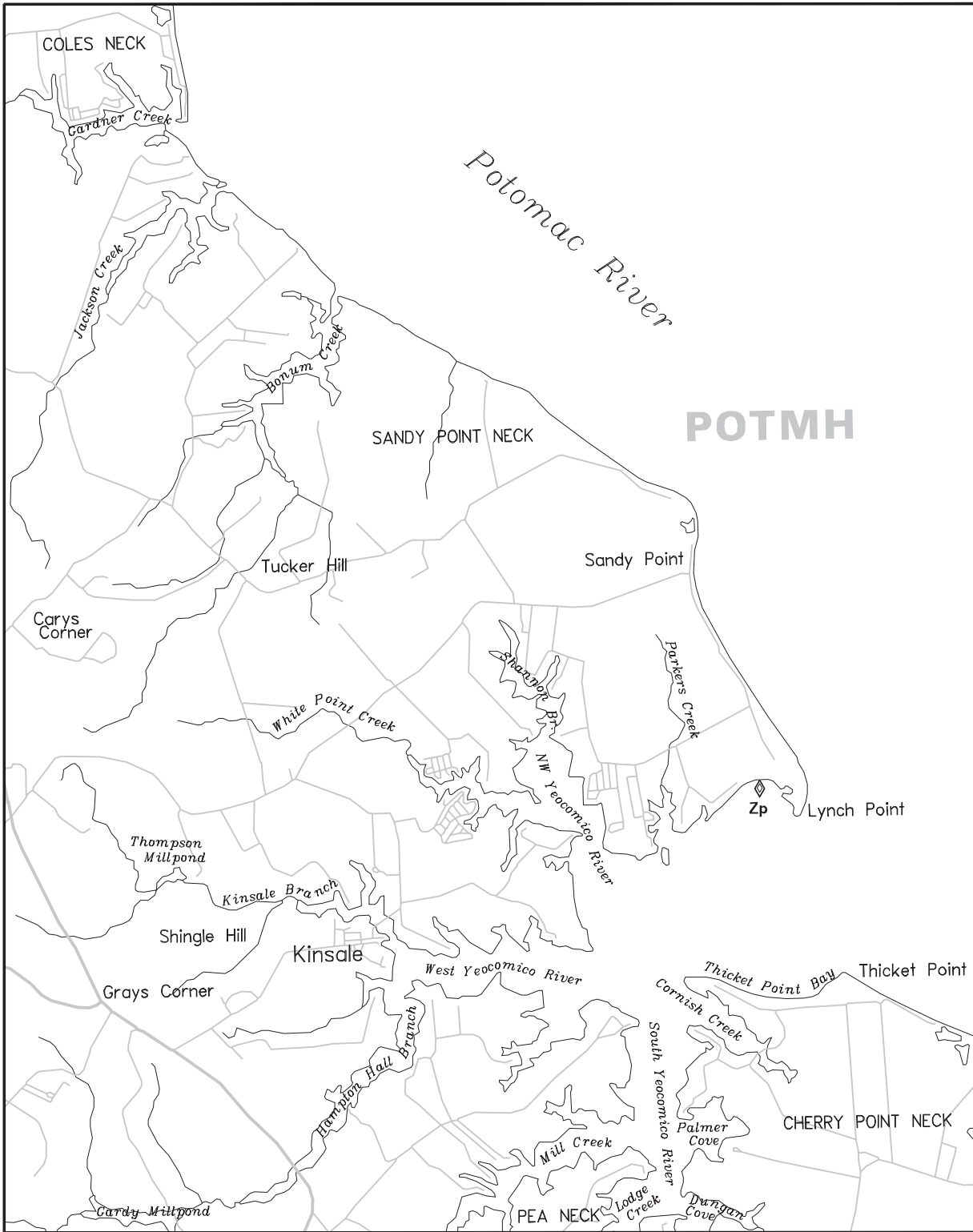
**Hectares of SAV: 16.81**  
Date Flown: 07/31/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

Kinsale, Va.–Md. (088)



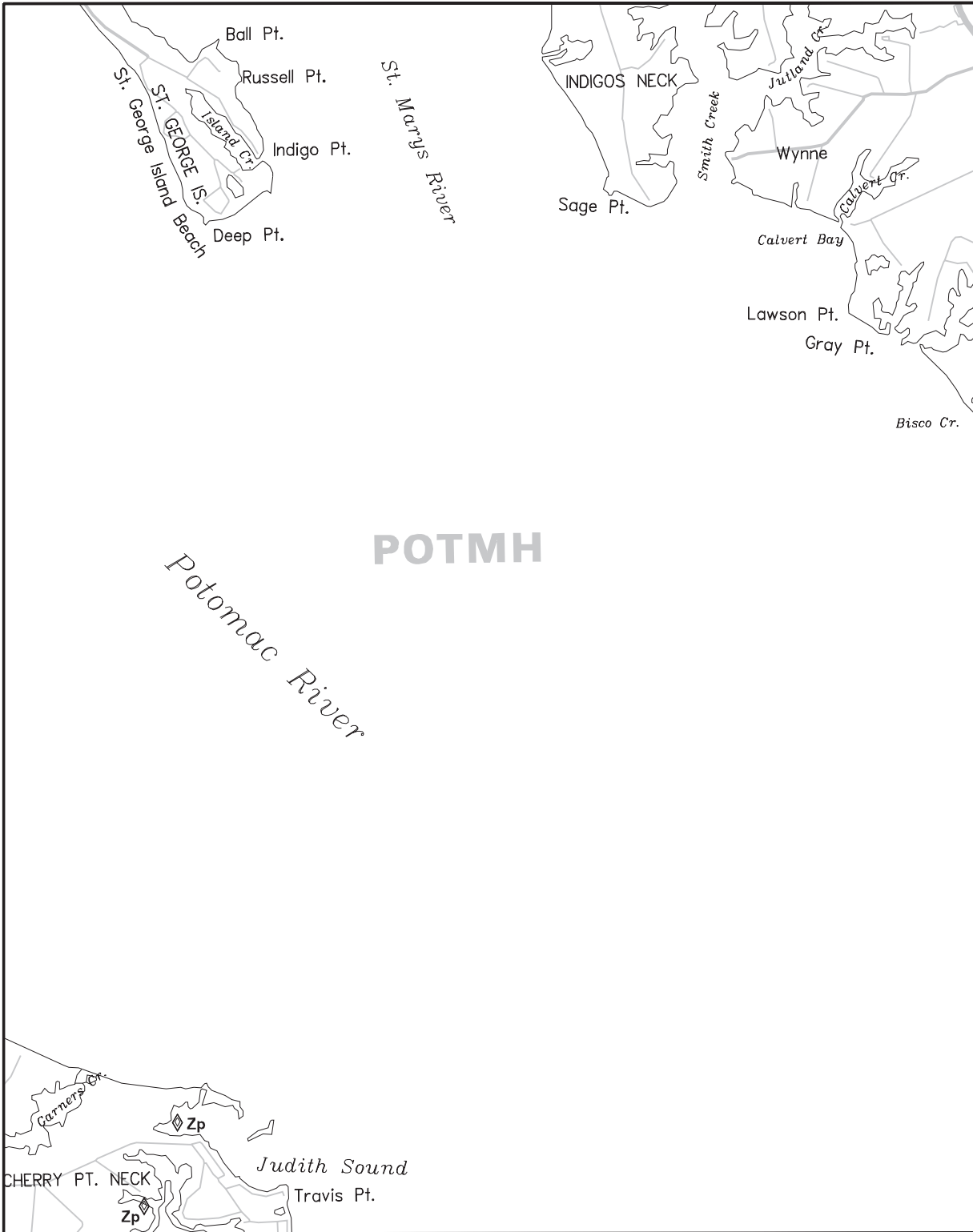
**Hectares of SAV: 0.00**  
Date Flown: 07/18/97



**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

# Submerged Aquatic Vegetation 1997

(089) St. George Island, Va.–Md.



**Hectares of SAV: 0.00**  
Date Flown: 07/18/97

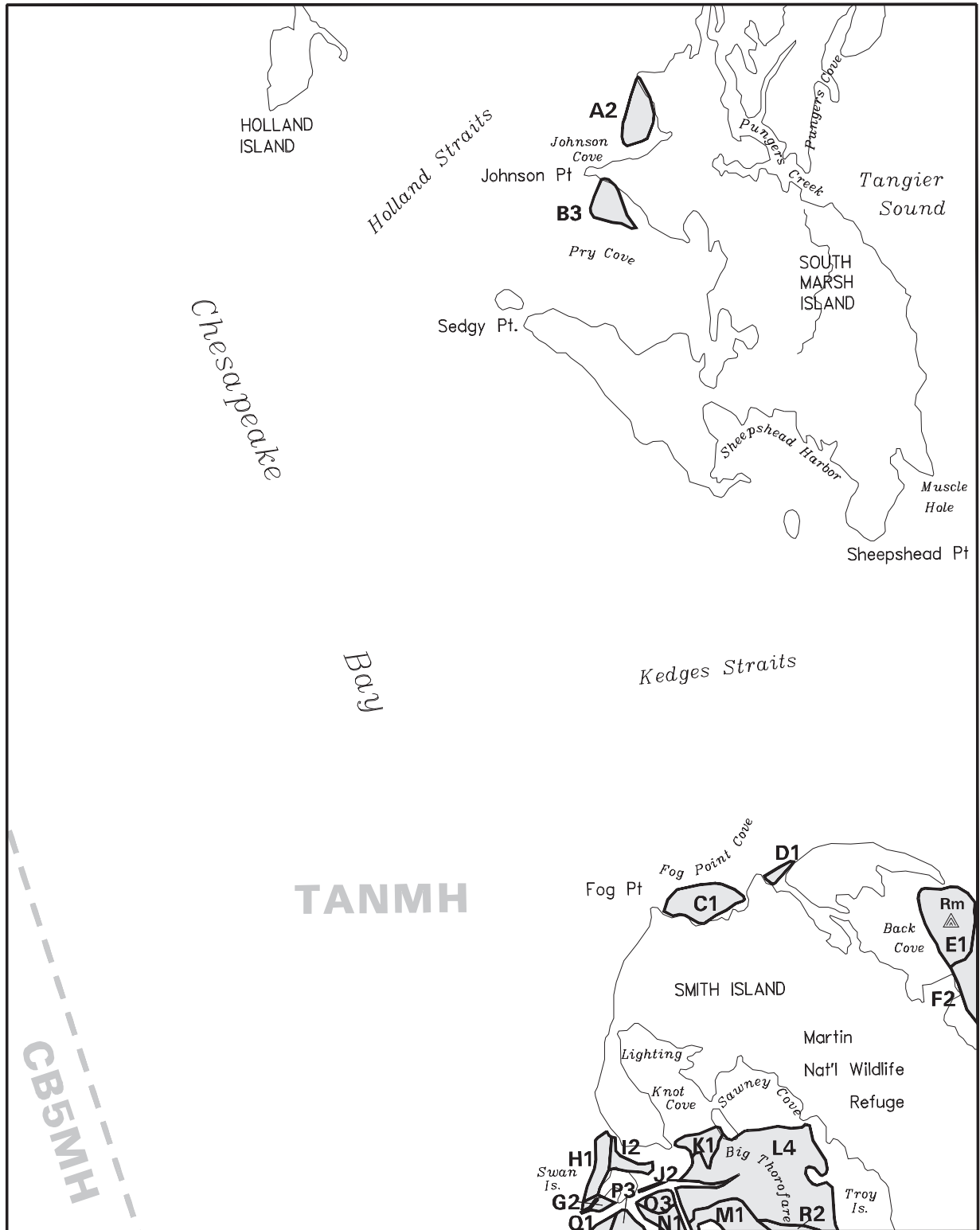
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

224 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Kedges Straits, Md. (091)



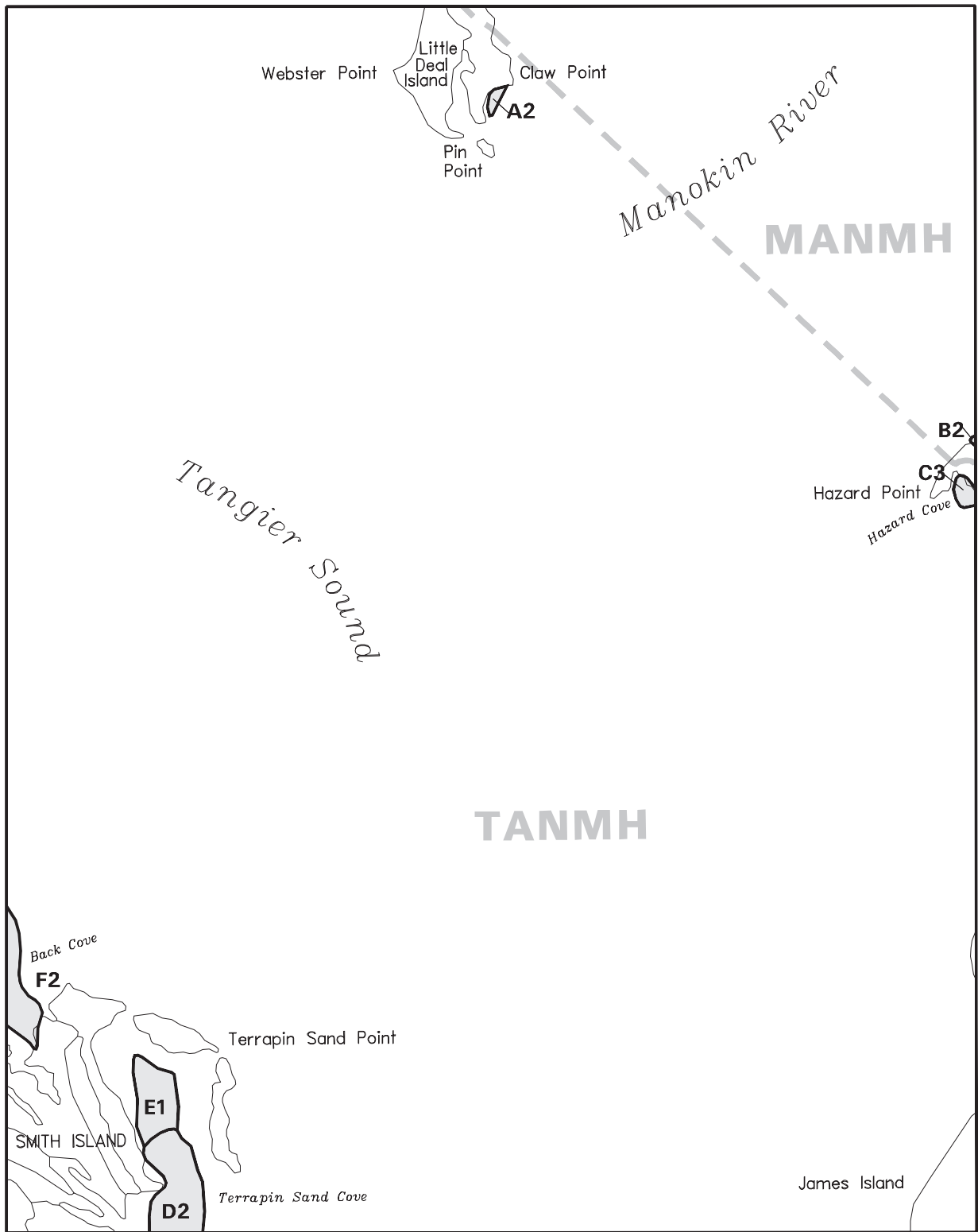
Hectares of SAV: 345.52  
Date Flown: 05/24/97

Sources: School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(092) Terrapin Sand Point, Md.



**Hectares of SAV: 137.87**  
Date Flown: 05/24/97, 06/09/97

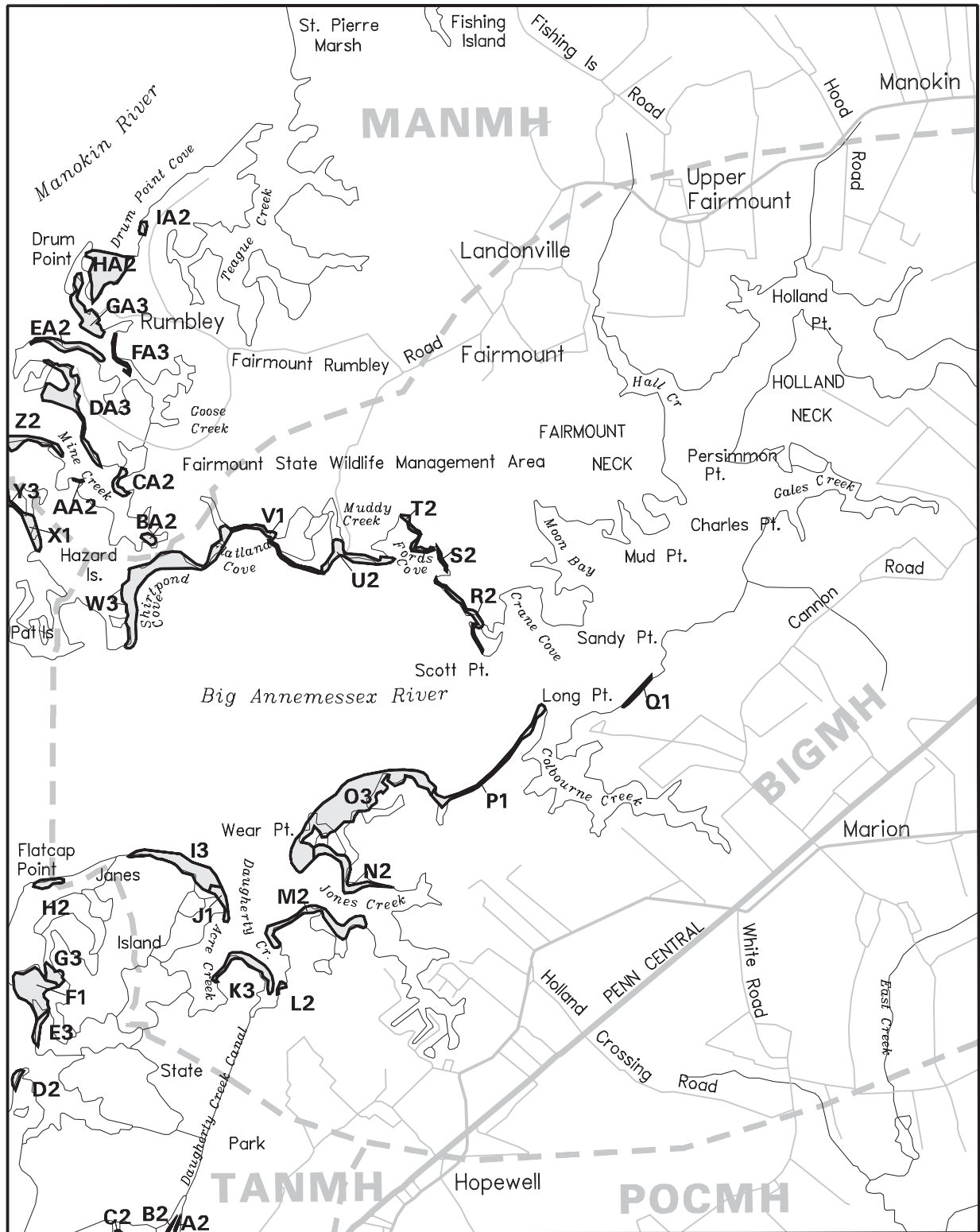
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

226 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Marion, Md. (093)



Hectares of SAV: 229.11  
Date Flown: 06/09/97

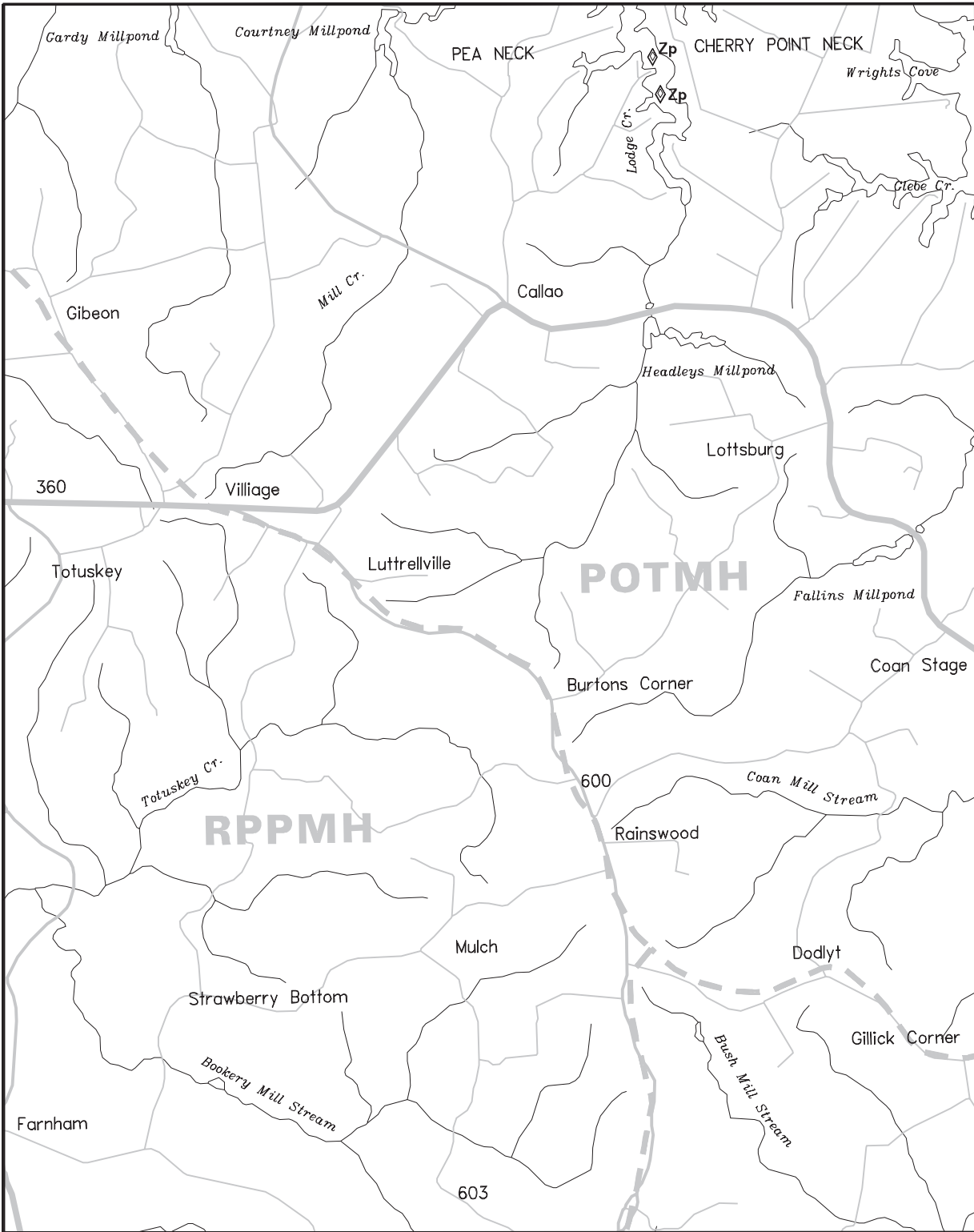
Sources: School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey





# Submerged Aquatic Vegetation 1997

(096) Lottsburg, Va.



**Hectares of SAV: 0.00**  
Date Flown: Not Flown

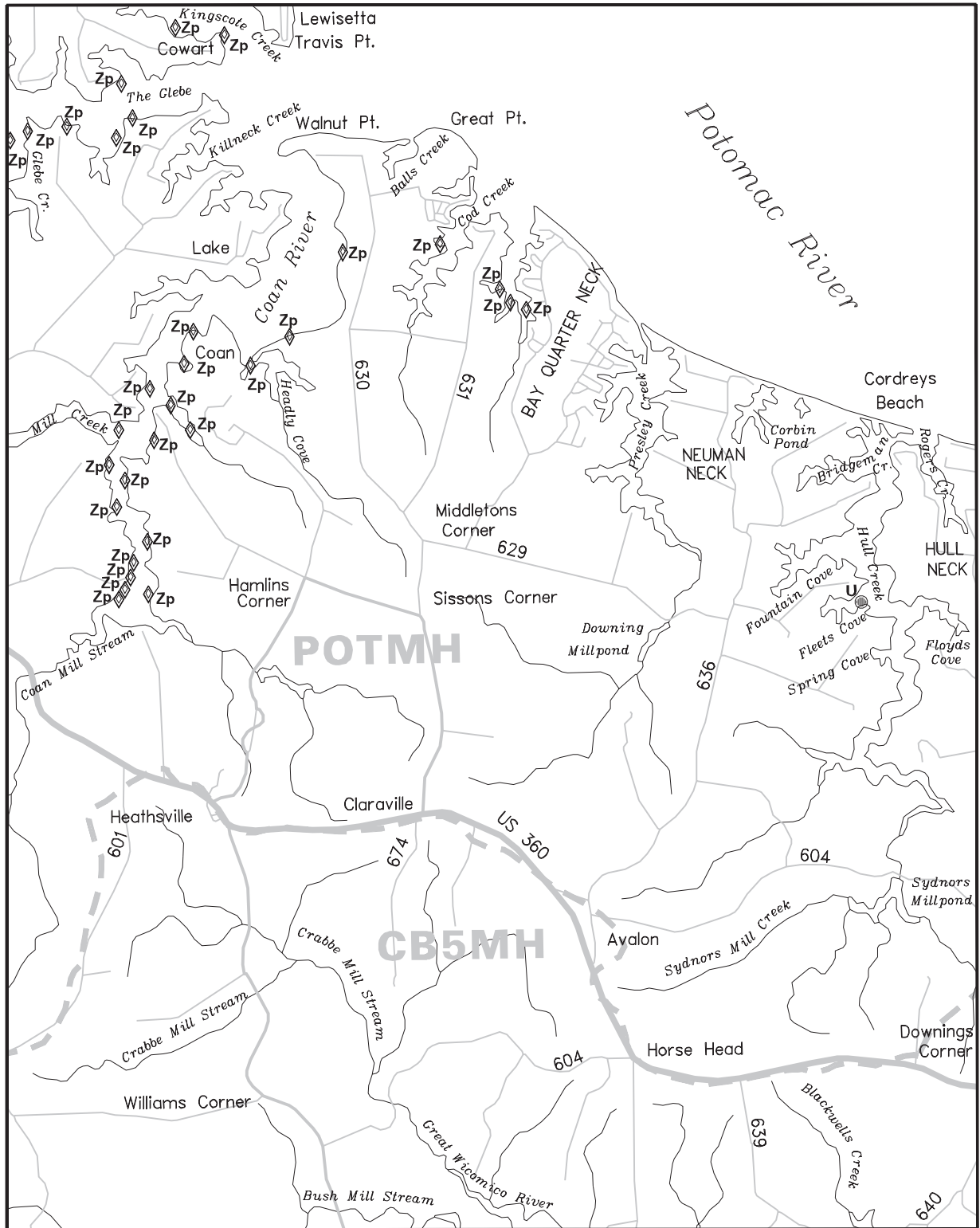
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

228 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Heathsville, Va.–Md. (097)



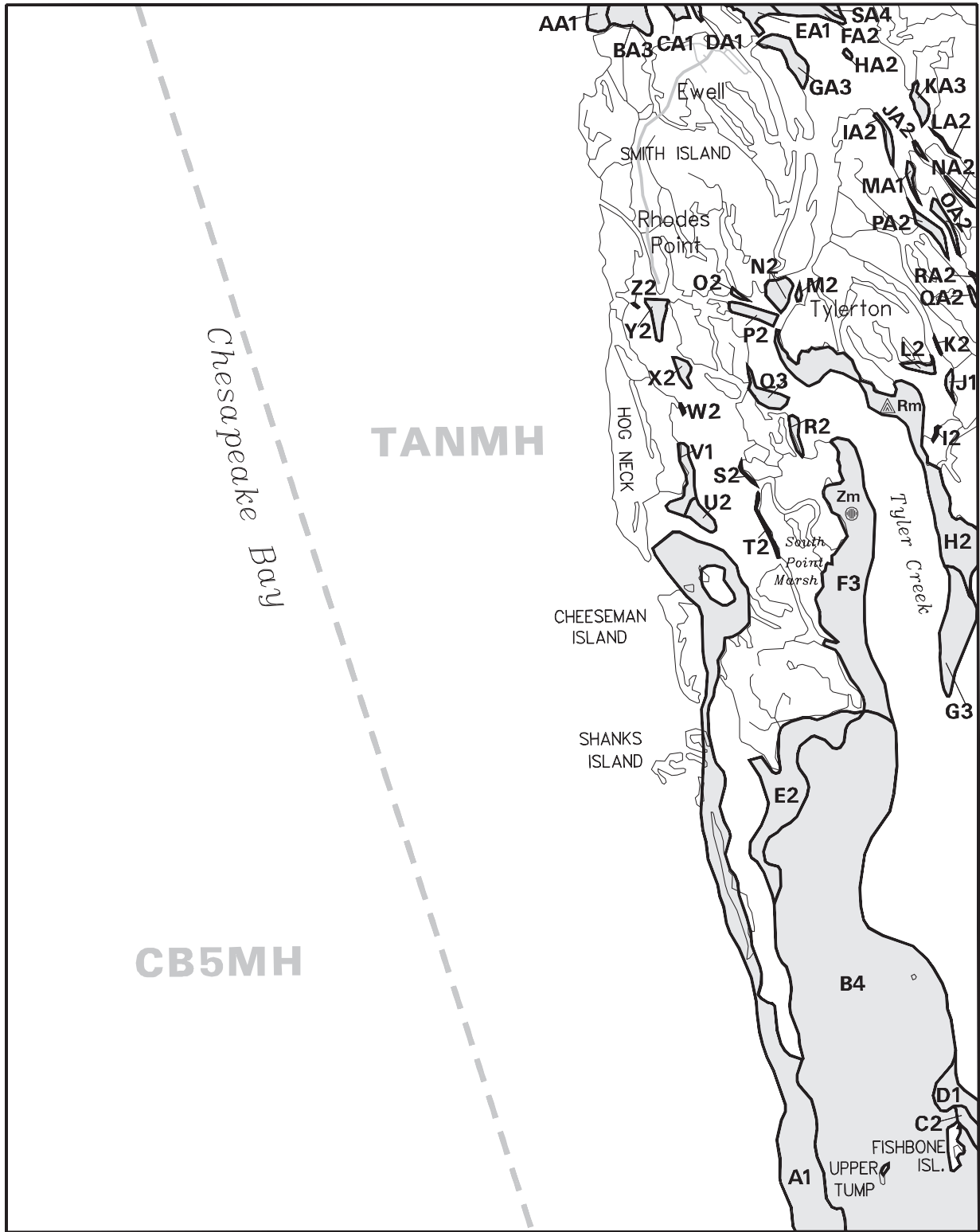
**Hectares of SAV: 0.00**  
Date Flown: 07/18/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(099) Ewell, Md.–Va.



**Hectares of SAV: 1,503.02**  
Date Flown: 05/24/97

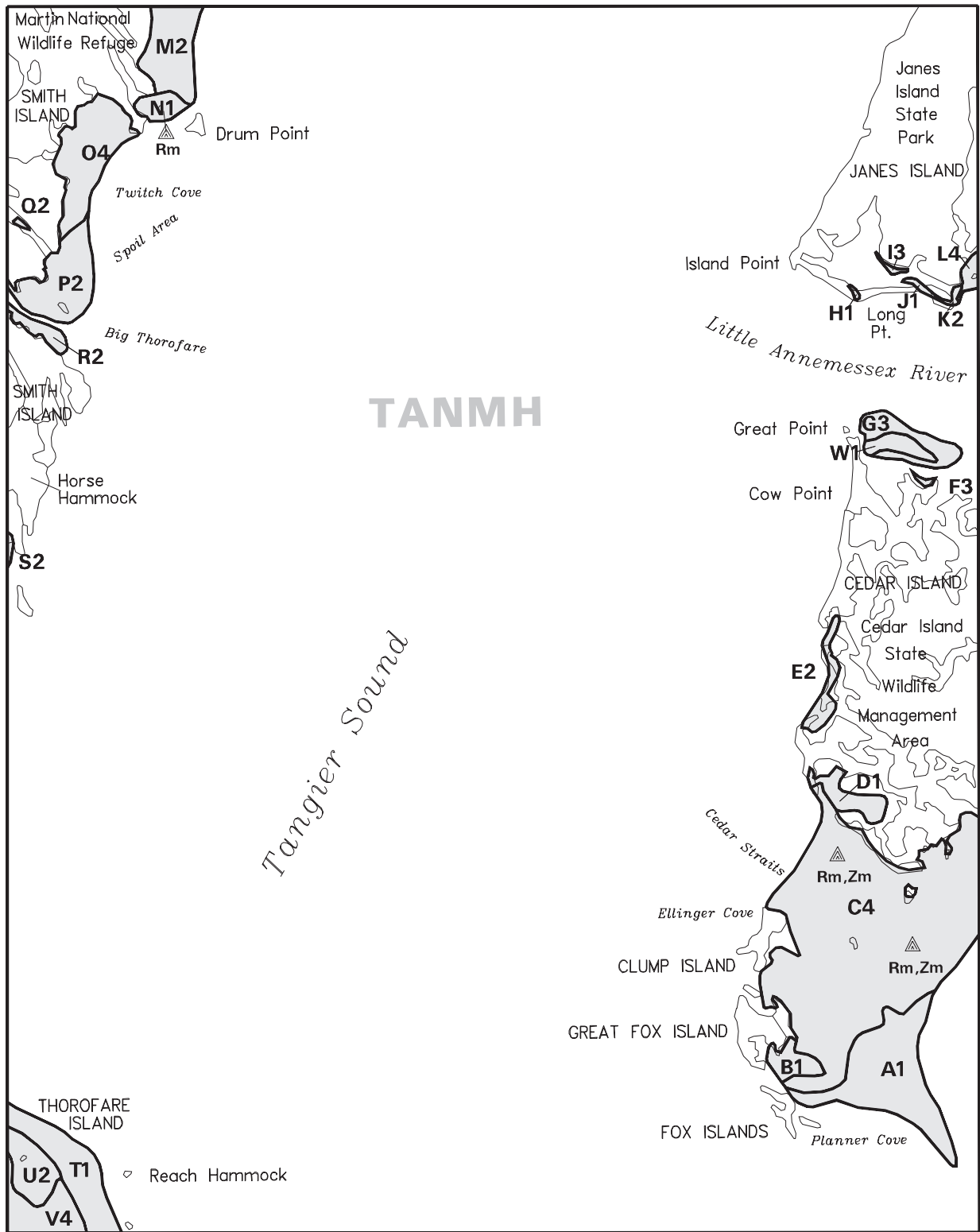
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

230 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Great Fox Island, Va.–Md. (100)



**Hectares of SAV: 1,048.36**  
Date Flown: 06/09/97

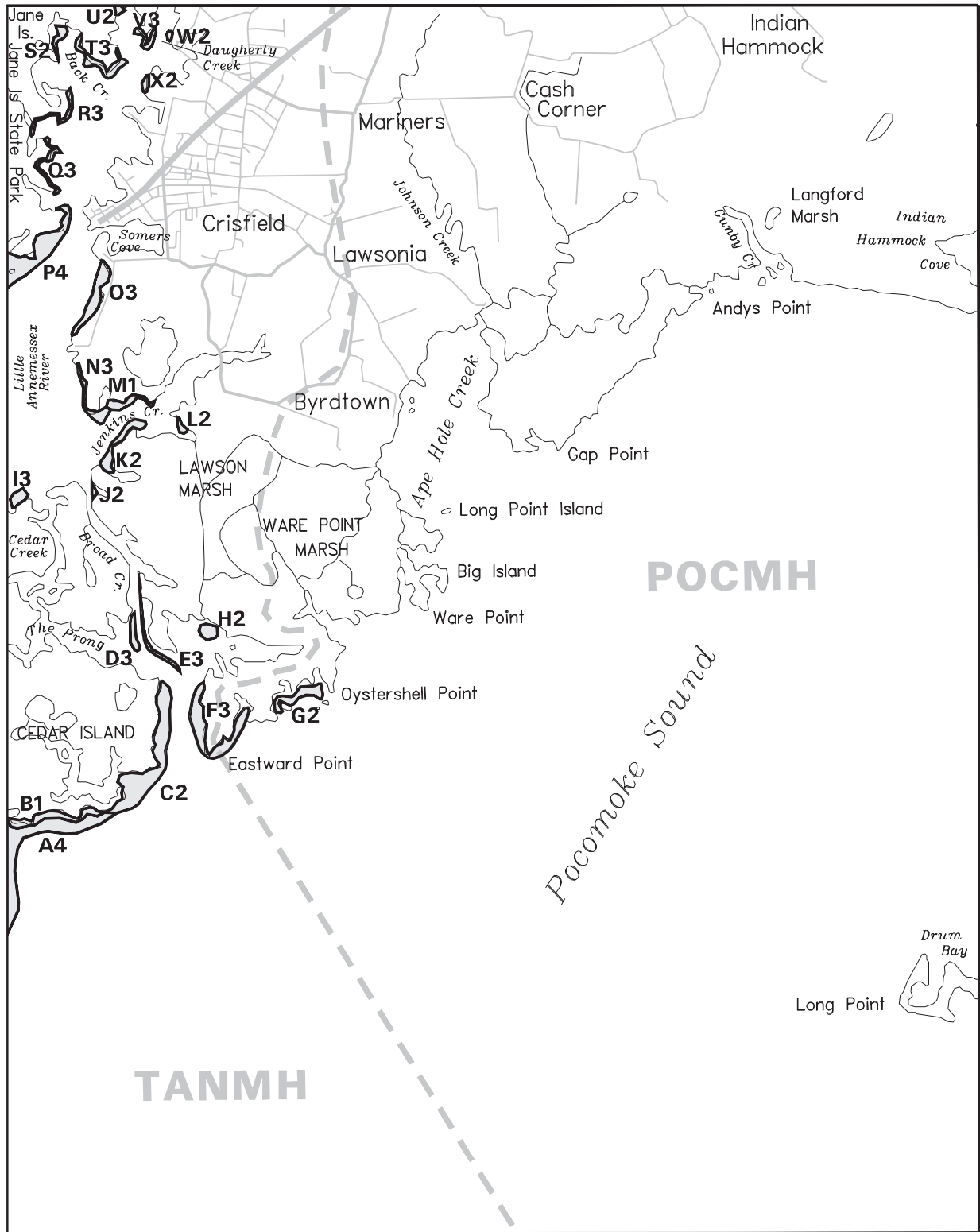
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary



U.S. Geological Survey

# Submerged Aquatic Vegetation 1997

(101) Crisfield, Md.–Va.



**Hectares of SAV: 160.36**  
Date Flown: 06/09/97

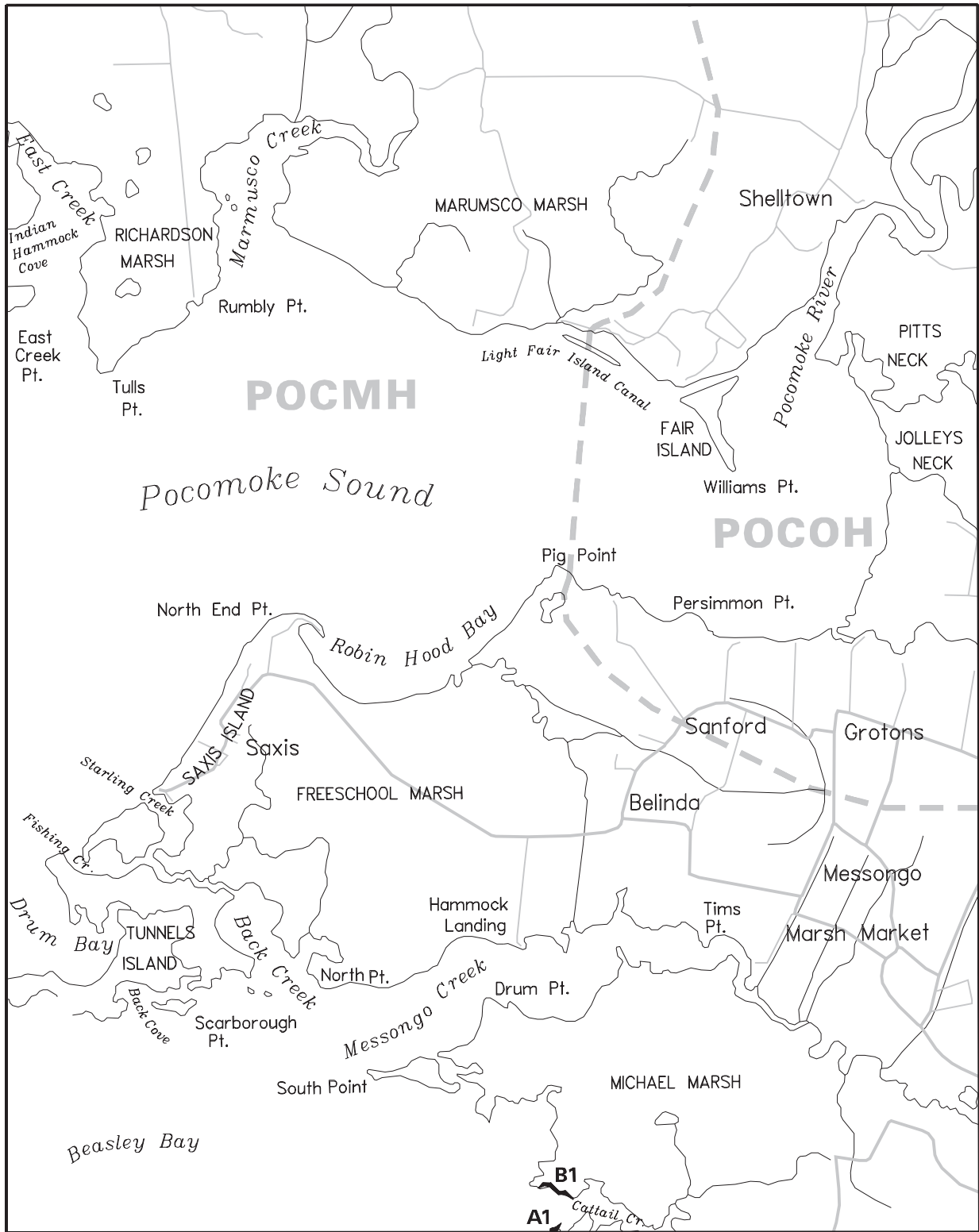
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

232 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Saxis, Va.–Md. (102)



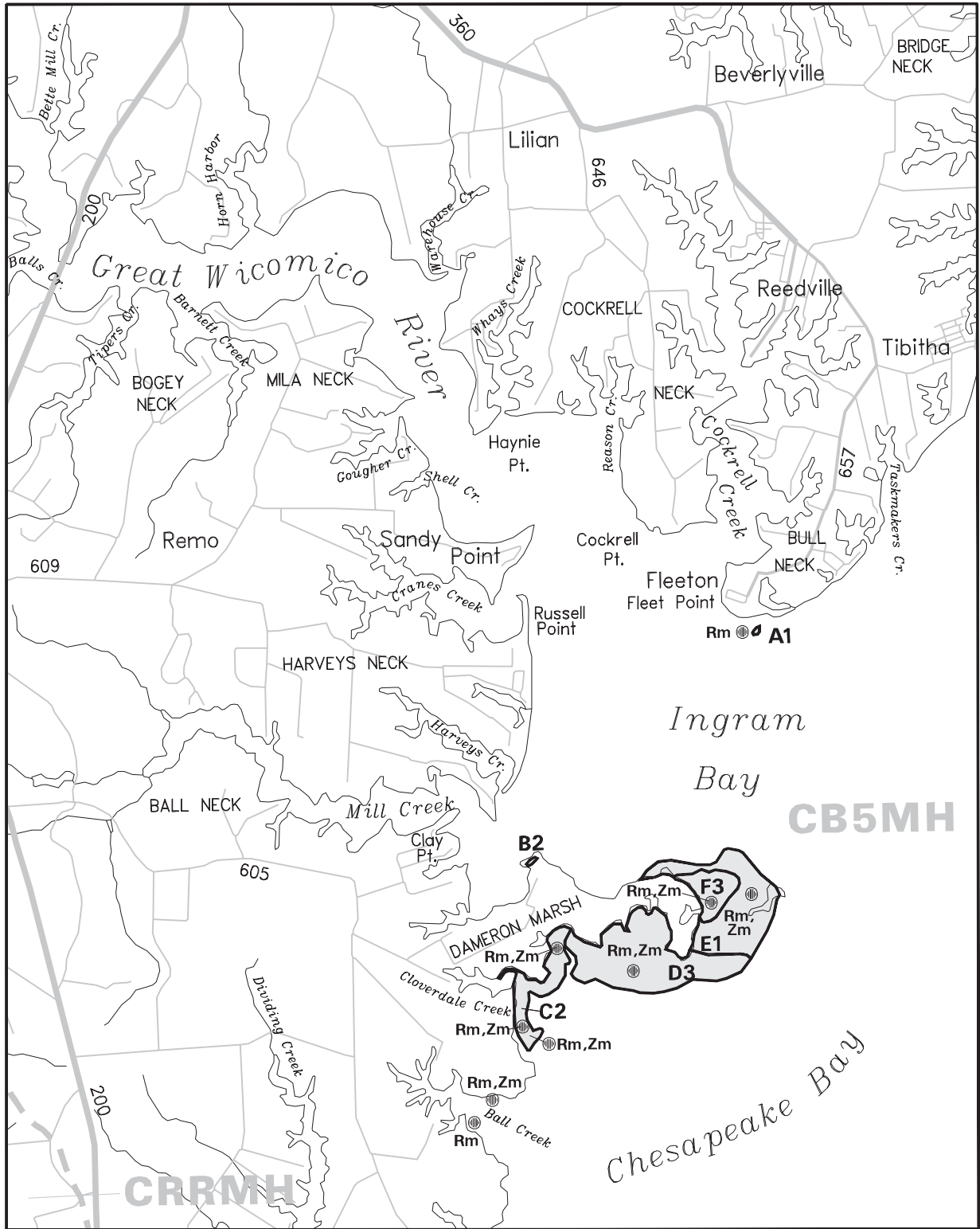
**Hectares of SAV: 0.83**  
Date Flown: 05/24/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(106) Reedville, Va.



**Hectares of SAV: 235.88**  
Date Flown: 05/24/97

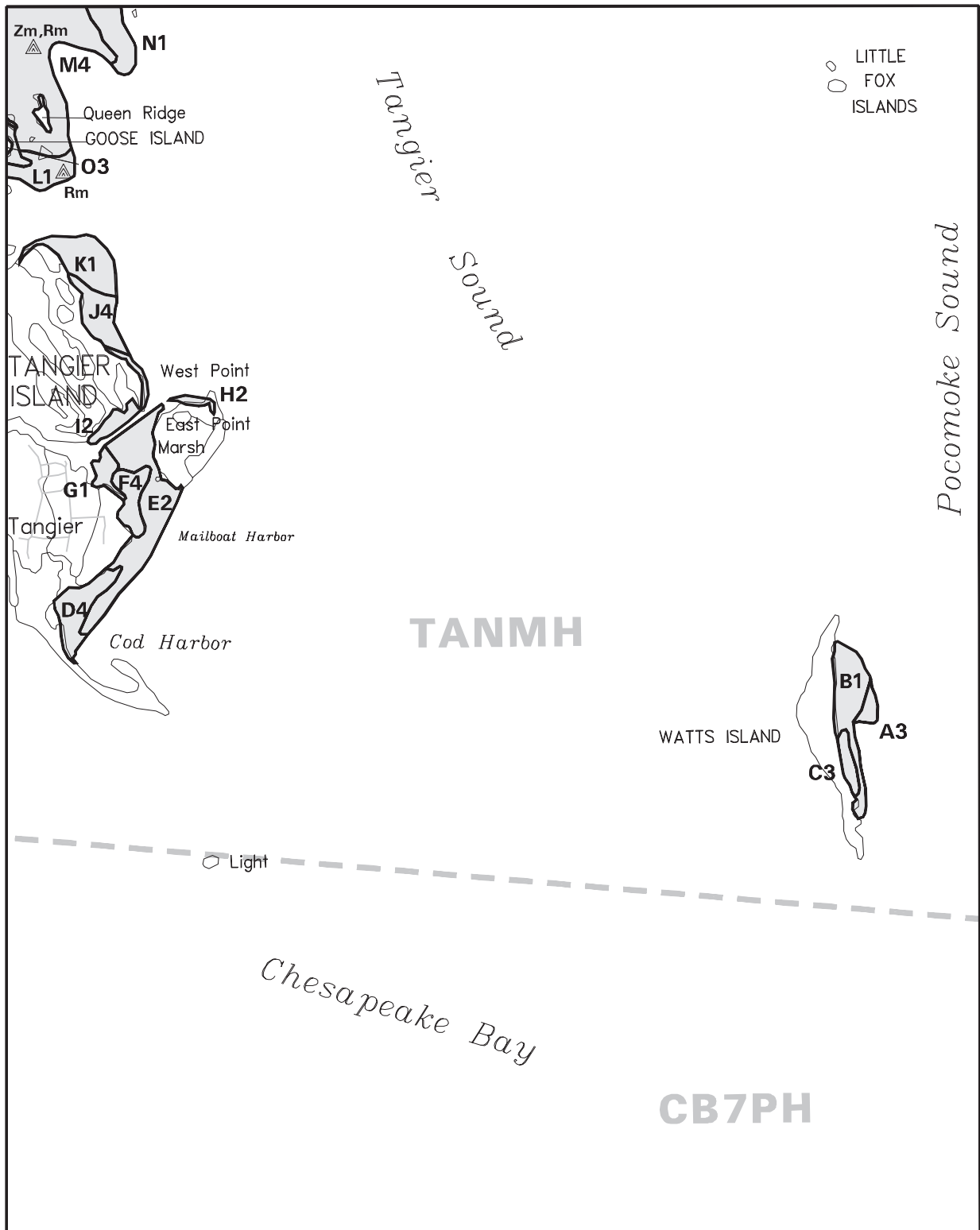
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

234 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Tangier Island, Va. (107)



**Hectares of SAV: 437.00**  
Date Flown: 05/24/97

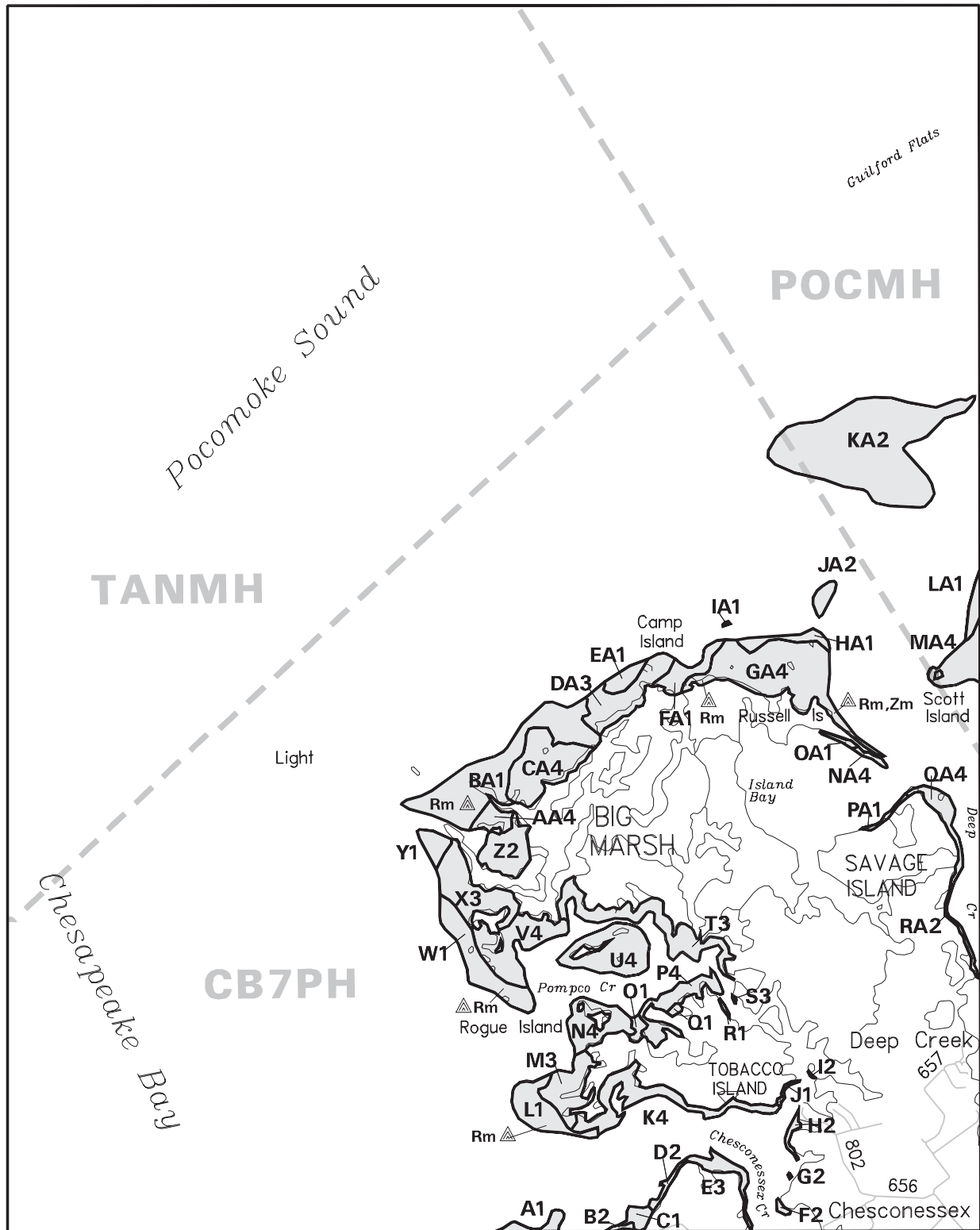
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey





# Submerged Aquatic Vegetation 1997

(108) Chesconessex, Va.



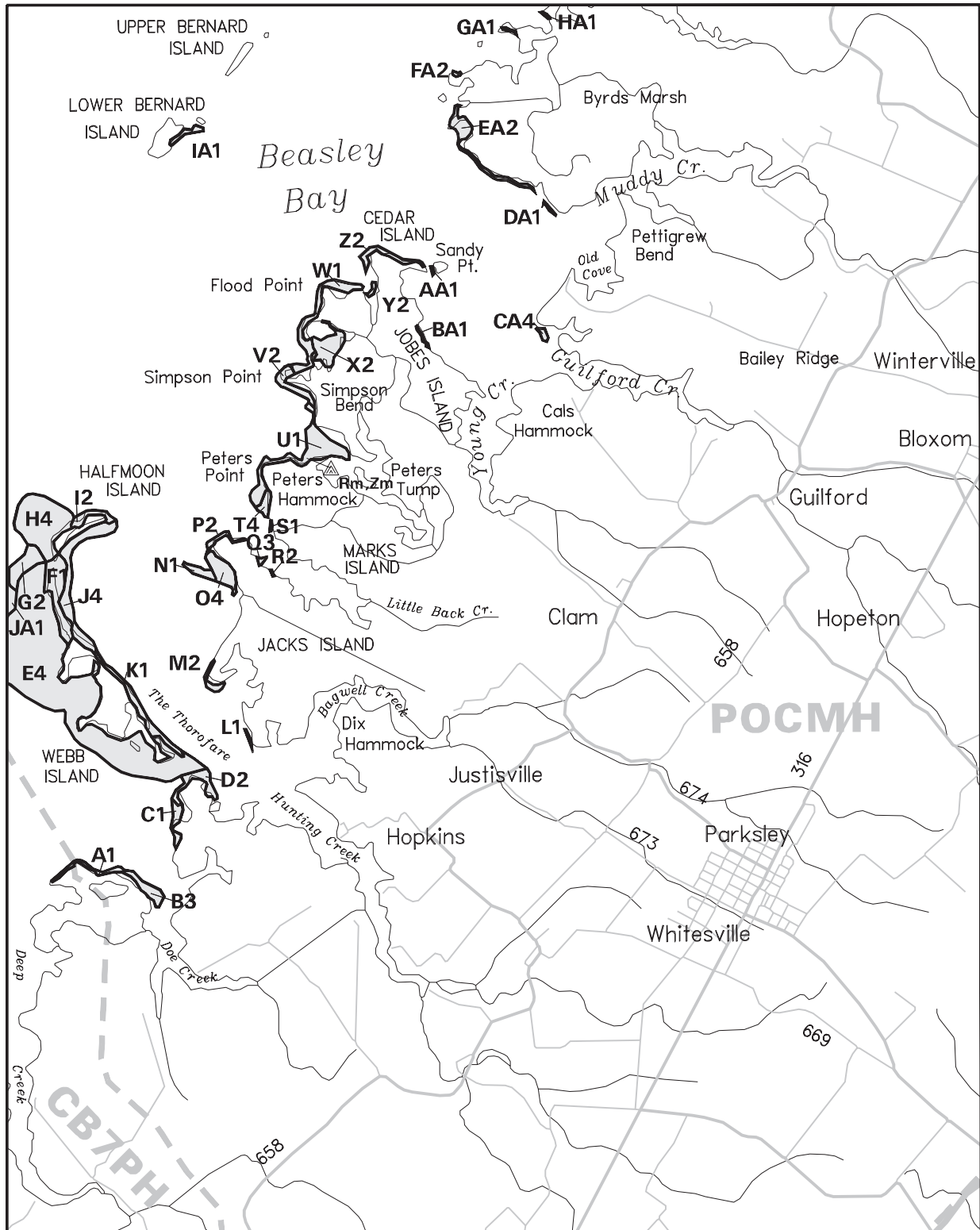
**Hectares of SAV: 932.00**  
Date Flown: 05/24/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

236 1000 0 1000 2000 meters

# Submerged Aquatic Vegetation 1997

Parksley, Va. (109)



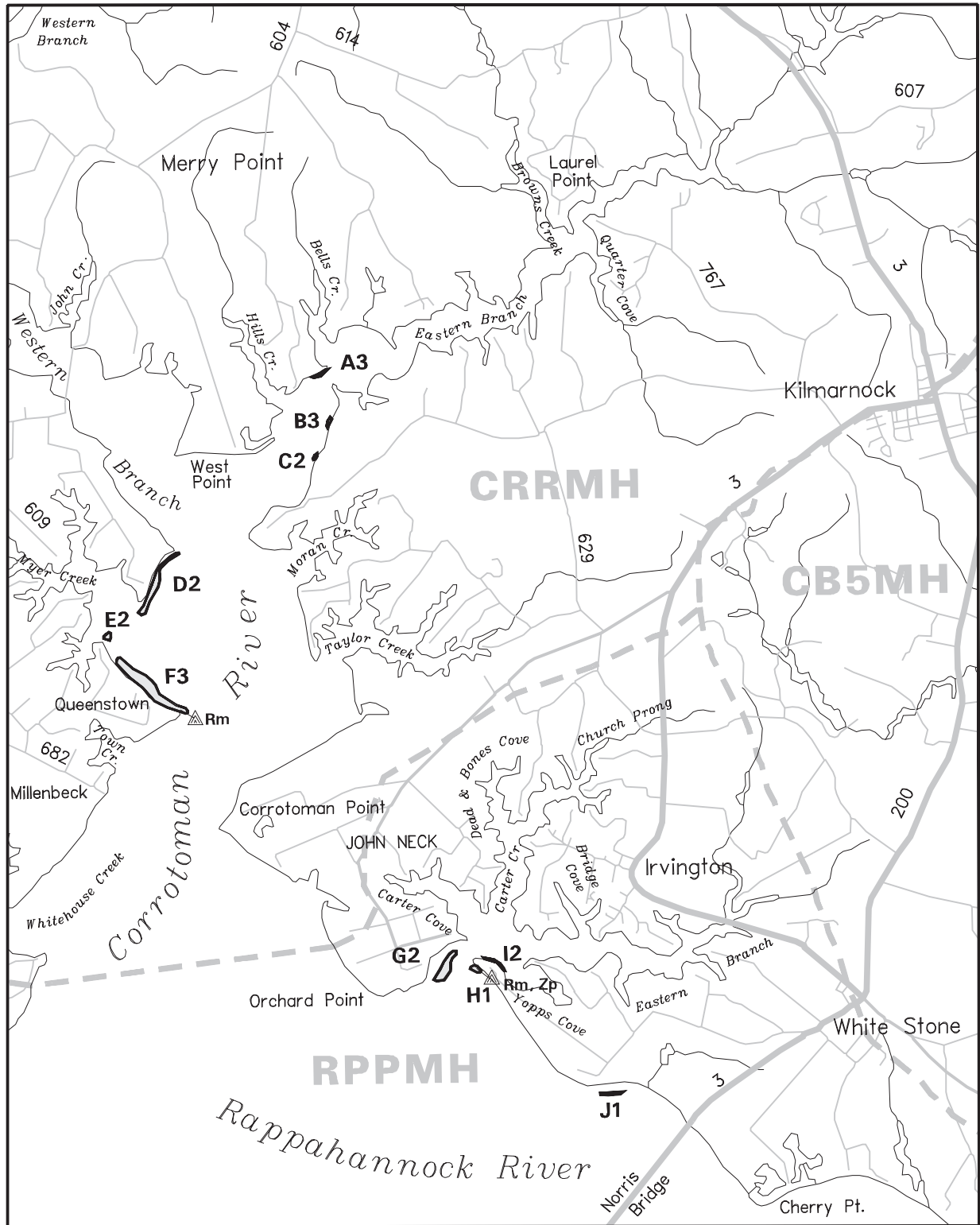
**Hectares of SAV: 340.40**  
Date Flown: 05/24/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(111) Irvington, Va.



**Hectares of SAV: 20.51**  
Date Flown: 06/09/97

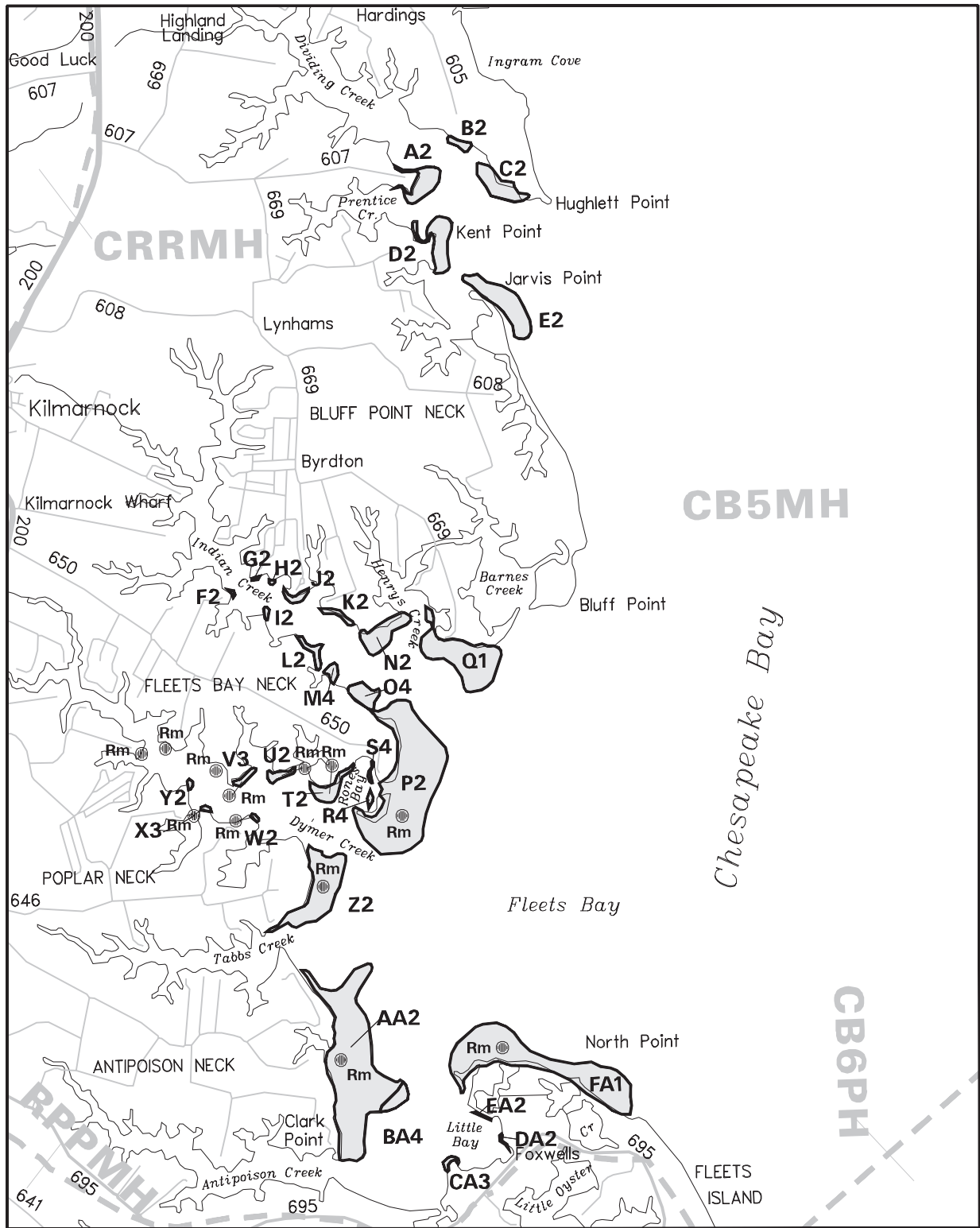
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

238 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Fleets Bay, Va. (112)



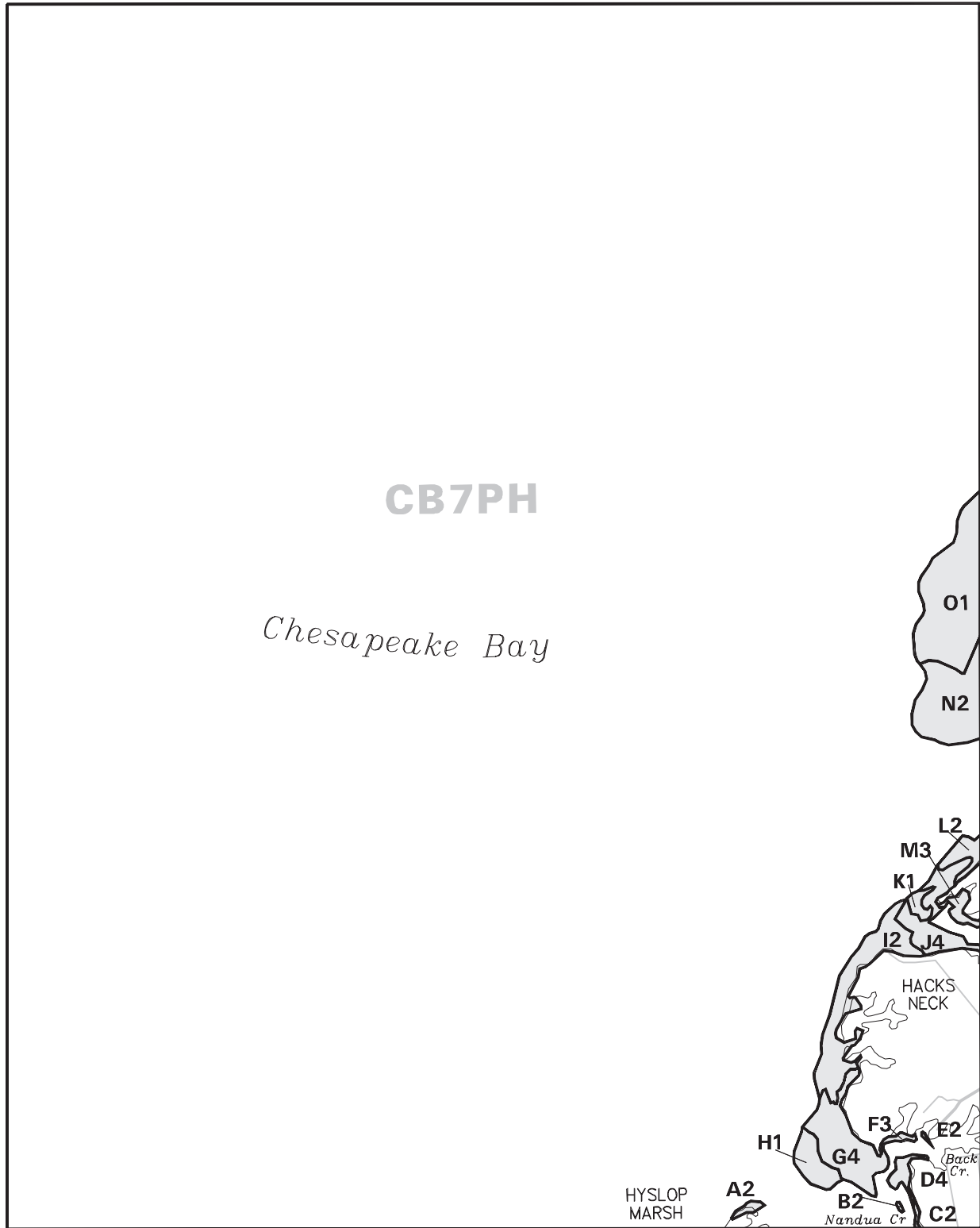
**Hectares of SAV: 431.25**  
Date Flown: 05/24/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(113) Nandua Creek, Va.



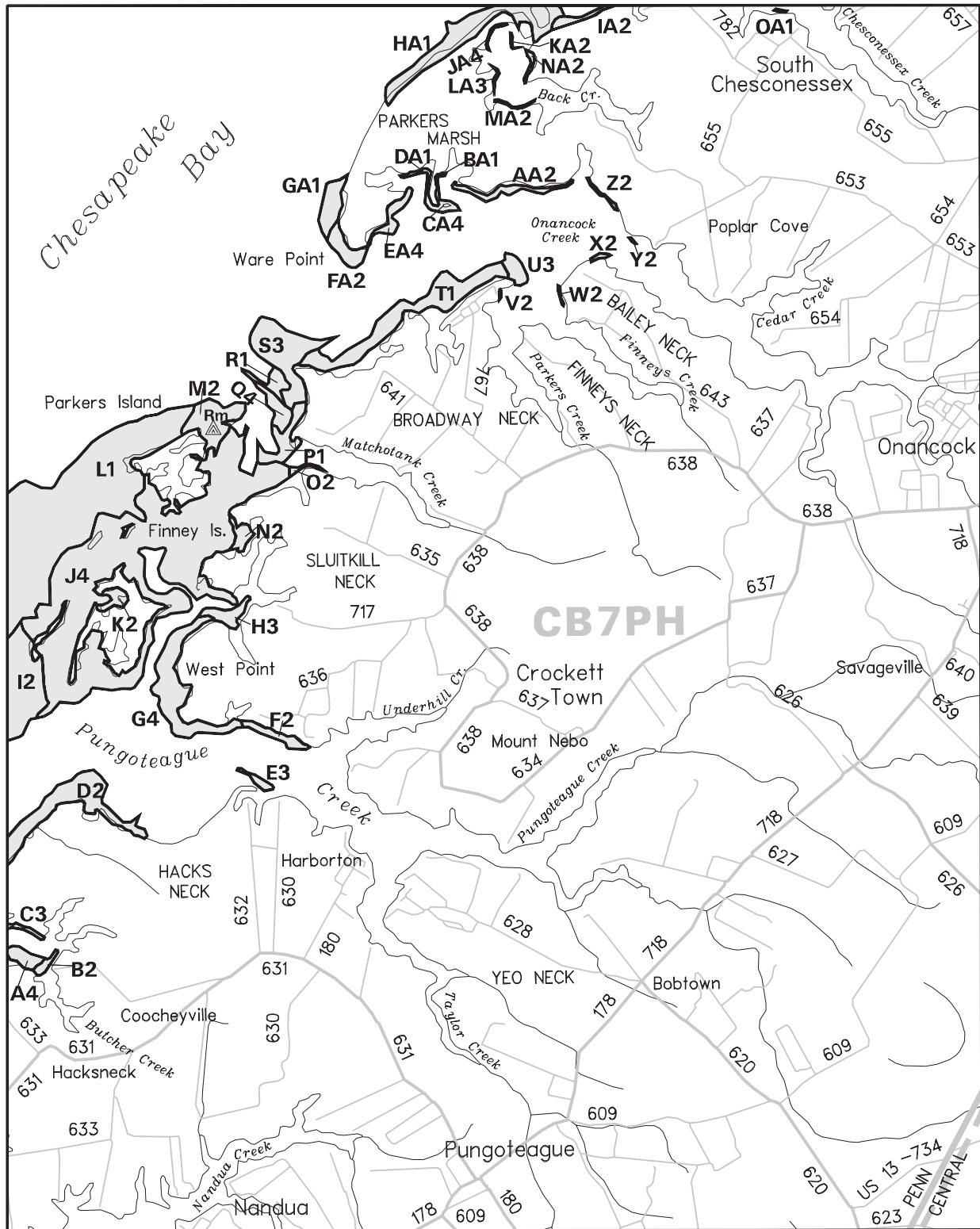
**Hectares of SAV: 378.30**  
Date Flown: 05/24/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

240 1000 0 1000 2000 meters

# Submerged Aquatic Vegetation 1997

Pungoteague, Va. (114)



**Hectares of SAV: 891.14**  
Date Flown: 05/24/97

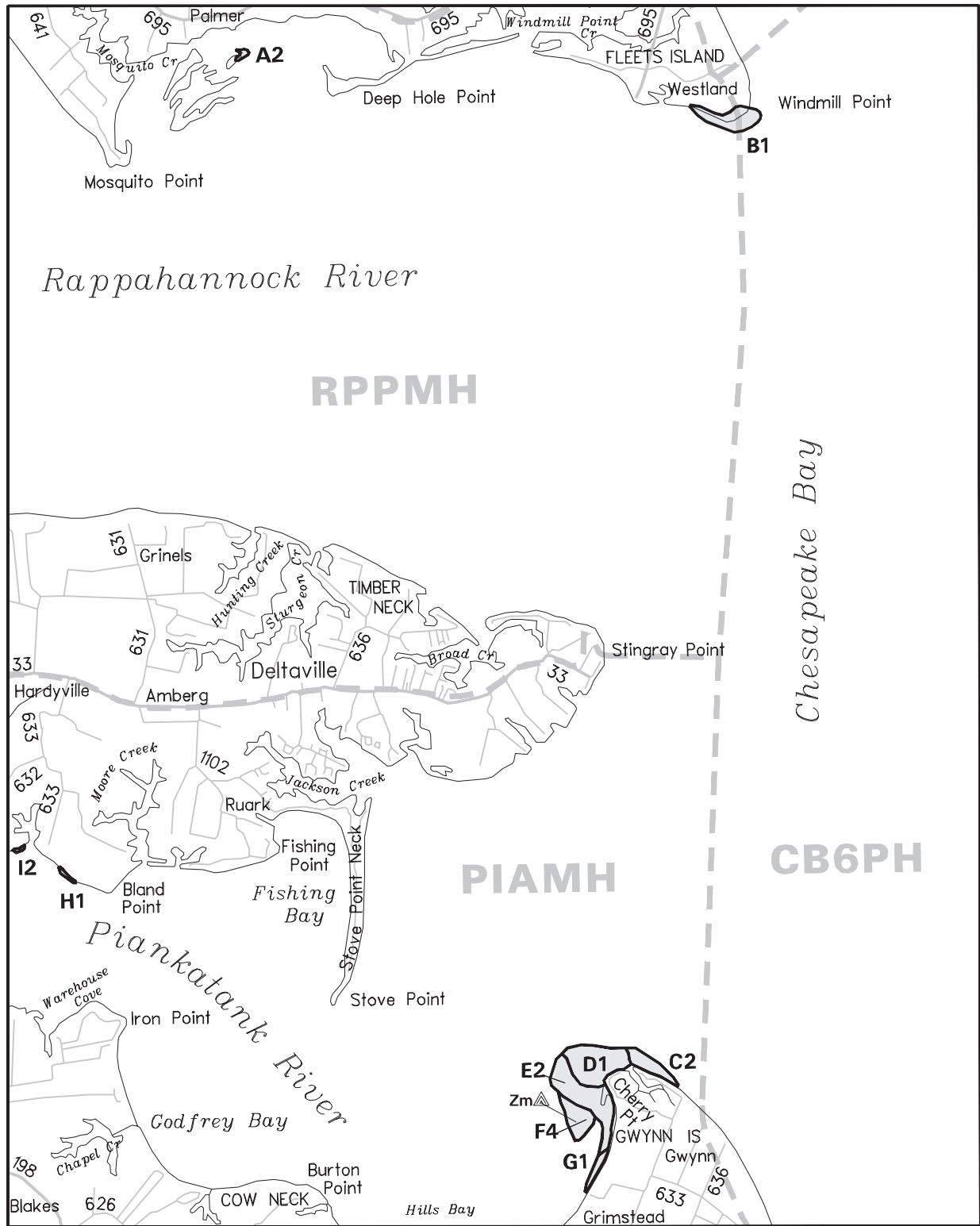
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary



U.S. Geological Survey

# Submerged Aquatic Vegetation 1997

(118) Deltaville, Va.



**Hectares of SAV: 91.66**  
Date Flown: 06/09/97, 05/23/97

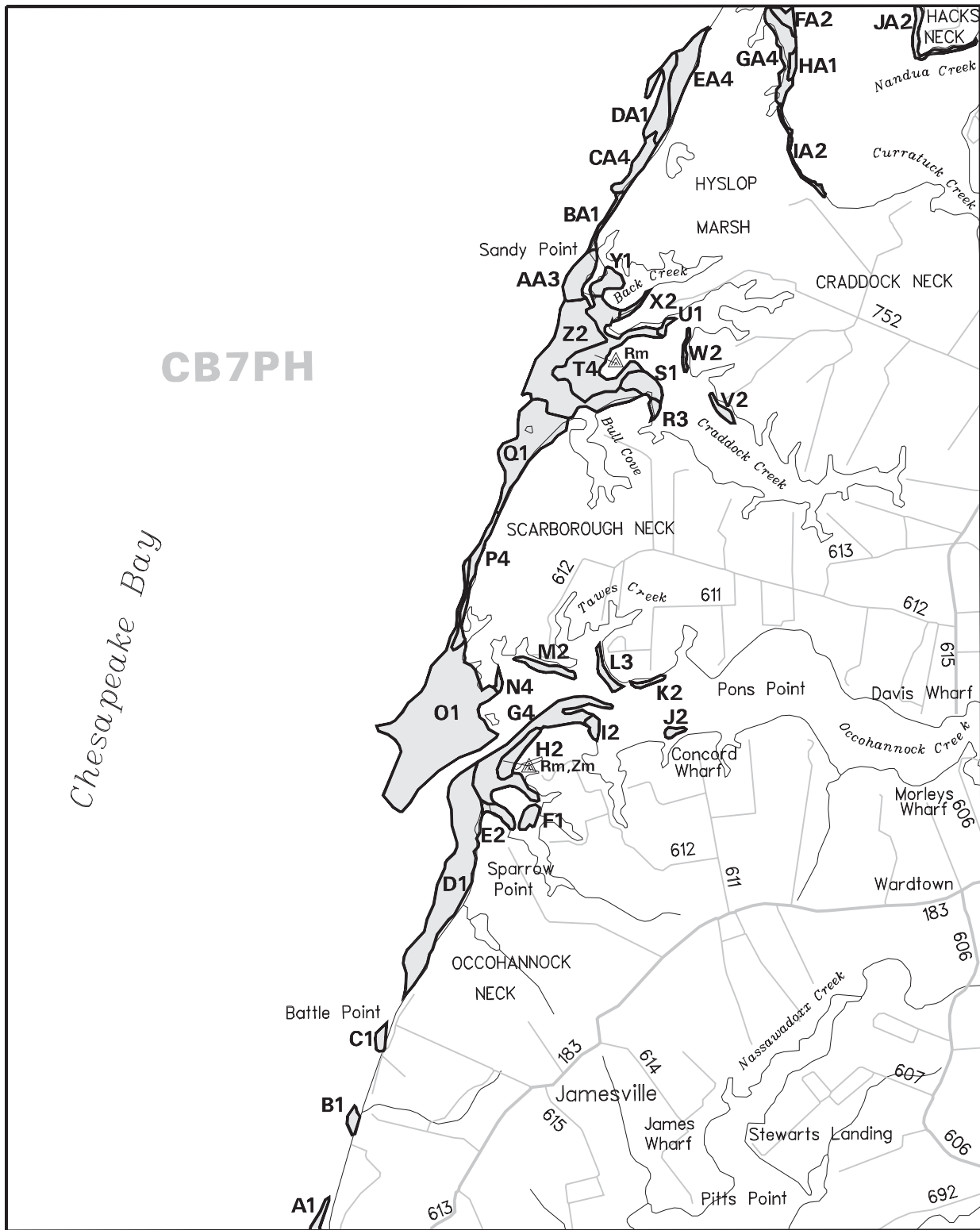
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

242 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Jamesville, Va. (119)



**Hectares of SAV: 546.09**  
 Date Flown: 05/23/97, 05/24/97

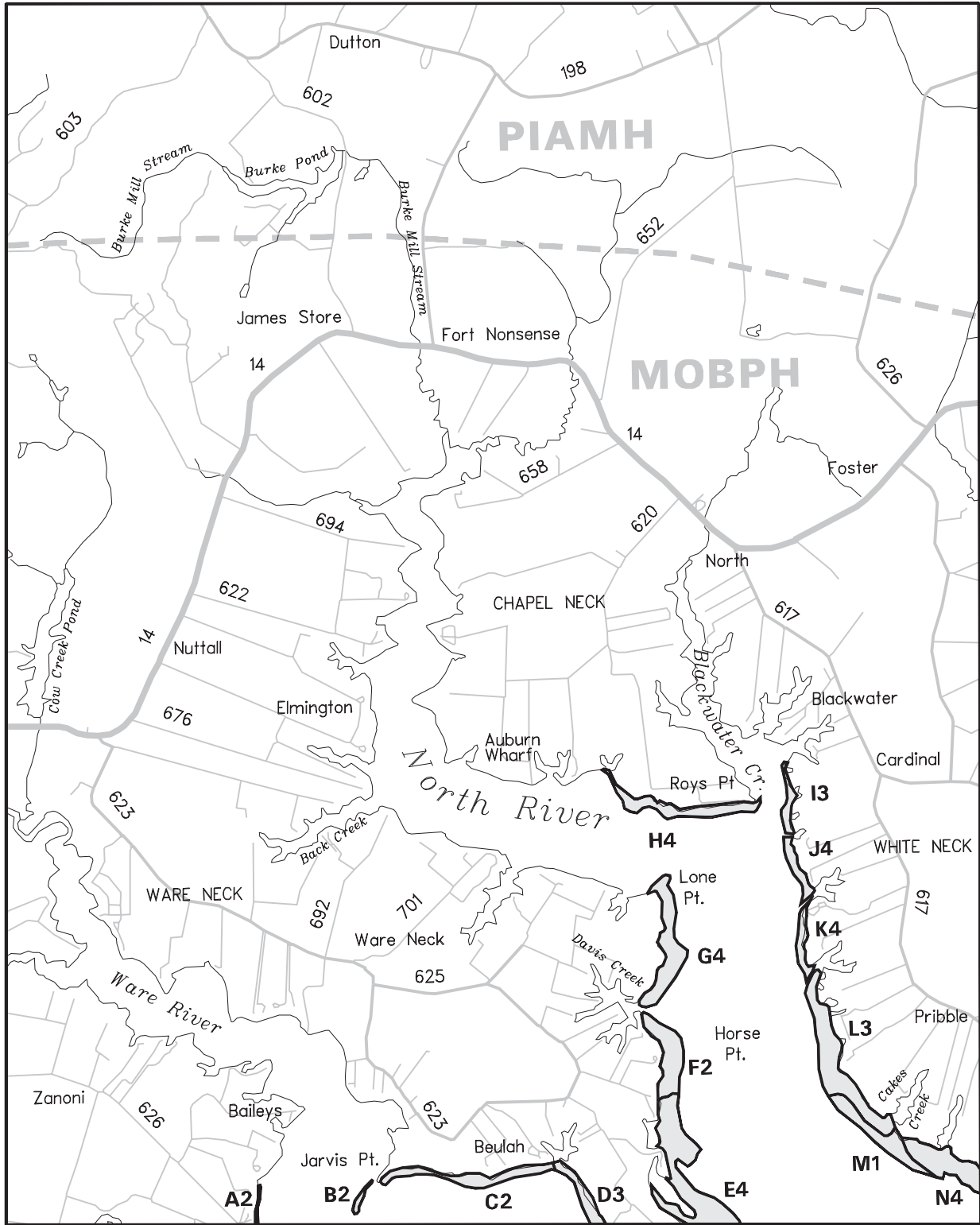
**Sources:** School of Marine Science  
 Virginia Institute of Marine Science  
 College of William and Mary  
 U.S. Geological Survey





# Submerged Aquatic Vegetation 1997

(122) Ware Neck, Va.



**Hectares of SAV: 257.84**  
Date Flown: 05/23/97

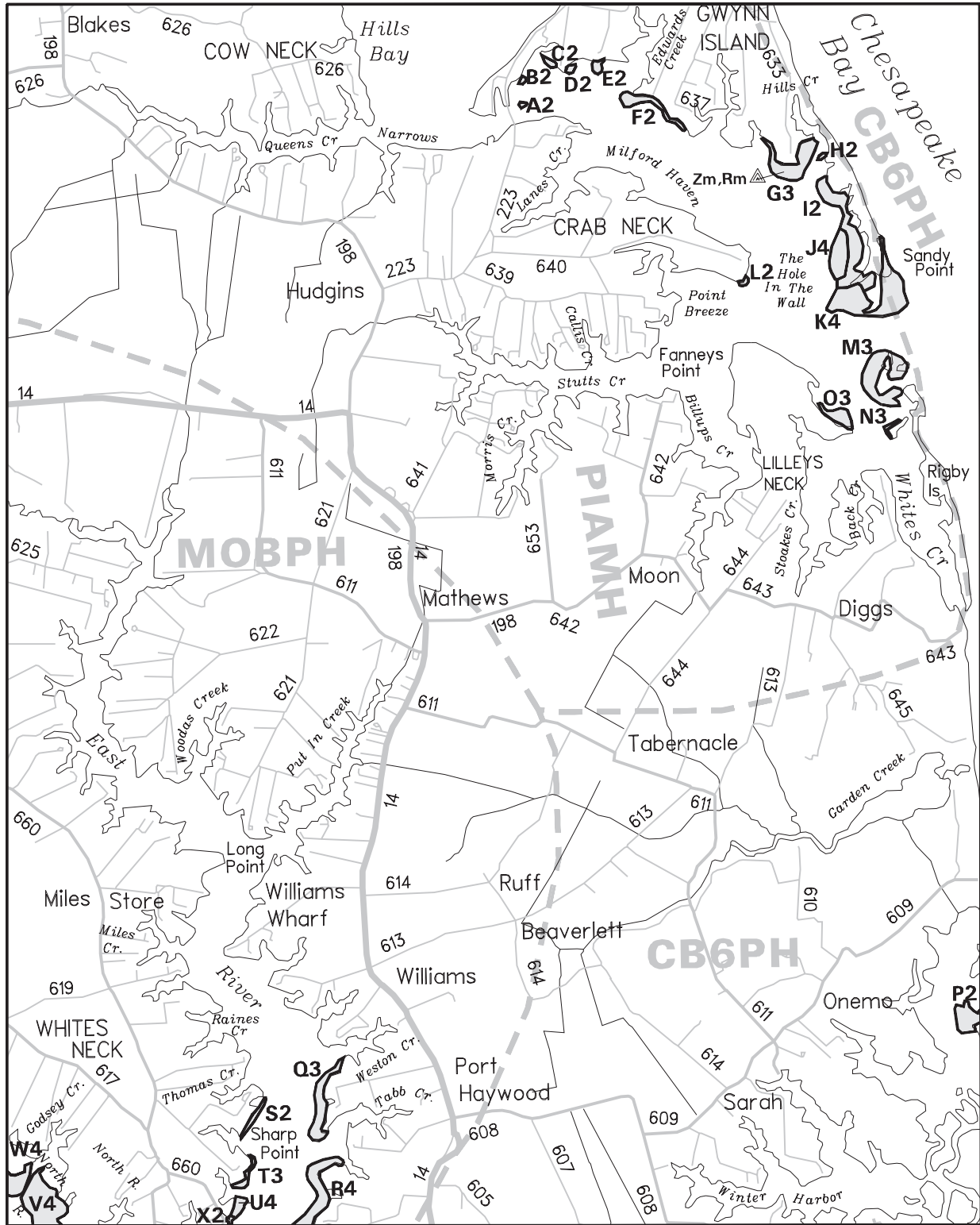
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

244 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Mathews, Va. (123)



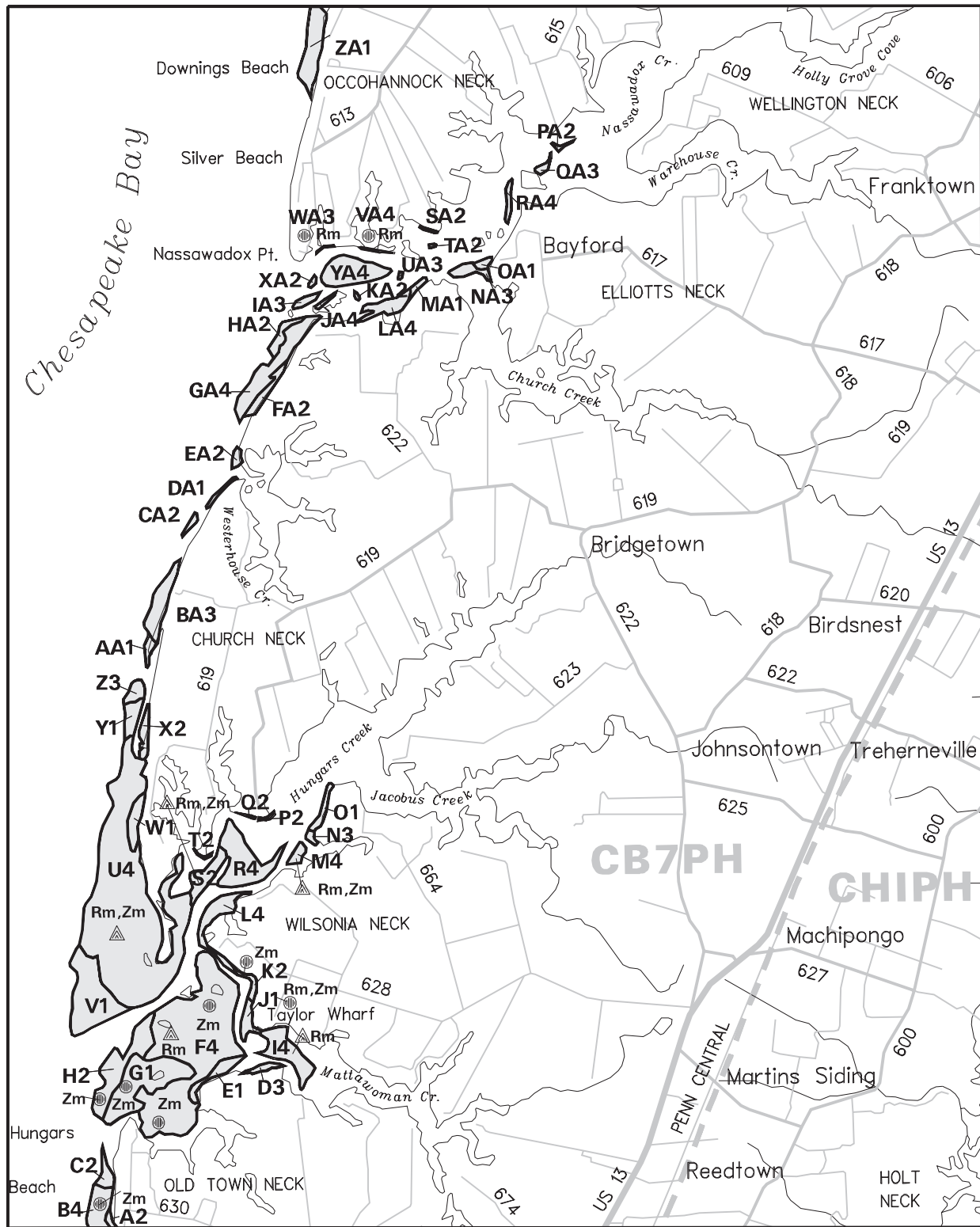
**Hectares of SAV: 173.64**  
Date Flown: 05/23/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(124) Franktown, Va.



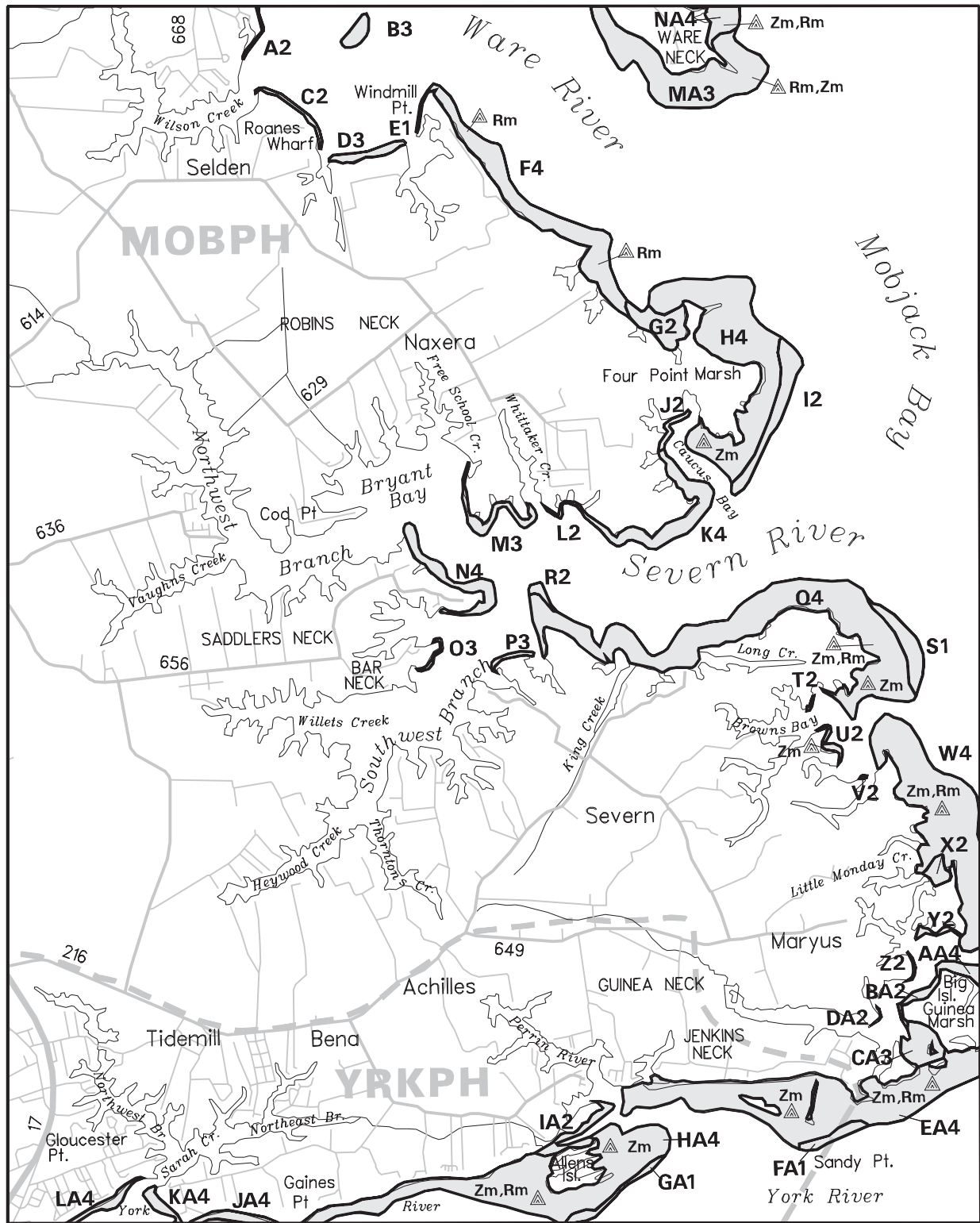
Hectares of SAV: 645.06  
Date Flown: 05/23/97

Sources: School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

246 1000 0 1000 2000 meters

# Submerged Aquatic Vegetation 1997

Achilles, Va. (131)



**Hectares of SAV: 1,197.73**  
Date Flown: 05/23/97

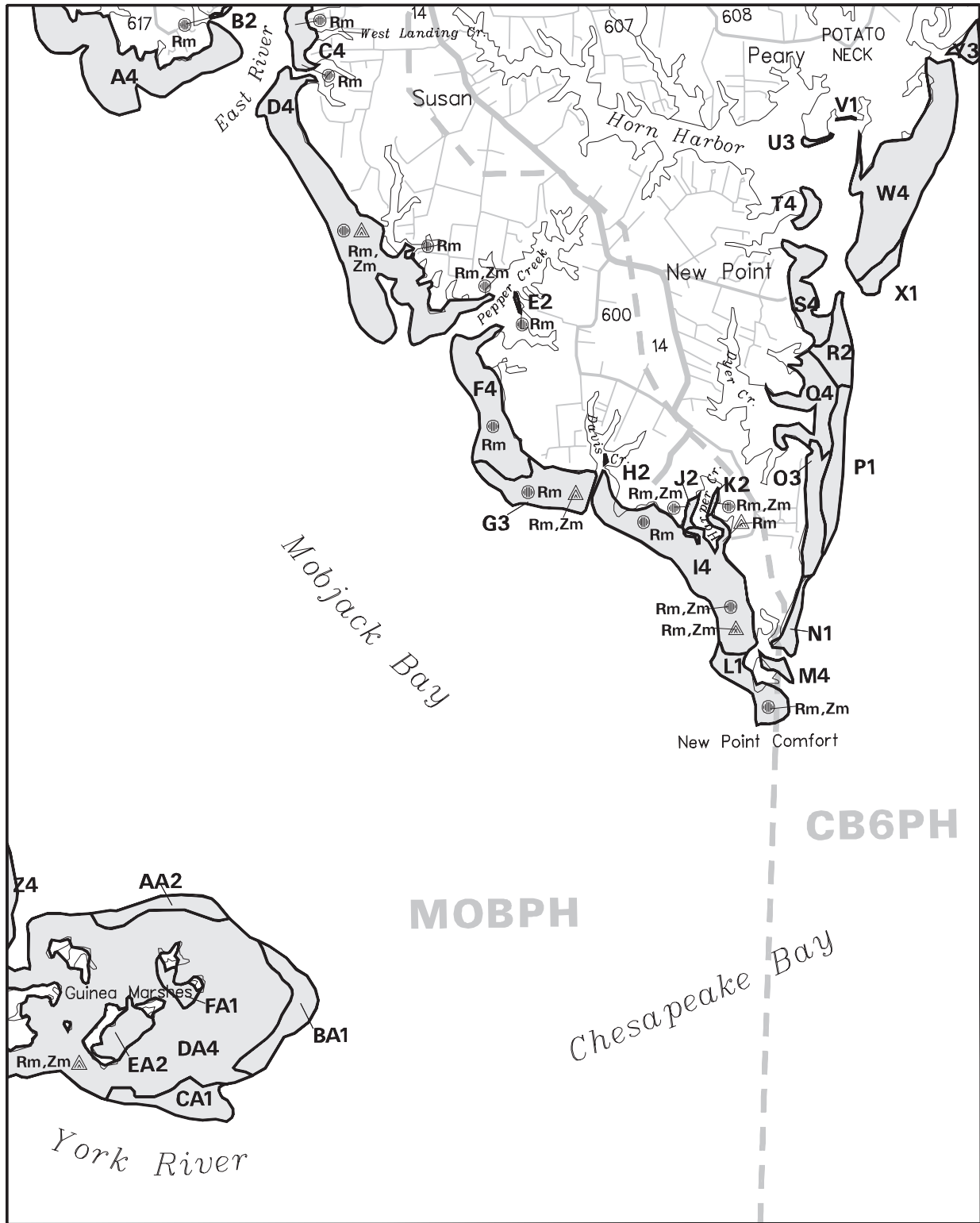
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary



U.S. Geological Survey

# Submerged Aquatic Vegetation 1997

(132) New Point Comfort, Va.



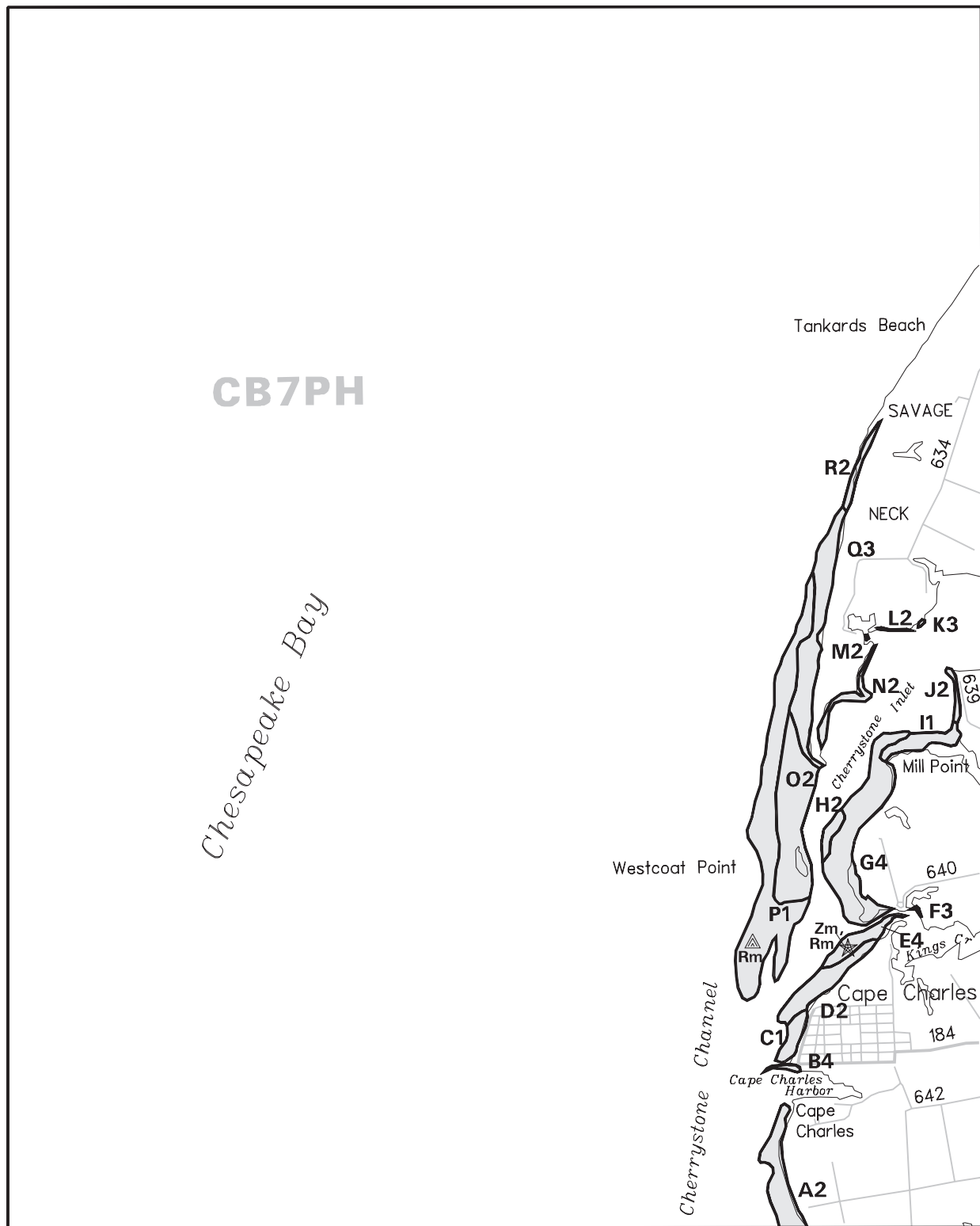
**Hectares of SAV: 1,513.93**  
Date Flown: 05/23/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

248 1000 0 1000 2000 meters

# Submerged Aquatic Vegetation 1997

Cape Charles, Va. (133)



**Hectares of SAV: 428.29**  
Date Flown: 05/23/97

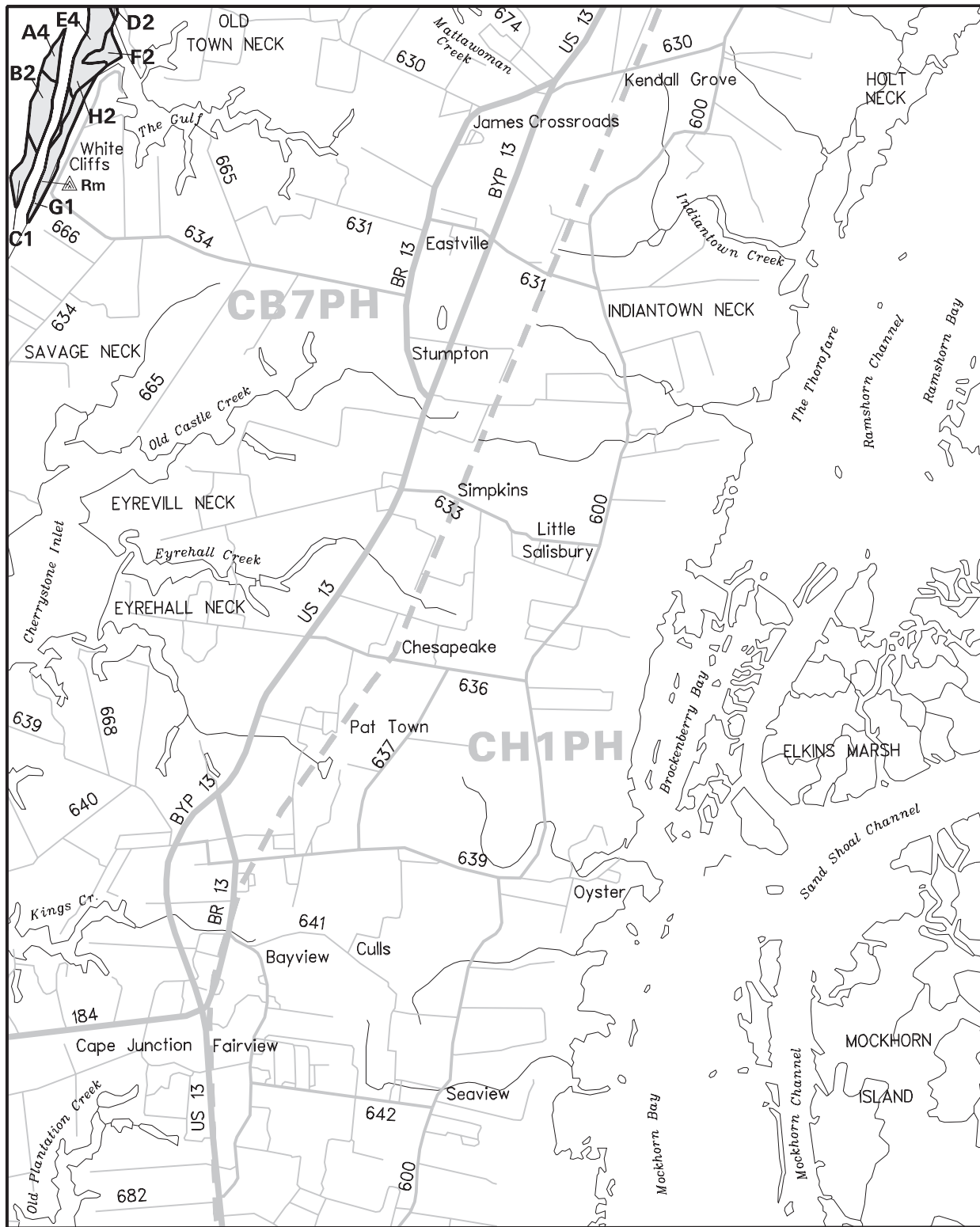
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary

1000 0 1000 2000 meters

U.S. Geological Survey

# Submerged Aquatic Vegetation 1997

(134) Cheriton, Va.



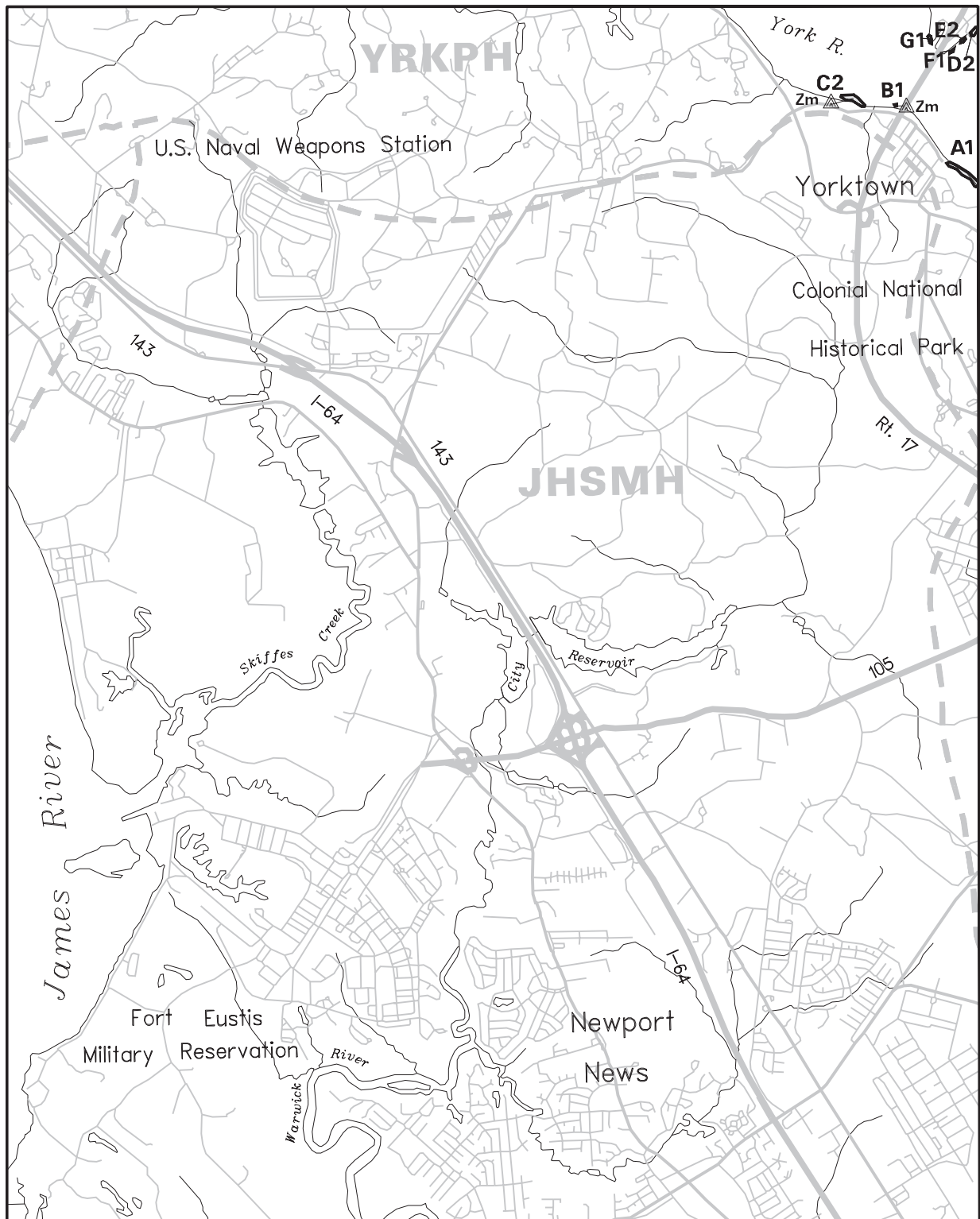
**Hectares of SAV: 88.31**  
Date Flown: 05/23/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

Yorktown, Va. (139)



**Hectares of SAV: 5.00**  
Date Flown: 05/23/97

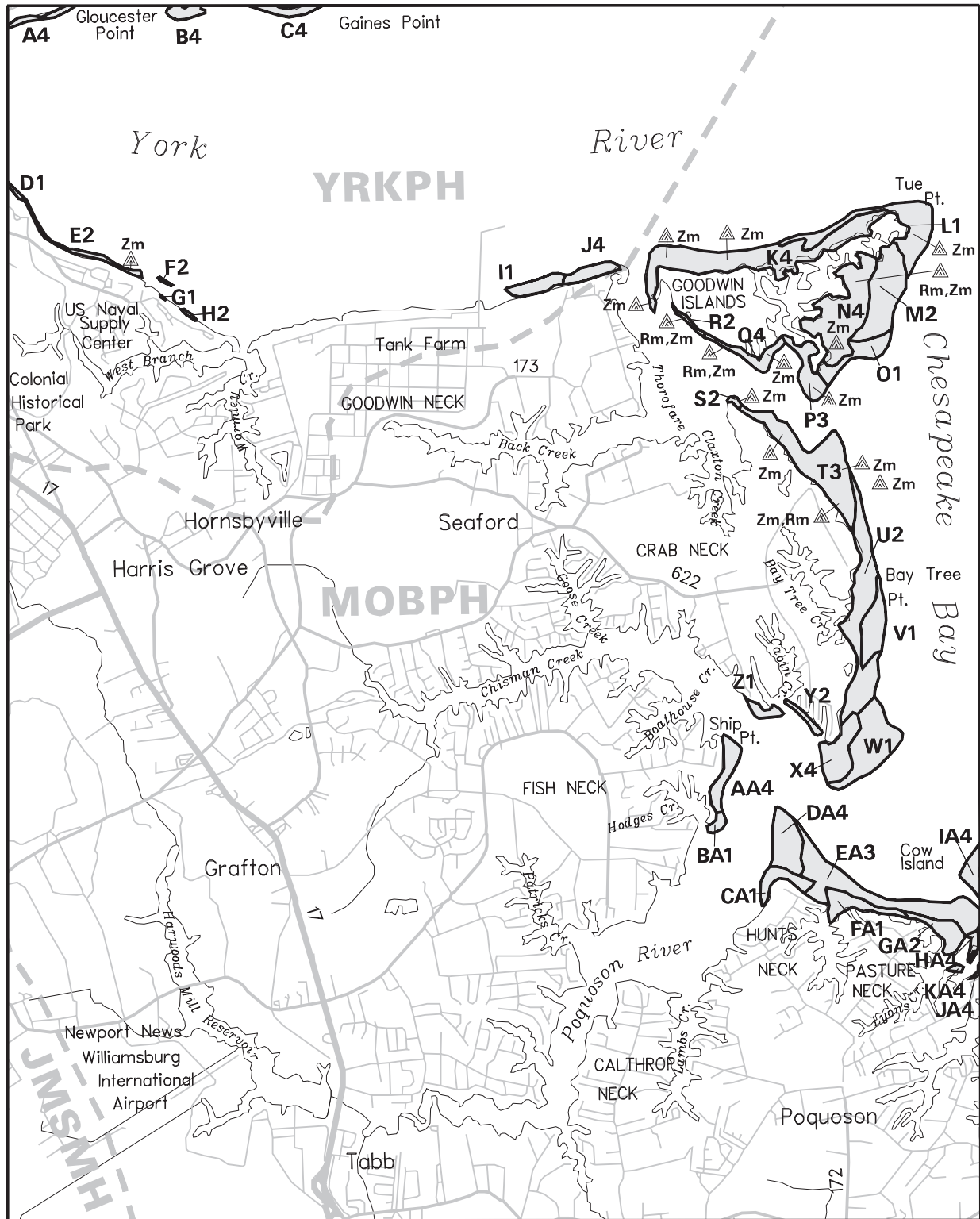
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey





# Submerged Aquatic Vegetation 1997

(140) Poquoson West, Va.



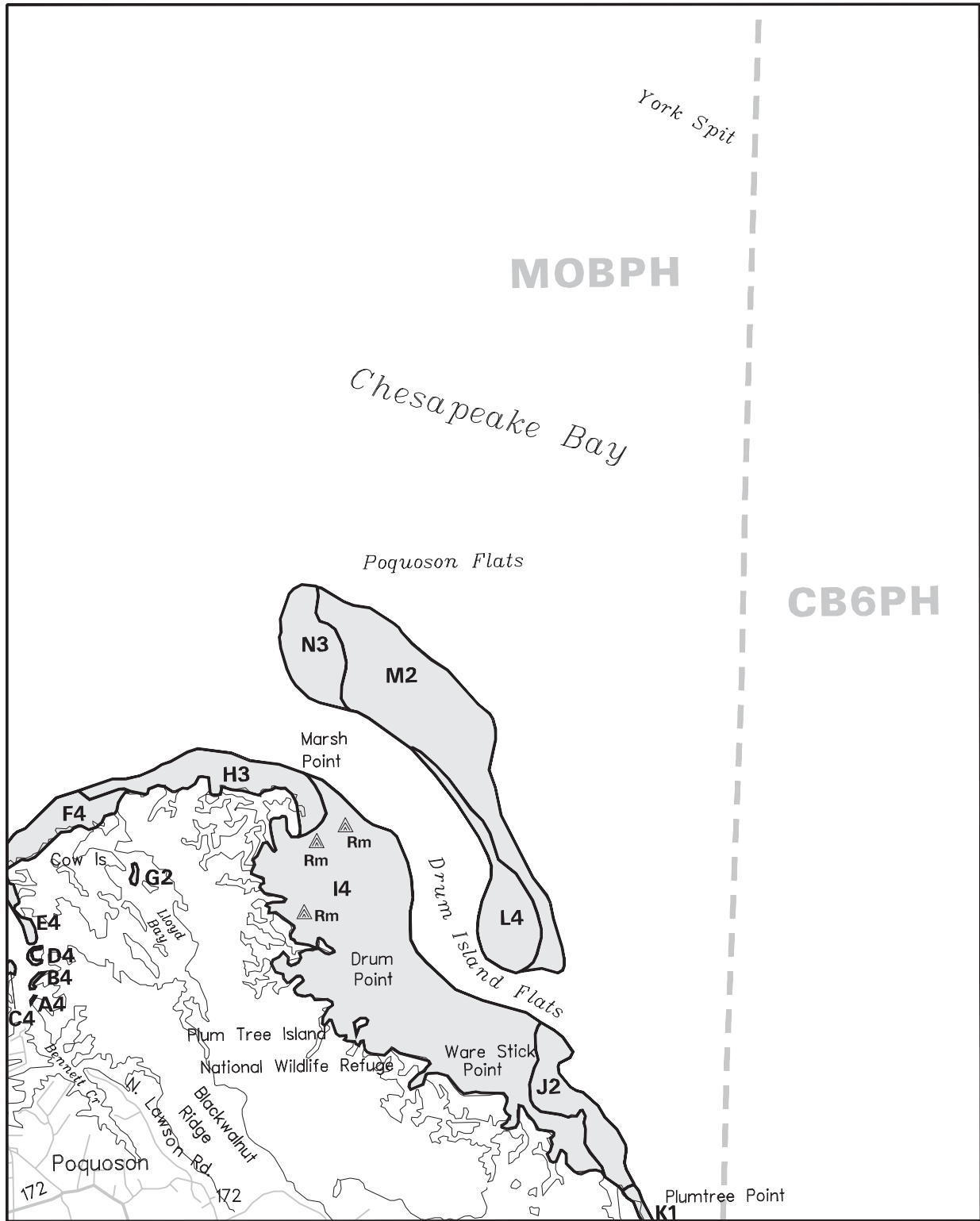
**Hectares of SAV: 584.69**  
Date Flown: 05/23/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

Poquoson East, Va. (141)



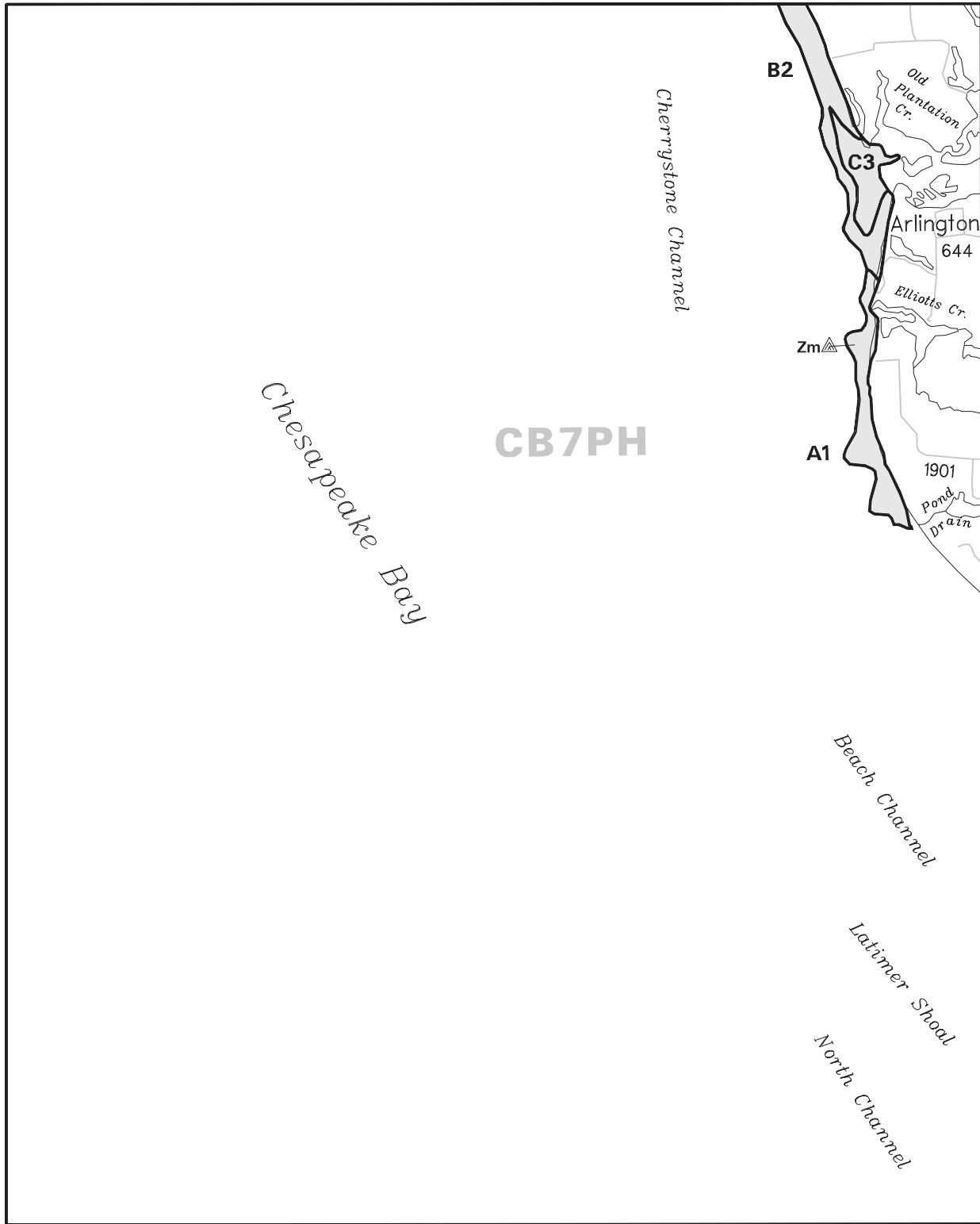
**Hectares of SAV: 1,185.90**  
Date Flown: 05/23/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(142) Elliotts Creek, Va.



**Hectares of SAV: 183.33**  
Date Flown: 05/23/97

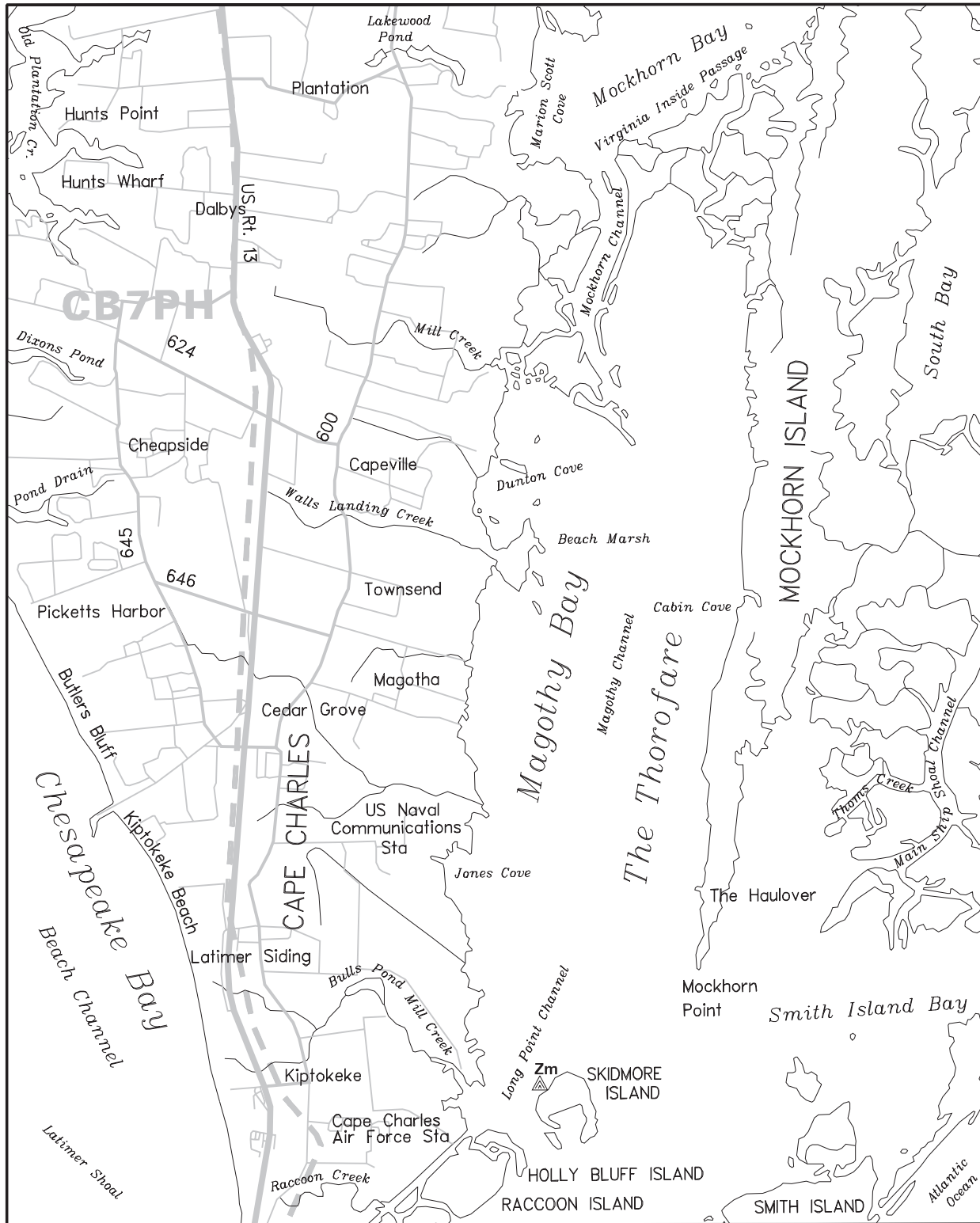
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

254 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Townsend, Va. (143)



**Hectares of SAV: 0.00**  
Date Flown: 05/23/97

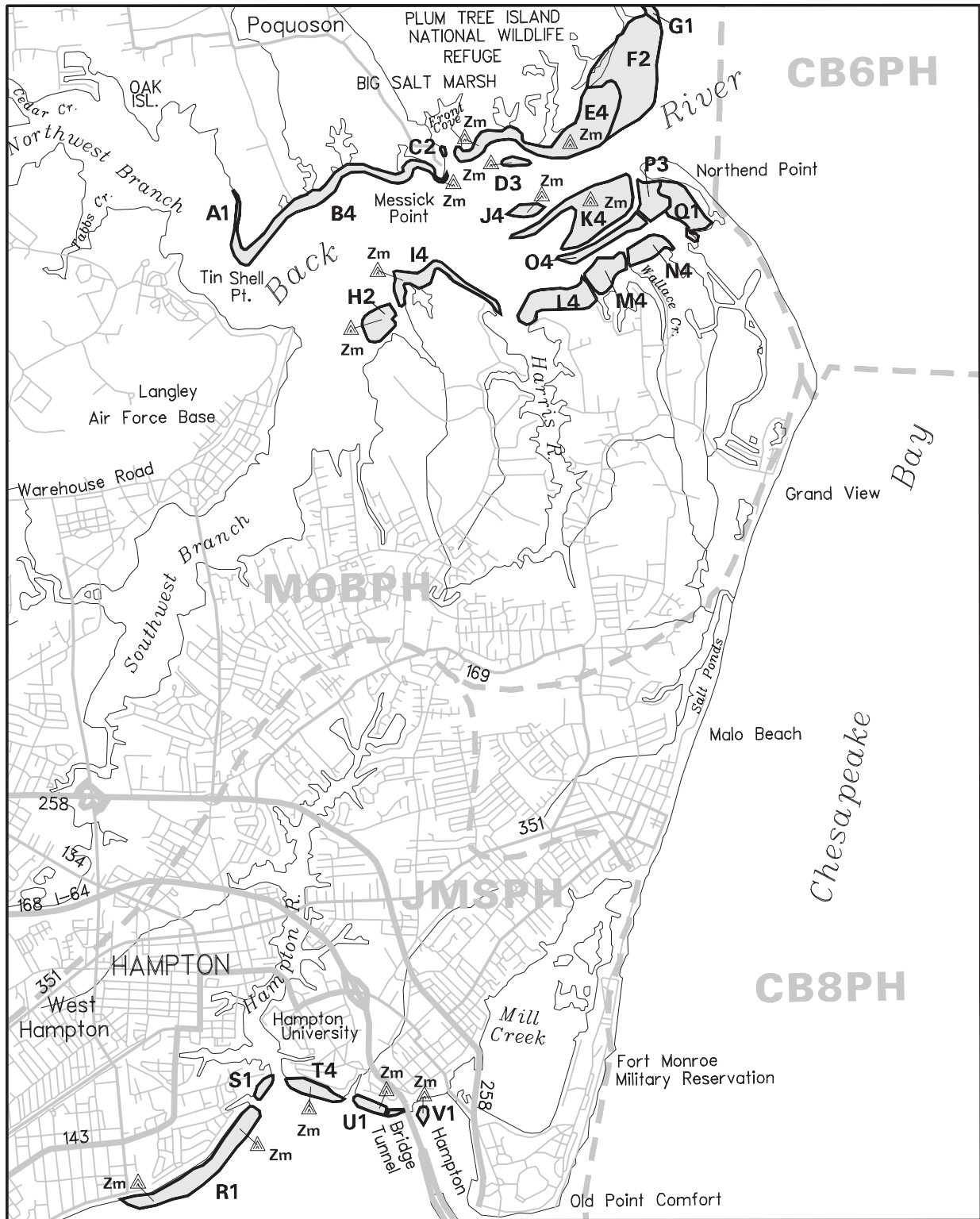
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary



U.S. Geological Survey

# Submerged Aquatic Vegetation 1997

(147) Hampton, Va.



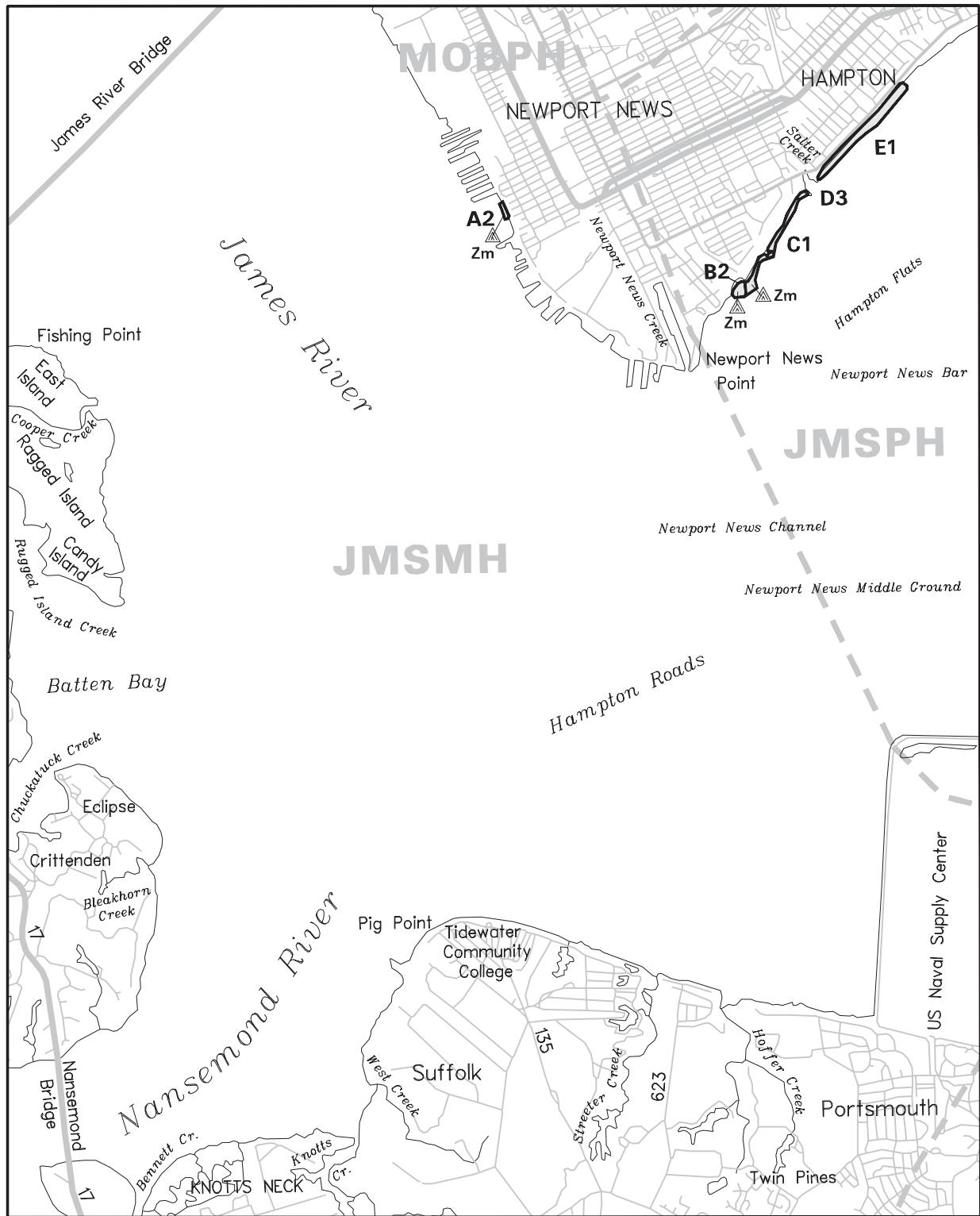
**Hectares of SAV: 369.03**  
Date Flown: 05/23/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

Newport News South, Va. (149)



**Hectares of SAV: 24.52**

Date Flown: 05/23/97

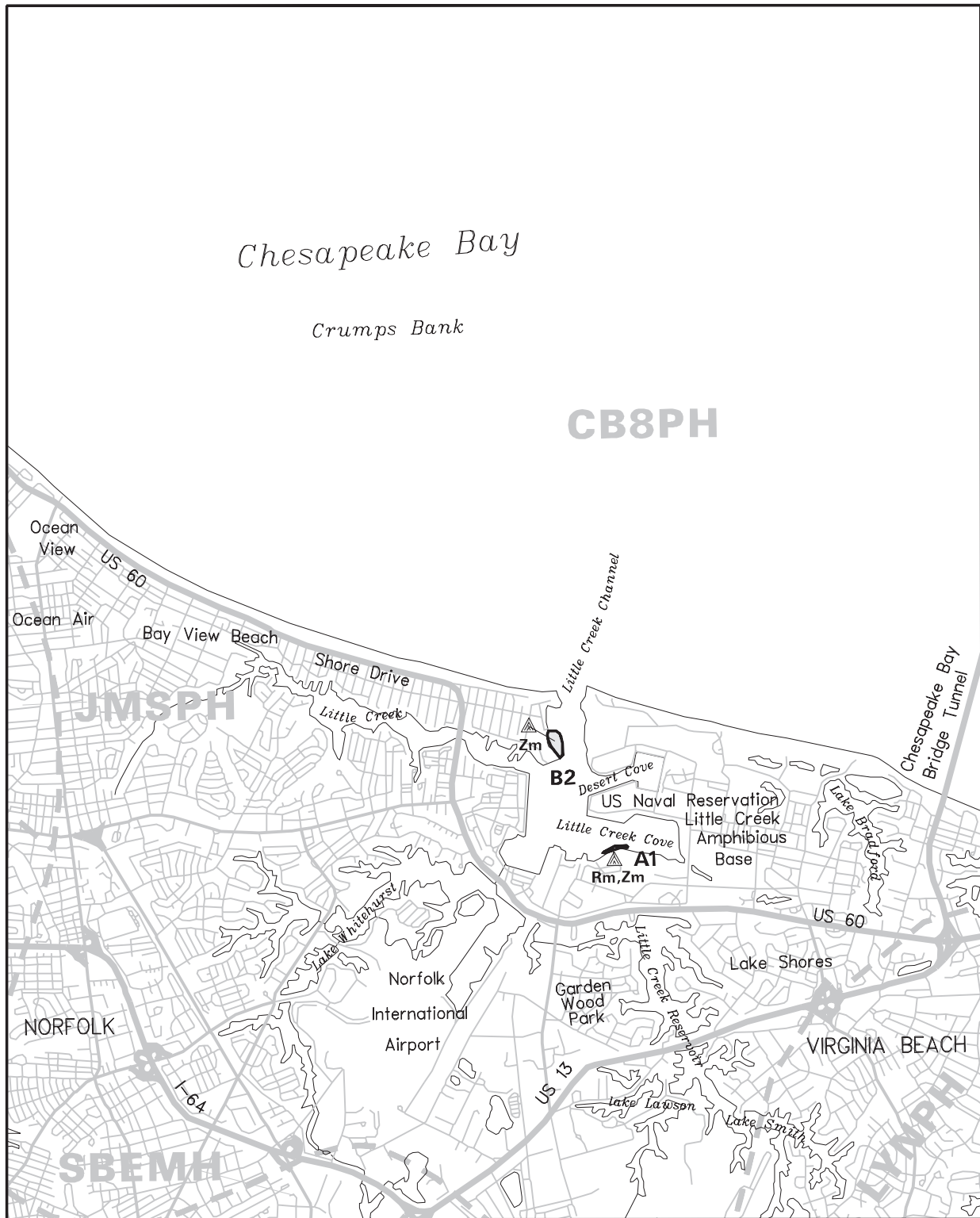


**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary

U.S. Geological Survey

# Submerged Aquatic Vegetation 1997

(151) Little Creek, Va.



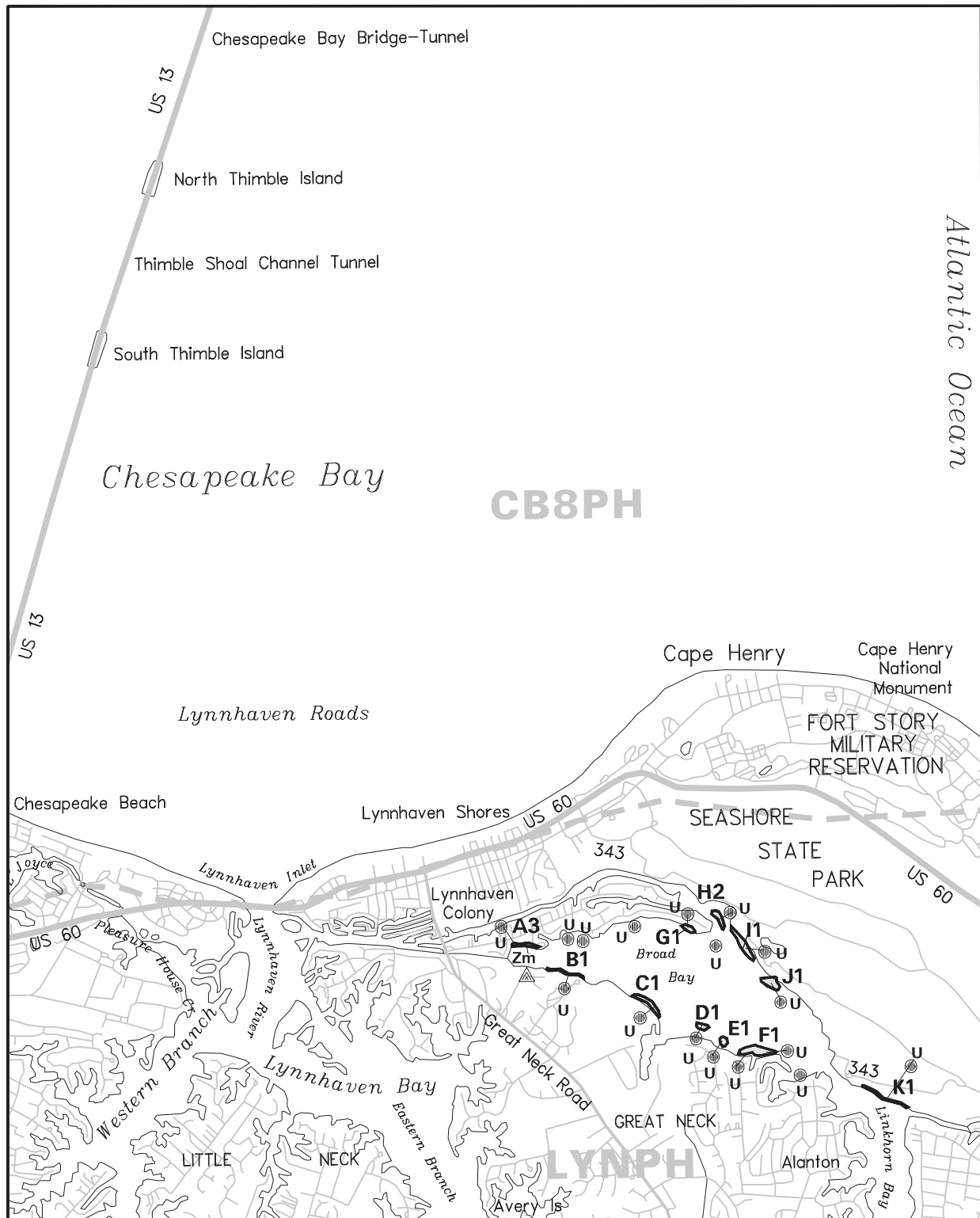
Hectares of SAV: 4.37  
Date Flown: 05/23/97

Sources: School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

258 1000 0 1000 2000 meters

# Submerged Aquatic Vegetation 1997

Cape Henry, Va. (152)



**Hectares of SAV: 16.14**  
Date Flown: 05/23/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary

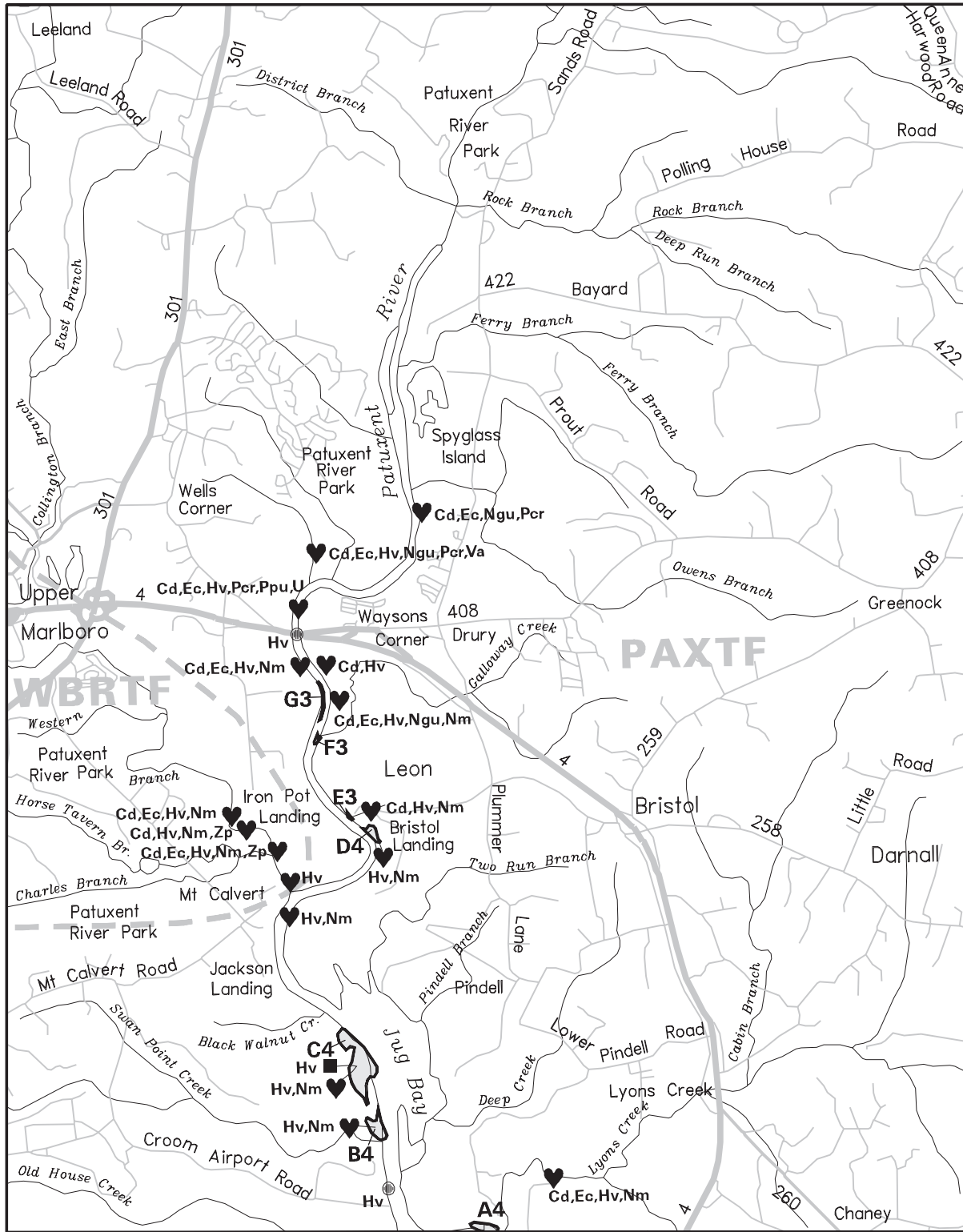


U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(159) Bristol, Md.



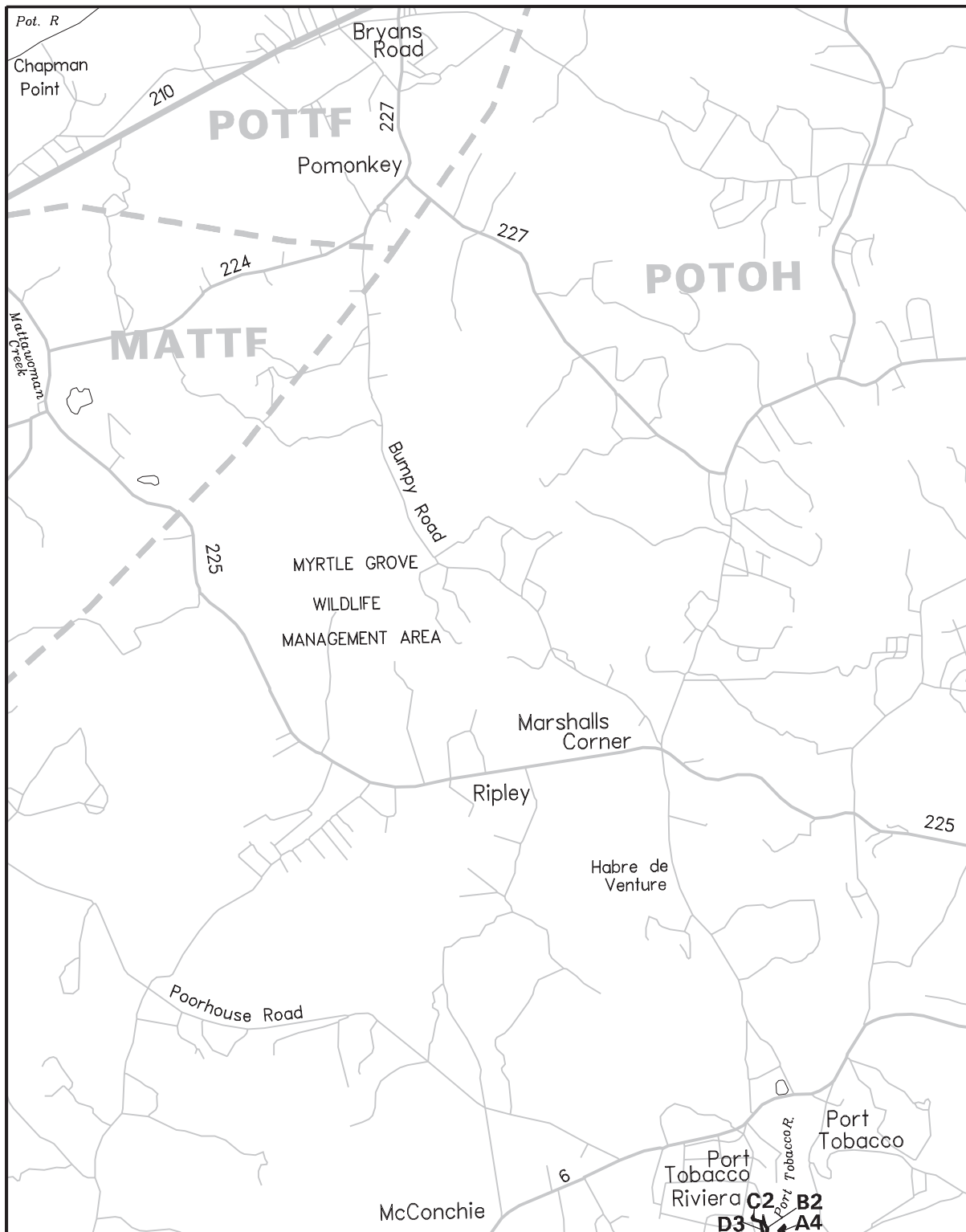
**Hectares of SAV: 23.95**  
Date Flown: 08/01/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

Port Tobacco, Md. (161)



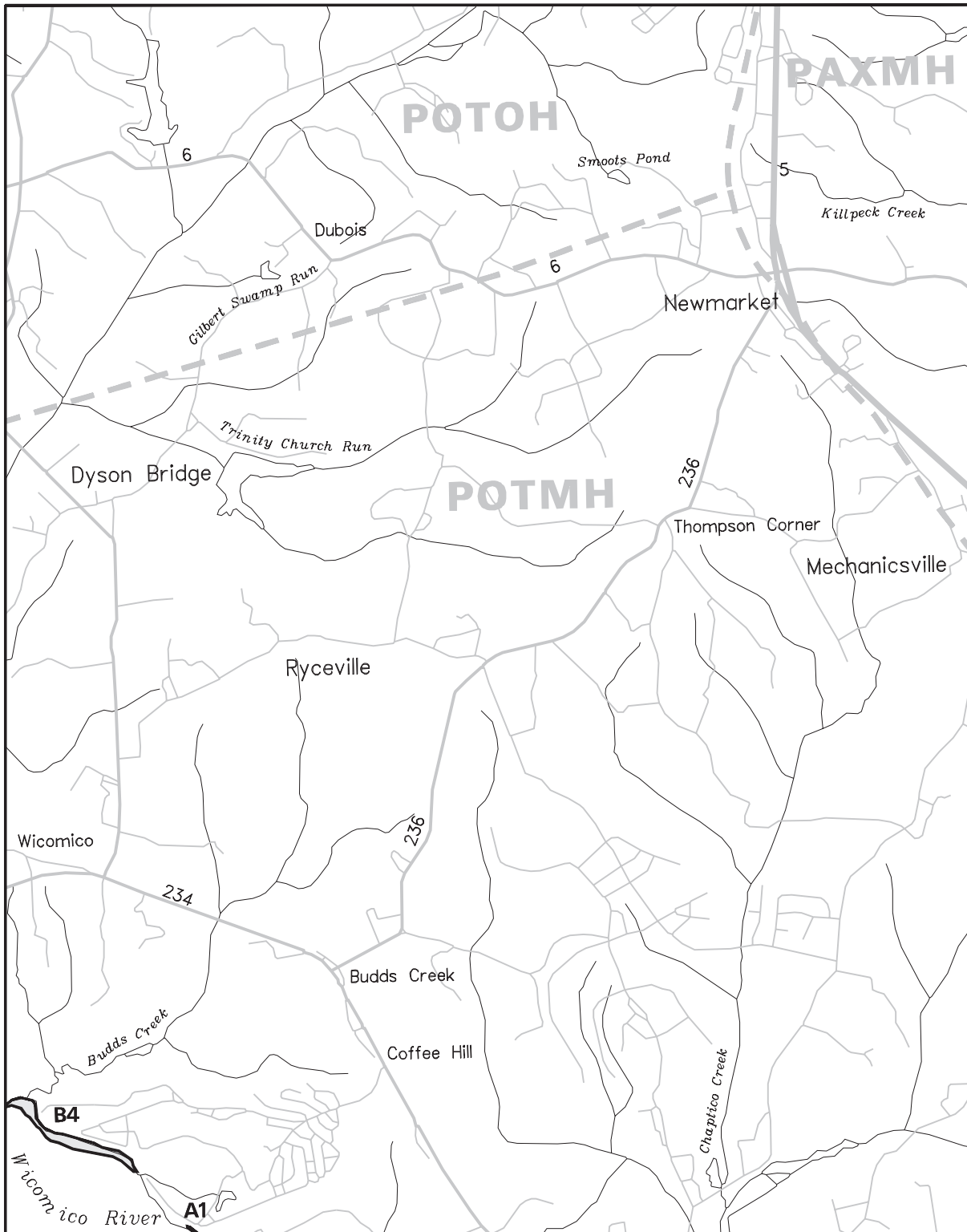
**Hectares of SAV: 0.74**  
Date Flown: 08/24/97, 07/31/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(162) Charlotte Hall, Md.



**Hectares of SAV: 16.09**  
Date Flown: 07/31/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

262 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Assawoman Bay, Md.–Del. (166)



**Hectares of SAV: 243.31**  
Date Flown: 05/24/97

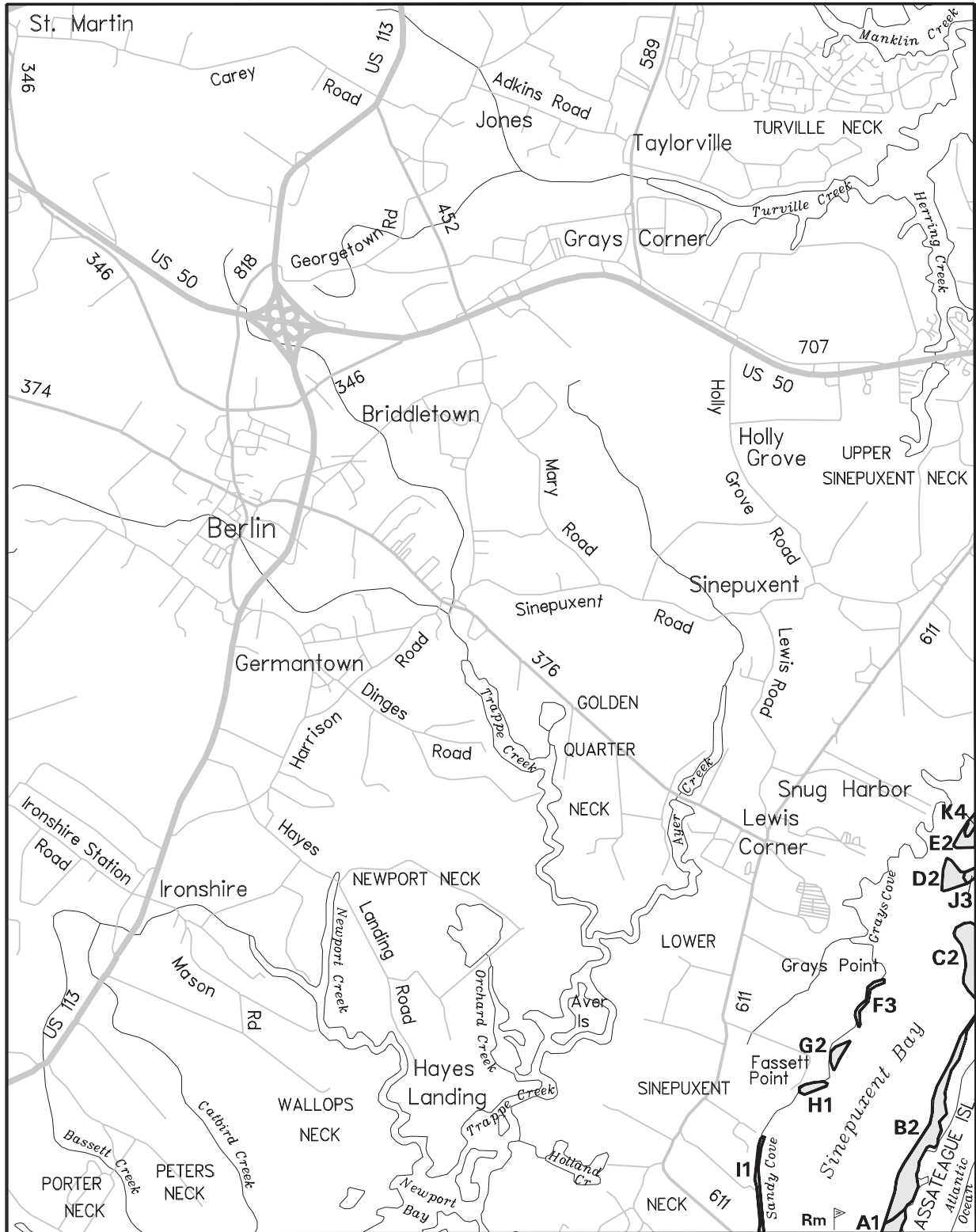
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary



U.S. Geological Survey

# Submerged Aquatic Vegetation 1997

(167) Berlin, Md.



**Hectares of SAV: 73.82**  
Date Flown: 05/24/97

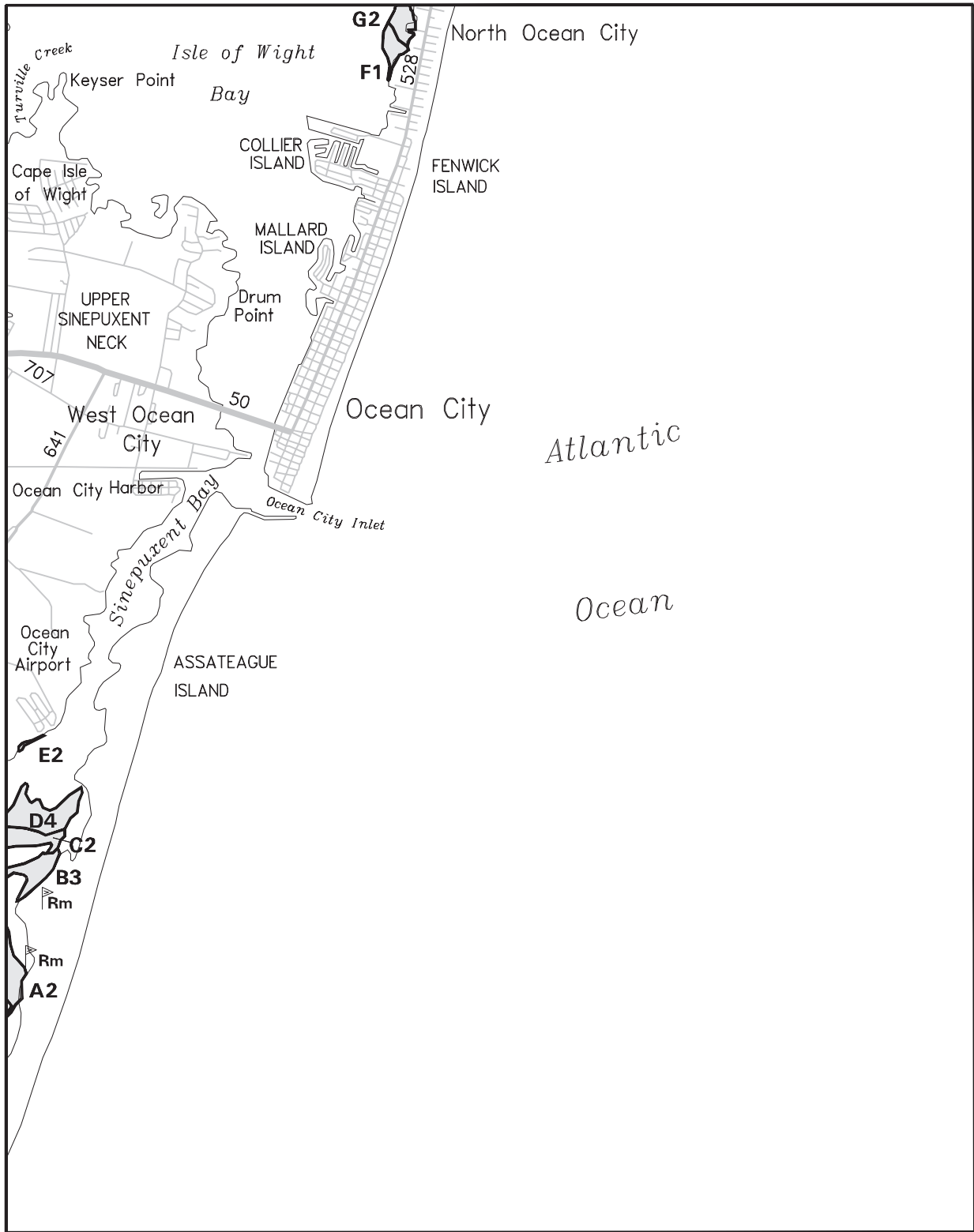
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

264 1000 0 1000 2000 meters



# Submerged Aquatic Vegetation 1997

Ocean City, Md. (168)



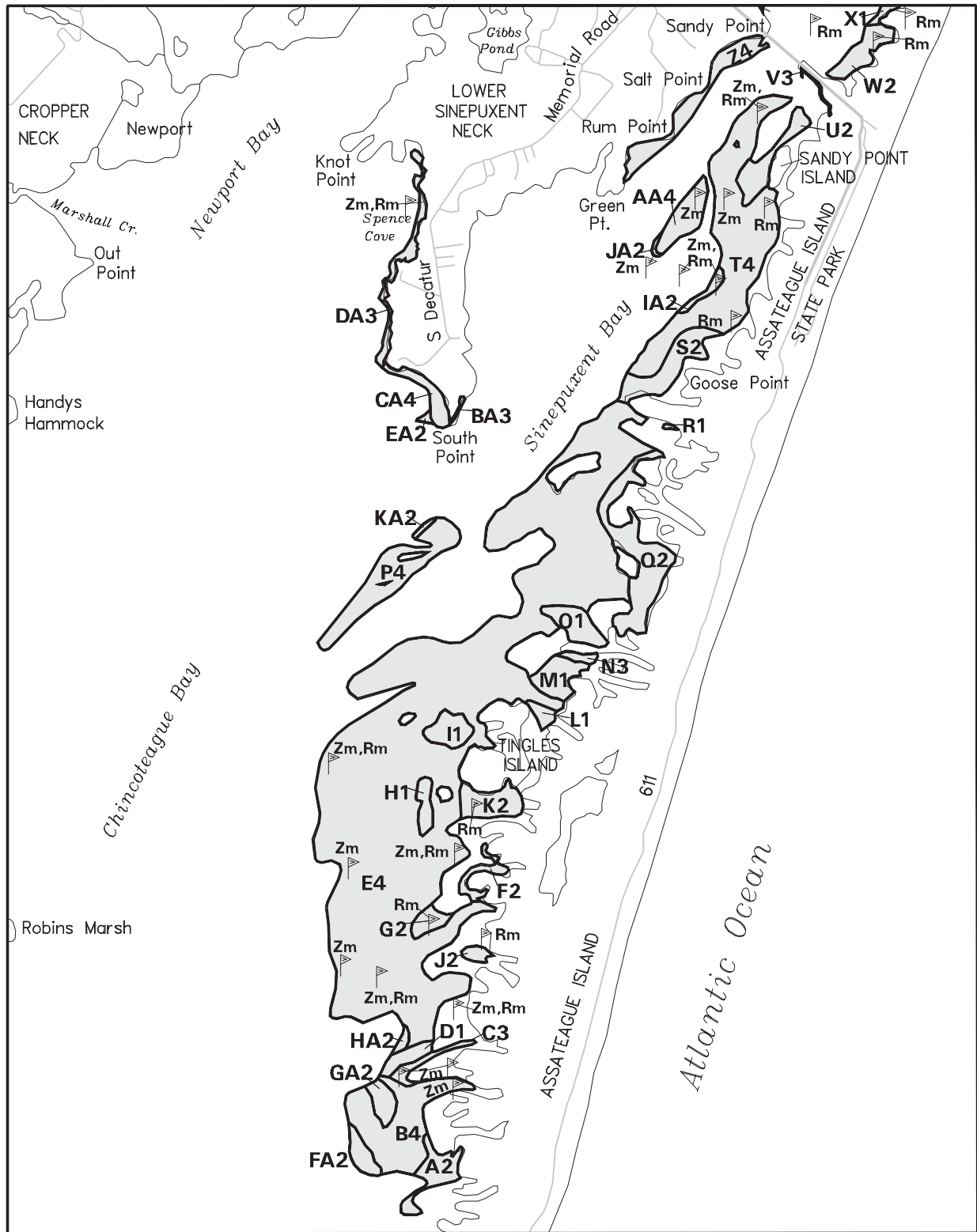
**Hectares of SAV: 79.85**  
Date Flown: 05/24/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(170) Tingles Island, Md.



Hectares of SAV: 1,522.43  
Date Flown: 05/24/97

Sources: School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

266 1000 0 1000 2000 meters

# Submerged Aquatic Vegetation 1997

Girdle Tree, Md.–Va. (171)



**Hectares of SAV: 15.34**  
Date Flown: 06/09/97

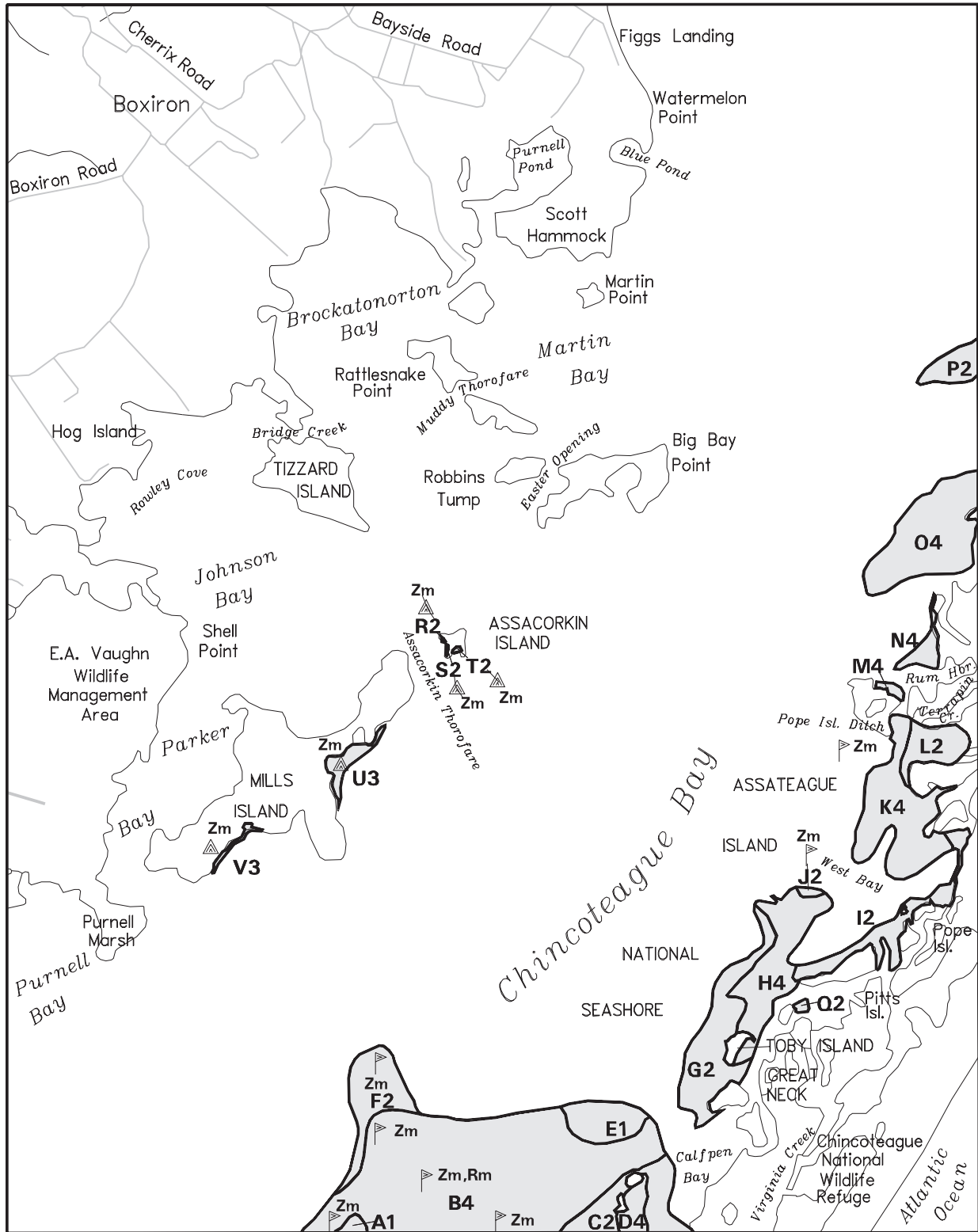
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey





# Submerged Aquatic Vegetation 1997

(172) Boxiron, Md.–Va.



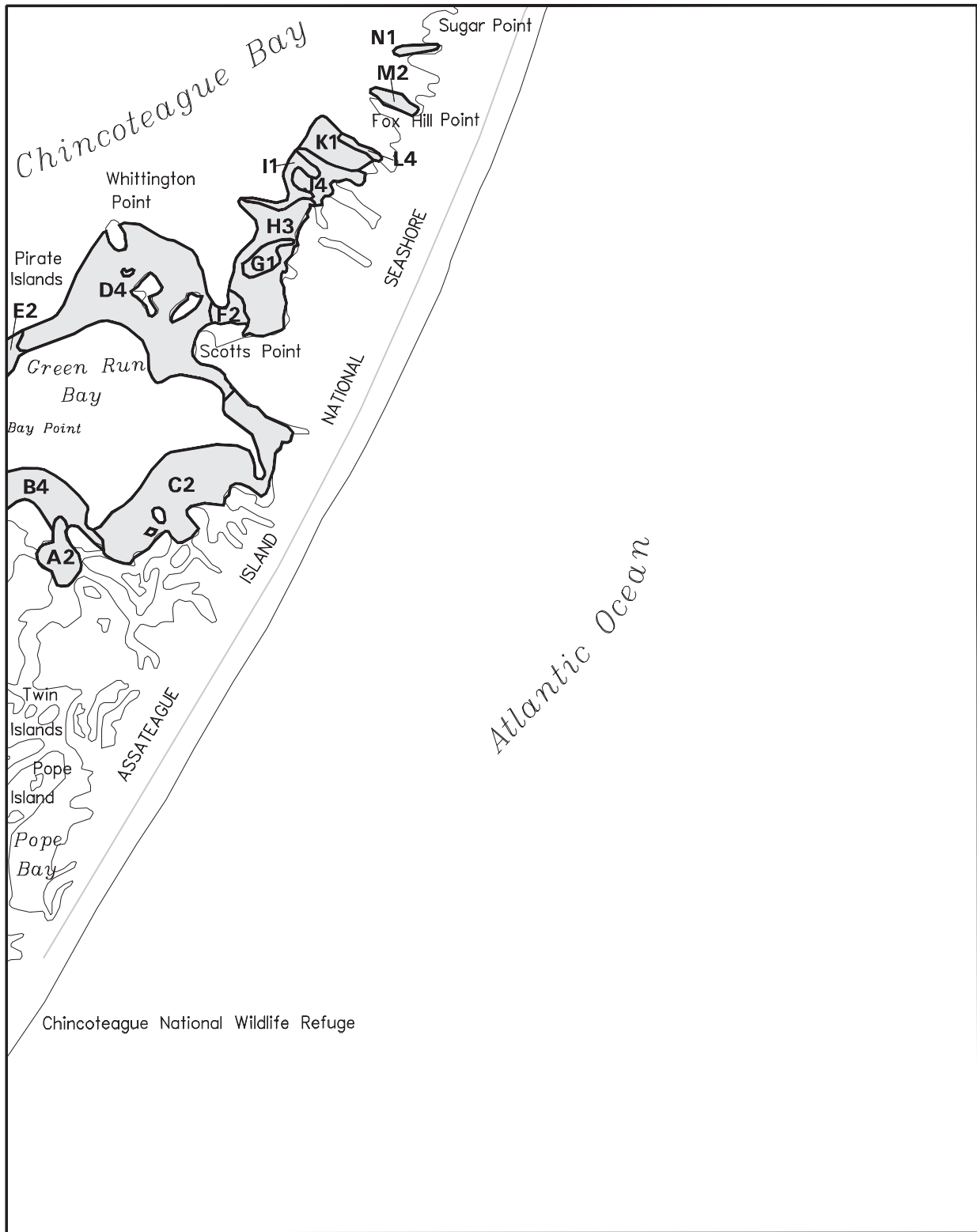
**Hectares of SAV: 1,034.63**  
Date Flown: 05/24/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

268 1000 0 1000 2000 meters

# Submerged Aquatic Vegetation 1997

Whittington Point, Md.–Va. (173)



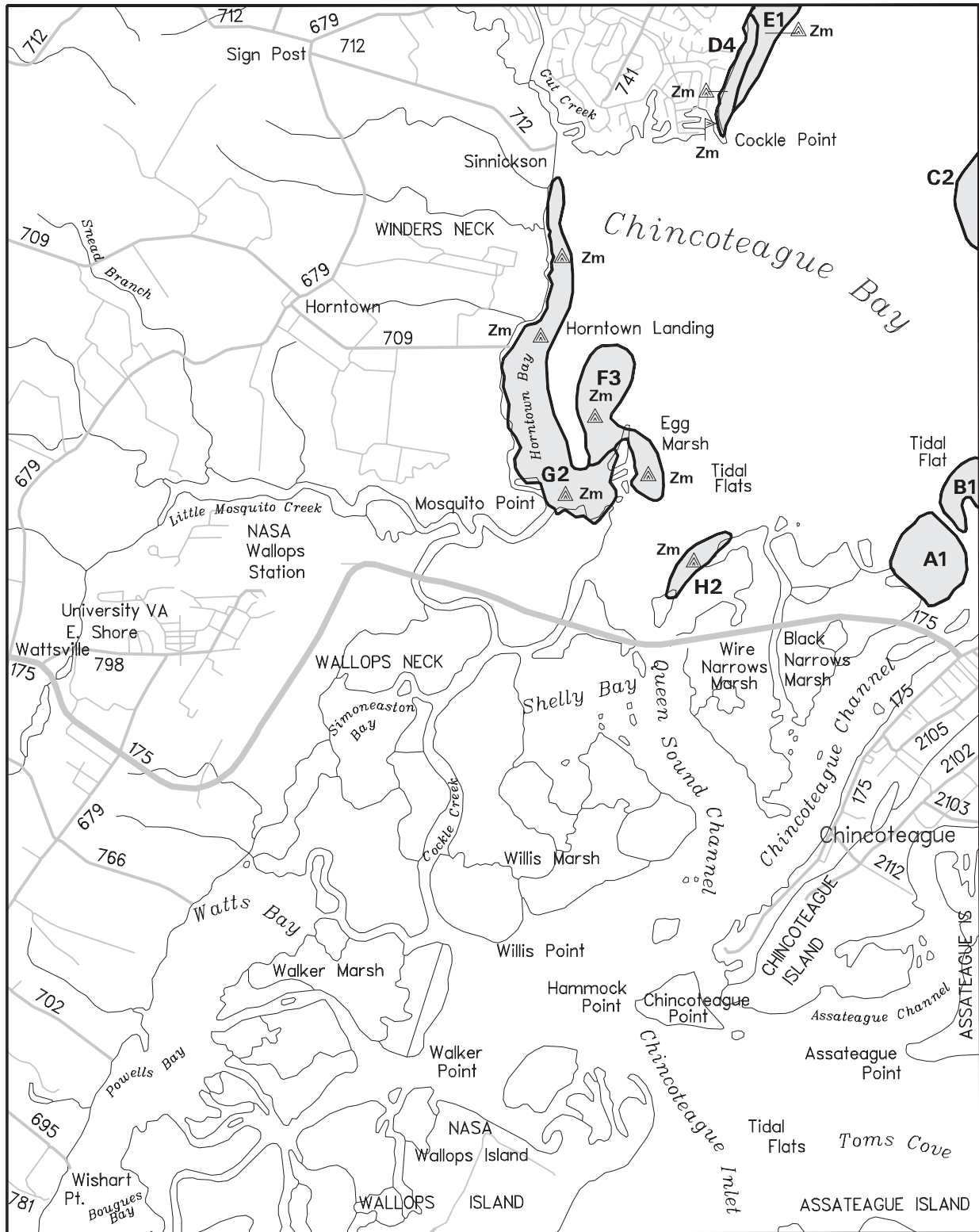
**Hectares of SAV: 567.77**  
Date Flown: 05/24/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(174) Chincoteague West, Va.



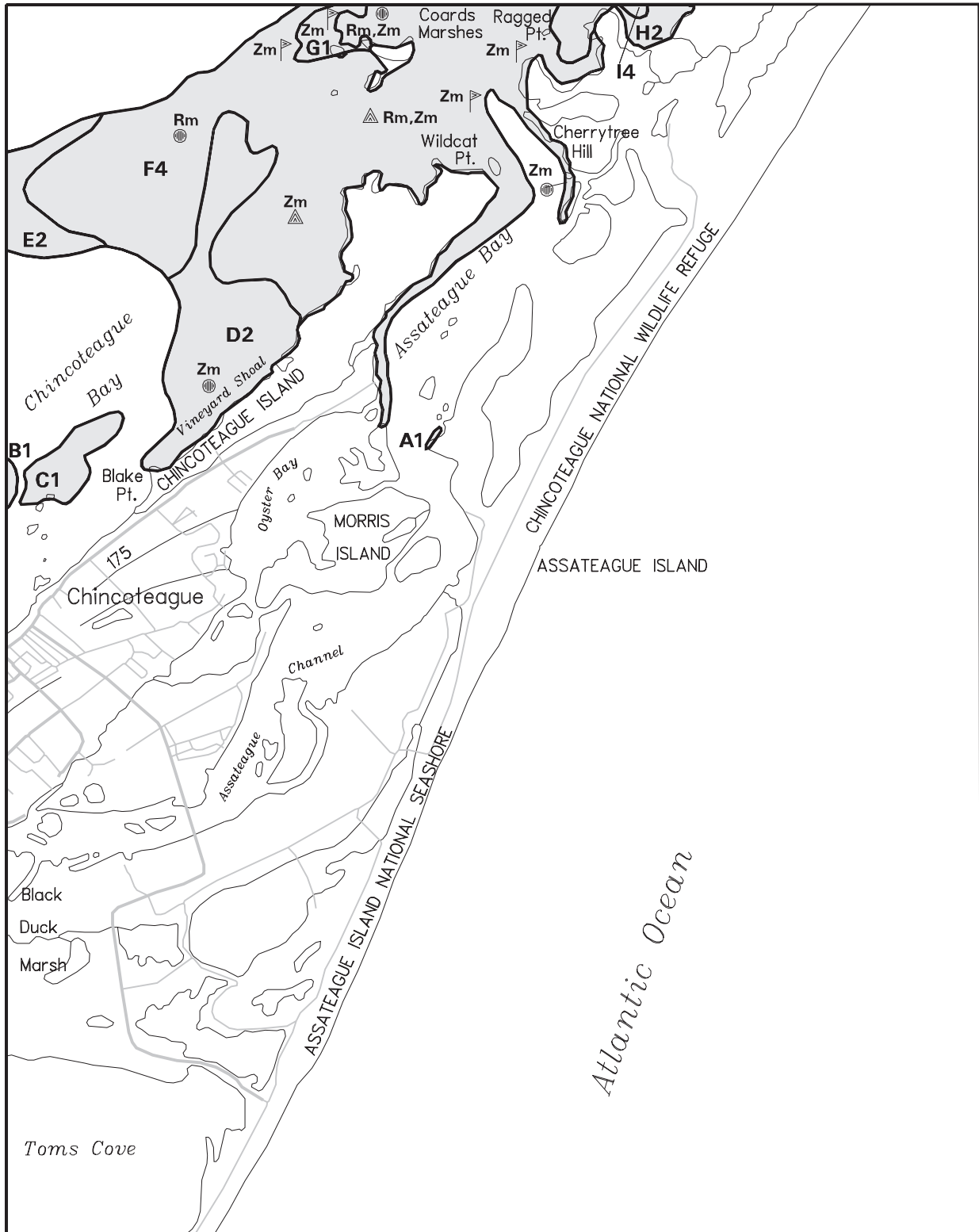
**Hectares of SAV: 411.88**  
Date Flown: 05/24/97, 06/09/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

Chincoteague East, Va. (175)



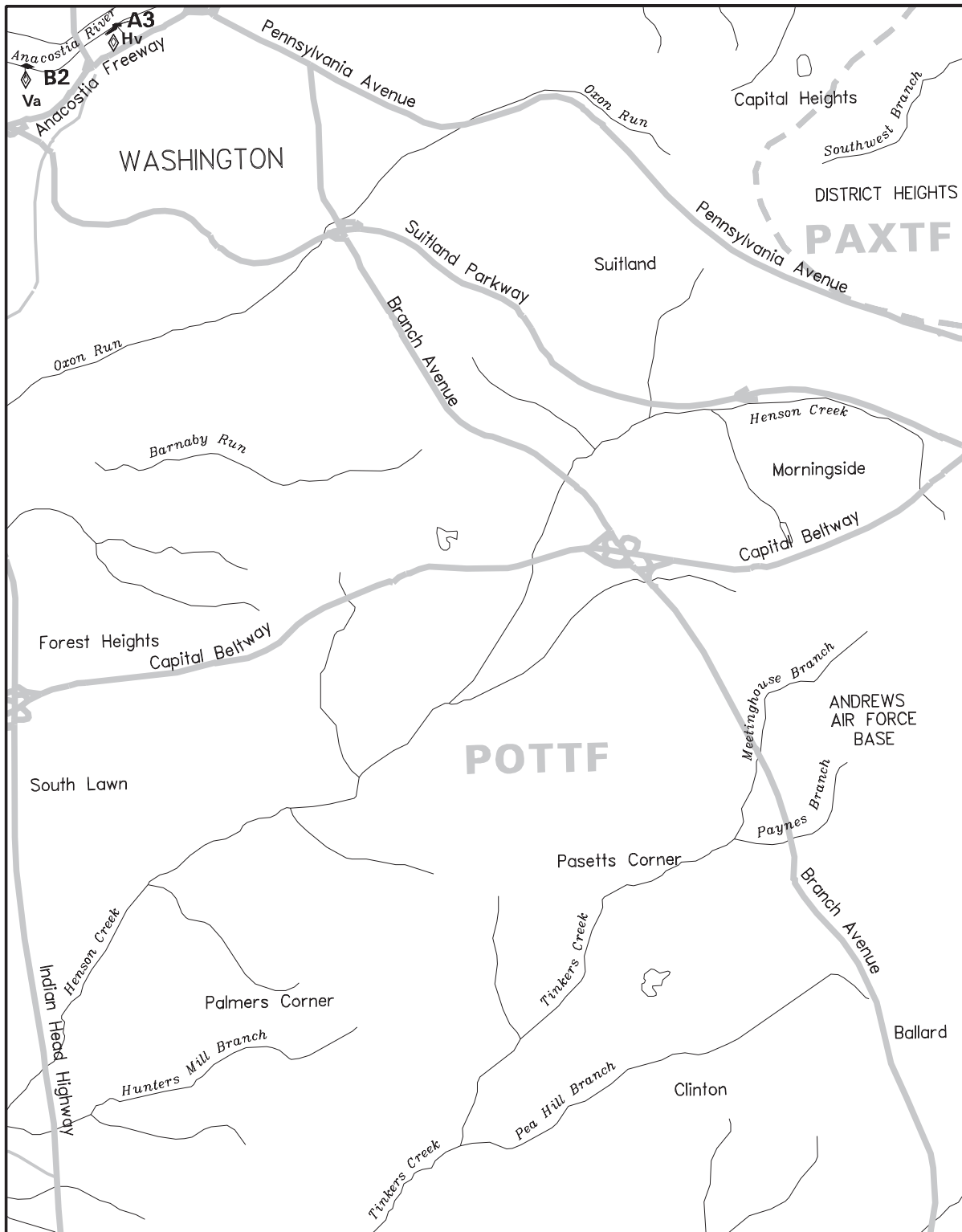
**Hectares of SAV: 1,649.34**  
Date Flown: 05/24/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

(176) Anacostia, D.C.–Md.



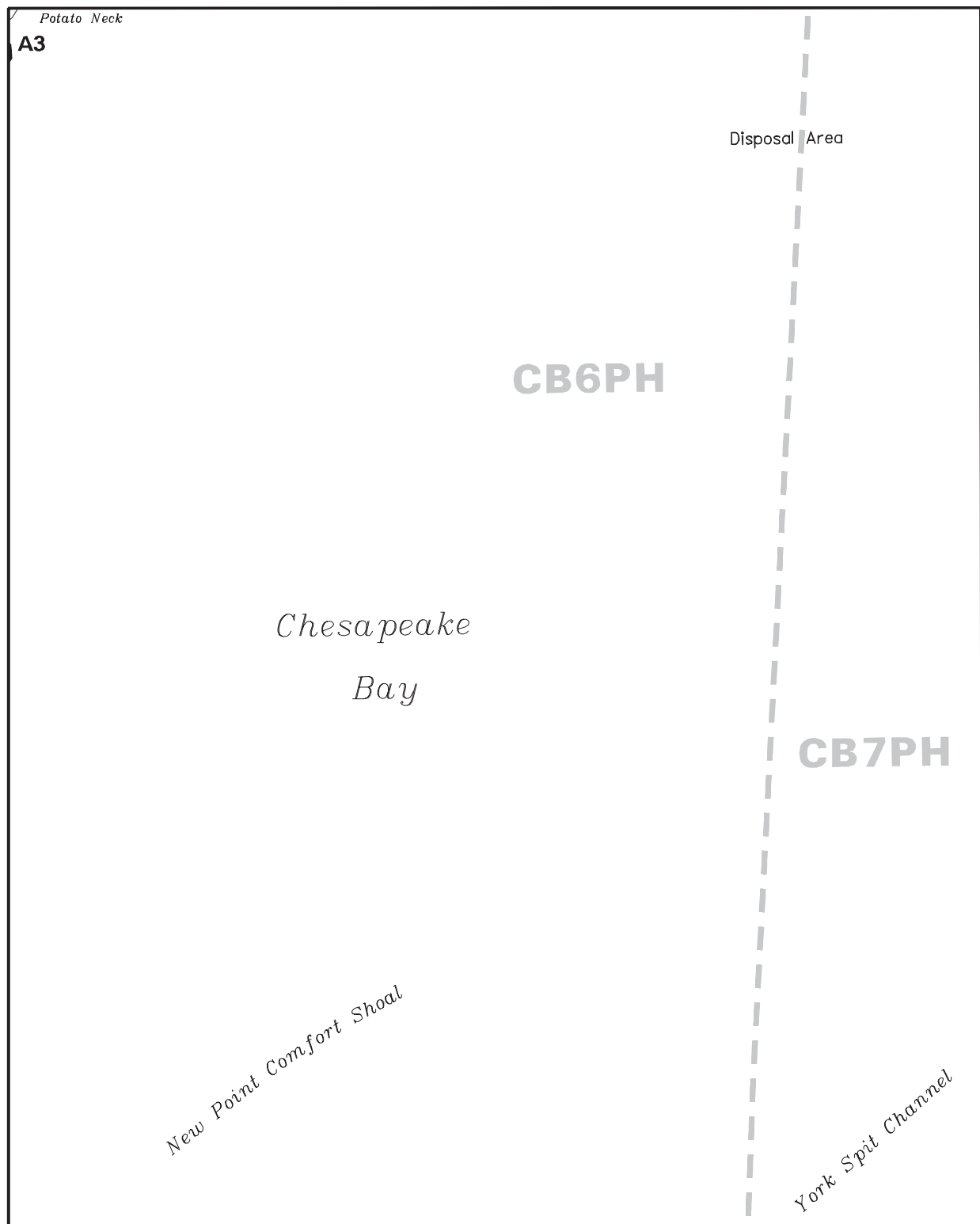
**Hectares of SAV: 0.35**  
Date Flown: 08/23/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey



# Submerged Aquatic Vegetation 1997

East of New Point Comfort, Va. (177)



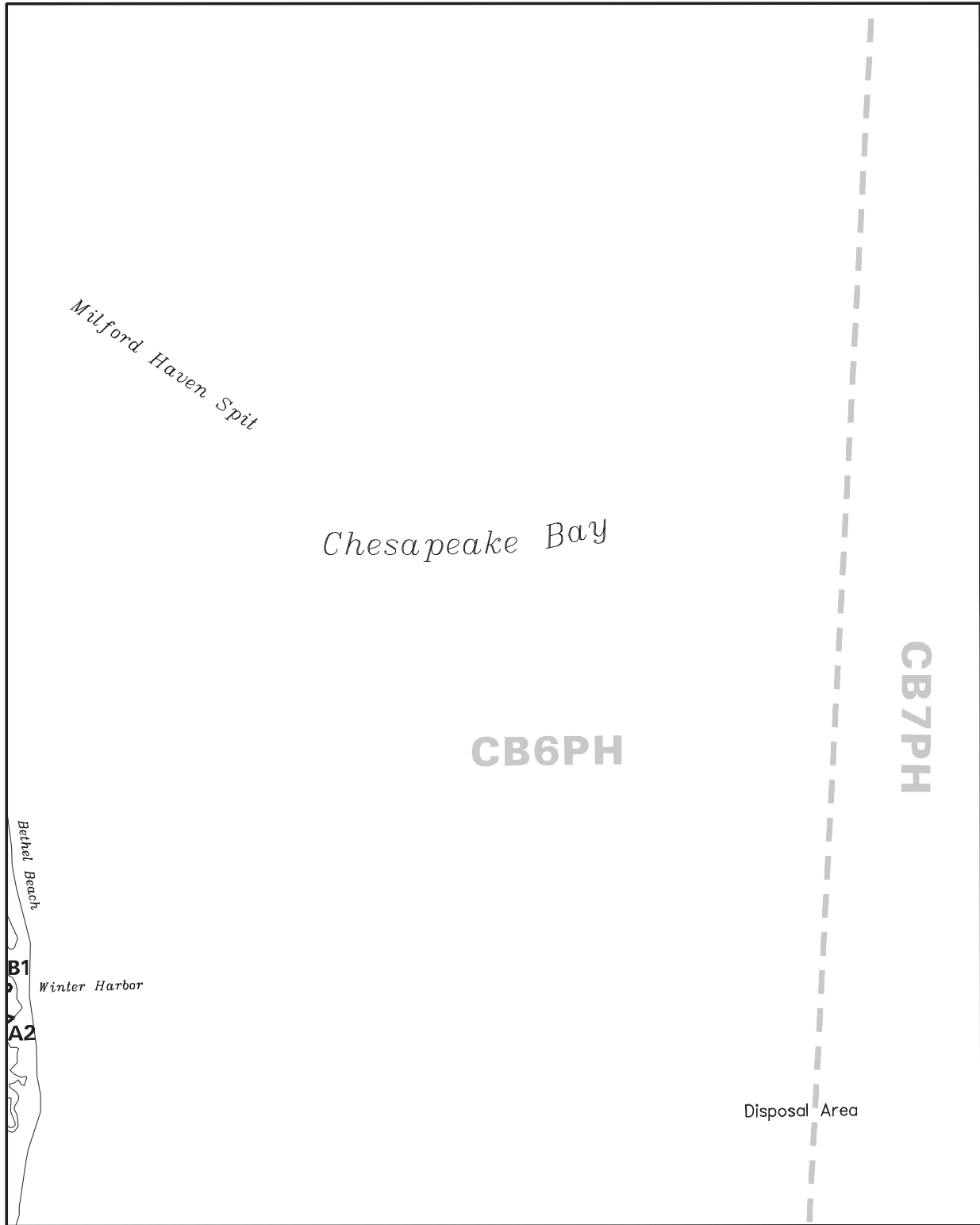
**Hectares of SAV: 0.37**  
Date Flown: 05/23/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

1000 0 1000 2000 meters

# Submerged Aquatic Vegetation 1997

(178) Bethel Beach, Va.



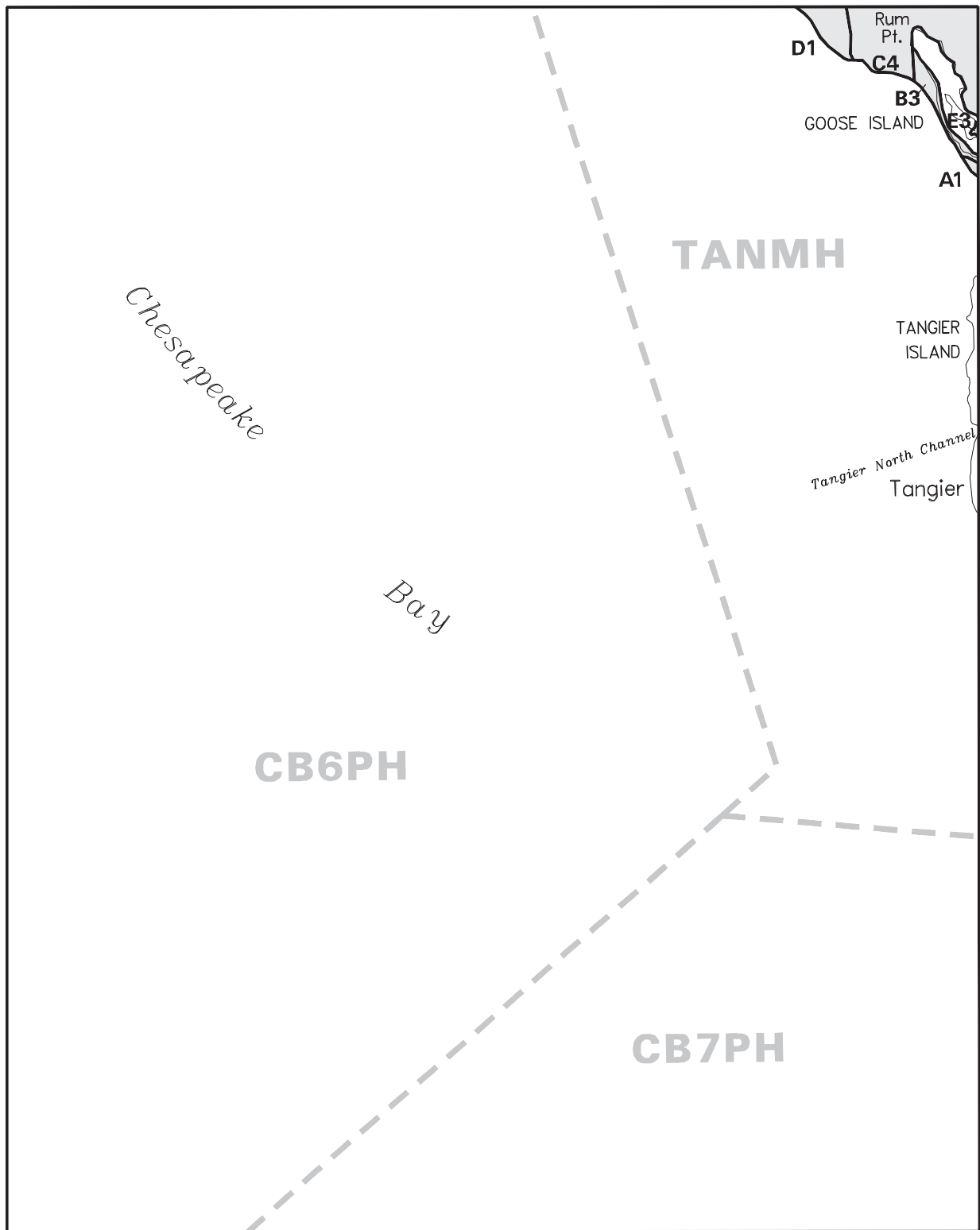
**Hectares of SAV: 0.78**  
Date Flown: 05/23/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

274 1000 0 1000 2000 meters

# Submerged Aquatic Vegetation 1997

Goose Island, Va. (179)



**Hectares of SAV: 137.36**  
Date Flown: 05/24/97

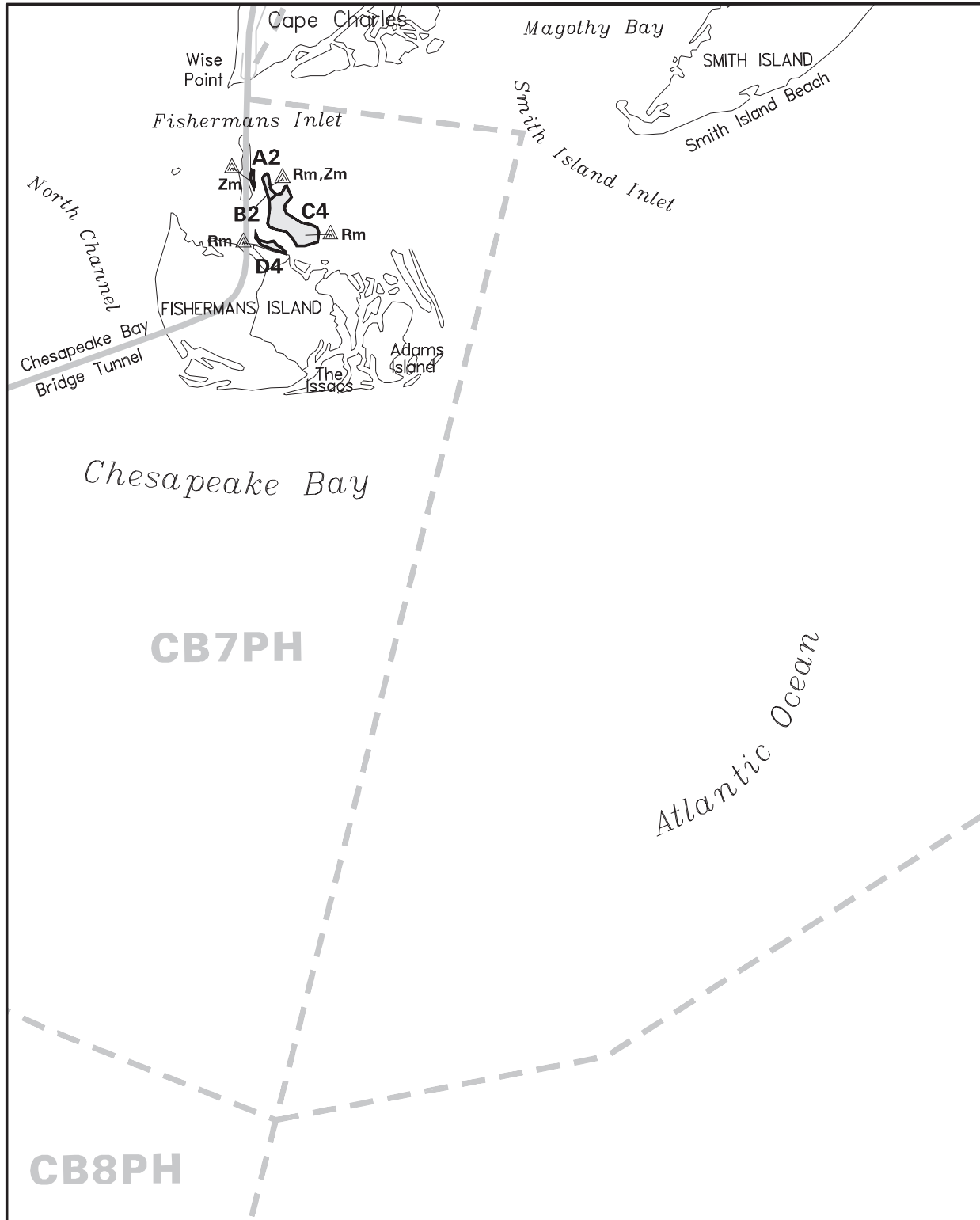
**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey





# Submerged Aquatic Vegetation 1997

(186) Fishermans Island, Va.



**Hectares of SAV: 21.57**  
Date Flown: 05/23/97

**Sources:** School of Marine Science  
Virginia Institute of Marine Science  
College of William and Mary  
U.S. Geological Survey

276 1000 0 1000 2000 meters



---

# APPENDIX C

Number of Square Meters of SAV for Individual Beds and Totals for Density Categories for Each USGS 7.5 Minute Quadrangle in 1997.



## APPENDIX C

Number of Square Meters of SAV for Individual Beds and Totals for Density Categories for Each USGS 7.5 Minute Quadrangle in 1997. [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)

A2	86,118	C3	801	E4	6,242	G2	63,416
B2	1,502	D4	2,996	F3	9,513		
Density (1) 0		(2) 151,036	(3) 10,313	(4) 9,239			Total: 170,588

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

A1	16,208,662	N3	13,795	AA3	133,651	NA4	229,580
B2	60,373	O3	6,533	BA3	63,228	OA2	1,109,445
C1	2,333,110	P2	5,042	CA2	6,848	PA4	35,575
D2	1,318,837	Q3	5,122	DA4	603	QA3	20,119
E4	331,385	R3	1,748	EA4	2,278	RA3	15,055
F3	129,048	S3	2,435	FA4	705	SA3	35,037
G4	3,033	T1	378	GA3	34,000	TA3	15,708
H4	118,564	U4	8,550	HA2	6,808	UA3	23,997
I1	3,717	V3	19,661	IA4	190,986	VA2	21,652
J4	99,500	W3	15,013	JA3	9,746	WA3	47,027
K2	32,935	X3	10,930	KA3	3,019	XA3	5,165
L3	9,377	Y3	10,282	LA3	17,002		
M2	5,849	Z3	3,175	MA4	291,281		
Density (1) 18,545,866		(2) 2,567,790	(3) 649,871	(4) 1,312,040			Total: 23,075,567

### North East, Md. (VIMS Map # 004)

A1	5,649	E2	17,275	I1	5,523	L1	14,000
B2	3,042	F4	39,533	J3	20,255	M4	49,751
C2	19,020	G1	15,183	K1	3,146		
D2	19,985	H2	18,985				
Density (1) 43,501		(2) 78,307	(3) 20,255	(4) 89,284			Total: 231,346

### White Marsh, Md. (VIMS Map # 006)

A2	5,844						
Density (1) 0		(2) 5,844	(3) 0	(4) 0			Total: 5,844

SAV

**Edgewood, Md. (VIMS Map # 007)**

A1	82,158	E3	430,510	H2	21,614	K3	49,421
B2	2,588	F1	305,531	I4	56,667	L4	4,367
C4	150,862	G3	56,930	J4	439,372		
D3	7,915						

Density (1) 387,689      (2) 24,202      (3) 544,776      (4) 651,267      Total: 1,607,935

**Perryman, Md. (VIMS Map # 008)**

A4	2,195	G3	11,860	M3	16,684	S3	20,050
B2	16,304	H2	2,233	N2	2,093		
C4	20,543	I2	4,708	O2	1,412		
D3	12,565	J1	3,550	P4	18,500		
E3	6,055	K4	122,188	Q4	13,125		
F3	23,530	L2	3,180	R4	4,598		

Density (1) 3,550      (2) 29,930      (3) 90,744      (4) 181,149      Total: 305,374

**Spesutie, Md. (VIMS Map # 009)**

A2	8,684	N2	10,811	AA4	3,148	NA4	2,762
B1	67,139	O4	41,149	BA4	4,323	OA4	11,037
C3	5,073	P4	55,809	CA4	3,353	PA4	19,948
D3	1,976	Q1	28,121	DA4	1,667	QA3	17,442
E1	44,756	R4	18,674	EA3	14,557	RA2	5,671
F2	9,140	S3	5,538	FA4	4,594	SA2	13,553
G1	16,230	T4	5,014	GA4	12,136	TA1	31,190
H3	5,246	U1	14,678	HA4	19,747	UA4	100,833
I2	8,526	V4	18,399	IA4	5,383	VA3	97,431
J1	853	W4	2,861	JA4	38,792	WA2	39,972
K1	12,955	X4	3,416	KA2	26,476	XA4	54,460
L4	196,121	Y2	13,072	LA1	35,135	YA1	9,746
M3	3,931	Z4	7,728	MA4	32,064		

Density (1) 260,803      (2) 135,906      (3) 151,194      (4) 663,419      Total: 1,211,322

**Earleville, Md. (VIMS Map # 010)**

A1	124,401	H2	1,671	O2	32,056	U2	83,737
B1	8,311	I2	3,985	P2	62,515	V3	30,848
C4	432,160	J4	5,552	Q1	37,951	W3	39,894
D4	12,801	K4	59,801	R1	14,146	X2	2,765
E3	16,368	L2	19,863	S2	74,850	Y2	88,389
F2	7,985	M2	12,943	T3	25,948		
G1	3,812	N1	5,795				

Density (1) 194,416      (2) 390,759      (3) 113,058      (4) 510,314      Total: 1,208,546

**Middle River, Md. (VIMS Map # 013)**

A1	2,575	E1	120,945	I1	66,219	L1	16,098
B2	88,225	F4	114,288	J3	5,391	M1	107,412
C4	6,083	G2	94,310	K1	33,042		
D2	55,180	H2	62,075				

Density (1) 346,292      (2) 299,790      (3) 5,391      (4) 120,371      Total: 771,845

**Gunpowder Neck, Md. (VIMS Map # 014)**

A3	6,322	M3	3,511	Y3	120,145	KA4	216,449
B3	19,177	N3	8,671	Z4	66,919	LA2	58,620
C3	28,045	O1	3,069	AA1	2,398	MA4	218,359
D1	3,246	P1	492	BA4	269,676	NA2	212,056
E4	119,251	Q1	31,834	CA1	2,921	OA4	697,428
F2	27,451	R1	111,685	DA2	506,911	PA4	254,161
G2	34,002	S3	20,021	EA4	203,485	QA2	31,292
H1	3,271	T3	47,249	FA1	46,835	RA4	584,207
I2	18,340	U2	94,207	GA4	837,962	SA1	350,537
J1	1,944	V2	31,031	HA2	137,886	TA1	136,383
K3	67,083	W4	71,226	IA4	77,627		
L3	4,442	X2	44,944	JA2	65,620		

Density (1) 694,614      (2) 1,262,360      (3) 324,665      (4) 3,616,749      Total: 5,898,388

**Hanesville, Md. (VIMS Map # 015)**

A1	21,963	G2	13,341	M2	2,161	S2	4,862
B3	47,261	H1	40,021	N3	40,655	T2	2,107
C4	4,585	I3	10,412	O4	6,544	U2	2,312
D4	1,020	J3	7,625	P4	2,023	V2	6,952
E2	6,163	K1	2,758	Q3	58,049		
F2	51,846	L3	2,759	R1	3,862		

Density (1) 68,604      (2) 89,744      (3) 166,761      (4) 14,174      Total: 339,282

**Betterton, Md. (VIMS Map # 016)**

A1	9,656	D2	13,326	G4	71,097	J3	3,064
B1	182,955	E4	59,453	H2	5,372		
C2	27,708	F2	269,923	I3	87,007		

Density (1) 192,611      (2) 316,329      (3) 90,072      (4) 130,550      Total: 729,561

SAV

**Galena, Md. (VIMS Map # 017)**

A1	8,943	D4	15,247	G2	19,950	J4	17,401
B2	39,011	E1	7,117	H1	7,655	K1	139,913
C1	52,903	F1	7,520	I1	10,229		
Density (1) 234,281		(2) 58,961		(3) 0		(4) 32,648	
							Total: 325,890

**Sparrows Point, Md. (VIMS Map # 019)**

A2	53,492	C2	24,867	D3	3,924		
B3	85,881						
Density (1) 0		(2) 78,359		(3) 89,805		(4) 0	
							Total: 168,164

**Swan Point, Md. (VIMS Map # 020)**

A3	8,081	D4	4,963	G4	69,364	J4	35,562
B3	3,615	E4	36,132	H3	8,993	K4	33,138
C2	3,835	F4	63,065	I4	581		
Density (1) 0		(2) 3,835		(3) 20,690		(4) 242,804	
							Total: 267,329

**Rock Hall, Md. (VIMS Map # 021)**

A3	7,474	D4	15,170	G2	69,207	J2	6,755
B4	142,152	E4	4,343	H2	4,575	K3	31,748
C4	396	F3	62,618	I4	14,583		
Density (1) 0		(2) 80,536		(3) 101,840		(4) 176,644	
							Total: 359,021

**Round Bay, Md. (VIMS Map # 023)**

A2	3,655	H1	15,085	O4	117,263	V3	29,609
B2	3,594	I4	118,696	P3	22,727	W2	8,234
C3	18,817	J3	30,326	Q3	1,494	X1	12,365
D4	126,842	K2	20,653	R3	2,718	Y4	23,003
E4	495,189	L2	9,670	S3	2,393	Z1	2,357
F2	22,431	M2	7,327	T3	1,535		
G1	5,308	N4	178,338	U3	4,996		
Density (1) 35,115		(2) 75,564		(3) 114,614		(4) 1,059,330	
							Total: 1,284,623

**Gibson Island, Md. (VIMS Map # 024)**

A4	12,184	J1	1,424	S2	1,173	AA4	9,679
B4	818	K1	2,079	T4	16,606	BA4	32,948
C1	9,701	L2	7,590	U3	9,940	CA4	1,897
D4	23,461	M3	24,995	V4	1,630	DA4	90,183
E4	22,356	N1	1,873	W4	18,151	EA4	57,050
F1	9,274	O3	11,862	X1	923	FA3	19,318
G3	22,197	P3	1,693	Y4	15,193	GA4	2,986
H2	22,874	Q3	5,400	Z4	26,450		
I2	19,085	R2	5,196				

Density (1) 25,273                      (2) 55,918                      (3) 95,405                      (4) 331,592                      Total: 508,188

**Langford Creek, Md. (VIMS Map # 026)**

A4	6,790	M3	9,792	X4	719,635	IA2	46,005
B4	48,114	N3	4,049	Y1	53,099	JA4	2,355,061
C4	44,769	O4	22,789	Z2	47,433	KA1	211,507
D4	26,786	P4	13,454	AA4	15,255	LA4	154,567
E4	2,918	Q4	22,996	BA4	56,636	MA2	175,513
F3	5,881	R4	59,911	CA4	154,424	NA4	118,543
G4	36,960	S4	14,867	DA4	92,117	OA1	27,205
H4	20,155	T4	101,395	EA2	12,005	PA3	2,619
I3	20,255	U4	71,539	FA3	9,031	QA2	7,132
J4	136,428	V3	35,026	GA4	318,827	RA4	30,515
K4	49,240	W4	214,937	HA3	11,894		
L4	46,875						

Density (1) 291,811                      (2) 288,088                      (3) 98,548                      (4) 4,956,504                      Total: 5,634,951

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

A4                      1,993

Density (1) 0                      (2) 0                      (3) 0                      (4) 1,993                      Total: 1,993

**South River, Md. (VIMS Map # 030)**

A2	13,414	D3	37,256	F2	2,540	H4	13,507
B3	15,285	E1	12,475	G3	2,446		
C3	66,570						

Density (1) 12,475                      (2) 15,954                      (3) 121,558                      (4) 13,507                      Total: 163,493



SAV

**Kent Island, Md. (VIMS Map # 032)**

A2	13,511	Q4	14,651	DA4	149,522	LA3	77,569
B4	36,183	R3	1,765	DB3	98,473	MA4	148,957
C4	7,662	S3	10,941	EA2	7,685	NA2	91,065
D4	11,195	T4	78,488	EB4	123,383	OA2	8,292
E3	10,113	U2	1,795	FA4	133,688	PA4	2,638
F4	4,959	V1	15,466	FB2	90,765	QA4	41,277
G3	6,549	W2	49,106	GA4	369,132	RA4	31,276
H4	8,818	X4	165,333	GB4	591,083	SA4	73,842
I4	23,529	Y3	117,266	HA3	110,969	TA4	464,503
J2	1,309	Z2	5,491	HB4	62,107	UA3	99,276
K4	31,172	AA4	1,072,774	IA1	25,797	VA1	27,415
L1	21,487	AB2	205,914	IB2	65,598	WA4	33,844
M4	36,831	BA3	31,112	JA4	777,265	XA4	13,460
N4	63,910	BB3	130,298	JB1	48,713	YA2	45,257
O2	14,091	CA4	279,187	KA1	49,620	ZA4	385,772
P2	9,928	CB4	106,101	KB4	3,664		

Density (1) 188,499      (2) 609,808      (3) 694,332      (4) 5,346,206      Total: 6,838,845

**Queenstown, Md. (VIMS Map # 033)**

A4	94,162	S4	13,741	EB2	3,084	NA3	4,284
B4	95,549	T1	4,150	FA4	583,002	NB3	12,937
C2	1,161	U4	4,456	FB1	5,323	OA4	177,188
D4	7,682	V3	5,173	GA2	123,580	OB2	9,459
E3	43,286	W3	4,950	GB3	5,927	PA1	50,034
F2	188,657	X2	16,306	HA4	336,611	PB2	1,766
G1	126,817	Y4	14,839	HB4	6,393	QA3	7,230
H2	184,097	Z4	530,488	IA2	190,911	QB2	1,290
I4	56,859	AA1	23,752	IB1	10,898	RA2	9,247
J4	122,565	AB2	3,617	JA4	30,567	SA2	97,692
K4	5,431	BA2	150,671	JB4	8,377	TA4	554,989
L4	36,555	BB1	8,126	KA2	10,869	UA4	56,530
M1	26,300	CA4	191,668	KB2	8,684	VA2	8,187
N4	15,950	CB2	19,414	LA4	14,266	WA1	109,145
O4	193,461	DA3	137,660	LB2	25,559	XA3	61,430
P4	155,188	DB2	59,933	MA2	7,264	YA1	8,211
Q2	15,848	EA1	80,333	MB3	6,081	ZA2	85,834
R3	2,653						

Density (1) 453,090      (2) 1,223,129      (3) 291,611      (4) 3,306,517      Total: 5,274,347

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

A4	1,708	K4	338,172	U3	21,588	DA2	27,022
B3	4,161	L4	27,433	V4	3,855	EA2	6,279
C1	4,221	M1	13,590	W4	7,722	FA3	8,439
D3	48,420	N4	15,233	X4	126,563	GA4	1,855
E4	46,291	O3	1,143	Y4	7,346	HA4	2,523
F4	13,580	P3	1,172	Z4	6,977	IA4	1,702
G4	2,610	Q3	1,046	AA2	6,267	JA3	25,059
H4	15,771	R4	422	BA4	7,084	KA4	724
I4	11,078	S4	2,710	CA4	3,906		
J1	550,384	T2	1,570				

Density (1) 568,196      (2) 41,138      (3) 111,027      (4) 645,266      Total: 1,365,627

**Claiborne, Md. (VIMS Map # 036)**

A2	30,059	P4	133,649	CA4	447,529	NA1	45,616
B2	9,394	Q2	30,539	CB3	26,845	OA1	87,450
C4	116,545	R4	122,436	DA4	167,908	PA2	106,448
D2	19,593	S2	15,326	DB1	151,588	QA1	153,765
E4	1,100,631	T4	140,563	EA4	134,146	RA3	39,091
F4	84,977	U4	112,227	EB3	119,556	SA4	67,230
G4	11,635	V2	19,706	FA2	17,687	TA2	30,595
H4	26,093	W4	29,770	GA4	18,003	UA2	10,608
I4	62,348	X4	337,674	HA4	13,979	VA4	6,225
J4	90,065	Y3	24,787	IA4	20,306	WA4	19,901
K4	188,640	Z4	154,342	JA4	606,574	XA4	6,565
L2	67,313	AA3	20,582	KA4	284,585	YA1	57,734
M4	94,304	AB2	90,779	LA1	153,933	ZA4	182,307
N2	62,894	BA2	3,634	MA4	283,750		
O1	57,985	BB1	94,557				

Density (1) 802,627      (2) 514,574      (3) 230,861      (4) 5,064,907      Total: 6,612,969

SAV

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

A2	7,377	S4	142,042	FA4	65,454	OA3	175,437
B2	38,901	T3	5,899	FB4	235,830	OB2	58,881
C2	27,718	U4	119,458	GA2	191,143	PA4	182,477
D4	38,689	V4	52,122	GB2	117,321	PB4	44,274
E2	23,941	W3	89,035	HA2	16,686	QA4	31,394
F4	234,382	X1	62,847	HB4	158,469	QB4	10,958
G2	10,876	Y4	22,556	IA1	16,460	RA1	214,979
H4	93,765	Z4	33,800	IB4	30,295	RB2	17,507
I1	33,806	AA2	6,481	JA2	63,942	SA3	264,017
J3	137,358	AB1	96,676	JB4	3,268	SB2	13,342
K2	9,044	BA4	4,717	KA3	31,507	TA3	83,166
L3	6,911	BB2	91,645	KB4	12,786	UA1	22,998
M4	23,265	CA2	14,702	LA4	329,225	VA4	13,044
N3	28,052	CB4	110,846	LB4	918,665	WA1	8,888
O3	971,805	DA2	71,722	MA3	48,051	XA2	7,373
P1	88,898	DB4	21,421	MB4	338,652	YA1	63,547
Q4	15,625	EA3	67,196	NA4	27,088	ZA3	177,923
R3	6,169	EB2	14,424	NB4	356,260		

Density (1) 609,100      (2) 803,027      (3) 2,092,526      (4) 3,670,827      Total: 7,175,481

**Easton, Md. (VIMS Map # 038)**

A4	8,089	D4	24,540	F4	13,705	H2	6,321
B2	16,012	E3	4,890	G4	20,377		
C4	30,573						

Density (1) 0      (2) 22,333      (3) 4,890      (4) 97,284      Total: 124,508

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

A4	54,607	F4	204,995	J3	39,375	N2	3,593
B4	33,541	G2	69,416	K4	266,776	O4	59,029
C2	155,160	H4	256,009	L4	702,718	P4	5,576
D1	85,205	I2	44,297	M4	34,940		
E2	52,458						

Density (1) 85,205      (2) 324,924      (3) 39,375      (4) 1,618,191      Total: 2,067,695

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

A4	10,509	H2	34,843	O4	19,647	U4	11,161
B4	63,515	I4	36,032	P4	13,697	V2	83,509
C4	48,374	J3	45,521	Q4	85,294	W1	2,382
D4	9,480	K4	66,488	R2	13,363	X1	2,938
E1	6,622	L2	7,611	S4	385,466	Y2	23,337
F2	52,662	M4	1,140,734	T1	12,101	Z4	53,957
G4	148,550	N4	92,728				

Density (1) 24,043                    (2) 215,325                    (3) 45,521                    (4) 2,185,631                    Total: 2,470,521

**Lower Marlboro, Md. (VIMS Map # 041)**

A3	1,811	E4	6,814	I4	141,435	M2	2,280
B3	6,160	F4	23,960	J4	30,872	N4	18,508
C4	111,423	G4	34,355	K3	9,917	O4	9,559
D4	274,605	H2	13,635	L4	7,515		

Density (1) 0                    (2) 15,915                    (3) 17,888                    (4) 659,046                    Total: 692,849

**North Beach, Md. (VIMS Map # 042)**

A3            153,102

Density (1) 0                    (2) 0                    (3) 153,102                    (4) 0                    Total: 153,102

**Tilghman, Md. (VIMS Map # 043)**

A4	228,745	I1	36,162	Q2	32,979	X4	89,393
B4	161,201	J2	88,092	R2	9,777	Y4	3,687
C4	46,319	K4	115,723	S3	38,602	Z4	7,228
D1	23,409	L4	886,493	T2	21,529	AA4	40,276
E2	40,966	M2	194,434	U1	21,986	BA4	168,148
F2	87,762	N4	549,019	V4	1,359,423	CA4	111,496
G2	38,591	O1	28,672	W2	15,155		
H3	596,611	P3	238,800				

Density (1) 110,229                    (2) 529,285                    (3) 874,014                    (4) 3,767,151                    Total: 5,280,679

SAV

**Oxford, Md. (VIMS Map # 044)**

A4	170,990	V4	148,804	GA4	48,444	QB3	9,046
B4	120,578	W3	90,673	GB4	9,820	RA4	76,239
C4	209,902	X1	75,012	HA4	37,119	RB2	1,139
D4	27,669	Y4	110,558	HB4	232,779	SA4	81,162
E1	100,650	Z2	183,309	IA3	8,156	SB2	5,099
F4	252,876	AA4	15,042	IB2	20,120	TA4	30,955
G4	42,073	AB2	4,496	JA4	4,528	TB2	4,683
H4	142,062	AC4	18,517	JB2	14,198	UA3	9,774
I3	9,020	BA4	322,527	KA4	41,094	UB1	4,198
J4	7,633	BB4	146,430	KB3	176,604	VA4	47,969
K4	31,202	BC3	40,907	LA2	20,426	VB2	28,193
L2	10,732	CA1	59,438	LB2	7,998	WA4	5,627
M4	581,680	CB2	13,894	MA4	46,664	WB2	16,560
N2	13,234	CC2	5,269	MB3	30,852	XA3	5,620
O3	69,767	DA4	76,331	NA4	81,963	XB2	5,317
P4	2,000,052	DB4	88,933	NB3	46,376	YA2	1,084
Q2	389,364	DC3	3,942	OA2	19,220	YB2	3,926
R4	417,281	EA1	26,619	OB2	10,410	ZA4	45,890
S1	60,432	EB4	30,810	PA4	31,838	ZB4	13,716
T4	604,268	FA3	65,239	PB1	31,508		
U2	71,164	FB2	10,165	QA2	22,498		

Density (1) 357,856            (2) 882,499            (3) 565,974            (4) 6,402,025            Total: 8,208,354

**Trappe, Md. (VIMS Map # 045)**

A2	18,823	E2	7,096	I3	5,738	M3	4,161
B4	75,736	F4	38,258	J4	129,041	N3	4,969
C4	33,052	G4	26,043	K4	27,077		
D4	26,325	H4	8,079	L3	3,011		

Density (1) 0            (2) 25,918            (3) 17,879            (4) 363,611            Total: 407,409

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

A4	1,141,195	E2	9,608	I4	484,284	M4	5,987
B4	175,522	F4	10,033	J4	20,345	N4	90,082
C4	62,884	G4	54,477	K4	13,444		
D4	37,437	H3	13,715	L4	3,664		

Density (1) 0            (2) 9,608            (3) 13,715            (4) 2,099,356            Total: 2,122,679

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

A4	93,143	H4	5,528	O4	10,446	U4	11,315
B4	52,312	I4	27,244	P4	2,619	V4	31,029
C4	44,987	J4	168,219	Q4	18,292	W3	6,804
D4	6,805	K4	17,050	R3	14,111	X2	4,848
E4	25,131	L4	27,308	S4	3,803	Y4	5,130
F2	10,952	M4	14,594	T4	7,656		
G4	40,816	N4	8,083				

Density (1) 0                      (2) 15,800                      (3) 20,915                      (4) 621,511                      Total: 658,226

**Hudson, Md. (VIMS Map # 051)**

A4	49,399	K2	8,863	U2	9,168	DA2	38,450
B3	26,482	L2	438,403	V4	1,122,722	EA2	156,880
C3	15,849	M3	73,734	W2	612,521	FA4	729,354
D2	63,651	N1	23,913	X1	259,480	GA3	206,942
E1	25,398	O3	188,917	Y4	1,392,049	HA1	106,145
F1	14,233	P3	126,782	Z3	127,586	IA4	272,587
G3	8,331	Q3	18,390	AA1	332,938	JA4	21,729
H3	3,730	R2	29,587	BA1	303,871	KA2	8,318
I1	10,769	S2	21,034	CA2	22,964		
J2	32,784	T2	132,863				

Density (1) 1,076,746                      (2) 1,575,486                      (3) 796,743                      (4) 3,587,840                      Total: 7,036,815

**Church Creek, Md. (VIMS Map # 052)**

A3	160,798	U3	10,551	HA4	3,178	QB1	267,157
B2	61,032	V4	7,565	HB2	3,794	RA2	159,683
C1	64,029	W4	25,271	IA3	16,151	RB3	109,697
D3	16,529	X3	42,230	IB2	50,607	SA2	90,218
E4	21,112	Y1	62,589	JA3	5,860	SB1	238,441
F4	4,467	Z2	93,413	JB1	19,589	TA1	16,770
G4	4,760	AA3	324,735	KA3	5,563	TB2	102,073
H4	2,752	AB3	135,128	KB1	11,795	UA4	34,639
I3	7,644	BA4	69,996	LA3	212,551	UB4	826,234
J4	6,433	BB4	208,670	LB3	32,166	VA1	13,042
K4	13,439	CA3	19,857	MA4	209,791	VB4	5,146
L3	30,116	CB3	12,198	MB2	33,379	WA3	10,269
M4	3,460	DA3	10,055	NA4	128,732	WB4	7,242
N4	5,634	DB3	8,431	NB3	48,513	XA4	164,628
O3	2,096	EA3	18,178	OA2	61,451	XB4	5,205
P4	75,333	EB4	32,092	OB2	244,639	YA4	34,558
Q1	6,719	FA3	3,448	PA4	164,322	YB3	74,975
R3	9,256	FB4	38,167	PB3	541,985	ZA1	40,836
S4	10,848	GA4	11,847	QA4	165,582		
T3	4,322	GB3	17,773				

Density (1) 740,967                      (2) 900,289                      (3) 1,891,075                      (4) 2,291,104                      Total: 5,823,436

SAV

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

A2	3,198	F4	13,645	K4	6,909	P3	60,390
B4	333,526	G4	25,253	L3	2,097	Q3	5,735
C2	8,029	H2	5,269	M4	35,523	R2	76,286
D4	558,997	I4	125,682	N3	3,553		
E3	77,793	J2	3,145	O2	4,992		
Density (1) 0		(2) 100,918	(3) 149,568	(4) 1,099,535	Total: 1,350,021		

**Nanjemoy, Md. (VIMS Map # 056)**

A4	27,383	J4	4,524	S4	13,575	BA4	22,709
B2	96,743	K4	2,598	T4	54,219	CA4	42,805
C1	19,158	L2	33,606	U4	7,974	DA4	39,727
D2	22,434	M4	12,263	V4	3,081	EA3	99,252
E3	124,890	N2	6,159	W4	7,383	FA3	50,201
F2	13,757	O2	25,740	X4	42,672	GA4	860,609
G2	26,231	P3	29,740	Y4	49,247	HA1	8,554
H4	26,634	Q1	35,556	Z4	16,676		
I2	10,794	R2	7,209	AA4	1,510		
Density (1) 63,268		(2) 242,672	(3) 304,084	(4) 1,235,590	Total: 1,845,614		

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

A2	44,299	L4	159,403	W3	81,011	GA1	134,415
B4	286,041	M3	15,213	X2	39,681	HA4	8,423
C2	39,665	N4	32,037	Y1	35,446	IA2	16,230
D2	35,085	O4	254,333	Z2	100,055	JA4	73,341
E4	323,639	P2	118,607	AA2	222,294	KA2	229,115
F4	21,292	Q1	81,275	BA3	336,112	LA4	190,859
G4	242,389	R2	59,456	CA4	359,576	MA2	57,735
H3	5,187	S3	31,823	DA4	121,625	NA4	22,120
I3	2,838	T2	48,967	EA2	46,998	OA2	78,826
J3	228,318	U2	94,395	FA2	107,865		
K4	19,709	V1	33,106				
Density (1) 284,242		(2) 1,339,273	(3) 700,502	(4) 2,114,787	Total: 4,438,804		

**Popes Creek, Md. (VIMS Map # 058)**

A3	7,459	D2	13,648	G2	144,627	J3	855
B2	15,207	E2	7,579	H3	59,107		
C3	15,508	F3	91,455	I4	4,050		
Density (1) 0		(2) 181,059	(3) 174,384	(4) 4,050	Total: 359,494		

**Taylors Island, Md. (VIMS Map # 062)**

A4	101,219	E2	176,076	H2	9,076	K2	8,143
B1	36,622	F4	58,504	I4	23,433	L2	3,008
C4	4,555	G2	29,447	J4	47,497		
D1	16,863						

Density (1)	53,485	(2)	225,749	(3)	0	(4)	235,207	Total:	514,441
-------------	--------	-----	---------	-----	---	-----	---------	--------	---------

**Golden Hill, Md. (VIMS Map # 063)**

A1	21,017	C2	31,526	D2	2,402
B2	39,982				

Density (1)	21,017	(2)	73,911	(3)	0	(4)	0	Total:	94,928
-------------	--------	-----	--------	-----	---	-----	---	--------	--------

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

A1	83,132	D4	240,406	G2	12,907	J2	46,893
B4	144,586	E2	4,038	H4	1,362,738	K2	212,463
C2	55,523	F4	41,166	I4	321,415		

Density (1)	83,132	(2)	331,825	(3)	0	(4)	2,110,312	Total:	2,525,269
-------------	--------	-----	---------	-----	---	-----	-----------	--------	-----------

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

A4	54,963	C4	198,642	E1	2,626	G2	96,926
B1	44,924	D1	4,406	F1	1,696		

Density (1)	53,651	(2)	96,926	(3)	0	(4)	253,605	Total:	404,182
-------------	--------	-----	--------	-----	---	-----	---------	--------	---------

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

A4	8,682	I1	297	Q4	11,356	Y2	39,428
B4	14,046	J2	30,652	R4	20,731	Z1	5,834
C4	52,566	K2	61,353	S2	5,270	AA4	31,608
D4	20,534	L1	5,878	T2	70,004	BA3	7,071
E4	54,945	M2	9,923	U2	10,691	CA2	5,185
F4	11,623	N2	21,691	V4	201,780	DA4	116,971
G1	2,017	O4	8,378	W3	92,223		
H1	693	P2	5,863	X2	2,986		

Density (1)	14,719	(2)	263,047	(3)	99,295	(4)	553,220	Total:	930,281
-------------	--------	-----	---------	-----	--------	-----	---------	--------	---------



SAV

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

A4	80,229	F4	21,526	K4	27,009	P3	82,196
B4	168,574	G2	20,013	L2	150,560	Q2	63,879
C1	5,365	H4	281,368	M4	61,221	R4	160,437
D4	350,335	I4	2,653	N4	111,501	S3	8,972
E2	16,293	J1	87,948	O3	168,817	T2	101,275
Density (1) 93,313		(2) 352,021	(3) 259,985	(4) 1,264,853	Total: 1,970,172		

**Rock Point, Md. (VIMS Map # 068)**

A4	3,382	I4	8,766	Q2	11,396	Y2	186,265
B4	31,551	J2	25,047	R2	12,526	Z1	19,399
C4	114,891	K1	53,319	S4	6,111	AA2	40,895
D4	68,123	L2	16,772	T2	6,850	BA4	69,419
E4	35,335	M1	26,994	U4	13,705	CA4	49,434
F4	200,149	N4	115,289	V4	2,492	DA4	20,940
G2	32,618	O4	28,426	W4	108,736		
H3	86,929	P1	8,171	X2	3,021		
Density (1) 107,883		(2) 335,392	(3) 86,929	(4) 876,748	Total: 1,406,951		

**Leonardtown, Md. (VIMS Map # 069)**

A3	38,097	D2	5,040	G4	17,567	I1	13,022
B3	13,170	E4	18,381	H4	277,143		
C4	102,811	F4	20,216				
Density (1) 13,022		(2) 5,040	(3) 51,267	(4) 436,119	Total: 505,447		

**Solomons Island, Md. (VIMS Map # 071)**

A2	10,179						
Density (1) 0		(2) 10,179	(3) 0	(4) 0	Total: 10,179		

**Barren Island, Md. (VIMS Map # 072)**

A2	19,839	C2	5,595	D1	115,902		
B2	110,131						
Density (1) 115,902		(2) 135,565	(3) 0	(4) 0	Total: 251,467		

**Honga, Md. (VIMS Map # 073)**

A2	20,049	K4	41,225	U2	70,504	EA1	12,260
B3	45,088	L2	687,361	V2	117,053	FA3	76,662
C1	36,738	M3	723,576	W1	2,836	GA2	21,749
D1	25,423	N4	576,654	X2	15,164	HA2	31,941
E3	35,577	O2	156,457	Y2	17,895	IA2	83,315
F1	17,284	P3	191,691	Z2	217,408	JA2	33,534
G2	235,151	Q2	100,371	AA3	5,129	KA2	41,666
H2	147,144	R2	18,551	BA4	17,802	LA3	4,354
I1	79,378	S1	6,483	CA3	11,169	MA1	32,966
J2	1,677,115	T2	78,260	DA2	34,962		

Density (1) 213,367      (2) 3,805,651      (3) 1,093,246      (4) 635,680      Total: 5,747,944

**Wingate, Md. (VIMS Map # 074)**

A3	494,324	D4	562,709	F3	1,167,342	H2	324,811
B1	145,886	E2	257,379	G2	429,066		
C2	118,687						

Density (1) 145,886      (2) 1,129,943      (3) 1,661,666      (4) 562,709      Total: 3,500,203

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

A4	13,392	D4	50,321	G3	12,265	I3	4,679
B2	12,126	E2	18,718	H1	2,224		
C4	55,911	F4	30,897				

Density (1) 2,224      (2) 30,844      (3) 16,945      (4) 150,521      Total: 200,534

**St. Clements Island, Va.-Md. (VIMS Map # 078)**

A4	15,327	E2	5,566	I4	13,763	L4	227,189
B4	15,873	F2	5,991	J4	135,043	M1	6,441
C4	351,064	G4	11,246	K2	34,073		
D4	19,919	H4	15,626				

Density (1) 6,441      (2) 45,631      (3) 0      (4) 805,050      Total: 857,121

**St. Marys City, Md. (VIMS Map # 080)**

A1	26,656	C1	47,494	E4	43,510	G1	6,086
B2	18,881	D2	17,969	F3	26,169		

Density (1) 80,236      (2) 36,850      (3) 26,169      (4) 43,510      Total: 186,766

SAV

**Bloodsworth Island, Md. (VIMS Map # 083)**

A4 383,642

Density (1) 0 (2) 0 (3) 0 (4) 383,642 Total: 383,642

**Machodoc, Va. (VIMS Map # 087)**

A2 9,871 C3 18,445 E4 97,020  
 B4 17,647 D4 25,160

Density (1) 0 (2) 9,871 (3) 18,445 (4) 139,827 Total: 168,143

**Kedges Straits, Md. (VIMS Map # 091)**

A2 181,220	F2 164,814	K1 115,623	P3 61,618
B3 152,230	G2 40,928	L4 1,394,338	Q1 27,639
C1 264,858	H1 118,225	M1 201,532	R2 45,252
D1 31,390	I2 72,738	N1 89,406	
E1 415,582	J2 3,962	O3 73,876	

Density (1) 1,264,254 (2) 508,914 (3) 287,724 (4) 1,394,338 Total: 3,455,230

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

A2 35,840 C3 70,161 E1 366,387  
 B2 4,765 D2 590,314 F2 311,242

Density (1) 366,387 (2) 942,161 (3) 70,161 (4) 0 Total: 1,378,709

**Marion, Md. (VIMS Map # 093)**

A2 2,309	J1 31,553	S2 7,472	BA2 14,307
B2 3,182	K3 68,046	T2 28,437	CA2 24,149
C2 2,209	L2 6,192	U2 80,817	DA3 142,046
D2 15,097	M2 115,663	V1 36,729	EA2 58,491
E3 26,110	N2 76,654	W3 259,950	FA3 15,444
F1 149,672	O3 464,676	X1 46,538	GA3 88,180
G3 31,538	P1 66,777	Y3 4,568	HA2 152,941
H2 23,535	Q1 12,745	Z2 50,169	IA2 10,768
I3 134,260	R2 37,950	AA2 1,882	

Density (1) 344,013 (2) 712,223 (3) 1,234,817 (4) 0 Total: 2,291,053

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

A1	2,308,237	M2	8,253	Y2	65,303	JA2	9,264
B4	7,923,299	N2	82,865	Z2	1,496	KA3	48,795
C2	60,953	O2	9,190	AA1	66,881	LA2	7,626
D1	162,269	P2	66,887	BA3	119,550	MA1	20,619
E2	712,860	Q3	76,171	CA1	31,681	NA2	14,814
F3	1,213,109	R2	38,055	DA1	11,404	OA2	41,507
G3	339,137	S2	7,339	EA1	75,203	PA2	58,126
H2	879,724	T2	15,812	FA2	85,016	QA2	11,583
I2	4,665	U2	66,470	GA3	122,303	RA2	4,809
J1	17,272	V1	104,892	HA2	7,586	SA4	18,752
K2	4,118	W2	3,767	IA2	34,209		
L2	30,948	X2	37,411				

Density (1) 2,798,458      (2) 2,370,657      (3) 1,919,064      (4) 7,942,052      Total: 15,030,230

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

A1	1,162,107	G3	437,311	M2	541,308	S2	19,458
B1	174,671	H1	9,481	N1	145,430	T1	613,099
C4	4,644,995	I3	18,333	O4	736,189	U2	328,286
D1	220,419	J1	24,964	P2	615,723	V4	378,570
E2	175,212	K2	23,095	Q2	11,126		
F3	15,259	L4	69,952	R2	118,661		

Density (1) 2,350,171      (2) 1,832,867      (3) 470,902      (4) 5,829,706      Total: 10,483,646

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

A4	269,174	H2	29,832	N3	44,888	T3	62,106
B1	80,549	I3	25,916	O3	86,581	U2	8,003
C2	280,320	J2	6,656	P4	188,147	V3	26,047
D3	25,424	K2	62,739	Q3	36,349	W2	5,463
E3	28,883	L2	10,978	R3	32,962	X2	12,004
F3	158,219	M1	36,881	S2	23,608		
G2	61,847						

Density (1) 117,430      (2) 501,448      (3) 527,376      (4) 457,321      Total: 1,603,575

**Saxis, Va.-Md. (VIMS Map # 102)**

A1	1,613	B1	6,711				
----	-------	----	-------	--	--	--	--

Density (1) 8,324      (2) 0      (3) 0      (4) 0      Total: 8,324

SAV

**Reedville, Va. (VIMS Map # 106)**

A1	5,478	C2	319,975	E1	756,909		
B2	6,309	D3	1,044,159	F3	225,958		
Density (1)	762,386	(2)	326,283	(3)	1,270,117	(4)	0
							Total: 2,358,787

**Tangier Island, Va. (VIMS Map # 107)**

A3	64,887	E2	748,579	I2	152,261	M4	1,165,834
B1	397,860	F4	196,025	J4	249,492	N1	227,354
C3	92,292	G1	100,078	K1	354,877	O3	57,235
D4	294,247	H2	40,498	L1	228,441		
Density (1)	1,308,610	(2)	941,338	(3)	214,414	(4)	1,905,598
							Total: 4,369,960

**Chesconessex, Va. (VIMS Map # 108)**

A1	67,213	M3	265,998	X3	387,598	IA1	3,210
B2	16,209	N4	261,939	Y1	90,538	JA2	61,598
C1	61,886	O1	36,649	Z2	257,585	KA2	1,606,948
D2	39,173	P4	224,998	AA4	99,151	LA1	70,663
E3	111,523	Q1	16,218	BA1	868,611	MA4	213,857
F2	14,401	R1	7,798	CA4	462,647	NA4	21,734
G2	1,851	S3	2,722	DA3	332,054	OA1	20,927
H2	30,504	T3	437,612	EA1	86,376	PA1	23,763
I2	2,322	U4	413,141	FA1	145,707	QA4	140,627
J1	15,342	V4	415,392	GA4	845,687	RA2	36,101
K4	387,876	W1	352,800	HA1	97,893		
L1	263,151						
Density (1)	2,228,744	(2)	2,066,690	(3)	1,537,507	(4)	3,487,050
							Total: 9,319,992

**Parksley, Va. (VIMS Map # 109)**

A1	28,695	K1	86,027	T4	26,286	CA4	11,517
B3	54,573	L1	4,449	U1	205,999	DA1	3,770
C1	38,109	M2	21,810	V2	56,542	EA2	82,762
D2	64,911	N1	31,433	W1	126,132	FA2	4,126
E4	1,452,008	O4	78,962	X2	94,543	GA1	4,093
F1	150,347	P2	20,888	Y2	8,092	HA1	3,838
G2	87,493	Q3	5,600	Z2	43,158	IA1	20,706
H4	313,978	R2	1,706	AA1	2,347	JA1	34,139
I2	40,354	S1	2,301	BA1	4,926		
J4	187,417						
Density (1)	747,309	(2)	526,386	(3)	60,173	(4)	2,070,168
							Total: 3,404,036

**Irvington, Va. (VIMS Map # 111)**

A3	5,823	D2	40,919	G2	33,346	J1	6,783
B3	3,972	E2	5,549	H1	7,017		
C2	2,113	F3	94,500	I2	5,116		
Density (1) 13,800		(2) 87,042	(3) 104,296	(4) 0	Total: 205,138		

**Fleets Bay, Va. (VIMS Map # 112)**

A2	104,605	J2	22,690	R4	8,214	Z2	297,891
B2	22,843	K2	21,983	S4	5,681	AA2	928,936
C2	112,066	L2	31,374	T2	67,987	BA4	49,050
D2	131,534	M4	22,336	U2	26,495	CA3	13,173
E2	196,828	N2	124,555	V3	17,070	DA2	4,470
F2	3,792	O4	66,799	W2	5,453	EA2	3,589
G2	3,191	P2	954,285	X3	6,271	FA1	702,615
H2	3,113	Q1	341,254	Y2	5,944		
I2	6,373						
Density (1) 1,043,870		(2) 3,079,996	(3) 36,514	(4) 152,080	Total: 4,312,460		

**Nandua Creek, Va. (VIMS Map # 113)**

A2	32,966	E2	5,328	I2	638,747	M3	76,015
B2	5,255	F3	28,628	J4	359,435	N2	635,523
C2	13,913	G4	525,840	K1	60,651	O1	1,003,494
D4	79,067	H1	195,566	L2	122,597		
Density (1) 1,259,711		(2) 1,454,329	(3) 104,643	(4) 964,341	Total: 3,783,023		

**Pungoteague, Va. (VIMS Map # 114)**

A4	62,582	L1	1,928,617	W2	4,526	GA1	120,623
B2	27,333	M2	222,545	X2	9,774	HA1	422,035
C3	20,961	N2	56,285	Y2	2,615	IA2	42,626
D2	377,022	O2	15,061	Z2	12,943	JA4	8,903
E3	28,619	P1	140,554	AA2	80,630	KA2	3,893
F2	68,587	Q4	84,918	BA1	5,621	LA3	6,765
G4	384,644	R1	69,860	CA4	47,106	MA2	8,977
H3	76,013	S3	369,917	DA1	16,282	NA2	13,840
I2	411,751	T1	472,194	EA4	68,667	OA1	2,819
J4	2,997,977	U3	64,571	FA2	98,369		
K2	52,548	V2	1,863				
Density (1) 3,178,605		(2) 1,511,186	(3) 566,845	(4) 3,654,797	Total: 8,911,433		

SAV

**Deltaville, Va. (VIMS Map # 118)**

A2	11,259	D1	251,796	G1	33,545	I2	5,572
B1	139,257	E2	273,124	H1	9,306		
C2	84,759	F4	108,013				
Density (1) 433,903		(2) 374,714	(3) 0	(4) 108,013	Total: 916,631		

**Jamesville, Va. (VIMS Map # 119)**

A1	27,555	K2	19,986	T4	434,761	CA4	88,197
B1	29,171	L3	40,707	U1	15,976	DA1	167,367
C1	28,753	M2	53,350	V2	28,605	EA4	165,550
D1	681,978	N4	13,583	W2	18,750	FA2	40,612
E2	48,234	O1	1,256,692	X2	23,448	GA4	145,377
F1	44,153	P4	96,415	Y1	69,112	HA1	23,412
G4	381,275	Q1	372,937	Z2	633,442	IA2	36,627
H2	86,936	R3	21,168	AA3	125,866	JA2	62,623
I2	30,664	S1	97,773	BA1	31,894		
J2	17,972						
Density (1) 2,846,771		(2) 1,101,249	(3) 187,741	(4) 1,325,158	Total: 5,460,920		

**Ware Neck, Va. (VIMS Map # 122)**

A2	11,037	E4	491,235	I3	62,782	L3	402,828
B2	20,438	F2	220,042	J4	77,885	M1	192,024
C2	190,809	G4	283,012	K4	77,019	N4	235,044
D3	102,831	H4	211,412				
Density (1) 192,024		(2) 442,326	(3) 568,441	(4) 1,375,607	Total: 2,578,398		

**Mathews, Va. (VIMS Map # 123)**

A2	4,753	H2	5,381	N3	9,933	T3	23,439
B2	5,577	I2	224,303	O3	47,868	U4	25,840
C2	10,793	J4	92,911	P2	72,877	V4	198,686
D2	9,158	K4	276,258	Q3	105,020	W4	61,089
E2	16,495	L2	7,169	R4	132,837	X2	6,599
F2	64,247	M3	186,258	S2	21,307		
G3	127,611						
Density (1) 0		(2) 448,658	(3) 500,129	(4) 787,621	Total: 1,736,408		

**Franktown, Va. (VIMS Map # 124)**

A2	13,755	O1	36,569	BA3	134,784	OA1	18,205
B4	109,334	P2	5,976	CA2	16,339	PA2	8,248
C2	44,910	Q2	3,658	DA1	15,261	QA3	15,334
D3	25,533	R4	258,301	EA2	21,028	RA4	24,426
E1	67,575	S2	96,163	FA2	55,153	SA2	4,058
F4	1,216,827	T2	6,089	GA4	222,282	TA2	3,159
G1	355,663	U4	1,803,332	HA2	49,493	UA3	3,934
H2	247,171	V1	344,063	IA3	24,552	VA4	4,616
I4	166,900	W1	72,877	JA4	10,491	WA3	3,163
J1	49,999	X2	48,057	KA2	4,038	XA2	8,449
K2	26,147	Y1	64,438	LA4	80,949	YA4	187,192
L4	123,654	Z3	43,895	MA1	17,789	ZA1	170,591
M4	29,847	AA1	26,390	NA3	46,660		
N3	13,322						

Density (1) 1,239,418      (2) 661,891      (3) 311,176      (4) 4,238,150      Total: 6,450,634

**Achilles, Va. (VIMS Map # 131)**

A2	15,285	K4	356,176	U2	33,863	EA4	1,719,728
B3	68,388	L2	18,300	V2	3,153	FA1	82,174
C2	44,234	M3	124,002	W4	1,286,279	GA1	85,342
D3	74,955	N4	208,726	X2	64,026	HA4	1,385,112
E1	11,041	O3	16,952	Y2	24,838	IA2	112,298
F4	709,667	P3	26,268	Z2	6,695	JA4	81,417
G2	204,949	Q4	1,855,774	AA4	69,751	KA4	57,971
H4	1,375,913	R2	30,918	BA2	52,144	LA4	67,362
I2	255,477	S1	175,610	CA3	176,168	MA3	925,761
J2	35,270	T2	5,451	DA2	2,385	NA4	127,523

Density (1) 354,166      (2) 909,286      (3) 1,412,493      (4) 9,301,397      Total: 11,977,343

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

A4	1,203,758	J2	33,893	R2	259,022	Z4	86,766
B2	10,577	K2	14,653	S4	325,458	AA2	261,290
C4	175,353	L1	290,429	T4	75,276	BA1	409,301
D4	1,731,600	M4	50,395	U3	19,031	CA1	361,990
E2	7,467	N1	112,364	V1	3,161	DA4	4,600,410
F4	664,449	O3	293,138	W4	1,288,355	EA2	230,241
G3	472,386	P1	307,459	X1	117,540	FA1	107,460
H2	2,582	Q4	429,985	Y3	84,180		
I4	1,109,322						

Density (1) 1,709,703      (2) 819,726      (3) 868,735      (4) 11,741,128      Total: 15,139,291



SAV

**Cape Charles, Va. (VIMS Map # 133)**

A2	287,182	F3	4,067	K3	3,878	P1	1,211,002			
B4	19,272	G4	685,662	L2	5,326	Q3	523,110			
C1	98,149	H2	64,530	M2	2,082	R2	65,686			
D2	236,279	I1	139,170	N2	92,098					
E4	131,695	J2	33,995	O2	679,714					
Density (1) 1,448,321							(2) 1,466,891	(3) 531,055	(4) 836,629	Total: 4,282,896

**Cheriton, Va. (VIMS Map # 134)**

A4	67,338	D2	8,861	F2	79,336	H2	37,949			
B2	164,502	E4	239,026	G1	187,304					
C1	98,780									
Density (1) 286,084							(2) 290,648	(3) 0	(4) 306,365	Total: 883,097

**Yorktown, Va. (VIMS Map # 139)**

A1	22,122	C2	15,528	E2	2,593	G1	2,927			
B1	683	D2	5,027	F1	1,129					
Density (1) 26,860							(2) 23,148	(3) 0	(4) 0	Total: 50,009

**Poquoson West, Va. (VIMS Map # 140)**

A4	43,398	K4	675,851	U2	525,084	DA4	207,074			
B4	54,642	L1	336,853	V1	166,943	EA3	514,449			
C4	60,385	M2	356,428	W1	346,883	FA1	127,447			
D1	26,927	N4	499,262	X4	199,237	GA2	116,434			
E2	43,316	O1	144,608	Y2	33,077	HA4	29,123			
F2	4,500	P3	142,455	Z1	45,624	IA4	76,488			
G1	1,320	Q4	93,248	AA4	120,565	JA4	6,105			
H2	7,371	R2	19,681	BA1	30,285	KA4	10,846			
I1	91,358	S2	12,287	CA1	100,246					
J4	81,314	T3	495,826							
Density (1) 1,418,495							(2) 1,118,179	(3) 1,152,730	(4) 2,157,540	Total: 5,846,944

**Poquoson East, Va. (VIMS Map # 141)**

A4	1,906	E4	66,418	I4	5,468,725	M2	2,637,659			
B4	11,056	F4	478,608	J2	708,683	N3	712,058			
C4	12,104	G2	14,838	K1	54,764					
D4	15,412	H3	866,887	L4	809,873					
Density (1) 54,764							(2) 3,361,180	(3) 1,578,945	(4) 6,864,104	Total: 11,858,993

**Elliotts Creek, Va. (VIMS Map # 142)**

A1	637,943	B2	795,361	C3	400,028	
Density (1)	637,943	(2)	795,361	(3)	400,028	(4) 0
						Total: 1,833,333

**Hampton, Va. (VIMS Map # 147)**

A1	13,484	G1	20,537	M4	128,312	S1	30,672
B4	335,532	H2	116,502	N4	101,618	T4	87,196
C2	5,259	I4	155,997	O4	106,961	U1	54,712
D3	24,511	J4	44,803	P3	117,086	V1	19,057
E4	521,214	K4	437,307	Q1	182,996		
F2	632,946	L4	222,493	R1	331,057		
Density (1)	652,515	(2)	754,707	(3)	141,597	(4)	2,141,433
							Total: 3,690,252

**Newport News South, Va. (VIMS Map # 149)**

A2	10,456	C1	71,507	E1	134,173	
B2	21,990	D3	7,042			
Density (1)	205,680	(2)	32,446	(3)	7,042	(4) 0
						Total: 245,168

**Little Creek, Va. (VIMS Map # 151)**

A1	7,733	B2	36,012			
Density (1)	7,733	(2)	36,012	(3)	0	
					(4) 0	
						Total: 43,745

**Cape Henry, Va. (VIMS Map # 152)**

A3	9,474	D1	8,369	G1	8,697	J1	21,911
B1	6,163	E1	8,006	H2	12,901	K1	10,672
C1	17,336	F1	32,444	I1	25,396		
Density (1)	138,995	(2)	12,901	(3)	9,474	(4)	0
							Total: 161,371

**Bristol, Md. (VIMS Map # 159)**

A4	23,619	C4	149,440	E3	2,281	G3	7,067
B4	37,563	D4	15,525	F3	4,027		
Density (1)	0	(2)	0	(3)	13,375	(4)	226,147
							Total: 239,523

SAV

**Port Tobacco, Md. (VIMS Map # 161)**

A4	3,774	C2	1,257	D3	680
B2	1,664				

Density (1) 0	(2) 2,922	(3) 680	(4) 3,774	Total: 7,376
---------------	-----------	---------	-----------	--------------

**Charlotte Hall, Md. (VIMS Map # 162)**

A1	2,186	B4	158,688
----	-------	----	---------

Density (1) 2,186	(2) 0	(3) 0	(4) 158,688	Total: 160,873
-------------------	-------	-------	-------------	----------------

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

A2	248,506	E4	895,725	I4	121,325	L2	6,433
B4	385,813	F1	126,900	J3	18,292	M3	27,406
C2	65,711	G1	113,567	K4	78,744		
D1	280,198	H2	64,464				

Density (1) 520,665	(2) 385,114	(3) 45,698	(4) 1,481,606	Total: 2,433,083
---------------------	-------------	------------	---------------	------------------

**Berlin, Md. (VIMS Map # 167)**

A1	41,169	D2	65,556	G2	29,865	J3	15,518
B2	317,182	E2	38,842	H1	27,455	K4	16,885
C2	120,510	F3	27,190	I1	38,023		

Density (1) 106,647	(2) 571,955	(3) 42,708	(4) 16,885	Total: 738,196
---------------------	-------------	------------	------------	----------------

**Ocean City, Md. (VIMS Map # 168)**

A2	113,213	C2	115,773	E2	9,469	G2	90,031
B3	131,805	D4	259,440	F1	78,782		

Density (1) 78,782	(2) 328,486	(3) 131,805	(4) 259,440	Total: 798,513
--------------------	-------------	-------------	-------------	----------------

**Tingles Island, Md. (VIMS Map # 170)**

A2	202,221	K2	222,795	U2	215,607	DA3	178,222
B4	728,213	L1	57,793	V3	14,084	EA2	13,771
C3	83,302	M1	191,244	W2	184,325	FA2	106,532
D1	97,457	N3	39,997	X1	27,714	GA2	110,936
E4	8,355,043	O1	183,746	Y1	2,456	HA2	29,354
F2	91,885	P4	542,418	Z4	339,757	IA2	52,287
G2	93,937	Q2	585,157	AA4	213,605	JA2	12,689
H1	94,083	R1	7,257	BA3	9,994	KA2	17,385
I1	156,816	S2	310,891	CA4	128,503		
J2	46,120	T4	1,476,686				

Density (1) 818,566      (2) 2,295,889      (3) 325,599      (4) 11,784,226      Total: 15,224,280

**Girdle Tree, Md.-Va. (VIMS Map # 171)**

A1      153,434

Density (1) 153,434      (2) 0      (3) 0      (4) 0      Total: 153,434

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

A1	47,087	G2	807,689	M4	35,486	S2	2,743
B4	3,895,610	H4	768,007	N4	125,219	T2	5,225
C2	497,541	I2	429,247	O4	1,026,702	U3	124,645
D4	151,549	J2	26,431	P2	209,362	V3	33,716
E1	357,367	K4	959,829	Q2	19,778		
F2	520,432	L2	300,573	R2	2,063		

Density (1) 404,454      (2) 2,821,084      (3) 158,361      (4) 6,962,401      Total: 10,346,300

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

A2	216,182	E2	57,140	I1	145,580	M2	78,706
B4	405,595	F2	102,491	J4	206,408	N1	44,911
C2	1,475,966	G1	114,948	K1	242,270		
D4	1,865,163	H3	678,748	L4	43,585		

Density (1) 547,710      (2) 1,930,485      (3) 678,748      (4) 2,520,752      Total: 5,677,695

**Chincoteague West, Va. (VIMS Map # 174)**

A1	602,764	D4	204,125	F3	796,337	H2	186,653
B1	222,269	E1	267,641	G2	1,634,665		
C2	204,317						

Density (1) 1,092,674      (2) 2,025,636      (3) 796,337      (4) 204,125      Total: 4,118,771

SAV

**Chincoteague East, Va. (VIMS Map # 175)**

A1	15,878	D2	2,851,293	G1	308,118	I4	33,511		
B1	52,026	E2	736,626	H2	530,072				
C1	550,098	F4	11,415,775						
Density (1)	926,119	(2)	4,117,991	(3)	0	(4)	11,449,286	Total:	16,493,395

**Anacostia, D.C.-Md. (VIMS Map # 176)**

A3	1,844	B2	1,693						
Density (1)	0	(2)	1,693	(3)	1,844	(4)	0	Total:	3,537

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

A3	3,652								
Density (1)	0	(2)	0	(3)	3,652	(4)	0	Total:	3,652

**Bethel Beach, Va. (VIMS Map # 178)**

A2	3,934	B1	3,862						
Density (1)	3,862	(2)	3,934	(3)	0	(4)	0	Total:	7,796

**Goose Island, Va. (VIMS Map # 179)**

A1	20,542	C4	980,691	E3	8,018				
B3	158,459	D1	205,863						
Density (1)	226,405	(2)	0	(3)	166,477	(4)	980,691	Total:	1,373,574

**Fishermans Island, Va. (VIMS Map # 186)**

A2	5,658	C4	170,417	D4	19,867				
B2	19,763								
Density (1)	0	(2)	25,421	(3)	0	(4)	190,284	Total:	215,705

# APPENDIX D

---

1997 Submerged Aquatic Vegetation Ground-Survey Data Listed by USGS 7.5 Minute Quadrangle  
and by 1997 Bed.

## KEY

\* Abbreviations under column “Species” are as follows:

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

\*\* Abbreviations under column “Surveyor” are as follows:

ACOE	-	U.S. Army Corps of Engineers, Baltimore District
APG	-	Aberdeen Proving Ground, U.S. Army (USAEC/ARL)
Citizen	-	Citizens’ Survey
CBL	-	Chesapeake Biological Laboratory, University of Maryland
EPA	-	United States Environmental Protection Agency
GICS	-	Gibson Island Country School
FOMC	-	Friends of Mattawoman Creek
Harford	-	Harford Community College
Ocean Pines	-	Ocean Pines Yacht Club
MD-DNR	-	Maryland Department of Natural Resources
MU	-	Millersville University, Biology
NAIB	-	National Aquarium in Baltimore
PRP	-	Maryland Natl. Park & Planning Commission, Patuxent River Park
PWRC	-	Patuxent Wildlife Research Center
NPS	-	National Park Service, Assateague National Seashore
SFNP	-	Sherwood Forest Naturalist Program
SMS	-	Southern Middle School
USFWS	-	United States Fish and Wildlife Service
USGS	-	United States Geological Survey
VIMS	-	Virginia Institute of Marine Science

## APPENDIX D

### 1997 Submerged Aquatic Vegetation Ground-Survey Data Listed by USGS 7.5 Minute Quadrangle

Quad	1997 Bed	Species*	Surveyor**	Survey Date
002	E4	Cd, Ec, Ms, Va	MU	09/06/97
	A2	Ec, Hv, Ms, Va	MU	09/06/97
	Spence Island	Cd, Ec, Hv, Ms, Va	MU	09/06/97
	A2	Ms, Hv, Cd, Nm	Harford	09/20/97
	A2	Ms, Hv, Cd	Harford	09/20/97
003	A1	Cd, Ms, Va	Citizen	09/01/97
	East of A1	Ms	Citizen	09/01/97
	East of A1	Cd, Ms	Citizen	09/01/97
	A1	Ms	Harford	10/12/97
	A1	Ms	Harford	10/12/97
	SA3	Ms	Harford	10/01/97
	QA3	Ms, Hv, Cd	Harford	10/01/97
	PA4	Ms, Cd, Hd, Hv	Harford	10/01/97
	OA2	Ms	Harford	10/01/97
	OA2	Va, Ms, Hv, Cd	Harford	10/01/97
	OA2	Ms, Va, Cd, Hv, Hd, Nm	Harford	10/01/97
	NA4	Ms, Hv, Cd, Hd	Harford	10/01/97
	NA4	Va, Ms, Hd, Nfl	Harford	10/01/97
	NA4	Hv, Va, Ms, Cd	Harford	10/01/97
	NA4	Va, Ms, Cd, Hd, Nm	Harford	10/01/97
	MA4	Hv, Ms, Cd	Harford	10/01/97
	MA4	Hv, Ms	Harford	10/01/97
	LA3	Hv, Ms, Cd	Harford	10/01/97
	JA3	Hv, Ms, Cd, Nm	Harford	09/20/97
	WA3	Ms, Hv, Hd, Cd	Harford	09/20/97
	UA3	Ms, Hv, Cd	Harford	09/20/97
	TA3	Ms, Hv, Cd	Harford	09/20/97
	IA4	Hv, Ms, Cd, Nm	Harford	09/20/97
	IA4	Hv, Ms, Hd	Harford	09/20/97
	GA3	Ms, Hv, Cd	Harford	09/20/97
	GA3	Ms, Cd, Hd, Hv	Harford	09/20/97
	GA3	Ms, Cd, Hd, Hv	Harford	09/20/97
	BA3	Ms, Hv, Cd	Harford	09/20/97
	CA2	Ms	Harford	09/20/97
	AA3	Ms, Hv	Harford	09/20/97
	Y3	Ms, Hv, Cd, Nm	Harford	09/20/97
	W3	Ms, Hv, Cd	Harford	09/20/97
	V3	Hv, Ms, Cd, Va	Harford	09/20/97
U4	Ms, Hv, Cd, Va	Harford	09/20/97	
T1	Ms	Harford	09/20/97	
S3	Ms, Hv, Va, Cd	Harford	09/20/97	



## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date
003	R3	Ms, Hv, Va, Cd	Harford	09/20/97
	Q3	Ms, Hv	Harford	09/20/97
	P2	Hv, Ms	Harford	09/20/97
	O3	Ms, Hv, Cd	Harford	09/20/97
	N3	Ms, Hv, Va	Harford	09/20/97
	M2	Ms, Hv, Va, Hd, Cd	Harford	10/12/97
	K2	Ms, Va, Hv, Cd	Harford	10/12/97
	F3	Ms, Va	Harford	10/12/97
	F3	Ms, Hd	Harford	10/12/97
	E4	Ms, Va, Cd	Harford	10/12/97
	E4	Ms	Harford	10/12/97
	E4	Hv, Ms, Cd, Va	Harford	10/12/97
	E4	Hv, Ms, Va, Hd, Cd	Harford	10/12/97
	J4	Cd, Hv, Ms, Va, Hd	Harford	10/12/97
	J4	Hv, Ms, Va	Harford	10/12/97
	J4	Hv, Va, Ms	Harford	10/12/97
	H4	Ms, Hv, Cd	Harford	10/12/97
	H4	Hv, Ms	Harford	10/12/97
	H4	Hv, Ms, Va, Hd	Harford	10/12/97
	H4	Va, Hv, Ms	Harford	10/12/97
	H4	Hv, Ms, Hd, Va, Cd	Harford	10/12/97
	H4	Va, Hv, Ms, Cd	Harford	10/12/97
	H4	Ms, Va, Cd, Hv	Harford	10/12/97
	H4	Ms, Hv, Va, Hd	Harford	10/12/97
	G4	Ms, Hd, Hv	Harford	10/12/97
	D2	Va, Ms	Harford	10/12/97
	D2	Ms, Va, Hd	Harford	10/12/97
	D2	Ms, Hd	Harford	10/12/97
	D2	Hd, Ms, Va	Harford	10/12/97
	D2	Ms, Hd, Va	Harford	10/12/97
	D2	Ms, Hd	Harford	10/12/97
	C1	Ms	Harford	10/12/97
	C1	Ms	Harford	10/12/97
	B2	Ms, Hd	Harford	10/12/97
004	West of M4	Cd, Ms	Citizen	08/25/97
	West of Hance Point	Ms	Citizen	08/25/97
	South of K1	Ms	Citizen	07/25/97
	Piney Creek Cove	Ms	Citizen	07/25/97
	Piney Creek Cove	Ms, Pcr	Citizen	07/25/97
	Muddy Creek	Ms, Va	Citizen	07/25/97
	A1	Ms	Citizen	07/25/97
	B2	Ms	Citizen	07/25/97
	A1	Ms	Harford	10/04/97
	D2	Ms, Va	Harford	10/04/97
	E2	Va, Ms	Harford	10/04/97
F4	Va, Ms	Harford	10/04/97	

Quad	1997 Bed	Species*	Surveyor**	Survey Date
004	G1	Va	Harford	10/04/97
	H2	Ms, Va, Ppc	Harford	10/04/97
	I1	Va	Harford	10/04/97
	J3	Va, Ms	Harford	10/04/97
	K1	Ms	Harford	10/04/97
	L1	Ms	Harford	10/04/97
	007	H2	Zp	Citizen
G3		Zp	Citizen	11/03/97
F1		Zp	Citizen	11/03/97
East of H2		Ms	APG	09-10/97
Reardon Inlet		Va, Zp, Ms	APG	09-10/97
Canal Creek		Va, Ms	APG	09-10/97
A1		Va, Ms	APG	09-10/97
A1		Va, Ms, Pcr	APG	09-10/97
A1		Va, Ms	APG	09-10/97
A1		Va, Ms	APG	09-10/97
A1		Ms, Va, Ppf	APG	09-10/97
A1		Va, Ms	APG	09-10/97
South of A1		Ms, Va	APG	09-10/97
K3		Ms, Pcr, Cd	APG	09-10/97
Kings Creek		Ms	APG	09-10/97
L4		Cd, Ms, Ec	APG	09-10/97
008		C4	Cd, Ms, Ec	APG
	B2	Cd, Ms, Ec	APG	09-10/97
	B2	Ms	APG	09-10/97
	A4	Hv, Ms, Va, Cd, Ppf, Zp	APG	09-10/97
	Bridge Creek	Ms	APG	09-10/97
	West of D3	Ms	APG	09-10/97
	D3	Ms, Hv	APG	09-10/97
	E3	Ms	APG	09-10/97
	Taylor Island Point	Va, Ms	APG	09-10/97
	F3	Ms	APG	09-10/97
	G3	Ms, Hv, Cd, Va	APG	09-10/97
	G3	Ms, Cd	APG	09-10/97
	H2	Ms	APG	09-10/97
	I2	Ms	APG	09-10/97
	J1	Ms, Va, Hv, Cd	APG	09-10/97
	K4	Ms, Va, Hv, Cd	APG	09-10/97
	K4	Hv, Ms	APG	09-10/97
	K4	Hv, Ms	APG	09-10/97
	K4	Ms, Va, Hv, Cd	APG	09-10/97
	K4	Ms, Va, Hv, Cd	APG	09-10/97
	M3	Va, Ms, Hv, Cd	APG	09-10/97
	Delph Creek	Hv, Cd, Va	APG	09-10/97
	Delph Creek	Ms, Va, Hv, Cd	APG	09-10/97

## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date
008	Delph Creek	Ms, Va, Hv, Cd	APG	09-10/97
	N2	Va, Ms	APG	09-10/97
	O2	Va, Ms	APG	09-10/97
	Old Womans Gut	Va, Ms	APG	09-10/97
	S3	Ms	APG	09-10/97
	S3	Ms	APG	09-10/97
009	Turkey Point	Ms, Va	Citizen	08/25/97
	WA2	Va, Ms, Hv	Harford	10/04/97
	YA1	Ms	Harford	09/28/97
	E1	Ms, Va, Hd	Harford	10/01/97
	F2	Ms	APG	09-10/97
	I2	Ms	APG	09-10/97
	G1	Ms, Hv	APG	09-10/97
	H3	Ms, Hv	APG	09-10/97
	J1	Ms	APG	09-10/97
	K1	Ms	APG	09-10/97
	LA1	Ms, Va	APG	09-10/97
	LA1	Ms	APG	09-10/97
	TA1	Ms	APG	09-10/97
	EA3	Ms, Va	APG	09-10/97
	FA4	Ms	APG	09-10/97
	Spesutie Island	Ms	APG	09-10/97
	Spesutie Island	Ms	APG	09-10/97
	Spesutie Island	Ms	APG	09-10/97
	Mouth of Back Creek	Ms	APG	09-10/97
	HA4	Ms, Hv, Cd	APG	09-10/97
	HA4	Ms, Hv, Cd	APG	09-10/97
	IA4	Ms, Hv, Cd	APG	09-10/97
	North of IA4	Ms	APG	09-10/97
	JA4	Ms, Hv	APG	09-10/97
	JA4	Ms, Hv, Cd	APG	09-10/97
	KA2	Ms, Hv, Cd	APG	09-10/97
	MA4	Ms, Hv, Cd	APG	09-10/97
	NA4	Ms, Hv, Cd	APG	09-10/97
	OA4	Ms, Hv, Cd	APG	09-10/97
	PA4	Ms, Hv, Cd	APG	09-10/97
	PA4	Ms, Hv, Cd	APG	09-10/97
	RA2	Ms, Hv, Cd	APG	09-10/97
QA3	Ms, Hv, Cd	APG	09-10/97	
SA2	Ms	APG	09-10/97	
SA2	Va	APG	09-10/97	
L4	Ms, Hv	APG	09-10/97	
L4	Ms, Nm, Hv, Va	APG	09-10/97	
L4	Ms, Nm, Hv	APG	09-10/97	
L4	Ms, Hv, Nm	APG	09-10/97	
L4	Ms, Hv, Cd, Nm	APG	09-10/97	

Quad	1997 Bed	Species*	Surveyor**	Survey Date
009	L4	Nm, Ms, Hv	APG	09-10/97
	L4	Nm, Hv, Ms	APG	09-10/97
	L4	Hv, Ms	APG	09-10/97
	L4	Hv	APG	09-10/97
	L4	Hv	APG	09-10/97
	L4	Hv, Ms	APG	09-10/97
	M3	Ms	APG	09-10/97
	N2	Ms	APG	09-10/97
	Dipper Creek	Hv, Ms	APG	09-10/97
	Dipper Creek	Hv, Ms, Cd	APG	09-10/97
	O4	Ms, Cd	APG	09-10/97
	O4	Hv, Ms, Cd, Nm	APG	09-10/97
	O4	Ms, Hv, Cd, Nm	APG	09-10/97
	P4	Ms, Hv, Nm, Cd	APG	09-10/97
	Q1	Ms, Hv, Nm, Cd	APG	09-10/97
	Woodrest Creek	Ms, Hv	APG	09-10/97
	Woodrest Creek	Ms, Hv	APG	09-10/97
	Woodrest Creek	Ms, Hv	APG	09-10/97
	R4	Ms, Hv, Cd, Va	APG	09-10/97
	R4	Ms, Va	APG	09-10/97
	S3	Ms, Va	APG	09-10/97
	U1	Ms, Va	APG	09-10/97
	V4	Va, Ms, Hv	APG	09-10/97
	Little Mosquito Creek	Va, Ms, Nm, Hv	APG	09-10/97
	V4	Ms	APG	09-10/97
	Mosquito Creek	Ms	APG	09-10/97
	Mosquito Creek	Ms	APG	09-10/97
	X4	Ms	APG	09-10/97
	Y2	Ms, Va, Hv	APG	09-10/97
	Z4	Hv, Ms, Cd	APG	09-10/97
	Mosquito Creek	Ms	APG	09-10/97
	Mosquito Creek	Ms, Cd, Hv	APG	09-10/97
	Mosquito Creek	Ms, Hv, Cd	APG	09-10/97
	Mosquito Creek	Ms, Hv, Cd	APG	09-10/97
Mosquito Creek	Ms, Cd, Hv	APG	09-10/97	
010	Sassafras River	Ms	Harford	09/28/97
	A1	Ms	Harford	09/28/97
	B1	Ms	Harford	09/28/97
	D4	Va, Ms	Harford	10/04/97
	E3	Ms, Va	Harford	10/04/97
	O2	Hv, Va, Ms	Harford	10/04/97
	P2	Hv, Va, Ms	Harford	10/04/97
	Q1	Ms	Harford	10/04/97
	R1	Ms	Harford	10/04/97
	S2	Ms	Harford	10/04/97
	S2	Ms, Hv	Harford	10/04/97

## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date
010	S2	Ms, Va	Harford	10/04/97
	T3	Va, Ms, Ppc	Harford	10/04/97
	U2	Ms, Va	Harford	10/04/97
	V3	Va, Ms	Harford	10/04/97
	W3	Ms	Harford	10/04/97
	X2	Ms, Va	Harford	10/04/97
	Y2	Ms, Va	Harford	10/04/97
	013	North of Hopkins Creek	Ppf, Zp	Citizen
Hopkins Creek		Ppf, Zp	Citizen	06/01/97
North of Log Point		Ppf, Zp	Citizen	06/01/97
N. of Strawberry Point		Ms, Va, Zp	Citizen	08/14/97
Stansbury Creek		Ms, Va, Zp	Citizen	08/14/97
Stansbury Creek		Ec, Ms, Va, Zp	Citizen	08/14/97
Stansbury Creek		Ms, Pcr, Va, Zp	Citizen	08/14/97
B2		Ec, Ms	APG	09-10/97
014	Railroad Creek	Cd, Ms, U	Citizen	08/15/97
	West of Wright Creek	Ec	Citizen	06/28/97
	West of Wright Creek	Ms	APG	09-10/97
	West of Swaderick Creek	Ms, Ngr, Pcr, Va, Ec	APG	09-10/97
	N3	Ms, Va	APG	09-10/97
	N3	Va	APG	09-10/97
	F2	Cd, Ms, Ec	APG	09-10/97
	E4	Ms, Ec, Cd	APG	09-10/97
	East of E4	Ms, Cd	APG	09-10/97
	E4	Ec, Ms, Cd	APG	09-10/97
	I2	Ms	APG	09-10/97
	Tip Carroll Point	Va	APG	09-10/97
	Carroll Point	Va	APG	09-10/97
	DA2	Va	APG	09-10/97
	EA4	Ec, Va	APG	09-10/97
	DA2	Ec, Va	APG	09-10/97
	DA2	Va, Ec	APG	09-10/97
	DA2	Va, Ec	APG	09-10/97
	GA4	Ec, Ms, Cd, Va, Ppu	APG	09-10/97
	GA4	Ec, Va, Cd	APG	09-10/97
	BA4	Ec, Ms, Va	APG	09-10/97
	BA4	Ec, Zp, Cd	APG	09-10/97
	Z4	Ec, Ms, Va	APG	09-10/97
	Y3	Ec, Ms, Va	APG	09-10/97
	Y3	Ec, Ms, Va	APG	09-10/97
	U2	Va, Ms	APG	09-10/97
	U2	Ms, Ec	APG	09-10/97
	W4	Ec, Va, Ms, Cd	APG	09-10/97
	North of LA2	Ec, Ms	APG	09-10/97
	LA2	Ec, Cd, Ms	APG	09-10/97

Quad	1997 Bed	Species*	Surveyor**	Survey Date	
014	KA4	Va, Ec, Ms, Cd	APG	09-10/97	
	JA2	Cd, Ec, Va	APG	09-10/97	
	HA2	Ec, Ms	APG	09-10/97	
	HA2	Va	APG	09-10/97	
	TA1	Va	APG	09-10/97	
	TA1	Va	APG	09-10/97	
	TA1	Va	APG	09-10/97	
	RA4	Va, Ec, Ms, Cd	APG	09-10/97	
	RA4	Ec, Va, Ms	APG	09-10/97	
	PA4	Ec, Ms, Va, Cd	APG	09-10/97	
	PA4	Va, Ec, Ms, Cd, Ppf	APG	09-10/97	
	PA4	Ec, Ms, Cd	APG	09-10/97	
	PA4	Va, Ec	APG	09-10/97	
	PA4	Ec, Cd, Va	APG	09-10/97	
	PA4	Ec, Cd, Va	APG	09-10/97	
	PA4	Ec, Ms, Va	APG	09-10/97	
	OA4	Va, Ms, Ec	APG	09-10/97	
	OA4	Va, Ec, Ms, Ppf	APG	09-10/97	
	OA4	Ec, Va, Ms, Cd	APG	09-10/97	
	OA4	Va, Ec, Ms, Ppf	APG	09-10/97	
	OA4	Ms, Va, Cd	APG	09-10/97	
	OA4	Ec, Va, Ms, Cd	APG	09-10/97	
	OA4	Ec, Ms, Nm, Cd	APG	09-10/97	
	MA4	Ec	APG	09-10/97	
	MA4	Ec, Cd	APG	09-10/97	
	MA4	Cd, Va, Ec	APG	09-10/97	
	B3	Va, Ms, Ppf, Pcr	APG	09-10/97	
	B3	Va, Ms, Ppf, Pcr, Cd	APG	09-10/97	
		West Cunninghill Cove	Ms, Va	APG	09-10/97
	015	G2	Ms, Pcr	Citizen	08/09/97
E2		Pcr	Citizen	08/09/97	
M2		Ms	Citizen	08/09/97	
I3		Ms	Citizen	08/09/97	
Handys Point		Ms, Pcr, Va	Citizen	08/24/97	
Worton Creek		Pcr	Citizen	06/21/97	
Abbey Creek		Va, Ms, Cd, Ppu, Zp	APG	09-10/97	
Abbey Creek		Va, Ms, Cd, Ppu, Zp	APG	09-10/97	
S2		Va, Ms, Cd, Ppu, Zp	APG	09-10/97	
T2		Ms	APG	09-10/97	
U2		Ms	APG	09-10/97	
016		B1	Cd, Ms, Hv	Harford	09/28/97
	H2	Ms, Cd, Hv	Harford	09/28/97	
	D2	Ms	Harford	09/28/97	
	E4	Ms, Cd, Hv, Va	Harford	09/28/97	
	F2	Ms, Cd, Hv, Va	Harford	09/28/97	

## SAV

<b>Quad</b>	<b>1997 Bed</b>	<b>Species*</b>	<b>Surveyor**</b>	<b>Survey Date</b>
016	F2	Ms, Cd, Hv, Va	Harford	09/28/97
017	F1	Ms	Harford	09/28/97
	G2	Ms	Harford	09/28/97
	H1	Ms	Harford	09/28/97
	I1	Ms	Harford	09/28/97
	E1	Ms	Harford	09/28/97
	K1	Ms	Harford	09/28/97
	B2	Va, Hv, Ms	Harford	09/28/97
018	Tanyard Cove	Ms	Citizen	08/31/97
019	B3	Ms	ACOE	07/28-29/97
021	J2	Rm, Ppf, Ms, Ec, Va	PWRC	08/08/97
023	V3	Rm	Citizen	08/03/97
	Severn River Bridge	Rm	Citizen	08/03/97
	E4	Ppf, Rm	SFNP	08/25/97
	O4	Ppf	SFNP	08/25/97
	N4	Ppf	SFNP	08/25/97
	C3	Ms	SFNP	08/25/97
	T3	Rm	SFNP	08/25/97
	U3	Rm	SFNP	08/25/97
	P3	Rm	SFNP	08/25/97
	O4	Rm	SFNP	08/25/97
	O4	Rm	SFNP	08/25/97
	O4	Rm	SFNP	08/25/97
	O4	Rm	SFNP	08/25/97
	N4	Rm	SFNP	08/25/97
	N4	Rm	SFNP	08/25/97
	J3	Rm	SFNP	08/25/97
	J3	Rm	SFNP	08/25/97
	K2	Rm	SFNP	08/25/97
	K2	Rm	SFNP	08/25/97
	I4	Rm	SFNP	08/25/97
	Little Round Bay	Rm	SFNP	08/25/97
	H1	Rm	SFNP	08/25/97
	Herald Harbor	Rm	SFNP	08/25/97
	East of Forked Creek	Rm	SFNP	08/25/97
	G1	Rm	SFNP	08/25/97
	Linestead on the Severn	Rm	SFNP	08/25/97
	F2	Rm	SFNP	08/25/97
	E4	Rm	SFNP	08/25/97
	E4	Rm	SFNP	08/25/97
	North of D4	Rm	SFNP	08/25/97
	C3	Ms, Rm	SFNP	08/25/97

Quad	1997 Bed	Species*	Surveyor**	Survey Date
023	Chase Creek	Rm	SFNP	08/25/97
	B2	Rm	SFNP	08/25/97
	A2	Rm	SFNP	08/25/97
	Winchester on the Severn	Rm	SFNP	06/10/97
	Cool Spring Creek	Ppf	SFNP	08/25/97
	E4	Ppf, Zp	MD-DNR	06/19/97
	O4	Rm, Zp	MD-DNR	06/19/97
	N4	Zp, Rm, Ppf, Ms	Citizen	06/18/97
	X1	Zp	USFWS	07/09/97
	Henderson Point	Zp	USFWS	07/09/97
	Smugglers Cove	Ms, Zp	USFWS	07/09/97
	Cypress Creek	Zp	USFWS	07/09/97
	Cypress Creek	Zp	USFWS	07/09/97
	Y4	Rm	USFWS	10/05/97
	E4	Ppf	USFWS	05/23/97
	E4	Ppf	USFWS	05/23/97
	E4	Ppf, Rm	USFWS	05/23/97
	Cypress Creek	Zp	USFWS	07/09/97
	Cypress Creek	Zp	USFWS	07/09/97
	X1	Ppf, Zp	USFWS	07/09/97
	X1	Zp	USFWS	07/09/97
	X1	Zp	USFWS	07/09/97
	X1	Ppf, Va, Zp	USFWS	07/09/97
	X1	Rm, Zp	USFWS	07/09/97
	X1	Zp, Rm, Ppf	USFWS	07/09/97
	W2	Ppf, Rm	USFWS	06/14/97
	North Ferry Point	Zp	USFWS	07/09/97
	Y4	Rm, Zp	USFWS	07/09/97
	Y4	Rm, Zp	USFWS	07/09/97
	North of X1	Rm, Zp	USFWS	07/09/97
	North of Z1	Zp	USFWS	07/09/97
	Ross Cove	Zp	USFWS	07/09/97
	Ross Cove	Zp	USFWS	07/09/97
	Cockey Creek	Zp	USFWS	07/09/97
	Cockey Creek	Zp	USFWS	07/09/97
	Cattail Creek	Zp	USFWS	07/09/97
	Dividing Creek	Zp	USFWS	07/09/97
	Dividing Creek	Zp	USFWS	07/09/97
	Henderson Point	Zp	USFWS	07/09/97
	Cypress Creek	Zp	USFWS	07/09/97
	Mill Creek	Zp	USFWS	07/09/97
	Mill Creek	Zp	USFWS	07/09/97
	Cockey Creek	Zp	USFWS	07/09/97
	Cockey Creek	Zp	USFWS	07/09/97
	Magothy Park Beach	Zp	USFWS	07/09/97
	Magothy cove	Zp	USFWS	07/09/97
	Magothy/Beachwood park	Zp	USFWS	07/09/97



## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date
023	Whitehurst Beach	Zp	USFWS	07/09/97
	Mill Creek	Zp, Ms	USFWS	07/09/97
	Cattail Creek	Zp	USFWS	07/09/97
	E4	Rm, Zp, Ppf, Ppc	USFWS	07/04/97
	Mill Creek	Zp	USFWS	07/09/97
	Mill Creek	Zp	USFWS	07/09/97
	Mill Creek	Zp	USFWS	07/09/97
	024	C1	Ppf, U, Zp	Citizen
	D4	Ms	Citizen	08/19/97
	W4	Ec, Ms, Ppf, Zp	Citizen	06/24/97
	Y4	Ec, Ms, Ppf, Va, Zp	Citizen	06/24/97
	Z4	Ms, Ppf, Rm, Zp	Citizen	06/24/97
	BA4	Ec, Ppf, Rm	GICS	09/02/97
	Park Creek	Ms, Rm	Citizen	07/09/97
	Forked Creek	Zp	Citizen	05/26/97
	Deep Creek	Ms	Citizen	08/19/97
	Deep Creek	Ms	Citizen	08/19/97
	A4	Ms	Citizen	09/13/97
	Winchester Pond	Ms, Ppf, Zp	Citizen	09/14/97
	Manresa	Ms	Citizen	09/14/97
	B4	Ms	Citizen	09/13/97
	DA4	Ppf, Zp, Rm	USFWS	06/25/97
	EA4	Ppf	USFWS	05/08/97
	Y4	Ms, Ppf, Ec, Zp, N, Ppc	USFWS	06/25/97
	EA4	Ppc, Ppf	USFWS	05/25/97
	Broad Creek	Zp	USFWS	06/22/97
	W4	Ppf, Rm, Ppc, Ms, Va, Ec, Zp	USFWS	06/22/97
	H2	Rm, Ppf, Zp	USFWS	06/28/97
	Blackhole Creek	Zp	USFWS	05/08/97
	Z4	Ppf, Ms, Rm, Ec, Zp	USFWS	06/25/97
	EA4	Ppc	USFWS	05/08/97
	DA4	Ms, Zp, Ppf	USFWS	05/08/97
	Dobbins Island	Zp	USFWS	05/08/97
	Blackhole Creek	Ppc, Zp, Ppf	USFWS	06/22/97
	Blackhole Creek	Zp	USFWS	06/22/97
	EA4	Ppf, Ppc	USFWS	07/27/97
	I2	Zp, Ppc, Rm	USFWS	09/13/97
	Little Magothy River	Ms	USFWS	09/13/97
	U3	Ppf, Rm, Ec, Ms, Ppc	USFWS	07/27/97
	Blackhole Creek mouth	Ppc, Zp	USFWS	07/09/97
	G3	Zp, Rm, Ppc, Ppf	USFWS	07/27/97
	E4	Ppc, Ppf, Rm, Zp	USFWS	07/27/97
	G3	Zp	USFWS	07/27/97
026	NA4	Rm, Ppf, Ppc	PWRC	08/13/97
	OA1	Rm, Ppf, Ppc	PWRC	08/13/97

Quad	1997 Bed	Species*	Surveyor**	Survey Date
026	RA4	Rm, Ppf, Ms, Ec, Zp	PWRC	08/02/97
	U4	Rm, Ppf, Ppc, Ms, Ec, Cd	PWRC	08/02/97
	B4	Rm, Ms, Ec	PWRC	08/05/97
	C4	Rm, Ec, Zp	PWRC	08/05/97
	D4	Rm, Ppf, Ec, Zp	PWRC	08/05/97
	F3	Rm, Ppf, Ec, Zp	PWRC	08/05/97
	K4	Ms, Ec	PWRC	08/05/97
	G4	Rm, Ms, Ec	PWRC	08/05/97
	S4	Rm, Ppf, N	PWRC	08/04/97
	W4	Ppf, Ms, Ec	PWRC	08/04/97
	W4	Rm, Ms, Ec, N, C	PWRC	08/02/97
	X4	Rm, Ppf, Ms, Ec, Zp, N, C	PWRC	08/02/97
	Y1	Rm, Ppf, Ec, N	PWRC	08/02/97
	BA4	Rm, Ppf, Ec	PWRC	08/08/97
	CA4	Rm, Ppf, Ms, Ec, Zp	PWRC	08/08/97
	DA4	Rm, Ms	PWRC	08/08/97
	EA2	Ppf, Ms	PWRC	08/08/97
	FA3	Ppf, Ms	PWRC	08/08/97
	GA4	Rm, Ppf, Ppc, Ms, Ec	PWRC	08/08/97
	HA3	Rm, Ppf, Ppc	PWRC	08/08/97
	IA2	Rm, Ppf, Ppc	PWRC	08/08/97
	JA4	Rm, Ppf, Ms, Ec, Zp, N, C	PWRC	08/08/97
	JA4	Rm, Ppf, Ppc	PWRC	08/08/97
	K4	Ms, Ec	PWRC	08/05/97
	Z2	Rm, Ppf, Ec, N	PWRC	08/02/97
	T4	Ec, Rm, Ms, Zp, Va	PWRC	08/02/97
	JA4	Ppf, Ms, Zp, Ec	USFWS	06/13/97
	Wickes Beach	Ms, Ec	USFWS	06/13/97
	JA4	Ppc, Ppf, Zp	USFWS	06/13/97
	CA4	Ms, Ppf	USFWS	06/13/97
028	East Potomac Park	Va	USGS	09/25/97
	S. of Memorial Bridge	Hv	USGS	09/25/97
	Memorial Bridge	Hv	USGS	09/25/97
	South of A4	Hv	USGS	09/25/97
	Northwest of A4	Hv	USGS	09/25/97
029	Anacostia River	Hv	USGS	09/25/97
030	Selby Bay	Zp	Citizen	06/01/97
	B3	Rm, Zp	Citizen	07/28/97
	C3	Rm, Zp	Citizen	Summer 97
	Limehouse Cove	Zp	Citizen	06/01/97
	Brewers Creek	Rm, Zp	Citizen	06/01/97
	Pocahontas Creek	Rm, Zp	Citizen	06/01/97
	Larkington Cove	Rm, Zp	Citizen	06/01/97
	Brewers Creek	Rm, Zp	Citizen	Summer 97

## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date
030	Cedar Point	Zp	Citizen	06/01/97
	Cedar Point	Rm, Zp	Citizen	07/28/97
	Cedar Point	Zp	Citizen	06/01/97
	D3	Rm, Zp	Citizen	07/28/97
	Glebe Bay	Zp	Citizen	06/01/97
	Glebe Creek	Zp	Citizen	06/01/97
	Glebe Creek	Zp	Citizen	06/01/97
	Glebe Creek	Zp	Citizen	06/01/97
	Glebe Creek	Zp	Citizen	06/01/97
	Glebe Creek	Zp	Citizen	06/01/97
	Glebe Creek	Zp	Citizen	06/01/97
	E1	Rm, Zp	Citizen	Summer 97
	West of E1	Rm, Zp	Citizen	Summer 97
	West of E1	Rm, Zp	Citizen	Summer 97
	Almshore Creek	Zp	Citizen	06/01/97
	Almshore Creek	Zp	Citizen	06/01/97
	Almshore Creek	Zp	Citizen	06/01/97
	Almshore Creek	Zp	Citizen	06/01/97
	N. of Pine Whiff Beach	Zp	Citizen	06/01/97
	Warehouse Creek	Zp	Citizen	06/01/97
	Warehouse Creek	Zp	Citizen	06/01/97
	Warehouse Creek	Zp	Citizen	06/01/97
	Beards Creek	Zp	Citizen	06/01/97
	Edgewater Beach	Zp	Citizen	06/01/97
	Beards Creek	Zp	Citizen	06/01/97
	Beards Creek	Zp	Citizen	06/01/97
	South Down Shores	Zp	Citizen	06/01/97
	Beards Creek	Zp	Citizen	06/01/97
	Beards Creek	Zp	Citizen	06/01/97
	Beards Creek	Zp	Citizen	06/01/97
	Beards Creek	Zp	Citizen	06/01/97
	Beards Creek	Zp	Citizen	06/01/97
	Beards Creek	Zp	Citizen	06/01/97
	Hardestys Cove	Zp	Citizen	06/01/97
	Beards Creek	Zp	Citizen	06/01/97
	Riva Bridge	Zp	Citizen	06/01/97
	Riva Bridge	Zp	Citizen	06/01/97
	Granville Creek	Zp	Citizen	06/01/97
	Hambleton	Zp	Citizen	06/01/97
	Glen Isle	Zp	Citizen	06/01/97
	Upper South River - S. shore	Zp	Citizen	06/01/97
	Upper South River - S. shore	Zp	Citizen	06/01/97
	Upper South River - S. shore	Zp	Citizen	06/01/97
	Upper South River - S. shore	Zp	Citizen	06/01/97
	Upper South River	Zp	Citizen	06/01/97
	Upper South River - N. shore	Zp	Citizen	06/01/97
	Upper South River - N. shore	Zp	Citizen	06/01/97
	Upper South River - N. shore	Zp	Citizen	06/01/97

Quad	1997 Bed	Species*	Surveyor**	Survey Date
030	Bon Haven	Zp	Citizen	06/01/97
	South Haven	Zp	Citizen	06/01/97
	South Haven	Zp	Citizen	06/01/97
	Porter Point	Zp	Citizen	06/01/97
	Broad Creek	Zp	Citizen	06/01/97
	Broad Creek	Zp	Citizen	06/01/97
	Broad Creek	Zp	Citizen	06/01/97
	Broad Creek	Zp	Citizen	06/01/97
	Broad Creek	Zp	Citizen	06/01/97
	Broad Creek	Zp	Citizen	06/01/97
	NW of Boyd Point	Zp	Citizen	06/01/97
	NW of Boyd Point	Zp	Citizen	06/01/97
	Cape St John	Zp	Citizen	06/01/97
	Cape St John	Zp	Citizen	06/01/97
	Cape St John	Zp	Citizen	06/01/97
	Gingerville Creek	Zp	Citizen	06/01/97
	Gingerville Creek	Zp	Citizen	06/01/97
	Gingerville Creek	Zp	Citizen	06/01/97
	Gingerville Creek	Zp	Citizen	06/01/97
	W. of Shadow Point	Zp	Citizen	06/01/97
	Shadow Point	Zp	Citizen	06/01/97
	E. of Shadow Point	Zp	Citizen	06/01/97
	Church Creek	Zp	Citizen	06/01/97
	Church Creek	Zp	Citizen	06/01/97
	Church Creek	Zp	Citizen	06/01/97
	Church Creek	Zp	Citizen	06/01/97
	Church Creek	Zp	Citizen	06/01/97
	Childs Point	Zp	Citizen	06/01/97
	Crab Creek	Zp	Citizen	06/01/97
	Crab Creek	Zp	Citizen	06/01/97
	Crab Creek	Zp	Citizen	06/01/97
	Crab Creek	Zp	Citizen	06/01/97
	Crab Creek	Zp	Citizen	06/01/97
	F2	Zp	Citizen	06/01/97
	Wild Rose Shores	Zp	Citizen	06/01/97
	H4	Zp	Citizen	07/28/97
	G3	Zp	Citizen	06/01/97
	Aberdeen Creek	Zp	Citizen	06/01/97
	Aberdeen Creek	Zp	Citizen	06/01/97
	NW of Persimmon Point	Zp	Citizen	06/01/97
	Persimmon Point	Rm, Zp	Citizen	06/01/97
	E. of Persimmon Point	Zp	Citizen	07/28/97
	Harness Creek	Zp	Citizen	07/28/97
	Harness Creek	Zp	Citizen	07/28/97
	Harness Creek	Zp	Citizen	06/01/97
	SE Persimmon Point	Zp	Citizen	06/01/97
	NW of Hill Point	Rm, Zp	Citizen	07/28/97

## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date
030	NW of Hill Point	Zp	Citizen	06/01/97
	North of Hill Point	Zp	Citizen	06/01/97
	Cadle Creek	Rm	Citizen	Summer 97
031	Duvall Creek	Rm	Citizen	08/15/97
	Duvall Creek	Rm	Citizen	08/15/97
	Duvall Creek	Zp	Citizen	06/01/97
	Duvall Creek	Zp	Citizen	06/01/97
	Duvall Creek	Zp	Citizen	06/01/97
	Marshy Point	Rm	Citizen	08/15/97
	Fishing Creek	Zp	Citizen	06/01/97
	Fishing Creek	Zp	Citizen	06/01/97
	Fishing Creek	Zp	Citizen	06/01/97
	Fishing Creek	Zp	Citizen	06/01/97
	Fishing Creek	Zp	Citizen	06/01/97
	Oyster Creek	Zp	Citizen	06/01/97
	Lake Ogleton	Ms, Zp	Citizen	06/01/97
	Lake Ogleton	Ms, Zp	Citizen	06/01/97
	Lake Ogleton	Ms, Zp	Citizen	06/01/97
	Back Creek	Zp	Citizen	06/01/97
	Back Creek	Zp	Citizen	06/01/97
	Spa Creek	Zp	Citizen	06/01/97
	Spa Creek	Zp	Citizen	06/01/97
	Spa Creek	Zp	Citizen	06/01/97
	College Creek	Zp	Citizen	06/01/97
	College Creek	Zp	Citizen	06/01/97
	Horseshoe Point	Zp	Citizen	06/01/97
Ramsay Lake	Rm	Citizen	08/15/97	
032	UA3	Ppf	Citizen	07-08/97
	TA4	Ppf, Rm	Citizen	07-08/97
	TA4	Rm	Citizen	07-08/97
	TA4	Ppf, Rm	Citizen	07-08/97
	OA2	Rm	Citizen	07-08/97
	Cox Creek	Rm	Citizen	07-08/97
	NA2	Ppf, Rm	Citizen	07-08/97
	MA4	Ppf	Citizen	07-08/97
	Cox Creek	Rm	Citizen	07-08/97
	Cox Creek	Rm	Citizen	07-08/97
	Cox Creek	Rm	Citizen	07-08/97
	PA4	Ppf, Rm	Citizen	07-08/97
	Thompson Creek	Rm	Citizen	07-08/97
	SA4	Ppf, Rm	Citizen	07-08/97
	GB4	Rm, Zp	PWRC	07/31/97
	FB2	Rm, Ppc, Zp	PWRC	07/31/97
EB4	Zp	PWRC	07/31/97	
DB3	Rm, Zp	PWRC	07/31/97	

Quad	1997 Bed	Species*	Surveyor**	Survey Date
032	CB4	Rm, Ppc, Zp	PWRC	07/31/97
	ZA4	Rm, Ppc, Zp	PWRC	07/31/97
	YA2	Rm, Zp	PWRC	07/31/97
	XA4	Rm, Zp	PWRC	07/25/97
	WA4	Rm, Ppf	PWRC	07/25/97
	TA4	Rm, Ppf	PWRC	07/25/97
	TA4	Rm, Ppf, Ms	PWRC	07/25/97
	TA4	Rm, Ppf	PWRC	07/25/97
	OA2	Rm, Ppf	PWRC	08/19/97
	NA2	Rm, Ppf	PWRC	08/19/97
	LA3	Rm, Ppf	PWRC	08/19/97
	KA1	Rm	PWRC	08/19/97
	JA4	Rm, Ppc, Zp	PWRC	08/19/97
	JA4	Rm, Ppc	PWRC	08/19/97
	JA4	Rm, Ppc	PWRC	08/19/97
	IA1	Rm	PWRC	08/19/97
	HA3	Rm, Ppc	PWRC	08/19/97
	DA4	Rm, Ppc	PWRC	08/19/97
	FA4	Rm	PWRC	08/19/97
	CA4	Rm, Ppc, Zp	PWRC	08/19/97
	AA4	Rm, Zp	PWRC	08/19/97
	AA4	Rm, Zp	PWRC	08/19/97
	AA4	Rm, Ppc	PWRC	08/19/97
	East of Parson Island	Rm, Ppc	PWRC	08/19/97
	JB1	Rm, Ppc	PWRC	08/19/97
	HB4	Rm, Ppc	PWRC	08/19/97
	Y3	Rm, Ppf	PWRC	08/01/97
	Y3	Rm	PWRC	08/01/97
	X4	Rm, Zp	PWRC	08/01/97
	T4	Rm, Ppf, Ms	PWRC	08/01/97
	S3	Rm, Ppf, Ms	PWRC	08/01/97
	Q4	Rm, Ppf, Ms, Ec	PWRC	08/01/97
	N4	Rm, Ppf, Ms, Ec	PWRC	08/11/97
	N4	Rm, Ppf, Ms	PWRC	08/11/97
	K4	Rm, Ppf, Ms	PWRC	08/11/97
	K4	Ppf, Ms	PWRC	08/11/97
	I4	Rm, Ppf, Ms, Ec	PWRC	08/11/97
	H4	Rm, Ppf, Ms, Ec	PWRC	08/11/97
	BB3	Rm, Ppc, Zp	PWRC	07/31/97
	AB2	Rm, Ppc, Zp	PWRC	07/31/97
	VA1	Rm, Ppf	PWRC	07/25/97
	GA4	Rm, Ppc	PWRC	08/19/97
	EA2	Rm	PWRC	08/19/97
IB2	Rm, Ppc	PWRC	08/19/97	
West of IB2	Rm	MD-DNR	08/15/97	

## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date
033	ZA2	Rm	PWRC	09/08/97
	XA3	Rm	PWRC	08/17/97
	OA4	Rm	PWRC	08/17/97
	LA4	Rm	PWRC	09/08/97
	JA4	Rm	PWRC	08/17/97
	JA4	Rm	Citizen	Summer 97
	IA2	Rm	Citizen	Summer 97
	IA2	Rm	PWRC	08/01/97
	HA4	Rm	Citizen	Summer 97
	HA4	Rm, Ppc	PWRC	08/01/97
	GA2	Rm	Citizen	Summer 97
	GA2	Rm	PWRC	08/01/97
	FA4	Rm, Ppc, Zp	PWRC	08/01/97
	EA1	Rm	PWRC	08/01/97
	DA3	Rm	PWRC	08/01/97
	CA4	Rm	PWRC	08/01/97
	CA4	Rm	PWRC	08/01/97
	CA4	Ms, Ppf	Citizen	07/09/97
	CA4	Rm	PWRC	08/11/97
	BA2	Rm	PWRC	08/11/97
	BA2	Rm, Zp	Citizen	07/09/97
	AA1	Rm, Zp	Citizen	07/09/97
	Z4	Rm, Ppf, Ppc, Ms, Ec	PWRC	08/11/97
	Z4	Ec, Ms, Ppc, Ppf, Rm, Zp	NAIB	06/21/97
	Y4	Rm, Ppf	PWRC	08/11/97
	Y4	Ms, Ppf, Rm	MD-DNR	08/15/97
	X2	Rm, Ppf	PWRC	08/11/97
	X2	Rm, Ppf, Ms	PWRC	08/11/97
	W3	Rm, Ppf	PWRC	08/11/97
	P4	Ms, Ppf, U	Citizen	07/13/97
	P4	Rm, Ppf, Ms, Ec	PWRC	08/11/97
	P4	Ms, Ppf, U	Citizen	07/13/97
	P4	Rm, Ppf, Ppc, Ms	PWRC	08/11/97
	O4	Ms, Ppf, U	Citizen	07/13/97
	O4	Rm, Ppf, Ms, Ec	PWRC	08/11/97
	N4	Ms, Ppf, U	Citizen	07/13/97
	M1	Ms, Ppf, U	Citizen	07/13/97
	L4	Ms, Ppf, U	Citizen	07/13/97
	N4	Rm, Ppf	PWRC	08/11/97
	M1	Rm, Ppf	PWRC	08/11/97
	L4	Rm, Ppf, Ppc	PWRC	08/11/97
	K4	Ms, Ppf, U	Citizen	07/13/97
	K4	Ppf, Ms, Ec	PWRC	08/13/97
	Stony Bar Bluff	Ms, Ppf, U	Citizen	07/13/97
	Stony Bar Bluff	Ppf	PWRC	08/11/97
	J4	Ms, Ppf, U	Citizen	07/13/97
	J4	Rm, Ppf, Ms, Ec	PWRC	08/11/97

Quad	1997 Bed	Species*	Surveyor**	Survey Date
033	J4	Ms, Ppf, U	Citizen	07/13/97
	J4	Rm, Ms	PWRC	08/11/97
	J4	Rm	MD-DNR	08/15/97
	J4	Rm, Ppf, Ms	PWRC	08/11/97
	J4	Ms, Ppf, U	Citizen	07/13/97
	J4	Rm, Ms, Ec	PWRC	08/11/97
	J4	Ms, Ppf, U	Citizen	07/13/97
	J4	Rm, Ppf, Ms, Ec	PWRC	08/11/97
	J4	Ms, Ppf, U	Citizen	07/13/97
	J4	Ms, Ppf, U	Citizen	07/13/97
	J4	Ppf, Ms, Ec	PWRC	08/11/97
	H2	Rm, Ppf, Ppc, Ms, Ec	PWRC	08/13/97
	H2	Ms, Ppf, U	Citizen	07/13/97
	I4	Ms, Ppf, U	Citizen	07/13/97
	I4	Ms, Ppf, U	Citizen	07/13/97
	G1	Ms, Ppf, U	Citizen	07/13/97
	G1	Rm, Ppf	PWRC	08/13/97
	E3	Ms, Ppf, U	Citizen	07/13/97
	D4	Ms, Ppf, U	Citizen	07/13/97
	D4	Rm, Ms, Ec	PWRC	08/13/97
	E3	Rm, Ppf, Ms, Ec	PWRC	08/13/97
	B4	Rm, Ppf, Ec, N	PWRC	08/07/97
	B4	Ms, Ppf, U	Citizen	07/13/97
	A4	Rm, Ppf, Ms, Ec, N	PWRC	08/07/97
	SA2	Ppc, Rm, Zp	MD-DNR	08/15/97
	TA4	Rm, Ppc	PWRC	08/19/97
	TA4	Ppc, Rm, Zp	MD-DNR	08/15/97
	WA1	Rm, Ppc	PWRC	08/19/97
	WA1	Ppc, Rm, Zp	MD-DNR	08/15/97
	VA2	Rm, Ppc	PWRC	08/19/97
	UA4	Rm	MD-DNR	08/15/97
	SA2	Rm	MD-DNR	08/15/97
	Z4	Rm, Ms, Zp, Ppf	USFWS	06/21/97
	South of Z4	Rm, Ms, Zp, Ppf	USFWS	06/21/97
	Little Queenstown Creek	Ms, Ppc	USFWS	06/28/97
	E3	Ppf, Ec, Rm, Ppc, Ms, Zp	USFWS	06/28/97
	D4	Ms, Zp	USFWS	06/28/97
	B4	Ms, Ppc, Ppf, Rm, Zp	USFWS	06/28/97
	Z4	Ppf, Rm, Ppc, Ms, Zp, Ec	USFWS	06/21/97
	Z4	Ppf, Ms, Rm, Ppc	USFWS	06/21/97
	South of Z4	Zp, Ms	USFWS	06/21/97
	Z4	Rm, Ms, Zp, Ppf, Ppc	USFWS	06/21/97
	South of Z4	Rm, Ms, Zp, Ppf	USFWS	06/21/97
	East of TA4	Rm, Ppc, Zp	MD-DNR	08/15/97
	Y4	Rm, Ppf, Ms	MD-DNR	08/07/97
	Z4	Rm, Ppf, Ms	MD-DNR	08/07/97
	East of TA4	Rm	MD-DNR	08/15/97



## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date
034	East of TA4	Rm, Ppc, Zp	MD-DNR	08/15/97
	UA4	Rm, Ppc	PWRC	08/19/97
	JA3	Cd, Hv	Citizen	08/26/97
	A4	Hv, Va	Citizen	08/26/97
	D3	Hv, Ms, Va	Citizen	08/26/97
	D3	Hv, Va	Citizen	08/26/97
	E4	Ms, Va	Citizen	08/26/97
	North of Rosier Bluff	Ms, Va	Citizen	08/26/97
	F4	Hv, Va	Citizen	08/26/97
	J1	Hv	Citizen	08/26/97
	B3	Va, Hv	USGS	09/11/97
	C1	Va, Ms, Hv	USGS	09/11/97
	D3	Va, Hv	USGS	09/11/97
	D3	Va, Hd	USGS	09/11/97
	D3	Va, Hd	USGS	09/11/97
	D3	Va	USGS	09/11/97
	E4	Va, Hd, Hv	USGS	09/11/97
	E4	Hv, Va	USGS	09/11/97
	North of E4	Hv	USGS	09/11/97
	North of E4	Hv	USGS	09/11/97
	South of F4	Hv, Va	USGS	09/11/97
	F4	Hv, Nm, Va	USGS	09/11/97
	North of F4	Hv, Ppc, Va	USGS	09/24/97
	J1	Hv, Cd	USGS	09/24/97
	H4	Hv	USGS	09/24/97
	H4	Hv	USGS	09/24/97
	H4	Hv, Va, Ppc	USGS	09/24/97
	H4	Hv	USGS	09/24/97
	I4	Hv	USGS	09/24/97
	L4	Ms	USGS	09/24/97
	North of M1	Hv, Nm	USGS	09/24/97
	US Navy Research Lab	Hv	USGS	09/24/97
	N. of Navy Research Lab	Nm	USGS	09/24/97
	N4	Va	USGS	09/24/97
	North of N4	Va, Ms	USGS	09/24/97
	O3	Va	USGS	09/24/97
	North of O3	Va	USGS	09/24/97
	Anacostia River	Va	USGS	09/24/97
	Anacostia River	Va	USGS	09/24/97
	South of Q3	Hv	USGS	09/24/97
	Anacostia River	Va	USGS	09/24/97
	S4	Va, Hv	USGS	09/24/97
	T2	Va	USGS	09/24/97
	U3	Va	USGS	09/24/97
	U3	Va	USGS	09/24/97
	U3	Va, Ms	USGS	09/24/97
	JA3	Hv	USGS	09/12/97

Quad	1997 Bed	Species*	Surveyor**	Survey Date	
034	HA4	Hv	USGS	09/12/97	
	GA4	Hv	USGS	09/12/97	
	E. of Hunting Creek	Hv	USGS	09/12/97	
	E. of Hunting Creek	Hv	USGS	09/12/97	
	E. of Hunting Creek	Hv, Pcr	USGS	09/12/97	
	J1	Hv, Cd, Nm	USGS	09/24/97	
	J1	Hv, Cd, Nm	USGS	09/24/97	
	J1	Hv, Cd, Nm	USGS	09/24/97	
	West of Goose Island	Hv	USGS	09/24/97	
	West of Goose Island	Hv	USGS	09/24/97	
	FA3	Nm, Hv	USGS	09/24/97	
	EA3	Hv	USGS	09/24/97	
	North of EA2	Va	USGS	09/24/97	
	South of DA2	Va	USGS	09/24/97	
	DA2	Va, Hv, Nm	USGS	09/24/97	
	Dangerfield Island	Va	USGS	09/24/97	
	CA4	Hv, Va	USGS	09/24/97	
	BA4	Hv, Va	USGS	09/24/97	
	AA2	Hv	USGS	09/24/97	
	AA2	Hv	USGS	09/24/97	
	Z4	Hv	USGS	09/24/97	
	Y4	Hv	USGS	09/24/97	
	X4	Hv	USGS	09/24/97	
	South of X4	Hv	USGS	09/24/97	
	South of X4	Hv, Nm, Va	USGS	09/24/97	
	X4	Hv, Nm, Va	USGS	09/24/97	
	W4	Hv	USGS	09/24/97	
	North of Gravelly Point	Hv	USGS	09/24/97	
	NE of Gravelly Point	Va	USGS	09/24/97	
	036	CA4	Rm	Citizen	07/26/97
		CA4	Rm	Citizen	07/26/97
		DA4	Rm	Citizen	07/26/97
		EA4	Rm	Citizen	07/26/97
CA4		Rm	Citizen	07/26/97	
SA4		Rm, Zp	PWRC	07/31/97	
BB1		Rm	PWRC	07/31/97	
ZA4		Rm, Ppc, Zp	PWRC	07/31/97	
NA1		Rm	PWRC	08/21/97	
MA4		Rm	PWRC	08/21/97	
MA4		Rm	PWRC	08/21/97	
JA4		Rm	PWRC	08/21/97	
JA4		Rm	PWRC	08/21/97	
JA4		Rm, Zp	PWRC	08/21/97	
HA4		Rm	PWRC	08/21/97	
GA4		Rm	PWRC	08/21/97	
FA2	Rm, Ppc, Zp	PWRC	08/21/97		

## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date
036	KA4	Rm, Zp	PWRC	08/21/97
	LA1	Rm, Zp	PWRC	08/21/97
	Z4	Rm	PWRC	09/23/97
	X4	Rm	PWRC	09/23/97
	X4	Rm	PWRC	09/23/97
	X4	Rm	PWRC	09/23/97
	X4	Rm	PWRC	09/23/97
	W4	Rm	PWRC	09/23/97
	V2	Rm	PWRC	09/23/97
	U4	Rm	PWRC	09/23/97
	T4	Rm	PWRC	09/23/97
	P4	Rm	PWRC	09/23/97
	O1	Rm	PWRC	09/23/97
	N2	Rm	PWRC	09/23/97
	M4	Rm	PWRC	09/23/97
	L2	Rm	PWRC	09/23/97
	Waterhole Creek	Rm	PWRC	09/23/97
	C4	Rm	PWRC	09/23/97
	E4	Rm	PWRC	09/16/97
	F4	Rm	PWRC	09/15/97
	G4	Rm	PWRC	09/15/97
	H4	Rm	PWRC	09/15/97
	I4	Rm	PWRC	09/15/97
	I4	Rm	PWRC	09/15/97
	J4	Rm	PWRC	09/15/97
	K4	Rm	PWRC	09/15/97
	CA4	Rm	PWRC	09/15/97
	CA4	Rm	PWRC	09/15/97
	CA4	Rm	PWRC	09/15/97
	CA4	Rm	PWRC	09/15/97
	DA4	Rm	PWRC	09/26/97
	EA4	Rm	PWRC	09/26/97
	EA4	Rm	PWRC	09/26/97
YA1	Rm, Ppc, Zp	PWRC	07/31/97	
CB3	Rm	PWRC	07/31/97	
Sherwood Pier	Rm	USFWS	02/26/97	
037	IB4	Rm	Citizen	08/03/97
	C2	Rm	PWRC	08/17/97
	D4	Rm	PWRC	08/29/97
	F4	Rm	PWRC	08/17/97
	H4	Rm	PWRC	08/17/97
	J3	Rm	PWRC	08/17/97
	N3	Rm, Ms	PWRC	08/12/97
	O3	Rm	PWRC	08/28/97
	O3	Rm	PWRC	08/28/97
	O3	Rm	PWRC	08/28/97

Quad	1997 Bed	Species*	Surveyor**	Survey Date
037	P1	Rm	PWRC	08/28/97
	S4	Rm	PWRC	08/12/97
	U4	Rm	PWRC	08/12/97
	W3	Rm	PWRC	08/12/97
	X1	Rm	PWRC	08/12/97
	Z4	Rm	PWRC	08/12/97
	AA2	Rm	PWRC	08/28/97
	DA2	Rm	PWRC	08/28/97
	DA2	Rm	PWRC	08/28/97
	GA2	Rm	PWRC	08/28/97
	FA4	Rm, Ppf	PWRC	08/28/97
	HA2	Rm	PWRC	08/28/97
	JA2	Rm	PWRC	08/28/97
	LA4	Rm, Zp	PWRC	08/28/97
	NA4	Rm	PWRC	08/28/97
	OA3	Rm	PWRC	08/12/97
	OA3	Rm	PWRC	08/12/97
	PA4	Rm, Zp	PWRC	08/12/97
	RA1	Rm, Zp	PWRC	08/12/97
	SA3	Rm	PWRC	08/12/97
	Spencer Creek	Rm	PWRC	08/12/97
	TA3	Rm	PWRC	08/12/97
	WA1	Rm, Zm	PWRC	08/28/97
	ZA3	Rm, Zm	PWRC	08/28/97
	AB1	Rm, Zm	PWRC	08/21/97
	CB4	Rm	PWRC	08/21/97
	DB4	Rm, Ppc, Zp	PWRC	08/21/97
	FB4	Rm	PWRC	09/26/97
	HB4	Rm	PWRC	09/26/97
	HB4	Rm	PWRC	09/26/97
	IB4	Rm	PWRC	09/26/97
	KB4	Rm	PWRC	09/15/97
	LB4	Rm	PWRC	09/15/97
	LB4	Rm	PWRC	09/26/97
	LB4	Rm	PWRC	09/26/97
	LB4	Rm	PWRC	09/26/97
	LB4	Rm	PWRC	09/26/97
	LB4	Rm	PWRC	09/26/97
	LB4	Rm	PWRC	09/26/97
	LB4	Rm	PWRC	09/26/97
	LB4	Rm	PWRC	09/26/97
	LB4	Rm	PWRC	09/26/97
	QA4	Rm	PWRC	09/26/97
	QA4	Rm	PWRC	09/26/97
	NB4	Rm	PWRC	10/02/97
	MB4	Rm	PWRC	10/02/97
	NB4	Rm, Zp	PWRC	08/12/97

## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date
039	L4	Cd, Hv, N	Citizen	07/27/97
	L4	Cd, Hv, N	Citizen	07/27/97
	M4	Ms, Hv, Va	Citizen	07/27/97
	F4	Hv, Ms, N, Va	Citizen	08/17/97
	K4	Hv, Ms, N, Va	Citizen	09/06/97
	I2	Va	Citizen	09/06/97
	H4	Cd, Hv, Ms, N, Va	Citizen	09/06/97
	G2	N, Va	Citizen	09/06/97
	O4	Va	Citizen	09/06/97
	M4	Ms, Va	Citizen	09/06/97
	South of G2	Va	USGS	09/17/97
	East of G2	Hv, Va, Nm, Ms, Ppu	USGS	09/17/97
	H4	Hv, Nm, Va	USGS	09/17/97
	H4	Nm, Va, Ppu, Ppc, Cd, Ms	USGS	09/17/97
	I2	Nm, Hv, Cd	USGS	09/17/97
	West of H4	Va	USGS	09/17/97
	I2	Va, Nm	USGS	09/17/97
	J3	Nm, Va, Hv	USGS	09/17/97
	J3	Va, Nm, Hv	USGS	09/17/97
	J3	Va, Hv, Nm	USGS	09/17/97
	J3	Va, Hv, Nm	USGS	09/17/97
	K4	Va, Ms	USGS	09/17/97
	K4	Ms, Va	USGS	09/17/97
	K4	Hv, Va	USGS	09/17/97
	K4	Va, Hv, Nm, Ms	USGS	09/17/97
	K4	Va, Ms, Hv	USGS	09/17/97
	K4	Va, Ms, Hv	USGS	09/17/97
	K4	Va	USGS	09/17/97
	K4	Va, Ms, Hv	USGS	09/17/97
	K4	Va, Hv	USGS	09/17/97
	K4	Va, Ms	USGS	09/17/97
	K4	Hv, Va	USGS	09/17/97
	K4	Va, Hv	USGS	09/17/97
	O4	Va, Hv	USGS	09/17/97
	M4	Hv, Va	USGS	09/17/97
	O4	Va	USGS	09/17/97
	M4	Va, Ms, Hv, Nm	USGS	09/17/97
	M4	Hv, Va, Ms, Nm, Cd	USGS	09/17/97
	L4	Hv, Cd, Nm	USGS	09/19/97
	L4	Hv	USGS	09/19/97
	L4	Hv	USGS	09/19/97
	L4	Hv, Cd, Nm	USGS	09/19/97
	Pohick	Hv	USGS	09/17/97
	South of Pohick	Cd, Va, Hv	USGS	09/17/97
	F4	Hv, Nm, Ms	USGS	09/17/97
	F4	Hv, Va, Ms	USGS	09/17/97
	F4	Hv, Nm, Ms	USGS	09/17/97

Quad	1997 Bed	Species*	Surveyor**	Survey Date
039	South of A4	Va	USGS	09/17/97
	A4	Hv, Nm, Ms	USGS	09/17/97
	A4	Hv, Nm, Ms	USGS	09/17/97
	East of A4	Hv, Nm, Ms	USGS	09/17/97
	East of B4	Nm, Hv, Va	USGS	09/17/97
	E2	Hv, Va	USGS	09/17/97
	P4	Va	USGS	09/19/97
	North of P4	Hv	USGS	09/19/97
	D1	Hv, Nm, Va, Ms	USGS	07/31/97
040	G4	Va	Citizen	07/26/97
	F2	Va	Citizen	07/26/97
	D4	Cd, Hv, N, Nm	Citizen	07/26/97
	C4	Cd, Hv, N	Citizen	07/26/97
	A4	Cd, Hv, N	Citizen	07/26/97
	B4	Cd, Hv	Citizen	08/26/97
	M4	Hv	Citizen	08/26/97
	M4	Cd, Hv, N	Citizen	08/26/97
	N4	Hv	Citizen	08/26/97
	O4	Va	Citizen	08/26/97
	Q4	Hv, N, Va	Citizen	08/26/97
	R2	Hv, Va	Citizen	08/26/97
	S4	Hv	Citizen	08/26/97
	S4	Hv, N	Citizen	08/26/97
	Z4	Cd, Ec, Hv, Va	Citizen	10/13/97
	Z4	Cd, Ec, Hv, Va	Citizen	10/13/97
	D4	Hv, Va, Cd	USGS	09/19/97
	A4	Va, Hv, Cd	USGS	09/19/97
	B4	Hv, Cd	USGS	09/19/97
	C4	Hv, Cd	USGS	09/19/97
	E1	Va, Hv, Cd	USGS	09/19/97
	F2	Va, Cd, Hv	USGS	09/19/97
	F2	Va, Hv	USGS	09/19/97
	F2	Va, Hv	USGS	09/19/97
	F2	Va, Hv, Cd	USGS	09/19/97
	F2	Va, Hv, Cd	USGS	09/19/97
	G4	Va, Hv, Cd	USGS	09/19/97
	G4	Va, Hv, Cd	USGS	09/19/97
	G4	Hv, Va	USGS	09/19/97
	G4	Hv, Va	USGS	09/19/97
	G4	Hv, Va	USGS	09/19/97
	E1	Va	USGS	09/19/97
G4	Va, Hv	USGS	09/19/97	
H2	Va, Hv, Cd	USGS	09/19/97	
H2	Va	USGS	09/19/97	
H2	Va, Hv, Nm	USGS	09/19/97	
H2	Va, Hv, Cd	USGS	09/19/97	

SAV

040	I4	Hv, Nm, Va, Hd	USGS	09/19/97
	J3	Va, Hv, Nm	USGS	09/19/97
	J3	Va, Hv	USGS	09/19/97
	J3	Va, Hv	USGS	09/19/97
	J3	Va, Hv, Hd	USGS	09/19/97
	K4	Nm, Hv, Va, Hd	USGS	09/19/97
	L2	Va, Hv, Nm	USGS	09/19/97
	South of L2	Hv, Cd	USGS	09/11/97
	M4	Hv, Nm	USGS	09/11/97
	North of M4	Hv, Nm	USGS	09/11/97
	M4	Hv, Nm	USGS	09/11/97
	North of M4	Hv	USGS	09/11/97
	M4	Hv	USGS	09/11/97
	M4	Hv	USGS	09/11/97
	M4	Hv	USGS	09/11/97
	North of M4	Hv, Nm	USGS	09/11/97
	M4	Hv, Nm	USGS	09/11/97
	East of N4	Hv, Nm, Cd	USGS	09/11/97
	M4	Hv, Cd, Nm	USGS	09/11/97
	South of N4	Hv, Va, Cd	USGS	09/11/97
	N4	Hv, Va, Cd	USGS	09/11/97
	N4	Va, Hd	USGS	09/11/97
	N4	Va	USGS	09/11/97
	O4	Va, Hd	USGS	09/11/97
	O4	Va, Hd	USGS	09/11/97
	P4	Nm, Hv	USGS	09/11/97
	Q4	Nm, Hv	USGS	09/11/97
	Q4	Va	USGS	09/11/97
	Q4	Va, Hd	USGS	09/11/97
	Q4	Va	USGS	09/11/97
	R2	Hv, Va, Nm, Hd, Cd	USGS	09/11/97
	S4	Hv, Nm, Cd	USGS	09/11/97
	T1	Hv	USGS	09/12/97
	T1	Va, Hv, Hd	USGS	09/12/97
	T1	Va	USGS	09/12/97
	U4	Va, Nm, Hv, Ppc	USGS	09/12/97
	V2	Va, Hv	USGS	09/12/97
	V2	Va, Hv	USGS	09/12/97
	V2	Va, Hv	USGS	09/12/97
	V2	Va, Ppc, Hd, Hv	USGS	09/12/97
	V2	Va, Ppc, Hd, Hv	USGS	09/12/97
	V2	Va, Hv	USGS	09/12/97
	Sheridan Point	Ms, Hd, Hv	USGS	09/12/97
	Y2	Va	USGS	09/12/97
	Z4	Hv, Nm, Hd	USGS	09/19/97
	Z4	Va, Hv, Nm	USGS	09/19/97
	Z4	Va	USGS	09/19/97

Quad	1997 Bed	Species*	Surveyor**	Survey Date	
041	Mataponi Creek	Cd, Ec, Hv, Nm, Per	PRP	08/07/97	
	Mataponi Creek	Cd, Hv, Nm	PRP	08/07/97	
	Hall Creek	Cd, Ngu, Nm, Va	PRP	08/07/97	
	Cocktown Creek	Cd, Ec, Per, Va	SMS	10/30/97	
	I4	N, Hv	MD-DNR	08/28/97	
	I4	N, Hv	MD-DNR	08/28/97	
	Jones Point	N, Cd	MD-DNR	08/28/97	
	South of M2	Hv, N	MD-DNR	08/28/97	
	North of Swamp Creek	N	MD-DNR	08/28/97	
	C4	N	MD-DNR	08/28/97	
	D4	N	MD-DNR	08/28/97	
	D4	Nm, Hv	MD-DNR	08/28/97	
	042	A3	Rm	EPA	08/14/97
	043	Q2	U	Citizen	Summer 97
V4		U	Citizen	Summer 97	
CA4		Rm	PWRC	09/15/97	
BA4		Rm	PWRC	09/15/97	
AA4		Rm	PWRC	09/15/97	
Z4		Rm	PWRC	09/15/97	
Y4		Rm	PWRC	09/15/97	
X4		Rm	PWRC	09/15/97	
V4		Rm	PWRC	09/15/97	
V4		Rm	PWRC	09/15/97	
S3		Rm	PWRC	09/15/97	
Q2		Rm	PWRC	09/15/97	
Q2		Rm	PWRC	09/15/97	
P3		Rm	PWRC	09/15/97	
N4		Rm	PWRC	09/16/97	
M2		Rm	PWRC	09/16/97	
L4		Rm	PWRC	09/16/97	
L4		Rm	PWRC	09/16/97	
L4		Rm	PWRC	09/16/97	
K4		Rm	PWRC	09/23/97	
J2		Rm	PWRC	09/23/97	
I1		Rm	PWRC	09/23/97	
H3		Rm	PWRC	10/02/97	
H3		Rm	PWRC	10/02/97	
H3		Rm	PWRC	10/02/97	
G2		Rm	PWRC	10/02/97	
F2		Rm	PWRC	10/02/97	
C4	Rm	PWRC	09/16/97		
A4	Rm	PWRC	09/16/97		
East of A4	Rm	USFWS	02/26/97		



## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date
044	K4	Ppc, Zp	Citizen	09/19/97
	PB1	Rm	PWRC	09/24/97
	OB2	Rm	PWRC	09/24/97
	NB3	Rm	PWRC	09/24/97
	MB3	Rm	PWRC	09/24/97
	KB3	Rm	PWRC	09/24/97
	KB3	Rm	PWRC	09/24/97
	HB4	Rm	PWRC	09/24/97
	HB4	Rm	PWRC	09/24/97
	GB4	Rm	PWRC	09/24/97
	EB4	Rm	PWRC	09/24/97
	DB4	Rm	PWRC	09/24/97
	BB4	Rm	PWRC	09/17/97
	BB4	Rm	PWRC	09/17/97
	ZA4	Rm	PWRC	09/17/97
	VA4	Rm	PWRC	09/17/97
	TA4	Rm	PWRC	09/17/97
	SA4	Rm	PWRC	09/17/97
	SA4	Rm	PWRC	09/17/97
	SA4	Rm	PWRC	09/17/97
	RA4	Rm	PWRC	09/17/97
	RA4	Rm	PWRC	09/17/97
	PA4	Rm	PWRC	09/17/97
	NA4	Rm	PWRC	09/17/97
	MA4	Rm	PWRC	09/17/97
	HA4	Rm	PWRC	09/17/97
	HA4	Rm	PWRC	09/17/97
	GA4	Rm	PWRC	09/17/97
	FA3	Rm	PWRC	09/17/97
	EA1	Rm	PWRC	09/17/97
	BA4	Rm	PWRC	09/17/97
	X1	Rm	PWRC	09/17/97
	T4	Rm	PWRC	09/17/97
	V4	Rm	PWRC	09/17/97
	W3	Rm	PWRC	09/17/97
	R4	Rm	PWRC	09/17/97
	R4	Rm	PWRC	09/17/97
	S1	Rm	PWRC	09/17/97
	Q2	Rm	PWRC	09/17/97
	Q2	Rm	PWRC	09/17/97
	Q2	Rm	PWRC	10/02/97
	P4	Rm	PWRC	10/02/97
	P4	Rm	PWRC	10/02/97
	M4	Rm	PWRC	10/02/97
	M4	Rm	PWRC	10/02/97
	M4	Rm	PWRC	10/02/97
	L2	Rm	PWRC	10/02/97

Quad	1997 Bed	Species*	Surveyor**	Survey Date
044	H4	Rm	PWRC	10/02/97
	H4	Rm	PWRC	10/02/97
	G4	Rm	PWRC	10/02/97
	F4	Rm	PWRC	10/02/97
	F4	Rm	PWRC	10/02/97
	F4	Rm	PWRC	10/02/97
	D4	Rm	PWRC	10/02/97
	C4	Rm	PWRC	09/26/97
	B4	Rm	PWRC	09/26/97
	A4	Rm	PWRC	09/15/97
	ZA4	U	Citizen	07/29/97
	AB2	U	Citizen	07/29/97
	BB4	U	Citizen	07/29/97
	045	B4	Rm	PWRC
C4		Rm	PWRC	09/24/97
D4		Rm	PWRC	09/24/97
G4		Rm	PWRC	09/17/97
H4		Rm	PWRC	09/17/97
J4		Rm	PWRC	09/17/97
J4		Rm	PWRC	09/17/97
046	Hunting Creek	Zp	Citizen	06/23/97
	Choptank River	Zp	Citizen	06/23/97
047	Goose Bay	Hv, Va	Citizen	08/09/97
	South of Goose Bay	Hv, Va	Citizen	08/09/97
	B4	Hv, Ms	Citizen	08/09/97
	M4	Hv	USGS	10/02/97
	I4	Hv, Nm	USGS	10/03/97
	I4	Hv, Nm	USGS	10/03/97
	I4	Hv, Nm	USGS	10/03/97
	South of I4	Hv, Nm	USGS	10/03/97
	South of I4	Hv, Nm	USGS	10/03/97
	H3	Hv, Nm, Va	USGS	10/03/97
	J4	Hv	USGS	10/03/97
	J4	Hv	USGS	10/03/97
	H3	Hv	USGS	10/03/97
	H3	Hv	USGS	10/03/97
	K4	Hv	USGS	10/03/97
	G4	Hv	USGS	10/03/97
	F4	Va	USGS	10/03/97
	South of K4	Hv	USGS	10/03/97
	D4	Hv	USGS	10/03/97
	D4	Hv	USGS	10/03/97
B4	Hv	USGS	10/03/97	
B4	Hv	USGS	10/03/97	

## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date
047	C4	Hv	USGS	10/03/97
	B4	Hv, Cd, Nm	USGS	10/03/97
	B4	Hv, Cd, Nm	USGS	10/03/97
	A4	Hv, Nm	USGS	10/03/97
	A4	Hv, Nm	USGS	10/03/97
	A4	Hv, Nm	USGS	10/03/97
	A4	Hv, Nm	USGS	10/03/97
	A4	Hv, Nm	USGS	10/03/97
	A4	Hv, Nm	USGS	10/03/97
	A4	Hv, Nm, Cd	USGS	10/03/97
048	B4	Hv, N	Citizen	08/09/97
	A4	Hv, N	Citizen	08/09/97
	Poseys Wharf	Hv, N	Citizen	08/09/97
	L4	Cd, Hv, Nm, Va	FOMC	08/16/97
	K4	Va	FOMC	08/16/97
	North Chapman Point	Va	FOMC	09/07/97
	S. Chapman Point	Va	FOMC	09/07/97
	Mattawoman Creek	Va	FOMC	08/16/97
	Mattawoman Creek	Cd, Hv, Nm	FOMC	08/16/97
	Mattawoman Creek	Hv, Ms	FOMC	08/16/97
	Mattawoman Creek	Cd, Hv, Nm, Va	FOMC	08/16/97
	West of Poseys Warf	Hv, Va	USGS	09/05/97
	East of Poseys Warf	Hv	USGS	09/05/97
	A4	Hv	USGS	09/05/97
	A4	Hv, Nm	USGS	09/05/97
	A4	Hv, Nm	USGS	09/05/97
	A4	Hv, Nm	USGS	09/05/97
	A4	Hv, Nm	USGS	09/05/97
	A4	Hv, Nm	USGS	09/05/97
	A4	Hv, Nm	USGS	09/05/97
	B4	Hv, Nm	USGS	09/05/97
	A4	Hv, Nm	USGS	09/05/97
	C4	Nm, Hv	USGS	10/01/97
	C4	Nm, Hv	USGS	10/01/97
	D4	Hv, Nm	USGS	10/01/97
	E4	Hv, Nm	USGS	10/01/97
	E4	Va	USGS	10/01/97
	E4	Va	USGS	10/01/97
	F2	Va	USGS	10/01/97
	F2	Hv, Va	USGS	10/01/97
	F2	Hv, Nm, Va	USGS	10/01/97
	H4	Hv, Nm, Ms	USGS	10/01/97
North of H4	Hv	USGS	10/01/97	
I4	Hv, Nm	USGS	10/01/97	
M4	Hv	USGS	10/01/97	
West of J4	Hv	USGS	10/01/97	
South of L4	Hv	USGS	10/01/97	

Quad	1997 Bed	Species*	Surveyor**	Survey Date
048	North of L4	Hv, Va, Nm, Cd	USGS	09/19/97
	L4	Hv, Va, Nm, Cd	USGS	09/19/97
	K4	Hv, Va, Nm, Cd	USGS	09/19/97
	South of L4	Hv	USGS	09/19/97
	South of L4	Hv	USGS	09/19/97
	L4	Va, Hv	USGS	09/19/97
	North of N4	Hv, Va	USGS	09/19/97
	O4	Hv, Va	USGS	09/19/97
	South of Q4	Hv, Nm	USGS	09/19/97
	East of R3	Hv, Nm, Cd	USGS	09/19/97
	S4	Hv, Nm, Cd	USGS	09/19/97
	Q4	Hv, Nm, Cd	USGS	09/19/97
	R3	Hv	USGS	09/19/97
	R3	Hv	USGS	09/19/97
	R3	Va	USGS	09/19/97
	U4	Hv, Nm	USGS	09/19/97
	V4	Hv, Nm, Va	USGS	09/19/97
	V4	Hv, Nm	USGS	09/19/97
	Indian Head Powder Factory	Ms	USGS	09/19/97
	East of Indian Head	Ms	USGS	09/19/97
	Riverview Village	Cd	USGS	09/19/97
	X2	Va, Hv, Hd, Ms, Nm	USGS	09/19/97
	North of Potomac Heights	Va	USGS	09/19/97
North of Potomac Heights	Va	USGS	09/19/97	
051	V4	U	Citizen	09/19/97
	U2	U	Citizen	09/19/97
	T2	U	Citizen	09/19/97
	FA4	Rm	PWRC	10/03/97
	IA4	Rm	PWRC	10/03/97
052	WA3	Zp	Citizen	08/15/97
	YA4	Zp	Citizen	08/15/97
	XA4	Zp	Citizen	08/15/97
	KB1	Zp	Citizen	08/15/97
	UB4	Rm	PWRC	10/03/97
	PB3	Rm	PWRC	10/03/97
	SB1	Rm	PWRC	10/03/97
	TB2	Rm	PWRC	10/03/97
053	Highlys Beach	Zp	Citizen	Summer 97
	West of Chancellor Point	Zp	Citizen	Summer 97
	East of Highlys Beach	Zp	Citizen	Summer 97
	East of Highlys Beach	Zp	Citizen	Summer 97
	Choptank River	Zp	Citizen	Summer 97
	Choptank River	Zp	Citizen	Summer 97

## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date
055	A2	Hv, Ms, Va	Citizen	08/09/97
	Sandy Point	Hv, Ms, Va	Citizen	08/09/97
	B4	Hv, Ms	Citizen	08/09/97
	North of Willow Landing	Hv	USGS	09/08/97
	O2	Hv	USGS	09/08/97
	East of Willow Landing	Hv	USGS	09/08/97
	East of Willow Landing	Hv	USGS	09/08/97
	East of Willow Landing	Hv	USGS	09/08/97
	East of Willow Landing	Hv	USGS	09/08/97
	East of Willow Landing	Hv	USGS	09/08/97
	N3	Hv	USGS	09/08/97
	M4	Hv	USGS	10/03/97
	M4	Hv	USGS	10/03/97
	M4	Hv	USGS	10/03/97
	Bennetts Point	Hv	USGS	10/03/97
	L3	Hv, Ms	USGS	10/03/97
	J2	Hv	USGS	09/08/97
	J2	Hv, Ms	USGS	09/08/97
	K4	Hv	USGS	10/03/97
	I4	Nm, Hv, Cd	USGS	09/08/97
	I4	Nm, Hv	USGS	09/08/97
	F4	Hv	USGS	09/08/97
	F4	Ms, Hv	USGS	09/08/97
	E3	Ms	USGS	09/08/97
	E3	Ms	USGS	09/08/97
	G4	Hv	USGS	10/03/97
	R2	Ms	USGS	10/03/97
	North of R2	Ms, Nm	USGS	10/03/97
	South of P3	Hv, Nm	USGS	10/03/97
	P3	Hv, Ms, Nm	USGS	10/03/97
	P3	Hv, Va	USGS	10/03/97
	P3	Hv	USGS	10/03/97
	North of Thomas Point	Ms	USGS	09/05/97
	North of Thomas Point	Cd, Hv, Va	USGS	09/05/97
	Clifton Beach	Va	USGS	09/05/97
	D4	Va, Ms, Hv	USGS	09/05/97
	D4	Ms	USGS	09/05/97
	D4	Va, Ms	USGS	09/05/97
	D4	Ms, Nm, Va, Cd	USGS	09/05/97
	D4	Ms, Nm, Va, Cd	USGS	09/05/97
	D4	Va, Ms, Hv, Hd	USGS	09/05/97
	D4	Ms, Va, Hv	USGS	09/05/97
	D4	Va, Ms	USGS	09/05/97
	D4	Va	USGS	09/05/97
	C2	Va, Hv	USGS	09/05/97
	C2	Hv	USGS	09/05/97
	B4	Hv, Nm	USGS	09/05/97

Quad	1997 Bed	Species*	Surveyor**	Survey Date
055	B4	Hv	USGS	09/05/97
	North of B4	Va	USGS	09/05/97
	South of A2	Va	USGS	09/05/97
056	A4	Va	USGS	10/06/97
	B2	Va	USGS	10/06/97
	B2	Va	USGS	10/06/97
	B2	Va	USGS	10/06/97
	B2	Va	USGS	10/06/97
	D2	Va	USGS	10/06/97
	D2	Va	USGS	10/06/97
	E3	Va	USGS	10/06/97
	F2	Va	USGS	10/06/97
	G2	Ms, Va, Cd	USGS	10/06/97
	G2	Ms, Va, Cd	USGS	10/06/97
	H4	Ms, Va, Cd	USGS	10/06/97
	K4	Va, Ms, Cd	USGS	10/06/97
	L2	Va, Ms, Cd	USGS	10/06/97
	M4	Va, Ms, Cd	USGS	10/06/97
	O2	Va, Ms, Cd	USGS	10/06/97
	P3	Va, Ms, Cd	USGS	10/06/97
	P3	Va, Ms, Cd	USGS	10/06/97
	P3	Va, Ms, Cd	USGS	10/06/97
	P3	Ms	USGS	10/06/97
	EA3	Ms, Va, Cd	USGS	10/06/97
	EA3	Ms	USGS	10/06/97
	GA4	Ed, Ms, Cd	USGS	10/06/97
	GA4	Va	USGS	10/06/97
	GA4	Va	USGS	10/06/97
	GA4	Ms, Va	USGS	10/06/97
	HA1	Ms, Va	USGS	10/06/97
	GA4	Ms, Va, Cd	USGS	10/06/97
	P3	Va, Ms, Cd	USFWS	10/06/97
	B2	Va	USFWS	10/06/97
	B2	Va	USFWS	10/06/97
	GA4	Va, Ms, Cd	USFWS	10/06/97
	GA4	Va, Ms	USFWS	10/06/97
	GA4	Ms, Ec	USFWS	10/06/97
	EA3	Ms, Cd	USFWS	10/06/97
	A4	Va	USFWS	10/06/97
P3	Va, Ms	USFWS	10/06/97	
O2	Va, Ms, Cd	USFWS	10/06/97	
M4	Va, Ms	USFWS	10/06/97	
B2	Va	USFWS	10/06/97	
C1	Va	USFWS	10/06/97	
E3	Va	USFWS	10/06/97	
L2	Va, Ms	USFWS	10/06/97	

## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date
057	M3	Ppc, Ppf, Va	Citizen	08/16/97
	O4	Hv, Ms, Va	Citizen	08/16/97
	O4	Ppf, Va	Citizen	08/16/97
	T2	Va	Citizen	08/16/97
	U2	Va	Citizen	08/16/97
	W3	Va	Citizen	08/16/97
	G4	Ms, Va	USGS	10/06/97
	G4	Va, Ms	USGS	10/06/97
	G4	Ms, Va	USGS	10/06/97
	G4	Va, Ms	USGS	10/06/97
	G4	Va, Ms	USGS	10/06/97
	G4	Va, Ms	USGS	10/06/97
	G4	Va, Ms	USGS	10/06/97
	G4	Va, Ms	USGS	10/06/97
	F4	Va, Ppc	USGS	10/06/97
	F4	Va, Ppf	USGS	10/06/97
	F4	Va, Ppf	USGS	10/06/97
	F4	Va	USGS	10/06/97
	E4	Va	USGS	10/06/97
	E4	Va, Ppc	USGS	10/06/97
	E4	Ppc, Va	USGS	10/06/97
	E4	Va, Ppc, Ppf	USGS	10/06/97
	E4	Va, Ppc, Ppf	USGS	10/06/97
	E4	Va, Ppf, Ppc	USGS	10/06/97
	E4	Va, Ms, Ppc, Ppf	USGS	10/06/97
	D2	Va	USGS	10/06/97
	D2	Va	USGS	10/06/97
	A2	Va	USGS	10/06/97
	A2	Va	USGS	10/06/97
	B4	Va	USGS	10/06/97
	B4	Va, Ppf	USGS	10/06/97
	B4	Va, Ppf	USGS	10/06/97
	C2	Va, Ppf	USGS	10/06/97
	OA2	Va, Ms	USGS	10/06/97
	MA2	Va, Ms	USGS	10/06/97
	KA2	Ms, Cd, Va	USGS	10/06/97
	KA2	Va, Ms	USGS	10/06/97
	JA4	Va, Ms	USGS	10/06/97
	HA4	Va, Ms, Cd	USGS	10/06/97
	CA4	Ms, Va, Cd	USGS	10/06/97
	CA4	Ms, Va, Cd	USGS	10/06/97
	CA4	Ms, Va, Cd	USGS	10/06/97
	GA1	Va, Ms	USGS	10/06/97
	CA4	Va, Ms	USGS	10/06/97
	CA4	Va, Ms	USGS	10/06/97
	CA4	Va, Ms	USGS	10/06/97
	Burgess Creek	Va, Ms, Ppf	USGS	10/06/97

Quad	1997 Bed	Species*	Surveyor**	Survey Date
057	BA3	Ms, Ec, Cd	USGS	10/06/97
	BA3	Ms, Ec, Cd	USGS	10/06/97
	BA3	Ms, Ec, Cd	USGS	10/06/97
	AA2	Ms, Ec, Cd	USGS	10/06/97
	AA2	Va, Ms, Cd	USGS	10/06/97
	AA2	Va, Ms, Cd	USGS	10/06/97
	AA2	Va, Ms, Cd	USGS	10/06/97
	J3	Va, Ms, Cd	USGS	10/06/97
	J3	Va, Ms	USGS	10/06/97
	Z2	Va, Ms	USGS	10/06/97
	Z2	Va, Ms	USGS	10/06/97
	Z2	Va, Ms	USGS	10/06/97
	Y1	Va, Ms, Cd	USGS	10/06/97
	X2	Va, Ms, Cd	USGS	10/06/97
	W3	Va	USGS	10/07/97
	W3	Va	USGS	10/07/97
	U2	Va	USGS	10/07/97
	U2	Va	USGS	10/07/97
	T2	Va	USGS	10/07/97
	T2	Va	USGS	10/07/97
	S3	Va	USGS	10/07/97
	R2	Va, Ppc, Ppf	USGS	10/07/97
	Q1	Va, Ppc	USGS	10/07/97
	Q1	Va, Ppc	USGS	10/07/97
	P2	Va, Ppc	USGS	10/07/97
	P2	Va, Ppc, Ppf	USGS	10/06/97
	O4	Va, Ms	USGS	10/06/97
	O4	Va, Ppc	USGS	10/06/97
	O4	Va, Ms, Nm, Ppc, Cd	USGS	10/06/97
	O4	Va, Ms, Nm, Cd, Ppc	USGS	10/06/97
	O4	Ms	USGS	10/06/97
	O4	Ms, Va, Cd	USGS	10/06/97
	O4	Ms, Va, Cd	USGS	10/06/97
	O4	Ms, Va	USGS	10/06/97
	O4	Ms, Va	USGS	10/06/97
	N4	Ms, Va	USGS	10/06/97
	N4	Ppc, Va, Rm	USGS	10/06/97
	N4	Va	USGS	10/06/97
	M3	Va	USGS	10/06/97
	M3	Va	USGS	10/06/97
	L4	Va	USGS	10/06/97
	L4	Va	USGS	10/06/97
	L4	Ms, Va	USGS	10/06/97
	L4	Va	USGS	10/06/97
	L4	Va, Ppc	USGS	10/06/97
	L4	Va	USGS	10/06/97
	L4	Va, Ppc	USGS	10/06/97



## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date	
057	L4	Va	USGS	10/06/97	
	L4	Va, Ms	USGS	10/06/97	
	L4	Va, Ms	USGS	10/06/97	
	L4	Va, Ms	USGS	10/06/97	
	L4	Va, Ms	USGS	10/06/97	
	Tobacco River, west bank		Va	USGS	10/06/97
	Port Tobacco Marina		Va	USGS	10/06/97
	I3	Va, Ms	USGS	10/06/97	
	K4	Va	USGS	10/06/97	
	P2	Ppf, Va	Citizen	08/16/97	
	KA2	Va, Ms, Cd	USFWS	10/06/97	
	FA2	Va, Ms, Cd	USFWS	10/06/97	
	CA4	Va, Ms, Cd	USFWS	10/06/97	
	X2	Va, Ms	USFWS	10/06/97	
	NA4	Va, Ms, Cd	USFWS	10/06/97	
	Z2	Va, Ms	USFWS	10/06/97	
	J3	Va, Ms, Cd	USFWS	10/06/97	
	AA2	Va, Ms, Cd	USFWS	10/06/97	
	AA2	Va, Ms, Cd	USFWS	10/06/97	
	South of OA2		Va	USFWS	10/06/97
	JA4	Va, Ms	USFWS	10/06/97	
	Y1	Va, Ms	USFWS	10/06/97	
	GA1	Va, Ms, Cd	USFWS	10/06/97	
	South of CA4		Va, Ms, Ppu	USFWS	10/06/97
	OA2	Va, Ms	USFWS	10/06/97	
	BA3	Ec, Ms	USFWS	10/06/97	
	BA3	Va, Ms, Cd	USFWS	10/06/97	
	O4	Va	USFWS	10/06/97	
	MA2	Va, Ms	USFWS	10/06/97	
	058	A3	Va, Ppf	USGS	10/06/97
A3		Va, Ppf	USGS	10/06/97	
B2		Va, Ppf	USGS	10/06/97	
D2		Va	USGS	10/06/97	
060	Long Cove	Zp	Citizen	06/15/97	
	Broomes Island	Zp	Citizen	06/08/97	
	Petersons Point	Zp	Citizen	06/15/97	
061	North of Saw Pit Cove	Zp	Citizen	06/15/97	
	W. of Breeden Road	Zp	Citizen	06/15/97	
	E. of Breedens Point	Zp	Citizen	06/15/97	
	SW of Fort Hill	Zp	Citizen	06/15/97	
064	A1	Ms	USGS	10/06/97	
	B4	Ms	USGS	10/06/97	
	B4	Ms	USGS	10/06/97	

Quad	1997 Bed	Species*	Surveyor**	Survey Date
064	C2	Ms	USGS	10/06/97
	D4	Hv, Ms	USGS	09/08/97
	D4	Hv, Ms	USGS	09/08/97
	D4	Hv, Ms, Nm, Va	USGS	09/08/97
	D4	Hv, Ms, Nm, Va	USGS	09/08/97
	D4	Hv, Ms, Nm	USGS	09/08/97
	D4	Hv, Nm, Ms	USGS	09/08/97
	D4	Hv, Nm, Ms	USGS	09/08/97
	E2	Hv, Ms, Nm	USGS	09/08/97
	F4	Hv, Ms	USGS	09/08/97
	F4	Hv, Nm, Ms	USGS	09/08/97
	F4	Hv, Nm, Ms	USGS	09/08/97
	F4	Hv, Nm, Cd	USGS	09/08/97
	G2	Hv, Ms, Nm, Cd	USGS	09/08/97
	H4	Hv, Ms, Nm, Cd	USGS	09/08/97
	H4	Hv, Nm, Ms	USGS	09/08/97
	H4	Ms, Hv, Nm	USGS	09/08/97
	H4	Hv, Ms, Nm	USGS	09/08/97
	H4	Hv, Ms, Nm	USGS	09/08/97
	H4	Nm, Hv, Ms, Va, Cd	USGS	09/08/97
	H4	Hv, Nm, Cd, Ms	USGS	09/08/97
	H4	Hv, Nm, Cd	USGS	09/08/97
	J2	Hv, Nm, Ms, Cd	USGS	09/08/97
	I4	Hv, Nm, Va	USGS	09/08/97
	I4	Hv, Ms, Nm	USGS	09/08/97
	K2	Hv, Ms, Nm	USGS	09/08/97
	K2	Ms	USGS	09/08/97
	K2	Ms	USGS	09/08/97
	K2	Ms	USGS	09/08/97
	065	West of G2	Ms	USGS
West of G2		Ms	USGS	10/06/97
G2		Va	USGS	10/06/97
Naval Research Lab		Va	USGS	09/05/97
North of F1		Va	USGS	09/05/97
South of F1		Va	USGS	09/05/97
D1		Va, Hv	USGS	09/05/97
C4		Va, Ms	USGS	10/05/97
C4		Va, Ms	USGS	10/05/97
C4		Va, Ms	USGS	10/05/97
C4		Va	USGS	10/05/97
B1		Va	USGS	10/05/97
A4		Va	USGS	10/05/97
C4		Va, Ms	USFWS	10/06/97
C4		Va	USFWS	10/06/97
D1		Va	USFWS	10/06/97
C4		Va, Ms	USFWS	10/06/97

## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date
065	C4	Va	USFWS	10/06/97
	B1	Va	USFWS	10/06/97
	A4	Va	USFWS	10/06/97
066	W3	Ms, Pcr, Ppc, Ppf, Va	Citizen	06/28/97
	V4	Ppc, Ppf, Va	Citizen	07/20/97
	T2	Ppf, Va	Citizen	07/20/97
	East of S2	Ppf	Citizen	07/20/97
	S2	Ppf	Citizen	07/20/97
	Baber Point	Ppf	Citizen	07/20/97
	J2	Ppf	Citizen	07/20/97
	Y2	Ms	USGS	10/06/97
	DA4	Ms	USGS	10/06/97
	W3	Va, Ppf	USGS	10/06/97
	W3	Va, Ppf	USGS	10/06/97
	W3	Va, Ppf	USGS	10/06/97
	W3	Va, Ppf	USGS	10/06/97
	W3	Ppc	VIMS	June 97
067	S3	Ppf, Va	Citizen	09/01/97
	R4	Ms, Ppf, Va	Citizen	09/01/97
	R4	Ppf, Va	Citizen	09/01/97
	D4	Hd, Ms, Ppf	Citizen	08/15/97
	Aqualand Marina	Ms, Va	USGS	10/06/97
	Aqualand Marina	Ms, Va	USGS	10/06/97
070	S. of Clarks Landing	Zp	Citizen	06/07/97
	NE of Sam Abell Cove	Zp	Citizen	06/07/97
071	Green Holly Pond	Ms	Citizen	06/07/97
	A2	Ppc	CBL	June 97
072	Great Cove	Rm	Citizen	06/20/97
	Great Cove	Rm	Citizen	06/20/97
	A2	Rm	Citizen	06/20/97
	The Big Broads	Rm	Citizen	06/20/97
	Meekins Neck	Rm	Citizen	06/20/97
077	South West of B2	Ms	USGS	05/14/97
	South West of A4	Ms	USGS	05/14/97
078	Smarts Creek	Ms	Citizen	09/07/97
	Smarts Creek	Ms	Citizen	09/07/97
	Mathews Cove	Ms, Zp	Citizen	Summer 97
	Branson Cove	Zp	USGS	05/14/97
	South of Grannys Bar	Ms	USGS	05/14/97
	Danger Point	Zp	USGS	05/14/97

<b>Quad</b>	<b>1997 Bed</b>	<b>Species*</b>	<b>Surveyor**</b>	<b>Survey Date</b>	
078	Glebe Creek	Zp	USGS	05/14/97	
	Glebe Creek	Zp	USGS	05/14/97	
	Glebe Creek	Zp	USGS	05/14/97	
	Linton Point	Zp	USGS	05/14/97	
	North of Linton Point	Zp	USGS	05/14/97	
	Cabin Point Creek	Ms	USGS	05/14/97	
	Cabin Point Creek	Ms, Zp	USGS	05/14/97	
	Cabin Point Creek	Ms, Zp	USGS	05/14/97	
	Buchner Creek	Zp, Ms	USGS	05/14/97	
	Buchner Creek	Zp, Ms	USGS	05/14/97	
	Mathews Cove	Zp, Ms	USGS	05/14/97	
	Poor Tack Creek	Zp, Ms	USGS	05/14/97	
	North of H4	Ms, Zp	USGS	05/14/97	
	080	Rose Croft Point	Zp	Citizen	09/01/97
		E4	Rm	VIMS	05/10/98
084	Laws Thorofare	Rm	Citizen	08/10/97	
	Laws Thorofare	Rm	Citizen	08/10/97	
087	Glebe Creek	Zp	Citizen	06/15/97	
	Glebe Creek	Zp	Citizen	06/15/97	
	Plumb Point	Zp	Citizen	06/15/97	
	A2	Zp	Citizen	06/15/97	
	B4	Zp	Citizen	06/15/97	
	B4	Zp	Citizen	06/15/97	
	North of Boyse Point	Zp	Citizen	06/15/97	
	Hanley Point	Zp	Citizen	06/15/97	
	Harrison Point	Zp	Citizen	06/15/97	
	Lower Machodoc Creek	Zp	Citizen	06/15/97	
	Drum Bay	Zp	Citizen	06/15/97	
	Parham Point	Zp	Citizen	06/15/97	
	Nomini Creek	Ms, Zp	Citizen	Summer 97	
	Palmers Cove	Ms, Zp	Citizen	Summer 97	
	Barnes Creek	Ms, Zp	Citizen	Summer 97	
	Booths Bend	Ms, Zp	Citizen	Summer 97	
	D4	Ms, Zp	Citizen	Summer 97	
	E4	Ms, Zp	Citizen	Summer 97	
	Meter	Zp, Ms	USGS	05/14/97	
	A2	Zp	USGS	05/14/97	
	B4	Zp	USGS	05/14/97	
	C3	Zp	USGS	05/14/97	
	North of Parham Point	Zp	USGS	05/14/97	
	East of Drum Bay	Zp	USGS	05/14/97	
	Lower Machodoc Creek	Zp	USGS	05/14/97	
	Boyse Point	Zp	USGS	05/14/97	
	Negro Point	Zp	USGS	05/14/97	

## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date
087	S. of Plumb Point	Zp	USGS	05/14/97
	E4	Ms, Zp	USGS	05/14/97
	Carys Point	Zp	USGS	05/14/97
	Jenkins Cove	Zp	USGS	05/14/97
	Palmers Cove	Zp	USGS	05/14/97
	Browns Cove	Zp	USGS	05/14/97
	Pierce Creek	Zp	USGS	05/14/97
088	West of Lynch Point	Zp	USGS	05/14/97
089	Cherry Point Neck	Zp	USGS	05/13/97
	West of Judith Sound	Zp	USGS	05/13/97
091	E1	Rm	VIMS	09/15/97
096	Lodge Creek	Zp	USGS	05/13/97
	Lodge Creek	Zp	USGS	05/13/97
097	Fleets Cove	U	Citizen	07/25/97
	Kingscote Creek	Zp	USGS	05/13/97
	Kingscote Creek	Zp	USGS	05/13/97
	The Glebe	Zp	USGS	05/13/97
	Glebe Creek	Zp	USGS	05/13/97
	Glebe Creek	Zp	USGS	05/13/97
	The Glebe	Zp	USGS	05/13/97
	The Glebe	Zp	USGS	05/13/97
	The Glebe	Zp	USGS	05/13/97
	E. Coan River	Zp	USGS	05/13/97
	Cox Creek	Zp	USGS	05/13/97
	W. Bay Quarter Neck	Zp	USGS	05/13/97
	W. Bay Quarter Neck	Zp	USGS	05/13/97
	W. Bay Quarter Neck	Zp	USGS	05/13/97
	N. Boathouse Point	Zp	USGS	05/13/97
	W.Boathouse Point	Zp	USGS	05/13/97
	Coan River	Zp	USGS	05/13/97
	Coan River	Zp	USGS	05/13/97
	Headly Cove	Zp	USGS	05/13/97
	Headly Cove	Zp	USGS	05/13/97
	E. Coan River	Zp	USGS	05/13/97
	E. Coan River	Zp	USGS	05/13/97
	E. Coan River	Zp	USGS	05/13/97
	E. Coan River	Zp	USGS	05/13/97
	W. Coan River	Zp	USGS	05/13/97
	W. Coan River	Zp	USGS	05/13/97
W. Coan River	Zp	USGS	05/13/97	
W. Coan River	Zp	USGS	05/13/97	
W. Coan River	Zp	USGS	05/13/97	

Quad	1997 Bed	Species*	Surveyor**	Survey Date
097	W. Coan River	Zp	USGS	05/13/97
	W. Coan River	Zp	USGS	05/13/97
	W. Coan River	Zp	USGS	05/13/97
099	F3	Zm	Citizen	07/20/97
	H2	Rm	VIMS	09/15/97
100	N1	Rm	VIMS	09/15/97
	C4	Rm, Zm	VIMS	09/15/97
	C4	Rm, Zm	VIMS	09/15/97
106	A1	Rm	Citizen	06-07/97
	F3	Rm, Zm	Citizen	06/20/97
	E1	Rm, Zm	Citizen	06/20/97
	D3	Rm, Zm	Citizen	06/20/97
	Balt Creek	Rm	Citizen	07/13/97
	Balt Creek	Rm, Zm	Citizen	07/13/97
	C2	Rm, Zm	Citizen	07/13/97
	C2	Rm, Zm	Citizen	07/13/97
	C2	Rm, Zm	Citizen	07/13/97
107	M4	Zm, Rm	VIMS	05/22/97
	L1	Rm	VIMS	09/15/97
108	GA4	Rm, Zm	VIMS	09/15/97
	GA4	Rm	VIMS	09/15/97
	BA1	Rm	VIMS	09/15/97
	W1	Rm	VIMS	09/15/97
	L1	Rm	VIMS	09/15/97
109	U1	Rm, Zm	VIMS	09/15/97
111	F3	Rm	VIMS	06/25/97
	H1	Rm, Zp	VIMS	06/25/97
112	FA1	Rm	Citizen	08/15/97
	AA2	Rm	Citizen	08/15/97
	Z2	Rm	Citizen	08/15/97
	Dymer Creek	Rm	Citizen	08/15/97
	V3	Rm	Citizen	08/15/97
	U2	Rm	Citizen	08/15/97
	T2	Rm	Citizen	08/15/97
	P2	Rm	Citizen	08/15/97
	Dymer Creek	Rm	Citizen	08/15/97
	Dymer Creek	Rm	Citizen	08/15/97
	Dymer Creek	Rm	Citizen	08/15/97
	X3	Rm	Citizen	08/15/97

## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date
114	M2	Rm	VIMS	09/15/97
118	F4	Zm	VIMS	06/19/97
119	H2	Rm, Zm	VIMS	09/15/97
	T4	Rm	VIMS	09/15/97
	T4	Rm	VIMS	09/15/97
123	G3	Zm, Rm	VIMS	06/18/97
124	F4	Zm	Citizen	07/21/97
	B4	Zm	Citizen	07/21/97
	WA3	Rm	Citizen	07/05/97
	VA4	Rm	Citizen	07/05/97
	G1	Zm	Citizen	07/22/97
	F4	Zm	Citizen	07/22/97
	K2	Zm	Citizen	07/22/97
	H2	Zm	Citizen	10/04/97
	J1	Rm, Zm	Citizen	07/22/97
	U4	Rm, Zm	VIMS	09/15/97
	M4	Rm, Zm	VIMS	09/15/97
	S2	Rm, Zm	VIMS	09/15/97
	F4	Rm	VIMS	09/15/97
	I4	Rm	VIMS	09/15/97
131	HA4	Zm, Rm	VIMS	05/12/97
	HA4	Zm	VIMS	October 97
	HA4	Zm	VIMS	October 97
	EA4	Zm	VIMS	October 97
	EA4	Zm, Rm	VIMS	05/13/97
	W4	Zm, Rm	VIMS	06/20/97
	U2	Zm	VIMS	October 97
	Q4	Zm	VIMS	October 97
	Q4	Zm, Rm	VIMS	05/15/97
	H4	Zm	VIMS	06/20/97
	MA3	Rm, Zm	VIMS	06/20/97
	MA3	Zm, Rm	VIMS	05/14/97
	F4	Rm	VIMS	09/15/97
	F4	Rm	VIMS	09/15/97
132	C4	Rm	Citizen	07/17/97
	B2	Rm	Citizen	09/03/97
	C4	Rm	Citizen	09/03/97
	D4	Rm, Zm	Citizen	09/03/97
	E2	Rm	Citizen	09/03/97
	F4	Rm	Citizen	09/03/97
	G3	Rm	Citizen	09/03/97

Quad	1997 Bed	Species*	Surveyor**	Survey Date
132	Pepper Creek	Rm, Zm	Citizen	09/03/97
	I4	Rm	Citizen	08/13/97
	I4	Rm, Zm	Citizen	08/13/97
	J2	Rm, Zm	Citizen	08/13/97
	K2	Rm, Zm	Citizen	08/13/97
	L1	Rm, Zm	Citizen	08/13/97
	South of Sloop Creek	Rm	Citizen	08/13/97
	D4	Rm, Zm	VIMS	06/20/97
	G3	Rm, Zm	VIMS	05/14/97
	I4	Rm, Zm	VIMS	06/20/97
	DA4	Rm, Zm	VIMS	05/16/97
	I4	Rm	VIMS	09/15/97
	133	P1	Rm	VIMS
E4		Zm, Rm	USFWS	06/19/97
134	G1	Rm	VIMS	09/15/97
139	B1	Zm	VIMS	05/12/97
	C2	Zm	VIMS	05/12/97
140	K4	Zm	VIMS	07/10/97
	K4	Zm	VIMS	07/10/97
	N4	Zm, Rm	VIMS	07/10/97
	N4	Rm, Zm	VIMS	07/10/97
	N4	Zm	VIMS	07/10/97
	P3	Zm	VIMS	07/10/97
	Q4	Zm	VIMS	07/10/97
	Q4	Rm, Zm	VIMS	07/10/97
	R2	Rm, Zm	VIMS	07/10/97
	South of K4	Zm	VIMS	07/10/97
	L1	Zm	VIMS	07/10/97
	S2	Zm	VIMS	07/10/97
	T3	Zm	VIMS	07/10/97
	T3	Zm	VIMS	07/10/97
	T3	Zm, Rm	VIMS	07/10/97
East of T3	Zm	VIMS	07/10/97	
E2	Zm	VIMS	06/11/97	
141	I4	Rm	VIMS	09/15/97
	I4	Rm	VIMS	09/15/97
	I4	Rm	VIMS	09/15/97
142	A1	Zm	VIMS	09/15/97
143	Skidmore Island	Zm	VIMS	05/30/97



## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date
147	B4	Zm	VIMS	05/19/97
	E4	Zm	VIMS	05/19/97
	D3	Zm	VIMS	05/19/97
	E4	Zm	VIMS	05/19/97
	K4	Zm	VIMS	05/19/97
	J4	Zm	VIMS	05/19/97
	I4	Zm	VIMS	05/19/97
	H2	Zm	VIMS	05/19/97
	R1	Zm	VIMS	05/05/97
	R1	Zm	VIMS	05/05/97
	T4	Zm	VIMS	06/13/97
	U1	Zm	VIMS	05/05/97
	V1	Zm	VIMS	05/20/97
149	A2	Zm	VIMS	07/06/97
	B2	Zm	VIMS	06/09/97
	C1	Zm	VIMS	06/09/97
151	A1	Rm, Zm	VIMS	08/28/97
	B2	Zm	VIMS	05/08/97
152	B1	U	Citizen	07/21/97
	C1	U	Citizen	07/21/97
	D1	U	Citizen	07/21/97
	E1	U	Citizen	07/21/97
	F1	U	Citizen	07/21/97
	F1	U	Citizen	07/21/97
	The Narrows	U	Citizen	07/21/97
	J1	U	Citizen	07/21/97
	I1	U	Citizen	07/21/97
	Carter Point	U	Citizen	07/21/97
	H2	U	Citizen	07/21/97
	G1	U	Citizen	07/21/97
	Bay Island	U	Citizen	07/21/97
	Broad Bay Colony	U	Citizen	07/21/97
	Broad Bay Colony	U	Citizen	07/21/97
	A3	U	Citizen	07/21/97
K1	U	Citizen	07/21/97	
A3	Zm	VIMS	05/08/97	
159	S. of Spyglass Island	Cd, Ec, Ngu, Pcr	PRP	07/25/97
	W. of Back Channel	Cd, Ec, Hv, Ngu, Pcr, Va	PRP	07/25/97
	Hills Bridge	Cd, Ec, Hv, Pcr, Ppu, U	PRP	07/25/97
	Marlboro Hunt Club	Cd, Hv	PRP	07/25/97
	Marlboro Hunt Club	Cd, Ec, Hv, Nm	PRP	07/25/97
	Mill Creek	Cd, Ec, Hv, Ngu, Nm	PRP	07/25/97
	E3	Cd, Hv, Nm	PRP	07/25/97

Quad	1997 Bed	Species*	Surveyor**	Survey Date
159	D4	Hv, Nm	PRP	07/25/97
	Mt. Calvert	Hv	PRP	07/25/97
	Mt. Calvert	Cd, Ec, Hv, Nm, Zp	PRP	07/25/97
	Iron Pot Landing	Cd, Hv, Nm, Zp	PRP	07/25/97
	Iron Pot Landing	Cd, Ec, Hv, Nm	PRP	07/25/97
	East of Mt. Calvert	Hv, Nm	PRP	07/25/97
	Lyons Creek	Cd, Ec, Hv, Nm	PRP	08/07/97
	Hills Bridge	Hv	Citizen	09/05/97
	West of House Marsh	Hv	Citizen	09/05/97
	C4	Hv, Nm	PRP	08/07/97
	B4	Hv, Nm	PRP	08/07/97
	C4	Hv	MD-DNR	08/28/97
	166	M3	Rm	Ocean Pines
L2		Rm	Ocean Pines	07/02/97
K4		Rm	Ocean Pines	07/02/97
K4		Rm	Ocean Pines	07/02/97
H2		Rm	Ocean Pines	07/02/97
I4		Rm	Ocean Pines	07/02/97
E4		Rm	Ocean Pines	07/02/97
E4		Rm	Ocean Pines	07/02/97
D1		Rm	Ocean Pines	07/02/97
B4		Rm	Ocean Pines	07/02/97
M3		Rm	VIMS	07/02/97
L2		Rm	VIMS	07/02/97
K4		Rm	VIMS	07/02/97
I4		Rm	VIMS	07/02/97
E4		Rm	VIMS	07/02/97
E4		Rm	VIMS	07/02/97
E4		Rm, Zm	VIMS	07/02/97
E4		Rm, Zm	VIMS	07/02/97
D1		Rm, Zm	VIMS	07/02/97
B4		Rm, Zm	VIMS	07/02/97
B4	Rm	VIMS	07/02/97	
B4	Rm, Zm	VIMS	07/02/97	
167	East of I1	Rm	NPS	09/19/97
168	East of A2	Rm	NPS	08/28/97
	East of B3	Rm	NPS	08/28/97
170	B4	Zm	NPS	05/07/97
	East of C3	Zm	NPS	05/07/97
	C3	Zm	NPS	05/07/97
	West of E4	Zm, Rm	NPS	07/11/97
	E4	Zm, Rm	NPS	05/08/97
	E4	Zm	NPS	05/08/97

## SAV

Quad	1997 Bed	Species*	Surveyor**	Survey Date
170	North of J2	Rm	NPS	07/09/97
	G2	Rm	NPS	07/09/97
	E4	Zm	NPS	07/09/97
	E4	Zm, Rm	NPS	06/27/97
	E4	Zm, Rm	NPS	05/14/97
	K2	Rm	NPS	09/24/97
	DA3	Zm, Rm	NPS	07/17/97
	JA2	Zm	NPS	09/16/97
	AA4	Zm	NPS	09/16/97
	East of JA2	Zm, Rm	NPS	09/19/97
	IA2	Zm, Rm	NPS	09/19/97
	T4	Rm	NPS	09/12/97
	T4	Rm	NPS	09/19/97
	T4	Zm	NPS	08/14/97
	T4	Rm	NPS	09/16/97
	T4	Zm, Rm	NPS	09/16/97
	T4	Zm, Rm	NPS	09/16/97
	East of Y1	Rm	NPS	09/19/97
	W2	Rm	NPS	09/19/97
	X1	Rm	NPS	09/19/97
171	A1	Zm	VIMS	05/07/97
172	V3	Zm	VIMS	07/01/97
	U3	Zm	VIMS	07/01/97
	S2	Zm	VIMS	07/01/97
	T2	Zm	VIMS	07/01/97
	R2	Zm	VIMS	07/01/97
	B4	Zm	NPS	10/30/97
	B4	Zm	NPS	10/29/97
	B4	Zm, Rm	NPS	10/29/97
	B4	Zm	NPS	10/29/97
	F2	Zm	NPS	10/29/97
	J2	Zm	NPS	07/16/97
	West of K4	Zm	NPS	07/15/97
174	E1	Zm	VIMS	07/01/97
	D4	Zm	VIMS	07/01/97
	G2	Zm	VIMS	07/01/97
	G2	Zm	VIMS	07/01/97
	G2	Zm	VIMS	07/01/97
	F3	Zm	VIMS	07/01/97
	F3	Zm	VIMS	07/01/97
	H2	Zm	VIMS	07/01/97
West of D4	Zm	NPS	07/15/97	

<b>Quad</b>	<b>1997 Bed</b>	<b>Species*</b>	<b>Surveyor**</b>	<b>Survey Date</b>
175	F4	Zm	Citizen	08/25/97
	F4	Rm, Zm	Citizen	08/25/97
	F4	Rm	Citizen	08/25/97
	D2	Zm	Citizen	08/25/97
	F4	Rm, Zm	VIMS	10/29/97
	F4	Zm	VIMS	10/29/97
	F4	Zm	NPS	10/30/97
	G1	Zm	NPS	10/30/97
	F4	Zm	NPS	10/30/97
	F4	Zm	NPS	10/30/97
176	B2	Va	USGS	09/24/97
	A3	Hv	USGS	09/24/97
186	A2	Zm	VIMS	08/21/97
	B2	Rm, Zm	VIMS	08/21/97
	C4	Rm	VIMS	08/21/97
	D4	Rm	VIMS	08/21/97