

Chesapeake Bay Cliff Erosion in Calvert County

Draft Steering Committee Report

Calvert County
Maryland Department of Natural Resources
Maryland Department of the Environment
United States Army Corps of Engineers
United States Fish and Wildlife Service
Maryland Emergency Management Agency

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I. INTRODUCTION

Following a February 20, 2010 Town Hall meeting in Calvert County, state, federal and county agencies formed a Steering Committee to study and develop recommendations to address the impact of shoreline erosion on houses located near the eroding cliffs in Calvert County. The cliffs have been naturally eroding for hundreds of years. The presence of the federally threatened and state endangered Puritan Tiger Beetle (PTB) living at various locations along the shoreline, and the potentially adverse impact that cliff and shoreline stabilization could have on its habitat, adds another dimension to the problem. The Committee has now developed a preliminary framework for addressing these issues. It is presented here as a Draft Report for public input and discussion, and includes short-term, medium-term and long-term options. The paths for each of these options will to some extent run in parallel to one another.

Short-Term

There are 234 homes located on the Calvert County cliffs. The County should conduct a site-specific investigation of the 83 homes that are within twenty (20) feet of the cliffs to identify the homes that are potentially in immediate danger and develop a set of options available to willing landowners, including funding for house relocation or acquisition.

These homes are located in Port Republic (Scientists Cliffs), St. Leonard, Chesapeake Beach, Prince Frederick and Lusby, including the 7 properties in Chesapeake Ranch Estates that are most at risk according to CRE's engineering consultant.

The County should apply for Maryland Emergency Management Assistance funds for the investigation and as appropriate, relocation and acquisition of homes from willing landowners. MEMA has up to \$3 million available from the Federal Emergency Management Agency for this work, which will enable payment of 75% of the costs. The Committee recommends that the County and DNR explore options for funding the non-Federal share, including allocation of State Program Open Space funds.

Medium-Term

Half of the 234 properties do not have PTB habitat. For these properties, the Committee has identified a range of potential engineering solutions. It is important to note, however, that there is no proven engineering solution that has been tried directly on the steep cliffs.

For the properties that have PTB habitat, the United States Fish and Wildlife Service in consultation with the Department of Natural Resources has now developed a set of draft guidelines for processing applications for shore erosion control permits that would allow for the incidental take of some PTB. A "take" will require mitigation

and DNR would use Program Open Space funds for initial acquisition of PTB habitat which may be counted toward mitigation.

Long-Term

Beginning in early 2011, the Committee would work with the United States Army Corps of Engineers to conduct a two-year feasibility study of the eroding shorelines in Calvert, Kent and Cecil Counties to seek to develop a comprehensive solution to address the eroding cliffs. The USACE would fund 75% of the cost of the study. The Committee recommends that the County and DNR explore options for funding the non-Federal share, including in-kind contributions.

In addition, DNR and FWS will identify and pursue fee simple or easement acquisition of PTB habitat within the Calvert County subpopulations. Permanently protecting PTB habitat reduces the risk of jeopardy to the species and expands opportunity for incidental take of the subpopulations.

Calvert County Citizens Advisory Committee

The Steering Committee recommends that Calvert County State and local officials establish a Citizens Advisory Committee to review the Draft Report and meet with the Steering Committee going forward.

Comments and Requests for Assistance

A copy of this Draft Report and the October 26, 2010 PowerPoint presentation to the Calvert County Commissioners is available on-line at www.co.cal.md.us. Comments and questions about this Draft Report or requests for assistance in implementing its draft recommendations may be sent to:

Gregory A. Bowen
Director, Calvert County Department of Planning and Zoning
County Services Plaza,
150 Main St.
Prince Frederick, MD 20678
(410) 535-1600, ext. 2332
bowenga@co.cal.md.us

II. THE STEERING COMMITTEE

Members of the Committee included the Maryland Department of Natural Resources (DNR), the Maryland Department of the Environment, the United States Fish and Wildlife Service (FWS), the United States Army Corps of Engineers (USACE), Calvert County and the Maryland Emergency Management Agency (MEMA). The Committee has had over a dozen meetings during the past six months, beginning in March and

continuing through October. In between, the Committee has conducted its work in conjunction with *ad hoc* technical subcommittees from our various agencies.

III. OVERVIEW

A. The Cliffs in Calvert County

1. Homes on the Cliffs

A cliff is defined in the Calvert County Zoning Ordinance as a “high steep face of 10 feet or higher from the toe of the slope with a slope in excess of 50 percent either vegetated or non-vegetated.” Using 2003 Light Detection and Ranging (LIDAR) data, Calvert County staff identified 234 homes situated along the Chesapeake Bay cliffs of Calvert County that are within 100 feet of the cliffs. LIDAR is an optical remote sensing technology that measures properties of scattered light to find range and/or other information of a distant target. The properties are located in the following area codes: Chesapeake Beach, Huntingtown, Port Republic, Prince Frederick, St. Leonard, and Lusby. Within these area codes are the following communities: Randle Cliffs, Locust Grove, Holiday Beach, Camp Roosevelt, Roosevelt Cliffs, Willows Colony, Dares Beach, Windcliff, Scientists Cliffs, Kenwood Beach, Western Shores, Calvert Beach, Long Beach, Cove Lake, Park Chesapeake, and Chesapeake Ranch Estates. Considering the degree of accuracy and age of the data, the housing count provides a good estimate, although not necessarily a final count of the number of homes within 100 feet of the cliffs.

Of the 234 homes:

- 1 house overhangs a cliff,
- 19 houses are within five (5) feet of the cliff,
- An additional 20 houses are within 10 feet of the cliff, and
- 43 more houses are within 20 feet of the cliff.

2. Soil Erosion

Soil erosion is one of the most significant problems currently facing Maryland’s diverse coastal environment. Today, approximately 69 percent of Maryland’s coastline is experiencing some degree of erosion. Studies estimate that Maryland loses approximately 260 acres per year to shore erosion. Sea level rise influences on-going coastal processes that drive coastal erosion, in turn making coastal areas ever more vulnerable to both chronic (on-going) erosion and episodic events (e.g., tropical storms, hurricanes). Such impacts pose a significant threat to the steep cliffs, wetlands and marshes, tidal estuaries, and sandy beaches, and barrier islands that comprise Maryland’s coastal environment.

Erosion rate is the landward movement of the shoreline over time. Historic erosion rates were determined from the two most recent shoreline studies available for the Calvert coast. According to the Maryland Geological Survey, from Scientists Cliffs northward the available shorelines are 1960 and 1993; south of Scientists Cliffs the shorelines are 1942 and 1993. These are historic averages over relatively long time spans and are not meant to represent rates on shorter time scales, or specific slumping occurrences. Based upon this data, the cliffs in Calvert County historically have eroded at an average rate of less than 2 feet/year. There are 234 properties along the Calvert County shoreline, with the following erosion rates:

Number of Properties	Erosion Rate ft/yr
102	0
131	<2
1	2 to 4

Anecdotally, the rate of erosion at one community, Chesapeake Ranch Estates (CRE) appears to be closer to two feet/year. The CRE Community Association commissioned a study from the engineering firm Ryan and Associates to look at erosion in the CRE community. The ten houses located closest to the cliffs in the CRE Community as identified by the Ryan study experienced 1.67 feet/year of erosion according to Calvert County’s 2003 shoreline data. Specific properties have experienced higher rates of cliff erosion. When one property owner bought his property in 1991, his house was 60 feet from the edge and the County recommended he armor the cliff’s toe to prevent further erosion. This did not occur and his house is now 20 feet from the edge -- an erosion rate of two feet/year. A second property owner who moved to his house in 1996 has lost 40 feet of shoreline since then, or 2.8 feet/year. When a third property owner bought her house a year ago, the cliff was 52 feet from their deck. It is now 12 feet, or an average of 4 feet per year.

One recurrent issue is that shore erosion rates are not constant. Rather, the bluffs, some of which are made up of higher amounts of sand, can give way without warning. This occurred in 1996 when a cliff suddenly collapsed and caused the death of a young girl on the beach below. Recently, one property owner lost 10 to 15 feet at the top of the cliff in one event even though the shore at the base was protected with a stone revetment. Heavy rains at the end of September 2010 caused additional sloughing at another property whose house was already only eight feet from the cliff. Calvert County inspectors subsequently advised the property owners to stay off the wooden deck.

3. Calvert County Zoning – Building Restrictions

In 1997, the County adopted an ordinance establishing cliff setbacks ranging from 100 feet to 300 feet, depending on the existing development pattern and erosion

rates. Most of the homes along the cliffs were built before the ordinance was adopted. However, the ordinance applies to any new construction or location of new structures on shoreline parcels. As an example, one property owner's outdoor hot tub that fell with a cliff collapse last January had been illegally constructed. The County ordinance further provides: (a) if structures on a property are damaged due to cliff failure or shoreline erosion, property owners are financially liable for all cleanup costs, and (b) construction permit applicants shall sign a Cliff Liability Waiver to hold the Board of County Commissioners and County employees harmless for any personal injury or property damage sustained by result of construction, development, building or building permit issued or allowed by the County.

4. Efforts to Address Soil Erosion

Several news reports have stated that the government has prevented landowners from attempting to address erosion in one of the communities in Little Cove Point – Chesapeake Ranch Estates (CRE). Our investigation found otherwise. DNR has been performing shoreline inspections and offering technical and/or financial assistance to landowners at CRE since 1975. An engineering firm retained by CRE, Ryan and Associates (Ryan) identified 56 property owners at CRE deemed to be in “immediate danger.” Of these:

- 45 landowners either have not applied for permits or shore erosion control assistance, or did not pursue the application once filed;
- 11 permits were issued

For some of these property owners, later requests for revised permits required submission of additional information which has not been provided. As of this writing, there are two permit applications pending.

B. Considerations

There are three overall issues that should be considered in addressing erosion along the Calvert Cliffs:

1. Geology

The cliffs are naturally eroding. Geologists point out that even if the base of the cliff is protected from continued shore erosion that the cliff itself will continue to slump until a natural “angle of repose” is attained. This continued slumping is due to processes operating on the sediments that compose the cliff, and include groundwater flow from the land surface to the cliff face, freeze-thaw action, direct water flow down the face of the cliff, rainwater impacts on the cliff face and wind erosion of the sediments. Due to the variable composition of the cliff sediments and land use, the relative importance of these factors is variable along the length of Calvert County (Miller 1983). For example, installing a septic field in an area that was formerly forested will increase the movement of water through the sediments

composing the cliffs which can potentially increase the rate of slumping and increase in the freeze-thaw action. Studies conducted at Cove Point, Flag Ponds Nature Park, and the Flag Harbor Marina suggest that the natural angle of repose for these cliffs is between 25 and 40 degrees (45 to 85 percent slope), and that these angles are attained in a period of 35-40 years (Clark, Larsen et al. 2004).

2. Engineering

There are no proven effective engineering solutions that have been tried directly on the steep cliffs. The cost to implement any of these solutions are likely prohibitive, and because of the close proximity of neighboring properties, any work on steep cliffs would have to be comprehensive (i.e., include many property owners) or there would likely be a negative impact on adjacent properties.

Some property owners have suggested that it is possible to stop erosion completely by armoring the base of the cliff. Extant research, however, concludes otherwise. Continued erosion and slumping of the cliff face is likely to continue until the cliff attains the natural “angle of repose” discussed above.

3. The Puritan Tiger Beetle

Parts of the shoreline are populated by the federally threatened and state endangered Puritan Tiger Beetle. The PTB occurs at only a few sites along the Connecticut River in New England and the Chesapeake Bay in Maryland. Generally, an endangered species is a species in danger of extinction, and a threatened species is one that is likely to become an endangered species within the foreseeable future. The reasons for listing the Puritan tiger beetle federally as a threatened, rather than an endangered species are provided in the Federal Registers proposing the species for listing (10/2/89) and the final rule (8/7/90).¹ A major reason for the threatened status was that “certain areas along the Connecticut River where the beetle has been extirpated may be suitable for recolonization.” This is a factor that would not be considered in the state listing by Maryland, which only considers the status within the state. However, the Fish and Wildlife Service's 2007 five-year status review for the species recommends revising the Federal listing to “endangered” due to loss and degradation of habitat and decline in population size.

PTB undergo their entire life cycle on or near cliffs and adjacent sandy beaches, and require some cliff erosion to maintain suitable unvegetated habitat conditions. Thus, any attempt to stabilize the shoreline by preventing erosion could potentially destroy PTB habitat. For this reason and as discussed below, a person who wishes to take action that will result in the destruction of threatened or endangered species or its habitat – here, the habit of PTB on the cliffs -- must obtain an “incidental take” permit from the FWS and DNR. Further, before issuing a federal permit for shore

¹ www.fws.gov/chesapeakebay/EndSppWeb/BEETLE/PDFs/Federal%20register.pdf

erosion control, the Corps of Engineers must consult with the U.S. Fish and Wildlife Service and Maryland DNR to ensure that the action is not likely to jeopardize the continued existence of any endangered or threatened species.

III. SHORT-TERM POTENTIAL SOLUTIONS

A. Site Characterization

The first step in identifying homes that are potentially in immediate danger begins with characterizing the 234 homes along the Calvert Cliffs by considering a number of factors. In addition to erosion (discussed above), the factors include soil composition, the presence of shoreline structures to stabilize the cliff, the degree of slope; erosion rates at the bank; vegetative cover; the presence of the Puritan Tiger Beetle, and other data, including a video of the Calvert County shoreline. A description of those factors follows.

2. Soil Composition

The Calvert Cliffs are comprised of three formations which were deposited in marine environments of varying depths over a period of approximately 10 million years during the Miocene Epoch (Shattuck 1904; Gernant 1970; Gernant, Gibson et al. 1971; Kidwell 1997). During the deposition of the sediments there were multiple deeping and shallowing cycles but overall the oceanic waters were becoming shallower over time. In general, the coarser sandier sediments were deposited in relatively shallower waters and the finer clay and silt rich sediments in deeper water. Throughout the formations there are variable numbers and varieties of fossil marine mammals and invertebrates that lived in those waters. The three formations, from oldest to youngest are: Calvert, Choptank and Saint Marys, although the not all researchers are in agreement as to the dividing lines between the various formations.

Overlying these three formations along the entire Calvert County shoreline are cliff top sands and gravels that were emplaced into fluvial or shallow intertidal channels cut into the underlying sediments. The thickness and composition of the sediments in these infilled channels are variable but are generally coarser than the underlying formations, and they are considerably younger than the underlying Miocene sediments (Kidwell 1982).

All of the Miocene age formations dip to the southeast and thus the oldest (Calvert Formation) is located along the northern portions of the cliffs and the youngest (St. Marys) in the southern part of the county. Because of the southeast slope, the formations gradually dip to the south on the cliff face and descend below the waterline at various points. The Calvert Formation descends into the subsurface between Matoaka (Calvert Beach) and Camp Conoy. The younger Choptank Formation appears at the top of the cliffs at about Plum Point and disappears below the surface near Cove Point Beach. The youngest St Marys Formation appears at the

top of the cliffs between Scientists Cliffs and Governor Run and comprises all of the cliffs, with the exception of the incised fluvial gravels, to the south of Cove Point Beach.

While the compositions of the various layers in these formations are variable, in general the Calvert Formation has a large occurrence of fine grained sediments and is interpreted to have been deposited in a muddy inner to middle continental shelf area. The Choptank Formation predominantly reflects a sandier inner shelf to shoreface environment, and the St. Marys Formation represents marginal marine and intertidal deposits that are mixed sandy and muddy layers (Shattuck 1904; Gernant 1970; Kidwell 1982).

Although there are a number of factors that lead to shore erosion and cliff slumping at any particular location, the general underlying geology has a large effect on relative erosion and slumping rates:

- North of Calvert Beach much of the cliff base is comprised of the Calvert Formation, which has a relatively higher clay content than the other formations. The overlying Choptank Formation which is present in the upper section of the cliffs from Plum Point south to Calvert Beach has a higher proportion of sand, but numerous clayey layers are present. As a result, in a very general sense, cliff failures in this area are less common.
- South of Calvert Beach the relatively sandier composition of the cliffs results in potentially higher rates of erosion and slumping. In addition, the sand and gravel filled incised channels at the cliff top are much thicker and common south of Calvert Beach. These sediments apparently have much lower resistance to erosion and slumping than the older Miocene aged Calvert, Choptank and St Marys Formations and have resulted in some of the major slumping and landslide events that occurred at Chesapeake Ranch Estates as noted above.
- The cliffs south of Cove Point are also relatively solid clay at the base and the overlying portions of the St Marys Formation and the cliff top sands and gravels have very little fine clays that increase the resistance to slumping.
- Cliff slumps along Scientists Cliffs in Port Republic are usually less than two-foot thick, according to Peter Vogt, a retired geoscientist living there. By counting the rings of trees that fell this year in the Scientists Cliffs area Vogt determined that most were up to 20 years old, indicating that the cliffs in that area were eroding at a relatively low rate and were almost stable. Forty-seven (47) of the 83 houses located within 20 feet of the cliffs are in Scientists Cliffs.

2. Presence of Shoreline Structures

The Virginia Institute of Marine Sciences (VIMS) surveyed the shoreline in 2006 and identified the locations of hard structures in place for shoreline protection. The

various structures identified included: bulkheads, groin fields, riprap, and unconventional types (sandbags, culverts, or other miscellaneous material placed neatly along the shoreline). Shoreline protection reduces the risk of cliff failure, although it does not entirely eliminate it. Thirty-eight (38) houses along the cliffs have shoreline structures; the majority of these structures protect houses that are within 20 feet of the cliffs.

3. Degree of Slope

As discussed earlier, the percentage of slope was calculated by Calvert County using 2003 planimetric data. Cliff height (rise) is divided by cliff length (run) to determine the slope. Steeper slopes – e.g., 90 to 100% -- are more likely to fail. Fifty-two (52) houses have slopes that are less than 60% and are less likely to fail; the majority of these houses are located within 20 feet of the cliffs.

4. Soil Erosion at the Bank

VIMS surveyed the banks in 2006 and made the following assessments of the bank erosion rates, based on visual observations:

- Low = minimal erosion on bank face or toe;
- High = includes slumping, scarps, exposed roots; and
- Undercut = lower portion of bank is eroded causing upper portion of bank to hang over.

Higher erosion rates indicate increased the chances of the cliffs failing at the toe. One hundred four (104) houses have low erosion rates at the bank; the majority of the low-eroding banks (63) are at houses that are located 20 feet from the cliffs.

5. Vegetative Cover

The VIMS survey in 2006 also assessed the amount of vegetative cover at the bank. The assessments included the following categories:

- total = >75%;
- partial = 25% to 75%; and
- bare = <25%.

Larger amounts of vegetative cover provide some stability to the cliff face and may reduce the likelihood of failure. Eighty (80) homes are on sites with total vegetated cover; 50 of these homes are within 20 feet of the cliffs.

6. Puritan Tiger Beetle

Of the 234 properties within 100 feet of the cliffs, 114, or about one-half, have some degree of PTB habitat based upon PTB surveys conducted by FWS annually for the past five years. There is no PTB habitat present for 38 of the 83 homes (45%) within 20 feet of the cliffs.

7. Other Data

The FWS surveys provided descriptions for some of the shorelines. In addition, on May 20, 2010, DNR shot a video of the Calvert Cliffs shoreline from the water while cruising at approximately 2 knots and maintaining a distance of about 400 feet to 500 feet from the shore. The video was recorded using a digital video camera. A Global Positioning System (GPS) device was used to record the location of the boat. The time-stamped coordinates downloaded from the GPS device were matched to the time-stamped images from the digital video that was recorded. This process provided a series of images where the location from which the image was taken was able to be displayed on a map. It is therefore possible to compare the view of various properties from the water with aerial imagery of those properties and with data provided by Calvert County, Maryland Geological Survey and the Virginia Institute of Marine Sciences.

8. Characterization

The Steering Committee has compiled the foregoing data for each of the 234 properties located within 100 feet of the cliffs.

B. Assessment of Properties at Highest Potential Immediate Risk

Using the data described above, the Steering Committee conducted a preliminary valuation and assessment of the properties that are at the highest potential immediate risk. The Committee explored three approaches to this assessment:

1. Ryan and Associates

By letter dated March 1, 2010 to the CRE Property Owner's Association, Ryan, the engineering firm, identified 56 homes within 300 feet of the cliff indicating an "IMMEDIATE (slope failure and potentially leading to complete collapse) concern for any housing that is within 58' of the edge of any 100' (vertical elevation) cliff." The analysis went on to state that the "area of concern" is proportionally reduced for cliff elevations less than 100', e.g., "for a 50' cliff any house within 29' is an immediate concern." Ryan identified 56 homes stated as meeting this criterion -- 55 within 100 feet and one 300 feet from the cliff.

The Committee had three issues with the Ryan framework. First, the analysis was limited to CRE and did not consider the rest of the homes situated on Calvert Cliffs. Second, the Ryan analysis did not as stated proportionately reduce the level of risk for houses on cliff elevations less than 100 feet. Only 12 of the 56 CRE houses have

cliffs that are higher than 100' according to Ryan. However, the Ryan analysis appears to use distance to the cliff as the single factor of concern within CRE. Finally, given the historical erosion and failure rates of the Calvert County cliffs and the fact that 49 of the 56 CRE homes are at least 25 feet from the cliff and the majority over 40 feet away, the proposition that every home that is 100 feet from the cliff (55 of the 56 CRE homes) are in "IMMEDIATE" danger goes too far.

2. International Residential Code

The International Residential Code (IRC) applies to all new residential permits in Calvert County. Section 403.1.7.2 of the IRC states that the house setback "shall be measured from an imaginary plane 45 degrees to the horizontal, projected upward from the toe of the slope," where the slope is steeper than 100%. A slope is steeper than 100% when the rise (y) is greater than the run (x). While most of the homes on the Calvert County shoreline were built before the current Code was adopted, were the Code to apply, houses built to that criteria would potentially be in danger. Thus, standing alone, the IRC is not a useful tool for establishing safe distances from the edge of a cliff or assessing risk when those distances are exceeded.

3. Site-Specific Analysis

As discussed above, there are multiple factors that weigh in any evaluation of risk to homes along the cliffs, including distance from the cliffs, soil composition, the presence of shoreline structures, the degree of the slope, erosion rates at the bank, vegetative cover and the presence of PTB. Because of this, in order accurately to assess the properties at the highest potential immediate risk, a site-specific analysis is required. The question is where to begin? In view of the longer-term historic erosion rates but at the same time cognizant of the occasional cliff slumps, in the Steering Committee's view the appropriate starting point for Calvert County is to conduct a specific site assessment of the 83 homes that are located with twenty (20) feet of the cliffs. These homes are located in Port Republic (Scientists Cliffs), St. Leonard, Chesapeake Beach, Prince Frederick and Lusby, including the 7 properties in CRE that are most at risk according to Ryan.

C. Potential Short-Term Solutions

1. Relocation or Acquisition

Given the pace of erosion, the recent history of occasional slumps, and the absence of readily available cost-effective engineering solutions, the only reasonably viable option for house that are truly in immediate danger is property relocation or government acquisition.

Relocation of a home, e.g., to move the house back from the cliffs but on the same property, will require County permits. Calvert County's Department of Planning and Zoning manages the issuance of permits, including permits for new wells or septic

systems, stormwater management, sediment and erosion control, building codes, and setback, land use and environmental regulations for the Chesapeake Bay Critical Area. If an application to move a house meets all applicable regulations, a permit in the Critical Area can be approved in 6 to 12 working days. However, if changes are required or variances must be obtained, the process could take several months. Of course, it is ultimately up to the affected property owners whether exercise one or other of these options.

2. Funding

The Federal Emergency Management Agency (FEMA) has a set of Hazard Mitigation Assistance (HMA) programs that provide funding through a variety of grants that are available for eligible hazard mitigation activities. HMA programs are administered by the Maryland Emergency Management Agency (MEMA) and managed by local jurisdictions or county agencies. While the statutory origins of the programs differ, all share the common goal of reducing the risk of loss of life and property due to natural hazards. The HMA grant programs that may be considered for the mitigation of at-risk properties located along the Calvert Cliffs include:

- *Hazard Mitigation Grant Program (HMGP)*. This program assists in implementing long-term hazard mitigation measures following a Presidential disaster declaration. Funding is available to implement projects in accordance with State and local priorities. As a result of the December 2009 and February 2010 severe snow storm disaster declarations the State of Maryland is eligible for approximately \$9 million in HMGP funding.
- *Pre-Disaster Mitigation (PDM)*. This program could be used as a vehicle for HMGP. It provides funds on an annual basis for hazard mitigation planning and the implementation of mitigation projects prior to a disaster. The goal of the PDM program is to reduce overall risk to the population and structures, while at the same time, reduce reliance on Federal funding from disaster declarations. PDM grants are judged on a national competitive basis. The 2011 application period was opened on June 1, 2010 and MEMA is currently accepting PDM applications until December 3rd when final applications will be forwarded to FEMA. The maximum that can be awarded under a PDM grant is 3 million dollars. However, large projects such as the Calvert County Cliffs Erosion Projects can be submitted under multiple applications and spread over the course of a number of years.

For all HMA programs the total cost to implement approved mitigation activities is generally funded by a combination of Federal and non-Federal sources. HMA funds may be used to pay up to 75 percent of the eligible activity costs. The remaining 25 percent of eligible activity costs are derived from non-Federal sources. The non-Federal share must be an eligible cost used in direct support of the approved activities under the guidance and the grant awarded. Contributions of cash, in-kind services or materials, or any combination thereof, may be accepted as part of the non-Federal cost share.

2. The County MEMA/FEMA Application

On June 1, 2010, CRE asked Calvert County to apply as subapplicant for a FEMA pre-disaster mitigation grant. The application was for assistance to 51 CRE homes and 500 feet of Golden West Way, a road within CRE that is now 25 feet from cliff edge. On August 31, 2010, the County wrote to MEMA attaching a “Notice of Interest” to serve as the subapplicant for the grant application. However, the County’s letter stated that the County was awaiting the findings from this Steering Committee. The letter also stated that over 200 homes were within 100 feet of the bay shore of Calvert Cliffs and “would not be equitable to only focus FEMA funds on property owners within one community.”

The County’s Notice of Interest provided the following “Project Information”:

The proposed mitigation project is to prevent additional loss of property and life as a result of severe cliff erosion along Calvert County’s Chesapeake Bay shoreline. There are 234 homes identified in Calvert County that are currently affected by the bay cliffs erosion problem.

Suggested activities to mitigate loss of property and prevent additional loss of life are: relocation of homes, government purchase of property that is deemed unstable for supporting housing, condemnation and removal of structures that are deemed unsafe or in immediate danger of collapse due to cliffs erosion.

The purposes of this project are: (a) to identify and prioritize the homes that are affected; (b) to evaluate solutions that work for each property involved; (c) to evaluate long term solutions for the bay cliffs erosion problem; (d) to recommend final solutions for each property; (e) to implement recommended solutions.

The County estimated that the study, planning, and implementation of projects for year one were estimated to be 4 million dollars, including the local match. Its application for these funds is due December 3, 2010.

3. Implementation

The Steering Committee recommends that the County move forward to complete the application process for MEMA funds and conduct a site-specific analysis to inform final decisions on risk assessment. MEMA funds may be used first to conduct this assessment and then to provide funding to implement solutions for affected and willing property owners, including relocation or acquisition. FEMA/MEMA will fund 75% of the cost of this effort. The Committee recommends that the County and

DNR explore options for funding the non-Federal share, including in-kind and State Program Open Space funds

IV. MEDIUM-TERM POTENTIAL SOLUTIONS

The medium term potential solutions for address the eroding Calvert Cliffs will need to consider two sets of issues: (a) engineering, and (b) the impact of erosion control on the PTB. A preliminary framework for these potential solutions is discussed below. The Steering Committee will continue to develop this framework.

A. Engineering

1. Cliff Stabilization

Different types of applications have been used world-wide to help stabilize eroding banks and cliffs. Traditional solutions include “soil nailing,” “slurry walls”, “retaining walls”, and “mechanically stabilized earth.” Soil nailing or bank pinning is a technique for stabilizing slopes and for constructing retaining walls. This process typically involves the installation of steel rods into a pre-drilled hole and then grouted into place. A rigid or flexible facing or isolated nail heads may be used at the surface. The facing may be pneumatically applied concrete or may be precast panels made for vegetated cells. A recent proposal suggests use of mechanical anchors, geosynthetic mesh and root reinforced vegetation for cliff stabilization. However, the feasibility of using this proposal on the steep vertical cliffs in Calvert County, the difficulty of establishing long-term vegetation on vertical slopes without grading them back, and other technical issues (including the impact on Puritan Tiger Beetle habitat) are issues that have not been explored.

A determination of the appropriate solution, if any at all, will depend on many factors including site conditions, environmental impacts, aesthetics and cost. None of these solutions, however, have been tried at the Calvert Cliffs and, as noted, most may be infeasible due to cost and the impact of any solution on adjacent properties.

2. Shoreline Stabilization

Shoreline stabilization can be achieved through the use of revetments, sills, breakwaters or other structures which prevent wave and tidal activity from eroding the toe of the slopes. These structures are defined as follows:

Revetment - An assemblage of stones or concrete, commonly known as riprap, placed to prevent shore erosion, fortify a bulkhead, or stabilize an embankment.

Sill - A low profile offshore structure designed to retain sand and marsh on its landward side and generally constructed parallel to the shoreline and with a crest at or slightly above the elevation of mean high water.

Breakwater - an offshore structure designed to protect any landform or water area behind them from direct assault of waves.

Groin/Jetty - A shore protection structure built perpendicular to the shore to trap sand and retard shoreline erosion.

These types of structures are typically designed and built where shorelines are eroding in higher energy areas such as the Chesapeake Bay front shorelines in Calvert County. However, there are associated impacts which need to be considered with each of these structures such as the disruption of longshore sediment movement, the potential loss of beach and shallow water habitat and impacts on adjacent properties. Most importantly, stabilization of the shore at the base of the cliffs will not result in complete stabilization of the cliff face. Continued erosion and slumping of the cliff face is likely to continue until the cliff attains the natural “angle of repose” which appears to be between 25 and 40 degrees or 45 to 85 percent. This is particularly the case for those high cliffs where the current slope is 70% or higher. Selection of the appropriate structure will require assessment of a range of engineering factors.

B. Impacts on the Puritan Tiger Beetle

1. The Regulatory Framework

A shore erosion control project that prevents a cliff from eroding will likely result in the destruction of PTB. The State and federal endangered species acts do allow for “incidental take” of Puritan tiger beetles. Incidental take means the taking (including killing) of a listed species that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity (such as erosion control). Under federal and state law, a person may obtain a permit for the incidental take of Puritan tiger beetles if certain conditions have been met. Those conditions are:

- (i) The incidental taking will not appreciably reduce the likelihood of the survival or recovery of the Puritan tiger beetle in the wild;
- (ii) The applicant will, to the extent practicable, minimize and mitigate the impacts of the incidental taking;
- (iii) Adequate funding for the conservation plan is available and the plan will be implemented; and
- (iv) The applicant has obtained the required federal authorization for the incidental taking of the Puritan tiger beetle.

To streamline applications for incidental take permits, the FWS in consultation with DNR is developing a PTB Review Process for reviewing projects involving PTB that allows for some loss of Puritan tiger beetle habitat with off-setting conservation or mitigation measures based upon an updated Population Viability Analysis.

2. Population Viability Analysis

FWS prepared a population viability analysis (PVA) for the PTB in the Chesapeake Bay in 2005 and re-ran the analysis in 2010. The 2010 PVA defines the maximum number of beetles counted (x2) in the last 5 years (2005-2009) to be the carrying capacity of the subpopulation. The conclusion of the PVA is that it is important to keep all of the sub-populations in the Chesapeake Bay, but that some reduction of existing PTB may occur without jeopardizing the continued existence of the species. This means that a permit for an incidental take of some PTB may be issued. The draft PVA is currently undergoing additional review.

3. Minimization & Mitigation

Different types of shore erosion control measures have various impacts on the PTB. To assist property owners in understanding these measures and selecting the appropriate control measure, the PTB Review Process will provide a summary of the impacts of various erosion control structures on the PTB.

A property owner whose erosion control project results in destruction of PTB habitat is also required to mitigate the impact of this action. This can be achieved by protecting an equivalent amount of the habitat destroyed. One method for doing so would be to establish a conservation bank that would sell credits for PTB habitat protected through conservation fee simple or easement acquisitions. The conservation easements would prohibit shoreline stabilization or alteration of the cliff face on the property. DNR and FWS will identify and pursue fee simple or easement acquisition of PTB habitat within the Calvert County subpopulations. Permanently protecting PTB habitat will reduce the risk of jeopardy to the species -- thereby expanding opportunity for incidental take of the subpopulation -- and may be counted toward mitigation.

V. LONG-TERM POTENTIAL SOLUTIONS

DNR and USACE are finalizing the Chesapeake Bay Shoreline Erosion Management Guide, Maryland, and plan to scope a more comprehensive effort to encompass the Calvert, Kent and Cecil County shorelines. This effort, to be cost shared 75% Federal and 25% non-Federal, will include the identification of various locations for local, State, Federal, private or non-profit restoration and/or stabilization. The scoping process will determine how many sites will include planning level designs and costs.

USACE is currently awaiting their FY11 appropriations and is coordinating internally to determine available funding under the Continuing Resolution. The Committee recommends that the County and DNR explore options for funding the non-Federal share, including in-kind contributions.

In addition, DNR and FWS will identify and pursue fee simple or easement acquisition of PTB habitat within the Calvert County subpopulations. Permanently protecting PTB habitat reduces the risk of jeopardy to the species and expands opportunity for incidental “take” of the subpopulations. DNR and FWS will also explore establishing a conservation bank that would sell credits for PTB habitat protected through conservation fee simple or easement acquisitions.

VI. CONCLUSION

The Steering Committee will continue its work as described in this Draft Report, and looks forward to receiving public comments on the draft report, including meeting with a Citizens Advisory Committee established by Calvert County State and local officials. In addition, the Committee will begin work on the shoreline analysis of Kent and Cecil Counties and recommends that the local officials of those Counties establish a Citizens Advisory Committee for review and consultation on the Steering Committee’s draft report, once prepared.

VII. REFERENCES

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