
Reports

4-2003

City of Hampton Dune Inventory

C. Scott Hardaway Jr.
Virginia Institute of Marine Science

Donna A. Milligan
Virginia Institute of Marine Science

Lyle M. Varnell
Virginia Institute of Marine Science

George R. Thomas
Virginia Institute of Marine Science

Linda M. Meneghini
Virginia Institute of Marine Science

See next page for additional authors

Follow this and additional works at: <https://scholarworks.wm.edu/reports>



Part of the [Environmental Indicators and Impact Assessment Commons](#), [Natural Resources Management and Policy Commons](#), and the [Water Resource Management Commons](#)

Recommended Citation

Hardaway, C., Milligan, D. A., Varnell, L. M., Thomas, G. R., Meneghini, L. M., Barnard, T. A., & Killeen, S. A. (2003) City of Hampton Dune Inventory. Virginia Institute of Marine Science, William & Mary. <https://doi.org/10.21220/V5XP45>

This Report is brought to you for free and open access by W&M ScholarWorks. It has been accepted for inclusion in Reports by an authorized administrator of W&M ScholarWorks. For more information, please contact scholarworks@wm.edu.

Authors

C. Scott Hardaway Jr., Donna A. Milligan, Lyle M. Varnell, George R. Thomas, Linda M. Meneghini, Thomas A. Barnard, and Sharon A. Killeen

An aerial photograph of a coastal area. On the left is a large body of water. A long, narrow sandy beach runs diagonally from the bottom left towards the top right. To the right of the beach is a line of dunes covered in low-lying vegetation. Further inland, there is a small town or village with several buildings and a road. A small pond or lagoon is visible near the town. In the background, more land and water are visible under a hazy sky.

City of Hampton Dune Inventory

Virginia Institute of Marine Science
College of William & Mary
Gloucester Point, Virginia

April 2003

City of Hampton Dune Inventory

C. Scott Hardaway, Jr.¹

Donna A. Milligan¹

Lyle M. Varnell²

George R. Thomas¹

Linda M. Meneghini¹

Thomas A. Barnard²

Sharon Killeen²

Shoreline Studies Program¹
Department of Physical Sciences

and

Wetlands Program²
Center for Coastal Resources Management

Virginia Institute of Marine Science
College of William & Mary
Gloucester Point, Virginia

This project was funded by the Virginia Department of Environmental Quality's Coastal Resources Management Program through Grant #NA17OZ11142-01 of the National Oceanic and Atmospheric Administration, Office of Ocean and Coastal Resource Management, under the Coastal Zone Management Act of 1972, as amended.



April 2003

Table of Contents

Table of Contents i

List of Figures i

List of Tables i

1 INTRODUCTION 1

1.1 Purpose 1

1.2 Dune Act 1

2 BACKGROUND 2

2.1 Dune System Classification 3

2.2 Site Characteristics 4

3 DUNE DATA SUMMARY 5

4 INVENTORY 7

5 REFERENCES 7

Appendix A. Location of Dune Sites

Appendix B. Individual Dune Inventory Sheets

List of Figures

Figure 1. Location of City of Hampton within Chesapeake Bay estuarine system 1

Figure 2. Geographic extent of dunes in City of Hampton 2

Figure 3. Dune classification system developed by Hardaway *et al.* (2001) 3

Figure 4. Typical profile of a Chesapeake Bay dune 4

List of Tables

Table 1. Identified dune sites in the City of Hampton as of 2000 5

Table 2. Dune site measurements in City of Hampton as of 2000 6

Table 3. Dune site parameters in City of Hampton as of 2000 6

Cover Photo
Looking south from Lighthouse Point in Hampton, Virginia, June 2002, by VIMS, Shoreline Studies Program. HP12 is shown in the foreground while HP 8 is visible in the distance south of Grandview.

1 INTRODUCTION

1.1 Purpose

The City of Hampton, Virginia is located along the western shore of Chesapeake Bay (Figure 1). Six dune sites were identified along Hampton’s shoreline by site visits performed in 1999 and 2000. Most of the dunes are located along Chesapeake Bay between Old Point Comfort and Factory Point except of one site on Hampton Roads (Figure 2). It is the intent of this publication to provide the user with information on the status of dunes in the City of Hampton. This information comes from research performed in 1999 and 2000 which was presented in a report entitled “Chesapeake Bay Dune Systems: Evolution and Status (Hardaway *et al.*, 2001). Since much of the data was collected several years ago and the beach and dune systems may have changed, this report is intended only as a resource for coastal zone managers and homeowners; it is not intended for use in determining legal jurisdictional limits.

1.2 Dune Act

Coastal dune systems of the Commonwealth of Virginia are a unique and valuable natural resource. Dunes are important to both the littoral marine system (as habitat for flora and fauna) and the adjacent landward environment (as erosion control and protection from storms). These functions form the basis for the Coastal Primary Sand Dune Protection Act of 1980 (Act)¹ and the related resource management effort under which the primary dune and beach components of existing dune systems are protected. Secondary dunes are not protected under the Act; however, as they are an important part of the overall dune system, they were included in the original report (Hardway *et al.*, 2001) and analyzed as part of a risk assessment performed by Varnell and Hardaway (2002). In this inventory, both primary and secondary dunes are included.

Primary dunes must meet three criteria in order to fall under the Act’s jurisdiction:

- 1. **Substance:** a mound of unconsolidated sandy soil contiguous to mean high water
- 2. **Morphology:** landward and lateral limits are marked by a change in grade from >10% to <10%.
- 3. **Character:** primary dunes must support specific plant species or communities which are named in the Act and include: American beach grass (*Ammophila breviligulata*); beach heather (*Hudsonia tometosa*); dune bean (*Strophostylis* spp.); dusty miller (*Artemisia stelleriana*); saltmeadow hay (*Spartina patens*); seabeach sandwort (*Arenaria peploides*); sea oats (*Uniola paniculata*); sea rocket (*Cakile edentula*); seaside goldenrod (*Solidago sempervirens*); and short dune grass (*Panicum ararum*).

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

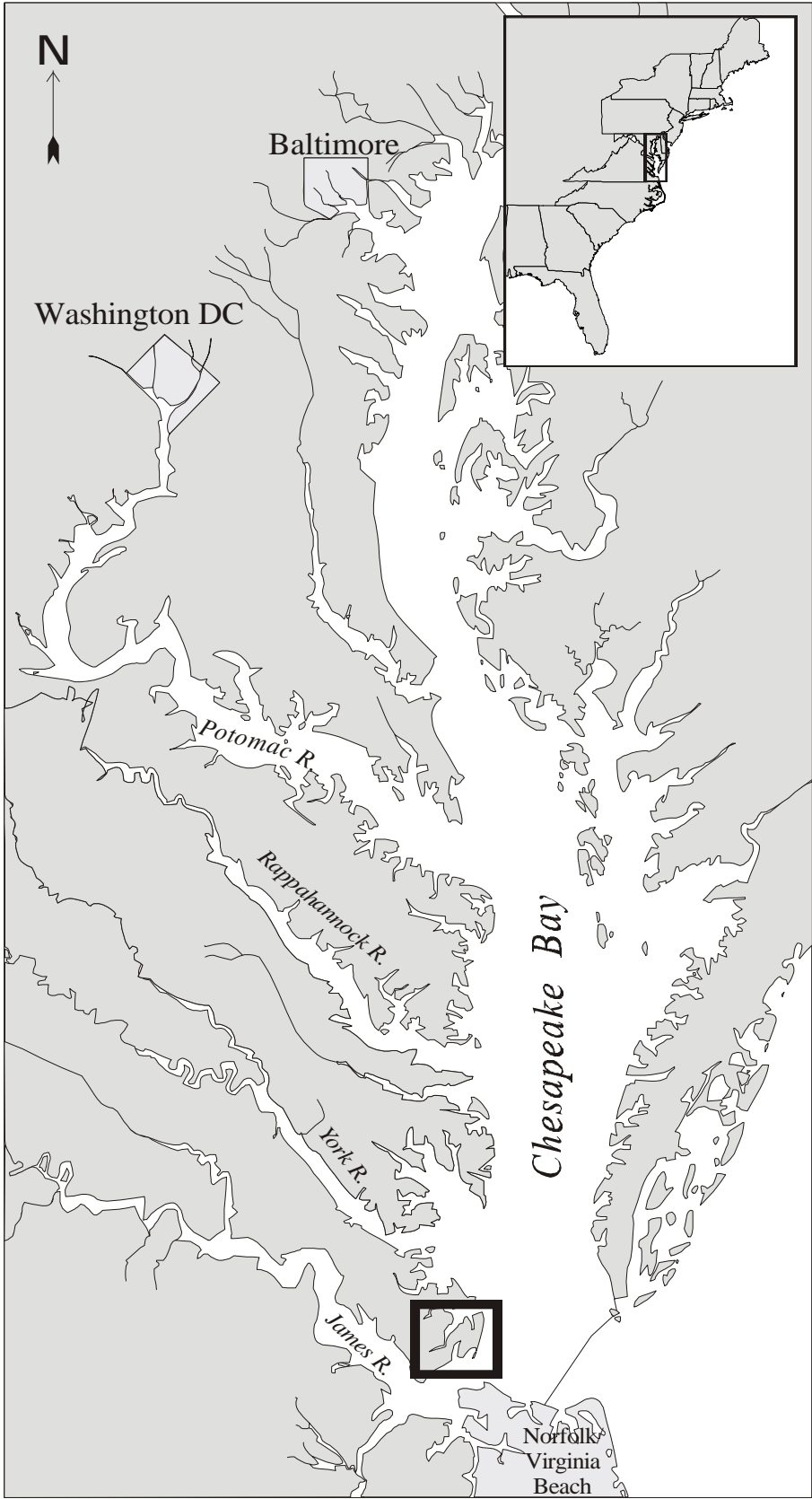


Figure 1. Location of City of Hampton within Chesapeake Bay estuarine system.

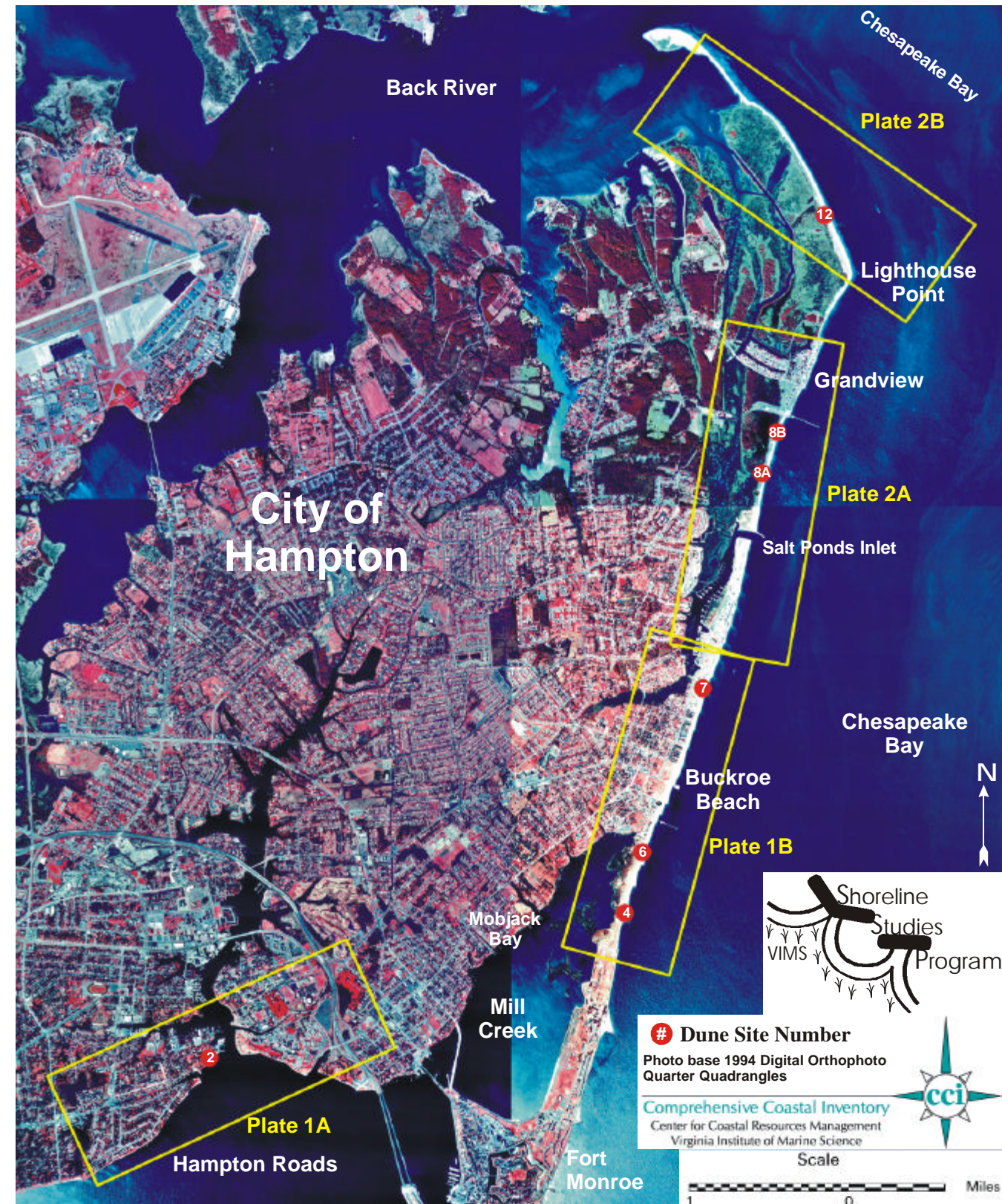


Figure 2. Geographic extent of dunes in City of Hampton.

2 BACKGROUND

Coastal primary sand dunes form by the accumulation of sand due to the interaction of wind and wave action along the shore. Sand deposited on the beach during periods of relatively low wave energy is moved landward by onshore winds. The deposition of material above the intertidal zone allows vegetation to take root along the wrack line which then acts as a baffle, slowing wind speed and causing wind-borne sand to settle and be trapped in the vegetation thereby resulting in further accretion of the dune. Therefore, the size and location of a primary dune is determined by the amount of sand available and the ability of wind and waves to move it as well as the degree to which any existing vegetation can act to trap it. Thus, just as the intensity, direction, and duration of winds and waves constantly change through the seasons, so too, do coastal dunes exist in a state of flux.

Dunes act as a reservoir of sand which can buffer inland areas from the effects of storm waves and, in the process, act as natural levees against coastal flooding. During high energy conditions, such as the northeast storms which frequent the Eastern Seaboard, primary dunes may be subject to attack by wind-driven waves aided by storm surges. The dune may be eroded, and the sand deposited in an offshore bar. Then, under low-energy conditions, the sand may move back to the beach.

All dunes in the Chesapeake Bay estuarine system are mobile features especially with regards to coastal zone management. Unlike ocean dune fields that are relatively continuous features exposed to the open ocean, the dunes of the Chesapeake form across a temporal and spatial geomorphic matrix driven by sand volume, varying wave climate, and shoreline geology. The coastal geology, in large part, determines whether shoreline erosion acts upon the upland (high bank) or marsh (low bank). Sand supply and the long-term local wave climate are significant factors in the location of dunes. The stability or ability of a dune/beach system to accrete over time is necessary for the formation of secondary dunes.

Natural dunes in the Chesapeake Bay estuarine system vary in size and nature but all require that an accreted feature, such as a beach washover or a spit, becomes vegetated above the intertidal zone. The vegetation and a continuous beach/dune profile are required to create the jurisdictional primary dune. If the dune/beach forms across a low marsh shoreline, the system will move landward in response to storms, and only a low primary dune will exist. If sand can accrete bayward due to shoals, spits, or man-made features such as jetties and groins, then a secondary dune may develop from the original primary dune.

Hardaway *et al.* (2001) found that the occurrence of dunes around Chesapeake Bay is due, in part, to three factors: 1) morphologic opportunity (*i.e.*, relatively stable setting), 2) abundant sand supply in the littoral transport system, and 3) conducive onshore wind/wave climate. Deposited sand must remain above a stable backshore to allow dune vegetation to become established. Each dune documented by Hardaway *et al.* (2001) has its own history of change -- growth and decay; natural and anthropogenic. Many miles of natural dunes have been altered by development, and many have been formed in response to processes altered by man's influence. Dunes around the Chesapeake Bay estuarine system in the localities within the Act encompass only about 40 miles of shoreline (Hardaway *et al.*, 2001). This is about 0.4% of the total Bay shore - making it an important, but rare, shore type.

2.1 Dune System Classification

The Chesapeake Bay dune classification was developed in Hardaway *et al.* (2001) and is portrayed in Figure 3. This classification is based on factors that are unique to certain dune systems and has a basis in the dune field evolution, vegetative zones, lateral and vertical extent of primary and secondary dune features, and anthropogenic impacts.

Dunes are categorized as Natural, Man Influenced, or Man Made. These three types reflect how the state of the dune is most impacted. The parameters (A through G) are most influential in defining the status of a given dune system. Parameter values within each category assign a range of limits or characteristics. Categories A, B, and C relate to the nature of the impinging wave climate at a given site while categories D, E, and F relate to geologic parameters. Dune parameter G relates to the type of anthropogenic influence.

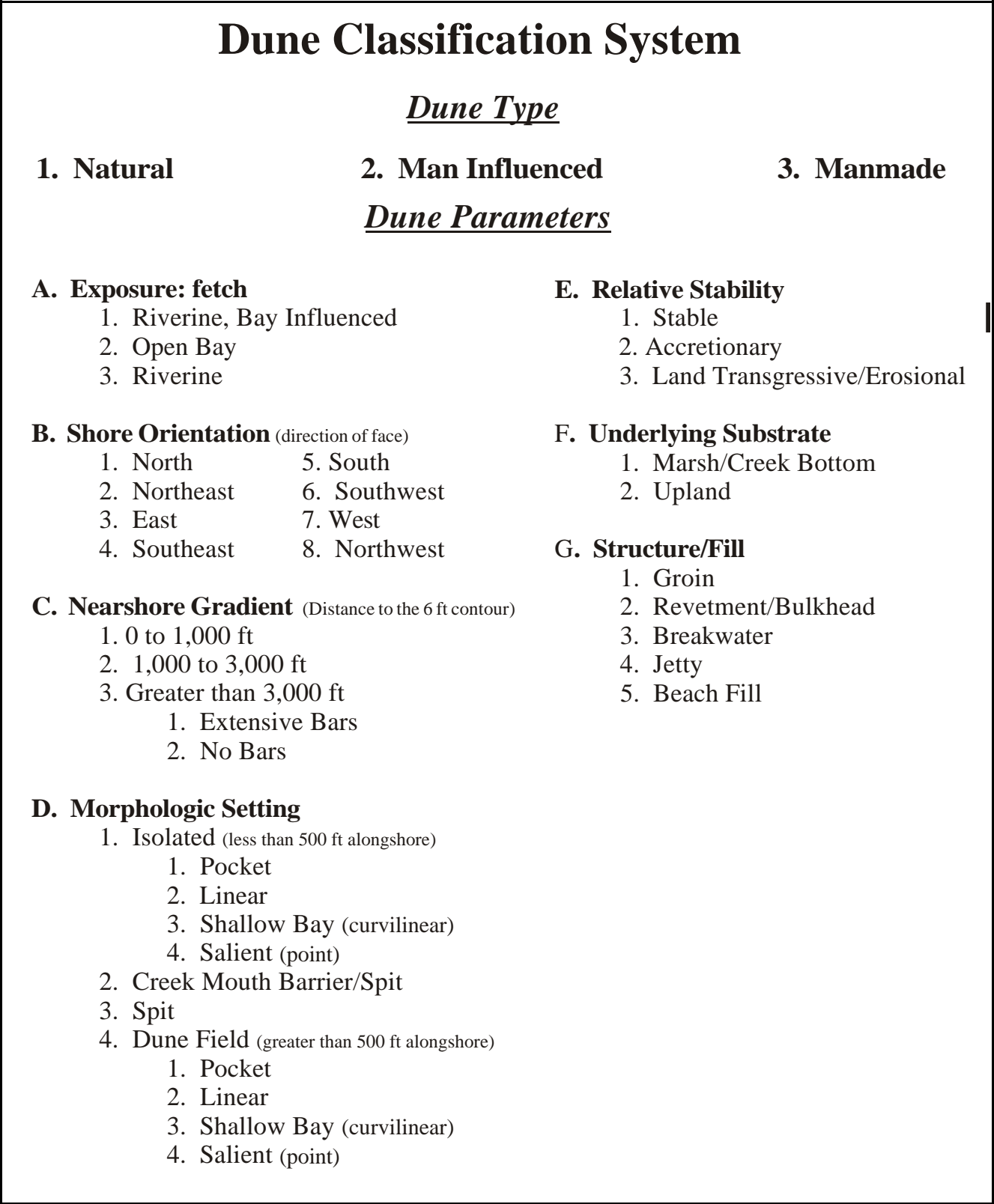
Fetch Exposure (A) is a qualitative assessment of the wave exposure and wave climate across open water. Wave impact is the dominant natural process driving shoreline erosion and sediment transport along the Bay coasts. Riverine, Bay Influenced (A.1) is somewhere between the Open Bay exposure (A.2) and Riverine Exposure (A.3). Generally, A.1 sites have fetches of 5-10 nautical miles (nm); A.2 have fetches of >10 nm; and A.3 have fetches <5 nm.

Shore Orientation (B) is the direction the main dune shore faces according to eight points on the compass. Shoreline exposure to dominant directions of wind and waves is a component of fetch exposure (A) and wave climate as well as aeolian processes that assist in dune growth and decay.

Nearshore Gradient (C) controls wave refraction and shoaling that, in turn, affect the nature of wave approach and longshore sand transport as well as onshore/offshore transport. The presence or absence of bars indicates the relative amount of nearshore sediment available for transport.

The Morphologic Setting (D) is significant in the genesis of a particular dune site. Aerial imagery from VIMS SAV Archive and field observations were used to determine and classify the Morphologic Setting. Four basic categories were developed including: 1) Isolated dunes, 2) Creek mouth barrier dune/spit, 3) Spit and 4) Dune fields. Morphological Settings 1 and 4 are distinguished only by shore length (*i.e.* Morphologic Setting 1 < 500 ft and Morphologic Setting 4 > 500 ft) as an arbitrary boundary. These categories were subdivided to reflect the nature of the setting into four subcategories which are 1) Pocket, 2) Linear, 3) Shallow Bay and 4) Salient.

The Relative Stability (E) of a dune is very subjective. It is meant as a value judgement as to the overall current and future integrity at the time of the site visit. If the site had wave cut scarps along the primary dune face and/or was actively moving landward (overwash), it was termed Land Transgressive/Erosional (E.3). If the backshore/dune face had a slight gradient with stabilizing vegetation, it was stable (E.2) or, possibly, accretionary (E.1).



The underlying substrate (F) is a general category for the type of substrate or sediment the dune resides on and against. Two broad categories were chosen - marsh and upland. The marsh category includes creek bottoms which should be a separate category because beach/dune development can occur across the mouth of a creek bottom without a true marsh. The distinction between upland and marsh was that the marsh substrate is usually a low bank that is subject to washover processes whereas the upland area offered a “backstop” to land beach/dune migration.

If the site was not Natural (1), *i.e.* Man-influenced (2) or Man-made (3), then the nature of man’s impact was determined by the type of modification. The shore structures include Groins (G.1), Bulkheads and Revetments (G.2), Breakwaters (G.3), Jetties (G.4), and Beach Fill (G.5). The degree of impact any given structure or combination of structures had on the dune site was not always clear. The Relative Stability (E) relates in part to whether man’s influence was erosive (destructive) or accretionary/stable (constructive).

2.2 Site Characteristics

Coastal zone profile and vegetation types present on dunes were determined by site visit. Beach profile transects were performed at most sites to measure the primary and secondary dune (where present) within 100 feet of the shoreline. Standard surveying and biological procedures were utilized. Not all dune sites were surveyed.

Each surveyed transect used the crest of the primary dune as the horizontal control and mean low water (MLW) as the vertical control. The primary dune crest was determined on site. The MLW line was indirectly obtained from water level measurements. The observed water level position and elevation were checked against recorded tidal elevations at the nearest NOAA tide station and time of day to establish MLW on the profile.

The typical dune profile has several components (Figure 4). A continuous sand sheet exists from the offshore landward and consists of a 1) nearshore region, bayward of MLW, 2) an intertidal beach, berm, and backshore region between MLW and base of primary dune, 3) a primary dune from bayside to landside including the crest, and, where present, 4) a secondary dune. All profiles extended bayward beyond MLW and landward to at least the back of the primary dune. The secondary dune crest was always measured but the back or landward extent of the secondary dune could not always be reached. The dimensions, including lateral position and elevation of

various profile components were measured. These include: primary dune crest elevation, distance from primary dune crest to back of dune, distance from primary dune crest to MLW, secondary dune crest elevation, secondary dune crest to back of primary dune, secondary dune crest to back of secondary dune, distance from back of primary dune to back of secondary dune, width of secondary dune, and width of primary and secondary dune.

During each site visit, dominant plant communities occupying the primary and secondary dunes (if present) were analyzed (Figure 4). Plant species distribution is based on observed percent cover in the general area of profiling and sampling within the identified dune reach.

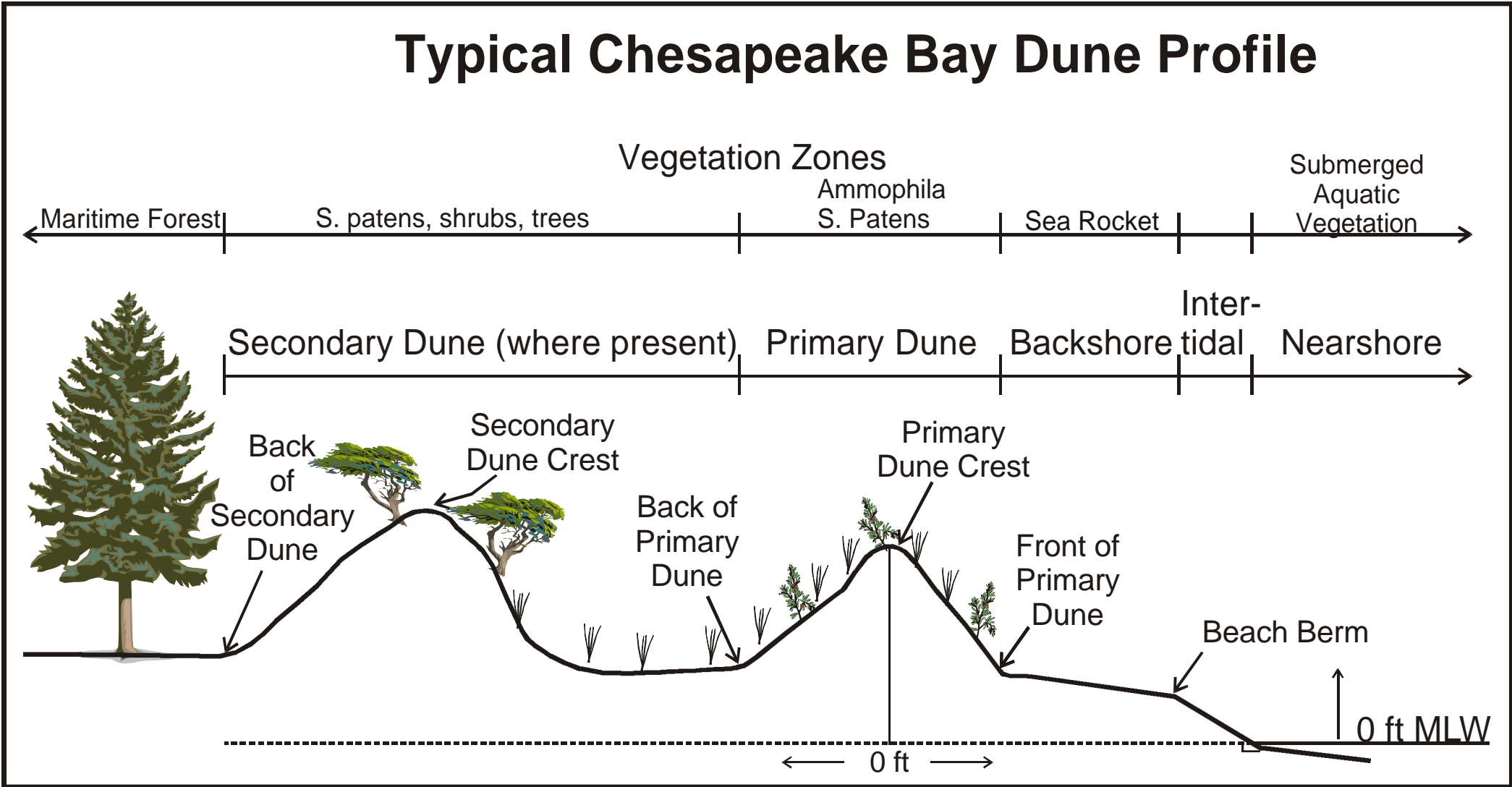


Figure 4. Typical profile of a Chesapeake Bay dune system (from Hardaway *et al.*, 2001).

3 DUNE DATA SUMMARY

Approximately 2.0 miles of dune shore consisting of 6 sites (Table 1) were identified in Hampton. Previous work by Hardaway *et al.* (2001) had named a total of 14 possible dune sites in Hampton, but site visits verified just 6. The distal end of Grandview Nature Preserve, which became an island in 1998, was originally identified as a potential dune site but was not visited for the original report. It likely had dune features. In fact, Hampton dune sites had a wide variety of site conditions, ranging from a large dune field south of the breach at HP 12 to a small isolated dune along Hampton Roads (HP 2). Generally, dunes occupied areas of sand accretion and stability such as around tidal creek mouths, embayed shorelines, in front of older dune features, as washovers, as spits and against man-made structures like channel jetties or groin fields. Most of the dune sites resided along Hampton’s Chesapeake Bay coast which was once a continuous, sandy shore. This dynamic coast is exposed to open Bay waters and ocean swell conditions and has had a history of dynamic shore change and geomorphic evolution. Over time, the coast has been fragmented by shoreline hardening at Grandview, Buckroe Beach, and Fort Monroe. Salt Ponds Inlet was made permanent by jetties, and numerous groins have restricted sand movement alongshore. Instead of a continuous sandy coast, the beaches and dunes reside in more isolated subreaches.

In Hampton, 3 of the 6 dune sites had both primary and secondary dunes. Table 2 presents the measurements of the dune attributes. The average length of primary dune only sites was 483 ft whereas the average length of the primary with secondary dunes was 3,030 feet. Clearly, the wider sites were also the longest. However, site visits occurred in 1999 and 2000; site characteristics may now be different due to natural or man-induced shoreline change.

The 3 main categories of Natural, Man-Influenced and Man-Made were used to portray a site’s potentially most influential element. In Hampton, 16% are Natural, 84% are Man-Influenced, and none were Man-Made (Table 3). In terms of shore length however, 40% are Natural and 60% are Man-Influenced Hampton’s dune sites are largely man-influenced with jetties, groins, and beach nourishment. Only the dune field along the northern coast at Grandview Nature Preserve remains a relatively natural feature.

Table 1. Identified dune sites in City of Hampton as of 2000. Site characteristics may now be different due to natural or man-induced shoreline change.

Dune Site No.	Location^		Date Visited	Dune Shore Length (Feet)	Primary Dune Site?	Secondary Dune Site?	*Public Ownership?
	Easting (Feet)	Northing (Feet)					
2	2,629,850	255,100	9/21/00	220	Yes		
4	2,643,450	260,450	9/21/00	550	Yes	Yes	Yes
6	2,643,950	262,500	9/21/00	680	Yes		Yes
7	2,645,750	268,050	11/18/99	1,540	Yes	Yes	
8A’	2,647,250	274,750	11/18/99	2,250	Yes		
8B’	2,647,850	276,700	11/18/99	1,100	Yes		
12	2,649,650	282,900	11/18/99	4,200	Yes	Yes	Yes
Total				10,540			

*Public ownership includes governmental entities including local, state, and federal; otherwise ownership is by the private individual.

^Location is in Virginia State Plane South, NAD 1927

‘One site with variable alongshore dune conditions

Table 2. Dune site measurements in City of Hampton as of 2000. Site characteristics may now be different due to natural or man-induced shoreline change.

			Dune Site Measurements							
Site No.		Dune Shore Length (Feet)	Primary Dune			Jurisdiction	Secondary Dune			
			Crest Elev (ft MLW)	Distance from Crest landward to back base (Feet)	To MLW (Feet)		Crest Elev (ft MLW)	Primary Crest landward to profile end (Feet)	2ndCrest landward (Feet)	2nd Crest seaward to 1st back base (Feet)
HP	2	220	6.8	15	51					
HP	4	55	12.5	6	167	Yes	17.0	58	16	36
HP	6	680	11.6	37	179					
HP	7	1,540	10.0	7	166	Yes	9.2	87	44	36
HP	8A	2,250	11.6	12	161					
HP	8B	1,100	10.0	125	135					
HP	12	4,200	13.8	68	169	Yes	8.4	174	48	58

Table 3. Dune site parameters in City of Hampton as of 2000. Site characteristics may now be different due to natural or man-induced shoreline change.

			Dune Site Parameters							
Site No.		Type	Fetch Exposure	Shoreline Direction of Face	Nearshore Gradient		Morphologic Setting	Relative Stability	Underlying Substrate	Structure or Fill
			A	B	C		D	E	F	G
HP	2	Man Inf	Riverine	Southeast	Steep	No Bars	Isolated, pocket	Stable	Upland	Groin, BW
HP	4	Man Inf	Open Bay	East	Steep	No Bars	Dune Field, pocket	Stable	Marsh/CB	Groin
HP	6	Man Inf	Open Bay	East	Steep	No Bars	Dune Field, linear	Erosional	Marsh/CB	Groin
HP	7	Man Inf	Open Bay	East	Steep	No Bars	Dune Field, linear	Stable	Upland	Groin
HP	8A	Man Inf	Open Bay	East	Steep	No Bars	Dune Field, linear	Stable	Marsh/CB	Groin,Jetty
HP	8B	Man Inf	Open Bay	East	Steep	No Bars	Dune Field, linear	Erosional	Marsh/CB	Revet
HP	12	Natural	Open Bay	Northeast	Medium	No Bars	Dune Field, linear	Stable	Marsh/CB	

4 INVENTORY

Each dune site is located on plates in Appendix A. The individual site inventory sheets are in Appendix B. Due to the mobile nature of dunes, their extent and morphology changes through time. The data presented in this report represents the status of the site at the time of assessment and to the best of the author’s knowledge. This information is for general management purposes and should not be used for delineation. For detailed delineation of any dune site, the reader should contact the local wetlands board or Virginia Marine Resources Commission. See [Figures 3](#) and [4](#) for description of the site parameters and measurements listed below.

Each dune site has the following information on its inventory page:

- 1. Date visited
- 2. Central site coordinates in Virginia South State Plane Grid NAD 1927
- 3. Coordinates of profile origin
- 4. Site length in feet
- 5. Ownership
- 6. Site Type
- 7. Fetch Exposure
- 8. Shoreline Direction of Face
- 9. Nearshore gradient
- 10. Morphologic Setting
- 11. Relative Stability
- 12. Underlying Substrate
- 13. Type of structure or fill (man-influenced only)
- 14. Primary Dune Crest Elevation in feet above Mean Low Water (MLW)
- 15. Landward extent of Primary Dune from Dune Crest in feet
- 16. Distance from Dune Crest to MLW
- 17. Secondary Dune Crest Elevation in feet above MLW (if present)
- 18. Distance from Primary Dune Crest landward to profile end
- 19. Distance from Secondary Dune Crest landward
- 20. Primary Dune vegetation communities
- 21. Secondary Dune vegetation communities
- 22. General Remarks

Also included on the dune site inventory page is the site cross-section, if surveyed, and ground photos, if taken. Long sites may have been represented with two or more profiles because the general morphology differs alongshore. Each profile was intended to be representative of that dune portion of the site.

5 REFERENCES

Hardaway, C.S., Jr., G.R. Thomas, J.B. Glover, J.B. Smithson, M.R. Berman, and A.K. Kenne, 1992. Bank Erosion Study. Special Report in Applied Marine Science and Ocean Engineering Number 319. Virginia Institute of Marine Science, College of William & Mary, Gloucester Point, Virginia.

Hardaway, C.S., Jr., L.M. Varnell, D.A. Milligan, G.R. Thomas, C.H. Hobbs, III, 2001. Chesapeake Bay Dune Systems: Evolution and Status. Technical Report. Virginia Institute of Marine Science, College of William & Mary, Gloucester Point, Virginia.

Varnell, L.M. and C.S. Hardaway, 2002. An Analysis of Shoreline Development Risk for Secondary Dune Systems in Tidewater Virginia With Associated Management Recommendations. Final report to the Virginia Coastal Program. Virginia Institute of Marine Science, College of William & Mary, Gloucester Point, Virginia.

Appendix A
Location of Dune Sites

[Plate 1](#)
[Plate 2](#)

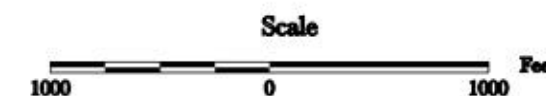


City of Hampton



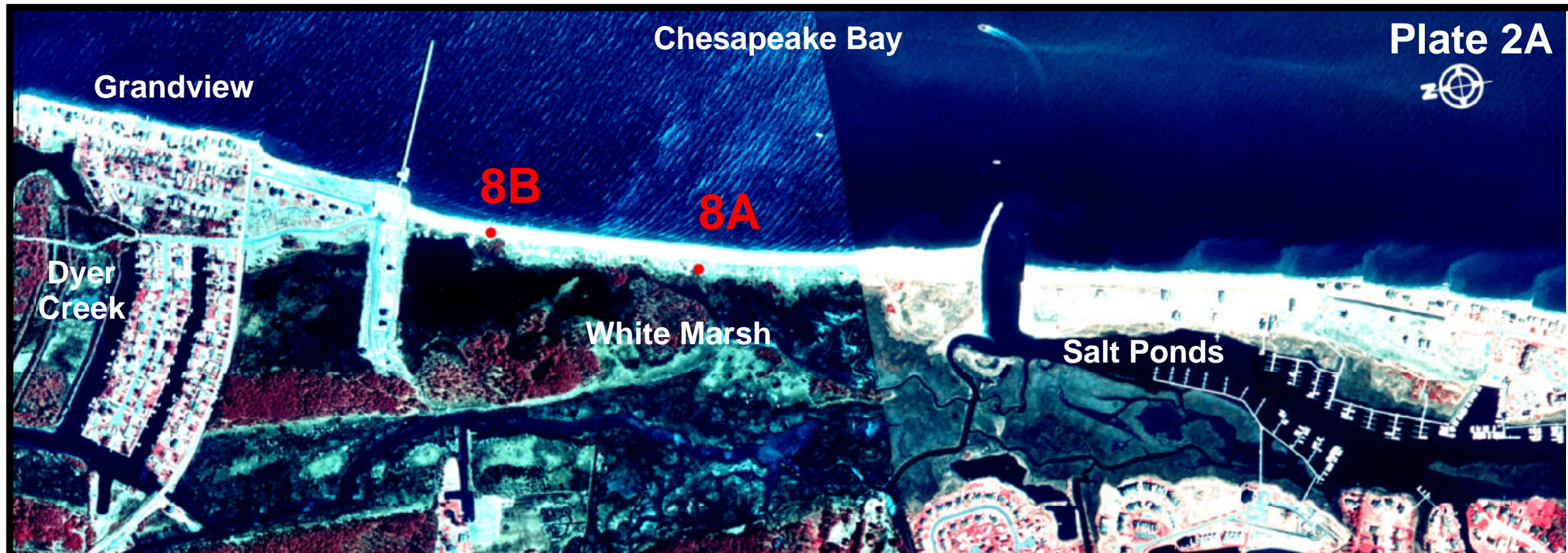
● Dune Site

Photo base 1994
Digital Orthophoto
Quarter Quadrangles

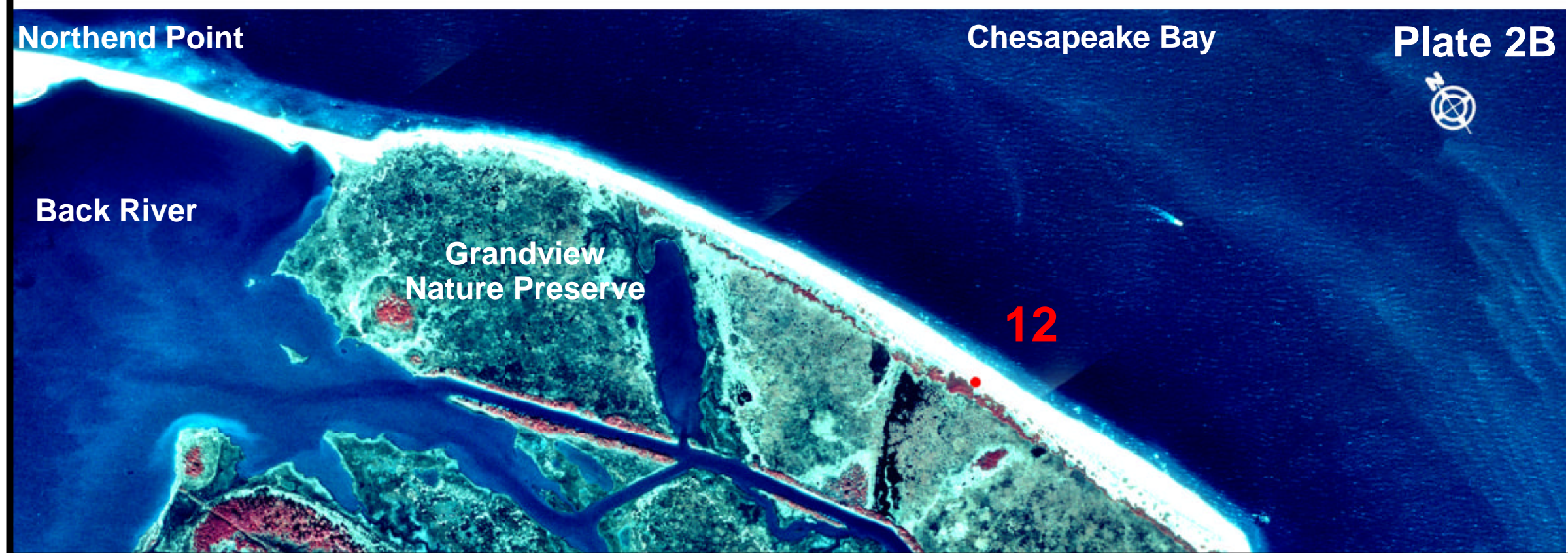


Comprehensive Coastal Inventory
Center for Coastal Resources Management
Virginia Institute of Marine Science





City of Hampton



● Dune Site

Photo base 1994
Digital Orthophoto
Quarter Quadrangles

Scale
1000 0 1000 Feet



Comprehensive Coastal Inventory
Center for Coastal Resources Management
Virginia Institute of Marine Science

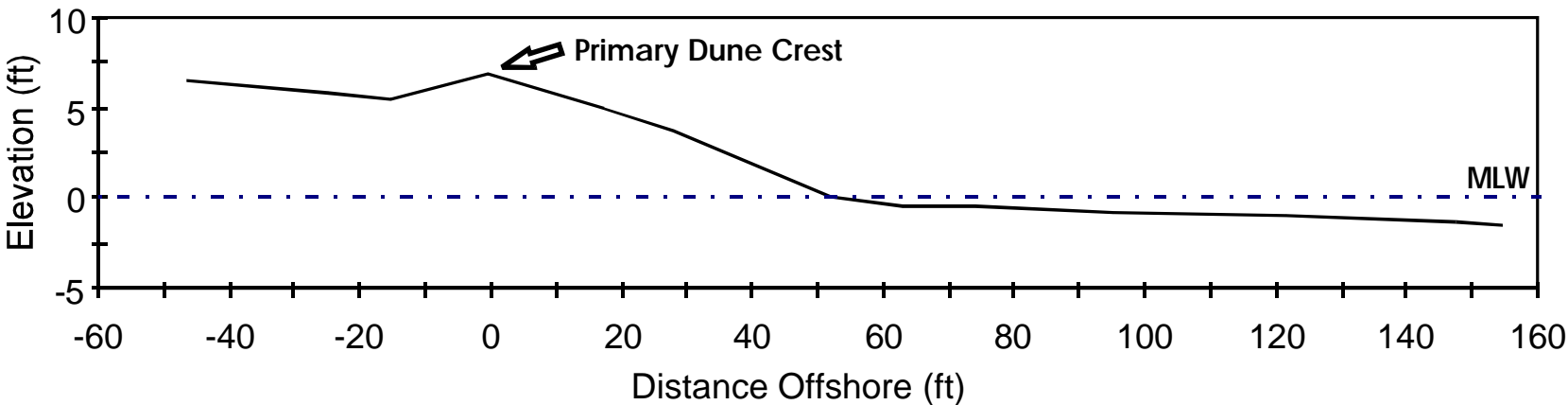


Appendix B

Individual Dune Inventory Sheets

[HP 2](#) [HP 4](#)
[HP 6](#) [HP 7](#)
[HP 8A](#) [HP 8B](#) [HP 12](#)

CITY OF HAMPTON DUNE SITE 2



Site Information

- 1. Date Surveyed: 21 Sep 2000
- 2. Central Coordinates: N: 255,100 ft E: 2,629,850 ft
- 3. Profile Coordinates: N: 255,100 ft E: 2,629,850 ft
- Virginia South State Plane Grid NAD 1927 [4502]
- 4. Site Length: 220 ft
- 5. Ownership: Private Plate: 1A

Site Parameters

- 6. Type: Man Influenced
- 7. Fetch Exposure: Riverine
- 8. Shoreline Direction of Face: Southeast
- 9. Nearshore Gradient: 0 to 1,000ft
- 10. Morphologic Setting: Isolated <500 ft Alongshore/Pocket
- 11. Relative Stability: Stable
- 12. Underlying Substrate: Upland
- 13. Structure or Fill: Groin and Breakwater

Site Measurements

- Primary Dune:
 - 14. Crest Elevation (ft MLW): 6.8
 - 15. Extent from Crest Landward (ft): 15
 - 16. Extent from Crest To MLW (ft): 51
- Secondary Dune: None
 - 17. Crest Elevation (ft MLW): N/A
 - 18. Land Extent From Primary Crest (ft): N/A
 - 19. Second Crest – Landward (ft): N/A

Vegetation Communities

- 20. Primary Dune:
 - Spartina patens* (saltmeadow hay)
 - Ammophila breviligulata* (American beach grass)
- 21. Secondary Dune: N/A

22. Remarks:
Site HP 2 is a pocket beach and dune bounded by a revetment on the west and a groin on the east. Since the initial aerial assessment in 1998, a stone breakwater and groin were installed in 2000. The site was once erosive but is now stable.



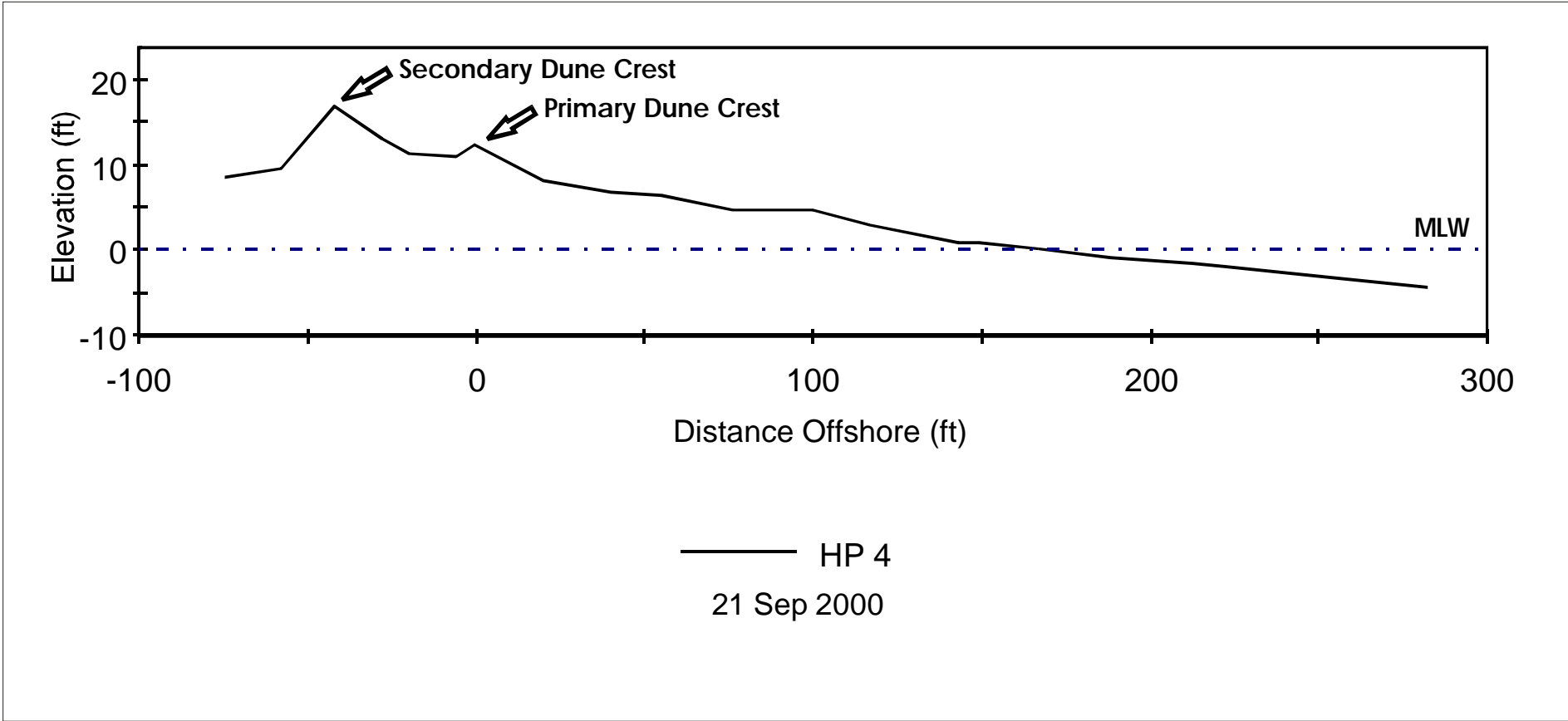
Looking eastward toward the stone groin/spur at the east boundary of the site.



Looking westward along the pocket beach and dune toward the stone breakwater.

Not intended for use in determining legal jurisdictional limits.

CITY OF HAMPTON DUNE SITE 4



Site Information

- 1. Date Surveyed: 21 Sep 2000
- 2. Central Coordinates: N: 260,450 ft E: 2,643,450 ft
- 3. Profile Coordinates: N: 260,450 ft E: 2,643,450 ft
- Virginia South State Plane Grid NAD 1927 [4502]
- 4. Site Length: 550 ft
- 5. Ownership: Public (military) Plate: 1B

Site Parameters

- 6. Type: Man Influenced
- 7. Fetch Exposure: Open Bay
- 8. Shoreline Direction of Face: East
- 9. Nearshore Gradient: 0 to 1,000ft/No Bars
- 10. Morphologic Setting: Dune Field >500 ft Alongshore/Pocket
- 11. Relative Stability: Stable
- 12. Underlying Substrate: Marsh
- 13. Structure or Fill: Groin

Site Measurements

- Primary Dune:
 - 14. Crest Elevation (ft MLW): 12.5
 - 15. Extent from Crest Landward (ft): 6
 - 16. Extent from Crest To MLW (ft): 167
- Secondary Dune:
 - 17. Crest Elevation (ft MLW): 17.0
 - 18. Land Extent From Primary Crest (ft): 58
 - 19. Second Crest – Landward (ft): 16

Vegetation Communities

- 20. Primary Dune:
 - Ammophila breviligulata* (American beach grass)
 - Spartina patens* (saltmeadow hay)
- 21. Secondary Dune: *Spartina patens* (saltmeadow hay) Shrub/woody

22. Remarks:
HP 4 is located at DOG Beach on Fort Monroe. These sites have evolved, in part, due to the three large broken concrete groins and a supply of sand from the north. Beach fill placed north of Fort Monroe at Buckroe Beach eroded and was subsequently transported south. HP 4 has a secondary dune.



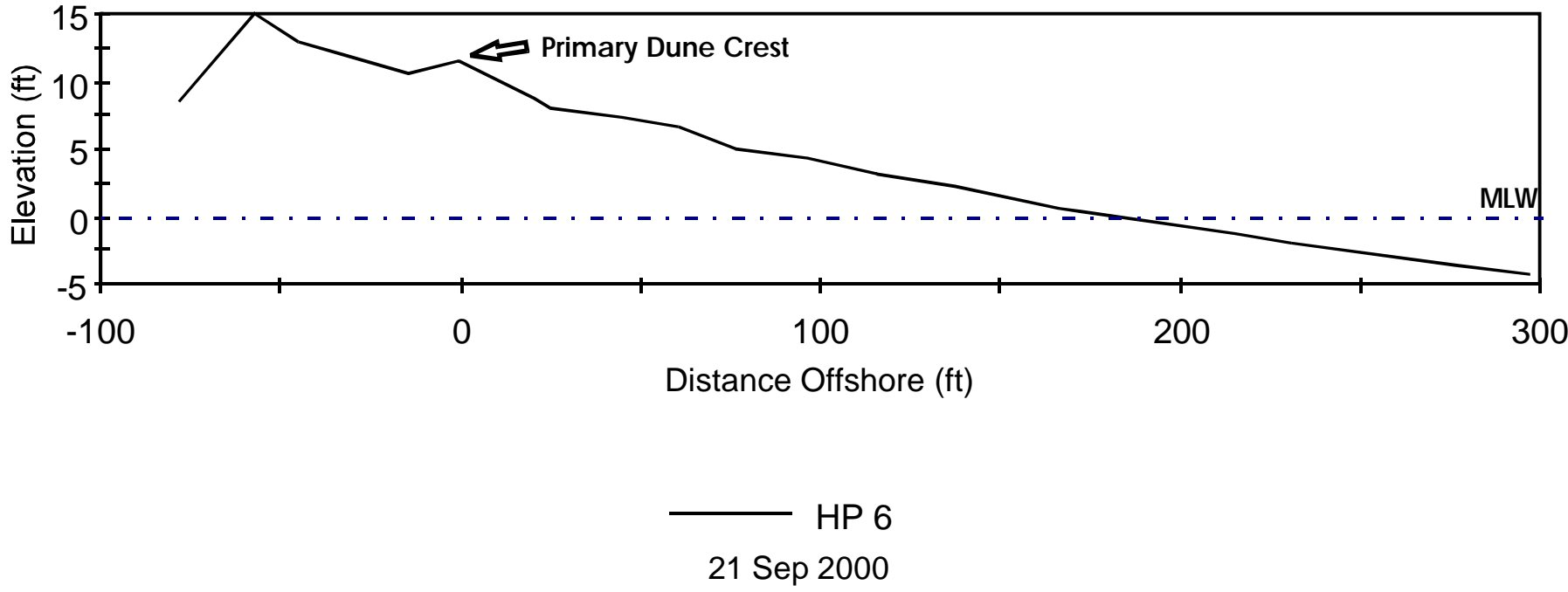
Looking south toward the southern most groin at DOG Beach.



Looking north at a middle groin.

Not intended for use in determining legal jurisdictional limits.

CITY OF HAMPTON DUNE SITE 6



Site Information

- 1. Date Surveyed: 21 Sep 2000
- 2. Central Coordinates: N: 262,500 ft E: 2,643,950 ft
- 3. Profile Coordinates: N: 262,500 ft E: 2,643,950 ft
- Virginia South State Plane Grid NAD 1927 [4502]
- 4. Site Length: 680 ft
- 5. Ownership: Public (military) Plate: 1B

Site Parameters

- 6. Type: Man Influenced
- 7. Fetch Exposure: Open Bay
- 8. Shoreline Direction of Face: East
- 9. Nearshore Gradient: 0 to 1,000ft/No Bars
- 10. Morphologic Setting: Dune Field >500 ft Alongshore/Linear
- 11. Relative Stability: Land Transgressional/Erosional
- 12. Underlying Substrate: Marsh
- 13. Structure or Fill: Groin

Site Measurements

- Primary Dune:
 - 14. Crest Elevation (ft MLW): 11.6
 - 15. Extent from Crest Landward (ft): 37
 - 16. Extent from Crest To MLW (ft): 179
- Secondary Dune: None
 - 17. Crest Elevation (ftMLW): N/A
 - 18. Land Extent From Primary Crest (ft.): N/A
 - 19. Second Crest – Landward (ft.): N/A

Vegetation Communities

- 20. Primary Dune: *Ammophila breviligulata* (American beach grass)
- 21. Secondary Dune: N/A

22. Remarks:
HP 6 is located in the northernmost groin cell at DOG Beach at Fort Monroe. The site is bounded on the south by a large broken concrete groin and on the north by a wood groin near the Base property line. The feature that looks like a secondary dune on the transect is a man made rubble mound.



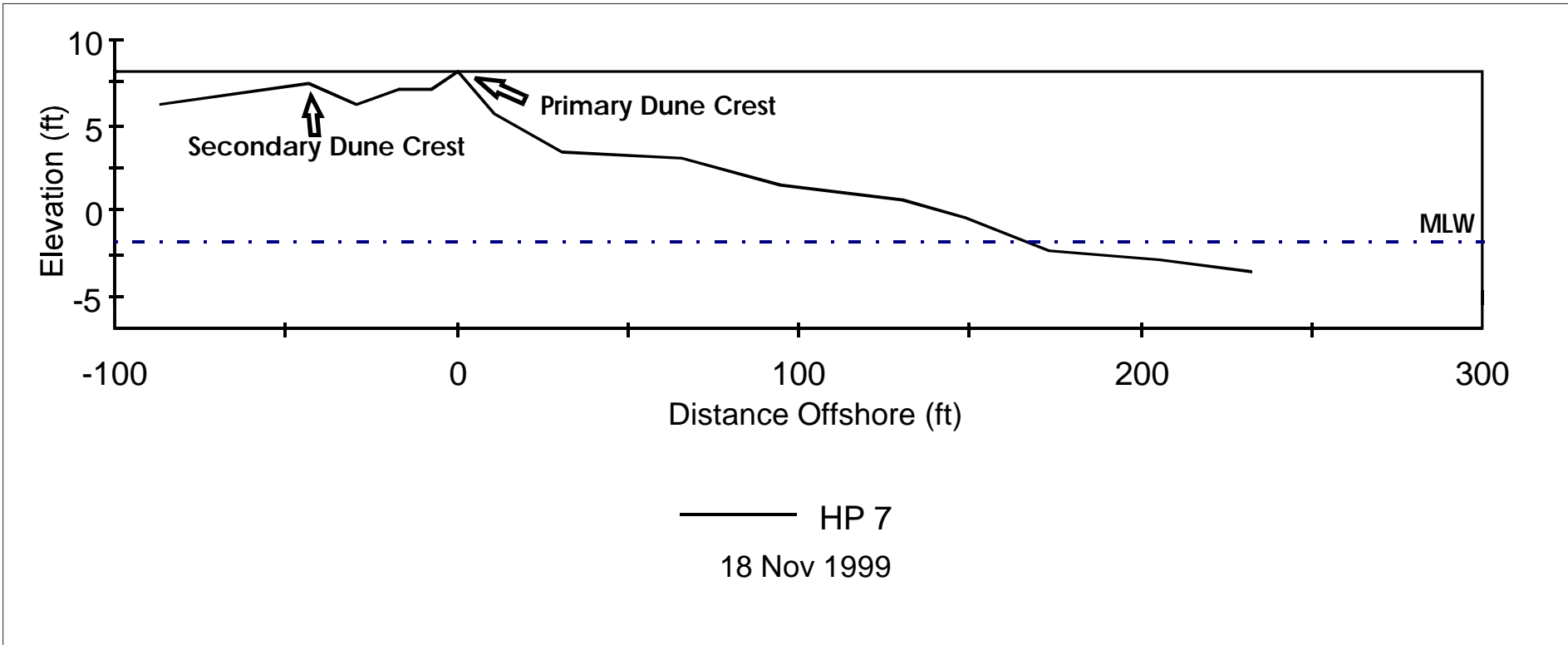
Looking south toward the northernmost broken concrete groin.



Looking south toward the wood groin and the Base property line.

Not intended for use in determining legal jurisdictional limits.

CITY OF HAMPTON DUNE SITE 7



Looking north along the dune crest.



Looking south along the dune face.

Site Information

- 1. Date Surveyed: 18 Nov 1999
- 2. Central Coordinates:
N: 268,050 f
E: 2,645,750 ft
- 3. Profile Coordinates:
N: 268,050 ft
E: 2,645,750 ft
- Virginia South State Plane Grid NAD 1927 [4502]
- 4. Site Length: 1,540 ft
- 5. Ownership: Private
- Plate: 1B

Site Parameters

- 6. Type: Man Influenced
- 7. Fetch Exposure: Open Bay
- 8. Shoreline Direction of Face: East
- 9. Nearshore Gradient: 0 to 1,000ft/No Bars
- 10. Morphologic Setting: Dune Field >500 ft Alongshore/Linear
- 11. Relative Stability: Stable
- 12. Underlying Substrate: Upland
- 13. Structure or Fill: Groin

Site Measurements

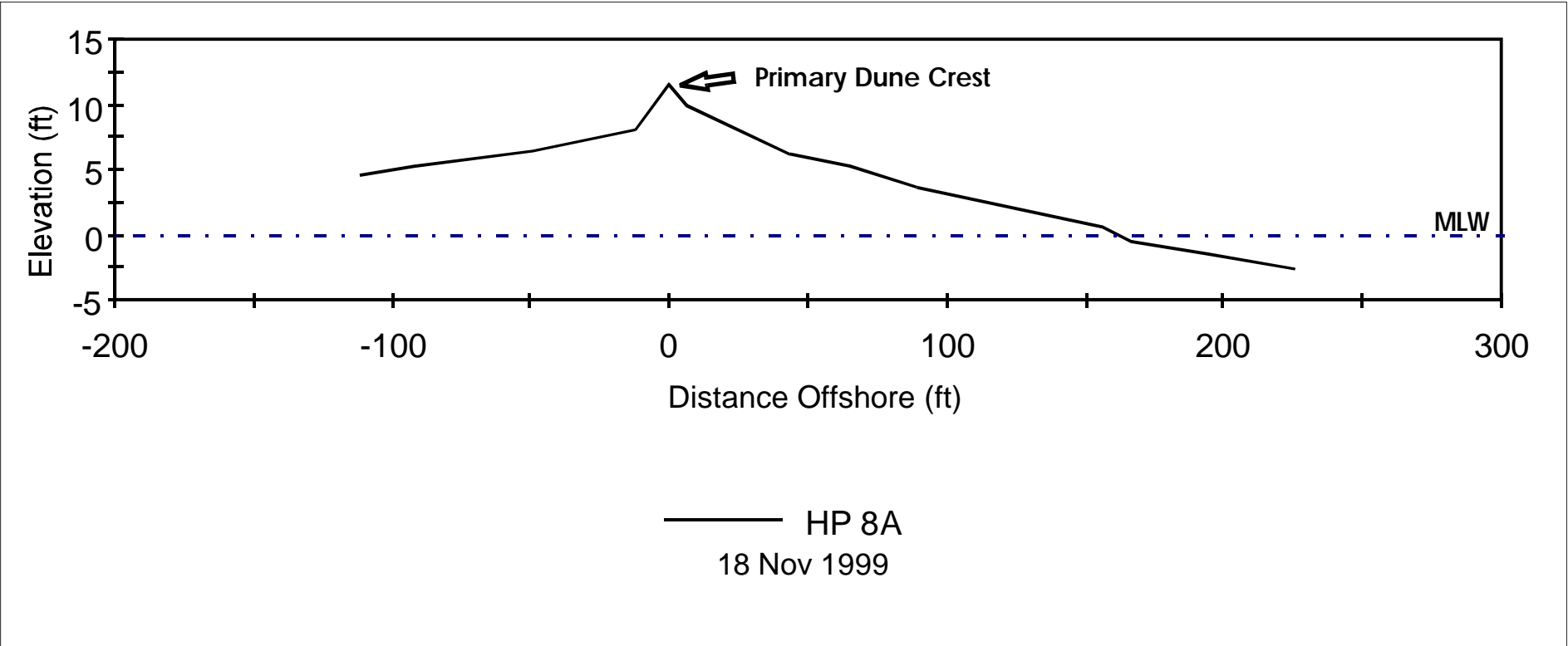
- Primary Dune:
 - 14. Crest Elevation (ft MLW): 10
 - 15. Extent from Crest Landward (ft): 7
 - 16. Extent from Crest To MLW (ft): 166
- Secondary Dune:
 - 17. Crest Elevation (ft MLW): 9.2
 - 18. Land Extent From Primary Crest (ft): 87
 - 19. Second Crest – Landward (ft): 44

Vegetation Communities

- 20. Primary Dune:
Ammophila breviligulata (American beach grass)
- 21. Secondary Dune:
Ammophila breviligulata (American beach grass)
Solidago sempervirens (seaside goldenrod)
- 22. Remarks:
HP 7 is located in a residential community north of Buckroe Beach. It is controlled by a series of long wooden groins and has benefited from beach nourishment projects at Buckroe Beach.

Not intended for use in determining legal jurisdictional limits.

CITY OF HAMPTON DUNE SITE 8A



Site Information

- 1. Date Surveyed: 18 Nov 1999
- 2. Central Coordinates: N: 274,750 ft
E: 2,647,250 ft
- 3. Profile Coordinates: N: 274,750 ft
E: 2,647,250 ft
- Virginia South State Plane Grid NAD 1927 [4502]
- 4. Site Length: 2,250 ft
- 5. Ownership: Private
- Plate: 2A

Site Parameters

- 6. Type: Man Influenced
- 7. Fetch Exposure: Open Bay
- 8. Shoreline Direction of Face: East
- 9. Nearshore Gradient: 0 to 1,000ft/No Bars
- 10. Morphologic Setting: Dune Field >500 ft Alongshore/Linear
- 11. Relative Stability: Stable
- 12. Underlying Substrate: Marsh
- 13. Structure or Fill: Groin and Jetty

Site Measurements

- Primary Dune:
 - 14. Crest Elevation (ft MLW): 11.6
 - 15. Extent from Crest Landward (ft): 12
 - 16. Extent from Crest To MLW (ft): 161
- Secondary Dune: None
 - 17. Crest Elevation (ft MLW): N/A
 - 18. Land Extent From Primary Crest (ft): N/A
 - 19. Second Crest – Landward (ft): N/A

Vegetation Communities

- 20. Primary Dune: *Spartina patens* (saltmeadow hay)
- 21. Secondary Dune: N/A

22. Remarks:
HP 8A and HP 8B are part of the same primary dune only system that exists between Grandview and Salt Ponds Inlet. The dune system fronts an extensive marsh area. HP 8A represents the southern portion of the site that is more stable than the northern section of the site.



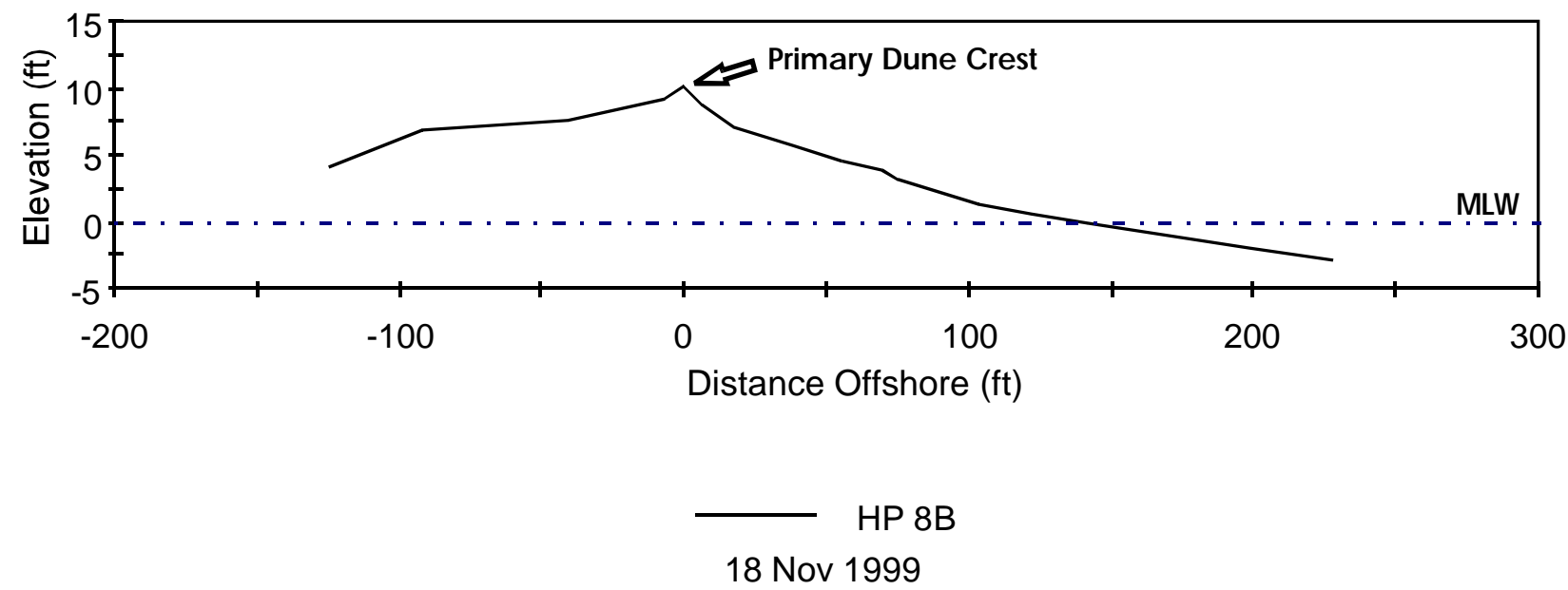
Looking southward toward Salt Ponds Inlet.



Looking north toward Grandview.

Not intended for use in determining legal jurisdictional limits.

CITY OF HAMPTON DUNE SITE 8B



Site Information

1. Date Surveyed: 18 Nov 1999
2. Central Coordinates:
N: 276,700 ft
E: 2,647,850 ft
3. Profile Coordinates:
N: 276,700 ft
E: 2,647,850 ft
Virginia South State Plane Grid NAD 1927 [4502]
4. Site Length: 1,100 ft
5. Ownership: Private
Plate: 2A

Site Parameters

6. Type: Man Influenced
7. Fetch Exposure: Open Bay
8. Shoreline Direction of Face: East
9. Nearshore Gradient: 0 to 1,000ft/No Bars
10. Morphologic Setting: Dune Field >500 ft Alongshore/Linear
11. Relative Stability: Land transgressive/Erosional
12. Underlying Substrate: Marsh
13. Structure or Fill: Revetment

Site Measurements

- Primary Dune:
14. Crest Elevation (ft MLW): 10.0
 15. Extent from Crest Landward (ft): 125
 16. Extent from Crest To MLW (ft): 135
- Secondary Dune: None
17. Crest Elevation (ft MLW): N/A
 18. Land Extent From Primary Crest (ft): N/A
 19. Second Crest – Landward (ft): N/A

Vegetation Communities

20. Primary Dune: *Spartina patens* (saltmeadow hay)
21. Secondary Dune: N/A

22. Remarks:
HP 8B represents the northern portion of site HP 8. It is similar to transect HP 8A but is more erosive in nature.



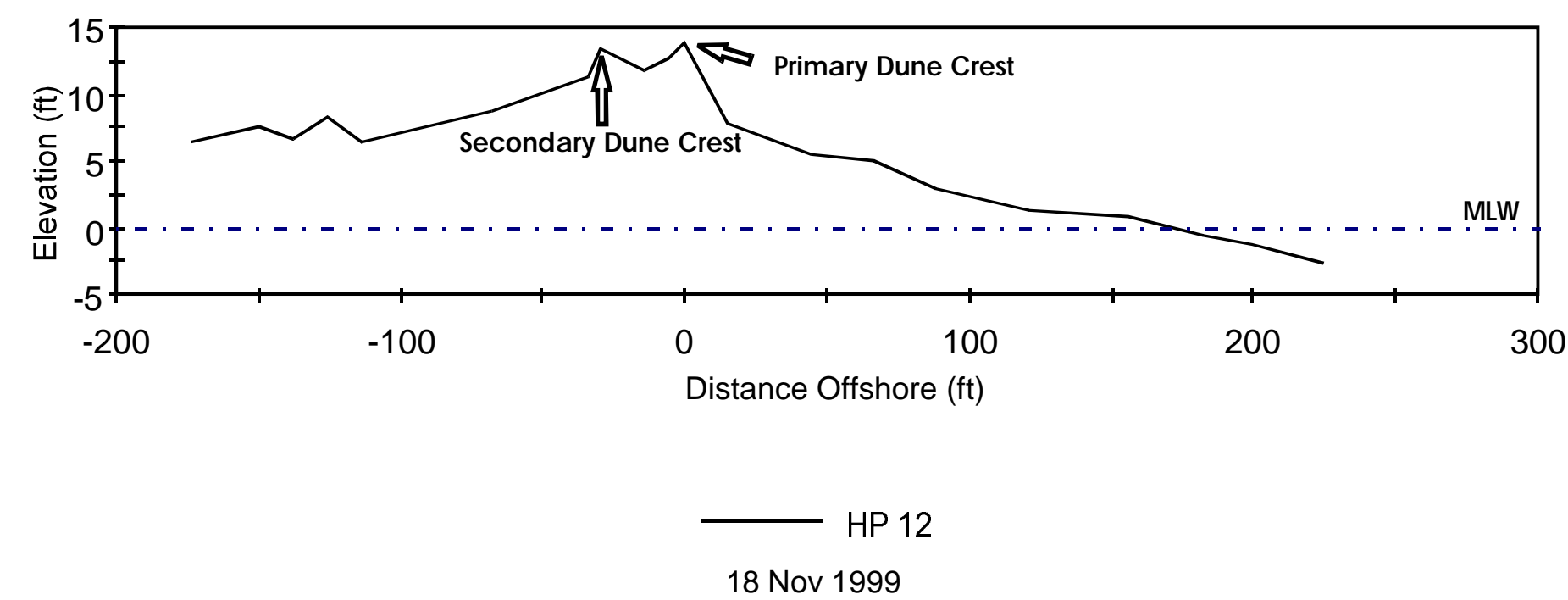
Looking north toward Grandview.



Looking southward toward HP 8A.

Not intended for use in determining legal jurisdictional limits.

CITY OF HAMPTON DUNE SITE 12



Site Information

- 1. Date Surveyed: 18 Nov 1999
- 2. Central Coordinates:
N: 282,900 ft
E: 2,649,650 ft
- 3. Profile Coordinates:
N: 282,900 ft
E: 2,649,650 ft
- Virginia South State Plane Grid NAD 1927 [4502]
- 4. Site Length: 4,200 ft
- 5. Ownership: Public
- Plate: 2B

Site Parameters

- 6. Type: Natural
- 7. Fetch Exposure: Open Bay
- 8. Shoreline Direction of Face: Northeast
- 9. Nearshore Gradient: 0 to 1,000ft/No Bars
- 10. Morphologic Setting: Dune Field >500 ft Alongshore/Linear
- 11. Relative Stability: Stable
- 12. Underlying Substrate: Marsh
- 13. Structure or Fill: N/A

Site Measurements

- Primary Dune:
 - 14. Crest Elevation (ft MLW): 13.8
 - 15. Extent from Crest Landward (ft): 68
 - 16. Extent from Crest To MLW (ft): 169
- Secondary Dune:
 - 17. Crest Elevation (ft MLW): 8.35
 - 18. Land Extent From Primary Crest (ft): 174
 - 19. Second Crest – Landward (ft): 48

Vegetation Communities

- 20. Primary Dune:
Ammophila breviligulata (American beach grass)
- 21. Secondary Dune:
Ammophila breviligulata (American beach grass)
Spartina patens (saltmeadow hay)

- 22. Remarks:
HP 12 is a large dune field on the north flank of Northend Point in Grandview Natural Preserve. Although labeled as a natural site, it was extensively planted with dune grasses by the city of Hampton in the early 1980s which probably influenced the site's long-term stability.



Looking southeast toward the remains of an old lighthouse in the nearshore.



Looking northwest along the dune crest.

Not intended for use in determining legal jurisdictional limits.