Eastern Shore of Virginia Regional Dredging Needs Assessment

Prepared for: Virginia Coastal Zone Management Program
Prepared by: Accomack-Northampton Planning District Commission

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PREFACE

The purpose of this study was to assess the navigability of the Eastern Shore of Virginia's waterways. The study was conducted for both short-term and long-range planning purposes and was made possible through a grant from the Virginia Coastal Zone Management Program (VCZMP) through the National Ocean and Atmospheric Administration (NOAA). It is expected that additional work will be needed to develop a strategic, comprehensive plan to address dredging needs in the region.

ACKNOWLEDGEMENTS

This project would not have been possible without the work, advice, and guidance provided by the members of the Eastern Shore of Virginia Regional Navigable Waterways Committee, especially the Chairman, Mr. John Joeckel. Neither would this research project have been possible without the assistance of the United States Army Corps of Engineers staff in the Norfolk District office. In addition, previous works by the Middle Peninsula Planning District Commission and the Virginia Institute of Marine Science were valuable resources. It is important to note that any errors or omissions in this report are the responsibility of Accomack-Northampton Planning District Commission staff and not those whom provided assistance along the way.

EXECUTIVE SUMMARY

Safely navigable waterways, dredged to an adequate depth for their varied uses are vital to the economy, culture, and quality of life for residents of and visitors to the Eastern Shore of Virginia. There has been a decline in federal funding for maintenance of federal channels and an absence of state and local funding for non-federally designated waterways. With well over 100 uniquely identified waterways, each with varying degrees of shoaling, a comprehensive evaluation of current conditions was needed.

To begin to accomplish this objective, the Accomack-Northampton Planning District Commission (A-NPDC) partnered with the Eastern Shore of Virginia Regional Navigable Waterways Committee (ESRNWC) and local stakeholders to develop this *Regional Dredging Needs Assessment*. This document provides a comprehensive evaluation of existing conditions in navigable channels and identifies where navigation has become restricted to the point where dredging is needed and is intended to serve as a supplemental resource and first step towards a prioritized regional dredging strategic plan.

Waterways of the Eastern Shore were first inventoried and evaluated using criteria established by the ESRNWC. A total of 59 waterways, including the 32 federal project areas and 27 non-federal waterways, were assessed. In total, about 37% (22) channels were determined to have sections of the waterway with no more than three feet of water depth at mean low water. Of the federal waterways, about 69% do not currently meet their respective authorized depths and about 31% (10), most of which are part of the Waterway on the Coast of Virginia, have sections with less than two feet of water at mean low water. A third of non-federal waterways which are not WCV connecting waters have sections with no more than three feet of water depth at mean low water and almot half (5/12) of the non-federal WCV connecting waters are in this condition. In addition, 81% of all assessed waterways are in need of permits prior to maintenance.

There are additional hindrances to completing dredging projects, including, but not limited to, expired permits and challenges with securing new permits, limited records of historic dredging (especially for the Waterway on the Coast of Virginia), and increased difficulty in securing appropriate dredge spoil locations. However, there are also new discoveries and technologies associated with the beneficial use of dredge spoil, and there are success stories from communities who have ongoing maintenance of their waterways without the use of federal funds.

With continued guidance and data from the United States Army Corps of Engineers, new tools and potential resources such as Section 22 and a regional sediment management plan, and dedicated local stakeholders, this report can be used towards the creation and implementation of a comprehensive strategic regional dredging plan that will ensure the continued safe use and enjoyment of our Eastern Shore waterways.

I. Introduction

This Regional Dredging Needs Assessment provides a comprehensive evaluation of existing conditions in navigable channels and identifies where navigation has become restricted to the point where dredging is needed.

In order to complete this assessment, the Accomack-Northampton Planning District Commission (A-NPDC) worked closely with the Eastern Shore Regional Navigable Waterways Committee (ESRNWC), the United States Army Corps of Engineers (USACE), and the Accomack County Public Works Department. Previous Virginia Coastal Zone Management Program (VCZMP)/National Oceanic and Atmospheric Administration (NOAA)-funded dredging planning projects were considered during the assessment criteria development process. Once criteria were finalized, the A-NPDC compiled information from existing bathymetric surveys and solicited local information from members of the ESRNWC and stakeholders with whom they engaged for up-to-date accounts of existing conditions for channels not previously surveyed and channels not surveyed within recent timeframes.

In an effort to recognize the needs of shallow draft navigation users, the following report has been developed to assist public policy decision makers by defining the existing conditions of local waterways and describing the problems, needs, and opportunities associated with their use and maintenance.

Geographical and Jurisdictional Setting

The Eastern Shore of Virginia is a narrow, approximately 70-mile peninsula separating the Chesapeake Bay from the Atlantic Ocean with two Counties and 19 incoporated Towns. The peninsula is buffered from coastal impacts along its Atlantic coast by a barrier island chain and vast tidal marshes and along some areas of its Chesapeake Bay coast by various islands and tidal marshes. The creeks that shape the Chesapeake Bay coast are in general much larger than those on the ocean or Seaside of the peninsula. Historic land-use activities and changes to the dynamic coastal environments have contributed to the sedimentation of many creeks of the Eastern Shore. Furthermore, the region faces unique challenges with regards to coastal flooding, coastal erosion, and inundation from sea-level rise, in that potential changes in storm intensities and frequency and changes in relative sea-level, will impact sedimentation patterns that affect the shoaling and navigability of coastal waterways.

Mainland Peninsula

The peninsula was both deposited by and shaped by fluctuations in sea level during the past 200,000 years.[1] [2] The highest land elevations vary from approximately 25-50 feet along a “spine” trending

[1] Colman, et al., 1988. The record of major Quaternary sea-level changes in a large Coastal Plain estuary, Chesapeake Bay, eastern United States: Palaeogeography, Palaeoclimatology, Palaeoecology, v. 68, no. 2-4, p. 99–116.
[2] Colman, et al., 1990. Ancient channels of the Susquehanna River beneath Chesapeake Bay and the Delmarva Peninsula: Geological Society of America Bulletin, v. 102, no. 9, p. 1,268–1,279.

northeast-southwest along the center of the peninsula with greater elevations occurring in Accomack County to the north.

Islands and Tidal Marshes

The Eastern Shore of Virginia is buffered from coastal impacts along its Atlantic Coast due largely to the presence of a discontinuous barrier island chain, of which the majority has not been developed as result of conservation efforts. These islands are likely no older than 10,000 years, as their formation had to have followed the end of the last ice age, about 18,000 years ago when sea levels were about 300 feet lower than today.[3]

Eastern Shore Waterways

Many of the navigation channels identified for this report are designated as Federal Navigation Channels, as defined by the USACE. “Navigable Waters” are administratively defined as waters that have been used in the past, are now used, or are susceptible to use as a means to transport interstate or foreign commerce up to the head of navigation. Shallow draft navigation channels and turning basins are specified as those with a depth of less than 15 feet when measured at mean low water (MLW).[4] According to the Commonwealth of Virginia, "State Waters" means all water, on the surface and under the ground, wholly or partially within or bordering the Commonwealth or within its jurisdiction, including wetlands.[5]

Economic Justification for Need

Figures from the Virginia Marine Resources Commission (VMRC) from 2014 indicate that almost $1.5 million of commercial fisheries goods landed on the seaside of the Eastern Shore alone. The USACE determined that the annual value of water-based recreation on the seaside alone is $1,920,741.00 (USACE, 2011.a). This figure is perceived by local members of the ESRNWC as a significant underestimate of the value of recreation on the seaside and thus a misrepresentation of the impact of declining maintenance of the regional waterways (ESRNWC Chairman, personal communication, August 15, 2016). The total value of commercial landings for both Accomack and Northampton Counties from both the seaside and the bayside for 2014 was about $38 million (VMRC, 2016). This value does not include the value associated with recreational boating, support industries, e.g., tackle shops, marinas and boat repair and maintenance services, lodging, restaurants, ecotourism, and other tourism related activities that bring visitors to the Eastern Shore waterways. Data has indicated that the sale value indicated by VMRC is much lower than the actual economic value. For example, in 2013 Northampton County landed about $20 million in clams and oysters, but shellfish farms sold over $36.7 million (Murray, 2014).

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[3] Hein, C.J., Fitzsimons, G.G., FitzGerald, D.M., *Fallon, A.R., 2016, Records of migration and ebb-delta breaching at historic and ancient tidal inlets along a river-fed paraglacial barrier island, Journal of Coastal Research, SI 75, p. 228-232.
[4] USACE. March 1999. Coastal Engineering Technical Note I-63.
[5] Code of Virginia § 62.1-44.3 http://law.lis.virginia.gov/vacode/title62.1/chapter3.1/section62.1-44.3/.

In 2015, the farm gate value for Virginia shellfish aquaculture was $48.3 million (Virginia Shellfish Aquaculture Situation and Outlook Report, April 2016, VIMS), $32.3 million in hard clams and $16.0 million in oysters. The farm gate value of a cultivated product is the net value of the product when it leaves the farm, after marketing costs have been subtracted, and is lower than retail price, as it does not include costs for shipping, handling, storage, marketing, etc.

On the Eastern Shore in 2014, private sector quahog (clam) landings total value for both counties was over $25 million (about 4/5 of that originating in Northampton County). For quahogs, the public sector landing value is almost negligible, but not so for the public sector oyster landings in Accomack County, which were about half of the private landing value. The total public and private sector landing value for oysters was about $7.5 million for both counties Just as the region's aquaculture industry is booming, access to these water-access-only sites are becoming more challenging and dangerous.

Tourism has a significant impact on the Eastern Shore of Virginia economy. Visitors come to the Eastern Shore to fish, crab, boat our waterways and take advantage of the growing eco-tourism opportunities. While here, visitors require the services provided by our lodging, restaurant, marina, and tackle shop businesses, all generating revenues, taxes and employment to the Eastern Shore economy. The number of residents with tourism related jobs increased from 2,597 in 2011 to 2,910 in 2015, and revenues from tourism during that time increased by $37 million to over $261 million.

Funding and Maintenance

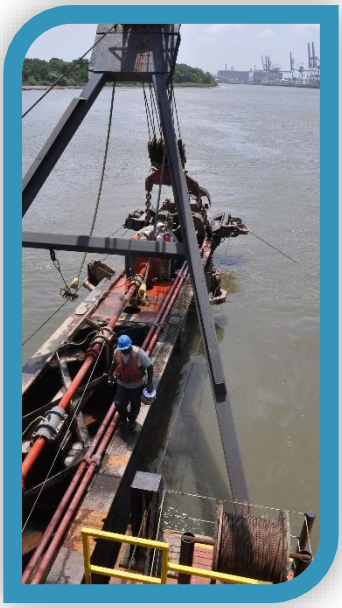
As a coastal peninsula, navigable waterways are vital to the economic viability of the Eastern Shore of Virginia. Thus, navigability has historically been an issue of concern. Residents and tourists are only able to explore and utilize the coastal resources and wildlife of the Atlantic and Bay ecosystems with adequate access to these waters. Natural processes commonly cause impacts to the coastal waters and the Eastern Shore. Of particular importance are the waters and water depths within and approaching facilities and infrastructure.

Public marinas, such as Wachapreague Town Marina, Willis Wharf County Marina, etc., have access to state funding with the Virginia Port Authorities (VPA) Aid to Local Ports Fund. Typically, these projects cost less than $100,000 and can often be accommodated by the VPA funding. Larger channel projects, however, often exceed $1 million in cost and thus, could not be funded by the VPA.

Federal funding for USACE shallow draft, low-use navigation projects has been in decline for decades, and has been more drastically reduced in the last ten years. Current budget metrics are not providing sufficient funding at levels to sustain maintenance dredging of the 32 Federal navigation dredging projects located on the Eastern Shore. More recently, Federal funding for the maintenance of federal harbors has changed to be prioritized based on the national economic benefits of the harbor related to commercial navigation (see **Appendix D**). Harbors that lack significant commercial navigation are not currently a high funding priority. Consequently, maintenance of recreational harbors and harbors with limited commercial traffic has been deferred indefinitely. In addition, there are many bayside and seaside channels with economic significance that are not designated as

federal channels, and thus alternate sources of funding for maintenance are required. An evaluation of current Commonwealth navigable waterway and ecosystem project funding mechanisms is necessary to determine the ability of the Commonwealth to implement needed non-federal waterway projects.

Within the Water Resources Development Act of 1974, Section 22, the USACE were granted general authority to cooperate with states to provide several services, on a cost-shared basis, including technical assistance to support preparation of comprehensive water resource plans.



USCG Aids to Navigation

Since 2013 the USACE and the United States Coast Guard (USCG) have been working together to determine the best way to make the Waterway on the Coast of Virginia (WCV)/Virginia Inside Passage (VIP) safer. Due to natural shoaling and shifting of aquatic sediment, some of the Aids to Navigation (AtoN) are no longer accurately marking safely navigable waterways. Due to the limitations of funding available for the maintenance of these channels, the USACE and USCG have determined that many of the AtoN will be systematically removed by 2019. Some of the permanent AtoN will also be replaced with buoys, so that they may be more easily moved to accurately mark the channel as it naturally shifts. **Figure 3** reveals which of the AtoNs will be kept (green), removed (red), and reevaluated in the future (orange).

Eleven of the fifteen federal WCV projects and seven of the twenty-seven non-federal waterway project areas are scheduled to have the AtoNs removed by the end of 2019.

Local Commitment to Maintenance

The ESRNWC was formed based upon previous years' efforts of the Eastern Shore Navigation Partnership, with the hope of developing a more comprehensive strategic plan for dredging. The goal is to have a waterway dredging project schedule for the next 5 to 10 years, rather than suggesting dredging projects on an annual, last-minute basis. With the development of a comprehensive strategic plan for waterway projects, funding needs can be forecasted and long-term planning accomplished for obtaining the necessary permits and development of plans to use the sediment obtained by the waterway dredging in a beneficial manner. The ultimate objective is to develop a multi-year, multi-project Eastern Shore Shallow Draft Navigation and Regional Sediment Management Plan.

II. Methodology

The purpose of this section is to explain the methodology utilized to determine which creeks were to be assessed as to their dredging needs and how that need was determined.

This report considers the condition of federal projects and state waterways, however, locally-owned marinas and dock areas are not included. Private marinas are responsible for funding their own maintenance.

Of the 87 creeks and waterways inventoried, see **Appendix A** for this list, a total of 59 project areas were identified for assessment. This includes all 32 of the federal projects, all 12 of the non-federal connecting waters for the WCV, and 15 non-federal waterways. The non-federal waterways were included based on their existing infrastructure, safety concerns (i.e., USCG access), and economic value. The WCV connecting waters were included as they have recent USACE surveys, their importance in accessing the federal projects on the seaside, and their necessity in the continuity of the WCV, also known as the Virginia Inside Passage (VIP). The next criteria for inclusion was the presence of USCG AtoN; however, several waterways with no AtoNs were included based on the presence of essential infrastructure and the value provided to commercial and recreational fishing and boating. **Appendix A** and **Appendix B** record these criteria for 43 of the inventoried non-federal waterways, exclusive of the 12 WCV connecting waters.

Figure 1, on the following page, supplies a visual representation of this decision making process. The last qualifying question asked for a waterway was if there was "sufficient infrastructure and use." This question was addressed using data from VMRC, the Virginia Department of Game and Inland Fisheries (VDGIF), the *2013 Eastern Shore of Virginia Transient and Working Waterfronts Inventory Needs Assessment*, and input from the ESRNWC members and additional stakeholders.

Tables 1, 2, and **4** are comprehensive in nature and supply the majority of data necessary for planning. **Table 1** provides information for the federally-designated channels, **Table 2** for the WCV (also federally-designated), and **Table 4** for non-federally designated channels (including WCV connecting waters). They are designed to be comparable and to serve as the core reference points for this assessment report.

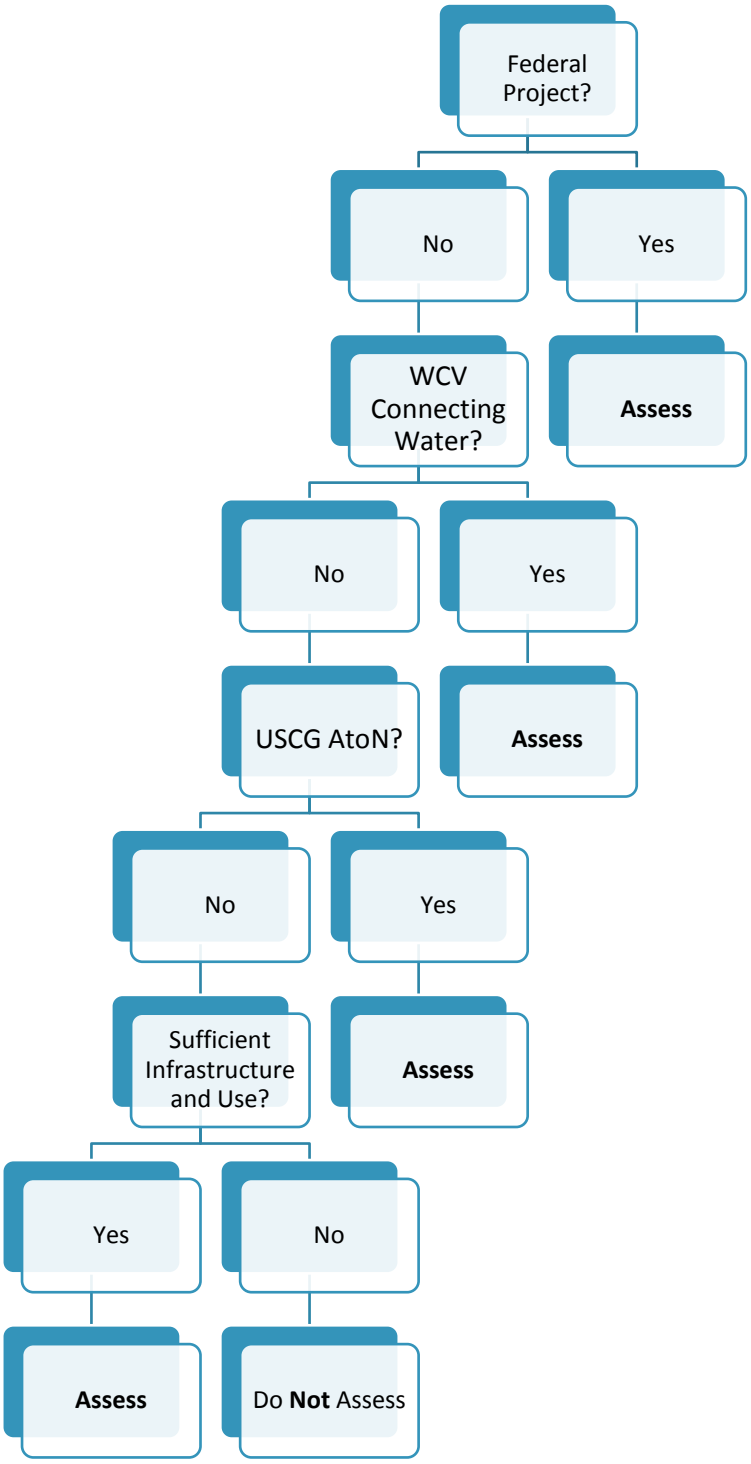


Figure 1: Waterway Assessment Inclusion Tree

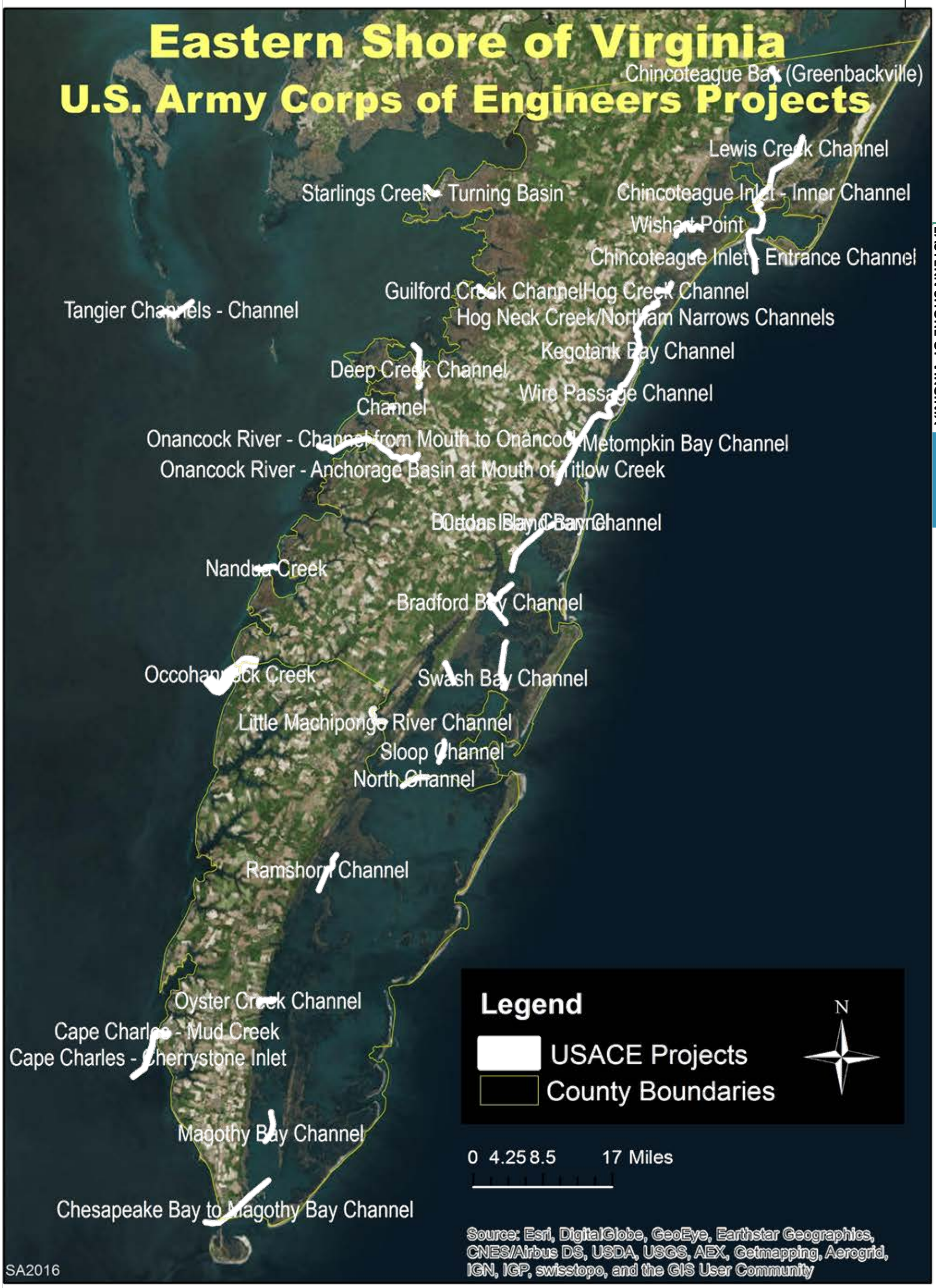


Figure 2: Federal Channel Project Area Map

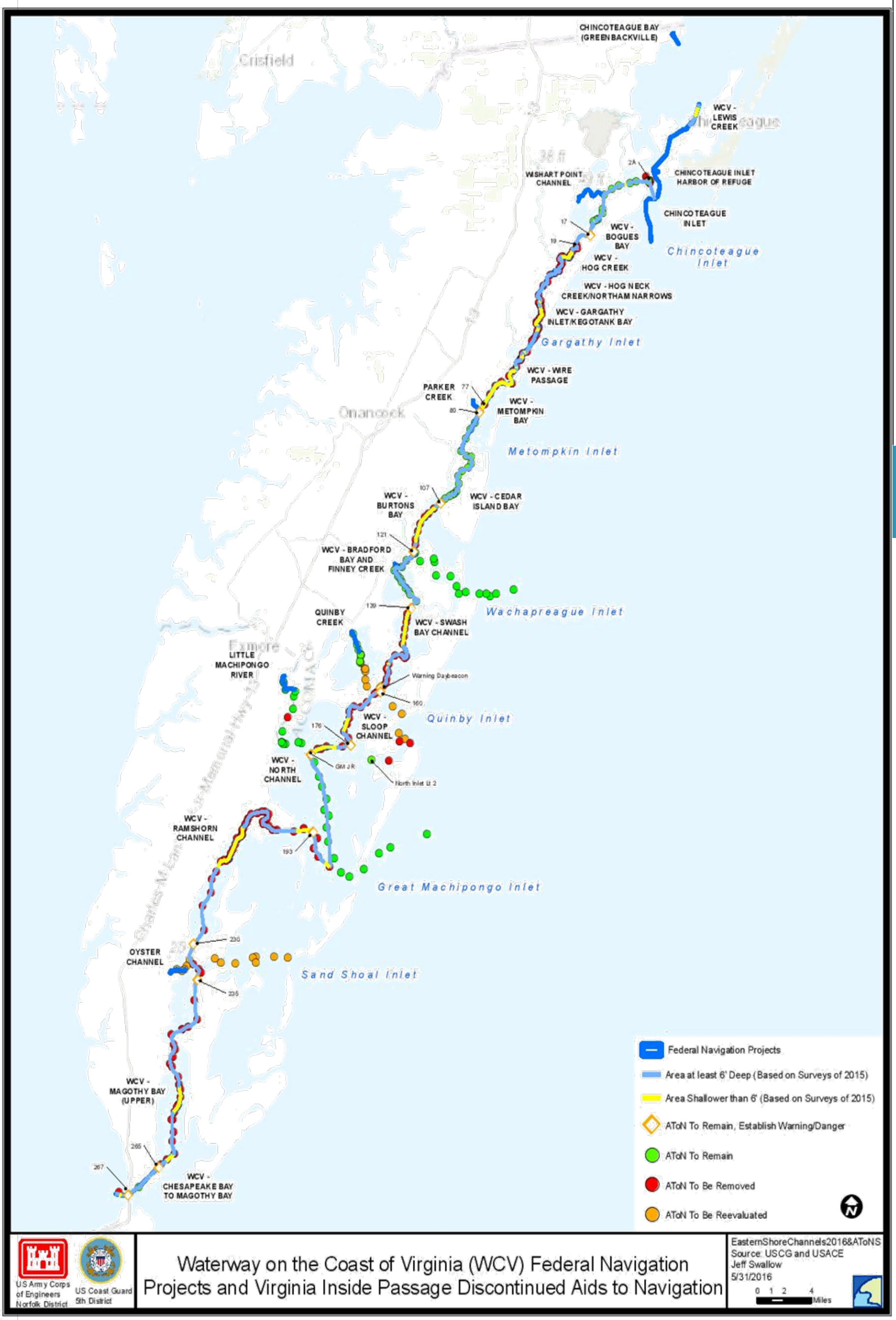


Figure 3: USCG AtoN Removal Plans Mapped

III. Results

The following sections summarize the findings of the Regional Dredging Needs Assessment and are organized by waterway maintenance responsibility:

- Federal Waterways
- Federal WCV
- Non-Federal Waterways

Federal Waterways

The summary table that follows (**Table 1**) contains data important to assessing the condition of the waterway and will be useful for supporting a dredging prioritization process. The last two columns provide the status of the project permits. These permits are required before any funded project can be serviced; however, they are not sought after until funding is confirmed. Therefore, the process of obtaining the relevant permits can often slow down progress towards project completion significantly. Historically, dredging projects were required to have active VMRC and Virginia Water Protection (VWP) (also known as DEQ-401) permits, with some also requiring Local Wetlands Board (LWB) permits, all of which can be applied through a Standard Joint Permit Application. Only two of the federal projects, Guilford Creek and Bogues Bay, require LWB Permits, which expired in 2000 and 2006 respectively. As of October 2015, the Virginia Department of Environmental Quality (VDEQ) does not require the USACE to obtain VWP permits to meet the section 401 water quality certification requirement for dredging projects. If a project's VDEQ permit is active, the project will continue to operate under the permit until its expiration. If a project's VDEQ permit is expired, the section 401 water quality requirement is to be met through the coordination of the Coastal Zone Management Act's (CZMA) Federal Consistency Determination (FCD).

Two-thirds of all federal channels have one or more of their required permits set to expire in the next year (by November of 2017). Projects for which the USACE has no permit data availablewere assumed to have no active permits. Of the 17 federal, non-WVC waterways, 12 are currently in need of permit work. Of the 15 federal WCV waterways, 9 are currently in need of permit work. None of the non-federal waterways had active permits at the time of the assessment.

The following descriptions include the USACE project name, authorization, project code, and status. The USACE project code was included, so that users of this report can easily find and request data concerning the federally designated waterways, but this code is primarily for access to data on the Electronic Survey Distribution System (ESDS) at http://gis.nao.usace.army.mil/ESDS, and often does not directly correlate to the project permits or other USACE project data. The first paragraphs consist of the USACE provided description and direct information from the United States Coast Pilot. The following paragraphs and tables provide historic dredging and economic value, primarily sourced from the *Eastern Shore of Virginia Seaside Commercial Use Assessment Report* of May, 2015 and from VMRC data. Projects are in alphabetical order within the section and all of the WCV are together in the unique section that follows.

Table 1: Federal Channel Summary Table (17 listed north to south, first seaside then bayside; 32 total, 15 WCV in the next section)

Project Name	Project Code	Last Year Dredged	Avg. Req. Dredging Cycle (years) *****	USACE Authorized Width (ft)	USACE Authorized Length (miles)	USACE Authorized Depth (ft)	USACE Survey Results (all depths in reference to MLW) [Survey Date]	Removal of USCG AtoN? Y/N/M/NA*	VMRC Permit Exp. Date**	VDEQ-401 VWP Permit Exp. Date/FCD **
Chincoteague Bay (Greenbackville)	CB_01_CBC	2013	6	60	0.8	5	Most < 6 ft, entrance < 5 ft [10/27/2014]	N	NR	May '17/ -
Chincoteague Inlet Harbor of Refuge	CH_01_CHR	2013	7	60	0.05	8	[4/8/2016] < 5 ft in places; < 3 ft near some slips FY16&17 funded	NA	NR	June '19/ -
Chincoteague Inlet - Outer Channel	CH_01_CHI	2009***	1	200	1.2	12	No part of channel < 9 ft [6/10/2015] FY16&17 funded	N	Feb '20	Jan '19/ -
Chincoteague Inner Channel	CH_01_CHI	2009***	1	100	6.4	9	No part of channel < 9 ft [6/10/2015]	N	Apr '17	June '19/ May '97
Wishart Point Channel	H-51-11-066	1971*** *	Unknow n	60	2.0	6	No Survey	NA	-	-

Project Name	Project Code	Last Year Dredged	Avg. Req. Dredging Cycle (years) *****	USACE Authorized Width (ft)	Length (miles)	Depth (ft)	USACE Survey Results (all depths in reference to MLW) [Survey Date]	Removal of USCG AtoN? Y/N/M/NA*	VMRC Permit Exp. Date**	VDEQ-401 VWP Permit Exp. Date/FCD **
Parker Creek	H_51_27_038	1998***	10	40	1.5	5	Many shoaled locations < 1 ft [11/2012]	NA	Dec '06	Dec '05/ -
Quinby Creek	QB_01_QBY	2016	3				All < 2 ft, much < 1 ft [8/6/2014] Dredging to be done in October, 2016	N	June '19	June '18/ -
Entrance Channel				80	1	8	-			
Creek Channel				60	0.1	8	-			
Turning Basin				200	0.1	8	-			
Little Machipongo River	LM_01_LMR	1988***	NA	80	1.5	8	All portions > 10ft [10/22/2014]	N	NR	Mar '95/ -
Oyster Channel	OY_01_OYS	2008***	4-6	80	0.8	6	Much of channel < 3 ft; center of harbor ≈ 5 ft [7/21/2016] {Much of channel < 4 ft; center of harbor < 6 ft [5/5/2015]}	M	NR	June '07/ Mar '79

Project Name	Project Code	Last Year Dredged	Avg. Req. Dredging Cycle (years) *****	USACE Authorized Width (ft)	Length (miles)	Depth (ft)	USACE Survey Results (all depths in reference to MLW) [Survey Date]	Removal of USCG AtoN? Y/N/M/NA*	VMRC Permit Exp. Date**	VDEQ-401 VWP Permit Exp. Date/FCD **
Starling Creek (Saxis)	SC_01_STC	2015	5				After dredge, all > 7 ft [8/18/2015]	N	Oct '19	NR/ Dec '87
Channel to Harbor of Refuge				60	0.5	7	-			
Entrance Channel				60	0.4	7	-			
Tangier Channels	TN_01_TNC	2014, 2018**	3-6				[5/21/2014] FY17 funded	N	Apr '17	Sept '22/ Aug '11
Channel to Sound				60	0.9	8	6 ft to 9 ft			
Entrance Channel				100	0.3	8	Narrow from Mailboat Harbor to Fishermen's Corner			
To Chesapeake Bay				60	0.7	7	Channel shifted, places down to ~ 6 ft			
Guilford Creek	GF_01_GFD	1997*** *	Increase				About half < 5 ft; all < 4 ft [4/11/2015]	N	Sept '99	Mar '05/ Dec '98

Project Name	Project Code	Last Year Dredged	Avg. Req. Dredging Cycle (years) *****	USACE Authorized Width (ft)	Length (miles)	Depth (ft)	USACE Survey Results (all depths in reference to MLW) [Survey Date]	Removal of USCG AtoN? Y/N/M/NA*	VMRC Permit Exp. Date**	VDEQ-401 VWP Permit Exp. Date/FCD **
Deep Creek	DC_01_DCA	1957****	Increase				[10/28/14]	N	-	-
Channel				75	2.5	7	Most of channel between 4 & 5 ft			
Turning Basin				200	0.1	7	Entire turning basin < 2 ft			
Chesconessex Creek	Inactive	1967****	Un-known				6ft in channel, 2ft near public launch (Navionics®; no USACE survey data)	N	-	-
Onancock Creek	ON_01_ONC	2010 & 2014	Un-known				Most > 12 ft [9/17/2014]	N	Nov '19	Jan '20/ Oct '09
Anchorage Basin at Mouth of Titlow Creek				4 acres	0	6	-			
Basin in North Branch				100-180	0	12	All > 8 ft			
Channel from Mouth to Onancock				100-200	5.9	12	-			

Project Name	Project Code	Last Year Dredged	Avg. Req. Dredging Cycle (years) *****	USACE Authorized Width (ft)	USACE Authorized Length (miles)	USACE Authorized Depth (ft)	USACE Survey Results (all depths in reference to MLW) [Survey Date]	Removal of USCG AtoN? Y/N/M/NA*	VMRC Permit Exp. Date**	VDEQ-401 VWP Permit Exp. Date/FCD **
Channel in Joynes Branch				100	0.1	6	Most about 5.5 ft			
Channel in North Branch				100	0.2	12	Some between 9 & 10 ft			
Turning Basin at Onancock				0.7 acres	0	12	-			
Nandua Creek	ND_01_NDC	2002	See Section	60	1.3	6	Most between 7 & 12 ft, few places about 6.5 ft [10/28/14]	N	Nov '07	June '08/ Jan '98
Occohannock Creek	Unknown	Un-known	Un-known	100	1.0	9	Majority of channel ≥5 ft, areas up to 26 ft (Navionics®); Although authorized to 9 ft deep and 100 ft wide, the original project was only dredged to 6 ft deep and 60 ft wide.	N	-	-

Project Name	Project Code	Last Year Dredged	Avg. Req. Dredging Cycle (years) *****	USACE Authorized Width (ft)	Length (miles)	Depth (ft)	USACE Survey Results (all depths in reference to MLW) [Survey Date]	Removal of USCG AtoN? Y/N/M/NA*	VMRC Permit Exp. Date**	VDEQ-401 VWP Permit Exp. Date/FCD **
Cape Charles City Harbor	CC_01_CCH	1987; 2015					After dredge, most > 18 ft [10/28/2015]	N	Oct '17	Jan '30/ Sep '14
Cherrystone Bar				500	2.8	18	This area about 11 ft			
City Harbor				400-1000	0.6	18	-			
Entrance to Harbor of Refuge				60	0.1	7	-			
Harbor of Refuge				200-250	0.1	7	-			
Mud Creek				100-180	0.1	10	-			

* NA means that there are currently no AtoNs.

** NR means not required. Wetlands Permits are only required for Guilford Creek and Bogues Bay. As of Oct. 2015, once the VDEQ-401 expires, it will not be required and the project will operate under the CZMA Federal Consistency Determination (FCD).

*** Data uncertainty.

**** Only recorded maintenance.

***** The average required dredging cycle is an observation from analyzing dredging data. The actual dredging requirements can vary depending upon weather events, construction and land use in adjacent areas, new infrastructure such as jetties, etc.

CAPE CHARLES CITY HARBOR

Deep > 14' CC_01_CCH ACTIVE

The Cherrystone Bar, Inlet Channel-and Harbor, and the Mud Creek Channel and Basin were authorized by the river and Harbor Act of September 19, 1890 and modified by the River and Harbor Acts of 1938, 1945 and the Water Resources Development Act (WRDA) of 1986. The harbor of refuge was approved by the Chief of Engineers under authority of Section 107 of the River and Harbor Act of July 14, 1960.

The USACE provided the following description. A channel 18 feet deep and 500 feet wide from the 18-foot contour in Chesapeake Bay, through Cherrystone Bar and Inlet, to the harbor entrance; basin in the harbor 18 feet deep, 1,000 feet to 400 feet wide and 3,000 feet long; a channel 10 feet deep and flaring from 100 feet to 180 feet wide and 260 feet long, to a basin 10 feet deep, 180 feet wide and 420 feet long at the head of Mud Creek; a harbor of refuge on the north side of Mud Creek 7 feet deep, 200 to 250 feet wide, and 375 feet long, connected to Mud Creek by an entrance channel 7 feet deep and 60 feet wide. All depths refer to mean low water.

In early 2015, the inner and outer harbor were dredged and the sand portion of the spoil was used to nourish the Town beach. The federal channel was dredged Labor Day weekend of 2016 and the sand portion of the spoil used to nourish the Town's public beach. The long-term intention is to add dunes on the northern end of the beach and perhaps be built higher from the sand fences (Cape Charles Code Official, personal communication, June 8, 2016).

Fiscal Year (Federal)	Cubic Yards Removed	Cost
Channel & Harbor		
1945	Unknown	Unknown
1966	62,463	Unknown
1967	336,95	Unknown
1987	479,608	Unknown
2016	596,589	Unknown
2017	Scheduled	Unknown
Mud Creek Basin		
1959	13,672	Unknown
1961	985	Unknown
1963	1,660*	Unknown
1964	1,830*	Unknown
1965	1,150*	Unknown
1967	3,553	Unknown
1987	9,540	Unknown
2015/16	Unknown	Unknown

Harbor of Refuge		
1967 (new work)	96,725	Unknown

*Pre-dredging quantity, after dredging estimate not completed.

CHESCONESSEX CREEK

Shallow ≤ 14' No Survey Data INACTIVE

The project was approved by the Chief of Engineers under authority of Section 107 of the River and Harbor Act of 14 July 1960. A channel 6 feet deep and 60 feet wide from the mouth of the creek 3.2 miles into Chesconessex Creek; an access channel 50 feet wide and 6 feet deep from that depth in Chesconessex Creek to a turning basin of the same depth, 50 feet wide and 150 feet long, opposite the public landing on the north shore of the creek; an access channel 50 feet wide and 6 feet deep from that depth in Chesconessex Creek to a turning basin of the same depth, 100 feet wide and 250 feet long opposite the public landing on the south shore.

There is no survey data for this project, as it is inactive.

There are two County-maintained public facilities on the creek including a boat ramp with parking at the end of Southside Rd. (Rt. 649) on the south side of the Creek and a truckable timber pier and crab shacks on the northern side of the Creek at the end of Rt. 656 that are active and provide commercial and recreational access to the Creek and the Chesapeake Bay. There are also VMRC leased oyster grounds near the public boat ramp and the mouth of the Creek.

Fiscal Year (Federal)	Cubic Yards Removed	Cost
1967 (new work)	31,075	Unknown

CHINCOTEAGUE BAY GREENBACKVILLE

Shallow ≤ 14' CB_01_CBC ACTIVE

The project was authorized by the River and Harbor Act of 26 August 1937. An approach channel 5 feet deep and 60 feet wide from that depth in Chincoteague Bay to an L-shaped harbor of the same depth, 60 feet wide and 1500 feet long at Greenbackville, Va. The total length is approximately 4200 feet. All depths refer to mean low water.

Historically, this area is dredged about every 6 years. In the past couple of decades, this area is dredged at the same time as the Chincoteague Harbor of Refuge, which is an efficient use of the dredge and fuel. The ESRNWC is actively seeking FY2017 or FY2018 funding to have the USACE dredge this project in the near future, hopefully prior to the May 2017 expiration of the DEQ-401-Permit, as there has not been an FCD completed for this waterway.

Fiscal Year (Federal)	Cubic Yards Removed	Cost
1961	31,730	Unknown
1967	22,722	Unknown
1973	42,230	Unknown
1983	23,076	$129,427.96
1991	8,000	$8,300.00
1997	Unknown	Unknown
2002	Unknown	Unknown
2006	11,422	$126,832.00
2009	Unknown	Unknown
2013	13,353	$234,864.51

CHINCOTEAGUE HARBOR OF REFUGE

Shallow ≤ 14' CH_01_CHR ACTIVE

The project was approved by the Chief of Engineers under authority of Section 107 of the River and Harbor Act of 1960. A channel 8 feet deep and 60 feet wide from "The Canal" to and including a basin of the same depth, 235 feet wide and 650 feet long. All depths refer to mean low water.

On average, this harbor has been dredged about every 6 years. As the cost of dredging is much lower with higher frequency, as this is the only harbor of refuge on the seaside of the Eastern Shore of Virginia, and as it is in such close proximity to several other recreationally, commercially, and economically-important dredge project areas, this area should be maintained at least every 6 years as it has been for the last two decades.

Fiscal Year (Federal)	Cubic Yards Removed	Cost
1962 (new work)	109,260	Unknown
1973	Unknown	Unknown
1985	27,505	$94,087.00
1991	10,700	$77,200.00
1997	Unknown	Unknown
2003	11,900	Unknown
2007	1,885	$58,770.00
2009	Unknown	Unknown
2013	5,558	$48,196.70

CHINCOTEAGUE INLET

Shallow ≤ 14' CH_01_CHI ACTIVE

The project was approved by the Chief of Engineers during 1972 under authority of Section 107 of the River and Harbor Act of 1960. A channel 12 feet deep and 150 feet wide across the Ocean Bar in the Atlantic Ocean to the mouth of the Inlet; thence, a channel 9 feet deep and 100 feet wide from the Inlet through the "Canal" and thence along Chincoteague Channel to a point approximately 2000 feet north of the State Highway bridge to Chincoteague; a distance of approximately 6.9 miles. All depths refer to mean low water.

Historically, this channel has been dredged annually since the original dredging in 1971. However, when the scheduled FY2016 work begins there will not have been a full dredge event since 2009. Although the USACE Dredge Currituck has dredged portions of the project to take down certain shoals over the last seven years (J. Swallow, USACE, personal communication, July 7, 2016), the upcoming maintenance is anticipated to remove more cubic yards than previous years and come at a higher cost.

Fiscal Year (Federal)	Cubic Yards Removed	Cost
1971 (new work)	40,500	Unknown
1973-1974	127,295	Unknown
1974	48,500	Unknown
1974	78,795	Unknown
1975	86,290	Unknown
1976	86,290	Unknown
1978	45,783	Unknown
1978	65,808	Unknown
1979-1980	111,393	Unknown
1980 (August)	54,855	Unknown
1980 (February)	93,880	Unknown
1981	111,758	Unknown
1982	118,450	$534,500.00
1983	100,390	$638,544.00
1984	186,084	$1,094,028.19
1985	182,216	$839,116.58
1987	266,957	Unknown
1988	121,184	$580,457.76
1990	123,037	Unknown
1991	99,000	$467,800.00
1992	80,000	$665,000.00
1992 (Inner)	45,000	$280,000.00
1993	148,000	$945,000.00
1994	123,300	$673,000.00
1995	120,800	$958,200.00
1996	Unknown	Unknown

Fiscal Year (Federal)	Cubic Yards Removed	Cost
1997	Unknown	Unknown
1998	73,000	$860,400.00
2002	72,592	$348,64.80
2003-2004	Unknown	592,500.00
2005	12,500	Unknown
2006	70,000	Unknown
2007	Unknown	Unknown
2008	63,800	Unknown
2009	Unknown	Unknown
2016	Scheduled	TBD

DEEP CREEK (ACCOMACK CO.)

Shallow ≤ 14' DC_01_DCA ACTIVE

The project was authorized by the River and Harbor Act of 3 September 1954. A channel 7 feet deep and 75 feet wide from that depth in Pocomoke Sound to and including a turning basin of the same depth, 200 feet wide and 300 feet long opposite the terminal facilities at the town of Deep Creek, a distance of approximately 2.4 miles. All depths refer to mean low water.

The survey results from the *2013 Transient and Working Waterfront Inventory Needs Assessment* (TWWINA) indicated that water depth at both the access channel and in the marina and boatyard slips is less than one foot at mean low water. According to the October 2015 USACE survey map, the northern part of the creek channel is sufficiently deep, but as one approaches the turning basin, the depth decreases, and at the basin is often below 2 feet at mean low water. This is a critical location on the bayside for fishing net repair (2013 TWWINA). USACE records indicate that since the original work almost 60 years ago, Deep Creek has not had any dredging maintenance. Due to the worsening conditions here, dredging should be considered in the near future.

Fiscal Year (Federal)	Cubic Yards Removed	Cost
1957 (new work)	138,207	Unknown

GUILFORD CREEK

Shallow ≤ 14' GF_01_GFD ACTIVE

The project was approved during 1997 by the Chief of Engineers under authority of Section 107 of the River and Harbor Act of 1960, as amended. A channel 6 feet deep and 60 feet wide over a length of about 1 mile, from Beasley Bay into Guilford Creek, including a turning basin 6 feet deep and 100 feet

square; a rock groin approximately 140 feet in length at the dredged material placement site at Guard Shore. All depths referred to mean low water.

The March 2016 USACE Survey map shows significant areas on the north side of the Guilford Creek channel, on both the north and south of the turning basin, and directly adjacent to the New Rd. docks, all with depths of less than 3 feet at mean low water.

Fiscal Year (Federal)	Cubic Yards Removed	Cost
1997	Unreported	Unknown

LITTLE MACHIPONGO RIVER

Shallow ≤ 14' LM_01_LMR ACTIVE

The project was authorized by the River and Harbor Act of 3 July 1930 and modified in 1989 under Section 107 of the River and Harbor Act of 1960. A channel 8 feet deep at mean low water and 80 feet wide from the town of Willis Wharf to deep water in the river below and a turning basin adjacent to the channel.

Willis Wharf, on the west bank of Parting Creek 1 mile above the junction with Machipongo River, is a hub for the shellfish and fishing industries. Willis Wharf is the location of both Cherrystone Aqua-Farms and H.M. Terry Company, which provide significant employment and are economically-important aquaculture companies. A County-owned boat ramp, kayak launch, and a marine railway capable of handling craft up to 60 feet are available. Additionally, the County owns a boat harbor on the west side of Parting Creek. The harbor offers about 41 slips for commercial fishing boats, about 30 of which are available for rent seasonally. The harbor has electricity, water and a launching ramp. This location is the only location on the seaside that has facilities that offer net repair. (2013 TWWINA, 2015 SCUAR)

According to USACE records, this area has not been maintained since 1988. In 2013, the TWWINA surveys indicated that at mean low water there was only a 3 foot water depth for portions of the access channel. The 2014 USACE survey maps reveal the area just south east of the public ramp and harbor has shoaled depths that restrict the safe passage of vessels through much of the tidal cycle. Due to the economic value of this area, it is important to make sure that safe and efficient access to the harbor and commercial working waterfront is maintained.

Fiscal Year (Federal)	Cubic Yards Removed	Cost
1948	16,108	Unknown
1972	20,728	Unknown
1987	38,087	$246,297.00
1988 (new work, basin)	36,650	$182,579.60

NANDUA CREEK

Shallow ≤ 14' ND_01_NDC ACTIVE

The project was authorized by the River and Harbor Act of 3 June 1896 and modified by the River and Harbor Act of 3 July 1930. A channel 100 feet wide and 9 feet deep at mean low water across the bar at the mouth of Nandua Creek. A traffic survey revealed that the maintenance of a 100-foot wide, 9-foot deep channel is not justified at this time. A 60-foot wide, 6-foot deep channel will be maintained until traffic indicates the need for a change.

The 1931 dredging was not necessary due to natural scour. Although the inlet to Nandua Creek hasn't been dredged since 2002, the channel maintains a depth of 7 feet or greater at mean low water according to the October 2014 USACE survey maps. There is one area on the northwest portion of the channel, west of Milbys Point and east of red marker number 6, where there is some shoaling beginning to move into the channel. It is possible that this could cause an issue, but the majority of the channel provided ample depth for small vessel navigation as of 2014.

There are commercial operations located on the creek and significant recreational use that are dependent on navigable access.

Fiscal Year (Federal)	Cubic Yards Removed	Cost
1998	21,000	$139,100.00
2002	21,281	$110,181.00

OCCOHANNOCK CREEK

Shallow ≤ 14' Not on ESDS ACTIVE

The project was authorized by the River and Harbor Act of 3 July 1930, and modified by the River and Harbor Act of 2 March 1945. A channel 9 feet deep and 100 feet wide from that depth in Chesapeake Bay upstream 1.0 mile. A traffic survey revealed that the maintenance of a 100-foot wide, 9-foot deep channel is not justified at this time. A 60-foot wide, 6-foot deep channel will be maintained until traffic indicates the need for a change. The USACE has no data available for this waterway.

Occohannock Creek flows into the Chesapeake Bay and is located 18 miles northward of Cape Charles Harbor. A fixed bridge 5.4 miles above the entrance is the head of navigation. The channel over the bar to the entrance of the creek has a Federal project depth of 9 feet and a width of 100 ft. Inside the creek, depths of about 5 feet can be carried to Morley Wharf on the south side 4 miles above the entrance, with lesser depths to the fixed bridge. The channel over the bar of Occohannock Creek is marked by lights and daybeacons, but it is narrow and tortuous, and difficult to navigate without local knowledge. The channel within the creek also is narrow, but the ends of the shoals are marked by daybeacons all the way to Morley Wharf. A public pier and boat ramp are at Morley Wharf. Gasoline, hull and engine

repairs, a 25-ton travel lift, and limited marine suppled are available at Davis Wharf, on the north side of the creek. (NOAA, BookletChart 12226)

There are many active VMRC oyster ground leases and a large public Baylor grounds area within the creek.

The 2013 TWWINA survey respondents indicated that there was at least 5 feet of water depth at mean low water both in the slips of Davis Wharf and in the access channel, indicating that shoaling is probably not an issue in Occohannock Creek. In 2013 there was a comment on the survey for the TWWINA pointing out that red Marker #3 needed to be moved since it was no longer at the channel, but this is outside of the creek.

Fiscal Year (Federal)	Cubic Yards Removed	Cost
1932	Unknown	Unknown
1942	Unknown	Unknown

ONANCOCK RIVER

Shallow ≤ 14' ON_01_ONC ACTIVE

The project was authorized by the River and Harbor Act of 3 March 1925 and modified by the River and Harbor Acts of 26 August 1937 and 2 March 1945. A channel 200 feet wide and 12 feet deep across Onancock Bar, thence a minimum width of 100 feet to a point roughly 1,200 feet above the mouth of the North Branch, widened at the upper end to form a turning basin 200 feet square. A turning basin of about 2.3 acres and 12 feet deep at Onancock. A channel 6 feet deep and 100 feet wide in the lower 500 feet of Joynes Branch and an anchor-age basin 6 feet deep and 3.9 acres in area at the mouth of Titlow Creek. All depths refer to mean low water.

Although the Onancock River, or Creek, has not had a full channel dredge completed by the USACE since 1963. The USACE Currituck dredged from July 23 to August 2010. After hurricane Sandy, the Dredge Murden returned for work on the Creek from April 25 to May 8, 2014. The depth in the channel is 12 feet or greater at mean low water according to the September 2014 USACE survey maps.

The waterway receives relatively heavy recreational and commercial use and also serves as a critical industrial access point for the transportation of gravel to the region.

Fiscal Year (Federal)	Cubic Yards Removed	Cost
1963	195,824	Unknown
2010	9,634 from channel, 15,738 total	Approx. $158,000
2014	Unknown	Unknown

OYSTER CHANNEL

Shallow ≤ 14' OY_01_OYS ACTIVE

The project was authorized by the River and Harbor Act of 2 March 1945 and modified by the River and Harbor Act of 3 September 1954. A channel 1.0 mile long, 6 feet deep at mean low water and 80 feet wide from deep water in Liscombes Channel to and including a turning basin of the same depth, 1,100 feet long and approximately 8 acres in area at Oyster, Virginia.

The USACE July 2016 Survey map shows that at mean low tide, there is about a 5-foot water depth in the harbor, and less than 3 feet of water depth in the access channel, which leads to Liscombes Channel. This is almost a foot less water depth in just over a year, as the May 2015 Survey map showed that at mean low tide, there was about a 6-foot water depth in the harbor, and at least 3 feet of water depth in the access channel. Although the Oyster Public Harbor doesn't offer transient boating facilities, it is one of only a few facilities available on the southern portion of the Shore, and 100 percent of the seasonal slips are occupied by commercial users to supply the various seafood processors in Oyster.

Fiscal Year (Federal)	Cubic Yards Removed	Cost
1948	Unknown	Unknown
1956	46,280	Unknown
1957	129,390	Unknown
1961	81,460	Unknown
1968	11,389	Unknown
1971	48,174	Unknown
1984	57,447	$264,042.00
1991	46,100	$341,800.00
1998	26,000	$120,700.00
2002	26,127	$93,127.00
2008	30,440	$168,382.80

PARKER CREEK

Shallow ≤ 14' H_51_27_038 ACTIVE

The project was approved by the Chief of Engineers under authority of Section 107 of the River and Harbor Act of 1960. A channel 5 feet deep and 40 feet wide from that depth in Metompkin Bay into Parker Creek, a distance of approximately one half mile. All depths refer to mean low water.

Prior to 1993, this creek was dredged with regularity, however, it has not been dredged since that time. According to the 2012 survey there are many spots with less than 3 feet of water at mean low water. Some places appear to have no water at mean low water. Parkers Creek Landing, a public concrete boat ramp with parking, is located at the end of Fox Grove Road (Rt. 666).

Fiscal Year (Federal)	Cubic Yards Removed	Cost
1964	45,125	Unknown
1974	52,602	Unknown
1986	50,805	Unknown
1991	29,000	$271,600.00
1993	31,000	$353,000.00
1998	Unknown	Unknown (Cottrell Contracting Corp.)
2005	Surveyed	Unknown
2012	Surveyed	Unknown

QUINBY CREEK

Shallow ≤ 14' QB_01_QBY ACTIVE

The project was authorized by the River and Harbor Act of 17 May 1950. A channel 8 feet deep and 80 feet wide from that depth in Upshur Bay to within approximately 600 feet of Quinby Landing, thence 60 feet wide to Quinby Landing, a total of 6,900 feet; and a mooring and turning basin at the head of the 60-foot channel and opposite the terminal landing, 8 feet deep, 200 feet wide and 400 feet long. All depths refer to mean low water.

The frequency with which this channel is being dredged has declined over the last 3 decades, unless there is some missing USACE data. Regular dredging is required to ensure safe entry to the harbor, which can accommodate 80 vessels, 60% of which are estimated to be commercial vessels (2013 TWWINA). The TWWINA surveys indicated that at mean low water there was only 3 feet water depth for portions of both the slips and the access channel. More recent discussions with users indicated that there was less than 1-foot water depth in portions of the access channel at low tide. The federal channel is scheduled for dredging in October of 2016.

Fiscal Year (Federal)	Cubic Yards Removed	Cost
1982	95,034	$191,367.00
1986	84,302	$253,532.50
1991	73,900	$311,600.00
1995	43,300	$268,500.00
2004	65,200	Unknown
2007	65,194	$236,631.56
2016	Scheduled	

STARLING CREEK

Shallow ≤ 14' SC_01_STC ACTIVE

The entrance channel and turning basin were authorized by the River and Harbor Act of 30 August 1935. The harbor of refuge was approved by the Chief of Engineers under authority of Section 107 of the River and Harbor Act of 14 July 1960. A channel 7 feet deep and 60 feet wide from that depth in Pocomoke Sound to the mouth of Starlings Creek; a turning basin of the same depth, 100 feet wide and approximately 1,100 feet long inside the entrance; and a channel 60 feet wide connecting the turning basin with a harbor of refuge, 7 feet deep, 200 feet wide, and 500 feet long. All depths referred to mean low water.

Since the Harbor of Refuge was dredged in 1965, Starling Creek has been maintained about every 5 years. There is a USACE data gap from 1979 to 1991, but based on the amount of spoil removed, it is thought that there was unrecorded dredging during this time.

The significant increase in the costs associated with dredging is easily recognized in the table below. In 1991 almost the same amount of spoil was removed, but the associated cost almost doubled.

Fiscal Year (Federal)	Cubic Yards Removed	Cost
1961	49,300	Unknown
1965 (new work, Harbor of Refuge)	93,432	Unknown
1966	57,584	Unknown
1970	72,288	Unknown
1974	73,894	Unknown
1979	74,520	Unknown
?	Unknown	Unknown
1991	78,300	$340,200.00
1996	Unknown	Unknown
2001	Unknown	Unknown
2005	-	-
2015 (Sandy)	82,500	$689,484.40

TANGIER CHANNELS

Shallow ≤ 14' TN_01_TNC ACTIVE

The channel was authorized by the River and Harbor Act of 2 March 1919 and modified by the P.W.A. Acts of 3 January 1934 and 30 August 1935 and River and Harbor Act of 2 March 1945. In 1964, under Section 107 of the River and Harbor Act of 14 July 1960, the project was modified to provide a channel from the basin through Tangier Creek westward to the Chesapeake Bay. A channel 8 feet deep, 100 feet

wide, and 1,300 feet long in Tangier Sound; thence 8 feet deep, 60 feet wide, and 4,800 feet long to an anchorage basin 400 feet square and 7 feet deep adjacent to the town of Tangier, Virginia. All depths referred to mean low water.

Historically the channels have been dredged every 2 to 3 years, however, the frequency has been declining. As the major means of transportation for goods, services, and residents is via water, it is imperative that the channels be dredged with sufficient frequency to provide safe and effective transportation regardless of the tide. According to the May 2014 USACE Survey maps, the majority of the channel system has a water depth of over 8 feet at mean low water.

The channels create an estimated $140,000 in benefits each year. Since construction in 1967, it has provided over $3 million in transportation savings, increased crab production, and provided access to a harbor of refuge. In addition, Tangier is a unique and historic geography, which was named to the Virginia Register of Historic Places in 2015 (USACE, http://www.nao.usace.army.mil/About/Projects/TangierNav/). Tangier was also one of only 4 locations surveyed in the region where facilities that provide hull and motor repairs exist (2013 TWWINA).

Fiscal Year (Federal)	Cubic Yards Removed	Cost
Channel to Tangier Sound		
1957	51,508	Unknown
1959	49,000	Unknown
1963	77,222	Unknown
1965-1966	99,920	Unknown
1969	91,920	Unknown
1972	92,170	Unknown
1974	122,789	Unknown
1977	117,146	Unknown
1980	71,898	$209,032.12
1982	79,041	$316,680.95 TOTAL
1985	Portion of 108,041	$469,099.82 TOTAL
1988	81,040 9,346 of this was Wachapreague Channel	$337,249.90 TOTAL $23,688.00 of this was Wachapreague Channel
1991	69,479	$394,000.00 TOTAL
2000	Unknown	Unknown
2005	49,800	Unknown
2018 (Sandy)	est. 55,000	est. $991,500.00 TOTAL

Channel to Chesapeake Bay		
1966 (new work)	99,920	Unknown
1969	12,235	Unknown
1977	31,491	Unknown
1982	19,000	$316,680.95 TOTAL
1985	Portion of 108,041	$469,099.82 TOTAL
1988	10,803	$337,249.90 TOTAL
1991	10,325	$394,000.00 TOTAL
2000	Unknown	Unknown
2006	24,900	Unknown
2009	49,768	$487,018.44
2010	24,904	$357,187.55
2015	56,353	$0.00 bid: $1,063,528.06
2018 (Sandy)	Scheduled est. 55,000	est. $991,500.00 TOTAL

WISHART POINT CHANNEL

Shallow ≤ 14' H-51-11-066 ACTIVE

The channel was authorized under Section 107 of the River and Harbor Act of 14 July 1960. The channel runs from the WCV at the Four Mouths through Ballast Narrows and across Powell's Bay to Wishart Point, approximately 2.0 miles in length.

This project area is not surveyed frequently. USACE Electronic Survey Distribution System (ESDS) data from 2006 is most current, but is inaccessible on the ESDS. Efforts to have the channel dredged from about 1995 to 2010 were unsuccessful. According to Navionics, there is a depth of 5 feet above MLW at and in the channel approaching Wishart Point. The ramp at Wisharts Point is not in a usable condition and the ownership of the property is in an indeterminate state. Funds to complete facility repairs were never granted from VMRC's Saltwater Recreational Fishing Development Fund, as the channel was never dredged to make the project viable.

Fiscal Year (Federal)	Cubic Yards Removed	Cost
1971 (new work)	13,101	Unknown

WATERWAY ON THE COAST OF VIRGINIA (WCV)

Shallow ≤ 14' All Shoals listed Below ACTIVE

The project was authorized during 1970 under Section 201 of the Flood Control Act of 1965. That portion of the project located within Virginia is a modification of a previous project designated: Waterway on the Coast of Virginia. The Waterway on the Coast of Virginia project was authorized by the River and Harbor Act of 25 June 1910 and modified by the River and Harbor Act of 2 March 1945.

DELAWARE BAY - CHESAPEAKE BAY WATERWAY, DE, MD, VA (VA PORTION) - A channel in Virginia 6 feet deep and 100 feet wide from the Maryland-Virginia line in Chincoteague Bay to Chesapeake Bay, being a portion of the 145 mile channel from Delaware Bay at Roosevelt Inlet, Delaware, to Chesapeake Bay, Virginia. All depths referred to mean low water. Construction of the previous project was completed in 1959 and provides a channel 6 feet deep and 60 feet wide from Chincoteague Bay to Chesapeake Bay, a distance of 87 miles.

Before 2000, the USACE did not maintain comprehensive records of which sections of the WCV were dredged, but rather that dredging for some portion of the WCV was funded. The data in **Table 2** therefore, may be incomplete or even inaccurate. The "Last Year Dredged" provided in **Table 2** was based on the information in **Table 3** and the frequency of dredging prior to 1994 from the 1994 VIMS Report. All information provided for dredging which occurred prior to 1978 are based on card catalog references from USACE Surveys that stated "After Dredging" in the description, and not actual dredging data. These card catalog references could be follow-up surveys to assess the continued success of the dredging project, rather than new dredging work, and so their accuracy is not confirmed. Almost all WCV project areas were surveyed in 2015 by USACE using Hurricane Sandy Disaster Funds. The data from the survey maps was used to provide the assessment for the WVC waterways as presented in the seventh column in **Table 2**.

With complete records indicating when these waterways were dredged, it is impossible to suggest a frequency with which maintenance should be completed.

Table 2: WCV Summary Table (15 total WCV projects, alphabetically-ordered)

Project Name	Project Code	Pre-1994 approximate dredging frequency *****	Last Year Dredged* ***	Width (ft)	Length (miles)	Depth (ft)	USACE Survey Results (all depths in reference to mean low water) [Survey Date]***	Removal of USCG AtoN? Y/N/M/NA*	VMRC Permit Exp. Date**	VDEQ-401 VWP Permit Exp. Date/FCD **
				USACE Authorized						
Bogues Bay	WC_10_BOG		2008?	60	0.5	6	Okay, ≤ 4 ft at the entrance to Cat Creek [6/10/2014]	N	NR	Jan '14/ Aug '03
Bradford Bay (BB) and Wachapreague Channel (WC)	WC_50_BFC	7 years	2013 WC & 2014 BB	60	5.5	6	Okay, no portion < 6 ft [5/15/2016]	N	Nov - 17	Jan '28/ -
Cedar Island Bay (northeast of Teagles Ditch)	WC_40_CIB			60	0.2	6	Channel has rounded and shifted south/southeast [5/22/2015] (Might be included in the Burtons Bay Permit.)	N	- no info	- no info
Chesapeake Bay to Magothy Bay (see also Holly Bluff Island permit #87-1656 exp. '90/'97)	WC_80_CBM	5 years		60-100	4.3	6	Multiple shoals: west side (≈ 3.5 ft), just east of NWR ramp (≈ 4 ft), most of Magothy Bay section (≈ 4 ft) [Jan/Feb 2015]	N	May '12	Oct '12 -
Gargathy Inlet	WC_25_GIK			60	1.5	6	**Poor**, channel shifted east at Gargathy Beach (≈ 2 ft), shoaled at north end of inlet to ≤ 0.5 ft [6/7/2015]	Y	Jan '09	Feb '14/ -

Project Name	Project Code	Pre-1994 approximate dredging frequency *****	Last Year Dredged* ***	Width (ft)	Length (miles)	Depth (ft)	USACE Survey Results (all depths in reference to mean low water) [Survey Date]***	Removal of USCG AtoN? Y/N/M/NA*	VMRC Permit Exp. Date**	VDEQ-401 VWP Permit Exp. Date/FCD **
Wire Passage (seems to be under Gargathy permits, more research by USACE needed)	WC_30_WIR			60	2.8	6	**Poor**, much of channel ≤ 3 ft, some exposed mud flats, closed completed at Metompkin Island [5/30/2014]	Y		
Kegotank Bay	WC_25_GIK	6 years		60	1.3	6	**Poor**, channel shifted east at Gargathy Beach (≈ 2 ft), shoaled at north end of inlet to ≤ 0.5 ft [6/7/2015]	Y	Mar 88	Mar '93/ -
Hog Creek	WC_15_HOG	8 years		60	1	6	**Poor**, almost entire channel ≤ 4 ft, some areas ≤ 2 ft [6/10/2014]	Y	Apr '02	Dec '09/ -
Northam Narrows (Hog Neck Creek)	WC_20_HNC	6 years				6	Okay, the channel has shifted in several spots in the northern half [6/9/2014]	Y	NR	Mar '93/ -
Lewis Creek	WC_05_LEW			60	1.3	6	Okay, but northern section often ≤ 6 ft [4/1/2015]	N	Oct '02	Aug '07/ -
Magothy Bay (Upper)	WC_75_MAG	4 years		60	1.7	6	**Poor**, much shoaled ≤ 4 ft, some ≤ 2.5 ft [6/29/2015]	Y	'12	Exp.
Metompkin Bay	WC_35_MET	6 years		60	5	6	**Poor**, entire channel north of Battle Point is ≤ 2 ft, in some places exposed mud flats, closed	Y	Apr '19	Aug '19/ May '85

Project Name	Project Code	Pre-1994 approximate dredging frequency *****	Last Year Dredged* ***	Width (ft)	Length (miles)	Depth (ft)	USACE Survey Results (all depths in reference to mean low water) [Survey Date]***	Removal of USCG AtoN? Y/N/M/NA*	VMRC Permit Exp. Date**	VDEQ-401 VWP Permit Exp. Date/FCD **
							completed at Metompkin Island [5/30/2014]			
North Channel	WC_65_NCH	4 years		60	1.5	6	**Poor**, entire channel ≤ 2 ft [3/25/2015]	Y	June '19	May '18/ -
Ramshorn Channel	WC_70_RHC			60	2.3	6	**Poor**, almost entirely ≤ 2 ft [2/11/2015]	Y	June '19	Sept '19/ Sept '96
Sloop Channel	WC_60_SLP	4 years		60	1.2	6	**Poor**, almost entirely ≤ 2 ft [5/13/2015]	Y	June '19	May '18/ -
Swash Bay Channel	WC_55_SWH	5 years	1997?	60	2.7	6	**Poor**, almost entirely ≤ 2 ft [4/23/2015]	Y	Aug '02	Sept '02/ -

* NA means that there are currently no AtoNs.

** NR means not required. Wetlands Permits are not required for any of the WCV projects. As of Oct. 2015, once the VDEQ-401 expires, it will not be required and the project will operate under the CZMA Federal Consistency Determination (FCD).

*** Based on the 2014-2015 USACE Survey Maps.

**** Data is incomplete from USACE, see WCV section for explanation.

***** Data from Table 1. In the 1996 VIMS WCV Report.[6]

[6] Priest, Walter I., et al., 1996. Beneficial Uses of Dredged Material from the Waterway on the Coast of Virginia. Special Report No. 330 in Applied Marine Science and Ocean Engineering VIMS.

Table 3: WCV Comprehensive Dredging List

Year	WCV Section (if reported)	Cubic Yards Removed	Cost USD
1900	Oyster Channel	After Dredging	Survey*
1932	Occohannock Creek	After Dredging	Survey*
1937	Starlings Creek	After Dredging	Survey*
1942	Occohannock Creek	After Dredging	Survey*
1943	Starlings Creek	After Dredging	Survey*
1948	Starlings Creek	After Dredging	Survey*
1954	Quinby Creek	After Dredging	Survey*
1955	Starlings Creek	After Dredging	Survey*
1956	Oyster Creek	After Dredging	Survey*
1956	Quinby Creek	After Dredging	Survey*
1957	Burtons Bay (North and South)	After Dredging	Survey*
1957	Metompkin Bay (South)	After Dredging	Survey*
1957	Bradford Bay	After Dredging	Survey*
1957	Sloop Channel	After Dredging	Survey*
1957	Oyster Channel	After Dredging	Survey*
1957	Metompkin Channel	After Dredging	Survey*
1957	North Channel	After Dredging	Survey*
1958	Chesapeake to Magothy	After Dredging	Survey*
1958	Bogues Bay (Hog Creek)	After Dredging	Survey*
1959	Bogues Bay (Hog Creek)	After Dredging	Survey*
1960	Quinby Creek	After Dredging	Survey*
1960	Chesapeake Bay to Magothy Bay	After Dredging	Survey*
1961	Starlings Creek	After Dredging	Survey*
1961	Oyster Channel	After Dredging	Survey*
1962	Chesapeake to Magothy Bay	After Dredging	Survey*
1962	Bradford Bay	After Dredging	Survey*
1962	Sloop Channel	After Dredging	Survey*
1962	Burtons Bay	After Dredging	Survey*
1962	Metompkin Channel	After Dredging	Survey*
1963	North Channel	After Dredging	Survey*
1963	Onancock River	After Dredging	Survey*
1963	Quinby Creek	After Dredging	Survey*
1964	Chesapeake to Magothy Bay	After Dredging	Survey*
1965	Starlings Creek	After Dredging	Survey*
1966	Starlings Creek	After Dredging	Survey*
1966	Chesapeake to Magothy Bay	After Dredging	Survey*
1966	Bradford Bay	After Dredging	Survey*
1966	Metompkin Bay	After Dredging	Survey*

Year	WCV Section (if reported)	Cubic Yards Removed	Cost USD
1967	North Channel	After Dredging	Survey*
1967	Sloop Channel	After Dredging	Survey*
1967	Burtons Bay	After Dredging	Survey*
1967	Chesapeake to Magothy Bay	After Dredging	Survey*
1968	Quinby Creek	After Dredging	Survey*
1969	Chesapeake to Magothy Bay	After Dredging	Survey*
1969	Burtons Bay (South)	After Dredging	Survey*
1970	Starlings Creek	After Dredging	Survey*
1970	Chesapeake to Magothy Bay	After Dredging	Survey*
1971	Oyster Channel	After Dredging	Survey*
1972	North Channel	After Dredging	Survey*
1972	Chesapeake to Magothy Bay	After Dredging	Survey*
1973	Metompkin Bay	After Dredging	Survey*
1973	Quinby Creek	After Dredging	Survey*
1973	Burtons Bay (North and South)	After Dredging	Survey*
1974	Sloop Channel	After Dredging	Survey*
1974	Starlings Creek	After Dredging	Survey*
1975	North Channel	After Dredging	Survey*
1976	Chesapeake to Magothy Bay	After Dredging	Survey*
1977	Quinby Creek	After Dredging	Survey*
1977	Bradford Bay	After Dredging	Survey*
1977	Chesapeake to Magothy Bay	After Dredging	Survey*
1977	Burtons Bay	After Dredging	Survey*
1978	Bogues Bay WC_10_BOG	20,189	Unknown
1982	Unspecified	709,303	1,137,563.41
1983	Unspecified	639,968	90,922.65
1986	Metompkin Bay/Parker Creek	476,172	$605,56.06
1986	Unspecified	391,791	593,708.00
1987	Unspecified	197,818	337,409.61
1988	Bradford Bay & Finney Creek WC_50_BFC	8,555	Unknown
1988	Unspecified	98,860	345,579.22
1989	Unspecified	391,369	727,364.44
1990	Unspecified	160,300	527,122.60
1991	Unspecified	190,900	1,113,500.00
1991	Unspecified	40,000	2,300.00
1992	Lewis Creek	35,000	605,000.00
1992	TOTAL?	175,000	979,000.00
1993	Unspecified	220,000	1,341,000.00
1994	Unspecified	115,900	1,231,600.00

Year	WCV Section (if reported)	Cubic Yards Removed	Cost USD
1995	Unspecified	145,600	955,900.00
1996	Gargathy	Unknown	Unknown
1997	Swash Bay & *unknown*	Unknown	Unknown
1998	Chincoteague & *unknown*	156,000	$995,000.00
2000	Unspecified	Unknown	Unknown
2001	Unspecified	Unknown	Unknown
2002	North, Sloop & Burton Bay	216,870	$537,903.50
2003	WCV-IDIQ, Start in FY 2004	111,400	Unknown
2004	Bogues Bay	4,000	Unknown
2007	Unspecified	175,002	792,789.07
2008	Bogues Bay	1,500	190,982.50
2009	Magothy	Unknown	Unknown
2009	WW on the Coast of VA IDIQ	81,033	$331,048.21
2013	Wachapreague Channel	29,107	773,765.41
2014	Bradford Bay	est. 82,000	est. $1,122,500.00

*USACE records are incomplete, this is when 'after dredging' surveys were completed, which may indicate that dredging was done just prior to this date.

Non-Federal Channels, Creeks, and Waterways of Concern

The following descriptions include those waterways which were not designated as federal projects and thus must be funded using state, local, or alternative funding for completion. **Appendix B** supplies a list of all 41 non-federal channels, excluding the 12 WCV connecting waterways, considered using the decision-making process identified in **Figure 1**.

The Chincoteague USCG Base and Kings Creek have previously been dredged by the USACE and were done as "work for others". There are additional projects that the USACE may have been contracted to complete; however, records are lacking. The following paragraphs and tables provide historic dredging and economic value, primarily sourced from the *Eastern Shore of Virginia Seaside Commercial Use Assessment Report*, personal communications, and from VMRC data, but due to gaps in historic data, some may be inaccurate or incomplete.

All of the descriptions for the state waters following **Table 5** have information from the United States Coast Pilot online resource hosted by NOAA, some have additional information supplied by members of the ESRNWC and local residents and stakeholders.

Because the non-federal channels are not eligible for federal funding, they are not required to have a FCD. However, they are required to have the VMRC permit with an approved dredge spoil placement site.

Table 4: Non-Federal Channel Summary Table (27, alphabetically ordered)

State Waterway Project Key	Name	Last Year Dredged	Water Depth (ft) (at MLW) *		Total Length (Approx. in miles)	Local Assessment / USACE Survey Results (for WCV projects)	Removal of USCG AtoN? Y/N/M/NA
			Min	Max			
SW01	Chincoteague USCG Station	2011		5.5		Needs dredging	NA
SW02	Eastern End of Federal Channel to Quinby Inlet	Never	6	49	4.8	Deep water	M
SW03	End of Oyster Channel to Sand Shoal Inlet	Never	12	64	7.5	Deep water	M

State Waterway Project Key	Name	Last Year Dredged	Water Depth (ft) (at MLW) *		Total Length (Approx. in miles)	Local Assessment / USACE Survey Results (for WCV projects)	Removal of USCG AtoN? Y/N/M/NA
SW04	Folly Creek-WCV project area (SW23)	Never			1.2	Deep water	NA
SW05	Gargathy Creek	Never			3.0	Deep water at least from Gargatha Landing to Inlet	NA
SW06	Great Machipongo Inlet & Channel	Never	15	66	12.7	Deep water, some shoaling near the ocean Inlet	N
SW07	Hungars Creek	Never	4	8	3.0	Good water in channel, shoals past Masden Gut	N
SW08	Hunting Creek	Never	1	9	1.3	Entering the Creek from Bagwell, the water shallows quickly to ≤ 4 ft	N
SW09	Kings Creek	2004	3	7	0.7	Narrow entrance channel,	N
SW10	Metompkin Inlet & Metompkin Inlet to WCV project area (SW23)	Never			1.3	Deep water	NA
SW11	Nassawadox Creek (& Church & Warehouse Creek)	2008 (300,000y^3)	1	2	0.1	Entrance to channel from Bay unmarked and in need of removal of hazards to navigation.	NA (removed previously)
SW12	Pungoteague Creek	Never	7	15	2.2	Good water in channel, shoals in the Bay near entrance to Creek	N
SW13	Red Bank Creek to Hog Island Bay	Never	1	6	2.3	Shallow, but nice ramp facility	Y
SW14	Wachapreague Channel (Finney Creek, in front of the Town & working waterfront)		7	11	2.0	Majority of channel deep water	NA

State Waterway Project Key	Name	Last Year Dredged	Water Depth (ft) (at MLW) *		Total Length (Approx. in miles)	Local Assessment / USACE Survey Results (for WCV projects)	Removal of USCG AtoN? Y/N/M/NA
SW15	Wachapreague Inlet to Day Marker 122	Never	15	40	4.0	Majority of channel deep water, but many areas of shoaling	N
SW16 (WC_12_B2H)	WCV - Bogues Bay To Hog Creek Connecting Waters	Never	6	15	2.3	Deep water, but 2 short areas ≤ 7 ft in southern section [7/1/2014]	Y
SW17 (WC_52_B2S)	WCV - Bradford Bay Channel To Swash Bay Channel Connecting Waters	Never	4	10	1.4	Shoals out as enters Swash Bay to ≤ 4 ft [5/15/2015]	N
SW18 (WC_48_B2B)	WCV - Burtons Bay Channel To Bradford Bay Channel Connecting Waters	Never	2	10	0.8	Narrow, shoaled out as enters Burtons Bay (≤ 3 ft) [5/51/2015]	Y
SW19 (WC_42_C2B)	WCV - Cedar Island Bay Channel To Burtons Bay Channel Connecting Waters (Teagles Ditch)	Never	6	10	0.5	Good (≥ 7 ft, most at ≤ 10 ft) [5/22/2015]	N
SW20 (WC_77_C2M)	WCV - Chesapeake Bay/Magothy Bay To Upper Magothy Bay Connecting Waters	Never	1	10	2.3	Majority of eastern side of channel shoaled to less than 2 ft, but channel could have shifted and there still be ample depth [3/7/2015]	Y
SW21 (WC_07_C2B)	WCV - Chincoteague Inlet To Bogues Bay Connecting Waters	Never	4	10	5.0	Okay, some shoaling east of Walker Point (≈ 3 ft) and east of Hammock Point (≈ 4 ft) [6/7/2015]	N
SW22 (WC_17_H2H)	WCV - Hog Neck Creek To Hog Creek Connecting Waters	Never	4	15	0.7	Most ≥ 6 ft, except small section at south end (approaching Northam	Y

State Waterway Project Key	Name	Last Year Dredged	Water Depth (ft) (at MLW) *		Total Length (Approx. in miles)	Local Assessment / USACE Survey Results (for WCV projects)	Removal of USCG AtoN? Y/N/M/NA
						Narrows), but very narrow [6/9/2014]	
SW23 (WC_38_M2C)	WCV - Metompkin Bay Channel To Cedar Island Bay Channel Connecting Waters	Never	4	10	3.0	Okay [6/1/2015]	N
SW24 (WC_68_R2N)	WCV - North Channel To Ramshorn Channel Connecting Waters	Never	2	11	12.75	Northern section in Hog Bay okay, but shoaled to ≤ 3 ft in Outlet Bay leading to Point Creek in 'The Ramshorn', which is also silted in to depths of ≤ 4 ft [3/19/2015]	Y-Hog Bay N-E to W to Ramshorn
SW25 (WC_62_S2N)	WCV - Sloop Channel To North Channel Connecting Waters	Never	2	11	1.8	Okay, but shoals out as enters Hog Island Bay [5/4/2015]	Y
SW26 (WC_58_S2S)	WCV - Swash Bay Channel To Sloop Channel Connecting Waters	Never	0	10	5.5	**Poor**, almost entirely ≤ 3 ft [5/5/2015]	Y
SW27 (WC_72_M2R)	WCV - Upper Magothy Bay To Ramshorn Connecting Waters (≈ 13 miles)	Never	0.5	12	15	Almost 15 mile stretch, all suitable depth, except the northern portion (≈ 4 miles) in Ramshorn Bay. [3/8/2015]	Y

*Min/Max depth for non-WCV waterways was derived from Navionics maps. If this data is not provided, then the Navionics maps were deemed unreliable and no local knowledge was obtained.

CHINCOTEAGUE UNITED STATES COAST GUARD BASE

In 2007, this was a USACE "work for others" project and 10,500 cubic yards were removed.

Just over 10,000 cubic yards were removed at a cost of $317,006.00 in 2011.

Fiscal Year (Federal)	Cubic Yards Remove	Cost
2007 "work for others"	10,500	Unknown
2011 "work for others"	10,347	$317,006.00

FOLLY CREEK TO METOMPKIN INLET

On the seaside, this creek leads westward from the south end of Metompkin Bay and has a depth of 1 foot to the landing at its head, 3 miles above the mouth. A County launching ramp and a pier are on the south side of Folly Creek about 1 mile west of Light 87. Metompkin Inlet, the ocean entrance between Metompkin and Cedar Islands, is used by some small local fishing and oyster boats. The changeable entrance channel is unmarked and should not be entered without local knowledge (Coast Pilot).

This project area coincides with another state waterway project area, WCV - Metompkin Bay Channel to Cedar Island Bay Channel Connecting Waters. There are only AtoNs on the small segment that is part of this project area. Therefore, the Folly Creek to Metompkin Inlet project area includes the 1.3 miles from the Folly Creek Road County boat ramp facility to the junction with the WCV, and picks up an additional 1.2 miles from where the WCV turns south, northeast to Metompkin Inlet.

KINGS CREEK

About 1 mile northward of Cape Charles Harbor and eastward of Sandy Island, this Northampton County bayside creek has depths of 3.5 feet for 1 mile upstream. The shoal that extends out from the north side of the entrance bares at low water; a light marks the entrance. The creek is used extensively by fishermen and pleasure craft. Gasoline, diesel fuel, berths, and marine supplies are available at a marina just inside the entrance.

Sandy Island, former site of a factory, and which has now almost completely eroded away, is potentially a good spoil site (N 37º 17' 01" ; W76º 01' 29") (Granville Hogg, ESRNWC Member, personal communications, September 3, 2016).

Private funds enabled this waterway to be dredged in 2004, as did a permit from VMRC.

METOMPKIN INLET

On the seaside, this inlet is the ocean entrance between Metompkin Island and Cedar Island. The inlet is used by some small local fishing and oyster boats. The changeable entrance channel is unmarked and should not be entered without local knowledge.

GARGATHY CREEK

From Kegotank Landing (County, public) on the northern bank at the end of Kegotank Road (Rt. 681 near Modest Town), to Gargatha Landing (County, public) on the southern bank, the creek depth is unknown, but smaller recreational boats use the waterway regularly. From Gargathy Landing, there is deep water to Gargatha Inlet. The Inlet itself, was one navigated as part of the WCV, however, the constantly changing and shifting shoals of the inlet and the increasing breadth of the inlet, make it challenging to navigate safely to the Atlantic, but is used to navigate to Kegotank Bay to the north. Gargathy Creek provides access to the aquaculture beds in Gargathy Bay, fishing opportunities in the guts and bays, as well as access to Wire Passage which once connected to Metompkin Bay, but has now closed in due to the western migration of the island sands.

GREAT MACHIPONGO INLET AND CHANNEL

Great Machipongo Inlet leads between Hog Island and Cobb Island to Great Machipongo Channel. Shoals on either side of the entrance are marked by breakers at all times; the bar breaks only in heavy weather. The inlet is marked by buoys that are shifted in position with changing channel conditions (Coast Pilot).

Great Machipongo Channel extends northwestward through Hog Island Bay from the inlet to the mainland where it continues as Machipongo River. Willis Wharf on the west bank of Parting Creek 1 mile above the junction with Machipongo River, is a base for shellfish and fishing boats. A public launching ramp is available and a marine railway can handle craft up to 60 feet (Coast Pilot).

A County-owned boat harbor is just below Willis Wharf on the west side of Parting Creek. An area with about 41 slips available for commercial fishing boats. The harbor has electricity, water and a launching ramp (Coast Pilot).

USCG AtoNs mark this entire length and beyond into the Atlantic. These are not scheduled for removal.

HUNGARS CREEK

Hungars Creek and Mattawoman Creek have a common outlet to the Bay 8 miles northward of Cape Charles Harbor. Hungars Creek is marked by lights, daybeacons, and bush stakes, and Mattawoman Creek by bush stakes. Both creeks are difficult to follow without local knowledge (Coast Pilot).

Hungars Creek extends about 4 miles in a northeasterly direction to Bridgetown**.** Depths of 3 feet are available in the narrow entrance channel, marked by lights, thence decreasing to 1 foot to Bridgetown (Coast Pilot).

Mattawoman Creek extends about 2 miles in a southeasterly direction and has several branches at its head. The best approach is to follow the lights at the entrance of Hungars Creek to the light off Wilsonia Neck**,** then follow the bush stakes southeastward and southward along the shore. The controlling depth is about a foot to the head of navigation (Coast Pilot).

Although there are no public access facilities on Hungars Creek, the access channel is important to access the extensive aquaculture ground leases in the creek. According to the ESRNWC Chairman, this creek is one of the top three creeks in importance to aquaculture.

HUNTING CREEK

Another tributary channel, 3.5 miles northeastward of Pocomoke Sound Light 6, leads to Hunting Creek along the south side of Guilford Flats and southward through The Thorofare to the wharf at Hopkins on the east side of Hunting Creek. The marked channel has depths of 7 feet or more to within 0.7 mile of Hopkins, thence 2.5 feet to the wharf and Hunting Creek Pier (Coast Pilot). This data may be a bit dated, as satellite imagery and Navionics reveal shallow waters no deeper than four feet from day marker "9" up the creek. The Hunting Creek Pier is 440 feet in length. Hunting Creek also has a County pier for crabbing and fishing and a concrete boat ramp at Johnson Landing.

NASSAWADOX CREEK (and Church and Warehouse Creeks)

Past the mouth of the creek, the channel to Bayford typically has greater than 3 feet of water at low tide. Primary attention to maintenance needs to be at the mouth of the creek, thus the short length of maintenance, 0.1 miles, or approximately 500 feet. Additional spot dredging in the channel may be necessary when operations commence to complete maintenance.

The condition of the creek as entered from the Bay, as of 2016, is considered hazardous. The AtoNs have been removed and replaced with danger signs. Two steel pilings have rusted and fallen over, creating a hazard submerged just below the water line at low tide. The northern channel section entering the Bay has about a 100 feet section of 3.5 feet depth at low tide (as of August 28, 2016). Inside the 100- feet length of 3.5 feet depth, there is between 5 and 10 feet channel depth to Warehouse Creek. There is also a southern channel which is partially marked by PVC pipes along shellfish lease areas and has a minimum depth of 4 to 6 feet. Aerial photographs of the Bay entrances at low tide, as pictured in **Figure 4**, are available from Friends of Nassawadox Creek several times a year.

A *Dredge Project Plan* by USACE was active from 2003 to 2007 at a cost of $500,000 and included the completion of a survey. The projected costs associated with the dredging escalated when USACE engineers increased the project scope from the locally requested 500 feet to approximately 9,000 feet length. The plan included sourcing funding from waterfront residents, who protested when USACE made it clear that their project was to support commercial activities and was not designed for recreational boating support. The project ultimately folded.

Figure 4: 2016 Aerial Image of the Mouth of Nassawadox Creek. Photo coutesy of Friends of Nassawadox Creek

Smaller-scale dredging was accomplished in 2008 with a permit from VMRC (#2005-4-92) for the organization, Friends of Nassawadox Creek. About a dozen volunteer Nassawadox Creek recreational boaters removed approximately 300 cubic yards at a total cost of $13,500. The funding was donated by community residents and included a Piranha P-135E dredge system (20-30 cubic yards per hour) and a J1450 Carolina Skiff platform. That equipment is still operational and could be used if necessary and volunteers could be organized and a new permit acquired.

FY	Cubic Yards Removed	Cost
2004 privately funded and implemented	300	$13,500

As of 2016, VMRC has granted many shellfish ground leases that include several of the main boating channels on all three creeks including the eight-foot-deep channel about 900 feet upstream of Bayford. There is a publically available tool from VMRC, the Chesapeake Bay Online Map, accessible online. Church Creek has shellfish leases from shore to shore in places without regard for the boating channel; however, the plat plan can and usually does take these issues into account. Warehouse Creek follows the same pattern from the beginning of the shellfish condemnation line. Warehouse Creek is the outflow from the Riverside Memorial Hospital Waste Water Treatment Plant. Shellfish from this area must be transported (currently to Occohannock Creek) to a different water body for cleansing to allow commercial sale.

The only commercial support facility on Nassawadox Creek is located at Bayford and offers a dock, fuel, concrete ramp (in need of maintenance), and a sandy launch. In addition, there is a shed that has sorting tables and is used during soft shell crab harvest by two operators. On all three creeks, there are a total of six crabbing personnel including helpers. Shellfish leases now cover large areas, and there are about 25-30 personnel that are actively engaged in commercial harvesting in this area.

PUNGOTEAGUE CREEK

Three miles northeastward of Nandua Creek, this bayside creek has depths of 8 feet to the pier at Harborton, 2 miles above the mouth, and thence 4 feet to the ruins of Boggs Wharf, 3 miles above the mouth. Above this point the creek shoals rapidly. The entrance and inside channel are marked as far as Harborton. For years, barges loaded pulpwood at Harborton for delivery to West Point on the York River, but this hasn't been occurring for almost two decades. Barges carrying trash from Tangier Island still operate at the facility. The County facilities at Harborton include both a drive on and launch facilities and offers ample parking, restrooms and trash cans.

This waterway offers a lot of oyster aquaculture, and is highly used by both commercial watermen and recreational boaters. In addition to the public and private facilities at Harborton, the Eastern Shore Yacht and Country Club is located on the Creek as is the Sandpiper Marine and Campground.

RED BANK CREEK

The VDGIF dual boat ramp provides access to extensive public Baylor grounds and oyster ground leases in both Hog Island and Outlet Bays and beyond to USCG AtoN marked channel to the Great Machipongo Channel to the Atlantic Ocean. This is the only public boat ramp on the seaside for about 20 miles between Willis Wharf and Oyster Harbor.

There is shoaling as the creek enters Hog Island Bay and the guts that lead through Fowling Point and Castle Ridge to Ramshorn Bay are extremely narrow and do not provide adequate water depth for many vessels.

QUINBY – EASTERN END OF FEDERAL CHANNEL TO QUINBY INLET

A channel to the seaside village, marked by lights, follows Sandy Island Channel to Upshur Bay, thence through a slough in the mudflats to a dredged channel leading to a basin that has a public County landing and harbor with a pump-out station available with a wide concrete boat ramp with rental slips and parking. A no-wake speed limit is enforced. Quinby Inlet, the ocean entrance between Parramore/Revell Islands and Hog Island, has a fan of breakers across the bar at the entrance. The buoys marking the inlet are frequently shifted and not charted. The inlet should not be used without local knowledge (Coast Pilot).

The USCG AtoNs in the federally-designated Quinby project areas are not scheduled to be removed, however, those marking this state waterway are scheduled to be reevaluated at a later date, after the 2016 federal channel dredging, to determine if they should remain or be removed.

WACHAPREAGUE CHANNEL AND DAY MARKER 122 TO WACHAPREAGUE INLET

”The Little City by the Sea” is on the mainland about 4 miles west-northwest of Wachapreague Inlet. It serves as an important oystering and fishing center and is a base for recreational, commercial and charter fishing boats. Gasoline, diesel fuel, berths, and some marine supplies can be obtained. Hull and engine repairs can be made; largest marine railway, 50 feet. Although the channel between the WCV and along the Town’s working waterfront is considered a state waterway, it rarely needs maintenance, as it has historically and is currently a naturally deep channel.

A depth of about 4 feet can be carried from Wachapreague Inlet through Hummock Channel and Wachapreague Channel, marked by lights, to the wharves and marinas at the town. Wachapreague Inlet, between Cedar Island and Parramore Island, is 20 miles south-southwestward of Chincoteague Inlet. The entrance is marked by a lighted bell buoy and unlighted buoys that are shifted in position with changing channel conditions. The controlling depth is about 5 feet through the inlet, which is used by many fishing boats and by some boats seeking shelter, but should be entered only with local knowledge. There are many areas of shoaling between Day Marker 122 and Wachapreague Inlet. This waterway is used extensively by recreational and commercial vessels as well as housing the USCG Station Wachapreague.

Wachapreague Inlet has undergone drastic changes as result of dynamic coastal process and storms. The inlet is currently several times wider than it once was due to the coastal erosion of Cedar Island and shoals have been significantly relocated in parts of the inlet channel. Navigation around certain areas is particularly dangerous where shoaling, pilings, ships, and other objects once located on the southern end of Cedar Island are now in or just beneath the water.

IV. Summary and Conclusions

The Eastern Shore of Virginia’s history, culture, and economies are closely connected to the region’s proximity to, and safe navigation of, the surrounding tidal waters. Current predictions indicate that federal funding for dredging shallow draft navigation projects will continue to decline, thus the need for prioritization and alternative planning has arisen. This analysis has also revealed the substantial dependence that the Eastern Shore has on waterways of the Commonwealth where funding for maintenance of these non-federal waterways has been almost non-existent. The threat of a reduction in safely-navigable waterways, both federal and state, particularly as the tourism and aquaculture industries are growing, is a concern for communities and economies in the region.

To address these concerns, A-NPDC completed an assessment of local waterways, both federally and non-federally designated, on the seaside and bayside of the Eastern Shore of Virginia. This assessment was based primarily on USACE data and survey maps, previous reports and resources, personal communication with the ESRNWC and users of our waterways, and aid to navigation charts. The results of these assessments indicate that 22, or 37%, of the 59 assessed waterways of the Eastern Shore of

Virginia are in immediate need of maintenance attention and 56, or 81%, of these will require permit work in order to make progress towards accomplishing dredging.

Discussion

About 37% of the waterways assessed have at least some portion of the waterway with three feet or less water depth at mean low water. Of the 32 federal channels, 69% (22) of them do not meet their respective authorized depths, and 37% (12) of them have at least some portion of the channel with three feet or less water depth. These calculations are based on the assumption that those waterways which are scheduled for USACE maintenance in the next year are already dredged to depth, so it is expected that an even greater percentage of waterways have portions with three feet or less water at the time of this assessment. Almost half of the non-federal, WCV connecting waters have sections with three feet or less water and 37% (10) of the total 27 non-federal assessed waterways have areas of three feet or less water at mean low water.

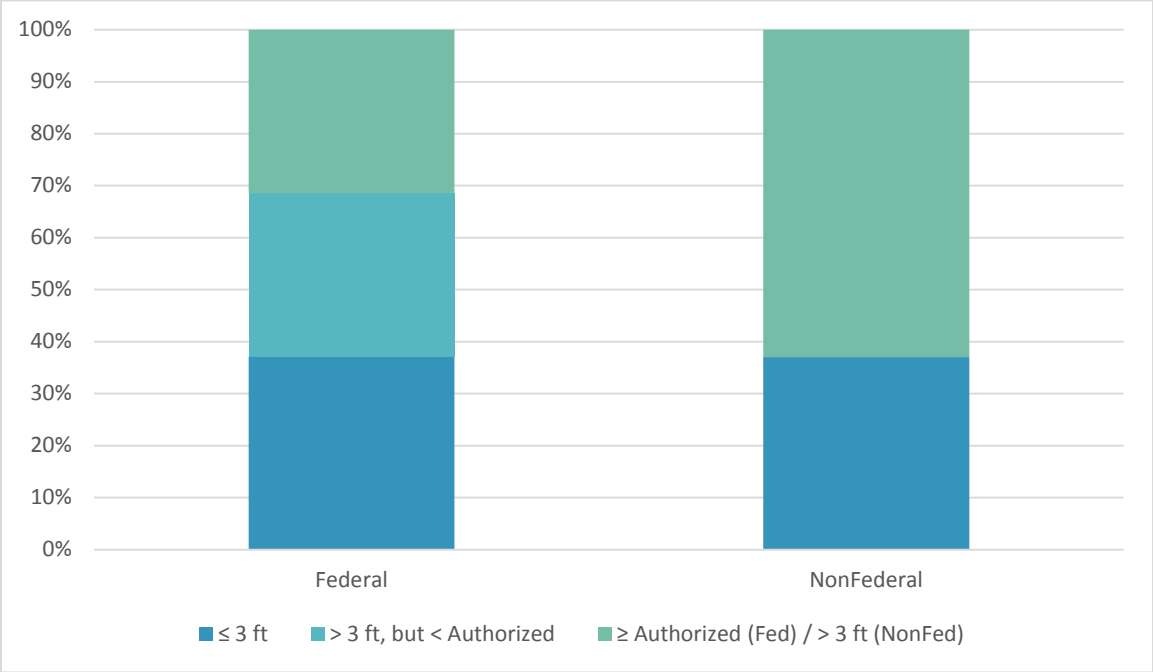


Figure 5: Waterway Condition Summary

About 21 of the 59 total assessed waterways are in need of immediate maintenance attention to ensure the continued safe navigation of the waterways. Fortunately, many of the local recreational boaters and even commercial watermen operate skiffs and other shallow-draft vessels. Many of these power boats draft less than one foot. For example, a 23-foot Ultra Carolina Skiff drafts only about 7 inches, but requires additional depth for safe operation of the outboard motors. However, vessels that are designed for off-shore boating, typically require deeper, wider channels for safe navigation. In addition, 21 of the 32 federal project areas and all of the non-federal project areas are in need of permit work, which slows the process in reaching completion for a dredging project.

Conclusions:

- Safely navigable waterways are vital to the social and economic wellbeing of residents and visitors of the Eastern Shore of Virginia,
- Federal budget constraints are likely to continue into the future. Not only are the USACE projects scrutinized by their 'Value to the Nation', explained in **Appendix D**, but also their direct commercial economic value. Some of the language used in **Appendix D** may require referring to the glossary in **Appendix C**,
- The Commonwealth of Virginia offers insufficient funding ($1 million annually statewide) for the projects that 3,315 miles (NOAA) of coastline and 3,165 square miles of water require.
- Almost half of our assessed waterways are not federally-designated, and as such can never receive federal funding for project dredging,
- 69% of federal channels do not currently meet their respective authorized depths
- 37% (23 of 62) of all assessed waterways are in immediate need of maintenance, with at least some of the waterway having depths of only 3 feet or less at mean low tide,
    - 37% (12 of 32) of federally-designated waterways are in this condition,
        - The majority of these are WCV
    - 37% (10 of 27) of non-federal waterways are in this condition,
        - A third of non-federal waterways which are not WCV connecting waters are in this condition,
        - Almost half (5/12) of the non-federal, WCV connecting waters are in this condition, and
- 81% of all assessed waterways are in need of permits prior to maintenance.

V. Recommendations

The following recommendations are based on the assessments and findings presented in this report:

- It is recommended that the Eastern Shore Regional Navigable Waterways Committee (ESRNWC) consider this report when selecting and prioritizing future dredging projects. The works cited in this report and additional resources are listed in **Appendix F**.
- A database with the waterways included in this assessment should be created and continuously updated as new information about the condition of waterways be available.
    - Updates should be ongoing, but a complete update accomplished annually, with special attention following large storm events.
- A comprehensive strategic plan for dredging of the Eastern Shore of Virginia waterways should be pursued.
    - Accomplishing this with the USACE Planning Assistance to States (Section 22) would be ideal. The result of which would be a *Shallow Draft Navigation and Sediment Management Plan* (more details below).
    - This plan should include consideration of alternative funding options.
    - This plan should consider changing the potential scope of work, on a project by project basis, from the federal project dimensions to smaller scale maintenance projects that still meet the navigations needs of that particular waterway, but that are affordable and can be implemented locally.
        - To that end, **Appendix E** provides a guide for working towards the dredging of a waterway. Some of the language used in **Appendix E** may require referring to the glossary in **Appendix C**.
- A regional *Shallow Draft Navigation and Sediment Management Plan* (discussed in further detail below) would provide vital insight into completing projects in a holistic way that can increases our coastal resilience and decreases the frequency with which our waterways require maintenance dredging.
- Steps should be taken to increase state funding of waterway maintenance projects.
- It is recommended that the Eastern Shore attempt to synthesize our regional priorities with other Virginia regions, in particular the Middle Peninsula, to maximize the USACE dredging schedules. This would allow for efficient use of the dredge once it enters the Chesapeake Bay.

Shallow Draft Navigation and Sediment Management Plan

Regional sediment management (RSM) is an approach that is intended to manage sediment using natural processes and treat sediment as a resource in a system context. Potentially this can save money; improve the environment; help address problems with erosion, wetland loss and habitat loss; increase our coastal resilience; and decrease the frequency with which our waterways require dredge maintenance.

Broadly speaking, RSM refers to the optimum utilization of various sediment resources (littoral, estuarine, and riverine) in an environmentally-effective and economically-feasible manner. RSM changes

the complexion of engineering activities within the systems from the local or project-specific scale to a broader regional scale which is defined by the natural sediment processes. By managing the sediment on regional scale, RSM aids in making the best local project decisions within the context of a regional plan that maximizes overall benefits and/or reduces total cost. Matching a dredged material disposal need with a beneficial use solution is likely to be more practical, cost-effective, and environmentally advantageous when made as part of a broad, watershed-level planning effort. This approach requires innovative collaboration at the local level to achieve implementable solutions.

Hurricane Sandy funds have made it possible to implement a few mitigation projects on the Eastern Shore to be carried out by USACE, listed in **Table 5**. In order to be most efficient with dredge materials, they must be thought of as a resource for similar mitigation projects region-wide. Knowing which projects, dredging and mitigation, are compatible, and a plan in place to effectively complete these collaborative projects is imperative to effective management of our coastal resources, particularly with limited funding.

Table 5 : USACE Hurricane Sandy funded Eastern Shore mitigation projects

Year	Section	Cubic Yards Removed	Cost USD
2016	Wallops Island Beach Nourishment	3,214,732	$35,911,947.50
2017	Tangier Jetty – authorization: Water Resources Development Act of 1996	NA	$642,000.00 ($100,000 federally funded, 50/50 state/federal cost share on remainder)
2018	Wallops Island Restoration	est. 850,000	est. $13,742,500.00

Because over wash may be one of the major causes of sediment loss from the littoral zone along much of this coastal Virginia, certain local communities on the seaside have expressed interest in pursuing mitigation projects to restore barrier islands on the seaside of the Eastern Shore and are interested in incorporating such projects into future regional planning efforts. The primary objective of these mitigation activities would be to attempt to stabilize landward retreat and the disintegration of the barrier islands by adding sediment to the system and translating the barriers into various types of modified morpho-sedimentary environments, which would also aid in preventing sedimentation of adjacent seaside waterways. These restoration efforts would primarily depend on the emplacement of suitable sediments to build up barrier systems. These localities suggest that the success of coastal erosion mitigation and restoration efforts depends on locating sufficient volumes of sand and mixed sediments (sand plus silt plus clay) that are suitable for placement on beaches, for building dunes, and for creating marshes.

Development of dynamic RSM plans would be needed for future planning, construction, and monitoring of wetland and barrier island restoration. Such a process should help enrich the range of beneficial use alternatives considered, improve compatibility with watershed-wide planning goals, and enhance stakeholder acceptance of the results.

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Appendices

Appendix A. - Inventory of Eastern Shore Waterways

The following table provides a full inventory of major creeks of the Eastern Shore. They are separated by seaside and bayside and then ordered north to south. There are a total of 87 identified, 32 federally-designated projects (Wire Passage is considered under the Gargathy Inlet project) and 55 local waters. The 'Assessed?' columns identifies if the waterway was included in this *Regional Dredging Needs Assessment*.

Name	County	Peninsula Side	Federally Designated?	Assessed?
Chincoteague Bay (Greenbackville)	Accomack	Seaside	Yes	Yes
Swans Gut Creek (Captain's Cove/Horntown area)	Accomack	Seaside	No	No
Lewis Creek (WCV)	Accomack	Seaside	Yes	Yes
Little Mosquito Creek	Accomack	Seaside	No	No
Chincoteague USCG Station	Accomack	Seaside	No	Yes
Chincoteague Inlet Harbor of Refuge	Accomack	Seaside	Yes	Yes
Chincoteague Inlet	Accomack	Seaside	Yes	Yes
Chincoteague Inlet to Bogues Bay Connecting Waters (WCV)	Accomack	Seaside	No	Yes
Wishart Point Channel (Atlantic)	Accomack	Seaside	Yes	Yes
Bogues Bay (WCV)	Accomack	Seaside	Yes	Yes
Bogues Bay to Hog Creek Connecting Waters (WCV)	Accomack	Seaside	No	Yes
Assawoman Creek	Accomack	Seaside	No	No
Hog Creek (WCV)	Accomack	Seaside	Yes	Yes
Hog Neck Creek to Hog Creek Connecting Waters (WCV)	Accomack	Seaside	No	Yes
Northam Narrows (Hog Neck Creek) (WCV)	Accomack	Seaside	Yes	Yes
Kegotank Bay (WCV)	Accomack	Seaside	Yes	Yes
Gargathy Inlet (WCV) (seems to include Wire Passage)	Accomack	Seaside	Yes	Yes
Gargathy Creek	Accomack	Seaside	No	Yes
Wire Passage (WCV) (seems to be included in Gargathy Inlet permit)	Accomack	Seaside	Yes	Yes
Metompkin Bay (WCV)	Accomack	Seaside	Yes	Yes
Parker Creek	Accomack	Seaside	Yes	Yes
Metompkin Inlet	Accomack	Seaside	No	Yes
Metompkin Bay Channel to Cedar Island Bay Channel (WCV)	Accomack	Seaside	No	Yes
Folly Creek-Metompkin Inlet	Accomack	Seaside	No	Yes

Name	County	Peninsula Side	Federally Designated?	Assessed?
Cedar Island Bay (WCV)	Accomack	Seaside	Yes	Yes
Cedar Island Bay Channel to Burtons Bay Channel Connecting Waters (WCV)	Accomack	Seaside	No	Yes
Burtons Bay Channel to Bradford Bay Channel Connecting Waters (WCV)	Accomack	Seaside	No	Yes
Wachapreague Channel	Accomack	Seaside	No	Yes
Day Marker 122 to Wachapreague Inlet	Accomack	Seaside	No	Yes
Bradford Bay and Finney Creek (WCV)	Accomack	Seaside	Yes	Yes
Bradford Bay Channel to Swash Bay Channel Connecting Waters (WCV)	Accomack	Seaside	No	Yes
Swash Bay Channel (WCV)	Accomack	Seaside	Yes	Yes
Swash Bay Channel to Sloop Channel Connecting Waters (WCV)	Accomack	Seaside	No	Yes
Quinby Creek	Accomack	Seaside	Yes	Yes
Eastern End of Federal Channel to Quinby Inlet	Northampton	Seaside	No	Yes
Sloop Channel (WCV)	Northampton	Seaside	Yes	Yes
North Channel (WCV)	Northampton	Seaside	Yes	Yes
Great Machipongo Inlet & Channel	Northampton	Seaside	No	Yes
North Channel to Ramshorn Channel Connecting Waters (WCV)	Northampton	Seaside	No	Yes
Ramshorn Channel (WCV)	Northampton	Seaside	Yes	Yes
Little Machipongo River	Northampton	Seaside	Yes	Yes
Sloop Channel to Ramshorn Channel Connecting Waters (WCV)	Northampton	Seaside	No	Yes
Upshur Creek	Northampton	Seaside	No	No
Red Bank Creek	Northampton	Seaside	No	Yes
Mill Creek	Northampton	Seaside	No	No
Indiantown Creek	Northampton	Seaside	No	No
Taylor Creek	Northampton	Seaside	No	No
Oyster Channel	Northampton	Seaside	Yes	Yes
End of Oyster Channel to Sand Shoal Inlet	Northampton	Seaside	No	Yes
Upper Magothy Bay to Ramshorn Connecting Waters (WCV)	Northampton	Seaside	No	Yes
Magothy Bay (Upper) (WCV)	Northampton	Seaside	Yes	Yes
Chesapeake Bay to Magothy Bay (WCV)	Northampton	NA	Yes	Yes

Name	County	Peninsula Side	Federally Designated?	Assessed?
Chesapeake Bay /Magothy Bay to Upper Magothy Bay Connecting Waters (WCV)	Northampton	Seaside	No	Yes
Pitts Creek	Accomack	Bayside	No	No
Bullbeggar Creek	Accomack	Bayside	No	No
Holdens Creek	Accomack	Bayside	No	No
Starling Creek (Saxis)	Accomack	Bayside	Yes	Yes
Messongo Creek	Accomack	Bayside	No	No
Cattail Creek	Accomack	Bayside	No	No
Muddy Creek	Accomack	Bayside	No	No
Tangier Channels	Accomack	Bayside	Yes	Yes
Guilford Creek	Accomack	Bayside	Yes	Yes
Youngs Creek	Accomack	Bayside	No	No
France Creek	Accomack	Bayside	No	No
Little Back Creek	Accomack	Bayside	No	No
Bagwell Creek (Parkers Landing Rd)	Accomack	Bayside	No	Yes
Hunting Creek (Hopkins unincorp.)	Accomack	Bayside	No	Yes
Doe Creek	Accomack	Bayside	No	No
Deep Creek	Accomack	Bayside	Yes	Yes
Chesconessex Creek	Accomack	Bayside	Yes	Yes
Onancock Creek	Accomack	Bayside	Yes	Yes
Parkers Creek	Accomack	Bayside	No	Yes
Matchotank Creek	Accomack	Bayside	No	No
Pungoteague Creek	Accomack	Bayside	No	No
Butcher Creek	Accomack	Bayside	No	No
Nandua Creek	Accomack	Bayside	Yes	Yes
Craddock Creek	Accomack	Bayside	No	No
Occohannock Creek	Northampton	Bayside	Yes	Yes
Nassawadox Creek (& Church & Warehouse Creek)	Northampton	Bayside	No	Yes
Westerhouse Creek	Northampton	Bayside	No	No
Hungars Creek	Northampton	Bayside	No	Yes
Mattawoman Creek	Northampton	Bayside	No	No
Barlow Creek	Northampton	Bayside	No	No
the Gulf (Smith Beach)	Northampton	Bayside	No	No
Cherrystone Inlet	Northampton	Bayside	No	No
Kings Creek	Northampton	Bayside	No	Yes
Cape Charles City Harbor	Northampton	Bayside	Yes	Yes
Longs Pond	Northampton	Bayside	No	No

Appendix B. - Non-Federal Waterways Assessment Justification Data

The table below provides the data used to determine if a non-federal waterway were to be included in the dredging needs assessment and correlates to further explanation in the methods section. The twelve WCV connecting waters were not included here, as their inclusion was not dependent upon the presence of facilities.

Waterway Name	USCG AtoN? Y/N*	Facilities	Use	Assess?
Hunting Creek (Hopkins unincorp.)	Y	Landing (2)	Com & Rec Fishing & Boating, Aquaculture	Yes
Pungoteague Creek	Y	Landing, Country Club, Campground, Aquaculture, Seafood Co.	Com & Rec Fishing & Boating, Aquaculture	Yes
Hungars Creek	Y		Com & Rec Fishing & Boating, Aquaculture	Yes
Kings Creek	Y	Marina, Restaurant, Campground, Seafood Co.	Com & Rec Fishing & Boating, Aquaculture	Yes
Nassawadox Creek (& Church & Warehouse Creek)	N	Landing	Com & Rec Fishing & Boating, Aquaculture	Yes
Chincoteague USCG Station	NA	USGS Station	USGS Station	Yes
Day Marker 122 to Wachapreague Inlet	Y	**USGS Station**, Marina (3), Ramp, Fuel, Lodge, Campground, VIMS Lab, Seafood Co.	**USGS Station**, Com & Rec Fishing & Boating, Aquaculture, Research/Education	Yes
Folly Creek-Metompkin Inlet	N, but leads into VIP with AtoNs	Landing,	Com & Rec Fishing & Boating, Aquaculture	Yes
Gargathy Creek	N	2 Landings	Com & Rec Fishing & Boating, Aquaculture	Yes
Wachapreague Channel	N	**USGS Station**, Marina (3), Ramp, Fuel, Lodge, Campground,	Com & Rec Fishing & Boating, Aquaculture, Research/Education	Yes

		VIMS Lab, Seafood Co.		
Eastern End of Federal Channel to Quinby Inlet	Y	Landing, Campground, Seafood Co.	Com & Rec Fishing & Boating, Aquaculture	Yes
Great Machipongo Inlet & Channel	Y	Landing, Restaurant, Aquaculture, Seafood Co., & Crab Shanties	Com & Rec Fishing & Boating, Aquaculture, Research	Yes
Red Bank Creek	N	Landing	Com & Rec Fishing & Boating, Aquaculture	Yes
Metompkin Inlet	N		Com & Rec Fishing, USCG Atlantic access	Yes
Bagwell Creek (Parkers Landing Rd)	N	Parkers Landing Rd, no ramp	Rec Fishing & Boating	No
End of Oyster Channel to Sand Shoal Inlet	Y	Public harbor, landing, UVA Center, Seafood Co.	Com & Rec Fishing & Boating, Aquaculture, Research/Education	Yes
Bullbeggar Creek	N			No
Butcher Creek	N		Rec Fishing & Boating	No
Cattail Creek	N	Landing	Com & Rec Fishing & Boating, Aquaculture	No
Craddock Creek	N		Com & Rec Fishing & Boating	No
Doe Creek	N		Rec Fishing & Boating	No
France Creek	N		Rec Fishing & Boating	No
Holdens Creek	N			No
Little Back Creek	N		Rec Fishing & Boating	No
Matchotank Creek	N		Rec Fishing & Boating	No
Messongo Creek	N	Landing (2), Seafood Co.	Com & Rec Fishing & Boating, Aquaculture	No
Muddy Creek	N	Landing, Pier, Beach	Com & Rec Fishing & Boating, Aquaculture	No
Pitts Creek	N	Landing (actually on Pocomoke River)	Com & Rec Fishing & Boating	No
Youngs Creek	N		Rec Fishing & Boating	No
Barlow Creek	N		Com & Rec Fishing & Boating, Aquaculture	No
Cherrystone Inlet	N	Private companies docks, etc.	Com & Rec Fishing & Boating, **Aquaculture**	No

Longs Pond/ Old Plantation Creek/ Arlington Creek	N	Tomb of Custis	Com & Rec Fishing & Boating, **Aquaculture**	No
Mattawoman Creek	N		Com & Rec Fishing & Boating, Aquaculture	No
Parkers Creek	?	Landing	Com & Rec Fishing & Boating	Yes
the Gulf (Smith Beach)	N	Seafood Co.	Com & Rec Fishing & Boating, **Aquaculture**	No
Westerhouse Creek	N		Rec Fishing & Boating, **Aquaculture**	No
Assawoman Creek & Inlet	N	Old NASA ferry dock	Com & Rec Fishing & Boating	No
Little Mosquito Creek	N	Ramp, Slips, Trails End Resort	Rec Fishing & Boating	No
Swans Gut Creek (Captain's Cove/Horntown area)	N			No
Indiantown Creek	N	Indiantown Rec Park (no water access)		No
Taylor Creek	N		Rec Fishing & Boating	No
Upshur Creek	N	TNC dock	Rec Fishing & Boating, Research/Education	No

Appendix C. - Glossary

Aids to Navigation: Buoys, beacons, fog signals, lights, radio beacons, range markers, and generally any charted or published information serving the interest of safe navigation.

Appropriation: Congressional funding for the construction and maintenance of navigation channels and turning basins.

Authorization: Congressional approval for the construction and maintenance of navigation channels and turning basins.

Authorized Dimensions: Length, width, and depth dimensions of a navigation project as specified in the authorizing document.

Beach: The shoreline zone comprised of unconsolidated sandy material upon which there is mutual interaction of the forces of erosion, sediment transport and deposition extending from the mean low water line landward to where there is a marked change in either material composition or physiographic form such as a dune, bluff, or marsh, or where no such change can be identified, to the line of woody vegetation (usually the effective limit of storm waves), or the nearest impermeable manmade structure, such as a bulkhead, revetment, or paved road (§28.2-1400 of the Code of Virginia).

Beach nourishment: Placement of good quality sand along a beach shoreline to raise the elevation of the nearshore area. (VIMS, 2006)

Beach of the Commonwealth: Public beach.

Channel: Part of body of water deep enough to be used for navigation. Channels can be either natural or artificial waterways.

Constructed Dimensions: Channel dimensions which have been provided by initial or new work dredging.

Continuing Authorities Program (Navigation): Congressionally directed authority provided to the Chief of Engineers on an on-going basis for small navigation projects as defined by Section 107 of the River and Harbor Act of 1960, as amended.

Deauthorized Navigation Channel or Turning Basin: Navigation channels and turning basins (or portions thereof) which were never constructed and subsequently were removed from any further consideration as a result of a formal deauthorization process.

Draft: The depth of water displaced by a vessel.

Dredging: The practice of excavating and removing material from underwater locations, either by mechanical or hydraulic means.

Dredging Cycle: The period of time (years) between dredging events. Also referred to as dredging frequency.

Dredging Process: Removal (usually from underwater), transportation, and placement of material, for the purpose of constructing new waterways, maintaining existing waterway dimensions, obtaining fill for land reclamation, beach nourishment, dike and levee construction, creating wetlands and marshes, obtaining materials from borrow areas or other beneficial uses.

Fuel Taxed Inland Waterways System: 27 waterways of the United States' interior, along the Atlantic and Gulf Coasts, and in the Pacific Northwest where fuel consumed by vessels transporting cargo is subject to a Federal tax (currently 20 cents per gallon). The fuel taxed waterways comprise near 11,000 miles of waterways at least 9 feet deep and includes 186 lock sites. These waterways move over 600 million tons and would cost over 125 billion dollars to replace. (REF: INLAND WATERWAYS USERS BOARD 23rd ANNUAL REPORT TO THE SECRE TARY OF T HE ARMY AND UNITED STATES CONGRES S, AUGUST 2009)

General Navigation Feature: Refers to any navigation channel, turning basin, anchorage, and dredged material placement area which is cost shared between the Federal government and the local sponsor of a Federally authorized project. It excludes Aids to Navigation which are paid fully by the Coast Guard as well as lands, easements, rights-of-way, relocations (LERRS) which are the responsibility of the local sponsor.

Hydraulic Dredging: Dredging performed by a hydraulic dredge, which generally moves bottom material via a centrifugal pump and pipeline or hopper directly toward a dredged material placement area.

Inactive Navigation Channel or Turning Basin: Navigation channels and turning basins which are no longer actively used for either commercial or recreation pursuits. In some cases, inactive projects might become eligible for deauthorization.

Joint Permit Application or JPA: The standard Joint Permit Application for shoreline stabilization structures and other activities conducted in wetlands and the marine environment. The applicant completes one form and submits to either local agency or VMRC, which is responsible for distributing to local, state and federal permitting and advisory agencies (e.g. Virginia Institute of Marine Science, Department of Game and Inland Fisheries, Department of Conservation and Recreation, Department of Environmental Quality, U.S. Army Corps of Engineers). (VIMS, 2006)

Maintained Dimensions: Navigation channel dimensions (length, width, and depth) that are determined by using traffic, or other restrictions, which are less than or equal to authorized dimensions, or the constructed dimensions if less than the authorized dimensions.

Maintenance Dredging: The removal of shoal material from a constructed project. (USACE) Dredging activities for navigation purposes that have been previously authorized by the Commission, to the depth previously authorized by the Commission, and where a royalty has been previously paid to

the Commission for the initial removal State-owned submerged lands (Constitution of Virginia Article XI Section II) (VMRC).

Mean Lower Low Water (MLLW): A tidal datum established by the National Ocean Service. The average height of all lower low waters recorded over a specific 19-year period called the National Tidal Datum Epoch. It is the reference datum used for Federal navigation projects.

Mean low water (MLW): The average height of low waters over a nineteen year period. Virginia is a low water state, meaning private property extends to the mean low water line.

Mechanical Dredging: Dredging performed with a mechanical dredge which normally lift the dredged material above the waterline by means of buckets or scoops of various designs and deposit it in a barge or similar conveyance for transport and placement.

Navigation Channel: A project feature with authorized project limits/dimensions, which is designed, constructed and maintained for use by commercial and/or recreational navigation traffic. This definition includes appropriate harbors, canals, turning basins, anchorage/mooring areas and/or waterways.

Overdepth Dredging: Any dredging below the authorized depth (or constructed depth if less than the authorized depth) to include required, allowable and non-pay dredging overdepth.

Private Beach: a beach, as defined by §28.2-1400 of the Code of Virginia, whose underlying fee (ownership) is held privately and not by a local, state or federal governmental entity and whose public use is restricted or controlled by the property owner.

Project Dimensions: (see Authorized Dimensions).

Public beach: A sandy beach located on a tidal shoreline suitable for bathing in a county, city or town and open to indefinite public use (Code of Virginia §10.1-705)

Recreational Craft: Non-commercial vessels used for recreational activity.

Resource Protection Area (RPA): The component of the Chesapeake Bay Preservation Area comprised of lands adjacent to water bodies with perennial flow that have an intrinsic water quality value due to the ecological and biological processes they perform or are sensitive to impacts which may result in significant degradation to the quality of state waters (9VAC10-20-40).

River and Harbor Act: Congressional Authorization for construction of Federal navigation channels and turning basins.

Royalties: Fees paid to the Commonwealth for certain uses of submerged public lands. They are assessed in addition to permit fees. All royalties are subject to change in accordance with the Commission's public participation procedures and regulatory adoption process. Contact the Virginia Marine Resources Commission Habitat Management Division for a current royalties schedule (VMRC Subaqueous Guidelines Section I).

Shallow Draft Navigation System: Those navigation channels and turning basins with a depth of less than 15 feet when measured at MLW (REF: Coastal Engineering Technical Note I-63, March 1999).

Shoaling Rate: This is the rate at which sediment fills a navigation channel or feature, usually measured in terms of cubic yards per year.

Turning Basin: General navigation features which allow ships to make a U-turn and leave a channel the way they entered. They eliminate the need for long backing-out movements.

Vessels: Towboats, barges, and other waterborne craft.

Water Resources Development Act of 1986 -- Title I, Section 101 (Public Law 99-662): The non-Federal share of the cost of general navigation features is 1 0 percent for that portion of the project which has a depth not in excess of 20 feet.

Water Resources Development Act of 1996 -- Title II, Section 201 (Public Law 104-303): Designates that land based and aquatic dredged material disposal areas built for construction and operation and maintenance shall be considered a General Navigation Feature and cost shared in accordance with Title I of the Water Resources Development Act of 1986 (Public Law 99-662).

Water Resources Development Act of 2007 – Sections 2005, 2029 and 2037 (Public Law 110-114): To provide for the conservation and development of water and related resources, to authorize the Secretary of the Army to construct various projects for improvements to rivers and harbors of the United States, and for other purposes.

Waterborne Commerce: Commodities moved or transported by way of navigation channels.

Waterway: Any body of water wide enough and deep enough to accommodate the passage of water craft.

Appendix D. - Value to the Nation

The following is a guide sheet for local sponsors and stakeholders to provide input to the USACE for project budget justifications.

Although USACE is committed to finding balance among economic, recreation, and the environment with their projects, their Civil Works program focuses on coastal protection, disaster preparedness and response, environmental protection and restoration, flood risk management, recreational opportunities, and others. This could be an important focus in requesting a project be completed.

General:

- Whenever possible, cite the source of the factual information provided.
- If possible, information should be specific to the project.
- In addition to specific factual information, the sponsor or stakeholder may provide a narrative describing the importance of the project from their perspective.
- Not all factors apply to each project. Use the best information you can obtain in the categories that follow. Sooner is better. Provide what you can in the short term, and follow up with information that takes longer to obtain.

Commerce (commodities, tonnages, cargo value, transportation savings):

- Estimated annual tonnages by commodity moving on the project (sand/gravel, aggregates, petroleum, grain, fish, shellfish, etc.)
- Whenever possible, list by name the various businesses that use the project.
- For fish/shellfish, if available provide estimated cargo value relating to the tonnage.
- Estimated number, size, draft and type of commercial vessels using the project.
- Estimated annual trips for commercial vessels (count both inbound and outbound.)
- Estimated transportation savings vs. other mode or other harbor.
- If project were not dredged, estimate the additional costs for light loading, waiting for tide, using truck or rail, or going to another harbor.
- Are you already being forced to light load or wait for tide? Estimate savings to you if channel or harbor is dredged.
- List and describe other commercial uses with supporting information.
    - Seafood buyers and processors located on or adjacent to the project.
    - Charter boats, head boats – size, number of boats, estimated annual trips.
    - Ferries, tour boats, eco-tours, scientific and educational tours. Cite estimated annual vessel trips and estimated passengers carried on the project.
    - Boat repair yards, commercial marinas, etc.

Safety and Public Health:

- Does the project serve as a harbor of refuge? If so, estimate the typical number of vessels that use the harbor in a storm, and identify the next closest available harbor.

- US Coast Guard – use of the project as a base for Search & Rescue activities, ice- breaking, aids to navigation maintenance, etc.
- Life threatening situations caused by shoaling – cite sources if available.
- Groundings on shoals, accidents, injuries and fatalities at the project.

National, State and Local Security:

- Cite any military use such as Navy or Marines.
- Coast Guard use for Homeland Security activities.
- Shipment of any commodities or equipment used by the military.
- Use by local or state law enforcement activities.

Recreation:

- Estimated number of recreation boats using the project and vessel trips.
- Number of boat ramps and marinas on the project.

Environmental Factors:

- Does the project factor into a local, state or federal environmental initiative?
- What environmental benefits are to be gained from the project?
- Is the work required to support agreements with other agencies?
- Be sure to explain why such factors should influence priority.

Consequences:

- What happens if the project is not dredged?
- Jobs lost and businesses affected.
- Lost tax revenues.
- Describe extent and value of local investments that would go unrealized.
    - Local investments in dredging, dredged material placement sites and other real estate, bulkheads, piers, public landings, boat ramps, etc.
    - Private investments in businesses.

Other Remarks:

- Unique features available only at that project.
- Cultural or historic values.
- Why is the project important to you?

Appendix E. - Users Guide to Dredging on the Eastern Shore of Virginia

The intention of this appendix is to provide guidance through a dredging project – from the identification of a dredging need, to identification of sediment disposal site, to applying for a dredging permit, to the dredging of a channel. Much thanks to the Middle Peninsula Planning District Commission for sharing their 2011 publication: *Users Guide to Dredging in Tidewater Virginia*, which provided a template and much information for this asset to this Report.

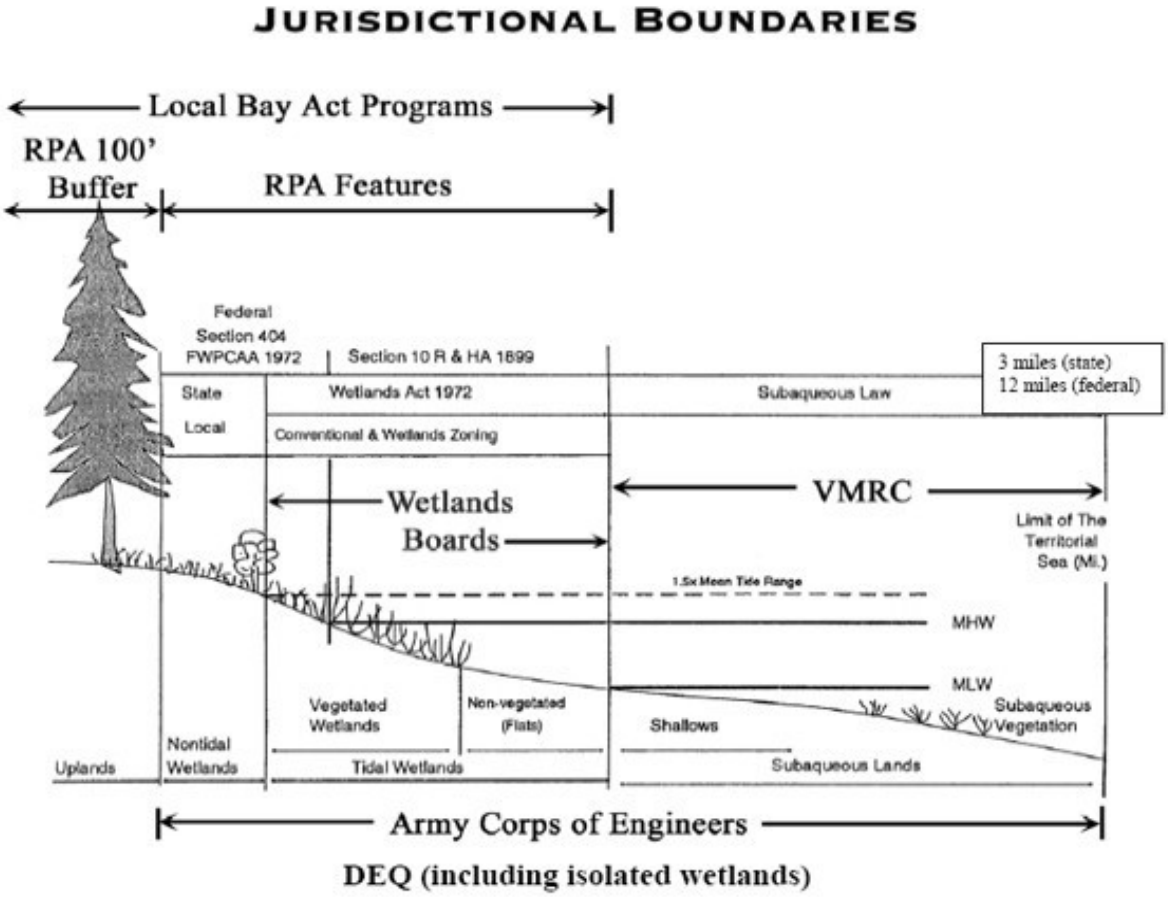
STEPS: The Execution of a Dredging Project

1. Identify Channel with Dredging Need:

To begin the dredging process, a navigable channel must be identified as having a need for dredging, which is evident when navigation becomes obstructed and/or limited, particularly due to shoaling. The need may be identified by a private or public entity, but may also be identified by the USACE if a problem is noticed during a routine survey of a channel. Following the identification of a channel in need of dredging, the party interested in having the channel dredged may choose to meet with the regulatory agencies responsible for the review and permitting of the proposed dredging. These agencies typically include the USACE, Virginia Department of Environmental Quality (DEQ), Virginia Marine Resources Commission (VMRC) and local wetlands board. Locally, we have the Eastern Shore Navigable Waterways Committee which will often will facilitate and assist with this process. The agencies will review the channel in question and the associated project need. Preliminary comments will be offered relative to the information necessary to complete the JPA and the agencies will recommend design considerations necessary to avoid or minimize adverse environmental impacts. Also there will be consideration and discussing regarding the suitability of the proposed disposal site as well as the associated permit fees, royalties and/or mitigation costs.

The Role of Jurisdictional Boundaries

The jurisdictional boundaries of the Virginia Commonwealth in conjunction with the specifics of the individual dredging project will ultimately determine the permits necessary to complete a dredging project. As shown in the figure below, the jurisdictional boundaries of federal, state and local jurisdictions have the tendency to overlap, which makes the permitting process project specific and at times complicated.



With a specific channel identified, it is important to note whether the channel has been previously dredged or not. This will likely influence the amount of permit fees and royalties required by the permitting agencies. According to VMRC's Subaqueous Guidelines Section II, K, II maintenance dredging is defined by VMRC as dredging activities for navigation purposes that have been previously authorized by the Commission, to the depth previously authorized by the Commission, and where a royalty, if applicable, has been previously paid to the Commission for the initial removal of State-owned submerged lands. (Please note that public entities, including towns, cities and counties are exempt from dredging royalties). As a maintenance dredging project, the applicant is required to pay VMRC's permit fee, but shall be exempt from all other fees and royalties. Typically, maintenance dredging requires no additional permit fees from the USACE or DEQ, however, mitigation costs may or may not be applicable. If a project is within the jurisdiction of the local

wetlands board, permit fees and/or mitigation costs may be required. This will vary between counties.

2. Pre-Dredge Bathymetric Survey:

For the identified channel, a pre-dredge bathymetric survey is needed to determine the water depths relative to mean low water (MLW). The pre-dredge survey may be performed by anyone (i.e. certified engineer, licensed land surveyor or firm, private entity, etc.), but should include sufficient transects and be referenced to MLW. The survey evaluates current depth conditions and ultimately guides the amount of dredging that will occur at the site. For private channels, maximum project depths typically are governed by the draft of the vessels utilizing the area. For channels designated as federally maintained, maximum project depths are previously established by the District Engineer (USACE) or by Congress.

3. Identify and Select a Disposal Site:

Once a channel is identified as having a dredging need, a disposal site location should be determined and prepared to receive and permanently contain the dredged material. Since overboard disposal of dredged material into tidal waters is generally not permitted (VMRC Subaqueous Guidelines Section III, E), applicants will need to consider disposal areas that are acceptable to the various permitting agencies. Factors to consider for a disposal site, include, but are not limited to the following (VMRC Subaqueous Guidelines Section III, C):

1. Encroachment into natural drainage ways;
2. Chemical nature of the dredged material and its potential for polluting adjacent or nearly underground water supplies;
3. Encroachment over the underground utilities, i.e. water lines and sewer facilities;
4. Value of the site to the natural environment;
5. Proximity to populated areas; and
6. Anticipated use of the material or disposal site after dredging material is placed and consolidated.

According to§10.1-704 of the Code of Virginia, the beaches of the Commonwealth (i.e. beaches classified as public) shall be given priority consideration as sites for the disposal of dredged material determined to be suitable for beach nourishment for public benefit. The Secretary of Natural Resources shall have the responsibility of determining if the dredged material is suitable for beach nourishment; however, if a public beach placement site is not suitable or available, dredged material may be placed on private beach, or in a private or public upland containment site. In general, the regulatory and advisory agencies reach a decision on the suitability of an area for beach nourishment.

Depending on the sediment disposal site, VMRC has associated royalties. Such royalties may be important in determining the most feasible disposal site for the dredge project:

a. Public Beach

If a public beach is chosen as the disposal site, fee simple and adjacent property owners may benefit from the additional protection offered by the larger beach. VMRC requires a permit and charges an encroachment royalty of $0.05 per square foot for placement of sandy dredge material over the adjacent State-owned subaqueous lands (i.e. area channelward of MLW). The placement of sandy dredge material on public or

b. Private Beach or Shoreline

Applicants may have to work with fee simple and adjacent property owners to obtain an easement if the proposed disposal site is a private beach or shoreline. If the private property owner is unwilling to relinquish property rights to the applicant, then they will need to apply for permits to allow for the placement of the dredge material on their property. Ideally the applicant and property owner will be co-applicants on the VMRC JPA (see Section 3 for more information). VMRC has no jurisdiction landward of MLW; therefore, there will never be a placement royalty assessed by VMRC for the disposal of dredge material above MLW. The placement of sandy dredge material on public or private beaches, landward of MLW, is exempt from local wetlands boards. Permits may, however, be required from the DEQ and the USACE. The placement of dredge material on intertidal shorelines which do not meet the definition of a beach will require permits from the local wetland board, DEQ and the USACE.

c. Private Upland Containment Site

A containment site owned privately may be used for disposal of dredged material, particularly if the dredge material is unsuitable for beach nourishment. The upland containment site acts as a permanent reserve for dredged sediment and in some case acts as a holding location for dredged material to dry. Also in ideal situations the upland containment site is not located within the Resource Protection Area (RPA).

d. Public Upland containment site

A containment site owned by a public entity may be used for disposal of dredged material, if it is unsuitable for beach nourishment. The upland containment site acts as a permanent reserve for dredged sediment and in some case acts as a holding location for dredged material to dry. Also in ideal situations the upland containment site is not located within the RPA.

Additionally, as county wetland boards regulate the use and development of wetlands, the placement of dredged material on public and private beach, and/or upland private or public containment site may fall in the jurisdiction of the local Wetlands Board. Wetlands Boards within the Eastern Shore have very similar wetland permit application fees and those fees are the same for both residential and commercial projects. Wetland Boards will receive the JPA application for review and within 45 days the Wetland Board will notify the applicant if a wetland permit is required or not. The table below reviews the fee schedule for wetland permits for each county within the Eastern Shore of Virginia.

County	**Wetland Permit Fee**	**Contact for more information**
Accomack	Non-commercial/residential or Commercial Project: $297.00 (+ $160.00 advertisement costs for public notice)	(757) 787-5721
Northampton	Non-commercial/residential or Commercial Projects: $300 application (+ advertisement costs for public notice)	(757) 678-0443 ext. 544

4. Submission of the Joint Permit Application:

One of three parties, including a public entity (i.e. political subdivision), private entity (i.e. home owner, home owner association), or a public private partnership, ma y request a dredging project. This request is made upon the completion and submission of a Local/State/Federal Standard Joint Permit Application (JPA) to VMRC. Commission serves as the clearinghouse agency for the distribution of the JPA to the advisory and regulatory agencies routinely involved in the review and permitting of dredge projects. This application must be submitted for any and all projects which propose to impact to tidal and non-tidal shorelines and submerged lands. This includes dredging projects, erosion control project, private or commercial piers, utility and road crossings, etc. Upon receipt of a given application by all of these regulatory agencies, the JPA is concurrently reviewed by the wetlands board, VMRC, USACE, and DEQ. Most dredge projects additionally are received by the National Marine Fisheries Service (NMFS), the Environmental Protection Agency (EPA), the Virginia Institute of Marine Science and possibly other State advisory agencies.

In accordance with the Code of Virginia, VMRC assesses a permit fee of $25 for projects costing $10,000 or less, and $100 for projects costing more than $10,000. Copies of the JPA may be obtained from the local wetlands boards, VMRC, DEQ, USACE, or can be downloaded from the Norfolk District Corps of Engineers web site at http://www.nao.usace.army.mil/Missions/Regulatory/JPA.aspx.

Agencies will review the JPA application and contact the applicant individually about additional permit requirements for the project. As mentioned earlier each project is unique which requires unique consideration as well as associated permits.

As the USACE has regulatory authority over Section 404 of the Clean Water Act (33 U.S.C. §1344), Section 10 of the Rivers Harbors Act of 1899 (33 U.S. C. §403), and Section 103 of the Marine Protection Research and Sanctuaries Act (33 U.S.C. §1413), shallow water dredging projects may qualify for additional national and regional permits. The USACE will notify the prospective permittee within 45 days of receiving the JPA application whether the project may proceed under the nationwide permit or whether an individual permit is required. If, after reviewing the notification, the District Engineer determines that the proposed activity would have more than a minimal individual or cumulative adverse impact on the aquatic environment or otherwise may be contrary to the public interest, the engineer will either condition the nationwide permit authorization or reduce or eliminate the adverse impacts, or notify the prospective permittee the at the activity is not authorized by the nationwide permit and provide the permittee with instruction on how to seek

authorization under an individual permit. The specifics of the projects will determine the type of permits required for the project, but below is sample of permits that dredging project may require:

- Nationwide Permit 3 Maintenance2: authorizes the removal of accumulated sediments and debris in the vicinity of and within an existing structure and the placement of new or additional riprap to the structure. The removal of sediment is limited to the minimum necessary to restore the waterway in the immediate vicinity of the structure to the approximate dimensions that existed when the structure(s) was built but cannot extend further than 200 feet in any direction from the structure.
- Nationwide Permit 19 Minor Dredging3: authorizes dredging of no more than 25 cubic yards below the plane of the ordinary high watermark or the mean high water mark from navigable waters of the United States.
- LOP-2 (Letter of Permission)4: authorizes dredging (channels and basins) for certain navigationally-related recreational and commercial dredging projects, by either mechanical or hydraulic method, in waters of the United States, within the geographical limits of the Commonwealth of Virginia under the regulatory jurisdiction of the Norfolk District Corps, subject to the terms and conditions further set out herein.

To have questions answered about particular projects within the region please call the Norfolk District Public Affairs Office at 757-201-7500 or cenao-pa@usace.army.mil.

As the Virginia Department of Environmental Quality administers the Virginia Water Protection (VWP) Permit Program (§§ 62.1-44.15 and 62.1-44.15:20 of the Code of Virginia) for the Commonwealth, impacts to surface waters such as land clearing, dredging, filling, excavation, draining or ditching in open water, streams and wetlands require such a permit. For maintenance dredging previously authorized, a regional permit 19 (RP-19) may be required which does not does include a fee. However, if it is determined that a permit from DEQ is required, then the fee structure is based on the size of the area to be dredged, the amount of material to be removed, the habitat of the area, and if the area is tidal or non-tidal. Since each project is case specific and such things as avoidance and minimization of wetland impacts, and project purpose and need are all taken into consideration it is best to call the DEQ Tidewater Regional Office for more details at (757) 518-2158.

Once the application has been approved by all of the regulatory agencies exerting jurisdiction, the permittee is responsible for the project's permit fees, associated dredging and placement royalties and/or mitigation costs. With respect to VMRC, according to VA Code §28.2-1206 Section E, "All counties, cities and towns of the Commonwealth shall pay the required permit fee but shall be exempt from all other fees;" such fees include dredging and placement fees. For private applicants, dredging fees will apply while VMRC will consider the dredging fees for private public partnerships on a case by case basis. The approved permit shall specify a royalty which may not be less than $0.20 per cubic yard and no more than $0.60 per cubic yard. In establishing the royalty, VMRC takes the following factors into consideration:

1. The primary and secondary purpose for removing the bottom material;

2. Whether the material has any commercial value and whether it will be used for any commercial purpose;
3. The use to be made of the removed material and public benefit or adverse effect upon the public that will result from the removal or disposal of the material;
4. The physical characteristics of the material to be removed; and
5. The expense of removing and disposing of the material.

In most cases the applicant is charged $0.45 per cubic yard for dredged material, proposed to be removed from State-owned bottom. If the dredged material is high quality and has the potential for commercial use, then the applicant may be charged $0.60 per cubic yard.

As stated earlier, another factor contributing to the projects associated dredging royalty is whether the project is considered a maintenance dredge project or not. A maintenance dredge, as defined by VMRC, is a dredging activity for navigation purposes that have been previously authorized by the Commission, to the depth previously authorized by the Commission, and where a royalty, if applicable, has been previously paid to the Commission for the initial removal State-owned submerged lands (Constitution VMRC Subaqueous Guidelines Section II). Therefore, if one's project meets this definition the permittee is exempt from dredging royalties. If the project is not considered maintenance, then the permittee will be charged $0.20-$0.60 per cubic yard.

A permittee is also responsible for placement royalties. If the dredged sediment is placed below mean low tide then the associated royalty is $0.05 per square foot. However, to place dredged material above the mean low water mark on private property, the private property owner may have to obtain a wetlands or coastal primary sands dunes and beaches permit.

Ultimately the permittee is liable for the proper completion of the project, in particular closely adhering to all of the permit conditions issued by the regulatory agencies. These include strict adherence to the maximum permissible project depths, vegetated wetlands buffers, allowable dredge footprints and proper erosion and sediment control at the dredge cut, pipeline or transfer route and dredge disposal site. The permittee is also required to adhere to any regulations or laws that protect threatened and endangered species and other sensitive habitats such as submerged aquatic vegetation or oyster reefs.

For a comprehensive overview of permit fees, dredging fees, and encroachment/placement fees associated with dredging projects, please refer to the Dredging Project Table on the following page.

5. Selection of a contractor:

With the parameters for a dredged project approved by the appropriate regulatory agencies, the permittee seeks bids from marine contractors and subcontractors capable of meeting the permits parameters.

6. Pre-dredging conference:

Often, as permit condition, a pre-dredging conference is held at the site prior to the commencement of dredging. The permittee, the dredging contractor, and a member of the VMRC staff must attend the meeting. Other agencies may choose to participate. Held seven days prior to the commencement of dredging, the conference includes an inspection of the dredge material containment area, an inspection of the previously staked dredge area, and a discussion of the terms and conditions of the permit.

7. Dredging

Initiation of the dredge project commences only after all parties acknowledge that they understand the terms and conditions of the permits issued.

8. Post-Dredge Bathymetric Survey:

The permittee will often be required to provide a post-dredging bathymetric survey of the dredged area within 30 days following dredging of the channel. The survey must be signed and dated as being accurate and true. The survey must be referenced to mean low water and include a transect at the channelward end of the dredge cut and at specified intervals along the dredged channel to the landward terminus of the dredged area. Accurate bathymetric data from each transect shall be used to establish the top width of the dredge cut (± 1') and must include a depth measurement exterior to both sides of the dredge cut. If applicable, the survey must also indicate the horizontal distance between the top of the dredge cut and the vegetated wetlands depicted on the project drawings.

9. VMRC Final Review:

VMRC is responsible for regulating activities on State-owned submerged land, tidal wetlands and dunes/beaches pursuant to Chapters 12, 13, and 14, Subtitle III, of Title 28.2 of the Code of Virginia. Hence, following dredging activities and receipt of the required post-dredge bathymetric survey, VMRC staff will review the dredged activity to verify that it was completed in accordance with the terms and conditions of their permit. The remaining permitting authorities will also review the project to insure project compliance with their laws and regulations.

Table 3: This matrix identifies sediment disposal options as well as the associated costs (ie. permit fees, dredging fees and royalties and encroachment fees) for entities interested in pursuing a maintenance or new dredging project.

Dredging Project Applicant	Type of Dredging		Sediment Disposal Site Options					Associated Costs		
	Maintenance	New	Public Beach	Private Beach		Public Upland Containment Site	Private Upland Containment Site	Permit Fees	Dredging fees and royalties	Encroachment/Placement royalties
				Easement	No easement					
Public Entity	✱		✓	✓		✓	✓	**VMRC**: Dredging Permit is $25, but if the cost of the project is to exceed $10,000 the permit fee of $100 shall be paid **DEQ**: will vary based on permit requires (ie. Virginia Water Protection Permit) **USACE**: individual permits may require a fee up to $100 (case sensitive); additional permits related to a nationwide permit there are no additional permit fees **Local Wetland Board:** Wetland Permit fees vary (Refer to Table 2)	Counties, Cities and Towns are exempt from all other dredging royalties	Counties, Cities, and Towns are exempt from all other dredging royalties
Public Entity		✱	✓	✓		✓	✓			
Public Entity	✱		✓		✓	✓	✓			Counties, Cities, and Towns are exempt from all other dredging royalties
Public Entity		✱	✓		✓	✓	✓			
Private Entity	✱		✓	✓		✓	✓	**VMRC**: Dredging Permit is $25, but if the cost of the project is to exceed $10,000 the permit fee of $100 shall be paid **DEQ**: will vary based on permit requires (ie. Virginia Water Protection Permit) **USACE**: individual permits may require a fee up to $100 (case sensitive); additional permits related to mulit-user permits there are no additional permit fees **Local Wetland Board:** Wetland Permit fees vary (Refer to Table 2)	Exempt from all other fees and royalties due to being a maintenance dredging activity	$0.05 / ft^2 below MLW and the applicant may have to pay legal fees to obtain an easement for placement on private property
Private Entity		✱	✓	✓		✓	✓		$0.20 - $0.60, per cubic yard ; in the majority of cases the fee is $0.45	
Private Entity	✱		✓	✓	✓	✓	✓		Exempt from all other fees and royalties due to being a maintenance dredging activity	$0.05 / ft^2 below MLW and private land owners may need to obtain a permit for beach nourishment along and adjacent to private property
Private Entity		✱	✓	✓	✓	✓	✓		$0.20 - $0.60, per cubic yard ; in the majority of cases the fee is $0.45	
Public Private Partnership	✱		✓	✓		✓	✓	**VMRC**: Dredging Permit is $25, but if the cost of the project is to exceed $10,000 the permit fee of $100 shall be paid **DEQ**: will vary based on permit requires (ie. Virginia Water Protection Permit) **USACE**: individual permits may require a fee up to $100 (case sensitive); additional permits related to mulit-user permits there are no additional permit fees **Local Wetland Board**: Wetland Permit fees vary (Refer to Table 2)	Exempt from all other fees and royalties due to being a maintenance dredging activity	$0.05 / ft^2 below MLW and the applicant may have to pay legal fees to obtain an easement for placement on private property
Public Private Partnership		✱	✓	✓		✓	✓		$0.20 - $0.60, per cubic yard ; in the majority of cases the fee is $0.45	
Public Private Partnership	✱		✓		✓	✓	✓		Exempt from all other fees and royalties due to being a maintenance dredging activity	$0.05 / ft^2 below MLW and private land owners may need to obtain a permit for beach nourishment along and adjacent to private property
Public Private Partnership		✱	✓		✓	✓	✓		$0.20 - $0.60, per cubic yard ; in the majority of cases the fee is $0.45	

Appendix F – Notes and Additional Resources

Notes

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