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Tidewater Virginia's Non-Jurisdictional Beach Assessment - 2006

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College of William & Mary
Gloucester Point, Virginia

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Data Report

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Introduction

Seventeen of Virginia's coastal localities were analyzed to determine the extent of their beach resources presently not being managed by the Coastal Primary Sand Dunes and Beaches Act[1] (Dune Act). Aerial video of the James River (Isle of Wight, Surry, and Prince George, Charles City, James City, and Newport News), the York River (York, New Kent, King William, King and Queen, and Gloucester), the Rappahannock River (Middlesex, Essex, and Richmond), and the Potomac River (Westmoreland, King George, and Stafford) determined the extent of beaches in each locale. The localities studied are shown in Figure 1. The Dune Act manages dunes in eight Virginia localities, Accomack, Hampton, Lancaster, Mathews, Norfolk, Northampton, Northumberland, and Virginia Beach and as such were not part of this project. This project is intended to provide guidance on the amount of beach resources not being managed presently in localities outside the eight jurisdictional localities of the Dune Act.

As defined by the code of Virginia (§ 28.2-1400), "Beach" means the shoreline zone comprised of unconsolidated sandy material upon which there is a mutual interaction of the forces of erosion, sediment transport, and deposition that extends from the low water line landward to where there is a marked change in either material composition or physiographic form such as a dune, bluff, or marsh or where no such change can be identified, to the line of woody vegetation (usually the effective limit of storm waves), or the nearest impermeable manmade structure, such as a bulkhead, revetment, or paved road. For this report, this definition of beaches was used. Non-vegetated wetlands are defined by Code of Virginia as un-vegetated lands lying contiguous to mean low water (MLW) and between mean low water and mean high water (MHW) (§ 28.2-1300). Since beaches, as defined above, must have sand above MHW to some landward limit, the many instances where vegetation extends to MHW were not counted as beach shoreline. They were considered the vegetated part of the intertidal zone or non-vegetated wetlands, but not a beach.

In addition to determining the distribution of beaches in the non-jurisdictional localities, this project also tallied a specific set of descriptors of the beaches. The measurements and parameters were input to a Geographic Information System (GIS) for ease of viewing and summarizing. From these data, individual locality data were summarized. In addition, site types were grouped by region or river system to determine beach type frequency.

[1]The General Assembly of Virginia enacted the Coastal Primary Sand Dune Protection Act (the Dune Act) in 1980. The Dune Act was originally codified in § 62.1-13.21 to -13.28. The Dune Act is now recodified as Coastal Primary Sand Dunes and Beaches in § 28.2-1400 to -1420.

Methods

Virginia's beaches in the non-jurisdictional localities were identified from the aerial video taken in 2005 and 2006. The oblique aerial video of the shoreline was obtained by Shoreline Studies personnel using a Sony Handycam DVD403 which records directly to DVD. These DVDs were viewed in concert with 2002 orthorectified planform aerial photos obtained from the Virginia Base Mapping Program (VBMP). When a beach was identified, attributes of each site were obtained from the video. The set of attributes includes: whether the beach appears to natural, man-influenced, or man-made; length along shore; average width; time and stage of previous tide at the site; landward boundary condition; geomorphic setting; beach stability; underlying substrate; and lists of structures influencing the beach; a list of site location on the DVD (Table 1). In addition, remarks were made regarding a site's peculiarities. Many of these elements were modified and adopted from recently completed dune research (Hardaway *et al.*, 2001; Hardaway *et al.*, 2002; Milligan *et al.*, 2005).

The site locations and attributes were input to a GIS database. About 550 miles of aerial video has been obtained for all of Virginia's non-jurisdictional localities except Portsmouth, Suffolk, and Poquoson. The project was limited to the main river shorelines and the regions around the mouths of tidal creeks. No ground-truthing occurred for the project. The site identification and characterization was based on the professional experience of Shoreline Studies personnel who performed the aerial video review. However, Hurricane Isabel greatly impacted the Chesapeake Bay region on 18 September 2003 between the time of the 2002 ortho photos and the aerial video, so transferring beach elements seen in the video to the vertical GIS based imagery was time consuming and required a certain amount of interpretation. Some small sand features may have been missed during the review.

The beach assessment could only quantify the planform of the shore feature (not its elevation changes) so typical beach and dune profiles are shown in Figure 2. The profiles depict the extent from MLW to the Beach Berm and then landward to the base of the bank. Also shown is the typical profile when a beach is backed by a structure. The area from the beach berm to the base of the primary dune or some other marked change is called the backshore. The backshore gives the beach its width which is in turn dependent on the shore geomorphology and available supply of sand. The sand supply is, in turn, a function of bank type (whether sandy or clayey) and erosion rate. Over time, as shorelines erode and are hardened by shore structures, the nature and type of sand accumulation will evolve. If conditions are right, a beach will develop and may become wider or narrower as boundaries change. Therefore, beach site length and width are the two primary measurements.

"Site type" refers to whether the beach has had an unimpeded existence through natural processes (Figure 3) or whether it has been impacted in some way by man. Man's Influence (Figure 4) can be significant either in sand entrapment by groins or by creating hard boundaries with revetments or bulkhead. Man-made beaches (Figure 5) are purposefully created with a design element such as in a headland breakwater system. If structures impact a site, the type of structure was noted and comments were made regarding the site.

The landward boundary of the beach may be open or closed either naturally or by a structure. If

natural, it may be stable (Figure 3), eroding (Figure 6), or in transition (Figure 7) from erosive to stable or visa versa. Due to the variety of boundaries involved, the land boundaries and conditions are offered as remarks in the locality data.

The geomorphic setting of a beach site may be as a linear feature (Figure 6), curvilinear (Figure 8), salient (Figure 9) or a pocket beach (Figure 4). Many beaches occur as low barriers (Figure 7) or spits (Figure 10) across the mouths of creeks. Shore structures such as breakwaters may have sand fill added and attached to the structure as tombolos. Also, many Man-Influenced beaches occur within groin fields. The actual stability of a beach, determined by the visible changes in the site between 2002 and the time of the video, also was assessed. The type of substrate was depicted as to whether it occurs along an upland bank (Figure 11) or across a marsh or creek channel (Figure 7).

Table 1. Attributes collected for each beach site.

		Site Parameters	
Site Information	County	Type	Natural
	River System		Man-Influenced
	Topographic Quadrangle		Manmade
Video Information	DVD ID	Landward Boundary	Stable
	Date of Flight		Erosional
	Site location on DVD shown as time from beginning of DVD		Transitional
Tide Information	Time over Site*	Geomorphic Setting	Creek Mouth Barrier/Spit
	Time of Previous High Tide at Site*		Curvilinear
Site Measurements	Center Point Location^		Linear
	Alongshore Length		Pocket
	Average Beach Width <5 ft, 5-10 ft, >10 ft		Salient
			Spit
			Tombolos
		Stability	Accretionary
			Erosional
			Stable
		Underlying Substrate	Marsh/Creek Channel
			Upland
		Structures or Beach Fill	If Present

*Eastern Standard Time

^UTM, NAD83, meters

Results

The location and attribute data for each site are shown in Appendix A which includes county-wide maps and tables with all data. Approximately 76 miles or about 14% of the coast assessed for this study were identified as beach shoreline (Table 2). This is comprised of 1,361 sites in the 17 non-jurisdictional localities. The average site length is about 294 feet but they vary individually from as small as 10 feet to as long as 3,600 feet. The greatest number of beach sites was in Gloucester County which had 235 beaches. Westmoreland had the greatest beach length with 12.2 miles. The smallest number of beaches was found in New Kent County with 4, but King and Queen had only 0.2 miles of beach shore, the least of any locality with beaches. King William was reviewed, but it contained no beaches.

The beach-width parameter totals show that most of the beach sites (596) were in the medium width range (5-10ft) (Table 2). Of the medium width sites, most were found in Gloucester County (117) while the fewest were in New Kent (1). However, 459 sites were very narrow. Most of the narrow width beaches were found in Surry County (95), the least were in King and Queen (1). The least number of sites (306) had beach widths greater than 10 ft between MHW and the landward boundary. Of the highest width sites most (94) are found in Middlesex County, while the least number of the widest sites are found where there are the least number sites; again, New Kent and King and Queen.

Beach type fell into the three categories: Natural, Man-Influenced, and Man-made. Man-made sites were fewest (106), and many of these were from breakwater systems (Table 3). Most of the man-made sites occurred in James City County (46) while none were found in Essex, King and Queen, Richmond, and Stafford. Of all the beach sites, most had some type of influence by man's activities such as groins, bulkheads, and/or revetments and most of these were in Middlesex County (168) and none were found in New Kent. Natural beach sites accounted for about 35% or 471 sites, and most of those are found in Surry and Gloucester Counties, each with 88 sites.

Most of the beaches, 794, had stable landward boundaries, followed by 360 erosional, and 207 transitional boundaries (Table 3). Most of the stable landward boundaries are found in Gloucester (160). The most erosional landward boundaries are in Surry while the most transitional landward boundaries are in Middelsex (39). The actual relative stability of the total beach sites were by far mostly stable at 1,163 sites while 129 were erosional and 69 were accretionary. Gloucester County had the most stable (193) and the most erosional (33) sites. Most of the accretionary beach sites were in Middlesex and Westmoreland with 19 sites each.

Of the six classes of beach geomorphology, most sites are classified as linear or straight (878) and occur most frequently in Middlesex (Table 4). The least found type was spits, 15 sites, and most of those were in Surry and Westmoreland with 3 and 7 sites, respectively. Tombolos and salients are usually associated with breakwater systems. Most tombolos were found in Gloucester (36).

Two types of substrates are considered: upland and marsh/creek. Most beaches occur in front of upland banks (1,049) while the remainder occupy areas across marshes or creek mouths (312) (Table 4). The most upland backed beaches are in Middlesex (173) while the fewest are in New Kent (3). Eighty-five marsh/creek channel beaches occur in Gloucester, the most, and none in Charles City. The remarks section in Appendix A details the type of beach and the landward boundaries.

When considered on a regional basis, the James River and the Potomac River each have a third of the total beach length and the most total number of sites (Table 5). The Rappahannock and York Rivers have 17% and 15% of the total beach length, respectively. The James River also has the narrowest beaches with 50% of the total number of sites less than 5 ft wide. The Rappahannock River has the widest beaches with 38% of the beaches wider than 10 ft. The James River has 75% of the man-made beaches (80 out of 106 sites). This also is reflected in the geomorphic data. The James River has the highest number of sites in the curvilinear, pocket, and tombolo categories which are associated with headland breakwater sites. The York River has the highest number of sites with marsh/creek channel as an underlying substrate (104 out of 312 or 33%). The Rappahannock River has the highest number of sites that were accretionary (29 out of 69 or 41%) while the James River only had 9% of the accretionary sites). The Rappahannock River also has the least number of erosional sites while the James had the most number of stable sites.

Table 2. Summary of site parameters for each non-jurisdictional locality. King William County was assessed, but no beach sites existed within its boundaries.

County Name	# Sites	Length			Width		
		Feet	Miles	Meters	<5 ft	5-10 ft	>10 ft
Charles City	29	3,146	0.6	959	13	14	2
Essex	55	8,153	1.5	2,485	18	23	14
Gloucester	235	45,968	8.7	14,011	67	117	51
Isle of Wight	77	54,390	10.3	16,578	39	30	8
James City	99	14,708	2.8	4,453	48	43	8
King and Queen	6	823	0.2	251	1	3	2
King George	91	45,745	8.7	13,943	27	50	14
Middlesex	216	53,356	10.1	16,263	36	86	94
New Kent	4	1,942	0.4	592	2	1	1
Newport News	45	11,709	2.2	3,569	13	13	19
Prince George	30	7,100	1.3	2,164	21	7	2
Richmond County	41	5,233	1.0	1,595	13	21	7
Stafford	45	17,152	3.3	5,228	14	22	9
Surry	157	54,925	10.4	16,741	95	51	11
Westmoreland	190	64,334	12.2	19,609	38	94	58
York	41	12,175	2.3	3,711	14	21	6
Total	**1,361**	**400,859**	**75.9**	**122,152**	**459**	**596**	**306**

Table 3. Summary of measured parameters for type, landward boundary and stability for each non-jurisdictional locality.

County Name	Type			Landward Boundary			Stability		
	Man-Influence	Manmade	Natural	Erosional	Stable	Transitional	Accretionary	Erosional	Stable
Charles City	13	2	14	7	19	3	0	1	28
Essex	42	0	13	6	46	3	4	2	49
Gloucester	136	11	88	56	160	19	9	33	193
Isle of Wight	29	5	43	39	23	15	0	19	58
James City	20	46	33	22	62	15	2	5	92
King and Queen	3	0	3	1	4	1	0	0	6
King George	61	1	29	33	49	9	6	9	76
Middlesex	168	7	41	37	140	39	19	17	180
New Kent	0	1	3	0	3	1	0	1	3
Newport News	15	20	10	3	41	1	1	2	42
Prince George	8	2	20	12	14	4	0	0	30
Richmond County	28	0	13	6	29	6	6	1	34
Stafford	22	0	23	18	21	6	0	5	40
Surry	64	5	88	74	47	36	3	11	143
Westmoreland	156	2	32	32	124	34	19	16	155
York	19	4	18	14	12	15	0	7	34
Total	**784**	**106**	**471**	**360**	**794**	**207**	**69**	**129**	**1,163**

Table 4. Summary of measured parameters for geomorphology and substrate for each non-jurisdicational locality.

County Name	Geomorphology							Substrate	
	Creek Mouth	Curvilinear	Linear	Pocket	Salient	Spit	Tombolo	Marsh/Creek Channel	Upland
Charles City	0	3	23	3	0	0	0	0	29
Essex	0	7	45	0	3	0	0	10	45
Gloucester	19	18	151	9	1	1	36	85	150
Isle of Wight	0	17	35	16	2	1	6	21	56
James City	4	12	38	17	0	1	27	17	82
King and Queen	0	1	5	0	0	0	0	1	5
King George	8	8	67	1	3	0	4	15	76
Middlesex	13	10	165	15	6	2	5	43	173
New Kent	0	0	3	0	0	0	1	1	3
Newport News	2	5	23	1	0	0	14	13	32
Prince George	1	2	20	4	3	0	0	5	25
Richmond County	8	2	28	0	2	0	1	11	30
Stafford	1	6	32	2	3	0	1	3	42
Surry	4	12	97	26	15	3	0	18	139
Westmoreland	10	24	128	2	14	7	5	52	138
York	6	5	18	6	0	0	6	17	24
Total	**76**	**132**	**878**	**102**	**52**	**15**	**106**	**312**	**1,049**

Table 5. Summary of site measurements and parameters by river system.

		James River	York River	Rappahannock River	Potomac River	Total All Sites
	# Sites	437	286	312	326	1,361
Length	Feet	145,978	60,909	66,742	127,231	400,859
	Miles	27.6	11.6	12.7	24.1	75.9
	Meters	44,464	18,565	20,343	38,780	121,152
Width	<5 ft	229	84	67	79	459
	5-10 ft	158	142	130	166	596
	>10 ft	50	60	115	81	306
Tier	Man Influenced	149	158	238	239	784
	Manmade	80	16	7	3	106
	Natural	208	112	67	84	471
Landward Boundary	Erosional	157	71	49	83	360
	Stable	206	179	215	194	794
	Transitional	74	36	48	49	207
Geomorphic Setting	Creek Mouth	11	25	21	19	76
	Barrier/Spit	51	24	19	38	132
	Curvilinear	236	177	238	227	878
	Linear	67	15	15	5	102
	Pocket	20	1	11	20	52
	Salient	5	1	2	7	15
	Spit	47	43	6	10	106
	Tombolos	6	9	29	25	69
Stability	Accretionary	38	41	20	30	129
	Erosional	393	236	263	271	1,163
	Stable	74	104	64	70	312
Underlying Substrate	Marsh/ Creek Channel	363	182	248	256	1,049
	Upland					

Discussion

Most of the beach sites occur in Gloucester (235) , Middlesex (216), and Westmoreland (190) Counties. The total beach length have Westmoreland (12.2 miles), Surry (10.4 miles), Isle of Wight (10.3 miles), and Middlesex (10.1 mi) with Gloucester and King George with 8.7 miles each. Generally, these localities have relatively medium to high wave energies (Hardaway and Byrne, 1999) and eroding upland banks which combine to provide the energy and source of material, sand, for beaches. The most number of wide beaches (>10ft) are in Middlesex (86 or 4.7 mi), Westmoreland (57 or 5.4 mi) and Gloucester (51 or 2.7 mi). Farther up the rivers, more marsh shoreline and less wave energy occur due to smaller fetch exposures as well as slower erosion of upland banks. Consequently, the number and size of beaches decrease significantly.

The prevalence of beaches in the James and Potomac Rivers is likely influenced by the underlying geology which will provide the material for beaches and whether or not man has influenced the shoreline with structures. Impacts to beaches, Man-Influenced, can be positive or negative. It is difficult to surmise, but historical imagery from other localities shows that extensive hardening with bulkheads and rip-rap of the shore can locally reduce beach widths by: 1) encroaching bayward with structures that cover existing beach features and 2) by impoundment of the eroding bank, thereby cutting off a source of sand (Figure 12). Positive impacts can be groin-fields which trap littoral moving sands thereby building up the beaches in those areas. However, there is usually the negative side where the land at the “downdrift” end of the groin field is “starved” of sand, the beach narrows and upland erosion occurs (Figure 13).

Man-made beaches using beach fill and breakwaters have become more prevalent in the last 20 years. Man-made beaches represent about 5.9 miles or about 8% of the total beach mileage. That is an average length about 0.056 miles per site. Natural beaches represent about 35% of the total and about 0.05 miles/site with 26.3 total miles. Finally, Man-Influenced beaches, 47.3 miles, are 58% of the total and average about 0.05 miles/site. The per site average of each category is about the same, between 260 and 340 feet.

Summary

Sand is the foundation of the beach, and the beach is the foundation for dunes. These resources are buffers for wave action during storms and provide an interface between upland and Bay. Over the years, shoreline hardening has reduced the number and length of beaches. Sand mining was also a common practice, further reducing beach volumes and extent.

Since beaches are important in both form and function, they are protected under the Virginia’s Dune Act for eight jurisdictional localities. However, after reviewing 550 miles of aerial video in 17 localities not within the purview of the Dune Act, approximately 14% of the shoreline or 76 miles was identified as beaches as defined by the Virginia Code. These beaches presently are not regulated. Coastal construction can proceed landward of MHW without benefit of review by local wetlands board or the Marine Resource Commission.

Generally, the building of beach and dunes is encouraged at the state and local levels; some existing beaches may be lost but more beach shore will be created with properly designed and constructed breakwater and beach nourishment systems. Adding these localities to the permitting review processes for beaches and dunes would follow the logic that if they are important in some coastal localities, why not the remaining ones.

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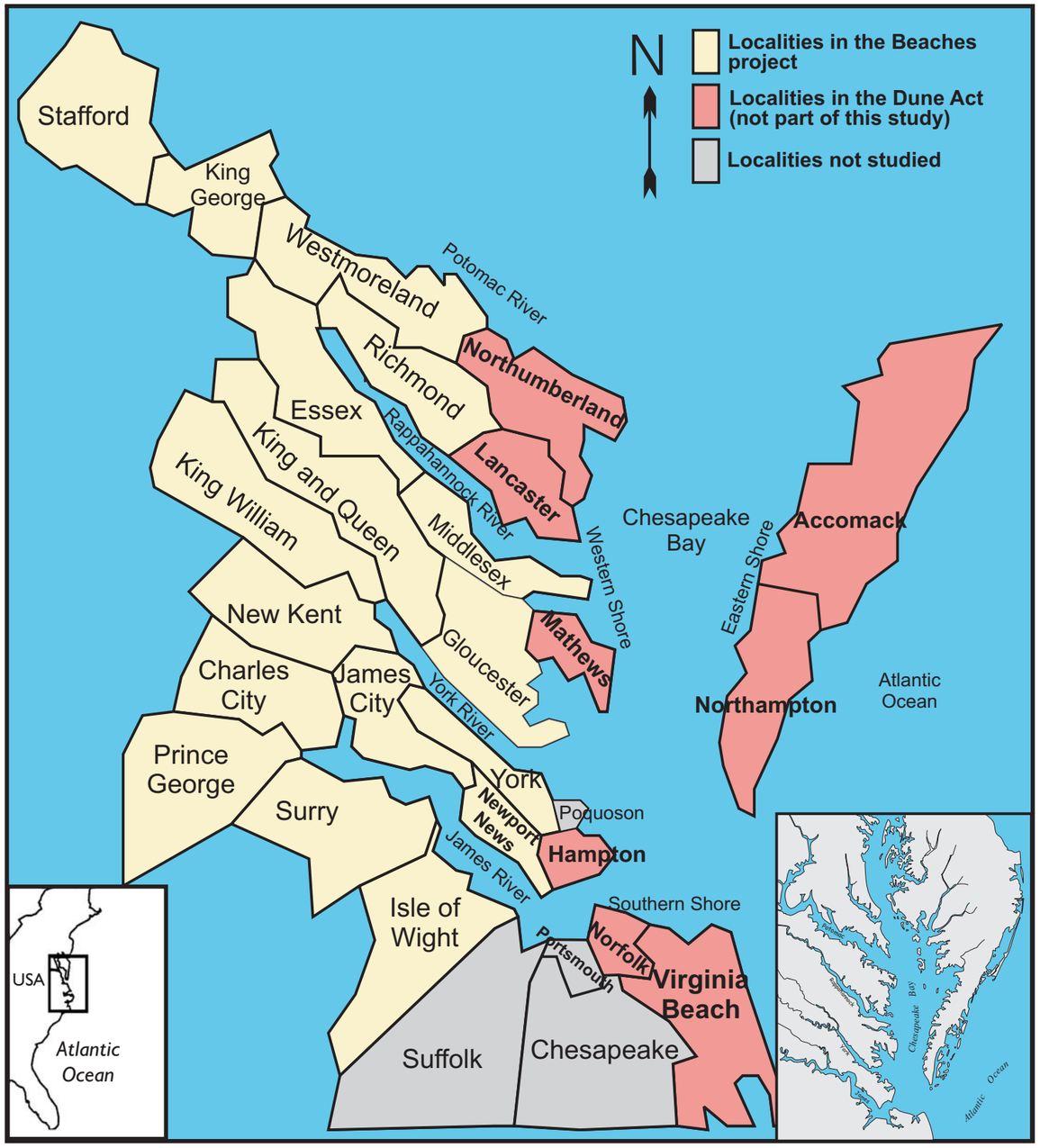
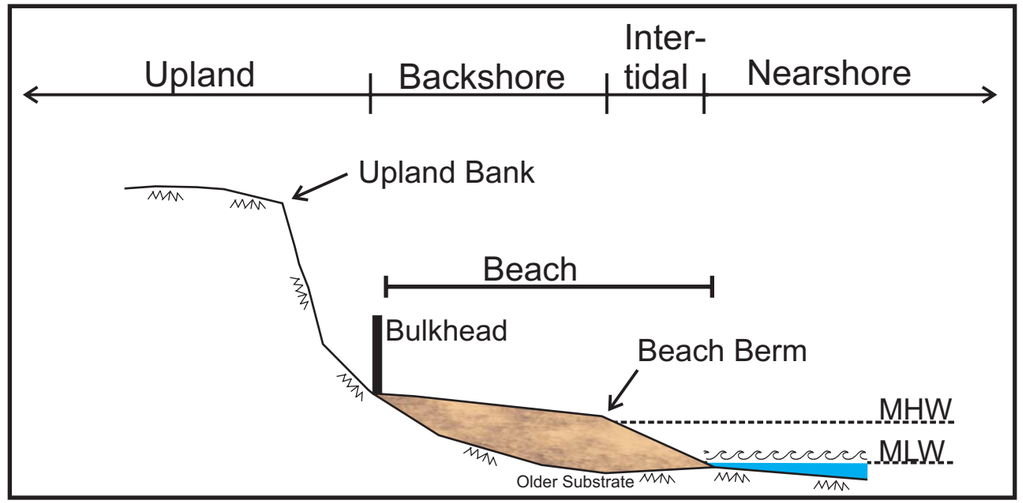


Figure 1. List of localities in the non-jurisdictional beaches assessment.



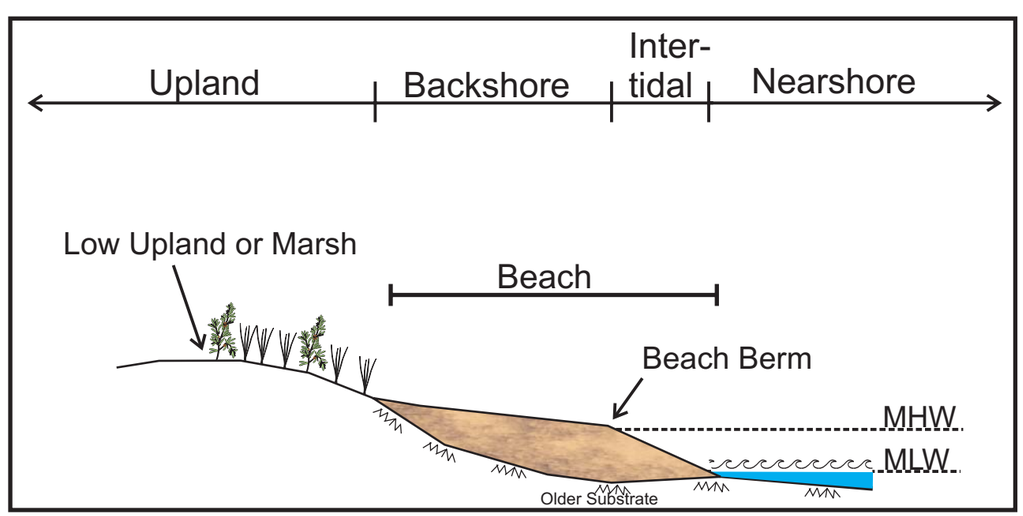


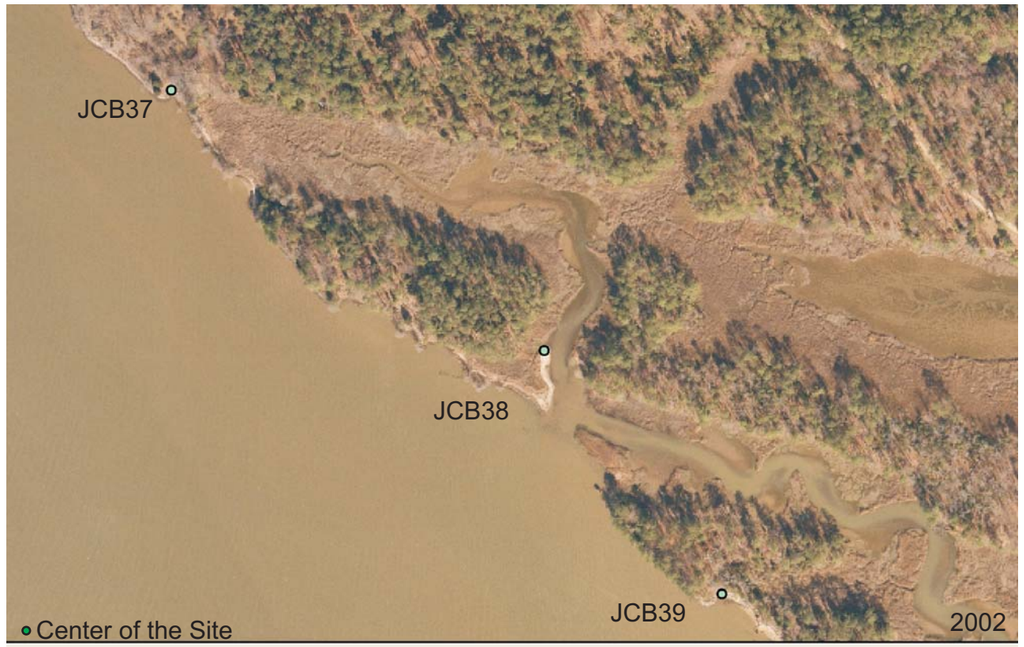
Figure 2. Typical cross-sections of beaches as defined by the Code of Virginia.

Richmond County
RMB2

Lack of image clarity is an artifact of clipping from the aerial video.

Beach Length (ft)	49
Beach Width (ft)	<5 ft
Type	Natural
Landward Boundary	Stable
Landward Boundary Comments	Marsh
Geomorphology	Creek mouth barrier
Stability	Stable
Underlying Substrate	Marsh/Creek Channel
Structure	None
Structure Comments	None

Figure 3. Richmond County site RMB2 2002 orthorectified aerial photo from VBMP, still shot from aerial video, and site attributes.



James City County
JCB37

Lack of image clarity is an artifact of clipping from the aerial video.

Beach Length (ft)	23
Beach Width (ft)	<5 ft
Type	Man Influenced
Landward Boundary	Stable
Landward Boundary Comments	Low marshy backshore
Geomorphology	Pocket
Stability	Stable
Underlying Substrate	Marsh/Creek Channel
Structure	Revetment/Bulkhead/Walls
Structure Comments	Revetment spur as upstream boundary

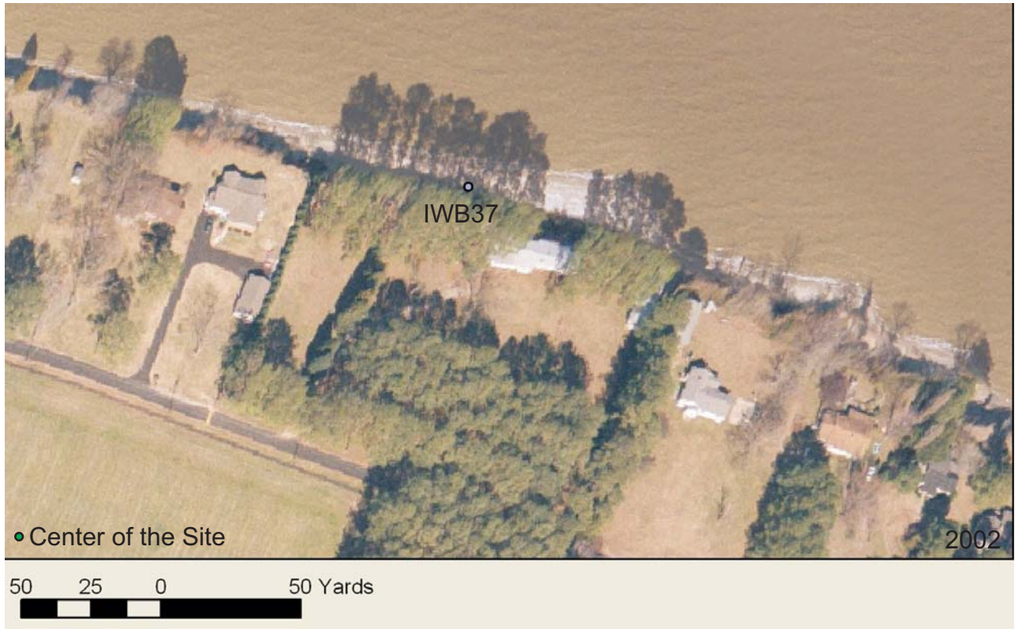
Figure 4. James City County site JCB37 2002 orthorectified aerial photo from VBMP, still shot from aerial video, and site attributes.

Isle of Wight
IWB31

Lack of image clarity is an artifact of clipping from the aerial video.

Beach Length (ft)	3,888
Beach Width (ft)	>10 ft
Type	Man Made
Landward Boundary	Stable
Landward Boundary Comments	Graded Upland
Geomorphology	Headland breakwater w/tombolos
Stability	Stable
Underlying Substrate	Upland
Structure	Breawater/Sills-Beach Fill
Structure Comments	14 breakwaters and beach fill; Luter site

Figure 5. Isle of Wight site IWB31 2002 orthorectified aerial photo from VBMP, still shot from aerial video, and site attributes.



Isle of Wight
IWB37

Lack of image clarity is an artifact of clipping from the aerial video.

Beach Length (ft)	837
Beach Width (ft)	5-10 ft
Type	Man Influenced
Landward Boundary	Erosional
Landward Boundary Comments	High bank eroding; low concrete wall
Geomorphology	Linear
Stability	Stable
Underlying Substrate	Upland
Structure	Groin-Revetment/Bulkhead
Structure Comments	Groin downstream boundary, revetment upstream boundary

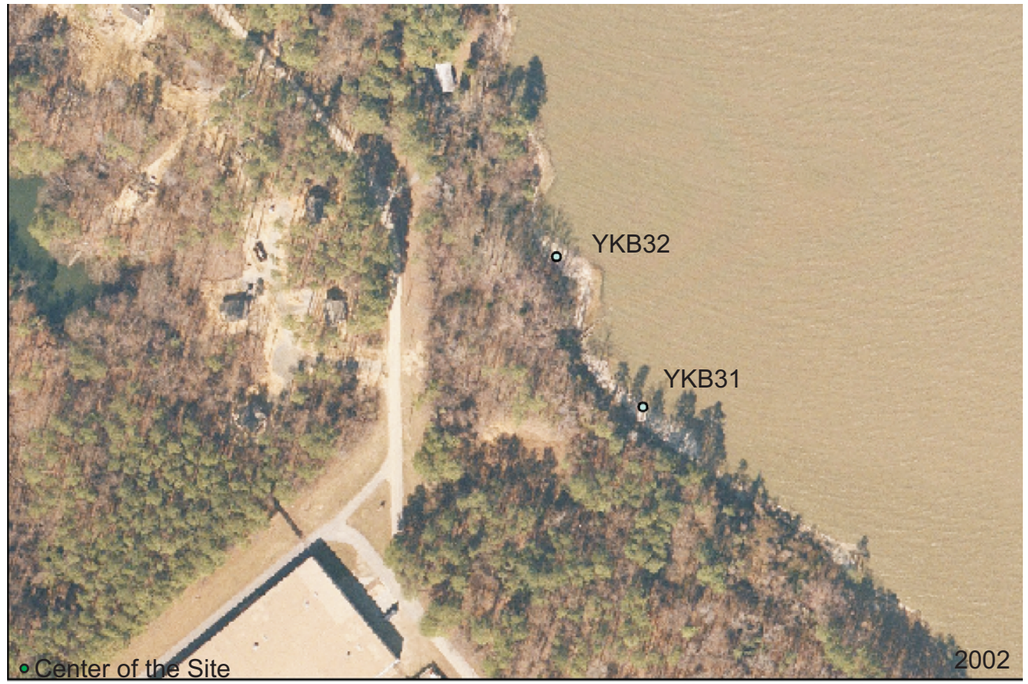
Figure 6. Isle of Wight site IWB37 2002 orthorectified aerial photo from VBMP, still shot from aerial video, and site attributes.

Newport News
NNB32

Lack of image clarity is an artifact of clipping from the aerial video.

Beach Length (ft)	436
Beach Width (ft)	5-10 ft
Type	Manmade
Landward Boundary	Transitional
Landward Boundary Comments	Cut marsh face
Geomorphology	Creek mouth barrier
Stability	Stable
Underlying Substrate	Marsh/Creek Mouth Barrier
Structure	Jetty,Revetment/Bulkhead/Wall,Beach fill
Structure Comments	Creek jetty upstream boundary;Wood bulkhead downstream boundary

Figure 7. City of Newport News site NNB32 2002 orthorectified aerial photo from VBMP, still shot from aerial video, and site attributes.



York County
YKB31

Lack of image clarity is an artifact of clipping from the aerial video.

Beach Length (ft)	243
Beach Width (ft)	5-10 ft
Type	Natural
Landward Boundary	Erosional
Landward Boundary Comments	Medium cut wooded bank
Geomorphology	Curvilinear
Stability	Stable
Underlying Substrate	Upland
Structure	None
Structure Comments	

Figure 8. York County site YKB31 2002 orthorectified aerial photo from VBMP, still shot from aerial video, and site attributes.

100 50 0 100 Yards

Westmoreland
WMB67

Lack of image clarity is an artifact of clipping from the aerial video.

Beach Length (ft)	62
Beach Width (ft)	5-10 ft
Type	Man Influenced
Landward Boundary	Transitional
Landward Boundary Comments	Marsh, fronted by woodland fringe and backshore grasses
Geomorphology	Salient
Stability	Stable
Underlying Substrate	Marsh/Creek Channel
Structure	Groin
Structure Comments	Groin with spur

Figure 9. Westmoreland County site WMB67 2002 orthorectified aerial photo from VBMP, still shot from aerial video, and site attributes.

100 50 0 100 Yards

Gloucester County
GLB62

Lack of image clarity is an artifact of clipping from the aerial video.

Beach Length (ft)	46
Beach Width (ft)	5-10 ft
Type	Natural
Landward Boundary	Stable
Landward Boundary Comments	Marsh
Geomorphology	Spit
Stability	Accretionary
Underlying Substrate	Marsh/Creek Channel
Structure	
Structure Comments	

Figure 10. Gloucester County site GLB62 2002 orthorectified aerial photo from VBMP, still shot from aerial video, and site attributes.

Stafford County
STB26

Lack of image clarity is an artifact of clipping from the aerial video.

Beach Length (ft)	115
Beach Width (ft)	5-10 ft
Type	Man Influenced
Landward Boundary	Transitional
Landward Boundary Comments	Low brushy backshore
Geomorphology	Curvilinear
Stability	Erosional
Underlying Substrate	Upland
Structure	Groin
Structure Comments	Groins

Figure 11. Stafford County site STB26 2002 orthorectified aerial photo from VBMP, still shot from aerial video, and site attributes.

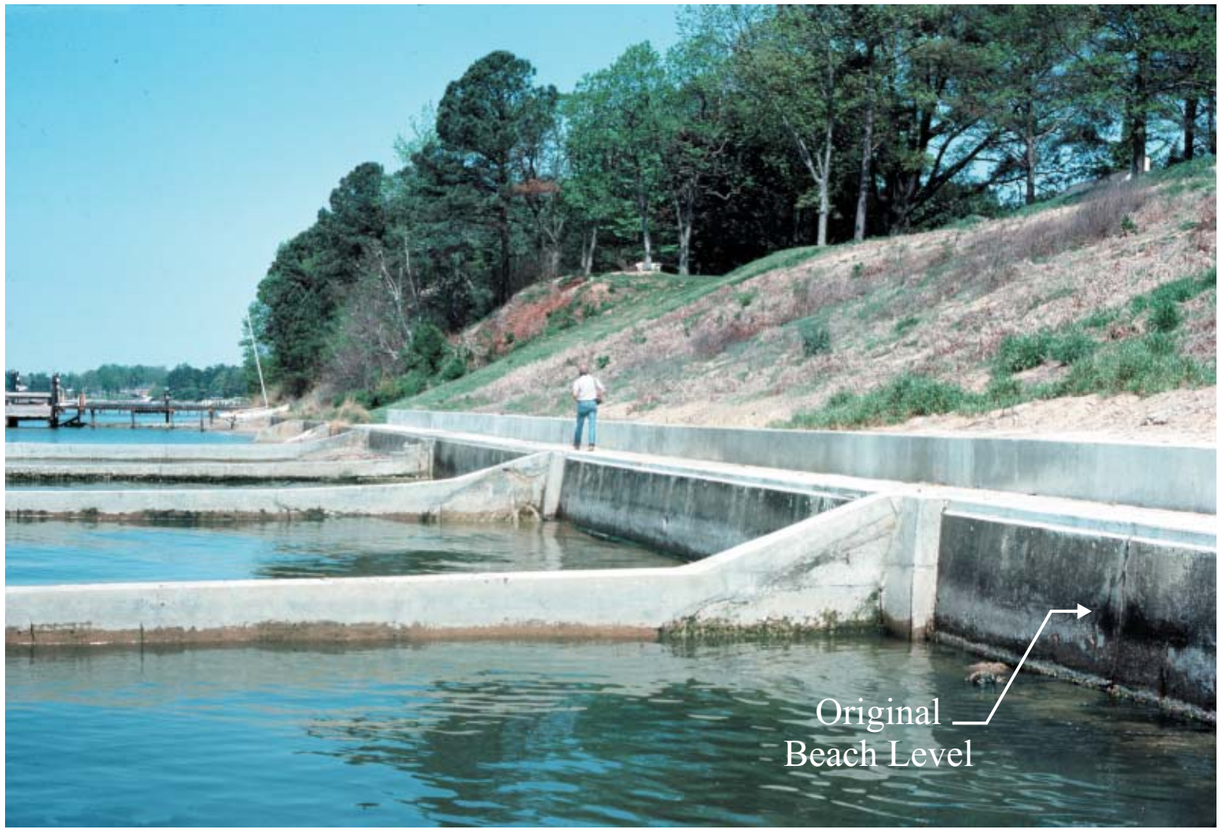


Figure 12. Concrete seawall on the James River in Newport News, Virginia (from Hardaway and Byrne, 1999).

Figure 13. Groin fields A) with adequate sand supply to provide protective beach zone to upland property, and B) with an inadequate sand supply along shore reach where the topmost groin acts as a littoral barrier (from Hardaway and Byrne, 1999).

Appendix A

Location map and tables of site data for:

Charles City County, Essex County, Gloucester County, Isle of Wight,
James City County, King and Queen County, King George County,
Middlesex County, New Kent County, Newport News, City of, Prince George County,
Richmond County, Stafford County, Surry County, Westmoreland County, and York County