Lancaster County Dune Inventory

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

June 2004
Lancaster County Dune Inventory

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Cover Photo
Mosquito Point, Lancaster County, Virginia on 15 August 2003 taken by VIMS, Shoreline Studies Program.
1 INTRODUCTION

1.1 Purpose

Lancaster County, Virginia is located at the confluence of the Rappahannock River and Chesapeake Bay (Figure 1). Most of the dunes are located along the Rappahannock River with the remainder along Chesapeake Bay. There are a total of 45 dune sites identified along the Lancaster County shoreline (Figure 2). It is the intent of this publication to provide the user with information on the status of dunes in Lancaster County. 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). Although somewhat dated, the information provides a short historical perspective of the state of each site at the time of the site visit. 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) 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 tomentosa*); 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*).

The 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.
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. Just as the intensity, direction, and duration of winds and waves constantly change through the seasons, so too, do coastal dunes. They 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 an accreted feature, such as a beach washover or a spit to become vegetated above the intertidal zone. 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 (1), Man Influenced (2), or Man Made (3). 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).

<table>
<thead>
<tr>
<th>Dune Type</th>
<th>1. Natural</th>
<th>2. Man Influenced</th>
<th>3. Manmade</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dune Parameters</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Exposure: fetch</td>
<td>1. Riverine, Bay Influenced</td>
<td>2. Open Bay</td>
<td>3. Riverine</td>
</tr>
<tr>
<td>C. Nearshore Gradient (Distance to the 6 ft contour)</td>
<td>1. 0 to 1,000 ft</td>
<td>2. 1,000 to 3,000 ft</td>
<td>3. Greater than 3,000 ft</td>
</tr>
<tr>
<td>D. Morphologic Setting</td>
<td>1. Isolated (less than 500 ft alongshore)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Underlying Substrate</td>
<td>1. Marsh/Creek Bottom</td>
<td>2. Upland</td>
<td></td>
</tr>
</tbody>
</table>

Figure 3. Classification system for Chesapeake Bay identified dune systems (from Hardaway et al., 2001).
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 subject to washover processes, whereas the upland area offered a "backstop" to land beach/dune migration.

If the site was not Natural (1), 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 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.
3 DUNE DATA SUMMARY

Approximately 2.8 miles of dune shore have been identified along Lancaster’s riverine and Bay shores. Previous work by Hardaway et al. (2001) indicated a total of 73 possible dune sites in Lancaster, but site visits verified 45 (Table 1). Due to inaccessibility, sites 17, 20, 21, 22, 23, 24, 28, and 29 were not profiled or photographed. Site 39 was profiled in two different locations in order to adequately describe the morphology of the entire site. All the dunes cover a wide variety of fetch exposures and site conditions. Dune lengths vary from a hundred feet to a thousand feet. Dunes reside in 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. Site visits occurred in 1999 and 2000; site characteristics may now be different due to natural or man-induced shoreline change.

In Lancaster County, 6 of the 45 dune sites have both primary and secondary dunes (Table 2). The average length of primary dune only sites is 300 ft while the average length of the primary with secondary dunes is 643 ft. Clearly, the wider sites with secondary dunes are also the longest. The 3 main categories of Natural, Man-Influenced and Man-Made were initially utilized to portray a sites most influential element. In Lancaster County, 38% are Natural, 62% are Man-Influenced and 0% are Man-Made. In terms of shore length however, 46% are Natural and 54% are Man-Influenced. This is evidence of shoreline development in Lancaster County particularly along the Rappannock River coast where 77% of the Riverine dune sites reside.

Lancaster County dune sites are quite variable and include the highest number of riverine dunes of the 8 jurisdictional dune localities (Table 3). Riverine dunes are characterized by relatively low primary dunes due to a lesser wind/wave climate than Open Bay or Riverine Bay influenced dunes. These riverine dunes are also often occur in isolated settings; Lancaster County has a higher percentage of isolated dune sites than any other jurisdictional locality.

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

<table>
<thead>
<tr>
<th>Dune Site No.</th>
<th>Location*</th>
<th>Date Visited</th>
<th>Primary Dune Length (feet)</th>
<th>Secondary Dune Site?</th>
<th>Public Ownership?</th>
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</table>

*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.

Sites were noted as dunes but were not photographed or surveyed.
Table 2. Dune site measurements in Lancaster County as of 2000. Site characteristics may now be different due to natural or man-induced shoreline change.

<table>
<thead>
<tr>
<th>Dune Site Measurements</th>
<th>2nd Dune Elevation</th>
<th>2nd Dune Distance From Sea Level</th>
<th>2nd Dune Crest to 2nd Dune Shoreline</th>
<th>2nd Dune Shoreline to 2nd Dune Bluff</th>
<th>2nd Dune Bluff to 2nd Dune Shoreline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site No.</td>
<td>(ft)</td>
<td>(Nautical Miles)</td>
<td>(ft)</td>
<td>(ft)</td>
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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 between Secondary Dune Crest and Primary Dune Crest
19. Landward extent of Secondary Dune from Secondary Dune Crest
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 (LN 39A and LN 39B). Several dune sites are listed in the Tables as dunes, but they were not surveyed or photographed. These sites are very isolated, hard to approach, and mostly natural features.

5 REFERENCES


Acknowledgments

The authors would like to thank Carl Hobbs, III, for his critical review and editing of the report as well as the personnel in VIMS’ Publications Center, particularly Susan Stein, Ruth Hershner, and Sylvia Motley, for their work in printing and compiling the final report.
Appendix A

Location of Dune Sites

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<th>Plate 1-2</th>
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<td>Plate 9-10</td>
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Appendix B
Individual Dune Inventory Sheets

LN3  LN4  LN5  LN6  LN7  LN8  LN10
LN11  LN12  LN13  LN15  LN16  LN18  LN19  LN25
LN32  LN34  LN36  LN39A  LN39B  LN40A  LN43
LN47  LN50  LN51  LN52  LN64  LN65  LN66
LN67  LN68  LN69  LN70  LN71  LN72  LN73
LANCASTER COUNTY DUNE SITE 3

Site Information
1. Date Surveyed: 30 Jul 1999
2. Central Coordinates: N: 525,350 ft, E: 2,555,400 ft
3. Profile Coordinates: N: 525,350 ft, E: 2,555,400 ft
   Virginia South State Plane Grid NAD 1927 [4502]
4. Site Length: 250 ft
5. Ownership: Private
6. Type: Man Influenced
7. Fetch Exposure: Riverine
8. Shoreline Direction of Face: Southwest
9. Nearshore Gradient: 1,000 to 3,000 ft./No Bars
10. Morphologic Setting: Isolated <500 ft. Alongshore/Pocket
11. Relative Stability: Stable
12. Underlying Substrate: Upland
13. Structure or Fill: Groin
14. Crest Elevation (ft MLW): 5.0
15. Extent from Crest: Landward (ft): 18
16. Extent from Crest: To MLW (ft): 35
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A
20. Primary Dune: Spartina patens (saltmeadow hay)
   Ammophila breviligulata (American beach grass)
21. Secondary Dune: N/A
22. Remarks:
   Site LN 3 is a low isolated riverine dune that is maintained by a series of three low-profile wood groins.

Looking downriver.
Looking upriver. Note the wood groin in the foreground.

Not intended for use in determining legal jurisdictional limits.
LANCASTER COUNTY DUNE SITE 4

Site Information

1. Date Surveyed: 30 Jul 1999
2. Central Coordinates: N: 524,600 ft, E: 2,555,750 ft
3. Profile Coordinates: N: 524,600 ft, E: 2,555,750 ft
4. Site Length: 210 ft
5. Ownership: Private
6. Type: Natural
7. Fetch Exposure: Riverine
8. Shoreline Direction of Face: Southwest
9. Nearshore Gradient: 1,000 to 3,000 ft./No Bars
10. Morphologic Setting: Creek Mouth Barrier/Spit
11. Relative Stability: Land Transgressive/Erosional
12. Underlying Substrate: Marsh
13. Structure or Fill: N/A

Site Parameters

14. Crest Elevation (ft MLW): 3.9
15. Extent from Crest: Landward (ft): 21
16. Extent from Crest: To MLW (ft): 44
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A

Site Measurements

Primary Dune:

- Crest Elevation (ft MLW): 3.9
- Extent from Crest: Landward (ft): 21
- Extent from Crest: To MLW (ft): 44

Secondary Dune:

- None

Vegetation Communities

20. Primary Dune:
   - Spartina patens (saltmeadow hay)
   - Shrub/woody

21. Secondary Dune: N/A

22. Remarks:
   - Site LN 4 is a lowland spit that is controlled, in part, by the mouth and tidal inlet of an unnamed creek.

Not intended for use in determining legal jurisdictional limits.
LANCASTER COUNTY DUNE SITE 5

Site Information
1. Date Surveyed: 30 Jul 1999
2. Central Coordinates: N: 518,400 ft E: 2,557,700 ft
3. Profile Coordinates: N: 518,400 ft E: 2,557,700 ft
   Virginia South State Plane Grid NAD 1927 [4502]
4. Site Length: 130 ft
5. Ownership: Private
6. Type: Natural
7. Fetch Exposure: Riverine
8. Shoreline Direction of Face: West
9. Nearshore Gradient: 1,000 to 3,000 ft./No Bars
10. Morphologic Setting: Creek Mouth Barrier/Spit
11. Relative Stability: Stable
12. Underlying Substrate: Marsh
13. Structure or Fill: N/A

Site Parameters
14. Crest Elevation (ft MLW): 3.4
15. Extent from Crest: Landward (ft): 32
16. Extent from Crest: To MLW (ft): 45
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A

Site Measurements
   Primary Dune:
   Secondary Dune: None

Vegetation Communities
20. Primary Dune: Spartina patens (saltmeadow hay)
    Ammophila breviligulata (American beach grass)
21. Secondary Dune: N/A
22. Remarks:
   Site LN 5 is a small pocket beach/dune on the downriver side of Midway Creek. The site is bounded by marsh headlands.

Not intended for use in determining legal jurisdictional limits.
LANCASTER COUNTY DUNE SITE 6

Site Information
1. Date Surveyed: 30 Jul 1999
2. Central Coordinates: N: 515,750 ft E: 2,558,750 ft
3. Profile Coordinates: N: 515,750 ft E: 2,558,750 ft
4. Site Length: 670 ft
5. Ownership: Private
6. Type: Natural
7. Fetch Exposure: Riverine
8. Shoreline Direction of Face: South
9. Nearshore Gradient: 0 to 1,000 ft./No Bars
10. Morphologic Setting: Isolated <500 ft. Alongshore/Pocket
11. Relative Stability: Land Transgressive/Erosional
12. Underlying Substrate: Upland
13. Structure or Fill: N/A

Site Parameters
15. Extent from Crest: Landward (ft): None
16. Extent from Crest: To MLW (ft): N/A
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A

Site Measurements
20. Primary Dune: Spartina patens (saltmeadow hay)
Ammophila breviligulata (American beach grass)
Shrub/woody
21. Secondary Dune: N/A

Vegetation Communities
22. Remarks:
Site LN 6 resides on the downstream side of a prominent point of land. At one time, the sand beach must have been wider in order to allow the shrubs and grasses to flourish. Now the site is very erosional, possibly because of reduced sand supply from shore hardening upriver.
LANCASTER COUNTY DUNE SITE 7

Site Information
1. Date Surveyed: 30 Jul 1999
2. Central Coordinates: N: 514,847 ft E: 2,559,810 ft
   Virginia South State Plane Grid NAD 1927 [4502]
3. Profile Coordinates: N: 514,847 ft E: 2,559,810 ft
4. Site Length: 1,025 ft
5. Ownership: Private

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

Site Measurements
14. Crest Elevation (ft MLW): 5.0
15. Extent from Crest: Landward (ft): 6
16. Extent from Crest: To MLW (ft): 53
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A
20. Primary Dune:
   Phragmites australis (reed grass)
   Cakile edentulata (sea rocket)
   Spartina patens (saltmeadow hayg)
21. Secondary Dune: N/A
22. Remarks:
   Site LN 7 is a stable if not an accretionary dune/beach system that has evolved across the mouth of a low backshore of a small unnamed creek.

Not intended for use in determining legal jurisdictional limits.
LANCASTER COUNTY DUNE SITE 8

Site Information
1. Date Surveyed: 30 Jul 1999
2. Central Coordinates: N: 514,150 ft E: 2,560,450 ft
3. Profile Coordinates: N: 514,150 ft E: 2,560,450 ft
Virginia South State Plane Grid NAD 1927 [4502]
4. Site Length: 580 ft
5. Ownership: Private
6. Type: Man Influenced
7. Fetch Exposure: Riverine
8. Shoreline Direction of Face: Southwest
9. Nearshore Gradient: 0 to 1,000 ft./No Bars
10. Morphologic Setting: Isolated <500 ft. Alongshore/Pocket
11. Relative Stability: Stable
12. Underlying Substrate: Upland
13. Structure or Fill: Groin

Site Parameters
14. Crest Elevation (ft MLW): -3
15. Extent from Crest: Landward (ft): -2
16. Extent from Crest: To MLW (ft): 0
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A

Site Measurements
Primary Dune:
10. Crest Elevation (ft MLW): 4.8
11. Extent from Crest: Landward (ft): 39
12. Extent from Crest: To MLW (ft): 40
Secondary Dune:
None
13. Crest Elevation (ft MLW): N/A
14. Extent between Second and Primary Crest (ft): N/A
15. Second Crest – Landward (ft): N/A

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

Remarks:
Site LN 8 is actually a downriver extension of LN 7 except for a gap of about 100 ft. This site is controlled, in part, by several wood groins on the downriver half.

Not intended for use in determining legal jurisdictional limits.
Site LN 10 is a small dune feature that has evolved on the upriver side of a prominent wooded/marsh headland feature.
LANCASTER COUNTY DUNE SITE 11

Site Information
1. Date Surveyed: 30 Jul 1999
2. Central Coordinates: N: 509,338 ft E: 2,562,662 ft
3. Profile Coordinates: N: 509,338 ft E: 2,562,662 ft
4. Site Length: 990 ft
5. Ownership: Private

Site Parameters
6. Type: Natural
7. Fetch Exposure: Riverine
8. Shoreline Direction of Face: Southwest
9. Nearshore Gradient: 1,000 to 3,000 ft./No Bars
10. Morphologic Setting: Dune Field >500 ft. Alongshore/Shallow Bay
11. Relative Stability: Stable
12. Underlying Substrate: Upland
13. Structure or Fill: N/A

Site Measurements
14. Crest Elevation (ft MLW): 3.5
15. Extent from Crest: Landward (ft): 3
16. Extent from Crest: To MLW (ft): 28
17. Crest Elevation (ft MLW): 3.3
18. Extent between Second and Primary Crest (ft): 29
19. Second Crest – Landward (ft): 3

Vegetation Communities
20. Primary Dune: Spartina patens (saltmeadow hay)
   Panicum amarum (running beach grass)
   Phragmites australis (reed grass)
   Shrub/woody
21. Secondary Dune: N/A

22. Remarks:
   Site LN 11 resides on the downriver side of the same prominent headland spit as LN 10. This dune field sits in a stable geomorphic setting.

Not intended for use in determining legal jurisdictional limits.
Site Information
1. Date Surveyed: 30 Jul 1999
2. Central Coordinates: N: 507,800 ft E: 2,564,500 ft
3. Profile Coordinates: N: 507,800 ft E: 2,564,500 ft
4. Site Length: 190 ft
5. Ownership: Private
6. Type: Riverine
7. Fetch Exposure: Southwest
8. Shoreline Direction of Face: Southwest
9. Nearshore Gradient: 1,000 to 3,000 ft./No Bars
10. Morphologic Setting: Marsh/Creek Bottom
11. Relative Stability: Accretionary
12. Underlying Substrate: Marsh/Creek Bottom
13. Structure or Fill: Revetment/Bulkhead
14. Crest Elevation (ft MLW): 3.9
15. Extent from Crest: Landward (ft): 9
16. Extent from Crest: To MLW (ft): 47
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A
20. Primary Dune: Spartina patens (saltmeadow hay) Shrub/woody
21. Secondary Dune: N/A
22. Remarks: LN 12 exist as a stable pocket beach that has developed across a small tidal creek. It is bounded on each side by stone revetments.
LANCASTER COUNTY DUNE SITE 13

Site Information
1. Date Surveyed: 30 Jul 1999
2. Central Coordinates: 3. Profile Coordinates:
   N: 507,250 ft  
   E: 2,565,400 ft  
   N: 507,250 ft  
   E: 2,565,400 ft
Virginia South State Plane Grid NAD 1927 [4502]
4. Site Length: 300 ft
5. Ownership: Private

Site Parameters
6. Type: Man Influenced
7. Fetch Exposure: Riverine
8. Shoreline Direction of Face: Southwest
9. Nearshore Gradient: 0 to 1,000 ft./No Bars
10. Morphologic Setting: Isolated <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): 4.6
15. Extent from Crest: Landward (ft): 23
16. Extent from Crest: To MLW (ft): 28
Secondary Dune: None
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A

Vegetation Communities
20. Primary Dune:  
   Ammophila breviligulata (American beach grass)
   Panicum amarum (running beach grass)
   Spartina patens (saltmeadow hay)
21. Secondary Dune: N/A
22. Remarks:
   LN 13 is controlled, in part, by a series of low profile wood groins.

Not intended for use in determining legal jurisdictional limits.
LANCASTER COUNTY DUNE SITE 15

Site Information
1. Date Surveyed: 30 Jul 1999
2. Central Coordinates: 3. Profile Coordinates:
   N: 507,161 ft   N: 507,161 ft
   E: 2,565,915 ft  E: 2,565,915 ft
   Virginia South State Plane Grid NAD 1927 [4502]
4. Site Length: 150 ft
5. Ownership: Private

Site Parameters
6. Type: Man Influenced
7. Fetch Exposure: Riverine
8. Shoreline Direction of Face: Southwest
9. Nearshore Gradient: 1,000 ft. To 3,000 ft /No Bars
10. Morphologic Setting: Isolated <500 ft alongshore/Linear
11. Relative Stability: Land Transgressive/Erosional
12. Underlying Substrate: Marsh/Creek Bottom
13. Structure or Fill: Beach Fill

Site Measurements

Primary Dune:
14. Crest Elevation (ft MLW): 3.8
15. Extent from Crest: Landward (ft): 19
16. Extent from Crest: To MLW (ft): 35

Secondary Dune:
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A

Vegetation Communities
20. Primary Dune: Spartina patens (saltmeadow hay)
   Panicum amarum (running beach grass)
   Shrub/woody
21. Secondary Dune: N/A

22. Remarks:
Site LN 15 results from erosion of a dredge material disposal area just downriver that provides sand to the beach. This has created a spot feature that has become vegetated with time.

Not intended for use in determining legal jurisdictional limits.
LANCASTER COUNTY DUNE SITE 16

Site Information
1. Date Surveyed: 30 Jul 1999
2. Central Coordinates: N: 503,350 ft  E: 2,567,750 ft
3. Profile Coordinates: N: 503,350 ft  E: 2,567,750 ft
 Virginia South State Plane Grid NAD 1927 [4502]
4. Site Length: 125 ft
5. Ownership: Private
6. Type: Man Influenced
7. Fetch Exposure: Riverine
8. Shoreline Direction of Face: West
9. Nearshore Gradient: 1,000 ft to 3,000 ft /No Bars
10. Morphologic Setting: Creek Mouth Barrier/Spit
11. Relative Stability: Land Transgressive/Erosional
12. Underlying Substrate: Marsh/Creek Bottom
13. Structure or Fill: Revetment/Bulkhead

Site Parameters
14. Crest Elevation (ft MLW): 2.8
15. Extent from Crest: Landward (ft): 13
16. Extent from Crest: To MLW (ft): 23
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A
20. Primary Dune: Spartina patens (saltmeadow hay)
21. Secondary Dune: Shrub/woody
22. Remarks:

Ln16 is a small vegetated spit that occurs across the upstream side of Paynes Creek.

Vegetation Communities

30 Jul 99

Looking upriver.

Looking downriver.

Not intended for use in determining legal jurisdictional limits.
LANCASTER COUNTY DUNE SITE 18

Site Information
1. Date Surveyed: 3 Dec 1999
2. Central Coordinates: N: 494,750 ft E: 2,568,350 ft
3. Profile Coordinates: N: 494,750 ft E: 2,568,350 ft
4. Site Length: 310 ft
5. Ownership: Private

Site Parameters
6. Type: Man Influenced
7. Fetch Exposure: Riverine
8. Shoreline Direction of Face: West
9. Nearshore Gradient: 1,000 ft to 3,000 ft / No Bars
10. Morphologic Setting: Creek Mouth Barrier/Spit
11. Relative Stability: Land Transgressional/Erosional
12. Underlying Substrate: Marsh/Creek Bottom
13. Structure or Fill: Revetment/Bulkhead

Site Measurements
Primary Dune:
14. Crest Elevation (ft MLW): 5.1
15. Extent from Crest: Landward (ft): 18
16. Extent from Crest: To MLW (ft): 27

Secondary Dune:
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A

Vegetation Communities
20. Primary Dune: Ammophila breviligulata (American beach grass)
   Spartina patens (saltmeadow hay)
   Shrub/woody
21. Secondary Dune: N/A

Remarks:
Site LN 18 is on the downriver side of a Bulls Creek opposite of LN 17.

No Photos

Not intended for use in determining legal jurisdictional limits.
LANCASTER COUNTY DUNE SITE 19

Site Information
1. Date Surveyed: 3 Dec 1999
2. Central Coordinates: N: 492,350 ft E: 2,568,050 ft
3. Profile Coordinates: N: 492,350 ft E: 2,568,050 ft
4. Site Length: 200 ft
5. Ownership: Private

Site Parameters
6. Type: Man Influenced
7. Fetch Exposure: Riverine
8. Shoreline Direction of Face: West
9. Nearshore Gradient: 1,000 ft to 3,000 ft /No Bars
10. Morphologic Setting: Isolated <500 ft Alongshore/Linear
11. Relative Stability: Stable
12. Underlying Substrate: Upland
13. Structure or Fill: Groin

Site Measurements
14. Crest Elevation (ft MLW): 5.8
15. Extent from Crest: Landward (ft): 24
16. Extent from Crest: To MLW (ft): 54
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and 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

Remarks:
LN 19 is the most upriver of 6 isolated dune sites along a barrier island like spit that defines the western side of Beach Creek. Sites LN 20, LN 21, LN 22, LN 23 and LN 24 were viewed as isolated dune sites that were not surveyed or photographed. Therefore, individual pages were not created, but site parameter data is included in Table 2 of the text.
LANCASTER COUNTY DUNE SITE 25

03 Dec 99
Looking upriver.

03 Dec 99
Looking downriver.

Site Information
1. Date Surveyed: 03 Dec 1999
2. Central Coordinates: N: 488,750 ft  E: 2,570,000 ft
3. Profile Coordinates: N: 488,1,750 ft  E: 2,570,000 ft
Virginia South State Plane Grid NAD 1927 [4502]
4. Site Length: 420 ft
5. Ownership: Private

Site Parameters
6. Type: Man Influenced
7. Fetch Exposure: Riverine
8. Shoreline Direction of Face: Southwest
9. Nearshore Gradient: 1,000 to 3,000 ft./No Bars
10. Morphologic Setting: Isolated <500 ft. Alongshore/Linear
11. Relative Stability: Stable
12. Underlying Substrata: Marsh/Creek Bottom
13. Structure or Fill: Beach Fill

Site Measurements
Primary Dune:
14. Crest Elevation (ft MLW): 4.6
15. Extent from Crest: Landward (ft): 15
16. Extent from Crest: To MLW (ft): 50
Secondary Dune: None
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A

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

22. Remarks:
   Site LN 25 occurs on a long spit on the downriver side of the
   entrance to Beach Creek. Much of the sand is beach
   nourishment that came from dredging the new inlet to Beach
   Creek several years prior to the site visit.

Not intended for use in determining legal jurisdictional limits.
LANCASTER COUNTY DUNE SITE 32

1. Date Surveyed: 22 Apr 1999
2. Central Coordinates: 
   - N: 481,450 ft
   - E: 2,604,055 ft
3. Profile Coordinates: 
   - N: 481,450 ft
   - E: 2,604,055 ft
Virginia South State Plane Grid NAD 1927 [4502]
4. Site Length: 900 ft
5. Ownership: Private
6. Type: Man Influenced
7. Fetch Exposure: Riverine
8. Shoreline Direction of Face: Southwest
9. Nearshore Gradient: 0 to 1,000 ft./No Bars
10. Morphologic Setting: Dune Field >500 ft. Alongshore/Linear
11. Relative Stability: Stable
12. Underlying Substrate: Upland
13. Structure or Fill: Jetty
15. Extent from Crest: Landward (ft): 18
16. Extent from Crest: To MLW (ft): 45
17. Crest Elevation (ft MLW): 4.4
18. Extent between Second and Primary Crest (ft): 31
19. Second Crest – Landward (ft): 9
20. Primary Dune: Spartina patens (saltmeadow hay)
21. Secondary Dune: Spartina patens (saltmeadow hay)
22. Remarks: Site LN 32 occurs on the upriver side of the Route 3 bridge across the Rappahannock River. The bridge abutment has acted as a large jetty and trapped southerly moving littoral sands, thus creating the dune site over time. In addition, a secondary dune also has evolved.
LANCASTER COUNTY DUNE SITE 34

Site Information
1. Date Surveyed: 22 Apr 1999
2. Central Coordinates: N: 478,650 ft E: 2,608,900 ft
3. Profile Coordinates: N: 478,650 ft E: 2,608,900 ft
Virginia South State Plane Grid NAD 1927 [4502]
4. Site Length: 1,200 ft
5. Ownership: Private
6. Type: Man Influenced
7. Fetch Exposure: Riverine
8. Shoreline Direction of Face: South
9. Nearshore Gradient: 0 to 1,000 ft./No Bars
10. Morphologic Setting: Creek Mouth Barrier/Spit
11. Relative Stability: Stable
12. Underlying Substrate: Marsh/Creek Bottom
13. Structure or Fill: Groin

Site Parameters
14. Crest Elevation (ft MLW): 5.5
15. Extent from Crest: Landward (ft): 28
16. Extent from Crest: To MLW (ft): 60
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A
20. Primary Dune: Spartina patens (saltmeadow hay) Ammophila brevii/stilagrata (American beach grass) Shrub/woody
21. Secondary Dune: N/A
22. Remarks: Site LN 34 is a long, wide sand barrier across a tidal creek just downriver of Cherry Point. It is bounded on the upriver end by a groin and revetment and bounded on the downriver end by the tidal inlet.

Not intended for use in determining legal jurisdictional limits.
LANCASTER COUNTY DUNE SITE 36

Site Information
1. Date Surveyed: 22 Apr 1999
2. Central Coordinates:
   N: 479,100 ft
   E: 2,610,700 ft
3. Profile Coordinates:
   N: 479,100 ft
   E: 2,610,700 ft
Virginia South State Plane Grid NAD 1927 [4502]
4. Site Length: 140 ft
5. Ownership: Private
6. Type: Man Influenced
7. Fetch Exposure: Riverine
8. Shoreline Direction of Face: South
9. Nearshore Gradient: 0 to 1,000 ft./No Bars
10. Morphologic Setting: Isolated <500 ft. Alongshore/Shallow Bay
11. Relative Stability: Stable
12. Underlying Substrate: Upland
13. Structure or Fill: Groin

Site Parameters
14. Crest Elevation (ft MLW): N/A
15. Extent from Crest: Landward (ft): N/A
16. Extent from Crest: To MLW (ft): N/A
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A

Site Measurements
Primary Dune: No Data
Secondary Dune: None

Vegetation Communities
20. Primary Dune: Spartina patens (saltmeadow hay)
   Ammophila brevilligulata (American beach grass)
21. Secondary Dune: N/A

Remarks:
Site LN 36 resides on the downriver side of a small landing/pier at the end of Route 639.

Looking downriver from the landing/pier.
LANCASTER COUNTY DUNE SITE 39A

Site Information
1. Date Surveyed: 22 Apr 1999
2. Central Coordinates:
   N: 471,983 ft
   E: 2,618,801 ft
   Virginia South State Plane Grid NAD 1927 [4502]
3. Profile Coordinates:
   N: 471,983 ft
   E: 2,618,801 ft
4. Site Length: 850 ft
5. Ownership: Private
6. Type: Natural
7. Fetch Exposure: Riverine
8. Shoreline Direction of Face: West
9. Nearshore Gradient: 0 to 1,000 ft./No Bars
10. Morphologic Setting: Dune Field >500 ft. Alongshore/Salient
11. Relative Stability: Accretionary
12. Underlying Substrate: Upland
13. Structure or Fill: N/A

Site Parameters
15. Extent from Crest: Landward (ft): 32
16. Extent from Crest: To MLW (ft): 61
17. Crest Elevation (ft MLW): 3.4
18. Extent between Second and Primary Crest (ft): 57
19. Second Crest – Landward (ft): 15
20. Primary Dune: Spartina patens (saltmeadow hay)
21. Secondary Dune: Spartina patens (saltmeadow hay)
   Shrub/woody

Vegetation Communities
22. Remarks:
   Site LN 39 is a large prominent spit at Mosquito Point. LN 39A is located on the upriver side of Mosquito Point and faces up and across the Rappahannock River.

Not intended for use in determining legal jurisdictional limits.
LANCASTER COUNTY DUNE SITE 39B

Site Information
1. Date Surveyed: 22 Apr 1999
2. Central Coordinates:
   N: 471,725 ft  E: 2,618,926 ft
   NAD 1927 Virginia South State Plane Grid
3. Profile Coordinates:
   N: 471,725 ft  E: 2,618,926 ft
   Plate: 12
4. Site Length: 600 ft
5. Ownership: Private

Site Parameters
6. Type: Natural
7. Fetch Exposure: Riverine, Bay Influenced
8. Shoreline Direction of Face: South
9. Nearshore Gradient: 0 to 1,000 ft./No Bars
10. Morphologic Setting: Dune Field >500 ft. Alongshore/Salient
11. Relative Stability: Land Transgressive/Erosional
12. Underlying Substrate: Upland
13. Structure or Fill: N/A

Site Measurements
14. Crest Elevation (ft MLW): 5.3
15. Extent from Crest: Landward (ft): 27
16. Extent from Crest: To MLW (ft): 65
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and 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 LN 39B is the downriver side of the Mosquito Point site where it is more exposed to the Chesapeake Bay.

Not intended for use in determining legal jurisdictional limits.
LANCASTER COUNTY DUNE SITE 40A

Site Information
1. Date Surveyed: 22 Apr 1999
2. Central Coordinates: N: 76,649 ft E: 623,930 ft
3. Profile Coordinates: N: 476,649 ft E: 2,623,930 ft
4. Site Length: 320 ft
5. Ownership: Private

Virginia South State Plane Grid NAD 1927 [4502]

Site Parameters
6. Type: Man Influenced
7. Fetch Exposure: Riverine, Bay Influenced
8. Shoreline Direction of Face: Southeast
9. Nearshore Gradient: Greater than 3,000 ft/No Bars
10. Morphologic Setting: Isolated <500 ft/Alongshore/Shallow Bay
11. Relative Stability: Stable
12. Underlying Substrate: Upland
13. Structure or Fill: Revetment/Bulkhead

Site Measurements
14. Crest Elevation (ft MLW): 5.5
15. Extent from Crest: Landward (ft): 20
16. Extent from Crest: To MLW (ft): 45
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A

Site 40A is bounded by an upriver bulkheaded headland that acts as a groin. It is relatively open to the Chesapeake Bay.

Vegetation Communities
20. Primary Dune:
   Ammophila breviligulata (American beach grass)
   Panicum virgatum (switch grass)
21. Secondary Dune: N/A
22. Remarks:

Not intended for use in determining legal jurisdictional limits.
Site Information

1. Date Surveyed: 22 Apr 1999
2. Central Coordinates: N: 476,201 ft  E: 2,631,650 ft
3. Profile Coordinates: N: 476,201 ft  E: 2,631,650 ft
4. Site Length: 820 ft
5. Ownership: Private
6. Type: Natural
7. Fetch Exposure: Riverine, Bay Influenced
8. Shoreline Direction of Face: Southeast
9. Nearshore Gradient: 1,000 to 3,000 ft/Extensive Bars
10. Morphologic Setting: Dune Field >500 ft. Alongshore/Linear
11. Relative Stability: Land Transgressive/Erosional
12. Underlying Substrate: Upland
13. Structure or Fill: N/A

Site Parameters

14. Crest Elevation (ft MLW): 5.0
15. Extent from Crest: Landward (ft): 20
16. Extent from Crest: To MLW (ft): 30
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A

Site Measurements

14. Crest Elevation (ft MLW): 5.0
15. Extent from Crest: Landward (ft): 20
16. Extent from Crest: To MLW (ft): 30
Secondary Dune: None
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A

Vegetation Communities

20. Primary Dune: Ammophila breviligulata (American beach grass) Phragmites australis (reed grass) Spartina patens (saltmeadow hay) Shrub/woody
21. Secondary Dune: N/A
22. Remarks: LN 43 is located on a sandy barrier, that has a small lagoon between the upland and the site. It connects to the upland marsh at the end.
Not intended for use in determining legal jurisdictional limits.

<table>
<thead>
<tr>
<th>Site Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Date Surveyed: 22 Apr 1999</td>
</tr>
<tr>
<td>2. Central Coordinates: N: 475,750 ft E: 2,636,250 ft</td>
</tr>
<tr>
<td>3. Profile Coordinates: N: 475,750 ft E: 2,636,250 ft Virginia South State Plane Grid NAD 1927 [4502]</td>
</tr>
<tr>
<td>4. Site Length: 360 ft</td>
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<tr>
<td>5. Ownership: Private</td>
</tr>
<tr>
<td>6. Type: Man Influenced</td>
</tr>
<tr>
<td>7. Fetch Exposure: Riverine, Bay Influenced</td>
</tr>
<tr>
<td>8. Shoreline Direction of Face: South</td>
</tr>
<tr>
<td>9. Nearshore Gradient: 1,000 to 3,000 ft/Extensive Bars</td>
</tr>
<tr>
<td>10. Morphologic Setting: Isolated &lt;500 ft/Alongshore/Linear</td>
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<tr>
<td>11. Relative Stability: Stable</td>
</tr>
<tr>
<td>12. Underlying Substrate: Upland</td>
</tr>
<tr>
<td>13. Structure or Fill: Groin</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Site Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. Crest Elevation (ft MLW): 5.0</td>
</tr>
<tr>
<td>15. Extent from Crest: Landward (ft): 50</td>
</tr>
<tr>
<td>16. Extent from Crest: To MLW (ft): 41</td>
</tr>
<tr>
<td>17. Crest Elevation (ft MLW): N/A</td>
</tr>
<tr>
<td>18. Extent between Second and Primary Crest (ft): N/A</td>
</tr>
<tr>
<td>19. Second Crest – Landward (ft): N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Site Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>20. Primary Dune: Ammophila breviligulata (American beach grass) Saportina patens (saltmeadow hay)</td>
</tr>
<tr>
<td>21. Secondary Dune: N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vegetation Communities</th>
</tr>
</thead>
<tbody>
<tr>
<td>22. Remarks: Site LN 47 has developed due, in large part, to the existing wood grain field. Accreted sand at LN 47 has created a wide beach and backshore that provided the setting for dune development.</td>
</tr>
</tbody>
</table>
LANCASTER COUNTY DUNE SITE 50

Site Information
1. Date Surveyed: 22 Apr 1999
2. Central Coordinates:
   - N: 474,850 ft
   - E: 2,638,500 ft
3. Profile Coordinates:
   - N: 474,850 ft
   - E: 2,638,500 ft
4. Site Length: 580 ft
5. Ownership: Private

Site Parameters
6. Type: Man Influenced
7. Fetch Exposure: Riverine, Bay Influenced
8. Shoreline Direction of Face: Southwest
9. Nearshore Gradient: 1,000 to 3,000 ft/No Bars
10. Morphologic Setting: Dune Field <500 ft Curvilinear Bay
11. Relative Stability: Stable
12. Underlying Substrate: Upland
13. Structure or Fill: Groin/Spur

Site Measurements

Primary Dune:
- Crest Elevation (ft MLW): 4.3
- Extent from Crest: Landward (ft): 15
- Extent from Crest: To MLW (ft): 60

Secondary Dune:
- None
- Crest Elevation (ft MLW): N/A
- Extent between Second and Primary Crest (ft): N/A
- Second Crest – Landward (ft): N/A

Vegetation Communities
20. Primary Dune:
   - Ammophila breviligulata (American beach grass)
   - Spartina patens (saltmeadow hay)
21. Secondary Dune: Panicum virgatum (switch grass)

22. Remarks:
   Site LN 50 is a long curvilinear embayed shoreline defined on the upriver end by a revetment and on the downriver end by a groin and spur.

Not intended for use in determining legal jurisdictional limits.
LANCASTER COUNTY DUNE SITE 51

Site Information
1. Date Surveyed: 22 Apr 1999
2. Central Coordinates: N: 474,308 ft E: 2,638,864 ft
3. Profile Coordinates: N: 474,308 ft E: 2,638,864 ft
   Virginia South State Plane Grid NAD 1927 [4502]
4. Site Length: 250 ft
5. Ownership: Private
6. Type: Man Influenced
7. Fetch Exposure: Riverine, Bay Influenced
8. Shoreline Direction of Face: Southwest
9. Nearshore Gradient: 0 to 1,000 ft/No Bars
10. Morphologic Setting: Isolated <500 ft, Alongshore/Linear
11. Relative Stability: Stable
12. Underlying Substrate: Upland
13. Structure or Fill: Groin

Site Parameters
14. Crest Elevation (ft MLW): 5.0
15. Extent from Crest: Landward (ft): 40
16. Extent from Crest: To MLW (ft): 28
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A

Site Measurements
Primary Dune:
20. Primary Dune: Ammophila breviligulata (American beach grass) Spartina patens (saltmeadow hay)
Secondary Dune: None
21. Secondary Dune: N/A

Vegetation Communities
22. Remarks:
   Site NL 51 and NL 52 reside on either side of the headland formed by an old wharf/groin at the end of State Road 695. NL 51 is on the upriver side and NL 52 on the downriver side. The net sand transport is upriver.
LANCASTER COUNTY DUNE SITE 52

Site Information
1. Date Surveyed: 22 Apr 1999
2. Central Coordinates: N: 474,150 ft E: 2,639,000 ft
3. Profile Coordinates: N: 474,150 ft E: 2,639,000 ft
4. Site Length: 100 ft
5. Ownership: Private

Site Parameters
6. Type: Man Influenced
7. Fetch Exposure: Riverine, Bay Influenced
8. Shoreline Direction of Face: South
9. Nearshore Gradient: 0 to 1,000 ft/No Bars
10. Morphologic Setting: Isolated <500 ft/Alongshore/Linear
11. Relative Stability: Stable
12. Underlying Substrate: Upland
13. Structure or Fill: Groin
14. Crest Elevation (ft MLW): 7.2
15. Extent from Crest: Landward (ft): 32
16. Extent from Crest: To MLW (ft): 63
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A

Site Measurements
20. Primary Dune:
   - Spartina patens (saltmeadow hay)
   - Ammophila breviligulata (American beach grass)
21. Secondary Dune: N/A
22. Remarks:
Site LN 52 sits on the downriver side of an old wharf/groin at the end of State Road 695 and is bounded on the downriver end by a series of stone groins. This site is exposed to the open bay, thus has a higher primary dune crest (due, in part, to increased wave run-up) than it's sister site NL 51.
Lancaster County Dune Site 64A

Site Information
1. Date surveyed: 20 May 1999
2. Central Coordinates:
   N: 489,996 ft
   E: 2,626,162 ft
3. Profile Coordinates:
   N: 489,996 ft
   E: 2,626,162 ft
Virginia South State Plane Grid NAD 1927 [4502]
4. Site length: 200 ft
5. Ownership: Private

Site Parameters
6. Type: Man Influenced
7. Fetch Exposure: Open Bay
8. Shoreline Direction of Face: East
9. Nearshore Gradient: 1,000 to 3,000 ft/Extensive Bars
10. Morphologic Setting: Isolated <500 ft. Alongshore/Linear
11. Relative Stability: Land Transgressive/Erosional
12. Underlying Substrate: Upland
13. Structure or Fill: Beach Fill

Site Measurements
14. Crest Elevation (ft MLW): 5.8
15. Extent from Crest: Landward (ft): 50
16. Extent from Crest: To MLW (ft): 40
Secondary Dune:
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and 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

Remarks:
Site LN 64A, LN 65, LN 66, LN 67 and LN 68 are isolated dunes scattered across the distal end of Poplar Neck. LN 64A is the southernmost site. The small, primary dune crest is the remnant of a recent storm event.
LANCASTER COUNTY DUNE SITE 65

Site Information
1. Date Surveyed: 20 May 1999
2. Central Coordinates: N: 490,350 ft E: 2,626,300 ft
3. Profile Coordinates: N: 490,350 ft E: 2,626,300 ft
   Virginia South State Plane Grid NAD 1927 [4502]
4. Site Length: 150 ft
5. Ownership: Private
6. Type: Man Influenced
7. Fetch Exposure: Open Bay
8. Shoreline Direction of Face: East
9. Nearshore Gradient: 1,000 to 3,000 ft/Extensive Bars
10. Morphologic Setting: Isolated <500 ft. Alongshore/Pocket
11. Relative Stability: Land Transgressive/Erosional
12. Underlying Substrate: Upland
13. Structure or Fill: Revetment/Bulkhead

Site Parameters
14. Crest Elevation (ft MLW): 4.9
15. Extent from Crest: Landward (ft): 44
16. Extent from Crest: To MLW (ft): 48
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A

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

Vegetation Communities
22. Remarks:
Site LN 65 is a small pocket beach/dune bounded on the south by a marsh headland and on the north by a stone revetment.

Not intended for use in determining legal jurisdictional limits.
LANCASTER COUNTY DUNE SITE 66

Primary Dune Crest

Site Information
1. Date Surveyed: 20 May 1999
2. Central Coordinates:
   N: 490,600 ft
   E: 2,626,100 ft
3. Profile Coordinates:
   N: 490,600 ft
   E: 2,626,100 ft
4. Site Length: 170 ft
5. Ownership: Private

Site Parameters
6. Type: Natural
7. Fetch Exposure: Riverine
8. Shoreline Direction of Face: Northeast
9. Nearshore Gradient: Greater than 3,000 ft/No Bars
10. Morphologic Setting: Isolated <500 ft. Alongshore/Salent
11. Relative Stability: Accretionary
12. Underlying Substrate: Upland
13. Structure or Fill: N/A

Site Measurements
15. Extent from Crest: Landward (ft): 7
16. Extent from Crest: To MLW (ft): 42
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A

Vegetation Communities
20. Primary Dune: Solidago sempervirens (seaside goldenrod)
   Spartina patens (saltmeadow hay)
21. Secondary Dune: N/A
22. Remarks:
   LN 66 sits inside an embayment and occurs as a salient spit. This embayment was once isolated by a barrier spit that has since breached.
LANCASTER COUNTY DUNE SITE 67

Site Information
1. Date Surveyed: 20 May 1999
2. Central Coordinates: N: 491,250 ft  E: 2,625,750 ft
3. Profile Coordinates: N: 491,250 ft  E: 2,625,750 ft
   Virginia South State Plane Grid NAD 1927 (4502)
4. Site Length: 140 ft
5. Ownership: Private

Site Parameters
6. Type: Natural
7. Fetch Exposure: Riverine, Bay Influenced
8. Shoreline Direction of Face: East
9. Nearshore Gradient: 1,000 to 3,000 ft/Extensive Bars
10. Morphologic Setting: Land Transgressive/Erosional
11. Relative Stability: None
12. Underlying Substrate: Marsh/Creek Bottom
13. Structure or Fill: N/A

Site Measurements
14. Crest Elevation (ft MLW): 5.1
15. Extent from Crest: Landward (ft): 63
16. Extent from Crest: To MLW (ft): 50
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A

Secondary Dune:

Vegetation Communities
20. Primary Dune:
   Spartina patens (saltmeadow hay)
   Ammophila breviligulata (American beach grass)
   Panicum virgatum (switch grass)
21. Secondary Dune: N/A
22. Remarks:
   LN 67 is at the opposite end of the embayment from LN 66 and occurs as a pocket beach.

Not intended for use in determining legal jurisdictional limits.
**LANCASTER COUNTY DUNE SITE 68**

### Site Information

1. **Date Surveyed:** 20 May 1999
2. **Central Coordinates:**
   - N: 491,900 ft
   - E: 2,625,355 ft
3. **Profile Coordinates:**
   - N: 491,900 ft
   - E: 2,625,355 ft
4. **Site Length:** 250 ft
5. **Ownership:** Private
6. **Type:** Natural
7. **Fetch Exposure:** Riverine, Bay Influenced
8. **Shoreline Direction of Face:** North
9. **Nearshore Gradient:** 0 to 1,000 ft/No Bars
10. **Morphologic Setting:** Isolated <500 ft. Alongshore/Salient
11. **Relative Stability:** Accretionary
12. **Underlying Substrate:** Upland
13. **Structure or Fill:** N/A

### Site Parameters

- **Crest Elevation (ft MLW):** 3.6
- **Extent from Crest: Landward (ft):** 18
- **Extent from Crest: To MLW (ft):** 79

### Site Measurements

- **Secondary Dune Crest**
  - **Crest Elevation (ft MLW):** 3.4
  - **Extent between Second and Primary Crest (ft):** 60
  - **Second Crest – Landward (ft):** 13

### Vegetation Communities

- **Primary Dune:**
  - *Ammophila breviligulata* (American beach grass)
  - *Spartina patens* (saltmeadow hay)
  - *Panicum virgatum* (switch grass)

- **Secondary Dune:**
  - N/A

### Remarks:

LN 68 is an accretionary spit with salient features on the Dymer Creek side of Poplar Neck.

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**Looking west up Dyer Creek shoreline.**

**Looking east out into Fleets Bay. Note Grog Island in the distance.**
Site Information
1. Date Surveyed: 20 May 1999
2. Central Coordinates: N: 494,300 ft, E: 2,628,800 ft
3. Profile Coordinates: N: 494,300 ft, E: 2,628,800 ft
Virginia South State Plane Grid NAD 1927 [4502]
4. Site Length: 100 ft
5. Ownership: Private
6. Type: Man Influenced
7. Fetch Exposure: Riverine, Bay Influenced
8. Shoreline Direction of Face: South
9. Nearshore Gradient: 0 to 1,000 ft/Extensive Bars
10. Morphologic Setting: Isolated < 500 ft, Alongshore/Pocket
11. Relative Stability: Land Transgressive/Erosional
12. Underlying Substrate: Upland
13. Structure or Fill: Groin

Site Parameters
14. Crest Elevation (ft MLW): 5.4
15. Extent from Crest: Landward (ft): 25
16. Extent from Crest: To MLW (ft): 65
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A

Site Measurements
Primary Dune:
20. Primary Dune:
Ammophila breviligulata (American beach grass)
Panicum virgatum (switch grass)
Panicum amarum (running beach grass)
21. Secondary Dune: N/A

Vegetation Communities
22. Remarks:
Site LN 69 is a small pocket beach/dune that has developed between two stone groins.
Site LN 70 exist between two stone revetments and has a single breakwater near the western end. Sites LN 70, LN 71, LN 72 and LN 73 are a series of dunes along the northside of Fleets Bay Neck that are separated by a groin field and revetments.
LANCASTER COUNTY DUNE SITE 71

Site Information
1. Date Surveyed: 20 May 1999
2. Central Coordinates:
   N: 496,956 ft
   E: 2,628,177 ft
3. Profile Coordinates:
   N: 496,956 ft
   E: 2,628,177 ft
4. Site Length: 300 ft
5. Ownership: Private
6. Type: Man Influenced
7. Fetch Exposure: Riverine, Bay Influenced
8. Shoreline Direction of Face: Northeast
9. Nearshore Gradient: 0 to 1,000 ft/Extensive Bars
10. Morphologic Setting: Isolated <500 ft/Alongshore/Linear
11. Relative Stability: Stable
12. Underlying Substrate: Upland
13. Structure or Fill: Groin

Site Parameters
14. Crest Elevation (ft MLW): 5.3
15. Extent from Crest: Landward (ft): 4
16. Extent from Crest: To MLW (ft): 44
17. Crest Elevation (ft MLW): N/A
18. Extent between Second and Primary Crest (ft): N/A
19. Second Crest – Landward (ft): N/A
20. Primary Dune:
   Ammophila breviligulata (American beach grass)
21. Secondary Dune: N/A
22. Remarks:
   Site LN 71 is controlled and stabilized, in large part, by the existing groin field.

Site Measurements

Not intended for use in determining legal jurisdictional limits.
LANCASTER COUNTY DUNE SITE 72

Site Information
1. Date Surveyed: 20 May 1999
2. Central Coordinates: N: 497,650 ft E: 2,627,400 ft
   NAD 1927 Virginia South State Plane Grid
3. Profile Coordinates: LN 72 20 May 1999
4. Site Length: 570 ft
5. Ownership: Private
6. Type: Natural
7. Fetch Exposure: Riverine, Bay Influenced
8. Shoreline Direction of Face: North
9. Nearshore Gradient: 0 to 1,000 ft/No Bars
10. Morphologic Setting: Dune Field >500 ft, Alongshore/Shallow Bay
11. Relative Stability: Stable
12. Underlying Substrate: Upland
13. Structure or Fill: N/A

Site Parameters
14. Crest Elevation (ft MLW): 3.4
15. Extent from Crest: Landward (ft): 18
16. Extent from Crest: To MLW (ft): 29
17. Crest Elevation (ft MLW): 3.0
18. Extent between Second and Primary Crest (ft): 22
19. Second Crest – Landward (ft): 18

Site Measurements
20. Primary Dune:
   Ammophila breviligulata (American beach grass)
21. Secondary Dune:
22. Remarks:
   Site LN 72 is a low primary dune field along Indian Creek that occurs as a relatively stable embayment.

Not intended for use in determining legal jurisdictional limits.
LANCASTER COUNTY DUNE SITE 73

**Site Information**
1. Date Surveyed: 20 May 1999
2. Central Coordinates: N: 498,050 ft  E: 2,626,773 ft
3. Profile Coordinates: N: 498,050 ft  E: 2,626,773 ft
4. Site Length: 300 ft
5. Ownership: Private

**Site Parameters**
6. Type: Man Influenced
7. Fetch Exposure: Riverine, Bay Influenced
8. Shoreline Direction of Face: Northeast
9. Nearshore Gradient: 0 to 1,000 ft/No Bars
10. Morphologic Setting: Isolated <500 ft. Alongshore/Salient
11. Relative Stability: Stable
12. Underlying Substrate: Upland
13. Structure or Fill: Jetty

**Site Measurements**
14. Crest Elevation (ft MLW): 47
15. Extent from Crest: Landward (ft): 25
16. Extent from Crest: To MLW (ft): 50
17. Crest Elevation (ft MLW): 5.1
18. Extent between Second and Primary Crest (ft): 52
19. Second Crest – Landward (ft): 52

**Vegetation Communities**
20. Primary Dune: Ammophila breviligulata (American beach grass) Panicum virgatum (switch grass)

22. Remarks:
Site LN 73 resides on the upriver, but downdrift, end of the shore reach. It is bounded on each end by groins and a jetty.

Not intended for use in determining legal jurisdictional limits.