

RELATIVE ESTUARINE SHORELINE
EROSION POTENTIAL IN NORTH CAROLINA

INTRODUCTION & INSTRUCTIONS

THIS IS A METHOD FOR PLANNERS, LANDOWNERS, OR PROSPECTIVE BUYERS OF ESTUARINE SHORELINE PROPERTY TO OBTAIN A RELATIVE INDICATION OF THE INTENSITY OF EROSION ALONG ANY SPECIFIC SHORELINE SEGMENT. THE 12 MAJOR SHORELINE VARIABLES (I) THAT CONTROL EROSION ARE LISTED ALONG THE LEFT SIDE OF THE TABLE. EACH VARIABLE IS DIVIDED INTO A NUMBER OF DESCRIPTIVE CATEGORIES (II), AND EACH CATEGORY HAS AN ASSIGNED EROSION POTENTIAL VALUE, OR EPV.

1. SYSTEMATICALLY CONSIDER EACH OF THE 12 SHORELINE VARIABLES (I) AND MATCH THE CHARACTERISTICS OF THE SEGMENT OF ESTUARINE SHORELINE UNDER CONSIDERATION TO THE APPROPRIATE DESCRIPTION (II) TO THE RIGHT OF EACH VARIABLE.
2. PLACE THE EPV ASSIGNED TO THE APPROPRIATE DESCRIPTION (II) FOR EACH OF THE 12 SHORELINE VARIABLES IN THE RIGHT HAND COLUMN (III). IF YOUR ESTIMATION OF A VARIABLE FALLS WITHIN TWO DESCRIPTIVE CATEGORIES, RECORD THE HIGHER OF THE TWO EPV'S.
3. OBTAIN THE CUMULATIVE EROSION POTENTIAL VALUE, OR CEPV (IV) BY ADDING THE ASSIGNED EPV'S RECORDED IN COLUMN III.
4. COMPARE THE CEPV (IV) OBTAINED FOR THE SEGMENT OF SHORELINE UNDER CONSIDERATION WITH THE SHORELINE EROSION POTENTIAL SCALE (V).

SHORELINE EROSION - THE CAUSE

NORTH CAROLINA'S ESTUARIES REPRESENT A GEOLOGICALLY YOUNG AND DYNAMIC PORTION OF THE COASTAL SYSTEM. ABOUT 18,000 TO 15,000 YEARS AGO, THE GREAT ICE SHEETS OF THE PLEISTOCENE GLACIAL EPOCH COVERED THE NORTHERN HALF OF NORTH AMERICA. AT THIS TIME THE NORTH CAROLINA SHORELINE AND COASTAL SYSTEM WAS LOCATED 20 TO 50 MILES SEAWARD OF AND ABOUT 400 FEET LOWER THAN THE PRESENT SHORELINE ON THE OUTER EDGE OF THE CONTINENTAL SHELF. AS THE GLACIERS BEGAN TO MELT AND RECEDE IN RESPONSE TO A GRADUALLY WARMING CLIMATE, THE MELTWATERS SLOWLY AND SYSTEMATICALLY BEGAN TO RAISE THE LEVEL OF THE OCEANS. THIS RISING SEA LEVEL CAUSED THE SHORELINE AND COASTAL SYSTEM TO SLOWLY MIGRATE UPWARD AND WESTWARD ACROSS THE CONTINENTAL SHELF. THE ESTUARIES FORMED AS THE RISING SEA FLOODED THE TOPOGRAPHICALLY LOW RIVER AND STREAM VALLEYS.

THE GLACIERS ARE STILL MELTING TODAY, SEA LEVEL CONTINUES TO RISE, AND THE SEA CONTINUES TO FLOOD THE COASTAL LANDS OF NORTH CAROLINA. THIS RESULTS IN THE CONTINUING UPWARD AND LANDWARD MIGRATION OF THE SHORELINE; THE SPECIFIC PROCESS OF SHORELINE MIGRATION IS BETTER KNOWN AS **SHORELINE EROSION**. THE FACT THAT SEA LEVEL IS RISING WORLDWIDE MEANS THAT EROSION IS UBIQUITOUS TO ALL OF NORTH CAROLINA'S THOUSANDS OF MILES OF SHORELINE; THE ONLY DIFFERENCES ARE THE RATES OF EROSION WHICH ARE DEPENDENT UPON THE SPECIFIC SHORELINE VARIABLES AND THE VARYING STORM CONDITIONS. LOCALLY, A SHORELINE MAY APPEAR STABLE OR ACTUALLY ACCRETED SEDIMENTS; SUCH A SITUATION IS ANOMALOUS AND IS USUALLY EPHEMERAL IN NATURE.

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| I. SHORELINE VARIABLES | II. DESCRIPTIVE CATEGORIES EROSION POTENTIAL VALUE (EPV) LOCATED IN UPPER LEFT HAND CORNER OF EACH CATEGORY BOX | | | | | | III. ASSIGNED EPV FOR EACH SHORELINE VARIABLE |
|--|--|--|--|--|--|---|---|
| 1. FETCH AVERAGE DISTANCE (IN MILES) OF OPEN WATER MEASURED AS EITHER SIDE OF THE PERPENDICULAR TO THE SHORELINE | 0 LESS THAN 1/10 | 2 1/10 TO 1/3 | 4 1/3 TO 1 | 7 1 TO 3 | 10 3 TO 10 | 13 10 TO 30 | 16 GREATER THAN 30 |
| 2. DEPTH AT 20 FEET DEPTH OF WATER (IN FEET) 20 FEET FROM THE SHORELINE (MEASURED AT MEAN HIGH WATER) | 1 LESS THAN 1 | 2 1 TO 3 | 3 3 TO 6 | 4 6 TO 12 | 5 GREATER THAN 12 | | |
| 3. DEPTH AT 100 FEET DEPTH OF WATER (IN FEET) 100 FEET FROM THE SHORELINE (MEASURED AT MEAN HIGH WATER) | 1 LESS THAN 1 | 2 1 TO 3 | 3 3 TO 6 | 4 6 TO 12 | 5 GREATER THAN 12 | | |
| 4. BANK HEIGHT HEIGHT OF THE BANK (IN FEET) AT THE SHORELINE OR IMMEDIATELY BEHIND THE SEDIMENT BEACH | 1 GREATER THAN 20 | 2 20 TO 10 | 3 10 TO 5 | 4 5 TO 1 | 5 LESS THAN 1 | | |
| 5. BANK COMPOSITION COMPOSITION AND DEGREE OF CEMENTATION OF THE SEDIMENTS | 0 ROCK, MARL, TIGHT CLAY, WELL CEMENTED SAND (BREAK WITH A HAMMER OR DIG WITH A PICK) OR SWAMP FOREST | | | 7 SOFT CLAY, CLAYEY SAND, MODERATELY CEMENTED SAND (EASILY DUG WITH A KNIFE) | | 15 UNCEMENTED SANDS, OR PEAT (EASILY DUG WITH YOUR HAND) | |
| 6. WIDTH OF SAND BEACH WIDTH OF SAND BEACH (IN FEET) BETWEEN BANK AND SHORELINE (MEASURED AT MEAN HIGH WATER) | 0 SWAMP FOREST (NO BEACH) OR LESS THAN 1/3 MILE FETCH | | 1 GREATER THAN 20 | 2 20 TO 10 | 3 10 TO 5 | 4 5 TO 1 | 5 LESS THAN 1, OR BEACH MARSH |
| 7. OFFSHORE VEGETATION TYPE AND ABUNDANCE OF THE VEGETATION OCCURRING IN THE WATER OFF THE SHORELINE | 1 DENSE OR ABUNDANT CYPRESS AND/OR AQUATIC GRASSES (SUBMERGED WEED BEDS) | | 4 SCATTERED OR PATCHY VEGETATION; MARSH GRASS, CYPRESS, AND/OR UPLAND TREES AND SHRUBS | | 7 LACK OF CYPRESS AND/OR AQUATIC GRASSES (SUBMERGED WEED BEDS) | | |
| 8. SHORE VEGETATION TYPE AND ABUNDANCE OF THE VEGETATION OCCURRING ON A SAND BEACH BETWEEN THE BANK AND THE SHORELINE | 0 NO SEDIMENT BEACH | 1 DENSE, CONTINUOUS VEGETATION; MARSH FRINGS, CYPRESS FRINGE, AND/OR UPLAND TREES AND SHRUBS | | 4 SCATTERED OR PATCHY VEGETATION; MARSH GRASS, CYPRESS AND/OR UPLAND TREES AND SHRUBS | | 7 LACK OF LIVING VEGETATION; FREQUENTLY ABANDONED STUMPS AND LOGS IN THE WATER; OR A MARSH WITH NO SAND BEACH | |
| 9. BANK VEGETATION TYPE AND ABUNDANCE OF THE VEGETATION OCCURRING ON THE BANK AND IMMEDIATELY ON TOP OF THE BANK LIP | 1 DENSE VEGETATION: UPLAND TREES AND SHRUBS, GRASS | | | 4 CLUMPS OF VEGETATION ALTERNATING WITH AREAS LACKING VEGETATION | | 7 LACK OF VEGETATION (CLEARED ANNUAL PLANTS (CROP OR AGRICULTURAL LAND) OR EXTENSIVE MARSH) | |
| 10. SHORELINE GEOMETRY GENERAL SHAPE OF THE SHORELINE AT THE POINT OF INTEREST PLUS 200 YARDS ON EITHER SIDE | 1 COVES | | | 4 IRREGULAR SHORELINE | | 8 HEADLAND OR STRAIGHT SHORELINE | |
| 11. SHORELINE ORIENTATION THE GENERAL DIRECTION THE SHORELINE FACES | 0 LESS THAN 1/3 MILE FETCH | | 1 SOUTH TO EAST | 4 SOUTH TO WEST | 8 WEST TO NORTH TO EAST | | |
| 12. BOAT WAKES PROXIMITY TO AND USE OF BOAT CHANNELS | 1 NO CHANNELS WITHIN 100 YARDS, BROAD OPEN WATER BODY, OR CONSTRUCTED SHALLOW WATER BODY | | | 6 MINOR CHANNEL WITHIN 100 YARDS CARRYING LIMITED TRAFFIC, OR MAJOR CHANNEL 100 YARDS TO 1/2 MILE OFFSHORE | | 12 MAJOR CHANNEL WITHIN 100 YARDS; PARTICULARLY THE INTRACOASTAL WATERWAY | |

IV. CUMULATIVE EROSION POTENTIAL VALUE (CEPV)

V. SHORELINE EROSION POTENTIAL SCALE:

AVERAGE EROSION RATE*

IF THE CEPV IS BETWEEN 0 AND 50, EROSION POTENTIAL IS LOW.....LESS THAN 2 FEET/YEAR
 IF THE CEPV IS BETWEEN 50 AND 70, EROSION POTENTIAL IS INTERMEDIATE.....FROM 2 TO 4 FEET/YEAR
 IF THE CEPV IS BETWEEN 70 AND 100, EROSION POTENTIAL IS HIGH.....GREATER THAN 4 FEET/YEAR

* 1. Since much of the shoreline erosion is a direct product of high energy storms, the rate and amount of erosion in any specific location is quite variable from year to year. Therefore, the rate of erosion depends upon the following conditions:

1. STORM FREQUENCY
2. STORM TYPE AND DIRECTION
3. STORM INTENSITY AND DURATION
4. RESULTING WIND TIDES, CURRENTS, AND WAVES

2. The presence of man-made structures (bulkheads, groins, etc.) will modify the erosion potential, increasing or decreasing it to a degree depending on the type, location, design, etc., of the structure.

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