Walops Assateague Chincoteague Inlet (WACI) Geologic and Coastal Management Summary Report

C. Scott Hardaway Jr.
Virginia Institute of Marine Science

Donna A. Milligan
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Christine A. Wilcox
Virginia Institute of Marine Science

Curtis Smith
Accomack-Northampton Planning District Commission

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Geologic and Coastal Management Summary Report

VIMS and Accomack-Northampton Planning District Commission

2015
Wallops Assateague Chincoteague Inlet (WACI)
Geologic and Coastal Management Summary Report

C. Scott Hardaway, Jr.
Donna A. Milligan
Christine A. Wilcox
Shoreline Studies Program
Department of Physical Sciences
Virginia Institute of Marine Science
College of William & Mary

And

Curtis Smith
Accomack-Northampton Planning District Commission

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October 2015
1 Introduction

The Seaside Special Area Management Plan (SAMP) has engaged many stakeholders to reduce use conflicts and enhance the productivity and resiliency of both natural systems and local water-based industries. The northern areas of the Seaside face a unique set of challenges related to established development and uses on the barrier islands of Wallops, Chincoteague, and Assateague that are not common to the remainder of the Seaside which is largely undeveloped and pristine (Figure 1-1). Wallops Island is host to NASA’s Wallops Flight Facility (WFF), the Mid-Atlantic Regional Spaceport (MARS), and a section of Chincoteague National Wildlife Refuge (CNWR). As Figure 1-1 indicates, the Chincoteague National Wildlife Refuge comprises of the following management units: Assateague Island, Chincoteague Island’s Wildcat Marsh and Morris Islands, Assawoman Island, and portions of Metompkin and Cedar Islands. In addition, the Refuge complex includes, Wallops Island NWR, Eastern Shore of Virginia NWR, and Fisherman Island NWR. Chincoteague Island hosts the Town of Chincoteague, a vibrant community with thriving tourism and seafood industries and a federally-designated Harbor of Safe Refuge. Assateague Island is host to the US Fish and Wildlife Service’s (USFWS) CNWR and National Park Service’s (NPS) Assateague Island National Seashore (AINS). These islands are located around Chincoteague Inlet, which provides access to inland and offshore waters which is critical for local and regional recreational and commercial economies.

These entities represent different types of ownership and management policies. WFF, USFWS, NPS are federal agencies, while the Mid-Atlantic Spaceport is owned by Commonwealth of Virginia. The Town of Chincoteague is locally managed, and The Nature Conservancy (TNC) is a private organization. The entire project area is located in Accomack County.

The purpose of this project was two-fold: 1) to provide the geologic background as to how the coastal land/seascape has evolved and what is and what is not currently well understood regarding how the geologic underpinnings may control shoreline evolution in response to storms, sea level rise, and various shoreline management activities and 2) to solicit reactions to the range of management alternatives in the area so that each stakeholder’s needs and desires can be better understood by the collective group. It was intended that this project may serve as an initial
discussion and sound basis that could ultimately lead to a regional interjurisdictional management plan that can enhance resiliency and productivity for everyone in this dynamic area by augmenting current research, planning, and shoreline management efforts already underway. The project consisted of four separate tasks: literature review and annotated bibliography, stakeholder meeting, summary report, and website creation. In order to better understand the physical system, a review of existing literature was performed. These reports and articles were obtained through internet searches and their contents summarized into an annotated bibliography.

On September 29, 2015, a meeting was held at CNWR Bateman Center. Federal and state stakeholders from several agencies, TNC, and Accomack County, and the Town of Chincoteague to discuss coastal issues that are of a high priority to the local community including:

1) Relocation of public beach at Assateague Island National Seashore
2) Ongoing re-nourishment of Wallops Island and fate of sand
   a. Northward transport to Chincoteague Inlet
   b. Southward transport to Assawoman Island and washover
3) Toms Cove Isthmus Stability
   a. Breach Potential and impacts to aquaculture and Town of Chincoteague

2  Coastal Setting

The overall the geologic evolution of WACI is not completely understood which creates unique management challenges in such a dynamic environment. We have a good handle on the general pattern of longshore sediment transport (LST) but the actual volumes are very much, estimates. Ongoing monitoring of the Wallops Beach fill should “clarify” LST along Wallops Island. We suspect that Chincoteague Inlet was entrenched in a paleochannel in the past (Oertel et al., 2008) but there needs to be more research into that important feature. It can affect the volume of material and sediment processes of the Chincoteague Inlet ebb shoal which are poorly understood and are important from a sand management perspective in WACI. The widening of Chincoteague Inlet over the past 20 years impacts the Town of Chincoteague but to what degree. The evolution of Fishing Point and Tom’s Cove are pretty well documented but the volume of the feature, LST and fate of the Tom’s Cove Isthmus are mostly based on maps. Coring and GPR (ground penetrating radar) would be most useful in that regard. Although the Assateague Island shoreline change is also well documented the future of the proposed public beach area is unknown. So, we have a pretty good handle on specific areas but we know less about the collective system which is critical to the WACI coastal management planning.

2.1 Physical

The Wallops-Assateague-Chincoteague Inlet (WACI) shore plan area is located within a larger shore reach that extends from Cape Henlopen at the mouth of Delaware Bay to Cape Charles which is at the mouth of Chesapeake Bay (Figure 2-1). However, the WACI shore is only one of three subreaches set within the larger coastal setting from southern Virginia to New York’s Long Island. These subreaches are defined morphodynamically and by the sediment transport within the reach. The first subreach (Cape Charles to Cape Henlopen) occurs along the Virginia, Maryland and Delaware coasts. The second subreach is along the New Jersey coast from Delaware Bay north to Raritan Bay. The third subreach is along New York’s Long Island. Each of these subreaches have similar sediment transport patterns. Sediment is transported north
on the northernmost end of the reach; there is an area of reversal south of which, the sediment is transported south (Figure 2-1). The VA-MD-DE shore is slightly different in that there is an area of reversal at Wallops Island which is at the boundary of sediment zone 1 and 2 where sediment is transported north.

The Virginia Eastern Shore has migrated south over the past 200,000 years (Bratton et al., 2013) forcing the Chesapeake Bay mouth southward (Figure 2-2). With each lowering of sea level during ice ages, the Susquehanna River channel would carry water and sediment far out onto the continental shelf to the ocean that existed at that time. During the last glacial age, the

![Figure 2-1](image1.png)

**Figure 2-1. Location of the WACI shore within the larger reach from Southern Virginia to New York’s Long Island (from McBride et al., 2013).**

Cape Charles Channel was formed just north of where the modern day shipping channel occurs. From a geologic perspective, 15,000 years ago the ocean of the Mid-Atlantic coast was about 60 miles to the East and sea level was about 300 feet lower, the last glacial age, the Wisconsin, Late Holocene (Coleman et al., 1988; Field, 1980; Tascano & York, 1992). Since that time, sea level has been rising at about 1 foot/100 years which is a simplification of the trend. The effect nonetheless is a transgressive sea flooding the coastal landscape which itself is a result of numerous episodes of the sea coming going in response to glacial and interglacial climate processes. Early research by Shattuck (1901, 1902, and 1906) characterized mid-Atlantic coastal morphology as the “terrace-formation” hypothesis. Later investigators included stratigraphic relationships in interpreting the coastal landscape. Jordan (1962) shows how fluvial systems interface with ocean during the Pleistocene (Figure 2-3). Kraft (1971) detailed the stratigraphic relationship of the Delaware coastal plain (Figure 2-4)

![Figure 2-2](image2.png)

**Figure 2-2. Positions of the Susquehanna River channels during several ice ages. With each successive sea level rise, sedimentation extended the Delmarva Peninsula southward and pushed the river channel southward as well (from Coleman, 1990).**

where transgressive Holocene sediments overly pre-Wisconsin stratigraphy.
Today, the coastal landscape continues to be a function of a rising sea level, projected to increase in the near future. The shoreline is the intersection of the land, sea and air and its movement, rate of change, is a measure of the impacts of not only long-term sea-level rise but the impinging wave climate. Early maps, based on John Smith’s maps, positioned Mid-Atlantic coastal features as early as 1621, but it was not until 1776 that the updated Anthony Smith map was printed (Stephenson and McKee, 2000). Coastal mapping had developed with some degree of accuracy by then. However, it was not until about 1840 that National Ocean Service T-sheets were developed that a reasonably accurate depiction of the ocean shoreline was constructed. Later survey efforts include the Survey of the Coast in 1852 and 1880, and the U.S. Coast and Geodetic Survey in 1882. In the early 1900s, topographic quadrangle maps were developed and the mean high water shoreline displayed. In 1937/1938, the first comprehensive aerial imagery was obtained, and aerial photography has been used up until the recent advent of Lidar. In 1980, the National Ocean Survey developed shoreline positions for the East Coast by topographic quadrangle from the mid-1850s through 1980. This included a varying number of field surveys and analysis of aerial imagery. For example, the Wallops Island quadrangle had 12 shoreline plotted at mean high water.

In an updated paper, Hapke et al. (2010) developed long-term shoreline change rate for the New England and Mid-Atlantic Ocean coasts (Figures 2-5 and 2-6). The long-term rates were developed along numerous coastal transects and included shoreline surveys 1800s to 1997/2000 along with short term rates from
Figure 2-5. Long-term and short-term erosion rates along the Virginia, Maryland, and Delaware shoreline. Long-term rates extend from the 1800-1997/2000 and the short-term rates from 1960/70s to 1997/2000 (from Hapke et al., 2010).

1960s-70s to 1997/2000. Within the data are coastal features, either natural, man-made or some combination, that effect the nature of shore change. These features also support the nature of sediment transport along the coast.

Delmarva North shore change region features the Cape Henlopen to Fishing Point “Hammer Headland”, along about 70 miles of coast. Hammer Headlands are coastal features that can be large or small but involve erosion of the inter drainage divides, both upland and nearshore that result in the addition of sand to the littoral system. The impinging wave climate, which is heavily influenced by nearshore bathymetry, forces the sediment either left or right along shore where there is usually a nodal point (Figure 2-1). The end points are often accretory features, spits, like Cape Henlopen and Fishing Point. The nodal point in this case lies somewhere between Indian River Inlet and Ocean City Inlet. The jetty features and consequent sand build on one side with erosion on the other attest to this. More recently, large beach nourishment projects at Ocean City and the Delaware beaches obviously modify the sediment budget and may amplify the coastal morphology accordingly.

Delmarva South features Wallops Island to Cape Charles and is more complex as the string of barrier island extends southward with multiple inlets. This reach of coast extends about 65 miles from Fishing Point to Cape Charles.

2.1.1 Assateague Island

Recently, Seminack and McBride (2015) described the coastal geomorphic dynamics of Assateague Island which is 36 miles long. Assateague Island is a wave dominated barrier island which are prone to breaching events and inlet formation. Both breaching and inlet formation occur during storms but breaches usually are shorter lived than actual inlets. According to Seminack and McBride (2015), Assateague Island has experienced many breaching events though out its recent history as a result of extratropical and tropical storm impacts. Eleven inlet events were identified from the late 1700s to 2011. In total, 34% of Assateague Island is estimated to contain tidal inlet fill. The inlet locations are shown in Figure 2-7 along with the inlet life span of each.

The Ocean City Inlet and Chincoteague Inlet were not described by Seminack and McBride (2015), but they are...
the bounding water bodies for Assateague Island. Ocean City Inlet was formed in an August 1933 hurricane and was subsequently jettied to maintain the opening. The impacts to longshore or littoral sediment transport (LST) have been obvious. With the net direction of LST being southward along Assateague, the sand has accumulated on the north side Ocean City Inlet (net accretion) with a consequent landward offset on the south (erosion). This is further evidence on the southward direction of sand transport along Assateague.

Another geomorphic feature that is evidence of the direction of LST is Fishing Point at the south end of Assateague Island. Fishing Point is a large accretionary spit feature that was non-existence in the mid-1850s. Old charts in 1690 show 5 inlets along what is now called Assateague Island (Figure 2-8) including Breach Inlet, today’s Ocean City Inlet. From a LST perspective inlets tend to interrupt the flow of sand as the material is caught up in the ebb and flood shoals. By 1880, all of the inlets have closed except for Green Run Inlet which at the time was closing. Other inlets including Ocean City Inlet in the 20th century developed on the north end of Assateague Island. It was between 1859 and 1908 that the Fishing Point Spit began forming possibly as a result of lack of littoral “interruptions” by inlets over time as proposed in Schupp (2013). There was also shore advance several miles north along Assateague Island that may have been part of the “improved” LST system.

Fishing Point has therefore evolved from a modest spit feature in 1908 to the large accretionary feature it is today. Along the way, as the spit migrated southward the area to the west, including old Assateague Inlet which was once open ocean became progressively more sheltered as a new lagoon, Tom’s Cove was created (Figure 2-9). With time Assateague Inlet
and Chincoteague Inlet combined to become one broad tidal inlet. LST also occurs along the
nearshore region and sand entered the ebb shoal region of Chincoteague Inlet making it a larger
feature, important to the overall sediment budget. Estimates of net LST along southern
Assateague Island range from $1.6 \times 10^5$ m$^3$/yr to $1.1 \times 10^6$ m$^3$/yr with a large percentage of
material trapped in sediment sinks of Fishing Point and Chincoteague Inlet (Finkelstein, 1983;
Headland et al. 1987; and Moffat Nichols, 1986). The average long and short term erosion rates
vary along Assateague Island (Figure 2-5) with erosional spikes south of Ocean City and Tom’s
Cove Isthmus as well as accretionary spike at Fishing Point.

The early spit feature became a
connecting isthmus by 1908 and acted as
zone of sediment bypass to the terminal end
for spit, Fishing Point. Today, the Tom’s
Cove isthmus connects the large vegetated
Fishing Point to Assateague Island. The
Tom’s Cove Isthmus is generally
unvegetated at its middle and breached in
the 2009 Northeaster but subsequently
closed (Figure 2-10). Any breach must
compete with the larger tidal prism of
Chincoteague Inlet.

The offshore region of Assateague
Island and much of the coast to Cape
Henlopen has many northeast/southwest
linear trending shoals (Figure 2-11). Field (1980) describes these a being formed by wave and
current processes acting on previously deposited sediments, and these sand bodies are being
formed and modified at the present. These shoals may impact the imping wave climate and
along the nearshore operate with the littoral zone of sediment transport. Many are sand rich and
are a good source of beach sands like the one used for the Wallop Island beach nourishment
projects in 2012 and 2015.

Assateague Island and much of the surrounding coast became part of the CNWR in 1943
and a public beach was established later. Over the past decade, frequent overwash events across
the beach parking lot require ongoing maintenance (Figure 2-12)

2.1.2 Wallops Island

The Delmarva south coast extends from Chincoteague Inlet to Cape Charles and consists
of numerous barrier islands along a tidal dominated system (Figure 2-13). The long and short
term shoreline change indicates a more complex island evolutionary history. This is due to the
numerous tidal inlets which trap sand and control in large part the littoral processes operating
along this reach.

The evolution of Fishing Point impacted Wallops Island as well. Wallops Island, begins
the string of smaller more tidally dominated barrier islands that extend to Cape Charles.
Wallops is also the north extent of what is called the arc of erosion or the Chincoteague Bight
which extends to down to Wachapreague. Wallops Island is bounded on the north by
Chincoteague Inlet and the south by Assawoman Island. Up until the early 2000s, Assawoman
Island was separated from Wallops Island by Assawoman Inlet which closed by 2007 (King et al., 2011).

Wallops Island has resided in the “lee” of Assateague Island as far back as 1690. The “headland” effect of Assateague Island is now exacerbated by the development of Fishing Point as well as the offshore shoals and large ebb shoal of Chincoteague Inlet. Historically, since the mid-1800s, Wallops Island has tended to erode along the south end and accrete along the north end. When Assawoman Inlet closed, the LST was able to operate along a continuous shore reach. Shoreline change in the WACI zone is illustrated in Figure 2-14.

Wallops Island became the site of the NASA’s Goddard Space Flight Center’s WFF in 1945. Rocket launch facilities and support buildings were located along the coast. Chronic shoreline erosion caused the WFF to initiate

Figure 2-11. Bathymetry offshore Assateague Island. Extensive offshore shoals indicate potential sources of beach sand. The black dots indicate fine-medium sand thicknesses of > 3 m. (from Field, 1980).

Figure 2-12. Chincoteague NWR parking area in 1991 (on the left) and during an overwash event in 2003 (on the right), (from USFWS, 2011).
shore protection installations. A steel sheet pile wall was installed in 1956 followed by a series of wood groins in 1959 (Figure 2-15). The wall failed in the 1962 Ash Wednesday Storm resulting filling the south end of the island and in the addition of more groins by 1972. These measures
were inadequate and were abandoned in lieu of using rock for a long seawall (Figure 2-16). After 10 years of constant maintenance, WFF engaged Moffat & Nichol to perform shoreline modeling to ascertain the nature of sediment transport (Figure 2-17). The sediment budget of the WACI zone shows over 1 million cy/yr of LST southward along Assateague Island. The updated model results are shown in Figure 2-18 that illustrate the persistent nodal zone on Wallops Island where transport diverges north and south.

The beach fill project of 2012 utilized sand from the offshore shoal designated Shoal A. Hopper dredges were used to bring the sand to the nearshore where it hooked up to a SCOTS buoy and pumped ashore (Figure 2-19). Post 2012 beach fill is shown in Figure 2-20. Hurricane Sandy impacted the region...
shortly thereafter causing loss of beach fill both along shore, off shore and as washover across the southern end of Wallops Island (Figure 2-21). Post Sandy surveys show the dramatic sequence of events in a typical cross section about mid-project (Figure 2-22).

Assawoman Island and the other Eastern Shore barrier islands have their own history of shoreline change and as seen in Figure 2-5 where the tidal inlets control the longshore sediment transport processes. At the nodal zone on south Wallops Island the net movement of sands is to the south.

2.1.3 Chincoteague Inlet

As seen in the previous sections Chincoteague Inlet has evolved largely in response to evolution of Fishing Point and to a lesser degree the north end of Wallops Island. The inlet throat had narrowed to about 1,800 feet by 1994, but then it slowly has gotten wider as the terminal end of Fishing Point migrated southward not westward. The inlet throat widened to about 6,400 feet by 2013 which may account for increased concern by the Town of Chincoteague of more wave energy now allowed through the inlet.

Tidal inlet morphology (inlet cross-sections) is typically a function of the tidal prism, and in the case of Chincoteague Inlet, it is a function of the area of Chincoteague Bay and the tide

Figure 2-18. Result of GENESIS modeling. Note the littoral sediment transport nodal zone (from Fenster and Bundick, 2015).

Figure 2-19. Project overview showing borrow area, transit routes, pump out areas, beach fill, and seawall repair (from NASA, 2013).
range. Water quality was modeled in a study of Chincoteague Bay. The tide range within the Chincoteague Bay tidal system (Figure 2-23) decreases northward then increases again as a function the estuary narrowing into Sinepuxent Bay and the narrow tidal connection to Ocean City Inlet. The tidal volume and rate of turnover is shown to be between 3.9 and 4.4 tidal cycles. Tidal current running in and
out of Chincoteague Inlet are reported to be significant, but no data can be found to support this.

Sediment transport processes around Chincoteague Inlet include about a 1.0 million cy of sand coming down from Assateague Island that gets caught up in the ebb shoal and eventually may bypass to the south past Wallops Island. The shoaling is clearly seen in the 1949 aerial image (Figure 2-24) and the nature of the sand bypassing may be similar to that at Ocean City inlet (Figure 2-25).

Chincoteague Inlet is a federal navigation channel and the USACE performs maintenance dredging since 1995 (Table 2-1). It is 200 feet wide with a controlling depth of 12 feet. The latest bathymetry for the inlet throat is shown in Figure 2-26 showing infilling from the Fishing Point side of the channel. Past disposal areas include an area off of Wallops Island (Figure 2-27). The channel is currently being dredged for maintenance (USACE, personal comm., 2015). The material from the interior channel will be placed in the designated upland disposal site, and the entrance channel sandy material will be placed in the designated disposal area just offshore of Wallops Island.

Figure 2-23. Water depth and mean tide range in meters in Chincoteague Bay (from Allen et al., 2007).

Figure 2-24. 1949 aerial photo of Chincoteague Inlet from the VIMS archives.
2.2 Hydrographic Setting

Sea level rise is the underlying force behind shoreline change and varies globally depending on the tectonic setting of the coast. For the Mid-Atlantic sea-level rise since the last low stand, 15,000 years ago in illustrated in Figure 2-28. Future projections are complex based on various models; therefore three levels of SLR are provided in Figure 2-29. For planning, the 50 year scenario is preferred.
The mean tide range in the WACI zone is 3.67 ft (1.12 m) measured at Wallops Island. As discussed earlier the tidal flushing in and out of Chincoteague Bay has been modelled as only a few days. Water levels are elevated during storm events. Historic storm surge elevations for Wallops Island are shown in Figure 2-30. According to NASA (2013), more recently Hurricane Irene in 2011 and Hurricane Sandy in 2012 had comparable storm surges of 5 ft. At Wachapreague, about 25 miles south, Sandy storm surge levels exceeded 8 ft MLLW (NOAA, 2012).

The wave climate along the Mid-Atlantic coast is function of the frequency, speed and duration of the local winds (Figure 2-31). This region experiences predominantly winds from the south-southwest during the summer mostly between 11 to 22 miles/hr (5 to 10 m/s). During
the winter, winds are generally from the northwest quadrant with wind speeds frequently greater than 22 miles/hr (10 m/s) (Carruthers et al., 2011). However, along with nearshore bathymetry, northeast storms and the infrequent hurricane can control, in part, the sediment transport processes operating along a given coast.

Figure 2-29. Three projected sea level rise scenarios through 2100 (from Smith, 2015).

Figure 2-30. Storm tide frequency curve for Wallops Island, VA showing observed tide levels during major events (from Moffat & Nichol, 1986).
The WACI coastal neighborhood (Figure 1-1) consists of: Accomack County, Accomack-Northampton Planning District Commission, Town of Chincoteague, The Nature Conservancy, NASA, U.S. Fish and Wildlife Service, and the National Park Service. Other entities that have regulatory oversight in the region include: Commonwealth of Virginia, US Army Corps of Engineers, and the Bureau of Ocean Energy Management. Presently, many efforts are currently underway in the WACI coastal neighborhood including but limited to:

- University of Virginia - Long-term Ecological Research Project (LTER)
- NASA Wallops – Environmental Assessments for Shore projects
- NASA Goddard Space Flight Center (GSFC); WFF and Marine Science Consortium (MSC)
- 2009- Mid-Atlantic Regional Council on the Ocean (MARCO), Eastern Shore North coast SAMP (Special Area Management Plan)
- 2010-Present - Eastern Shore of Virginia Climate Adaptation Working Group (CAWG)
- 2014-2016 - TNC Hurricane Sandy National Fish and Wildlife Foundation Coastal Resilience Funds to enhance coastal resilience from the National Fish and Wildlife Foundation
- 2014- Mid-Atlantic Coastal Resilience Institute
- 2015 FWS – Chincoteague and Wallops Island NWR Final Comprehensive Conservation Plan (CCP)
- 2015 NPS – Assateague Island National Seashore General Management Plan
- 2015 USGS - Sediment collection offshore Delmarva Peninsula.

Shoreline management strategies were developed by Wallops, FWS, and TNC for inclusion in the Barrier Island-Inlet Evolution Model currently under development and funded by...
a NFWF grant to TNC (Table 3-1). More recently, USFWS concluded that the beach nourishment component option should be removed from consideration due in part to cost and maintenance as outlined in the final Comprehensive Conservation Plan (USFWS, 2015) (Figures 3-2 and 3-3). Wallops will continue to protect its infrastructure with beach nourishment and maintain its rocks seawall. The beach will require ongoing maintenance. TNC concluded that modeling the natural migration of barrier islands is preferred.

The following entities were represented at a meeting on September 29, 2015 at the Chincoteague NWR: Accomack County, Accomack Northampton Planning District Commission, Town of Chincoteague, The Nature Conservancy, NASA, U.S. Fish and Wildlife Service, National Park Service, U.S. Army Corps of Engineers, U.S. Geological Survey, and the Virginia Marine Resources Commission. The purpose of the meeting was to initiate the development of an interjurisdictional framework. The stated goals of the meeting were to:

1) Provide the geological background as to how the coastal landscape has evolved; and
2) Solicit reaction so that we can better understand each stakeholder’s needs and desires.

Discussed were: Relocation of public beach at Assateague Island National Seashore

1) Ongoing re-nourishment of Wallops Island and fate of sand
   a. Northward transport to Chincoteague Inlet
   b. Southward transport to Assawoman Island and washover
2) Toms Cove Isthmus Stability
   a. Breach Potential and impacts to aquaculture and Town of Chincoteague

During the discussion period of the meeting, several concerns were raised by the local constituents. These are: 1) the recession of Fishing Point and consequent widening of Chincoteague Inlet which exposed the Town of Chincoteague to storm surge; and 2) the narrow isthmus along the ocean side of Tom’s Cove may breach under storm attack threatens Fishing Point as well as the oyster grounds and aquaculture in Tom’s Cove. Will a permanent inlet form?

A series of questions were posed about what research questions and specific issues needing to be addressed further:

- What can be done to protect the welfare of the residents of Chincoteague Island and Accomack County in the immediate and long-term future?
- On Assateague Island: What is the long term plan for the new beach?
- Will allowing inlets/breaches to remain open along Assateague Is reduce LST and threatened the Tom’s Cove Isthmus?
- Can a breach in Tom’s Cove Isthmus sustain itself?
- Will WFF beach fill increase shoaling in Chincoteague Inlet?
- What is the contribution (s) of LST into Chincoteague Inlet? How was Chincoteague Inlet formed?
- Can Chincoteague Inlet dredge material be put on shore either at WFF or Assateague Island?
- How can the fines be utilized? Thin layering across tidal marsh?
- What are LST impacts of WFF beach fill to Assawoman Island and backbarrier marshes?
- Can WFF beach fill be “governed” with coastal structures to increase beach fill residency?
- Is back passing WFF beach a viable option?
Table 3-1. Summary of identified management actions for inclusion in the barrier island-inlet evolution model presently under development by The Nature Conservancy and the Accomack Northampton Planning District Commission.

<table>
<thead>
<tr>
<th>Summary of Identified Management Actions for Inclusion in the Barrier Island-Inlet Evolution Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Fish and Wildlife Service Chincoteague National Wildlife Refuge and National Park Service Assateague Island National Seashore:</td>
</tr>
<tr>
<td>- Sand fencing along dune line of Assateague Island beaches between Swan Cove Trail and the old Coast Guard Station on Toms Cove Hook.</td>
</tr>
<tr>
<td>- Sand fencing and dune recontouring between Swan Cove Trail and the old Coast Guard Station on Toms Cove Hook.</td>
</tr>
<tr>
<td>- Beach replenishment between Swan Cove Trail and the old Coast Guard Station on Toms Cove Hook.</td>
</tr>
<tr>
<td>- Permanent inlet breaches that occur along Assateague Island caused by storms that are maintained and allowed to persist versus filling in and repairing.</td>
</tr>
<tr>
<td>NASA Wallops Flight Facility:</td>
</tr>
<tr>
<td>- Continue to protect Wallops Island by full beach fill and extension and maintenance of 4,600-ft seawall.</td>
</tr>
<tr>
<td>The Nature Conservancy Barrier Islands:</td>
</tr>
<tr>
<td>- Natural migration (no action)</td>
</tr>
</tbody>
</table>

*Please note:* At the request of participants, The Nature Conservancy agreed to follow up with the modelers to determine whether modeling erosion control actions on the islands would provide useful information regarding impacts of rising seas and storms on islands to the aquaculture industry and the mainland. In conversations with the modelers since the workshop, the Conservancy has concluded that the model will not directly provide this type of information, and thus only natural migration will be modeled for Conservancy-owned islands.
Table 3-2. Summary of preliminary draft alternatives (from USFWS, 2015).

<table>
<thead>
<tr>
<th>CCP Purpose</th>
<th>CCP/EIS Section</th>
<th>Preliminary Draft Alternatives</th>
<th>Components from Scoping</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Achieve refuge purposes.</td>
<td>1.4</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>Fulfill the Refuge System mission.</td>
<td>1.5</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Maintain and, where appropriate, restore the ecological integrity of the refuge and Refuge System.</td>
<td>1.6</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Help achieve goals of the National Wilderness Preservation System.</td>
<td>1.7</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Meet other mandates.</td>
<td>1.8</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Address significant local concerns: climate change and sea level rise; regional conservation; balance between public use and wildlife conservation; public access to the refuge, in particular to the recreational beach; impact to visitor experience; and impact to local economy.</td>
<td>1.9</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

● = positive contribution toward achieving purpose;
○ = negative contribution (detract from achieving the purpose); and
● = no contribution (neutral).

Table 3-2. Summary of preliminary draft alternatives (from USFWS, 2015).

<table>
<thead>
<tr>
<th>Issue</th>
<th>Alternative A</th>
<th>Alternative B</th>
<th>Alternative C</th>
</tr>
</thead>
</table>
| Recreational Beach | • Continue to allow NPS to manage a 1-mile recreational beach.  
• Continue to allow NPS to maintain 8.5 acres of land (and preserve the capacity of 961 spaces) for parking at the existing recreational beach as long as suitable land base directly behind the recreational beach remains.  
• Continue to coordinate with NPS and the town of Chinoteague to identify a suitable off-site beach parking area for future use once existing beach parking is lost due to lack of suitable land base behind the recreational beach.  
• In being consistent with the 1995 Master Plan, as storms and other natural forces eliminate parking spaces adjacent to the beach, implement an alternate means of transportation such as a shuttle system.  
• Allow hiking/intertidal zone access north of recreational beach. | • Continue to allow NPS to manage a 1-mile recreational beach.  
• Relocate recreational beach and parking approximately 1.5 miles north of current area.  
• Allow hiking/intertidal zone access north of recreational beach.  
• Allow pedestrian access south of recreational beach outside of breeding season, between approximately September 16 and March 14. | Same as alternative B, except:  
• Reduce beach parking to 480 spaces (approximately 4.25 acres)  
• Coordinate with NPS and the town of Chinoteague to identify a suitable off-site beach parking area, as close to the beach as possible, and institute a shuttle service from off-site parking to recreational beach for use during specific times of the year when parking capacity exceeded (anticipated to be every weekend in May and September and every day from Memorial Day weekend through Labor Day weekend). |
| Service Road    | • Maintain current access of the Service Road.                                                                 | • Close Service Road to private motor vehicles north of relocated parking except by special use permit or special day use privileges/openings. Hiking allowed. | • Close Service Road to all public access north of relocated parking except by special use permit or special day use privileges/openings. |
4  WACI Management Structure

General consensus was reached during the meeting that an interjurisdictional planning effort was appropriate. Two opportunities for continuing the process were identified during the meeting and are described below.

4.1  Strategic Planning (SAMP)

While many issues and research needs were identified, it was generally agreed that any strategic process initiated needed to be limited and focused to only a few specific high priority items. Furthermore, it is important that any strategic planning consider existing planning efforts in the area including MACRI and the TNC Coastal Resilience project. The planning effort would provide an opportunity for the collective group of stakeholders to communicate regularly regarding ongoing and future management decisions and new scientific research and information. The A-NPDC was identified as the likely coordinating entity to maintain a link to each of the property owners and stakeholders in the WACI coastal neighborhood. The Virginia Coastal Zone Management Program and the Bureau of Ocean and Energy Management were identified as two potential funding sources that could support this work.

To support this process, VIMS has developed a website as part of this grant that has taken links from USGS etc. that can act as a working model for information sharing.

4.2  Chincoteague Inlet, Ongoing Dredging Project

A second option for the WACI stakeholders to collectively participate in meetings focused on the ongoing USACE maintenance dredging of Chincoteague Inlet. This project could serve as an opportunity to see if a sand management approach to utilizing the sandy dredge material for beach nourishment could be an effective management approach. At a later time, the group could then reconvene to initiate a strategic planning process to address other issues and needs of greatest concern as described in Section 4.1.

The current inlet management plan is to maintenance dredge the channel twice a year, one spring and one fall. The interior channel including the Coast Guard Station basin consists of mostly fine grained sediments that taken to the upland disposal area. The outer channel, the outer bar, consists of sandy material that is taken to the disposal area off Wallops Island. This volume of material is typically about 10,000 cy and is dredged by split hull barges that use “dust pan” type dredging to fill the barge which carries it to the disposal site. The hull then opens and the dredge material drops to the seafloor. Typically, these dredges can carry about 500 cy/cycle.

At this point, this is the most cost-effective and responsive method of maintenance dredging Chincoteague Inlet. It usually takes a larger volume of material to make beach nourishment cost-effective. An alternative may be to perform a lateral advance maintenance at the outer bar, increase the dredge volume enough to make placing on or closer the shoreline more cost-effective. This could decrease the dredging frequency and may provide a safer channel of passage for a longer time span. This option would be part of the long-term planning in the WACI coastal management plan.
5 References


Finkelstein, K., 1983, Cape formation as a cause of erosion on adjacent shorelines; Proceedings Coastal Zone ’83, American Society of Civil Engineers, p. 620-640.


Appendix A

List of Participants in the September 29, 2015 Meeting
### WACI Meeting Attendees

<table>
<thead>
<tr>
<th>First</th>
<th>Last</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jill</td>
<td>Bieri</td>
<td>TNC</td>
</tr>
<tr>
<td>Rob</td>
<td>Bloxom</td>
<td>Delegate</td>
</tr>
<tr>
<td>Michael</td>
<td>Bonsteel</td>
<td>NASA/USACE</td>
</tr>
<tr>
<td>Josh</td>
<td>Bundick</td>
<td>NASA</td>
</tr>
<tr>
<td>Deborah</td>
<td>Christie</td>
<td>Congressman Scott Rigell</td>
</tr>
<tr>
<td>Susan</td>
<td>Conner</td>
<td>USACE</td>
</tr>
<tr>
<td>Gwynn</td>
<td>Crichton</td>
<td>TNC</td>
</tr>
<tr>
<td>Hillary</td>
<td>Essex</td>
<td>ANPDC</td>
</tr>
<tr>
<td>Michael</td>
<td>Fenster</td>
<td>Randolph-Macon</td>
</tr>
<tr>
<td>Emily</td>
<td>Hein</td>
<td>VIMS</td>
</tr>
<tr>
<td>Kevin</td>
<td>Holcomb</td>
<td>FWS</td>
</tr>
<tr>
<td>Mark</td>
<td>Hudgins</td>
<td>USACE</td>
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<tr>
<td>Bill</td>
<td>Hulslander</td>
<td>NPS</td>
</tr>
<tr>
<td>Kristen</td>
<td>Hunt</td>
<td>Atkins</td>
</tr>
<tr>
<td>David</td>
<td>Lin</td>
<td>NASA</td>
</tr>
<tr>
<td>Caroline</td>
<td>Massey</td>
<td>NASA</td>
</tr>
<tr>
<td>Donna</td>
<td>Milligan</td>
<td>VIMS</td>
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<tr>
<td>Hollis</td>
<td>Parks</td>
<td>Accomack Co.</td>
</tr>
<tr>
<td>Robert</td>
<td>Ritter</td>
<td>Town of Chincoteague</td>
</tr>
<tr>
<td>Kevin</td>
<td>Sloan</td>
<td>USFWS</td>
</tr>
<tr>
<td>Curt</td>
<td>Smith</td>
<td>A-NPDC</td>
</tr>
<tr>
<td>Wanda</td>
<td>Thornton</td>
<td>Accomack Co.</td>
</tr>
<tr>
<td>Christine</td>
<td>Wilcox</td>
<td>VIMS</td>
</tr>
<tr>
<td>Gregg</td>
<td>Williams</td>
<td>USACE</td>
</tr>
</tbody>
</table>

### Conference Called In

- Troy Anderson, FWS
- Laura Brothers, USGS
- Tom Minetti, FWS
- Courtney Schupp, NPS
- Tony Watkinson, VMRC