Catlett Islands Reserve Component Resource Management Plan

Chesapeake Bay National Estuarine Research Reserve - Virginia

2025 Update

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CHESAPEAKE BAY NATIONAL ESTUARINE RESEARCH RESERVE VIRGINIA

VIMS | WILLIAM & MARY
VIRGINIA INSTITUTE OF MARINE SCIENCE

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In Case of Emergency:

Medical: 911
Gloucester Sheriff Department: (804) 693-3890
Fire: VA Department of Forestry (434) 220-9036
Oil/Chemical Spill: (800) 424-8802
Department of Wildlife Resources:
    Charles City Office: (804) 829-6580;
    Violations: (800) 237-5712
Virginia Marine Resources Commission:
    Middle Area Office: (804) 695-1936
Machicomoco Park Headquarters: (804) 642-2419

Basic Information:

Closest address: 3601 Timberneck Farm Rd, Hayes, VA 23072
County: Gloucester
HUC12: Carter Creek/York River - 020801070203
Zoning: Rural (R-1)
Acres: 463 (Gloucester Co. 2024)
Parcel Numbers: 44-87; 44-89; 44-90; 44-91; 45-64; 45-65
Flood Zone: AE High Flood Risk

Figure 1: *Map of the Catlett Islands Reserve Component.*

Introduction

The Catlett Islands (Figure 1) are one of four Reserve Components of the Chesapeake Bay National Estuarine Research Reserve System in Virginia (CBNERR-VA) (Figure 2). The National Estuarine Research Reserve program is administered nationally by the National Oceanic and Atmospheric Administration (NOAA) Office of Coastal Management for the primary purpose of addressing national estuarine research and management issues.

Figure 2: *The Catlett Islands Reserve Component in relation to the other CBNERR-VA components along the York River.*

The purpose of this management plan is to guide the adaptive management of the Catlett Islands Reserve Component that supports the overall CBNERR-VA mission to enhance stewardship, protection and management of estuaries, generate and transfer scientific knowledge to coastal communities, and advance environmental literacy and appreciation of estuaries (Reay et al. 2022).

Site Goals:

The primary management goal for the Catlett Islands component is to maintain a functioning ecosystem to support informed management of coastal resources through estuarine research, education, stewardship, and advisory service.

Figure 3: *Parcel Map of Catlett Islands*

Background and Current Conditions:

The Catlett Islands (37° 18’ N; 76° 33’ W) are located approximately 18 km (11 mi) from the mouth of the York River and 8 km (5 mi) from the Virginia Institute of Marine Science (VIMS), on the North side of the York River in Gloucester County, Virginia. The site consists of parallel ridges of forested wetlands surrounded by mesohaline saltmarshes (Figure 1). The Islands share an upland boundary with Machicomoco State Park to the north, Cedarbush Creek to the west, Timberneck Creek to the east and the York River to the south (Figure 1). The two main islands are divided by Poplar Creek. A portion of the North Island (~32 ha; ~79 ac) is privately owned by the Ablowich Family Joint Trust (Figure 3). Timberneck creek is approximately 4.1 miles long and drains 3.83 sq miles of land. Cedarbush creek is 3.7 miles long and drains 2.57 sq miles. CBNERR-VA purchased Parcel 44-65 in 2003, and the remainder of the property in 2012 from Timberneck Farms LLC. A conservation eastment on the property restricts any new buildings, piers, and roads, as well as any commercial or industrial activities (Appendix A). CBNERR-VA and the Department of Conservation and

Recreation (DCR) have a joint memorandum of understanding (MOU) to ensure consistency in management (Appendix B). The site is accessible via boat or by foot through Machicomoco State Park.

History and Cultural Resources:

Prior to colonization, the islands were inhabited by Native Americans from the Late Archaic until the Late Woodland period. The Catlett Islands were part of the Powhatan Indian Confederation at the time the first English settlers arrived in 1608 (Blanton et al 1993). Powhatan's home at Werowocomoco (translation: Place of Leadership) was identified in 2002, approximately 16 km upstream from the Catlett (NPS 2025). The Catlett Islands' English ownership (post-colonization) began as a King's Grant to George Menefie (Minifye) in 1639. Following Menefie's death, the islands passed through several hands, including the well-known Mann and Page families, coming under the ownership of the Catlett family in 1792. Throughout the 19th century, the islands likely served as satellite farms and housed enslaved African Americans who worked on the land (Brown and Harpool 2022). During the two centuries that the Catlett family owned the property, the site was operated as a commercial farm (Blanton et al 1993). In 1991, when the Catlett Islands Reserve Component was initially designated as part of the CBNERR-VA Reserve system, it was privately owned by the Catlett family and managed by CBNERR-VA/VIMS via a conservation easement and MOU with the owners (Appendix A). A single parcel was purchased in 2003 and the remainder of the property was purchased by the College of William & Mary (WM) and the Virginia Institute of Marine Science (VIMS) in 2012; CBNERR-VA continues to manage it today. Works by Blanton et al. (1993) and Brown and Harpole (2022) contain a more extensive description of the history of ownership of the property.

A cultural resource assessment was conducted by WM in conjunction with CBNERR-VA staff, the Fairfield Foundation, and the Virginia Department of Historic Resources (VDHR) for the Timberneck Farm property and Catlett Islands in 1993, 2015, and again in 2022 (Blanton et al 1993; Lowery 2015; Brown and Harpole 2022). Artifacts found indicate that during the Archaic period (10,000-2,500 B.P[1]), the site was primarily used as several short term camps for small groups looking for food on a seasonal basis. However, changes in water level play an important role in what has been found, as during the Archaic period, terraces off of the island's shorelines were likely exposed. Any sites on these terraces are now underwater. During the Woodland period (2,500 BP - 400 BP) sites were primarily temporary camps as well, though there are indications that there was a base camp and village in the area. Locations of the camps seem to indicate that the gradual inundation in low lying areas encouraged movement upland. Sites from the 17th, 18th and 19th century indicate plantation tobacco agriculture, small domestic homes, farmsteads, and hunting or fishing camps. In the 1900's, there is evidence that the site was used to graze cattle. Many of these cultural sites are presently threatened by sea level rise and shoreline erosion. Lowery's 2015 report notes that four previously recorded sites are now underwater. The Brown and Harpole (2022) report recommends one site in the forest habitat on the South Island as potentially eligible for inclusion in the National Register of Historic Places, so care should be taken to avoid damaging actions near this site.

Maps from 1857 show housing and fields present on the islands. Aerial images from the Department of Forestry indicate the presence of a homestead and orchard, pastures, at least three roads and a pier in 1937. A summer cottage on the property was abandoned due to Sea Level Rise in 1985 along with a hunting lodge. The last remaining structure on the islands is a small hunting cabin that has been boarded and therefore, needs to be removed. Due to the sensitive nature of these cultural sites, maps of the locations are not included in this report but are available from the Reserve upon request.

Physical Conditions:

The Catlett Islands are a microtidal site that experiences semi-diurnal tides. While the Catlett Islands site is located in the York River Poly Haline - "YRKPH" Bay Segment for the Chesapeake Bay Program, the Catlett Islands Reserve Component is considered a mesohaline site (8-18ppt). Available CBNERR-VA datasets include

1 *BP in archaeology refers to "Before Present" which uses A.D. 1950 as the reference point for present. E.g. 2000 BP refers to 50 BC.*

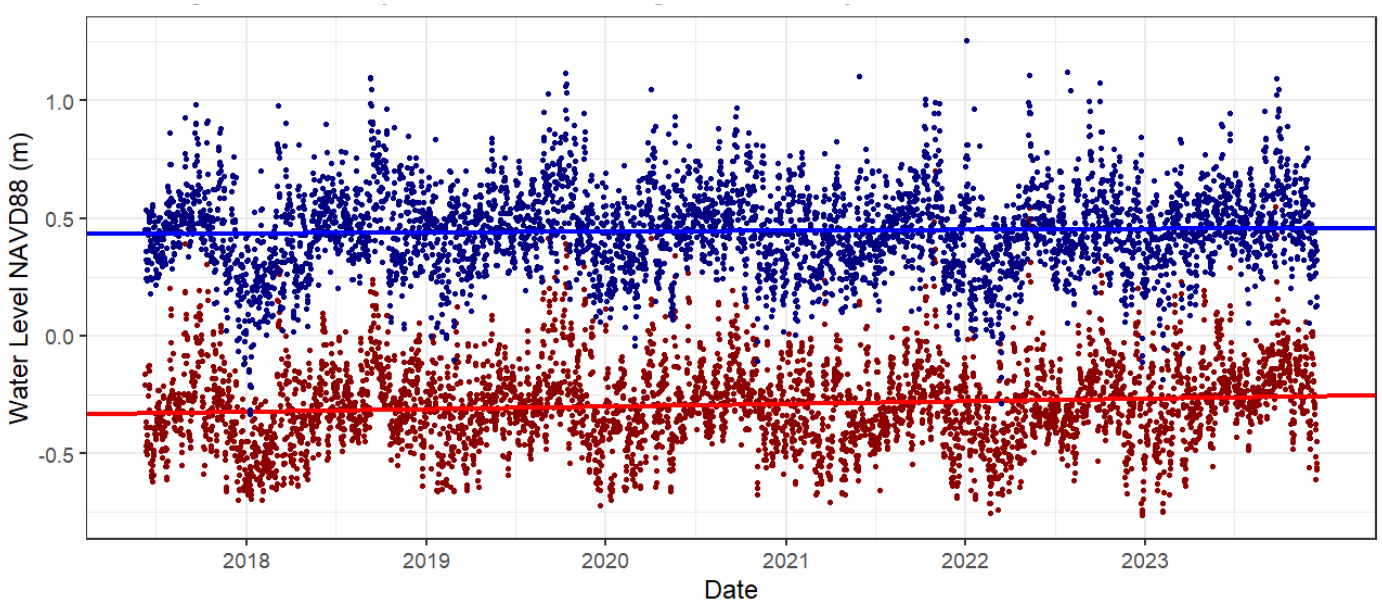

Figure 4: *Daily High (Blue) and Low (Red) tides from the radar water level gauge on the Machicomoco pier were plotted from June 2017 to December 2023. Short term rates show Mean High Water (MHW) rising at 3.91 mm/yr, and Mean Low Water (MLW) rising at 11.2 mm/yr.*

monthly nutrient sampling accessed via the NERRS Centralized Data Management Office (CDMO) and water level data accesed via CBNERR-VA. Using data from the on-site radar water level logger, the calculated tidal range is 0.74m with MLLW at -0.324m NAVD88 and MHHW at 0.505m NAVD88 (June 2017 - Dec 2023). These values are approximately 14 cm higher than the datums from the current NOAA tidal epoch (1981–2001). Tidal epochs are calculated using 19 year time ranges. The relative Sea Level Rise (SLR) rate from the on-site logger is 8.36mm/yr, though this is higher than long term rates for the York River, which vary from 4.87mm/yr (Yorktown - NOAA 2024) to 6.85 mm/yr (Chen and Kirwan 2023). See the section on SLR below for more detailed information. Interestingly, MLW appears to be increasing faster than MHW, narrowing the tidal frame. This may result in a habitat squeeze for both high and low marsh species as they try to migrate (Figure 4) and is similar to modeled results across Chesapeake Bay marshes (Lee et al. 2017, Ross et al. 2017). Upstream water quality stations include CBNERR-VA Claybank and Chesapeake Bay Program (CBP) LE4 stations.

Figure 5: *A Ribbed Mussel (Geukensia demissa) feeds near two Marsh perriwinkles (Littorina irrorata) and Saltmarsh cordgrass (Spartina alterniflora).*

Geology and Biology:

The Catlett Islands feature a ridge and swale topography. The landscape is most known by its alternating elevated ridges and low-lying swales, creating dynamic and unique habitats. The topography within the Reserve and the surrounding area is a result of rapidly changing sea level as a result of climate-driven changes in the ice caps during the late pleistocene (Hobbs 2009, Finklestein and Hardaway 1988). This would result in long-term erosion of the shoreline at periods of higher sea level, followed by deposition of sediment during periods of lower sea level. The fringing marshes that characterise the site now formed about 2,000 BP (Finklestein and Hardaway 1988).

Primary ecological community groups occurring within the Reserve include tidal meso and polyhaline marshes, forested

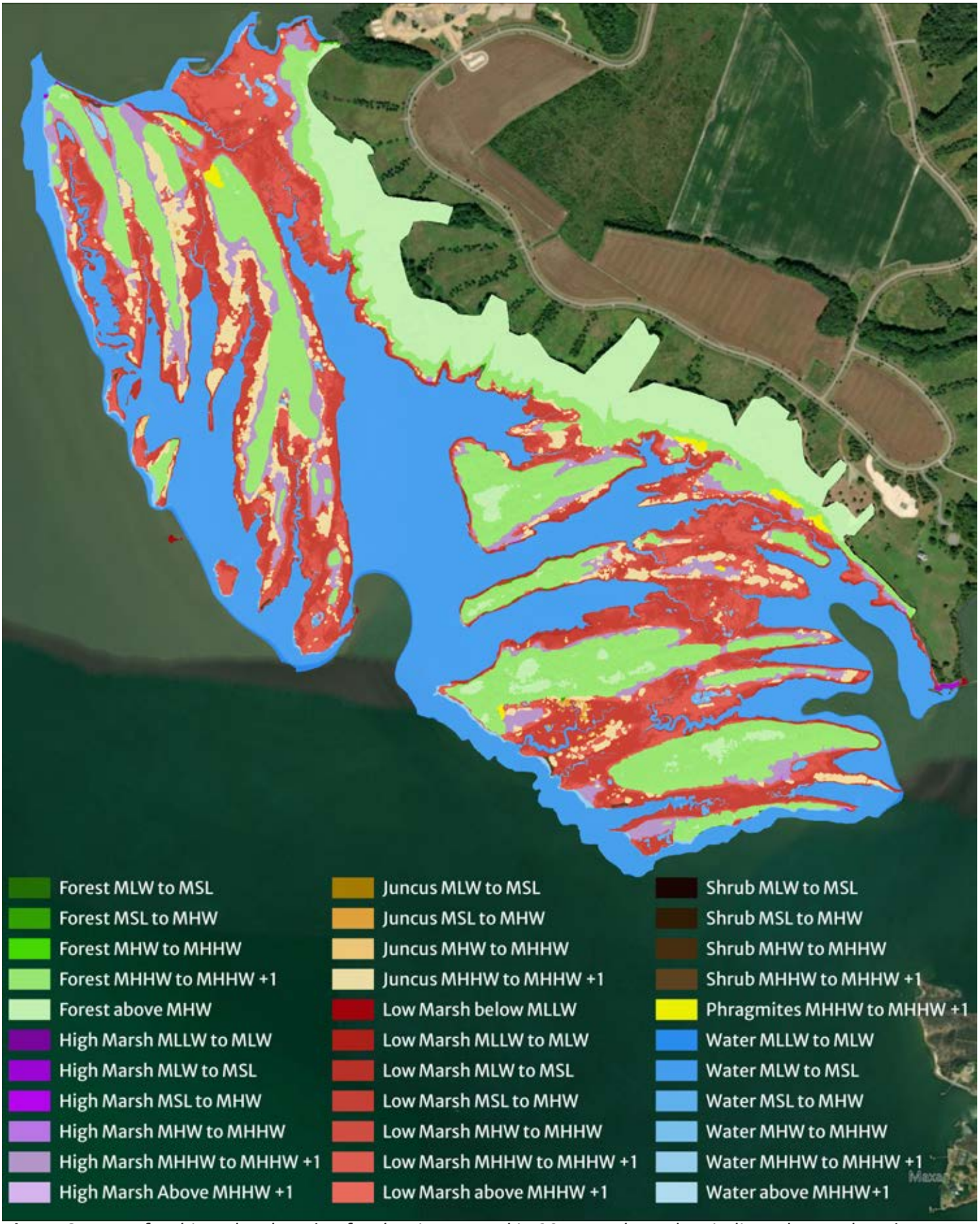

Figure 6: *Map of Habitats by Elevation for the site created in 2017. Darker colors indicate lower elevations. Elevation data is from USGS Coastal National Elevation database (CoNED) https://doi.org/10.5066/F7Z60MHJ. Datums are calculated from radar data at the site from 2017 to 2023.*

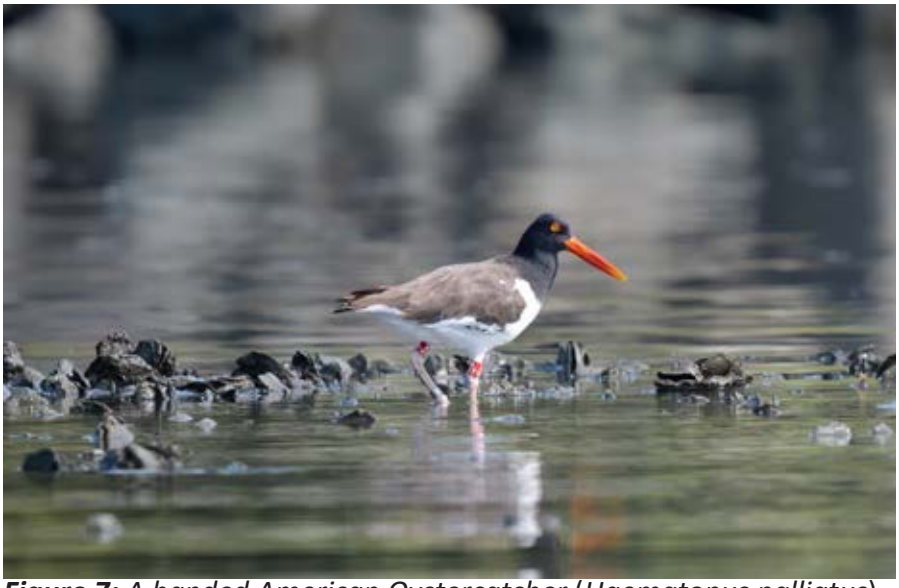

Figure 7: *A banded American Oystercatcher* (*Haematopus palliatus*) *stands on the intertidal oyster reef. Credit: David Yeager.*

wetlands, and maritime upland forests (Figure 6). The marsh area is primarily dominated by smooth cordgrass (*Spartina alterniflora*), predominately in 'short form', along with spike grass (*Distichlis spicata*), saltmeadow hay (*Spartina patens*), black needlerush (*Juncus roemerianu*s), and various halophytic forbs. Occurring in transitional areas from salt marsh to forested wetlands and hammock regions, estuarine scrub/shrub vegetation includes saltbush or high-tide shrub (*Iva frutescens*), groundsel tree (*Baccharis halimifolia*), southern bayberry (*Myrica cerifera*), and northern bayberry (*Myrica pennsylvanica*).

The upland habitat consists of multiple parallel ridges of maritime forest dominated by several oak species (*Quercus phellos, Q. falcata, Q. pagoda*), loblolly pine (*Pinus Taeda*), and to a lesser degree, black cherry (*Prunus serotina*), red maple (*Acer rubrum*), and black gum (*Nyssa sylvatica*). For more information see the 2024 Department of Forestry Report in Appendix D.

Although shellfish grounds near the Reserve are condemned, there are seven leases adjacent to the islands. There is also an intertidal oyster reef off of the Machicomoco living shoreline that was installed in 2009 through a cooperative agreement between CBNERR-VA, Timberneck LLC., and the Chesapeake Bay Foundation. The bed was initially constructed with 2,000 yd^3 of oystershell and constructed in conjunction with the living shoreline. The oyster bed deteriorated significantly after an incidence of poaching, but appears to have shown some signs of recovery. The oyster reef is currently exposed at low water and provides habitat for migratory birds (Figure 7) as well as providing subtidal habitat and water quality benefits. Catlett once supported dense beds of submerged aquatic vegetation (SAV), consisting of both Eelgrass (*Zostera marina*) and Widgeon Grass (*Ruppia maritima*). By the 1970s, the habitat collapsed; recent papers analyzing light attenuation attribute the collapse to poor water quality and the lack of improvement to support SAV populations again. Efforts were made to transplant SAV in 1984, but were met with limited success (Moore et al. 1996).

The Catlett Islands are home to a diverse array of fauna, both in its waters and on the islands. The York River, supports numerous fisheries, including striped bass (*Morone saxatilis*), invasive blue catfish (*Ictalurus furcatus*), and Atlantic menhaden (*Brevoortia tyrannus*). The brackish waters around the islands also provide substantial habitat for various types of crabs, such as blue crabs (*Callinectes sapidus*), and shellfish, including eastern oysters (*Crassostrea virginica*) and various clam species. The marshes and creeks found within the Reserve and the surrounding area also serve as important nursery habitat for striped bass, Atlantic croaker (*Micropogonias undulatus*), summer flounder (*Paralichthys dentatus*), white perch (*Morone americana*), and spot (*Leiostomus xanthurus*)(Hewitt et al 2009). Two migratory species of concern, the American eel (*Anguilla rostrata*) and Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), are found in the waters around the Reserve (Hewitt et al 2009). The waters around Catlett support both commercial and recreational fisheries. The Catlett Islands and neighboring Machicomoco State Park are also nesting sites for Northern Diamondback Terrapins (*Malaclemys terrapin terrapin*).

The birdlife within the Reserve spans a wide range of habitats and ecological niches. Data from Park bioblitzes and the Global Biodiversity Information Facility (GBIF), which collates information from multiple dataportals such as eBird, iNaturalist, the World Register of Marine Species, and other surveys, indicate the

presence of approximately 180 bird species (GBIF 2023). The tidal marshes and mudflats support numerous shorebirds, such as the American oystercatcher (*Haematopus palliatus*) and semipalmated plovers (*Charadrius semipalmatus*), which feed along the coastline. The shallow, brackish waters provide hunting grounds for a variety of wading birds, including great egrets (*Ardea alba*), snowy egrets (*Egretta thula*), and great blue herons (*Ardea herodias*). The upland habitats, with their mix of pines and hardwoods, offer nesting sites for woodpeckers, such as the red-headed woodpecker (*Melanerpes erythrocephalus*) and downy woodpecker (*Dryobates pubescens*), along with several songbirds, including Carolina wrens (*Thryothorus ludovicianus*) and tree swallows (*Tachycineta bicolor*). Ospreys (*Pandion haliaetus*) snowy egrets (*Egretta thula*) and bald eagles (*Haliaeetus leucocephalus)* have been found nesting in and around the Reserve. The Reserve serves as a vital stopover for several migratory birds, such as Forster's terns (*Sterna forsteri*) and laughing gulls (*Leucophaeus atricilla*).

The Catlett Islands Reserve and the surrounding waters are also home to several threatened species. Of the 180 Bird Species observed at the site, 36 are state identified Species of Greatest Conservation Need (SOGCN). Other SOGCN found at the site include Northern Scarlet Snake (*Cemophora Cope, 1860*), Northern Diamondback Terrapin (*Malaclemys terrapin terrapin*), and Eastern Bumblebee (*Bombus impatiens Cresson, 1863*). The SOGCN listings primarily identify habitat protection and reduction in pesticide use as actions to conserve these species. No Federally listed species have been found at the site but US Fish and Wildlife Service Information for Planning and Consultation (IPaC) database identifies Catlett as potential habitat for Northern Long-eared Bat (*Myotis septentrionalis*, endangered) and Eastern Black Rail (*Laterallus jamaicensis*, Threatened) though there are no confirmed sightings. One federally listed species, the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus,* Endangered), may be found foraging in the waters of the York River. IPaC also identifies 29 Migratory Birds that may use the area.

Public Access:

Access to the Catlett Islands Reserve Component is restricted to those conducting permitted research and educational activities; given the sensitivity of the marshes, general access to the marshes is not currently allowed. However, given the surrounding lands and waters, there are a number of authorized activities at the site for the public. These include wildlife viewing from Machicomoco Park facilities or boats; fishing, crabbing, and collection of shellfish according to state laws and regulations; and waterfowl hunting from floating blinds or Reserve maintained blinds with a permit from CBNERR-VA. As Machicomco State Park continues to grow, coordination between DCR staff and CBNERR-VA staff to manage increasing numbers of visitors will be important.

Figure 8: *CBNERR-VA Staff looks around during a survey for migratory birds.*

Reserve Infrastructure:

Within the Reserve Component, there are nine duck blinds that require regular monitoring and maintainence, including the renewal of tags and repairing any decayed structure to ensure they remain legally recognized and safe for use. There are also eight permanent drone targets throughout the Reserve to assist in various drone operations. These targets are often placed on the top of duck blinds or structures. The position of these targets are checked using high grade survey equipment periodically, and if any have deteriorated or been lost they will need to be replaced to ensure having enough ground control points to support aerial mapping operations.

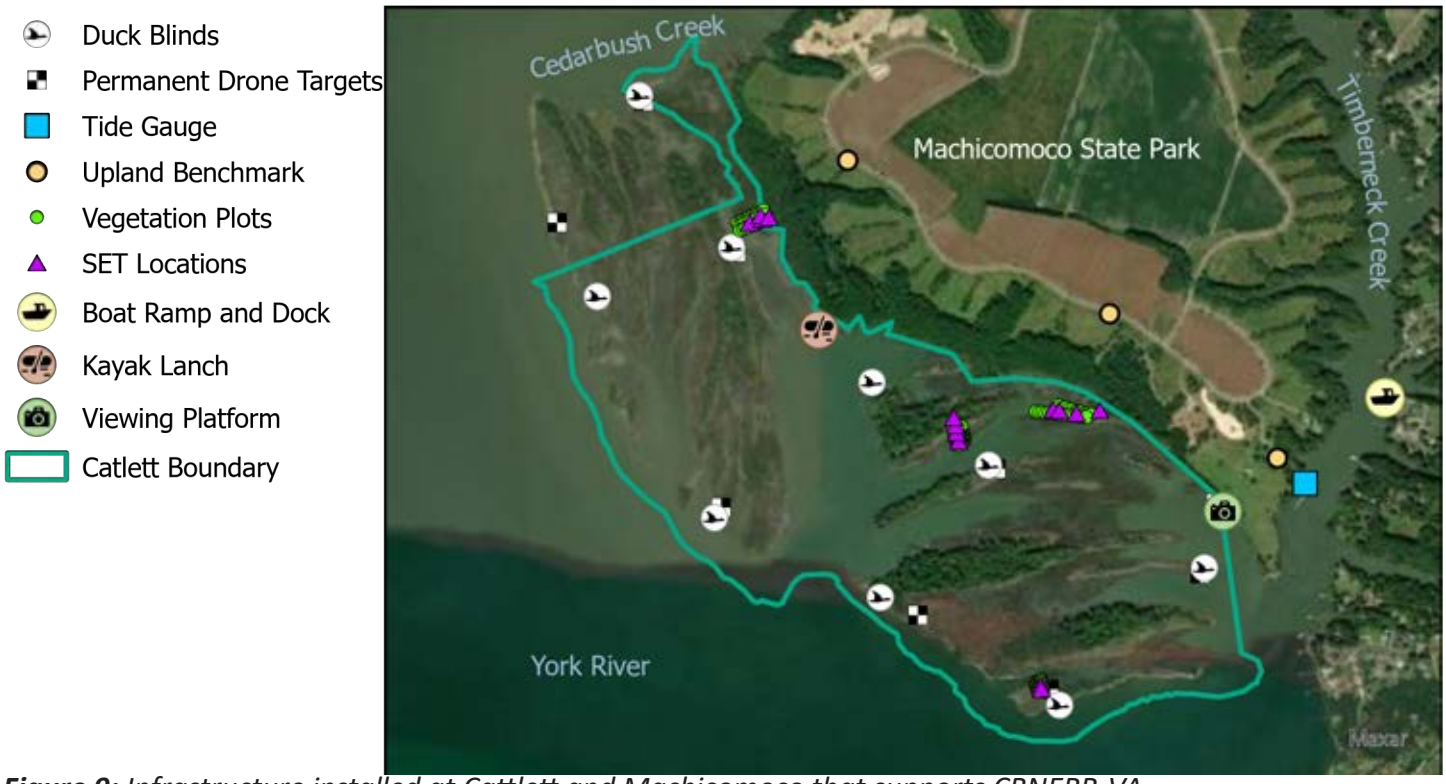

Figure 9: *Infrastructure installed at Cattlett and Machicomoco that supports CBNERR-VA.*

Additionally, there are a total of 14 surface elevation tables (SETs) found in four transects throughout the Reserve; these structures assist field staff in measuring the relative elevation change of wetland sediments (Cahoon 2024). There are 114 vegetation plots throughout 11 transects within the Reserve, with four transects containing a SET nearby (Figure 9). These vegetation plots allow field staff to monitor long-term changes in plant growth and diversity throughout the Catlett Islands. These plots are often indicated by PVC poles. For more information, please reference the CBNERR-VA Sentinel Site Plan. CBNERR-VA staff has also established three benchmarks within the upland areas of the Park to use during elevation surveys as well as ensuring all monitoring infrastructure is tied into NAVD88.

The adjacent Machicomoco State Park, owned and managed by VDCR, provides a viewing platform and car top boat launch for both staff and visitors at the Park which is partially on CBNERR-VA property. The State Park also has an elevated walkway for visitors to view the marsh, along with a Chronolog stationed at the end of the walkway (Figure 9). Chronolog stations are designed to capture a sequence of photos from the same place over time. The Chronolog is aimed towards the Catlett Reserve Component and allows users to contribute to long-term monitoring of the surrounding marsh. Along with this engagement tool, there is a VEGA Microwave Radar gauge H3611I positioned on Timberneck Creek off of the Park's dock. The radar gauge provides continuous data on changes in water level. The Catlett Islands Reserve Component is accessible by boat from the VIMS boat basin and Timberneck Creek Boat Ramp located accross from the Machicomoco docks.

Summary of Research:

Between 2014 and 2023 there were 21 research permits issued for the Catlett Islands Component (Appendix E). The majority of the research permits focused on wetland (marsh) systems. There are several types of studies conducted at Catlett that are less common in the other Reserve Components, including research on invertebrates (such as clams, crabs, mussels, oysters, and phytoplankton), bird surveys (Figure 8), and terrapins. See Appendix E for a list of research projects at the site.

CBNERR-VA staff have co-located vegetation plots, SETs, and groundwater wells along 4 primary long-term transect (Transects 1-4) at Catlett Islands to analyze long term changes in marsh habitat. CBNERRVA staff determined transect locations based on the presence of historical vegetation data as well as the opportunity

to study impacts on marsh systems on hummock islands as well as those connected to the mainland. This long-term wetland monitoring effort is focused on intensive and sustained observations to detect and understand physical and biological response to rising sea levels and salinity intrusion in the ecosystems and habitats (primarily the wetlands and low-lying maritime upland habitats) we manage on the York River. At Catlett Islands, this includes a total of 114 vegetation plots, 14 groundwater wells, and 14 surface elevation tables. All monitoring infrastructure is tied into NAVD88 through a robust vertical control network of benchmarks around the islands and mainland.

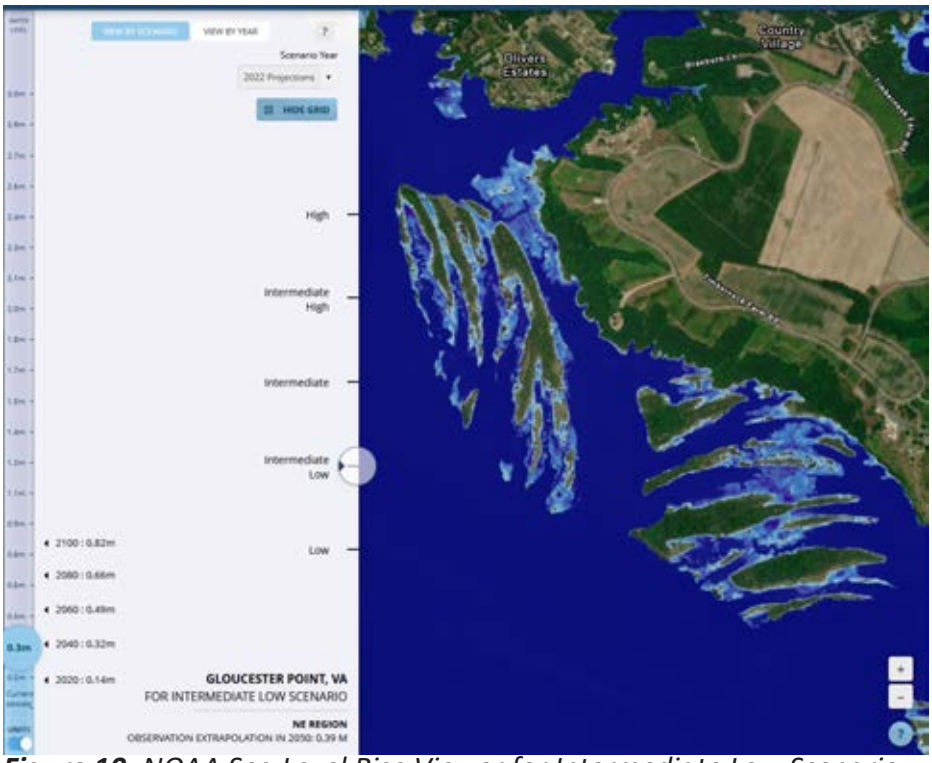

Figure 10: *NOAA Sea Level Rise Viewer for Intermediate Low Scenario in the year 2040. (NOAA 2022)*

Since 2002, CBNERR-VA staff have been collecting monthly grab samples to assess nutrient and chlorophyll concentrations approximately 100 m off of the North Island in the York River. This is paired with a light profile. Data is archived through the CDMO and provides a long term record of physical, chemical, and biological conditions.

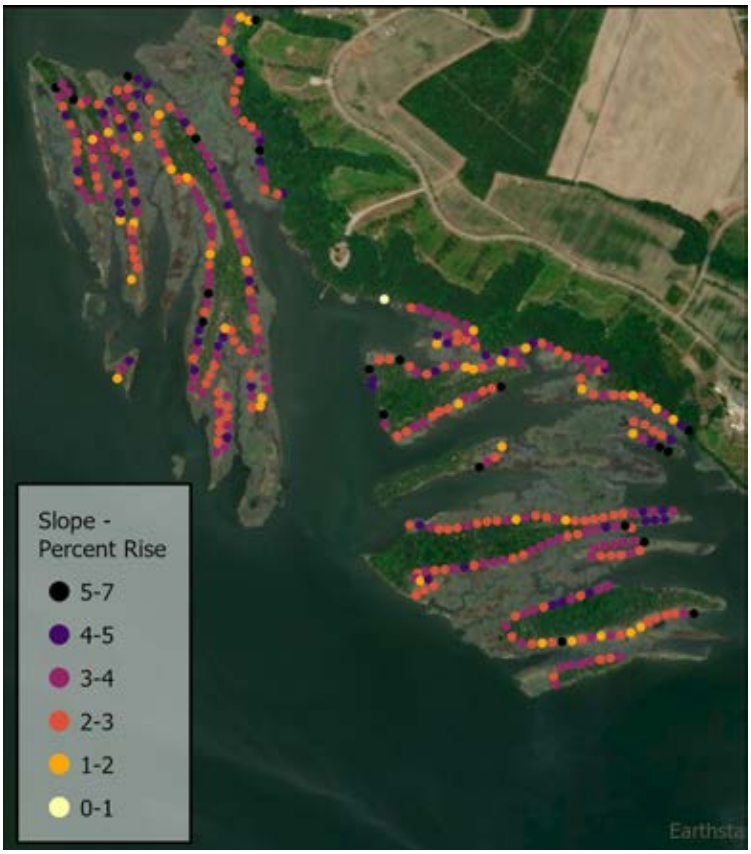

Figure 11: *Slopes at the Marsh-Forest interface. From Mollino et al 2020*

Threats and Concerns:

Sea Level Rise:

Sea level rise (SLR) due to global climate change and local subsidence is the largest threat facing the stability of the islands and their ecosystems. Regional predictions for SLR range from 4.87mm/yr (Yorktown - NOAA 2024) to 6.85 mm/yr (Chen and Kirwan 2023) using long records of data analyzed for linear trends. Water level data from the CBNERR-VA radar gauge on Timberneck Creek indicate a SLR rate of 8.36 mm/yr from 2017 to 2023. These rates are two to three times higher than the global average, as the Chesapeake Bay region is impacted by weakening of the Gulf Stream coupled with rapid regional subsidence from glacial rebound (Mollino et al 2020). While there has been significant marsh loss at the edges due to erosion, years of vegetation monitoring indicate conversion of forest to ghost forest, high marsh to low marsh, and low marsh to mudflat. The NOAA Sea Level Rise Viewer predicts the marshes at the site will be below MHHW by 2040 under an Intermediate Low Scenario (Figure 10), and all of the forested areas will be below MHHW by 2090 under an

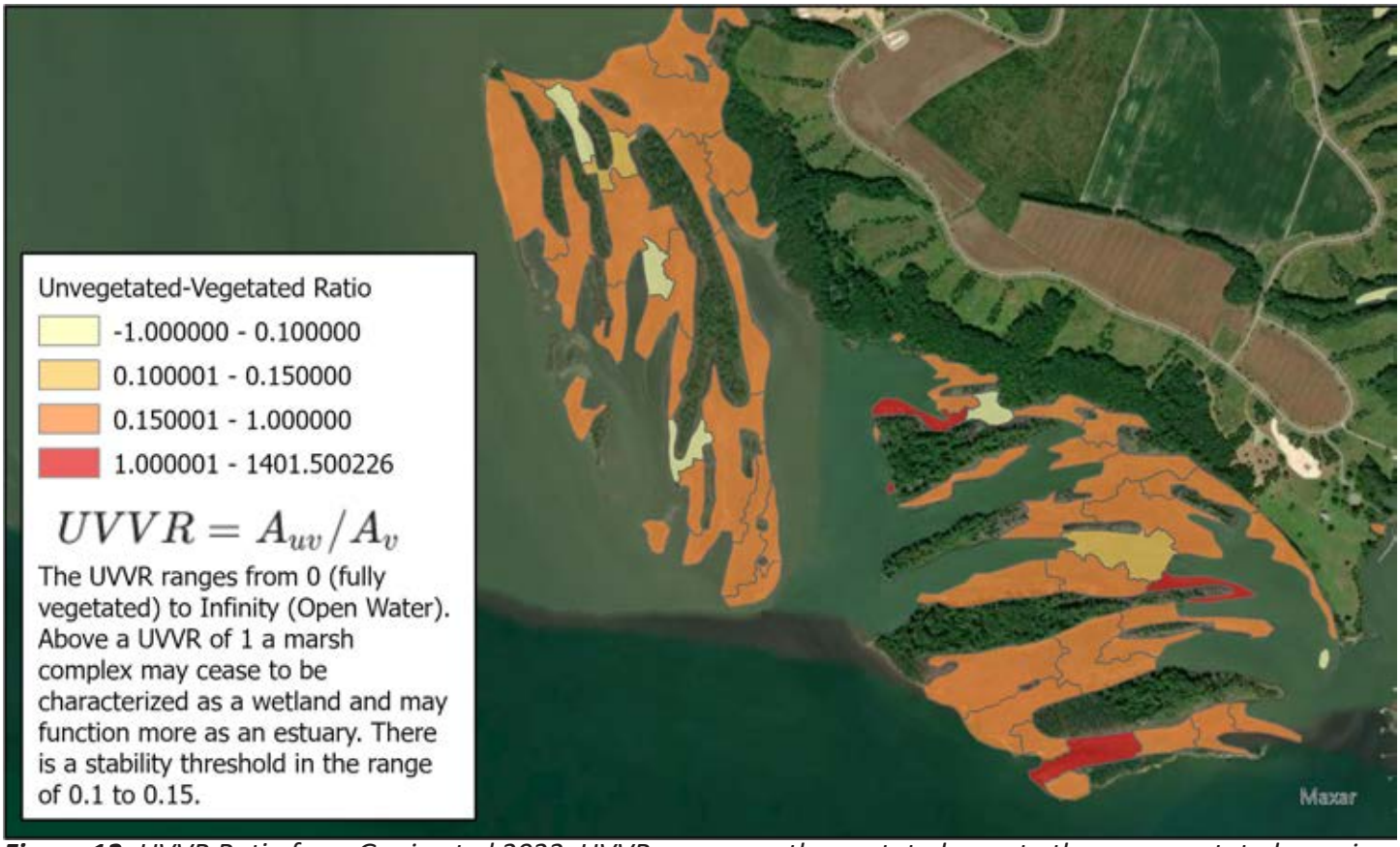

Figure 12: *UVVR Ratio from Ganju et al 2022. UVVR compares the vegtated area to the non vegetated area in each marsh unit and can indicate vulnerability of a marsh.*

Figure 13: *Elevation contours from the USGS CoNED project. Current Epoch contours are from the NOAA COOPs station at Yorktown from 1980-2001. Radar contours use calculated tidal datums from the radar gauge on site. Green squares highlight areas identified for potential Thin Layer Placement (TLP).*

Intermediate High Scenario. This viewer uses a modified bathtub model of elevation and projections of MHHW at various elevations, models scenarios and timeframes, (NOAA 2022). Vegetation transect data document habitat conversion indicative of longer inundation time periods, with high marsh converting to low marsh and pools/pannes forming in former low marsh areas. Regional vulnerability analyses, such as the Unvegetated to Vegetated Ratio (UVVR) show the marsh as at or above the stability threshold (Figure 12), and Surface Elevation Table Data show that all but two SETs in the low marsh are not keeping pace with both short and long term SLR rates. All of these data indicate the wetlands and tidal forests are highly vulnerable to climate change. Though SLR rates seem small (millimeters per year), over the shallow slopes of the marsh, this can impact a much larger horizontal area. Comparisons of the marsh elevation from the USGS CONED dataset, NOAA tidal datums for 1980-2001, and tidal datums calculated from water level data from 2017-2023, show that the shift in the Mean High Water contour from the previous tidal epoch (1983-2001) to current water levels (based on recent radar gauge data) would result in some sections becoming entirely disconnected from the mainland on most high tides (Figure 13). This indicates these sections may be good candidates for marsh restoration.

While there is the possibility for marsh migration to occur on the island's ridges, most of the slopes (Figure 11) are greater than the one percent rise modeled to allow for marsh migration without grading (Mollino et al 2020, Kirwan et al 2016). The marsh elevations combined with vulnerability scores indicate that this site may be improved by wetland enhancement via thin layer placement (TLP) of beneficial dredge material. Two areas in particular on the south island appear to be more vulnerable than the rest of the marsh and may provide a good test case for TLP at the site (Green Boxes - Figure 13). Additionally, dredge material could be beneficial in recreating the spits that protected the North island. CBNERR-VA is currently seeking funding for design and implementation for the TLP project.

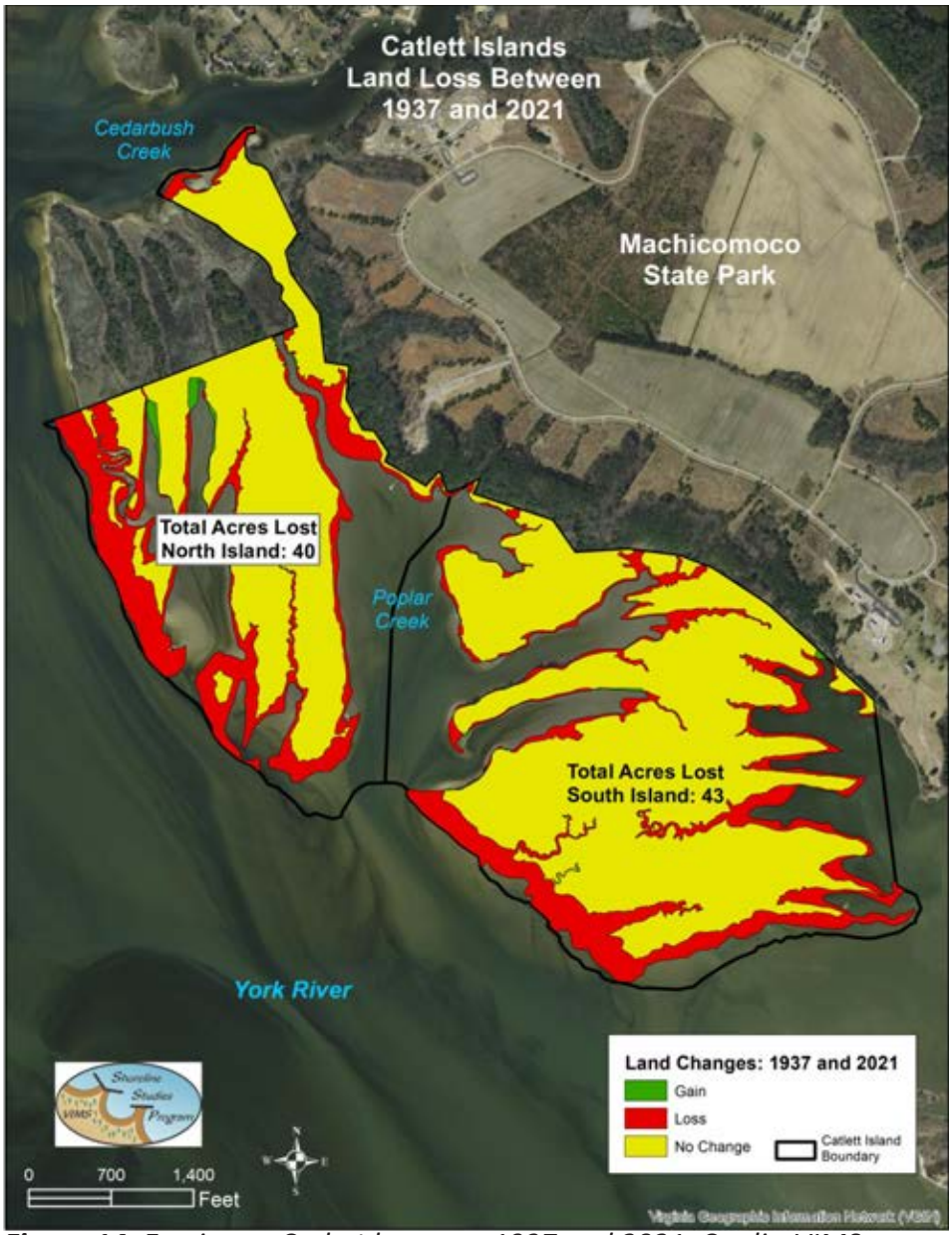

Figure 14: *Erosion at Catlett between 1937 and 2021. Credit: VIMS Shoreline Studies Program*

Shoreline Erosion:

The York River channel is used by large naval ships going to and from the Cheatham Annex site. The river is fairly wide near the islands with fetches of 32 km (20 mi) from the northwest, 6.4 km (4 mi) from the west, and 3.2 km (2 mi) from the southwest and south. Between 1937 and 2021, the Catlett Islands lost 33.6 ha (83 ac) along the edges of creeks and the shoreline (Figure 14). The outer edges, facing the York River, are experiencing erosion rates between 0.3-1.5 m (1-5 ft)

Figure 15: *Location of Phragmites patches.*

per year. Several of these areas contain floating tree stumps where buttresses are approximately 30 cm above the marsh surface, indicating elevation that previously supported upland habitat has been lost and converted to marsh (Lowery 2015). Internal creeks and channels, especially along Poplar Creek, are typically experiencing lower rates of erosion, or in some cases, accretion. These internal and small creek shorelines often have intertidal oysters present. However, one internal area experiencing higher rates of erosion is just northwest of the kayak launch (Appendix C, Plate 8). In addition, a preliminary design for a hybrid breakwater protection for the South Island was created in 2023. This design consisted of 21 structures along the outside edge of the island. This design has not been permitted or funded for construction (See Appendix C).

Invasive Species:

Very few invasive species have been recorded within the Catlett Islands and surrounding marsh, with only six small patches of common reed (*Phragmites australis*) (Figure 15), and areas with japanese honeysuckle (*Lonicera japonica*), blunt-leaved privet (*Ligustrum obstusifolium*), and southern magnolia (*Magnolia grandifolia*) present on the islands. *Phragmites*, despite its low presence on the island, remains a threat to the biodiversity of the marshes and maritime forest. This aggressive species has the potential to rapidly colonize new habitats following a disturbance event, such as wildfires or storms, outcompeting native vegetation and further altering the structure of the plant community. Both the honeysuckle and southern magnolia's presence poses a low threat to the maritime forest; these species can still contribute to shifts in plant and animal communities throughout the Reserve, leading to a reduction in biodiversity and habitat resilience.

The management of invasive species throughout the Reserve Component can be approached through several methods; including controlled burns, manual removal, or herbicide applications. However, given the relatively low threat of spread of invasive species within the Reserve, such measures may not be immediately necessary and monitoring remains crucial. *Phragmites* can be controlled by both manual removal via mowing, shading, digging, or fire, or pesticide application, but it is crucial that plant material is disposed of properly to prevent the accidental spread of the species. Removal of *Phragmites* should occur prior to any restoration or disturbance nearby,


Figure 16: *Aerial Imagery of the Catlett Islands.*

as this will help reduce risk of re-invasion. *Phragmites* can take advantage of disturbances, so it is important to prioritize its removal before large-scale disturbances occur in nearby areas, to prevent further spread. While effective at removing leaf litter, fire should not be used as a standalone strategy; for that it often fails to burn the root systems, leading to an increase of plant density or further spread. However, when used alongside other methods, fire can facilitate the germination and growth of native species by removing the dense *Phragmites* accumulation. Given the high number of invasive species present at Machicomoco State Park, extra attention is needed to prevent their spread into the Reserve Component, requiring more proactive management strategies in conjunction with the Park staff.

Nutria:

Nutria (*Myocastor coypus*) are an invasive rodent similar in size to a muskrat or beaver. Nutria destroy coastal marshes when feeding, chewing through emergent vegetation, converting wetlands to bare patches of mud. While no nutria have been confirmed in the York watershed, there are confirmed sightings in the adjacent Chickahominy. Nutria can be identified by their orange teeth, white muzzle, white whiskers and still tail while swimming. They are closer in size to beavers than muskrats, who have black whiskers and a moving tail while swimming. If nutria or signs of nutria are observed, take a photo if possible and contact VDWR (855-571-9003).

Pine Bark Beetle:

Damage from the southern pine bark beetle (*Dendroctonus frontalis*) has not yet been observed on the Reserve, but it is considered a potential threat to stressed loblolly pines (*Pinus taeda*) within the maritime forest. Management includes an initial impact assessment and potential control, including training staff to identify damage caused by the southern pine bark beetle (Figure 17), the thinning of loblolly pines within the maritime forest habitat, and further collaborating with surrounding stakeholders to monitor and control the spread. The Virginia Department of Forestry offers several programs for prevention, monitoring, and control.

> If found, notify the Virginia Department of Forestry:
> ***Primary Contact:*** Lisa R. Deaton, Area Forester, lisa.deaton@DOF.virginia.gov
> ***Secondary Contact:*** Nelson D. Jarvis, Forest Technician, nelson.jarvis@DOF.virginia.gov

Figure 17 A and B: *A) Pitch tubes of the southern pine bark beetle. Credit: Jiri Huler, University of Florida; B) Internal tree damage from the southern pine bark beetle. Credit: Jiri Huler, University of Florida.*

White Tailed Deer:

Unregulated white-tailed deer (*Odocoileus virginianus*) populations pose a possible threat to the preservation of natural habitats and plant communities throughout the Reserve and the surrounding area. Overgrazing by deer, particularly on hard mast and saplings, can limit the recruitment and regeneration of tree and shrub species. Disruption to these processes can lead to long-term changes in the maritime forest structure, thus reducing biodiversity and hindering ecosystem recovery.

There is some evidence of deer presence on the islands such as stripped bark, damaged vegetation, and reduced regeneration of plant species. Signs of overgrazing can include the loss of understory vegetation, stunted tree saplings, and the absence of new plant growth in areas frequented by the herd. CBNERR-VA is coordinating with Machicomoco State Park and VDCR on monitoring the current deer population and possible management strategies. Furthermore, collaboration with the VDWR for guidance on game management practices for the Park, Reserve, and surrounding area would help ensure an effective approach to controlling the local deer population and mitigating their impact on the Reserve. Without active management, the herd that resides in both Machicomocco State Park and the Catlett Islands Reserve Component is likely to continue growing, further increasing pressure on vegetation and preventing the growth of young trees and shrubs.

Fire:

The fire risk throughout the system remains moderate, as it has an abundance of fuel consisting of forest litter and duff (Figure 18), but is relatively contained from the mainland by surrounding water. With little human activity on the islands, a fire would likely be triggered by lightning, in which the large fuel build-up may result in a larger, hotter fire - which could result in tree death and damage to the upland ecosystems. There is a small risk of crown fires carrying embers to the mainland. Therefore, in any instance of fire on or near the islands, the VDOF and VDCR Park Staff should be contacted.

Figure 18: *View of the Forest to marsh transition at Catlett. Note the dead trees along the edge of the forest.*

Throughout the southeast United States, pine stands have been managed with fire, whether through intentional burning by indigenous peoples, contemporary management, or natural causes such as lightning. Regular, low-intensity fires can help maintain the pine-dominated ecosystem by reducing fuel loads, exposing mineral soils before seedfall, thin and prune trees, limit potential damage by diseases and/or pests, and remove competing hardwoods from the understory. While a controlled burn may benefit the island ecosystems, the following considerations merit attention: potential damage/destruction to duck blinds, keeping the fire low-intensity despite large available fuel Reserves, outreach and notifying the surrounding public of a controlled burn taking place, and protecting the already-stressed, mature trees.

Virginia Department of Forestry Fire and Emergency Response: (434) 220-9036

Oil and Chemical Spill:

Oil/chemical spills can pose a threat to both the ecological stability of the Reserve and the health of the surrounding public and Reserve staff. Management can vary depending on the pollutant and nature of the spill. No CBNERR-VA Reserve staff are currently trained or certified to manage a spill. If a spill is observed, remove any exposed persons from the immediate area and contact regulatory agencies.

Gloucester Emergency Management: 804-693-1390
Virginia Emergency Operations Center: 804-674-2400
National Response Center: 800-424-8802
VA EPCRA: 804-698-4000
US EPA Hotline: 800-424-9346

Figure 19: *The Middle Peninsula Bird Club at Catlett conducting a survey of resident and migratory birds.*

Suggested Management Actions and Activities:

1. Investigate whether there is a legitimate claim to Kings Grant Rights as these legal claims and associated authorities would allow CBNERR-VA to have greater ability to control access and use at the property. Preliminary discussions indicate that there is a potential claim, however costs associated with proving the claim may be high. Regardless of the Kings Grant status,
2. Work with the Virginia Marine Resources Commission to develop an MOU to protect a buffer zone around the reserve core from further encraochment by oyster leases.
3. Explore the possibility of acquiring the last parcel on the North Island. Ownership by CBNERR-VA would make management of the site easier, however it is a vulnerable piece of property that is not likely to be developed so responsible pricing is important. The property is 32 ha (79 ac).
4. Monitor the Reserve Component for expansion of invasive species, signs of over browsing by white tailed deer, presence of pine borer beetle etc.
5. Plan, design, and fund marsh enhancement projects such as erosion control structures, herbicide treatment of *Phragmites*, thin layer placement, spit reconnection, runneling, etc. via NERRs OPS award, partnership with the Park, or other identified funding sources.
6. Continue to encourage research at the Reserve Component by scientists, managers and volunteers. Unique research taking place at Catlett and not other Reserve Components includes cultural and archaeological surveys, terrapin, clam, mussel, crab and oyster research. This Reserve Component also could provide an opportunity for restoration focused research in the future.
7. Maintain good relations with DCR Machicomoco State Park Staff via annual meetings and exchange of information to communicate on shared issues such as hunting, invasive species, species of concern, and education and signage opportunities. In the Park's most recent management plan (2025), the viewshed of Catlett Islands was identified as an important part of the park's identity. It would benefit both groups to develop joint strategies with regard to their respective management plans.

Data Gaps:

1. As increased temperatures and improved water quality cause changes in the ranges of species, what new species will be moving into the habitats found at the Catlett Islands Reserve Component, and how will that impact the ecosystem? What species will be moving northward?
2. How can we continue to protect the natural and cultural resources of the islands given current and future rates of sea level rise and subsidence? Are there actions we can take to help buy time and protect these resources?
3. As the Park expands and increases visitorship, how will this impact the resources on the islands?
4. What aquatic communities and essential fish habitats are present at the Reserve and what is their status? Are there management concerns?
5. Are there actions that can be taken to help support populations of SOGCN species besides habitat conservation?

Figure 20: *CBNERR-VA Staff read SETs at Catlett.*

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Appendix A: Conservation Easement Documents

Conservation Easement

Catlett Island National Estuarine Research Reserve
in Virginia

THIS CONSERVATION EASEMENT, made this 5 day of September, 1990 by and between John W. C. Catlett and William E. Catlett, hereinafter called the Grantors, and The College of William and Mary in Virginia, hereinafter called the Grantee.

WITNESSETH

WHEREAS, the Grantors are owners in fee simple of certain real property (hereinafter described and referred to as the "Catlett Islands"), situated in the County of Gloucester, Commonwealth of Virginia, being more particularly described as "forested islands and marshes extending from mean low tide to the wetland/upland border where the marsh meets the treeline on the landward side of the islands" as shown in Exhibit A and described in Exhibit B, attached hereto and incorporated by reference herein; and

WHEREAS, the Catlett Islands have substantial wetlands and forest resources and significant ecological, natural, research, educational, and aesthetic values, which this Conservation Easement will help to preserve and maintain, including the ability to protect water quality and important aquatic resources and habitats of the York River; and

WHEREAS, the specific ecological, natural, research, educational, and aesthetic values of the Catlett Islands are documented in the ecological survey made by the Virginia Institute of Marine Science (VIMS) on behalf of the Grantee and dated August 31, 1990 (Exhibit C), which will serve as an information base for monitoring and enforcement purposes and will be kept current by VIMS; and

WHEREAS, this Conservation Easement is being made with the intention and understanding of both the Grantors and Grantee that the property subject to this easement will be designated as part of the **Chesapeake Bay National Estuarine Research Reserve System in Virginia** and the National Estuarine Research Reserve System; and

WHEREAS, the Grantors desire and intend that the ecological, natural, research, educational, and aesthetic values of the Catlett Islands shall be preserved and maintained by restricting and limiting the use of the land and contiguous water areas of their property, on the terms and conditions and for the purposes hereinafter set forth, and the Grantee is willing to accept responsibility for managing the property for the purpose of conducting basic scientific and applied research and providing timely and accurate information to the Grantors and the citizens of the Commonwealth regarding the quality and conservation of the resources, both living and non-living, of the Catlett Islands, on the terms and conditions and for the purposes hereinafter set forth;

33. Notification - The Grantors agree to notify the Grantee, in writing, before exercising any reserved right the exercise of which may have an adverse impact on the conservation interests associated with the Catlett Islands. Any notices by the Grantors to the Grantee pursuant to any provision hereof shall be sent by registered or certified mail, return receipt requested, addressed to Mr. John W.C. Catlett and Mr. William E. Catlett, P.O. Box 148, Wicomico, Virginia 23184.

IN WITNESS WHEREOF, the Grantors and Grantee have hereunto set their hands and seals the day and year above written.

State of Virginia
County of Gloucester, to-wit:

The foregoing instrument was acknowledged before me this 5th day of September 1990 by John W. C. Catlett, Jr. and William E. Catlett.

Susan W Carter
Notary Public
My commission expires: 8/31/93.

Grantors:

John W.C. Catlett, Jr. (SEAL)

William E. Catlett (SEAL)

ACCEPTED BY

_____

AS GRANTEE:

_____ (SEAL)

APPROVAL AS TO FORM:

Assistant Attorney General for the
Attorney General of Virginia

RECOMMEND:

Director
Division of Engineering and Buildings

RECOMMEND:

Director
Department of General Services

APPROVED FOR THE GOVERNOR:

Pursuant to the provisions of Section 2.1-504.2, Code of Virginia (1950), as amended, and by authority of Executive Order 78 (89), I hereby approve the acquisition of this conservation easement from John W. C. Catlett, Jr. and William E. Catlett, which is more fully described herein, and the execution of this document.

Secretary of Administration,
for the Governor of Virginia

10-02-90
Date

VIMS0912aHGD

Conservation Easement

Catlett Island National Estuarine Research Reserve
in Virginia

THIS CONSERVATION EASEMENT, made this 14 day of November, 1990 by and between John W. C. Catlett, Jr., Charles Catlett, and Mary Armistead Catlett Burruss, hereinafter called the Grantors, and The College of William and Mary in Virginia, hereinafter called the Grantee.

WITNESSETH

WHEREAS, the Grantors are owners in fee simple of certain real property (hereinafter described and referred to as the "Catlett Islands"), situated in the County of Gloucester, Commonwealth of Virginia, being more particularly described as "forested islands and marshes extending from mean low tide to the wetland/upland border where the marsh meets the treeline on the landward side of the islands" as shown in Exhibit A and described in Exhibit B, attached hereto and incorporated by reference herein; and

WHEREAS, the Catlett Islands have substantial wetlands and forest resources and significant ecological, natural, research, educational, and aesthetic values, which this Conservation Easement will help to preserve and maintain, including the ability to protect water quality and important aquatic resources and habitats of the York River; and

WHEREAS, the specific ecological, natural, research, educational, and aesthetic values of the Catlett Islands are documented in the ecological survey made by the Virginia Institute of Marine Science (VIMS) on behalf of the Grantee and dated August 31, 1990 (Exhibit C), which will serve as an information base for monitoring and enforcement purposes and will be kept current by VIMS; and

WHEREAS, this Conservation Easement is being made with the intention and understanding of both the Grantors and Grantee that the property subject to this easement will be designated as part of the Chesapeake Bay National Estuarine Research Reserve System in Virginia and the National Estuarine Research Reserve System; and

WHEREAS, the Grantors desire and intend that the ecological, natural, research, educational, and aesthetic values of the Catlett Islands shall be preserved and maintained by restricting and limiting the use of the land and contiguous water areas of their property, on the terms and conditions and for the purposes hereinafter set forth, and the Grantee is willing to accept responsibility for managing the property for the purpose of conducting basic scientific and applied research and providing timely and accurate information to the Grantors and the citizens of the Commonwealth regarding the quality and conservation of the resources, both living and non-living, of the Catlett Islands, on the terms and conditions and for the purposes hereinafter set forth;

NOW THEREFORE, as an absolute gift of no monetary consideration ($0.00) but in consideration of the mutual covenants, terms, conditions, and restrictions hereinafter set forth, the Grantors hereby grant and convey to the Grantee, its successors, and assigns forever and in perpetuity a Conservation Easement in Gross ("Conservation Easement") for the purpose of research, observation, and education and to the extent hereinafter set forth with respect to the Catlett Islands.

To achieve these objectives, the following conditions and restrictions are set forth:

ARTICLE I. DURATION AND GENERAL PURPOSE

1. General Purpose - The purpose of this Conservation Easement is to preserve and protect the environment of the Catlett Islands and to maintain permanently its natural and cultural values and its dominant scenic, rural, woodland, and wetland character so that the property remains suitable for long-term research on natural and human processes occurring within the York River tributary of the Chesapeake Bay. The Grantors and Grantee intend to confine the use of the property to such activities, including, without limitations, those involving hunting, trapping, fishing, gathering oysters, naturalistic uses, and estuarine reserve research purposes.

2. Duration - This Conservation Easement shall be perpetual. The covenants agreed to and the terms, conditions, restrictions and purposes imposed with this Conservation Easement shall not only be binding on the Grantors but also their agents, personal representatives, heirs and assigns and all other successors to their interests and shall continue as a servitude running in perpetuity with the Catlett Islands.

ARTICLE II. MANAGEMENT OBJECTIVES

3. Management Plan Preparation and Implementation - There shall be a Management Plan prepared for the Catlett Islands to provide general guidelines for the current and future use of the property. The Management Plan shall address appropriate wetlands and forest management activities, wildlife and waterfowl needs, and research and education uses of the Catlett Islands, and it shall provide any other applicable guidelines for the conservation of natural resources.

The Management Plan shall be prepared by VIMS, in consultation with other resource management agencies of the Commonwealth, and shall be submitted to be the Grantors and Grantee for their review and approval, within 6 months of the execution of this Conservation Easement. The Grantors and Grantee shall meet at least annually, and more frequently at the request of either party, to review the Management Plan and research results and, where appropriate, to develop more specific recommendations for carrying out certain aspects of the Plan. The Management Plan shall be updated at least every 5 years.

4. On-Site Management - VIMS is the agency designated by the Grantee and the Governor of the Commonwealth of Virginia to manage the Chesapeake Bay National Estuarine Research Reserve System in Virginia. In this capacity, VIMS shall serve as on-site manager for research at the Catlett Islands and shall be responsible for seeing that research conducted on the property is conducted in a manner consistent with the goals of the **Chesapeake Bay National Estuarine Research Reserve System in Virginia**, the objectives of the Management Plan, and the wishes of the Grantors and Grantee. The on-site manager will be the Grantee's primary representative for the purpose of monitoring the uses of the property for consistency with this Conservation Easement.

5. Natural Area Preservation - The Catlett Islands shall be maintained as open space, wildlife and waterfowl habitat, and a natural field laboratory for research and education. Any industrial or commercial activities shall be prohibited on the Catlett Islands. The protection and conservation of the land subject to this Conservation Easement will be maintained and enforced consistent with the goals and policies of the **Chesapeake Bay National Estuarine Research Reserve System in Virginia.**

6. Research and Education - The Catlett Islands shall be maintained for research and education activities associated with the **Chesapeake Bay National Estuarine Research Reserve System in Virginia.** Research and education uses of the Catlett Islands shall be in accordance with the principles, objectives, and performance standards set forth in the Management Plan developed by VIMS and approved by the Grantors and Grantee. A steering committee will be convened by VIMS to assist in the review and approval of proposals for research and education activities at reserve sites. Such approval shall not be unreasonably withheld.

7. Information Exchange - Research and education activities conducted at the Catlett Islands shall be used to enhance awareness, understanding, and wise use of estuarine environments. VIMS shall provide the Grantors and Grantee with an annual report on research and education activities conducted on the Catlett Islands and shall disseminate timely and accurate information to the Governor, General Assembly, State and local agencies, industry, and citizens of the Commonwealth regarding the living and non-living resources of the Catlett Islands and their relationship to the Chesapeake Bay system and the coastal waters of the Commonwealth of Virginia.

ARTICLE III. CONTROLLED ACTIVITIES

8. Wetlands and Forest Maintenance - Wetlands shall be protected and maintained in accordance with the Management Plan and the Wetland Guidelines developed pursuant to Chapter 2.1 of Title 62.1 of the Code of Virginia. Forest management activities shall be conducted in accordance with the Management Plan and Best Management Practices promulgated by the Commonwealth of Virginia, Division of Forestry, and recommended by the U.S. Department of Agriculture, Forest Service and Soil Conservation Service. There shall be no other destruction or alteration of wetlands or forests on

the Catlett Islands, except as needed to eradicate noxious plant species or reestablish native plant species and as approved by the Grantors and Grantee. Management activities shall not materially impair the scenic quality of the Catlett Islands.

9. Waterfowl and Wildlife Maintenance - Waterfowl and wildlife maintenance activities shall be conducted in accordance with the Management Plan. In general, such activities shall be limited, where necessary, to maintenance of existing habitat and minor improvements (such as tree thinning to improve understory vegetation, or opening of small areas to provide a greater diversity of habitats) and as approved by the Grantors and Grantee. Any waterfowl and wildlife management activities shall be carried out under the guidance of the Commonwealth of Virginia, Department of Game and Inland Fisheries and the U.S. Department of the Interior, Fish and Wildlife Service. Any plant and insect management activities that may affect species of plants or insects protected under the Virginia Endangered Plant and Insect Species Act shall be carried out under the guidance of the Virginia Department of Agriculture and Consumer Services.

10. Hunting and Fishing - Any hunting shall be carried out in designated areas on and around the Catlett Islands and in accordance with conditions established in the Management Plan and approved by the Grantors and Grantee, and in accordance with rules and regulations promulgated by the Commonwealth of Virginia, Department of Game and Inland Fisheries. The Grantors, or their assigns, may place noncommercial blinds on the Catlett Islands for personal use. Any fishing shall be carried out in accordance with regulations promulgated by the Virginia Marine Resources Commission.

11. Water Quality - There shall be no human activities on or uses of the Catlett Islands that are detrimental or adverse to the maintenance and conservation of surface and subsurface water quality. There shall be no manipulation or alteration of natural water courses, shorelines, marshes or other water bodies, nor shall there be activities conducted on or around the Catlett Islands that could alter either natural water level, flow, or both.

12. Structures, Roads, and Trails - Except as otherwise provided in this Conservation Easement, no new buildings, facilities, structures, piers, roads, or trails shall be constructed on the Catlett Islands, except those designed, constructed and utilized in, and accessary to, research, education, hunting, and naturalistic uses of the property. Any such construction must be planned for in the Management Plan and approved by the Grantors and Grantee. Similarly, removal of existing structures must be planned for in the Management Plan and approved by the Grantors and Grantee. There shall be no compulsion to remove existing structures.

13. Signs and Billboards - Display of billboards, signs or other advertisements is not permitted on or over the Catlett Islands, except to state the name and/or address of the owner, to provide notice of designation as a Chesapeake Bay National Estuarine Research Reserve in Virginia, and/or to post the property against trespass.

14. Subdivision - The Catlett Islands shall not be partitioned or subdivided.

15. Excavation, Dredging, and Mining - Excavation, dredging, mining and removal of loam, gravel, soil, rock, sand, coal, petroleum and other materials on or below ground or alteration of the topography of the land is prohibited on the Catlett Islands, except as related to the collection of geological data. Such activities shall be planned for in the Management Plan and approved by the Grantors and Grantee.

16. Industrial and Commercial Activities - No industrial or commercial activities shall be conducted on the Catlett Islands.

17. Trash, Rubbish, and Waste - There shall be no dumping of soil, trash, ashes, garbage, waste, or offensive materials on the Catlett Islands. There shall be no filling in of any wetland, pond or waterway, and such dumping shall be absolutely prohibited. Neither the Grantors nor the Grantee shall be responsible for unauthorized dumping.

18. Off Road Vehicles - Neither the Grantors or the Grantee shall authorize the operation of motor vehicles, trail bikes or all-terrain vehicles on the Catlett Islands, and such use shall be prohibited. The Grantors shall not be responsible for unauthorized use.

ARTICLE IV. ENFORCEMENT AND REMEDIES

19. Injunctive Relief and Restoration - Upon any breach of the terms of this Conservation Easement by the Grantors, their successors or assigns, or the Grantee, its successors or assigns, the breaching party may be subject to suit to: (1) enjoin any breach or enforce any covenant by temporary restraining order, preliminary and/or permanent injunction; (2) require that the property be restored promptly to the condition required by this Conservation Easement; or (3) seek any other remedy available, in law or equity, to assure compliance with the terms of this Conservation Easement.

20. Perpetual Right of Enforcement - Failure on the part of the Grantee to enforce any covenant or provision hereof shall not discharge or invalidate such covenant, or any other covenant, condition, or provision hereof, or affect the right of the Grantee to enforce the same in the event of a subsequent breach or default.

ARTICLE V. GRANTORS' RIGHTS

21. Grantors' Rights - The Grantors expressly reserve to themselves, their personal representatives, heirs, successors or assigns the right to:

a. Continue the naturalistic uses of the Catlett Islands subject to the conditions set forth above;

b. Continue to hunt, fish, trap, and gather oysters on and around the Catlett Islands subject to applicable laws;

c. Improve, repair, restore, alter, remove, remodel, or replace permitted structures, provided that such activity is consistent with the Management Plan; and

d. Continue the use of the Catlett Islands for all purposes consistent with this Conservation Easement.

ARTICLE VI. RIGHTS OF GRANTEE

22. Rights of Grantee - To accomplish the purpose of this Conservation Easement, the following rights are conveyed to the Grantee by this Conservation Easement:

a. To preserve and protect the conservation values of the Catlett Islands;

b. To enter upon the Catlett Islands at reasonable times in order to conduct approved research and educational projects and to monitor Grantors' compliance with and otherwise enforce the terms of this Conservation Easement; provided that such entry shall be upon prior reasonable notice to Grantors, such entry shall be by water, and shall not unreasonably interfere with Grantors' use and quiet enjoyment of the Catlett Islands;

c. To give permission to research scientists to conduct research and educational projects approved for the **Catlett Islands National Estuarine Research Reserve**, provided that permittees carry and display an official permit issued by the Grantee and approved by the Grantors; and

d. To prevent any activities or use of the Catlett Islands that is inconsistent with the purposes of this Conservation Easement and to require the restoration of such areas or features of the Catlett Islands that may be damaged by any inconsistent activity or use.

ARTICLE VII. GRANTORS' AND GRANTEE'S LIABILITY

23. Upkeep by Grantors - The Grantors, their successors, and assigns further agree that they shall be responsible for upkeep of the Catlett Islands and shall hold the Grantee, its successors or assigns, harmless from any charges or liens arising out of upkeep or taxes.

24. Taxes - The Grantor agrees to pay any and all real property taxes and assessments levied by competent authority on the property.

25. Grantors' Liability - The Grantors, their successors, and assigns shall not be held responsible for injury to persons or damages to property arising out of any research or educational activity being conducted on the Catlett Islands pursuant to the Management Plan and this management agreement, except those arising out of the negligence of the Grantors, their successors, and assigns. All persons participating in research or educational activities at the Catlett Islands must sign a liability release form indemnifying and holding harmless the Grantors, their agents and guests, from any and all liability, claims, or expenses for injury, death or damages to self or property, including without limitation attorney's fees, resulting from or arising out of or in anyway relating to the activities of the Grantee, any of its representatives, agents or guests, or resulting from, or occurring in the course of transit to or from the Catlett Islands. A copy of the release form appears as Exhibit D.

The Grantee has inspected the Catlett Islands and accepts their condition "as is" as described in Exhibit C. Any existing conditions or future conditions relating to permitted uses of the Catlett Islands by the Grantors, including, without limitation, any hunting and fishing activities, shall not constitute conditions giving rise to a claim of negligence on the part of the Grantors or to any potential liability for damage to property or injury to person. The Grantors' liability for all other activities on the Catlett Islands shall remain in effect.

26. Grantee's Liability - The Commonwealth of Virginia and all its agencies and institutions are covered by a self-insurance program as authorized by Section 2.1-526.8 of the Code of Virginia which is based upon a comprehensive general liability manuscript policy form as shown in Exhibit E. All persons who are not employees of the Commonwealth must receive approval from the Grantors and furnish evidence of liability coverage in the amount of $100,000/$300,000/$100,000 before participating in research or education activities at the Catlett Islands. All persons, whether employees of the Commonwealth or not, shall sign a liability release form referenced in paragraph 25 and appearing in Exhibit D.

ARTICLE VIII. PUBLIC ACCESS

27. Public Access - The granting of this Conservation Easement does not grant to the public any right to enter the property. The Grantee's right of entry does not include access to the interior of buildings or structures. All other protections against trespass by the public shall remain in effect.

ARTICLE IX. MISCELLANEOUS

28. Assignment, Transfer, and Reversion - The Grantee may assign its rights under this Conservation Easement to the Virginia Institute of Marine Science in such manner as to achieve the purposes and conditions herein. If any such assignee shall cease to exist or abandon this Conservation Easement or the rights and duties of enforcement herein set forth, or if proceedings

are instituted for condemnation of this Conservation Easement, the easement and rights of enforcement shall revert to the Grantee. If the Grantee shall be dissolved and if the terms of the dissolution fail to provide a successor, then the Court shall appoint an appropriate successor as Grantee.

The Grantors agree for themselves, their personal representatives, heirs, successors, and assigns to send in writing to the Grantee the names and addresses of any party to whom the Catlett Islands is to be transferred at the time said transfer is executed. The Grantee agrees to hold this Conservation Easement exclusively for conservation purposes, and that it will not transfer the Conservation Easement in exchange for money, other property, or services. This provision shall not preclude the Grantee from using the monetary value of any donations or gifts from the Grantor as match for money, other property, or services that will contribute to fulfilling the objectives of the Management Plan or the terms of this Conservation Easement.

29. Relationship of Easement to Property Value - The Grantors and the Grantee agree that the donation of the Conservation Easement gives rise for purposes of this paragraph to a property right, immediately vested in the Grantee with a fair market value that is at least equal to the proportionate value that the Conservation Easement bears to the value of the Catlett Islands at the time of the gift.

30. Eminent Domain - Whenever all or part of the Catlett Islands are taken in the exercise of eminent domain and such taking abrogates the restrictions imposed by this Conservation Easement, the Grantors and the Grantee shall join in appropriate actions at the time of such taking to recover the full value of the taking and all incidental or direct damages resulting from the taking. All expenses incurred by the Grantors and the Grantee in this action shall be paid out of the recovered proceeds.

31. Inclusion of Terms in Subsequent Deeds - The Grantors agree that the terms, conditions, restrictions and purposes of this grant will be inserted by them in any subsequent deed or other legal instrument by which the Grantors divest themselves of any interest in the Catlett Islands.

32. Construction and Severability - It is the intention of the parties hereto that this Conservation Easement, which is by nature and character negative in that the Grantors have restricted and limited their right to use the the Catlett Islands rather than granted any affirmative rights to the Grantee except as otherwise set forth herein, be construed at all times and by all parties to effectuate its terms, conditions and purposes. If any provision of this Conservation Easement or the application thereof to any person or circumstance is found to be invalid, the remainder of the provisions of the Conservation Easement and the application of such provisions to persons or circumstances other than those as to which it is found to be invalid shall not be affected thereby.

33. Notification - The Grantors agree to notify the Grantee, in writing, before exercising any reserved right the exercise of which may have an adverse impact on the conservation interests associated with the Catlett Islands. Any notices by the Grantors to the Grantee pursuant to any provision hereof shall be sent by registered or certified mail, return receipt requested addressed to Mr. John W.C. Catlett, P.O. Box 148, Wicomico, Virginia 23184.

IN WITNESS WHEREOF, the Grantors and Grantee have hereunto set their hands and seals the day and year above written.

Grantors:

State of Virginia
County of Gloucester, to-wit:

The foregoing instrument was acknowledged before me by Charles Catlett this 14th day of November, 1990.

Charles Catlett (SEAL)

14 November 1990 (DATE)

Susan W. Carter

Notary Public

My commission expires: August 31, 1993.

State of Virginia
County of Gloucester, to-wit:

The foregoing instrument was acknowledged before me by Mary A. C. Burruss this 14th day of November, 1990.

Mary A. C. Burruss (SEAL)

14 November 1990 (DATE)

Susan W. Carter

Notary Public

My commission expires: August 31, 1993.

State of Virginia
County of Gloucester, to-wit:

The foregoing instrument was acknowledged before me by John W. C. Catlett, Jr. this 19th day of November, 1990.

John W.C. Catlett, Jr. (SEAL)

19 November 1990 (DATE)

Susan W. Carter

Notary Public

My commission expires: August 31, 1993.

ACCEPTED BY

AS GRANTEE:

Paul R. Verkuil (SEAL)

2-5-91 (DATE)

The foregoing instrument was acknowledged before me by Paul R. Verkuil this 5th day of February, 1991.

Mary D. Anderson
Notary Public

My commission expires: May 31, 1993

State of Virginia
City of Williamsburg, to-wit

~~APPROVAL AS TO FORM:~~

Assistant Attorney General for the

~~Attorney General of Virginia~~

RECOMMEND:

Director

Division of Engineering and Buildings

RECOMMEND:

Director

Department of General Services

APPROVED FOR THE GOVERNOR:

Pursuant to the provisions of Section 2.1-504.2, Code of Virginia (1950), as amended, and by authority of Executive Order 78 (89), I hereby approve acquisition of this conservation easement from John W.C. Catlett, Jr., Charles Catlett, and Mary Armistead Catlett Burruss, which is more fully described herein, and the execution of this document.

Ruby G. Martin

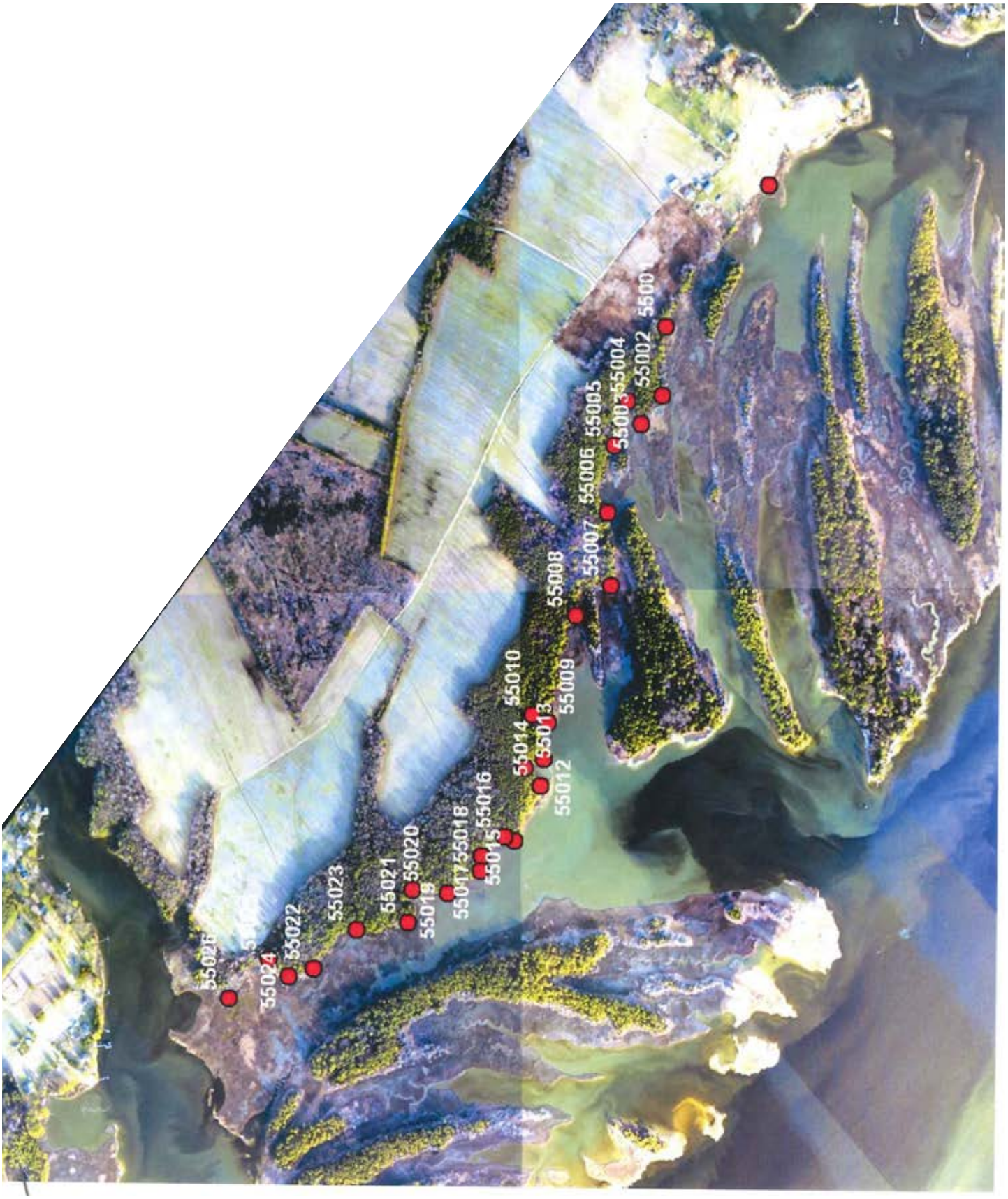
Secretary of Administration,

for the Governor of Virginia

12-18-90

Date

Conservation Easement Ammended April 8, 2010 as Instrument #080007316 to clarify the boundary lines of the easement to be as follows:



POINT	NORTHING	EASTING	NAME_	LAT	LONG
55000	3637535.366	12053904.196	Rod Set	37.296738	-76.536879
55001	3638312.804	12052979.714	Rod Set	37.298925	-76.540001
55002	3638325.938	12052537.172	Rod Set	37.298987	-76.541522
55003	3638487.509	12052353.252	Rod Set	37.299441	-76.542142
55004	3638605.184	12052496.758	Rod Set	37.299756	-76.541641
55005	3638700.184	12052209.381	Rod Set	37.300033	-76.542622
55006	3638739.176	12051782.357	Rod Set	37.300164	-76.544087
55007	3638693.344	12051322.284	Rod Set	37.300065	-76.545671
55008	3638966.967	12051118.086	Rod Set	37.300828	-76.546354
55009	3639164.459	12050432.609	Rod Set	37.301409	-76.548696
55010	3639287.810	12050481.552	Rod Set	37.301745	-76.548519
55012	3639188.743	12050201.852	Rod Set	37.301489	-76.549487
55013	3639337.966	12050144.328	Rod Set	37.301902	-76.549675
55014	3639210.365	12050033.668	Rod Set	37.301558	-76.550064
55015	3639408.042	12049673.889	Rod Set	37.302121	-76.551287
55016	3639487.354	12049698.909	Rod Set	37.302337	-76.551195
55017	3639662.679	12049572.301	Rod Set	37.302826	-76.551618
55018	3639668.543	12049475.759	Rod Set	37.302847	-76.551949
55019	3639922.556	12049326.207	Rod Set	37.303553	-76.552445
55020	3640208.437	12049337.068	Rod Set	37.304338	-76.552388
55021	3640232.307	12049133.410	Rod Set	37.304415	-76.553086
55022	3640977.772	12048814.850	Rod Set	37.306480	-76.554128
55023	3640644.808	12049071.169	Rod Set	37.305551	-76.553271
55024	3641165.896	12048761.893	Rod Set	37.306999	-76.554297
55025	3641324.815	12048862.426	Rod Set	37.307430	-76.553940
55026	3641633.321	12048607.016	Rod Set	37.308292	-76.554796

Appendix B: MOU with VA DCR

MEMORANDUM OF UNDERSTANDING

This MEMORANDUM OF UNDERSTANDING ("MOU") is made and entered into this 18th *day of October, 2019*, by and between the **COMMONWEALTH OF VIRGINIA, DEPARTMENT OF CONSERVATION AND RECREATION**, an agency of the Commonwealth of Virginia, of 600 East Main St., 24th Floor, Richmond, Virginia 23219 ("DCR") and the **VIRGINIA INSTITUTE OF MARINE SCIENCE/CHESAPEAKE BAY NATIONAL ESTUARINE RESEARCH RESERVE,** with its principal place of business located at P.O. Box 1346, Rt. 1208 Greate Road, Gloucester Point, Virginia 23062.

W I T N E S S E T H:

WHEREAS, DCR and VIMS/CBNERR agree to cooperate on the construction of a hand carry boat launch across VIMS/CBNERR property at the site of Poplar Creek for the future Machicomoco State Park. DCR and VIMS/CBNERR further agree to cooperate with the management of the Catlett Island component of the CBNERR and the future Machicomoco State Park.

WHEREAS, DCR and VIMS/CBNERR will work together to develop appropriate warning notification signage to alert recreational boaters to restricted access onto the Catlett Islands, adjoining intertidal habitats, and near any sensitive scientific equipment not located on the islands or adjoining intertidal habitats.

WHEREAS, DCR and VIMS/CBNERR agree that no additional structures (except the hand carry boat launch) will be constructed in Poplar Creek without prior written approval from both parties.

NOW, THEREFORE, in consideration of the foregoing recitals, the reciprocal duties and obligations set forth herein below and other goods and valuable consideration, the receipt and sufficiency of which is acknowledged, the parties agree as follows:

Management and Operational Services:

• VIMS/CBNERR will monitor resource conditions within the Catlett Island Reserve to ensure that resource degradation does not occur as a result of excessive visitor use. Appropriate measures will be taken to restore any damages. DCR will work with VIMS/CBNERR to mitigate any resource degradation issues if they should occur.

• DCR will assume all responsibilities for public access infrastructure replacement and maintenance to the Poplar Creek hand carry launch within the VIMS/CBNERR Catlett Island Research Reserve.

• DCR will work in cooperation with VIMS/CBNERR to develop interpretive and educational programming to inform the public about the coastal and historic resources of the region.

Programming may include, but not limited to: on site presentations; school program; water based programming; exhibits; and cooperative events.

Compliance with Laws:

• DCR will enforce Park rules and regulations and VIMS/CBNERR management policies within the Catlett Island Research Reserve. VIMS/CBNERR will ensure compliance among participants in VIMS/CBNERR sponsored activities within the Research Reserve. DCR will notify VIMS/CBNERR on non-compliance of personnel engaged in Research Reserve sponsored activities.

• DCR will work in cooperation with VIMS/CBNERR to protect nesting bald eagles, enhance and protect the great blue heron colony, enforce seasonal closures in an effort to protect important waterfowl including, but not limited to, canvasback and black duck wintering habitat at the Poplar Creek launch area, and ensure that DCR conservation officers strictly enforce access violations.

Notices, Reviews and Updates:

• DCR and VIMS/CBNERR will conduct meetings as needed or requested to review previous activities, identify upcoming research, education, resource protection, and restoration needs, and other mutual areas of interest for the Machicomoco State Park and Catlett Island Research Reserve. DCR and VIMS/CBNERR will seek funding to fulfill these identified needs.

• VIMS/CBNERR will review proposed research, education and resource protection/restoration projects to be conducted in the Catlett Island Research Reserve and make this information available to DCR. If requests are made to include activities within the future Machicomoco State Park property boundaries, reviews will include DCR Research and Collection Permit and CBNERR Research Permit applications. Following the review process, DCR and VIMS/CBNERR will issue permits and track approved research, education and resource protection/restoration projects as required.

• DCR and VIMS/CBNERR will be involved in the review and update of: Machicomoco State Park Resource Management Plan; Machicomoco Master Plan; CBNERRs Management Plan; and Catlett Island Natural Resource Management Plan.

• This MOU will be updated based on mutually determined needs. Review and updates of the MOU should, at a minimum, occur when DCR's Machicomoco State Park Master Plan or CBNERRs Management Plan are updated.

Termination:

• This MOU shall be in effect until superseded. DCR and VIMS/CBNERR agree that a decision to terminate this MOU shall be made jointly by the parties with a one-year advance notice given.

IN WITNESS HEREOF, the parties have caused this Agreement to be executed as of the date first set forth hereinabove.

VIMS/CBNERR

VIRGINIA INSTITUTE OF MARINE SCIENCE/CHESAPEAKE BAY NATIONAL ESTUARINE RESEARCH RESERVE

By:_____

John T. Wells, Dean and Director
Virginia Institute of Marine Science

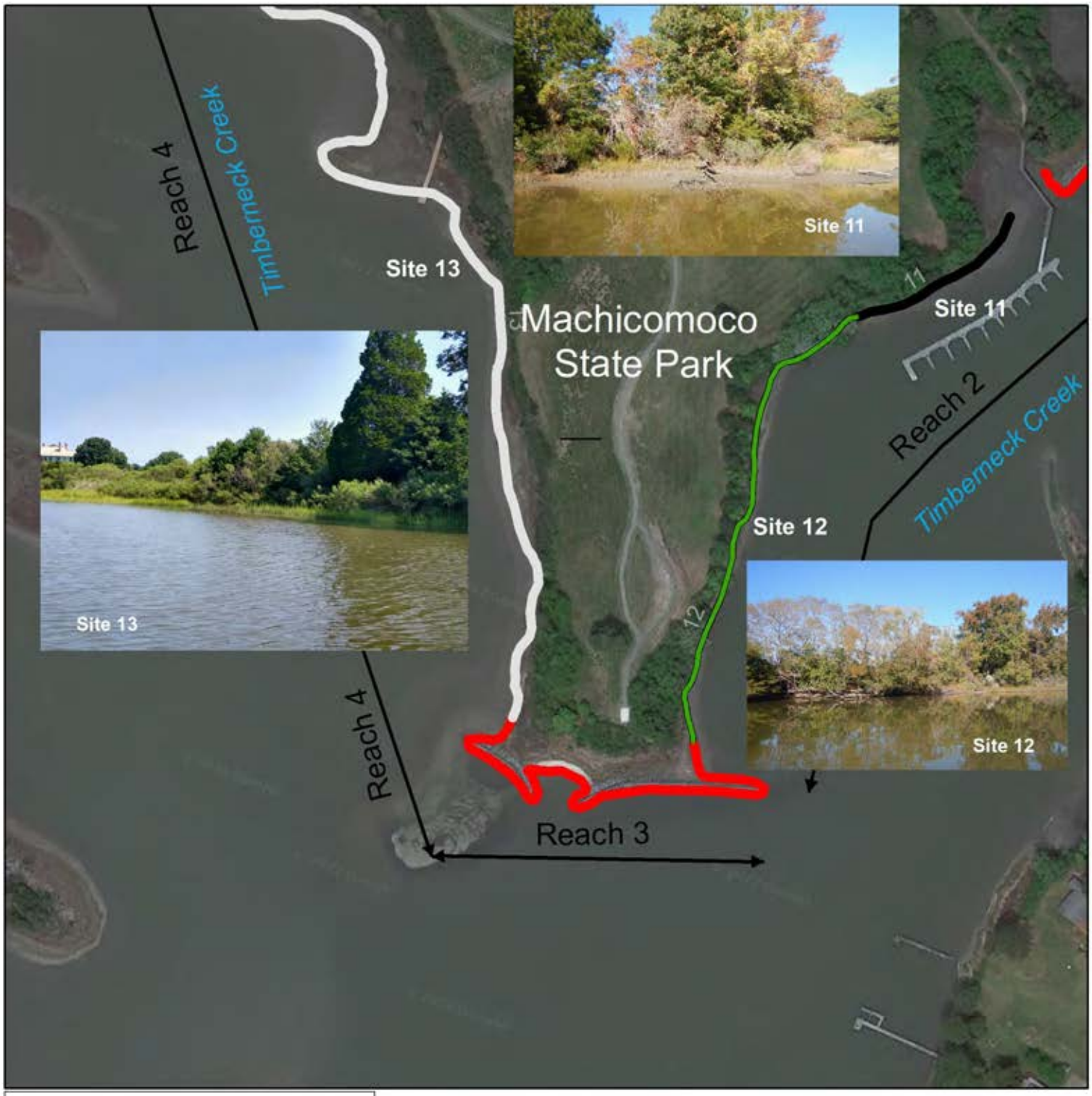
DCR

COMMONWEALTH OF VIRGINIA, DEPARTMENT OF CONSERVATION AND RECREATION

By:_____

Clyde E. Cristman, Director
Virginia Department of Conservation and Recreation

Appendix C: Shoreline Studies Program Suggestions for Shoreline Protection



Management Recommendations

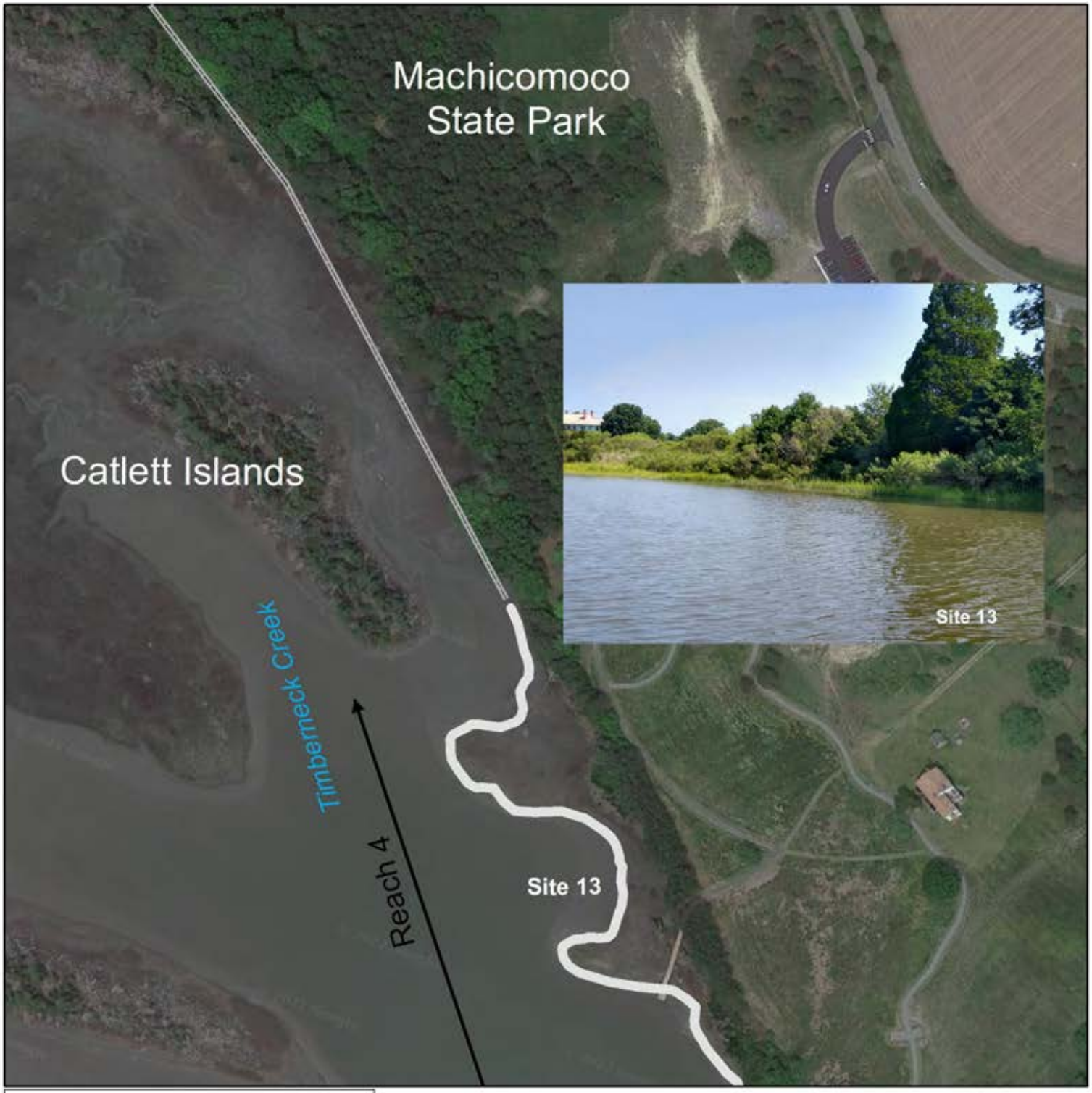
- Existing Structure
- Low Rock Sill
- Oyster Sill
- Intertidal Oysters
- Trim Trees, Plant Marsh, Intertidal Oysters

N W E S

Shoreline Studies Program VIMS

0 200 400 Feet

Location Index



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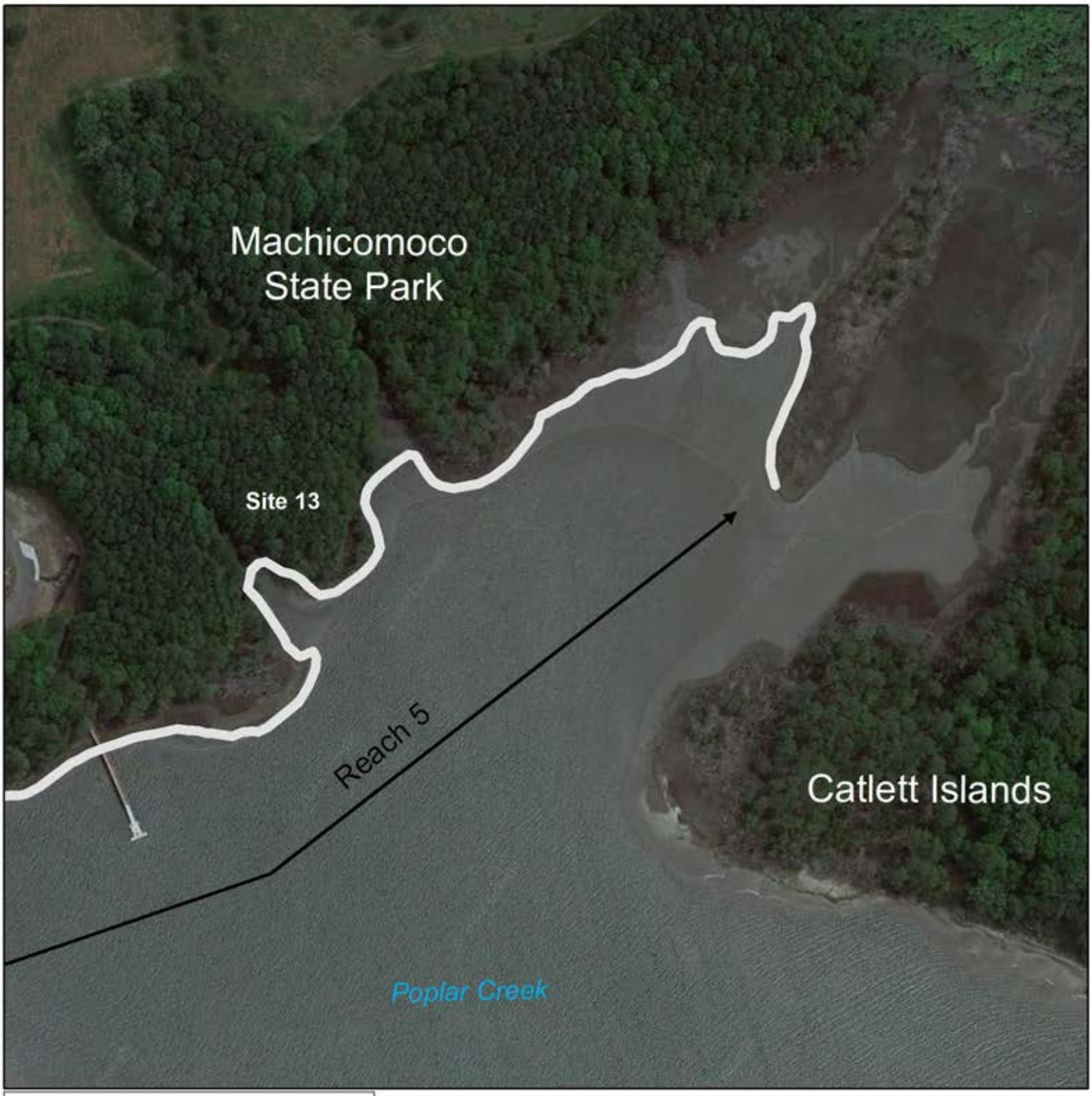
N W E S

Shoreline Studies Program VIMS

0 200 400 Feet

Location Index



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Shoreline Studies Program
VIMS

0 200 400 Feet

Location Index

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Shoreline Studies Program VIMS

0 200 400 Feet

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Management Recommendations

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- Low Rock Sill
- Oyster Sill
- Intertidal Oysters
- Trim Trees, Plant Marsh, Intertidal Oysters

Shoreline Studies Program
VIMS

0 200 400 Feet

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Catlett South Island
Shoreline Management Plan
Profiles
Proposed Structures
Breakwater
Brill
Sand Fill
Sill
Brill 1
Sand Fill
Breakwater 1
Breakwater 2
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Limit of Fill
Breakwater 3
Brill 2
Breakwater 4
Sand Fill
Brill 3
P2
Limit of Fill
Southwest Facing Shoreline
Breakwater 5
Breakwater 6
Limit of Fill
Sand Fill
Limit of Fill
Sill 3
Sill 4
Sill 5
Sill 6
Breakwater 10
Breakwater 9
Breakwater 8
P4
Brill 4
P3
Breakwater 7
Sill 2
Brill 5
Sill 1
South Facing Shoreline
0
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500
Feet
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York River
Shoreline Studies Program
VIMS

Appendix D: Forestry Management Plan

Virginia Forest Stand Plan

About This Plan

This Forest Stand Plan was developed to help guide you in the active management of the natural resources on your property. The plan is based upon the objectives you identified as being important to you. All of the management recommendations are for your consideration.

Primary Goals That You Identified For Managing The Property

The primary stewardship goal at Catlett Islands is to maintain a functioning ecosystem with a matrix of natural communities that will provide the research community with a long-term site for habitat-focused research opportunities. Management objectives for Catlett Islands include:

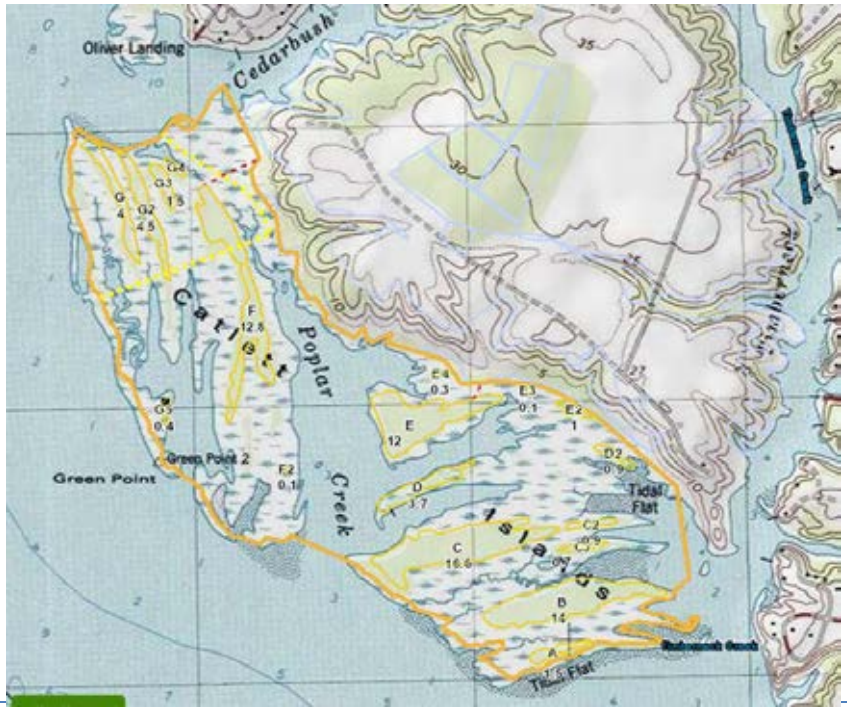
1. Maintaining and restoring natural communities;
2. Fostering research to accomplish conservation goals and contribute to the body of knowledge on flora, fauna, and natural communities of Virginia;
3. Managing habitat to benefit and provide for protection of natural resources, scenic resources, and historic resources;
4. Evaluating effects on management on plants, animals, and natural communities.

Introduction

This forest management plan covers the examination of approximately 75 acres of forestland on islands in the York River in Gloucester County, Virginia. Boundaries and acres are only estimates derived from aerial photographs. A tract map is attached allowing you to see the map as you read your plan.

Tract Location

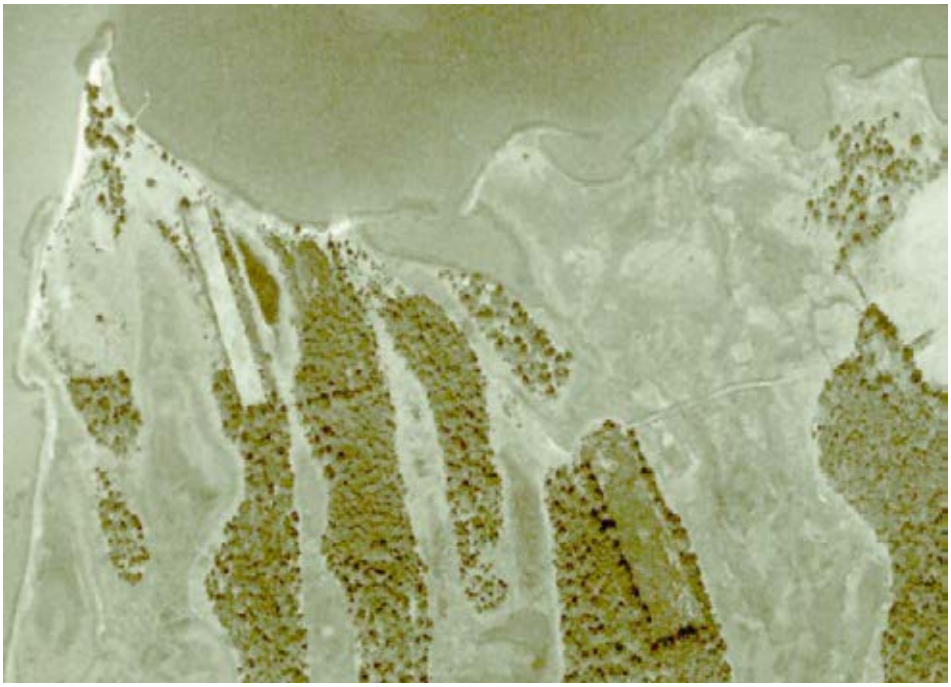
The Catlett Islands are situated on the York River waterfront of Machicomoco State Park, between Cedarbush Creek and Timberneck Creek. Tidal Poplar Creek flows from the middle of the Catlett Islands into the York River.



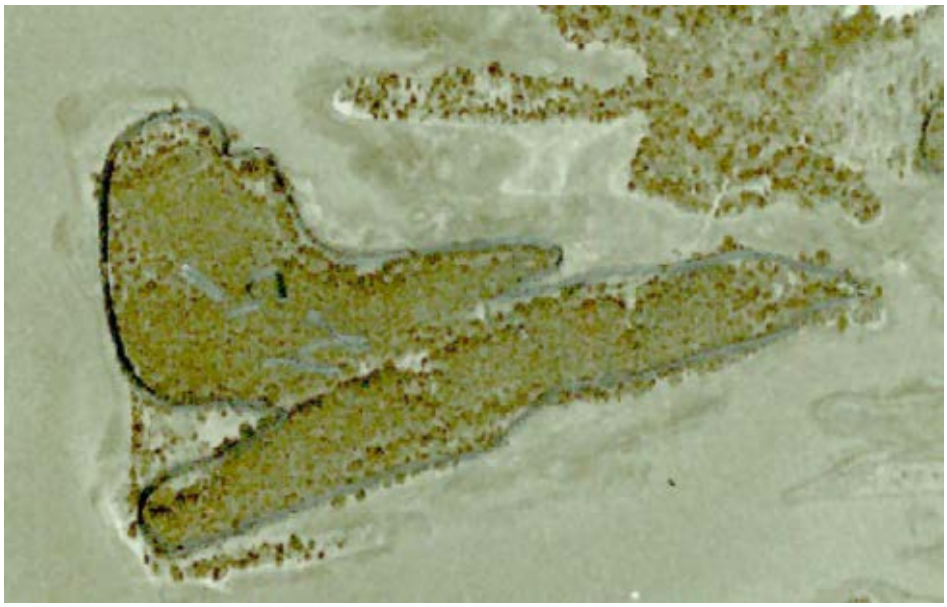
PROPERTY OVERVIEW

The Catlett Islands CBNERRVA is owned by The College of William and Mary and the Virginia Institute of Marine Science with the exception of Gloucester County Tax Parcel 44-88 located at the northern tip of the islands. This 79-acre parcel is owned by the Ablowich Family Joint Trust, and its perimeter is indicated by a yellow-dotted line on the topo map above.

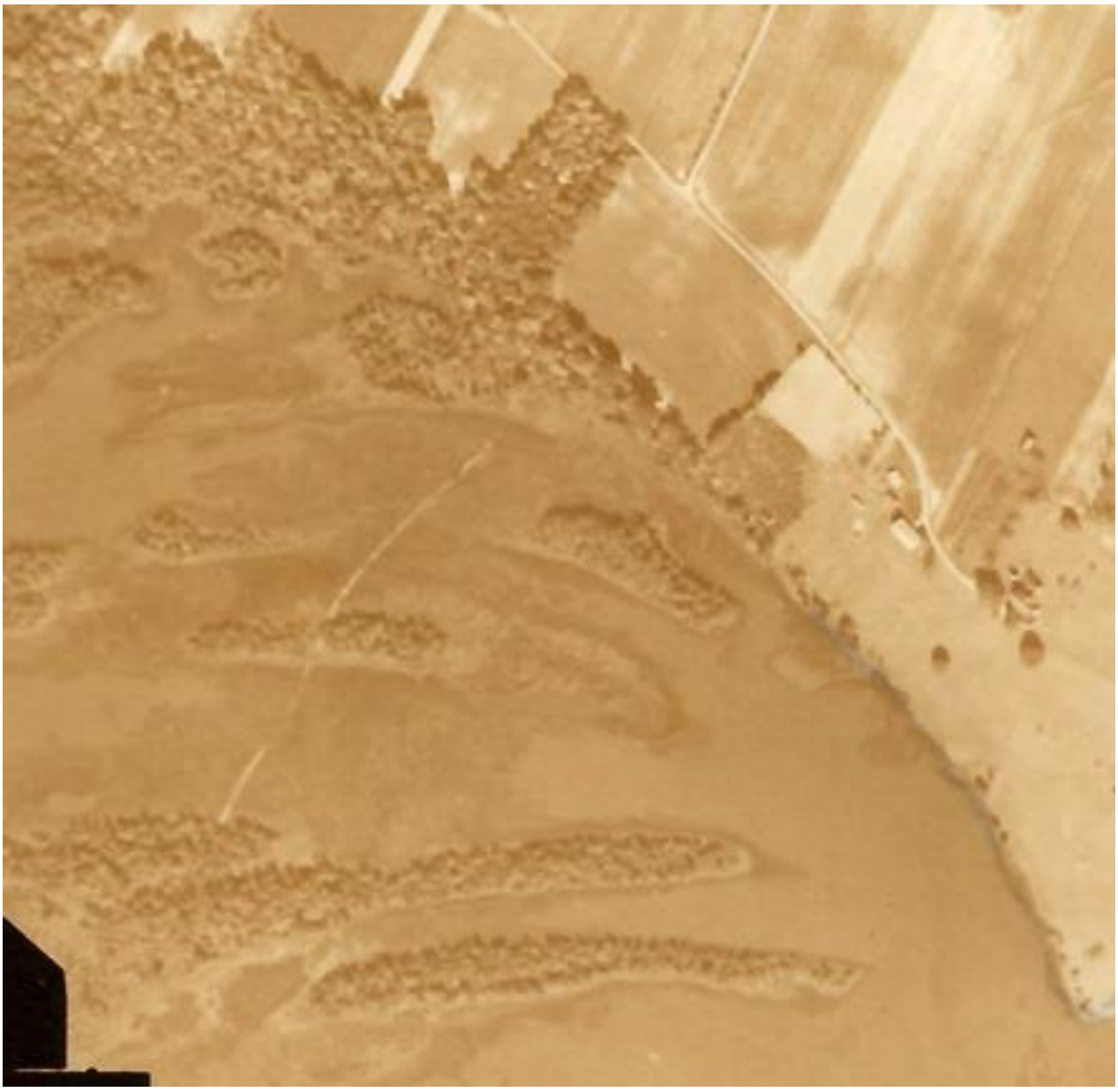
Two developed areas are visible on the islands in the 1937 aerial photograph. One is located on the north end of the islands and includes a house, a pier, and former fields or pastures. There is also a road connecting the northern end of the islands to the mainland.



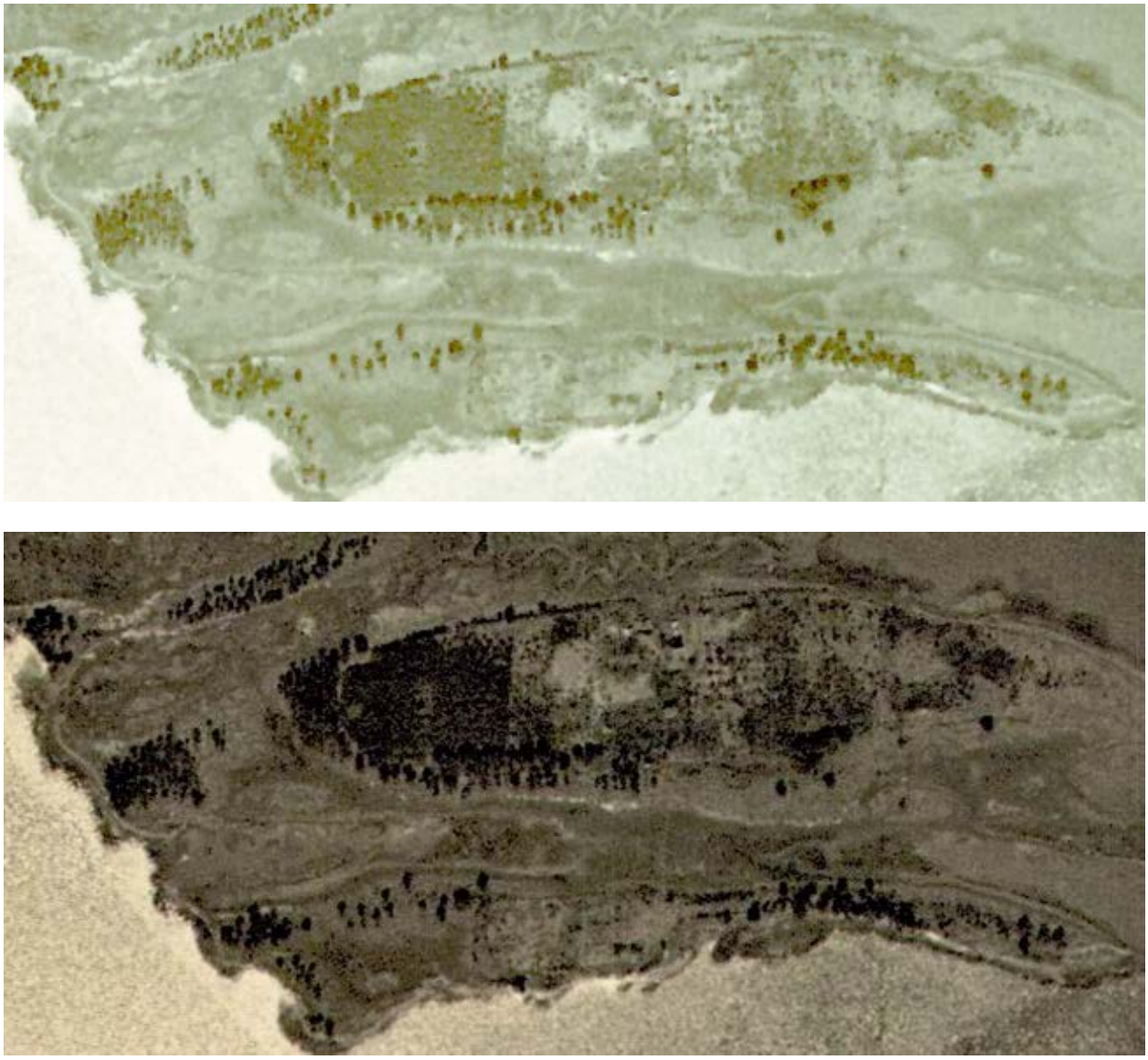
There was another connector road from the mainland to a forested island labeled “E” on the Tract Map. This island shows younger trees than the other islands, and it may have produced crops of timber or been used for agriculture prior to 1937.



A third connector road is visible in the 1953 and 1960 aerial photographs. It connected Island C to the mainland not far from Timberneck House.



The second area of development in the 1937 aerial photo is at the south end of the CBNERRVA. The islands labeled A and B on the Tract Map are in agricultural use, to include multiple structures and an orchard-like arrangement of trees.



Two different scans of the same aerial photograph, AFG 6-72, taken on April 1, 1937.

STANDS A-G

Descriptions and Recommendations:

Acres:	75
Forest Type:	Maritime Upland Forest
Species Present:	*Pinus taeda* (loblolly pine), *Quercus pagoda* (cherrybark oak), *Q. phellos* (willow oak), *Q. falcata* (southern red oak), *Q. coccinea* (scarlet oak), *Q. nigra* (water oak), *Q. alba* (white oak), *Nyssa sylvatica (*black gum), *Prunus serotina* (black cherry), *Ilex opaca* (American holly), *Liquidambar styraciflua* (sweetgum), *Acer rubrum* (red maple), *Liriodendron tulipifera* (yellow poplar), *Juniperus virginiana* (eastern redcedar), *Diospryos virginiana* (persimmon), *Fagus grandifolia* (American beech), *Cornus florida* (flowering dogwood), *Perseus palustris* (swampbay), and *Magnolia grandiflora* (Southern magnolia). Vines and shrubs include *Campsis radicans* (trumpet vine), *Vitis rotundifolia* (muscadine grape), *Smilax rotundifolia* (common greenbrier), *Toxicodendron radicans* (poison ivy), *Baccharis halimifolia* (high-tide bush), *Iva frutescens* (marsh-elder) and *Morella cerifera* (waxmyrtle)
Age:	These forest stands are mature and are 80+ years old. There are patches of young saplings of loblolly pine and yellow poplar filling in disturbed spots where large trees have fallen.
Stand History:	Loblolly pine has likely been the predominant species on the thinner sand-strip islands for thousands of years. The larger islands with better soil drainage have a surprising diversity of hardwood species. Some areas of the islands were cleared for agricultural use in the early 1900s, but by 1947, all of these clearings were growing back in trees.
Size:	Pines and oaks reach as tall as 100-110 feet. The largest diameter pine observed was 24” dbh (diameter at breast height) and the largest diameter cherrybark oak was 41” dbh. The largest diameter red maple we encountered was 32” dbh.
Tree Quality:	Good. Fusiform rust and red-heart cankers are present in the pines at what can be considered “normal” levels for their age.
Stocking/Density:	Well-stocked
Growth Rate & Vigor:	Slow due to maturity of trees and site conditions.
Site Quality & Soils:	The nearly level forested areas are composed of poorly drained Ochraquults-Haplaquets Complex, and the higher land (particularly the eastern islands) is composed of

	moderately well drained Eunola fine sandy loam. Consequently, the trees are growing quite well in the center of the islands that are ten acres or larger. The trees on the smaller islands and island perimeters are growing slowly and are smaller than expected for their age due to the extreme growing conditions of saltwater inundation and wind exposure.
Aspect & Topography:	Flat. Some islands are very flat and can be inundated during storm surges. The islands with predominantly hardwood stands in the center have a few feet of elevation. The islands all fall below 5 feet in elevation.
Water Resources:	This is a tidal island system in the York River. "Ghost forests" stand in areas that have reached the limit of saltwater inundation that trees can tolerate. The eastern islands have a lower water table of 18-30" deep, while the northern islands hold surface water in the winter months.
Invasive Species:	*Lonicera japonica* (Japanese honeysuckle) and introduced *Magnolia grandiflora* (Southern magnolia) observed.
Wildlife Habitat:	White-tailed deer seem to have the most impact on vegetation. Tracks and scat were abundant and there are large brier patches with vernal pools (from tree wind-throw) where the briers have been heavily browsed. We also observed squirrels, turkey feathers, otter scat, great blue herons, and numerous waterfowl.
Recreation/Aesthetics:	Recreation is limited to lottery duck-hunting managed by VIMS.
Threatened & Endangered Species Present:	None observed. There is a bald eagle nest on site. Northern long-eared bat (Myotis septentrionalis) is listed as a federal and state threatened species that is "known or likely to occur" in Gloucester County. The latest information for this species is located at https://www.fws.gov/midwest/endangered/mammals/nleb/index.html.
Fire Risk:	Moderate due to limited access to people. These islands have plenty of forest litter and duff that would burn readily during dry, hot weather. However, the fires would be contained by the surrounding water. We observed some trees killed by lightning but did not see evidence of past brush fires.
Unique Natural Features:	From a "mainland" forestry perspective, everything about these islands is unique. For an area with a history of

human settlement that is also subject to high winds, there was very little incidence of invasive species. These forests feel like an ecosystem frozen in time that is slowly giving way to rising water levels. Ghost forests of dead cedars and pines are present along the marsh edges. As the inland pines mature and die, the percent of hardwood forest cover can increase, depending on the rate of sea level rise and white-tailed deer predation on hard mast.

Recommendations: These forests should continue to be monitored for invasive species and pine bark beetle infestations. Islands present a great opportunity for invasive species research and the effectiveness of removal methods. If any areas of unexpected tree mortality or other forest health issues are observed, please contact the Virginia Department of Forestry as soon as possible.

Managed deer hunts might benefit the preservation of the current plant communities Machicomoco State Park opened in April of 2021, and since then no deer hunting has taken place on these 645 acres. This is a significant change in local deer population management. The effects of deer on tree and shrub regeneration can be measured by erecting deer exclosures and then comparing the occurrence of natural sprouts inside the exclosure to the occurrence of sprouts outside the exclosure. White-tailed deer can eat enough acorns to virtually eliminate oak regeneration. The Department of Wildlife Resources might be able to provide guidance on setting up special deer hunts to manage the deer herd that resides on Machicomoco State Park and the Catlett Islands.

Catlett Islands - VIMS

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While VDOF has attempted to ensure that the features shown on this map are accurate, VDOF did not perform survey work or otherwise verify information provided to it in preparing this map and all features and acreages shown are approximate. VDOF expressly disclaims all warranties of any type concerning this map, and any use of the map assumes you understand and agree with this disclaimer.

Feet
0 700 1,400 2,800

Values indicate acres in each forested patch.

Appendix E: List of Research Projects

Research and monitoring projects active during 2014 or later at Catlett Islands boundaries and adjacent Subtidal Areas, which have been compiled by CBNERR-VA (as of August 2025).

Lead PI(s)	Project	Sponsor	Lead PI Institution	Reserve	Duration
Active in 2025					
Alwine, R.	Catlett Island Corduroy Survey	VA Department of Historic Resources	Fairfield Foundation	CI	2025
Barksdale, MB.	Marsh Transect Model Comparisons	VIMS	VIMS	GI, CI	2025
Brown, D.	Cultural Resource Investigations	VA Department of Historic Resources	Fairfield Foundation	GI, CI	2019-Ongoing
Fabrizio, M.	Juvenile fish trawl survey	USFWS/VMRC	VIMS/FISH	GI, CI, CB, TC, SH	Ongoing
Harlan, D., and Duhring, K.	Machicomoco State Park Shoreline Cleanup	Friends of Machicomoco, VA Master Naturalists	Friends of Machicomoco	CI	2022-2025
Jobe, J.	Edges in Ecotones: Differentiating process at the leading and lagging edges of the marsh-forest ecotone	VIMS	VIMS	CI	2025
Lerberg, S.	Exchange- D, Degradation	SERC/PNLL/LBL	PNLL	CI	2025 - Ongoing
Lerberg, S.	Emergent wetland sentinel site monitoring	CBNERR-VA	VIMS/CBNERR-VA	GI, CI, TC, SH	2017 - Ongoing
Lipcius, R.	Blue crab ecology	NOAA, VCU, ACOE, CVA Science Collaborative	VIMS/FISH	CI, TC, GI	2000 - Ongoing
Reay, W.	NERRS SWMP: Water quality, nutrients and meteorological	NERRS	VIMS/CBNERR-VA	GI, GP, CI, CB, TC, SH, WH	1997 - Ongoing
Reay, W., and S. Lerberg	Sea level rise impacts to emergent wetlands and adjacent ecotones	NOAA	VIMS/CBNERR-VA	GI, CI, TC, SH	2009 - Ongoing
Reilly, E.	Bird Communities at Catlett Islands	NOAA	VIMS/CBNERR-VA	CI	2024 - Ongoing
Sanchez, Z.	Seascape spatial variability of carbon dynamics in coastal salt marshes in Virginia	Kirk Wetlands Research Program	ODU	CI	2023-2024

VA Shellfish Sanitation	Microbial water quality monitoring	VADH	VADH	CI, TC	1987 - Ongoing
Completed 2023					
Brush, M.	Effects of out-welling on metabolism of the York River	VIMS, NSF	VIMS/BIOL	TC, CI	2013-2023
Brush, M.	Primary production and respiration along the York River	VIMS	VIMS/BIOL	GI, CI, TC, SH	2015-2023
Schoenberg, N., and R. Seitz	Growth and survival of outplanted soft-shell clams during a winter grow-out period in the York River	NOAA Saltonstall-Kennedy Grant	VIMS/BIOL	CI	2021-2023
Completed 2022					
Brush, M.	Fine-scale spatial variability of marsh communities on the protected and unprotected sides of Catlett Islands	VIMS	VIMS/BIOL	CI	Mar-Apr 2022
Completed 2021					
Koontz, E.	NASA blue methane	NASA	SERC	GI, CI, TC, SH	2021
Walters, D., and S. Lerberg	Tidal marsh elevation survey for LEAN Correction	USGS, CBNERR-VA, VIMS	USGS	GI, CI, TC, SH	2021
Completed 2020					
Gillen, M., T. Messerschmidt, and M. Kirwan	Marsh soil shear strength along salinity gradient	NSF	VIMS/PHYS	GI, CI, TC, SH	2018-2020
Landry, S.	Recruitment and post-settlement mortality of the soft-shell clam	VIMS	VIMS	CI	2019-2020
Completed 2019					
Chambers, R	The nesting ecology and predation of diamondback terrapins	W&M	W&M Keck Lab	CI	2005-2019
Martinez-Soto, K., and D. Johnson	A comparison on the impacts of vanguard and core populations of Uca pugnax on marsh functions	NSF	VIMS/BIOL	CI	2019
Messerschmid, T. and M. Kirwan	Recreating forest root distribution	VIMS	VIMS/PHYS	CI	2018-2019
Neubauer, S.	Human alteration of sediment delivery to the coast	NSF	VCU	GI, CI, TC	2018-2019
Completed 2018					
Perry, J.	Wetland plant ID and general education	VIMS	VIMS	GI, CI, TC, SH	2002-2018
Shaw, T.	Vertical distribution of salt-marsh foraminifera as sea level indicators	NSF	Rutgers U	GI, CI, TC	2017-2018

Completed 2017					
Hoenig, J.	Shad stock assessment	VMR, NMFS, USFWS	VIMS	CI	2010-2017
Isdell, R.	Ecological drivers of ribbed mussel populations	VIMS	VIMS/BIOL	CI	2016-2017
Completed 2016					
Atkinson, R., and B. Bowen	Dendrologic assessment of coastal habitats	CBNERR-VA Rouse Bottom Fellowship	CNU	GI, CI, TC, SH	2012-2016