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Virginia Marine Resources Commission
Over-sand Vehicle Registration Application

An Assessment of the Barrier Island Policy and the Coastal Primary Sand Dune Act

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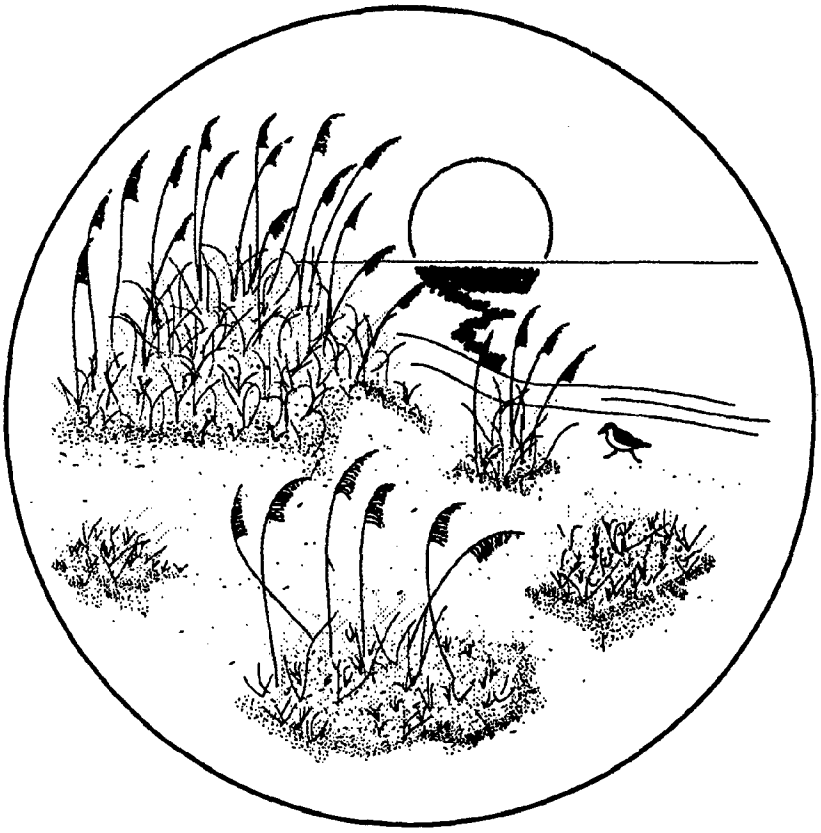

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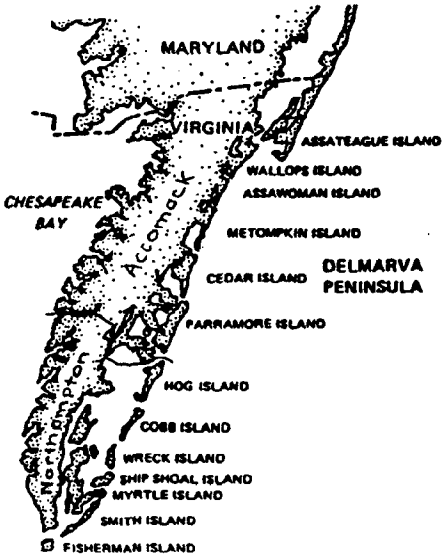
Introduction

The Commonwealth of Virginia legislatively adopted the Coastal Primary Sand Dune Protection Act in 1980. The Act was set forth in acknowledgment of the unique physiographic features of coastal primary sand dunes and beaches, which function as protective barriers from the effects of flooding and erosion caused by coastal storms. Sand dunes and beaches are also recognized for their importance to the overall scenic and recreational attractiveness of Virginia's coastal zone.

The Virginia Marine Resources Commission ("Commission" or "VMRC"), in conformance with Chapter 14 of Title 28.2 of the Code of

Figure 1 - Delmarva Peninsula and Virginia's 13 Barrier Islands



Virginia, is the State agency responsible for managing the permit program for encroachments on coastal primary sand dunes and beaches. There are eight localities which are authorized and have the option to adopt the Coastal Primary Sand Dune Ordinance: the Counties of Accomack, Lancaster, Mathews, Northampton and Northumberland and the Cities of Hampton, Norfolk, and Virginia Beach. Northampton County has adopted the Model Coastal Primary Sand Dune Zoning Ordinance. Accomack County, however, has not and it is the Commission's responsibility to consider the impacts to the primary sand dunes and beaches in that locality.

This report will focus on Accomack and Northampton Counties and one of Virginia's most valuable natural resources - a chain of 13 barrier islands located on the seaside of the Virginia portion of the southern Delmarva peninsula (Figure 1). The two primary geomorphological features of Accomack and Northampton Counties' barrier islands, sand dunes and overwash areas, are both included in the statutory definition of a coastal primary sand dune as a... "mound of unconsolidated sandy soil which is contiguous to mean high water, whose landward and lateral limits are marked by a change in grade from ten percent or greater to less than ten percent, and upon any part of which is growing"... one or more of the designated plants listed in Chapter 14 of Title 28.2 of the Code of Virginia.

As a direct result of the increased developmental pressure during the 1980's on Cedar Island in Accomack County, the Commission found it necessary and appropriate to establish a policy and supplemental guidelines to assist landowners and regulators alike in shaping barrier island uses in a manner that preserves and protects the values of Coastal Primary Sand Dunes as set forth by the General Assembly. The resulting Barrier Island Policy was created and implemented in 1986, and later revised in 1990.

The purpose of this study, funded in part by the National Oceanic and Atmospheric Administration through a grant received under the Coastal Zone Management Act of 1972 as amended, was to evaluate the effectiveness of the revised Barrier Island Policy in reducing the environmental impacts associated with man's increased activities on Virginia's barrier islands. This report focuses on Cedar Island since the majority of development has occurred there. In addition, the study would further examine a permitting system for over-sand vehicle use on the island and present a plan that would outline

possible changes to the present Barrier Island Policy.

Barrier Island Features and Processes

Accomack and Northampton Counties' barrier islands are located east of, and run parallel to, the mainland and generally exhibit a north-northeast trend. The barrier islands and their various morphological components provide protection to the Eastern Shore mainland from the direct action of the Atlantic's waves, currents, and storms. Similar barrier island systems occur in every coastal state of the United States having a shoreline along the Atlantic Ocean, Gulf of Mexico, and Pacific Ocean (Stauble, 1989).

Dimensions of the Eastern Shore barrier islands are quite variable. The average length and width of the islands are approximately 8 km and 1 km, respectively. The islands have been characterized as low-profile with vertical elevations ranging between 0 m and 10 m (Byrnes et al, 1989). Dune development along much of the coastal barriers could be described as minimal.

Because the barrier islands are low-lying, they are extremely susceptible to overwash during storm events which results in the transportation of sediment from the barrier beach and dune system to more quiescent areas behind the barrier islands (Figure 2). The resultant "overwash fans" quickly become re-colonized by coastal vegetation, which serves to trap windblown sand and assist in the natural reconstruction of coastal dunes. Overwash, aeolian (or wind blown) transportation, and the exchange of sediment and water through tidal inlets all contribute to the landward migration of the islands. The migration or "rollover" process actually maintains the integrity of the barrier island and the associated coastal primary sand dunes and beaches.

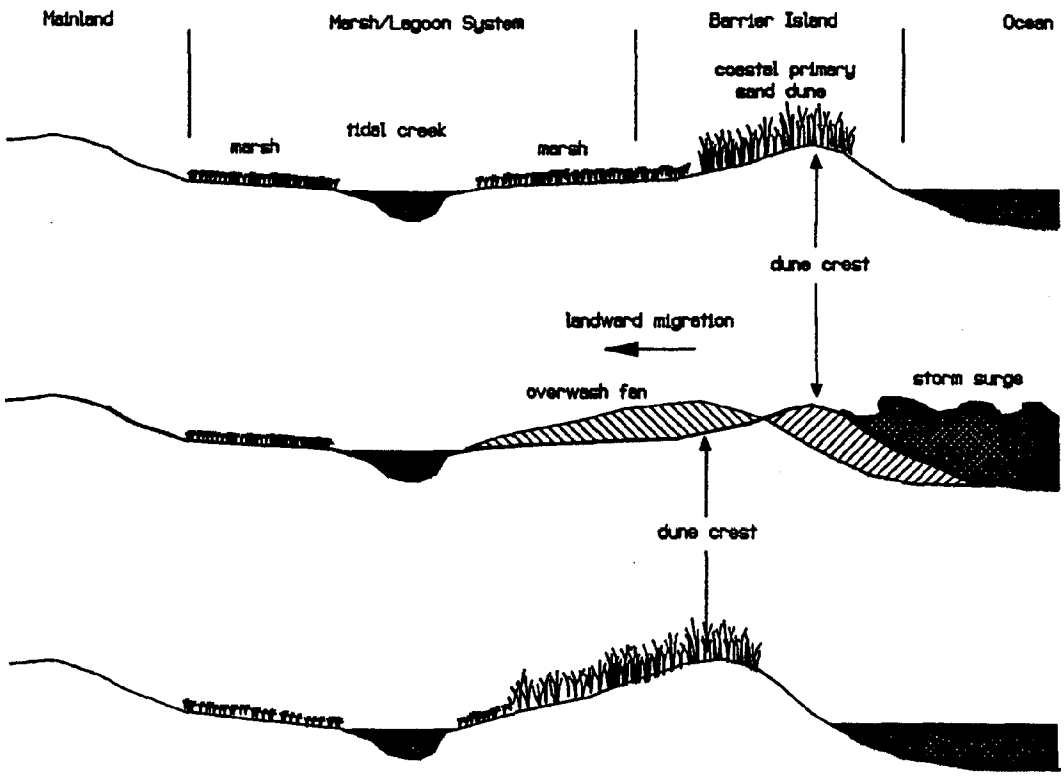
There is considerable temporal and spatial variation between the migration rates for each of the 13 barrier islands. Byrnes et al (1989) reported the southern half of Metomkin Island to be retreating at a rate of 13.6 m/yr, three times the rate of the northern half, between 1962 and 1988. Conversely, the northern section of Cedar Island, between 1949 and 1986, had an average retreat rate of 6.4 m/yr, while the southern section during the same time period had an average accretion rate of 2.1 m/yr (Dolan, 1986). Long-term (1852 to 1989) migration rates, however, indicate the entire island is retreating on an average of 4.8 m/yr (VIMS, 1989). The large variability of temporal and spatial accretion/erosion rates creates a very unpredictable scenario for island development.

As a result of the obvious difficulties associated with regulating development activities and minimizing the resultant environmental impacts on the extremely dynamic sand platforms, the Commission attempted to develop a set of guidelines to assist in the management of those areas.

Historical Use Of Virginia's Coastal Barriers

There is a well-documented history of human-related activities and habitation on the barrier islands off the Eastern Shore. Native Americans, primarily Nanticoke tribe members, made frequent trips to the islands to gather provisions and certain items used in bartering. In 1672 a small colony of European settlers lived on Hog Island, but mysteriously disappeared by the turn of the century. It was in the late 1800's that a large island village, Broadwater, emerged on Hog Island. There were more than 200 persons on the island, at least a dozen homes, a church, hotel, stores and a sportsmen's club. When the civil war ended, numerous wealthy visitors came to the Eastern Shore's islands to relax, hunt and fish. The simple existence of the island's inhabitants was short-lived, however. Although the village survived many coastal storms and floods, it was the continuous rollover and erosional processes that ultimately

Figure 2 - Barrier Island Rollover



forced the island residents to evacuate their belongings in the 1920's and early 1930's.

During the early years of intercoastal shipping from the major port of New York City to the Chesapeake Bay, the barrier islands played a key role in providing locations for the establishment of lifesaving stations along the Atlantic Coast. The shallow and unmarked waters along the eastern seaboard were quite dangerous, especially during stormy weather. At least eight separate lifesaving stations were established on the backside of several of the barrier islands, from Assateague to Fishermans Island, providing the most immediate response to maritime emergencies. Most of the original stations were replaced in the early 1900's with more modern facilities that currently exist, but in various states of disrepair. The U.S. Coast Guard Station on Parramore Island is the only remaining lifesaving station in use on the Eastern Shore.

Cedar Island has experienced similar human-related use, but mostly by seasonal recreational hunting and fishing parties. In the 1950's, however, approximately 95% of Cedar Island, which was privately owned, was subdivided into 2,200 lots. The planned development, called the Ocean City of Virginia, was to be linked to the mainland with a causeway. The plan lost momentum, however, and the developer offered to sell the property to several conservation organizations and the Commonwealth of Virginia (i.e. The Nature Conservancy, Fish & Wildlife Federation, and the Department of Game and Inland Fisheries), but without success. During the interim, the island continued its migratory trends and many of the originally platted lots were lost to the Atlantic Ocean. It

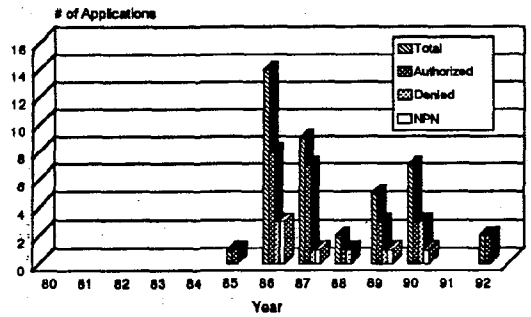
wasn't until the mid-1980's that the majority of Cedar Island again began to be marketed and purchased with individual lots ranging between two and twelve acres in size.

In contrast to Cedar Island, the majority of Virginia's barrier islands are undeveloped and exist as protected wildlife sanctuaries under the Virginia Coast Reserve or National Wildlife Refuge Programs.

Recent Development Trends and Activities

Since Virginia adopted the Coastal Primary Sand Dune Act in 1980 only about 40 applications have been filed in VMRC's offices requesting authorization to conduct activities upon the coastal primary sand dunes and beaches associated with the Eastern Shore barrier islands. Figure 3 depicts the distribution of the 40 applications, as well as the Commission's actions for each of the 12 years since 1980. Only two of the 40 applications submitted entailed proposed activities somewhere other than Cedar Island. During 1992 two applications were submitted for proposed activities on Wallops and Assateague Islands.

Figure 3 - Coastal Primary Sand Dune Applications for Virginia's Barrier Islands, 1980 - 1992.



During the period between 1980 and 1984 there were no coastal primary sand dune applications from the Eastern Shore filed in VMRC's offices (Figure 3). A single application was filed in 1985 for construction activities on the north end of Cedar Island. The 1985 application, which was approved by the Commission, was followed in 1986 by 14 coastal primary sand dune applications describing proposed activities on Cedar Island. After a time consuming and careful review of each of the applications, eight were approved, three were denied, and three were modified so as to not have any impacts on the coastal primary sand dune (no permit necessary; NPN).

The 1986 deluge of applications represents the peak year for proposed activities on Cedar Island. The potential construction "boom" revealed the necessity for further investigation of the possible environmental impacts due to the increased human-related activities on the barrier islands and the formulation of certain criteria and guidelines for management purposes. The resultant Barrier Island Policy was approved and adopted on June 24, 1986.

Figure 3 shows a highly variable, but decreasing trend in the number of coastal primary sand dune applications submitted to VMRC. While the data indicate a slight increase during 1989 and 1990, there were no applications submitted for proposed construction on Cedar Island after 1990. Applications submitted in 1992 were for proposed activities on Wallops and Assateague Islands.

Thirty-eight Cedar Island applications were submitted for consideration between 1985 and 1990, 23 were authorized, 9 were denied, and 6 were determined, after review, not to require a permit (NPN). Authorized construction activities, therefore, could have potentially occurred at 23 separate locations on Cedar island. Twenty-one of the 23 authorized projects were actually initiated during 1985-90. Approximately 70% of those structures, however, have either been relocated or destroyed as a result of the natural migration or rollover process.

The projects that have not been moved or destroyed are primarily located on the southern end of the island. Short-term shoreline position

changes indicate that this section of the island is actually accreting (VIMS, 1989). Newly constructed and relocated cottages have remained fairly secure along the southern reach of Cedar Island due to the wide beach and substantial primary sand dune. In addition, southern Cedar Island may benefit from being in the lee of northern Parramore Island. Southerly winds and waves may be dampened by Parramore Island and the ebb tidal shoal associated with Wachapreague Inlet.

Project Review and Evaluation

For the purpose of discussion, the following chapter will separately address three distinct regions of Cedar Island; the northern region, approximately 2.4 km in length and bounded by Metomkin Inlet, a central region approximately 3.6 km in length; and the southern 3.2 km stretch bounded by Wachapreague Inlet (Figure 4).

So that the investigations and findings of this study can be placed in proper context, a summary of the climatic events that occurred during late 1991 and early 1992 is necessary. During the period, several significant storms passed along the Virginia coastline that caused substantial damage. On October 31, 1992, the "Halloween Storm" brought unusually high water conditions, including storm surge and waves. As Hurricane Bob passed along the continental shelf on October 31 headed north, strong winds forced shelf water onshore and raised sea level approximately five feet above normal. In addition, aerial reconnaissance on the day of the storm provided the opportunity to observe five to eight-foot waves and much of the Eastern Shore barrier islands under water.

A typical nor'easter enveloped the area during the weekend following the Halloween Storm, taking advantage of the weakened natural shoreline defenses. On January 4, 1992, an exceptionally strong nor'easter struck the northern region of the Eastern Shore. Water levels at Wallops Island Flight Facility were reported to be ten feet above normal. Several cottages on Cedar Island were destroyed, while significant damage was reported at the Wallops Island Flight Facility and along Assateague Island further to the north.

Northern Cedar Island

The northern region of Cedar Island today bears scant resemblance to what existed during the mid-1980's. Distinct primary and secondary dunes, along with a wide beach and backshore, were present during the 1986 construction boom. However, northern Cedar Island, from 1985 to present, has migrated landward at a rate of approximately 30 m/yr, flattening the dunes, creating washover fans and eliminating all evidence of any previous human-related disturbances.

Ten projects authorized under the Barrier Island Policy were actually constructed within the northern region of Cedar Island between 1985-89. All of these previously disturbed construction sites were visited during this study to record any observable human-related impacts and determine how effective the Policy may have been at minimizing those impacts to the coastal primary sand dunes and beaches. Out of the ten structures, eight were moved to central or southern Cedar Island, while the remaining two structures were only partially constructed before being destroyed by natural forces.

The only remains of the authorized structures are the foundation pilings which supported several cottages. These pilings have been stranded in the Atlantic Ocean by the rapidly migrating island. VMRC, by utilizing the enforcement powers of the Barrier Island Policy and Title 28.2 of the Code of Virginia, has directed that these structures be removed in their entirety. Several problems were encountered during this effort, one of which was determining what lot and owner the remnant pilings were associated with. The primary logistical problem faced by the property owners was how to remove the pilings from the nearshore zone.

Identifying remnant pilings in the future could be accomplished by affixing some type of identification to the pilings, or requiring a detailed plan of the pilings configuration be submitted once the pilings had been installed. The most desirable solution to the stranded piling problem would be to have the pilings completely removed from the upland at the time of relocation or destruction. In the past, however, the pilings have apparently been cut at or just below dune level and then covered by sand. This makes it very difficult during follow-up compliance inspections to determine whether or not complete removal has been accomplished. With stricter compliance monitoring and inspections at the time of relocation or immediately after destruction, it may be possible to minimize this type of incident in the future.

It is difficult, if not impossible, to determine what impacts the construction projects may have had on the coastal features and processes associated with the north end of Cedar Island. Qualitatively, it appears that the natural processes are continuing at such a rate and intensity that any man-made structures placed in the way are incidental. Pedestrian access points over the dunes, sand fencing, pilings, and low-density single family cottages have played a rather insignificant role when viewed in relation to the natural processes.

Had the 1990 Policy setback criteria from the dune crest (20 times the local 100 year long-term annual shoreline recession rate) been applied to the 1986 structures on the north end of Cedar Island they would have been constructed approximately 122 m from the dune crest. Even so, they would only just recently have become situated on the beach. While this would have possibly added an additional two years to the life of the structures and given the property owners more time to formulate alternative plans, it would not have eliminated the inevitable. Maximizing the setback distance is preferable as long as the lots have the available upland. Many of the platted lots, however, do not contain enough highland property to allow for the required setback standards set forth in the 1990 Policy.

Central Cedar Island

The long-term migration rate for central Cedar island, although not as great as that at the north end, is still reported to be around 4.8 m/yr. During the period between 1986 and 1991, the shoreline has migrated landward 119 m, or approximately 24 m/yr. As a result, the coastal primary sand dune has been destroyed and redistributed along the shore and across the island in some areas as overwash fans.

Between 1986 and 1990, six cottages were authorized and constructed under the Barrier Island Policy in the central region of Cedar Island. All of those project sites were evaluated to determine whether they were in compliance with their permits and what impacts may have occurred to the coastal primary sand dunes and beaches. The investigations revealed that only two of the six authorized structures were still habitable and situated on their originally permitted sites. The other structures have either been destroyed, relocated, or deemed uninhabitable by the Health Department due to recent damage to the septic disposal systems.

The two cottages located on their originally permitted sites were within the predetermined (or trigger) distance to mean high water (predetermined distance is approximately 48 m for central Cedar Island). As stated in the Barrier Island Policy, "once local mean high water approaches a structure to within 10 times the average recession rate, a plan for its movement or relocation must be submitted for review." In accordance with the Policy, VMRC has requested submittal of relocation plans from the two property owners since their cottages are now located less than 48 m from the mean high water position.

After reviewing the permit issued for one of the above-mentioned properties, it appears that the setback distance from the crest of the coastal primary sand dune to the septic system was approximately 30 m. Under the present regulations of the Barrier Island Policy, the required setback distance is close to 90 m. This setback would have been enough to preserve the

structure for several years under the current conditions. The lot also appeared to contain enough upland to accommodate the setback distance prescribed by the revised Policy.

The most southern cottage within the central region is still standing, but uninhabitable since it is now located adjacent to a recently formed inlet and the mean high water position. The Policy did not intend for the relocation criteria to apply to structures threatened by the lateral movement of newly formed breaches or inlets. It is apparent from the recently formed inlet on Cedar Island, however, that the Policy should also address structure location/relocation with respect to inlets and breaches of the barrier islands systems.

Both the central and northern regions lacked a defined coastal primary sand dune during this investigation. It appears the migration rates for the past few years have vastly exceeded the island's natural ability to repair and reconstruct its dunes. Without conducting a detailed, quantitative sediment budget analysis, however, it is impossible to determine why the coastal primary sand dune no longer exists along the central and northern regions of the island. In our opinion, human-related activities are having little discernible impact on the coastal primary sand dunes and beaches relative to the natural migration or rollover processes.

Southern Cedar Island

The long-term migration rate for southern Cedar Island is approximately 4.1 m/y, but the short-term data indicate the southern portion of the island is actually accreting at approximately 2.1 m/yr. The beach profile of southern Cedar Island has a very wide, but flood-prone backshore. The coastal primary sand dune is fairly continuous with heights exceeding 4 m. Landward of the primary sand dunes are extensive secondary and tertiary dune systems, which ultimately grade into the marsh/lagoon complex found behind the barrier islands. The south end of Cedar Island has a wide variety of coastal geomorphological features that are generally indicative of a sand-sufficient system.

During the early 1900's, the Island House Hotel on southern Cedar Island was a popular vacation spot drawing visitors from all over the country. The southern portion of the island also became the site for several small private cottages. Most of these structures, however, were destroyed by the storms of the 1930's, or relocated to the mainland.

Due to the relative, short-term stability exhibited over the past 25 years, southern Cedar Island has again become the site for low-density construction activities. The development, however, has intensified over the past five years since the north and central portions of the island have experienced severe erosion and rollover. Approximately ten structures have been constructed, or relocated from the north, since the adoption of the Barrier Island Policy. Most of the cottages are situated far enough behind the primary sand dune that authorization under the Coastal Primary Sand Dune Act was averted. Permits have been issued, however, for permanent and temporary access crossings of the coastal primary sand dune, and for the installation of septic disposal systems.

Discussion

Access Ramps

The only access ramps to remain intact after the storms of 1991 and 1992 were located on southern Cedar Island. Efforts in evaluating the impacts related to access ramps, therefore, focused on the structures that remained on the relatively stable southern end of the island.

Temporary disturbances to the primary dune occurs while building materials are transported over the primary dune to the construction site. Those impacts can be minimized through the use of access ramps. Authorization for temporary access ramps is always contingent upon the permittee agreeing to restore the dune to its pre-existing contours and revegetate with the appropriate plants.

Each of the authorized structures on southern Cedar Island were investigated to determine if they still existed, whether their performance was adequate, what impacts they have had on the coastal primary sand dune, and how successful were the restoration efforts. The investigations were carried out after the severe storms and high water conditions that occurred during late 1991 and early 1992.

The permanent corduroy access roads did not endure the high water conditions very well. Many were observed to be washed from the dune crossing in a landward direction. It appeared that the access roads may have even channelized and accelerated the water being forced over the primary dune, causing considerable scour. This could present a potential problem if a septic disposal system is placed within the dune and in the general vicinity of the access ramp.

In concept, the access ramps are designed to funnel traffic through a single point of the dune rather than repeated crossings over a larger portion of the dune. In areas of accretion the dune will typically increase in height, while the access ramp remains at the level it was installed. The corduroy, or gapped ramp will also allow vegetation to grow between the planks of the ramp as long as traffic is not too great. Based on the evaluation of the structures and observations of breaching during the storm conditions, it might be advisable to require the owners of the access ramps to periodically remove the ramp and raise the elevation of the ramp area to approximate that of the adjacent dunes.

All of the evaluated access ramps were of the corduroy design. The Policy, however, permits the construction of both corduroy and open-pile elevated ramps. Although an open-pile elevated structure allows wind, water and sand to pass relatively undisturbed, and vegetation to grow beneath, the pilings present a problem similar to the one encountered on the north end of Cedar Island. Severe erosion or migration of the dune could leave the foundation pilings in an undesirable location, posing a potential hazard to the public, and require enforcement action in order to have the pilings removed and the problem resolved. Therefore it seems unlikely that the use of open-pile elevated ramps will be encouraged during future projects.

Restoration of the primary sand dune after removal of the temporary access ramps was evaluated during the study. Two temporary construction access ramps were removed from the coastal primary sand dune in the southern region. The areas, as conditioned by the permits, were to be restored to their pre-existing contours and sprigged with the appropriate vegetation. It appeared in both instances that the affected areas had not been returned to their pre-existing contours. Appropriate vegetation, however, appeared to have been sprigged, while natural vegetation was also successfully returning to the areas.

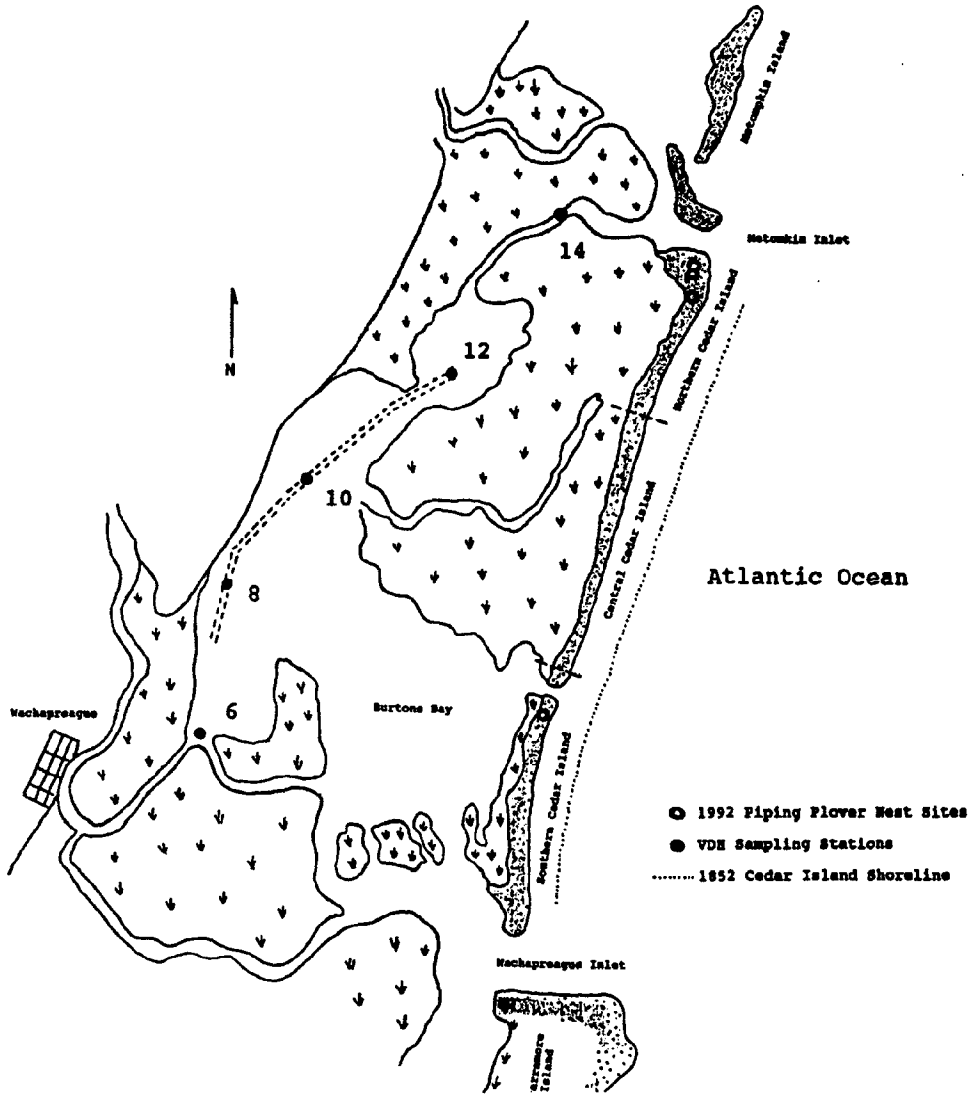
After witnessing the amount of damage caused by storm surge as it funneled through the access points along the primary dune, it appears that restoring temporary access crossings to their pre-existing contours is important. Significant scouring of the dunes occurred as a result of water channelling through the access areas, not to mention the potential impact to adjacent septic disposal systems. Stricter enforcement of permit conditions related to restoration could minimize those impacts.

Septic Disposal Systems

The Virginia Department of Health, Eastern Shore Health District is responsible for the evaluation and issuance of permits for septic disposal systems on the Eastern Shore and the barrier islands. In comparison to the islands, potential septic disposal sites on the "mainland" are evaluated on their soils and whether they are a naturally occurring, non-fill material that exhibits certain soil horizons indicative of leaching or percolation. The rate at which the soil percolates can be measured, and is used primarily when determining the suitability of a site for the placement of a drain field.

Potential septic disposal sites on the barrier islands, however, are not evaluated for their

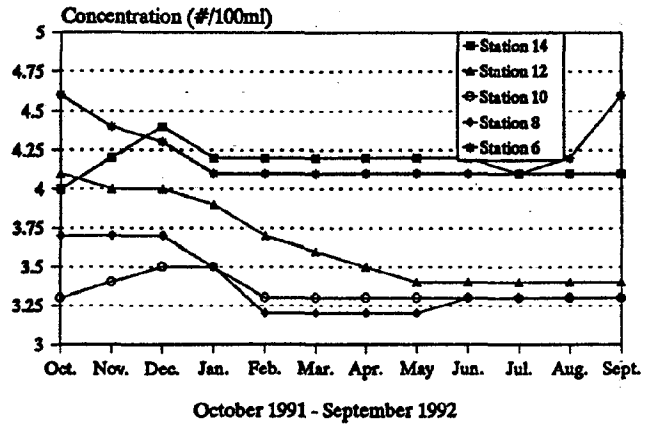
Figure 4 - Vicinity Map of Cedar Island



percolation rates, appearance of soil horizons or the origin of the soil. The islands are continuously shifting their sands from one site to another, therefore, soil horizons are unable to become established. Rather than measuring percolation rates, suitable septic disposal sites are identified by the distance from the surface of the sand to the elevation of the water table. The difference should be at least 8 to 12-inches. In addition, there must be at least five feet of sandy material above the underlying marsh peat. With this criteria in hand, suitable septic disposal sites are readily available for most of the single family cottages used on the barrier islands.

On May 5, 1992, the Eastern Shore Health District conducted a survey of the 26 habitable structures on Cedar Island and their sewage disposal systems. The survey was conducted to evaluate the damage that may have occurred as a result of the recent inclement weather, and any effects the failed systems may have had to adjacent shellfish growing waters. Approximately ten septic systems were found to be damaged and in violation of Virginia's

Figure 5 - Fecal Coliform Concentrations for Burtons Bay and Cedar Island



Sewage Handling and Disposal Regulations. The District notified each property owner of the alleged violation and requested the individuals to submit plans to correct the identified problems.

In addition to the failed septic systems identified by the District, this study noted the presence of dislocated septic tanks as a result of the high water conditions. The Barrier Island Policy requires that all septic tanks have an identification number affixed to the plastic tank to aid in the proper identification of its owner. This procedure has apparently not been adhered to. The problem was discussed with the Eastern Shore Health District and it is anticipated that the District will also require that all future septic tanks have the associated District permit number affixed thereto.

Water Quality

The Virginia Department of Health, Division of Shellfish Sanitation records monthly water quality information from numerous stations located in Burtons Bay, near Cedar Island (Figure 4). Figure 5 depicts the concentration of fecal coliform bacteria from five of those stations during the study period. After reviewing the water quality data and discussing the results with personnel from the Department of Health, it appears that the moderate fluctuations in the bacteriological levels is driven mostly by rainfall and seasonal fluctuations in water temperature. The data does show a slight increase in the concentration levels observed during the fall of 1991 and early winter of 1992. This does coincide with the months of high water conditions and, most likely, the time during which Cedar Island septic systems experienced failure. It is difficult, however, to associate increased bacterial concentrations with failed Cedar Island septic systems, since there are other potential local sources of contamination.

In addition to the potential impacts to the adjacent waters, septic disposal systems on southern Cedar Island were also evaluated to determine their impacts on the coastal primprimary sand dune. As stated earlier, the evaluation was confined to southern Cedar Island where a coastal primary sand dune still exists. Although many of the cottages on southern Cedar Island were placed in areas that did not require a permit from the Commission, numerous septic disposal systems were entrenched within the coastal primary sand dune. Of the several permitted sites evaluated, very few disturbances to the primary dune were noticed. Resprigging efforts seemed to have varied success, but natural recolonization occurred

very quickly for most of septic systems evaluated.

Endangered Species

The Barrier Island Policy requires that any impacts to threatened and endangered species be given due consideration prior to permit authorization. Wilson's and piping plovers are the two bird species of greatest concern on Cedar Island. Physical encroachment by any structure onto nesting sites is prohibited. Time of year restrictions, typically mid-March through September, are imposed on all construction activities through permit conditions. Special consideration can be given for construction and relocation activities as long as they are approved and monitored by personnel from the Department of Game and Inland Fisheries.

Figure 6 shows the number of piping plover pairs observed on Cedar Island and other adjacent barrier islands to the north and south from 1988 to 1992. All of the depicted islands showed slight increases in the number of plover pairs from the summer of 1990 to that of 1991. The summer of 1992, following the high water conditions of late 1991 and early 1992, had fewer observations of plover pairs on all of the depicted islands except Assawoman Island.

Piping plovers have primarily concentrated their nesting activity on northern Cedar Island. All of the previously constructed cottages, and associated human-related structures, have been removed from this part of Cedar Island as a result of the intense erosion. This area of Cedar Island, however, has always been popular with boaters, fishermen, and beachcombers. In addition to the humans, pets are often brought along to the islands for recreational purposes. It is suspected by researchers that these combined activities may have been disruptive to the piping plovers during the summer of 1992 on Cedar Island.

Figure 6 - Piping Plover Pairs for Eastern Shore, Virginia 1988 - 1992

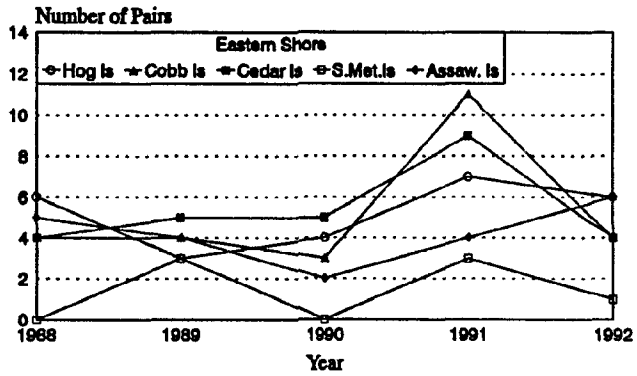


Figure 6, however, indicates that similar trends were observed on adjacent islands between the summers of 1991 and 1992. It is likely that the highly destructive storms and subsequent erosion had a significant affect on the success of the piping plovers during 1992. Human-related activities do remain a concern as evidenced by the signs posted and driving corridors established around critical nesting sites along the islands.

Over-Sand Vehicle Use

Vehicular traffic on Cedar Island and some of the other barrier islands has long existed to some degree, but at a low-level. It wasn't until

Cedar Island was platted and sold in small parcels that vehicles began to be used more regularly on Cedar Island. As more and more cottages were constructed on the island, the problems associated with over-sand/offroad vehicle use began to emerge. It is well known that ATV's and other vehicles can quickly destroy vegetation growing on the dunes and cause that feature to destabilize and deflate.

With the adoption of the Coastal Primary Sand Dune Act and even stricter regulations contained in the Barrier Island Policy, travelling over the coastal primary sand dune on the Eastern Shore barrier islands became explicitly denounced. The Barrier Island Policy, adopted in 1986, provides a well-defined set of guidelines that each individual property owner on Cedar Island could follow. The Policy's vehicular regulations have been in effect since it's adoption, but a permitting system and enforcement procedure has never been established. This is due, in part, to the Commissions anticipation of fewer vehicles on Cedar Island since construction activities were beginning to lessen during the late-1980's. Fortunately, impacts to endangered species have been minimized by posting signs and flagging driving corridors.

With the recent acknowledgment of accelerated migration rates, it appears that vehicle status and condition information could enhance the Commissions ability to have a vehicle removed from the island before the vehicle becomes abandoned. It is the finding of this study that a no-cost annually renewable vehicular permit form be devised which will be provided to all existing and proposed vehicle owners on Cedar Island, and that a permit tracking system be initiated. A possible format for the over-sand vehicle permit application has been included at the back of this document (see attachment).

Summary and Recommendations

After conducting an island-wide evaluation of the structures placed on Cedar Island, it was extremely difficult to measure either their individual or cumulative impacts on the islands coastal primary sand dunes and beaches. The majority of the island has undergone extreme changes and approximately two thirds of the islands coastal primary sand dune no longer exist. Coastal erosion and island migration rates have exhibited significant increases when compared to historical rates. This study was not able to determine whether the recent accelerated erosion and migration rates of Cedar Island were associated with the human-related activities that occurred during the mid-1980's. Severe erosion and island migration, however, were experienced all along the Delmarva Peninsula, which would indicate that the low-density development on Cedar Island has had an inconsequential contribution to the overall geomorphological changes observed there.

The placement of low-density structures, including the recently damaged or destroyed septic disposal systems, has caused no observable impacts to the adjacent waters monitored by the Health Department. Future septic disposal tanks will have the appropriate identification number affixed thereto. Threatened and endangered species (piping plover) populations were relatively stable between 1988 and 1990. The number of pairs increased, however, twofold in 1991, but decreased proportionally in 1992. Recent declines are more than likely a repercussion of the storms and overwash that severely impacted plover habitat during the study period. It was evident that uncontrolled public access on the northern point of Cedar Island may be detrimental to those species. Continued coordination with the Department of Game and Inland Fisheries regarding construction access, relocation plans, time-of-year restrictions, and vehicular traffic is essential.

Furthermore, this study recognizes the need for stepped-up project compliance and monitoring efforts. Construction debris must be completely removed from the site following construction or relocation. Temporary and permanent access roads over the coastal primary sand dune should be of the corduroy type, not open-pile design, and they should be located as

far from the septic disposal system as possible. Permit and dune restoration conditions within access areas should be monitored and enforced more closely.

Setback criteria incorporated in the revised 1990 Barrier Island Policy should contribute significantly to the life-span of the cottages and their appurtenances. Pre-1990 permitted structures were sometimes inundated, if not destroyed, by the Atlantic Ocean prior to completion. The revised Policy should at least enable the property owner to complete construction and utilize the structure for several years before contemplating relocation. The Policy does not specifically address lateral setback or movement/relocation criteria from existing or newly formed breaches and inlets. This may become a legitimate concern if the island becomes more and more deficient of sand. If that occurs, breaches and inlets, although mostly ephemeral, will begin to occur more regularly. It is the recommendation of this report, therefore, that future revisions to the Policy include additional criteria to address the lateral setback distance and movement/relocation from inlets and breaches.

Lastly, this report recognizes the need for a bonafide vehicular permit tracking system. The system would allow for easier identification of vehicles, current information on vehicle operating status, and hopefully reduce the number of vehicles and their impacts to resources of the barrier islands. A recommended vehicle permit application form has been attached to back of this report (see attachment).

Bibliography

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Virginia Marine Resources Commission
Over-sand Vehicle Registration Application

General Criteria

Dune Crossings

No cuts through the dune will be permitted. Temporary vehicular access for purposes of construction will be permitted only by corduroy ramps or open-pile ramps. Permits for temporary vehicular access ramps will be limited as necessary to protect significant natural resources. Temporary construction vehicles and access ramps must be removed and the dune restored to its pre-existing contours and revegetated. All plans for temporary construction access must be specified in the application for any construction permit. Permanent vehicle access across the dune will be permited only by corduroy or open-pile ramps. A temporary access ramp developed for the purposes of construction access may remain in place for permanent access if it is specifically approved.

Beach Access

Each dwelling will be limited to a maximum of one vehicle for access to and from the island's landings. All vehicles shall be subject to the following conditions:

- Each vehicle shall have a no-cost annually renewable permit to travel on the beach. The owner shall attest at the time of renewal the vehicle's status and condition.
- The permit number for each vehicle shall be displayed in two foot high letters on the roof and sides of the vehicle.
- When a vehicle for a particular dwelling is no longer functional, it must be removed from the island. Evidence of its removal must be provided prior to the issuance of a permit for a new vehicle.
- All driving will be limited to the intertidal zone and between there and approved dune crossovers. Vehicular use of the beach at periods greater than four hours either side of the low water shall be considered a violation of the Policy.
- All bird nesting areas posted by the Virginia Department of Game and Inland Fisheries, U.S. Fish and Wildlife Service, or Department of Conservation and Recreation shall be off limits to all vehicles.
- All terrain vehicles (ATV's) will not be permitted.
- Evidence of vehicle use in areas other than those authorized shall be cause for revocation of the permit and a requirement that the vehicle be removed from the island. Any person having his or her permit revoked shall be precluded from reapplication for a one-year period.

Operating Tips

- lower tire pressure to 15 pounds • don't drive in salt water • use CB channel 9 for emergencies
- carry four boards for placement under each tire when stuck • after stopping vehicle, back up several feet before proceeding forward • do not spin your tires when stuck • carry water displacement spray for drying wet engine electrical parts

Over-sand Vehicle Registration

On which barrier island will you be driving your vehicle?

How will you be transporting your vehicle to the island, and where will the vehicle be loaded and unloaded?

What is the tax parcel number of your property? Lot #_____

Is there a vehicle access ramp over the dune at this property? Y__ N__
If yes, please provide Coastal Primary Sand Dune Permit Number
CPSD Permit #_____

Vehicle Make_____ Model_____ License #_____

Vehicle Identification Number (VIN#)_____

Vehicle Color_____ Four Wheel Drive Y___ N___

Engine Type: Eight cylinder____ Six cylinder____ Four cylinder____

Please complete this form and return to :
Virginia Marine Resources Commission
P.O. Box 756
Newport News, Virginia 23607

Each individual application will be considered and a letter of authorization including the vehicle registration number will be forwarded once approved.

For information regarding vehicle use on Federally-owned beaches on the Eastern Shore send inquiries to:
Chincoteague National Wildlife Refuge
U.S. Fish and Wildlife Service
P.O. Box 62
Chincoteague, VA 23336

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