Self-Taught Education Unit

Coastal Resources and the Permit Process: Definitions and Jurisdictions

By William L. Roberts, Ph.D.

Introduction

Activities on Virginia's shoreline are controlled by a number of federal and state laws. The laws create overlapping jurisdictions for the various regulatory agencies. This unit reviews the jurisdictions of the various regulatory agencies and the definitions of terms relating to wetlands and other coastal resources in Virginia. The procedure for processing of permits for activities involving coastal resources is outlined.

Regulatory Authority

Authority for the protection and regulation of activities within wetlands, subaqueous land and dune systems is granted to several state and federal agencies by specific legislation passed by the Virginia General Assembly and the United States Congress in recent years.

State/Local Authority

Pertinent laws of the Commonwealth of Virginia include the Tidal Wetlands Act of 1972 (Title 28.2, Chapter 13) and the Coastal Primary Sand Dune Protection Act of 1980 and revision of 1989 (Title 28.2, Chapter 14)as illustrated in Figure 1.

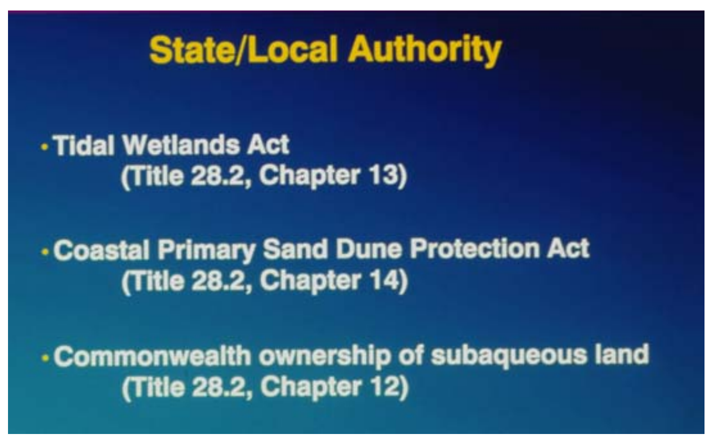


Figure 1.

The Commonwealth's ownership of subaqueous land is established in Title 62.1, Chapter 1 of the Virginia Code and is regulated by the VMRC. The Virginia Marine Resources Commission (VMRC) is the regulating authority for the coastal resources included in these laws. Localities (i.e., counties, cities and towns) which desire to regulate their own tidal wetlands or sand dunes have the option of adopting prescribed zoning ordinances and forming citizen Wetlands Boards. To date, 22 counties, 12 cities and 2 towns within the coastal plain of Virginia have established volunteer citizen wetland boards to oversee activities in wetlands and dune systems. VMRC retains an oversight and appellate role for the 36 localities which have adopted these coastal resource ordinances. For localities which do not adopt these ordinances, VMRC retains original jurisdiction over tidal wetlands and sand dunes.

Federal

Federal laws include Section 404 of the Clean Water Act of 1977 (33 U.S.C. 1251) which addresses dredge and fill operations in wetlands and Section 10 of the Rivers and Harbors Appropriations Act of 1899 (33 U.S.C. 403) which addresses activities affecting navigation as shown in Figure 2.

The U.S. Army Corps of Engineers (USACE) is assigned as the primary federal agency with regulatory authority for these laws. The Corps jurisdiction established by these laws includes waters of the U.S. and their adjacent wetlands

Section 401 of the Clean Water Act is a water quality certification which is required for activities within waters of the U.S. This certification process has been delegated to Virginia's Department of Environmental Quality, Water Division, and is known as the Virginia Water Protection Permit. It insures that Virginia Water Quality standards will not be contravened by any activity permitted by the Corps (USACE).

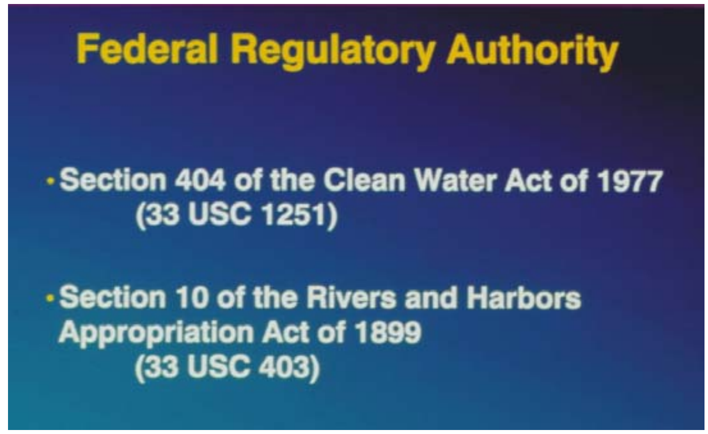


Figure 2.

Tides

The boundaries of state/local wetlands and other coastal resources are based on tidal datums. Therefore, it is helpful to have a basic understanding of tides. Tides are the periodic rise and fall of the surface of ocean water and connected estuaries, bays, and rivers. Astronomical tides are caused by the gravitational attraction of the moon and sun on the Earth and it's surface waters. An overview of the celestial bodies, the Earth, moon and sun, involved in creating tidal cycles on Earth is shown in Fig. 3.

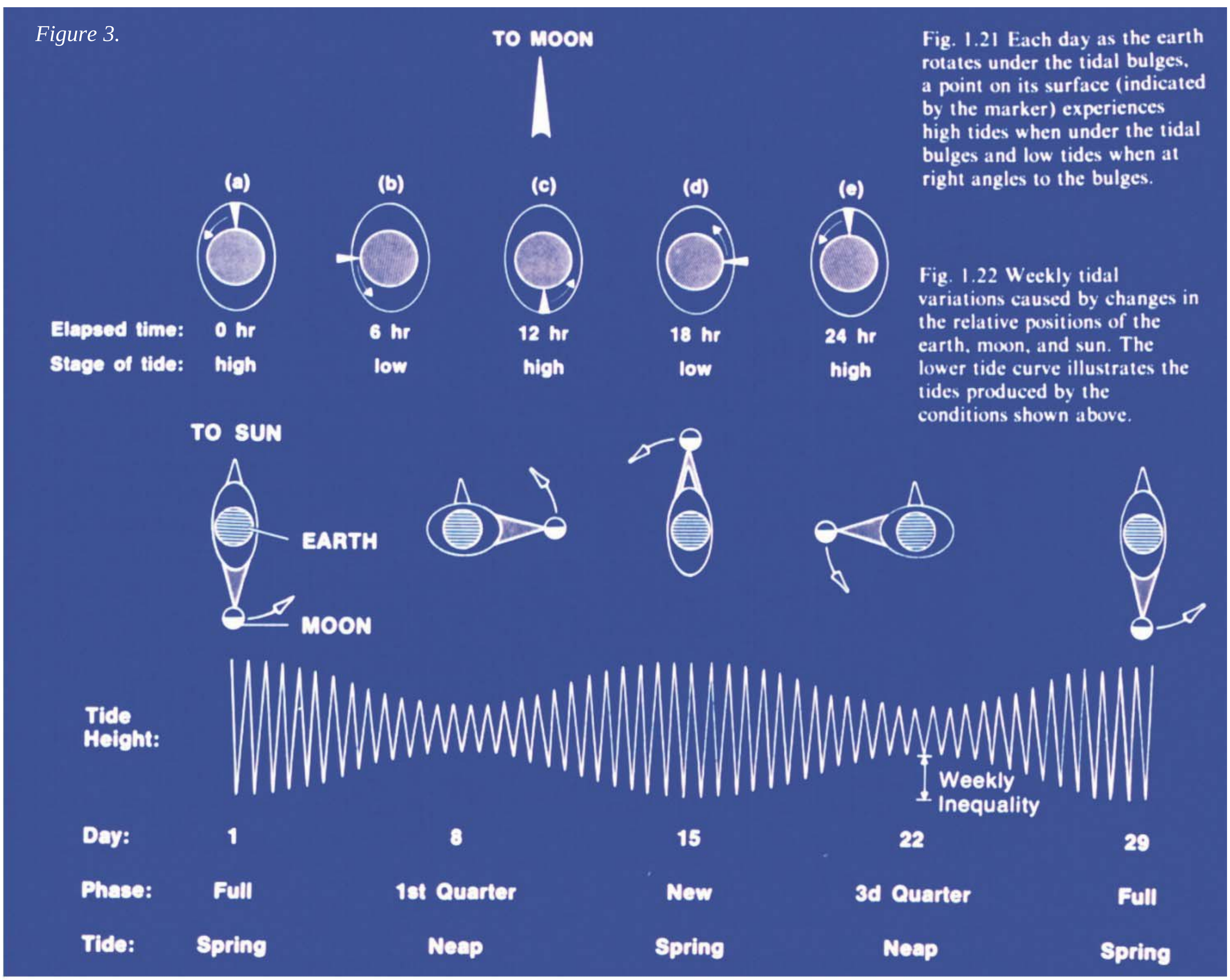


Figure 3.

Our moon is more important than the sun in producing tides because the moon is closer to the Earth. The moon's gravitational attraction and the centrifugal effect of the rotating Earth-moon system are opposing forces which cause two tidal bulges on the Earth depicted in Figure 4.

If we imagine the Earth rotating on its axis within a stationary fluid envelope, we see that a point on the Earth would pass through tidal bulges (i.e., high tides) twice in one rotation. In fact, most places on Earth, including the Atlantic coast of the United States, experience these semidiurnal (i.e., twice daily) tides, in which there are two high water events and two low water events each day. The times at which high and low tides occur vary each day because the tidal day is approximately 24 hours and 50 minutes long.

Changes in the positions of sun, moon, and Earth relative to each other cause changes in the heights of high and low tides. For example, when the sun, Earth, and moon are aligned (approximately every 2 weeks, at new and full moons), the gravitational forces of the sun and moon are in phase, or working together, to cause the highest high tides and the lowest low tides as shown in (Figure 2). These highest high and lowest low tides are called spring tides. Approximately one week after new and full moons, the sun, Earth and moon are at right angles, and therefore out of phase, or no longer aligned. At this time, the gravitational force of the sun on the Earth dampens that of the moon on the Earth and it's surface waters producing tide heights that are not as extreme as seen in spring tides. These dampened high and low tides are called neap tides as shown in Figure 5.

Predictions of times and heights of high and low tides in Virginia may be found in Tide Tables produced by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration's (NOAA) National Ocean Service are shown in Figure 6.

Throughout Virginia's coastal waters and rivers NOAA has placed and maintains monitoring stations which record the time and level of daily tide fluctuations. Using these centralized monitoring stations as a reference, the average time differential of both high and low tides for various locations along a particular waterway can also be found in this publication. Figure 7 shows the expected time difference between high and low tides at the reference monitoring station (Tue Marsh Light), located in the mouth of the York River, and locations upriver. Figure 8 is representative of information produced by NOAA concerning the expected times for daily high and low tides including the anticipated height in feet and centimeters each month throughout the year.

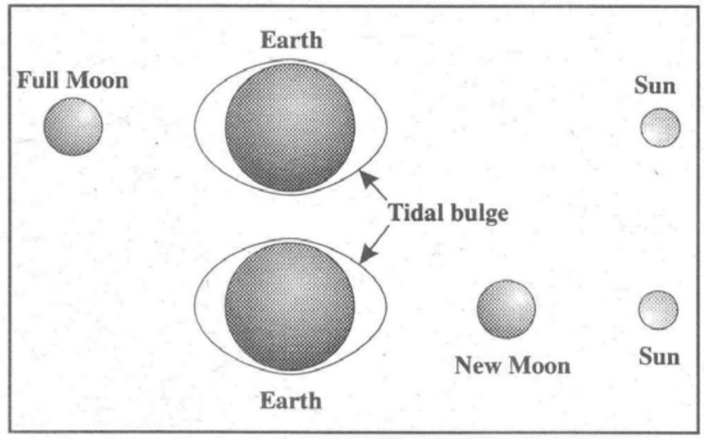


Figure 4.

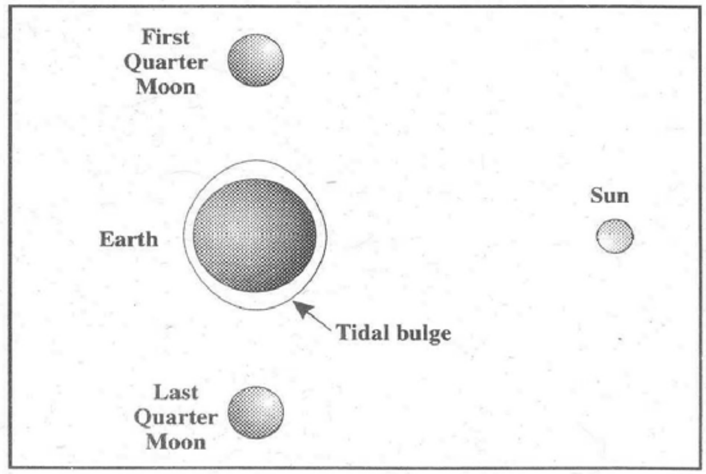


Figure 5.

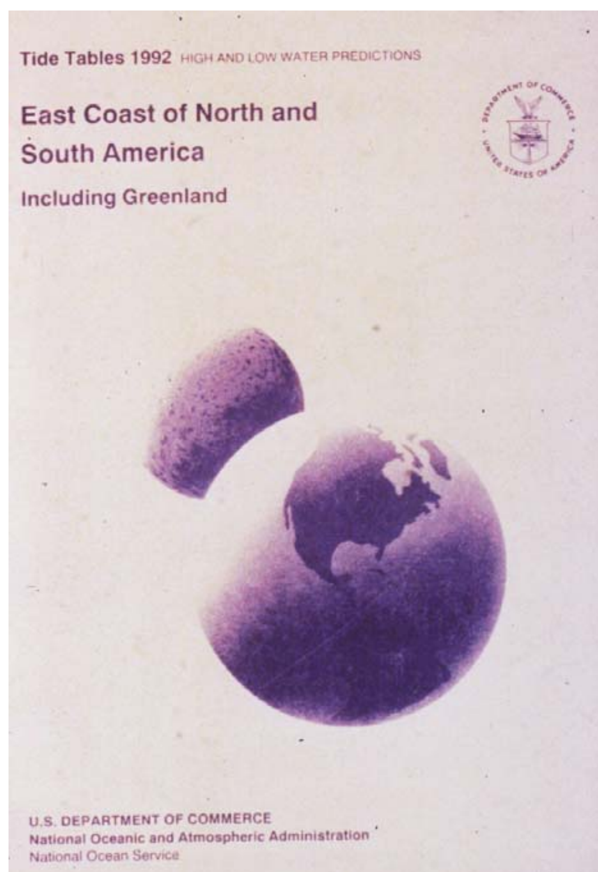


Figure 6.

Tidal Differences and Other Constants

No	PLACE	POSITION		DIFFERENCES				RANGES		Mean Tide Level
		Latitude	Longitude	Time: High Water	Time: Low Water	Height: High Water	Height: Low Water	Mean	Spring	
		North	West	h m	h m	ft	ft	ft	ft	ft
2607	Tue Marshes Light	37° 14'	76° 23'	−0 05	−0 02	*0.88	*0.92	2.2	2.6	1.2
2609	Perrin River	37° 16'	76° 25'	+0 13	+0 03	*1.00	*0.92	2.3	2.8	1.2
2611	Goodwin Neck	37° 14'	76° 26'	+0 13	+0 10	*0.86	*0.92	2.2	2.5	1.2
2613	Quarter Point	37° 15'	76° 27'	+0 08	+0 06	*0.93	*0.92	2.3	2.8	1.2
2615	Gloucester Point	37° 15'	76° 30'	+0 11	+0 07	*0.98	*0.96	2.4	2.8	1.3
2617	Yorktown	37° 14'	76° 30'	+0 11	+0 06	*0.96	*1.00	2.4	2.9	1.3
2619	Mumfort Islands	37° 18'	76° 31'	+0 19	+0 12	*1.00	*1.00	2.5	3.0	1.3
2621	Penniman Spit	37° 17'	76° 35'	+0 41	+0 44	*1.00	*1.00	2.5	3.0	1.3
2623	Cheatham Annex	37° 18'	76° 35'	+0 43	+0 35	*1.00	*1.00	2.5	3.0	1.3
2625	Queen Creek (2 miles above entrance)	37° 18'	76° 39'	+1 00	+0 59	*0.96	*0.96	2.4	2.9	1.3
2627	Clay Bank	37° 21'	76° 37'	+0 50	+0 49	*1.12	*1.12	2.8	3.4	1.4
2629	Allmondsville	37° 23'	76° 39'	+0 59	+1 02	*1.14	*1.16	2.8	3.3	1.5
2631	Roane Point	37° 27'	76° 42'	+1 42	+1 45	*1.12	*1.17	2.8	3.4	1.5
2633	West Point	37° 32'	76° 48'	+2 07	+2 33	*1.11	*1.17	2.8	3.4	1.5
	Mattaponi River									
2635	Wakema	37° 39'	76° 54'	+3 29	+3 52	*1.36	*1.33	3.4	3.9	1.9
2637	Walkerton	37° 43'	77° 02'	+4 26	+4 54	*1.56	*1.58	3.9	4.5	2.1
	Pamunkey River									
2639	Sweet Hall Landing	37° 34'	76° 54'	+3 48	+4 06	*1.08	*1.08	2.7	3.1	1.4
2641	Lester Manor	37° 35'	76° 59'	+4 40	+4 55	*1.12	*1.17	2.8	3.2	1.5
2643	White House	37° 35'	77° 01'	+5 09	+5 24	*1.23	*1.25	3.0	3.4	1.7
2645	Northbury	37° 37'	77° 07'	+5 58	+6 13	*1.35	*1.33	3.3	3.8	1.8
	Chesapeake Bay, western shore–cont.									
2647	York Point, Poquoson River	37° 10'	76° 24'	−0 07	+0 01	*0.96	*1.00	2.4	2.9	1.3
2649	Messick Point, Back River	37° 06'	76° 19'	−0 26	−0 05	*0.93	*0.92	2.3	2.8	1.3
	Hampton Roads									
2651	Old Point Comfort	37° 00'	76° 19'	−0 04	−0 14	*1.00	*1.00	2.5	3.0	1.4
2653	Hampton River	37° 01'	76° 20'	+0 02	−0 07	*1.04	*1.08	2.6	3.1	1.4

Figure 7. Example of the tide charts produced by the U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration's National Ocean Service.

Additionally, the Virginia Institute of Marine Science (VIMS) in conjunction with the Virginia Sea Grant Marine Advisory Service produces tide graphs for Gloucester Point on the York River and Wachapreague on the Eastern Shore of Virginia, as shown and discussed in Figures 9 and 10.

It is important to note that predicted or expected tide heights and times are based on astronomical cycles and past information gathered from the major monitoring stations. The average, or expected, or predicted tide height is an average height obtained from recorded heights experienced over time. Changing weather, especially wind velocity, direction and strength, have a potentially enormous effect on tide heights and times. Therefore, tide charts do not take into account the potential effects of unusual weather conditions or storms on water levels.

Figure 8.

Hampton Roads (Sewell's Point, Virginia, 1995
Times and Heights of High and Low Water

January

	Time (h m)	Height (ft)	Height (cm)		Time (h m)	Height (ft)	Height (cm)
1 Su ●	0217	-0.7	-21	16 M ○	0218	-0.1	-3
	0844	3.1	94		0839	2.6	79
	1510	-0.6	-18		1505	-0.1	-3
	2106	2.5	76		2057	2.2	67
2 M	0311	-0.7	-21	17 Tu	0259	-0.2	-6
	0935	3.1	94		0917	2.7	82
	1600	-0.6	-18		1542	-0.2	-6
	2158	2.5	76		2137	2.3	70
3 Tu	0403	-0.7	-21	18 W	0340	-0.2	-6
	1024	3.0	91		0954	2.7	82
	1647	-0.6	-18		1616	-0.2	-6
	2249	2.5	76		2216	2.3	70
4 W	0455	-0.5	-15	19 Th	0421	-0.2	-6
	1112	2.8	85		1033	2.7	82
	1734	-0.5	-15		1655	-0.2	-6
	2339	2.5	76		2257	2.4	73
5 Th	0546	-0.4	-12	20 F	0505	-0.2	-6
	1159	2.6	79		1113	2.6	79
	1820	-0.4	-12		1733	-0.2	-6
					2340	2.4	73
6 F	0029	2.4	73	21 Sa	0552	-0.1	-3
	0639	-0.2	-6		1157	2.5	76
	1246	2.4	73		1815	-0.2	-6
	1906	-0.3	-9				
7 Sa	0120	2.3	70	22 Su	0027	2.4	73
	0733	0.0	0		0644	-0.1	-3
	1335	2.2	67		1245	2.3	70
	1953	-0.2	-6		1902	-0.2	-6
8 Su ◐	0213	2.2	67	23 M ◑	0120	2.5	76
	0829	0.1	3		0742	0.0	0
	1425	2.0	61		1340	2.2	67
	2041	0.0	0		1956	-0.2	-6
9 M	0308	2.2	67	24 Tu	0220	2.5	76
	0927	0.2	6		0848	0.0	0
	1518	1.9	58		1441	2.1	64
	2132	0.0	0		2056	-0.2	-6
10 Tu	0404	2.2	67	25 W	0326	2.5	76
	1026	0.3	9		0958	0.0	0
	1613	1.8	55		1549	2.0	61
	2223	0.1	3		2200	-0.3	-9
11 W	0458	2.2	67	26 Th	0434	2.5	76
	1123	0.3	9		1107	-0.1	-3
	1708	1.8	55		1657	2.1	64
	2315	0.1	3		2307	-0.4	-12
12 Th	0550	2.3	70	27 F	0541	2.6	79
	1215	0.2	6		1211	-0.2	-6
	1800	1.9	58		1803	2.1	64
13 F	0004	0.0	0	28 Sa	0011	-0.5	-15
	0637	2.4	73		0642	2.8	85
	1303	0.2	6		1310	-0.4	-12
	1849	2.0	61		1904	2.3	70
14 Sa	0051	0.0	0	29 Su	0111	-0.6	-18
	0721	2.5	76		0739	2.8	85
	1346	0.1	3		1403	-0.5	-15
	1934	2.1	64		2000	2.4	73
15 Su	0136	-0.1	-3	30 M ●	0206	-0.7	-21
	0801	2.6	79		0830	2.9	88
	1427	0.0	0		1452	-0.6	-18
	2017	2.1	64		2052	2.5	76
				31 Tu	0258	-0.7	-21
					0919	2.9	88
					1538	-0.6	-18
					2140	2.5	76

February

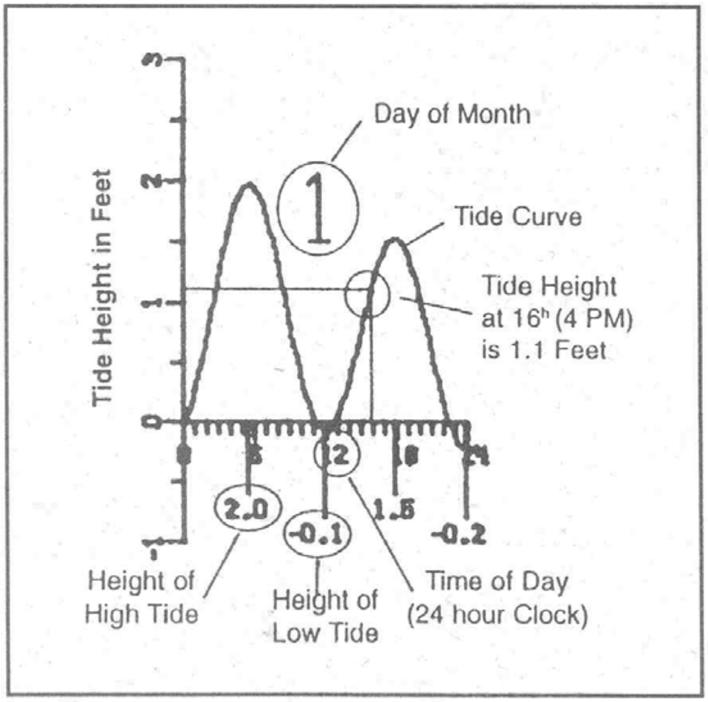
	Time (h m)	Height (ft)	Height (cm)		Time (h m)	Height (ft)	Height (cm)
1 W	0348	-0.6	-18	16 Th	0321	-0.3	-9
	1004	2.8	85		0931	2.8	85
	1622	-0.6	-18		1548	-0.3	-9
	2227	2.6	79		2152	2.6	79
2 Th	0436	-0.5	-15	17 F	0404	-0.3	-9
	1048	2.7	82		1012	2.7	82
	1703	-0.5	-15		1627	-0.3	-9
	2312	2.5	76		2234	2.7	82
3 F	0523	-0.4	-12	18 Sa	0450	-0.3	-9
	1130	2.5	76		1055	2.7	82
	1744	-0.4	-12		1708	-0.3	-9
	2356	2.4	73		2319	2.7	82
4 Sa	0609	-0.2	-6	19 Su	0538	0.2	-6
	1212	2.3	70		1140	2.6	79
	1825	-0.3	-9		1752	-0.3	-9
5 Su	0040	2.3	70	20 M	0008	2.7	82
	0656	0.0	0		0630	-0.1	-3
	1254	2.1	64		1230	2.4	73
	1907	-0.1	-3		1841	-0.3	-9
6 M	0127	2.3	70	21 Tu	0101	2.7	82
	0746	0.2	6		0728	0.0	0
	1339	2.0	61		1325	2.3	70
	1952	0.0	0		1936	-0.2	-6
7 Tu ◐	0217	2.2	67	22 W ◑	0202	2.6	79
	0840	0.3	9		0833	0.0	0
	1429	1.9	58		1427	2.2	67
	2041	0.1	3		2039	-0.2	-6
8 W	0311	2.1	64	23 Th	0310	2.5	76
	0938	0.4	12		0943	0.1	3
	1524	1.8	55		1536	2.1	64
	2135	0.2	6		2147	-0.1	-3
9 Th	0409	2.1	64	24 F	0421	2.5	76
	1038	0.4	12		1052	0.0	0
	1622	1.8	55		1646	2.1	64
	2232	0.2	6		2257	-0.2	-6
10 F	0506	2.2	67	25 Sa	0529	2.6	79
	1134	0.4	12		1156	-0.1	-3
	1720	1.9	58		1753	2.2	67
	2327	0.1	3				
11 Sa	0559	2.3	70	26 Su	0002	-0.3	-9
	1225	0.3	9		0630	2.7	82
	1814	2.0	61		1253	-0.2	-6
					1852	2.4	73
12 Su	0020	0.1	3	27 M	0102	-0.4	-12
	0646	2.4	73		0725	2.7	82
	1311	0.2	6		1343	-0.3	-9
	1903	2.1	64		1946	2.5	76
13 M	0108	0.0	0	28 Tu	0156	-0.5	-15
	0730	2.6	79		0814	2.8	85
	1353	0.0	0		1429	-0.4	-12
	1948	2.3	70		2034	2.6	79
14 Tu	0153	-0.1	-3				
	0811	2.7	82				
	1432	-0.1	-3				
	2030	2.4	73				
15 W ○	0237	-0.2	-6				
	0851	2.7	82				
	1510	-0.2	-6				
	2111	2.5	76				

March

	Time (h m)	Height (ft)	Height (cm)		Time (h m)	Height (ft)	Height (cm)
1 W ●	0245	-0.5	-15	16 Th ○	0214	-0.2	-6
	0859	2.8	85		0823	2.8	85
	1512	-0.4	-12		1436	-0.2	-6
	2119	2.7	82		2043	2.9	88
2 Th	0331	-0.5	-15	17 F	0301	-0.3	-9
	0941	2.7	82		0907	2.9	88
	1552	-0.4	12		1517	-0.3	-9
	2201	2.7	82		2127	3.0	91
3 F	0415	-0.4	-12	18 Sa	0347	-0.3	-9
	1021	2.6	79		0951	2.8	85
	1631	-0.3	-9		1600	-0.3	-9
	2242	2.7	82		2213	3.1	94
4 Sa	0457	-0.2	-6	19 Su	0435	-0.3	-9
	1100	2.5	76		1037	2.8	85
	1708	-0.2	-6		1644	-0.3	-9
	2321	2.6	79		2300	3.1	94
5 Su	0539	-0.1	-3	20 M	0525	-0.3	-9
	1138	2.4	73		1125	2.7	82
	1746	-0.1	-3		1732	-0.3	-9
					2351	3.0	91
6 M	0001	2.5	76	21 Tu	0619	-0.1	-3
	0621	0.1	3		1217	2.5	76
	1217	2.2	67		1824	-0.2	-6
	1825	0.1	3				
7 Tu	0042	2.4	73	22 W	0047	2.9	88
	0706	0.3	9		0717	0.0	0
	1259	2.1	64		1314	2.4	73
	1907	0.2	6		1923	-0.1	-3
8 W	0128	2.3	70	23 Th ◑	0148	2.7	82
	0755	0.4	12		0820	0.1	3
	1346	2.0	61		1418	2.3	70
	1955	0.3	9		2028	0.0	0
9 Th ◐	0219	2.2	67	24 F	0256	2.6	79
	0849	0.5	15		0926	0.1	3
	1439	2.0	61		1527	2.3	70
	2050	0.4	12		2138	0.0	0
10 F	0316	2.2	67	25 Sa	0407	2.6	79
	0948	0.6	18		1034	0.1	3
	1538	2.0	61		1636	2.3	70
	2149	0.4	12		2248	0.0	0
11 Sa	0416	2.3	70	26 Su	0514	2.6	79
	1046	0.5	15		1135	0.0	0
	1638	2.1	64		1740	2.4	73
	2249	0.4	12		2353	-0.1	-3
12 Su	0513	2.4	73	27 M	0614	2.6	79
	1140	0.4	12		1229	0.0	0
	1735	2.2	67		1837	2.6	79
	2346	0.3	9				
13 M	0606	2.5	76	28 Tu	0051	-0.2	-6
	1228	0.3	9		0707	2.7	82
	1827	2.4	73		1318	-0.1	-3
					1927	2.7	82
14 Tu	0038	0.1	3	29 W	0142	-0.2	-6
	0654	2.6	79		0754	2.7	82
	1313	0.1	3		1402	-0.2	-6
	1914	2.6	79		2013	2.8	85
15 W	0127	0.0	0	30 Th ●	0229	-0.2	-6
	0739	2.7	82		0836	2.7	82
	1355	0.0	0		1442	-0.2	-6
	1959	2.7	82		2055	2.9	88
				31 F	0312	-0.2	-6
					0916	2.6	79
					1521	-0.1	-3
					2134	2.9	88

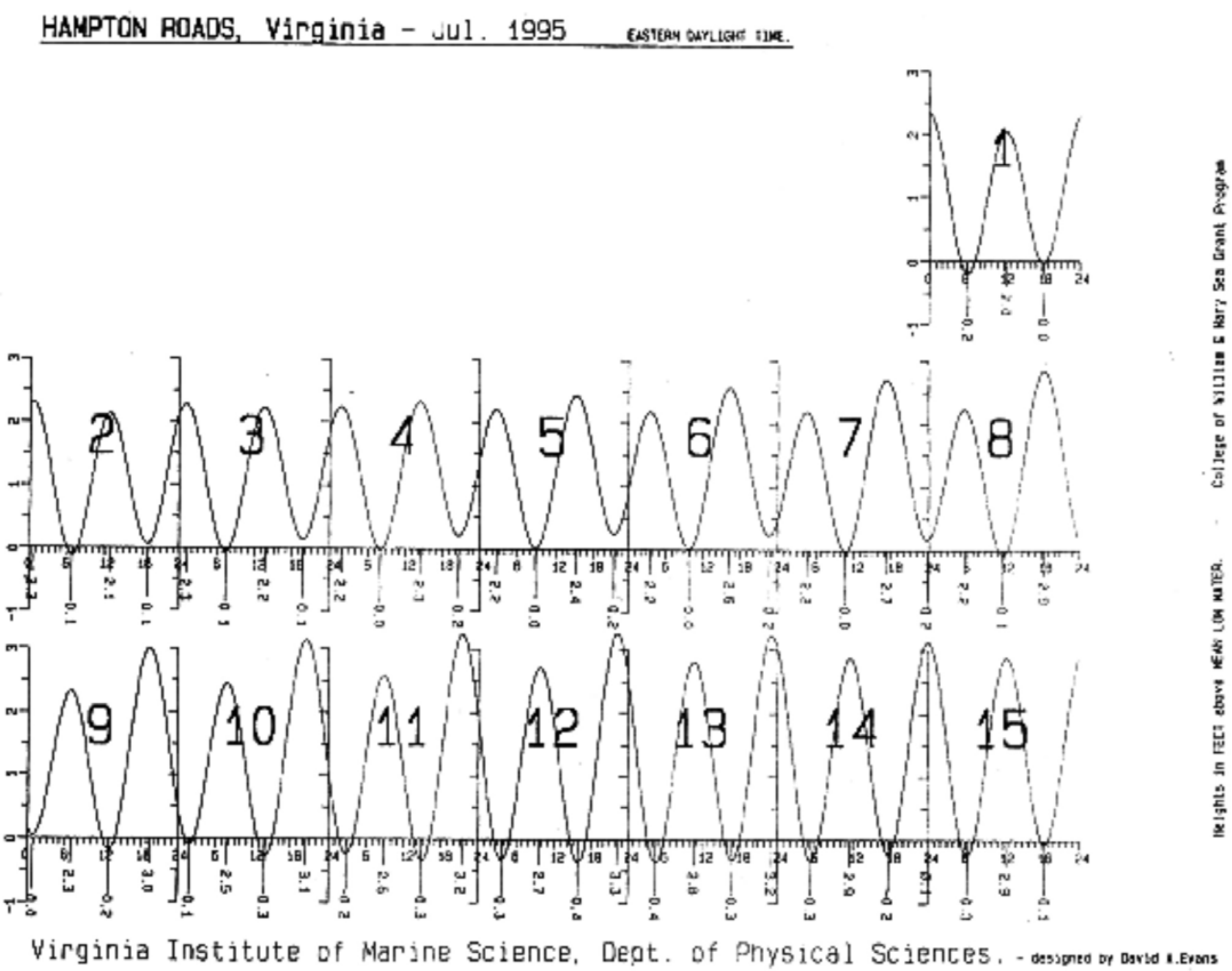
Time meridian 75° W. 0000 is midnight. 1200 is noon.
Heights are referred to mean lower low water which is the chart datum of soundings

Figure 9.



Tidal Datums Used In Wetland/Sand Dune Systems

The boundaries of the state/local wetlands and other coastal resources are based on tidal datums. A datum is something used as a reference or basis for calculating or measuring. Most maps which contain elevation data (such as those produced by USGS or NOAA) include a datum (such as mean low water or NGVD) which is the zero value from which the map elevations are referenced.



Definitions Used In Wetland/ Sand Dune Systems

Mean low water (MLW)- the average elevation of low water observed over a specific 19 year period.

Mean high water (MHW)- the average elevation of high water observed over a specific 19 year period.

Mean tide range-the difference in elevation between MLW and MHW.

Mean sea level- the average of hourly water elevations observed over a specific 19 year period. *Notes:* The National Oceanic and Atmospheric Administration's National Ocean Service keeps tidal datum records at a network of gage stations along the coast. The specific 19 year period used for calculating MLW and MHW, called the Metonic cycle or the National Tidal Datum Epoch, incorporates a number of the astronomical cycles which cause variations in tide levels.

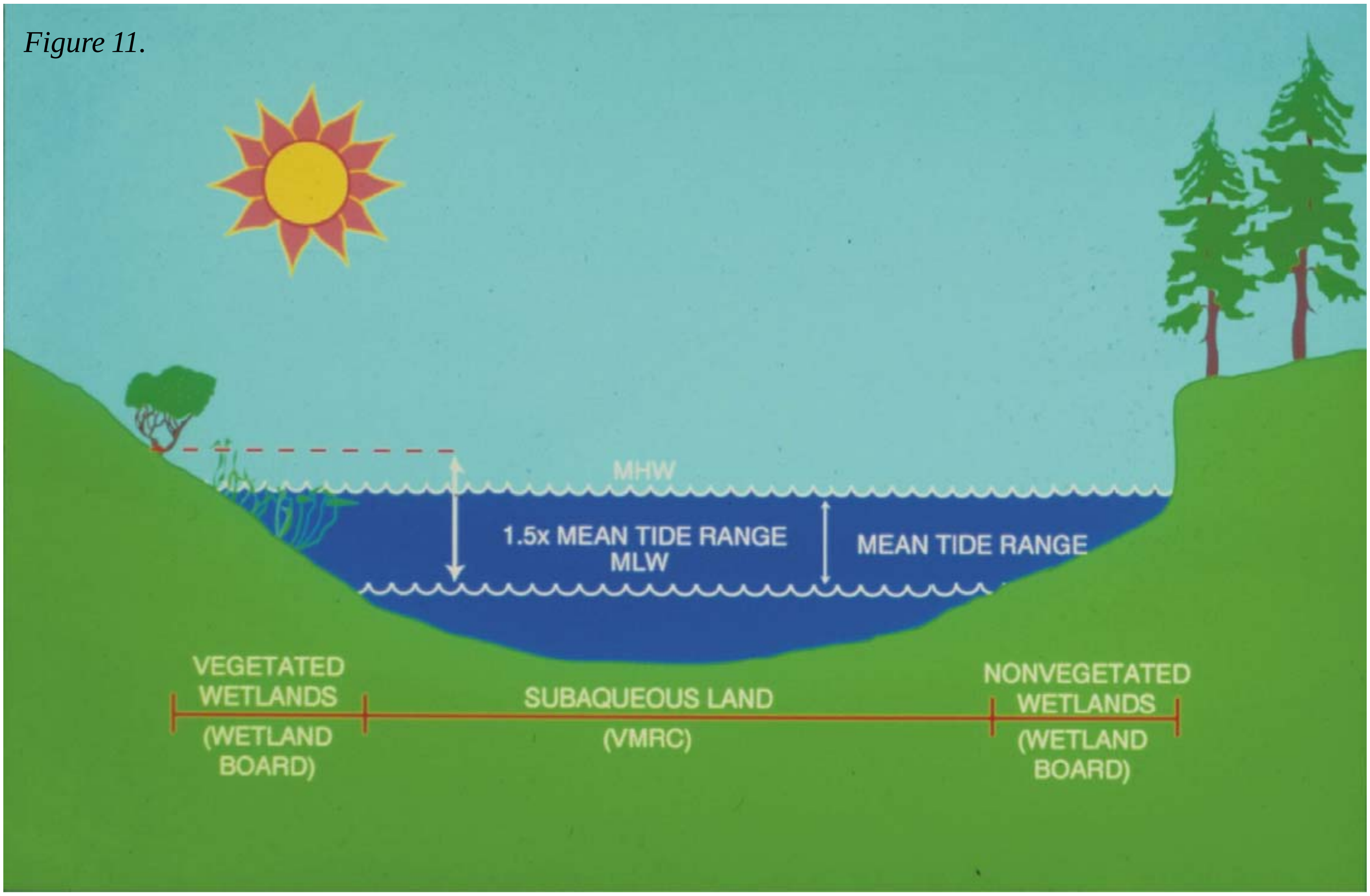
The **National Geodetic Vertical Datum (NGVD)** is a fixed reference based on the earth's shape and the distance between the earth's surface and the center of the earth. NGVD is the datum for land elevations on USGS topographic maps. NGVD was formerly known as the Sea Level Datum of 1929. The name was changed because of confusion with the tidal datum Mean Sea Level (defined above). Relationships between NGVD and local tidal datums are variable and are published in conjunction with the tidal bench mark data by the National Ocean Service.

State/local definitions

Vegetated wetlands are those lands which satisfy these criteria (Fig 11):

- between MLW and an elevation above MLW equal to 1.5 times the mean tide range
- contiguous to MLW
- vegetated with any of the listed wetland plant species (Fig15)

Figure 11.



Nonvegetated wetlands are those lands which satisfy these criteria (Fig 11):

- between MLW and **MHW**
- contiguous to MLW
- not otherwise considered vegetated wetlands

Subtidal land or subtidal bottom refers to the area channelward or seaward of MLW, without regard to political subdivision or land ownership.

Subaqueous land or **subaqueous beds** refer to ungranted beds of the bays, rivers, creeks and shores of the sea which are owned by the Commonwealth. This includes the beds of tidal and nontidal water bodies. Because property ownership in Virginia extends channelward to MLW in tidal areas, subaqueous land is the land channelward of MLW, with some exceptions:

Potomac River. The Potomac River is owned by the State of Maryland and the District of Columbia. The boundary between Maryland and Virginia is generally at MLW on the Virginia side of the river, except where embayments. creeks and inlets occur, at which the boundary line is from headland-to-headland. Therefore. VMRC often may not have jurisdiction over subtidal land on the Potomac River.

Manmade canals. VMRC does not currently exert jurisdiction over subtidal land in manmade canals. However, the Commonwealth's Tidal Wetlands Act does apply to vegetated and nonvegetated wetlands within manmade canals.

Coastal Primary Sand Dunes

Coastal primary sand dunes are those lands which have the following characteristics (Fig 12):

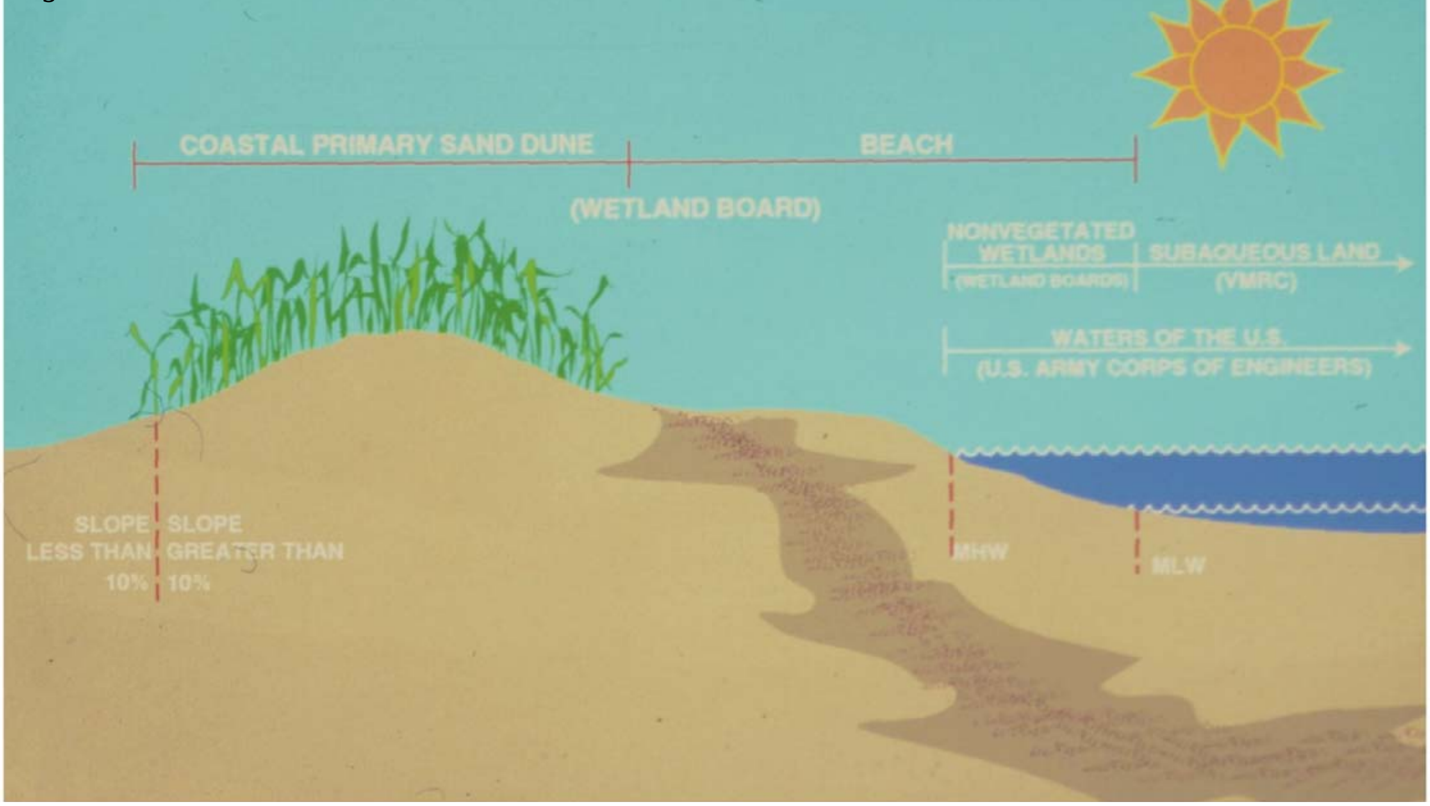
- mound of unconsolidated sandy soil
- contiguous to MHW
- landward and lateral limits marked by a change in grade from 10% or greater to less than 10%
- vegetated with any of the listed dune plant species (figure 16)

Applies only to Counties of Accomack, Lancaster, Mathews, Northampton, Northumberland, and Cities of Hampton, Norfolk, and Virginia Beach.

Beaches are those lands that meet the following criteria (Fig 12):

- the shoreline zone of unconsolidated sandy material extends from MLW landward to a marked change in material composition or in physiographic form (e.g., dune, bluff, marsh) if no such marked change occurs, then the landward limit of the beach is defined by a line of woody vegetation or the nearest impermeable manmade structure.

Figure 12.



Federal definitions

Unlike state/local wetlands, the boundaries of federally regulated wetlands are not based on tidal or other datums. The federal definition of **wetlands** is based on three parameters: soil, hydrology, and vegetation as illustrated in Fig 13.

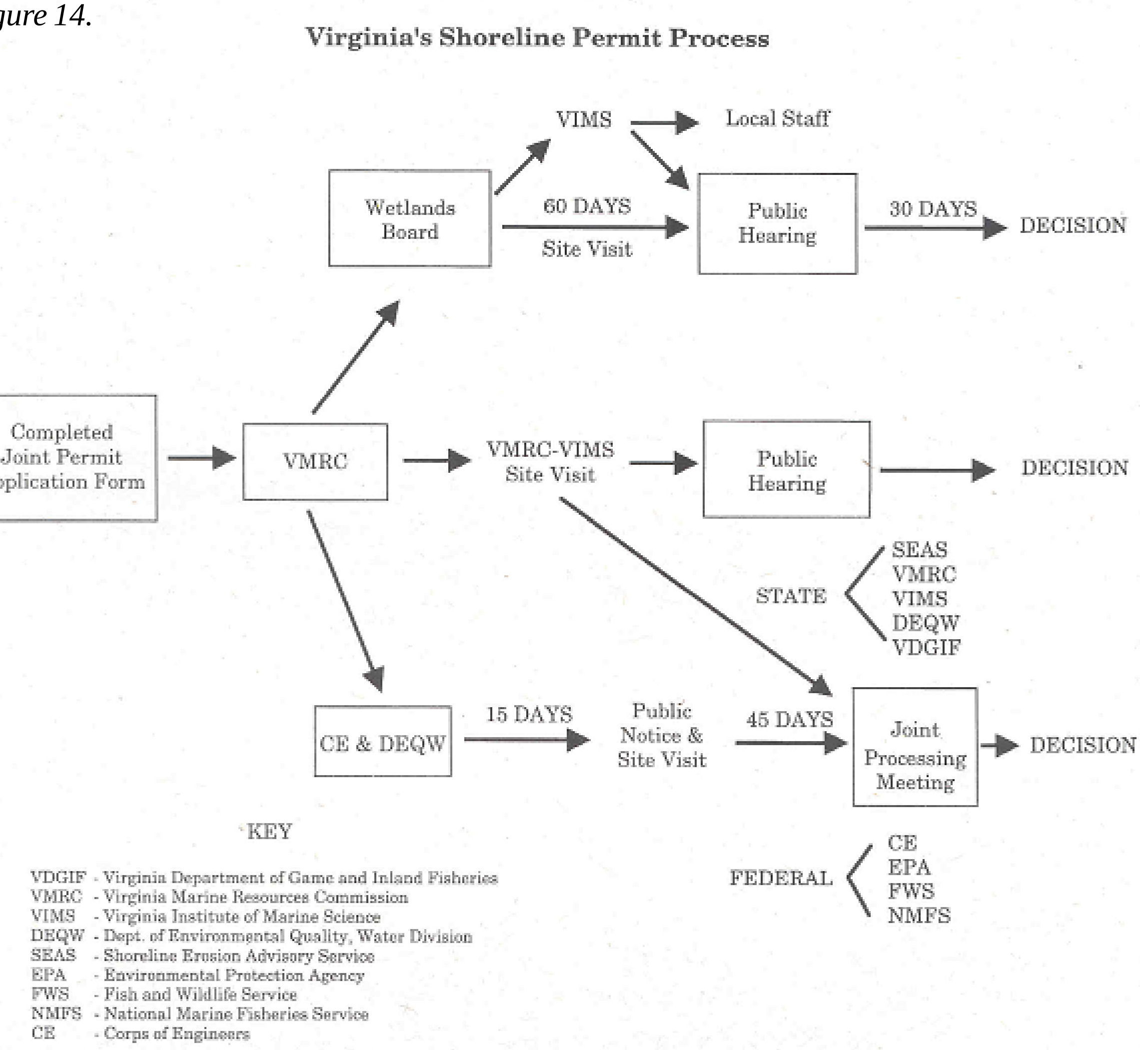
Specifically, wetlands are: "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." The federal definition includes both tidal and non-tidal wetlands. In tidal areas, wetlands under federal jurisdiction may encompass a broader area than the state/local jurisdiction (i.e., federal wetlands may extend to elevations greater than 1.5 times the mean tide range above MLW).

Figure 13.

Permit Process

U.S. Army Corps of Engineers, Virginia Marine Resources Commission, and/or local wetlands board permits may be required for activities in Virginia's wetlands, subaqueous beds, sand dunes, and beaches. Activities which may require permits include, but are not limited to, dredging, filling, and construction of bulk-heads, riprap revetments, groins, jetties, boat ramps, and piers. Submission of the Joint Permit Application (JPA) initiates the permit process. Applications are processed independently by each agency. Figure 14 is a diagrammatic representation of the movement of a JPA through the Virginia Shoreline Permit Process.

Figure 14.



The VIMS involvement in the permit process is strictly advisory. VIMS provides technical and scientific advice to the Commonwealth's regulatory agencies. Advice generally involves estimation of marine environmental impacts and recommendation of alternatives or modifications to minimize these impacts.

Literature Cited

Maloney, Elbert S. 1985. Dutton's Navigation and Piloting. 14th Edition. Naval Institute Press. Annapolis, MD.

List of wetlands plant species in Virginia's Tidal Wetlands Act

saltmarsh cordgrass	(*Spartina alternifiora*)
saltmeadow hay	(*Spartina patens*)
saltgrass	(*Distichlis spicata*)
black needlerush	(*Juncus roemerianus*)
saltwort	(*Salicornia* sp.)
sea lavender	(*Limonium* sp.)
marsh elder	(*Iva frutescens*)
groundsel bush	(*Baccharis halimifolia*)
wax myrtle	(*Myrica* sp.)
sea oxeye	(*Borrichia frutescens*)
arrow arum	(*Peltandra virginica*)
pickerelweed	(*Pontederia cordata*)
big cordgrass	(*Spartina cynosuroides*)
rice cutgrass	(*Leersia oryzoides*)
wildrice	(*Zizania aquatica*)
bulrush	(*Scirpus validus*)
spikerush	(*Eleocharis* sp.)
sea rocket	(*Cakile edentula*)
southern wildrice	(*Zizaniopsis miliacea*)
cattails	(*Typha* spp.)
three-squares	(*Scirpus* spp.)
buttonbush	(*Cephalanthus occidentalis*)
bald cypress	(*Taxodium distichum*)
black gum	(*Nyssa sylvatica*)
tupelo	(*Nyssa aquatica*)
dock	(*Rumex* sp.)
yellow pond lily	(*Nuphar* sp.)
marsh fleabane	(*Pluchea purpurascens*)
royal fern	(*Osmunda regalis*)
marsh hibiscus	(*Hibiscus moscheutos*)
beggar's tick	(*Bidens* sp.)
smartweed	(*Polygonurn* sp.)
arrowhead	(*Sagittaria* spp.)
sweet flag	(*Acorus calamus*)
water hemp	(*Amaranthus cannabinus*)
reed grass	(*Phragmites communis*, now called *P. australis*)
switch grass	(*Panicum virgatum*)

List of dune plant species in Virginia's Coastal Primary Sand Dune Protection Act

American beach grass	*(Ammophila breviligulata)*
beach heather	*(Hudsonia tomentosa)*
dune bean	*(Strophostyles umbellata* var *paludigena)*
dusty miller	*(Artemisia stelleriana)*
saltmeadow hay	*(Spartina patens)*
seabeach sandwort	*(Arenaria peploides)*
sea oats	*(Uniola paniculata)*
sea rocket	*(Cakile edentula)*
seaside goldenrod	*(Solidago sempervirens)*
short dune grass	*(Panicum amarum)*