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DEPARTMENT OF GEOLOGY, MINES AND WATER RESOURCES
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SHORE EROSION
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CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

THE SHORE EROSION PROBLEM

BY

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The Maryland Situation

The destructive effects of shore erosion in Tidewater Maryland have long been of concern to the inhabitants, but little had been done to determine the magnitude of the destruction, and very little has been done in the way of protection against these losses.

In 1914, J. F. Hunter, under the auspices of the Maryland Geological Survey, made the first measurements of the amount and the rate of shore erosion on three islands off the mouth of the Choptank River. He found that Sharps Island had been reduced from 438 acres in 1848 to 53 acres in 1910, a loss of 7 acres annually; that James Island had been reduced from 976 acres in 1848 to 490 acres in 1910, a loss of 8 acres annually; and that Tilghman Island had been reduced from 2,015 acres in 1847 to 1,686 acres in 1900, a loss of 6 acres annually. By 1946, Sharps Island had been reduced to only 6 acres.

The State first took cognizance of this problem in 1929 when the Legislature set up a Waterfront Commission "to recommend plans and policies for protection of water fronts from erosion." Apparently the only report made by the Waterfront Commission is a little known and almost unobtainable report of 5 pages dated September 21, 1933, under instructions from Governor Ritchie to survey the localities most severely damaged by the storm on August 23, 1933. This report lists the most severely damaged shorelines as comprising 6,500 feet in Worcester County, 60,400 feet in Anne Arundel County, 6,100 feet in Calvert County, and 8,200 feet in St. Marys County, a total of 81,200 feet. The report pointed out that in this one storm Bay Banks receded to the extent of 30 to 40 feet and "left the communities literally on the brink of a receding precipice." The report described briefly the methods of protection against erosion and estimated the cost of construction as ranging from $5.00 to $20.00 per running foot. Governor Ritchie submitted the report to the Legislature in October, 1933, with the comment that no State funds were available to remedy such property damage and that no State in the country protected private property against such loss.

The 1933 Legislature passed an Act authorizing the County Commissioners of Anne Arundel County to erect protection works and to charge the cost against the benefitted property owners. During 1934 to 1936, Anne Arundel County protected 29,000 feet of shore line against erosion at an expenditure of $377,000, an average cost of $13.00 per foot. Anne Arundel County has done

nothing under this Act since 1936, and no other county has asked for similar legislation.

In 1941, the Waterfront Commission was merged with the Department of Geology, Mines and Water Resources, but no State policy had been adopted other than that implied in the 1933 Act for Anne Arundel County, and no appropriations had been made for a study of the problem. Yet the Department was called on from time to time for advice and assistance. A purchaser of 5 lots in 1926, in a development along the Calvert Cliffs, reported in 1944 that one half the area of the lots had been eroded, the cliff having receded from 20 to 50 feet, a rate of 1 to 3 feet per year.

FEDERAL LEGISLATION

In 1930, Congress established the Beach Erosion Board under the Army Engineers, but primarily to deal with erosion on the shores of the United States, that is, with ocean-front shores. It was authorized to undertake construction for protection only for Federal property or as part of river and harbor improvements to protect such improvements against siltation. Special studies of particular localities were authorized on a cooperative basis, when requested by an authorized State agency which would bear half the cost of the study. The report on such a study recommends the nature of protection works needed and submits plans and specifications and estimates of cost, but no Federal funds are available to carry out the recommendations. No State funds have been provided to pay the State's half of the cost of such studies. Consequently, the Department of Geology, Mines and Water Resources has not been able to request such a study except in three cases where the affected owners were willing to underwrite the State half of the cost. Some of the other Atlantic Coast states have made fuller use of the expert services of the Beach Erosion Board than has Maryland.

In 1946, Congress went a step further and authorized Federal financial aid to the extent of one-third the construction cost, provided the plans and specifications are approved by the Beach Erosion Board, on "shores owned by States, municipalities, and other political subdivisions." This legislation still left without Federal aid privately owned shores. It is questionable whether a devious scheme resorted to by New York City to give publicly owned status to a private waterfront would pass Federal scrutiny and secure Federal aid for the protection of private waterfronts. In that case, the owners of the adjacent land deeded a strip one foot wide along the high water line for a distance of 7,500 feet to the City of New York, making the waterfront public land. The city then built a boardwalk and developed a beach at a cost of about $2,000,000.

POLICY IN OTHER STATES

Florida, North Carolina, and Virginia have participated in cooperative studies by the Beach Erosion Board, though the Florida policy has been to

require the local interests to contribute the State's half of the cost of the study. The Florida situation is, therefore, essentially the same as that in Maryland.

New Jersey and New York have been foremost in providing State aid in the construction of protection works. Probably the only case in which State aid has been extended to private property was an appropriation of $300,000, in 1938, by New Jersey which was restricted to the Atlantic coast, but was available on an equal-matched basis to private property paying taxes. New Jersey appropriations totaling $1,645,000 in 1940 and 1944 were available only to municipalities, in part on a matched basis requiring municipal and county contributions and in part not requiring matching but authorizing contributions by the benefitted municipalities. New York pays one-half the cost on shores owned by a county, city, town or municipality.

The Connecticut shore suffered unusually great damage in the hurricanes of 1938 and 1944, both of which aroused public interest in protection measures. It was not until 1946, however, that definite progress was achieved. At a public meeting in 1946, a Beach Erosion Control Committee was established, and a cooperative study by the Beach Erosion Board of the entire Connecticut shore was advocated with the State paying the State half of the cost of the study. In that same year, the Connecticut Legislature, anticipating the passage by Congress of the bill authorizing Federal contributions for one-third the cost of protection works, passed an act authorizing municipalities to appropriate funds for waterfront protection and providing for equal matching by State funds. Thus in both New York and New Jersey political subdivisions need provide only one-third the cost, the State providing one-third, and the Federal government providing one-third if the plans and specifications of the protection works are approved by the Beach Erosion Board.

UNIQUENESS OF THE MARYLAND PROBLEM

In the other Atlantic Coast states the problem is primarily one of ocean-front protection and concerns mostly highly developed and valuable ocean-front communities. In Maryland the problem is primarily along the shores of the Chesapeake Bay and its tributaries and concerns for the most part farm-land waterfronts. The Maryland inland-water shores subject to shore erosion have a length of about 2,000 miles. Obviously the cost of protecting the whole of this shore-line is prohibitive. However, there are many localities undergoing serious erosion where the property values are sufficient to warrant the cost of protection works. The losses affect the immediate property owners, the county, and the State. The problem is one meriting consideration by the three interests and is hence one to arouse State-wide consideration.

The damage inflicted by shore erosion is not only that incurred by the property eroded, but the long-shore movements of the products of erosion impair navigation and require the the expenditure of large sums of Federal money to restore the impaired navigation facilities.

SHORE EROSION DAMAGE IN MARYLAND

Believing that constructive public interest in the problem could be aroused only through a presentation of its magnitude, the Department of Geology, Mines and Water Resources began on July 1, 1947, a measurement of the acreage of Maryland that had been lost in the 90 years during which accurate surveys of the shore lines have been available and a determination of expenditures in Maryland by the Army Engineers on navigation improvements necessitated by the deposition of shore-erosion debris in navigable waters. This investigation was carried out by Turbit H. Slaughter, assisted in the enormous amount of drafting involved by Edwardine Goeb Slaughter.

The measurements were made possible through the helpful cooperation of the United States Coast and Geodetic Survey in making available to Mr. Slaughter the original survey charts. Maps were prepared on the large scales of 1:10,000 and 1:20,000 of 2,000 miles of Maryland's shore lines, showing the positions of the shore line on the earliest surveys and on the latest surveys. It would be prohibitively costly to publish all of these maps, but this report includes significant portions of many of the maps. The Baltimore District, Corps of Engineers, Department of the Army, cooperated in the estimates of Federal expenditures for navigation improvements attributable to shore erosion.

METHODS OF SHORE FRONT PROTECTION

The kind of construction that will arrest erosion and afford shore-front protection depends on many factors. Before undertaking shore-front protection construction, a study should be made of the affected area and adjacent areas. Factors that should be considered are:

1. The nature and amount of erosion shown by available shore line surveys.
2. The amount, direction and character of the littoral drift.
3. The grain size and composition of the beach sand.
4. Storm effects.
5. Offshore depths and changes in depths.
6. Tide levels.
7. Force and direction of seasonal winds.
8. The effects of protective measures that may have been tried previously.
9. Relation of eroding shore to nearby shores.

Enormous sums of money have been wasted in attempts at shore-front protection in Maryland because no prior study was made of these factors, in improperly planned construction, and in construction that was inadequate to combat the physical forces acting against it.

Where the onslaught of currents and storm waves is not too violent, erosion can frequently be arrested and a protecting beach built up by a series of short groins. The rate at which sand can be accumulated on a beach depends on the abundance of long-shore moving material. Such accumulation often takes

place with surprising rapidity where there is an ample supply of source material. Where a supply of source material is very limited, the beach is a "starved" beach, and the most that can be expected of groins is to retard the rate of erosion. A relatively short waterfront between two estuaries with deep water is lacking in source material other than that provided by the erosion of the waterfront. The usefulness of groins in such a situation is at most to retard the rate of erosion.

To be effective, groins must be properly spaced with respect to their length. Experience has shown that in general the distance between groins should be about $2\frac{1}{2}$ times the length of the groins in the water. The landward end should extend well back of the high tide line, and the top should slope gently toward the water end. The exposed portion of the groin should not be higher than high storm waves.

The effectiveness of groins in accumulating sands along an eroding shore and in building out a protecting beach is illustrated in Plates 32 to 35. Plate 32, figure 2, shows a large accumulation of sand against a stone jetty at Matapeake ferry landing. Plate 35, figures 1 and 2, shows progressive accumulation of sand on the source side of a well-built stone jetty at Chinks Point in Anne Arundel County. Plate 34, figures 1 and 2, illustrates the progressive accumulation of sand on the source side of a well-constructed timber groin at Bay Ridge in Anne Arundel County. Plate 33, figures 1 and 2, shows the results achieved with small rubble groins, at the Eastern Shore State Hospital on the Choptank River near Cambridge, in building out a protecting beach where shore erosion had started undermining the end of a concrete bulkhead. Plate 32, figure 1, illustrates a novel type of improvised groin made by driving a line of iron rods into the bottom which are used to hold discarded automobile tires in place. When a layer of tires has accumulated covering sand, another layer is placed on top of it. Even this groin is proving effective in building out the beach under the not severe erosion conditions at that locality.

Where the onslaught of storm waves is nearly at right angles to the shore and against a bluff, it is usually necessary to build a bulkhead along the shore to stop erosion. Bulkheading only part of such a waterfront serves merely to stay erosion at the bulkhead until the bulkhead has been outflanked as erosion continues at each end and is ultimately undermined from behind. To achieve permanent protection along a shore front requiring bulkheading, all of the owners must unite in the erection of the protection as a single unit along the entire front. A properly-planned and well-built timber bulkhead will hold for many years if constructed of pressure-creosoted lumber and if made tight enough to prevent washing out of sand from behind through spaces between the planks.

Where there is an adequate source of long-shore moving material from areas beyond the bulkhead, the bulkhead may be supplemented with groins to ac-

cumulate a beach in front of it to serve both to protect the bulkhead and to improve the recreational value of the waterfront.

The Department of Geology, Mines and Water Resources has investigated many shore fronts undergoing erosion at the request of the owners and has advised them regarding its prevention. In many of these investigations the Department has consulted with the Baltimore District and also with the Washington District of the Department of the Army Corps of Engineers and profited by their experience and willing cooperation in arriving at the recommendations made to the owners.

EXAMPLES OF SHORE EROSION PROBLEMS

Following are described a few cases of shore erosion that have been investigated by the Department and the recommendations made to the owners.

MIAMI BEACH (FIGURE 1)

A beach about 300 feet long, facing southeasterly on the Chesapeake Bay, on the peninsula between Middle River and Seneca Creek in Baltimore County, operated as a public bathing beach.

This was a relatively stable beach with a loose-stone groin at the north end. In an attempt to widen the beach, two loose-stone groins were built in July, 1947, a long groin at the north end, where the beach on the north side of the old groin was 3 feet lower than on the south side, and a short groin at the south end. Erosion set in immediately on the south side of the long groin, scouring out the area shown on Figure 1 by September. The south half of the beach had widened appreciably on each side of the short groin.

Investigation of the situation indicated that the beach is a relatively "starved" beach, that the long groin had caused a rotary movement of the water which scoured the angle between the groin and the beach line, and that a "pumping" effect was filtering sand through the loose-stone groin to the lower level beach on the north side of the groin. It was recommended that the long groin be shortened and made impermeable to the passage of water through it, a third groin be built between the two groins, and the denuded area be replenished with coarse sand.

In May, 1948, the long groin was shortened 25 feet, the interstices between the stones were filled with cement, and sand was dumped on the scoured area to replace that which had been eroded. By July, 1948, all of the groins had collected sand. The scouring action at the north groin had been remedied.

Some erosion occurred again during a storm in the spring of 1949, beach sand being carried southward to the marsh beyond the beach. This sand movement was due in part to bad condition of the landward end of the south groin.

This example illustrates the damage that can result from not properly-planned protective works and that the principal effect of properly planned

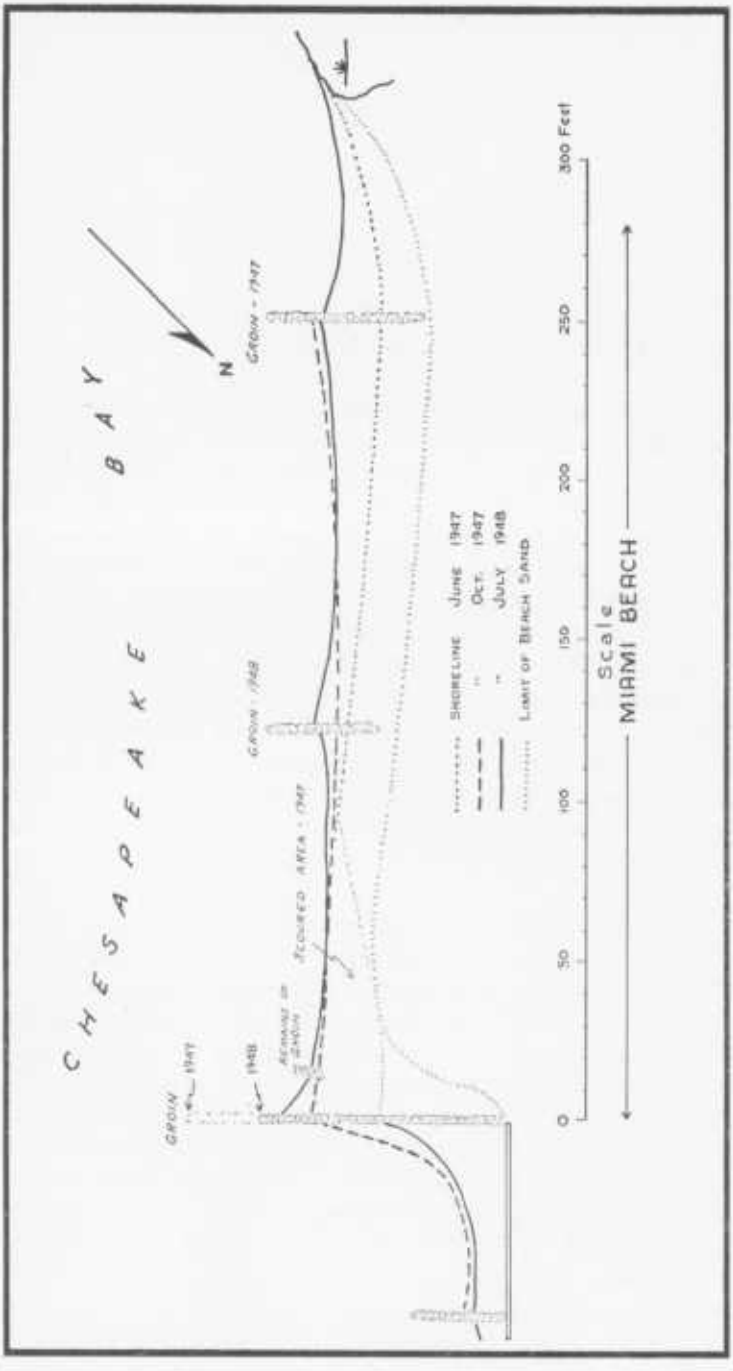

FIG. 1.—*Sketch of Miami Beach, Baltimore County, Showing Shore Line Changes and Protective Works.*

groins on a "starved" beach is to stabilize the beach rather than bring about accretion.

NEW BAY SHORE PARK (FIGURE 2)

This beach is at the south end of Hart Island on the Chesapeake Bay in Baltimore County.

In May, 1948, the beach was built out by the addition of 310,000 cubic yards of dredged sand, and two loose-stone groins were built. Rapid erosion of the sand set in immediately.

The Coast and Geodetic Survey charts show that this beach had receded 100 feet from 1846 to 1933 and that the northern end of Hart Island had receded 450 feet.

On inspecting the beach in August, 1948, the owners were advised that the fill used was smaller in grain size than the natural beach sand, the loose-stone groins were permitting sand to pass through them instead of accumulating it, the south groin should have been at right angles to the beach, and the distance between the groins was greatly in excess of effective spacing. The owners were advised further that more information regarding the erosion processes acting against this shore front was needed to plan effective erosion protection. It was recommended that two impermeable groins be built on the natural beach a short distance north of the Park beach and their effect on sand movement be observed through the weather cycle of one year. This would show the extent to which groins can hold the natural beach sands, and whether the beach receives enough long-shore moving sand to maintain a stable beach or even enlarge the beach by accretion, or whether it is a "starved" beach that will require additions of sand from time to time to maintain its width. It was also pointed out that additions of sand must be at least as coarse as the natural beach sands.

The recommended experimental work was not done. Instead, in the fall of 1948, one wooden groin was built at the south end of the Park beach and in the spring of 1949, two more wooden groins were built on that beach. In June, 1949, the area between the two southern wooden groins had undergone little change. In the area between the much too widely spaced groins to the north, recession of the beach continued and amounted to about 40 feet between August, 1948, and June, 1949.

This example illustrates the fact that an island beach is a "starved" beach. The only source of sand is the eroding beach itself. Complete protection against erosion can be achieved only with a bulkhead. However, some protection of a critical portion of such a shore front, as in this case the Park beach, can be achieved by utilizing the erosion products from unprotected portions of the shore front, in this case the northern unused portion of Hart Island. If this source is not adequete to maintain the beach as desired, sand must be added

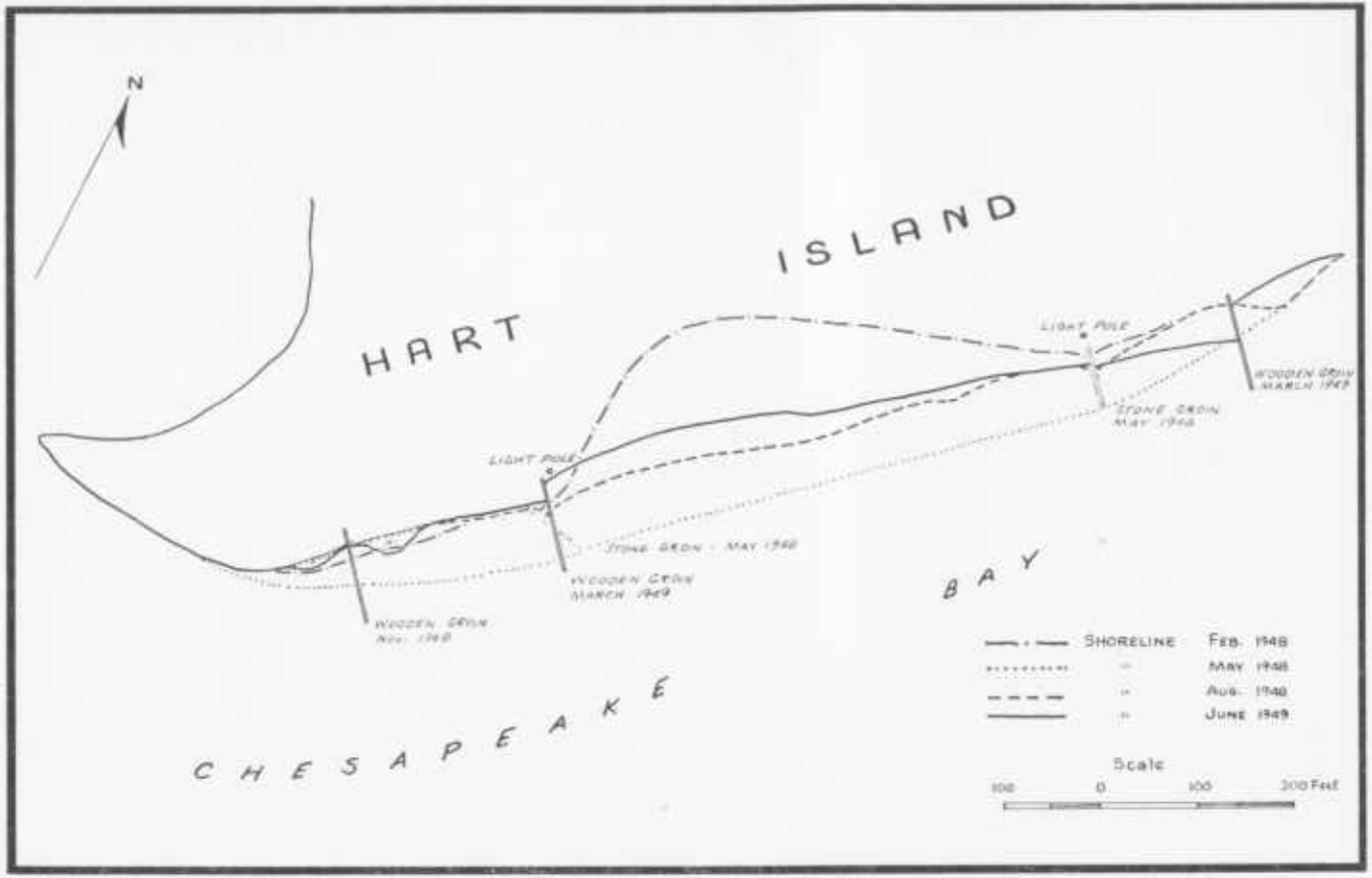

FIG. 2—*Shore Line Changes at New Bay Shore Park, Hart Island, Baltimore County.*

from elsewhere, but it must be as coarse as the natural beach sand. The natural beach sand represents the finest sand that approaches stability on the beach. Finer sand is washed away by the currents operating against the beach. The results illustrate the need of preliminary study before undertaking beach protection and the ineffectiveness of protection works that are not planned in accordance with principles established by experience in shore-front protection.

MOUNTAIN POINT, GIBSON ISLAND (FIGURE 3)

Mountain Point is the south end of Gibson Island, Anne Arundel County. The east shore faces the Chesapeake Bay and the west shore the Magothy River.

The position and shape of Mountain Point have undergone great changes since 1844. In 1933 the point extended over 500 feet further south than in 1844, but had migrated 600 feet to the west. It had also narrowed greatly. Sands carried southward along the Chesapeake Bay front had been deposited at the end of the Point, extending it southward. Some of the sand deposited at the end of the Point had in turn been carried northward along the Magothy River shore and deposited along that shore. Some of the accretion on the Magothy River shore resulted also from the deposition of sand from the Chesapeake Bay shore carried across the point by storm waves and winds.

Between 1933 and 1942, the Point receded more than 200 feet northward and migrated 80 feet further west, and had widened in places as much as 40 to 60 feet, most of the widening due to continued accretion on the Magothy River front. The change that began in 1933 was caused by the construction of many small groins and bulkheads along the east shore of the island north of Mountain Point which reduced the amount of source material reaching the Point. The Point became a "starved" area and erosion exceeded deposition.

Further change had occurred in 1948. The Chesapeake Bay front had built out from 20 feet to 30 feet since 1942, and substantial accretion had continued on the Magothy River front. The Point itself, however, had receded 60 feet further northward and had migrated 120 feet further west, and had narrowed greatly. This change is ascribed to the construction of three loose-stone groins on the Chesapeake Bay front to protect the pavilion. These groins further starved the tip of the Point, so that erosion continued there, by holding source material from the north and building out the Chesapeake Bay front north of the tip.

Another examination in July, 1949, found that since September, 1948, accretion had again set in at the tip and that the Point had extended more than 370 feet southward, making it nearly as long as in 1933, but had migrated 140 feet further to the west. Two factors contributed to this change, lack of severe storms during the preceding winter and spring, and an increase of source ma-

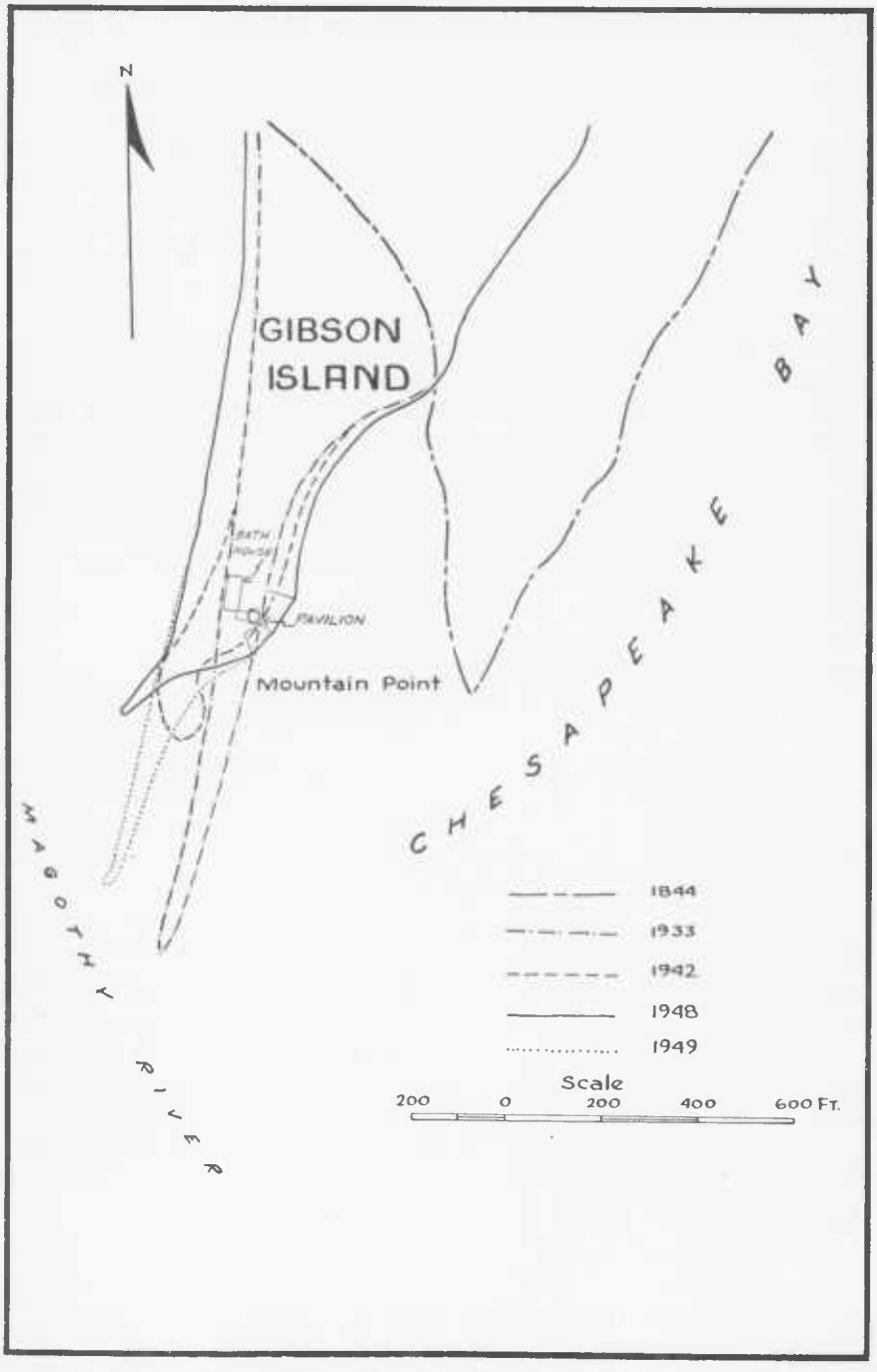

FIG. 3—*Shore Line Changes at the South End of Gibson Island, Anne Arundel County.*

terial from the north after the groins at the pavilion had accumulated their fill of sand.

Mountain Point is a striking example of erosion and deposition and of the effects of variations in the supply of long-shore moving material from eroding source areas. It illustrates equally strikingly how accumulation in one area through protection construction may accelerate erosion or even reverse deposition to erosion in an adjoining area that was dependent on source material from the protected area.

The vicissitudes of Mountain Point have been a source of concern and inconvenience in its use as a recreational area. Plans for the stabilization of the Point recommended in 1948 are shown in Figure 4. It was recommended that a bulkhead be built in stages along the line AE and that a groin BW be built at the end of the bulkhead at each stage, the stages to follow each other as the area in front of each section of the bulkhead and north of the groin had filled with sand. Overflow from the groin and storm and wind transported sand across the bulkhead will accumulate in the persistent area of deposition on the Magothy River side of the bulkhead. In this way the Point can be stabilized on the Chesapeake Bay side and be increased in width on the Magothy River side.

TALL TIMBERS, POTOMAC RIVER

Tall Timbers is a cottage community on the Potomac River, St. Marys County, 5 miles northwest of St. George Island. It has one of the most picturesque waterfronts in Maryland. Yet its shore front is the worst example in Maryland of futile efforts at shore front protection despite costly expenditures in protection works, as illustrated on Plate 31, figures 1 and 2.

The Coast and Geodetic Survey maps show that this shore receded 180 feet from 1868 to 1943, an annual average of 2.4 feet. This shore front is a bluff from 4 to 12 feet in height and about 5,000 feet in length. Photographs taken in 1926, when the area was subdivided into lots, show a sandy beach in front of the bluff with a width of at least 4 to 6 feet above normal high tide. Now there are only small areas of beach in erosion reentrants and where protection is afforded by the remnants of destroyed bulkheads.

From time to time individual owners have protected their front with bulkheads. Erosion on adjoining unprotected fronts progressed around the flanks of the bulkheads and destroyed them from behind. Many of these bulkheads were built of substantial reinforced concrete. Some of the properties now have their third bulkhead. The positions of the earlier bulkheads, at various distances off-shore, are marked by remnants of their bases and large masses of their remains.

There is marsh at the north end and low land at the south end of the bluff, so that the supply of source material for a beach was derived largely from the

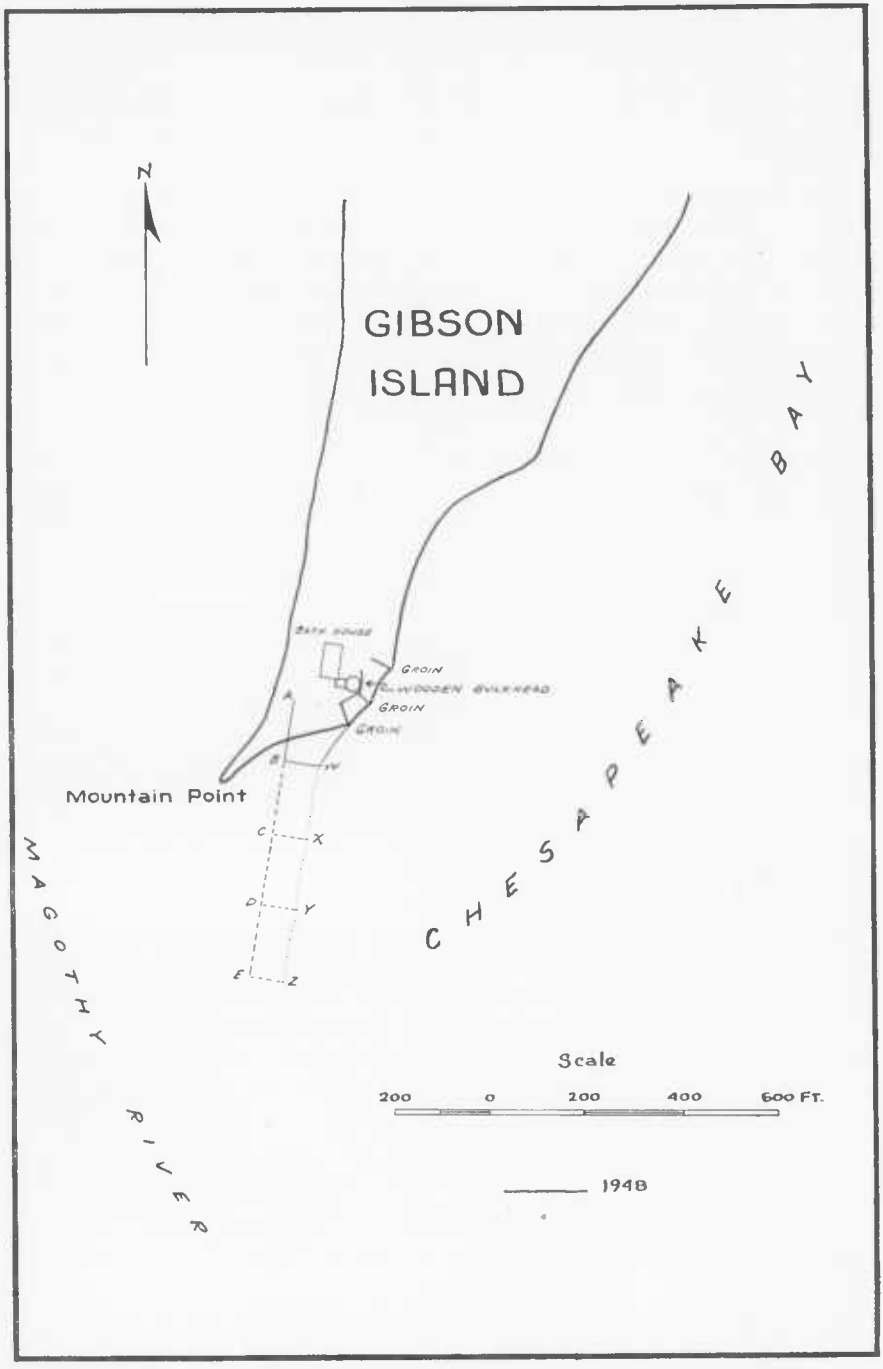

FIG. 4—*Recommended Bulkheads and Groins for the Stabilization of the Southern End of Gibson Island, Anne Arundel County.*

eroding bluff itself. When this supply was diminished by numerous bulkheads, the supply became inadequate to maintain the beach, and most of the beach was lost.

The Department examined this shore front in 1944 at the request of the Tall Timbers Citizens Association. Obviously, the only remedy was to build a bulkhead as a unit along the entire front. The futility of expecting permanent protection of individual properties by discontinuous bulkheads was emphasized, and unanimous community action was urged. It was estimated that the aggregate expenditures of the individual owners had been sufficient to have provided the hoped for protection if it had been spent at one time to protect the entire shore front.

The Tall Timbers shore front was inspected again in August, 1949, in cooperation with representatives of the Corps of Engineers and the U. S. Beach Erosion Board. The same conclusions were reached as in 1944.

Recently individual owners have constructed timber bulkheads along two portions of this waterfront, about 700 feet at the north end and about 1,000 feet at the south end. Part of this new bulkhead is well constructed with pressure-creosoted timber and tongue and groove planks. A portion, however, is built with uncreosoted timber and without interlocking planks, features that will shorten its life greatly. A few experimental groins have been erected in front of the bulkheads in an effort to restore the beach. The groins at the north end are too short and too high to accomplish their purpose. Not enough information is at hand to know whether, if the immediate source of sand from the eroding bulkhead is cut off by complete bulkheading of the waterfront, there is sufficient littoral drift of sand from sources beyond Tall Timbers to enable properly-placed groins along the bulkhead to restore the beach.

Tall Timbers is an example of a shore front that can be protected only by a bulkhead along the entire front, that lost its beach through decrease in the supply of source sand by partial bulkheading of the eroding bluff, and on which large sums of money have been spent in futile efforts by individual owners to protect their own property. It illustrates the need for some means to force unanimous concerted community action to check such destruction where property values are adequate to warrant the cost.

TYDINGS ON THE BAY AND LOG INN, ANNE ARUNDEL COUNTY

These two localities, only a half mile apart, illustrate the right way and the wrong way to secure protection against erosion on a shore requiring bulkheading.

In the Log Inn area two bulkheads were built with an intervening area of unprotected shore. The bulkheaded areas are now points where erosion is still temporarily checked by the disintegrating bulkheads. The intervening unprotected shore has continued to recede as shown on Plate 30, figure 1. Erosion

around the ends and behind the bulkheads will ultimately destroy them completely, and active erosion of the points will be resumed.

Tydings on the Bay is one of the erosion protection projects carried out by Anne Arundel County under the authority given the County Commissioners in 1933. The shore front was protected in 1936 by the construction of 1,833 feet of timber bulkhead supplemented by short groins. Plate 30, figure 2, shows that this construction is still in good condition and has afforded effective protection to this waterfront. The bulkheads built by Anne Arundel County at other communities have been equally effective.

SANDY POINT STATE PARK

The Sandy Point State Park area lies immediately south of the Tydings on the Bay-Log Inn area. Shore erosion along the park waterfront was investigated in November, 1948.

The park area has a waterfront about 6,000 feet long northwest of Sandy Point, and about 3,500 feet long southwest of Sandy Point, between Sandy Point and the Sandy Point ferry slip. Recession along the shore northwest of Sandy Point, during the 89 years from 1844 to 1933, increased progressively northward to a maximum of 500 feet in the northern part. Recession along the shore from Sandy Point to the ferry slip has been relatively small. At Sandy Point itself accretion occurred, and Sandy Point advanced over 400 feet southeastward. The area of accretion extends nearly 1,000 feet northwest and nearly 1,300 feet southwest from the Point.

At the north end of the Park site is a bluff rising to a height of 15 feet and sloping off to a marsh at each end. A wooden bulkhead 1,600 feet long and 5 feet high built along this bluff in 1928 began to disintegrate in 1946. The weakened portions had been undermined and erosion started behind them in 1948. There is no beach along this bulkhead.

A deeply indented area 300 feet long with a beach 8 to 10 feet wide at low tide and a marsh behind lies south of the bulkhead. Much of the littoral drift from the northwest is being accumulated in this indented area, resulting in "starving" the beach between this area and Sandy Point.

The indented area is followed to the southeast by a wooded bluff 600 feet long and 6 to 8 feet high with a beach only 1 to 3 feet wide at low tide. This portion of the shore line is "starved" from the northwest, and its erosion material affords a limited source of material for the 3,200 feet of beach between it and Sandy Point.

The shore suitable for a bathing beach is the approximately 6,600 feet represented by 3,200 feet northwest of Sandy Point and 3,400 feet southwest of Sandy Point. The beach has a width of 20 to 30 feet at low tide and has marshy ground behind it.

The predominant littoral drift along the shore of the Park is southeastward

to Sandy Point where it accumulates in part and is in part carried southwestward around the point but in an amount hardly sufficient to compensate for erosion between Sandy Point and the ferry slip.

The development of the park site as a recreational area involves two problems: the prevention of erosion at the two areas of bluff at the north end and the accumulation of a wider beach along the shore in the vicinity of Sandy Point.

The numerous bulkheads that have been erected along the shore northwest of the park area have decreased the supply of source material along the shore of the park. Yet the immediate problem in the development of the site as a waterfront park is widening the 6,600 feet of beach in the vicinity of Sandy Point and especially to the northwest of Sandy Point.

It was recommended, therefore, that the deteriorated wooden bulkhead at the north bluff be removed to permit temporarily accelerated erosion there to provide more source material and to leave unprotected temporarily the wooded bluff for the same reason. The initial construction recommended was 6 groins at intervals of 200 feet. It was recommended that the groin at Sandy Point itself have a length of 300 feet, 100 feet extending beyond the low tide line and 200 feet landward, and that the other 5 groins extend 60 feet beyond the low tide line and 40 feet landward. When these groins have accumulated a sufficiently wide beach, additional groins should be added progressively northwestward to build out the rest of that beach. When the desired beach development has been achieved, the bluffs beyond it can be protected against further erosion by bulkheading them.

Not enough is known regarding the quantity of littoral drift to forecast whether the groins northwest of Sandy Point will starve the beach between Sandy Point and the ferry slip while accumulation is taking place at them and make it necessary to protect that beach with groins, or whether there will still be enough littoral drift southwestward from Sandy Point not to disturb the equilibrium of that beach.

The Sandy Point Park site is an example of a shore that has been subject to erosion toward the source direction and the site of deposition in the opposite direction, and one that has had the quantity of source material reduced by effective bulkheading along much of the source area. Its most rapid development as a waterfront park makes it desirable not to retard erosion where erosion is taking place until the eroding portion has supplied the littoral drift needed to build out the beach in the area that is to be developed as a bathing beach.

WHAT SHOULD BE DONE ABOUT SHORE EROSION

The immediate incidence of shore erosion damage is upon the owner whose property is being destroyed and whose house may be in jeopardy. The damage is being inflicted also, however, upon the community where a waterfront is the

site of a cottage development, upon the County and upon the State, and the Federal government is called upon for expenditures to repair resulting impairment to navigation. Obviously, the remedy is not one to be left to the owners alone.

The increasing acceptance of responsibility by the Federal government has been described. The increasing acceptance of responsibility by some of the States has also been described. It has been pointed out that Maryland recognized some responsibility in 1929, but has not yet assumed any responsibility. The only action taken by the State was in 1933 when it authorized Anne Arundel County to assume responsibility in protection construction, but required the protected properties to bear the whole cost. It has also been pointed out that while the damages of the unusually severe storm of August, 1933, were still fresh in mind, during 1934 to 1936, Anne Arundel County actively carried out the responsibility delegated to it. No other county has asked for such responsibility. The problem since 1936 has been, therefore, left entirely in the lap of the individual owners of eroding shores.

Erosion is the effect of the resultant of a large number of diverse and variable, interdependent forces and conditions. Successful erosion protection requires engineering skill based on an understanding of those forces and conditions and backed by experience in combating them. A high measure of success cannot be achieved as long as the planning and construction of protective measures is left to the property owner alone.

The conditions under which erosion takes place are so variable, and the range in values of the property being destroyed is so great, that no one procedure can be evolved that would be applicable to the entire Maryland Tidewater shore lines. In cases of lands of low value, the policy of the past of fatalistically accepting the loss may have to continue to be followed. In countless cases of lands with farm values, erosion can be retarded and even stopped by simple protective measures that are not beyond the means or the ability of the owner to provide. In such cases, at little expense to the county or the State, the owner can be provided with competent advice how to secure protection against erosion and how to avoid wasteful expenditure on not properly-planned and improperly-built construction work. Property owners throughout Tidewater Maryland are in need of such advice and many are seeking it. Since 1944, the Department of Geology, Mines and Water Resources has given such advice whenever called upon.

The situation is entirely different where waterfront communities are affected by shore erosion. The monetary damages suffered are adequate to warrant the cost of providing protection. That was the case at the waterfronts protected by Anne Arundel County in 1934 to 1936, and is equally warranted at many other Anne Arundel county waterfront developments that have not been so benefitted. Innumerable similar developments are scattered along the

shores of all of the other Tidewater counties. The individual property owner who recognized the need has been faced with the dilemna of wasteful expenditure on his own property for temporary relief or of inaction because of inability to secure unanimous voluntary action on the part of his neighbors. To continue to do nothing in such cases is to complacently accept remediable damage and loss; and, in the light of increasing assumption of responsibility by the Federal government and by other States, it is an admission of backwardness in conservation progress in Maryland.

This report lays the magnitude of the problem clearly before the people of Maryland. This report does not go into the wider and larger, difficult question of policy whether State and/or county financial aid should be made available for shore-front protection, and if so how the cost should be divided between benefited owners and the county and/or the State. The maximum division of cost thus far authorized in other States is that, under the restricted conditions of publicly-owned waterfronts, the benefited properties, the State, and the United States share the construction costs equally, but the subsequent maintenance costs are borne solely by the benefited properties. Only once apparently has State aid been given to private property and then on an equal-matched basis.

The specific recommendation of this report is restricted to waterfronts where property values are adequate to warrant levying the costs of protection upon the benefited properties. It is recommended that the legislation enacted for Anne Arundel County in 1933 be extended to apply to all of the Tidewater counties. Such legislation will not of itself accomplish shore front protection. Thus no use of it has been made in Anne Arundel County since 1936. It will still be necessary to spur the counties to action. However, a progressive community can then bring pressure to bear upon the county and not be as easily pushed aside on the grounds that the county has no authority to carry out their wishes. Perhaps when confronted with the erosion data in this report, even the most reluctant and complacent county will respond to such a demand from one of its communities.

THE SHORE EROSION MEASUREMENTS

BY

TURBIT H. SLAUGHTER

Definition of Terms

The technical terms used in describing the effects of shore erosion are illustrated in Figure 5.

Shore Erosion. The physical attack of the combined forces of wind, wave, and tide on a shore.

Shore Line. A migrating line between high and low tide that separates land and water. In this report, it refers to mean high tide level.

Shore or Beach.* The zone extending from the low water mark to the landward limit of effective wave action.

Coast.* The zone of indeterminate width landward from the shore.

Cliff.* The wave erosion feature varying from an inconspicuous slope at the margin of a low coastal plain to an escarpement, situated at the seaward edge of the coast.

Littoral Drift.* The material that moves generally parallel to the shore line.

Deposition. The accumulation of littoral drift.

Measured Length of Shore Line. The length of the most recent shore line used in the determination of erosion and deposition.

Net Loss. The difference between the number of acres lost due to erosion and the number of acres accumulated due to deposition.

Linear Recession. The distance measured perpendicular to the old and new shore lines where erosion has occurred.

Linear Building Out. The distance measured perpendicular to the old and new shore lines where deposition has occurred.

The Comparative Rate Unit expresses change in Acres per Mile.

Rate of Erosion. The number of acres of land per mile lost during a given period of time.

Rate of Deposition. The number of acres of land per mile accumulated during a given period of time.

Rate of Loss. The net loss of acres of land per mile for a given period of time.

Rate of Gain. The net gain of acres of land per mile for a given period of time.

Shallow Water. The water between low tide level and the depth of 6 feet.

* War Dept., Engineering Manual for Civil Works, Part CXXXIII, April 1947, p. 3.

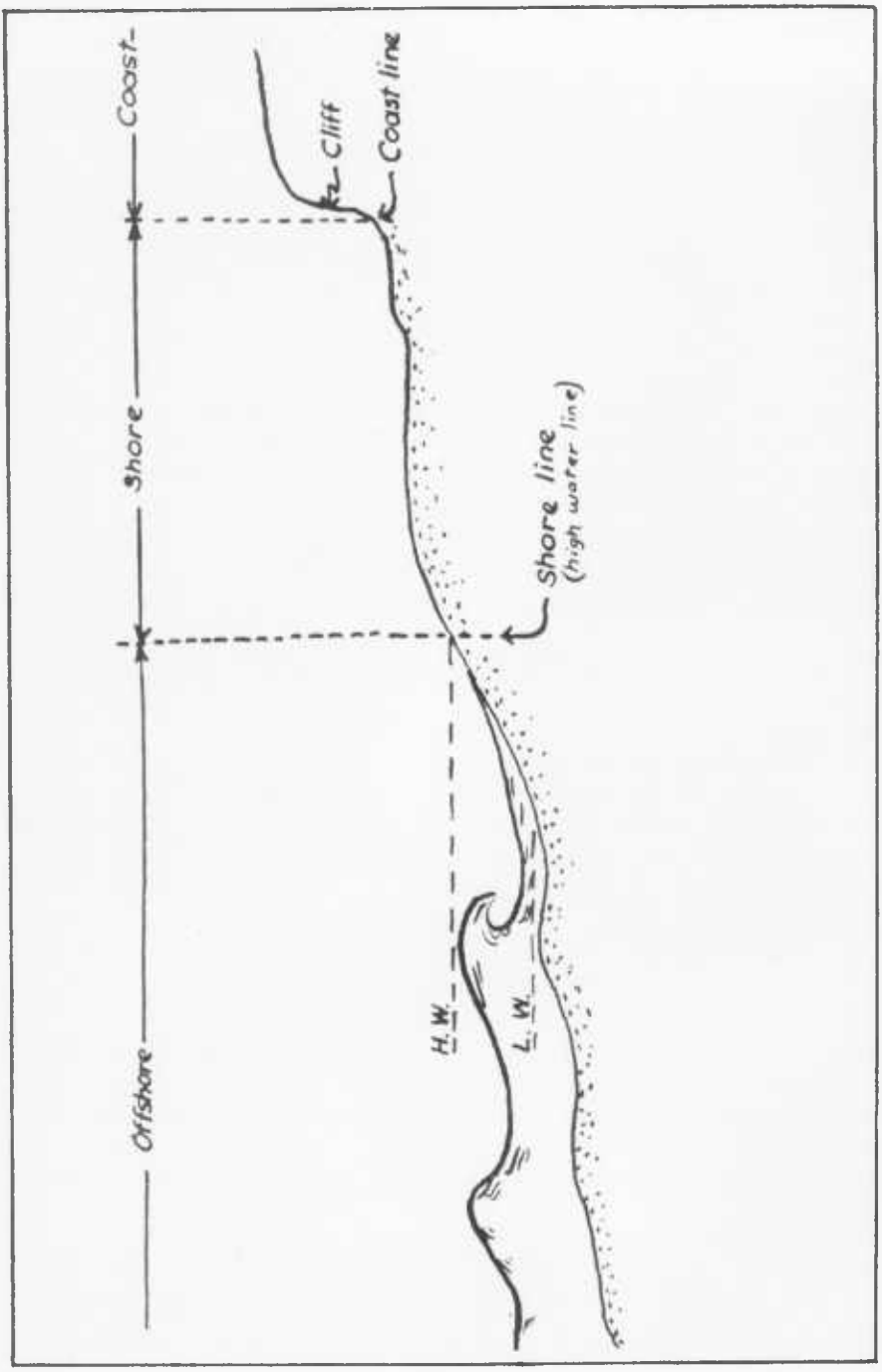

FIG. 5—*Illustration of Technical Terms.*

ANNE ARUNDEL COUNTY

The general topography landward of the Chesapeake Bay in Anne Arundel County ranges from low marsh to abrupt cliffs 20 ft. or more in height, the greatest proportion of which averages 5 to 10 ft. in height.

The Magothy, Severn and South rivers in general have steep cliffs landward of the shoreline. The cliffs rise to a maximum of 140 ft. along the Severn and South rivers. Landward of the Rhodes River the coast rises gently to a height of 40 ft. Landward of the West River the coast is flat and in a few localities marshy.

The geologic age and composition of the formations along the shores are:

Pleistocene—clay, peat, sand and gravel
Miocene —diatomaceous earth
Eocene —sand and clay
Cretaceous—sand and clay

DESCRIPTIONS OF AREAS IN ANNE ARUNDEL COUNTY

CHESAPEAKE BAY

Bodkin Point to Mountain Point (Plate 1)

Areas of greatest erosion:

1. Bodkin Point has receded 400 ft. southward. Between Bodkin Point and ¾ of a mile south maximum linear recession is 450 ft.
2. The Bay shore line of Gibson Island shows a maximum linear recession of 500 ft. at the central part of the island.
3. At the south end of Gibson Island there has been a linear recession of 400 ft. Mountain Point has migrated 800 ft. to the southwest.

Persimmon Point to Hackett Point (Plate 2)

Areas of greatest erosion:

1. Persimmon Point has receded 400 ft.
2. From the Little Magothy River to Sandy Point there has been a maximum linear recession of 500 ft. (Plate 30, fig. 1).
3. From South Mezick Pond to Hackett Point there has been a maximum linear recession of 400 ft. A thin strip of land that enclosed Moss Pond has been eroded into a number of small islands closer in shore. The bar that protected Goose Pond has disappeared. Its former maximum width was 200 ft. Hackett Point has receded 625 ft.

Areas of greatest deposition:

1. The point of the east shore entrance to the Little Magothy River has migrated 1100 ft. to the northwest.
2. Sandy Point has built out linearly 450 ft. to the southeast.

Hackett Point to Mill Creek

Area of greatest erosion:

This entire area is eroding. Sharps Point shows the maximum linear recession of 350 ft.

Areas of greatest deposition:

1. Sharps Point has migrated 500 ft. north and has built out linearly 180 ft. to the east.
2. 1800 ft. northwest of Hackett Point, a sharp point has built out linearly 400 ft. to the northwest.

Possum Point to Greenbury Point

Area of greatest erosion:

The entire length of this shore line is undergoing erosion. The greatest recession is at Greenbury Point which has receded 800 ft.

Area of greatest deposition:

Possum Point has built out linearly 750 ft. north.

Back Creek to 1400 ft. northwest of Marshy Point (Plate 3)

Areas of greatest erosion:

1. Chinks Point has migrated 500 ft. northwest. To the south of Chinks Point, for a distance of 1100 ft., the maximum linear recession is 300 ft.
2. Tolly Point shows a maximum recession of 450 ft.
3. From the south entrance of Oyster Creek to Marshy Point the greatest amount of erosion has occurred at Thomas Point, which has receded westward 2,000 ft. The entrance to Fishing Creek has increased from 0 ft. to 1800 ft. in width. Marshy Point has receded 300 ft.

Areas of greatest deposition:

1. At the entrance to Lake Ogleton, the west side has built out linearly 500 ft. northeast and the east side has built out 700 ft. northwest, overlapping the west side and almost closing the entrance.
2. Between Blackwalnut Creek and Oyster Creek, the shore has built out linearly a maximum of 250 ft.

Turkey Point to Dutchman Point

Areas of greatest erosion:

1. From 1500 ft. north of Saunders Point to Deep Pond, maximum linear recession is 600 ft. Saunders Point has receded 350 ft.
2. From Bream Pond to Dutchman Point, there has been a maximum linear recession of 220 ft. The eastern prong of Dutchman Point has receded 200 ft., the western prong, 100 ft.

Area of greatest deposition:

1. Turkey Point is 300 ft. northwest of its former position, having built out linearly 300 ft. to the north.

Curtis Point to Battees Point (Plate 4)

Areas of greatest erosion:

1. From Curtis Point to Horseshoe Point, the maximum linear recession has been 800 ft. Curtis Point has receded 550 ft. south, and Horseshoe Point 400 ft. northwest.
2. From Horseshoe Point to Franklin Point, there has been a maximum linear recession of 950 ft. Franklin Point has receded 150 ft.
3. From Franklin Point to Battees Point, the maximum linear recession is 850 ft. Battees Point has receded 100 ft.

Area of greatest deposition:

A hooked spit has built out linearly 1900 ft. to the northwest at the entrance to Jack Creek, reducing the entrance to a width of 150 ft. The former entrance was 1900 ft. wide.

Broadwater Creek to Cedar Point (Plate 4)

Areas of greatest erosion:

1. From Carrs Creek to Parker Creek, there has been a maximum linear recession of 700 ft.; however, the former neck of land known as Parker Island, which was the east shore of Parker Creek has receded 2600 ft.
2. From 3600 ft. northeast of Cedar Point to Cedar Point, the maximum linear recession is 380 ft. Cedar Point has receded 650 ft.

Areas of greatest deposition:

1. The east shore entrance of Carrs Creek has built out linearly 250 ft. northwest.
2. The west shore entrance of Parker Creek has built out 800 ft. southeast.

Rockhold Creek to the Anne Arundel-Calvert County line, south of Holland Point (Plate 5)

Areas of greatest deposition:

1. Between Rockhold Creek and the pond south of Fairhaven, there has been a maximum linear recession of 550 ft.
2. Between Red Lion Cove and the Anne Arundel-Calvert County line, there has been a maximum linear recession of 800 ft. Holland Point has receded 1000 ft.

Area of greatest deposition:

The entrance to Red Lion Cove was formerly 700 ft. wide. Now it is less than 20 ft. with the points 250 ft. wide.

PATAPSCO RIVER

Hawkins Point to Bodkin Point

Areas of greatest erosion:

1. Between Cox Creek and Stoney Creek the maximum linear recession is 450 ft.
2. Between Stoney Creek and Rock Creek the maximum linear recession is 350 ft. Stoney Point has receded 250 ft.
3. Between Rock Point and Old Landen Point the maximum linear recession is 300 ft. Rock Point has receded 400 ft. and Old Landen Point 300 ft.

MAGOTHY RIVER

North Shore

Areas of greatest erosion:

1. The west shore line of Gibson Island shows a maximum linear recession of 200 ft. at the central part of the island.
2. Rock Point has receded 200 ft., Chest Neck Point 200 ft., and North Ferry Point 100 ft.

Area of greatest deposition:

Mountain Point in 1942 had shifted 1100 ft. west and was 50 ft. farther south than in 1844; however, in 1933, it was 500 ft. farther south than its 1844 position.

South Shore

Areas of greatest erosion:

1. From Deep Creek to Ulmsteads Point, there is a maximum linear recession of 150 ft. Adams Point has receded 200 ft. Ulmsteads Point has receded 50 ft.

2. Maximum linear recession is 250 ft. in the vicinity of Wilsons Wharf.
3. Hendersons Point has receded 150 ft.

Areas of greatest deposition:

1. The north shore entrance to Deep Creek has built out linearly 200 ft. to the southeast.
2. Lesser areas are: 1000 ft. northwest of Adams Point, a maximum linear building out of 80 ft. to the northeast; 1400 ft. south of Ulmsteads Point, a maximum linear building out of 80 ft. to the northeast; and at the entrance to Forked Creek, the east shore has built out 100 ft. west and the west shore 200 ft. southeast.

SEVERN RIVER

Northeast Shore

Greenbury Point to Chase Creek

Areas of greatest erosion:

1. This shore line is deeply indented, so there are many small areas of erosion. A few examples are: the east shore entrance to Carr Creek shows a maximum linear recession of 200 ft.; north of the first inlet south of Chase Creek is a maximum linear recession of 150 ft.; and 1700 ft. south of Chase Creek is a maximum linear recession of 150 ft.

Chase Creek to 2250 ft. north of Cedar Point

Area of greatest erosion:

Between Arnold Point and Sullivan Cove, there is a maximum linear recession of 150 ft. Eaglenest Point has receded 100 ft.

Area of greatest deposition:

Between Swan Point and 3500 ft. to the northwest, maximum linear building out is 150 ft. Both Arnold and Swan Points have built out 50 ft. to the southeast.

Southwest Shore

Horn Point to Clements Creek

Areas of greatest erosion:

Due to the irregularity of the shore line, there are many small areas of erosion. The maximum linear recession is 100 ft. However, Horn Point has receded 350 ft. and Horseshoe Point, 600 ft.

Clements Creek to Herald Harbor

Area of greatest erosion:

At Little Round Bay, there has been a maximum linear recession of 200 ft. Long Point has receded 200 ft.

SOUTH RIVER

North Shore

Marshy Point to Church Creek

Areas of greatest erosion:

1. Between Marshy Point and Duvall Creek, maximum linear recession is 200 ft. A former curved spit at the entrance to Duvall Creek has receded 550 ft.
2. Between Duvall Creek and 1400 ft. north of Hill Point, the maximum linear recession is 250 ft. Hill Point has receded 200 ft.

3. Between Persimmon Point and Aberdeen Creek, the maximum linear recession is 230 ft. Persimmon Point has receded 200 ft.

Areas of greatest deposition:

1. 3500 ft. northwest of Marshy Point there has been a maximum linear building out of 350 ft. northwestward.
2. Between Crab Creek and Church Creek there has been a maximum linear building out of 300 ft. southward.

Church Creek to the head of South River

Areas of greatest erosion:

Boyd Point has receded 60 ft. and Porter Point has migrated 100 ft. southwesterly.

South Shore

Turkey Point to Larramore Point

Areas of greatest erosion:

1. Between Selby Bay and Brewer Point, the maximum linear recession is 250 ft. Mayo Point has receded 250 ft. and Brewer Point 150 ft.
2. Cedar Point area has receded a maximum of 130 ft.
3. Between Glebe Creek and Larramore Point, the maximum linear recession is 120 ft.

Larramore Point to head of South River

Areas of greatest erosion:

Between the two unnamed creeks upstream from Almshouse Creek, the maximum linear recession is 200 ft. Other areas of erosion are numerous but small.

Area of greatest deposition:

Between Larramore Point and Beards Creek, maximum building out is 140 ft., except for one small point which has built out 350 ft. southeastward.

RHODES RIVER

Dutchman Point on the east shore and Cheston Point on the west shore to Sellman Creek and Muddy Creek

The greatest erosion is from Cheston Point northward 1800 ft. with a maximum linear recession of 200 ft. Numerous small areas have suffered erosion on both the north and the south shores. Cheston Point has receded 180 ft.

The largest areas at deposition are between Dutchman Point and Cadle Creek. Immediately north of Dutchman Point there has been a maximum linear building out of 300 ft. northward. The other areas show a maximum linear building out of 200 ft. On the west shore, 3200 ft. north of Cheston Point, there has been a maximum linear building out of 140 ft.

WEST RIVER

Cheston Point on the north shore and Curtis Point on the south shore to Smith Creek and South Creek

Areas of greatest erosion:

1. Between Cheston Point and Tenthouse Creek, the maximum linear recession is 250 ft.
2. Between Cedar Point and Parish Creek, the maximum linear recession is 280 ft. Cedar Point has receded 100 ft. north and 100 ft. east.

3. Between Parish Creek and Curtis Point the maximum linear recession is 350 ft.
4. Chalk Point has receded 150 ft.

ISLANDS

Chesapeake Bay

Unnamed island northwest of Bodkin Point: only a small marshy remnant remains.
Three Sisters: formerly small, nonexistent today.
Unnamed islands recently formed in front of the entrance to Moss Pond, between Sandy Point and Hackett Point, are marshy remnants of the former protective strip of land.

Magothy River

Dobbins Island: no significant change.
Little Island: no significant change.

Severn River

St. Helena Island: no significant change.

Rhodes River

Big Island: no significant change.
Flat Island: east shore has receded a maximum of 250 ft.
High Island: southeast point of the island has receded 150 ft.

SUMMARY

In Anne Arundel County the area that shows the greatest net loss and has the highest rate of recession is that between Curtis Point and Battees Point. The area of next greatest net loss is between Rockhold Creek and the Anne Arundel-Calvert County boundary. The third area of great loss is between Persimmon and Hackett points. The lower third of the Bay shore has a greater amount and rate of loss than the upper two-thirds. The largest area of deposition is at Sandy Point.

The length of shore line of the rivers is more than twice that of the bay. The highest rate of loss of river shore is on the south shore of the Patapsco, a considerably wider river than the others. Though the length of the South River shores is 7.5 miles greater than that of Severn River, the net loss of both is almost equal. Hence, the rate of loss of Severn River shore is somewhat greater than that of South River. The smaller Rhodes and West Rivers have an approximately equal rate of loss.

The deeply-eroded and ragged shore line between Horseshoe Point and Battees Point illustrates the lack of resistance to erosion of a shore of clay and sand compared to a marshy shore.

There have been 1,931 acres of erosion and 295 acres of deposition in Anne Arundel County over the average time interval of 89 years, making the net loss to the County 1,636 acres. The Anne Arundel County measurements are summarized in Table 1.

TABLE 1.—*Shore Erosion Statistics of Anne Arundel County*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Chesapeake Bay							
Bodkin Pt. to Mountain Pt.	93	5.3	110	8	102	19.2	.2
Persimmon Pt. to Hackett Pt.	94	6.4	204	22	182	28.4	.3
Hackett Pt. to Mill Creek	94	2.9	42	4	38	13.1	.1
Possum Pt. to Greenbury Pt.	89	1.5	40	2	38	25.3	.3
Back Creek to 1400 ft. N.W. of Marshy Pt.	93	7.1	141	21	120	16.9	.2
Turkey Pt. to Dutchman Pt.	87	3.2	66	5	61	19.0	.2
Curtis Pt. to Battees Pt.	92	6.1	254	19	235	38.5	.4
Broadwater Cr. to Cedar Pt.	96	2.6	96	21	75	28.8	.3
Rockhold Creek to Anne Arundel-Calvert Co. line	88	5.2	202	12	190	36.5	.4
Totals	91	40.3	1,155	114	1,041	25.8	.3
Patapsco River							
Hawkins Pt. to Bodkin Pt.	91	9.9	146	20	126	12.7	.1
Magothy River							
North Shore	89	9.9	84	16	68	6.8	.07
South Shore	89	7.2	51	14	37	5.1	.05
Totals	89	17.1	135	30	105	6.1	.06
Severn River							
Greenbury Pt. to Chase Creek	90	4.6	22	12	10	2.1	.02
Chase Creek to 2250 ft. north of Cedar Pt.	90	6.7	48	11	37	5.5	.06
North Shore Totals	90	11.3	70	23	47	4.1	.04
Horn Pt. to Clements Creek	90	4.1	39	4	35	8.5	.09
Clements Creek to Herald Harbor	90	6.5	48	7	41	6.3	.07
South Shore Totals	90	10.6	87	11	76	7.1	.08
Totals	90	21.9	157	34	123	5.6	.06
South River							
Marshy Pt. to Church Creek	87	8.8	63	21	42	4.7	.05
Church Creek to head of River	87	5.0	22	10	12	2.4	.02
North Shore Totals	87	13.8	85	31	54	3.9	.04

TABLE 1.—*Continued*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
South River—Continued							
Turkey Pt. to Larramore Pt.	87	9.9	72	12	60	6.0	.07
Larramore Pt. to head of River	87	5.9	24	16	8	1.3	.01
South Shore Totals	87	15.8	96	28	68	4.3	.05
Totals	87	29.6	181	59	122	4.1	.05
Rhodes River—Totals	88	5.9	51	14	37	6.2	.07
West River—Totals	88	10.4	77	19	58	5.5	.06
River Totals	88	94.8	747	176	571	6.0	.06
Island Totals	89	3.0	29	5	24		
ANNE ARUNDEL COUNTY TOTALS	89	138.1	1,931	295	1,636	11.8	.1

BALTIMORE COUNTY

The general topography landward of the Chesapeake Bay is low and in many localities marshy. Landward of the shoreline along the Gunpowder, Middle and Back Rivers, the coast is low with scattered marshy areas. A few localities reach the 20 ft. contour level.

The geologic age and composition of the formations along the shores are:

Pleistocene—clay, peat, sand and gravel

Cretaceous—lignitic clay, sand, clay and gravel

DESCRIPTIONS OF AREAS IN BALTIMORE COUNTY

CHESAPEAKE BAY

Carroll Point to Brier Point

Areas of greatest erosion:

The area of Lower Island Point shows a maximum linear recession of 2150 ft. Carroll Point has receded 550 ft. and Brier Point 450 ft.

Area of greatest deposition:

Small areas on each side of the narrow neck of Lower Island Point have built out linearly a maximum of 200 ft.

Seneca Creek to Bowley Point

Maximum linear recession is 200 ft.

Maximum linear building out is 100 ft.

Cuckold Point to Shallow Creek (Plate 6)

The entire shore line on the Chesapeake Bay has undergone erosion with a maximum linear recession of 700 ft.

GUNPOWDER RIVER

Days Cove to Carroll Point, including the entrance to Bird River

Areas of greatest erosion:

1. The point of land on the east side of Days Cove has receded 1700 ft.
2. Between the Pennsylvania Railroad bridge and Cunningham Cove maximum linear recession is 300 ft.
3. Battery Point has receded 100 ft. and White Oak Point 70 ft.

Areas of deposition:

A few small areas in Cunningham Cove have built out a maximum of 150 ft.

MIDDLE RIVER

Bowley Point to Frog Mortar Creek on the north shore, and Booby Point to Turkey Point on the south shore

Areas of erosion:

Between Log Point and Frog Mortar Creek, maximum linear recession is 270 ft. Log Point has receded 130 ft., Turkey Point 150 ft., and Booby Point 200 ft.

BACK RIVER

North Shore

Booby Point to Witchcoat Point

Areas of greatest erosion:

1. Between Balliston Point and Rocky Point, maximum linear recession is 300 ft. Wells Point has remained stable. Balliston Point has receded 600 ft., Rocky Point 350 ft., Cedar Point 50 ft., and Witchcoat Point 300 ft.

Areas of greatest deposition:

1. Browns Creek shows a maximum building out of 250 ft.
2. Between Cedar Point and Claybank Point, there has been a maximum building out of 130 ft. Claybank Point has built out 50 ft. southeastward and Witchcoat Point 70 ft. southward.

Witchcoat Point to a half mile southeast of Northeast Creek

Between Witchcoat Point and Muddy Gut, maximum linear recession is 250 ft. Walnut Point has built out 150 ft. southwestward and Cox Point 150 ft. southward.

South Shore

Cuckold Point to Stansbury Point

Areas of greatest erosion:

From Cuckold Point for a distance of 6500 ft., maximum linear recession is 300 ft. Cuckold Point shows a recession of 300 ft. and Lynch Point 100 ft.

Stansbury Point to 3000 ft. above Cheese Creek

Maximum linear recession is 150 ft.
Maximum linear building out is 150 ft.

PATAPSCO RIVER

North Shore

The north shore was not measured because the greater portion of it has been changed by harbor and industrial construction.

South Shore

Curtis Creek to Hawkins Point

Hawkins Point shows a recession of 300 ft., Leading Point 250 ft. and the remaining shore line 200 ft.
Thoms Cove shows a maximum linear building out of 230 ft.

DUNDEE AND SALTPETER CREEKS

On the north and south shores, east of a north-south line through Bengies Point, maximum linear recession is 450 ft. Bengies Point has receded 150 ft.

SENECA CREEK

On the north shore, there has been a maximum linear recession of 300 ft.
5000 ft. north of Brier Point, there has been a maximum linear building out of 400 ft.

HART ISLAND (Plate 6 and Fig 2.)

Hart Island is at the mouth of Back River. The west shore is on Back River and the east shore is on the Chesapeake Bay. The island is half low land and half marsh.
Areas of greatest erosion:

Back River—The upper half of the shore line shows a maximum linear recession of 500 ft., and the lower half 300 ft. The north end of the island has receded 400 ft., and the south end 450 ft.

Chesapeake Bay—The upper half of the shore line shows a maximum linear recession of 450 ft. and the lower half 300 ft. The minimum width of the lower half of the island, formerly 450 ft., is now less than 50 ft. Drum Point has receded 200 ft.

MILLER ISLAND (Plate 6)

Miller Island lies northeast of Hart Island. The west shore is on Back River and the east shore on the Chesapeake Bay. The entire island is marshy.
Areas of greatest erosion:

Chesapeake Bay—Maximum linear recession is 800 ft.

Back River—Maximum linear recession is 200 ft. The north end of the island has receded 750 ft. and the south end 850 ft.

SUE ISLAND

No significant change.

SUMMARY

In Baltimore County the area that shows the greatest erosion is the mainland between Hart Island and Shallow Creek. The area of next highest rate of loss is between Carroll Point and Brier Point.

Along the river shores the south shore of Back River, between Cuckold Point and west of Witchcoat Point, has the greatest rate of loss. However, Middle River shows the greatest average rate of loss.

Miller Island has lost the greatest percentage of its area and has the highest rate of recession of the islands.

There have been 893 acres of erosion and 82 acres of deposition in Baltimore County over the average time interval of 89 years, resulting in a net loss to the County of 811 acres. The Baltimore County measurements are summarized in Table 2.

CALVERT COUNTY

The general topography landward of the Chesapeake Bay is high with cliffs reaching a height of over 100 ft. The Patuxent River coast is gently sloping with some localities reaching the 20 ft. contour level near the shore line.

The geologic age and composition of formations along the Chesapeake Bay and Patuxent River are:

Pleistocene—clay, peat, sand and gravel
Miocene —sandy clay and diatomaceous earth

DESCRIPTIONS OF AREAS IN CALVERT COUNTY

CHESAPEAKE BAY

Anne Arundel-Calvert County boundary to 2300 ft. north of Plum Point

Areas of greatest erosion:

1. Between the Anne Arundel-Calvert County boundary and 2700 ft. south of Chesapeake Beach, there is a maximum linear recession of 800 ft. The maximum is at the County boundary. North Beach shows a maximum linear recession of 400 ft. Chesapeake Beach shows a maximum linear recession of 200 ft.
2. 3900 ft. south of Chesapeake Beach inlet to 4000 ft. north of Plum Point, there is a maximum linear recession of 270 ft.

Area of greatest deposition:

From 2800 ft. north of Plum Point for a distance of 1300 ft. north, there is a maximum building out of 100 ft.

From 2300 ft. north of Plum Point to Parker Creek (Plate 7)

Areas of greatest erosion:

1. From 3800 ft. south of Plum Point to 1500 ft. north of Parker Creek is a maximum linear recession of 480 ft.
2. Plum Point has receded a maximum of 500 ft.

TABLE 2.—*Shore Erosion Statistics of Baltimore County*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Chesapeake Bay							
Carroll Pt. to Brier Pt.	91	4.8	85	10	75	15.6	.17
Seneca Creek to Bowley Pt.	91	1.6	13	4	9	5.6	.06
Cuckold Point to Shallow Creek	88	2.9	80	0	80	27.5	.31
Totals	90	9.3	178	14	164	17.6	.19
Patapsco River							
Curtis Creek to Hawkins Pt.	88	3.7	25	6	19	5.1	.05
Gunpowder River							
Days Cove to Carroll Pt. including entrance to Bird River	93	9.6	103	13	90	9.3	.10
Middle River							
Bowley Pt. to Frog Mortar Creek on north shore and Booby Pt. to Turkey Pt. on south shore	91	5.2	65	3	62	11.9	.13
Back River							
Booby Pt. to Witchcoat Pt.	87	6.9	65	12	53	7.6	.08
Witchcoat Pt. to half mile southeast of Northeast Creek	87	4.8	47	2	45	9.3	.10
North Shore Totals	87	11.7	112	14	98	8.3	.09
Cuckold Point to Stansbury Pt.	87	4.5	61	0	61	13.5	.15
Stansbury Pt. to 3000 ft. above Cheese Creek	87	4.1	24	5	19	4.6	.05
South Shore Totals	87	8.6	85	5	80	9.3	.10
Back River Totals	87	20.3	197	19	178	8.7	.10
Dundee and Saltpeter Creeks	93	8.2	93	14	79	9.6	.10
Seneca Creek	91	3.6	37	11	26	7.2	.07
Rivers and Creeks Totals	90	50.6	520	66	454	8.9	.09

TABLE 2.—*Continued*

	Time Interval	Miles Measured	Former Area	Present Area	Loss	Erosion	Deposition	Net Loss	Total Area Lost	Annual Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*	*acres*	*percent*	*acres*
Islands										
Hart	87	4.7	264	150	114	114	1	113	42	1.2
Miller	87	1.8	124	52	72	72	0	72	58	.8
Sue	91	.7				9	1	8		
Island Totals	88	7.2				195	2	193		
									Rate of Loss	Annual Rate of Loss
									acres	*acres*
BALTIMORE COUNTY TOTALS	89	67.1				893	82	811	12.0	.13

Area of deposition:

From 1900 ft. south of Plum Point for a distance of 2000 ft. south, there is a maximum linear building out of 130 ft.

Parker Creek to 2300 ft. south of Flag Ponds (Plate 8)

Areas of greatest erosion:

1. From Parker Creek for a distance of 4700 ft. south, there is a maximum linear recession of 250 ft.
2. Kenwood Beach area has receded linearly a maximum of 150 ft.
3. From 6000 ft. south of Kenwood Beach to the Flag Ponds, there is a maximum linear recession of 450 ft. The maximum is at Long Beach. Calvert Beach shows a maximum linear recession of 320 ft.

Areas of greatest deposition:

1. From 4200 ft. south of Parker Creek for a distance of 6700 ft. south, maximum building out is 150 ft.
2. From the Flag Ponds southward there has been a building out for a distance of 2000 ft. with a maximum width of 860 ft.

From 2300 ft. south of Flag Ponds to Cove Point (Plate 9)

Areas of greatest erosion:

1. From 5300 ft. south of the Flag Ponds to 1700 ft. north of Point of Rocks, maximum linear recession is 200 ft.
2. From Point of Rocks to Cove Point, maximum linear recession is 850 ft. Cove Point has receded 250 ft.

Areas of deposition:

There are three small areas with a maximum building out of 100 ft.

Cove Point to Drum Point (Plate 10)

Areas of greatest erosion:

1. From Little Cove Point for a distance of 3700 ft. northward, maximum linear recession is 500 ft.
2. From Little Cove Point to 2300 ft. northeast of Drum Point, maximum linear recession is 250 ft.

Areas of greatest deposition:

1. From Cove Point for a distance of 5000 ft. south, there is a maximum linear building out of 500 ft.
2. Little Cove Point has built out 60 ft.
3. From 2300 ft. northeast of Drum Point to 1500 ft. northwest of the Point, the shore line has been built out. The maximum is 400 ft. at Drum Point itself.

PATUXENT RIVER

Drum Point to St. Leonards Creek

Areas of greatest erosion:

From 4000 ft. south of Hungerford Creek to St. Leonards Creek, maximum linear recession is 250 ft. Point Patience has receded 320 ft. and the point on the north side of the entrance to Hellen Creek has receded 1100 ft.

Areas of deposition:

Immediately east of Second Cove a small area has built out linearly 230 ft. The west shore of Point Patience has built out 50 ft. and the point at the entrance to Hellen Creek 500 ft.

Petersons Point to Wells Cove

Areas of greatest erosion:

1. From Petersons Point to Island Creek, maximum linear recession is 300 ft. Peterson Point has receded 600 ft.
2. The west shore of Broomes Island shows a maximum linear recession of 150 ft.
3. From Broomes Island to Jack Bay, maximum linear recession is 300 ft.

Areas of greatest deposition:

1. The cove northwest of Peterson Point has built out linearly a maximum of 250 ft.
2. The east shore of Broomes Island Neck has built out linearly a maximum of 150 ft.
3. Wells Cove entrance has almost been closed by a point that has built out 300 ft. northeastward.

Battle Creek to Buzzard Island Creek

Between Prison Point and 1300 ft. northwest of Kitt Marsh, there is a maximum linear recession of 150 ft. Prison Point has receded 100 ft., and Kitt Marsh 70 ft.

Sheridan Point has built out 50 ft.

Buzzard Island Creek to Hunting Creek

Buzzard Island, which was formerly a part of the mainland, has become two islands. Sandy Point has receded 500 ft.

Hallowing Point has built out 270 ft., and Gods Grace Point 200 ft.

Hunting Creek to Cocktown Creek

Potts Point has receded 100 ft.

Deep Landing has built out 70 ft. and Holland Cliff 150 ft.

Cocktown Creek to Jones Point

Areas of erosion are small and scattered.
Maximum linear building out is 450 ft.

ST. LEONARDS CREEK

Most of the erosion has been on the east shore, with a maximum linear recession of 100 ft. Rodney Point has receded 100 ft.
Areas of deposition are small and scattered.

SOLOMONS ISLAND

Solomons Island is near the mouth of the Patuxent River, about 1½ miles west of Drum Point. The north shore of the island is on Back Creek; the east and west shores are on the Patuxent River.
The interior of the island reaches a height of 10 ft. Toward the shore the land is low.
For a distance of 1300 feet northeast of Sandy Point there is a maximum linear recession of 170 ft. Sandy Point has receded 150 ft. The whole of Solomon's Island shore was not measured due to man-made alterations.

SUMMARY

The rate of loss increases gradually southward from the Anne Arundel-Calvert County boundary to Parker Creek. From Parker Creek to the Flag Ponds erosion decreases and deposition increases. South of the Flag Ponds to Cove Point erosion is at a maximum rate. Here is the greatest rate of linear recession along the Chesapeake Bay shores.

The rate of loss along the Patuxent River decreases gradually from Drum Point to Buzzard Island Creek. From Buzzard Island Creek to Hunting Creek, there is a balance between erosion and deposition. Northward from Hunting Creek, the rate of deposition increases. The accretions are marsh areas.

On Solomons Island the greatest rate of erosion and linear recession is along the east shore.

There have been 893 acres of erosion and 232 acres of deposition in Calvert County over the average time interval of 90 years, resulting in a net loss to the County of 661 acres. The Calvert County measurements are summarized in Table 3.

CAROLINE COUNTY

The general topography landward of the Choptank River shore is marsh.

The geologic age and composition of the formations along the Choptank River are:

Pleistocene—clay, peat, sand and gravel

DESCRIPTIONS OF AREAS IN CAROLINE COUNTY

CHOPTANK RIVER

Hunting Creek to 2½ miles northwest of Skeleton Creek

Areas of greatest erosion:

TABLE 3.—*Shore Erosion Statistics of Calvert County*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Chesapeake Bay							
From Anne Arundel-Calvert County boundary to 2300 ft. north of Plum Pt.	98	6.0	107	8	99	16.5	.16
From 2300 ft. north of Plum Pt. to Parker Creek	97	6.3	169	4	165	26.1	.26
Parker Creek to 2300 ft. south of Flag Ponds	97	7.1	110	36	74	10.4	.10
2300 ft. south of Flag Ponds to Cove Pt.	96	6.2	185	4	181	29.2	.30
Cove Pt. to Drum Pt.	95	5.7	74	63	11	1.9	.02
Totals	96	31.3	645	115	530	16.9	.17
Patuxent River							
Drum Pt. to St. Leonards Creek	91	7.8	64	9	55	7.0	.07
Petersons Pt. to Wells Cove	85	13	104	22	82	6.3	.07
Battle Creek to Buzzard Island Creek	82	5.6	29	6	23	4.1	.05
Buzzard Island Creek to Hunting Creek	83	6.3	14	13	1	0	0
Hunting Creek to Cocktown Creek	83	6.0	9	17	8*	1.3*	.01*
Cocktown Creek to Jones Pt.	83	6.4	14	49	35*	5.4*	.06*
Totals	84	33.4	234	116	118	3.5	.04
St. Leonards Creek	94	2.3	11	1	10	4.3	.04
River and Creek Totals	85	35.7	245	117	128	3.5	.04

Locality	Time Interval	Miles Measured	Former Area	Present Area	Net Loss	% Total Area Lost
	years		*acres*	*acres*	*acres*	
Islands						
Solomons	94	1.7	46	43	3	6.5

	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rates of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
CALVERT COUNTY TOTALS	90	68.7	893	232	661	9.6	.10

* Gain.

1. Between Marsh Creek and Skeleton Creek, there is a maximum linear recession of 300 ft.
2. From the sharp point west of Skeleton Creek for a distance of 11,000 feet upstream, there is a maximum linear recession of 280 ft.

Vicinity of Dover bridge

From 5600 ft. downstream from Dover bridge to 3500 ft. upstream is a maximum linear recession of 250 ft.

SUMMARY

There have been 128 acres of erosion and 3 acres of deposition in Caroline County over the average time interval of 93 years, making the net loss to the County 125 acres. The Caroline County measurements are summarized in Table 4.

TABLE 4.—*Shore Erosion Statistics of Caroline County*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Choptank River							
Hunting Creek to 2½ miles N.W. of Skeleton Creek	93	6.8	70	2	68	10.0	1.0
Vicinity of Dover bridge	93	6.3	58	1	57	9.0	.09
CAROLINE COUNTY TOTALS	93	13.1	128	3	125	9.5	1.0

CECIL COUNTY

The general topography landward of the Chesapeake Bay and the Northeast, Elk and Bohemia Rivers is high with cliffs ranging from 20 ft. to over 200 ft. in height. The highest are between Red Point and Turkey Point on the west shore of Elk Neck. There are marshy areas between Reybold Wharf and Grove Point and along the north shore of the Sassafras River.

The geologic age and composition of the formations along the shores are:

Pleistocene—clay, peat, sand and gravel

Cretaceous—sand and gravel

DESCRIPTIONS OF AREAS IN CECIL COUNTY

CHESAPEAKE BAY

Perryville to Carpenter Point

Areas of erosion are small and scattered. Maximum linear recession is 150 ft. High Point has receded 150 ft. and Locust Point, 80 ft.

Areas of deposition are small and scattered. Maximum linear building out is 120 ft.

Red Point to Turkey Point

Areas of greatest erosion:

1. From Red Point to one mile south, there has been a maximum linear recession of 300 ft. Red Point has receded 120 ft.
2. From 1600 ft. south of Rocky Point for a distance of 7000 ft. south, there has been a maximum linear recession of 400 ft. Rocky Point has receded 100 ft. and Turkey Point 150 ft.

Areas of deposition:

Maximum linear building out of small areas is 100 ft.

Wroths Point to Grove Point

Areas of greatest erosion:

1. Between Wroths Point and Pond Creek, maximum linear recession is 400 ft.
2. Between Pond Creek and Grove Point, maximum linear recession is 350 ft. Wroths Point has receded 70 ft. and Grove Point 320 ft.

Area of greatest deposition:

The entrance of Pond Creek has built out 200 ft.

NORTHEAST RIVER

Carpenter Point on the west shore and Red Point on the east shore to within a mile of Northeast

West shore—from 2000 ft. southwest of Seneca Point to the large marshy inlet northeast of Charleston, there has been a maximum linear recession of 500 ft. Seneca Point has receded 100 ft.

East shore—the entire shore has undergone erosion with a maximum linear recession of 270 ft.

ELK RIVER

Northwest Shore

Turkey Point to half a mile southwest of Hylands Point

This shore line is very jagged so there are many small areas of erosion. Maximum linear recession is 300 ft. Thackery Point has receded 100 ft.

A maximum linear building out of 600 ft. is at 3500 ft. northeast of Turkey Point. Other areas are small and scattered.

Half a mile southwest of Hylands Point to Bull Minnow Point

The entire shore line has undergone erosion, with a maximum linear recession of 250 ft. Hylands Point has receded 200 ft., Oldfield Point 500 ft., and Bull Minnow Point 100 ft.

From the cove north of Bull Minnow Point to Plum Point

For a distance of one mile south of Ford Cove, there has been a maximum linear building out of 250 ft. Plum Point has built out 120 ft.

Southeast Shore

Wroths Point to Veazey Cove

Areas of greatest erosion:

1. Between Crystal Beach and Arnold Point, maximum linear recession is 200 ft.

2. Between Ford Landing and Veazey Cove, maximum linear recession is 250 ft.

Areas of deposition:

Between Cabin John Creek and Ford Landing, maximum linear building out is 100 ft. The area of Reybold Wharf has built out a maximum of 250 ft. Arnold Point has built out 50 ft.

Town Point to Back Creek

Areas of greatest erosion:

1. Between Town Point wharf and the cove south of Courthouse Point, maximum linear recession is 180 ft. Town Point has remained stable.
2. Between Courthouse Point and Back Creek, maximum linear recession is 200 ft. Courthouse Point has remained stable.

Area of deposition:

Immediately south of Town Point wharf, there has been a maximum linear building out of 150 ft.

Back Creek to Locust Point

Areas of erosion:

Between Little Welch Point and Henderson Point are a number of small areas which show a maximum linear recession of 180 ft. The northwest end of Welch Point has receded 100 ft., Little Welch Point 70 ft., Henderson Point 100 ft., and Locust Point 100 ft.

Areas of deposition:

1. Between Welch and Little Welch points, there has been a maximum linear building out of 800 ft. of marsh.
2. For a distance of 3000 ft. south of Locust Point, there has been a maximum linear building out of 200 ft.

BOHEMIA RIVER

Town Point to Manor Creek

Between 2000 ft. east of Rich Point and Pooles Creek, maximum linear recession is 270 ft. Between Pooles Creek and Manor Creek, maximum linear recession is 100 ft. Stony Point has receded 70 ft., Parlor Point 120 ft., and Rich Point 50 ft.

Veazy Cove to Little Hack Point

The east shore of Veazey Cove has receded a maximum of 1000 ft. and the west shore a maximum of 150 ft. Between Battery Point and the marsh to the east, maximum linear recession is 120 ft. Battery Point has receded 70 ft. Between Old Hack Point and Little Hack Point, a low marsh area has receded a maximum of 300 ft.

Areas of deposition are small and scattered. Long Point has built out 50 ft. and Old Hack Point 100 ft.

SASSAFRAS RIVER

Grove Point to Cassidy Wharf

Areas of greatest erosion:

1. From the marsh inlet east of Grove Point to Ordinary Point, there has been a maximum linear recession of 250 ft. Ordinary Point has receded 100 ft.
2. Between Money Creek and Cassidy Wharf, maximum linear recession is 300 ft.

Area of deposition:

A spit at the entrance to the marsh inlet east of Grove Point has built out 1400 ft. eastward parallel to the shore.

Back Creek to Hall Creek

Knight Island shows a maximum linear recession of 270 ft. on the north shore, 150 ft. on the west shore, and 400 ft. on the south shore. Other areas are small and scattered.

Areas of deposition are small and scattered. A small area on the north shore of Knight Island has built out linearly a maximum of 300 ft.

FURNACE CREEK

Areas of deposition are more numerous and larger than areas of erosion. Stump Point has remained stable. Shadow Hall Point has receded 50 ft. Maximum linear building out is 200 ft. on the west shore and 150 ft. on the east shore.

SUMMARY

In Cecil County the Chesapeake Bay shore that shows the greatest net loss and the highest rate of loss is between Wroths Point and Grove Point. The second greatest net loss and highest rate of loss is between Red Point and Turkey Point on Elk Neck. These areas also show the greatest maximum linear recession on the Bay shore.

Northeast River has the highest rate of loss on the river shores. Though the measured length of the north shore of the Elk River is considerably less than that of the south shore, the north shore shows a greater net loss. The rate of loss on the north shore of the Sassafras River decreases eastward.

There have been 843 acres of erosion and 163 acres of deposition in Cecil County over the average time interval of 94 years, making the net loss to the County 680 acres. The Cecil County measurements are summarized in Table 5.

CHARLES COUNTY

The general topography landward of the Potomac River from Marshall Hall to Benny Gray Point ranges in height from less than 20 ft. to 60 ft. in a few localities. Cedar Point Neck is low and marshy. From Chapel Point to two miles south of Popes Creek, the coast rises to cliffs of 100 ft. Cobb Neck is low with scattered areas of marsh.

Landward of the Wicomico River the coast is low with a few marshy areas. Landward of the Patuxent River the coast is low and marshy.

The geologic age and composition of the formations along the shores are:

Pleistocene—clay, peat, sand and gravel
Miocene —clay and sand
Cretaceous—sands and clay

DESCRIPTIONS OF AREAS IN CHARLES COUNTY

POTOMAC RIVER

Prince Georges-Charles County boundary to Pomonkey Point

The entire shore line has undergone erosion with a maximum linear recession of 180 ft. In the small cove immediately south of the County line there has been a maximum linear

TABLE 5.—*Shore Erosion Statistics of Cecil County*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Chesapeake Bay							
Perryville to Carpenter Pt.	94	4.1	32	4	28	6.8	.07
Red Pt. to Turkey Pt.	93	6.4	75	6	69	10.7	.11
Wroths Pt. to Grove Pt.	96	5.1	102	4	98	19.2	.20
Totals	94	15.6	209	14	195	12.5	.13
Northeast River							
Carpenter Pt. on West shore and Red Pt. on east shore to 1 mile south of Northeast	93	11.2	200	2	198	17.6	.19
Elk River—Northwest Shore							
Turkey Pt. to ½ mile southwest of Hylands Pt.	93	6.8	66	19	47	6.9	.07
½ mile southwest of Hylands Pt. to Bull Minnow Pt.	93	4.1	62	1	61	14.8	.15
Bull Minnow Pt. to Plum Pt.	95	3.7	8	17	9*	2.4*	.02*
Northwest Shore Totals	94	14.6	136	37	99	6.7	.07
Elk River—Southeast Shore							
Wroths Pt. to Veazey Cove	93	6.0	47	13	34	5.6	.06
Town Pt. to Back Creek	93	5.6	37	12	25	4.4	.04
Back Creek to Locust Pt.	95	4.4	19	40	21*	4.7*	.04*
Southeast Shore Totals	94	16.0	103	65	38	2.3	.02
Elk River Totals	94	30.6	239	102	137	4.4	.04
Bohemia River							
Town Pt. to Manor Creek and Veazey Cove to Little Hack Pt.	93	7.4	82	7	75	10.1	.10
Sassafras River							
Grove Pt. to Cassidy Wharf	98	5.6	60	10	50	9.4	.09
Back Creek to Hall Creek	92	4.5	39	12	27	6.0	.06
Sassafras River Totals	95	10.1	99	22	77	7.6	.08
Furnace Creek							
From Stump Pt. on West, Shadow Hall Pt. on East upstream to marshy head of River	93	2.6	12	16	4.0*	1.5*	.01*
River and Creek Totals	94	61.9	632	149	483	7.8	.08
Islands	92		2	8		6*	.06*
CECIL COUNTY TOTALS	94	77.5	843	171	672	8.7	.09

* Gain.

building out of 200 ft. and the north shore entrance of Pomonkey Creek has built out a maximum of 180 ft. Pomonkey Point has built out 50 ft.

Pomonkey Creek to Deep Point

Areas of greatest erosion:

1. Between Pomonkey Creek and Chapman Point, there has been a maximum linear recession of 120 ft.
2. From 9200 ft. south of Indian Head to Deep Point, there has been a maximum linear recession of 120 ft.

Mattawoman Creek to Goose Bay

Between Mattawoman Creek and Chicamuxen Creek, there has been a maximum linear recession of 100 ft.

Small areas at the north shore entrances of Chicamuxen Creek and Goose Bay have built out linearly a maximum of 200 ft.

Goose Bay to Smith Point

There has been little change in this area.

Smith Point to Riverside

The maximum linear recession in this entire area is 120 ft.

Areas of deposition are small and scattered.

Riverside to Windmill Point

There are numerous small areas of erosion in which the maximum linear recession is 180 ft. Upper Cedar Point has receded 100 ft. and Windmill Point 50 ft.

Between Upper Cedar Point and Windmill Point there has been a maximum building out of 250 ft.

Windmill Point to a mile and three-fourths south of Popes Creek

No areas of much erosion. Maximum linear recession is 80 ft.

Areas of deposition are small and scattered with a maximum building out of 150 ft.

From 3000 ft. north of the Potomac River Bridge to Neal Sound

Areas of greatest erosion:

1. Between Bachelors Hope Point and Swan Point, the maximum linear recession is 200 ft. Lower Cedar Point has receded 100 ft. and Swan Point 150 ft.
2. Between Swan Point and Neal Sound, the maximum linear recession is 100 ft.

Areas of deposition:

1. In the immediate vicinity of the Potomac River Bridge, there has been a maximum building out of 150 ft.
2. Between Swan Point and Neal Sound are numerous small areas with a maximum linear building out of 120 ft.

PORT TOBACCO RIVER

There has been little erosion except between Windmill Point and Goose Bay where the maximum linear recession is 250 ft.

Maximum building out along the west shore is 120 ft. and along the east shore 300 ft. Deposition has exceeded erosion along the Port Tobacco River shores.

WICOMICO RIVER

Neal Sound to Dolly Boarman Creek

Between Charleston Creek and Hatton Creek maximum linear recession is 200 ft. Rock Point has migrated 100 ft. south. Windmill Point shows no change. There are numerous small areas of erosion along this shore.

Between Windmill Point and Dolly Boarman Creek there has been a maximum linear building out of 150 ft.

Dolly Boarman Creek to the Charles-St. Marys County line

Areas of greatest erosion:

1. Between Persimmon Point and McReynolds Point, there has been a maximum linear recession of 120 ft.
2. Between Newport Marsh and the Charles-St. Marys County line, there has been a maximum linear recession of 120 ft.

Areas of deposition:

The areas are small and scattered with a maximum building out of 100 ft.

PATUXENT RIVER

For a distance of 4500 ft. north of Indian Creek, maximum linear recession is 150 ft. Old Town Point has migrated 150 ft. south and Teague Point, 100 ft. south.

COBB ISLAND

Cobb Island is on the west side of the mouth of the Wicomico River. Its north shore borders Neal Sound, its east shore the Wicomico River, and its west shore the Potomac River The island is low with bluffs not over 8 ft. high.

Areas of erosion:

North shore—areas are small due to ragged shore line.

East shore—none.

West shore—from Cobb Point to the western entrance of Neal Sound, there is a maximum linear recession of 300 ft. The north tip of the island has receded 400 ft. and Cobb Point has built out 80 ft.

SUMMARY

The rate of loss along the Potomac River gradually decreases downstream from the Charles-Prince Georges County boundary to the vicinity of Riverside. Between Riverside and Windmill Point, erosion and deposition are equal. From Port Tobacco River to one and three-quarters miles south of Popes Creek, deposition is greater than erosion. Downstream from that area erosion exceeds deposition.

The west shore of the Wicomico River shows a uniform rate of loss.

Erosion on Cobb Island has occurred along the Potomac River shore. This area also shows the highest maximum linear recession in Charles County.

There have been 415 acres of erosion and 199 acres of deposition in Charles County over the average time interval of 61 years, making the net loss to the County 216 acres. The Charles County measurements are summarized in Table 6.

TABLE 6.—*Shore Erosion Statistics of Charles County*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Potomac River							
Prince Georges-Charles County Boundary to Pomonkey Pt.	77	5.5	41	6	35	6.3	.08
Pomonkey Creek to Deep Pt.	76	8.6	48	2	46	5.3	.06
Mattawoman Creek to Goose Bay	76	4.1	21	2	19	4.6	.06
Goose Bay to Smith Pt.	42	7.7	29	5	24	3.1	.07
Smith Pt. to Riverside	41	9.1	33	8	25	2.7	.06
Riverside to Windmill Pt.	40	8.8	26	26	0	0	0
Windmill Pt. to 1¾ miles south of Popes Creek	40	5.5	5	18	13*	2.3*	.05*
3000 ft. north of Potomac River bridge to Neal Sound	81	10.2	42	19	23	2.2	.02
Potomac River Totals	59	59.5	245	86	159	2.6	.04
Port Tobacco River	40	9.6	22	93	71*	7.3*	.18*
Wicomico River							
Neal Sound to Dolly Boarman Creek	75	5.8	30	9	21	3.6	.04
Dolly Boarman Creek to Charles-St. Marys County line	75	8.6	35	2	33	3.8	.05
Smaller River Totals	75	14.4	65	11	54	3.7	.04
Patuxent River	83	4.8	29	3	26	5.4	.06
River Totals	61	88.3	361	193	168	1.9	.03

	Time Interval	Miles Measured	Former Area	Present Area	Loss	Erosion	Deposition	Net Loss	% Total Area Lost	Annual Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*	*acres*		*acres*
Islands										
Cobb	75	4.0	385	335	50	54	5	49	13.0	.65
									Rate of Loss	Annual Rate of Loss
									acres	*acres*
CHARLES COUNTY TOTALS	62	92.3				415	198	217	2.3	.03

* Gain.

DORCHESTER COUNTY

The general topography of the upper part of Dorchester County landward of the Chesapeake Bay is low with bluffs less than 10 ft. high and marsh in some localities. The remainder of the county is marsh with scattered ares of low land. The bluffs reaching a height of 10 ft. or more are along the south shore of the Choptank River upstream from Horn Point.

The geologic age and composition of the formations along the shores are:

Recent —Swamp and sand dunes, mostly southern half of the county

Pleistocene—Clay, peat, sand, and gravel, mostly northern half of the county

DESCRIPTIONS OF AREAS IN DORCHESTER COUNTY

CHESAPEAKE BAY

Cook Point to Covey Creek (Plate 11)

Areas of greatest erosion:

1. Cook Point area shows maximum linear recession of 1650 ft.
2. Between Cook Point and Covey Creek, maximum linear recession is 650 ft.

Area of deposition:

1. At the entrance to Covey Creek, a marshy area has built out linearly a maximum of 650 ft.

Covey Creek to Mills Point including Brannock and Trippe Bays (Plate 11)

The central portion of Brannock Bay shore shows a maximum linear recession of 500 ft. Areas of deposition are small and scattered.

Mills Point to Ragged Point (Plate 11)

Areas of greatest erosion:

1. Between Mills Point and Hills Point, maximum linear recession is 1850 ft., the maximum being immediately north of Hills Point. Mills Point has receded 500 ft. Hills Point has broken into several islands separated from the mainland by 1850 ft.
2. Between Hills Point Cove and Ragged Point, maximum linear recession is 950 ft. Ragged Point has receded 550 ft. Rioll Cove now separates Ragged Island from the mainland. The Island was formerly connected with the mainland by a strip of marsh with a minimum width of 400 ft. A point 2500 feet long west of Ragged Point has been completely washed away.

Areas of greatest deposition:

1. East of Mills Point a marsh area has built out a maximum of 550 ft.
2. The larger island remnant of Hills Point has built out eastward a maximum of 1150 ft.

Oyster Cove to the Big Broads (Plates 12, 13)

Areas of greatest erosion:

1. Between the tip of the west shore of Oyster Cove and the marsh area 5500 ft. south, the maximum linear recession has been 1800 ft.
2. Between the marsh and Punch Island Creek, maximum linear recession is 1400 ft.
3. Between Punch Island Creek and the Big Broads, maximum linear recession is 2200 ft.

CHOPTANK RIVER

Cook Point to Todd Point (Plate 11)

Areas of greatest erosion:

1. Between Cook Point and Cook Point Cove, maximum linear recession is 550 ft.
2. The east shore entrance of Cook Point Cove shows a maximum linear recession of 550 ft.
3. For one mile west of Todd Point maximum linear recession is 1650 ft. Todd Point has receded 1400 ft.

Area of deposition:

A marshy area southeast of Todd Point has built out linearly 1250 ft.

Todd Point to Chapel Creek

The east and west shores of the creek west of Chapel Creek have a maximum linear recession of 350 ft.

The deeply indented cove south of Todd Point has many small areas of deposition, the maximum linear building out being 150 ft. The west shore of Chapel Creek has two small areas, the maximum building out being 200 ft.

Chapel Creek to Lecompte Creek

Areas of greatest erosion:

1. Between Chapel Creek and Castelhaven Point, maximum linear recession is 500 ft. Castlehaven Point has migrated 550 ft. south. The former maximum width of Castlehaven Neck was 400 ft. but is now only 150 ft.
2. Between Castlehaven Point and Lecompte Creek maximum linear recession is 150 ft.

Area of deposition:

A small area 2000 ft. northeast of Chapel Creek has built out linearly a maximum of 320 ft.

Lecompte Creek to Hambrooks Bar

Areas of greatest erosion:

1. At Horn Point and vicinity, there has been a maximum linear recession of 350 ft.
2. Between Horn Point and Jenkins Creek, maximum linear recession is 300 ft.
3. Between Jenkins Creek and Hambrooks Bar, maximum linear recession is 150 ft.

Areas of deposition:

Hambrooks Bar is now an island separated from the mainland by a strip of piling. It has grown eastward 820 ft. and has increased from 150 to 400 ft. in width. The entrance of Jenkins Creek has almost closed due to a marsh area that has built out a maximum of 300 ft. to the southwest.

Hambrooks Bar to Whitehall Creek

Areas of greatest erosion:

1. For a distance of 2300 ft. west of Great Marsh Point, the maximum linear recession is 230 ft. Great Marsh Point has receded 100 ft.
2. The shore immediately west of the Choptank River Bridge shows a maximum linear recession of 150 ft. From the Choptank River Bridge to Shoal Creek, maximum linear recession is 200 ft.
3. The shore directly in front of Hurst Creek shows a maximum linear recession of 250 ft.

Areas of deposition:

The west shore entrance of Whitehall Creek has built linearly a maximum of 250 ft. to the north. Other areas are small and scattered.

Whitehall Creek to Warwick River

Areas of greatest erosion:

1. For a distance of 3000 ft. east of Oyster Shell Point, maximum linear recession is 200 ft. Oyster Shell Point has receded 150 ft.
2. Between Indian Creek and Goose Creek, maximum linear recession is 150 ft.
3. Between 2000 ft. north of Goose Creek and Warwick River, maximum linear recession is 350 ft.

Areas of deposition:

The entrance to Indian Creek has built out from both shores a maximum of 100 ft., almost closing the entrance to the creek. Immediately south of Warwick River a small area has built out linearly a maximum of 150 ft.

Warwick River to Hunting Creek

Area of greatest erosion:

1. Between Warwick River and Cabin Creek, maximum linear recession is 350 ft.
2. Between 3400 ft. north of Cabin Creek and Hunting Creek, maximum linear recession is 300 ft.

LITTLE CHOPTANK RIVER

North Shore

Ragged Point to Cedar Point

Areas of greatest erosion:

1. From Brooks Creek to Cassom Point, maximum linear recession is 250 ft. Cassom Point has receded 250 ft.
2. For a distance of 2200 ft. west from Cedar Point maximum linear recession is 250 ft. Cedar Point has receded 150 ft.
3. The point between Rioll Cove and Brooks Creek has receded 600 ft.

Areas of deposition:

The south shore of Rioll Cove shows a maximum linear building out of 250 ft. and the north shore 300 ft.

Cedar Point to Gaines Creek

Areas of greatest erosion:

1. Between Cedar Point and Phillips Creek, maximum linear recession is 300 ft.
2. Between Phillips Creek and Beckwith Creek, maximum linear recession is 350 ft.
2. From the southwest end of Morris Neck to Gaines Creek, maximum linear recession is 150 ft. The southwest tip of Morris Neck has receded 500 ft.

Area of deposition:

A small area at the west shore entrance to Phillips Creek has built out a maximum of 200 ft.

South Shore

Oyster Cove to Hooper Point (Plate 13)

Areas of greatest erosion:

1. The west shore of Oyster Cove shows a maximum linear recession of 350 ft. and the east shore 400 ft.
2. From Oyster Cove to Cators Cove, maximum linear recession is 650 ft.

3. Between Cators Cove and Hooper Point, the maximum linear recession is 1000 ft.

Areas of deposition:

Hooper Point has built out 850 ft. southward. Other areas are small and scattered.

From Travers Cove to Susquehanna Point, including the mouths of Slaughter and Parsons Creek (Plate 13)

Areas of greatest erosion:

1. Travers Cove to Travers Point shows a maximum linear recession of 400 ft. Travers Point has receded 100 ft.
2. Between Slaughter Creek and Poverty Point, there is a maximum linear recession of 500 ft. Poverty Point has receded 300 ft.
3. Between Parsons Creek and Susquehanna Point, maximum linear recession is 600 ft. Susquehanna Point has receded 100 ft.

Areas of deposition:

The small cove northeast of Parsons Creek has built out linearly a maximum of 200 ft. A narrow point south of Susquehanna Point has built out 850 ft. to the southeast.

Town Point to Gaines Creek

Between Town Point and Smith Cove, maximum linear recession is 450 ft. Town Point has receded 400 ft.

HONGA RIVER

East Shore

Kane Point to Windmill Point

Areas of greatest erosion:

1. For a distance of 7000 ft. northwest from Charles Creek, maximum linear recession is 300 ft.
2. The south shore of Parker Neck shows a maximum linear recession of 500 ft.
3. Between Lakes Cove and Cedar Point, there is a maximum linear recession of 500 ft.
4. Between Cedar Point and Windmill Point, maximum linear recession is 200 ft.

Area of deposition:

Kane Point has built out 100 ft. southward.

Windmill Point to Crab Point

The entire shore is a major erosion unit. Maximum linear recessions are: Taylor Point, 350 ft.; Paul Point, 1750 ft.; Fox Point, 200 ft.; Wingate Point, 200 ft.; Duck Point, 500 ft.; and Crab Point, 400 ft. From Crab Point to Fallins Cove, the rate of recession has been uniform,

Crab Point to 1000 ft. northwest of Bishops Head Point

Areas of greatest erosion:

1. Between Crab Point and Norman Cove, maximum linear recession is 500 ft.
2. For a distance of 7000 ft. southeast from Hope Point, the maximum linear recession is 500 ft. Hope Point has receded 400 ft.

Area of deposition:

An area west of Hopkins Cove has built linearly 500 ft. northeastward.

FISHING BAY

West Shore

Bishops Head Point to 4000 ft. southeast of Old House Point

Areas of greatest erosion:

1. Between Bishops Head Point and Sandy Point, maximum linear recession is 300 ft. Bishops Head Point has receded 500 ft. and Sandy Point 150 ft.
2. Between Tedious Creek and Ruebens Point, there is a maximum linear recession of 300 ft. Ruebens Point has receded 350 ft.
3. Between Goose Creek and 4000 ft. southeast of Old House Point, there is a maximum linear recession of 250 ft. Roasting Ear Point has receded 150 ft.

From 4000 ft. southeast of Old House Point to Blackwater Point

Areas of greatest erosion:

1. Between Cedar Creek and Thorofare Point, maximum linear recession is 550 ft.
2. Between Thorofare Point and Blackwater Point, maximum linear recession is 700 ft. Blackwater Point has receded 1200 ft., leaving a small island between the former location and the present location of the point.

East Shore

Transquaking River to McReadys Point

Areas of greatest erosion:

1. From Transquaking River to Island Creek, maximum linear recession is 500 ft.
2. For a distance of 3700 ft. south from Island Creek, maximum linear recession is 300 ft.
3. Between Fishing Point and McReadys Point, maximum linear recession is 400 ft. Fishing Point has receded 1400 ft.

Area of deposition:

The area immediately east of Fishing Point built out linearly a maximum of 150 ft.

McReadys Point to the southwest end of Clay Island

Maximum linear recession is 500 ft. near the southwest tip of Clay Island. The southwest end of Clay Island has receded 600 ft.

NANTICOKE RIVER

Clay Island to Newfoundland Point

Areas of greatest erosion:

This shore is deeply indented so there are many small areas showing considerable recession. The areas showing the maximum rates of recession are:

1. The eastern tip of Sandy Island has a maximum recession of 500 ft.
2. Mulberry Point shows a maximum recession of 600 ft.
3. Gravelly Point shows a maximum recession of 300 ft.
4. 2800 ft. south of Newfoundland Point, maximum linear recession is 500 ft. Newfoundland Point has receded 50 ft.

Areas of deposition are small and scattered.

Newfoundland Point to Penknife Point

Areas of greatest erosion:

1. Between Newfoundland Point and Jacks Creek, there is a maximum linear recession of 300 ft.

2. From Jacks Creek toward Penknife Point, the rate of recession gradually decreases. Penknife Point has receded 150 ft.

Area of deposition:

5000 ft. south of Penknife Point maximum linear building out is 150 ft.

Penknife Point to vicinity of Vienna

From Penknife Point northward, the Nanticoke River narrows and the shore line changes have been small. Both erosion and deposition have taken place.

FISHING CREEK

For a distance of 3800 ft. from Town Point, the maximum linear recession is 350 ft.

For a distance of 6100 ft. from McKeil Point, maximum linear recession is 300 ft.

MADISON BAY

For a distance of 6100 ft. from McKeil Point, there is a maximum linear recession of 300 ft. The south and west shores have small and scattered areas of erosion, maximum linear recession being 150 ft.

BROOKS CREEK

The west shore is deeply indented by six small coves so there are many small areas of erosion. The points of these individual areas that project into the creek have the highest rates of recession. In the lower half maximum recession is 450 ft. Towards the head of the creek it is 200 ft. Depositional areas are small.

The east shore is not as deeply indented as the west shore, and shows a more uniform rate of erosion. Along the lower two-thirds of the shoreline, maximum linear recession is 400 ft. The upper one-third shows a maximum linear recession of 150 ft. Depositional areas are small.

HUDSON CREEK

For a distance of 4000 ft. from Cassom Point, the maximum linear recession is 300 ft. along the west shore.

For a distance of 3300 ft. from Butter Pot Point, the maximum linear recession is 450 ft. on the east shore.

JAMES ISLAND (Plate 13)

James Island is at the mouth of the Little Choptank River. The east shore is on the Little Choptank River and the west shore on the Chesapeake Bay. The land is low.

The west shore of the island has suffered the greatest loss of land and has the highest rate of recession. Maximum linear recession is 3100 ft. at the central portion of the island.

The north shore has suffered the second highest rate of recession. Maximum linear recession is 2500 ft.

The east shore shows a maximum linear recession of 250 ft., and the areas are small. The southeast tip of the island has receded 350 ft.

A small area at the southwest end of the island has built out 250 ft.

James Island was formerly one body of land connected to the mainland at Taylors Island. It has broken up into six parts, two larger islands at either end and four small ones in between, and is separated from the mainland by 1950 ft. of water.

BARREN ISLAND (Fig. 6)

Barren Island is in the Chesapeake Bay west of Upper Hooper Island. The east shore of the island is on Tar Bay and the west shore is on the Chesapeake Bay. It comprises lowland and marsh.

The west shore of the island has suffered the greatest loss and has the highest rate of linear recession. Maximum linear recession is 2100 ft.

The east shore shows a maximum linear recession of 400 ft.

The north end of the island has receded 2900 ft.

The south end of the island has built out 2700 ft. to the southeast in a long narrow point with a maximum width of 150 ft.

The island has broken into two parts separated by Barren Island Thorofare.

HOOPER ISLAND

Hooper Island is actually three islands known as Upper, Middle, and Lower Hooper Islands. Their east shores are on the Honga River. The west shore of the Upper Island is on Tar Bay and the west shores of the Middle and Lower Islands are on the Chesapeake Bay. The Upper Island is mostly low land, the Middle Island is half marsh and half low land and the Lower Island is mostly marsh.

Upper Hooper Island

Maximum linear recession on the west shore is at Docs Point between Fishing Creek and Toms Point. It is 400 ft.

Maximum linear recessions on the east shore are: between Fishing Creek and Gunners Cove 650 ft.; and between Back Creek and Smoke Point 450 ft.

Middle Hooper Island

The maximum linear recession on the west shore is from the vicinity of Tom Cove to Richland Point where it is 1200 ft. The west side of Tom Cove has receded 1000 ft. and Richland Point 1900 ft.

The areas of greatest erosion on the east shore are: between Cat Cove and Bentley Point where the maximum linear recession is 400 ft.; between Flag Cove and Hickory Point where the maximum linear recession is 300 ft.; and from Muddy Hook Cove to the Thorofare separating the Middle and Lower Islands with a maximum linear recession of 250 ft.

Deposition on the west shore has filled in Tom Cove a maximum of 600 ft. and has built out linearly an area 1400 ft. north of Tom Cove a maximum of 300 ft.

Lower Hooper Island

Between Eel Hope Point and Mens Burial Point on the south shore, there is a maximum linear recession of 350 ft. near Fishing Point.

Between the Thorofare and Ware Point on the north shore, maximum linear recession is 350 ft. Ware Point has receded 300 ft.

From Ware Point to Mens Burial Point, on the east shore there is a maximum linear recession of 300 ft.

A small cove in Thorofare Cove shows a maximum filling in of 500 ft.

WROTEN ISLAND

Wroten Island is in the Honga River east of Upper Hooper Island. Three quarters of the island is marsh. Low land areas are in the western and the eastern portions of the island.

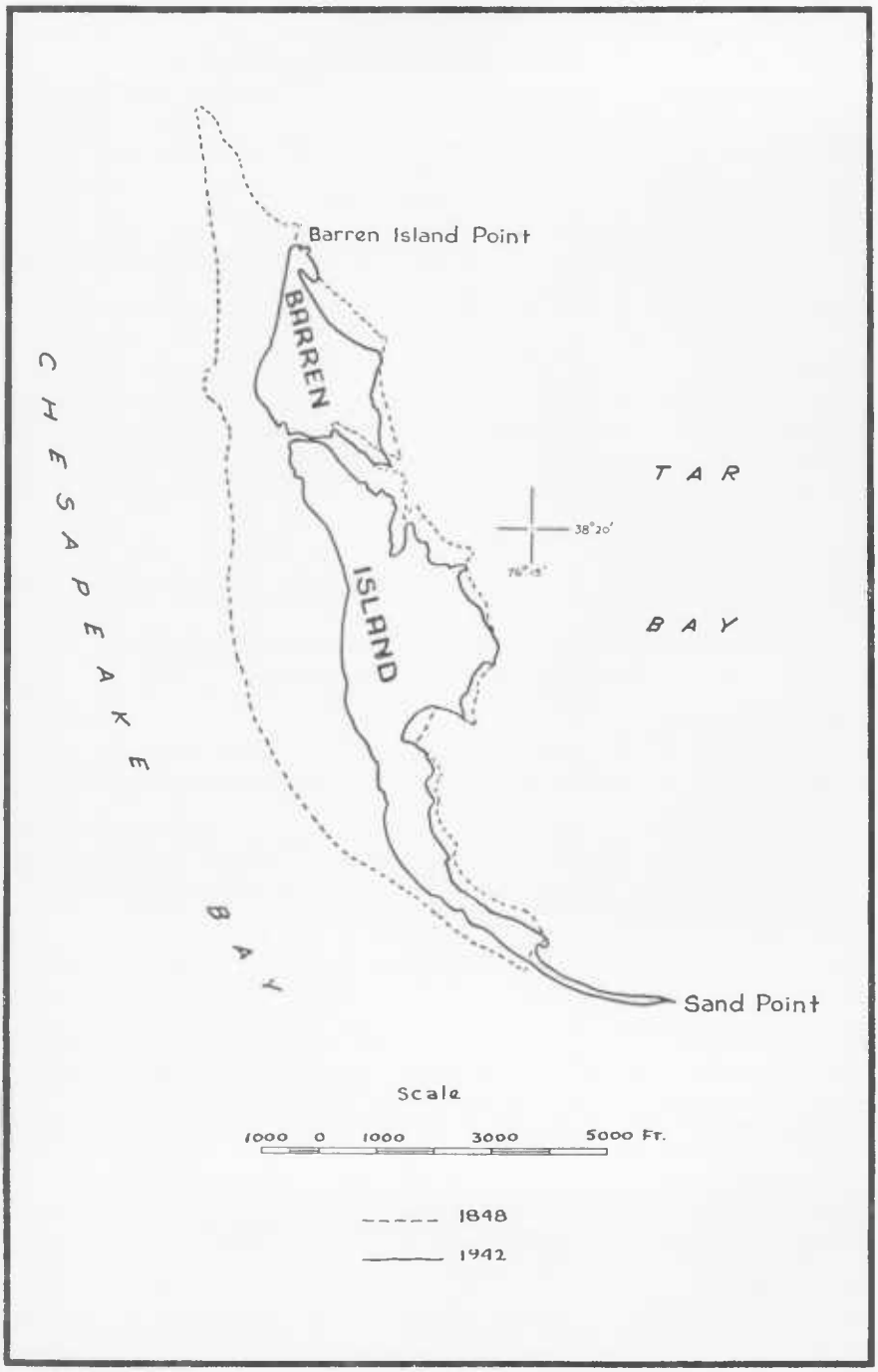

FIG. 6—*Shore Line Changes on Barren Island, Dorchester County.*

Between Charles Creek and Upper Wroten Island Point on the north shore maximum linear recession is 300 ft.

Maximum linear recession on the west shore is 150 ft. Lower Wroten Island Point has receded 400 ft.

Maximum linear recession on the south shore is 200 ft.

BLOODSWORTH ISLAND

Bloodsworth Island is bordered by Hooper Straight on the north, Tangier Sound on the east, Holland Strait on the south, and the Chesapeake Bay on the west. The island is marshy with small scattered areas of low land.

Areas of greatest erosion are:

1. From Tigs Point to Kits Point, maximum linear recession is 600 ft.
2. Between Kits Point and Okahaniken Point, maximum linear recession is 400 ft.
3. From Okahanikan Point southward, maximum linear recession is 900 ft. Okahanikan Point has receded 1600 ft.
4. From Tigs Cove to Piney Island Point, maximum linear recession is 300 ft. Tigs Cove shows a maximum linear recession of 650 ft.
5. From Piney Island Cove to Great Cove Point, maximum linear recession is 350 ft.
6. Between Lower Island Point and Cove Point, maximum linear recession is 250 ft.
7. From Cove Point to Northeast Cove, maximum linear recession is 250 ft.

Tigs Point has built 350 ft. southeastward.

PONE ISLAND

Pone Island lies southwest of Bloodsworth Island, separated only by a narrow passage. The south shore faces Holland Strait and the west shore the Chesapeake Bay. It is marsh except for a small area of low land.

Bloodsworth Point has receded 700 ft.

A narrow strip of marsh 400 ft. long has been built out to connect Bobbin Island with Pone Island.

HOLLAND ISLAND

Holland Island is the southernmost area in Dorchester County. It is bordered on the east by Holland Strait and on the west by Chesapeake Bay. About four-fifths of the island is marsh and the remainder low land.

The Chesapeake Bay shore shows a maximum linear recession of 400 ft. The southwest end of the island has receded 1900 ft.

ADAM ISLAND

Adam Island lies between Pone Island and Holland Island. Its north and west shores are on the Chesapeake Bay and the east shore on Holland Strait. It is marsh with two small areas of low land.

The west shore shows a maximum linear recession of 300 ft. A marshy point at the south end of the island has receded 500 ft.

SUMMARY

The area of Dorchester County mainland along the Chesapeake Bay shore that exceeds all others in the amount of loss, rate of loss, and linear recession is

from Oyster Cove southward to the vicinity of the Big Broads. The area of second highest amount and rate of loss is between Mills Point and Ragged Point.

The Fishing Bay shore line shows the third highest rate of loss.

The rates of loss of the Choptank, Little Choptank, Honga, and Nanticoke Rivers are approximately equal. On the Choptank River the highest rate of loss is between Cook Point and Hambrooks Bar. The south shore of the Little Choptank River far exceeds the northern shore in total net loss and rate of loss. The east shore of Honga River shows a uniform rate of loss. On the Nanticoke the area on the west shore from the entrance to Newfoundland Point shows the greatest rate of loss.

Of the islands, James Island has suffered the greatest loss and shows the highest percentage of loss. Barren Island shows the next greatest loss. Middle Hooper Island has the highest rate of loss of the Hooper Islands. Bloodsworth Island shows the least change of all the islands. Pone and Wroten Islands, of equal size, have equal amounts and rates of loss.

The greatest amounts of land lost and the highest linear recession rates are along the Chesapeake Bay front where the shore consists of clay, sand and gravel. The greatest linear recession of the entire Dorchester County shore line has occurred on the west shore of James Island, which is also composed of clay, sand and gravel.

Over an average time interval of 94 years, there have been 7,319 acres of erosion and 433 acres of deposition in Dorchester County, making the net loss to the County 6,886 acres. The Dorchester County measurements are summarized in Table 7.

HARFORD COUNTY

The general topography of the coast along the Chesapeake Bay is low and marshy with the exception of the area between Swan Creek and Havre De Grace where bluffs reach the 20 ft. contour level and higher. Along the east shore of the Gunpowder River the land is low. The lower two thirds of the Bush River is low and marshy in some localities, the upper one third reaches the 20 ft. contour level.

The geologic age and composition of the formation along the shores are:

Pleistocene—clay, peat, sand and gravel

DESCRIPTIONS OF AREAS IN HARFORD COUNTY

CHESAPEAKE BAY

Havre De Grace to Spesutie Narrows

Areas of erosion: Areas are small and scattered. Concord Point has receded 300 ft. The spit at the north shore entrance of Swan Creek has receded 350 ft. and has shifted slightly to the northwest. The curved spit on the west side of Plum Point has migrated 100 ft. to the east.

TABLE 7.—*Shore Erosion Statistics of Dorchester County*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Chesapeake Bay							
Cook Pt. to Covey Creek	94	3.1	168	22	146	47.0	.5
Covey Creek to Mills Pt. (includes Brannock and Trippe Bays)	94	8.6	86	8	78	9.0	.09
Mills Pt. to Ragged Pt.	94	6.8	441	23	418	61.4	.65
Oyster Cove to the Big Broads	95	8.1	1,169	3	1,166	143.9	1.5
Big Broads to Charity Pt.	94	2.9	10	9	1	0	0
Totals	94	29.5	1,874	65	1,809	61.0	.64
Choptank River							
Cook Pt. to Todd Pt.	94	9.3	209	46	163	17.5	.18
Todd Pt. to Chapel Creek	94	4.1	30	11	19	4.6	.05
Chapel Creek to Lecompte Creek	90	8.2	133	15	118	14.2	.15
Lecompte Creek to Hambrooks Bar	90	5.5	71	3	68	12.3	.14
Hambrooks Bar to Whitehall Creek	92	5.5	42	13	29	5.2	.06
Whitehall Creek to Warwick River	91	5.9	41	5	36	6.1	.07
Warwick River to Hunting Creek	92	5.7	57	3	54	9.4	.10
Totals	92	44.2	583	96	487	11.0	.11
Little Choptank River—North Shore							
Ragged Pt. to Cedar Pt.	95	5.2	51	11	40	7.7	.09
Cedar Pt. to Gaines Creek (includes entrances of Phillips and Beckwich Creeks)	90	6.2	67	7	60	9.6	.10
North Shore Totals	93	11.4	118	18	100	8.7	.09
Little Choptank River—South Shore							
Oyster Cove to Hooper Pt., includes Oyster and Cators Coves	95	8.6	195	13	182	21.1	.22
Travers Cove to Susquehanna Point, includes entrances of Slaughter and Parsons Creeks	95	6.2	129	8	121	19.5	.20
Town Pt. to Gaines Creek	90	4.6	42	1	41	8.9	.09
South Shore Totals	93	19.4	366	22	344	17.7	.19
Little Choptank River Totals	93	30.8	484	40	444	14.4	.15

TABLE 7.—*Continued*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Honga River—East shore							
Kane Pt. to Windmill Pt.	94	15.1	196	14	182	12.0	.12
Windmill Pt. to Crab Pt. (west shore of Fox Creek not included)	94	12.4	186	5	181	14.6	.15
Crab Pt. to 1000 ft. northwest of Bishops Head Pt.	93	8.2	113	12	101	12.3	.13
Totals	94	35.7	495	31	464	13.0	.13
Fishing Bay—West shore							
Bishops Head Pt. to 4000 ft. southeast of Old House Pt.	93	9.0	112	2	110	12.2	.13
4000 ft. southeast of Old House Pt. to Blackwater Pt.	93	7.7	176	2	174	22.6	.24
West Shore Totals	93	16.7	288	4	284	17.0	.18
Fishing Bay—East shore							
Transquaking River to McReadys Pt.	93	9.4	155	6	149	15.8	.16
McReadys Pt. to southwest end of Clay Island	93	6.4	151	0	151	23.5	.25
East Shore Totals	93	15.8	306	6	300	19.0	.20
Fishing Bay Totals	93	32.5	594	10	584	17.9	.19
Nanticoke River—West Shore							
Clay Island to Newfoundland Pt.	93	11.2	228	7	221	19.7	.21
Newfoundland Pt. to Penknife Pt.	93	7.7	108	9	99	12.8	.13
Penknife Pt. to vicinity of Vienna	93	9.3	103	3	100	10.7	.11
Totals	93	28.2	439	19	420	14.9	.16
Fishing Creek							
Town Pt. to north of Church Creek and McKeil Pt. to 6100 ft. southeast	90	5.4	31	3	28	5.1	.06
Madison Bay	90	5.6	49	5	44	7.8	.09
Brooks Creek	95	10.1	89	13	76	7.5	.08
Hudson Creek							
Both sides upstream $\frac{3}{4}$ mile	95	2.5	35	1	34	13.6	.14
River, Small Bay and Creek Totals	93	195.0	2,799	218	2,581	13.2	.14

TABLE 7.—*Continued*

	Time Interval	Miles Measured	Old Area	New Area	Area Lost	Erosion	Deposition	Net Loss	% Total Area Lost	Annual Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*	*acres*		*acres*
Islands										
James	95	6.8	978	336	642	647	7	640	65.6	6.7
Barren	94	7.7	839	371	468	477	9	468	55.7	5.0
Upper Hooper	94	14.2	1,179	1,024	155	166	12	154	13.0	1.6
Middle Hooper	94	19.1	2,098	1,739	359	368	13	355	17.1	3.7
Lower Hooper	94	6.9	825	728	97	108	11	97	11.7	1.0
Bloodsworth	93	21.9	4,788	4,388	400	395	5	390	8.3	4.2
Pone	93	6.0	553	478	75	78	4	74	13.5	.8
Wroten	94	6.3	568	488	80	82	3	79	14.0	.8
Holland	93	5.8	253	162	92	90	2	88	36.3	.9
Adam	93	4.2	195	140	55	55	0	55	28.2	.6
Other Islands		9.8				180	84	96		
Totals	94	108.7	12,276	9,854	2,423	2,646	150	2,496		
									Rate of Loss	Annual Rate of Loss
									acres	*acres*
DORCHESTER COUNTY TOTALS	94	333.2				7,319	433	6,886	20.9	.22

Areas of deposition: Between Concord Point and Swan Creek are five small areas which show a maximum linear building out of 150 ft.

Spesutie Narrows to Old Womans Gut

Areas of greatest erosion:

1. From 1200 ft. south of Cherry Tree Point to Old Womans Gut, maximum linear recession is 550 ft.
2. Black Point has receded 100 ft.
3. Cherry Tree Point has receded 50 ft.

Areas of deposition:

Areas are small and few in number. Immediately south of Black Point an area has built out linearly 150 ft.

Old Womans Gut to 4200 ft. northwest of Abbey Point (Plate 14)

Areas of greatest erosion:

1. From Old Womans Gut southward to Romney Creek, there is a gradual increase of linear recession, the maximum being 500 ft. The point on the east side of Romney Creek has receded 500 ft. northward.
2. Between Romney Creek and Abbey Point, maximum linear recession is 500 ft. Abbey Point has receded 650 ft.
3. For a distance of 4200 ft. from Abbey Point recession has been uniformly about 400 ft.

Lego Point to Rickett Point

This entire shore has undergone erosion. The maximum linear recession is 600 ft. and occurs in the northern half of the shore between Lego Point and Robins Point. Lego Point has receded 50 ft., Ford Point 400 ft., and Robins Point 400 ft.

Between Robins Point and Rickett Point, maximum linear recession is 450 ft. Rickett Point has receded 250 ft.

GUNPOWDER RIVER

Rickett Point to Maxwell Point

Areas of greatest erosion:

1. Between Rickett Point and Days Point, maximum linear recession is 300 ft. Days Point has receded 300 ft.
2. Between Days Point and Maxwell Point, maximum linear recession is 150 ft. Maxwell Point has receded 400 ft.

Maxwell Point to Foster Branch

Between Maxwell Point and Wright Creek, maximum linear recession is 350 ft. at the south shore entrance of Swaderick Creek.

Between Wright Creek and Foster Branch maximum linear building out is 200 ft.

BUSH RIVER

West Shore

Lego Point to Lauderick Creek

Areas of greatest erosion:

1. Sandy Point has receded 150 ft.
2. From 3300 ft. south of Briery Point to the center of Doves Cove, maximum linear recession is 500 ft.
3. From Wilson Point to Kings Creek maximum linear recession is 400 ft. Tapler Point has receded 250 ft. and Wilson Point 100 ft.

Areas of greatest deposition:

1. The south shore entrance of Lauderick Creek shows a maximum linear building out of 250 ft.
2. The curved spit at the south shore entrance of King Creek has migrated 300 ft. northwestward.
3. Briery Point has built out 150 ft.

Lauderick Creek to 700 ft. west of Bush Point

Maximum linear recession is 250 ft. west of Bush Point. Fairview Point has receded 100 ft. Areas of deposition are small and scattered. Maximum linear building out is 150 ft.

BUSH RIVER

East Shore

Bush Point to Chilbury Point

The areas of erosion are small and scattered. From Bush Point for a distance of 3200 ft. east, there is a maximum linear recession of 250 ft. Bush Point has receded 250 ft. A

former point of land at the south shore entrance of Towner Cove has receded 600 ft. Between Pond Point and Chilbury Point, maximum linear recession is 100 ft.

The southern cove of Towner Cove shows a maximum linear building out of 350 ft. Redmon Cove shows a maximum linear building out of 120 ft.

Chilbury Point to Church Point

Areas of greatest erosion:

1. Between Chilbury Point and Sod Creek, maximum linear recession is 230 ft. Chilbury Point has receded 50 ft.
2. From the marshy inlet north of the Pennsylvania Railroad bridge to Church Point, maximum linear recession is 380 ft.

Area of deposition:

Church Point has built out 150 ft.

ROMNEY CREEK

The areas of deposition are small, but the north shore shows a maximum linear recession of 350 ft. and the south shore 170 ft.

Small areas of deposition on the north shore show a maximum building out of 300 ft. Locust Point has built out 600 ft. northeastward, narrowing the entrance to Romney Creek from 1200 ft. to 600 ft. Locust Point formerly 50 ft. wide is now 170 ft. wide.

SPESUTIE NARROWS

The lower third of the shore shows a maximum linear recession of 330 ft.

Areas of deposition are small and scattered with a maximum linear building out of 120 ft.

SPESUTIE ISLAND

Spesutie Island is separated from the mainland by Spesutie Narrows. Its north, east, and south shores are on the Chesapeake Bay. The center of Spesutie Island, running north and south, is marsh; the eastern and western parts are low land.

Areas of greatest erosion:

North shore—between Locust Point and Spesutie Narrows erosion has not been great and maximum linear recession is 120 ft.

East shore—between Sandy and Locust Points, there is a maximum linear recession of 200 ft. Sandy Point has remained stable but Locust Point has receded 150 ft.

South shore—from Spesutie Narrows to Sandy Point, maximum linear recession is 420 ft. Bear Point has receded 350 ft.

West shore—areas of erosion in Spesutie Narrows are small and scattered. Maximum linear recession is 100 ft.

Areas of deposition:

About half way between Sandy Point and Locust Point, there is a small area with a maximum linear building out of 150 ft. In Spesutie Narrows building out is a maximum of 150 ft.

POOLES ISLAND (Fig. 7)

Pooles Island is in the Chesapeake Bay, one mile southeast of Gunpowder Neck. It is predominantly low land with a marsh area in the central part.

Major areas of erosion:

West shore—maximum linear recession is 400 ft.

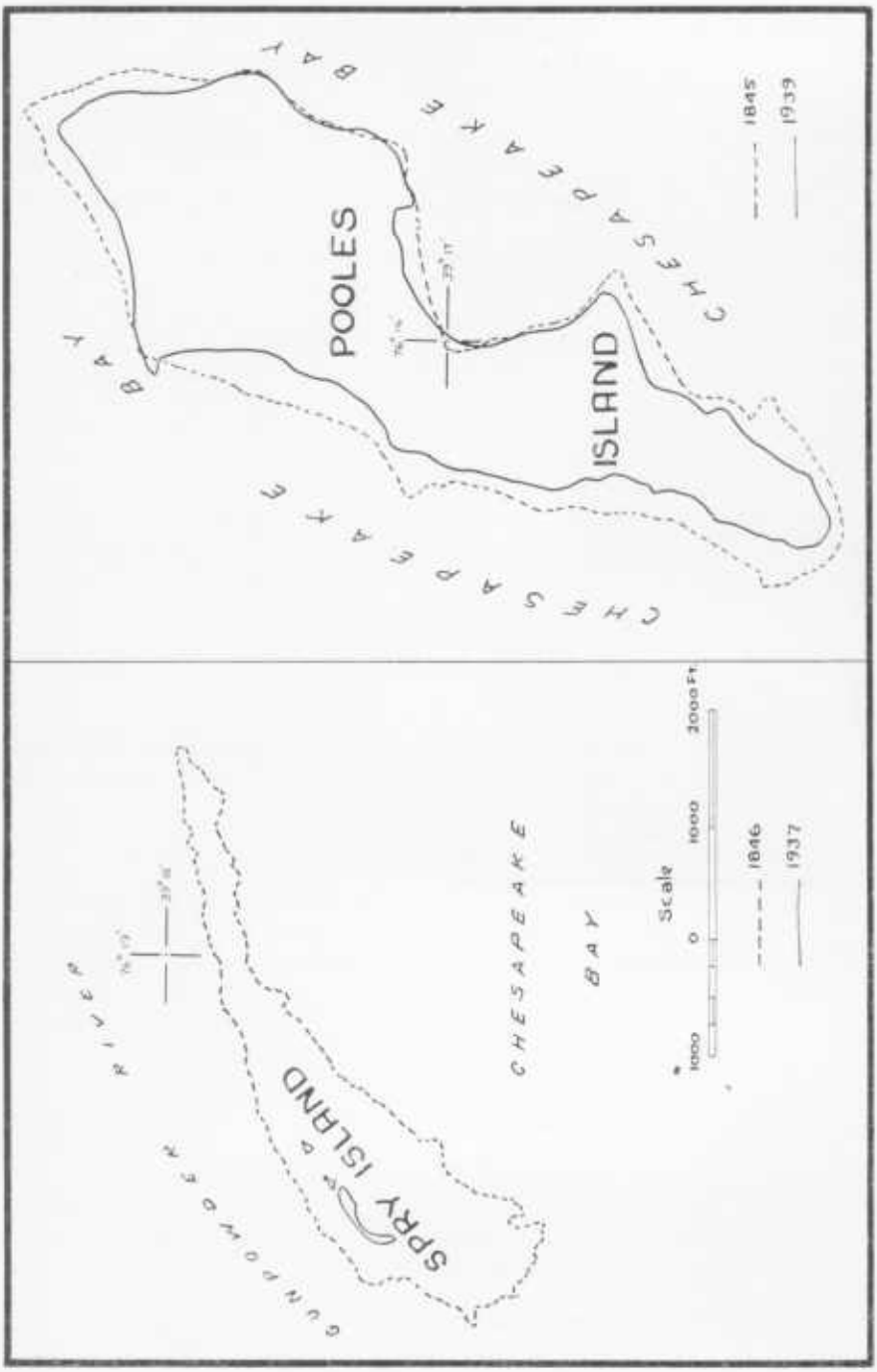

FIG. 7.—*Shore Line Changes on Pooles Island and Spry Island, Harford County.*

East shore—between the southern end of the island and the large cove, there is a maximum linear recession of 400 ft. In the cove and to the north end of the island, there has been less erosion and the maximum linear recession is 250 ft.

The north end of the island has receded 320 ft. and the south end 200 ft.

SPRY ISLAND (Fig. 7)

Spry Island is at the mouth of the Gunpowder River. It is wholly marsh. Only three small remnants of the western part of the island remain. Its reduction in size is:

	Former	*Present*
Length	5600 ft.	700 ft.
Width	1270	100

SUMMARY

The highest rate of loss has occurred between Old Womans Gut and the vicinity of Abbey Point at the entrance of Bush River. Between Lego and Rickett Points is second in the rate of loss and between Spesutie Narrows and Old Womans Gut is third.

Deposition has been a little greater than erosion between Havre De Grace and Spesutie Narrows.

The lower half of the Gunpowder River shows twice the rate of loss along the upper half. The east shore of the Bush River shows a higher rate of loss than the west shore.

Of the three islands, Spry Island has lost the greatest percentage of area, Spesutie the least percentage, and Pooles Island has lost the least amount of land.

There have been 1101 acres of erosion and 131 acres of deposition in Harford County over the average time interval of 95 years, making the net loss to the county 970 acres. The Harford County measurements are summarized in Table 8.

KENT COUNTY

The topography of the Chesapeake Bay coast is generally high with cliffs reaching the 20 ft. contour. Along Stillpond Neck cliffs reach a height of 80 ft. or more. Cliffs at the entrance to the Sassafras River are 80 ft. or more in height, diminishing upstream to 20 ft. or less. Landward of the Chester River the coast is lower than the 20 ft. contour level with a few small marshy areas.

The geologic age and composition of the formations along the shores are:

Pleistocene—Clay, peat, sand and gravel

Cretaceous—Micaceous sandy clays and light-colored sands and gravels

DESCRIPTIONS OF AREAS IN KENT COUNTY

CHESAPEAKE BAY

Betterton to Stillpond Creek

Areas of greatest erosion:

1. Between Betterton and Howell Point, the maximum linear recession is 150 ft. Howell Point has receded 60 ft.

2. Between Howell Point and Stillpond Creek, maximum linear recession is 250 ft
Area of deposition:

At the north shore entrance of Stillpond Creek, a point has built out 350 ft. southward, almost closing the entrance.

TABLE 8.—*Shore Erosion Statistics of Harford County*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Chesapeake Bay							
Havre De Grace to Spesutie Narrows	95	7.1	15	17	2*	.2*	
Spesutie Narrows to Old Womans Gut	98	4.5	78	3	75	16.6	.16
Old Womans Gut to 4200 ft. northwest of Abbey Pt.	95	7.1	202	1	201	28.3	.29
Lego Pt. to Rickett Pt.	93	5.3	110	1	109	20.5	.22
Totals	95	24.0	405	22	383	15.9	.16
Gunpowder River							
Rickett Pt. to Maxwell Pt.	92	5.9	67	0	67	11.3	.12
Maxwell Pt. to Foster Branch	91	5.4	46	18	28	5.1	.05
Totals	92	11.3	113	18	95	8.4	.09
Bush River—West Shore							
Lego Pt. to Lauderick Creek	93	8.8	103	10	93	10.5	.11
Lauderick Creek to 700 ft. west of Bush Pt.	93	5.4	27	29	2*	.3*	0
West Shore Totals	93	14.2	130	39	91	6.4	.06
Bush River—East Shore							
Bush Pt. to Chilbury Pt.	93	5.7	50	18	32	5.6	.6
Chilbury Pt. to Church Pt.	93	4.7	57	1	56	11.9	.12
East Shore Totals	93	10.4	107	19	88	8.4	.09
Bush River Totals	93	24.6	237	58	179	7.2	.07
Romney Creek							
Measured upstream $1\frac{1}{4}$ miles	98	3.8	34	17	17	4.4	.04
Spesutie Narrows—West Shore	98	3.1	45	2	43	13.8	.14
River and Creek Totals	94	42.8	429	95	334	7.8	.08

* Gain.

TABLE 8.—*Continued*

	Time Interval	Miles Measured	Former Area	Present Area	Loss	Erosion	Deposition	Net Loss	% Total Area Lost	Annual Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*	*acres*		*acres*
Islands										
Spesutie	98	10.0	2112	2007	105	118	13	105	4.9	1.0
Pooles	94	3.5	283	219	64	65	1	64	22.6	.68
Spry	93	.3	86	2	84	84	0	84	97.6	.90
Totals	95	13.8	2481	2228	253	267	14	253		
									Rate of Loss	Annual Rate of Loss
									acres	*acres*
HARFORD COUNTY TOTALS	95	80.6				1101	131	970	12.0	.12

Stillpond Creek to Tims Creek

Areas of greatest erosion:

1. Between Stillpond Creek and Churn Creek, maximum linear recession is 250 ft.
2. From Plum Point to Tims Creek, maximum linear recession is 350 ft. A spit on the north shore entrance of Tims Creek has receded 550 ft. Plum Point has receded 170 ft. and Worton Point 250 ft.

Worton Creek to Fairlee Creek

Areas of greatest erosion:

1. A point immediately south of Handys Point has receded 350 ft.
2. Between the marsh pond south of Handys Point and Fairlee Creek, maximum linear recession is 150 ft.
3. The east shore entrance point of Fairlee Creek has receded linearly 250 ft.

Areas of deposition:

1. The west shore of Worton Creek has built out linearly a maximum of 100 ft.
2. Between Handys Point and the marsh pond to the south, maximum linear building out is 160 ft.

Fairlee Creek to 2 miles south of Tolchester Beach

Areas of greatest erosion:

1. Between Fairlee Creek and the second marsh pond to the south, maximum linear recession is 220 ft. The west shore entrance spit of Fairlee Creek has receded 1000 ft.
2. From one mile north of Tolchester Beach to the entrance of the second pond south of Tolchester Beach, maximum linear recession is 150 ft.

Area of deposition:

For a distance of 2700 ft. south from the second pond south of Tolchester Beach maximum linear building out is 50 ft.

2 miles south of Tolchester Beach to Tavern Creek. (Plate 15)

Beginning $2\frac{3}{4}$ miles south of Tolchester Beach the rate of erosion increases greatly southward to the marsh area north of Swan Point with a maximum linear recession of 700 ft. Swan Point, which was formerly a part of the marshy mainland, is now an island 650 ft. from the mainland. Swan Point has migrated 700 ft. to the east.

The southeast end of Swan Point Island has built out 200 ft. southeastward.

Tavern Creek to Huntingfield Creek (Plate 15)

Areas of greatest erosion:

1. Between Swan Creek and Rock Hall Harbor, maximum linear recession is 450 ft.
2. For a distance of 2000 ft. south from Rock Hall Harbor, maximum linear recession is 300 ft.

Huntingfield Point to Wilson Point (Plate 16)

Areas of erosion:

1. 4000 ft. south of Huntingfield Point maximum linear recession is 600 ft. Huntingfield Point has receded 250 ft.
2. From Wilson Pond to Wilson Point, maximum linear recession is only 150 ft. Wilson Point has receded 200 ft.

Areas of deposition:

A small area immediately north of Wilson Point has built out linearly a maximum of 220 ft. A marshy spit at Huntingfield Point has built out eastward 450 ft.

SASSAFRAS RIVER

Betterton to Kentmore Park

Areas of greatest erosion:

1. Between Gut Marsh and Lloyd Creek, maximum linear recession is 300 ft.
2. Between Lloyd Creek and Turner Creek, maximum linear recession is 220 ft.
3. For 1500 ft. east from Turner Creek, maximum recession is 350 ft.

Areas of deposition:

1. The spit at the west shore entrance of Lloyd Creek has been extended 450 ft. to the east.
2. The spit at the entrance of the marshy pond northwest of Turner Creek has built out linearly a maximum of 200 ft. to the northeast and then 300 ft. to the southeast.
3. A small area at the west shore entrance of Turner Creek has built out linearly a maximum of 220 ft. northeast.

Kentmore Park to 3500 ft. east of Old Field Point

Kentmore Park shows a maximum linear recession of 400 ft. Other areas of erosion are small and scattered.

Two small coves between Kentmore Park and Freeman Creek have built out linearly a maximum of 300 ft. Other areas of deposition are small and scattered.

CHESTER RIVER

Ringold Point to Cliffs Point

Areas of greatest erosion:

1. Beginning 2400 ft. north of Bay Bush Point for a distance of 2500 ft., maximum linear recession is 550 ft. Ringold Point has receded 250 ft.

2. Between Grays Inn Creek and Langford Bay, maximum linear recession is 150 ft.
3. Between Nichols Point and Cliffs Point are numerous small areas which show a maximum linear recession of 250 ft.

Areas of deposition:

The areas are small and scattered.

Cliffs Point to Melton Point

Area of greatest erosion:

For a distance of 1900 ft. northwest from Deep Point, maximum linear recession is 320 ft. Deep Point has receded 170 ft.

Area of deposition:

The west shore entrance spit of Jarrett Creek has built out 200 ft. towards the northeast.

Melton Point to 6300 ft. northwest of Skillet Point

Areas of erosion are numerous but small. The west shore entrance point at the mouth of Broad Creek has receded a maximum of 300 ft., Hollow Marsh Point 100 ft., and Frying Pan Point 100 ft.

Areas of deposition are small and scattered. Skillet Point has built out 150 ft. eastward.

From 6000 ft. south of Radcliff Creek to north of Possum Point

The marsh east of Morgan Creek shows a maximum linear recession of 350 ft. Northward from Buckingham Wharf for 3000 ft. the maximum linear recession is 170 ft.

EASTERN NECK NARROWS

Wilson Point to Ringold Point

Between Wilson Point and Church Creek, maximum linear recession is 220 ft. The minimum width of Eastern Neck Narrows has increased from 150 ft. to 400 ft.

GRAYS INN CREEK

From Little Gum Point on the west and Grays Inn Point on the east for a distance of one mile upstream.

Areas of greatest erosion:

From Grays Inn Point for a distance of 3800 ft. northwest, maximum linear recession is 170 ft. Little Gum Point and Grays Inn Point have both receded 100 ft.

LANGFORD BAY

Numerous small areas of erosion on the east shore show a maximum linear recession of 250 ft.

The west shore is deeply indented, therefore the areas of erosion are quite small. The maximum linear recession is 200 ft.

EASTERN NECK ISLAND

Eastern Neck Island is at the entrance of the Chester River with its east and south shores facing the Chester River, the west shore the Chesapeake Bay, and the north shore Eastern Neck Narrows. About $\frac{3}{4}$ of the island area is low land and the remaining $\frac{1}{4}$ is marsh. Marsh rims all but the west shore.

Areas of greatest erosion:

West Shore—between the small cove west of Calfpasture Cove and Cabin Cove, maximum linear recession is 400 ft.

South Shore—from Cabin Cove to Panhandle Point, the shore line is ragged and marshy with many small areas showing a maximum linear recession of 350 ft. Panhandle Point has receded 250 ft. and Cedar Point 200 ft.

East Shore—the entire shore from Belts Bar Point to Hail Point has undergone a considerable loss and a high rate of recession, but the shoreline is very deeply indented with small coves and creeks so the individual erosional areas are small. Hail Point has receded 950 ft. Some marshy points have receded 400 to 500 ft.

North Shore—from Fryingpan Cove to Tubby Cove, maximum linear recession is 350 ft.

Area of deposition:

A bar from the west shore entrance of Cabin Cove has closed the cove completely. The length of the bar is 1000 ft. and the maximum width is 320 ft.

SUMMARY

The area extending from about 2 miles south of Tolchester to the point due north of Swan Point has suffered the greatest net loss and has the highest rate of loss of Chesapeake Bay shore in Kent County.

The Sassafras and Chester Rivers show an approximately equal rate of loss. The lower half of the south shore of the Sassafras River shows over twice the rate of loss of the upper half. The rate of loss along the Chester River gradually decreases upstream to halfway between Skillet Point and Chestertown, and then increases towards the head of the river.

There have been 1,302 acres of erosion and 122 acres of deposition in Kent County over the average time interval of 96 years, resulting in a net loss of 1,180 acres. The Kent County measurements are summarized in Table 9.

PRINCE GEORGES COUNTY

The topography landward of the Potomac River is generally high, with cliffs over 100 ft. high in a few localities. From Piscataway Creek to Bryan Point, the land is low with a few scattered areas of marsh. The portion of the county bordering the Patuxent River is low and marshy.

The geologic age and composition of the formations along the shores are:

Pleistocene—Clay, peat, sand and gravel

DESCRIPTIONS OF AREAS IN PRINCE GEORGES COUNTY

POTOMAC RIVER

From 2000 ft. north of Rosier Bluff to Swan Creek.

Areas of greatest erosion:

1. From 2700 ft. south of Rosier Creek to Indian Queen Bluff, there is a maximum linear recession of 200 ft.
2. From Broad Creek to Swan Creek, maximum linear recession is 150 ft.

Areas of deposition are small and scattered.

TABLE 9.—*Shore Erosion Statistics of Kent County*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Chesapeake Bay							
Betterton to Stillpond Creek	98	5.9	58	3	55	9.3	.09
Stillpond Creek to Tims Creek	98	7.1	123	4	119	16.7	.17
Worton Creek to Fairlee Creek	98	3.0	22	13	9	3.0	.03
Fairlee Creek to 2 miles south of Tolchester Beach	98	6.3	71	3	68	10.8	.11
2 miles south of Tolchester Beach to Tavern Creek	97	4.1	138	3	135	32.9	.33
Tavern Creek to Huntingfield Creek	97	5.4	64	5	59	10.9	.11
Huntingfield Pt. to Wilson Pt.	96	5.1	135	2	133	26.0	.27
Totals	97	36.9	611	33	578	15.6	.16
Sassafras River							
Betterton to Kentmore Park	98	6.0	96	18	78	13.0	.13
Kentmore Park to 3500 ft. east of Old Field Pt.	92	5.3	45	17	28	5.2	.05
Totals	95	11.3	141	35	106	9.3	.09
Chester River							
Ringold Pt. to Cliffs Pt.	96	6.3	70	5	65	10.3	.10
Cliffs Pt. to Melton Pt.	94	5.6	37	7	30	5.3	.05
Melton Pt. to 6300 ft. northwest of Skillet Pt.	94	5.8	26	11	15	2.5	.02
From 6000 ft. south of Radcliff Creek to point north of Possum Pt.	92	6.3	59	1	58	9.2	.10
Totals	94	24.0	192	24	168	7.0	.07
Eastern Neck Narrows							
Wilson Pt. to Ringold Pt.	96	2.0	22	0	22	11.0	.11
Grays Inn Creek							
From Little Gum Pt. and Grays Inn Pt. upstream 1 mile	96	2.4	15	2	13	5.4	.05
Langford Bay							
To $1\frac{1}{4}$ miles above mouth	96	4.6	32	5	27	5.8	.06
River and Creek Totals	95	44.3	402	66	336	7.5	.08

TABLE 9.—*Continued*

	Time Interval	Miles Measured	Old Area	New Area	Loss	Erosion	Deposition	Net Loss	% Total Area Lost	Annual Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*	*acres*		*acres*
Islands										
Eastern Neck	96	18.0	2,458	2,207	251	269	20	249	10.2	2.6
Little Neck	97	.8	17	6	11	14	3	11	64.7	.11
Millers	94	.2	3	1	2	2	0	2		
Small, no longer existing						4	0	4		
Totals	96	19.0	2,478	2,214	264	289	23	266		
									Rate of Loss	Annual Rate of Loss
									acres	*acres*
KENT COUNTY TOTALS	96	100.2				1,302	122	1,180	11.7	.12

From Swan Creek to the Charles-Prince Georges County boundary.

Areas of greatest erosion:

1. Between Mockley Point and the cove to the south, maximum linear recession is 150 ft.
2. Immediately north of the Charles-Prince Georges County boundary line, maximum linear recession is 180 ft.

Areas of deposition:

Mockley Point has built out a maximum of 300 ft. The west shore of the cove south of Mockley Point has built out linearly 150 ft.

PATUXENT RIVER

Chalk Point to Black Swamp Creek

Areas of erosion:

The shore shows a maximum linear recession of only 100 ft. The areas are small and numerous.

Areas of deposition:

Between Black Swamp Creek and 3500 ft. south, there has been a maximum linear building out of 150 ft. Other areas are small and scattered. Chalk Point and Trueman Point have built out 100 ft.

Milltown Landing to Rock Creek

Areas of erosion:

From 1300 ft. south of Bowling Landing for a distance of 4200 ft. southeast, maximum linear recession is 300 ft. Short Point has receded 120 ft. Numerous other areas have a maximum linear recession of 100 ft.

Area of deposition:

Between Short Point and Magruder Landing, maximum linear building out is 120 ft.

SWANSON CREEK

From Chalk Point upstream ¾ of a mile

No major change has taken place. The areas of erosion and deposition are small. Maximum linear recession is 70 ft., and maximum linear building out 50 ft.

SUMMARY

The greatest length of tidewater shore faces the Patuxent River. The lower half of the Patuxent River shoreline has a higher rate of loss than the upper

TABLE 10.—*Shore Erosion Statistics of Prince Georges County*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Potomac River							
2000 ft. north of Rosier Bluff to Swan Creek	77	3.8	20	2	18	4.7	.06
Swan Creek to Charles-Prince Georges County boundary	77	3.5	22	5	17	4.8	.06
Totals	77	7.3	42	7	35	4.8	.06
Patuxent River							
Chalk Pt. to Black Swamp Creek	83	7.3	35	11	24	3.2	.03
Milltown Landing to Rock Creek	83	5.6	28	15	13	2.3	.02
Totals	83	12.9	63	26	37	2.8	.03
Swanson Creek							
From Chalk Pt. upstream ¾ mile	83	1.1	2	2	0	0	0
PRINCE GEORGES COUNTY TOTALS	81	21.3	107	35	72	3.7	.04

half. The lower half and upper half of the shoreline along the Potomac River show an equal rate of loss.

There have been 107 acres of erosion and 35 acres of deposition in Prince Georges County over the average time interval of 81 years, making a net loss to the County of 72 acres. The Prince Georges County measurements are summarized in Table 10.

QUEEN ANNES COUNTY

The topography of the coast landward of the Chesapeake Bay in Queen Annes County is principally bluffs reaching the 20 ft. contour level with a few low marshy ponds. With the exception of the Kent Narrows area, which is low and marshy, the south shore of the Chester River is bordered by bluffs reaching

the 20 ft. contour level with higher elevations upstream. The remaining waterways are mostly bordered by cliffs that reach a height of 20 ft. with numerous areas of low land.

The geologic age and composition of the formations along the Chesapeake Bay and rivers of Queen Annes County are:

Pleistocene—clay, sand, gravel and boulders
Miocene —clay, sand, marl and diatomaceous earth

DESCRIPTIONS OF AREAS IN QUEEN ANNES COUNTY

CHESAPEAKE BAY

KENT ISLAND

Love Point to Broad Creek (Plate 17)

Areas of greatest erosion:

1. At Love Point maximum linear recession is 1150 ft. Recession continues $2\frac{3}{4}$ miles southward at a decreasing rate.
2. Between Broad Creek and a small pond 5400 ft. to the north, maximum linear recession is 850 ft.

Area of deposition:

1. Northward 4250 ft. from $1\frac{1}{4}$ miles north of Broad Creek, a marsh and sand area has built out linearly a maximum of 800 ft.

Broad Creek to $\frac{3}{4}$ mile south of Craney Creek (Plates 17, 18)

Areas of greatest erosion:

1. For a distance of 5000 ft. south from Broad Creek, maximum linear recession is 720 ft.
2. From 3300 ft. north to 4150 ft. south of Craney Creek, maximum linear recession is 620 ft.

Areas of deposition:

1. A marsh area built out 2000 ft. southwest from the north shore entrance of Broad Creek has nearly closed the mouth of the Creek. The south shore entrance has migrated 200 ft. southward.
2. A small area one mile south of Matapeake Ferry landing has built out a maximum of 100 ft.

From $\frac{3}{4}$ of a mile south of Craney Creek to Kent Point (Plate 18)

Areas of greatest erosion:

1. From $\frac{3}{4}$ of a mile south of Craney Creek to Tolson Creek, maximum linear recession is 700 ft.
2. Between Tolson Creek and the unnamed creek 1 mile south of Carter Creek, maximum linear recession is 300 ft.
3. Between the unnamed creek 1 mile south of Carter Creek and Kent Point, maximum linear recession is 1250 ft. Bloody Point has receded 1250 feet and Kent Point 650 ft. The mouth of Bloody Point Creek has moved 1250 ft. eastward.

Areas of greatest deposition:

1. The entrance to the unnamed creek 1 mile north of Tolson Creek has been closed by an area 650 ft. wide.
2. The entrance to Tolson Creek has been closed by a bar 600 ft. wide at its southern end.

3. The entrance to the unnamed creek south of Carter Creek has built out linearly a maximum of 300 ft.

CHESTER RIVER

Love Point to Piney Creek

Areas of greatest erosion:

1. From the unnamed creek south of Love Point Landing to Macum Creek, maximum linear recession is 500 ft.
2. Between Macum Creek and Piney Creek, maximum linear recession is 500 ft. The point at the west shore entrance of Piney Creek has receded 1100 ft.

Area of deposition:

The marsh area on the north side of Love Point Landing has built out linearly 700 ft.

Piney Creek to Jackson Creek

This shore is deeply indented so the individual areas are small but numerous. Long Point has receded 300 ft. The west shore of Jackson Creek shows a maximum linear recession of 500 ft.

Areas of deposition are small and scattered.

Jackson Creek to Tilghman Creek

Areas of greatest erosion:

1. Between Jackson Creek and Queenstown Creek, maximum linear recession is 300 ft.
2. Between Queenstown Creek and Tilghman Creek, maximum linear recession is 300 ft.

Areas of deposition:

1. The east shore of Jackson Creek has built out linearly a maximum of 200 ft.
2. The entrance of Winchester Creek has shifted 600 ft. west and decreased in width 300 ft.
3. A marsh area at the south shore entrance of Queenstown Creek has built out linearly a maximum of 150 ft.

Break Point to Holton Point

Areas of greatest erosion:

1. The maximum linear recession between Break Point and Butler Cove is 200 ft. Break Point has receded 800 ft.
2. From Piney Point to Gordon Point, maximum linear recession is 150 ft. Piney Point has receded 100 ft. and Gordon Point 200 ft.
3. From Grove Creek to Holton Point, maximum linear recession is 100 ft. Holton Point has receded 150 ft.

A small area southeast of Gordon Point has built out linearly a maximum of 150 ft.

Corsica River to Shell Point

The west shore of Spaniard Neck shows a maximum linear recession of 150 ft. Spaniard Point has receded 100 ft. Shell Point has receded 250 ft.

Shell Point to Hambleton Creek

Between Northwest Point and Wilmer Point, maximum linear recession is 150 ft. Wilmer Point has receded 100 ft. Northwest Point shows no change. From Deep Point to Hambleton Creek the areas of erosion are small.

Areas of deposition are small and scattered.

Hambleton Creek to 2200 ft. east of Possum Point

Between Long Point and 1700 ft. southwest of Peachtree Point, maximum linear recession is 150 ft. Possum Point has receded 150 ft.

Immediately southwest of Possum Point an area has built out linearly a maximum of 200 ft.

EASTERN BAY

West Shore

Kent Point to 4500 ft. north of Romancoke (Plate 18)

Areas of greatest erosion:

1. From 6000 ft. north of Kent Point to Tanners Creek, maximum linear recession is 350 ft.
2. From Long Point to Philpots Islands, maximum linear recession is 500 ft. Long Point has receded 750 ft.
3. Philpots Islands were formerly a long narrow neck of land. The northeast tip of the neck has receded 1000 ft.

EASTERN BAY

East Shore

Hoghole Creek to Bennett Point

Areas of greatest erosion:

1. From one mile south of Hoghole Creek to Greenwood Creek, maximum linear recession is 450 ft.
2. From Greenwood Creek to Bennett Point, maximum linear recession is 350 ft. Bennett Point has receded 300 ft.

Area of deposition:

The east shore entrance of Hoghole Creek has built out linearly a maximum of 700 ft. northwest.

CRAB ALLEY BAY

Turkey Point on the west and Narrow Point on the east to the head of the Bay

West Shore—between Turkey Point and Crab Alley Creek the areas of erosion are small, but there is a maximum linear recession of 350 ft. at the largest area.

East Shore—from Little Creek to Normans Point are numerous large areas with a maximum linear recession of 450 ft. Narrow Point has receded 1600 ft.

PROSPECT BAY

West Shore

Narrow Point to Kent Narrows

The shoreline is deeply indented with numerous small coves and inlets. Maximum linear recession is 200 ft.

PROSPECT BAY

East Shore

Kent Narrows to Hoghole Creek

Areas of greatest erosion:

1. Between Marshy Creek and Hood Point, maximum linear recession is 500 ft. Hood Point has receded 150 ft.
2. Between Cabin Creek and Hoghole Creek, maximum linear recession is 550 ft. Brian Point has receded 500 ft.

WYE RIVER

West Shore

Bennett Point to a point west of Grapevine Point

Areas of erosion are numerous but small.

WYE RIVER

East Shore

Bordley Point to 1500 ft. northeast of Grapevine Point

Areas of greatest erosion:

1. 3000 ft. northwest of Bordley Point to Bigwood Cove, maximum linear recession is 200 ft.
2. For a distance of 1500 ft. on each side of Grapevine Point, maximum linear recession is 250 ft. Grapevine Point has receded 350 ft.

WYE EAST RIVER

Bordley Point to Granary Creek

The point opposite Lloyd Creek has receded 220 ft.

A small area immediately west of Granary Creek has built out linearly a maximum of 100 ft.

CORSICA RIVER

North Shore

From entrance to Emory Creek

There are a number of small areas of erosion in which the maximum linear recession is 150 ft.

CORSICA RIVER

South Shore

Holton Point to Corsica Landing

Areas of erosion:

1. Between Holton and Town Points, there is a maximum linear recession of 150 ft. Town Point has receded 200 ft.

2. Between Tilghman Cove and Wash Point, there is a maximum linear recession of 200 ft.

Areas of deposition:

1. A small area immediately east of Town Point has built out a maximum of 250 ft. east.
2. Wash Point has built out 70 ft. north.

REED CREEK

From the entrance to $\frac{3}{4}$ mile upstream

Little erosion or deposition has occurred.

SOUTHEAST CREEK

From the entrance to $\frac{1}{2}$ mile upstream

The north shore shows a maximum linear recession of 200 ft. and the south shore 150 ft.

SHIPPING CREEK (Plate 18)

The west shore shows a maximum linear recession of 250 ft. A point of land on the north shore has receded 850 ft.

COX CREEK (Plate 18)

From the southern end of Bats Neck on the west and Turkey Point on the east upstream $1\frac{1}{2}$ miles

Areas of erosion:

West shore

1. The lower end of Bats Neck shows a maximum linear recession of 850 ft.
2. A small cove further north separates two areas of erosion, the southern area showing maximum linear recession of 200 ft. and the northern area 350 ft.

East shore

1. From Turkey Point for a distance of 3900 ft. north, there is a maximum linear recession of 200 ft. Turkey Point has receded 150 ft.
2. Further north is an area 2000 ft. long that shows a maximum linear recession of 300 ft.

Areas of deposition:

East shore

1. From 3900 ft. north of Turkey Point for a distance of 2000 ft. north, maximum linear building out is 200 ft.
2. In the northern half of the measured distance, an area 2600 ft. long has built out linearly a maximum of 300 ft.

PARSON ISLAND

Parson Island lies between Prospect Bay and Eastern Bay. The land is low with marsh areas at the northern and southern ends.

The greatest amount of land lost and the highest rate of recession has taken place at the southwest end of the island. The maximum linear recession is 600 ft.

The maximum linear recession along the east shore is 200 ft.

BODKIN ISLAND

Bodkin Island lies 2 miles southwest of Parson Island in Eastern Bay. The island, which was formerly low land with two small marsh areas, has broken into two parts, each of which is half low land and half marsh.

Maximum linear recession is 350 ft. on the west shore and 250 ft. on the east shore. The north end has receded 650 ft. and the south end 1000 ft.

SUMMARY

In Queen Annes County the northern third of Kent Island Chesapeake Bay shoreline has the highest rate of loss. The southern third has the second highest rate of loss, but has the greatest rate of linear recession.

The south shore of the Chester River shows a decrease in the rate of loss towards the head of the river.

The east shore of Prospect Bay has a higher rate of loss than the west shore.

The east shore of the Wye River has a higher rate of loss than the west shore.

Of the islands, Bodkin Island has lost the greatest percentage of total area.

Over an average time interval of 96 years there have been 2026 acres of erosion and 247 acres of deposition in Queen Annes County, making the total loss to the County 1779 acres. The Queen Annes County measurements are summarized in Table 11.

ST. MARYS COUNTY

The topography landward of the Chesapeake Bay in St. Marys County reaches the 20 ft. contour level from Hog Point to the shore line east of St. James. Southward to Point Lookout the land is low with scattered areas of marsh.

Along the Potomac River from Point Lookout to midway between Herring Creek and Blake Creek the land is below the 20 ft. contour level. From this location to Flood Creek the shore is backed by cliffs reaching a height of 20 ft. From Flood Creek to the entrance of the Wicomico River the land is below the 20 ft. contour level.

Along the east shore of the Wicomico River to Chaptico Bay the land is low. From Chaptico Bay northward the coast rises to a height of 40 ft. or more.

The west shore of the Patuxent River is backed by cliffs 20 ft. or more in height except from Horse Landing Creek to Indian Creek which is low land.

The geologic age and composition of the formations along the shores of St. Marys County are:

Pleistocene—clay, sand, gravel, peat and marl
Miocene —clay, sandy clay, marl, and diatomaceous earth

DESCRIPTION OF AREAS IN ST. MARYS COUNTY

CHESAPEAKE BAY

Hog Point to Pine Hill Run (Fig. 8)

Areas of greatest erosion:

From Hog Point to 7000 ft. south of Cedar Point, the maximum linear recession is 1100 ft. Hog Point has receded 400 ft. and Cedar Point 2000 ft. Cedar Point was

formerly connected to the mainland by two bars which formed a lake. The connecting bars have eroded away, leaving the small Cedar Island on which the light house is located.

Area of deposition:

1700 ft. southwest of Hog Point an area has built out linearly a maximum of 500 ft.

Pine Hill Run to the shore east of St. James

From Pine Hill Run for a distance of 3 miles maximum linear recession is 250 ft.

For a distance of 3800 ft. beginning 3½ miles south of Pine Hill Run, maximum linear building out is 120 ft.

From ¾ mile northwest of Point No Point to St. Jerome Point (Plate 19)

Areas of greatest erosion:

1. From Point No Point northwest for a distance of 4¾ miles, there is a maximum linear recession of 800 ft.
2. Between Point No Point and St. Jerome Point, there is a maximum linear recession of 400 ft. St. Jerome Point has receded 800 ft.

Areas of deposition:

1. Point No Point has built out 500 ft.
2. A spit on St. Jerome Point has built out 300 ft. to the northwest.

Deep Point to Point Lookout (Plate 19)

Areas of greatest erosion:

1. From 1600 ft. south of Deep Point to 2600 ft. south of Point Look-in, there is a maximum linear recession of 600 ft. Point Look-in has receded 300 ft.
2. From 1200 ft. south of Deep Creek to Point Lookout, there is a maximum linear recession of 1000 ft. at 3600 ft. north of Point Lookout. Scotland Beach area has receded a maximum of 500 ft.

Areas of deposition:

1. Deep Point has built out 1650 ft. to the north.
2. From 1800 ft. north to 1200 ft. south of Deep Creek, maximum linear building out is 600 ft.
3. Point Lookout has built out 100 ft. to the south.

POTOMAC RIVER

White Neck Creek to Flood Creek

Areas of greatest erosion:

1. Waterloo Point vicinity shows a maximum linear recession of 250 ft. Waterloo Point has receded 150 ft.
2. Colton Beach area shows a maximum linear recession of 200 ft. Colton Point has receded 500 ft.
3. From Cornish Point to Kaywood Point, maximum linear recession is 200 ft.
4. Between Huggins Point and Flood Creek, the maximum linear recession is 400 ft. Huggins Point has receded 700 ft.

Flood Creek to McKay Beach

Areas of greatest erosion:

1. Between Flood Creek and Belvedere Creek, there is a maximum linear recession of 200 ft.

TABLE 11.—*Shore Erosion Statistics of Queen Annes County*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Chesapeake Bay							
Love Pt. to Broad Creek	98	5.1	256	37	219	42.9	.43
Broad Creek to ¾ mile south of Craney Creek	96	5.7	136	26	110	19.3	.20
From ¾ mile south of Craney Creek to Kent Pt.	96	6.8	296	33	263	38.6	.40
Totals	97	17.6	688	96	592	33.0	.34
Chester River							
Love Pt. to Piney Creek	98	5.0	114	22	92	18.4	.18
Piney Creek to Jackson Creek	96	6.0	69	4	65	10.8	.11
Jackson Creek to Tilghman Creek	96	6.3	102	10	92	14.6	.15
Break Pt. to Holton Pt.	96	4.8	65	3	62	12.9	.13
Corsica River to Shell Pt.	93	5.8	38	3	35	6.0	.06
Shell Pt. to Hambleton Creek	94	6.2	36	7	29	4.6	.04
Hambleton Creek to 2200 ft. east of Possum Pt.	92	7.3	30	10	20	2.7	.02
Totals	95	41.4	454	59	395	9.5	.10
Eastern Bay—West Shore							
Kent Pt. to 4500 ft. north of Romancoke	98	6.4	141	10	131	20.4	.20
East Shore							
Hoghole Creek to Bennett Pt.	95	6.7	114	10	104	15.5	.16
Totals	97	13.1	255	20	235	17.9	.18
Crab Alley Bay	96	7.1	110	10	100	14.0	.14
Prospect Bay—West Shore							
Narrow Pt. to Kent Narrows	96	7.2	46	7	39	5.4	.05
East Shore							
Kent Narrows to Hoghole Creek	96	7.5	97	7	90	11.6	.12
Prospect Bay Totals	96	14.7	143	14	129	8.7	.09
Wye River—West Shore							
Bennett Pt. to west of Grapevine Pt.	94	5.2	18	7	11	2.1	.02
East Shore							
Bordley Pt. to 1500 ft. northeast of Grapevine Point	94	4.7	32	1	31	6.6	.07
Wye River Totals	94	9.9	50	8	42	4.2	.04

TABLE 11.—*Continued*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Wye East River							
Bordley Pt. to Granary Creek	94	3.8	14	6	8	2.1	.02
Corsica River—North Shore							
From entrance to Emory Cr.	94	2.0	10	2	8	4.0	.04
South Shore							
Holton Pt. to Corsica Landing	94	2.9	18	3	15	5.1	.05
Corsica River Totals	94	4.9	28	5	23	4.6	.04
Reed Creek							
From entrance upstream ¾ mile	96	3.0	15	4	10	3.3	.03
Southeast Creek							
From entrance upstream ½ mile	94	1.3	14	0	14	10.7	.11
Shipping Creek	98	1.3	26	0	26	20.0	.20
Cox Creek							
From south end of Bats Neck on west, Turkey Pt. on east, upstream 1½ miles	97	4.5	77	20	57	12.6	.12
River and Creek Totals	95	105.0	1,186	147	1,039	9.8	.10

	Time Interval	Miles Measured	Old Area	New Area	Loss	Erosion	Deposition	Net Loss	% Total Area Lost	Annual Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*	*acres*		*acres*
Islands										
Parson	96	2.6	182	130	52	52	0	52	28.5	.54
Bodkin	96	.8	44	8	36	36	0	36	81.8	.85
Other Small		3.4				64	4	60		
Island Totals	96	6.8	226	138	88	152	4	148		

	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
QUEEN ANNES COUNTY TOTALS	96	129.4	2,026	247	1,779	13.5	.14
KENT ISLAND TOTALS	96	52.3	1,233	166	1,067	20.4	.21

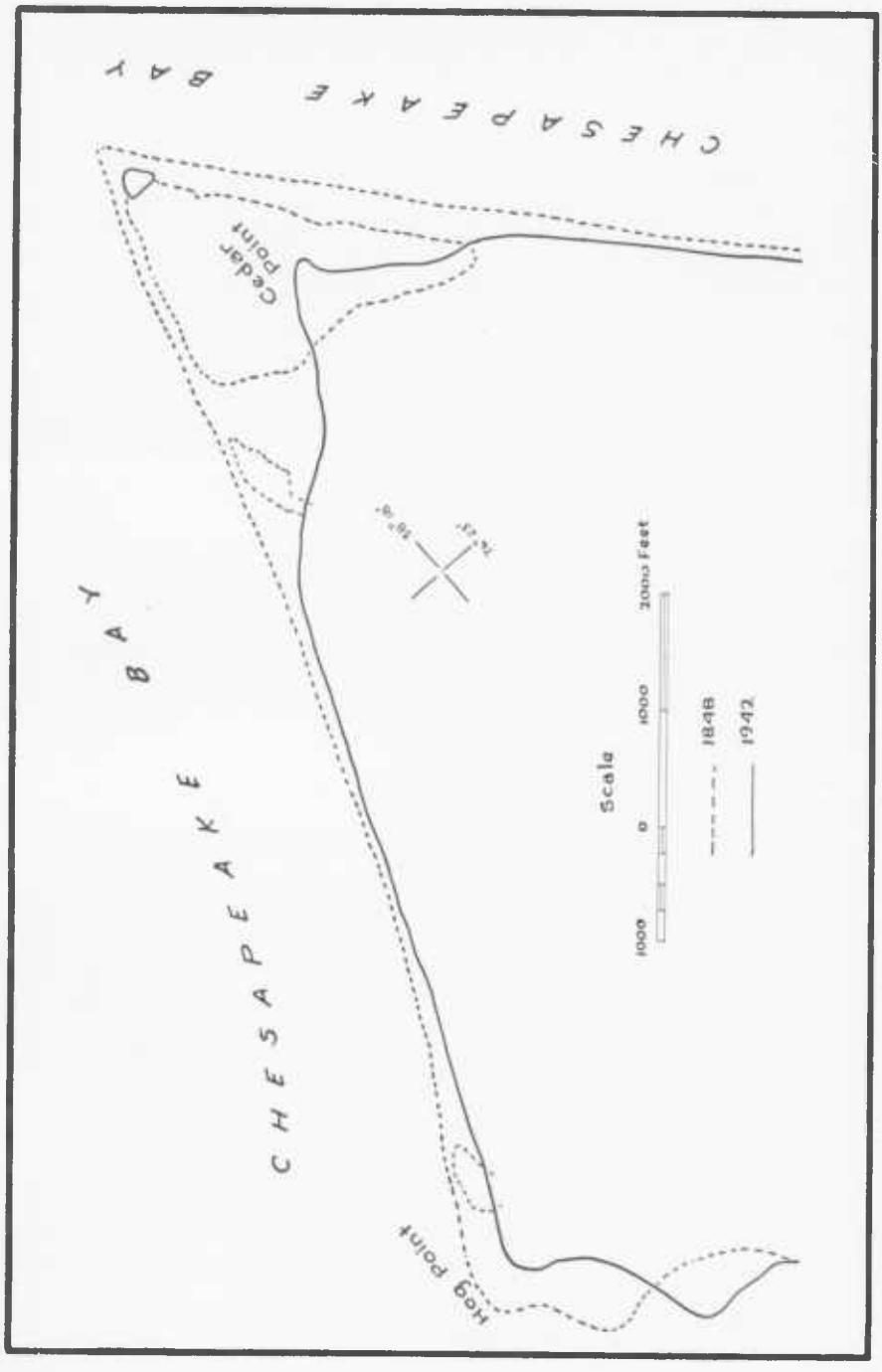

FIG. 8.—*Shore Line Changes in Cedar Point Area, St. Marys County.*

2. From Poplar Hill Creek to near Mulberry Field Creek, maximum linear recession is 200 ft.
3. From Blake Creek to McKay Beach, maximum linear recession is 260 ft.

McKay Beach to Straits Point

Areas of greatest erosion:

1. Between Herring Creek and Piney Point Creek, maximum linear recession is 300 ft. The shore of Tall Timbers shows a maximum linear recession of 180 ft.
2. From Straits Point for 2400 ft. west, maximum linear recession is 450 ft. Straits Point has receded 100 ft.

Areas of deposition are small and scattered.

Smith Creek to Biscoe Creek (Plate 20)

Areas of greatest erosion:

1. Between Smith Creek and Gray Point, maximum linear recession is 650 ft. Lawson Point has receded 700 ft. and Gray Point 1000 ft.
2. Between Harry James Creek and Biscoe Creek, maximum linear recession is 400 ft.

The entrance of Biscoe Creek which was 600 ft. wide has closed completely.

Biscoe Creek to Point Lookout (Plate 20)

Areas of greatest erosion:

1. Between Biscoe Creek and Point Lookout Creek, maximum linear recession is 350 ft. Cornfield Point has receded 200 ft.
2. For a distance of 6600 ft. northwest from Point Lookout, maximum linear recession is 150 ft.

PATUXENT RIVER

Harper Creek to Town Point

Area of erosion:

Between Harper Creek and Fishing Point is a maximum linear recession of 200 ft. Town Point has receded 70 ft.

Areas of greatest deposition:

1. From Fishing Point for a distance of 4000 ft. southwest, there is a maximum linear building out of 220 ft.
2. From 500 ft. north to 1500 ft. south of Green Holly Pond, the maximum linear building out is 170 ft.
3. From Esparanza Pond to Lewis Creek, the maximum linear building out is 70 ft.
4. Between Lewis Creek and Town Creek, there is a maximum linear building out of 250 ft.

Town Point to one mile northwest of St. Cuthbert Wharf

Areas of greatest erosion:

1. From 2000 ft. west of Town Point to Little Kingston Creek, the maximum linear recession is 100 ft. The point at the entrance of the creek has migrated 500 ft. southward.
2. For 4300 ft. north from Half Pone Point, there is a maximum linear recession of 170 ft.

3. For 2700 ft. north from St. Cuthbert Wharf, there is a maximum linear recession of 300 ft.

Areas of deposition are numerous but small and scattered.

From 1¼ miles southeast of Sotterly Point to Cole Creek

Areas of greatest erosion:

1. From 2300 ft. west of Captain Point for a distance of 3000 ft. west, there is a maximum linear recession of 100 ft.
2. From Cole Creek eastward 3500 ft., maximum linear recession is 170 ft.

On the east shore entrance of Cole Creek, a double pronged point has built out 400 ft. westward.

Cole Creek to Horse Landing Creek

Areas of greatest erosion:

1. Between Cole Creek and Second Creek, maximum linear recession is 120 ft.
2. Between Sandgates Creek and Cat Creek, maximum linear recession is 150 ft.
3. From 1400 ft. south to 1900 ft. north of Queen Tree Landing, maximum linear recession is 200 ft.
4. For 5500 ft. southward from Horse Landing, maximum linear recession is 200 ft.

Areas of deposition:

1. Between Second and Roslin Creeks, there is a maximum linear building out of 300 ft.
2. From Cat Creek for a distance of 1100 ft. north, an area has built out linearly a maximum of 370 ft.

Horse Landing Creek to Trent Hall Point

Areas of greatest erosion:

1. Between Horse Landing Creek and Spring Creek, maximum linear recession is 450 ft.
2. From Spring Creek to Cremona Creek, maximum linear recession is 150 ft. Marsh Point has receded 100 ft.
3. Between Cremona Creek and Persimmon Creek, maximum linear recession is 150 ft.
4. From Persimmon Creek to Jones Creek, maximum linear recession is 170 ft.
5. From 1000 ft. south of Trent Hall Point to Jones Creek, maximum linear recession is 150 ft.

Areas of deposition:

1. The entrance of Horse Landing Creek has built out a maximum of 250 ft. north.
2. The former entrance of Cremona Creek has closed toward the northwest with a maximum width of 200 ft.
3. From Trent Hall Point for a distance of 1000 ft. south, maximum building out is 70 ft.

Trent Hall Point to Indian Creek, including the entrance of Trent Hall Creek

Areas of greatest erosion:

1. From Trent Hall Point to Trent Hall Creek, maximum linear recession is 200 ft. Trent Hall Point has receded 200 ft.
2. From Trent Hall Creek to Long Point, maximum linear recession is 120 ft.
3. From Long Point to Indian Creek, maximum linear recession is 130 ft.

Areas of deposition:

1. The north and south shore entrances of Trent Hall Creek show a maximum linear building out of 100 ft.
2. The south shore entrance of Indian Creek shows a maximum linear building out of 150 ft.

WICOMICO RIVER

White Neck Point to Manahowic Creek

Areas of erosion are small and scattered. Bluff Point has receded 300 ft.
Areas of deposition are small.

Manahowic Creek to Budds Creek

For a distance of 3400 ft. northeast from Mill Point, maximum linear recession is 100 ft. Mill Point has receded 200 ft. From Chaptico Bay to Budds Creek, there has been little change in the shore line.

ST. MARYS RIVER

West Shore

Cherryfield Point to 1000 ft. north of Deep Point

Areas of greatest erosion:

1. Between Cherryfield Point and Edmund Point, maximum linear recession is 350 ft. Cherryfield Point has receded 500 ft. and Edmund Point 370 ft.
2. From Carthagena Creek to Windmill Point, maximum linear recession is 200 ft.

Windmill Point has migrated 300 ft. north. Other areas of deposition are small.

ST. MARYS RIVER

East Shore

Kitts Point to Church Point, including entrance of St. Inigoes Creek

Areas of greatest erosion:

1. Between Kitts Point and Sage Point, maximum linear recession is 900 ft. Kitts Point has receded 800 ft. and Sage Point 500 ft. (Plate 20)
2. From Sage Point to 3200 ft. north of Fort Point, maximum linear recession is 350 ft. Fort Point has receded 300 ft.

ST. CLEMENT BAY

From 2000 ft. south of St. Patrick Creek on the western shore and Cornish Point on eastern shore one mile upstream

Areas of greatest erosion:

1. From St. Patrick Creek for a distance of 2000 ft. south, maximum linear recession is 180 ft.
2. From St. Patrick Creek to Shipping Point, maximum linear recession is 350 ft. Shipping Point has receded 200 ft.

Area of deposition:

From Long Point on the east shore for a distance of 2400 ft. northeastward, there is a maximum linear building out of 180 ft.

BRETON BAY

From Kaywood Point on the west shore and Huggins Point on the east shore one mile upstream

Areas of greatest erosion:

1. Between Kaywood and Payne Points, maximum linear recession is 180 ft.
2. From Huggins Point for a distance of 2800 ft. north, maximum linear recession is 250 ft.

Area of deposition:

From Protestant Point for a distance of 6800 ft. eastward is a maximum linear building out of 180 ft. Protestant Point has built out 100 ft. northward.

CHAPTICO BAY

From the entrance 1½ miles upstream

Areas of erosion and of deposition are small.

ISLANDS

ST. GEORGE ISLAND

St. George Island is at the west entrance of St. Marys River with St. George Creek bordering its north shore, St. Marys River its east shore and the Potomac River its south and west shores. The island is low land with marsh in the southern and central parts.

Areas of greatest erosion:

North shore—none.

East shore—none. The areas are small.

South shore—from Island Creek to Deep Point, maximum linear recession is 400 ft.

West shore—from Deep Point to the north end of Island, maximum linear recession is 700 ft.

Areas of greatest deposition:

East shore—maximum linear building out is 200 ft. from the north end to 1200 ft. west of Ball Point. Deep Point has built out 100 ft. south.

ST. CATHERINE ISLAND

St. Catherine Island is at the east entrance of the Wicomico River with its north and east shores on St. Catherine Sound and its south shore on the Potomac River. The island is composed entirely of low land.

On the south shore, maximum linear recession is 250 ft.

Maximum linear building out on the northern shore is 180 ft. and on the eastern shore 200 ft.

BLAKISTON ISLAND

Blakiston Island lies in the Potomac River off the entrance of St. Clement Bay. The island is predominantly low land with small scattered areas of marsh along its shore line.

Areas of erosion:

Along the middle of the east shore is a maximum linear recession of 150 ft. The west shore shows a maximum linear recession of 400 ft.

Areas of deposition:

The northeast end shows maximum building out of 50 ft. The southeast end shows maximum building out of 100 ft.

SUMMARY

The area of Chesapeake Bay shore in St. Marys County that shows the greatest rate of loss is that between 4¾ miles north of Point No Point and St. Jerome Point. The greatest linear recession occurs, however, immediately west of Cedar Point. The area having the second highest rate of loss is between Deep Point and Point Lookout.

The Potomac River has the highest rate of loss of the rivers. The area showing the greatest annual rate of loss is between Smith Creek and Biscoe Creek. On the Patuxent River the rate of loss gradually increases to the vicinity of Trent Hall Point but north of Trent Hall Point it decreases.

The greatest amount of loss and linear recession on the islands occurs on the west shores of St. George, Blakiston and St. Catherine Islands. Blakiston Island has the highest percentage of area lost; but due to its larger size, St. George Island has the greatest area loss.

There have been 1,801 acres of erosion and 267 acres of deposition in St. Marys County over the average time interval of 82 years, resulting in a net loss to the County of 1,534 acres. The St. Marys County measurements are summarized in Table 12.

SOMERSET COUNTY

The topography landward of the tidewater shore in Somerset County is predominantly marsh. The largest area of low land is between Long Point at the mouth of the Wicomico River and the southern end of Deal Island. Another short stretch of low land extends from Wingate Point on the Wicomico River for a distance of 4 miles upstream.

The geologic age and composition of the formations along the shores are:

Recent —sand and marsh

Pleistocene—clay, peat, sand and gravel

DESCRIPTIONS OF AREAS IN SOMERSET COUNTY

TANGIER SOUND

Lower half of Laws Thorofare to Crab Point, including Big Sound Creek, Fishing Creek, and Letter Cove

Areas of erosion:

The shoreline is very ragged and marshy. Although maximum linear recession is great at certain points, there are no major areas of erosion. Laws Thorofare shows a maximum linear recession of 150 ft., Big Sound Creek 400 ft., eastern shore of Fishing Creek 400 ft., and Letter Cove 250 ft. West Point has receded 900 ft.

St. Pierre Point to Big Annemessex River, including Teague Creek, Drum Point Cove, Goose Creek, Mine Creek and Hazard Cove

Areas of greatest erosion:

1. Between Teague Creek and Drum Point Cove, there is a maximum linear recession of 200 ft.; Drum Point has receded 250 ft.
2. The southern shore of Goose Creek shows a maximum linear recession of 250 ft.
3. Hazard Point and immediate vicinity shows a maximum linear recession of 300 ft. Hazard Point has receded 1300 ft.

Flatcap Point to Island Point, including Rock Hole (Plate 21)

Areas of greatest erosion:

1. From Flatcap Point to Rock Hole, maximum linear recession is 450 ft.

TABLE 12.—*Shore Erosion Statistics of St. Marys County*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Chesapeake Bay							
Hog Pt. to Pine Hill Run	94	4.5	102	21	81	18.0	.19
Pine Hill Run to shore east of St. James	94	5.0	69	6	63	12.6	.13
From 4¾ miles northwest of Point No Point to St. Jerome Pt.	94	6.6	301	14	287	43.4	.46
Deep Pt. to Point Lookout	93	6.4	200	31	169	26.3	.28
Totals	94	22.5	672	72	600	26.6	.28
Potomac River							
White Neck Creek to Flood Creek	75	9.0	150	9	141	15.6	.20
Flood Creek to McKay Beach	75	5.1	62	1	61	12.0	.16
McKay Beach to Straits Pt.	75	5.7	63	7	56	9.8	.13
Smith Creek to Biscoe Creek	84	2.8	117	4	113	40.3	.43
Biscoe Creek to Point Lookout	94	4.8	74	5	69	14.3	.15
Totals	81	27.4	466	26	440	16.0	.19
Patuxent River							
Harper Creek to Town Pt.	94	5.4	24	23	1	0	0
Town Pt. to 1 mile northwest of St. Cuthbert Wharf	94	5.3	35	17	18	3.3	.03
From 1¼ miles southeast of Sotterly Pt. to Cole Creek	82	5.2	25	10	15	2.8	.04
Cole Creek to Horse Landing Creek	82	4.8	45	13	32	6.6	.08
Horse Landing Creek to Trent Hall Pt.	82	4.3	38	7	31	7.2	.08
Trent Hall Pt. to Indian Creek including entrance of Trent Hall Creek	82	3.6	22	5	17	4.7	.05
Totals	86	28.6	189	75	114	3.9	.04
Wicomico River							
White Neck Point to Manahowic Creek	75	5.5	21	5	16	2.9	.03
Manahowic Creek to Budds Creek	75	6.3	24	2	22	3.4	.04
Totals	75	11.8	45	7	38	3.2	.04
St. Marys River—West Shore							
Cherryfield Pt. to 1000 ft. north of Deep Pt.	85	6.3	53	7	46	7.3	.08
East Shore							
Kitts Pt. to Church Pt. including entrance of St. Inigoes Creek	85	7.9	117	2	115	14.5	.17
Totals	85	14.2	170	9	161	11.3	.13

TABLE 12.—*Continued*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
St. Clement Bay							
From 2000 ft. south of St. Patrick Creek on west shore and Cornish Pt. on east, upstream one mile	75	2.8	28	10	18	6.4	.08
Breton Bay							
From Kaywood Pt. on west shore, Huggins Pt. on east shore, upstream one mile	75	4.2	21	12	9	2.1	.02
Chaptico Bay							
From entrance upstream 1½ miles	75	3.6	9	7	2	0	0
Rivers and Small Bay Totals	80	92.6	928	146	782	8.4	.10

	Time Interval	Miles Measured	Former Area	Present Area	Loss	Erosion	Deposition	Net Loss	% Total Area Lost	Annual Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*	*acres*		*acres*
Islands										
St. George	84	8.3	664	547	117	151	37	114	17.0	1.3
St. Catherine	75	2.0	73	66	7	18	11	7	9.5	.09
Blakiston	75	1.4	79	58	21	22	1	21	26.5	.35
St. Margaret	75					10	0	10		.5
Totals	77	12.2				201	49	152		
									Rate of Loss	Annual Rate of Loss
									acres	*acres*
ST. MARYS COUNTY TOTALS	82	127.3				1,801	267	1,534	12.0	.14

2. From Ward Creek to 2800 ft. north of Island Point, maximum linear recession is 650 ft.

Areas of greatest deposition:

1. Island Point has built out 400 ft. south, and the connected easterly spit has built out 3200 ft. with a maximum width of 250 ft.
2. At the south shore entrance of Rock Hole, a point has built out 450 ft. northward.
3. The south shore entrance of Ward Creek has built out 200 ft. eastward.

Great Point to Cedar Island Creek

Areas of erosion:

This entire shore has undergone considerable erosion; however, it is deeply indented

and most of the change has taken place at the entrances of the small coves and creeks. The overall rate of recession is constant for the entire shoreline, and maximum linear recession is 550 ft. Great Point has receded 800 ft.

POCOMOKE SOUND

Watkins Point to Ware Point, including the entrance of Broad Creek

Areas of greatest erosion:

1. Between Fishing Creek and Westward Point, which is a ragged shoreline, the maximum linear recession is 400 ft. Westward Point has receded 200 ft.
2. Between Eastward Point and Oystershell Point, which is a deeply indented shoreline, there is a maximum linear recession of 350 ft. Eastward Point has receded 200 ft. and Oystershell Point 900 ft.

Ape Hole Creek to Fair Island Canal

Areas of greatest erosion:

1. Between Ape Hole Creek and Gunby Creek, there is a maximum linear recession of 750 ft. Gap Point has receded 700 ft.
2. Between Gunby Creek and East Creek Point, there is a maximum linear recession of 350 ft. The point at the west shore entrance of Gunby Creek has receded 700 ft.
3. Between East Creek and Marumsco Creek, maximum linear recession is 300 ft. Tull Point has receded 300 ft.
4. From Marumsco Creek to Fair Island Canal, maximum linear recession is 250 ft.

WICOMICO RIVER

Wingate Point to Mount Vernon Wharf

Major areas of erosion:

1. Between Wingate and Island Points, the maximum linear recession is 300 ft. Wingate Point has receded 150 ft. and Island Point 170 ft.
2. Between Island Point and Victor Point there is a maximum linear recession of 150 ft.

NANTICOKE RIVER AND WICOMICO RIVER ENTRANCES AND NORTHERN TANGIER SOUND

North Shore entrance of Upper Thorofare to Pigeon Creek (Plate 22)

Areas of greatest erosion:

1. Between Haines Point and Rock Creek, there is a maximum linear recession of 500 ft. Haines Point has receded 250 ft.
2. Between Rock Creek and Long Point, the maximum linear recession is 380 ft. Long Point has receded 700 ft.
3. Between Dames Quarter Creek and Pigeon Creek, there is a maximum linear recession of 300 ft.

Areas of greatest deposition:

1. The north shore entrance of Upper Thorofare has built out linearly 350 ft. for a distance of 1200 ft.
2. The west shore entrance of Rock Creek has built out 450 ft. to the northeast.

MONIE BAY

Wingate Point on north shore and Pigeon Creek on south shore to Nail Point

Areas of greatest erosion:

North shore:

1. Between Wingate Point and Monie Point, there is a maximum linear recession of 700 ft. Monie Point has receded 300 ft.

2. Between Monie Point and Nail Point, there is maximum linear recession of 300 ft.

South shore:

1. From Pigeon Creek to Bay Point, the maximum linear recession is 250 ft.
2. Sob Point, east of Bay Point, has receded 300 ft.

MANOKIN RIVER

Crab Point to Locust Point on the north shore and St. Pierre Point to Back Creek on the south shore

Areas of greatest erosion:

North shore:

Between Champ Point and Round Point, maximum linear recession is 200 ft. Champ Point has receded 300 ft., Round Point 270 ft., and Crab Point 150 ft.

South Shore:

The east shore of Broad Creek shows a maximum linear recession of 200 ft.

Area of deposition:

On the south shore Fishing Point has built out 400 ft. northward, and on the west shore of Broad Creek are two small areas of deposition.

BIG ANNEMESSEX RIVER

North Shore

Pat Island to Horsehead Point, including Mine, Shirtpond, Flatland, Fords, and Crane Coves and Moon Bay

This shore is deeply indented by many shallow coves. There are no large areas of erosion, but the rate of recession is high at some salients. Sandy Point has receded 100 ft.

South Shore

Flatcap Point to Gales Creek, including entrances to Acre and Jones Creeks

Areas of greatest erosion:

1. From Flatcap Point for a distance of 5200 ft. eastward, there is a maximum linear recession of 250 ft. Flatcap Point has receded 300 ft.
2. Between Joes Cove and Long Point, maximum linear recession is 200 ft. Long Point has receded 200 ft.

Areas of deposition are numerous, but small and scattered.

LITTLE ANNEMESSEX RIVER

Old House Cove to 1800 ft. northeast of Long Point on the north shore and Great Point to 1800 ft. northeast of Hammock Point, including the entrance of Jenkins Creek, on the south shore

Areas of greatest erosion:

1. Between the west shore of Old House Cove and Long Point, there is a maximum linear recession of 500 ft.
2. Between Jenkins Creek and Hammock Point, the maximum linear recession is 200 ft.

Long Point has built out 150 ft. eastward.

APE HOLE CREEK

Areas of greatest erosion:

From Ware Point Creek to 2400 ft. northwest of Long Point on the west shore, the maximum linear recession is 400 ft.

For a distance of 4600 ft. from the entrance of Johnson Creek, on the east shore, maximum linear recession is 400 ft.

CEDAR STRAITS

The maximum linear recession along the north shore is 100 ft.

EAST CREEK

From the entrance $\frac{3}{4}$ mile upstream

The maximum linear recession of the west shore is 150 ft. and of the east shore 150 ft.

MARUMSCO CREEK

From 3100 ft. north of Rumbly Point on the west shore and the west end of Sound Shore on the east shore upstream $\frac{1}{2}$ mile

Maximum linear recession of the west shore is 100 ft. and of the east shore 150 ft.

SOUTH MARSH ISLAND

South Marsh Island lies west of the upper half of Somerset County mainland. The southwest shore of South Marsh Island faces the Chesapeake Bay, the northwest shore Holland Strait, and the east shore Tangier Sound. Kedges Straits separate it from Smith Island on the south. It is almost entirely marsh.

Southwest Shore:

From Sedgy Point for a distance of $1\frac{3}{4}$ miles maximum linear recession is 800 ft. A marshy point which formerly extended 2200 ft. from Sedgy Point parallel to the shore has disappeared.

Northwest Shore:

From Johnson Point to Gunbarrel Point, maximum linear recession is 500 ft.

East shore:

1. The vicinity of Sound Point has receded a maximum of 400 ft.
2. Between Long and Thomas Points the maximum linear recession is 900 ft.

SMITH ISLAND (Plate 23)

The north shore of Smith Island faces Kedges Strait, the east shore Tangier Sound, and the south and west shores the Chesapeake Bay. Smith Island is predominantly marsh with a few small scattered areas of low land.

Smith Island is not a single island but four island aggregates of many small marsh islands with an intricate system of narrow inlets, natural canals, and waterways. The southern end of the Island is in Virginia.

North Shore:

Areas of greatest erosion:

1. Between Bridge Creek and Fishing Point, there is a maximum linear recession of 650 ft.
2. From Back Cove to Terrapin Sand Point, the maximum linear recession is 1100 ft.

Areas of deposition:

A marshy spit with a maximum width of 400 ft. has built out 1900 ft. eastward from Frog Point.

East Shore:

The shore is deeply indented and ragged with many small areas of erosion. Maximum linear recession is 200 ft.

South of Terrapin Sand Point a marshy island has built out southward with a length of 3400 ft. and maximum width of 650 ft.

South Shore:

No large areas of erosion or deposition

West Shore:

Areas of greatest erosion:

1. From Fog Point to the end of Swan Island, the maximum linear recession is 1200 ft.
2. From Goose Harbor Cove to the Maryland-Virginia boundary, the maximum linear recession is 1400 ft. at the boundary.

Areas of deposition:

Swan Island has built out to the east of the former shore. It has maximum dimensions of 1100 feet north-south and 900 feet east-west.

DEAL ISLAND (Plate 22)

Deal Island is separated from the northern mainland of Somerset County by Upper and Laws Thorofares. The west shore of the island is on Tangier Sound. The western portion of the island is low land with bluffs reaching a height of over 8 ft. at one point. The eastern portion of the island is marsh.

Upper Thorofare Shore:

A marshy area at the eastern part of the Upper Thorofare has receded a maximum of 200 ft.

East Shore:

Maximum linear recession is 160 ft.

South Shore:

Lower Thorofare shows a maximum linear recession of 250 ft.

The west shore entrance of Lower Thorofare has built out 300 ft. eastward.

West Shore:

Areas of greatest erosion:

1. Between Deal Point and 1100 ft. north of Middle Creek, the maximum linear recession is 380 ft. (Plate 29, fig. 2).
2. Between Middle Creek and Twiggs Point, the maximum linear recession is 350 ft. Twiggs Point has receded 250 ft.
3. From 1700 ft. south of Twiggs Point to Lower Thorofare, the maximum linear recession is 300 ft.

Area of deposition:

1500 ft. north of Middle Creek an area has built out a maximum of 350 ft.

LITTLE DEAL ISLAND

Little Deal Island is separated from Deal Island by Lower Thorofare. It is entirely marsh.

The north shore line is ragged and the areas of erosion are small. Maximum linear recession is 200 ft.

Maximum linear recession on the east shore is 150 ft.

The entire southeast shore has suffered much erosion, maximum linear recession being 400 ft.

The entire southwest shore has suffered much erosion, maximum linear recession being 600 ft.

Maximum linear recession on the west shore is 100 ft.

SUMMARY

In Somerset County the area of Tangier Sound shore that shows the highest rate of loss is between Great Point and Cedar Straits; however, excepting a few individual points, the shoreline between Flatcap Point and Island Point shows the highest rate of recession.

The north shore of Pocomoke Sound has a higher rate of loss and linear recession than the Tangier Sound mainland shore. The eastern half of Pocomoke Sound shoreline shows a much higher rate of loss than the western half.

The percentages of area lost by Smith Island and South Marsh Island are approximately equal, but the larger Smith Island has lost more acres. The west shores of all of the larger islands show the highest rate of loss.

The maximum linear recession is on the west shore of Hog Neck on Smith Island at the Maryland-Virginia boundary line.

Over an average time interval of 93 years, there have been 3,555 acres of erosion and 251 acres of deposition in Somerset County, making the net loss to the County 3,304 acres. The Somerset County measurements are summarized in Table 13.

TALBOT COUNTY

The general topography landward of the Chesapeake Bay in Talbot County ranges from low marshy areas to bluffs reaching the 10 ft. contour level. Along the Miles River bluffs reach a maximum height of 10 ft.; along the Tred Avon River they are generally less than 10 ft.; and along the Choptank they range from a general height of 10 ft. below Cambridge to 20 feet above Cambridge. A small area opposite Cambridge has a bluff 30 feet high.

The topography landward of the inland waterways is generally less than 10 ft. in height. Marsh areas are small and scattered.

The geologic age and composition of the formations along the shores are:

Pleistocene—clay, peat, sand and gravel

DESCRIPTIONS OF AREAS IN TALBOT COUNTY

CHESAPEAKE BAY

700 ft. east of Wades Point to Harbor Cove (Plate 24)

Areas of greatest erosion:

1. Between Wades Point and the marsh west of Wittman, the maximum linear recession is 650 ft. Wades Point has receded 550 ft.
2. Between Long Point and Harbor Cove, the maximum linear recession is 600 ft. (Plate 25).

Area of deposition:

The shoreline west of Wittman, north of Long Point, has built out linearly a maximum of 320 ft.

TABLE 13.—*Shore Erosion Statistics of Somerset County*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Tangier Sound							
Lower half of Laws Thorofare to Crab Pt.	93	10.4	103	5	98	9.4	.10
St. Pierre Pt. to Big Annemessex River	93	13.2	127	12	115	8.7	.09
Flatcap Pt. to Island Pt.	93	7.2	168	21	147	20.4	.21
Great Pt. to Cedar Island Creek	93	3.9	117	8	109	27.9	.30
Totals	93	34.7	515	46	469	13.5	.14
Pocomoke Sound							
Watkins Pt. to Ware Pt.	93	8.2	139	5	134	16.3	.17
Ape Hole Creek to Fair Island Canal	91	8.3	209	3	206	24.8	.27
Totals	92	16.5	348	8	340	20.6	.22
Wicomico River							
Wingate Pt. to Mt. Vernon Wharf	93	4.1	35	0	35	8.5	.09
Nanticoke River and Wicomico River Entrances and Tangier Sound							
North entrance of Upper Thorofare to Pigeon Creek	93	6.3	160	25	135	21.1	.22
Monie Bay							
Wingate Pt. and Pigeon Creek to Nail Pt.	93	6.0	103	1	102	17.0	.18
Manokin River							
On north shore, Crab Pt. to Locust Pt.; on south shore, St. Pierre Pt. to Back Creek	93	8.3	85	13	72	8.6	.09
Big Annemessex River—North shore							
Pat Island to Horsehead Pt.	93	9.9	96	5	91	9.1	.09
South Shore							
Flatcap Pt. to Gales Creek	93	9.0	84	8	76	8.4	.09
Big Annemessex River Totals	93	18.9	180	13	167	8.8	.09
Little Annemessex River							
On north shore from Old House Cove to 1800 ft. northeast of Long Pt.; on south shore from Great Pt. to 1800 ft. northeast of Hammock Pt.	93	7.0	75	7	68	9.7	.10

TABLE 13.—*Continued*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Ape Hole Creek	93	4.3	78	5	73	16.9	.18
Cedar Straits	93	2.2	16	0	16	7.1	.07
East Creek From entrance upstream ¾ mile	91	3.0	23	1	22	7.0	.07
Marumsco Creek From 3100 ft. north of Rumbly Pt. and from the western end of Sound Shore upstream ½ mile	91	1.8	12	2	10	5.5	.06
River and Creek Totals	93	61.9	767	67	700	11.3	.12

	Time Interval	Miles Measured	Old Area	New Area	Loss	Erosion	Deposition	Net Loss	% Total Area Lost	Annual Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*	*acres*		*acres*
Islands										
South Marsh	93	31.9	3,615	3,104	511	499	13	486	14.0	5.2
Smith	93	68.6	8,815	7,610	1,205	1,060	85	975	13.6	10.4
Deal	93	10.2	2,258	2,112	146	140	15	125	7.0	1.3
Little Deal	93	4.4	364	294	70	68	4	64	19.2	.6
Remaining—existing and non-existing	93	4.8				158	13	145		
Islands Totals	93	119.9				1,925	130	1,795		

	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
SOMERSET COUNTY TOTALS	93	233.0	3,555	251	3,304	14.1	.15

Harbor Cove to Knapps Narrows (Plate 25)

Areas of greatest erosion:

1. Between Harbor Cove and Lowes Wharf, the maximum linear recession is 650 ft. Lowes Point has receded 300 ft.
2. From Cabin Cove to opposite Goat Island, maximum linear recession is 370 ft. Punch Point has receded 450 ft.
3. Between Green Marsh Point and Amys Marsh Point, the maximum linear recession is 650 ft. Green Marsh Point has receded 150 ft. and Amys Marsh Point 250 ft.

4. Between Front Creek and Knapps Narrows, the maximum linear recession is 620 ft.

Areas of deposition:

1. The entrance of Front Creek has built out linearly 150 ft. on the west shore and 300 ft. on the east shore, nearly closing the entrance.
2. The north shore of Knapps Narrows has built out linearly a maximum of 200 ft. southward and a maximum of 350 ft. eastward.

EASTERN BAY

Wades Point to Tilghman Point (Plate 24)

Area of greatest erosion:

From Claiborne Ferry Wharf to Tilghman Point, the maximum linear recession is 600 ft. Tilghman Point has receded 750 ft. and the point $\frac{1}{2}$ mile north of Claiborne 500 feet.

CHOPTANK RIVER

Lucy Point to Benoni Point

Areas of greatest erosion:

1. From Benoni Point for a distance of 5700 ft. northwest, the maximum linear recession is 850 ft. Benoni Point has receded 100 ft.
2. 3500 ft. southeast of Lucy Point is a small area with a maximum linear recession of 400 ft.

Areas of deposition:

An area 2700 ft. southeast of Lucy Point has built out linearly a maximum of 350 ft., and an area 5000 ft. southeast of Lucy Point has built out linearly a maximum of 250 ft.

Bachelor Point to Martin Point

Areas of greatest erosion:

1. Between Bachelor Point and Boone Creek, the maximum linear recession is 200 ft. Bachelor Point has receded 300 ft.
2. Between Boone Creek and Island Creek, maximum linear recession is 230 ft.
3. Between Island Creek and Chlora Point, the maximum linear recession is 200 ft. Chlora Point has receded 200 ft.
4. From Martin Point for a distance of 3000 ft. northwest, maximum linear recession is 150 ft.

Area of deposition:

An area 800 ft. east of Chlora Point and 1200 ft. in length shows a maximum linear building out of 120 ft.

La Trappe Creek to Muddy Creek, including Dickinson Bay

Areas of greatest erosion:

1. From La Trappe Creek to Howell Point, maximum linear recession is 270 ft. Howell Point has receded 1450 ft. and migrated 200 ft. eastward.
2. From Dickinson Bay for a distance of 3000 ft. southeast, maximum linear recession is 170 ft.

Areas of deposition:

1. The shore line immediately east of Howell Point has built out linearly a maximum of 50 ft.
2. An area at the south shore entrance of Reed Creek has built out linearly a maximum of 150 ft.

Muddy Creek to Goose Point

Areas of greatest erosion:

1. From Muddy Creek for a distance of 3700 ft. southeast, maximum linear recession is 400 ft.
2. From the vicinity of the Choptank River Bridge to Bolingbroke Creek, the maximum linear recession is 120 ft.
3. Between Chancellor Point and Goose Point, the maximum linear recession is 150 ft. Chancellor Point has receded 100 ft. southward and migrated 150 ft. westward.

Areas of deposition:

1. The west shore entrance of Bolingbroke Creek has built out linearly 270 ft. to the southeast.
2. Chancellor Point has migrated 150 ft. to the west and has built out 100 ft. to the south.
3. Goose Point has built out 100 ft. to the east.

Goose Point to 6000 ft. northeast of Racoon Creek

Areas of greatest erosion:

1. Between Goose Point and Jamaica Point, there is a maximum linear recession of 350 ft.
2. Between Jamaica Point and Racoon Creek, the maximum linear recession is 160 ft.
3. From Racoon Creek for a distance of 6000 ft. northeast, the maximum linear recession is 170 ft.

Areas of deposition:

1. From Jamaica Point for a distance of 550 ft. southwest, there has been a maximum linear building out of 60 ft. Jamaica Point has built out 100 ft. to the southeast.
2. At the entrance of Racoon Creek, a curved spit, formerly connected to the mainland, has built out 350 ft. to the north.

From 6000 ft. northeast of Racoon Creek to Windy Hill

Areas of erosion are small and scattered with many points projecting into the Choptank River. Maximum linear recession is 300 ft.

From 2000 ft. southeast of Windy Hill there is an area 2200 ft. in length with a maximum linear building out of 120 ft. Other areas of deposition are small.

Windy Hill to 4700 ft. below Parker Creek

From 1500 ft. above Miles Creek to 2600 ft. below, maximum linear recession is 450 ft. Areas of deposition are small and scattered.

From 4300 ft. below Parker Creek to Kingston Landing

The largest area of erosion extends from 500 ft. below to 2200 ft. above Parker Creek with a maximum linear recession of 150 ft. Other areas are numerous but small.

Areas of deposition are numerous but small and scattered.

MILES RIVER

North shore

Wyetown Point to Fairview Point

Areas of greatest erosion:

1. Between Wyetown Point and Woodland Creek, maximum linear recession is 350 ft. Wyetown Point has receded 270 ft.

2. Between Woodland Creek and the second pond to the south, the maximum linear recession is 300 ft.
3. Between the second and third ponds south of Woodland Creek, there is a maximum linear recession of 450 ft.
4. From the third pond to Fairview Point, the maximum linear recession is 150 ft. Fairview Point has receded 250 ft.

Areas of deposition:

1. The entrances of the first and second ponds have been closed with maximum width of 300 ft. of deposition.
2. Immediately south of the third pond a small area has built out linearly a maximum of 150 ft.

From Leeds Creek to 3700 ft. above Hunting Creek

Areas of greatest erosion:

1. From Leeds Creek southward to the first small cove, the maximum linear recession is 200 ft.
2. From the first cove south of Leeds Creek to Hunting Creek, maximum linear recession is 270 ft.
3. For a distance of 3700 ft. above Hunting Creek, maximum linear recession is 200 ft.

There are a few small areas of deposition at the entrance of the cove south of Leeds Creek.

From 3700 ft. above Hunting Creek to the shore east of Unionville

Areas of erosion are small and scattered.

MILES RIVER

South shore

Tilghman Point to Hambleton Point (Plate 24)

Areas of greatest erosion:

1. Between Tilghman Point and the first cove to the south, there is a maximum linear recession of 200 ft.
2. Between the first cove south of Tilghman Point and Tilghman Creek, the maximum linear recession is 200 ft.
3. From Seth Point southward to the first unnamed creek to the south, there is a maximum linear recession of 350 ft.
4. Between the first and second unnamed creeks south of Seth Point, the maximum linear recession is 450 ft.
5. Between the second unnamed creek and Porter Creek, the maximum linear recession is 250 ft.
6. Between Porter Creek and Hambleton Point, the maximum linear recession is 380 ft.

Areas of deposition:

1. In the first cove south of Tilghman Point there is a maximum linear building out of 400 ft.
2. The east shore entrance point of the unnamed cove south of Seth Point has built out a maximum of 400 ft. to the northwest.
3. The east shore entrance of Porter Creek has built out a maximum of 550 ft. to the south.
4. Hambleton Point has changed greatly in shape through both erosion and deposition.

From Hambleton Cove to St. Michaels harbor

Areas of greatest erosion:

1. From Hambleton Cove to 1600 ft. northwest of Deepwater Point, there is a maximum linear recession of 220 ft.
2. Between Deep Water Point and Long Haul Creek, the maximum linear recession is 200 ft. Deep Water Point has receded 250 ft.
3. Between Long Haul Creek and St. Michaels harbor, the maximum linear recession is 200 ft.

Area of deposition:

500 ft. north of Deep Water Point an area 1000 ft. long shows a maximum linear building out of 120 ft.

Parrott Point to Newcomb Creek

Areas of greatest erosion:

1. Between Parrott Point and Spencer Creek, there is a maximum linear recession of 300 ft.
2. Between Spencer Creek and Little Neck Creek the maximum linear recession is 250 ft.
3. From Little Neck Creek for a distance of 4900 ft. southeast the maximum linear recession is 260 ft.

Newcomb Creek to shore east of Unionville

Areas of erosion are small and scattered.

WYE AND WYE EAST RIVERS, including Shaw Bay and Lloyd Creek.

1000 ft. northeast of Wyetown Point to opposite Granary Creek

Areas of greatest erosion:

1. Between the small pond northeast of Wyetown Point and the narrow neck of marsh connecting Bruffs Island to the mainland, there is a maximum linear recession of 100 ft.
2. The west shore of Bruffs Island shows a maximum linear recession of 150 ft.
3. Shaw Bay shows a maximum linear recession of 150 ft. The point at the east shore entrance of Shaw Bay has receded 280 ft.
4. Between Shaw Bay and Lloyd Creek, the maximum linear recession is 150 ft.
5. Northward from Lloyd Creek for a distance of 2300 ft., the maximum linear recession is 230 ft.
6. From the west shore entrance of Quarter Cove for a distance of 1500 ft. downstream, the maximum linear recession is 120 ft.
7. From the east shore entrance of Quarter Cove for a distance of 1700 ft. upstream, the maximum linear recession is 140 ft.

Areas of deposition:

Bruffs Island is now connected to the mainland by a marshy area a maximum of 400 ft. in width and 450 ft. in length. Other areas of deposition are small.

TRED AVON RIVER

West shore

Benoni Point to Pecks Point

East of Benoni Point a marshy spit curves northward. The east shore of this spit has receded a maximum of 300 ft. Other areas are small and scattered.

The northern tip of the marshy spit east of Benoni Point has built out 300 ft. to the west.

Pecks Point to Double Mills Point

This shoreline is indented by seven small coves and creeks so there are many small areas showing considerable recession. The average maximum linear recession of the main areas is 120 ft. Double Mills Point has receded 150 ft.

Areas of deposition are small.

Double Mills Point to Shipshead Creek

Areas of erosion are small and scattered.

Long Point has built out 120 ft. to the southeast.

TRED AVON RIVER

East shore

Bachelor Point to Trippe Creek, including the entrances of Town Creek, Flatty Cove and Goldsborough Creek

Areas of greatest erosion:

1. From the railroad pier at the south end of Oxford northward for a distance of 3500 ft., there is a maximum linear recession of 100 ft.
2. Between Flatty Cove and Goldsborough Creek the maximum linear recession is 350 ft.
3. Between Goldsborough Creek and Trippe Creek the maximum linear recession is 320 ft.

Trippe Creek to 2000 ft. north of Watermelon Point

This shoreline is deeply indented by small coves and creeks so the erosional areas are small but numerous. The point of land at the north shore entrance of Trippe Creek has receded 300 ft. and Watermelon Point 170 ft.

Areas of deposition are small and scattered.

HARRIS CREEK

West shore

Knapps Narrows to Smith Point, including Dun and Waterhole Coves

Areas of greatest erosion:

1. Between Knapps Narrows and Bald Eagle Point, there is a maximum linear recession of 250 ft. Bald Eagle Point has receded 130 ft.
2. Between Bald Eagle Point and Dun Cove, the maximum linear recession is 350 ft.
3. From Dun Cove to the first small cove northward, the maximum linear recession is 250 ft. Seaths Point has receded 120 ft.
4. From the small unnamed cove south of Waterhole Cove to Waterhole Cove, the maximum linear recession is 180 ft. Smith Point has receded 350 ft.

Area of deposition:

The cove immediately southwest of Bald Eagle Point shows a maximum linear building out of 150 ft.

Briery Cove to Rabbit Point, including Cummings Creek

For a distance of 1300 ft. upstream from Briery Cove, maximum linear recession is 250 ft. A point of marsh at the east shore entrance of Cummings Creek has receded 550 ft.

Areas of deposition are small and scattered.

HARRIS CREEK

East shore

Nelson Point to 2800 ft. northeast of Little Neck Point

Areas of greatest erosion:

1. From Nelson Point northwest to the unnamed cove, there is a maximum linear recession of 650 ft. Nelson Point has receded 4100 ft., leaving Nelson Island 1800 ft. offshore.
2. Between Change Point and Turkey Neck Point the maximum linear recession is 580 ft. Turkey Neck Point has receded 150 ft.
3. From Turkey Neck Point to 2500 ft. southeast of Indian Point, the maximum linear recession is 400 ft.
4. Between Indian Point and Little Neck Point, the maximum linear recession is 240 ft.
5. From Little Neck Point for a distance of 2800 ft. northeast, the maximum linear recession is 250 ft.

Areas of deposition:

The cove between Nelson Point and Change Point shows numerous areas of deposition with a maximum linear building out of 300 ft. The present Change Point has built out a maximum of 100 ft. east, Turkey Neck Point 60 ft. west, and Little Neck Point 160 ft. northwest.

BROAD CREEK

West shore

Nelson Point to 3700 ft. north of Edgar Cove

Areas of greatest erosion:

1. Between Nelson Point and Ball Creek, there is a maximum linear recession of 250 ft.
2. Between Ball Creek and Leadenham Creek are numerous small areas in which maximum linear recession is 350 ft.
3. Between Grace Creek and Mulberry Point, the maximum linear recession is 300 ft. Mulberry Point has receded 400 ft.

Areas of deposition are small and scattered.

BROAD CREEK

East shore

From Irish Creek to 1⅓ miles upstream from Church Neck Point, including Bridge Creek

Areas of greatest erosion:

1. Between the small creek northwest of Irish Creek to Bridge Creek, there is a maximum linear recession of 400 ft.
2. Between Bridge Creek and Cedar Point, the maximum linear recession is 350 ft. Deep Neck Point has receded 370 ft. and Cedar Point 370 ft.
3. From Church Neck Point northward, the areas are smaller due to the deeply indented shoreline. Maximum recession is 260 ft.

Area of deposition:

The east shore of the small creek northwest of Irish Creek has built out linearly a maximum of 200 ft. and a small point on the east shore of Bridge Creek 300 ft.

EDGE CREEK

From the entrance 1½ miles upstream, including Elberts Cove

North Shore:

From the north shore entrance to Drum Point, there is a maximum linear recession of 250 ft.

South Shore:

1. From the south shore entrance to 2200 ft. east, the maximum linear recession is 180 ft.
2. The east shore of Elberts Cove shows a maximum linear recession of 280 ft.

There are a few small areas of deposition on the south shore.

LEADENHAM AND GRACE CREEKS

Leadenham Creek 6800 ft. upstream and Grace Creek 2500 ft. upstream

Leadenham Creek:

The south shore is ragged in outline with many small areas of deposition. Maximum linear recession is 230 ft.

Grace Creek:

Both the west and the east shores are deeply indented so there are numerous small areas of erosion. Maximum linear recession is 150 ft. on the west shore and 200 ft. on the east shore.

SAN DOMINGO CREEK

From Hopkins Point for 1550 ft. along the east shore, there is a maximum linear recession of 300 ft. Hopkins Point has receded 100 ft. Areas of erosion on the west shore are numerous but small.

TRIPPE CREEK

From Snug Harbor eastward to the first unnamed cove along the north shore, there is a maximum linear recession of 150 ft. Areas of erosion on the south shore are small.

PEACHBLOSSOM CREEK

From the entrance to Le Gates Cove, along the north shore, there is a maximum linear recession of 150 ft.

LEEDS CREEK

Maximum linear recession on the west shore is 100 ft. Two small coves separate small areas of erosion on the east shore with maximum linear recession of 120 ft.

IRISH CREEK

The western shoreline is very ragged so there are many small areas of erosion with maximum linear recession of 180 ft.

KNAPPS NARROWS

North shore, including Back Creek entrance

The maximum linear building out is 150 ft.

TILGHMAN ISLAND (Plate 26)

Tilghman Island is separated from the mainland by Knapps Narrows. The west shore of the island faces the Chesapeake Bay, and the east shore faces Harris Creek and the Choptank River. Tilghman Island is low land with bluffs lower than the 10 ft. contour and is marshy in a few localities.

Areas of greatest erosion:

East Shore:

1. From Knapps Narrows to Dogwood Harbor, there is a maximum linear recession of 200 ft.
2. Between Dogwood Harbor and the cove north of Upper Bar Neck Point, the maximum linear recession is 360 ft.
3. Between Upper Bar Neck Point and the small unnamed cove to the south, the maximum linear recession is 370 ft. Upper Bar Neck Point has receded 300 ft.
4. Between the small unnamed cove south of Upper Bar Neck Point and Lower Bar Neck Point, the maximum linear recession is 650 ft. Lower Bar Neck Point has receded 600 ft.

South Shore:

1. From Lower Bar Neck Point to Blackwalnut Cove, there is a maximum linear recession of 450 ft.
2. Blackwalnut Cove shows a maximum linear recession of 250 ft.
3. Between Blackwalnut Cove and Blackwalnut Point, the maximum linear recession is 100 ft. in one small area.

West Shore:

1. Between Blackwalnut Point and Paw Paw Cove, the maximum linear recession is 2000 ft. Blackwalnut Point has receded 2000 ft.
2. Paw Paw Cove shows a maximum linear recession of 340 ft.
3. From Paw Paw Cove to Knapps Narrows, the maximum linear recession is 1100 ft.

Areas of deposition:

North Shore:

Knapps Narrows has built out linearly a maximum of 400 ft. north.

East Shore:

Areas are small and are in the minor coves.

South Shore:

1. The west shore of Blackwalnut Cove shows a maximum building out of 280 ft.
2. Between Blackwalnut Cove and Blackwalnut Point, maximum linear building out is 250 ft.

SHARPS ISLAND (Fig. 9)

Sharps Island lies in the Chesapeake Bay, off the entrance of the Choptank River, about 3¾ miles south of Tilghmen Island. It is three quarters marsh and one quarter low land.

Only a small remnant of the island remains. The north shore has receded 3500 ft., the east shore 380 ft., the south shore 6500 ft., and the west shore 2100 ft.

POPLAR ISLAND AND COACHES ISLAND (Plate 27)

Poplar Island and Coaches Island lie in the Chesapeake Bay, about 2 miles off the central portion of the Talbot County mainland. These two islands, now separated by 1200 ft. of water, were originally one. They are predominantly low land with a few large marsh areas.

FIG. 9—*Shore Line Changes on Sharps Island, Talbot County.*

Poplar Island

The entire west shore has receded, with a maximum recession of 1950 ft. Most of the east shore has receded also, with a maximum of 250 ft. The north end has receded 1700 feet. With the separation of Coaches Island, the south end has receded 6500 ft. northwestward. On the east shore, immediately south of North Point, an area has built out linearly a maximum of 320 ft. to the southeast. There are several other small areas of deposition along the east shore.

Coaches Island

The northwest shore shows maximum linear recession of 130 ft., the northeast shore 680 ft., the east shore 400 ft., and the south shore 1150 ft.

HAMBLETON ISLAND

Hambleton Island lies between Broad Creek and San Domingo Creek. It is low land fringed by small marshy areas.

Maximum linear recession on the east shore is 200 ft., and on the west shore 400 ft. Erosion has separated it into two islands.

A long thin neck of land at the north end of the larger southern island has migrated eastward 70 ft.

SUMMARY

In Talbot County the Chesapeake Bay shore line of Tilghman Island shows the greatest net loss, the greatest maximum linear recession, and the highest rate of loss. The second area of great loss is that between Wades Point and Knapps Narrows.

The north shores of the Choptank and the Miles Rivers show approximately equal rates of loss. The Tred Avon River shows a much lower rate of loss. The north shore of the Choptank River shows a gradual decrease in the rate of loss from its entrance to its head. The north and south shores of the Miles River show an approximately equal rate of loss with a gradual decrease toward the head. The east shore of the Tred Avon River shows a greater rate of loss than the west shore.

Of the two largest creeks, Harris Creek has a higher rate of loss than Broad Creek. The west shore of Harris Creek shows a higher rate of loss than the east shore. The east shore of Broad Creek shows a higher rate of loss than the west shore.

Sharps Island, formerly the third largest island of Talbot County, is now one of the smallest and will soon disappear completely. It has lost the highest percentage of area of any island in the County and also shows the highest linear recession. Poplar Island is next.

There have been 3,435 acres of erosion and 213 acres of deposition in Talbot County over the average time interval of 90 years making a net loss to the County of 3,222 acres. The Talbot County measurements are summarized in Table 14.

TABLE 14.—*Shore Erosion Statistics of Talbot County*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Chesapeake Bay							
700 ft. east of Wades Pt. to Harbor Cove	90	4.3	126	11	115	26.7	.29
Harbor Cove to Knapps Narrows	90	7.0	175	4	171	24.2	.26
Totals	90	11.3	301	15	286	25.3	.28
Eastern Bay							
Wades Pt. to Tilghmans Pt.	90	4.3	81	1	80	18.6	.20
Choptank River							
Lucy Pt. to Benoni Pt.	95	2.3	87	10	77	33.4	.35
Bachelor Pt. to Martin Pt.	94	5.2	54	3	51	9.8	.10
La Trappe Creek to Muddy Creek	93	6.0	49	5	44	7.3	.07
Muddy Creek to Goose Pt.	91	5.4	49	6	43	8.0	.08
Goose Pt. to 6000 ft. northeast of Racoon Creek	93	4.8	33	3	30	6.2	.06
6000 ft. northeast of Racoon Creek to Windy Hill	93	4.9	29	7	22	4.4	.04
Windy Hill to 4700 ft. below Parker Creek	93	4.9	32	5	27	5.5	.05
4300 ft. below Parker Creek to Kingston Landing	93	4.7	15	11	4	.8	.0
Choptank River Totals	93	38.2	348	50	298	7.8	.08
Miles River—North Shore							
Wyetown Pt. to Fairview Pt.	93	4.2	70	6	64	16.1	.17
Leeds Creek to 3700 ft. above Hunting Creek	93	3.9	40	1	39	10.0	.10
3700 ft. above Hunting Creek to shoreline east of Unionville	41	4.7	15	1	14	2.9	.07
North Shore Totals	76	12.8	125	8	117	9.1	.11
Miles River—South Shore							
Tilghman Pt. to Hambleton Pt.	90	6.0	87	13	74	12.3	.13
Hambleton Cove to St. Michaels Harbor	93	2.7	23	2	21	7.7	.08
Parrott Pt. to Newcomb Creek	93	4.3	46	4	42	9.7	.10
Newcomb Creek to shore east of Unionville	41	4.8	18	1	17	3.5	.08
South Shore Totals	77	17.8	174	20	154	8.6	.11
Miles River Totals	77	30.6	299	28	271	8.8	.11

TABLE 14.—*Continued*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Wye and Wye East Rivers							
Including Shaw Bay and Lloyd Creek	93	6.1	49	5	44	7.2	.07
Tred Avon River—West Shore							
Benoni Pt. to Pecks Pt.	95	3.5	15	6	9	2.5	.02
Pecks Pt. to Double Mills Pt.	95	3.4	26	1	25	7.3	.07
Double Mills Pt. to Shipshead Creek	94	3.3	10	4	6	1.8	.01
West Shore Totals	95	10.2	51	11	40	3.9	.04
Tred Avon River—East Shore							
Bachelor Pt. to Trippe Creek, includes Town Creek, Flatty Cove and Goldsborough Creek	95	6.2	44	4	40	6.4	.06
Trippe Creek to 2000 ft. north of Watermelon Pt.	94	4.8	27	2	25	5.2	.05
East Shore Totals	95	11.0	71	6	65	5.9	.06
Tred Avon River Totals	95	21.2	122	17	105	4.9	.05
Harris Creek—West Shore							
Knapps Narrows to Smith Pt., includes entrance of Dun and Waterhole Coves	90	5.0	58	8	50	10.0	.11
Briery Cove to Rabbit Pt., includes entrance of Cummings Creek	92	2.2	19	2	17	7.7	.08
West Shore Totals	91	7.2	77	10	67	9.1	.10
East Shore							
Nelson Pt. to 2800 ft. northeast of Little Neck Pt.	92	8.5	200	10	190	22.3	.24
Harris Creek Totals	92	15.7	277	20	257	16.3	.17
Broad Creek							
Nelson Pt. to 3700 ft. north of Edgar Cove on west shore	92	6.8	58	5	53	7.7	.08
Irish Creek to 1¼ miles upstream from Church Neck Pt., includes Bridge Creek, on east shore	92	8.0	110	6	104	13.0	.14
Broad Creek Totals	92	14.8	168	11	157	10.6	.11
Edge Creek							
From entrance upstream 1½ miles, includes Elberts Cove	95	4.5	45	4	41	9.1	.09

TABLE 14.—*Continued*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Leadenham and Grace Creeks							
Leadenham Creek upstream 6800 ft. and Grace Creek 2500 ft.	92	6.1	43	2	41	6.7	.07
San Domingo Creek							
Upstream 1½ miles	95	2.7	23	0	23	8.5	.08
Trippe Creek							
Upstream 4000 ft.	93	2.0	10	2	8	4.0	.04
Peachblossom Creek							
Upstream 2700 ft.	93	1.4	9	0	9	6.5	.06
Leeds Creek							
Upstream 2500 ft.	93	1.0	5	1	4	4.0	.04
Irish Creek							
Upstream 6400 ft.	92	1.7	10	1	9	5.2	.05
Knapps Narrows—North Shore	90	1.3	2	5	3*	2.3*	.01*
River and Creek Totals	90	151.6	1,491	147	1,344	8.8	.09

	Time Interval	Miles Measured	Former Area	Present Area	Loss	Erosion	Deposition	Net Loss	% Total Area Lost	Annual Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*	*acres*		*acres*
Islands										
Tilghman	95	12.9	2,014	1,465	549	590	43	547	27.2	5.7
Sharps	94	.6	440	11	429	429	0	429	97.5	4.5
Poplar	90	6.7	806	277	529	533	4	529	65.6	5.8
Hambleton	92	2.3	55	30	25	26	1	25	45.4	.2
Other smaller, existing and non-existing	92	3.6				65	3	62		
Island Totals	93	26.1				1,643	51	1,592		
									Rate of Loss	Annual Rate of Loss
									acres	*acres*
TALBOT COUNTY TOTALS	92	189.0				3,435	213	3,222	17.0	.18

* Gain.

WICOMICO COUNTY

The general topography landward of the Nanticoke River from Stump Point to Sandy Hill Beach is low land with bluffs reaching a height of 10 ft. in places. From Sandy Hill Beach northward there is marsh. The Wicomico River is bordered by marsh.

The geologic age and composition of the formations along the Nanticoke and Wicomico Rivers are:

Recent —marsh and sand
Pleistocene—clay, peat, sand and gravel

DESCRIPTIONS OF AREAS IN WICOMICO COUNTY

NANTICOKE RIVER

Stump Point to Bivalve (Fig. 10)

Areas of greatest erosion:

1. Between Stump Point and Roaring Point, maximum linear recession is 600 ft.
2. From 1600 ft. northeast of Roaring Point to Bivalve, maximum linear recession is 300 ft. Roaring Point has built out 300 feet.

Area of deposition:

From Roaring Point for a distance of 1600 ft. northeastward, maximum building out is 150 ft.

Bivalve to the southern inlet of Quantico Creek

Areas of greatest erosion:

1. Between Bivalve and Wetipquin Creek, maximum linear recession is 250 ft.
2. From Wetipquin Creek to the southern inlet of Quantico Creek, maximum linear recession is 500 ft.

Southern inlet of Quantico Creek to Atholoo Londing

From 6000 ft. northwest of Rewastico Creek to Athaloo Landing, maximum linear recession is 200 ft.

Athaloo Landing to the bridge ot Vienno

The entire shore has receded. The maximum linear recession is 400 ft.

WICOMICO RIVER

Nonticoke Point to 1800 ft. northeost of Hollond Point

Areas of greatest erosion:

1. Between Nanticoke Point and Mollies Point, maximum linear recession is 400 ft. Nanticoke Point has receded 80 ft. and Mollies Point 200 ft. Mollies Point Neck has reduced in width from 800 ft. to 100 ft.
2. From Ellis Bay to 1800 ft. northeast of Holland Point, maximum linear recession is 400 ft. Holland Point has receded 100 ft.

Area of deposition:

The north shore of Mollies Point has built out a maximum of 100 ft. north.

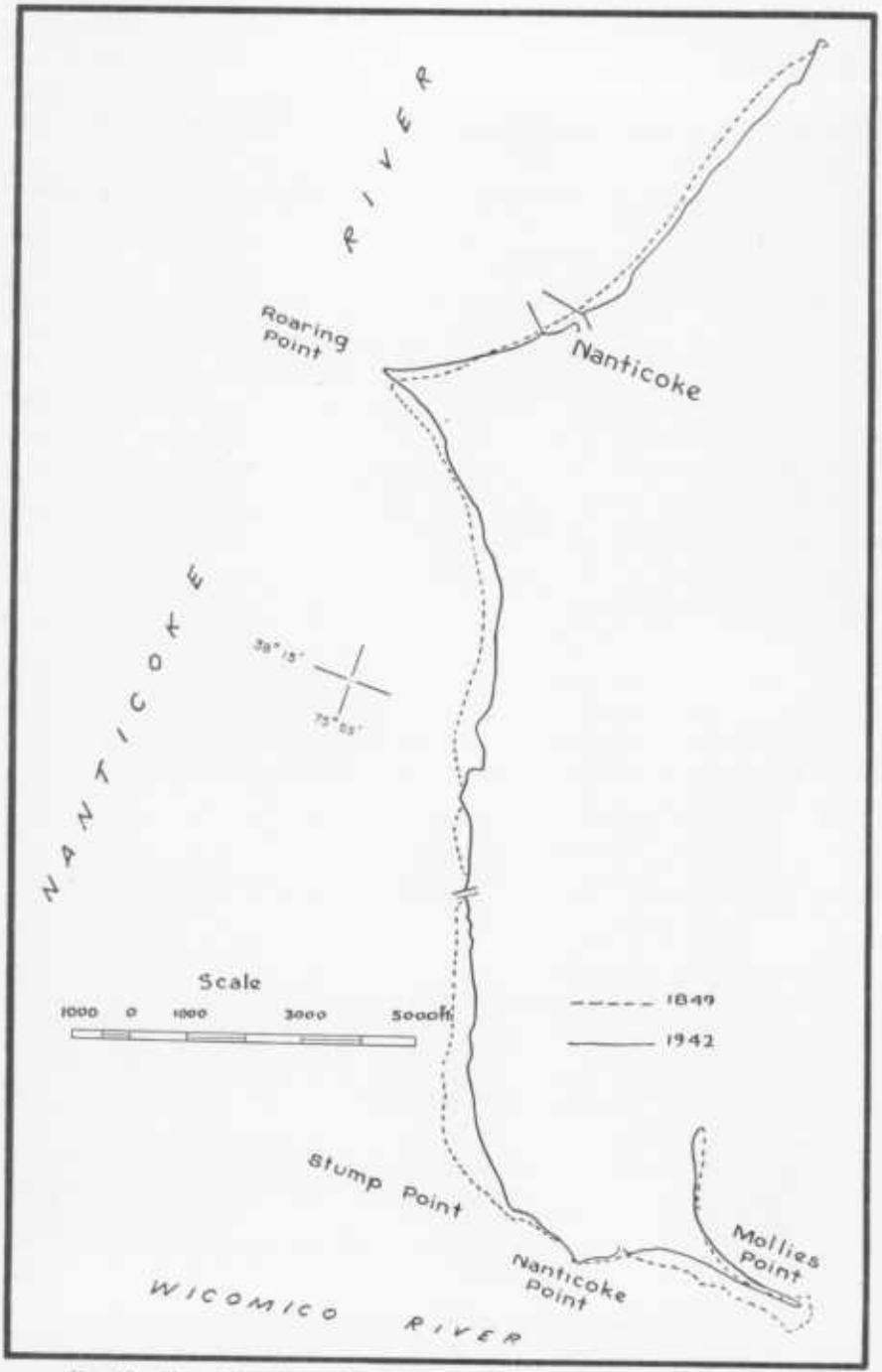

FIG. 10—Shore Line Changes from Mollies Point to Nanticoke, Wicomico County.

From 1800 ft. northeast of Holland Point to New Road Landing

The maximum linear recession is 200 ft.

SUMMARY

On the east shore of Nanticoke River, the area between Stump Point and Bivalve shows the greatest rate of loss and linear recession. The rate of loss gradually decreases upstream to Athaloo Landing. Above Athaloo Landing the rate of loss increases.

Along the Wicomico River there is a gradual decrease of the rate of loss upstream.

The Nanticoke and Wicomico Rivers have equal rates of loss.

There have been 552 acres of erosion and 9 acres of deposition in Wicomico County over the average time interval of 93 years, resulting in a net loss to the County of 543 acres. The Wicomico County measurements are summarized in Table 15.

WORCESTER COUNTY

The topography landward of the Assawoman, Isle of Wight, Sinepuxent, Newport and Chincoteague Bays is predominantly marsh with areas of low land. These waters are separated from the Atlantic Ocean by an offshore bar composed chiefly of marsh on the landward side and sand dunes on the ocean side.

The geologic age and composition of the coast formations and the offshore bar are:

Recent —marsh and sand dune
Pleistocene—clay, peat, sand and gravel

DESCRIPTION OF AREAS IN WORCESTER COUNTY

ATLANTIC OCEAN

Fenwick and Assateague Islands

Maryland-Delaware boundary to latitude 38°23′ N

Areas of greatest erosion:

1. From the Maryland-Delaware boundary to the ocean shore east of Devil Island there is a maximum linear recession of 320 ft.
2. From the ocean shore east of Devil Island to latitude 38°23′ N the maximum linear recession is 250 ft.

Latitude 38°23′ N to Ocean City Inlet (Plate 28)

The entire shore has suffered erosion, showing a maximum linear recession of 500 ft. at a point 2 miles north of the Ocean City inlet.

Ocean City Inlet to latitude 38°14′ N (Plate 28)

The entire shore has suffered erosion with a maximum linear recession of 1350 ft. at 5600 ft. south of the Ocean City Inlet. Southward from this location the rate of recession gradually decreases to latitude 38°14′ N where the shore is stable.

Latitude 38°14′ N to latitude 38°09′ N

The entire shore has built out a maximum of 250 ft.

TABLE 15.—*Shore Erosion Statistics of Wicomico County*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Nanticoke River							
Stump Pt. to Bivalve	93	6.7	154	5	149	22.2	.23
Bivalve to southern inlet of Quantico Creek	93	6.7	97	0	97	14.4	.15
Southern inlet of Quantico Creek to Athaloo Landing	93	7.4	72	1	71	9.5	.10
Athaloo Landing to Vienna	93	6.5	111	0	111	17.0	.18
Totals	93	27.3	434	6	428	15.6	.16
Wicomico River							
Nanticoke Pt. to 1800 ft. northeast of Holland Pt.	93	5.2	96	3	93	17.8	.19
From 1800 ft. northeast of Holland Pt. to New Road Landing	93	2.5	22	0	22	8.8	.09
Totals	93	7.7	118	3	115	14.9	.16
WICOMICO COUNTY TOTALS	93	35.0	552	9	543	15.5	.16

Latitude 38°09′ N to latitude 38°05′ N

From latitude 38°05′ N for a distance of 2 miles northward there is a maximum linear recession of 150 ft.

From latitude 38°09′ N to 1600 ft. south of latitude 38°07′ N there is a maximum linear building out of 250 ft.

Latitude 38°05′ N to the Maryland-Virginia boundary

Areas of greatest erosion:

1. From latitude 38°05′ N southward for 4000 ft., there is a maximum linear recession of 100 ft.
2. From the Maryland-Virginia boundary northward one mile, maximum linear recession is 100 ft.

Area of deposition:

From 2400 ft. south to 1¼ miles north of latitude 38°03′ N, there has been a maximum

linear building out of 2600 ft. on the landward side of the bar. This area was formerly an inlet and has been filled in.

ASSAWOMAN BAY

East shore

The shore line is extremely irregular and bordered by marsh and dune sand. There are no large areas of erosion or deposition.

ISLE OF WIGHT BAY

East shore

North of Ocean City small areas of deposition are numerous. Marshy points have built out a maximum of 400 feet.

SINEPUXENT BAY

East Shore

The shore from the Ocean City Inlet to 2000 ft. north of latitude 38°16′ N, shows a maximum linear building out of 2500 ft. A large spit on the south shore of the Ocean City inlet has built out 2200 ft. to the northeast and has advanced 1000 ft. southward.

SINEPUXENT AND CHINCOTEAGUE BAYS

East shore

Latitude 38°15′ N to Latitude 38°07′–30″ N

Areas of deposition are numerous. Maximum linear building out is is 700 ft.

CHINCOTEAGUE BAY

East Shore

Latitude 38°07′-30″ N to the Maryland-Virginia boundary

Area of erosion:

The north shore of Green Run Bay shows a maximum linear recession of 400 ft.

Areas of deposition:

Southward from Sugar Point for a distance of 4400 ft., maximum linear building out is 900 ft. The area of Middlemoor shows the greatest amount of deposition. Some points of marsh have built out a maximum of 2700 ft.

ASSAWOMAN BAY

West Shore

From the Maryland-Delaware boundary to St. Martin River

The entire shore line is very ragged and deeply endented. There are numerous small areas of erosion. The south shore of the Isle of Wight shows a maximum linear recession of 200 ft.

ISLE OF WIGHT BAY

West Shore

Manklin Creek to the southern Ocean City bridge, including the entrances to Manklin Creek and Turville Creek

The shore line is very ragged and deeply indented. There are many small areas of erosion.

SINEPUXENT BAY

West Shore

From the dredged harbor slip at Ocean City to Sandy Point

From Fassett Point to Sandy Point, there is a maximum linear recession of 200 ft. Other areas of erosion are numerous but small.
Areas of deposition are numerous but small.

Sandy Point to South Point

Between Salt Point and Green Point, maximum linear recession is 400 ft. and maximum building out 240 feet. Other areas of erosion and deposition are small.

NEWPORT BAY

East shore

Between South Point and Spence Cove, there is a maximum linear recession of 460 ft. South Point has receded 400 ft., Island Point 460 ft., and Knox Point 200 ft.

West shore

From latitude 38°15′ N to latitude 38°14′ N the maximum linear recession is 260 ft. Out Point has receded 200 ft.

CHINCOTEAGUE BAY

West Shore

Handys Hammock to Tanhouse Creek

Areas of greatest erosion:

1. Between Handys Creek and Waterworks Creek, there is a maximum linear recession of 250 ft.
2. Between Kelly Point and Turpin Cove the maximum linear recession is 250 ft.
3. From Robins Creek to Scarboro Creek, maximum linear recession is 350 ft. Ricks Point has receded 500 ft.
4. From Scarboro Creek to Tanhouse Creek, the maximum linear recession is 500 ft.

Areas of deposition are small but numerous.

Tanhouse Creek to Martin Bay

The entire shore line has undergone erosion, with a maximum linear recession of 450 ft. between Figgs Landing and Watermelon Point. Watermelon Point has receded 400 ft.
A spit at the east shore entrance of Martin Bay has built out 500 ft. west.

Martin Bay to the Maryland-Virginia boundary, including the tributary bays

From the entrance of Scarboro Creek to Shell Point in Johnson Bay, there is a maximum linear recession of 300 ft. Shell Point has receded 800 ft. and Hunting Point 240 ft. At the entrance to Purnell Bay, Purnell Point has receded 400 ft. and Goose Point 450 ft.

Areas of deposition are numerous but small and scattered.

ST. MARTIN RIVER

From Poplar Point on the north shore and Cedar Point on the south shore 3 miles upstream

Both shore lines are very ragged and deeply indented with a complex system of marshy inlets, coves and creeks. Erosional areas are small but numerous. Jenkins Point has receded 200 ft. and Cedar Point 500 ft.

Areas of deposition are small.

ISLANDS

MILLS ISLAND

Mills Island is at the south end of Chincoteague Bay, separated from the mainland by Parker Bay. Its north shore is on Johnson Bay. Mills Island is predominantly marsh with three small areas of low land. One in the northeast part of the island reaches a height of 20 ft.

The north shore has a maximum linear recession of 320 ft., the east shore 400 ft., the south shore 380 ft., and the west shore 150 ft. The southeast end of the island has receded 80 ft.

TIZZARD ISLAND

The north shore of Tizzard Island is on Brockatonorton Bay, the east and south shores on Johnson Bay, and the west shore on Rowley Cove. A narrow strip of low land runs north and south through the center of the island, which is predominantly marsh.

The north shore has a maximum linear recession of 300 ft., the east shore 250 ft., the south shore 200 ft., and the west shore 200 ft.

SUMMARY

The area in Worcester County which shows the greatest net loss, highest rate of loss, and highest linear recession rate is on the ocean shore from Ocean City inlet southward to latitude 38°–14′N. The highest rate of gain is along the shore east of Middlemoor Marsh, where a former inlet to Chincoteague Bay has been closed by deposition.

On the west shore of the offshore bar net gain is greater than net loss. The area showing the greatest rate of gain is between Ocean City inlet and latitude 38°–15′N, opposite the area showing the greatest net loss on the ocean shore.

Along the mainland shore, Assawoman, Newport, and Chincoteague Bays and St. Martin River have approximately equal rates of loss which are also the highest along Worcester County mainland.

The islands lying close to the shore between Martin and Purnell Bays show the greatest island losses. Close to the western shore of lower Assateague Island are many newly formed islands of marsh and sand dunes.

TABLE 16.—*Shore Erosion Statistics of Worcester County*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Atlantic Ocean							
Maryland-Delaware boundary to latitude 38°23′ N.	92	4.8	104	0	104	21.6	.22
Latitude 38°23′ N to Ocean City Inlet.	92	4.2	154	0	154	36.6	.39
Ocean City Inlet to latitude 38°14′ N.	93	6.5	570	0	570	87.6	.94
Latitude 38°14′ N to 38°09′ N.	93	6.2	0	122	122*	19.6*	.21*
Latitude 38°09′ N to 38°05′ N.	93	4.8	17	62	45*	9.3*	.10*
Latitude 38°05′ N to the Maryland-Virginia boundary.	92	4.5	16	160	144*	32.0*	.34*
Ocean Shore Totals.	93	31.0	861	344	517	16.6	.17
Assawoman Bay—East shore.	92	12.6	71	39	32	2.5	.02
Isle of Wight Bay—East shore.	92	5.3	14	34	20*	3.7*	.04*
Sinepuxent Bay—East shore to latitude 38°15′ N.	92	8.5	22	472	450*	52.9*	.57*
Lower Sinepuxent and Upper Chincoteague Bay—East shore Latitude 38°15′ N to 38°07′30″ N.	93	23.3	37	345	308*	13.2*	.16*
Chincoteague Bay—East Shore Latitude 38°07′30″ N to the Maryland Virginia boundary.	92	19.7	102	435	333*	16.9*	.18*
Western Shore of Fenwick and Assateague Islands Totals.	92	69.4	246	1,325	1,079*	15.5*	.16*
Assawoman Bay—West shore.	92	13.0	226	5	221	17.0	.18
Isle of Wight Bay—West shore							
Manklin Creek to southern Ocean City bridge, includes Manklin Creek and Turville Creek	92	8.2	111	4	107	13.0	.14
Sinepuxent Bay—West shore							
Ocean City dredged harbor slip to Sandy Point.	93	8.5	68	6	62	7.2	.07
Sandy Point to South Pt.	93	5.1	50	6	44	8.6	.09
Sinepuxent Bay Totals.	93	13.6	118	12	106	7.7	.08
Newport Bay.	92	7.7	135	2	133	17.2	.18

* Gain.

TABLE 16.—*Continued*

Locality	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Chincoteague Bay—West shore							
Handys Hammock to Tanhouse Creek	92	8.3	148	4	144	17.3	.18
Tanhouse Creek to Martin Bay	92	2.4	45	6	39	12.0	.13
Martin Bay to the Maryland-Virginia boundary	92	12.9	111	33	78	6.0	.06
Chincoteague Bay Totals	92	23.6	304	43	261	11.1	.12
St. Martin River From Poplar Pt. on the north and Cedar Pt. on the south, upstream 3 miles	93	11.8	205	3	202	17.1	.18
Mainland Totals	92	77.9	1,099	69	1,030	13.2	.14
Islands							
Mills	92	7.7	130	1	129		
Tizzard	92	2.6	32	1	31		
Islands neighboring western shore of Fenwick Island	92	4.4	30	25	5		
Islands neighboring western shore of Assateague Island	93	24.0	267	196	71		
Assawoman Bay Islands	92	3.6	89	1	88		
Isle of Wight Bay Islands	92	1.4	14	1	13		
Sinepuxent Bay Islands	93	0	3	0	3		
Martin to Purnell Bay Islands	92	10.9	263	7	256		
Chincoteague Bay Islands	92	.7	36	0	36		
Island Totals	92	55.3	864	232	632		
WORCESTER COUNTY TOTALS	92	233.6	3,070	1,970	1,100	4.6	.05

* Gain.

There have been 3,070 acres of erosion and 1,970 acres of deposition in Worcester County over an average time interval of 92 years, making a net loss to the County of 1,100 acres. The Worcester County measurements are summarized in Table 16.

SUMMARY OF SHORE EROSION IN TIDEWATER MARYLAND

The shore erosion measurements for Tidewater Maryland are summarized in Tables 17 to 20. Tidewater Maryland has lost, over an average interval of about 90 years, 29,371 acres by erosion and has gained 4,659 acres by deposition, resulting in a net loss of 24,712 acres. The gross annual loss averaged 326 acres and the net annual loss 274 acres.

TABLE 17.—*Mainland Shore Erosion Statistics of Maryland Tidewater Counties*

County	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Anne Arundel	89	135.1	1902	290	1612	11.1	.12
Baltimore	89	59.9	698	80	618	10.3	.11
Calvert	90	67.0	890	232	658	9.8	.10
Charles	61	88.3	361	193	168	1.9	.03
Harford	94	66.8	834	117	717	10.7	.11
Prince Georges	81	21.3	107	35	72	3.3	.04
St. Marys	82	115.1	1600	218	1382	12.0	.14
Western Shore Totals	84	553.5	6,392	1,165	5,227	9.4	.11
Caroline	93	13.1	128	3	125	9.3	.10
Cecil	94	77.5	843	171	672	8.6	.09
Dorchester	94	224.5	4673	283	4390	19.5	.20
Kent	96	81.2	1013	99	914	11.2	.11
Queen Annes	96	122.6	1874	243	1631	13.3	.13
Somerset	93	113.1	1630	121	1509	13.3	.14
Talbot	90	162.9	1792	162	1630	10.0	.11
Wicomico	93	35.0	552	9	543	15.5	.16
Worcester	92	178.3	2206	1738	468	2.5	.02
Eastern Shore Totals	93	1,008.2	14,711	2,829	11,882	10.7	.11
MAINLAND TOTALS	89	1,561.7	21,103	3,994	17,109	10.9	.11

TABLE 18.—*Island Shore Erosion Statistics of Maryland Tidewater Counties*

County	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Annual Loss
	years		*acres*	*acres*	*acres*	*acres*
Anne Arundel	89	3.0	29	5	24	.26
Baltimore	88	7.2	195	2	193	2.19
Calvert	94	1.7	3	0	3	.03
Charles	75	4.0	54	5	49	.65
Harford	95	13.8	267	14	253	2.66
Prince Georges						
St. Marys	77	12.2	201	49	152	1.97
Western Shore Totals	86	41.9	749	75	674	7.83
Caroline						
Cecil						
Dorchester	94	108.7	2646	150	2496	26.5
Kent	96	19.0	289	23	266	2.77
Queen Annes	96	6.8	152	4	148	1.54
Somerset	93	119.9	1925	130	1795	19.3
Talbot	93	26.1	1643	51	1595	17.1
Wicomico						
Worcester	92	55.3	864	232	632	6.76
Eastern Shore Totals	94	335.8	7,519	590	6,929	73.7
ISLAND TOTALS	90	377.2	8,268	665	7,603	84.4

TABLE 19.—*Shore Erosion Statistics of Chesapeake Bay Mainland Shore*

County	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Anne Arundel	91	40.3	1155	114	1041	25.8	.28
Baltimore	90	9.3	178	14	164	17.6	.19
Calvert	96	31.3	645	115	530	16.9	.17
Charles							
Harford	92	24.0	405	22	383	15.9	.16
Prince Georges							
St. Marys	94	22.5	672	72	600	26.6	.28
Western Shore Totals	92	127.4	3,055	337	2,718	21.3	.23
Caroline							
Cecil	94	15.6	209	14	195	12.5	.13
Dorchester	94	29.5	1874	65	1809	61.0	.64
Kent	97	36.9	611	33	578	15.6	.16
Queen Annes	97	17.6	688	96	592	33.0	.34
Somerset							
Talbot	90	11.3	301	15	286	25.3	.28
Wicomico							
Worcester							
Eastern Shore Totals	94	110.9	3,683	223	3,460	31.1	.33
CHESAPEAKE BAY TOTALS	93	238.3	6,738	560	6,178	25.9	.27

TABLE 20—*Shore Erosion Totals in Maryland Tidewater Counties*

County	Time Interval	Miles Measured	Erosion	Deposition	Net Loss	Rate of Loss	Annual Rate of Loss
	years		*acres*	*acres*	*acres*	*acres*	*acres*
Anne Arundel	89	138.1	1931	295	1636	11.9	.14
Baltimore	89	67.1	893	82	811	13.5	.15
Calvert	90	68.7	893	232	661	9.6	.11
Charles	61	92.3	415	198	217	2.4	.04
Harford	94	80.6	1101	131	970	12.0	.13
Prince Georges	81	21.3	107	35	72	3.4	.04
St. Marys	82	127.3	1801	267	1534	12.1	.15
Western Shore Totals	84	595.4	7141	1240	5901	9.7	.11
Caroline	93	13.1	128	2	125	9.2	.10
Cecil	94	77.5	843	171	672	8.7	.09
Dorchester	94	333.2	7319	433	6886	20.7	.22
Kent	96	100.2	1302	122	1180	11.8	.12
Queen Annes	96	129.4	2026	247	1779	13.7	.14
Somerset	93	233.0	3555	251	3304	14.2	.15
Talbot	93	189.0	3435	213	3222	17.0	.18
Wicomico	93	35.0	552	9	543	15.5	.17
Worcester	92	233.6	3070	1970	1100	4.7	.05
Eastern Shore Totals	94	1344.0	22,230	3419	18,811	14.0	.15
MARYLAND TOTALS	90	1939.4	29,371	4,659	24,712	12.6	0.14

Table 20 gives the erosion loss, depositional gain, and net gain by counties and for the Eastern Shore and the Western Shore counties. The total shore line measured is nearly 2,000 miles. The Eastern Shore suffered 75% of the loss and acquired 74% of the gain. It has 69% of the measured shore, and the average time interval of the measurements was 10 years longer on the Eastern Shore than on the Western Shore. The average annual loss in acres per mile of measured shore line was 0.15 acres for the Eastern Shore and 0.12 acres for the Western Shore.

The Eastern Shore counties that suffered the greatest loss of acreage are Dorchester, Somerset and Talbot. They also had the highest rate of loss, except for the small shore line of Wicomico County which had a higher rate of loss than the Somerset rate. The Western Shore counties that lost the greatest acreage are Anne Arundel and St. Marys, and their rate of loss is the highest on the Western Shore. Their acreage loss and rate of loss are nearly the same as for Queen Anne County which follows Dorchester, Somerset and Talbot Counties on the Eastern Shore.

The islands with 19% of the measured shore line suffered 28% of the erosion loss and gained 14% of the depositional areas. The islands suffered 31% of the net acreage loss. The Eastern Shore islands incurred 91% of the net acreage lost by islands, but they included 89% of the measured island shore line. There is little difference, therefore, in the rate of island loss between the Eastern Shore and the Western Shore.

The Eastern Shore mainland incurred 70% of the mainland acreage loss and gained 71% of the depositional acreage. It lost 69% of the net acreage lost and has 64% of the measured mainland shore line.

Table 19 shows that along the Chesapeake Bay mainland, the Eastern Shore with 47% of the measured mainland shore line of the Chesapeake Bay lost 55% of the eroded acreage, gained 40% of the depositional acreage, and suffered 56% of the net acreage loss. Erosion of the Chesapeake Bay mainland shore is thus somewhat more severe on the Eastern Shore than on the Western Shore.

Tables 17 to 20 show that the rate of erosion on the Eastern Shore per mile of waterfront is generally a little greater than on the Western Shore and that the acreage lost on the Eastern Shore greatly exceeds the acreage lost on the Western Shore. However, much of the acreage loss of the Eastern Shore has been low marsh land of little value per acre, whereas the land lost on the Western Shore has been dominantly higher land with a much greater value per acre. It is probable that the monetary loss on the Western Shore is as great as the monetary loss on the Eastern Shore.

NAVIGATION RESTORATION EXPENDITURES NECESSITATED BY SHORE EROSION

BY

TURBIT H. SLAUGHTER

The damage inflicted by shore erosion is not only that incurred by the property eroded, but the long-shore movements of the products of erosion result in their deposition in navigable waters and necessitate the expenditures of large sums of Federal money to restore the impaired navigation facilities.

Many tributaries of the Chesapeake Bay that were formerly navigable by the largest boats that plied the Bay have become navigable by only the smallest boats and in many cases have been completely closed at their entrances. Silting in these tributaries is due to two wholly independent causes. The products of soil erosion washed down into tidal waters have so shallowed the waters in many of these tributaries as to make them no longer navigable. Port Tobacco River is an outstanding and well-known example of the impairment of navigation in a tidal estuary through the deposition of soil erosion debris. In many estuaries, however, there is still adequate depth of water, but the deposition of long-shore moving shore-erosion debris at their entrance has closed their access to boats larger than a row boat or has closed them completely, converting the estuary into a pond and even into a swamp. Lake Ogleton at Bay Ridge is a striking example of such hindrance to navigation.

The United States Army Corps of Engineers is repeatedly called upon for navigation improvement projects to remedy impairment to navigation in Chesapeake Bay and other waters of the State. An analysis was made of the Federal expenditures in Maryland on river and harbor improvements to estimate the amount of those expenditures that can be ascribed to the results of shore erosion. Of the navigation improvement projects that have been carried out in Maryland by the Army Engineers, it is estimated that 27 were in whole or in part necessitated by silting caused by the deposition of the products of shore erosion. Table 21 is a list of these 27 projects, giving the beginning date of the project, the cumulative cost of the project, the cumulative maintenance cost, and the portion of the maintenance cost estimated to be ascribable to shore erosion. These projects to June 30, 1948, have necessitated an expenditure of $2,646,000 in new work and of $1,345,000 in maintenance. It is estimated that $591,000 of the maintenance cost was caused by the deposition of shore-erosion products in navigable waters.

These projects represent only those for which navigation improvements were authorized by Congress. In many more localities, restoration of navigation

TABLE 21.—*River and Harbor Improvement Expenditures Made Necessary by Deposition of Shore Erosion Products in Navigable Waters*

Project Location	Beginning Date of the Original Project	Accumulative Cost of New Work to June 30, 1948	Accumulative Maintenance Cost to June 30, 1948	Estimated Maintenance Cost Attributed to Bottom Drift and Shore Erosion
Susquehanna River above and below Havre De Grace	1852	$293,569.78	$81,602.05	$81,602.05 = 100%
Rock Hall Harbor, Kent County	1896	139,757.13	10,300.65	5,150.32 = 50%
Chester River	1881	56,102.30	89.095.64	8,909.56 = 10%
Queenstown Harbor, Queen Annes County.	1871	44,858.27	27,642.19	19,349.53 = 70%
Knapps Narrows, Talbot County	1933	46,121.20	33.116.20	6,633.24 = 20%
Island Creek, Talbot County	1937	6,229.93	1,068.80	1,068.80 = 100%
La Trappe River, Talbot County	1892	8,063.87	16,000.24	4,800.07 = 30%
Warwick River, Dorchester County	1880	22,040.82	73,271.90	14,654.38 = 20%
Cambridge Harbor, Dorchester County	1871	81,973.94	7,671.37	767.13 = 10%
Slaughter Creek, Dorchester County	1912	4,140.00	1,119.40	1,119.40 = 100%
Honga River and Tar Bay, Dorchester County	1935	34,290.13	51,448.17	46,303.35 = 90%
Fishing Bay, Dorchester County	1937	33,874.19	2,700.12	2,160.09 = 80%
Nanticoke River	1937	73,243.18	2,311.11	1,617.77 = 70%
Tyaskin Creek, Wicomico County	1902	16,296.63	18,266.39	9,133.19 = 50%
Wicomico River	1872	457,847.03	125,144.96	25,028.99 = 20%
Upper thorofare, Deal Island, Somerset County	1935	62,445.73	5,077.92	2,538.96 = 50%
Lower Thorofare, Deal Island, Somerset County	1881	12,200.00	1,625.20	1,625.20 = 100%
Crisfield Harbor, Somerset County	1875	263,582.31	5,723.71	1,144.74 = 20%
Broad Creek, Somerset County	1912	28,227.19	46,900.81	18,760.32 = 40%
Pocomoke River	1878	181,957.83	90,807.93	9.080.79 = 10%
Twitch Cove and Big Thorofare River, Somerset County	1912	164,174.53	46,258.73	13,877.61 = 30%

TABLE 21.—*Continued*

Project Location	Beginning Date of the Original Project	Accumulative Cost of New Work to June 30, 1948	Accumulative Maintenance Cost to June 30, 1948	Estimated Maintenance Cost Attributed to Bottom Drift and Shore Erosion
Ocean City Harbor and Inlet and Sinepuxent Bay, Worcester County	1935	350,193.02	506,306.51	253,153.25 = 50%
Fishing Creek, Calvert County	1937	111,242.07	50.017.68	25,008.84 = 50%
Herring Bay and Rockhold Creek, Anne Arundel County	1930	50,591.47	9,844.02	2,953.20 = 30%
Potomac River at Lower Cedar Point, Charles County	1910	10,233.51	6,216.49	4,973.19 = 80%
Island Creek, St. Georges Island, St. Marys County	1878	47,923.55	11,879.10	5,939.55 = 50%
St. Jerome Creek, St. Marys County	1881	44,356.95	23,805.90	23,805.90 = 100%
Totals		$2,645,536.56	$1,345,223.19	$591,159.42 = 43%

has been refused because the costs would not be warranted by the expected benefits. Restoration of impaired navigation has not even been brought to the attention of Congress in countless other localities. To remedy all of the impairment to navigation caused by the deposition of the products of shore erosion would require many times the amounts already expended in new work and in maintenance on such projects.

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PLATE 29, FIG. 1

Location: East end of North Harbor Road facing south on Sinepuxent Bay, Ocean City, Worcester County.

Date: May, 1947.

Remarks: Due to a shift in position of the large sand spit at the west end of the southern side of Ocean City inlet which changed current direction and velocity, the shore line at this point suddenly began to erode with the subsequent total destruction of the house at that location.

PLATE 29, FIG. 2

Location: The northwest shore of Deal Island facing Tangier Sound, Somerset County.

Date: June, 1948.

Remarks: Wave and storm tides have eroded this unprotected, low, sandy portion of the island at the rate of 2 to 3 ft. per year, necessitating immediate protection or movement of the house. Mute evidence of the site of former solid ground is the water pipe in the water on the right.

PLATE 30 FIG. 1

Location: Log Inn, south of Tydings on the Bay, Anne Arundel County.
Date: September, 1948.
Remarks: In 1930–31 a concrete bulkhead was constructed in front of the house and one 400 ft. to the north in front of another building. Since that time the shore front between the bulkheads has receded a maximum of 100 ft. or an average of 5 ft. per year.

PLATE 30. FIG. 2

Location: Tydings on the Bay, Anne Arundel County.
Date: September, 1948.
Remarks: The bulkhead was constructed in 1936 and is still in excellent condition.

PLATE 31, FIG. 1

Location: Tall Timbers on the Potomac River, St. Marys County.

Date: July, 1949.

Remarks: This shows the ineffectiveness of discontinuous bulkheads. Erosion of the unprotected areas between the bulkheads leads to the eventual destruction of the bulkheads, by eroding around their ends and undermining them from the rear.

PLATE 31, FIG. 2

Location: Tall Timbers on the Potomac River, St. Marys County.

Date: July, 1949.

Remarks: The concrete buttresses are the remnants of a bulkhead built in 1931. The shore continued to recede after the destruction of the bulkhead.

PLATE 32, FIG. 1

Location: Choptank River, Cambridge, Dorchester County.

Date: August, 1949.

Remarks: An improvised and inexpensive groin made of old tire casings thrown over iron pipe driven into the bottom. Ample littoral drift supply and not too severe wave and current action permit a degree of effectiveness.

PLATE 32, FIG. 2

Location: Northern groin at Matapeake Ferry Landing, Queen Annes County.

Date: August, 1949.

Remarks: In 19 years a predominant southerly-moving littoral drift has accumulated to form a wide beach on the north side of the groin.

FIG. 1

FIG. 2

PLATE 33, FIGS. 1 AND 2

Location: Choptank River in front of the Eastern Shore State Hospital, Cambridge, Dorchester County

Date: Fig. 1. February, 1949. Fig. 2. August, 1949.

Remarks: Small rubble groins have accumulated enough additional beach in 6 months to protect the end of the concrete wall that was being undermined by erosion. Wave and current action are not severe and the littoral drift supply abundant.

FIG. 1

FIG. 2

PLATE 34, FIGS. 1 AND 2

Location: Bay Ridge facing northeast on the Chesapeake Bay, Anne Arundel County.
Date: Fig. 1. December, 1946. Fig. 2. August, 1949.
Remarks: Illustrate the effectiveness of a groin to hold and to build out a beach when there is sufficient littoral drift supply.

FIG. 1

FIG. 2

PLATE 35, FIGS. 1 AND 2

Location: The south shore entrance of Back Creek at Chinks Point, Anne Arundel County.
Date: Fig. 1. December, 1946. Fig. 2. August, 1949.
Remarks: Over a relatively short period a considerable amount of littoral drift has accumulated on the southeast side of the stone jetty, evidencing an ample supply of sand moving along the beach at this point.

INDEX

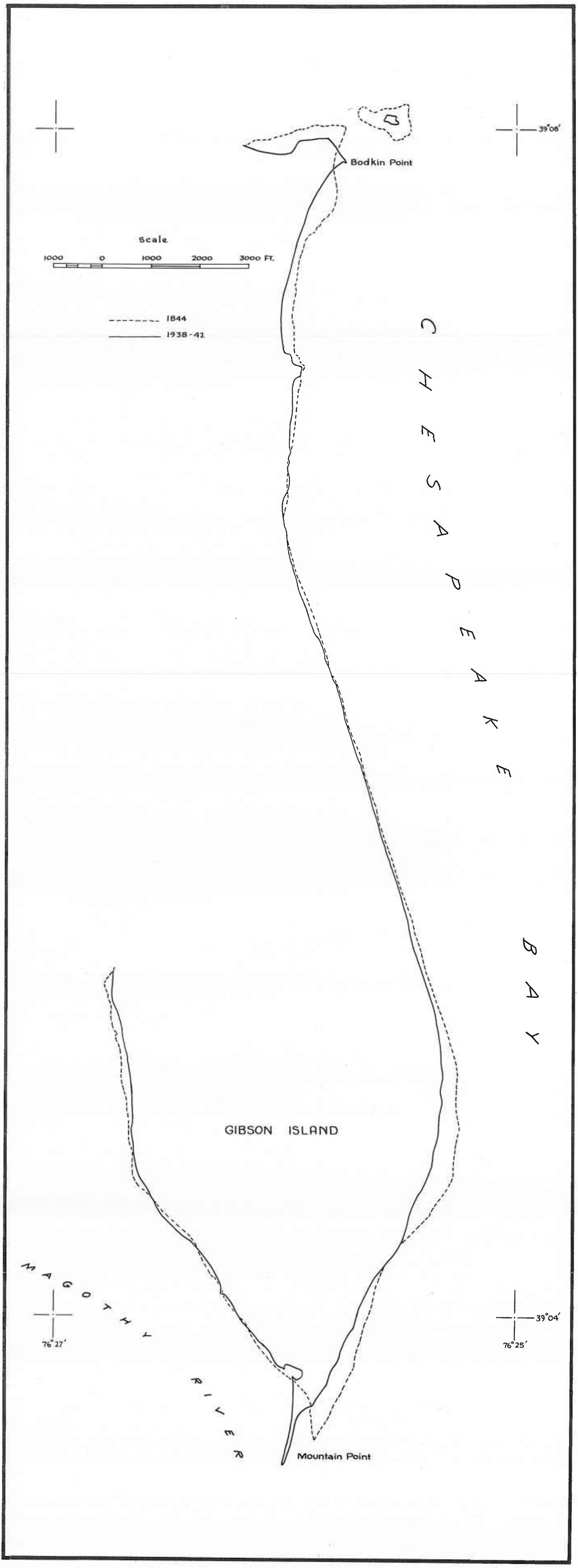


Plate 1. Shore Line Changes from Bodkin Point to Mountain Point, Anne Arundel County

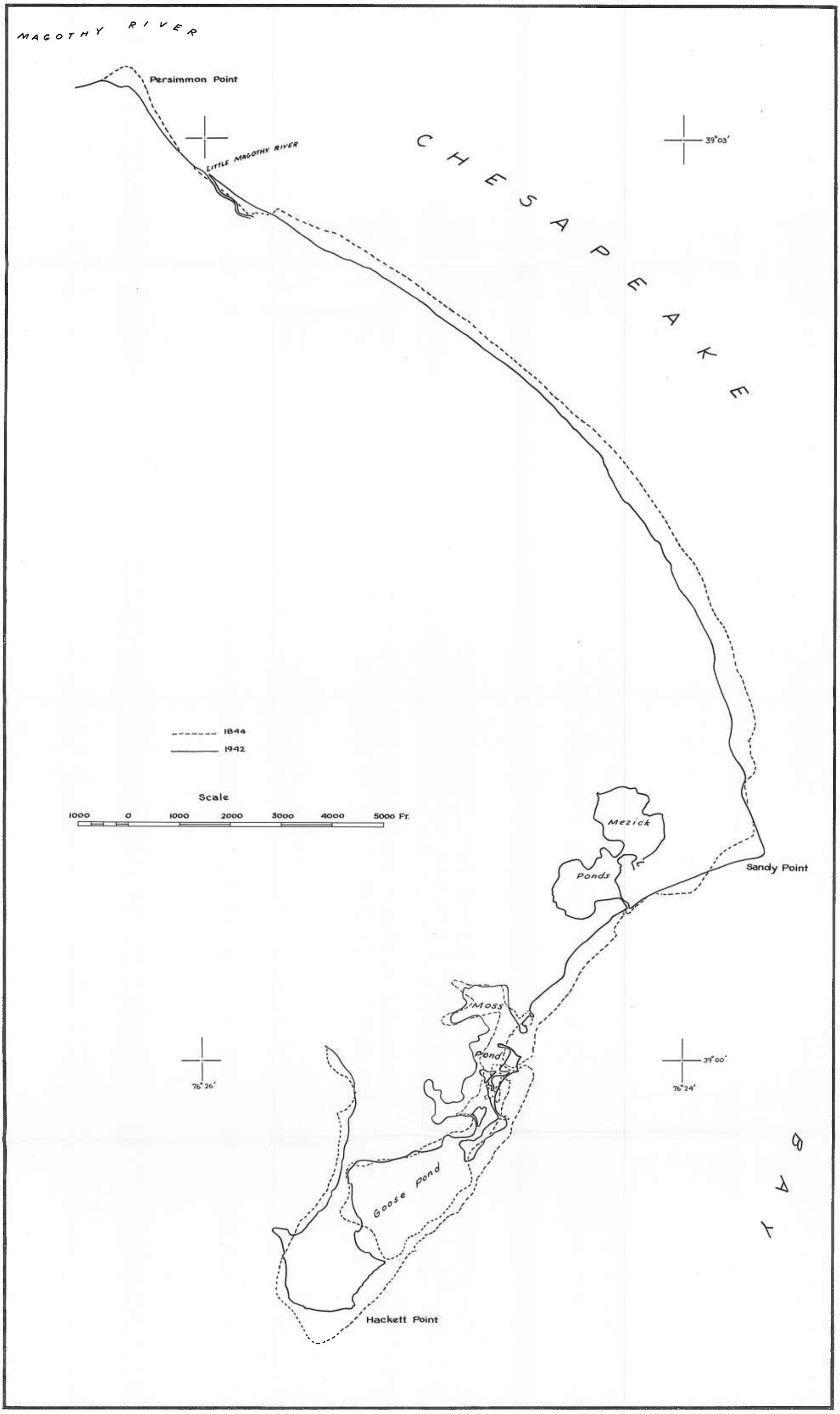


Plate 2. Shore Line Changes from Persimmon Point to Hackett Point, Anne Arundel County

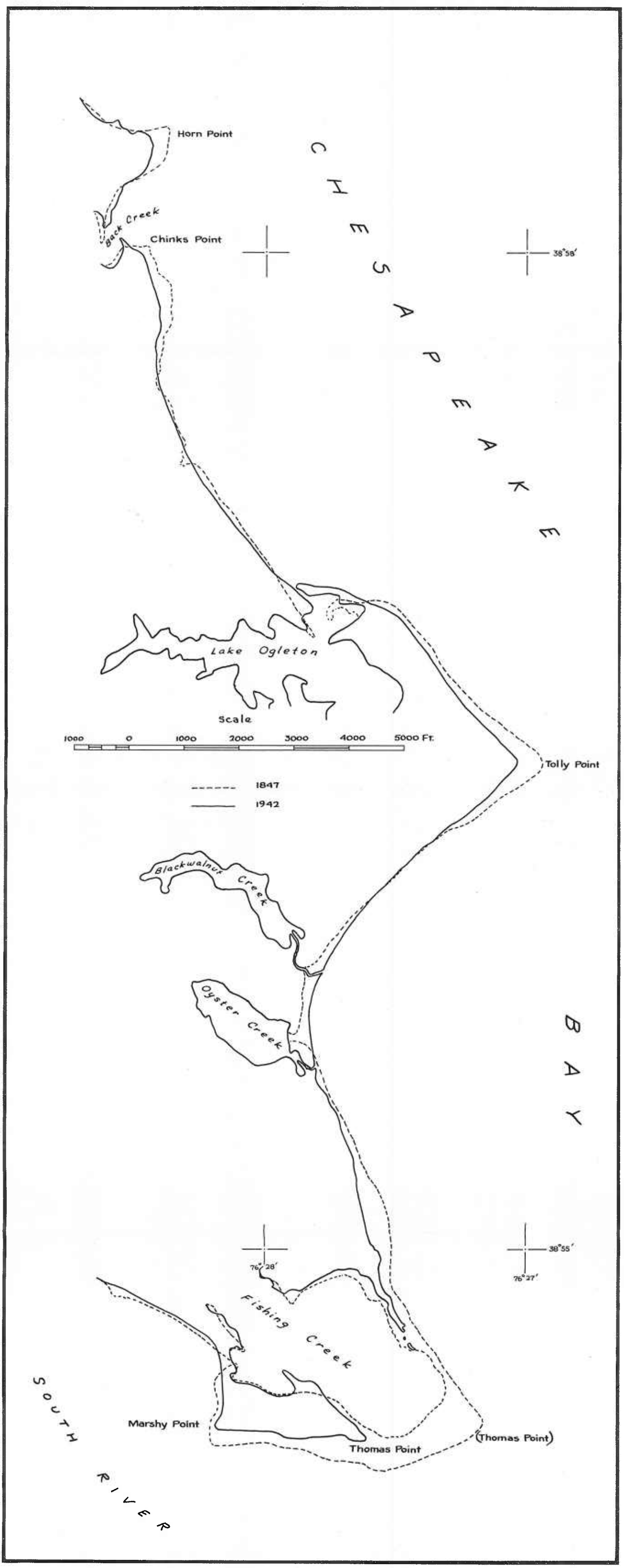


Plate 3. Shore Line Changes from Horn Point to Marshy Point, Anne Arundel County

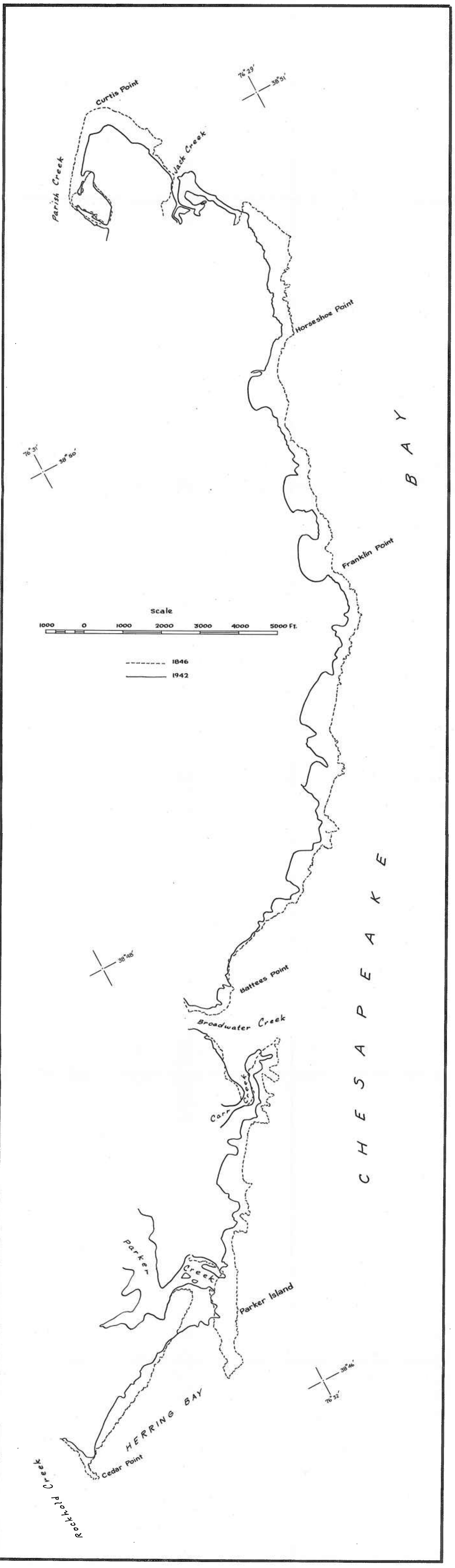


PLATE 4. Shore Line Changes from Curtis Point to Rockhold Creek, Anne Arundel County

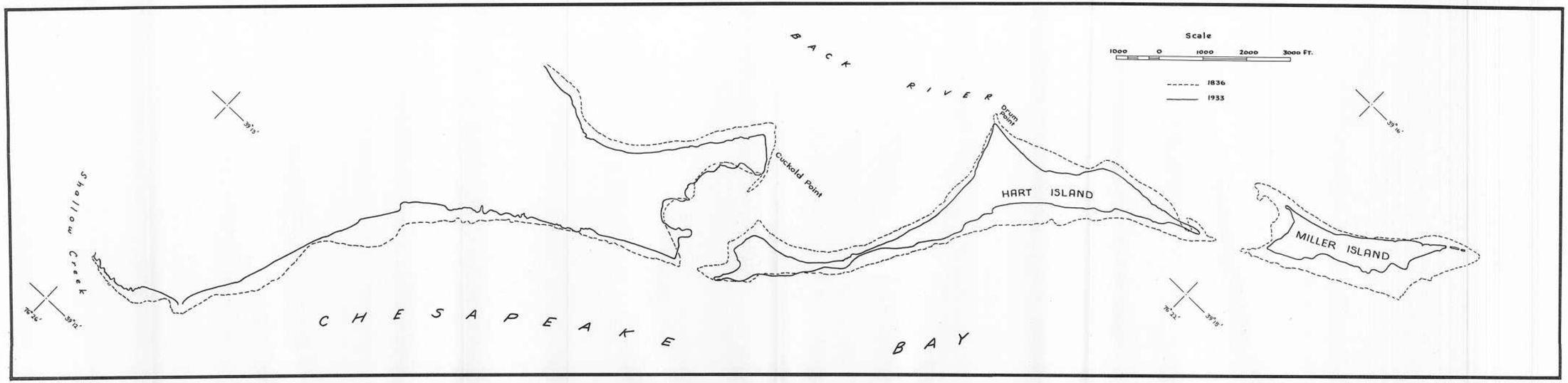


Plate 6. Shore Line Changes from Cuckhold Point to Shallow Creek, and on Hart and Miller Islands, Baltimore County

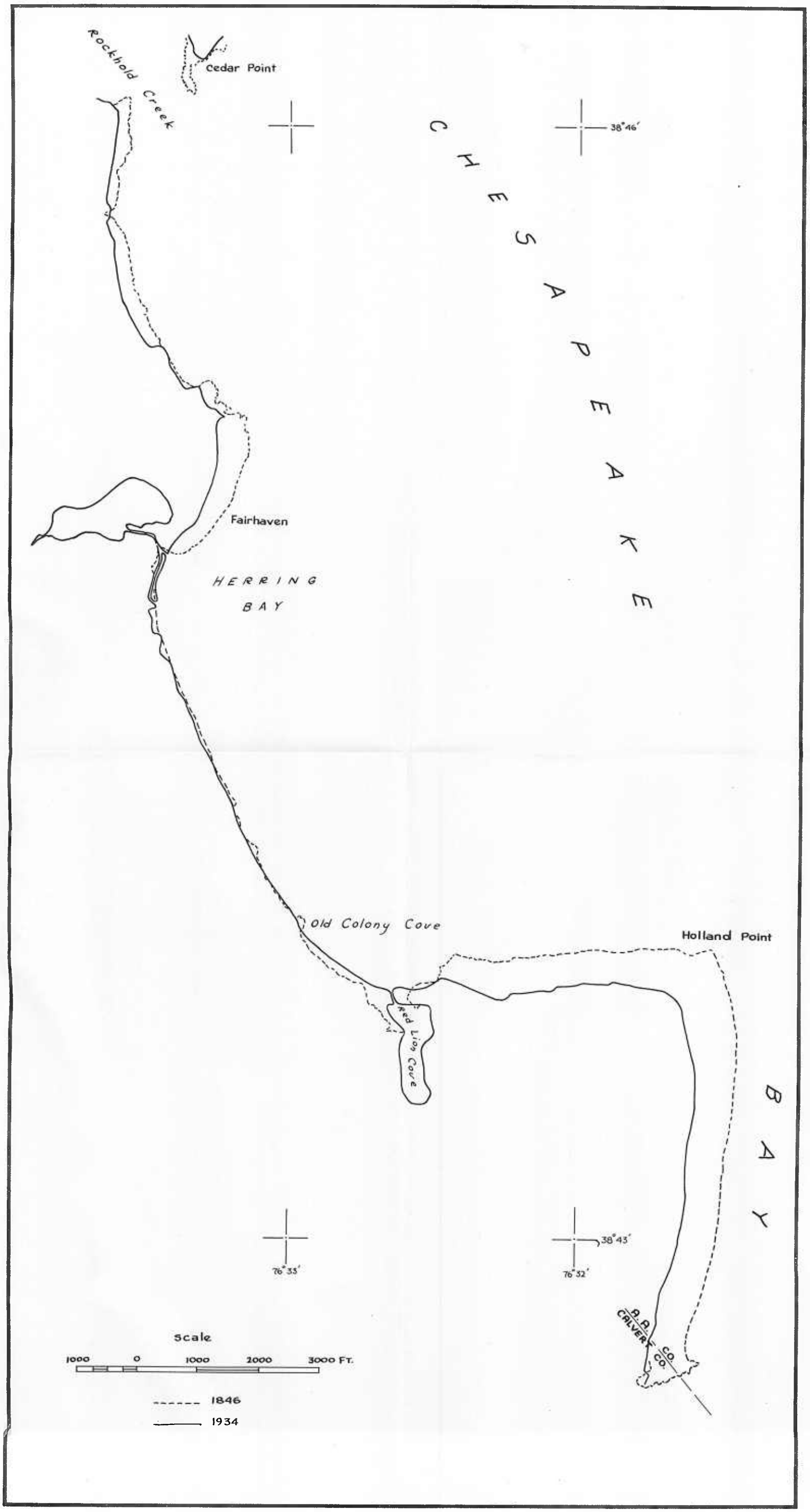


Plate 5. Shore Line Changes from Rockhold Creek to the Anne Arundel-Calvert County Boundary

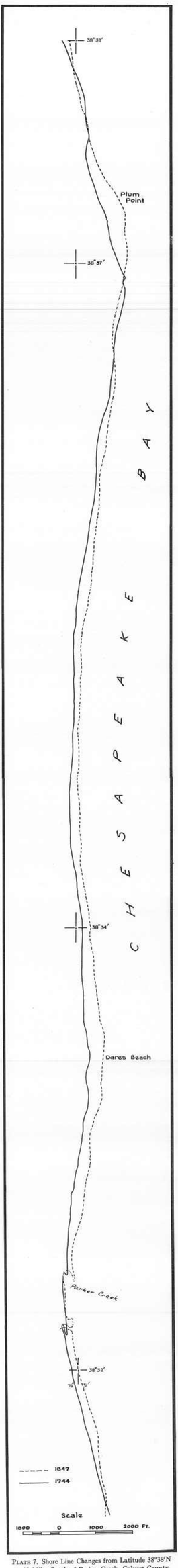


Plate 7. Shore Line Changes from Latitude 38°38'N to 1¼ Miles South of Parker Creek, Calvert County

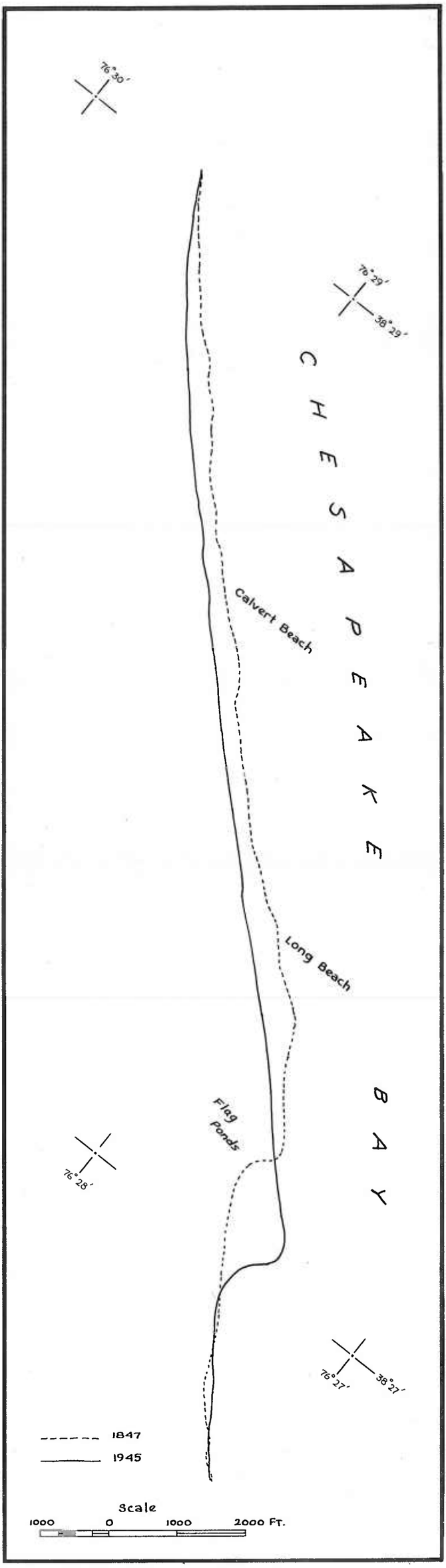


Plate 8. Shore Line Changes from Latitude 38°29'N to 1 Mile South of the Flag Ponds, Calvert County

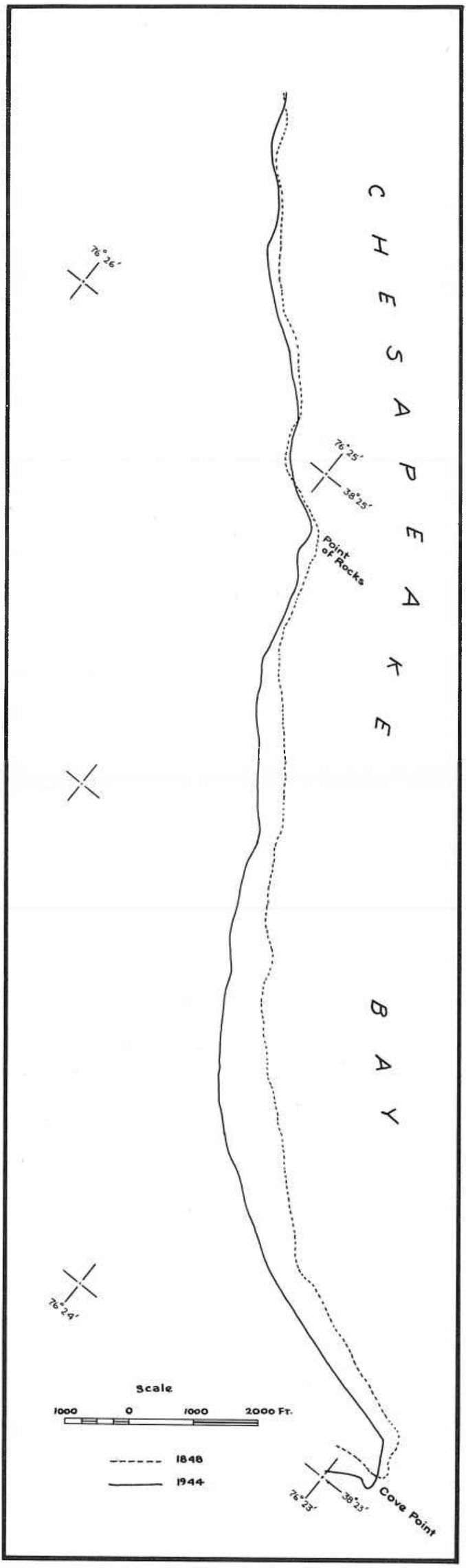


Plate 9. Shore Line Changes from 1 Mile North of Point of Rocks to Cove Point, Calvert County

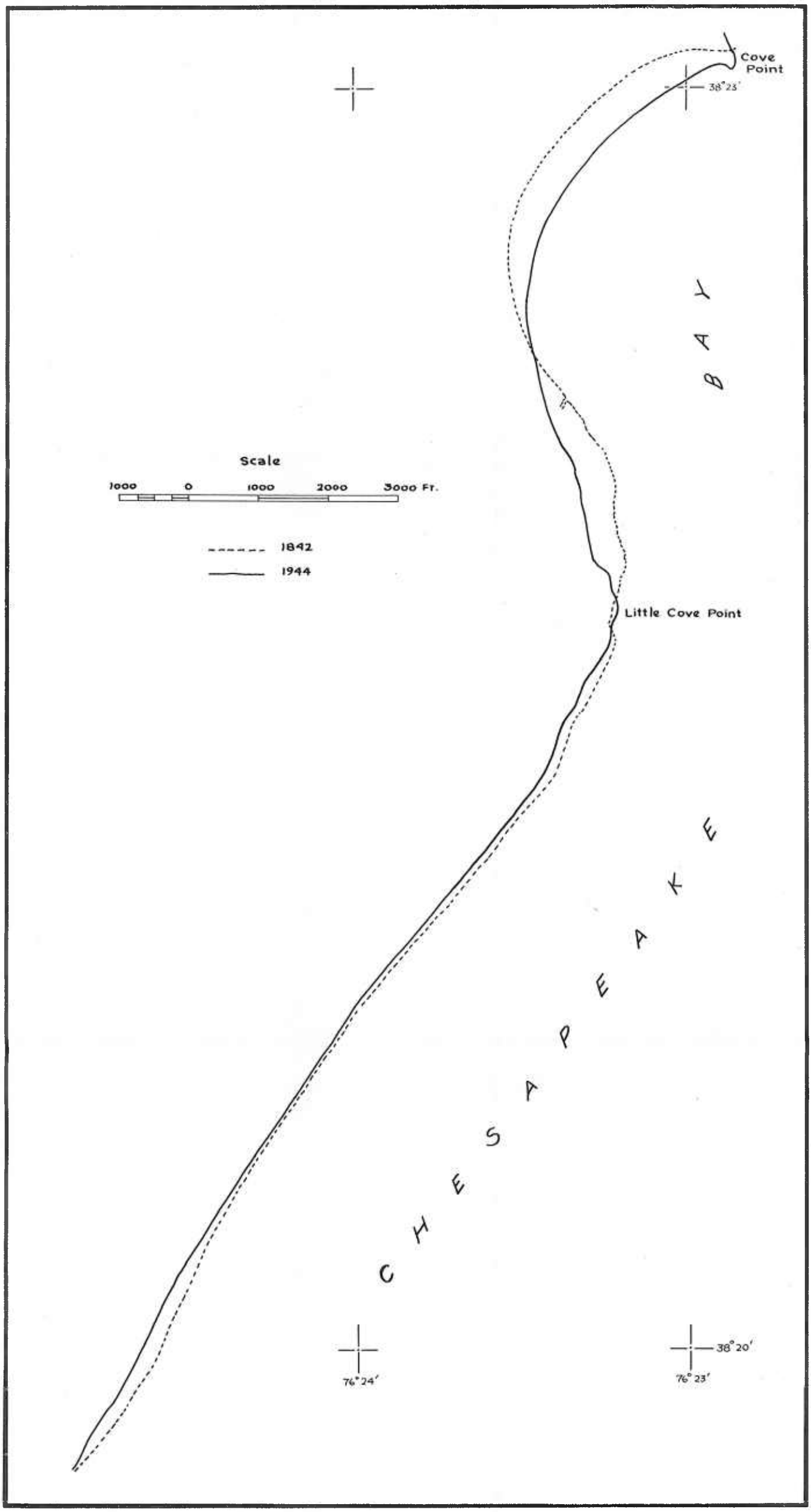


Plate 10. Shore Line Changes from Cove Point to $2\frac{3}{4}$ Miles South of Little Cove Point, Calvert County

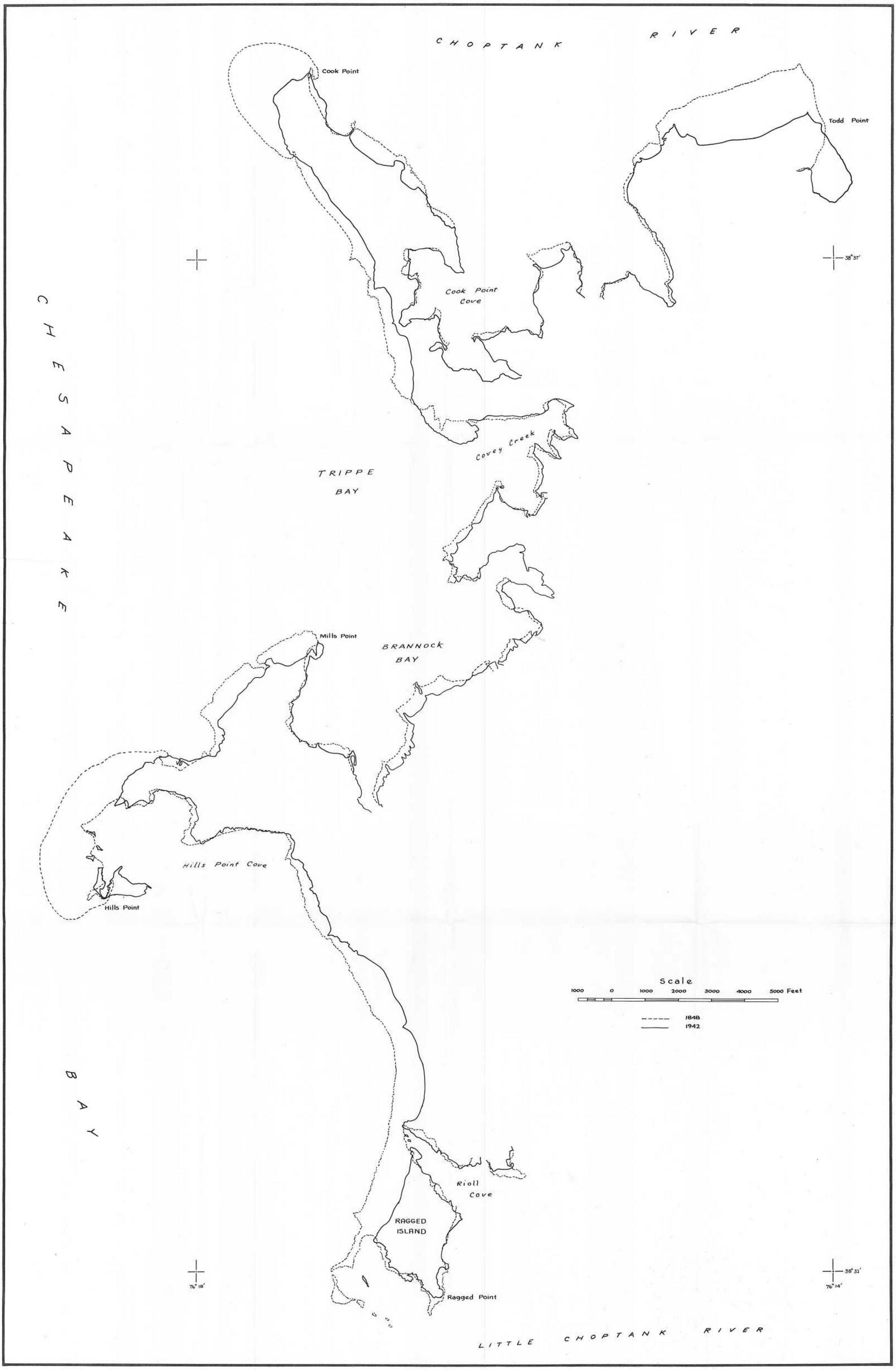


Plate 11. Shore Line Changes from Todd Point to Rioll Cove, Dorchester County

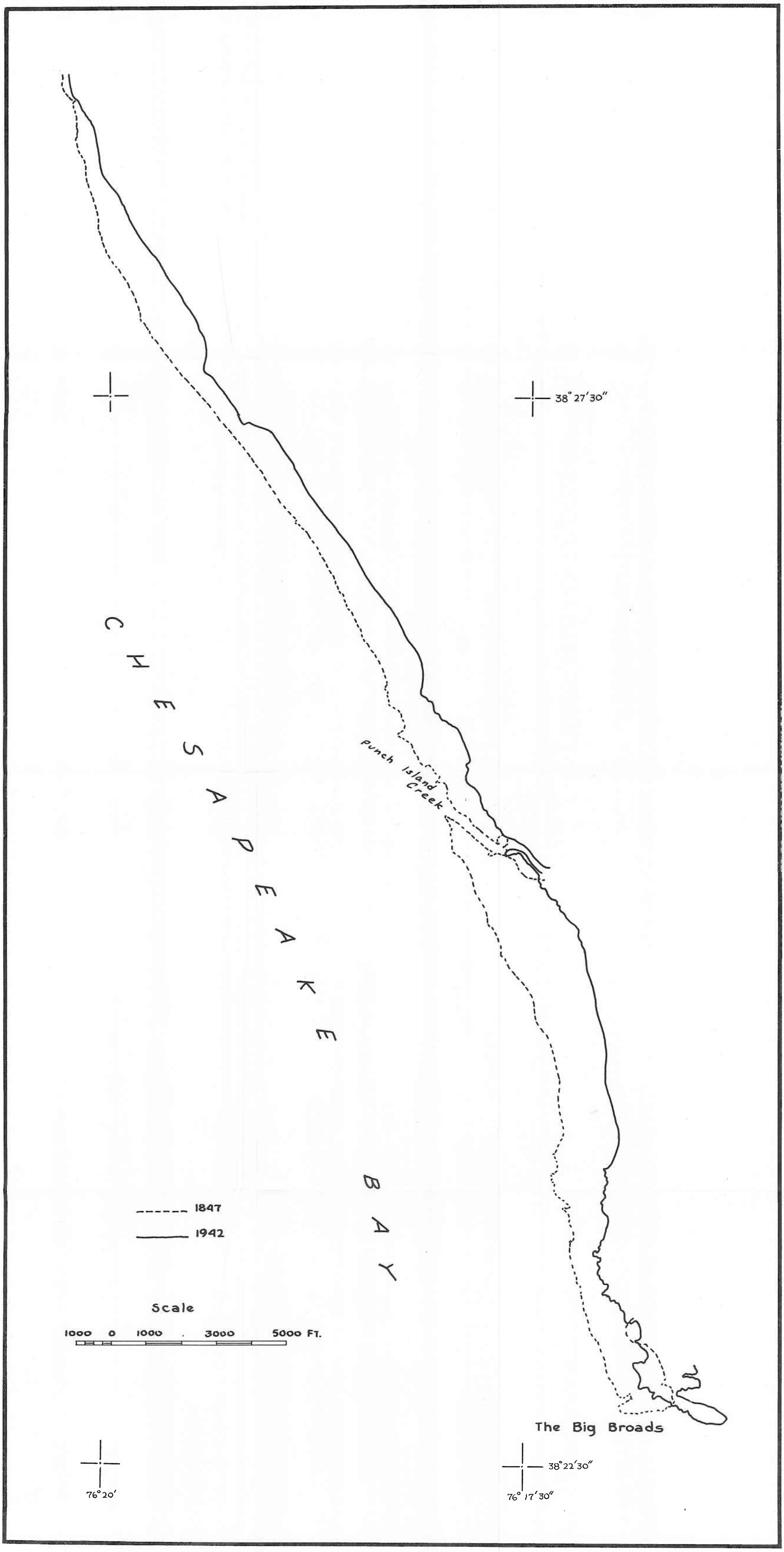


Plate 12. Shore Line Changes from 1 Mile South of Oyster Cove to the Big Broads, Dorchester County

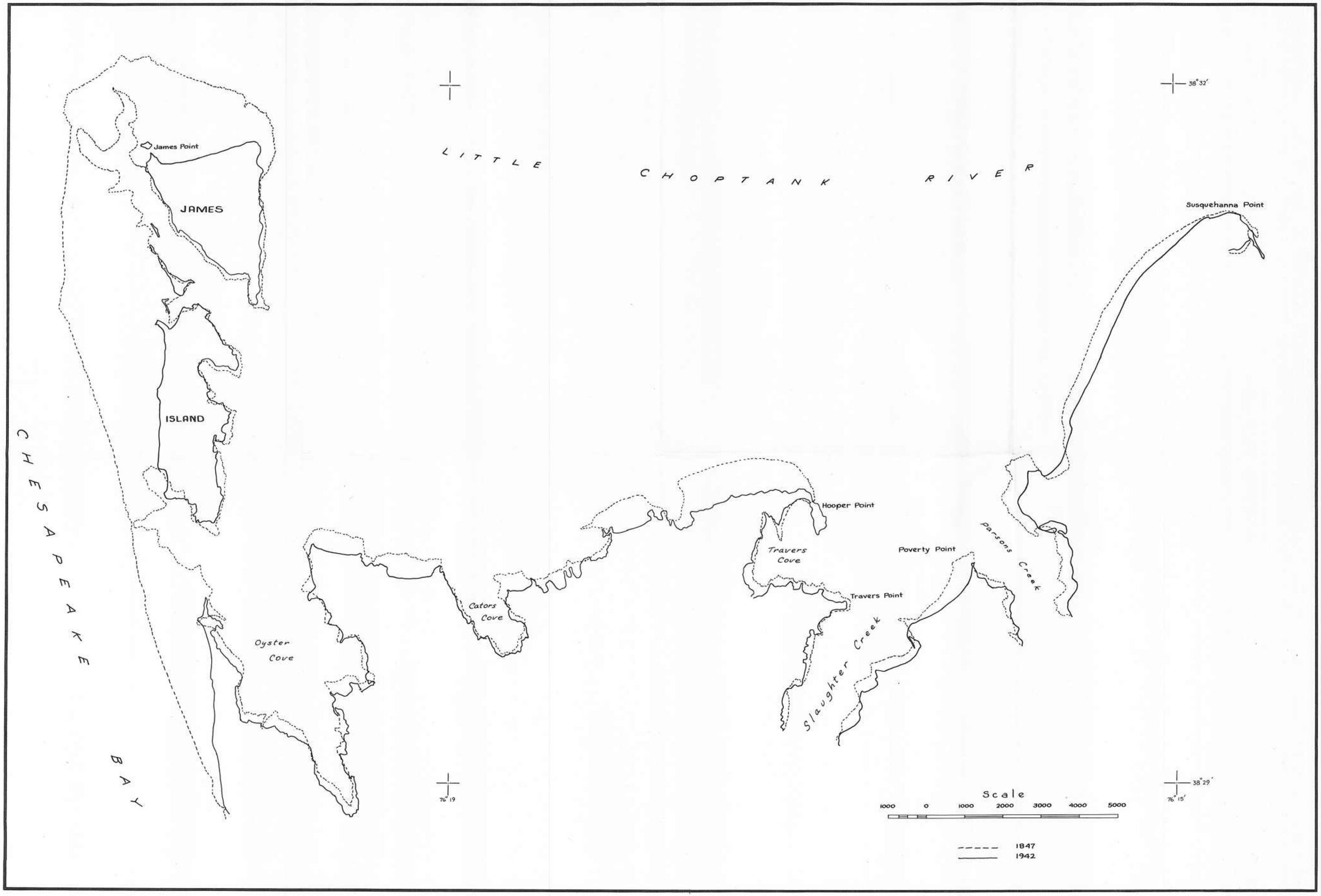


Plate 13. Shore Line Changes of James Island and from Susquehanna Point to 1 Mile South of Oyster Cove, Dorchester County

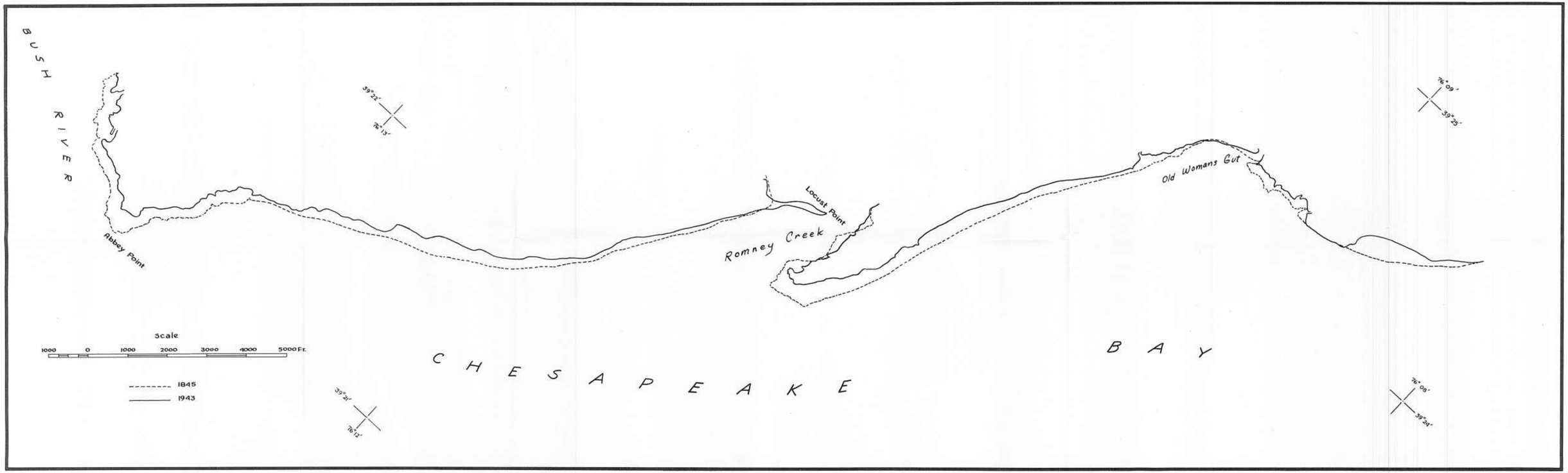


PLATE 14. Shore Line Changes from Old Womans Gut to Abbey Point, Harford County

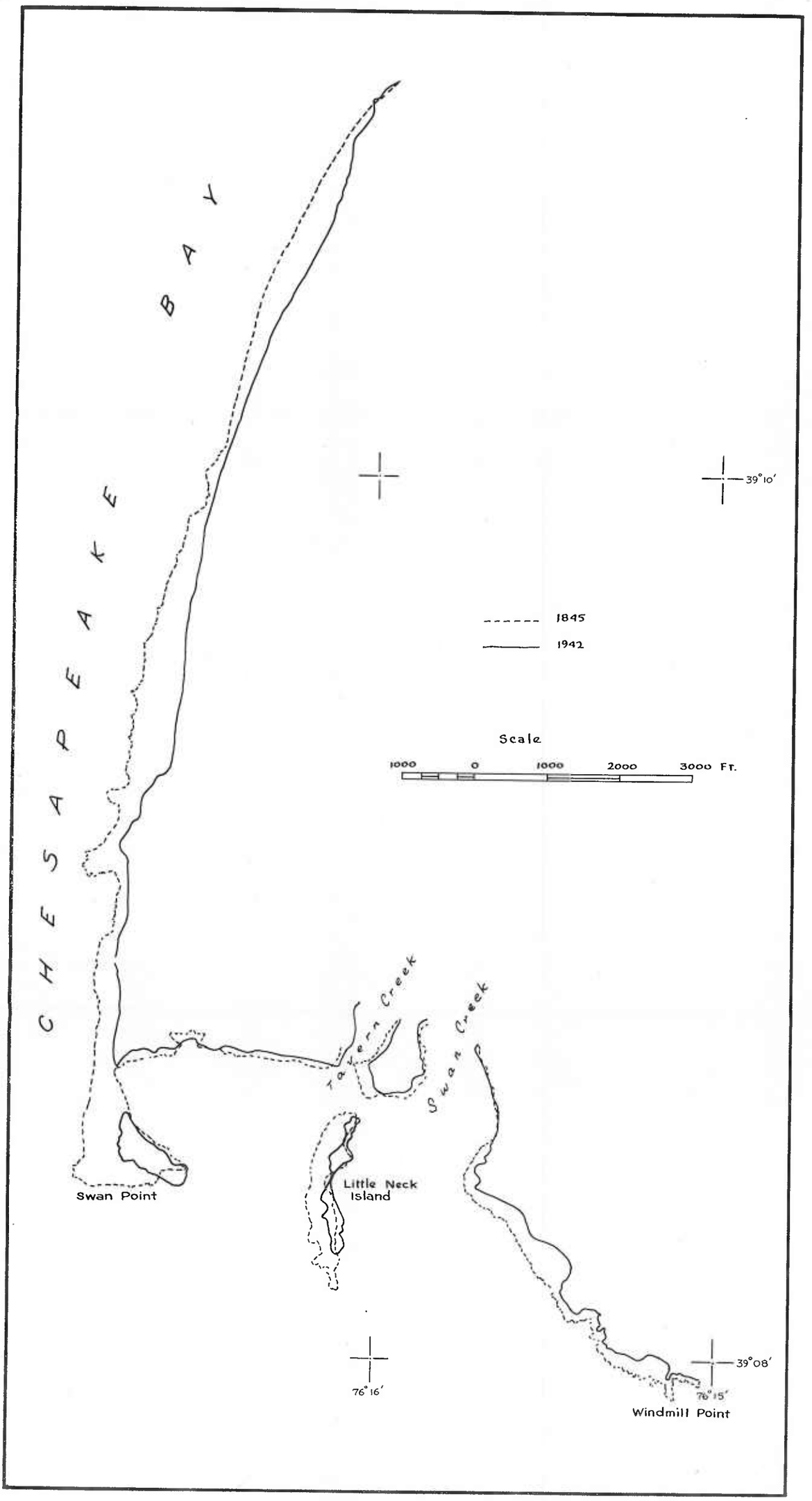


Plate 15. Shore Line Changes from 2 Miles South of Tolchester Beach to Windmill Point, Kent County

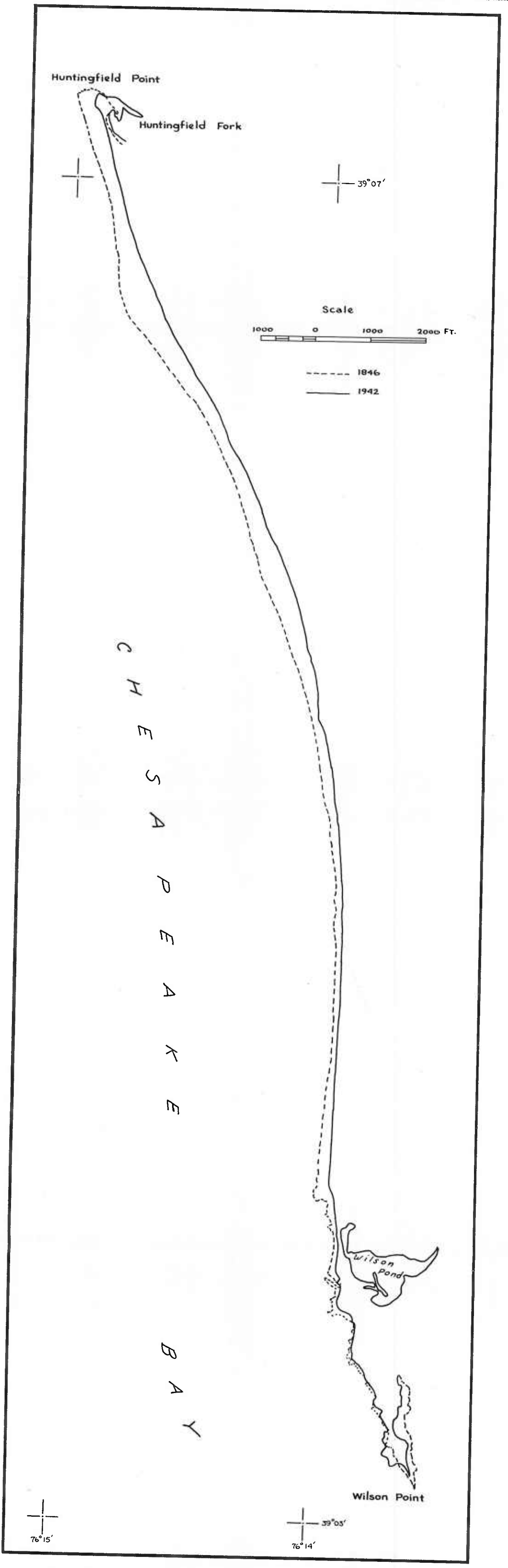


PLATE 16. Shore Line Changes from Huntingfield Point to Wilson Point, Kent County

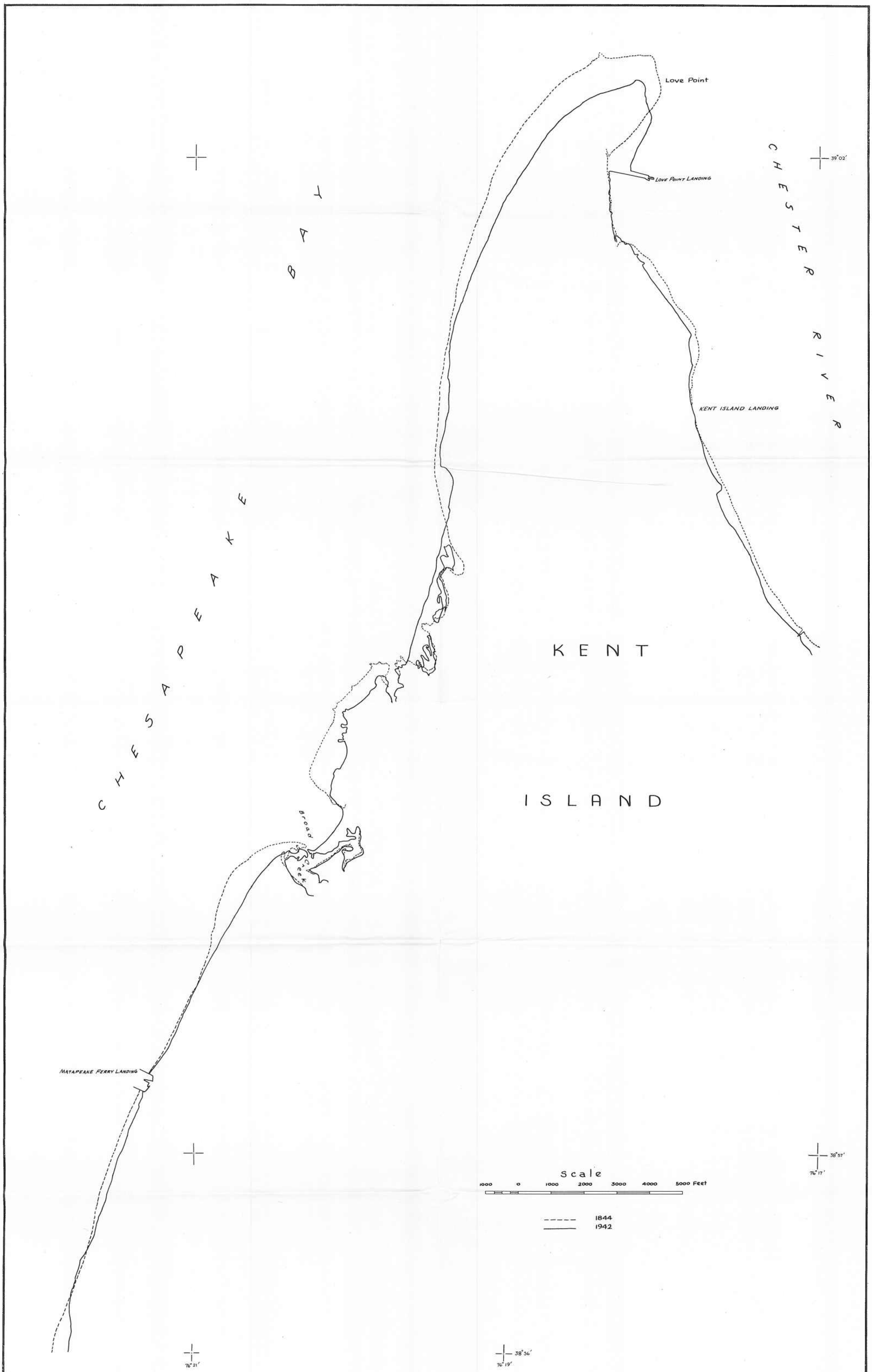


Plate 17. Shore Line Changes from Love Point to 1¾ Miles South of Matapeake Ferry Landing, Queen Annes County

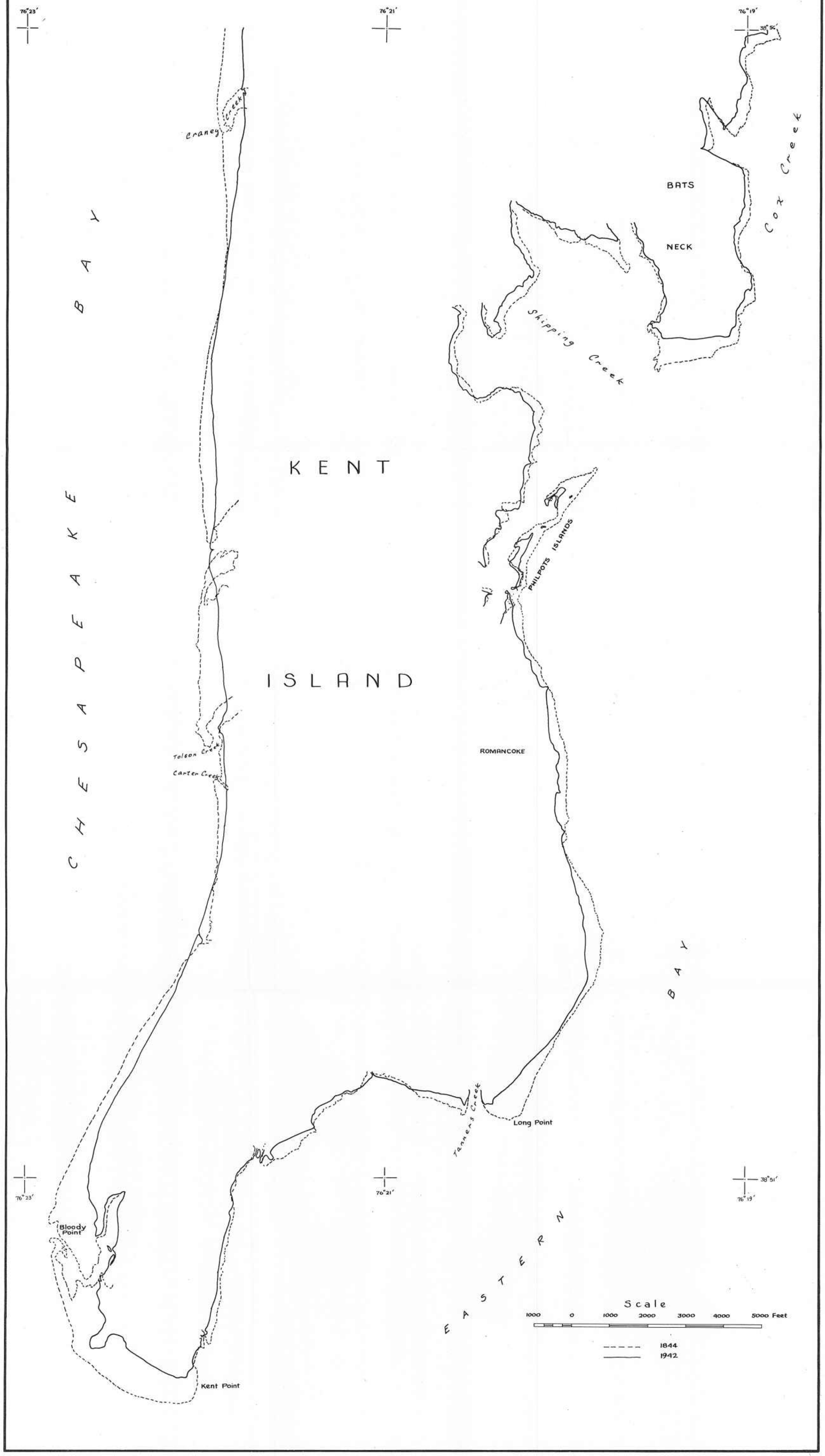


Plate 18. Shore Line Changes from Craney Creek to Kent Point and from Kent Point to Cox Creek, Queen Annes County

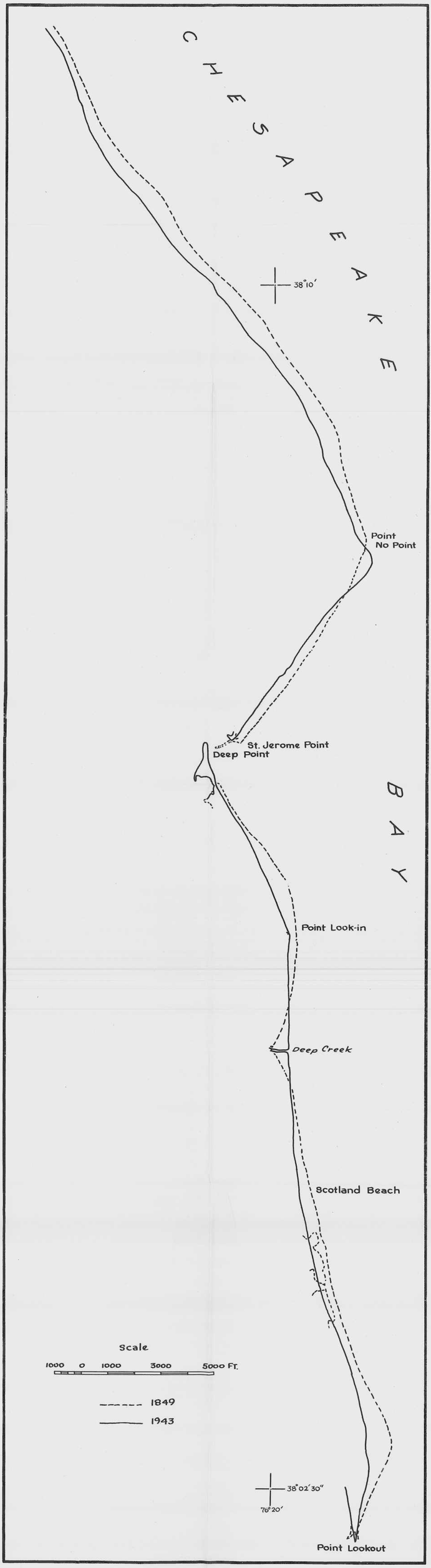


Plate 19. Shore Line Changes from 4½ Miles Northwest of Point No Point to Point Lookout, St. Marys County

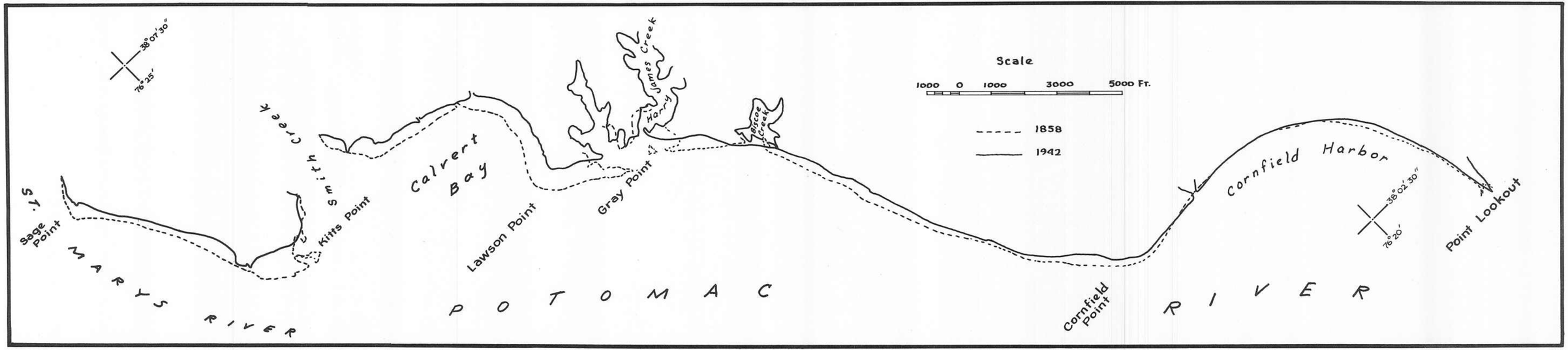


Plate 20. Shore Line Changes from Sage Point to Point Lookout, St. Marys County

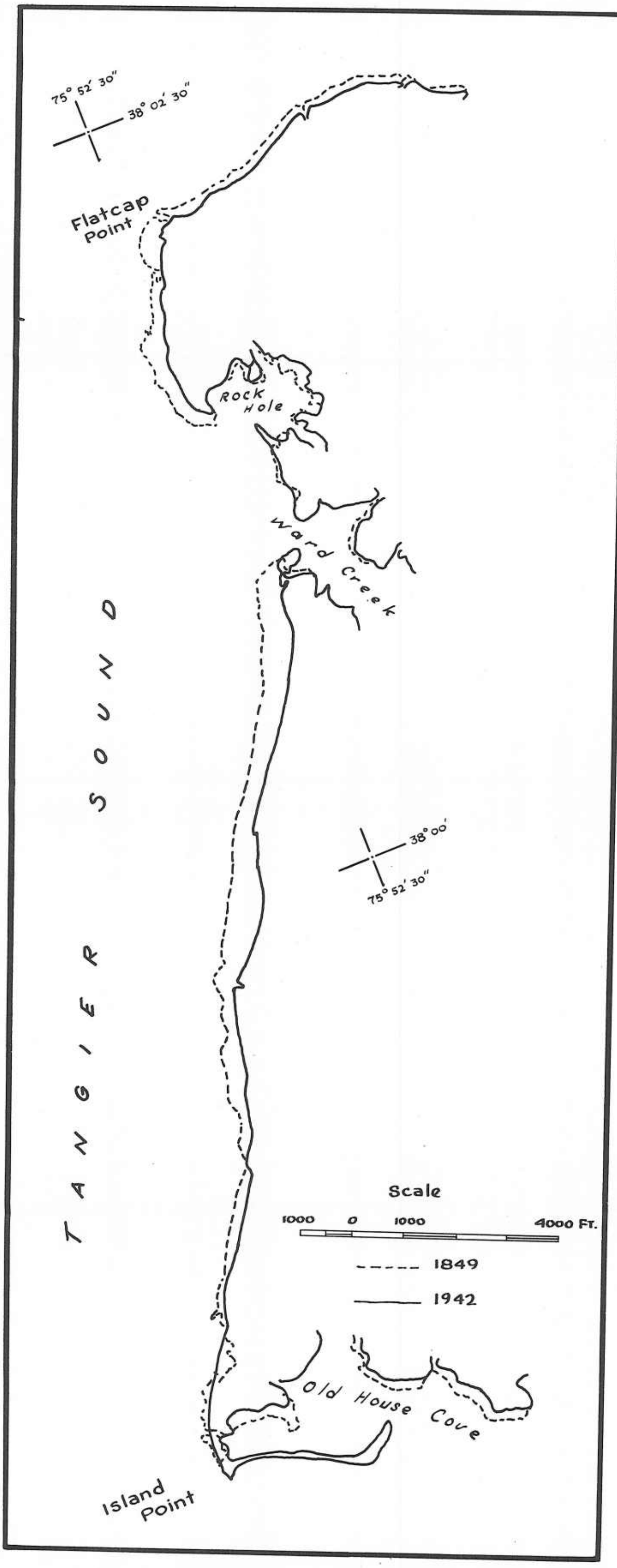


Plate 21. Shore Line Changes from Flatcap Point to Old House Cove, Tangier Sound, Somerset County

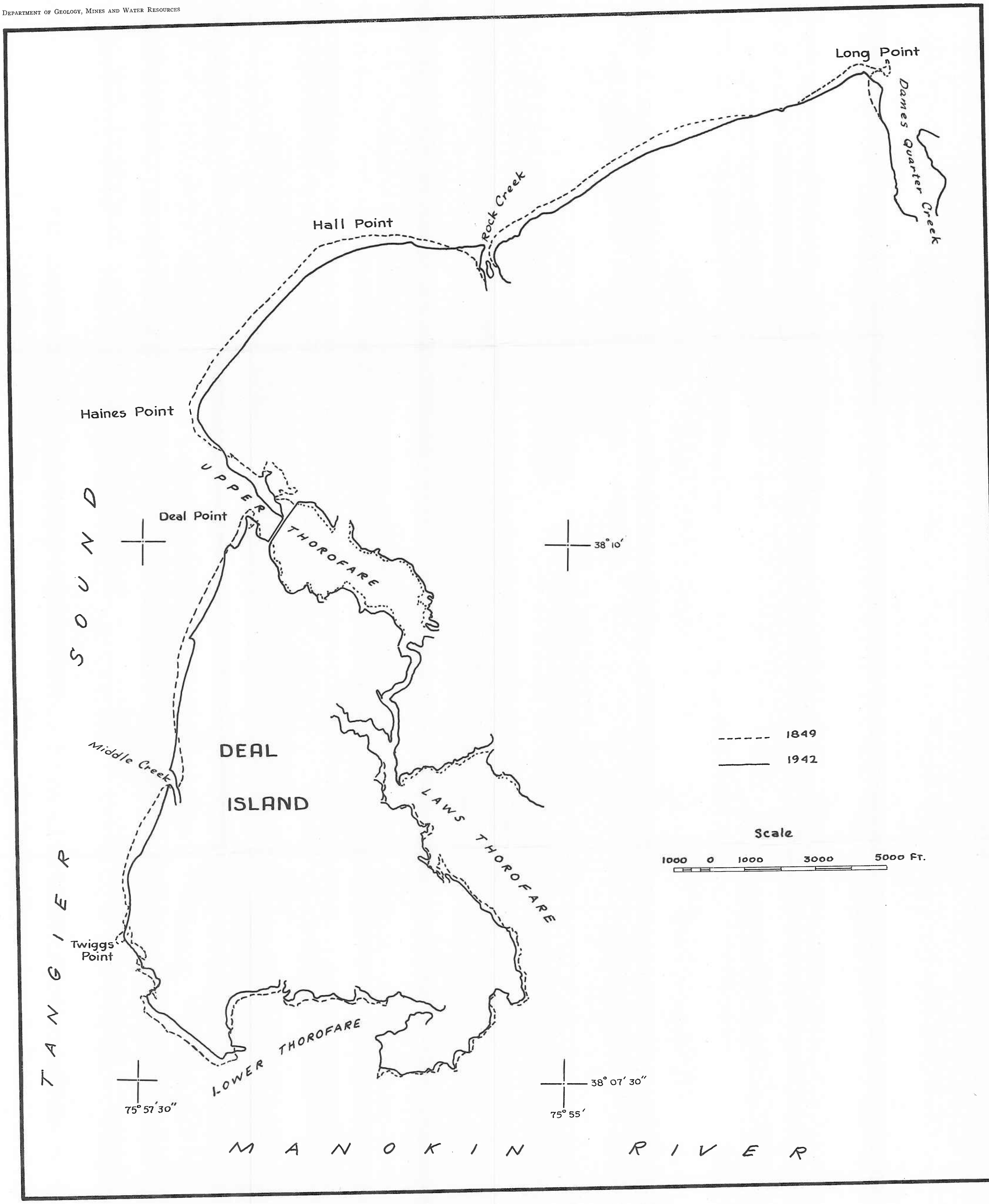
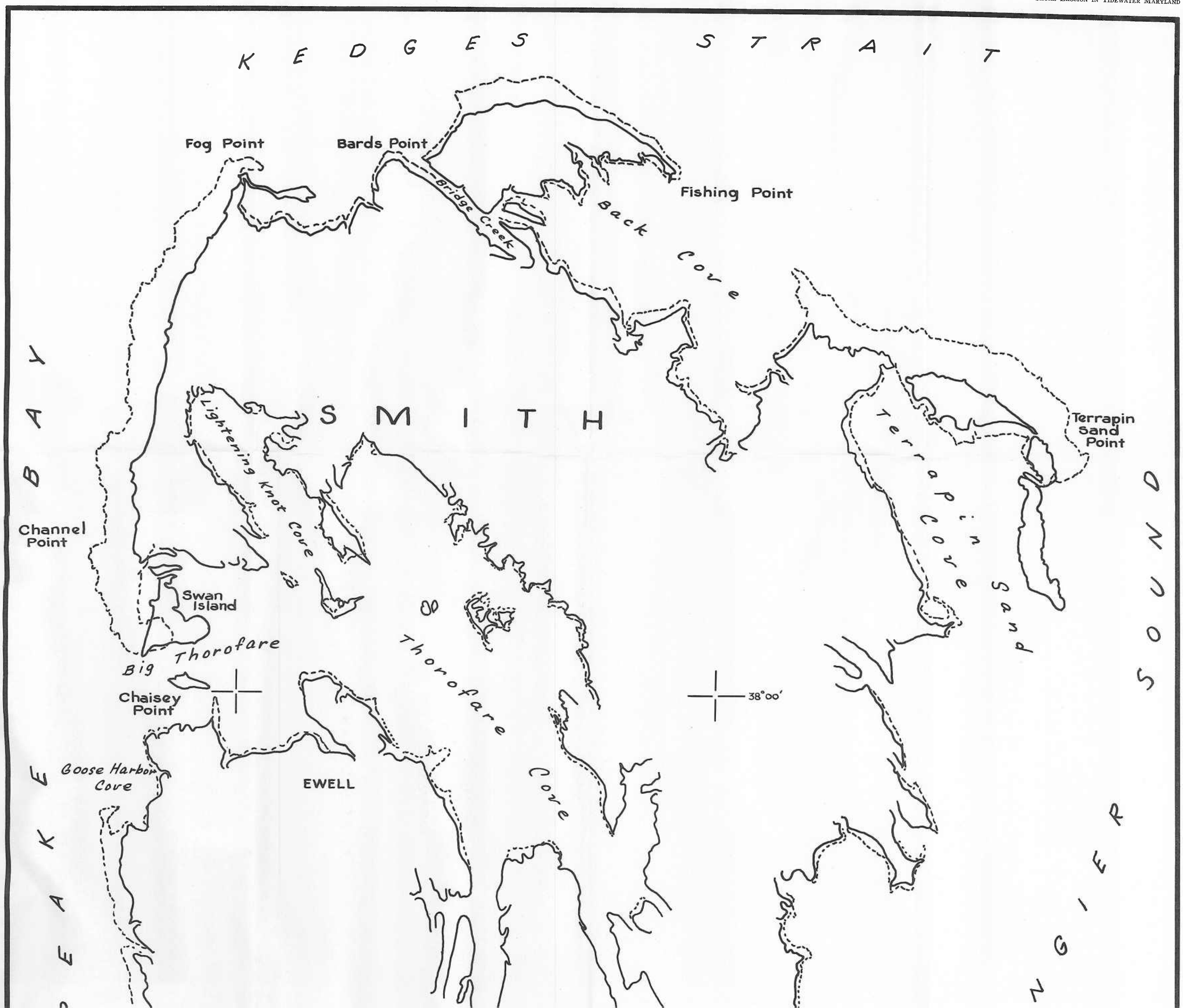


Plate 22. Shore Line Changes from Long Point to Lower Thorofare, Tangier Sound, Somerset County


KEDGES STRAIT
Fog Point
Bards Point
Bridge Creek
Fishing Point
Back Cove
Terrapin Sand Point
Terrapin Cove
SMITH
Lightening Knot Cove
Channel Point
Swan Island
Big Thorofare
Thorofare
Chaisey Point
38°00'
Goose Harbor Cove
EWELL
Cove
BEAKE
SOUND

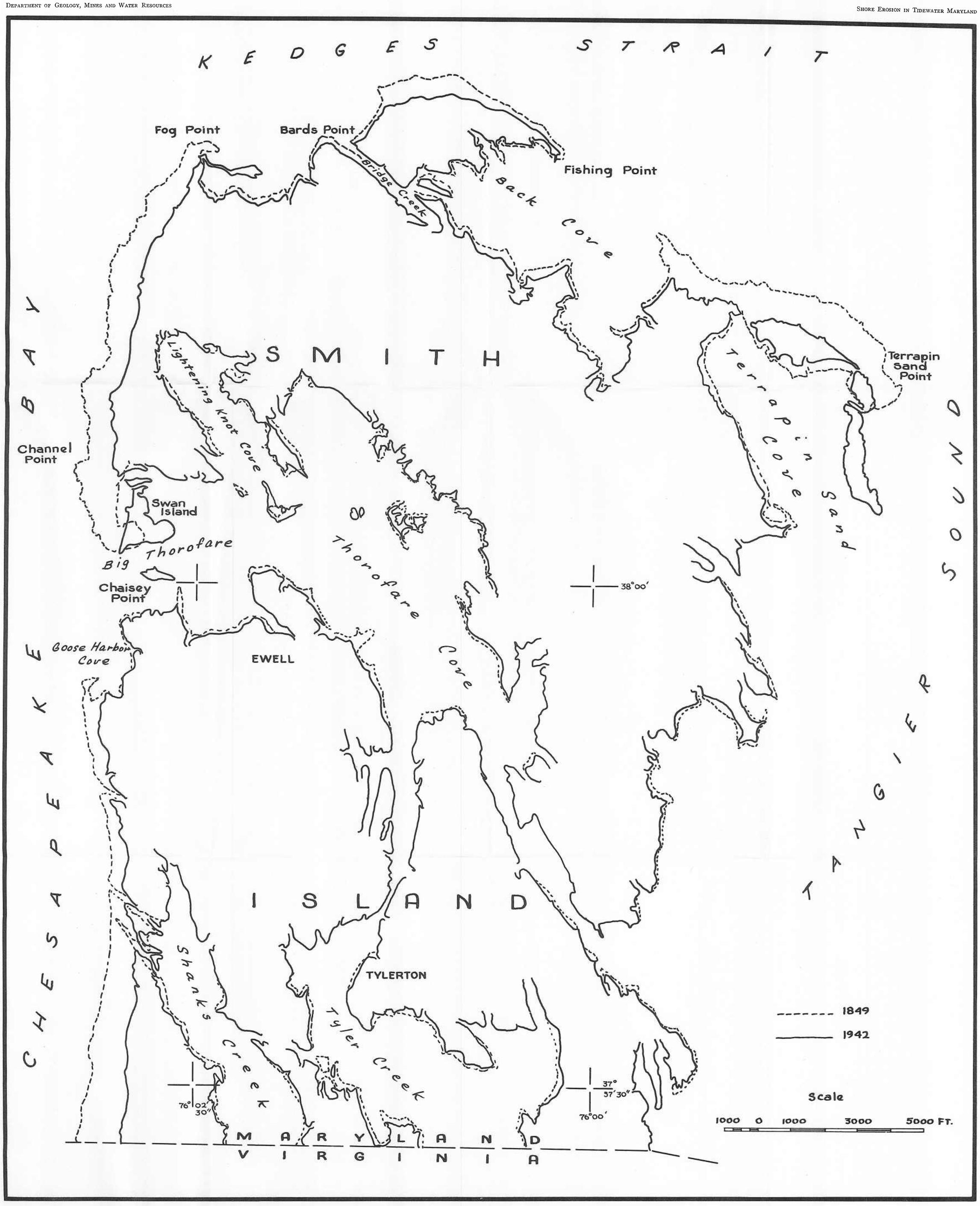


Plate 23. Shore Line Changes on Smith Island, Somerset County

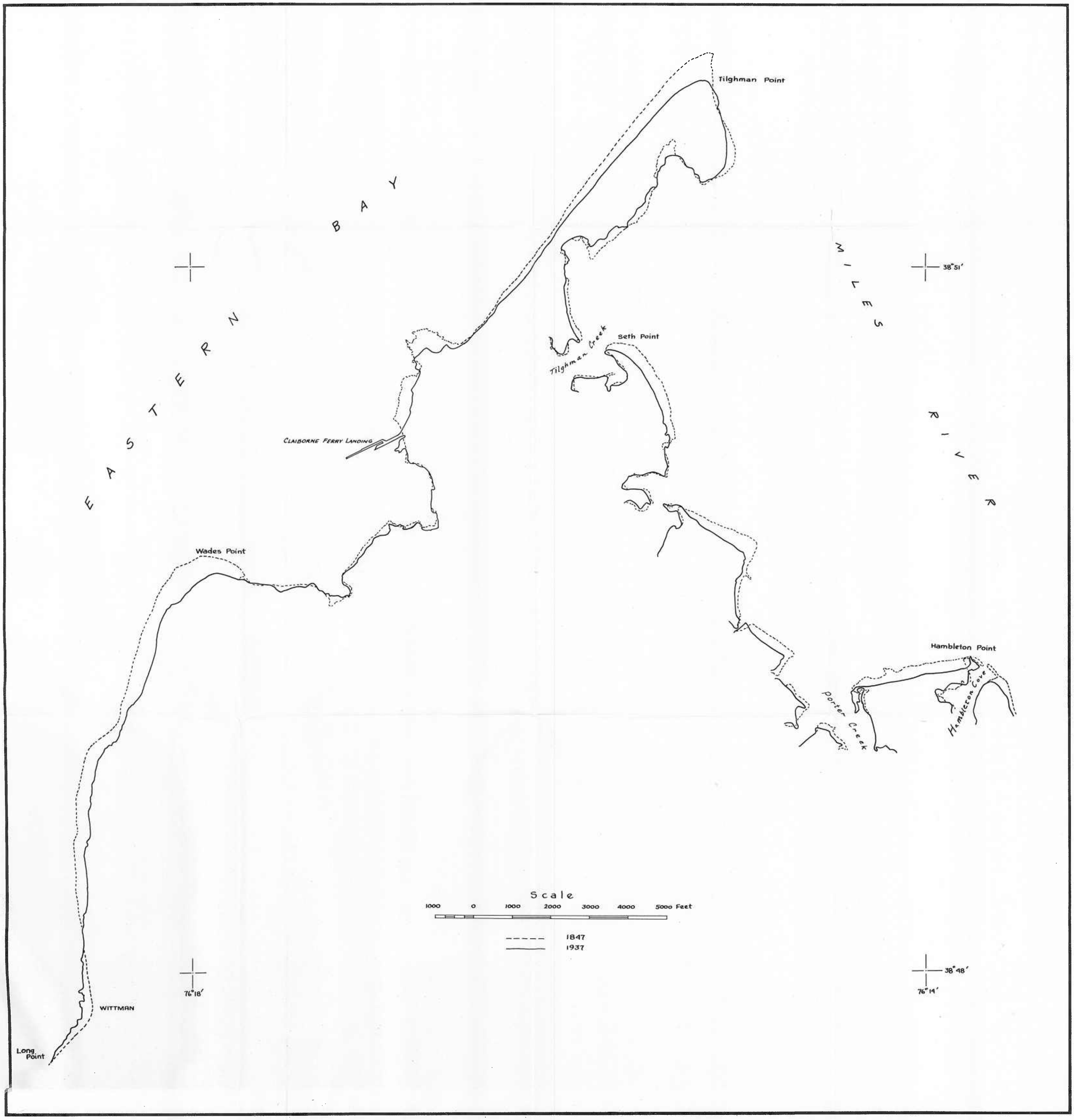


Plate 24. Shore Line Changes from Hambleton Cove on Miles River to Long Point on Chesapeake Bay, Talbot County

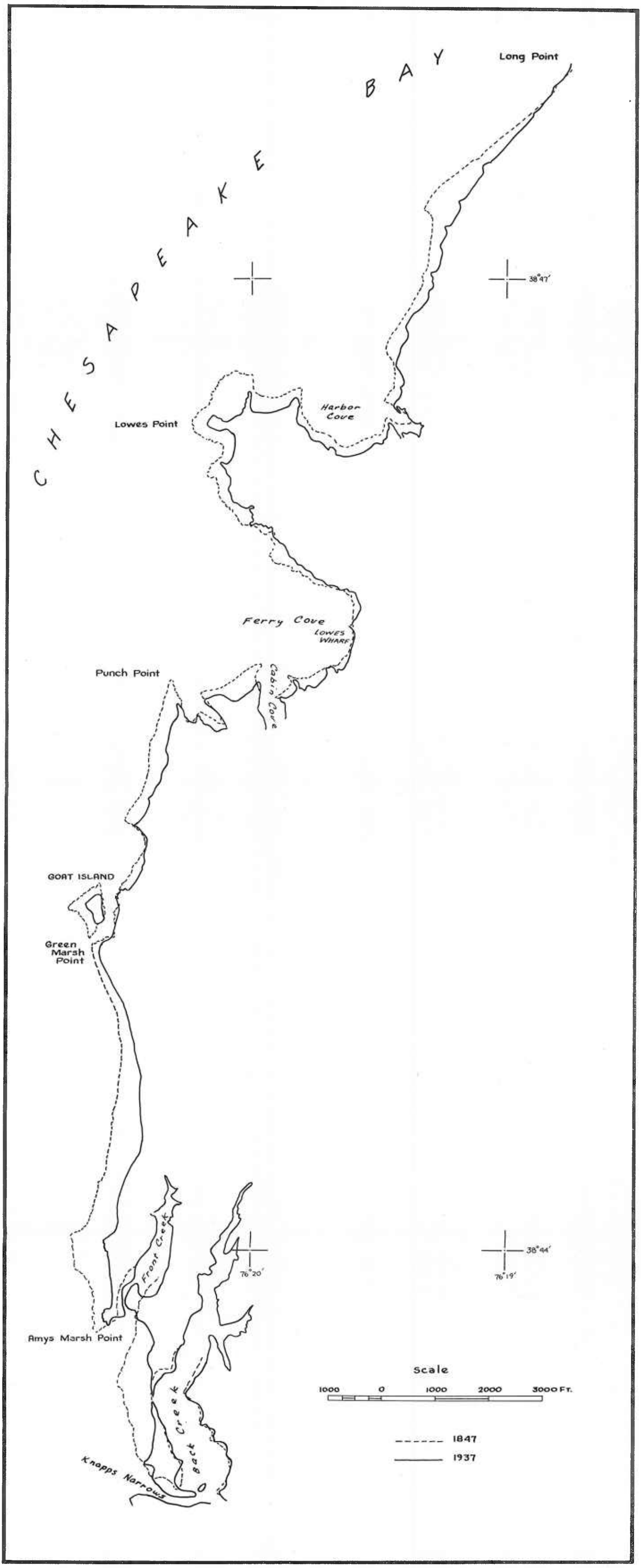


Plate 25. Shore Line Changes from Long Point to Knapps Narrows, Chesapeake Bay, Talbot County

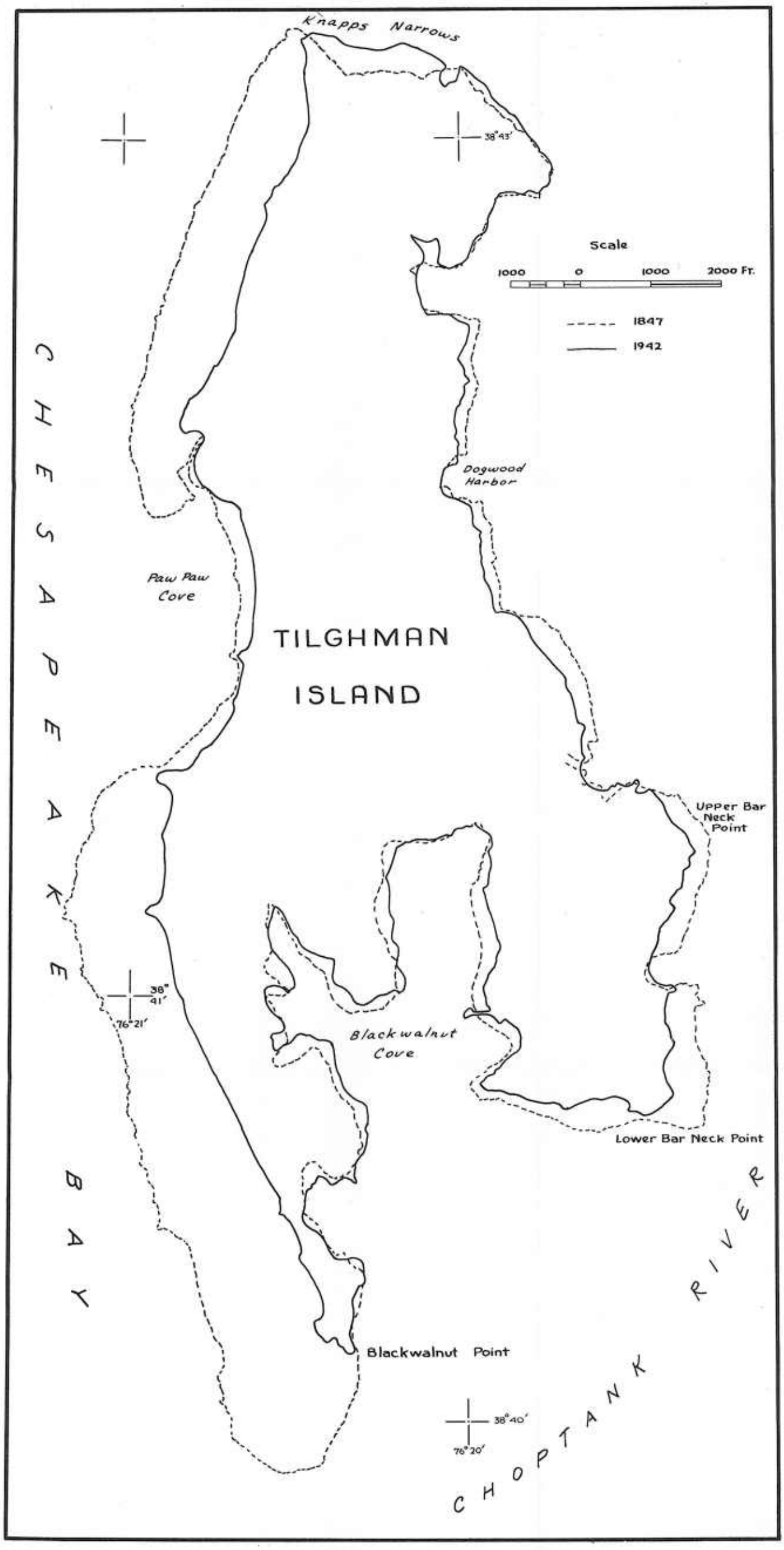


Plate 26. Shore Line Changes on Tilghman Island, Talbot County

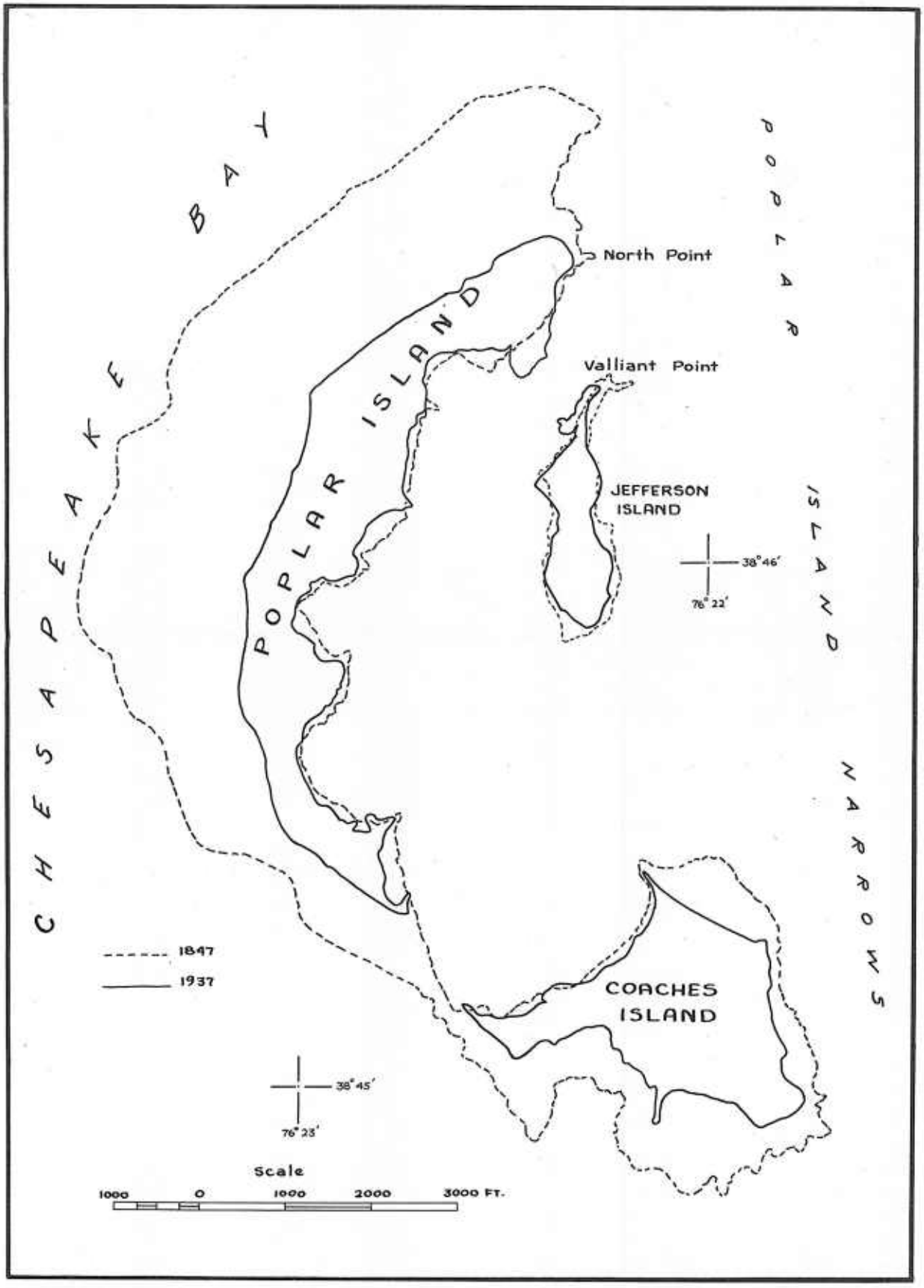


Plate 27. Shore Line Changes on Poplar and Coaches Islands, Talbot County

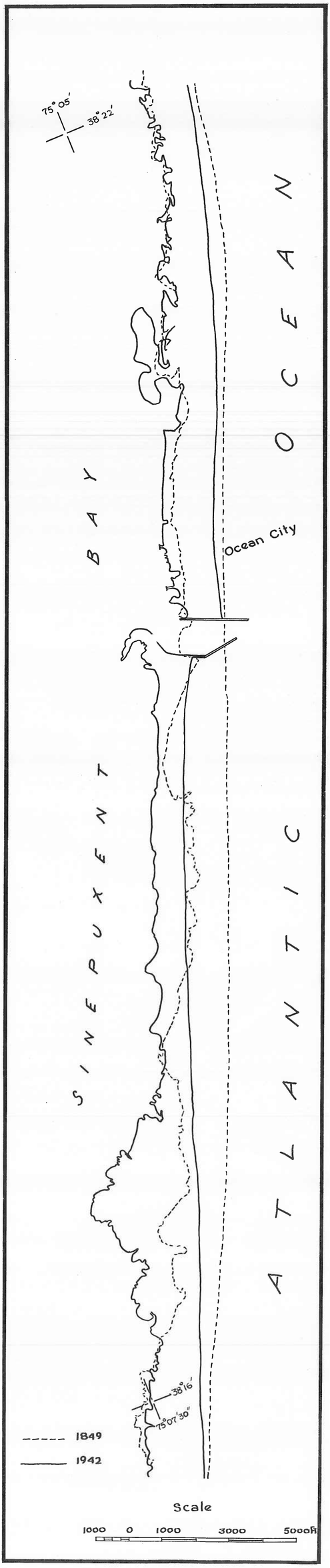


Plate 28. Shore Line Changes on Fenwick Island and Assateague Island between Latitudes 38°22'N and 38°16'N, Worcester County