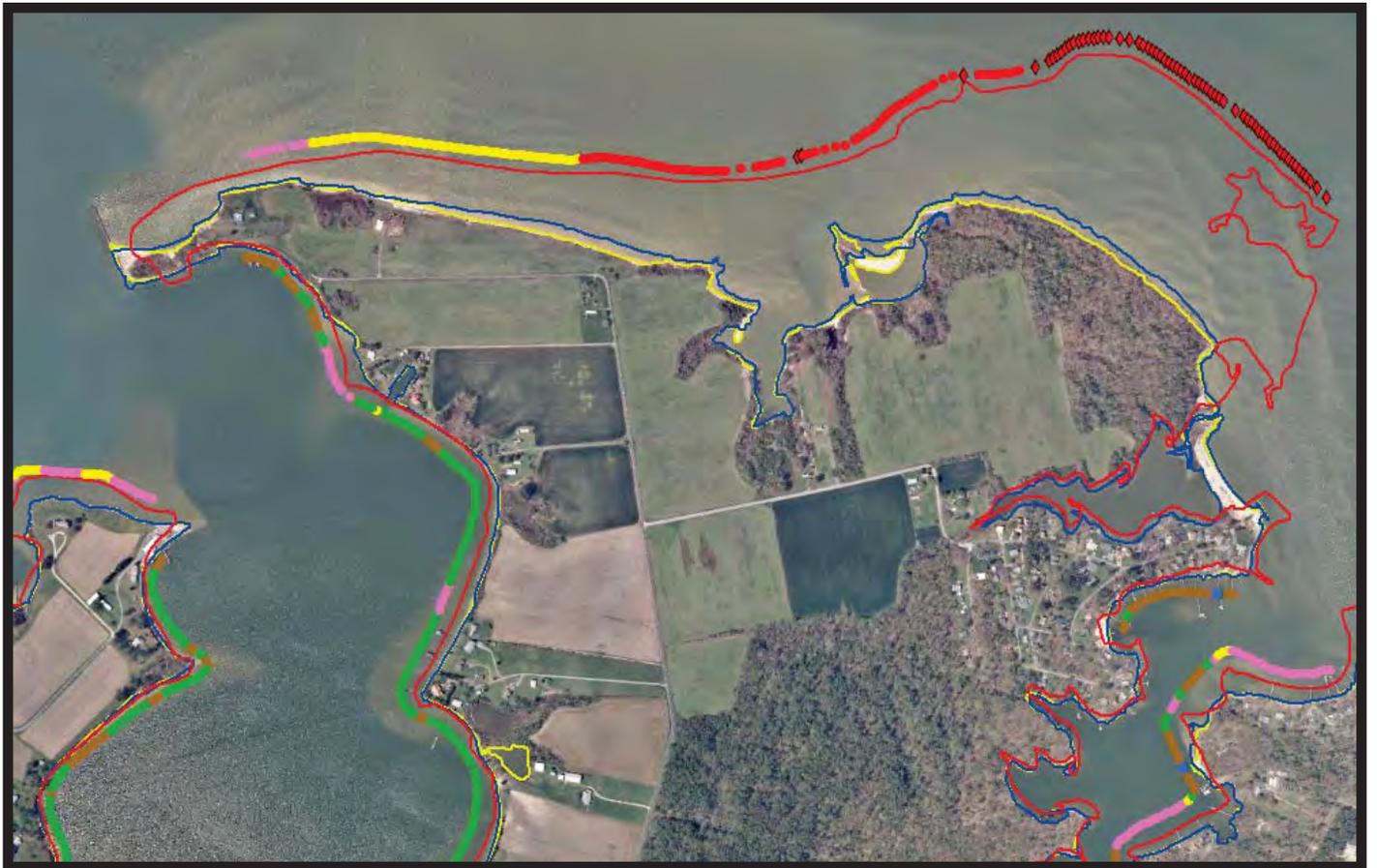


Shoreline Evolution: Northumberland County, Virginia Chesapeake Bay, Potomac River, and Great Wicomico River Shorelines



Shoreline Studies Program
Virginia Institute of Marine Science
College of William & Mary
Gloucester Point, Virginia

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Data Summary Report

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This project was funded by the Virginia Coastal Zone Management Program through Grant # NA13NOS4190135 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended. The views expressed herein are those of the authors and do not necessarily reflect the views of the U.S. Department of Commerce, NOAA, or any of its subagencies.

August 2014

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1 Introduction

Northumberland County is situated at the confluence of the Potomac River and Chesapeake Bay (Figure 1). Because the County's shoreline is continually changing, determining where the shoreline was in the past, how far and how fast it is moving, and what factors drive shoreline change will help define where the shoreline will be going in the future. These rates and patterns of shore change along Chesapeake Bay's estuarine shores will differ through time as winds, waves, tides and currents shape and modify coastlines by eroding, transporting and depositing sediments.

The purpose of this report is to document how the shorezone of Northumberland County has evolved since 1937. Aerial imagery was taken for most of the Bay region beginning that year and can be used to assess the geomorphic nature of shore change. Aerial photos show how the coast has changed, how beaches, dunes, bars, and spits have grown or decayed, how barriers have breached, how inlets have changed course, and how one shore type has displaced another or has not changed at all. Shore change is a natural process but, quite often, the impacts of man, through shore hardening or inlet stabilization, come to dominate a given shore reach. In addition to documenting historical shorelines, the change in shore positions along the larger creeks in Northumberland County will be quantified in this report. The shorelines of very irregular coasts, small creeks and around inlets, and other complicated areas will be shown but not quantified.

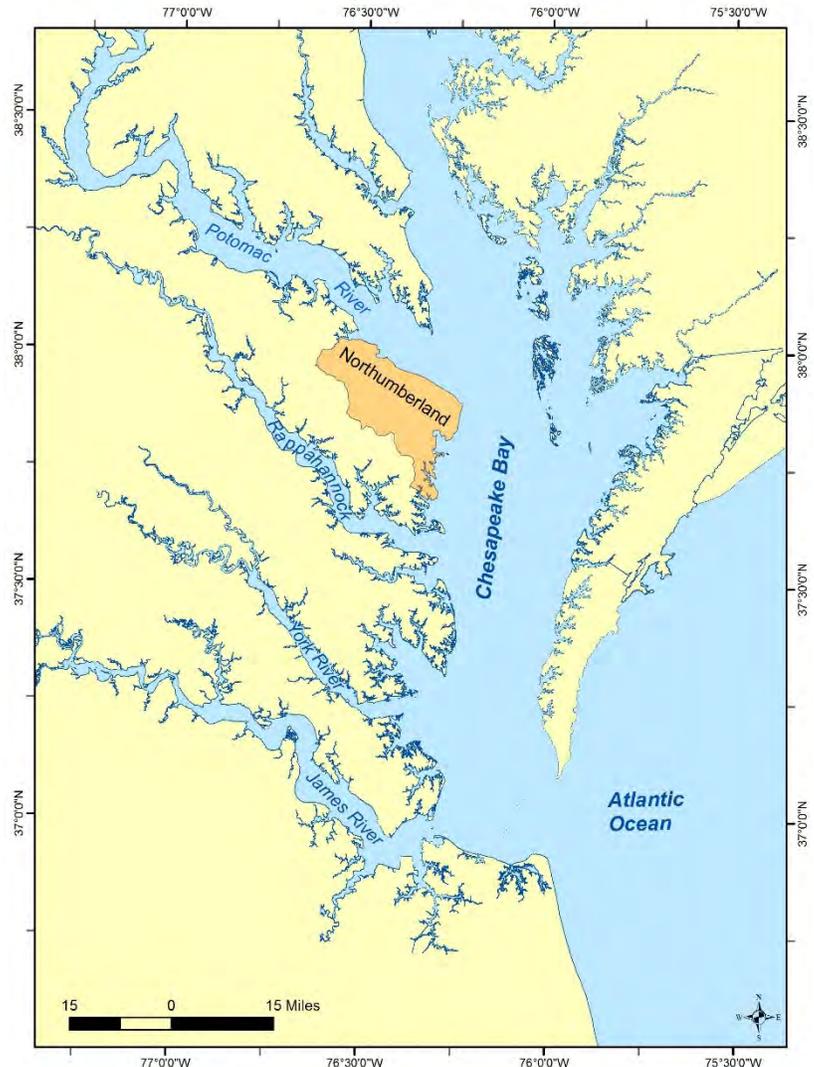


Figure 1. Location of Northumberland County in the Chesapeake Bay estuarine system.

2 Methods

2.1 Photo Rectification and Shoreline Digitizing

An analysis of aerial photographs provides the historical data necessary to understand the suite of processes that work to alter a shoreline. Images of the Northumberland County Shoreline from 1937, 1953, 1969, 1994, 2002, 2009, and 2013 were used in the analysis. The 1994, 2002, 2009, and 2013 images were available from other sources. The 1994 imagery was orthorectified by the U.S. Geological Survey (USGS) and the 2002, 2009, and 2013 imagery was orthorectified by the Virginia Base Mapping Program (VBMP). The 1937, 1953 and 1969 photos are part of the VIMS Shoreline Studies Program archives. The historical aerial images used to analyze the entire County shoreline were not always flown on the same day. The exact dates that the 1994 images were flown could not be ascertained; however, the dates for the other years are as follows:

1937 – April 1, March 28&29, and July 17;

1953 –October 2 and November 27;

1969 –December 3 and 5;

2002 –February 21 and 22, March 1;

2009 –February 17 and 18, March 18 and 24, and April 5;

2013 –February 21, March 4, 9 and 10.

The 1937, 1953 and 1969 images were scanned as tiffs at 600 dpi and converted to ERDAS IMAGINE (.img) format. These aerial photographs were orthographically corrected to produce a seamless series of aerial mosaics following a set of standard operating procedures. The 1994 Digital Orthophoto Quarter Quadrangles (DOQQ) from USGS were used as the reference images. The 1994 photos are used rather than higher quality, more recent aeriels because of the difficulty in finding control points that match the earliest 1937 images.

ERDAS Orthobase image processing software was used to orthographically correct the individual flight lines using a bundle block solution. Camera lens calibration data were matched to the image location of fiducial points to define the interior camera model. Control points from 1994 USGS DOQQ images provide the exterior control, which is enhanced by a large number of image-matching tie points produced automatically by the software. The exterior and interior models were combined with a digital elevation model (DEM) from the USGS National Elevation Dataset to produce an orthophoto for each aerial photograph. The orthophotographs were adjusted to approximately uniform brightness and contrast and were mosaicked together using the ERDAS Imagine mosaic tool to produce a one-meter resolution mosaic .img format. To maintain an accurate match with the reference images, it is necessary to distribute the control points evenly, when possible. This can be challenging in

areas given the lack of ground features and poor photo quality on the earliest photos. Good examples of control points were manmade features such as road intersections and stable natural landmarks such as ponds and creeks that have not changed much over time. The base of tall features such as buildings, poles, or trees can be used, but the base can be obscured by other features or shadows making these locations difficult to use accurately. Many areas of the County were particularly difficult to rectify, either due to the lack of development when compared to the reference images or due to no development in the historical and the reference images.

Once the aerial photos were orthorectified and mosaicked, the shorelines were digitized in ArcMap with the mosaics in the background. The morphologic toe of the beach or edge of marsh was used to approximate low water. High water limit of runup can be difficult to determine on some shorelines due to narrow or non-existent beaches against upland banks or vegetated cover. The feature digitized is noted in the shoreline attributes for the 2009 photos. Nearly 500 miles of shoreline were digitized from the 2009 photos. However, not all tidal shoreline was digitized inside very small creeks and marshes. Poor quality photos in some areas made rectifying and digitizing images difficult. Environmental conditions along the shoreline made it difficult to delineate the shoreline even on the latest photos in some areas as well. It was difficult to tell the difference between marsh and tidal flats in some areas. In addition, trees exist along many sections of the Northumberland shoreline. These trees can obscure the true shoreline because they can grow in the water and their branches cover the shoreline. In areas where the shoreline was not clearly identifiable on the aerial photography, the location was estimated based on the experience of the digitizer. The displayed shorelines are in shapefile format. One shapefile was produced for each year that was mosaicked.

Horizontal positional accuracy is based upon orthorectification of scanned aerial photography against the USGS digital orthophoto quadrangles. For vertical control, the USGS 30m DEM data was used. The 1994 USGS reference images were developed in accordance with National Map Accuracy Standards (NMAS) for Spatial Data Accuracy at the 1:12,000 scale. The 2002, 2009, and 2013 Virginia Base Mapping Program's orthophotography were developed in accordance with the National Standard for Spatial Data Accuracy (NSSDA). Horizontal root mean square error (RMSE) for historical mosaics was held to less than 20 ft.

2.2 Rate of Change Analysis

AMBUR (Analyzing Moving Boundaries Using R) is a suite of tools that are used to better analyze and understand historic shoreline changes. These tools use the free, open-source R software environment and can be customized to perform not only advanced statistics but also geospatial and geostatistical

functions. The AMBUR package provides tools for investigating diverse shoreline types through: multiple shoreline settings, improved transect casting methods, and detailed analysis and output. The package allows import and export of geospatial data in ESRI shapefile format, which is compatible with most commercial and open-source GIS software. The "baseline and transect" method is the primary technique used to quantify distances and rates of shoreline movement, and to detect classification changes across time.

Over 150 miles of baselines and 23,500 transects about 30 feet apart were created for Northumberland County. Baselines were digitized slightly seaward of the 1937 shoreline and encompassed most of the County's coast. The baselines may not include very small creeks and areas that have unique shoreline morphology such as creek mouths and spits.

The End Point Rate (EPR) is calculated by determining the distance between the oldest and most recent shoreline in the data and dividing it by the number of years between them. This method provides an accurate net rate of change over the long term and is relatively easy to apply to most shorelines since it only requires two dates. This method does not use the intervening shorelines so it may not account for changes in accretion or erosion rates that may occur through time. However, Milligan *et al.* (2010a, 2010b, 2010c, 2010d) found that in several localities within the bay, EPR is a reliable indicator of shore change even when intermediate dates exist.

Using methodology reported in Morton *et al.* (2004) and National Spatial Data Infrastructure (1998), estimates of error in orthorectification, control source, DEM and digitizing were combined to provide an estimate of total maximum shoreline position error. The data sets that were orthorectified (1937, 1953, and 1968) have an estimated total maximum shoreline position error of 20.0 ft, while the total maximum shoreline error for the three existing datasets are estimated at 18.3 ft for USGS and 10.2 ft for VBMP. The maximum annualized error for the shoreline data is ± 0.6 ft/yr. The smaller rivers and creeks are more prone to error due to their lack of good control points for photo rectification, narrower shore features, tree and ground cover and overall smaller rates of change. These areas are digitized but due to the higher potential for error, rates of change analysis are not calculated. Many areas of Northumberland County have shore change rates that fall within the calculated error. Some of the areas that show very low accretion can be due to errors within the method as described above.

The Northumberland County shoreline was divided into 23 plates (Figure 2) in order to display the shoreline data. In Appendix A, the 2009 image is shown with only the 1937 and 2009 shorelines and the calculated EPR of change. This time span was used to keep the rate of change interval consistent with other localities in the Shoreline Evolution Database. In Appendix B, one

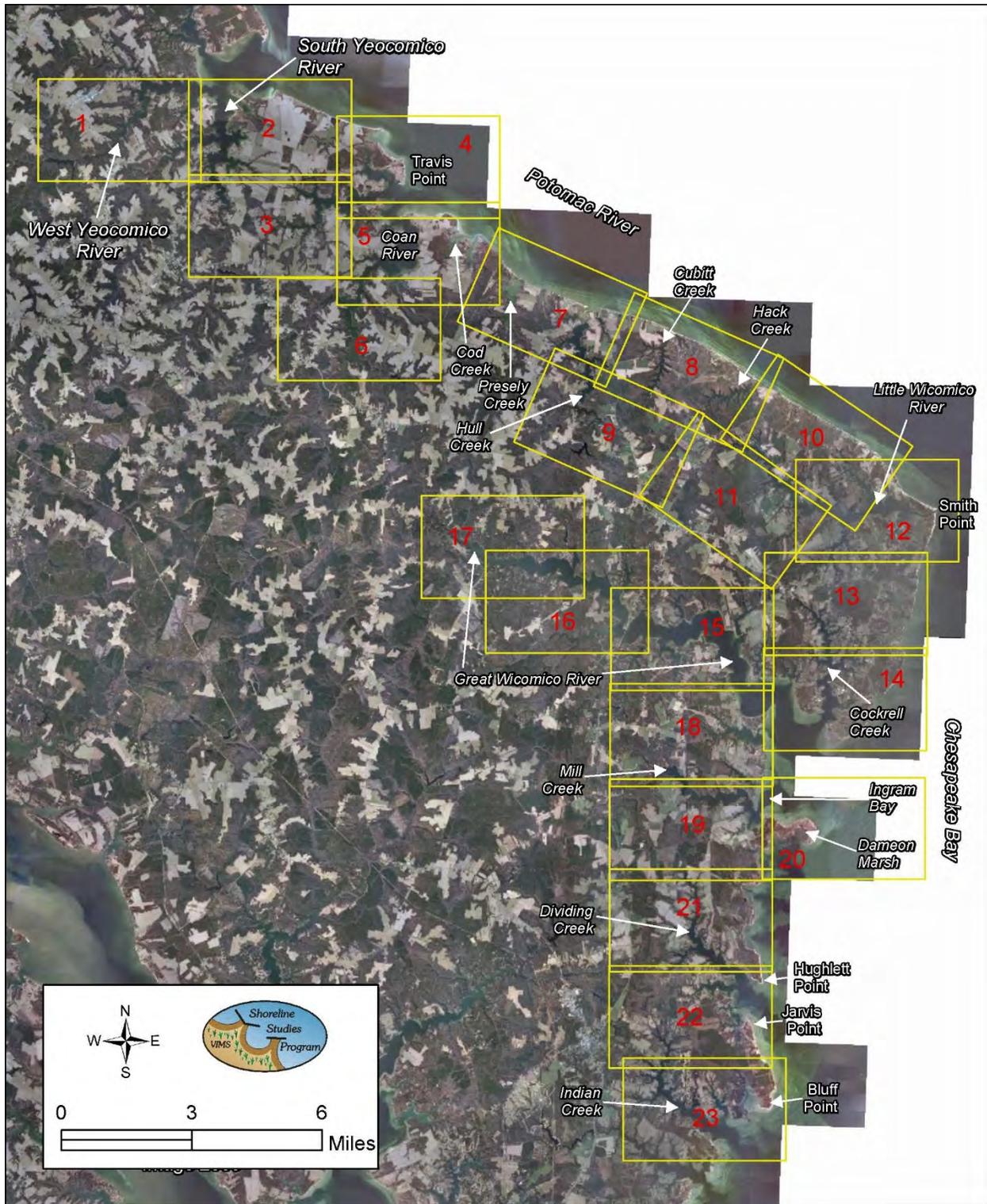


Figure 2. Plate index for Northumberland County shoreline maps.

photo date and the associated shoreline is shown on each. These include the photos taken in 1937, 1953, 1969, 1994, 2002, 2009, and 2013. The shorelines are summarized on the 2013 image.

3 Results and Discussion

Most of the river and creek shoreline in Northumberland County is experiencing very low erosion (<1 ft/yr). Table 1 shows the average EPR of change for sections of the County based on the digitized shorelines. Those sites that are on the Potomac River or Chesapeake Bay tend to have higher rates of change. In addition, many areas of the shoreline consists of high wooded banks. When trees on the bank fall, it can exacerbate instability of the high bank. Even though wave action is limited due to small fetches, during storms, waves can directly impact the base of bank causing the entire bank to slump. This can deposit enough material to offset the erosion.

Several areas are noteworthy. The spit across the Judith Sound on the Potomac has eroded completely since 1937 (Appendix A, Plate 4). As a result, erosion likely increased along the shorelines in Judith Sound. However, residents installed shore protection structures in order to control erosion as seen in the 1969 photo (Appendix B, Plate 4). This has resulted in an overall low rate of erosion and, in some cases, low accretion along the shore.

The shoreline from Walnut Point to Great Point has the highest end point rate of change between 1937 and 2009 (Table 1) as it is on the Potomac River and faces northeast (Appendix A, Plate 5). This section of shoreline is wooded and agricultural fields and most sections have no shore protection structures. However, the westernmost section of the headland near Walnut Point has had several structures built in the last fifteen years to mitigate the high erosion rate. In addition to bulkheads and groins, a long jetty was constructed to reduce sand loss from the shoreline to the Coan River. Sand is accreting at the jetty (Appendix B, Plate 5) as indicated by a wider beach in 2013 than in 2002.

Other sections of shoreline on the Potomac River have low to medium erosion. These shorelines generally are inhabited and have shore protection structures which modifies the erosion rate. In addition, some reaches of shoreline do not face northeast and therefore may not receive the brunt of erosive storm waves.

Smith Point at the confluence of the Potomac River and Chesapeake Bay is accreting (Appendix A, Plate 12) due to the construction of two jetties at the mouth of the Little Wicomico River. Sediment transported down the Potomac accumulates on the northern jetty. The southern jetty is accreting at a slower rate. Generally, the Chesapeake Bay shoreline is experiencing low to medium erosion with a few local areas of high erosion.

The east facing shoreline along Dameron Marsh is eroding at 2-5 ft/yr (Appendix A, Plate 20). Several small remnant marsh islands east of the present day marsh existed in 1937 (Appendix B, Plate 20). They steadily eroded until only a very small island existed in 1994. Since then, they have eroded completely.

The section of shoreline from Jarvis Point to Bluff Point (Appendix A, Plates 22 and 23) have been experiencing high and very high erosion. The very highest erosion has occurred where creeks that had a single inlet in 1937 have breached. This has allowed the Bay to reach farther inland and erode previously protected shorelines.

4 Summary

The rates of change shown in Table 1 are averaged across large sections of shoreline and may not be indicative of rates at specific sites within the reach. Some areas of the County, where the shoreline change rates are categorized as accretion, have structures along the shoreline which results in a positive long-term rate of change due to the structures themselves. Some of the areas with very low accretion, particularly in the smaller creeks and rivers, may be the result of errors within photo rectification and digitizing wooded shorelines.

Table 1. Average end point rates of shoreline change in feet per year along sections of Northumberland County's coast.

| Reach Name | Plate Number | Avg EPR (ft/yr) | Category |
|---|---------------|-----------------|------------------|
| Yeocomico River | 1-3 | -0.4 | Very Low Erosion |
| South Yeocomico to Judith Sound | 2 and 4 | -2.0 | Low Erosion |
| Judith Sound to Kingscote Cove | 4 | -0.8 | Very Low Erosion |
| Kingscote Cove to Walnut Point | 4-6 | -0.4 | Very Low Erosion |
| Walnut Point to Great Point | 5 | -8.4 | High Erosion |
| Cod Creek | 5 | -0.4 | Very Low Erosion |
| Cod Creek to Cubitt Creek | 5, 7, and 8 | -2.6 | Medium Erosion |
| Presley Creek | 7 | -0.2 | Very Low Erosion |
| Hull Creek | 7 and 9 | -0.2 | Very Low Erosion |
| Cubitt Creek to Smith Point | 8, 10, and 12 | -1.4 | Low Erosion |
| Little Wicomico River | 10-13 | -0.2 | Very Low Erosion |
| Smith Point to Chesapeake Beach | 12-14 | -2.1 | Medium Erosion |
| Chesapeake Beach to Fleeton Point | 14 | -1.8 | Low Erosion |
| Cockrell Creek | 13-14 | -0.3 | Very Low Erosion |
| Great Wicomico River | 14-18 | -0.4 | Very Low Erosion |
| Ingram Bay including Dameron Marsh down to Cloverdale Creek | 18-19, and 20 | -1.2 | Low Erosion |
| Mill Creek | 18-19 | -0.4 | Very Low Erosion |
| Cloverdale Creek to Hughlett Point | 19, 21, 22 | -2.2 | Medium Erosion |
| Hughlett Point to Jarvis Point (includes Dividing, Prentice and Jarvis Creek) | 21-22 | -0.5 | Very Low Erosion |
| Jarvis Point to Bluff Point | 22-23 | -8.3 | High Erosion |
| Bluff Point up Indian Creek | 22-23 | -0.6 | Very Low Erosion |

5 References

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http://web.vims.edu/physical/research/shoreline/docs/Cascade/Shoreline_Evolution/Newport_News_ShoreEvolve-Ir.pdf
- Milligan, D. A., K.P. O'Brien, C. Wilcox, C. S. Hardaway, JR, 2010b. Shoreline Evolution: City of Poquoson, Virginia, Poquoson River, Chesapeake Bay, and Back River Shorelines. Virginia Institute of Marine Science. College of William & Mary, Gloucester Point, VA.
http://web.vims.edu/physical/research/shoreline/docs/Cascade/Shoreline_Evolution/Poquoson_ShoreEvolve-Ir.pdf

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http://web.vims.edu/physical/research/shoreline/docs/Cascade/Shoreline_Evolution/York_ShoreEvolve-lr.pdf
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- National Spatial Data Infrastructure, 1998. Geospatial Positional Accuracy Standards, Part 3: National Standard for Spatial Data Accuracy. Subcommittee for Base Cartographic Data. Federal Geographic Data Committee. Reston, VA.

Appendix A

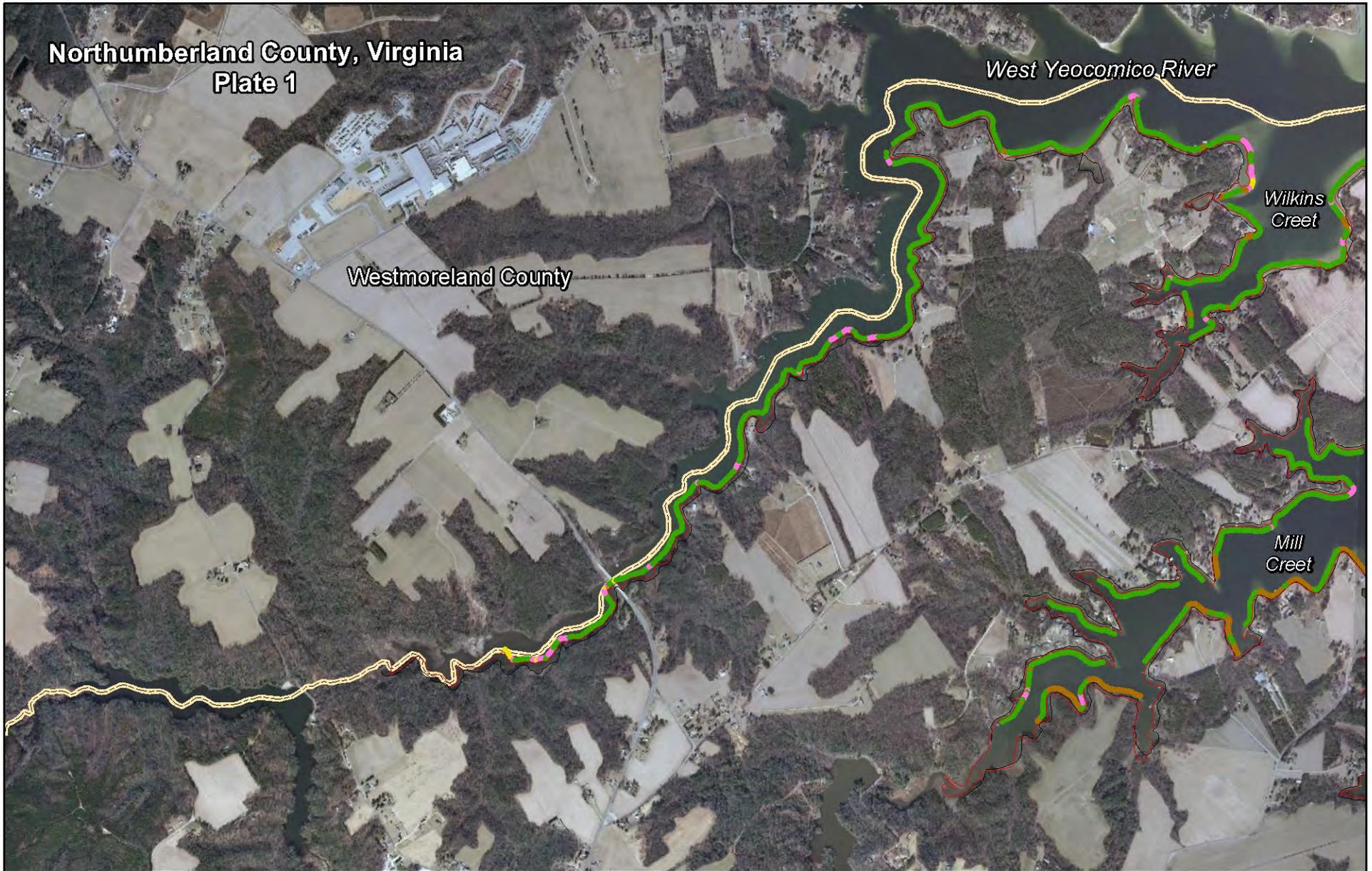
End Point Rate of Shoreline Change Maps

Shoreline change rates calculated between 1937 and 2009 are shown on a 2009 VBMP aerial photo. The calculated rates of change were averaged to determine an average rate of change for sections of shoreline as shown in Table 1 of the report.

Note: The location labels on the plates come from U.S. Geological Survey topographic maps, Google Earth, and other map sources and may not be accurate for the historical or even more recent images. They are for reference only.

| | | |
|----------------|-----------------|-----------------|
| Plate 1 | Plate 9 | Plate 17 |
| Plate 2 | Plate 10 | Plate 18 |
| Plate 3 | Plate 11 | Plate 19 |
| Plate 4 | Plate 12 | Plate 20 |
| Plate 5 | Plate 13 | Plate 21 |
| Plate 6 | Plate 14 | Plate 22 |
| Plate 7 | Plate 15 | Plate 23 |
| Plate 8 | Plate 16 | |

Northumberland County, Virginia
Plate 1

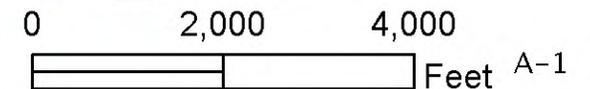
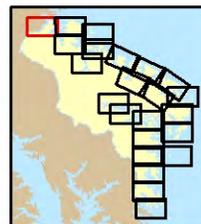


Shoreline Rates of Change

- | | |
|---------------------------------------|------------------------------------|
| ● High Accretion: +10 to +5 (ft/yr) | ● Low Erosion: -1 to -2 (ft/yr) |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ◆ Very High Erosion: < -10 (ft/yr) |
| ● Very Low Erosion: 0 to -1 (ft/yr) | |

Legend

- 1937 Shoreline
- 2009 Shoreline
- 2009 VBMP Photo



**Northumberland County, Virginia
Plate 2**

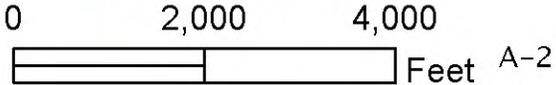
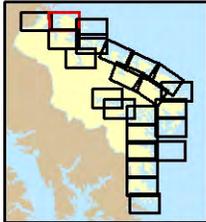


Shoreline Rates of Change

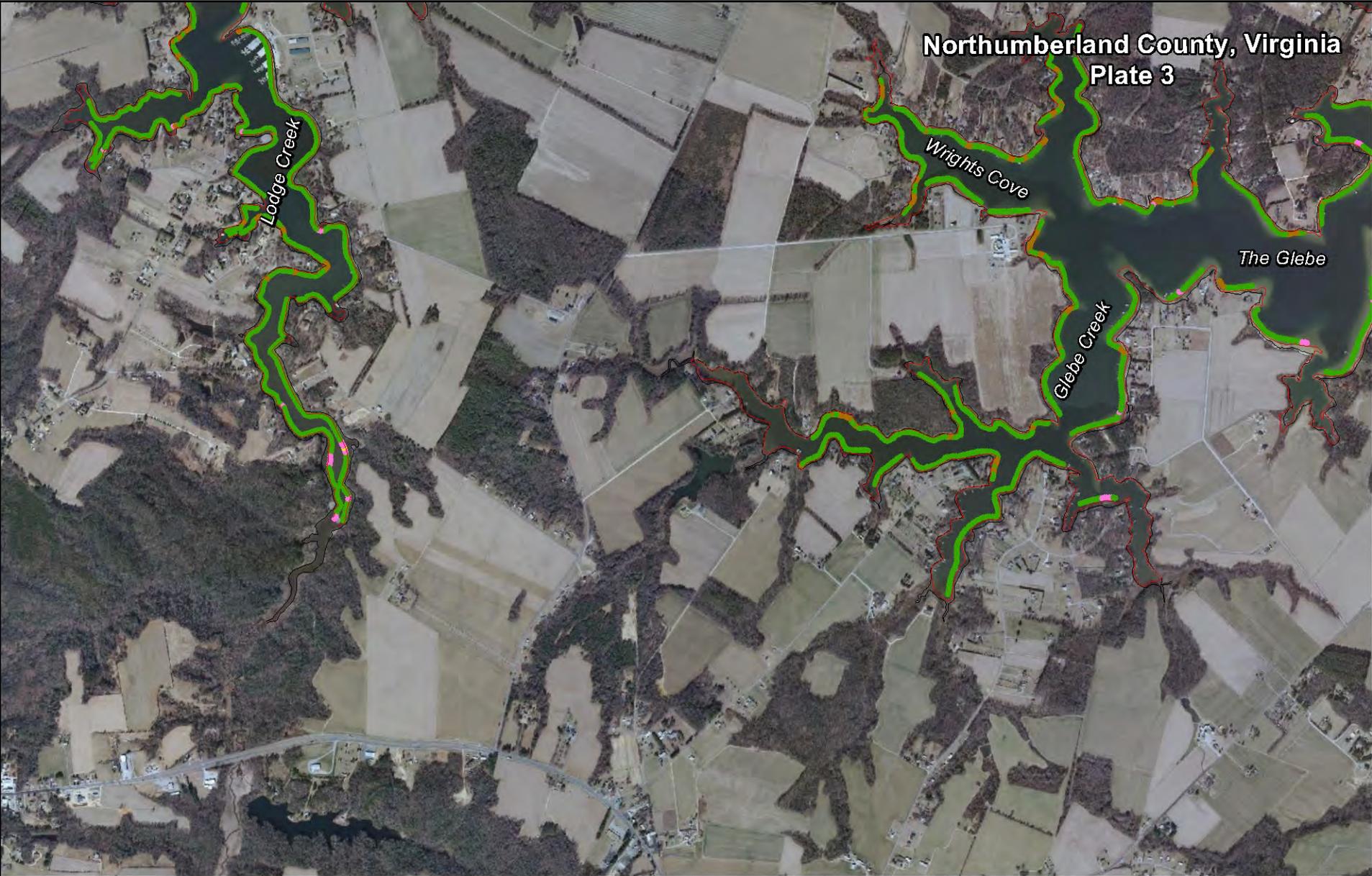
- | | |
|---------------------------------------|------------------------------------|
| ● High Accretion: +10 to +5 (ft/yr) | ● Low Erosion: -1 to -2 (ft/yr) |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ● Very High Erosion: < -10 (ft/yr) |
| ● Very Low Erosion: 0 to -1 (ft/yr) | |

Legend

- 1937 Shoreline
- 2009 Shoreline
- 2009 VBMP Photo



Northumberland County, Virginia
Plate 3



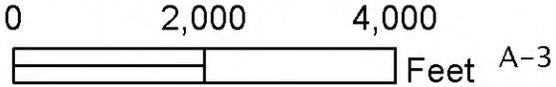
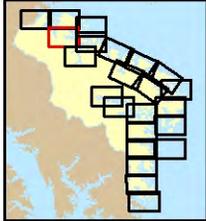
Shoreline Rates of Change

- | | |
|---------------------------------------|------------------------------------|
| ● High Accretion: +10 to +5 (ft/yr) | ● Low Erosion: -1 to -2 (ft/yr) |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ● Very High Erosion: < -10 (ft/yr) |
| ● Very Low Erosion: 0 to -1 (ft/yr) | |

Legend

- 1937 Shoreline
- 2009 Shoreline

2009 VBMP Photo



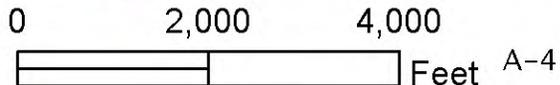
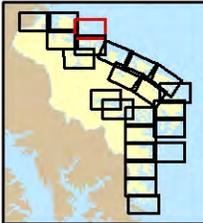


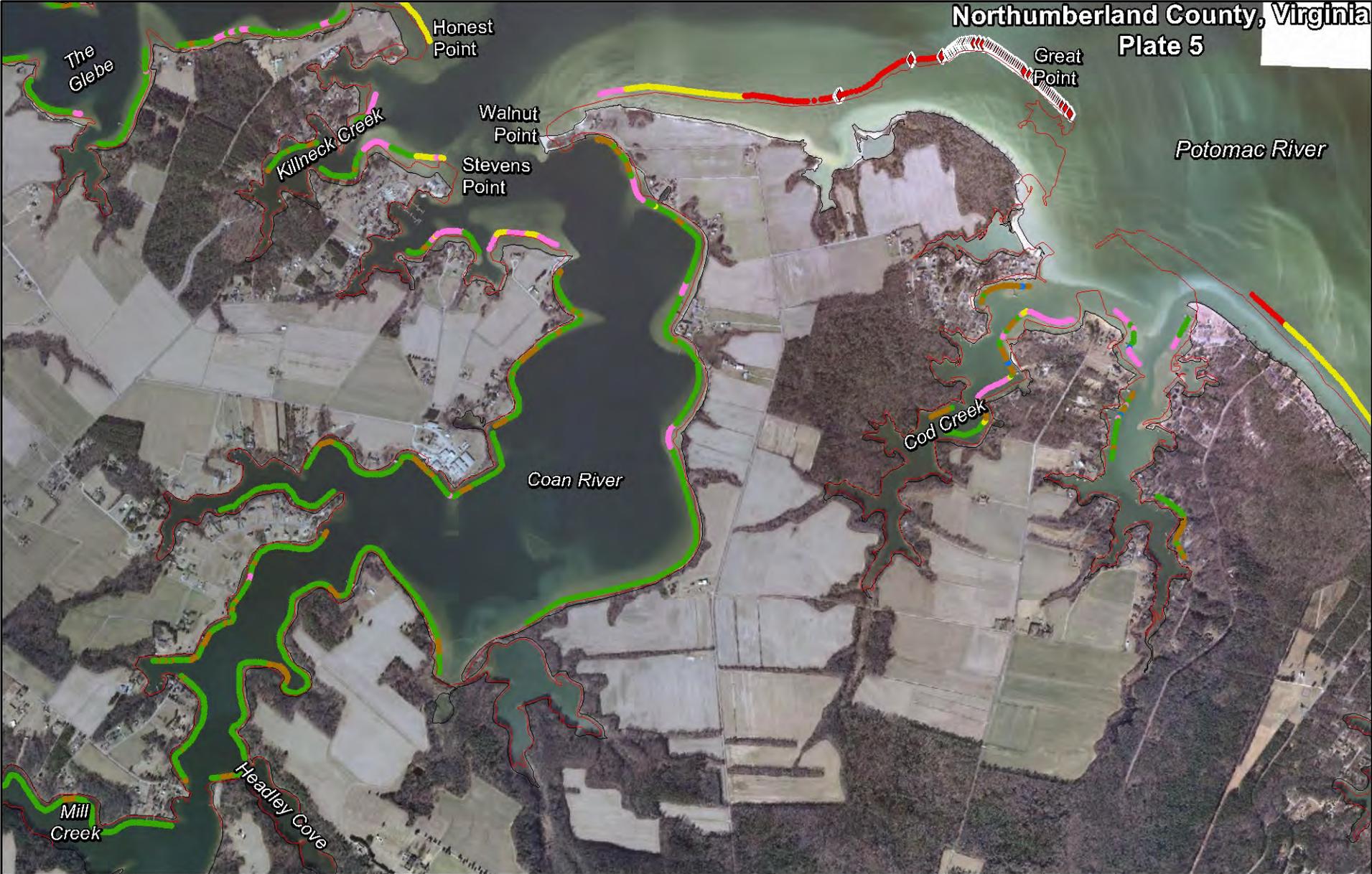
Shoreline Rates of Change

- High Accretion: +10 to +5 (ft/yr)
- Medium Accretion: +5 to +2 (ft/yr)
- Low Accretion: +2 to +1 (ft/yr)
- Very Low Accretion: +1 to 0 (ft/yr)
- Very Low Erosion: 0 to -1 (ft/yr)
- Low Erosion: -1 to -2 (ft/yr)
- Medium Erosion: -2 to -5 (ft/yr)
- High Erosion: -5 to -10 (ft/yr)
- ◆ Very High Erosion: < -10 (ft/yr)

Legend

- 1937 Shoreline
- 2009 Shoreline
- 2009 VBMP Photo





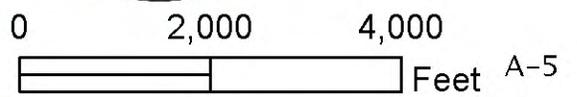
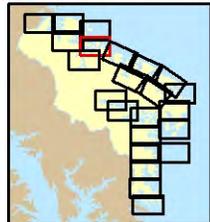
Shoreline Rates of Change

- High Accretion: +10 to +5 (ft/yr)
- Medium Accretion: +5 to +2 (ft/yr)
- Low Accretion: +2 to +1 (ft/yr)
- Very Low Accretion: +1 to 0 (ft/yr)
- Very Low Erosion: 0 to -1 (ft/yr)
- Low Erosion: -1 to -2 (ft/yr)
- Medium Erosion: -2 to -5 (ft/yr)
- High Erosion: -5 to -10 (ft/yr)
- Very High Erosion: < -10 (ft/yr)

Legend

- 1937 Shoreline
- 2009 Shoreline

2009 VBMP Photo



**Northumberland County, Virginia
Plate 6**



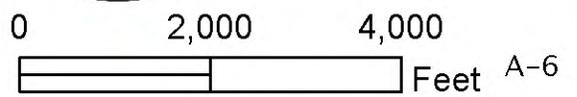
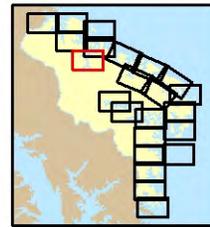
Shoreline Rates of Change

- | | |
|---------------------------------------|------------------------------------|
| ● High Accretion: +10 to +5 (ft/yr) | ● Low Erosion: -1 to -2 (ft/yr) |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ◆ Very High Erosion: < -10 (ft/yr) |
| ● Very Low Erosion: 0 to -1 (ft/yr) | |

Legend

- 1937 Shoreline
- 2009 Shoreline

2009 VBMP Photo



**Northumberland County, Virginia
Plate 7**

Potomac River

Cordreys Beach

Presley Creek

Corbin Pond

Bridgeman Creek

Rogers Creek

Hull Neck

Neuman Neck

Hull Creek

Fountain Cove

Fleets Cove

Floyds Cove

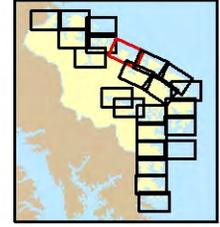
Shoreline Rates of Change

- | | |
|---------------------------------------|------------------------------------|
| ● High Accretion: +10 to +5 (ft/yr) | ● Low Erosion: -1 to -2 (ft/yr) |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ● Very High Erosion: < -10 (ft/yr) |
| ● Very Low Erosion: 0 to -1 (ft/yr) | |

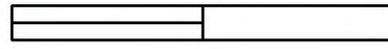
Legend

- 1937 Shoreline
- 2009 Shoreline

2009 VBMP Photo



0 2,000 4,000



Feet A-7

Potomac River

Northumberland County, Virginia Plate 8

Marshalls Beach

Lowes Pond

Condit Pond

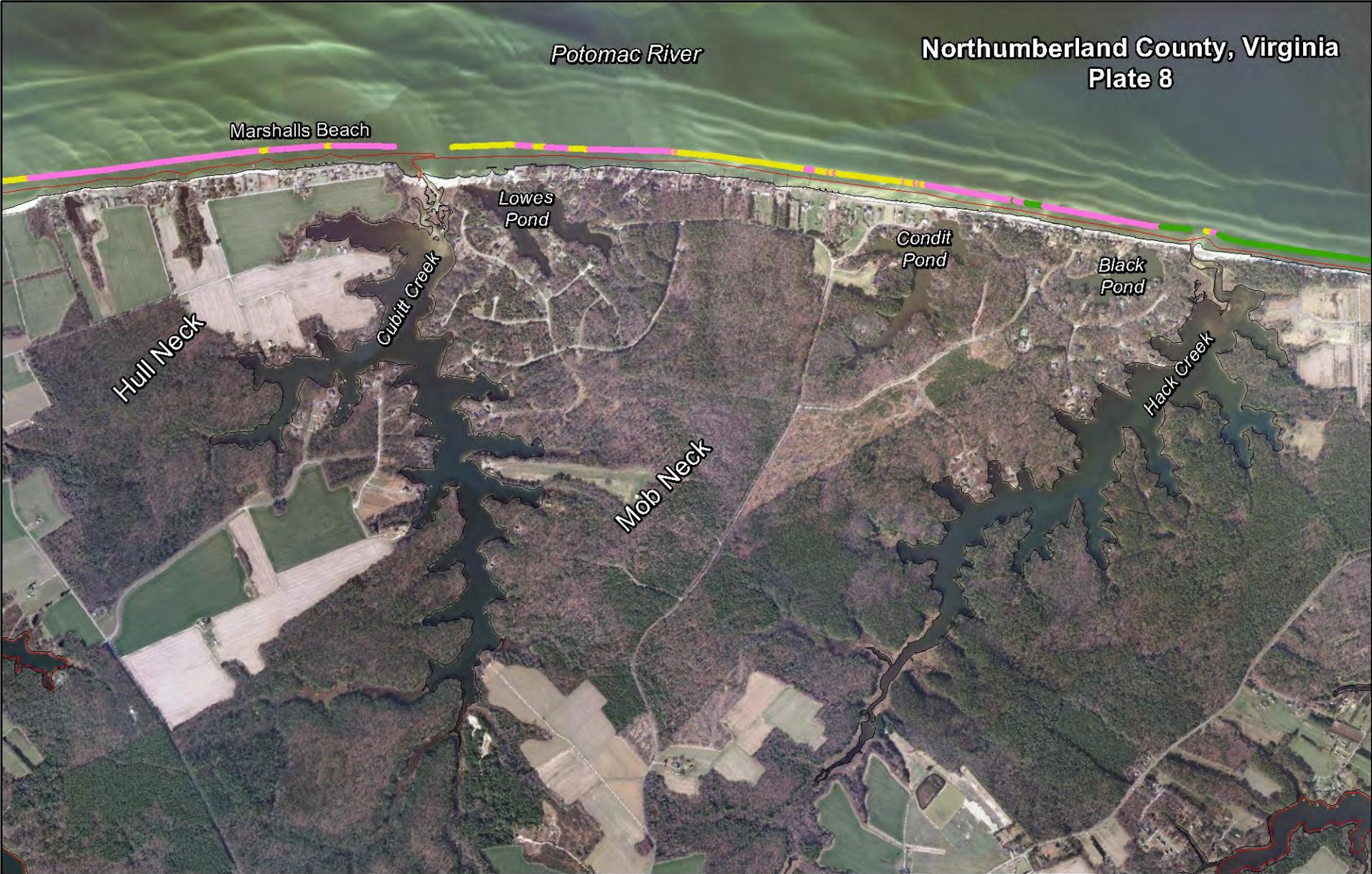
Black Pond

Hull Neck

Cubitt Creek

Mob Neck

Hack Creek



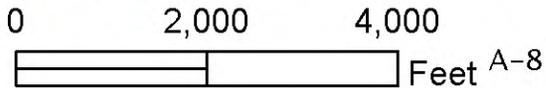
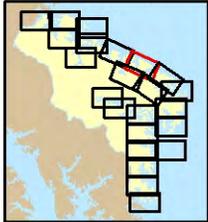
Shoreline Rates of Change

- | | |
|---------------------------------------|------------------------------------|
| ● High Accretion: +10 to +5 (ft/yr) | ● Low Erosion: -1 to -2 (ft/yr) |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ◆ Very High Erosion: < -10 (ft/yr) |
| ● Very Low Erosion: 0 to -1 (ft/yr) | |

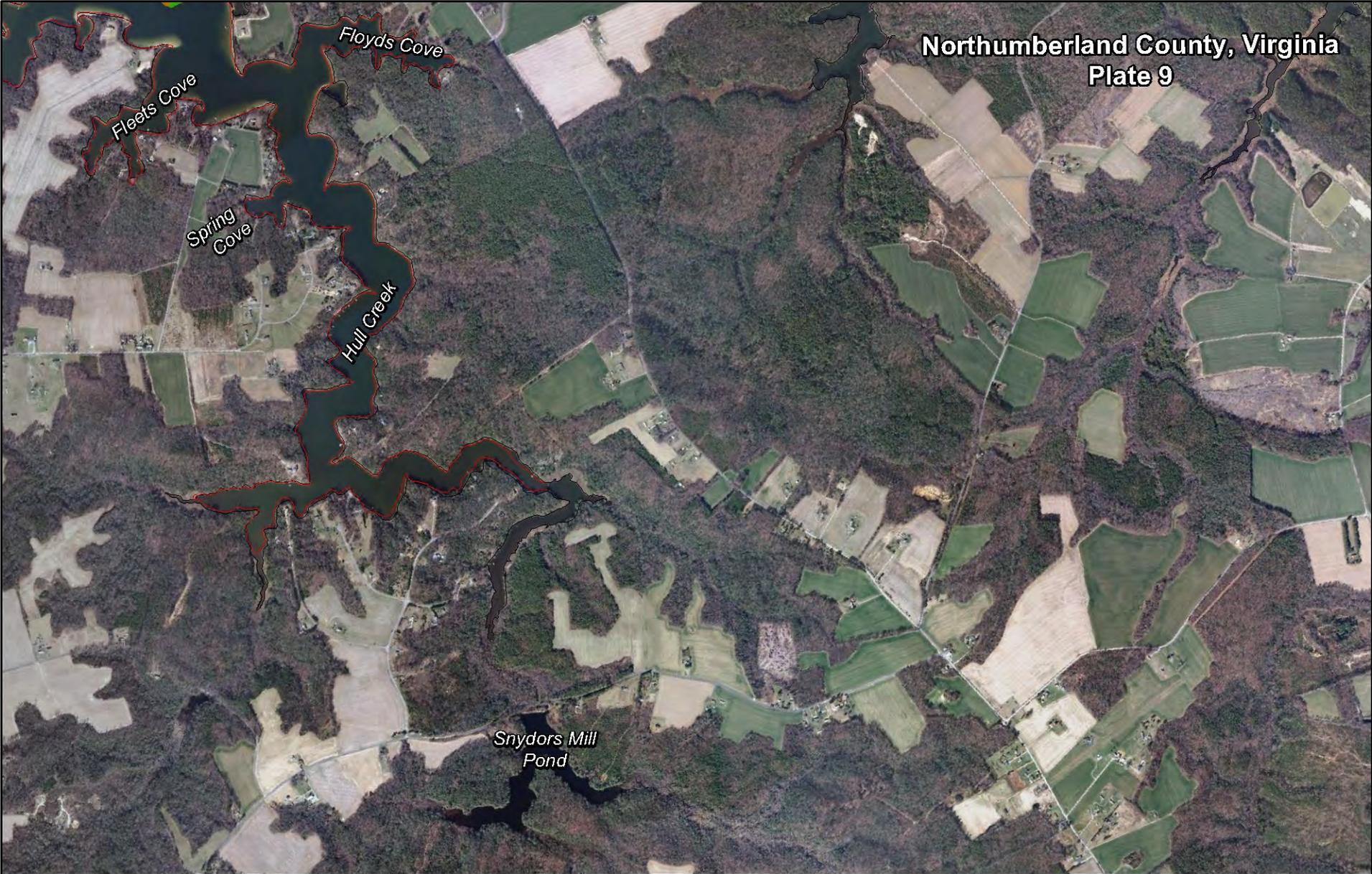
Legend

- 1937 Shoreline
- 2009 Shoreline

2009 VBMP Photo



Northumberland County, Virginia
Plate 9

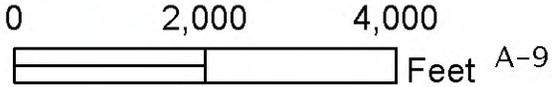
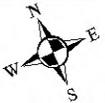
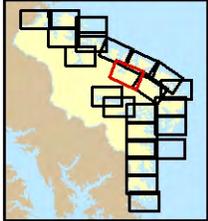


Shoreline Rates of Change

- | | |
|---------------------------------------|------------------------------------|
| ● High Accretion: +10 to +5 (ft/yr) | ● Low Erosion: -1 to -2 (ft/yr) |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ◆ Very High Erosion: < -10 (ft/yr) |
| ● Very Low Erosion: 0 to -1 (ft/yr) | |

Legend

- 1937 Shoreline
 - 2009 Shoreline
- 2009 VBMP Photo



Northumberland County, Virginia
Plate 10

Potomac River



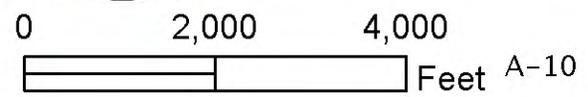
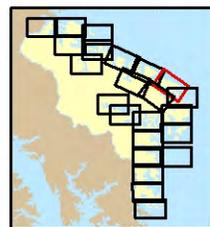
Shoreline Rates of Change

- | | |
|---------------------------------------|------------------------------------|
| ● High Accretion: +10 to +5 (ft/yr) | ● Low Erosion: -1 to -2 (ft/yr) |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ● Very High Erosion: < -10 (ft/yr) |
| ● Very Low Erosion: 0 to -1 (ft/yr) | |

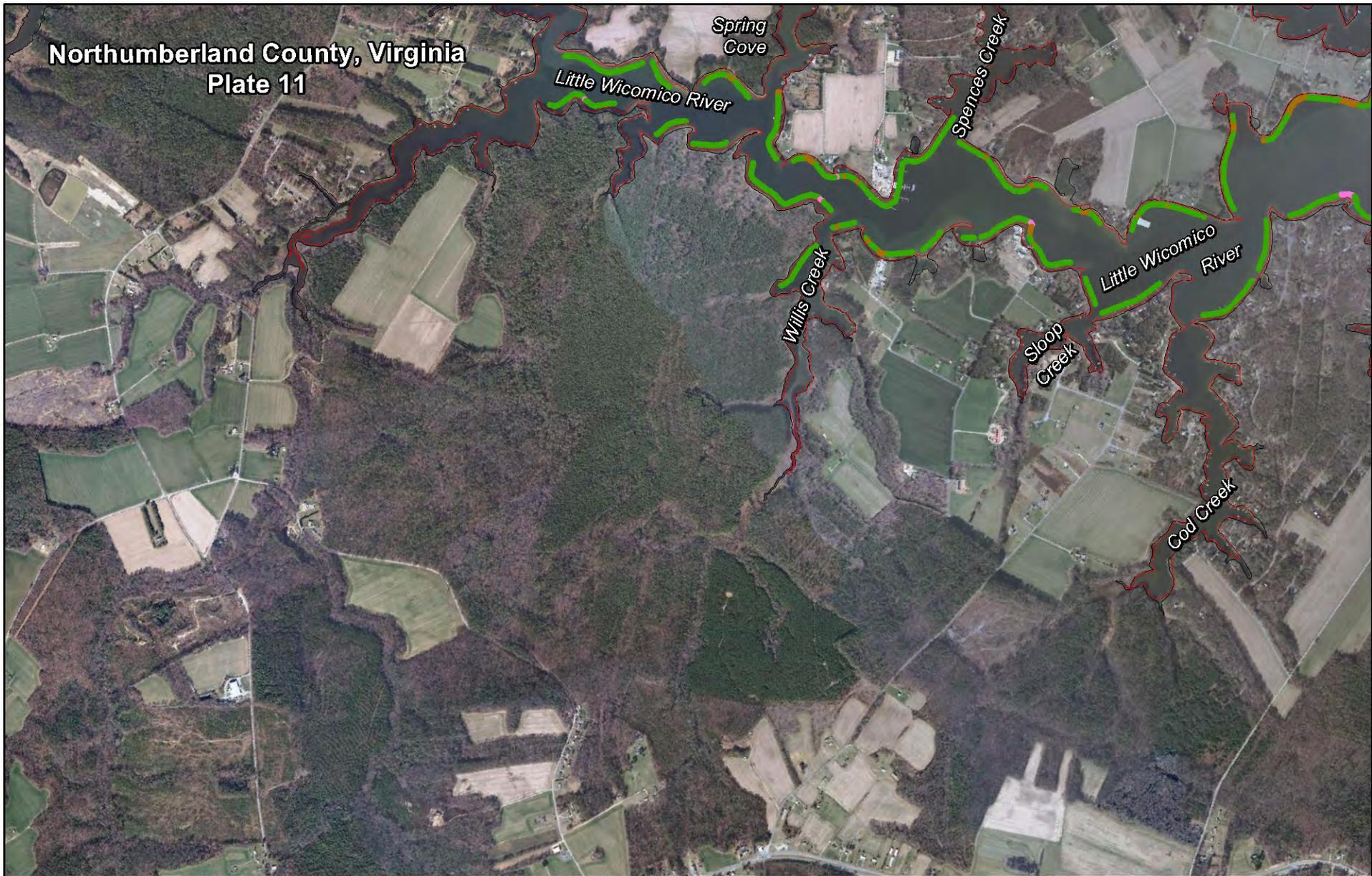
Legend

- 1937 Shoreline
- 2009 Shoreline

2009 VBMP Photo



**Northumberland County, Virginia
Plate 11**

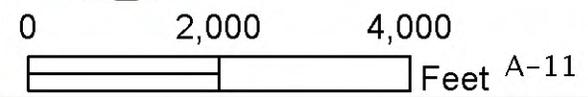
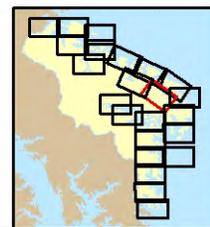


Shoreline Rates of Change

- | | |
|---------------------------------------|------------------------------------|
| ● High Accretion: +10 to +5 (ft/yr) | ● Low Erosion: -1 to -2 (ft/yr) |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ◆ Very High Erosion: < -10 (ft/yr) |
| ● Very Low Erosion: 0 to -1 (ft/yr) | |

Legend

- 1937 Shoreline
 - 2009 Shoreline
- 2009 VBMP Photo



**Northumberland County, Virginia
Plate 12**



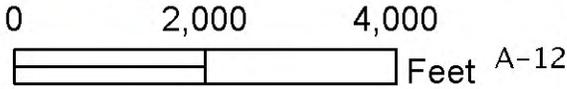
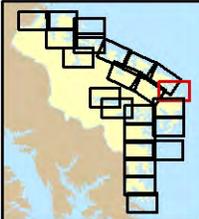
Shoreline Rates of Change

- | | |
|---------------------------------------|------------------------------------|
| ● High Accretion: +10 to +5 (ft/yr) | ◆ Low Erosion: -1 to -2 (ft/yr) |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ◆ Very High Erosion: < -10 (ft/yr) |
| ● Very Low Erosion: 0 to -1 (ft/yr) | |

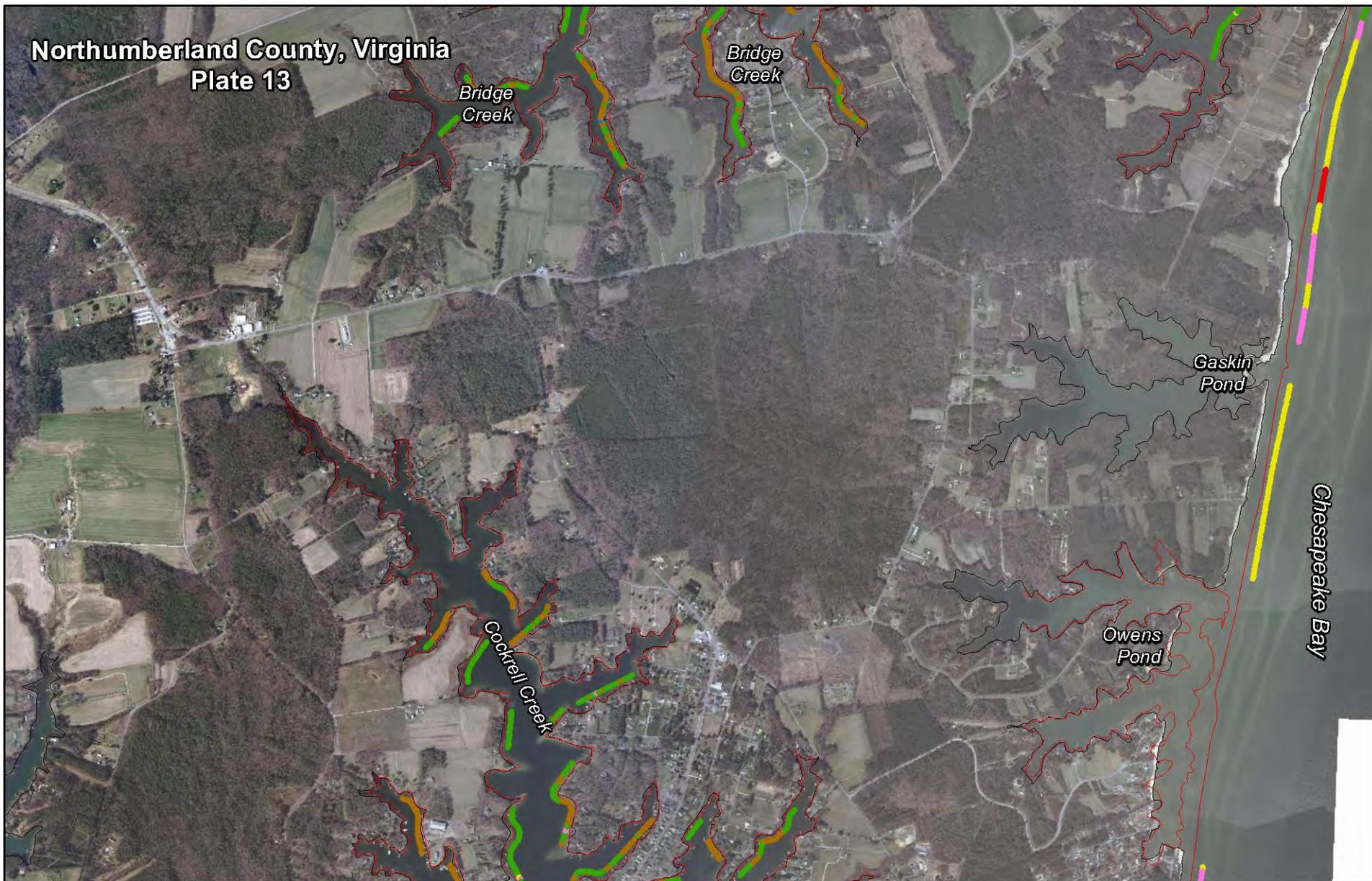
Legend

- 1937 Shoreline
- 2009 Shoreline

2009 VBMP Photo



**Northumberland County, Virginia
Plate 13**



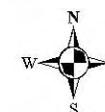
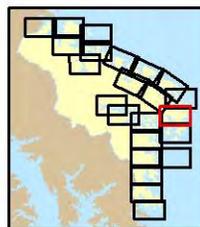
Shoreline Rates of Change

- | | |
|---------------------------------------|------------------------------------|
| ● High Accretion: +10 to +5 (ft/yr) | ● Low Erosion: -1 to -2 (ft/yr) |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ◆ Very High Erosion: < -10 (ft/yr) |
| ● Very Low Erosion: 0 to -1 (ft/yr) | |

Legend

- 1937 Shoreline
- 2009 Shoreline

2009 VBMP Photo



0 2,000 4,000

Feet A-13



Shoreline Rates of Change

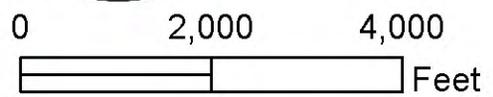
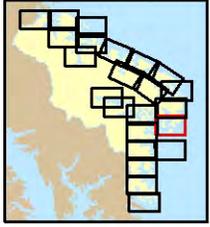
| | |
|---------------------------------------|------------------------------------|
| ● High Accretion: +10 to +5 (ft/yr) | ● Low Erosion: -1 to -2 (ft/yr) |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ◆ Very High Erosion: < -10 (ft/yr) |
| ● Very Low Erosion: 0 to -1 (ft/yr) | |

Legend

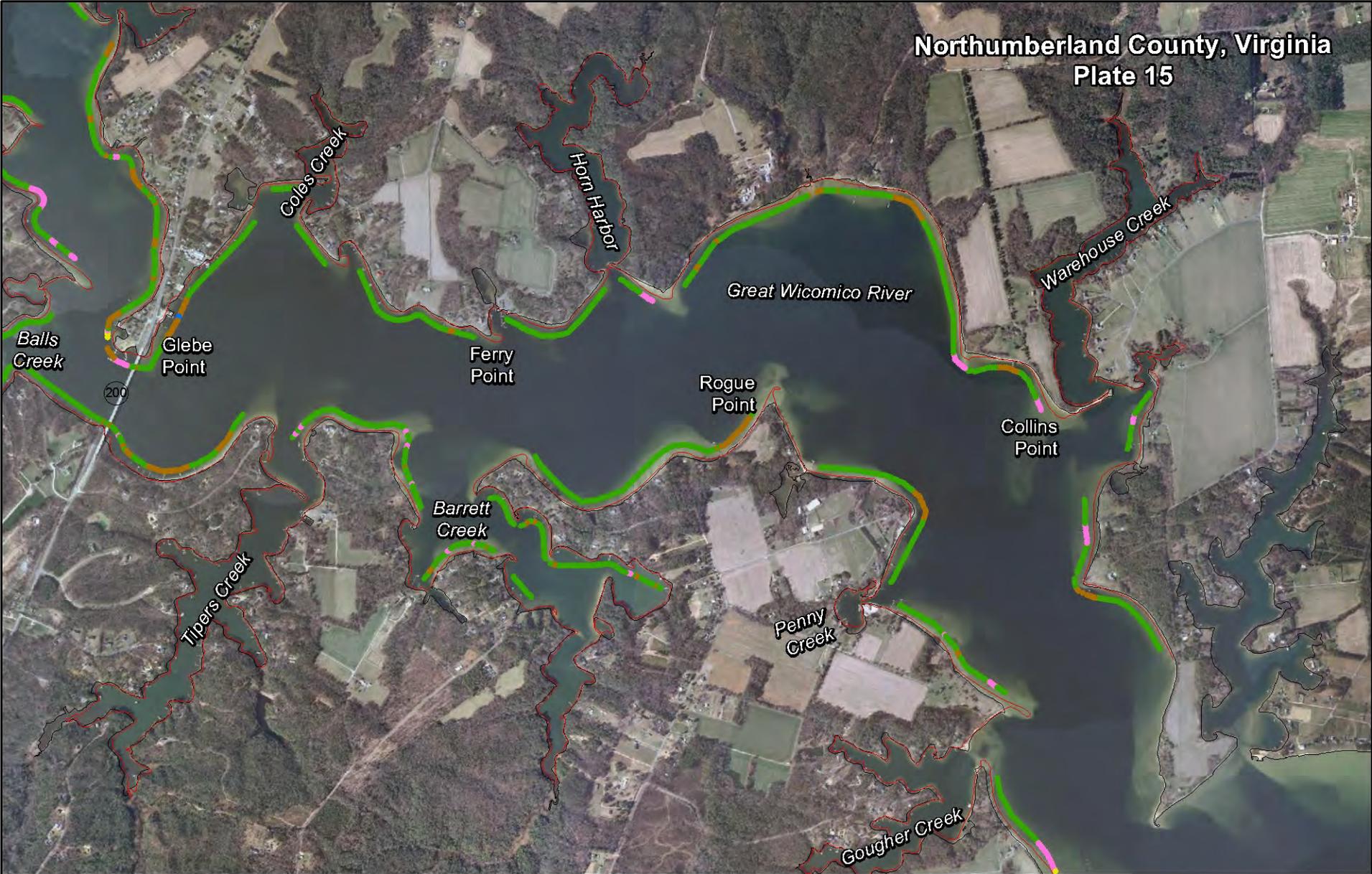
— 1937 Shoreline

— 2009 Shoreline

2009 VBMP Photo



Northumberland County, Virginia
Plate 15



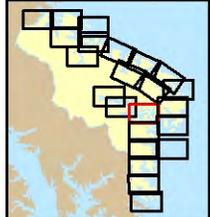
Shoreline Rates of Change

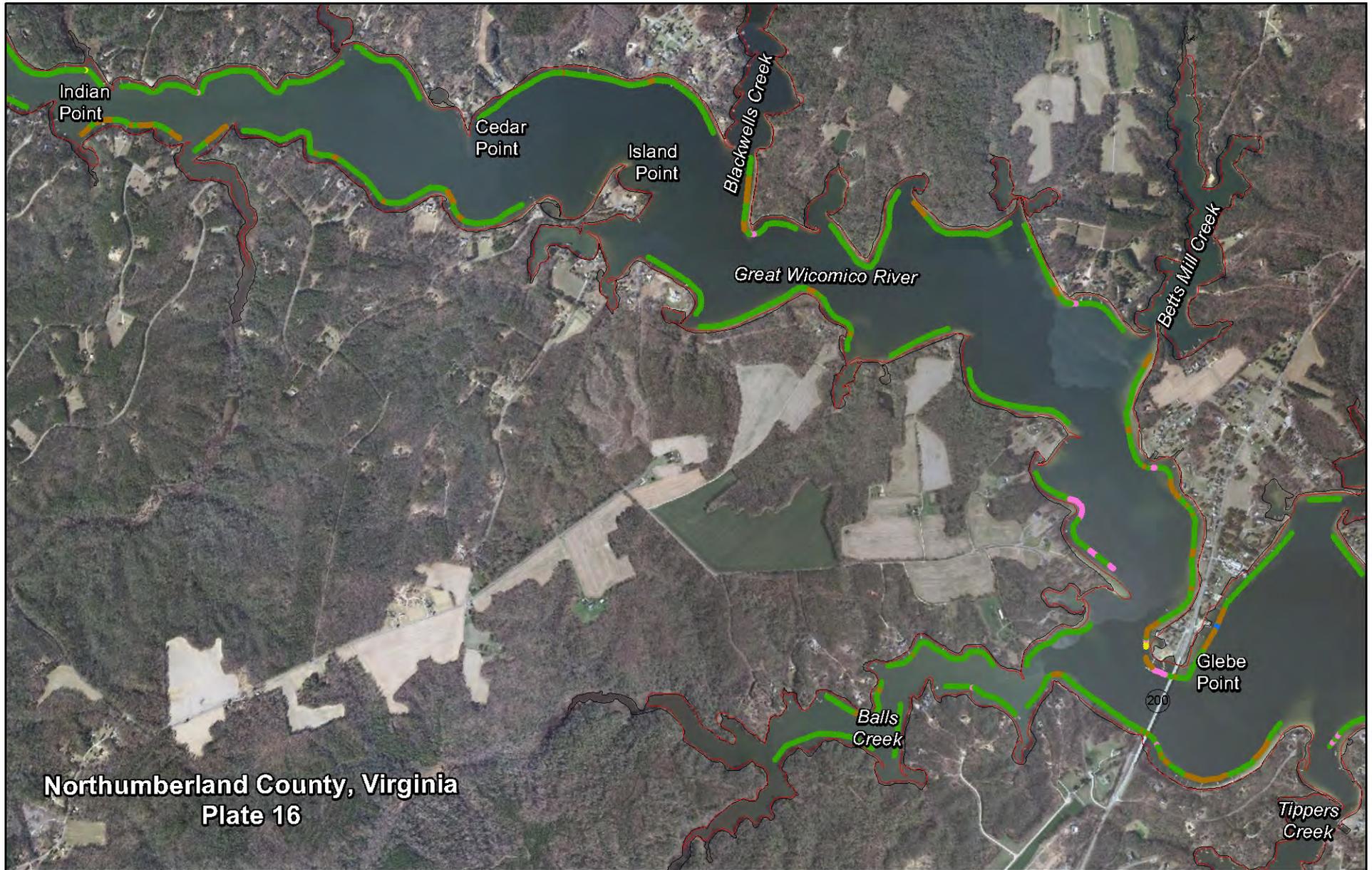
- High Accretion: +10 to +5 (ft/yr)
- Medium Accretion: +5 to +2 (ft/yr)
- Low Accretion: +2 to +1 (ft/yr)
- Very Low Accretion: +1 to 0 (ft/yr)
- Very Low Erosion: 0 to -1 (ft/yr)
- Low Erosion: -1 to -2 (ft/yr)
- Medium Erosion: -2 to -5 (ft/yr)
- High Erosion: -5 to -10 (ft/yr)
- ◆ Very High Erosion: < -10 (ft/yr)

Legend

- 1937 Shoreline
- 2009 Shoreline

2009 VBMP Photo





**Northumberland County, Virginia
Plate 16**

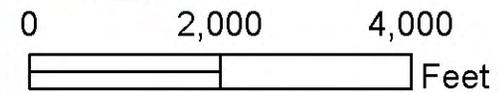
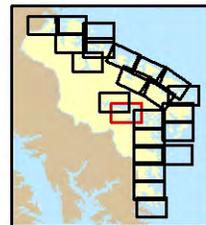
Shoreline Rates of Change

- | | |
|---------------------------------------|------------------------------------|
| ● High Accretion: +10 to +5 (ft/yr) | ● Low Erosion: -1 to -2 (ft/yr) |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ◆ Very High Erosion: < -10 (ft/yr) |
| ● Very Low Erosion: 0 to -1 (ft/yr) | |

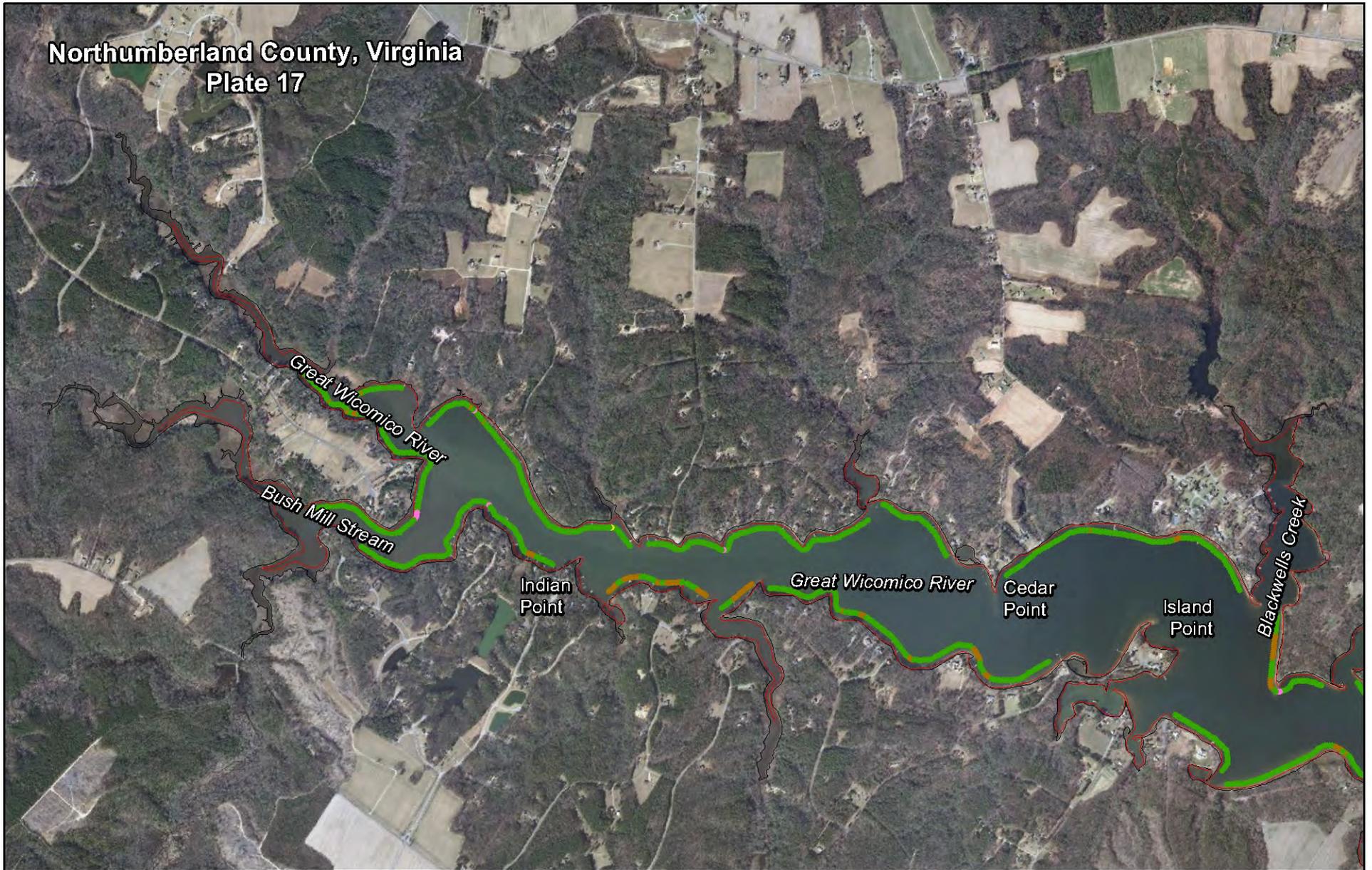
Legend

- 1937 Shoreline
- 2009 Shoreline

2009 VBMP Photo



Northumberland County, Virginia
Plate 17



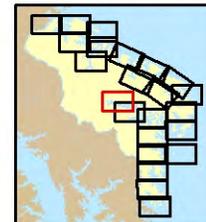
Shoreline Rates of Change

- | | |
|---------------------------------------|------------------------------------|
| ● High Accretion: +10 to +5 (ft/yr) | ● Low Erosion: -1 to -2 (ft/yr) |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ◆ Very High Erosion: < -10 (ft/yr) |
| ● Very Low Erosion: 0 to -1 (ft/yr) | |

Legend

- 1937 Shoreline
- 2009 Shoreline

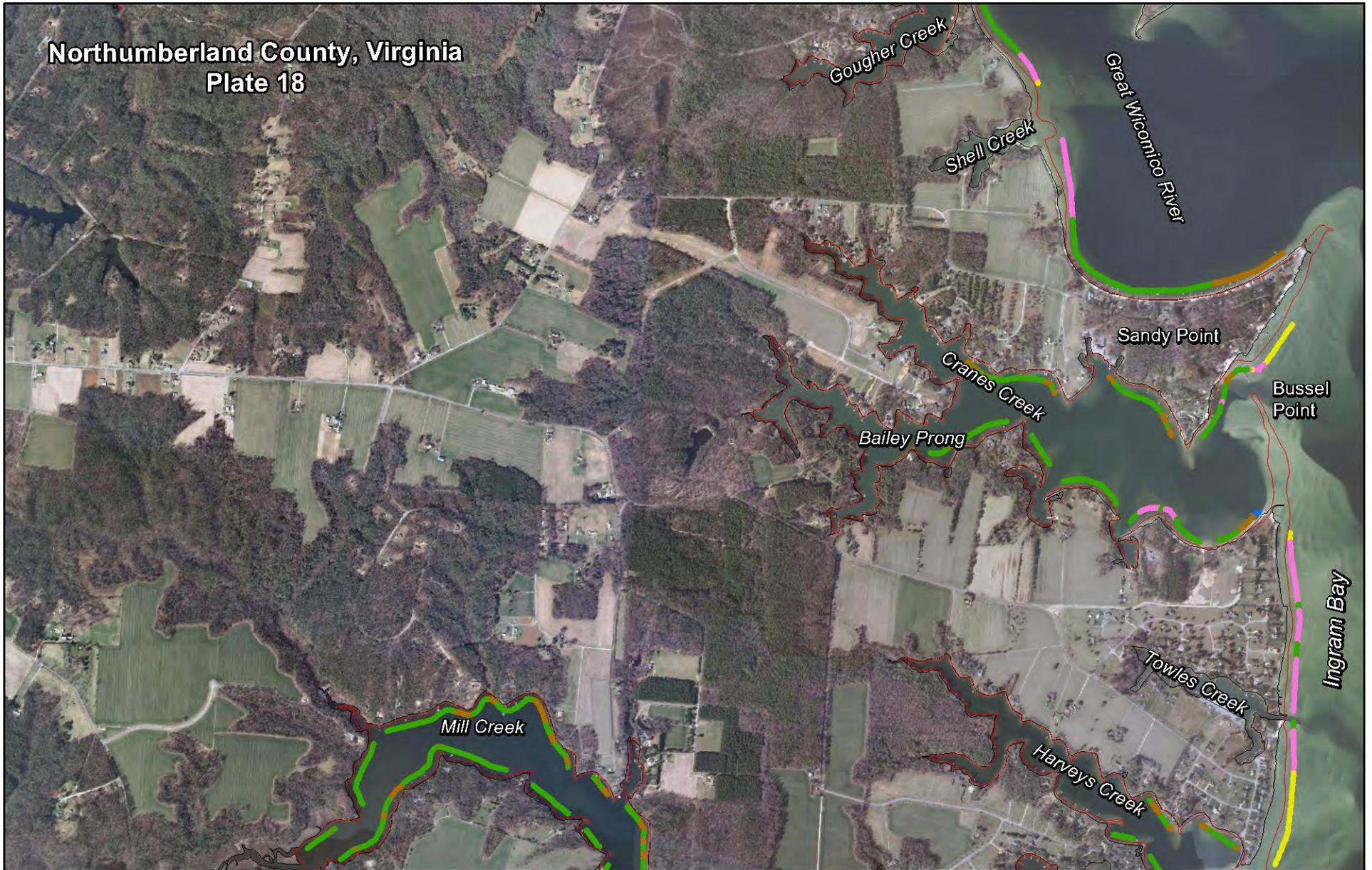
2009 VBMP Photo



0 2,000 4,000

Feet

Northumberland County, Virginia
Plate 18



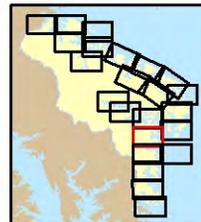
Shoreline Rates of Change

- | | |
|---------------------------------------|------------------------------------|
| ● High Accretion: +10 to +5 (ft/yr) | ● Low Erosion: -1 to -2 (ft/yr) |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ● Very High Erosion: < -10 (ft/yr) |
| ● Very Low Erosion: 0 to -1 (ft/yr) | |

Legend

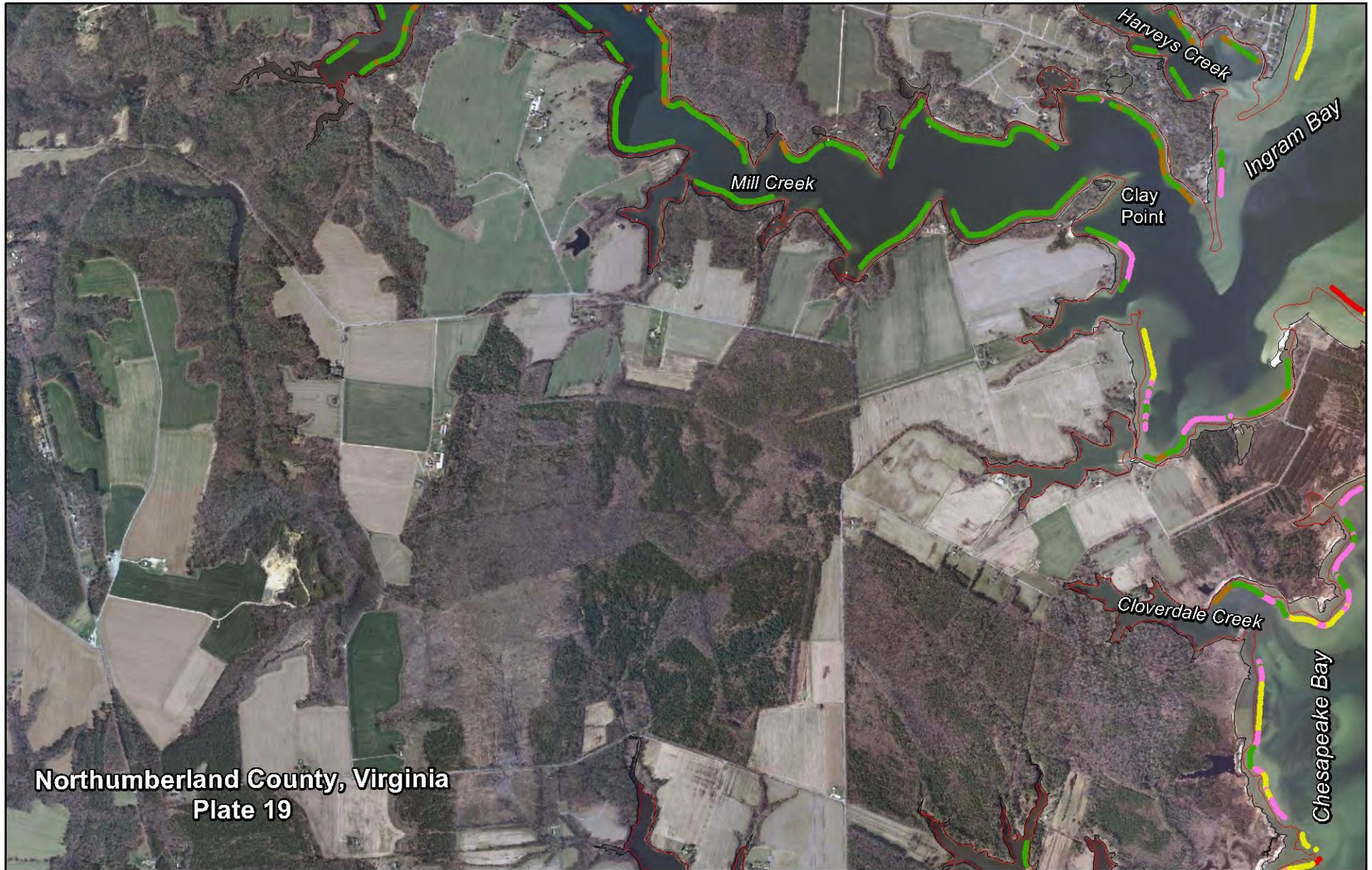
- 1937 Shoreline
- 2009 Shoreline

2009 VBMP Photo



0 2,000 4,000

Feet



Northumberland County, Virginia
Plate 19

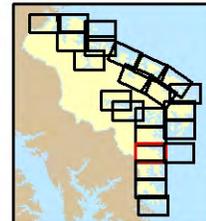
Shoreline Rates of Change

- | | |
|---------------------------------------|------------------------------------|
| ● High Accretion: +10 to +5 (ft/yr) | ● Low Erosion: -1 to -2 (ft/yr) |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ◆ Very High Erosion: < -10 (ft/yr) |
| ● Very Low Erosion: 0 to -1 (ft/yr) | |

Legend

- 1937 Shoreline
- 2009 Shoreline

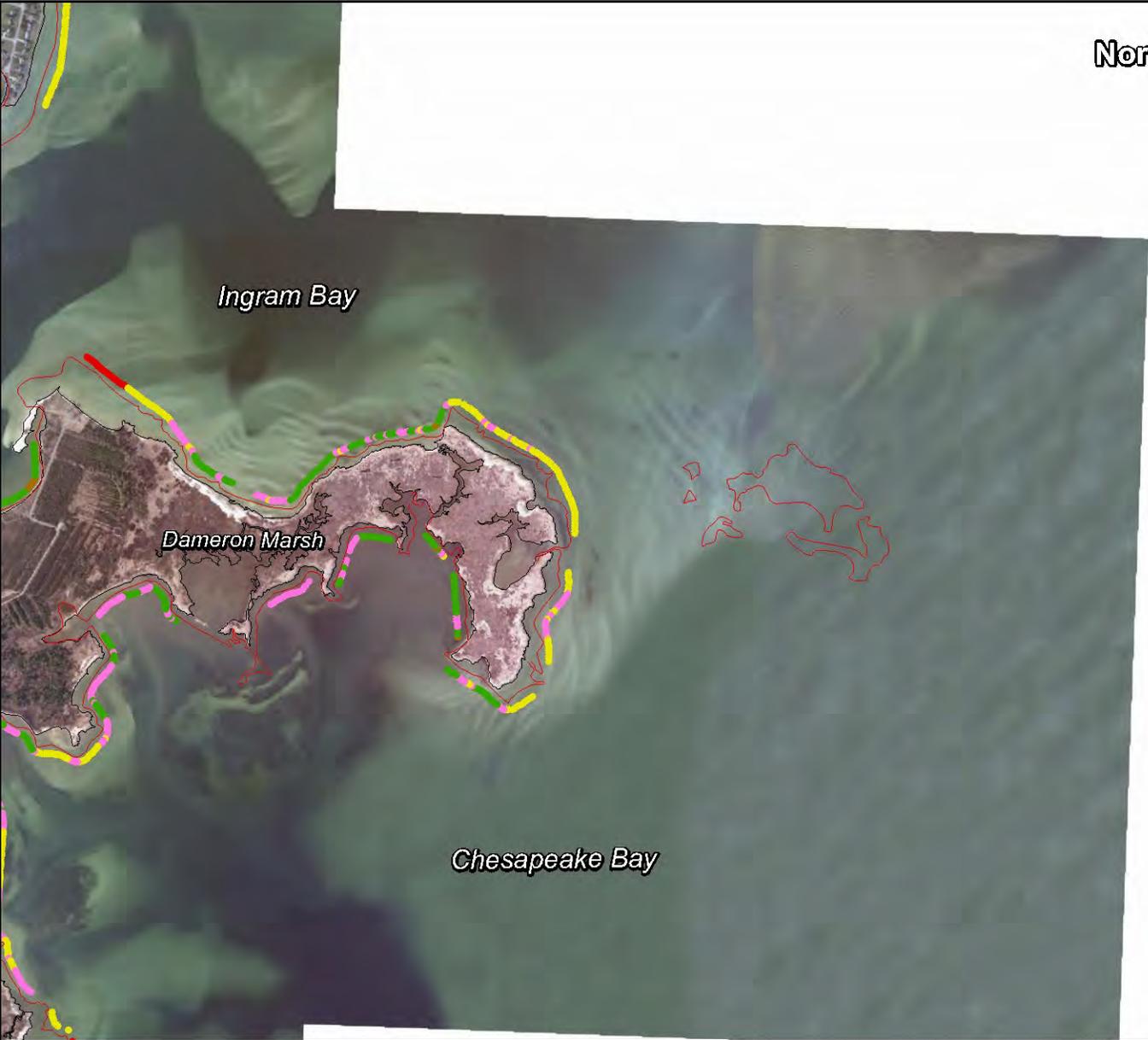
2009 VBMP Photo



0 2,000 4,000

Feet

Northumberland County, Virginia
Plate 20



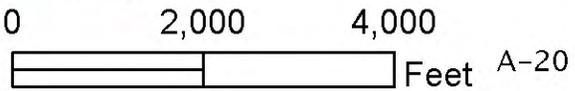
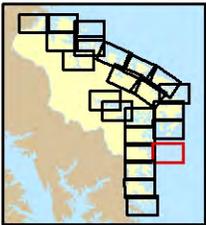
| Shoreline Rates of Change | | | |
|---------------------------------------|------------------------------------|--|--|
| ● High Accretion: +10 to +5 (ft/yr) | ● Low Erosion: -1 to -2 (ft/yr) | | |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) | | |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) | | |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ◆ Very High Erosion: < -10 (ft/yr) | | |
| ● Very Low Erosion: 0 to -1 (ft/yr) | | | |

Legend

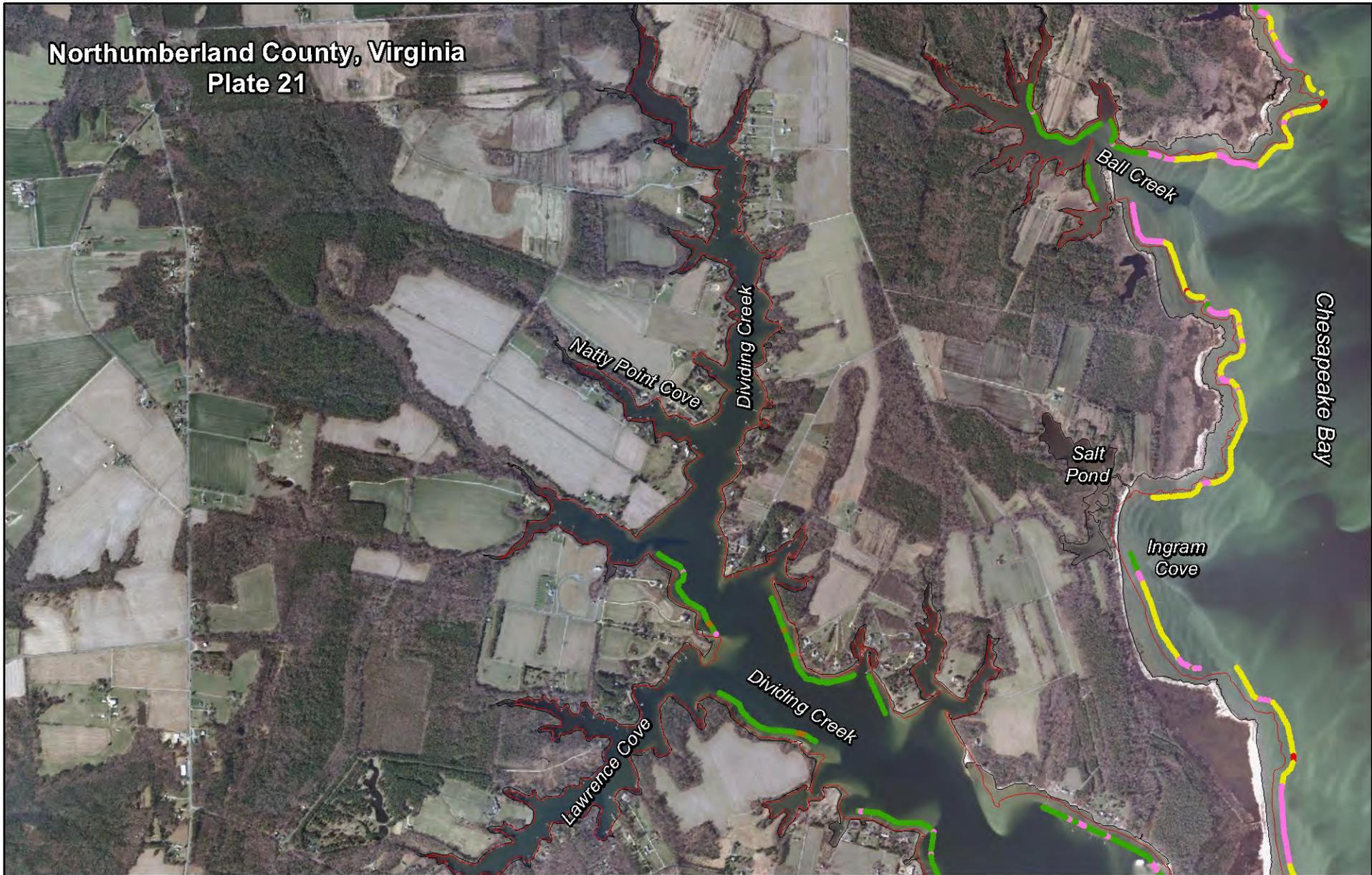
— 1937 Shoreline

— 2009 Shoreline

2009 VBMP Photo



**Northumberland County, Virginia
Plate 21**



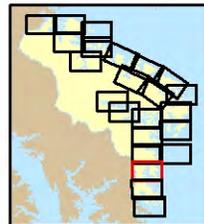
Shoreline Rates of Change

- | | |
|---------------------------------------|------------------------------------|
| ● High Accretion: +10 to +5 (ft/yr) | ● Low Erosion: -1 to -2 (ft/yr) |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ● Very High Erosion: < -10 (ft/yr) |
| ● Very Low Erosion: 0 to -1 (ft/yr) | |

Legend

- 1937 Shoreline
- 2009 Shoreline

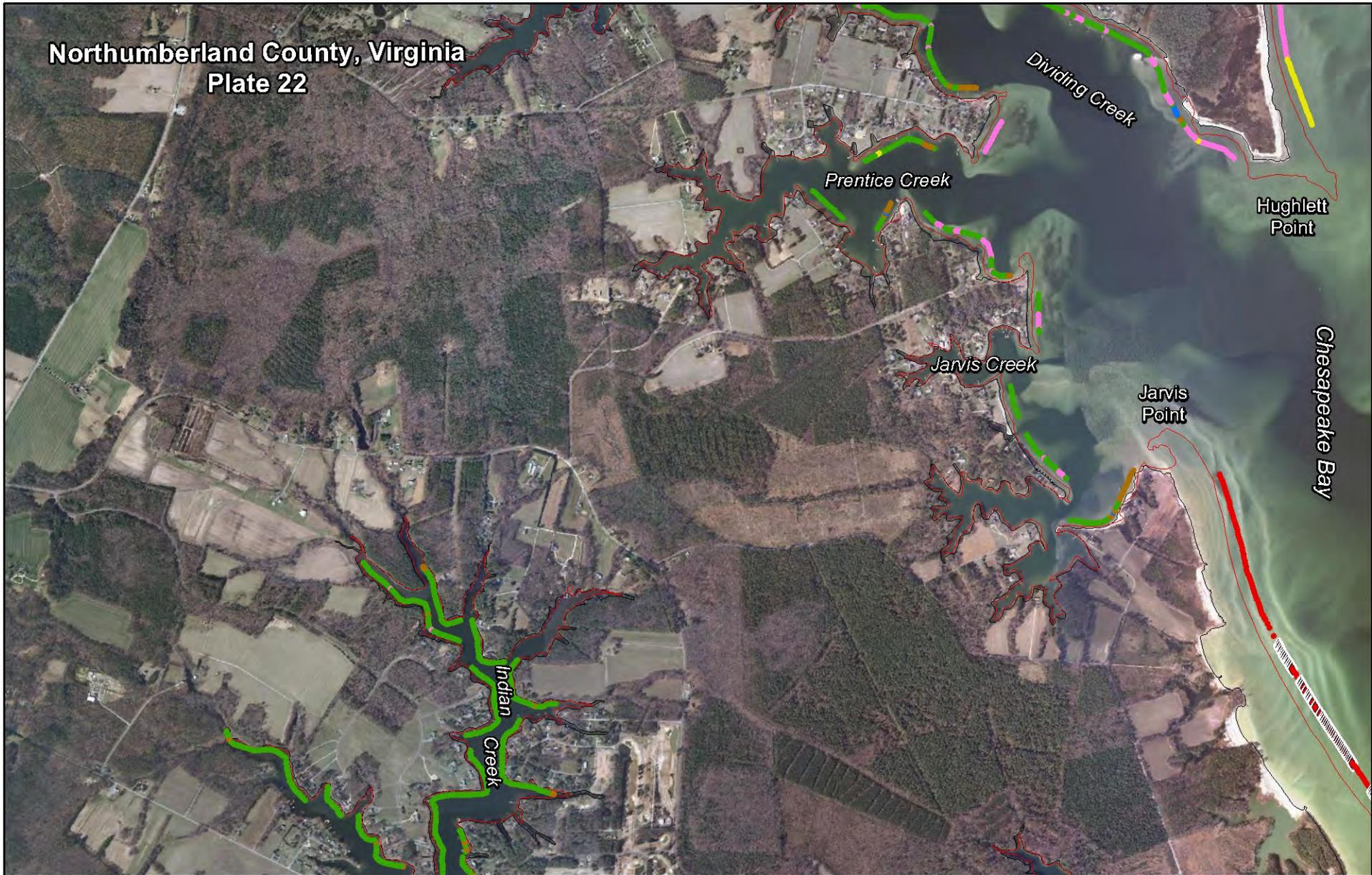
2009 VBMP Photo



0 2,000 4,000

Feet

**Northumberland County, Virginia
Plate 22**



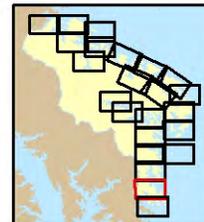
Shoreline Rates of Change

- | | |
|---------------------------------------|------------------------------------|
| ● High Accretion: +10 to +5 (ft/yr) | ● Low Erosion: -1 to -2 (ft/yr) |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ◆ Very High Erosion: < -10 (ft/yr) |
| ● Very Low Erosion: 0 to -1 (ft/yr) | |

Legend

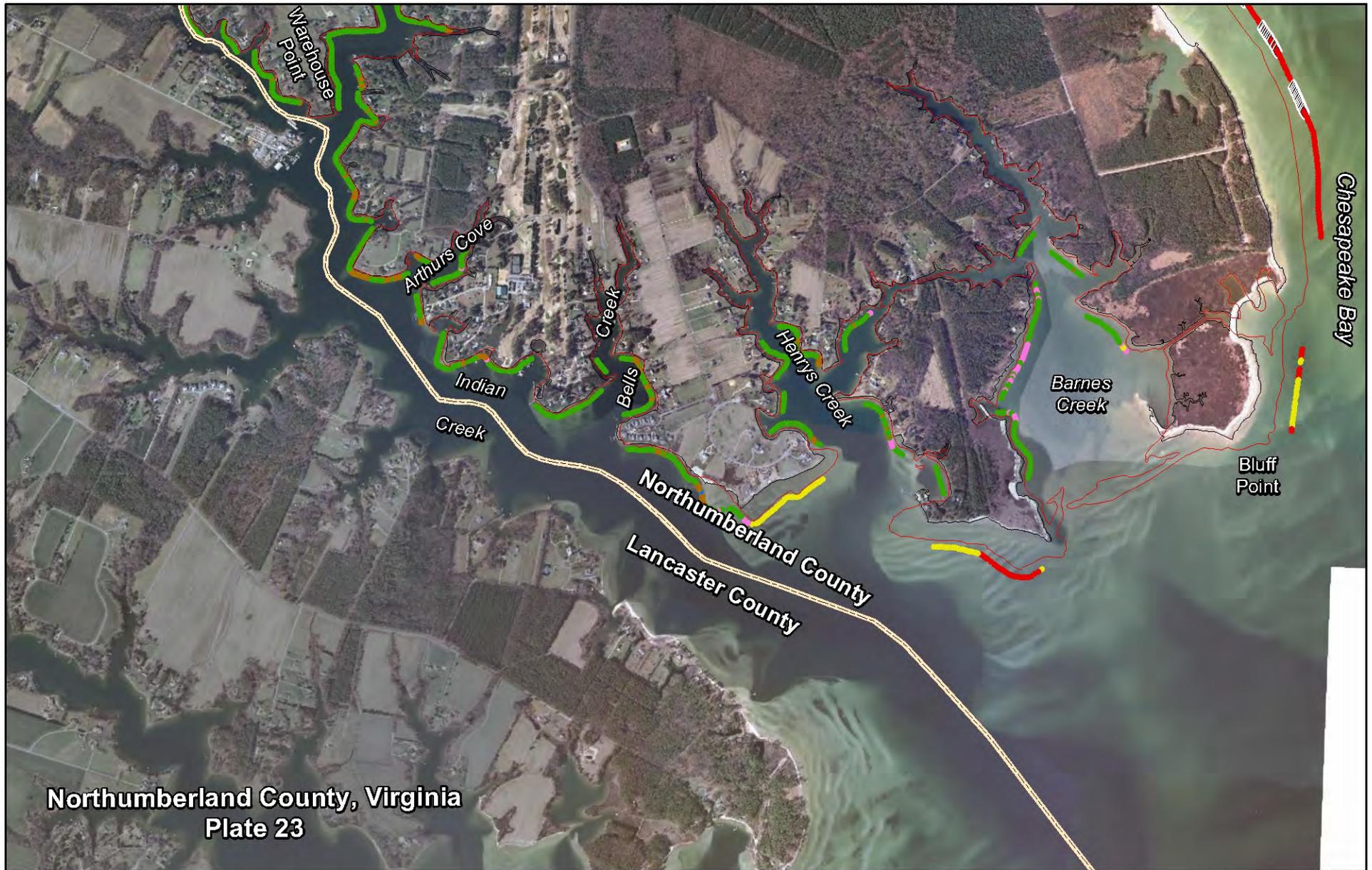
- 1937 Shoreline
- 2009 Shoreline

2009 VBMP Photo



0 2,000 4,000

Feet



**Northumberland County, Virginia
Plate 23**

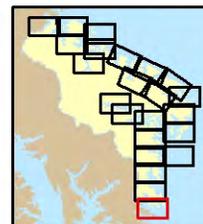
Shoreline Rates of Change

- | | |
|---------------------------------------|------------------------------------|
| ● High Accretion: +10 to +5 (ft/yr) | ● Low Erosion: -1 to -2 (ft/yr) |
| ● Medium Accretion: +5 to +2 (ft/yr) | ● Medium Erosion: -2 to -5 (ft/yr) |
| ● Low Accretion: +2 to +1 (ft/yr) | ● High Erosion: -5 to -10 (ft/yr) |
| ● Very Low Accretion: +1 to 0 (ft/yr) | ◆ Very High Erosion: < -10 (ft/yr) |
| ● Very Low Erosion: 0 to -1 (ft/yr) | |

Legend

- 1937 Shoreline
- 2009 Shoreline

2009 VBMP Photo



0 2,000 4,000

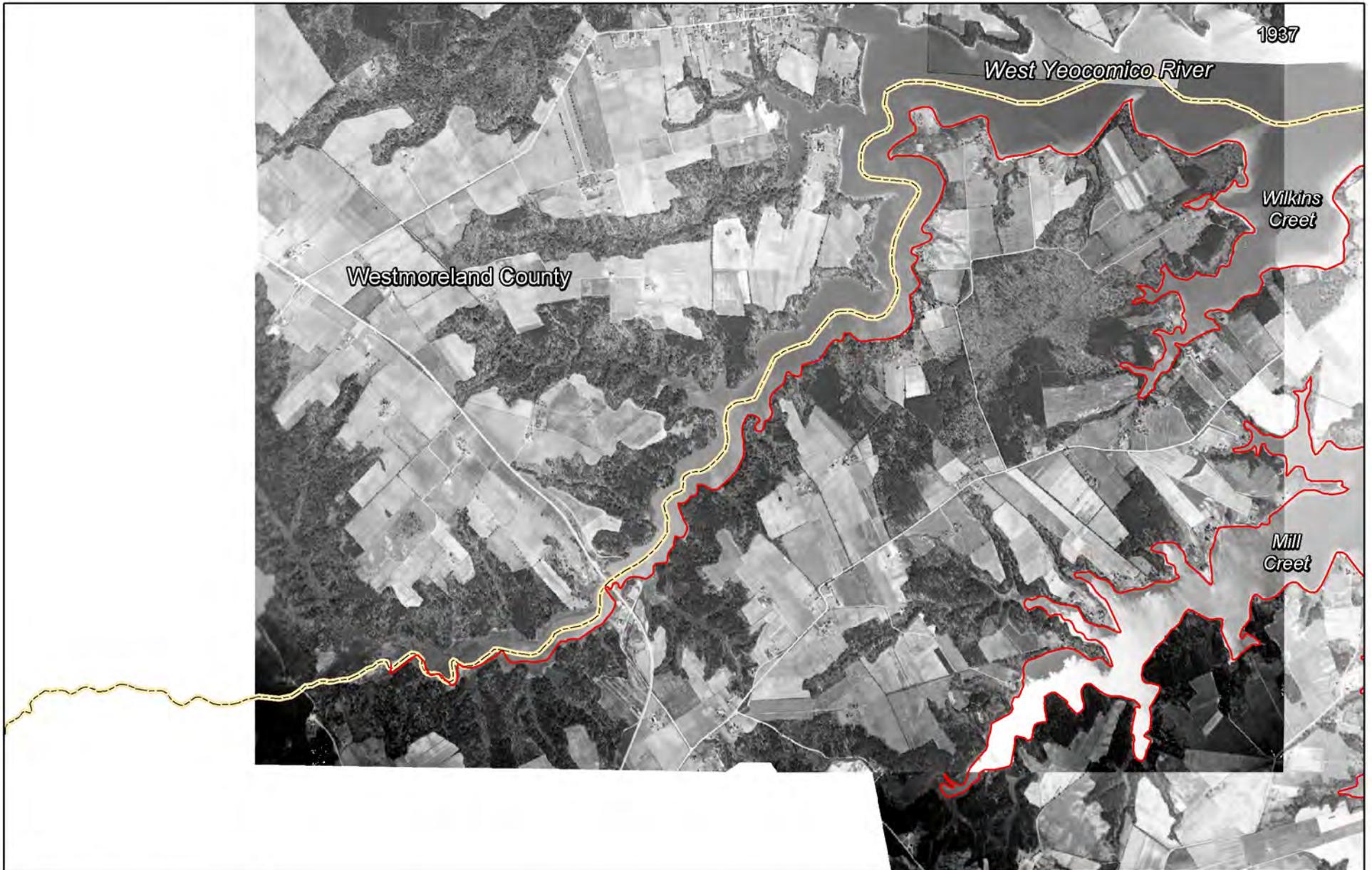
Feet

Appendix B

Historical Photo and Digitized Shoreline Maps

Note: The location labels on the plates come from U.S. Geological Survey topographic maps, Google Earth, and other map sources and may not be accurate for the historical or even more recent images. They are for reference only.

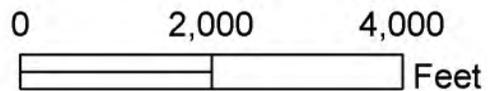
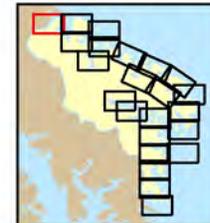
| | | |
|----------------|-----------------|-----------------|
| Plate 1 | Plate 9 | Plate 17 |
| Plate 2 | Plate 10 | Plate 18 |
| Plate 3 | Plate 11 | Plate 19 |
| Plate 4 | Plate 12 | Plate 20 |
| Plate 5 | Plate 13 | Plate 21 |
| Plate 6 | Plate 14 | Plate 22 |
| Plate 7 | Plate 15 | Plate 23 |
| Plate 8 | Plate 16 | |

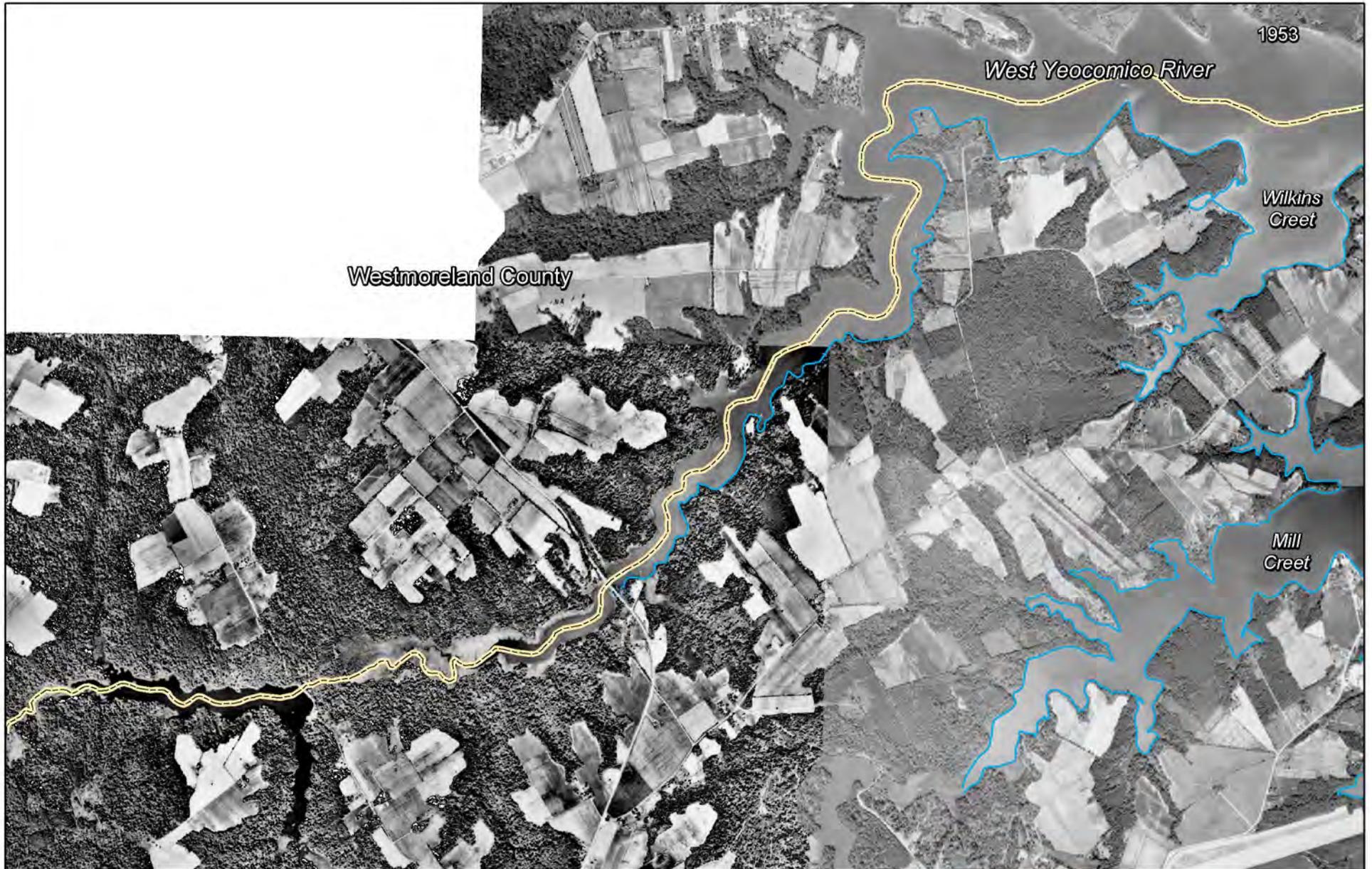


Legend
 — 1937 Shoreline



**Northumberland County, Virginia
 Plate 1**

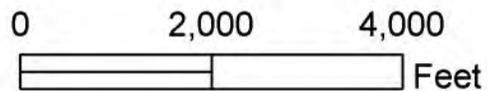
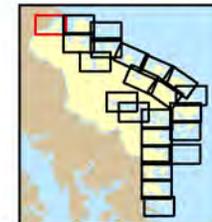


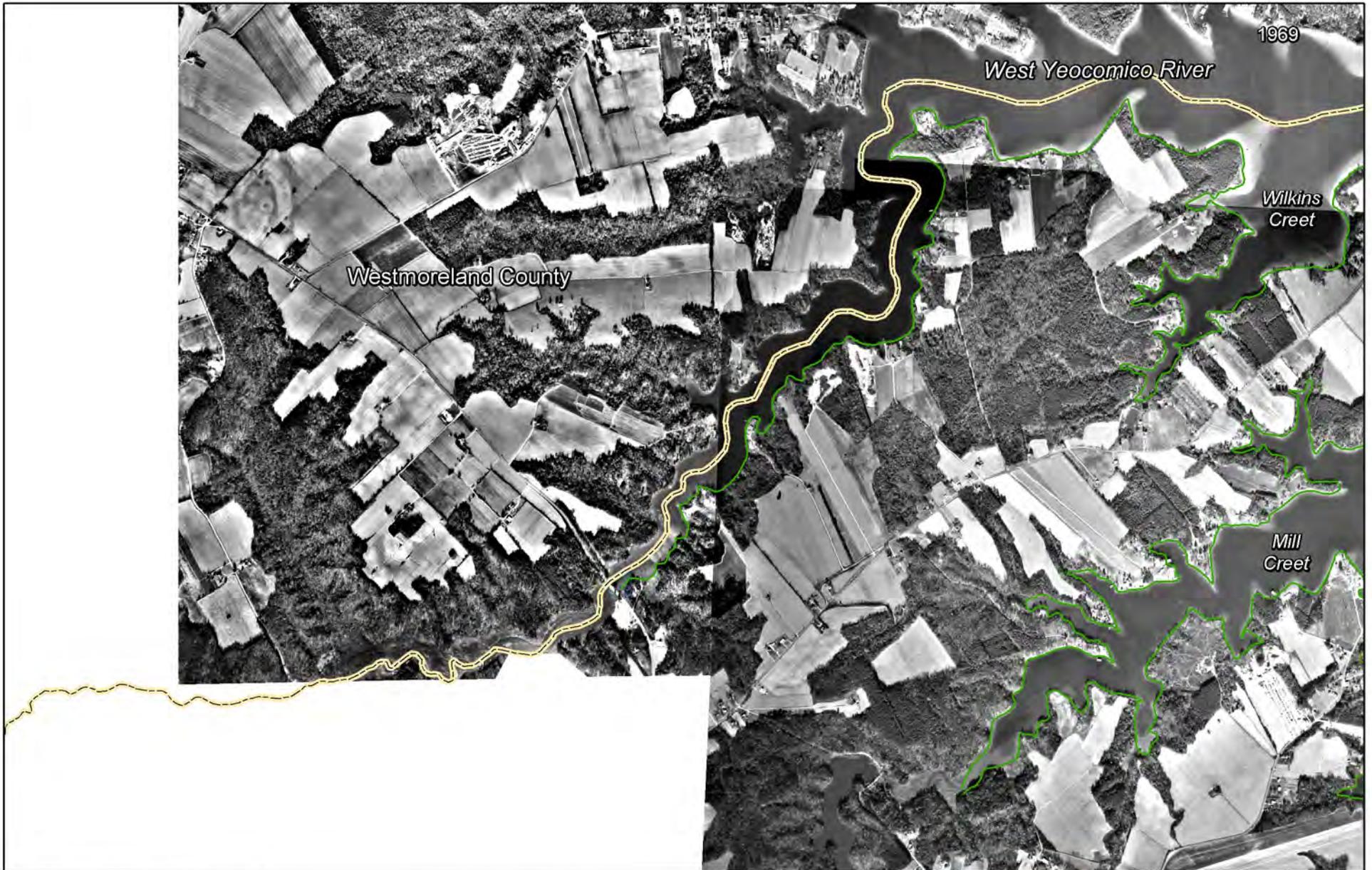


Legend
 — 1953 Shoreline



**Northumberland County, Virginia
 Plate 1**





Legend
— 1969 Shoreline



0 2,000 4,000
Feet

Northumberland County, Virginia Plate 1

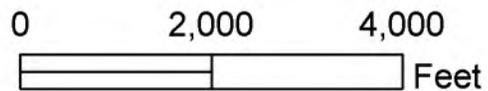
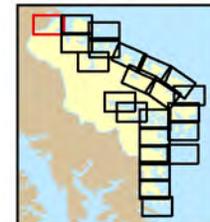


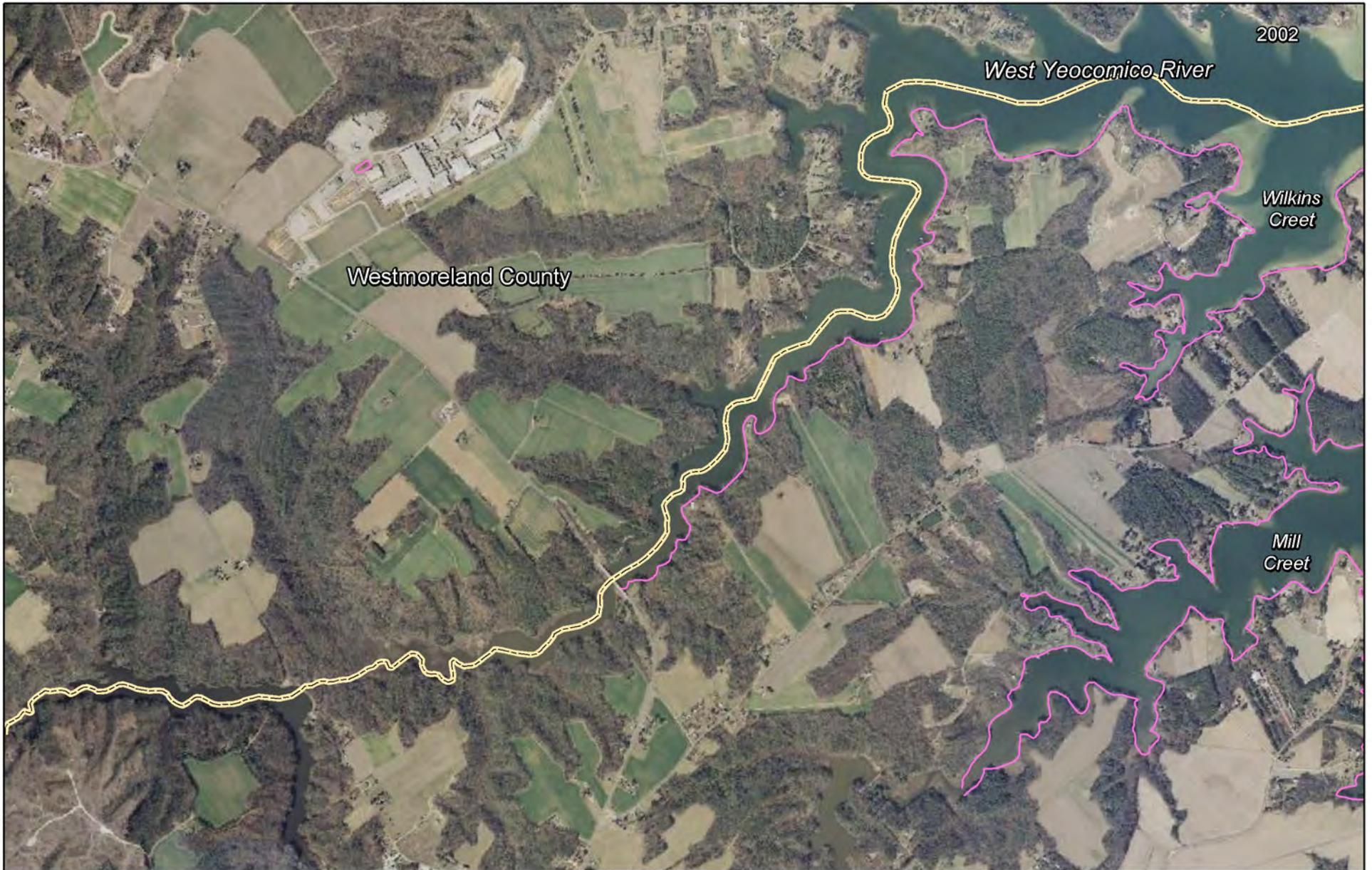


Legend
 1994 Shoreline



**Northumberland County, Virginia
 Plate 1**

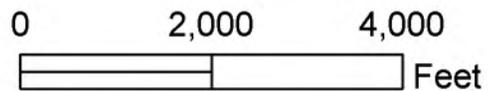
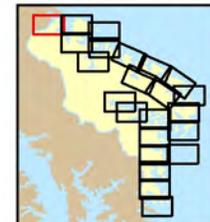




Legend
— 2002 Shoreline



Northumberland County, Virginia Plate 1

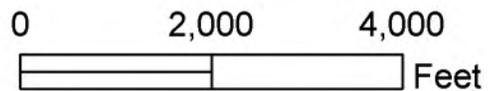
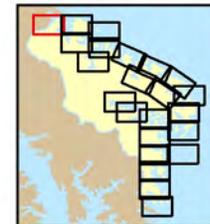


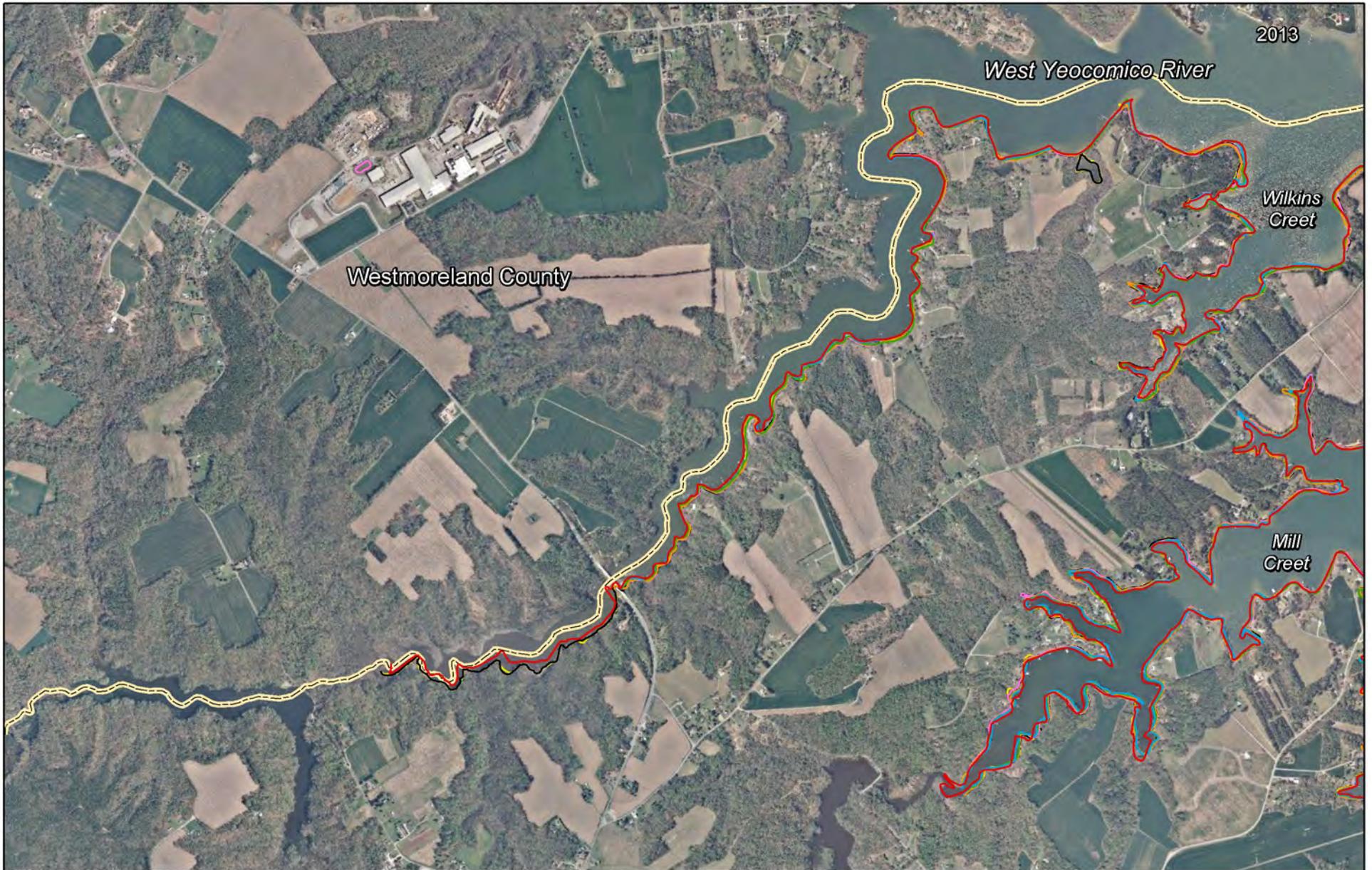


Legend
 — 2009 Shoreline



**Northumberland County, Virginia
 Plate 1**

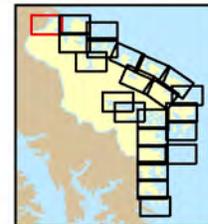
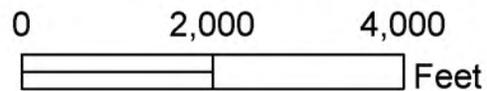




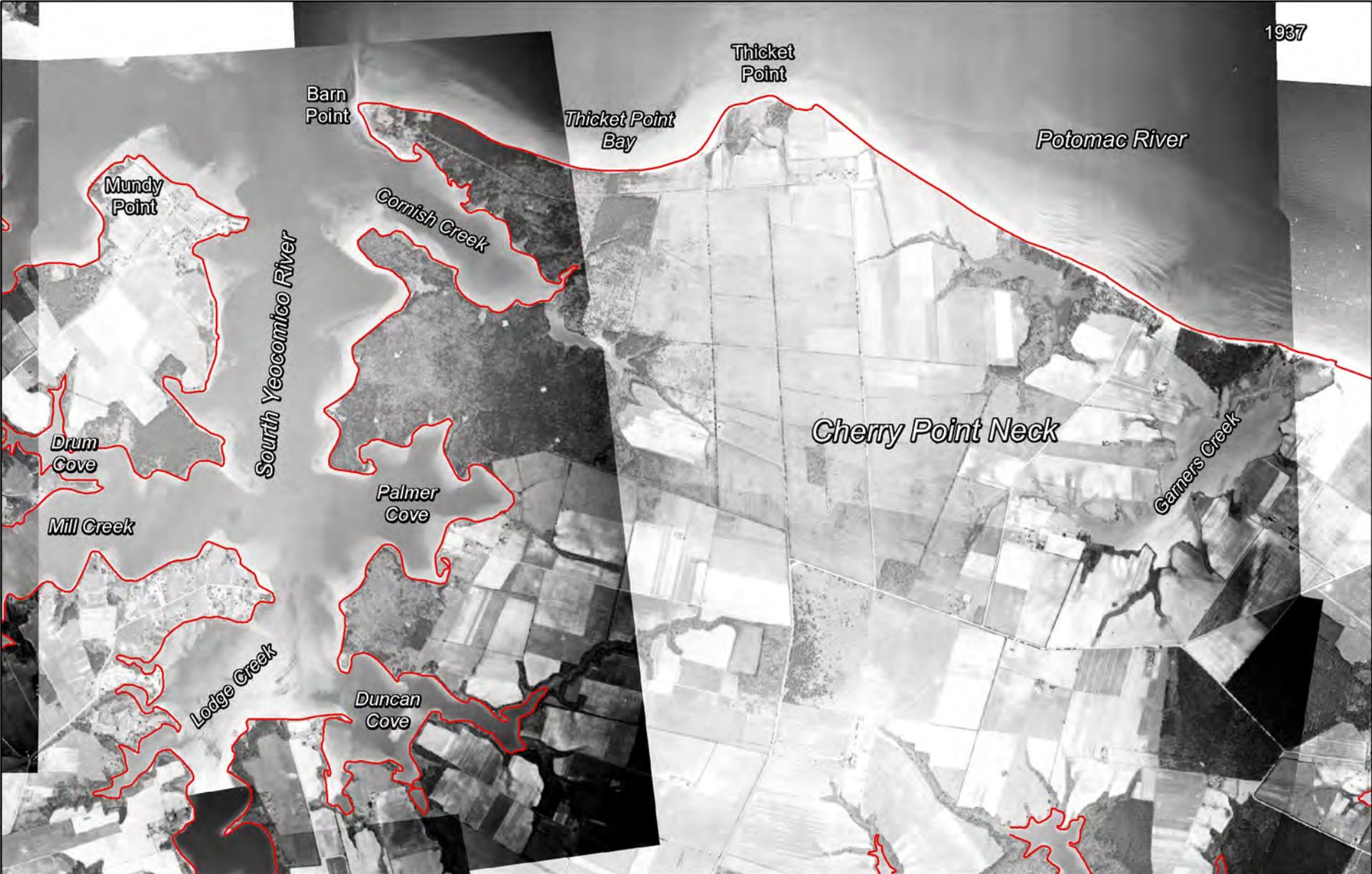
Legend

| | |
|------------------|------------------|
| — 1937 Shoreline | — 2002 Shoreline |
| — 1953 Shoreline | — 2009 Shoreline |
| — 1969 Shoreline | — 2013 Shoreline |
| — 1994 Shoreline | |

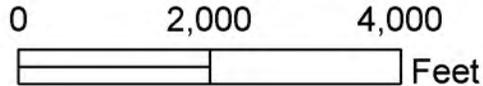
**Northumberland County, Virginia
Plate 1**



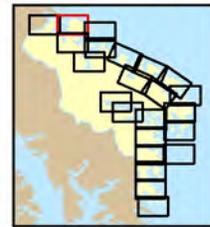
1937



Legend
 — 1937 Shoreline



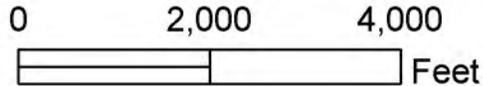
**Northumberland County, Virginia
 Plate 2**



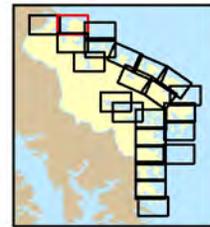
1953



Legend
 — 1953 Shoreline



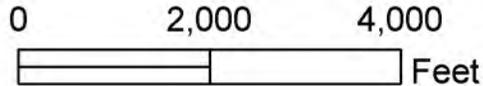
**Northumberland County, Virginia
 Plate 2**



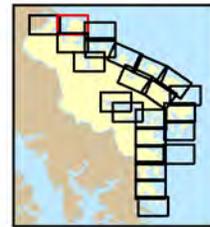
1969



Legend
 — 1969 Shoreline



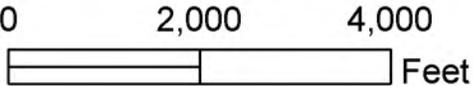
**Northumberland County, Virginia
 Plate 2**



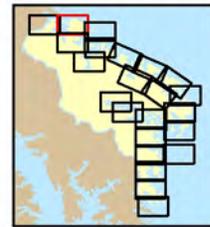
1994



Legend
 — 1994 Shoreline

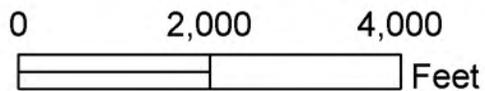


**Northumberland County, Virginia
 Plate 2**

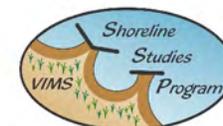
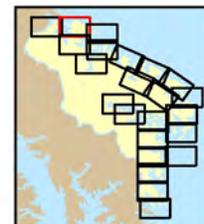




Legend
 — 2002 Shoreline

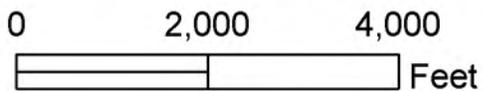


**Northumberland County, Virginia
 Plate 2**

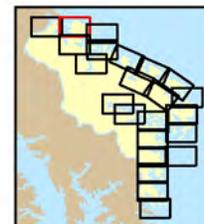




Legend
 — 2009 Shoreline



**Northumberland County, Virginia
 Plate 2**

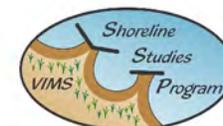
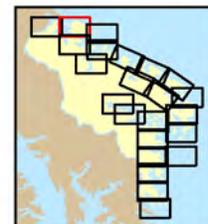
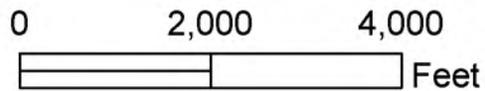


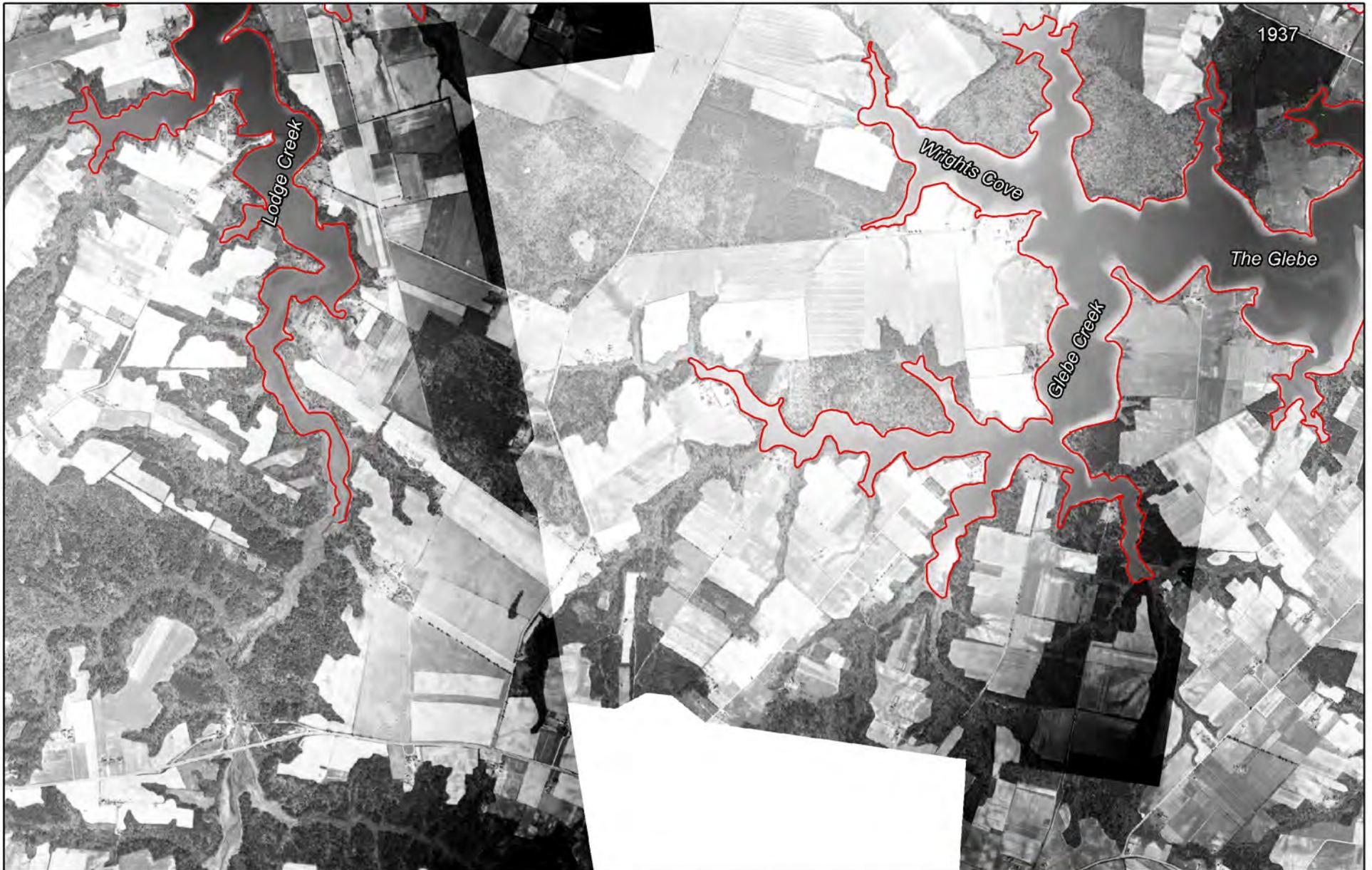


Legend

- 1937 Shoreline — 2002 Shoreline
- 1953 Shoreline — 2009 Shoreline
- 1969 Shoreline — 2013 Shoreline
- 1994 Shoreline

**Northumberland County, Virginia
Plate 2**



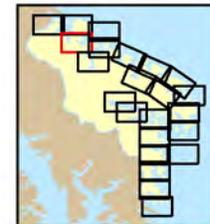


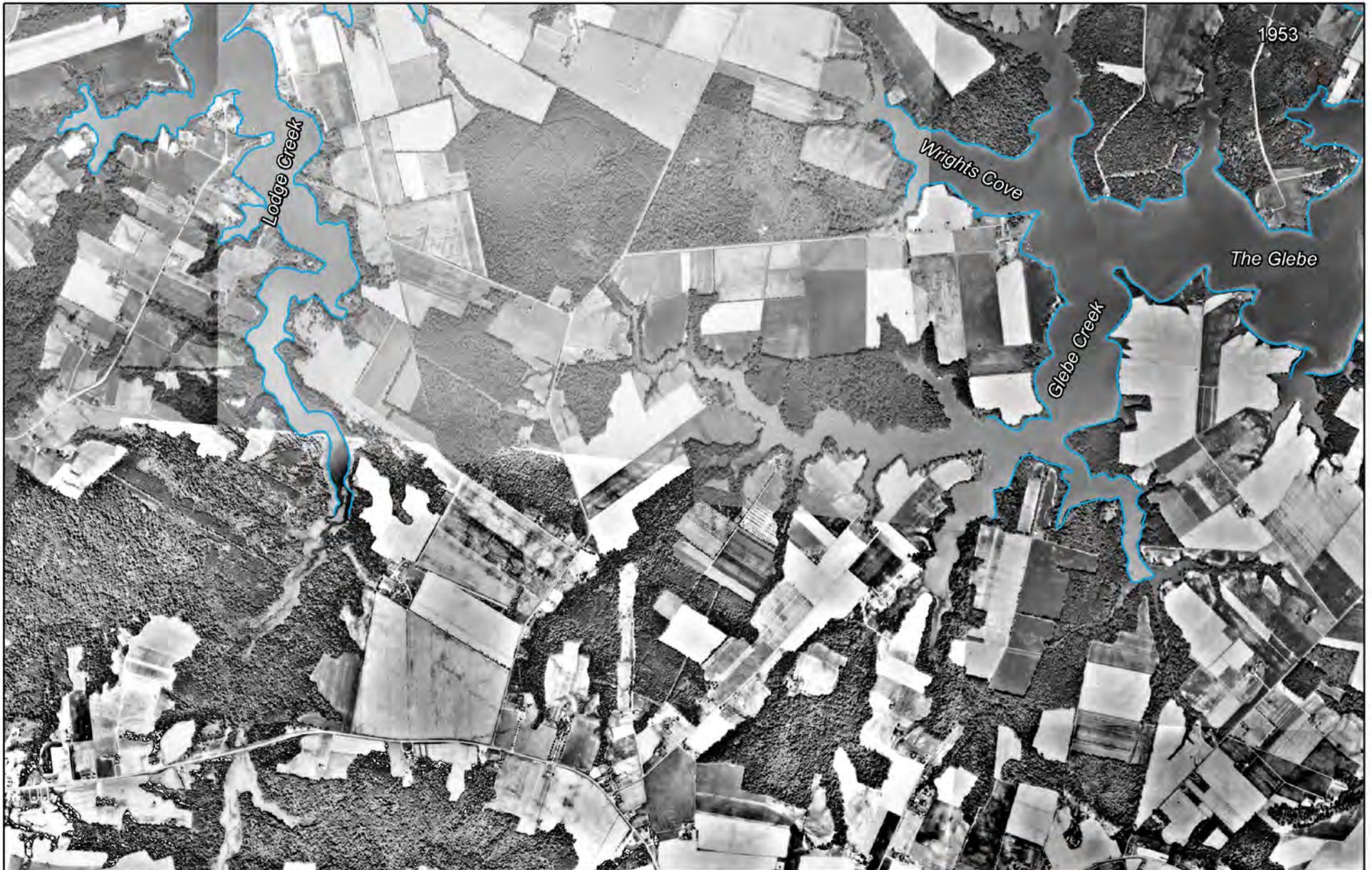
Legend
 — 1937 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 3**



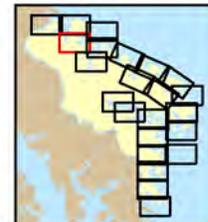


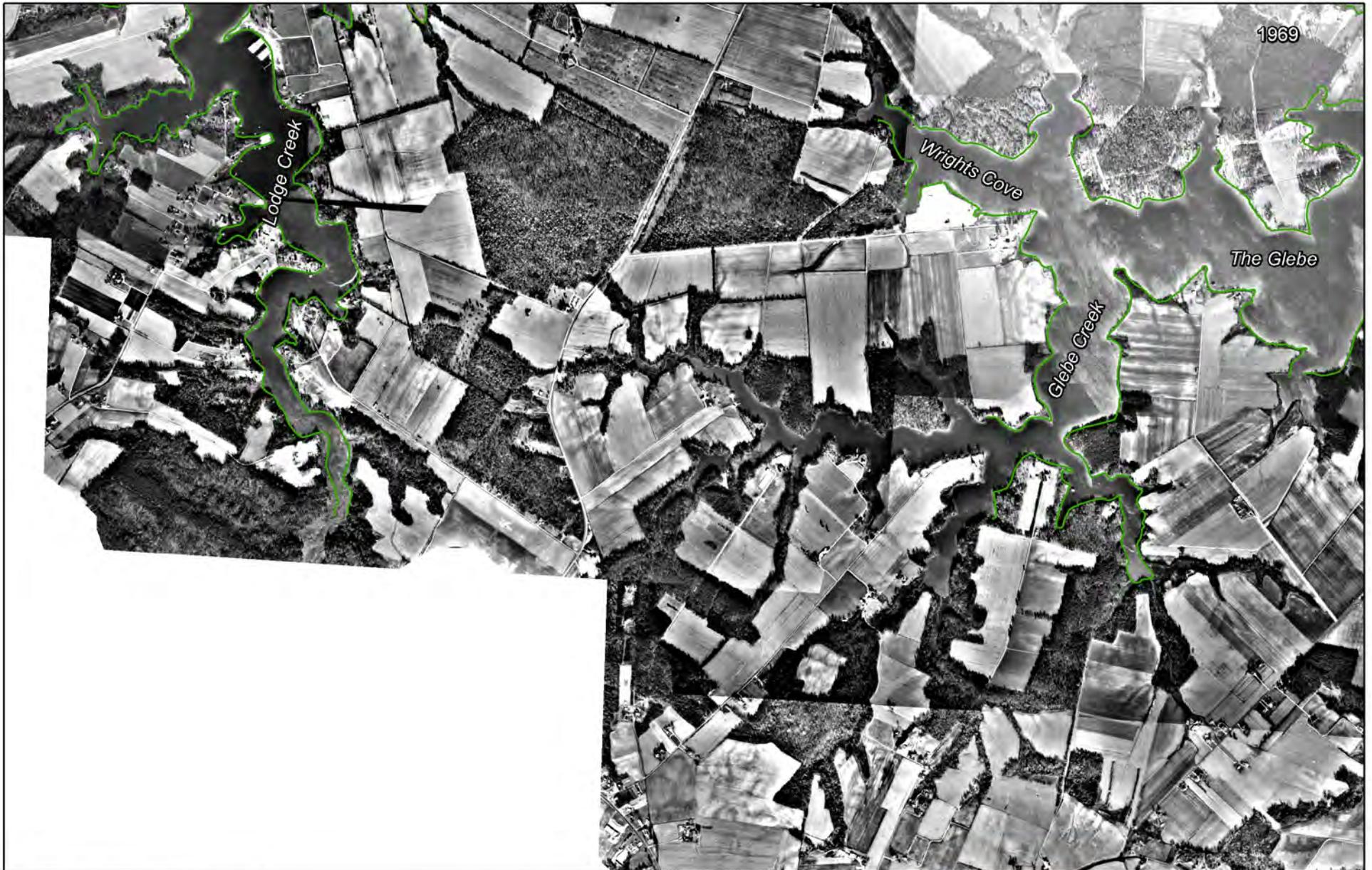
Legend
 1953 Shoreline



0 2,000 4,000
 Feet

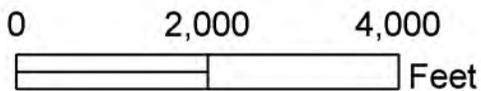
**Northumberland County, Virginia
 Plate 3**



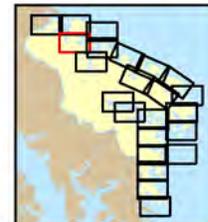


Legend

— 1969 Shoreline



**Northumberland County, Virginia
Plate 3**



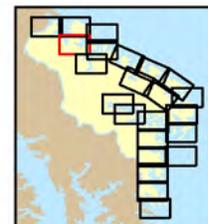


Legend
 — 1994 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 3**



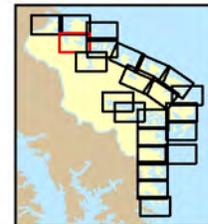


Legend
— 2002 Shoreline



0 2,000 4,000
Feet

Northumberland County, Virginia Plate 3



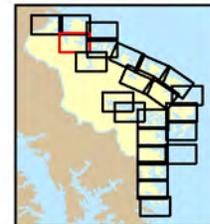


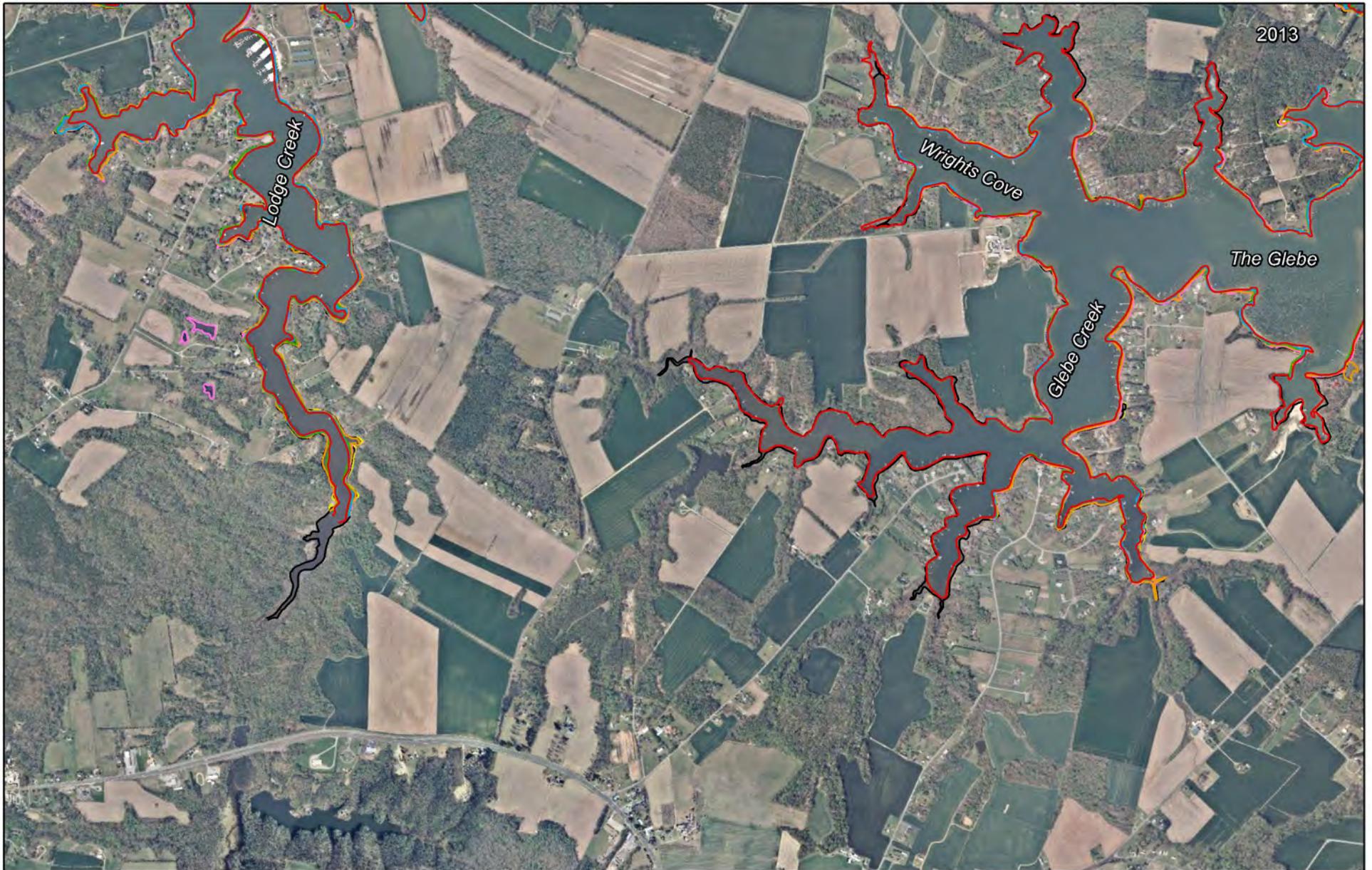
Legend
— 2009 Shoreline



0 2,000 4,000
Feet

Northumberland County, Virginia Plate 3





2013

Lodge Creek

Wrights Cove

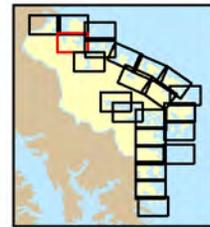
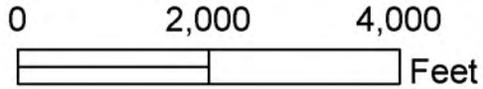
The Glebe

Glebe Creek

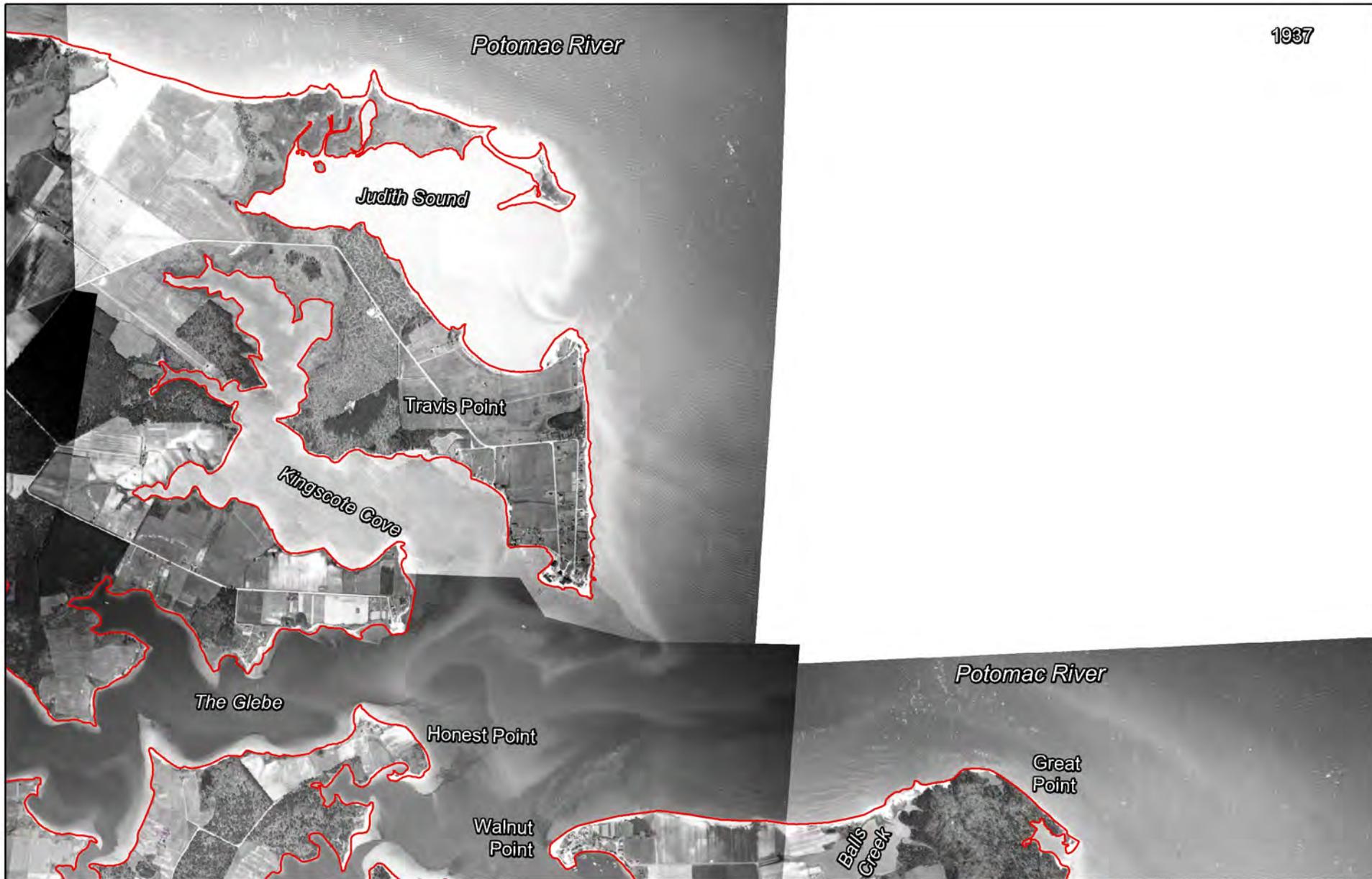
Legend

- 1937 Shoreline — 2002 Shoreline
- 1953 Shoreline — 2009 Shoreline
- 1969 Shoreline — 2013 Shoreline
- 1994 Shoreline

**Northumberland County, Virginia
Plate 3**



1937

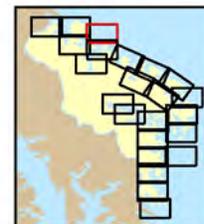


Legend
 — 1937 Shoreline

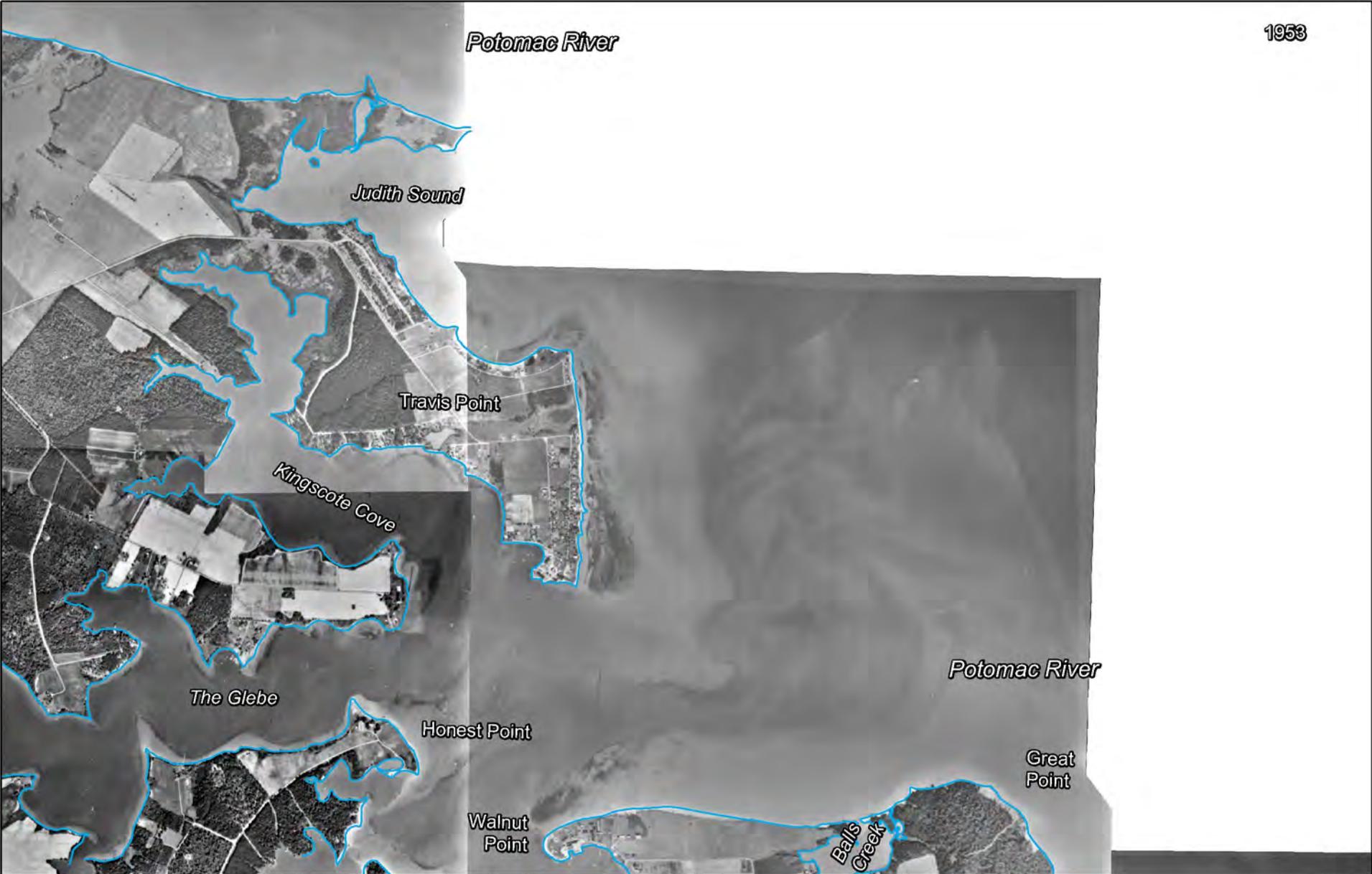


0 2,000 4,000
 Feet

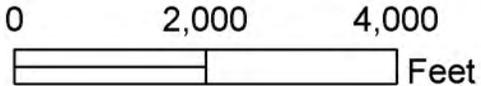
**Northumberland County, Virginia
 Plate 4**



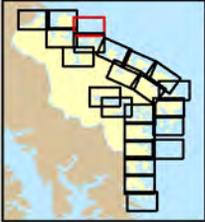
1953

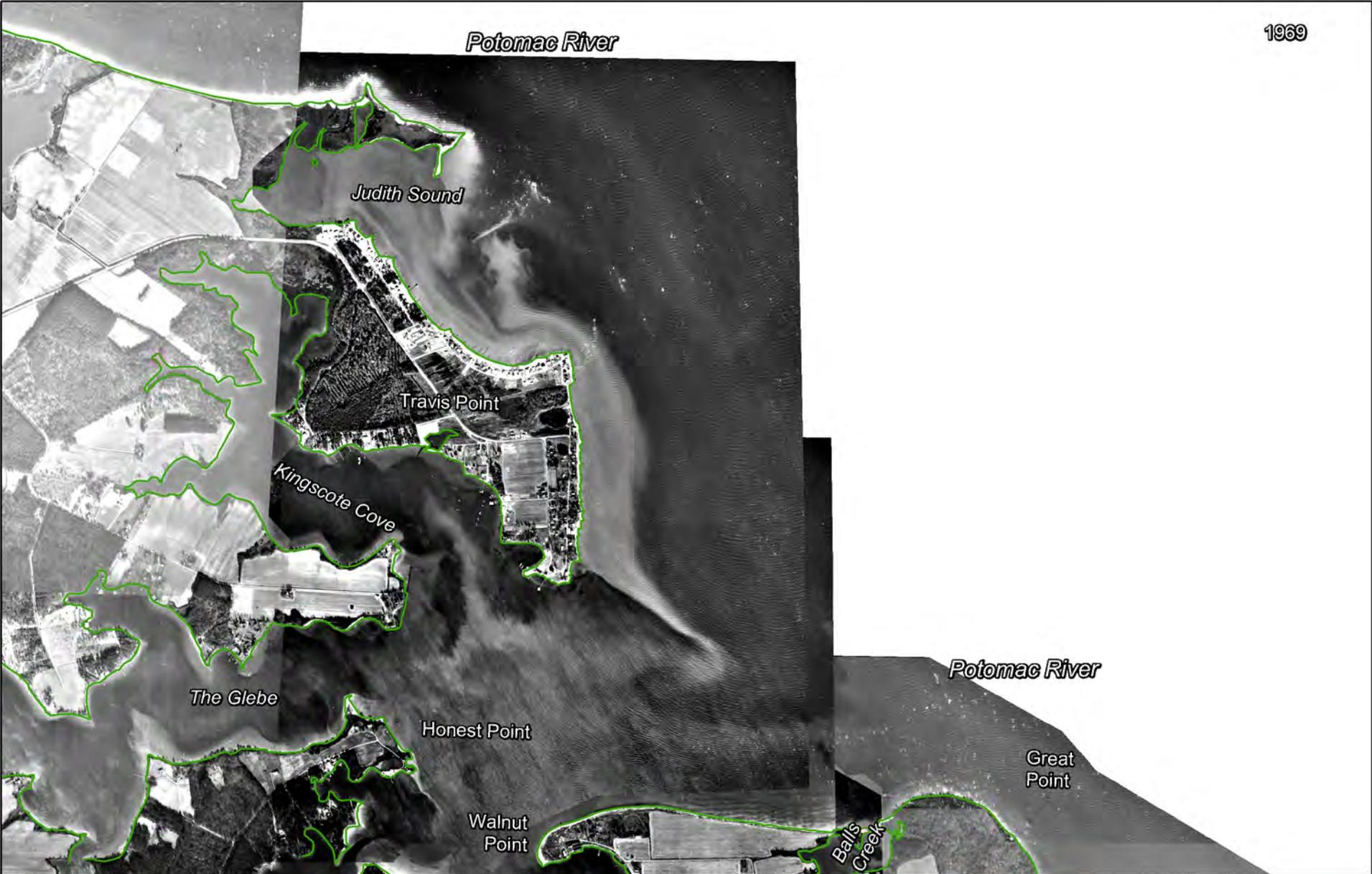


Legend
 — 1953 Shoreline

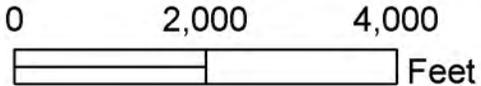


**Northumberland County, Virginia
 Plate 4**

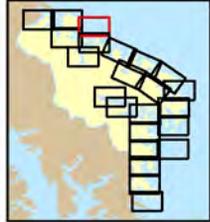




Legend
 — 1969 Shoreline



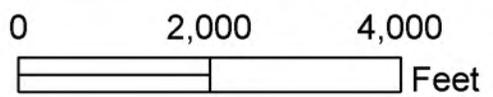
**Northumberland County, Virginia
 Plate 4**



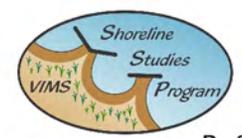
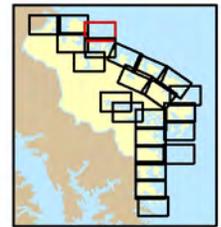
1994

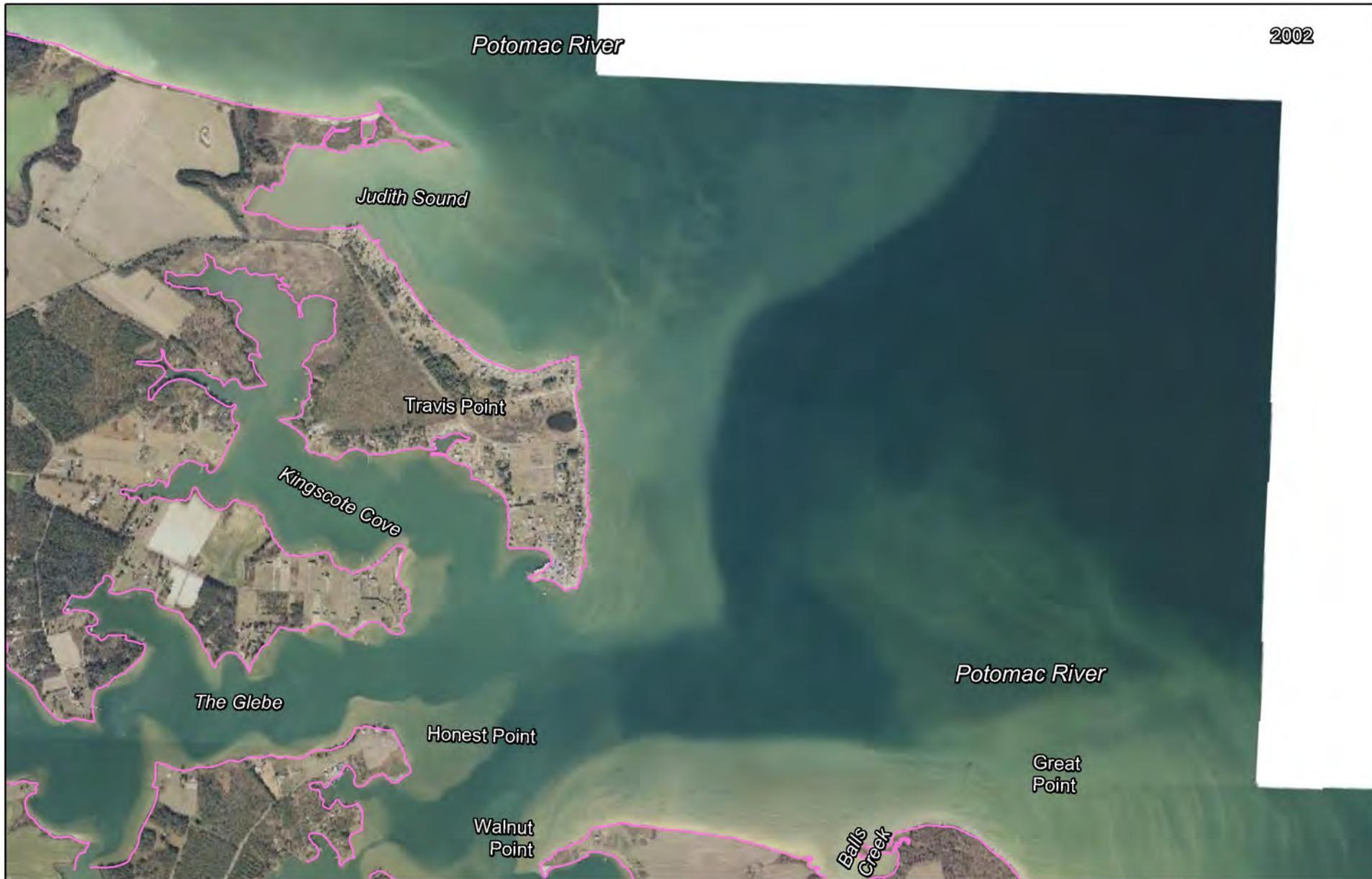


Legend
 — 1994 Shoreline

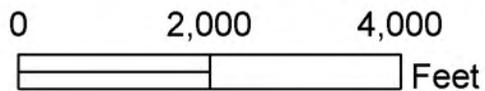


**Northumberland County, Virginia
 Plate 4**

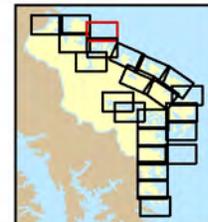


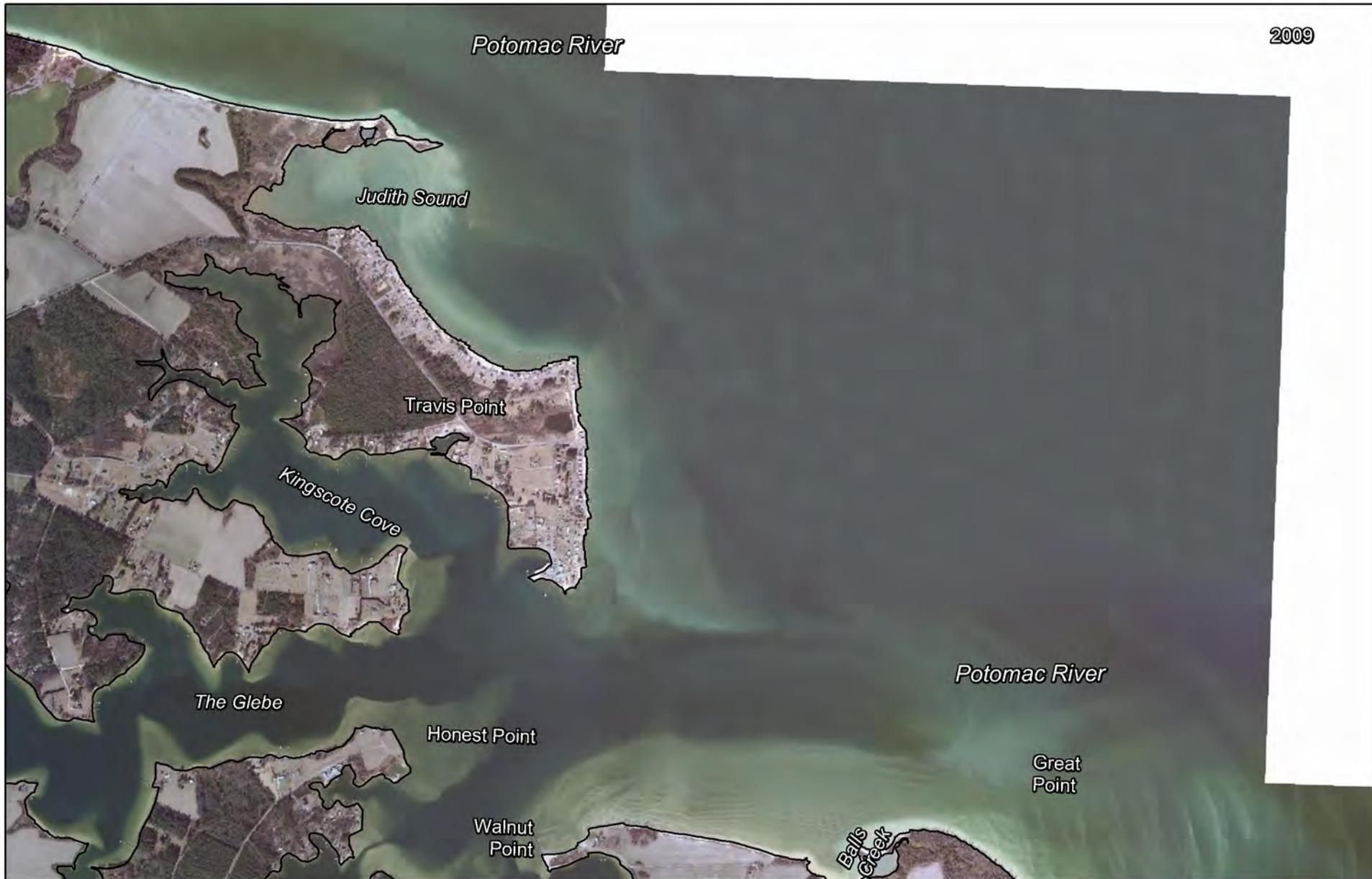


Legend
 — 2002 Shoreline



**Northumberland County, Virginia
 Plate 4**



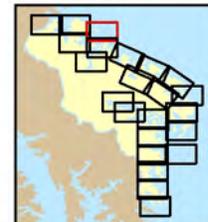


Legend
 — 2009 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 4**

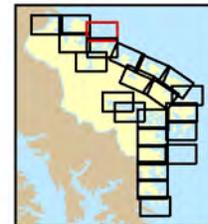
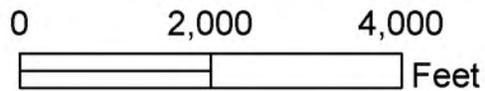


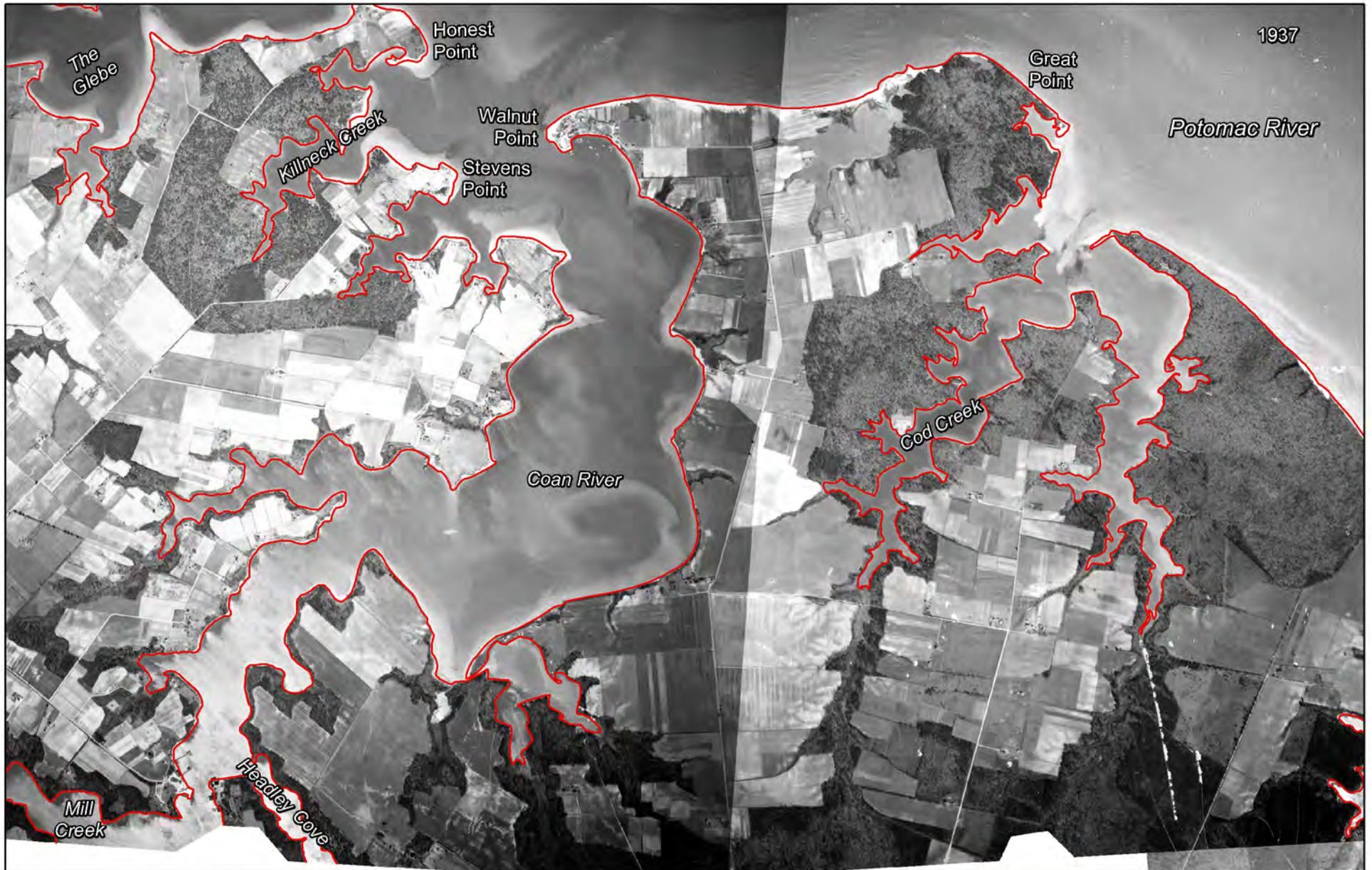


Legend

- 1937 Shoreline — 2002 Shoreline
- 1953 Shoreline — 2009 Shoreline
- 1969 Shoreline — 2013 Shoreline
- 1994 Shoreline

Northumberland County, Virginia
Plate 4



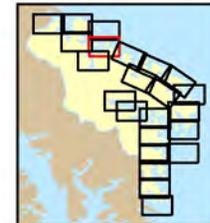


Legend
 — 1937 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 5**



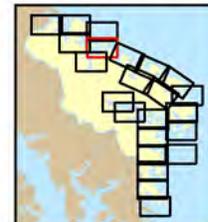


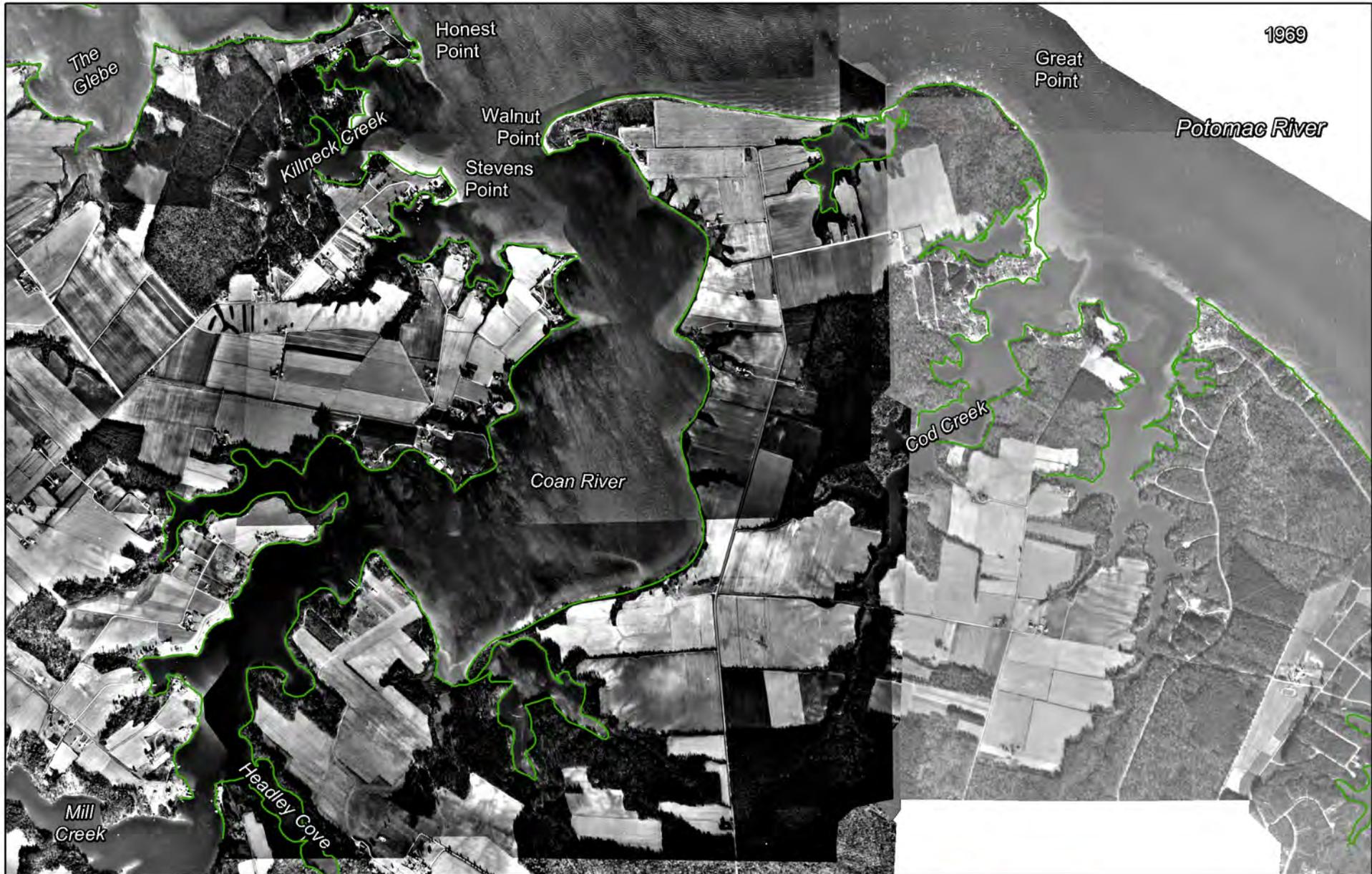
Legend
 — 1953 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 5**



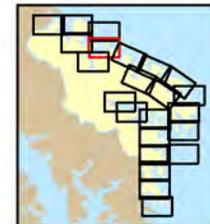


Legend
 — 1969 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 5**





1994

Potomac River

Honest Point

Great Point

The Glebe

Killneck Creek

Walnut Point

Stevens Point

Coan River

Cod Creek

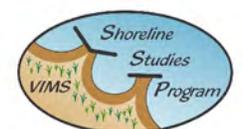
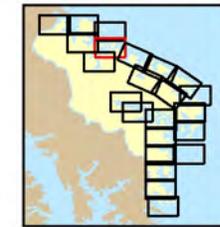
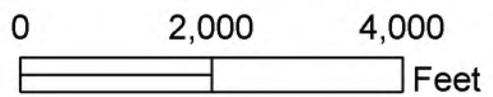
Mill Creek

Headley Cove

Legend
 1994 Shoreline



**Northumberland County, Virginia
Plate 5**



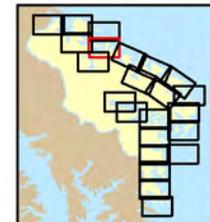


Legend
 — 2002 Shoreline



0 2,000 4,000
 Feet

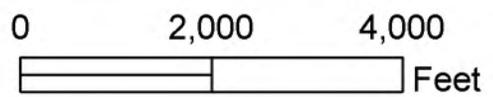
**Northumberland County, Virginia
 Plate 5**



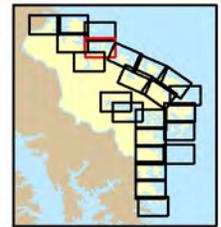
2009



Legend
 — 2009 Shoreline



**Northumberland County, Virginia
 Plate 5**



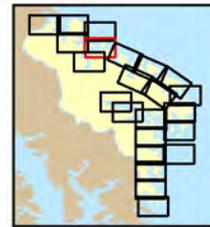
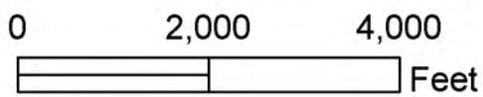
2013



Legend

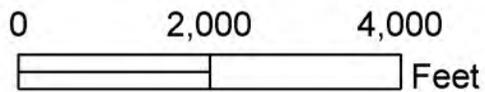
- 1937 Shoreline
- 1953 Shoreline
- 1969 Shoreline
- 1994 Shoreline
- 2002 Shoreline
- 2009 Shoreline
- 2013 Shoreline

**Northumberland County, Virginia
Plate 5**

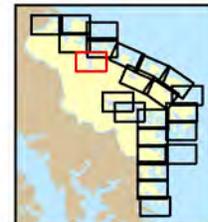


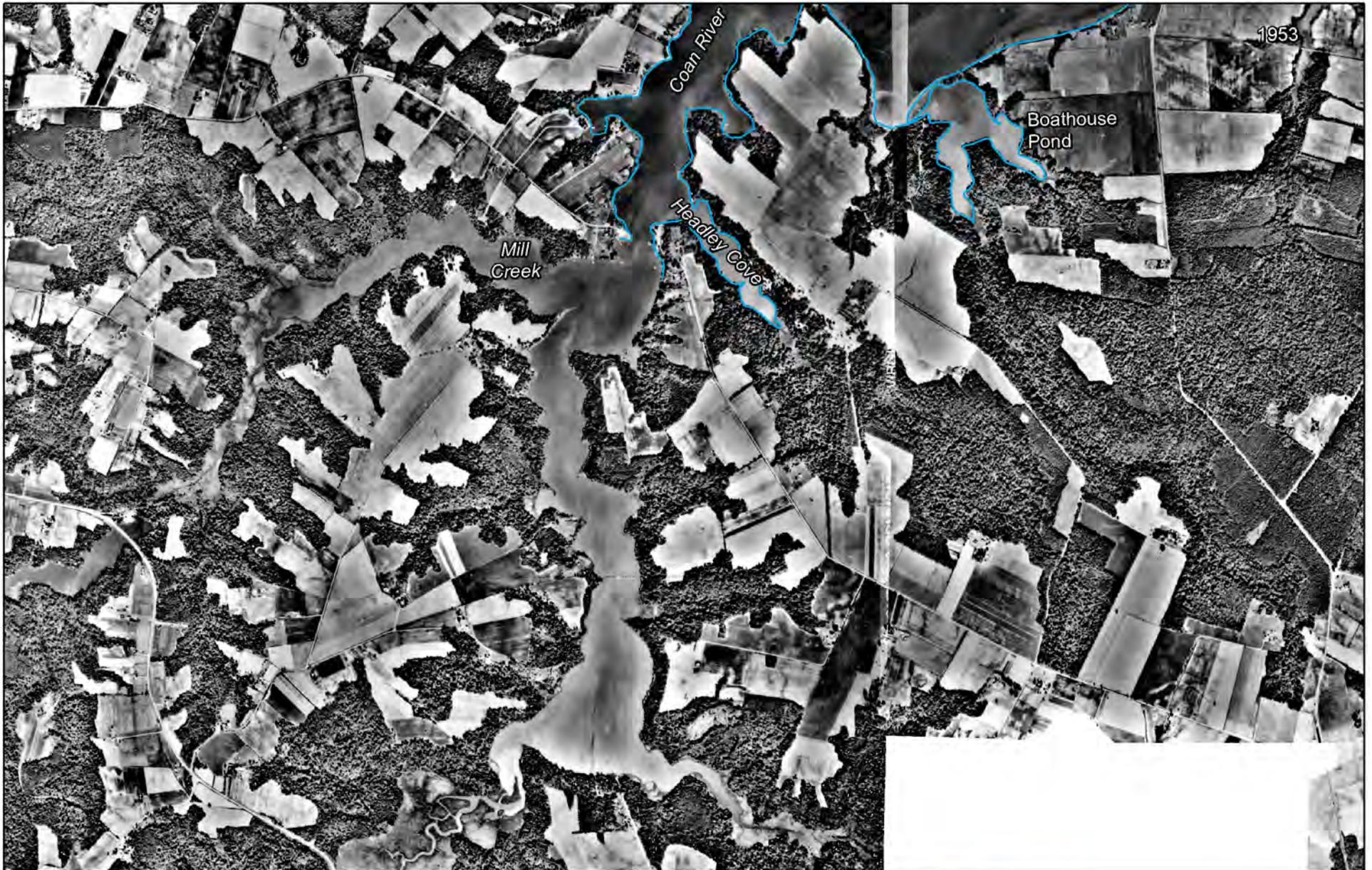


Legend
— 1937 Shoreline



Northumberland County, Virginia Plate 6



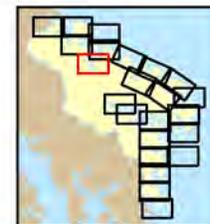


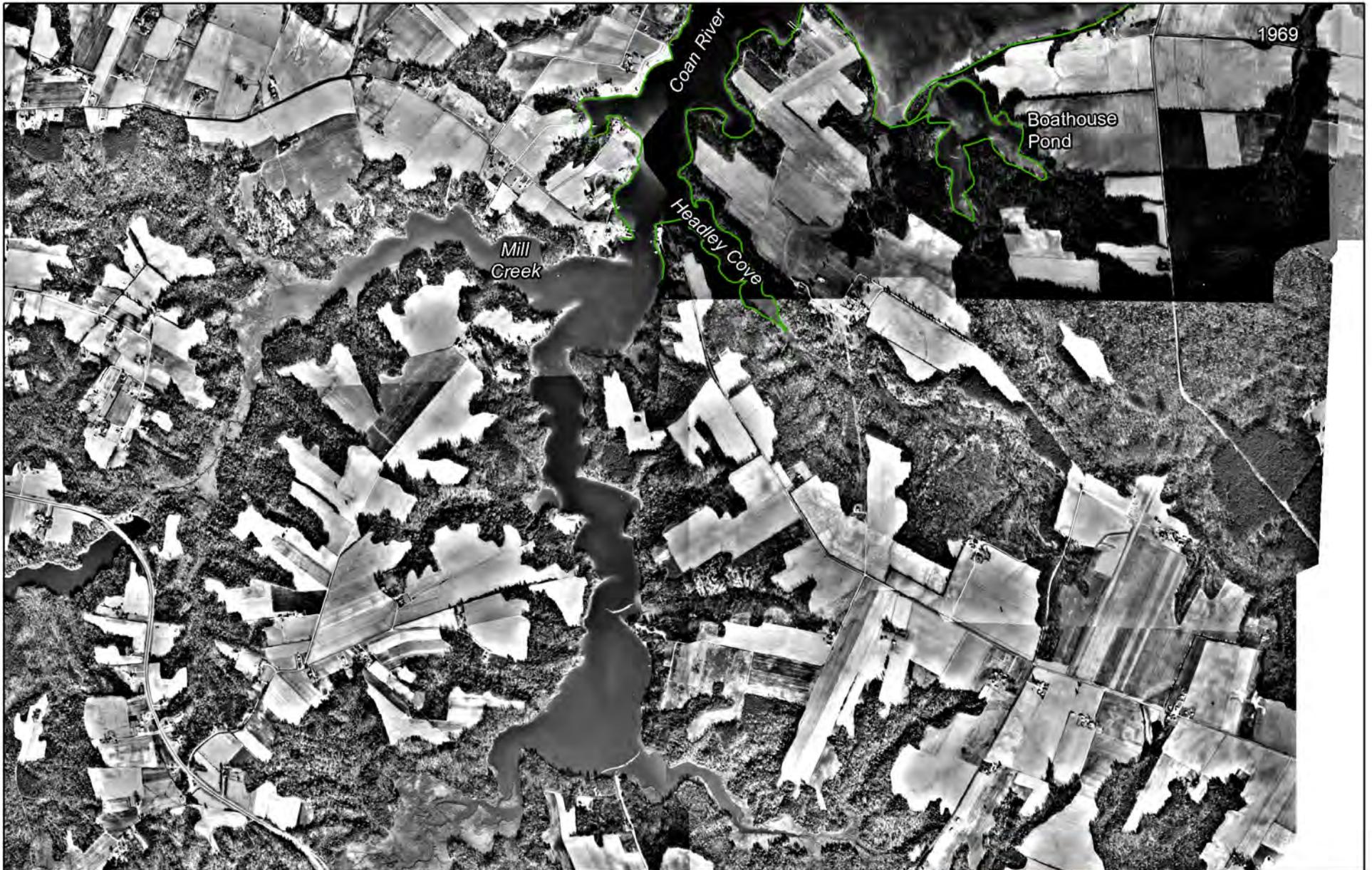
Legend
 — 1953 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 6**



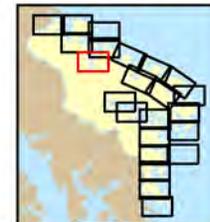


Legend
 — 1969 Shoreline



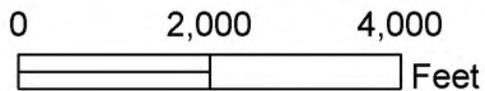
0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 6**

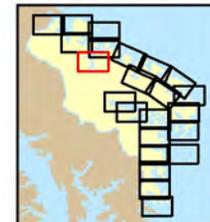




Legend
 — 1994 Shoreline

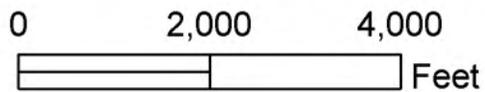


**Northumberland County, Virginia
 Plate 6**

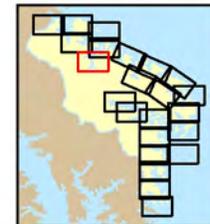




Legend
— 2002 Shoreline

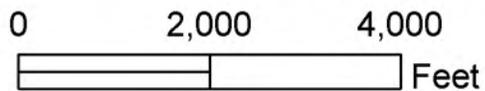


Northumberland County, Virginia Plate 6

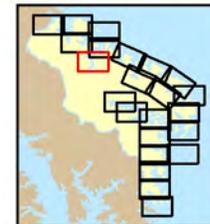


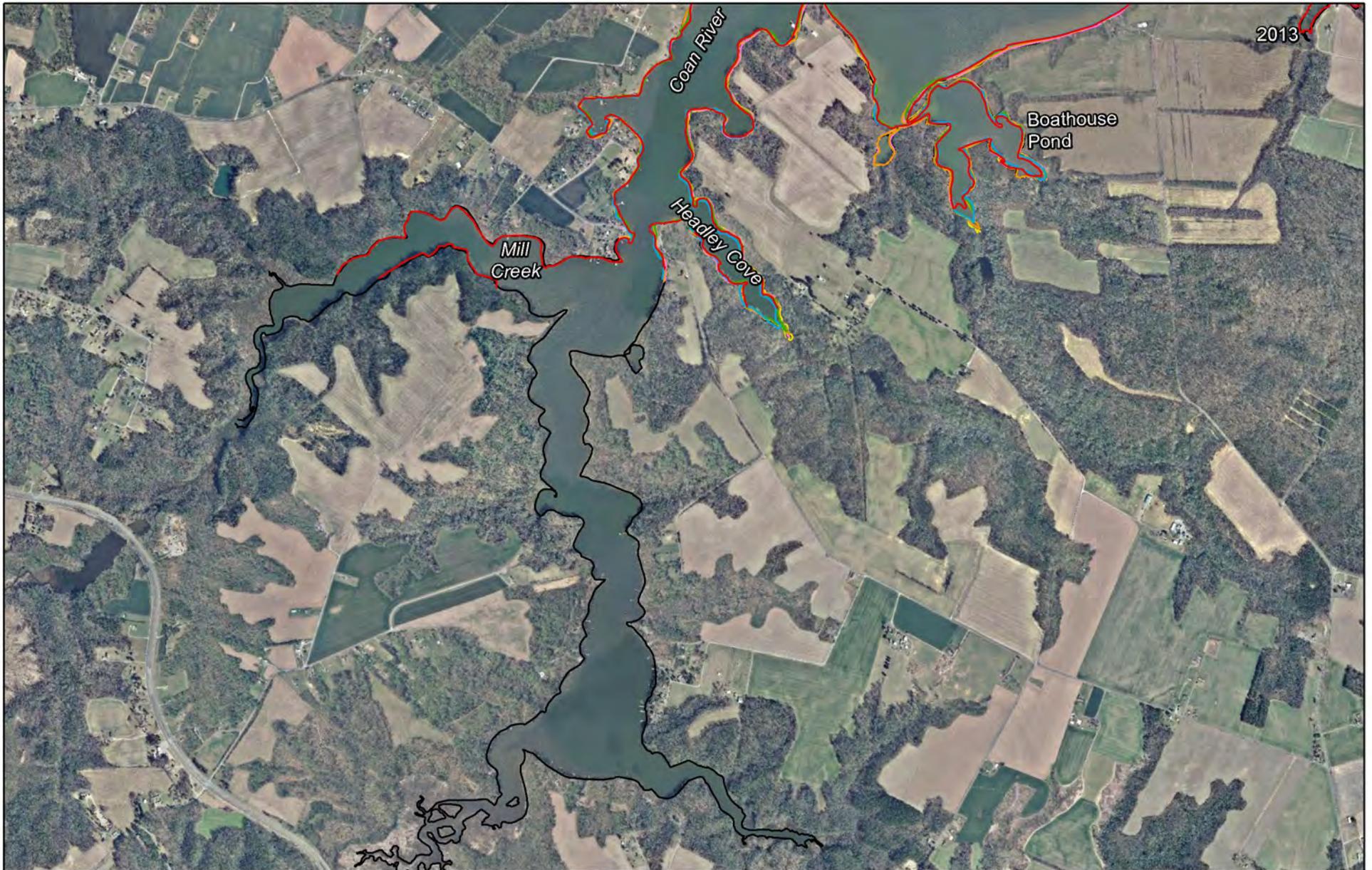


Legend
 — 2009 Shoreline



**Northumberland County, Virginia
 Plate 6**

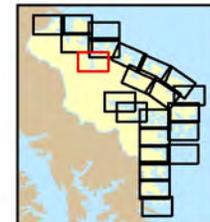
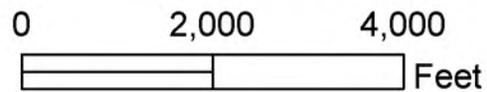




Legend

- 1937 Shoreline
- 1953 Shoreline
- 1969 Shoreline
- 1994 Shoreline
- 2002 Shoreline
- 2009 Shoreline
- 2013 Shoreline

**Northumberland County, Virginia
Plate 6**



1937

Potomac River

Cordreys Beach

Hull Neck

Corbin Pond

Presley Creek

Bridgeman Creek

Rogers Creek

Neuman Neck

Hull Creek

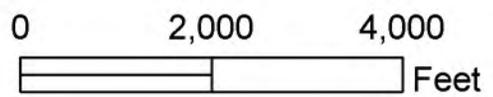
Fountain Cove

Fleets Cove

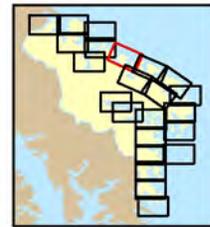
Floyds Cove

Legend

— 1937 Shoreline



**Northumberland County, Virginia
Plate 7**



1953

Potomac River

Cordreys Beach

Hull Neck

Presley Creek

Corbin Pond

Bridgeman Creek

Rogers Creek

Hull Creek

Neuman Neck

Fountain Cove

Floyds Cove

Fleets Cove

Legend
— 1953 Shoreline



0 2,000 4,000
Feet

Northumberland County, Virginia Plate 7



1969

Potomac River

Cordreys Beach

Hull Neck

Corbin Pond

Presley Creek

Rogers Creek

Bridgeman Creek

Neuman Neck

Hull Creek

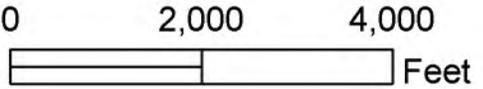
Fountain Cove

Floyds Cove

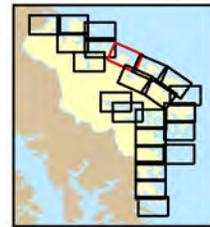
Fleets Cove

Legend

— 1969 Shoreline



**Northumberland County, Virginia
Plate 7**



1994

Potomac River

Cordreys Beach

Hull Neck

Corbin Pond

Presley Creek

Bridgeman Creek

Rogers Creek

Neuman Neck

Hull Creek

Fountain Cove

Floyds Cove

Fleets Cove

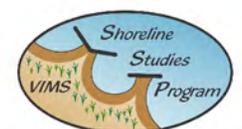
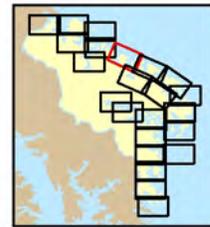
Legend

— 1994 Shoreline



0 2,000 4,000
Feet

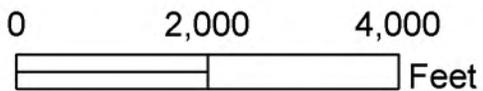
**Northumberland County, Virginia
Plate 7**



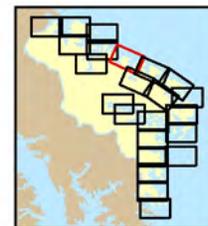
2002



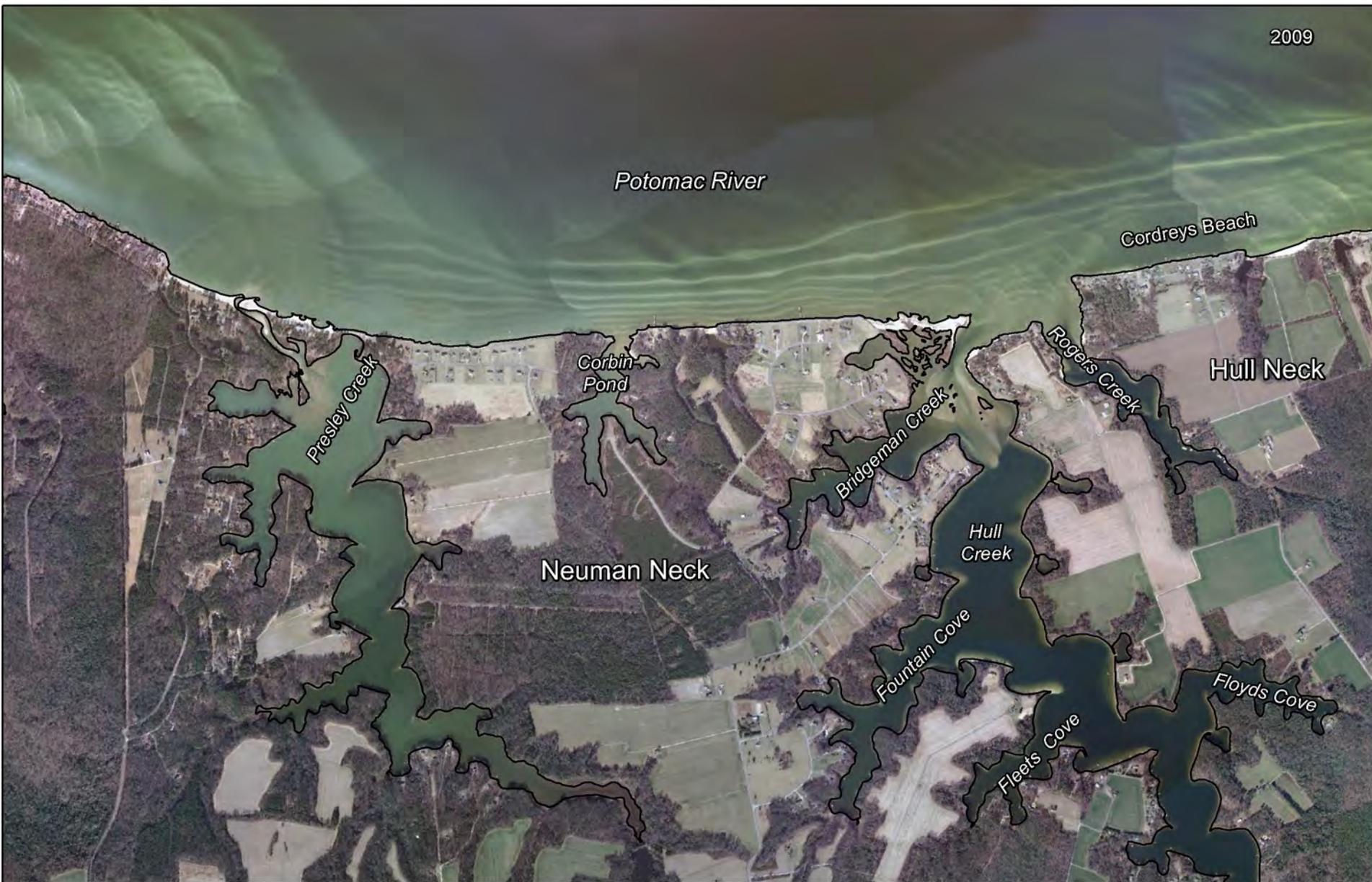
Legend
— 2002 Shoreline



Northumberland County, Virginia Plate 7



2009



Potomac River

Cordreys Beach

Hull Neck

Corbin Pond

Presley Creek

Bridgeman Creek

Rogers Creek

Neuman Neck

Hull Creek

Fountain Cove

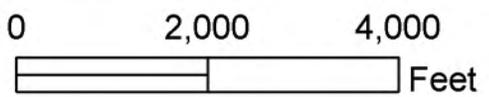
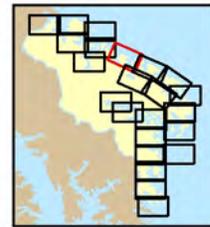
Floyds Cove

Fleets Cove

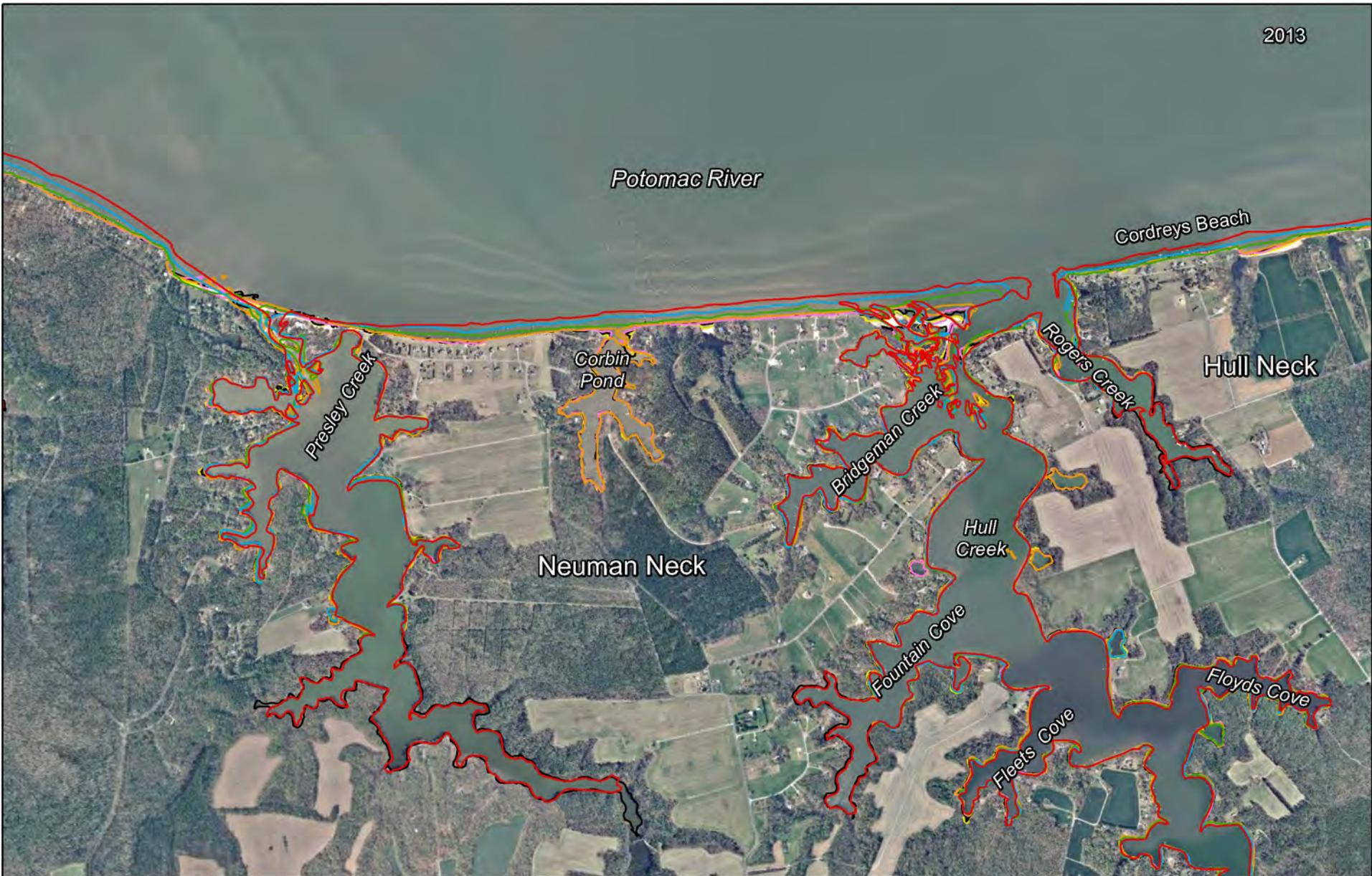
Legend
— 2009 Shoreline



Northumberland County, Virginia Plate 7



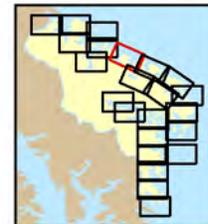
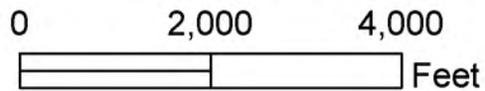
2013

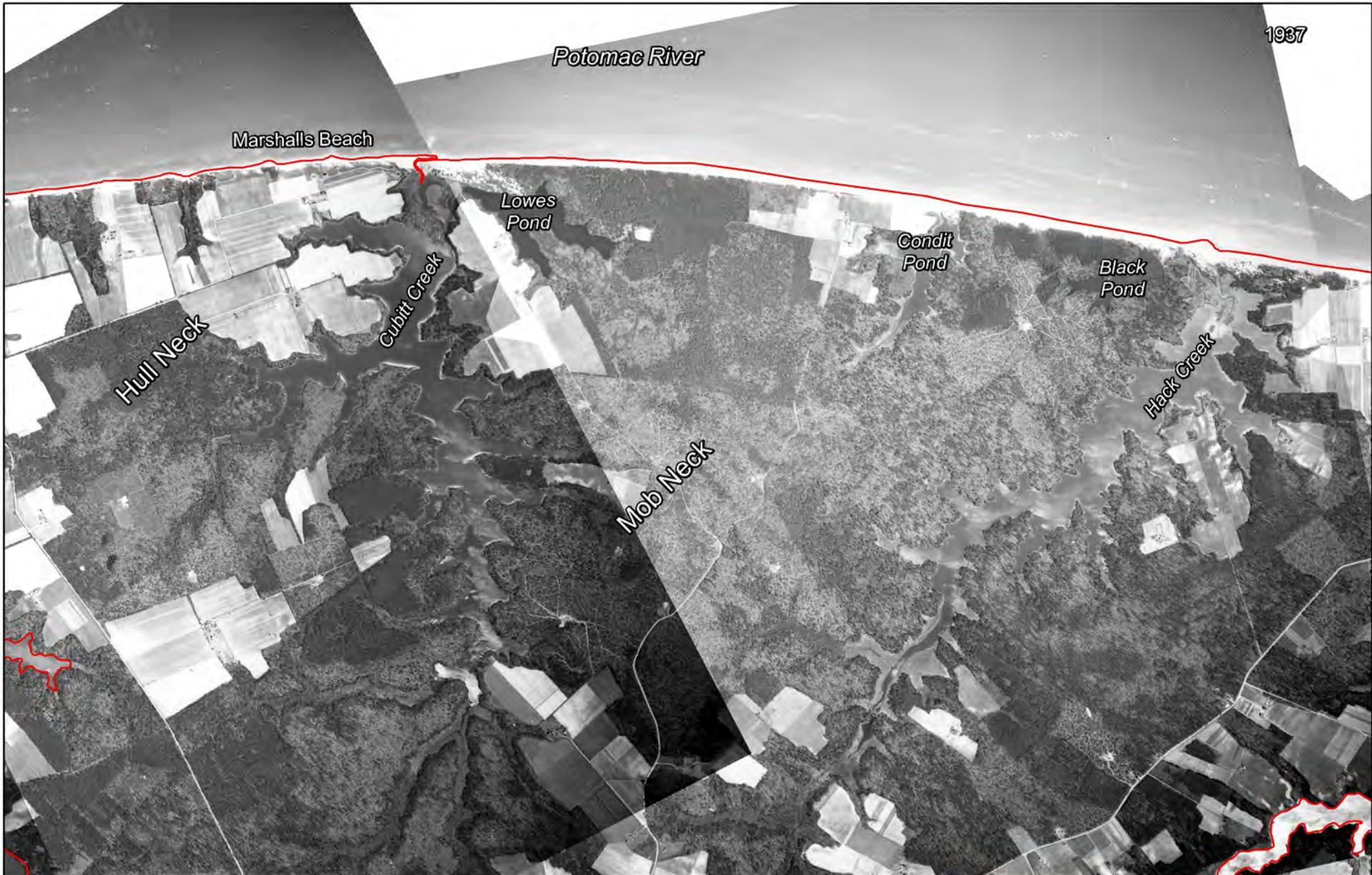


Legend

- 1937 Shoreline
- 1953 Shoreline
- 1969 Shoreline
- 1994 Shoreline
- 2002 Shoreline
- 2009 Shoreline
- 2013 Shoreline

**Northumberland County, Virginia
Plate 7**



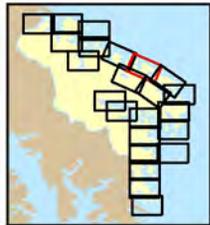


Legend
 — 1937 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 8**



1953

Potomac River

Marshalls Beach

Loves Pond

Condit Pond

Black Pond

Cubitt Creek

Hack Creek

Hull Neck

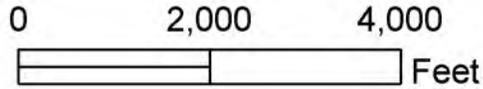
Mob Neck

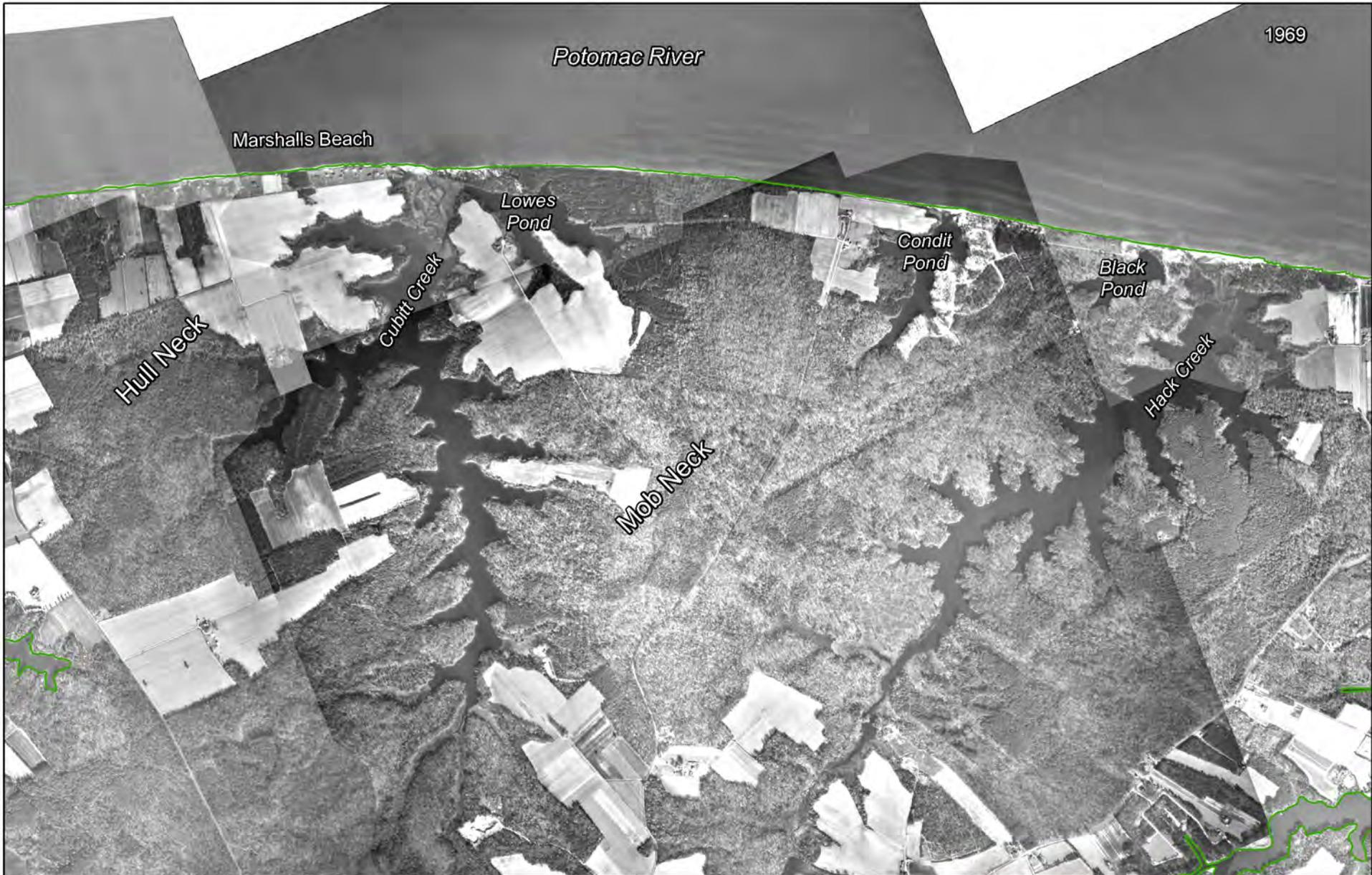


Legend
 — 1953 Shoreline



**Northumberland County, Virginia
 Plate 8**





1969

Potomac River

Marshalls Beach

Hull Neck

Cubitt Creek

Lowes Pond

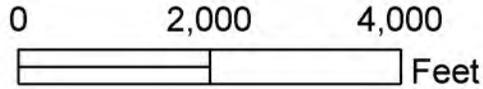
Mob Neck

Condit Pond

Black Pond

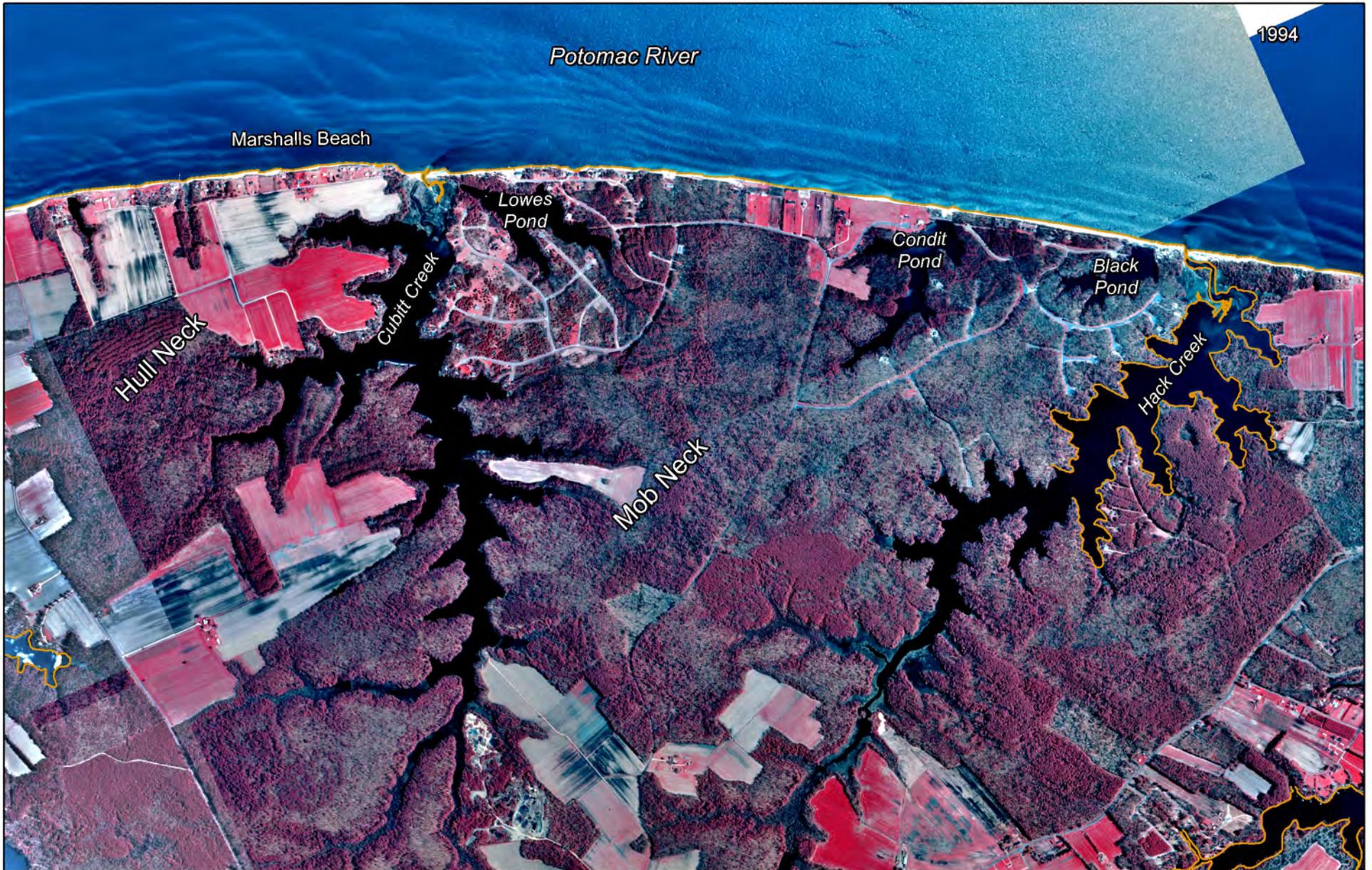
Hack Creek

Legend
 — 1969 Shoreline



**Northumberland County, Virginia
 Plate 8**



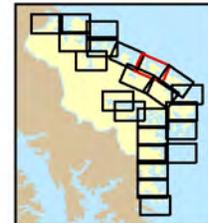


Legend
 — 1994 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 8**



2002

Potomac River

Marshalls Beach

Loves Pond

Condit Pond

Black Pond

Hull Neck

Cubitt Creek

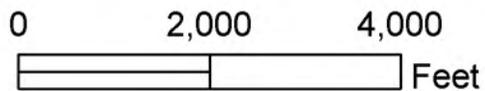
Mob Neck

Hack Creek

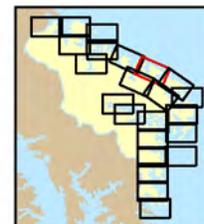


Legend

— 2002 Shoreline



**Northumberland County, Virginia
Plate 8**



2009

Potomac River

Marshalls Beach

Lowes Pond

Condit Pond

Black Pond

Hull Neck

Cubitt Creek

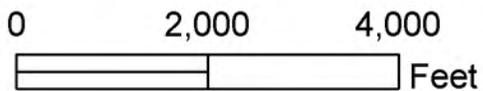
Mob Neck

Hack Creek

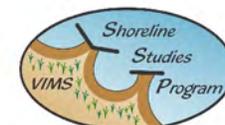
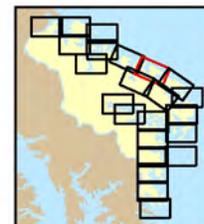


Legend

— 2009 Shoreline



**Northumberland County, Virginia
Plate 8**



Potomac River

Marshalls Beach

Lowes Pond

Condit Pond

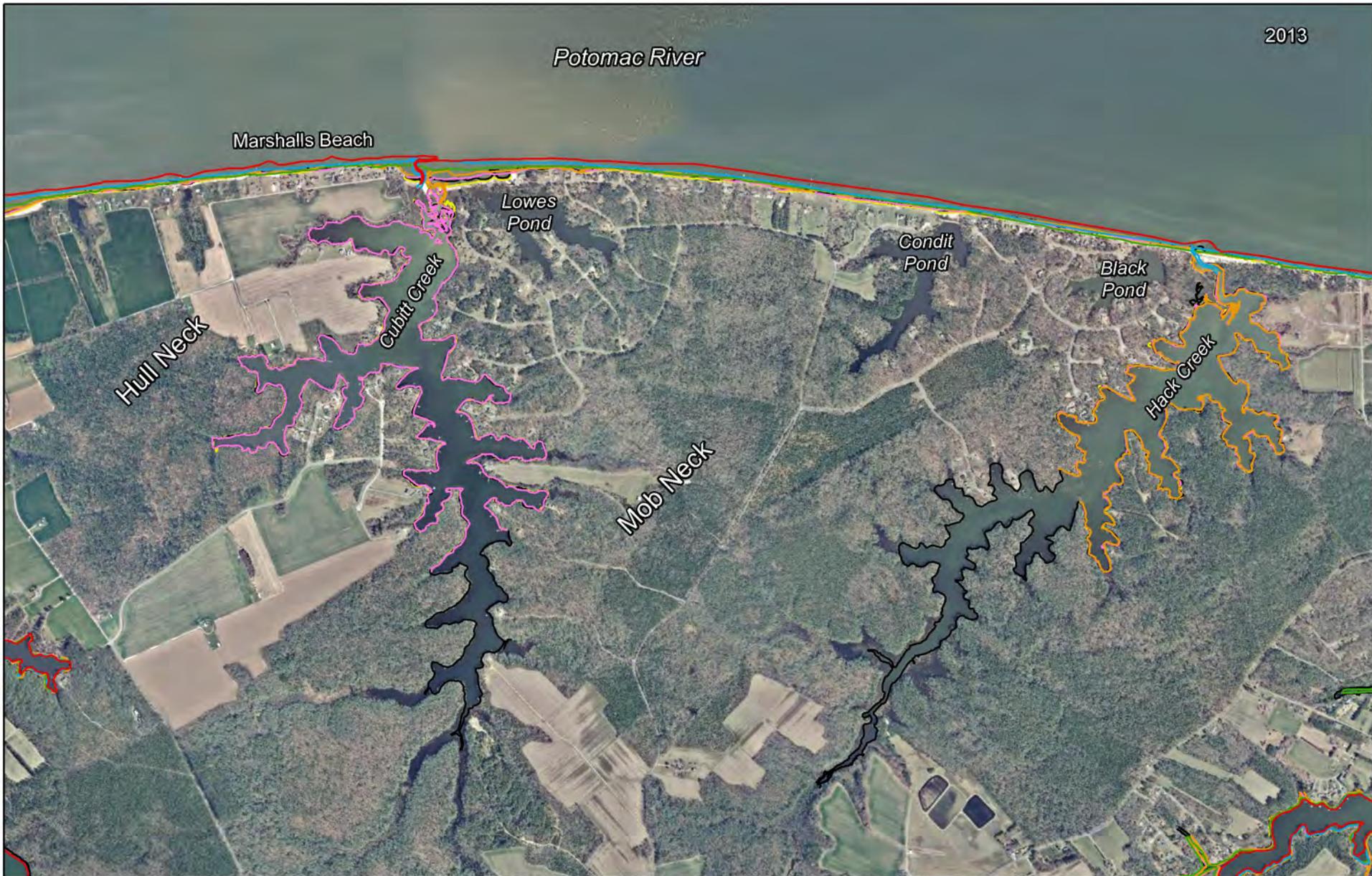
Black Pond

Hull Neck

Cubitt Creek

Mob Neck

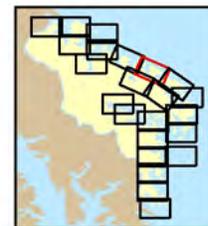
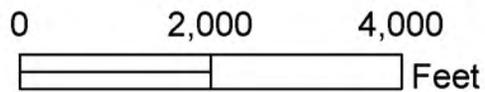
Hack Creek

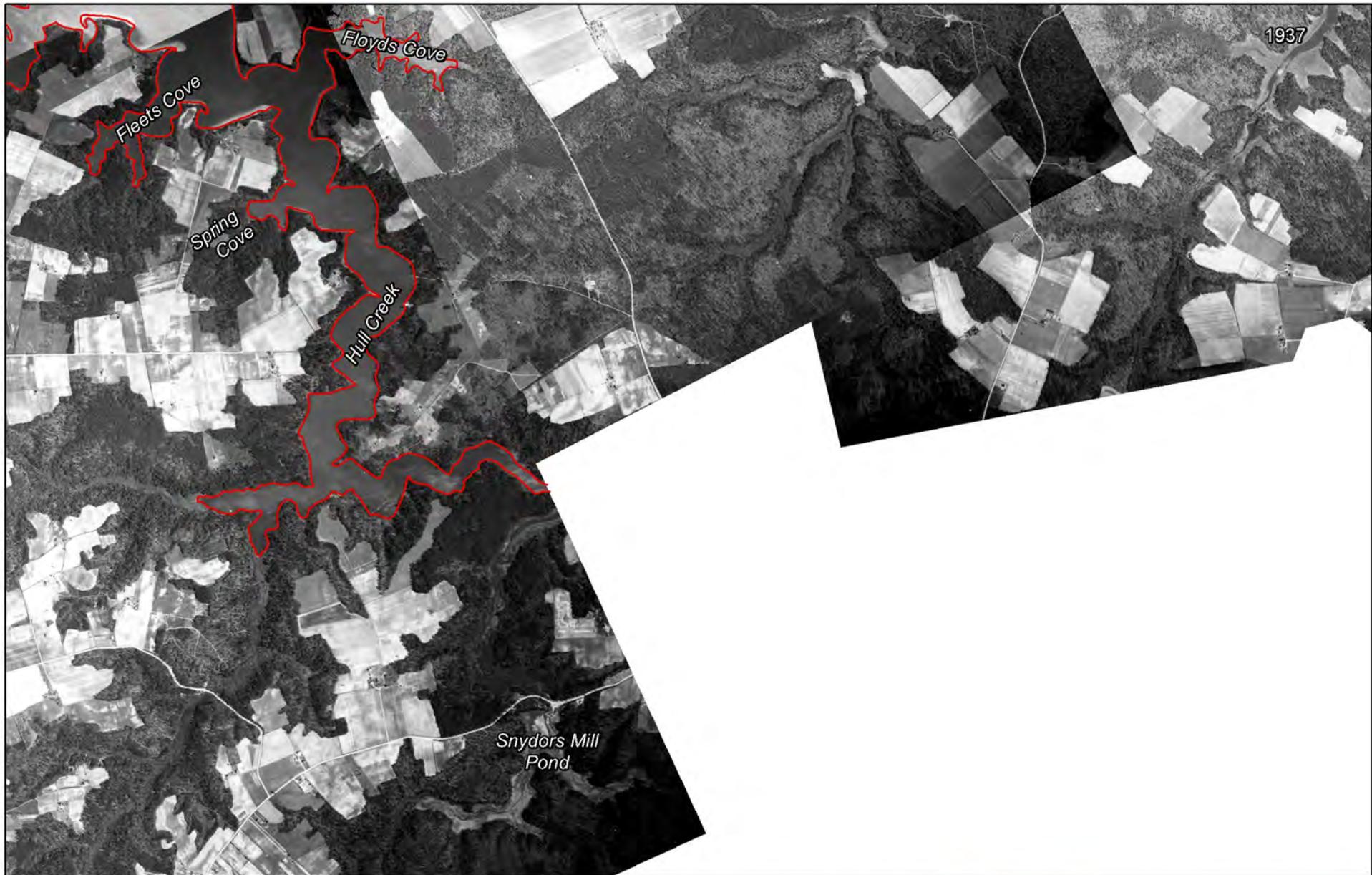


Legend

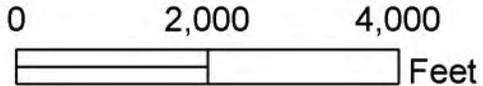
- 1937 Shoreline
- 1953 Shoreline
- 1969 Shoreline
- 1994 Shoreline
- 2002 Shoreline
- 2009 Shoreline
- 2013 Shoreline

**Northumberland County, Virginia
Plate 8**

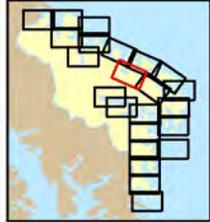


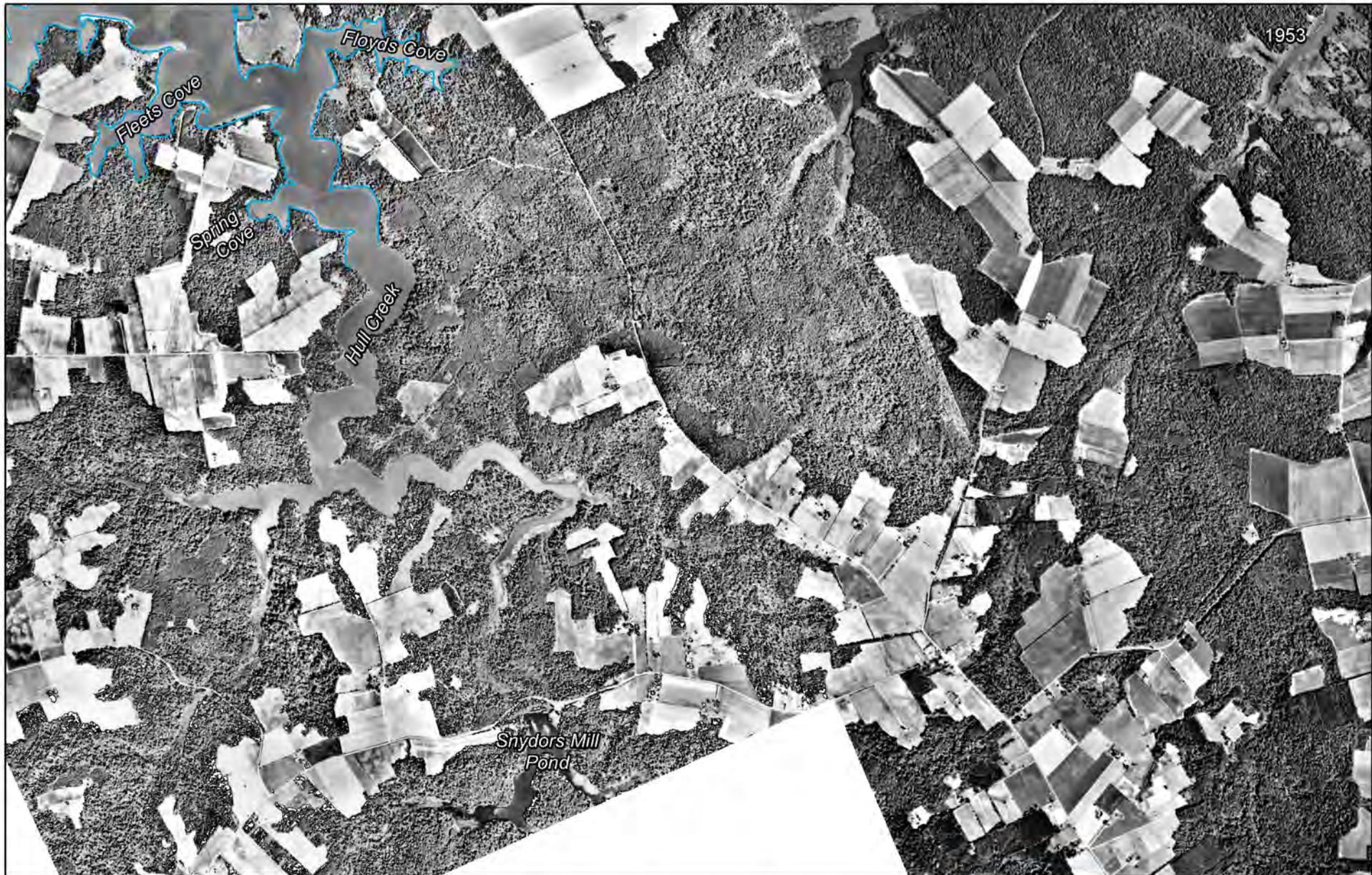


Legend
 — 1937 Shoreline



**Northumberland County, Virginia
 Plate 9**



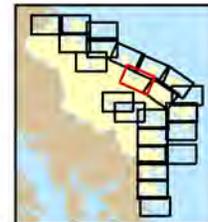


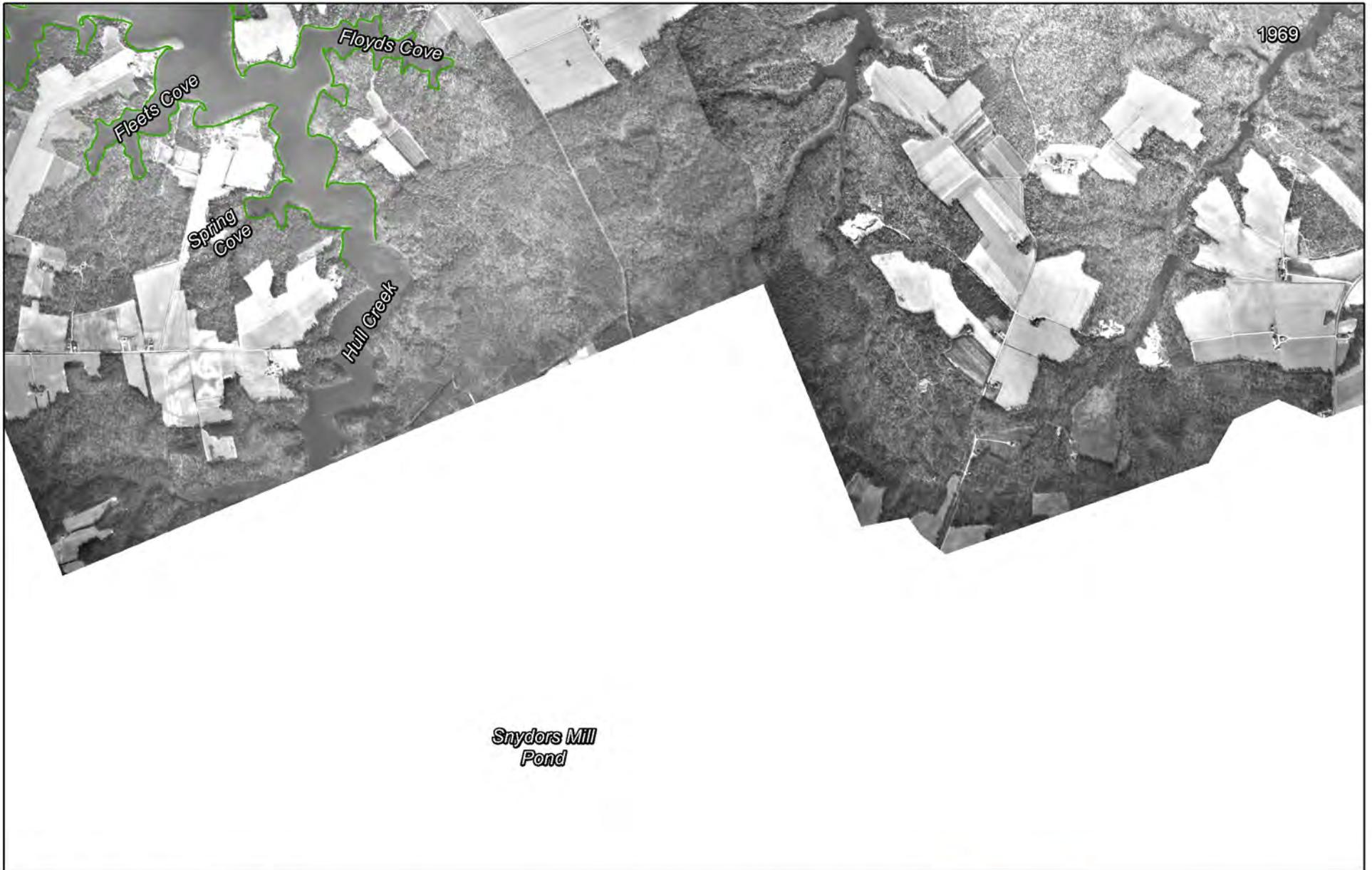
Legend
— 1953 Shoreline



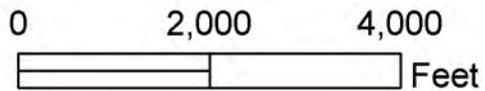
0 2,000 4,000
[] [] [] Feet

Northumberland County, Virginia Plate 9

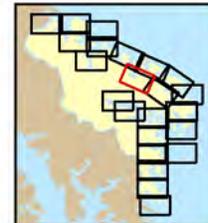




Legend
 — 1969 Shoreline



**Northumberland County, Virginia
 Plate 9**



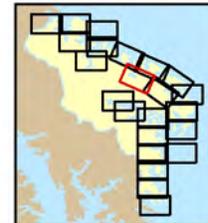


Legend
 — 1994 Shoreline



0 2,000 4,000
 Feet

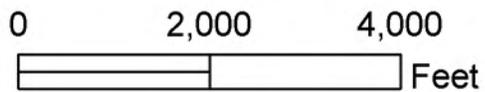
**Northumberland County, Virginia
 Plate 9**



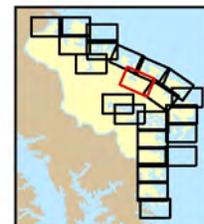
2002

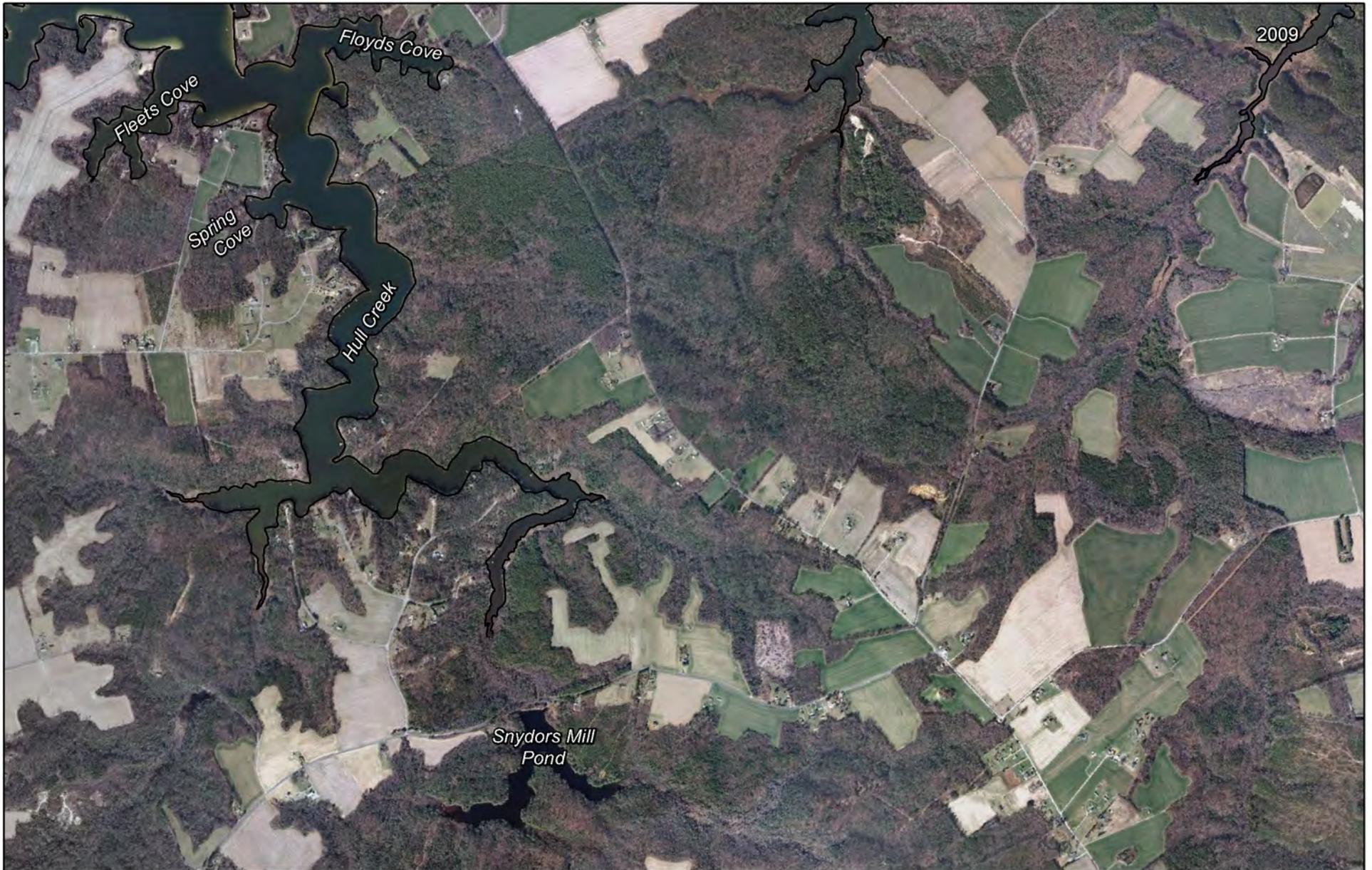


Legend



**Northumberland County, Virginia
Plate 9**



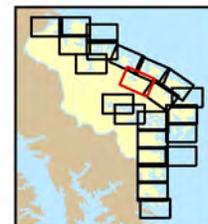


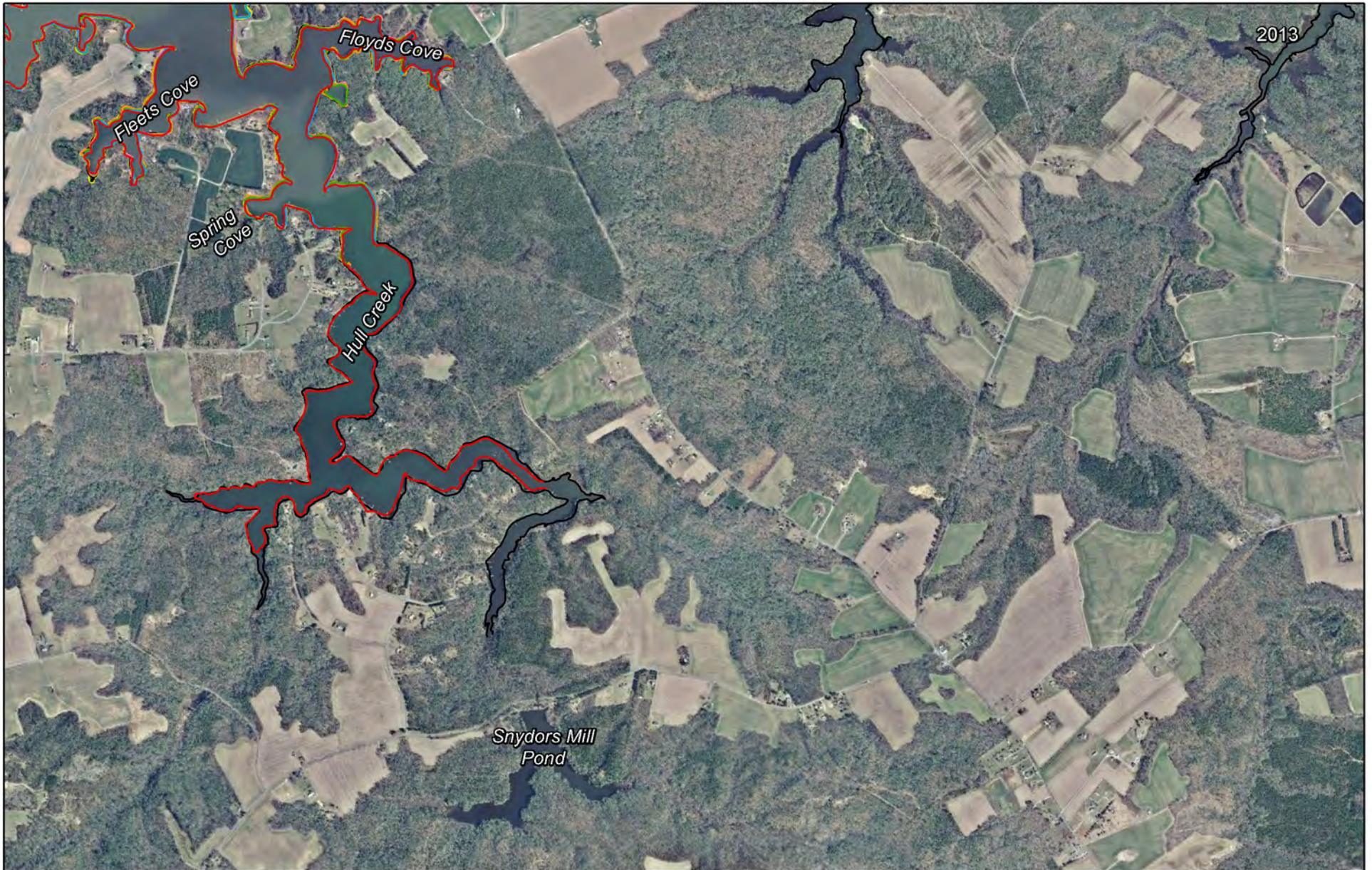
Legend
 — 2009 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 9**



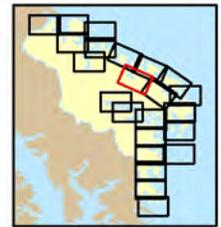
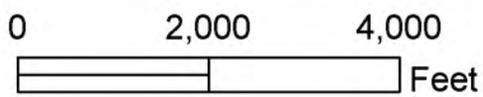


2013

Legend

- 1937 Shoreline
- 1953 Shoreline
- 1969 Shoreline
- 1994 Shoreline
- 2002 Shoreline
- 2009 Shoreline
- 2013 Shoreline

**Northumberland County, Virginia
Plate 9**



1937

Potomac River

Flag Pond

Hack Neck

Ellyson Creek

Bridgemans Back Creek

Sawmill Cove

Spring Cove

Spences Creek

Little Wicomico River

King Point

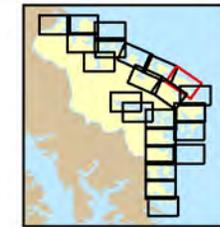
Little Wicomico River

Legend
— 1937 Shoreline



0 2,000 4,000
[Scale bar] Feet

Northumberland County, Virginia Plate 10



1953

Potomac River

Flag Pond

Hack Neck

Ellyson Creek

Bridgemans Back Creek

Sawmill Cove

Spring Cove

King Point

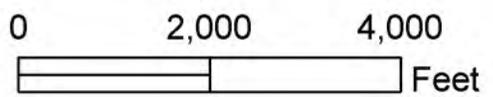
Little Wicomico River

Spences Creek

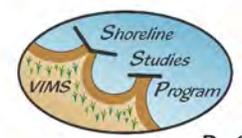
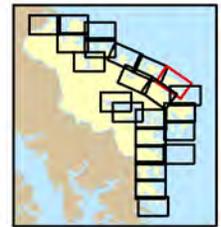
Little Wicomico River

Legend

— 1953 Shoreline



**Northumberland County, Virginia
Plate 10**



1969

Potomac River

Flag Pond

Hack Neck

Ellyson Creek

Bridgemans Back Creek

Sawmill Cove

Spring Cove

King Point

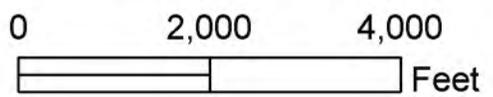
Little Wicomico River

Spences Creek

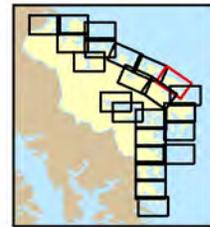
Little Wicomico River

Legend

— 1969 Shoreline

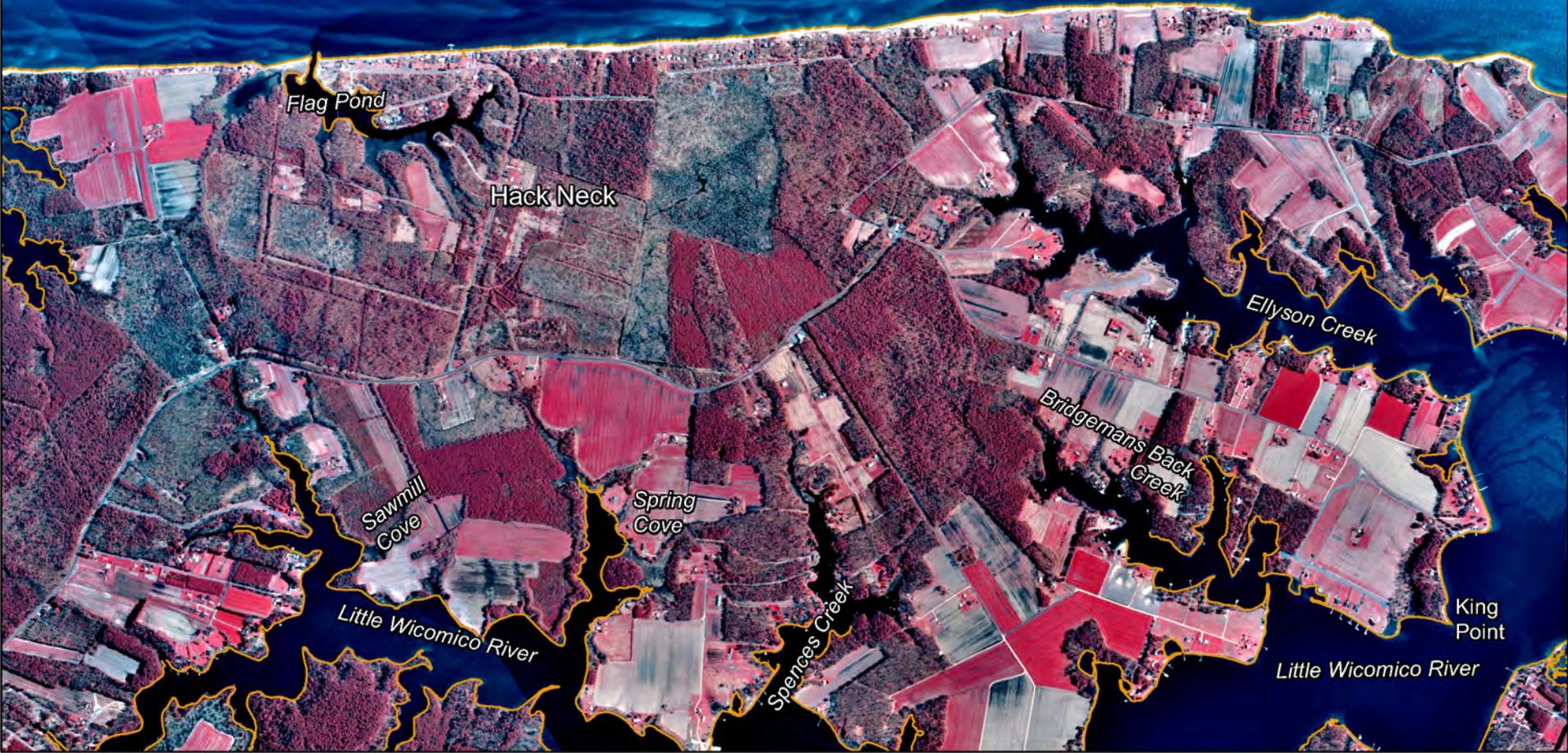


**Northumberland County, Virginia
Plate 10**



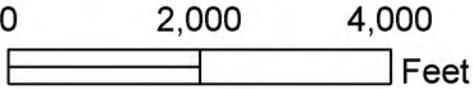
1994

Potomac River

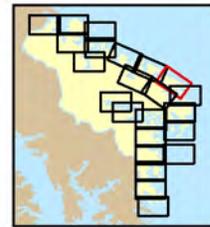


Legend

— 1994 Shoreline



**Northumberland County, Virginia
Plate 10**



2002

Potomac River

Flag Pond

Hack Neck

Ellyson Creek

Bridgemans Back
Creek

Sawmill
Cove

Spring
Cove

Little Wicomico River

Spences Creek

King
Point

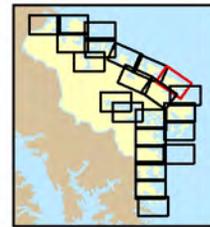
Little Wicomico River

Legend
— 2002 Shoreline



0 2,000 4,000
[Scale bar] Feet

Northumberland County, Virginia Plate 10



Potomac River

Flag Pond

Hack Neck

Ellyson Creek

Bridgemans Back
Creek

Sawmill
Cove

Spring
Cove

Spences Creek

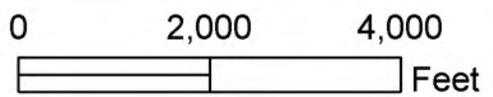
King
Point

Little Wicomico River

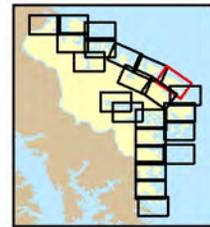
Little Wicomico River

Legend

— 2009 Shoreline



**Northumberland County, Virginia
Plate 10**



Potomac River

Flag Pond

Hack Neck

Ellyson Creek

Bridgemans Back
Creek

Sawmill
Cove

Spring
Cove

Spences
Creek

Little
Wicomico
River

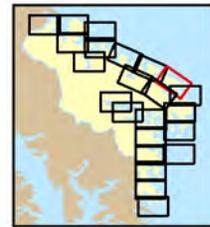
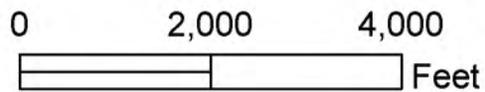
King
Point

Little
Wicomico
River

Legend

- 1937 Shoreline
- 1953 Shoreline
- 1969 Shoreline
- 1994 Shoreline
- 2002 Shoreline
- 2009 Shoreline
- 2013 Shoreline

**Northumberland County, Virginia
Plate 10**



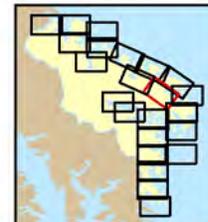


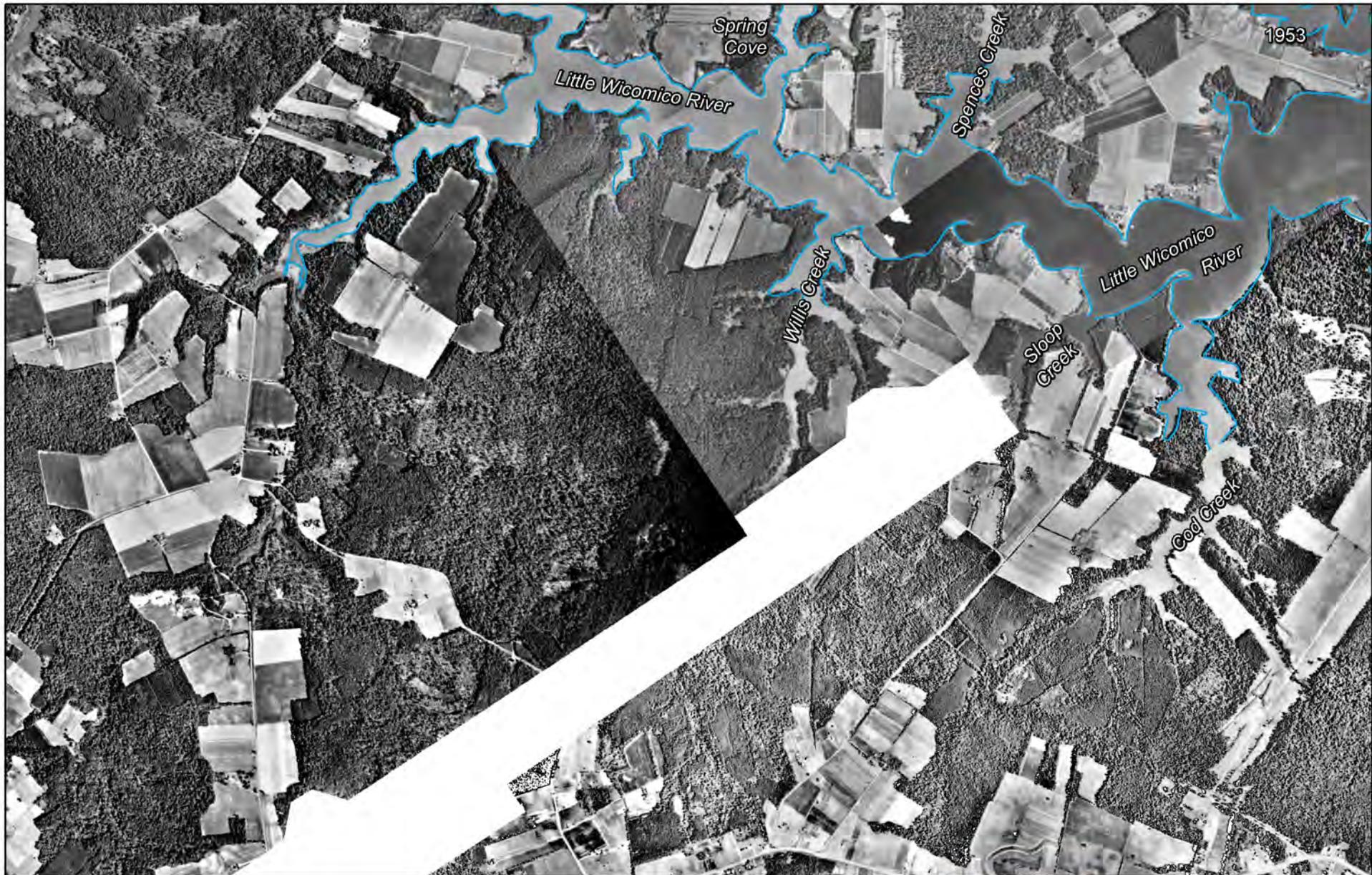
Legend
 — 1937 Shoreline



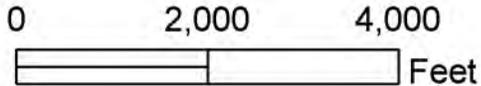
0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 11**



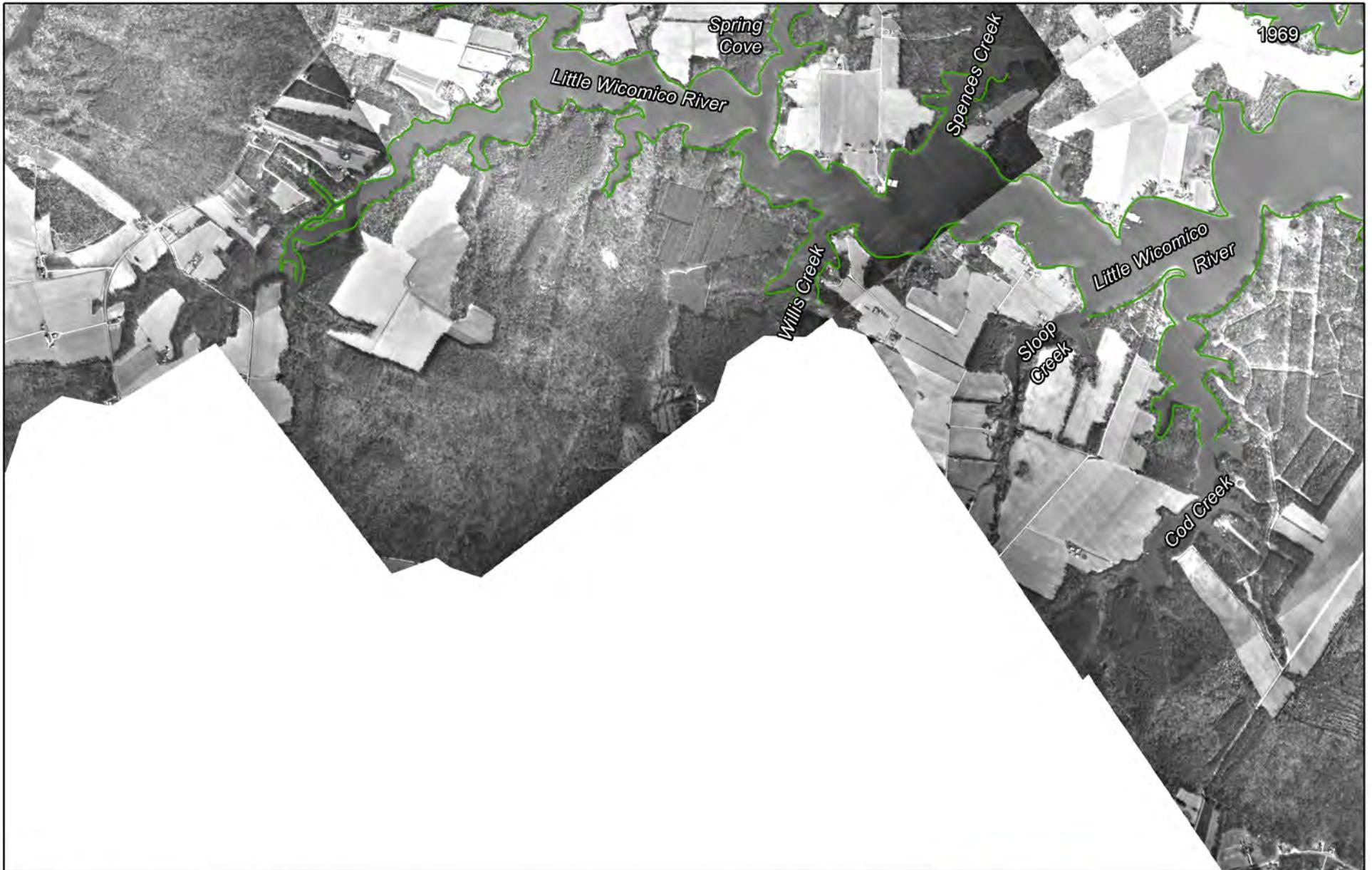


Legend
 — 1953 Shoreline



**Northumberland County, Virginia
 Plate 11**



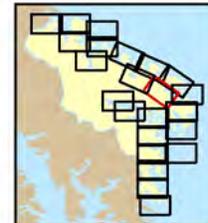


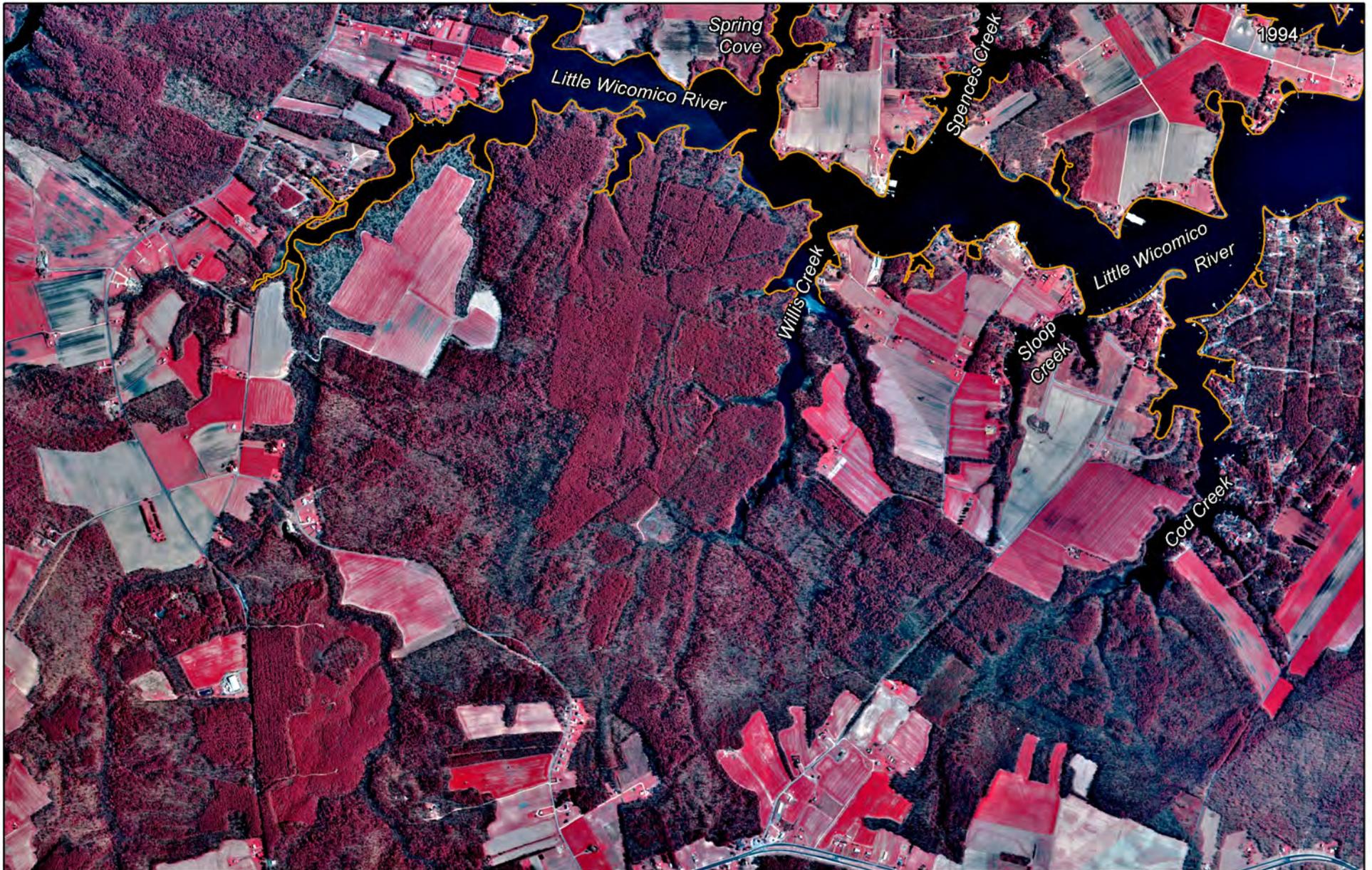
Legend
 1969 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 11**



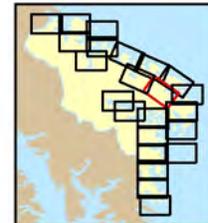


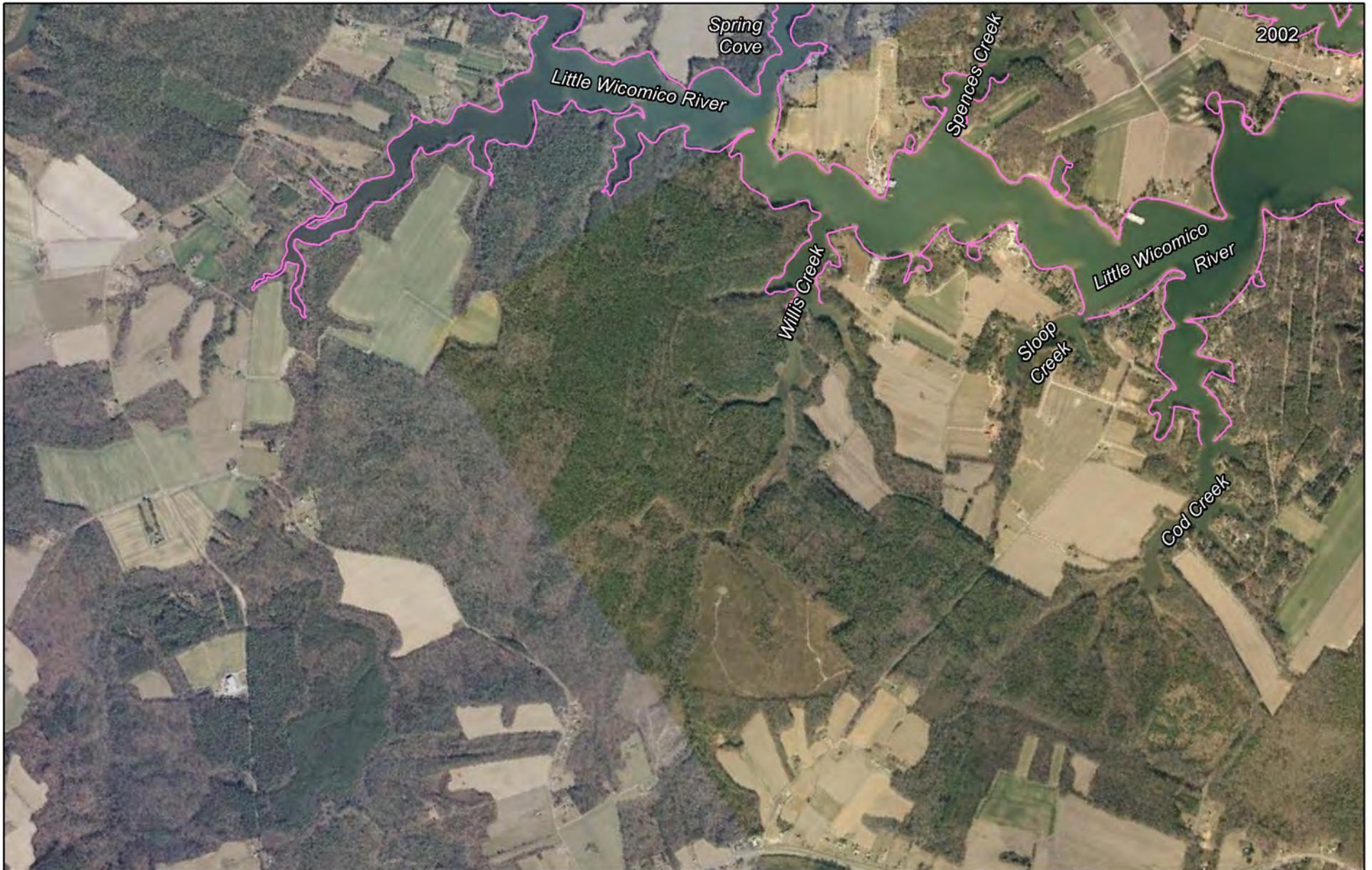
Legend
 — 1994 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 11**



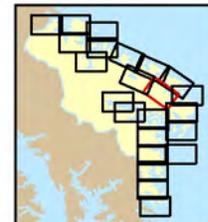


Legend
— 2002 Shoreline



0 2,000 4,000
[Scale bar] Feet

Northumberland County, Virginia Plate 11





2009

Spring Cove

Little Wicomico River

Spences Creek

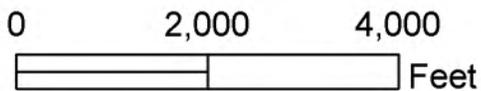
Willis Creek

Sloop Creek

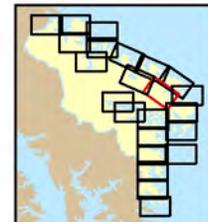
Little Wicomico River

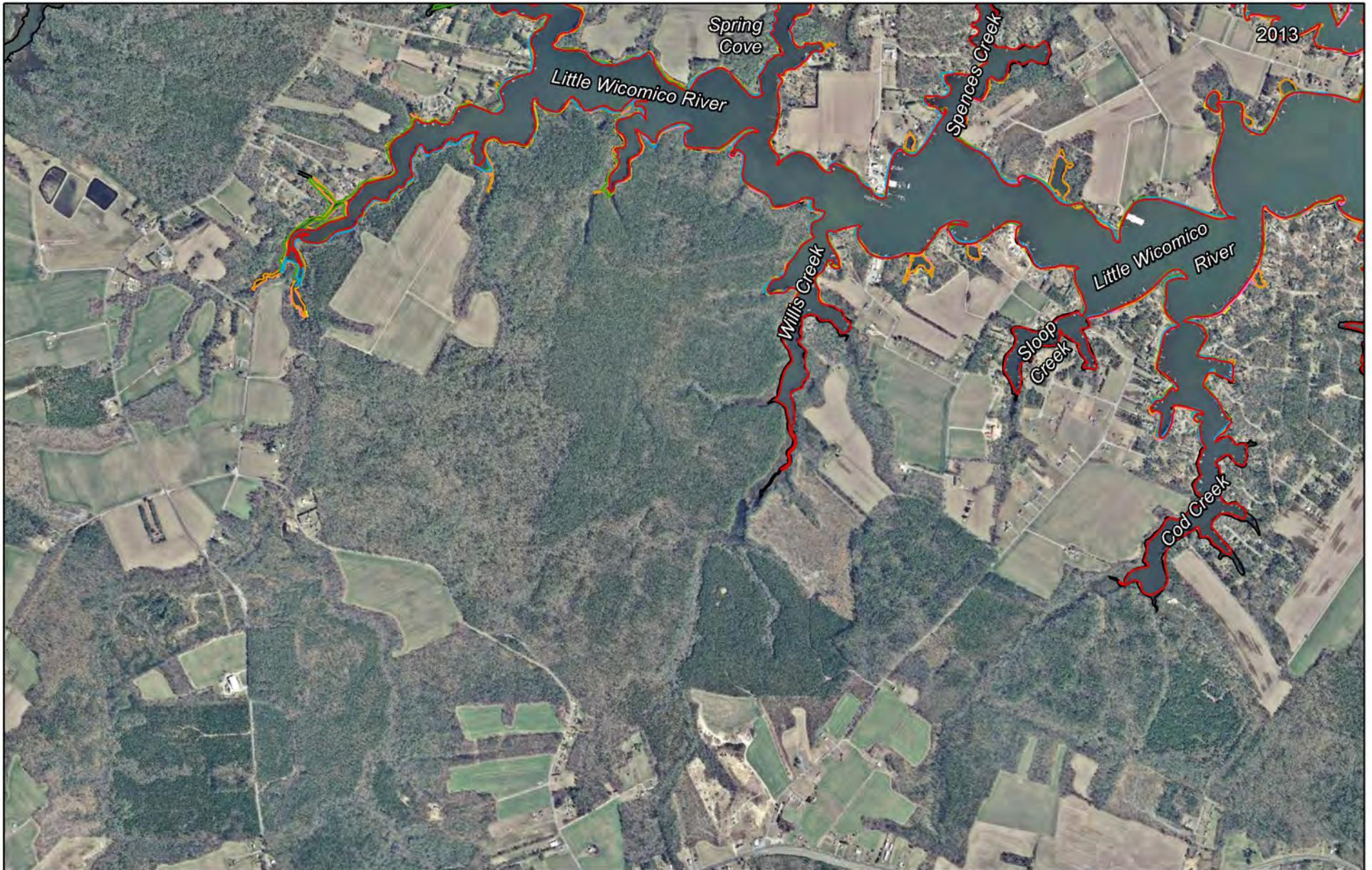
Cod Creek

Legend
 — 2009 Shoreline



**Northumberland County, Virginia
 Plate 11**

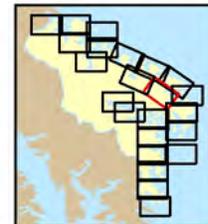
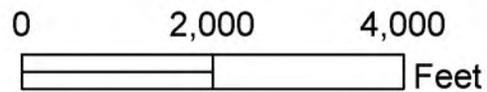




Legend

- 1937 Shoreline
- 1953 Shoreline
- 1969 Shoreline
- 1994 Shoreline
- 2002 Shoreline
- 2009 Shoreline
- 2013 Shoreline

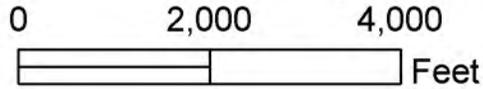
**Northumberland County, Virginia
Plate 11**



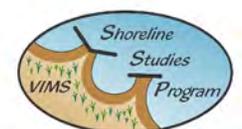
1937



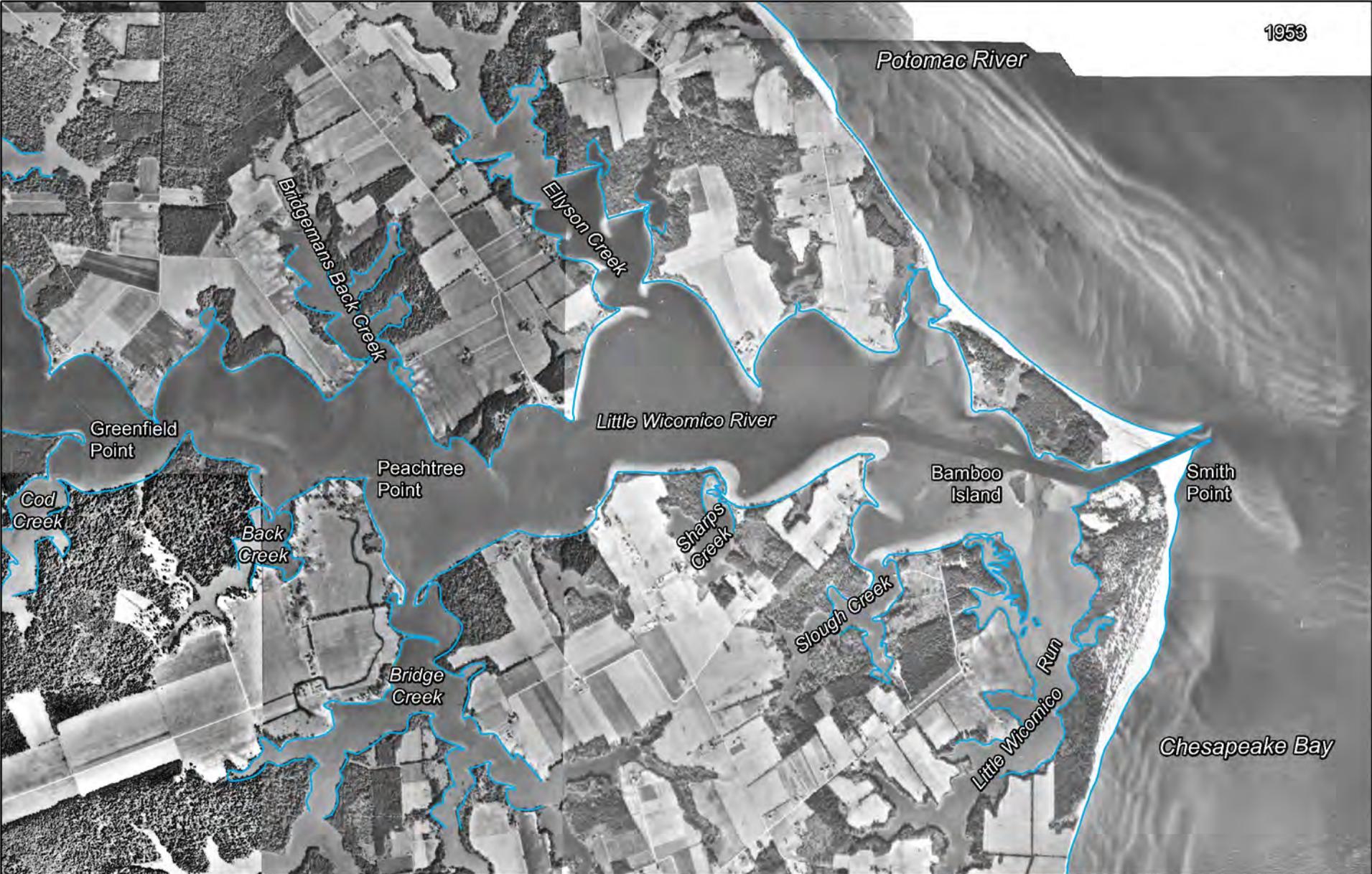
Legend
 — 1937 Shoreline



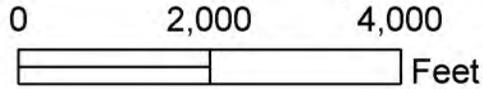
**Northumberland County, Virginia
 Plate 12**



1953

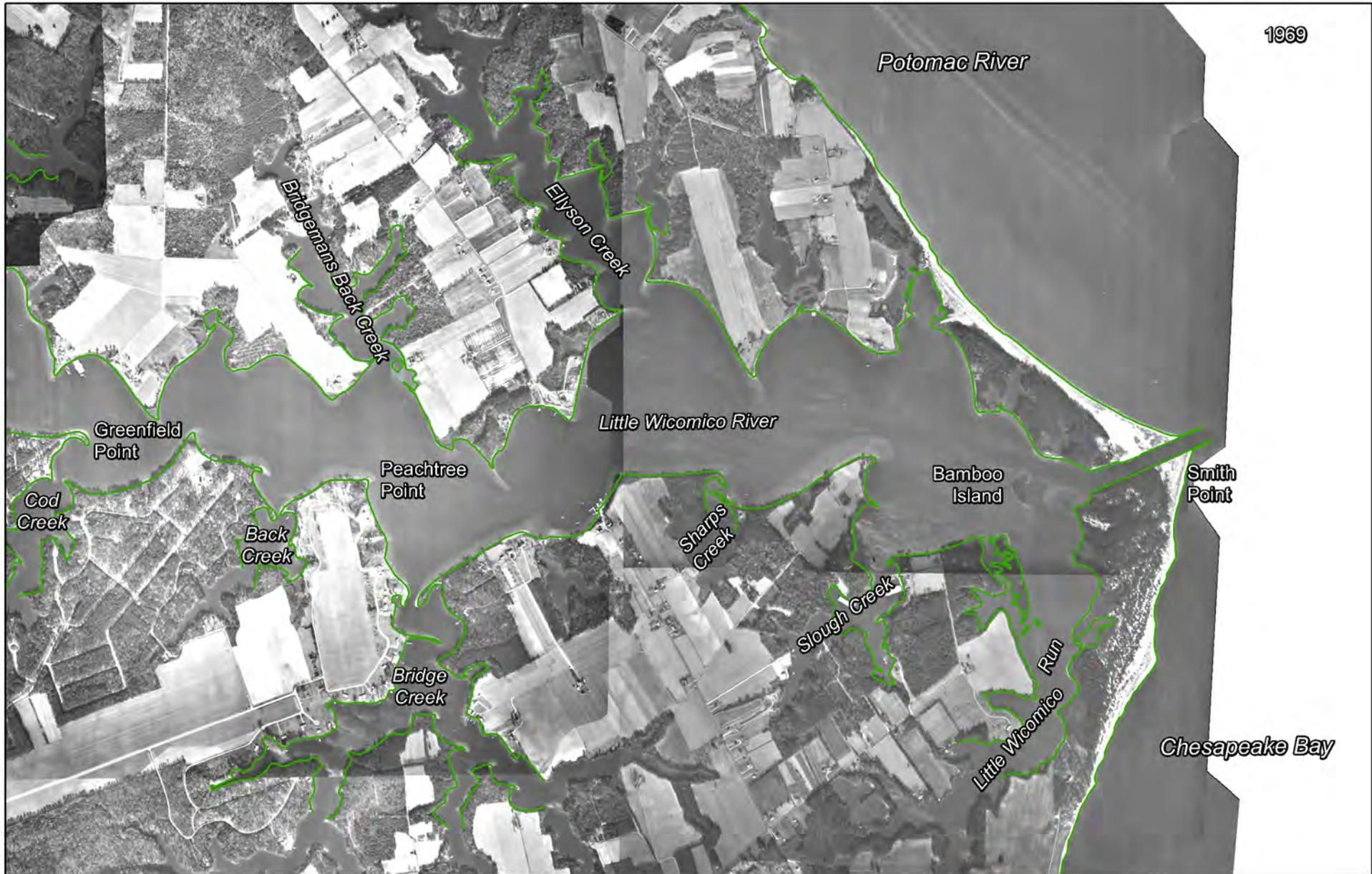


Legend
 — 1953 Shoreline



**Northumberland County, Virginia
 Plate 12**





Legend

— 1969 Shoreline



0 2,000 4,000

Feet

**Northumberland County, Virginia
Plate 12**



1994



Potomac River

Ellyson Creek

Bridgemans Back Creek

Little Wicomico River

Greenfield Point

Peachtree Point

Bamboo Island

Smith Point

Cod Creek

Back Creek

Sharps Creek

Slough Creek

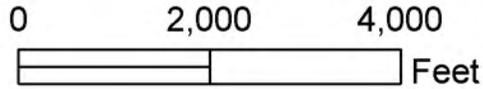
Bridge Creek

Little Wicomico Run

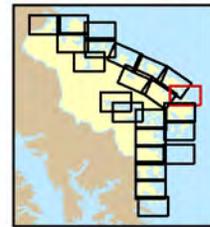
Chesapeake Bay

Legend

— 1994 Shoreline



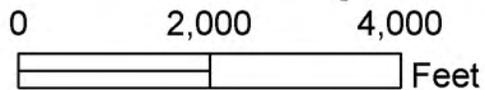
**Northumberland County, Virginia
Plate 12**



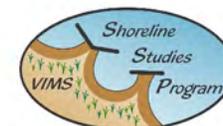
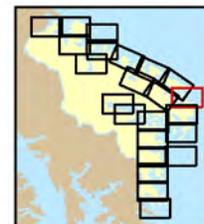
2002



Legend
 — 2002 Shoreline



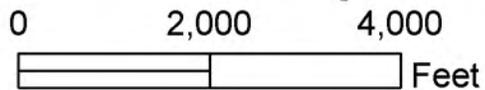
**Northumberland County, Virginia
 Plate 12**



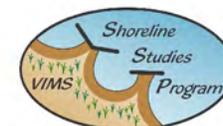
2009



Legend
 — 2009 Shoreline



**Northumberland County, Virginia
 Plate 12**



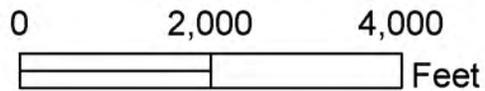
2013



Legend

- 1937 Shoreline
- 1953 Shoreline
- 1969 Shoreline
- 1994 Shoreline
- 2002 Shoreline
- 2009 Shoreline
- 2013 Shoreline

**Northumberland County, Virginia
Plate 12**





Legend
 — 1937 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 13**





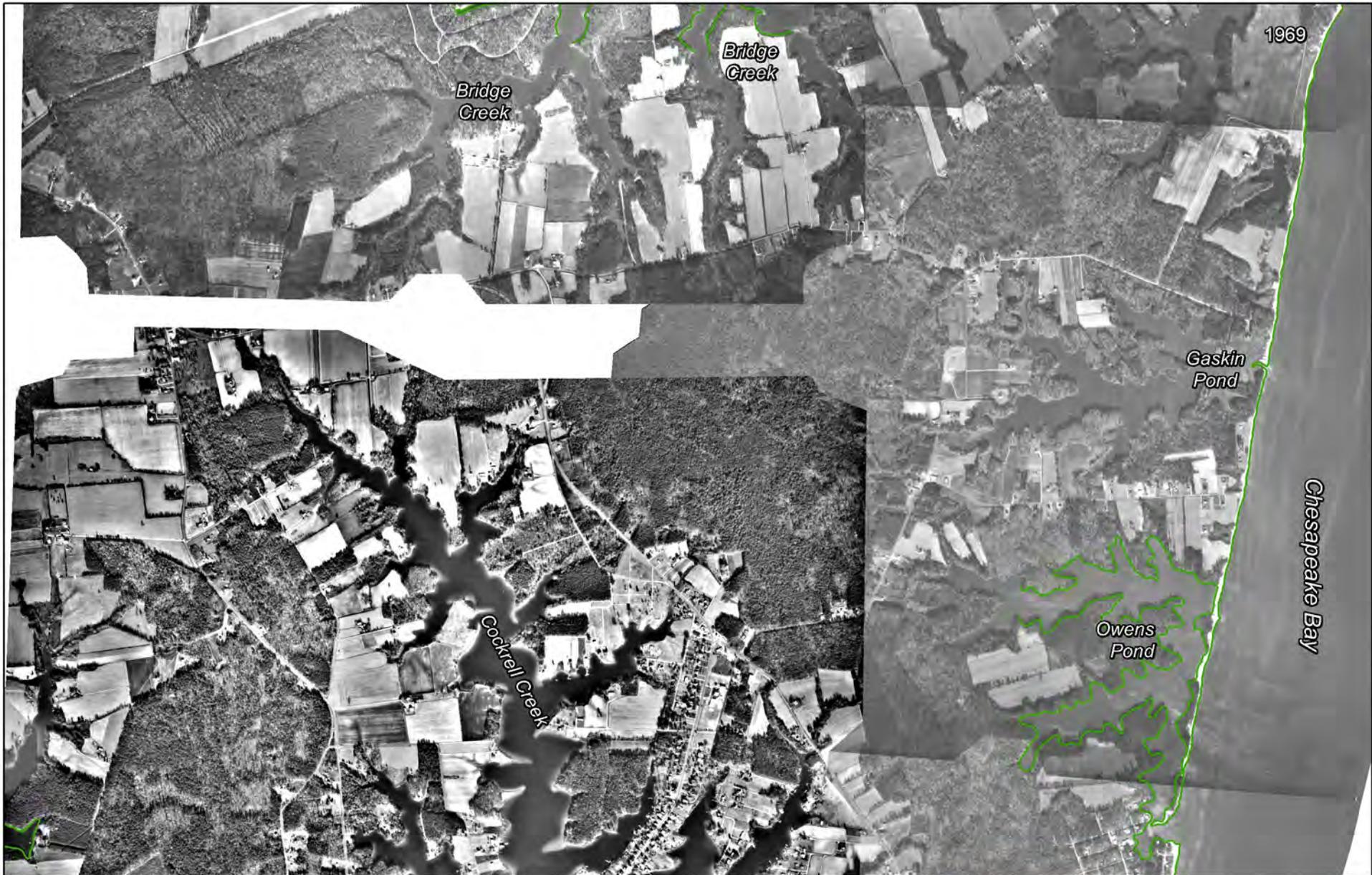
Legend
 — 1953 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 13**





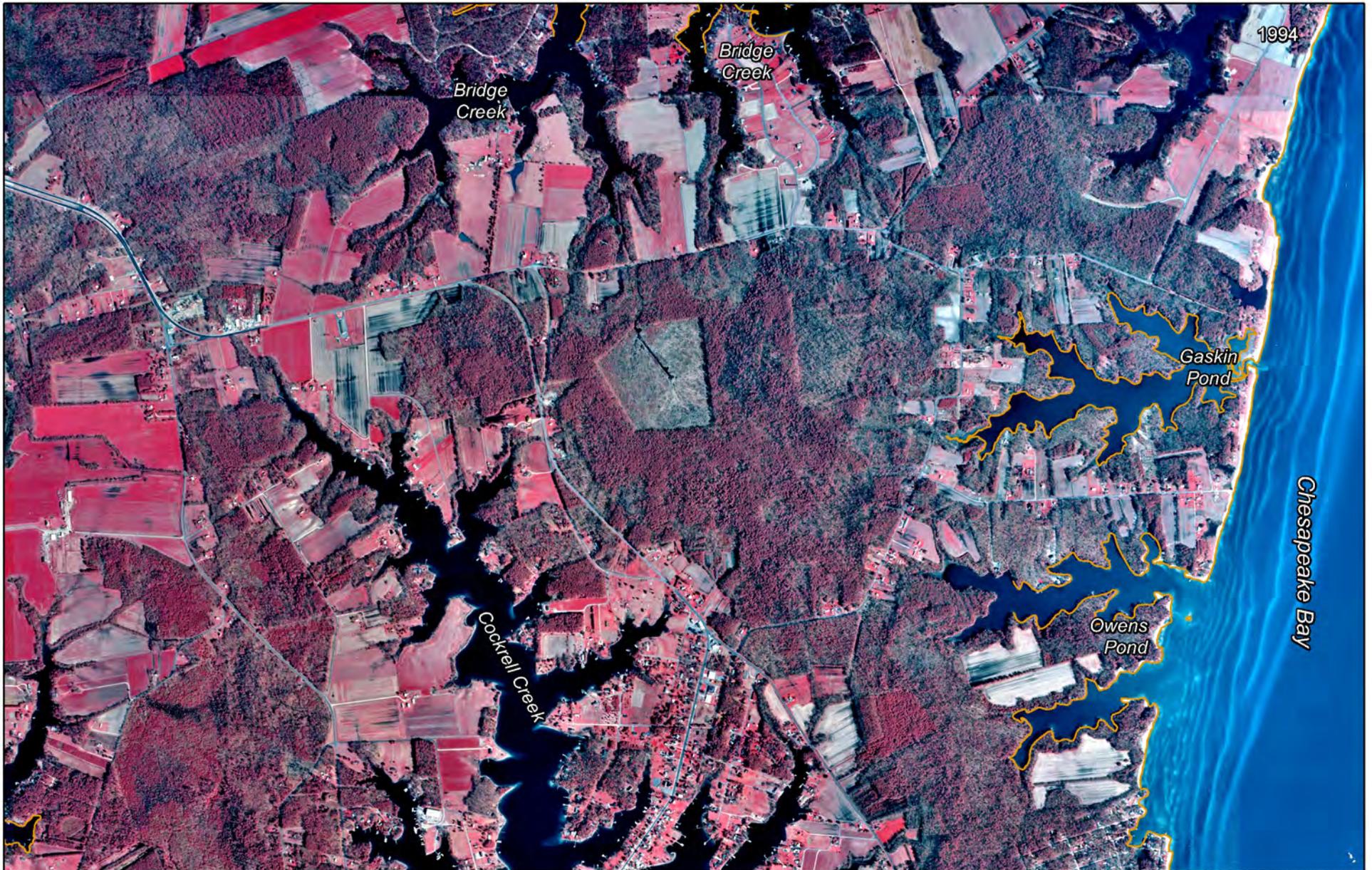
Legend
 — 1969 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 13**



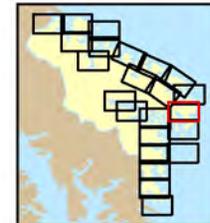


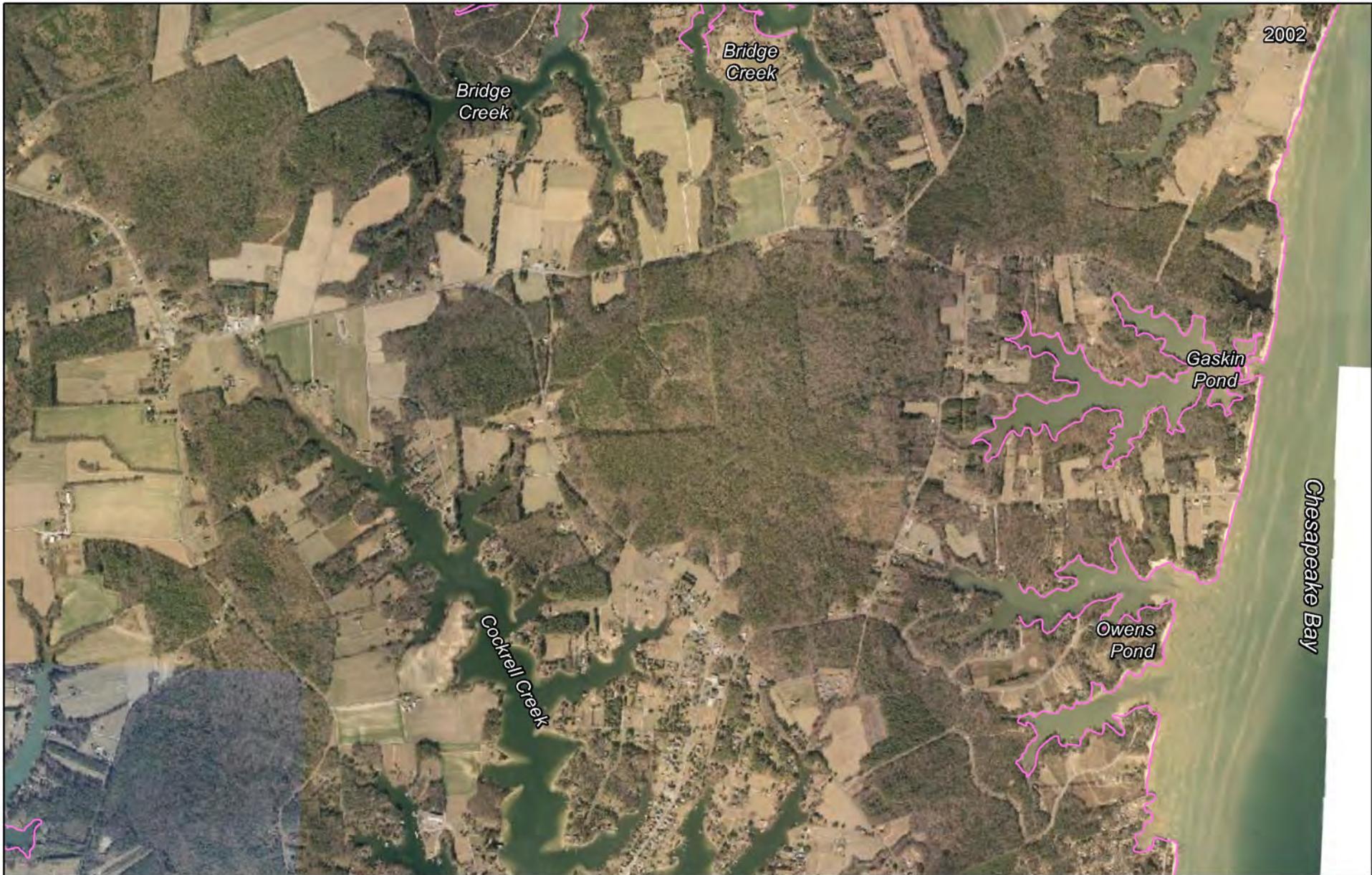
Legend
 — 1994 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 13**



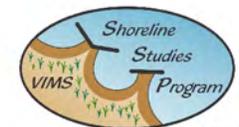
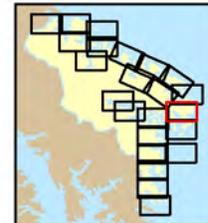


Legend
 — 2002 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 13**





2009

Bridge
Creek

Bridge
Creek

Gaskin
Pond

Cockrell
Creek

Owens
Pond

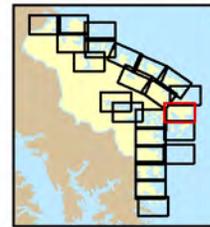
Chesapeake Bay

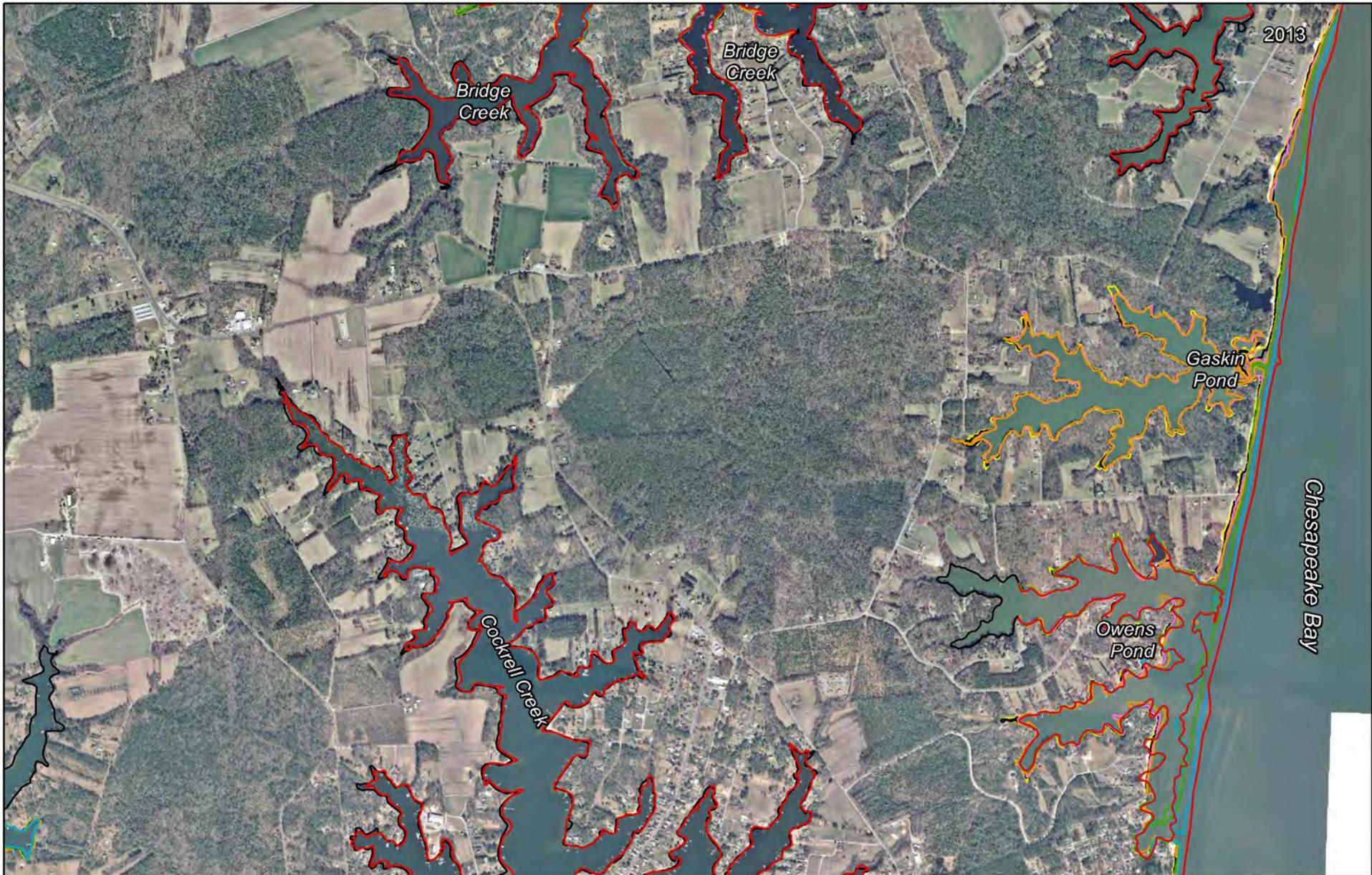
Legend
 — 2009 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 13**

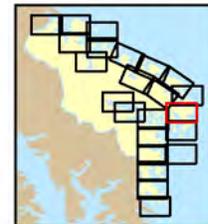
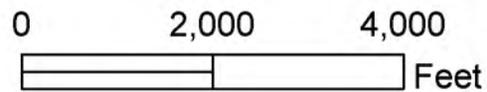




Legend

- 1937 Shoreline
- 1953 Shoreline
- 1969 Shoreline
- 1994 Shoreline
- 2002 Shoreline
- 2009 Shoreline
- 2013 Shoreline

**Northumberland County, Virginia
Plate 13**



1937

Whays
Creek

Reason
Creek

Cockrell
Creek

Taskmaker
Creek

Chesapeake
Beach

Great
Wicomico
River

Chesapeake
Bay

Cockrell
Point

Bull
Neck

Fleeton
Point

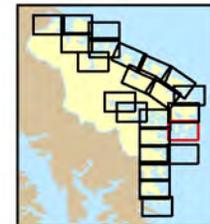
Legend

— 1937 Shoreline



0 2,000 4,000
Feet

**Northumberland County, Virginia
Plate 14**





Legend

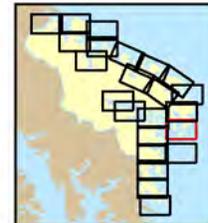
— 1953 Shoreline



0 2,000 4,000

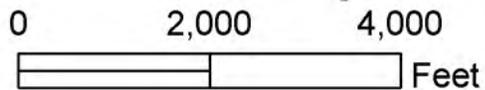
Feet

**Northumberland County, Virginia
Plate 14**

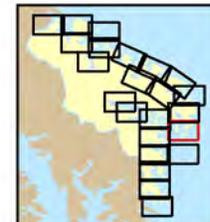




Legend
 — 1969 Shoreline



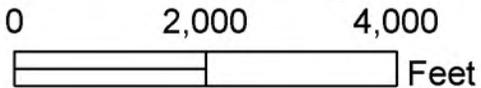
**Northumberland County, Virginia
 Plate 14**



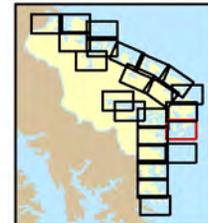


1994

Legend
 — 1994 Shoreline

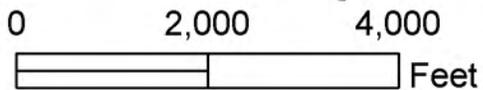


**Northumberland County, Virginia
 Plate 14**

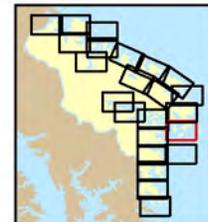




Legend
 — 2002 Shoreline



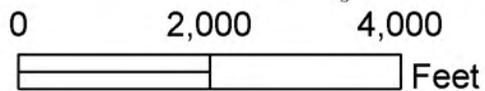
**Northumberland County, Virginia
 Plate 14**



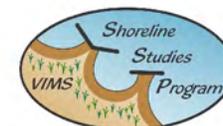
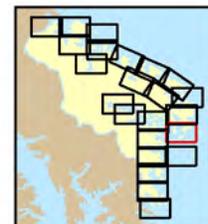
2009



Legend
 — 2009 Shoreline



**Northumberland County, Virginia
 Plate 14**

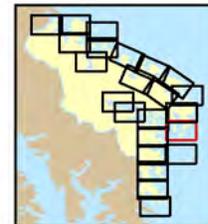
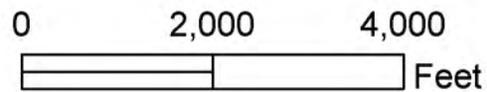


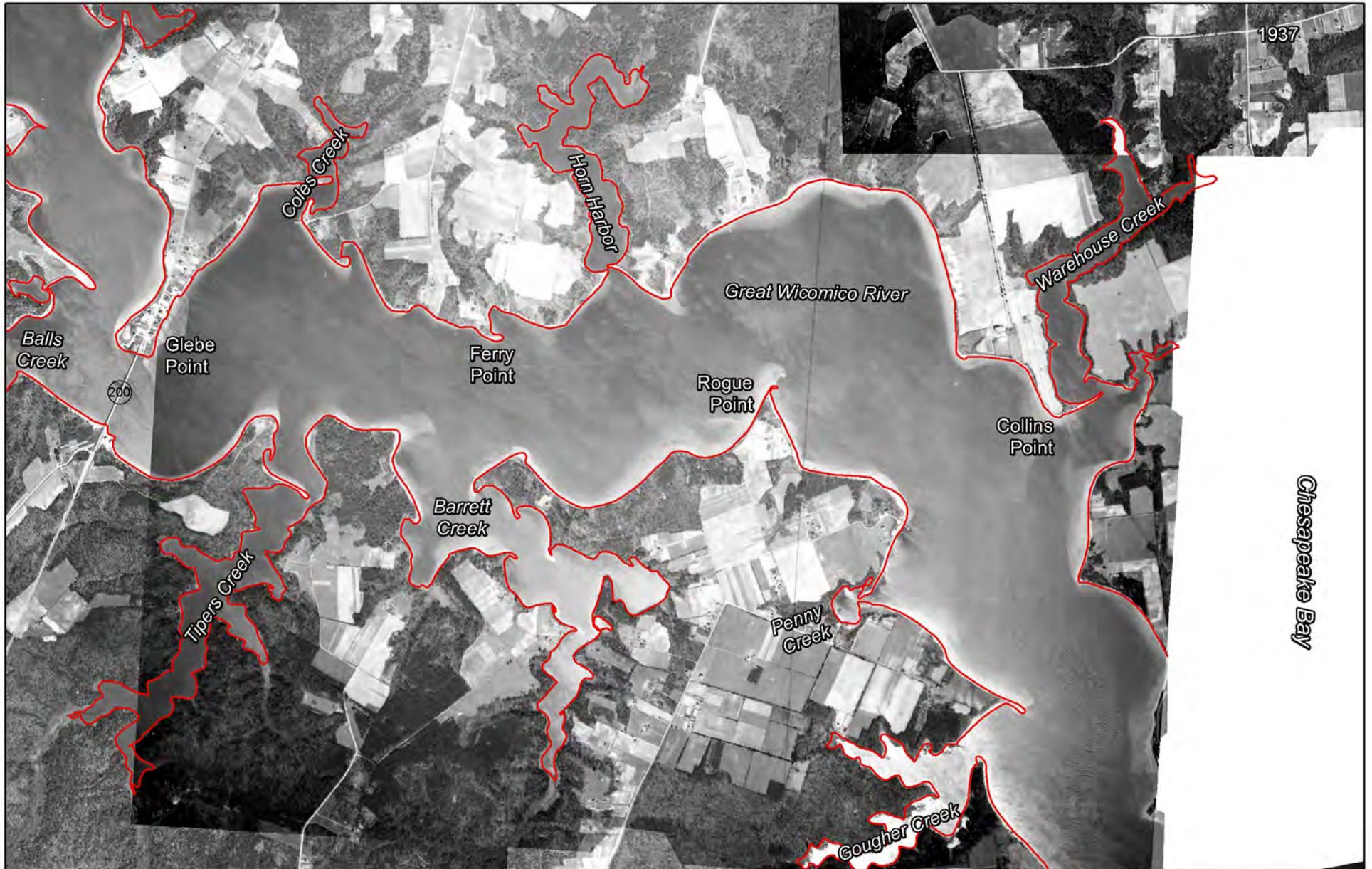


Legend

| | |
|------------------|------------------|
| — 1937 Shoreline | — 2002 Shoreline |
| — 1953 Shoreline | — 2009 Shoreline |
| — 1969 Shoreline | — 2013 Shoreline |
| — 1994 Shoreline | |

**Northumberland County, Virginia
Plate 14**



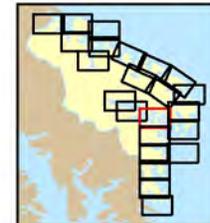


Legend
 — 1937 Shoreline



0 2,000 4,000
 Feet

Northumberland County, Virginia Plate 15



Chesapeake Bay



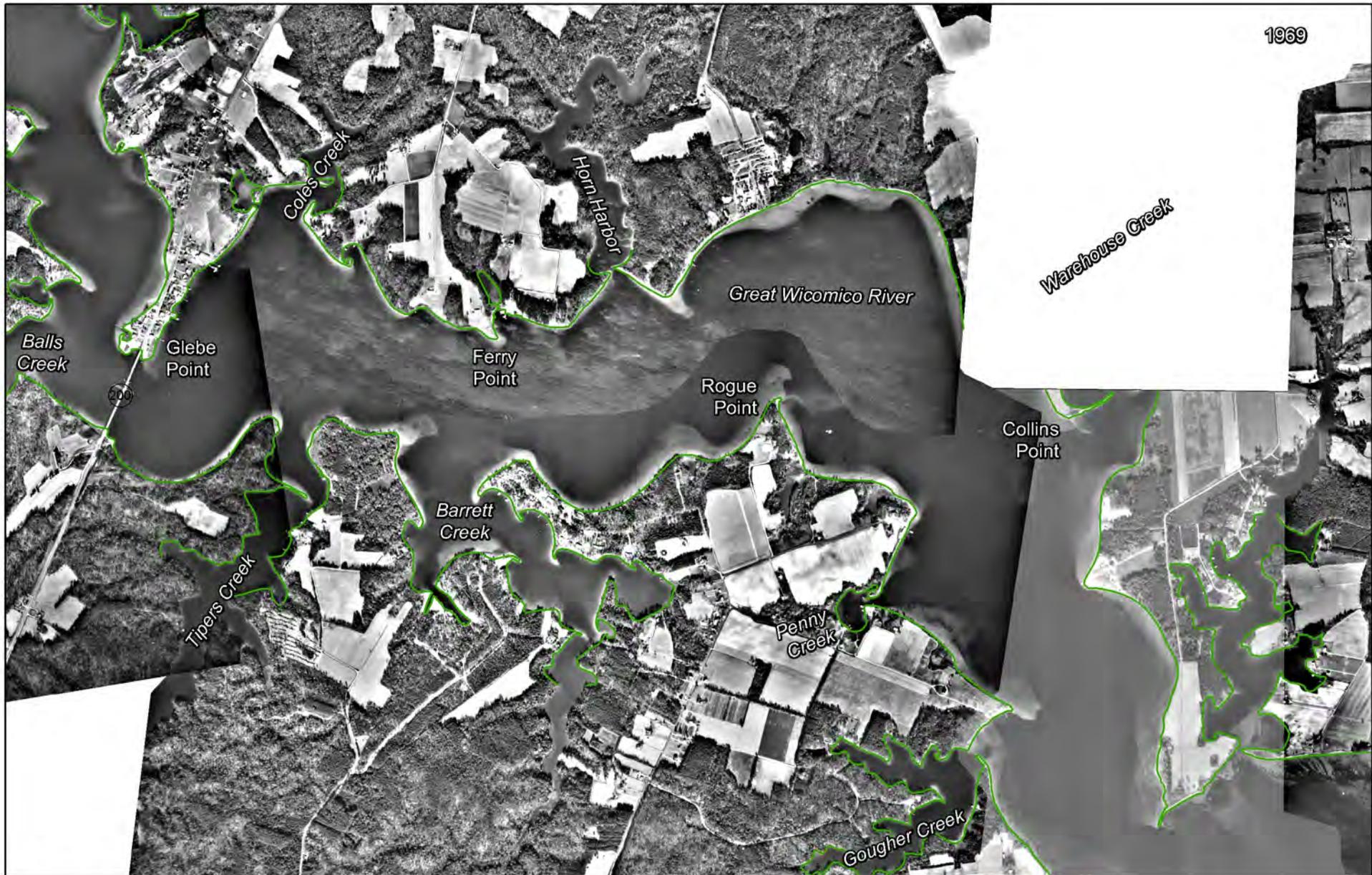
Legend
 — 1953 Shoreline



0 2,000 4,000
 Feet

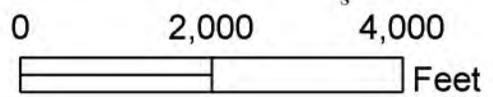
Northumberland County, Virginia Plate 15





1969

Legend
 — 1969 Shoreline



**Northumberland County, Virginia
 Plate 15**



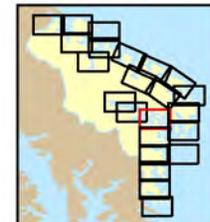


Legend
 — 1994 Shoreline



0 2,000 4,000
 Feet

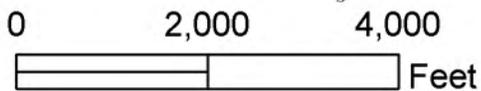
Northumberland County, Virginia Plate 15



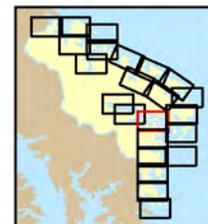
2002



Legend
 — 2002 Shoreline



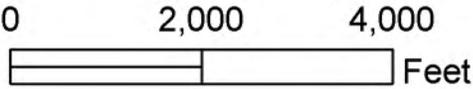
**Northumberland County, Virginia
 Plate 15**



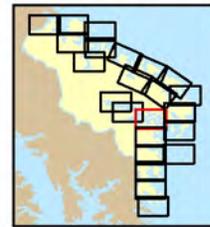
2009



Legend
 — 2009 Shoreline



**Northumberland County, Virginia
 Plate 15**



2013

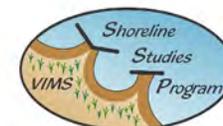
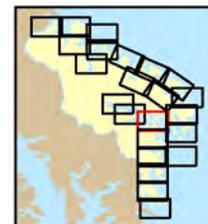
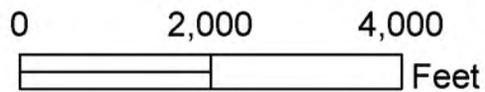


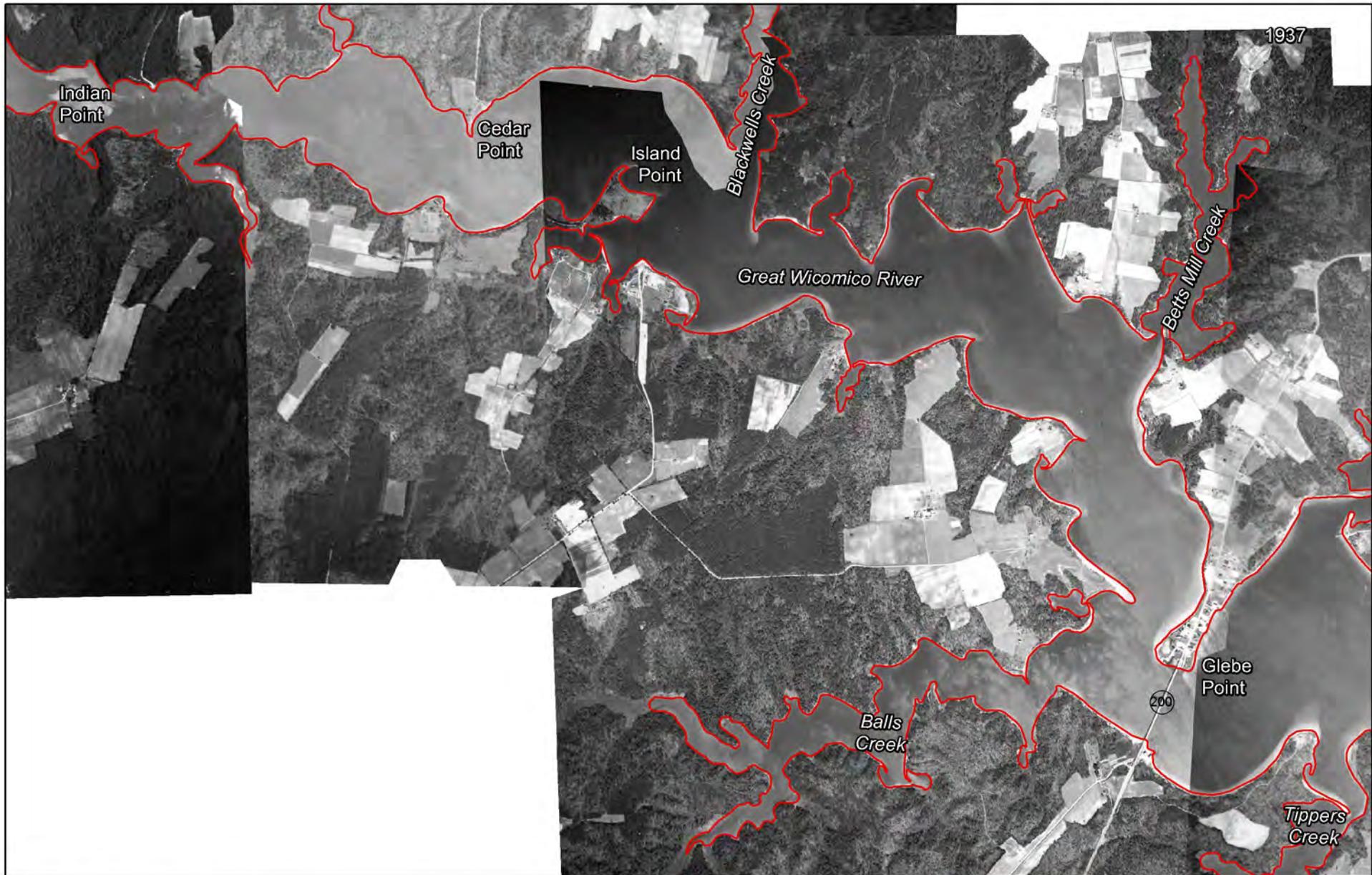
Legend

- 1937 Shoreline
- 1953 Shoreline
- 1969 Shoreline
- 1994 Shoreline
- 2002 Shoreline
- 2009 Shoreline
- 2013 Shoreline

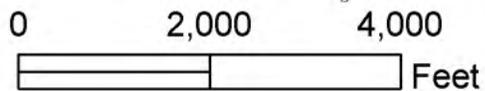
Northumberland County, Virginia

Plate 15

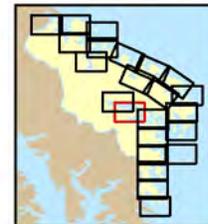


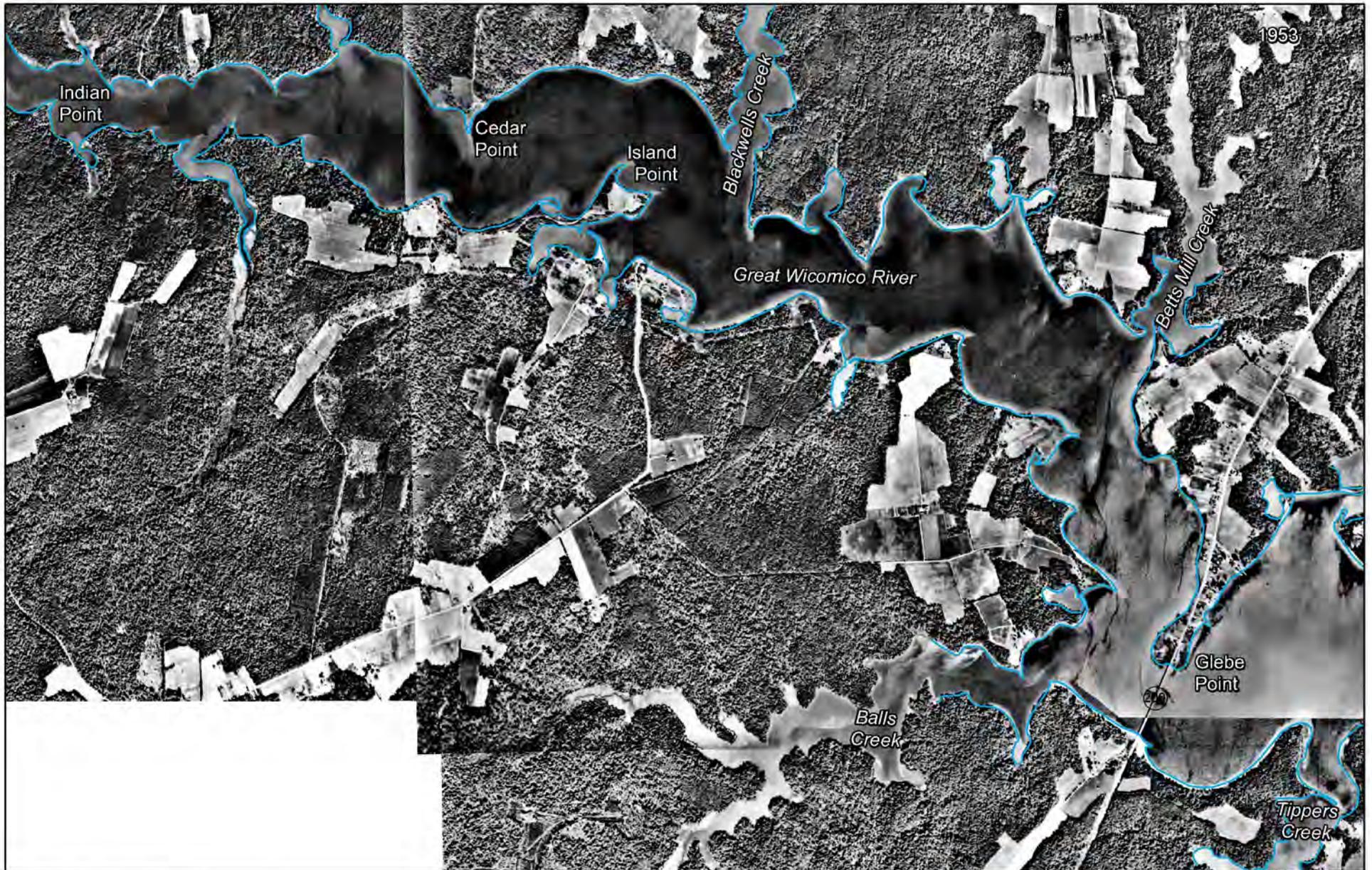


Legend
 — 1937 Shoreline



**Northumberland County, Virginia
 Plate 16**





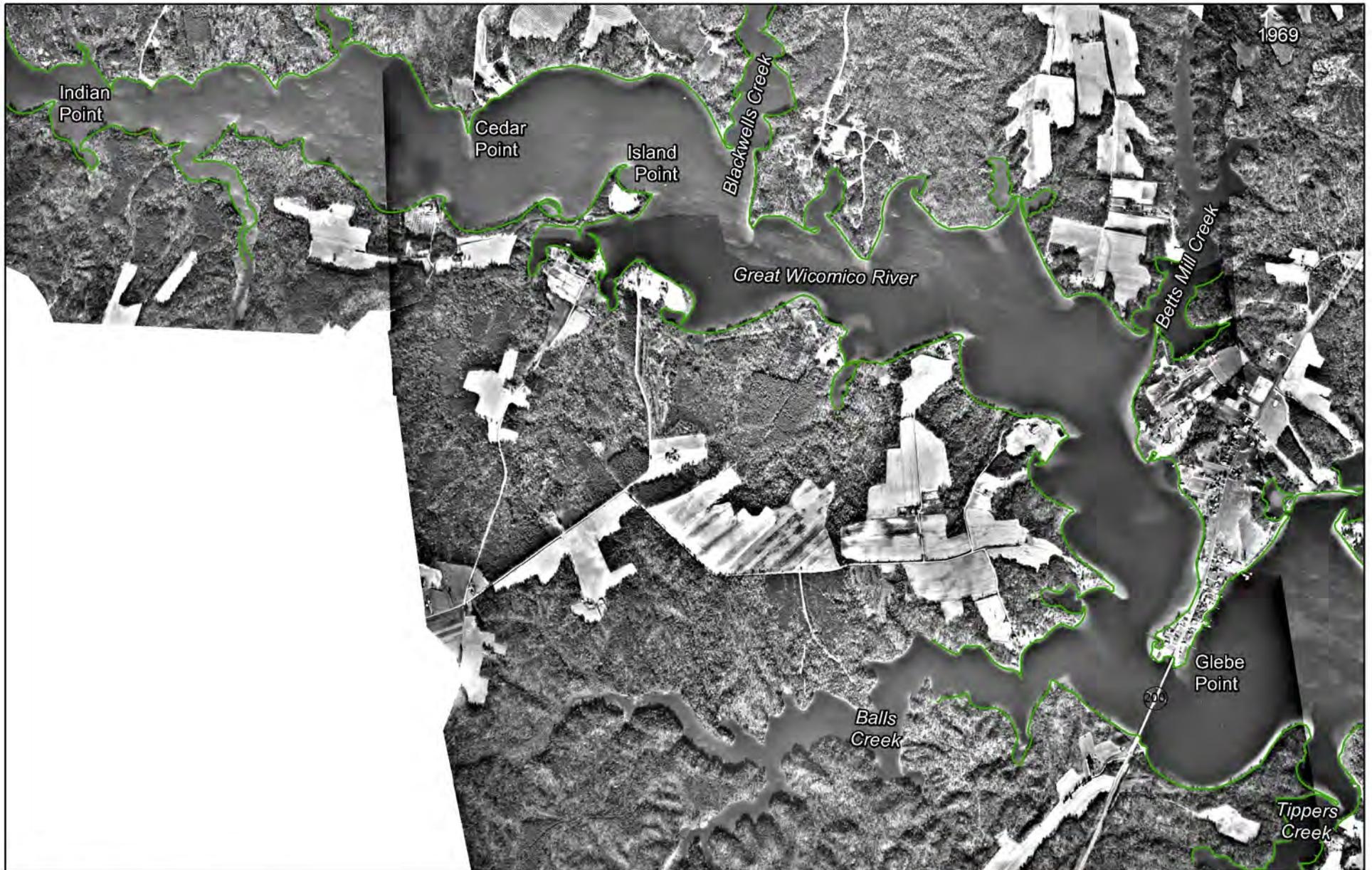
Legend
 — 1953 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 16**



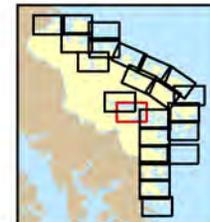


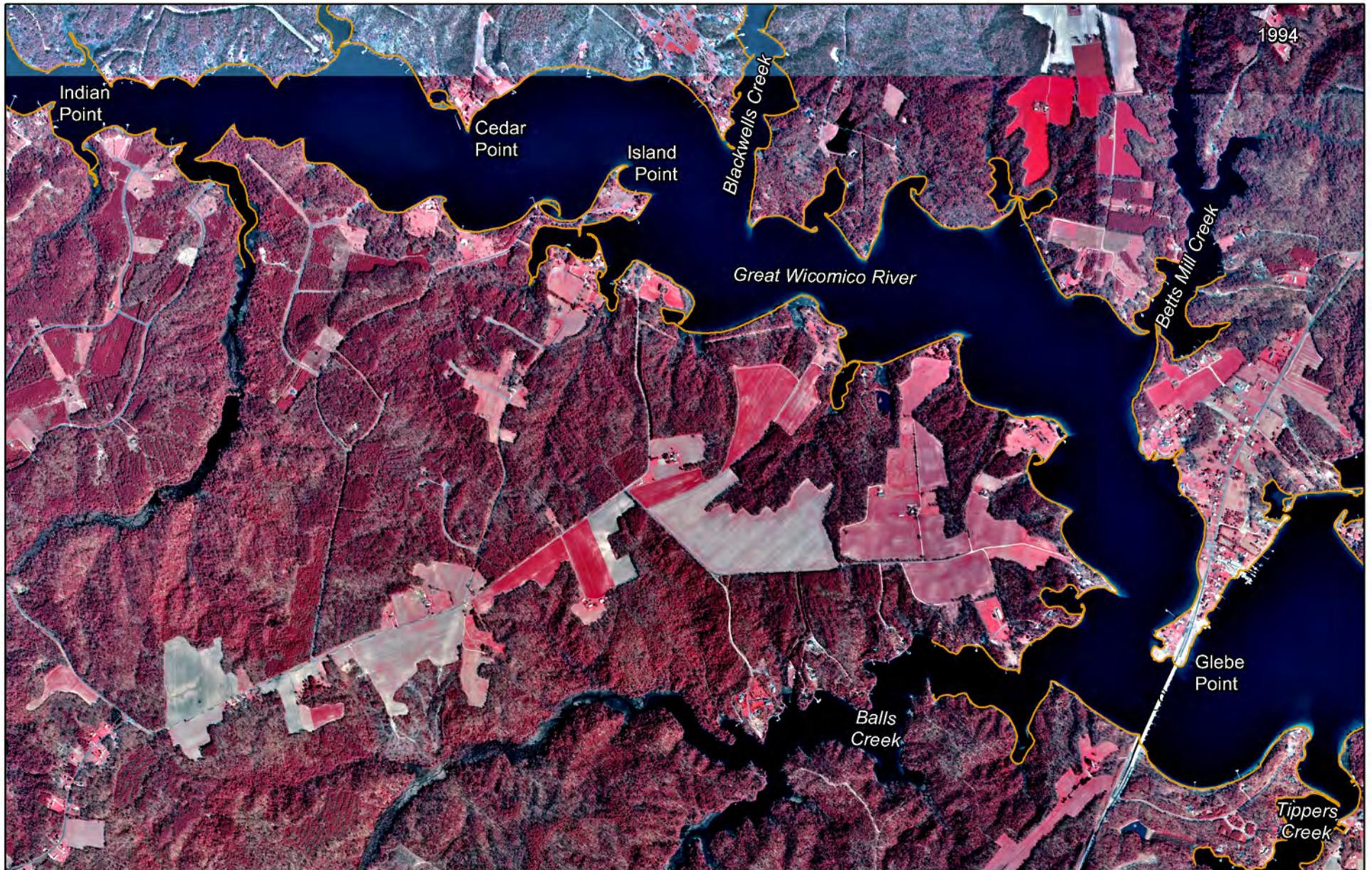
Legend
 — 1969 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 16**





Legend

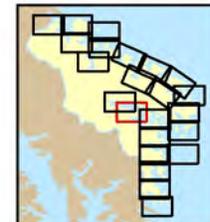
— 1994 Shoreline

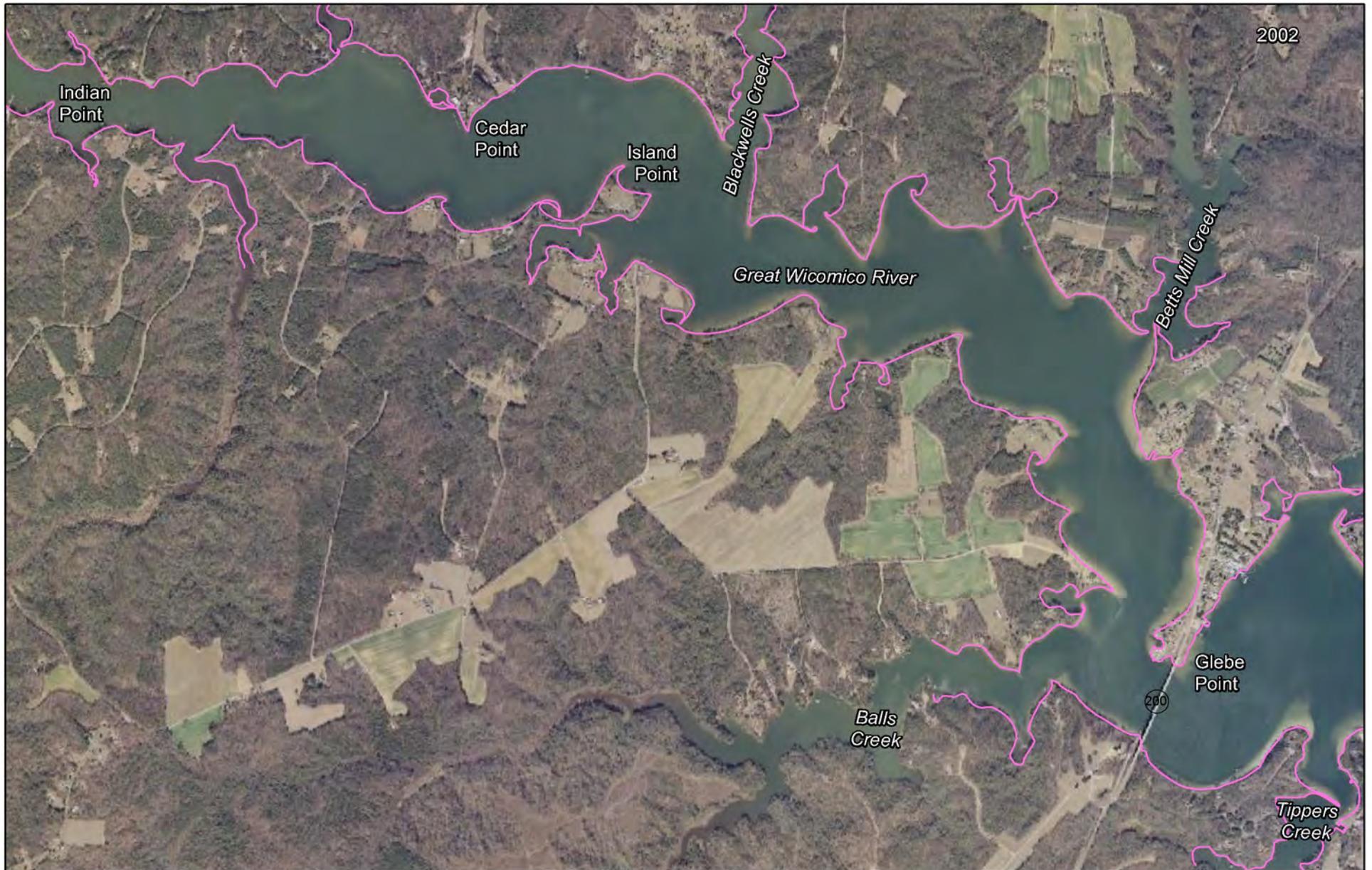


0 2,000 4,000

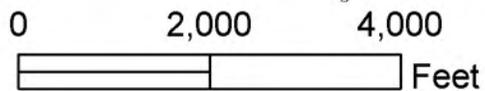
Feet

Northumberland County, Virginia
Plate 16

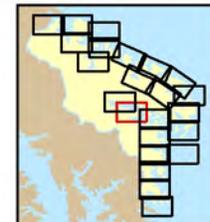


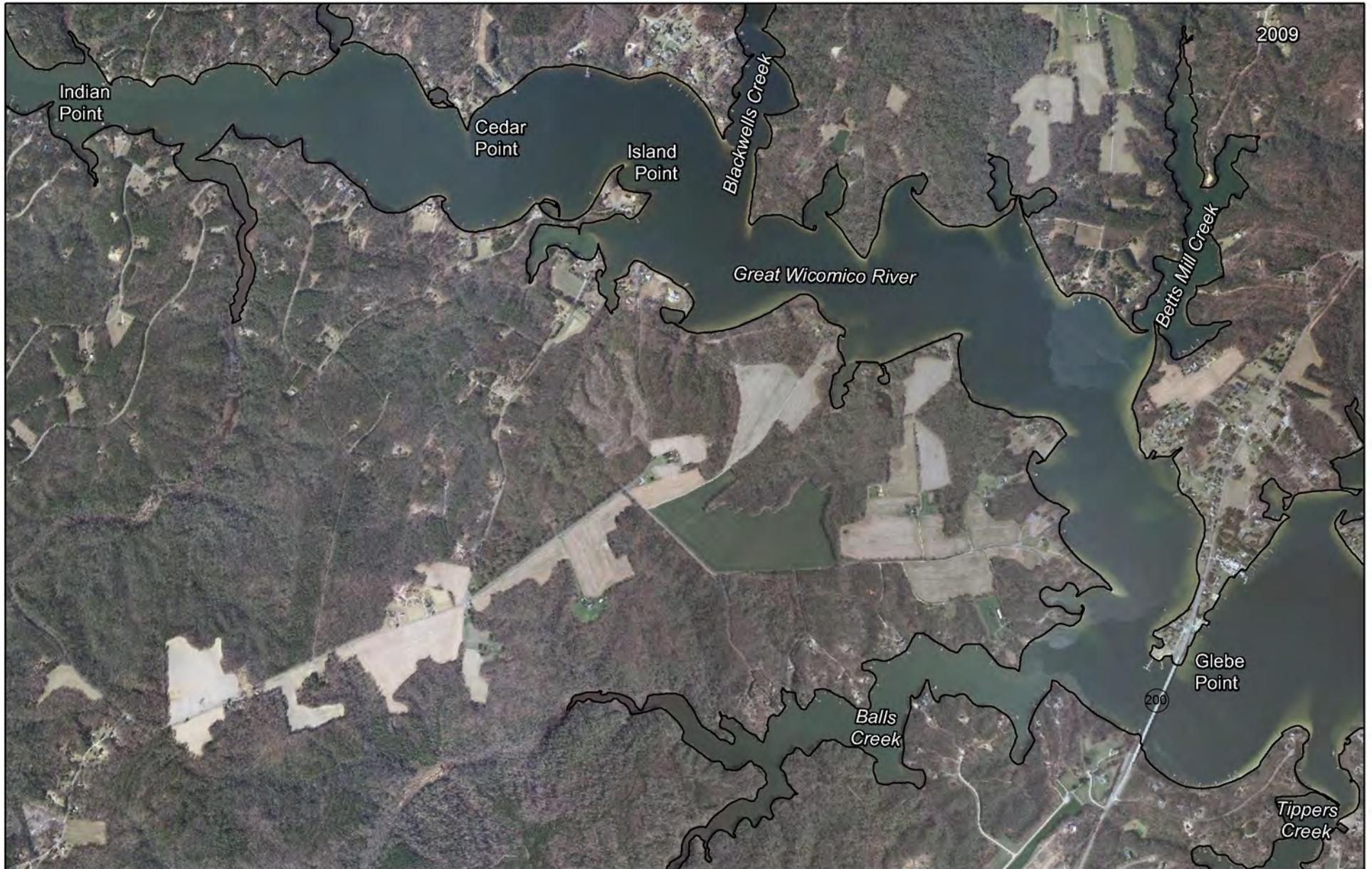


Legend
 — 2002 Shoreline

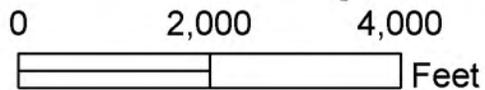


**Northumberland County, Virginia
 Plate 16**

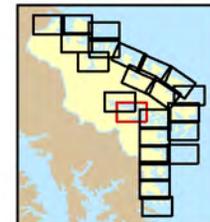


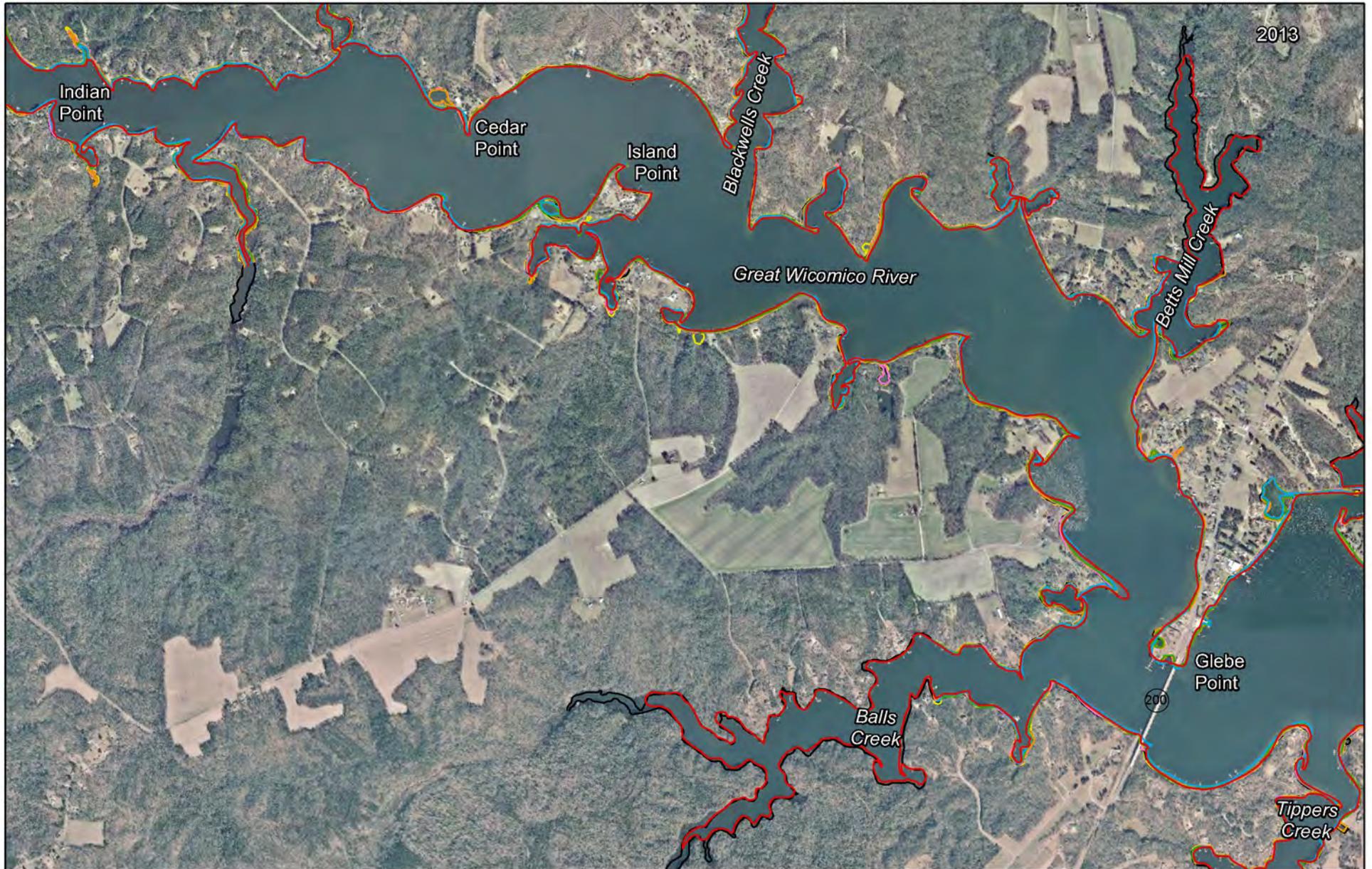


Legend
 — 2009 Shoreline



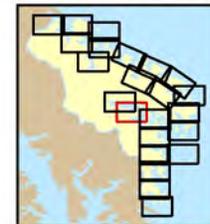
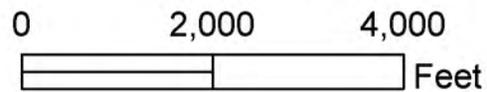
**Northumberland County, Virginia
 Plate 16**





| Legend | |
|--------|----------------|
| | 1937 Shoreline |
| | 1953 Shoreline |
| | 1969 Shoreline |
| | 1994 Shoreline |
| | 2002 Shoreline |
| | 2009 Shoreline |
| | 2013 Shoreline |

**Northumberland County, Virginia
Plate 16**



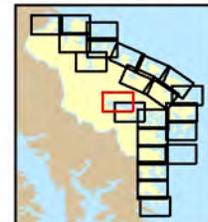


Legend
 — 1937 Shoreline

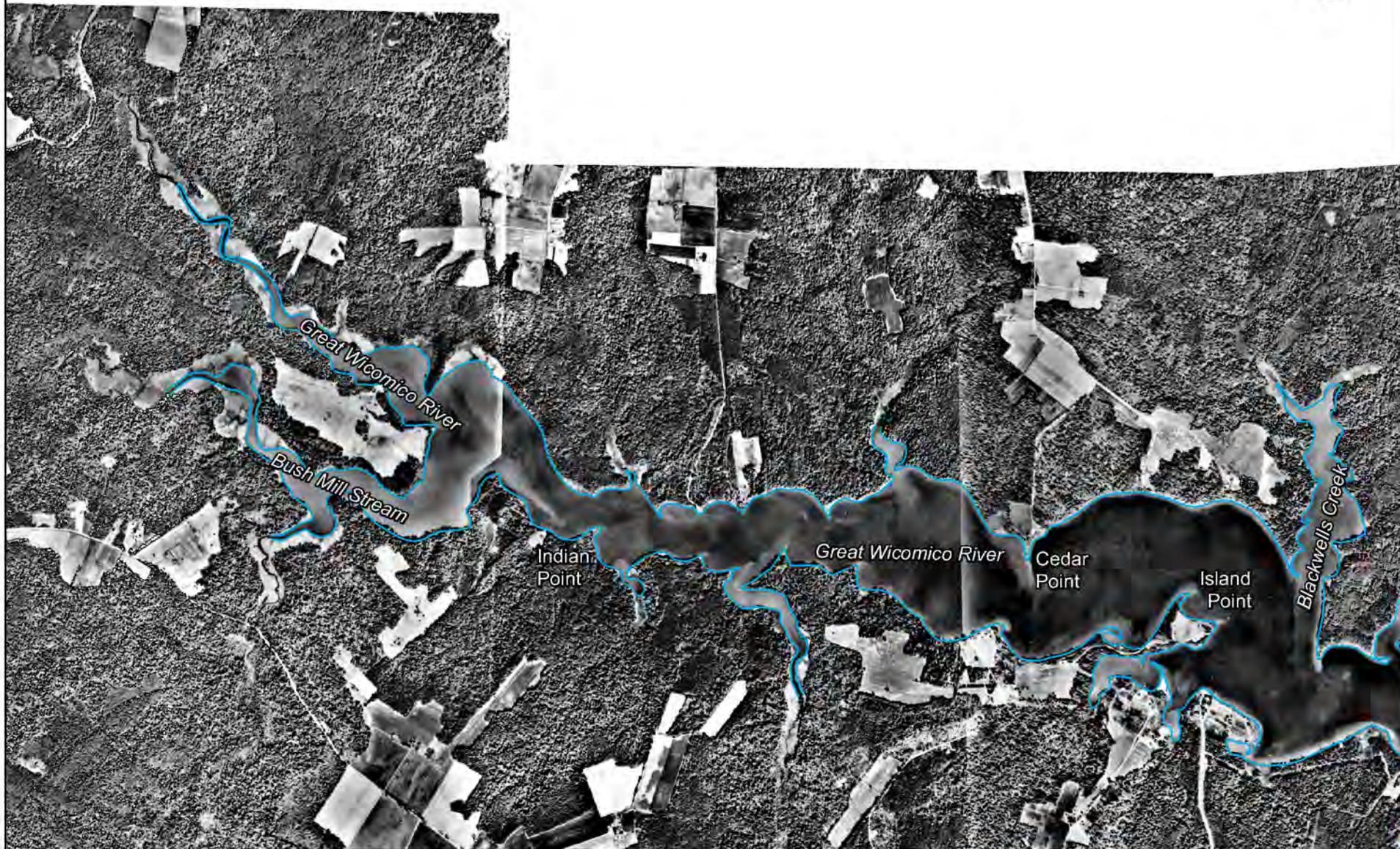


0 2,000 4,000
 Feet

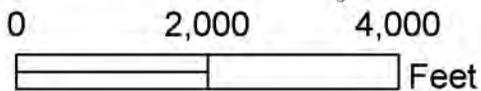
**Northumberland County, Virginia
 Plate 17**



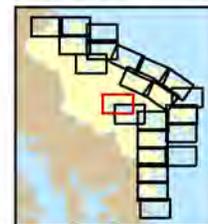
1953

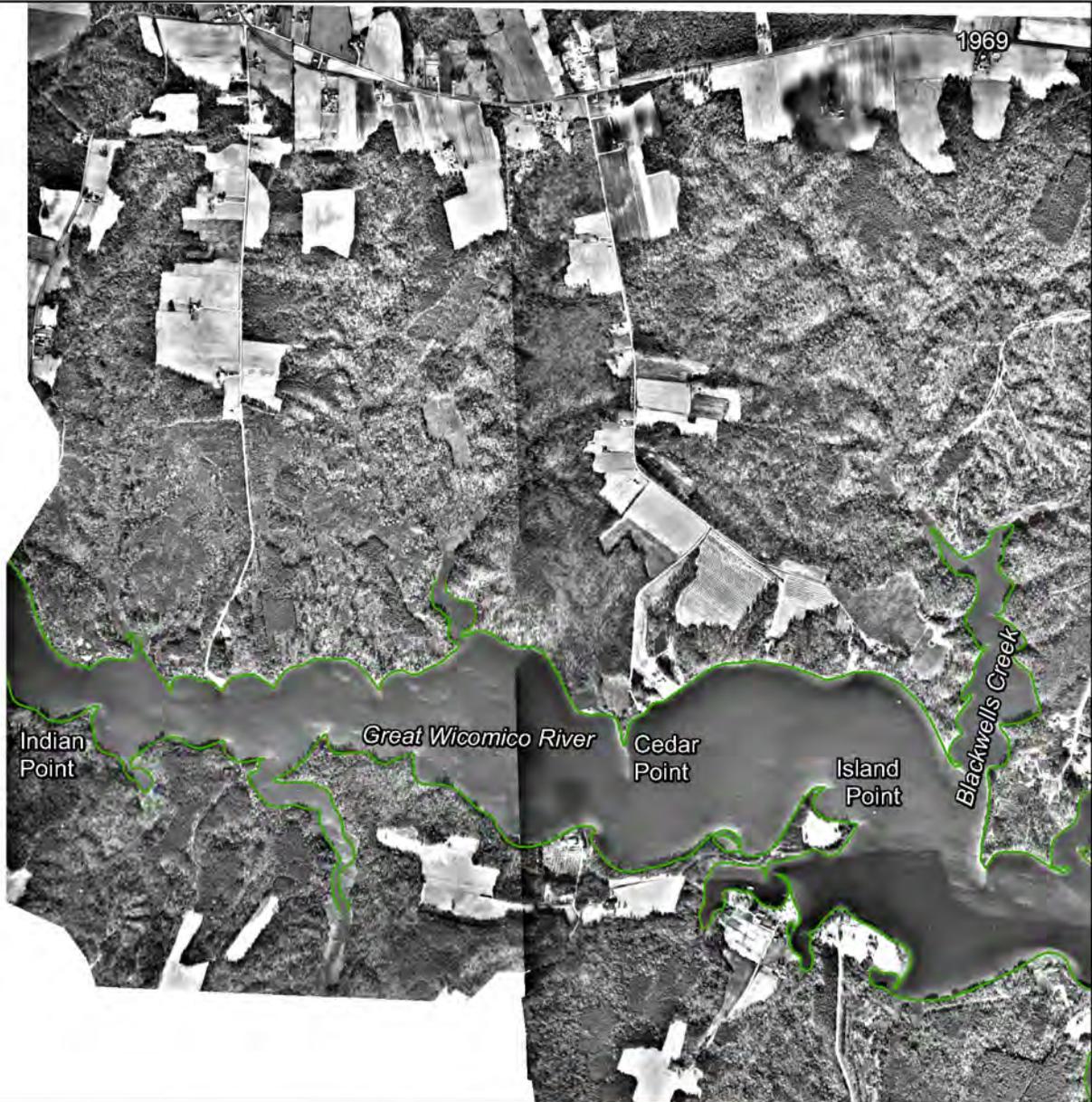


Legend
— 1953 Shoreline

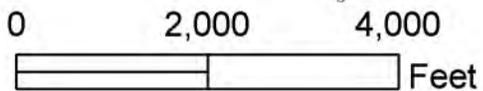


Northumberland County, Virginia Plate 17





Legend
 — 1969 Shoreline



**Northumberland County, Virginia
 Plate 17**



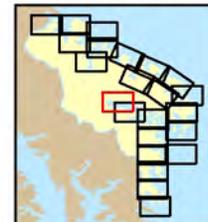


Legend
 — 1994 Shoreline

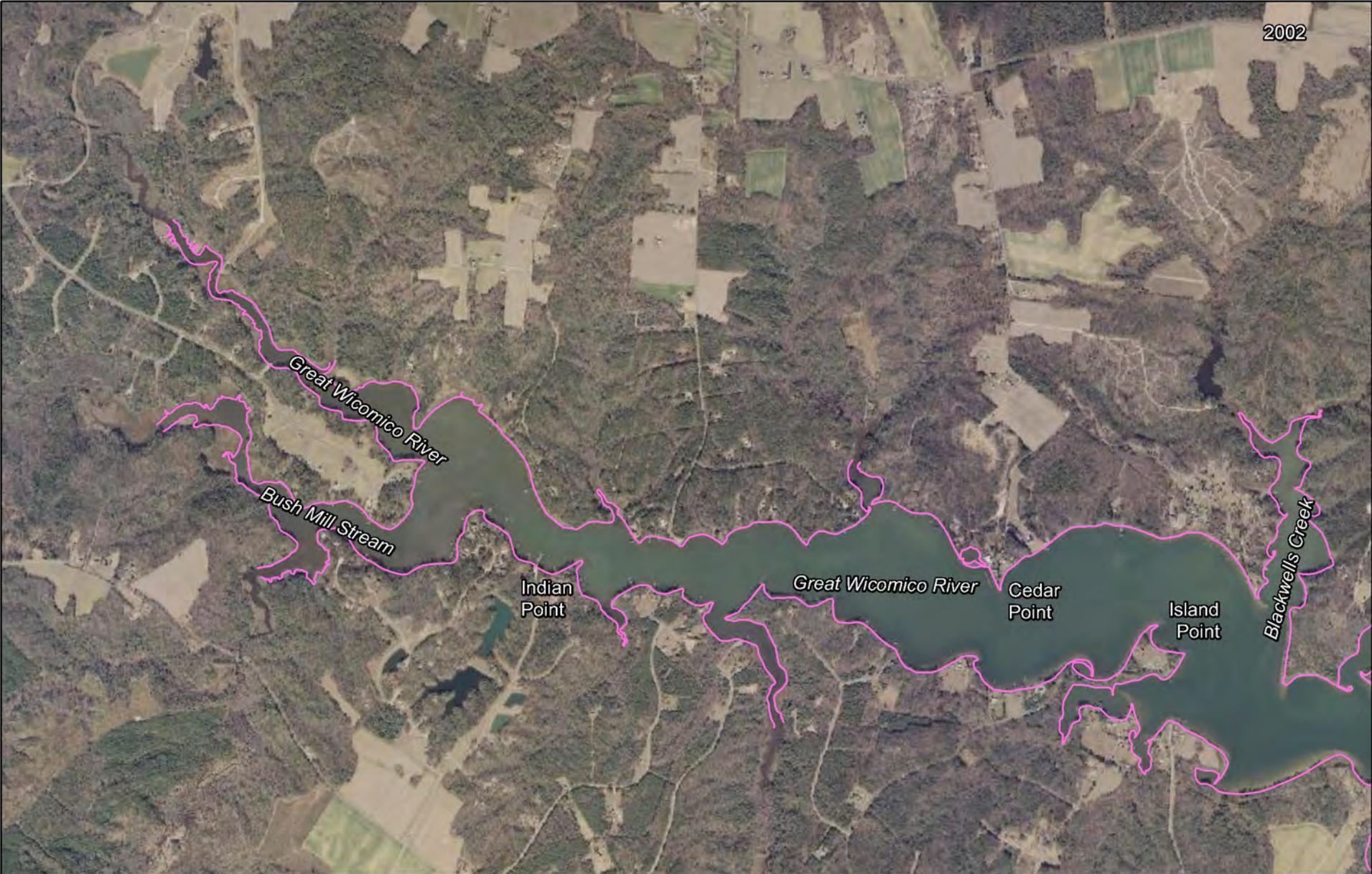


0 2,000 4,000
 Feet

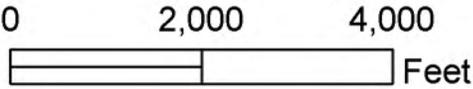
**Northumberland County, Virginia
 Plate 17**



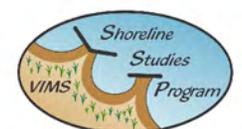
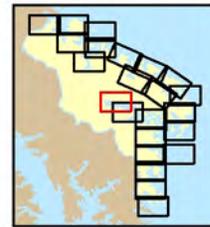
2002



Legend
 — 2002 Shoreline



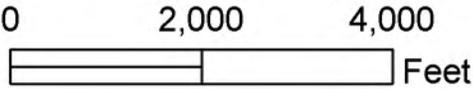
**Northumberland County, Virginia
 Plate 17**



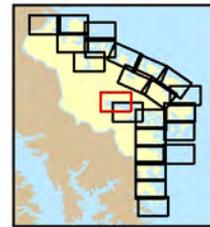
2009



Legend
 — 2009 Shoreline



**Northumberland County, Virginia
 Plate 17**





2013

Great Wicomico River

Bush Mill Stream

Indian Point

Great Wicomico River

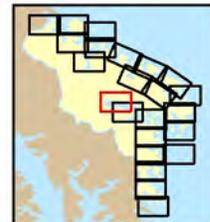
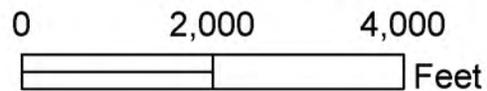
Cedar Point

Island Point

Blackwells Creek

| Legend | |
|--------|----------------|
| | 1937 Shoreline |
| | 1953 Shoreline |
| | 1969 Shoreline |
| | 1994 Shoreline |
| | 2002 Shoreline |
| | 2009 Shoreline |
| | 2013 Shoreline |

Northumberland County, Virginia Plate 17



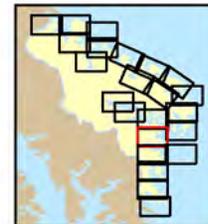


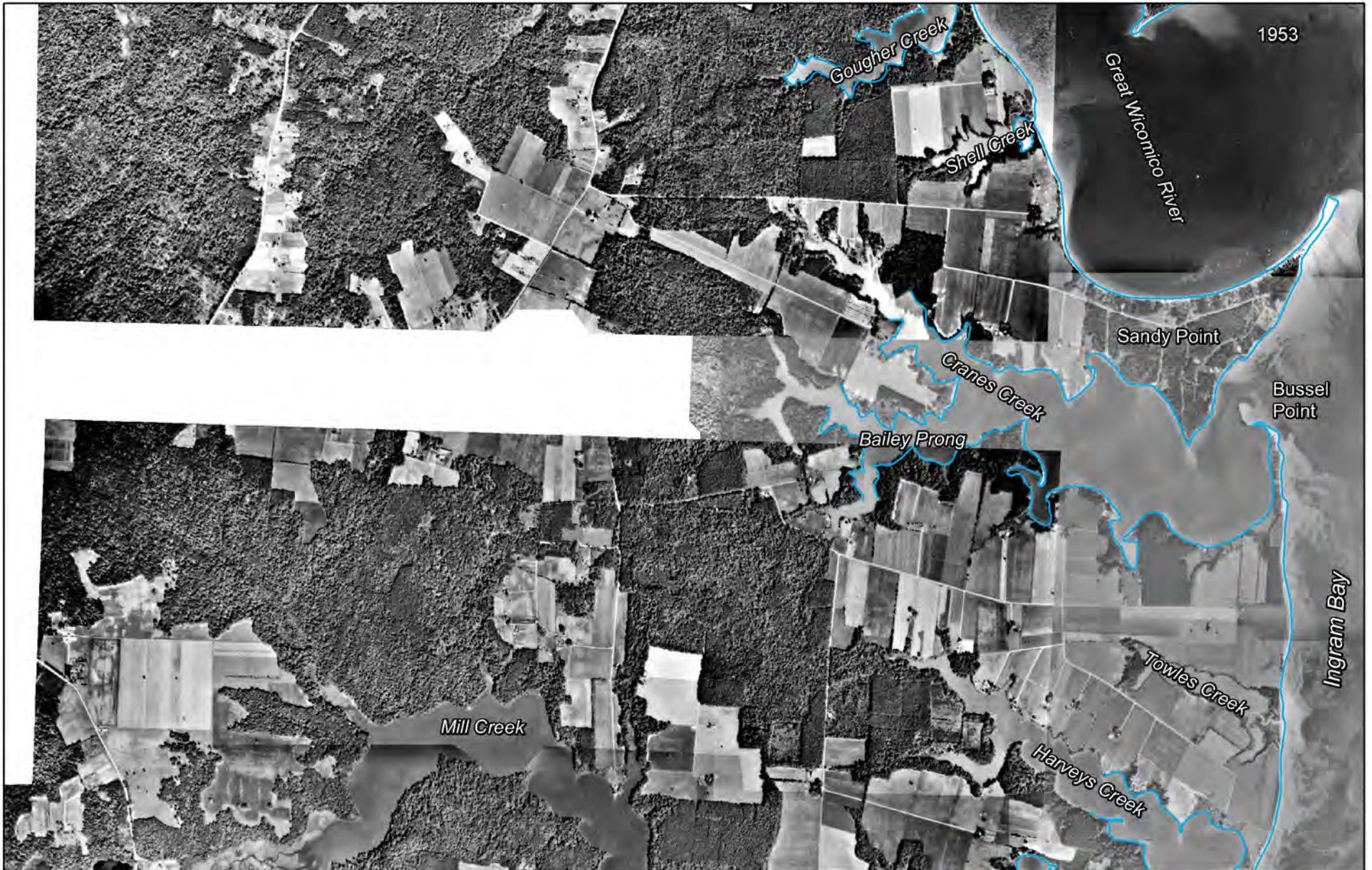
Legend
 — 1937 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 18**



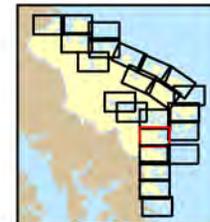


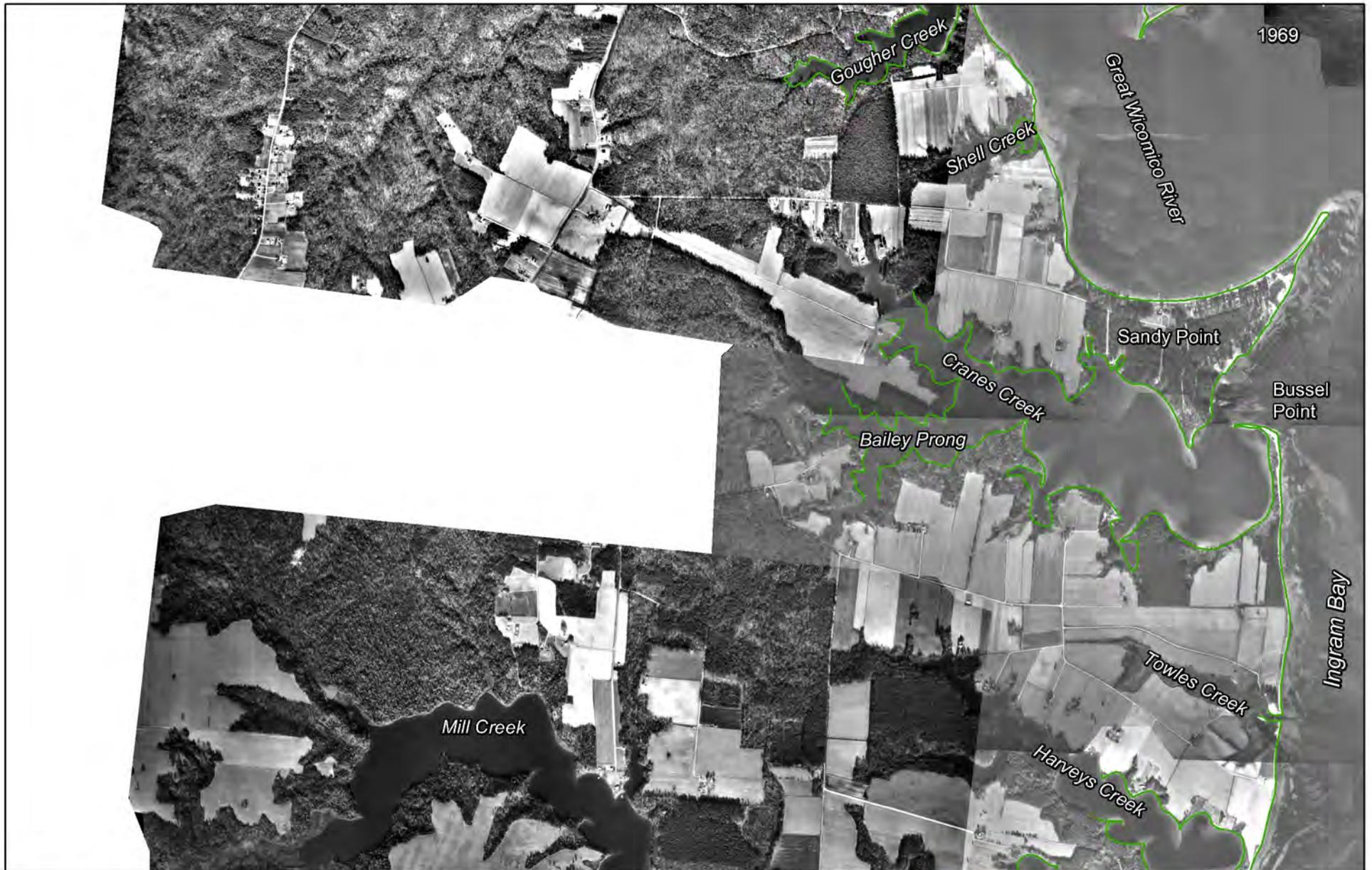
Legend
 — 1953 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 18**



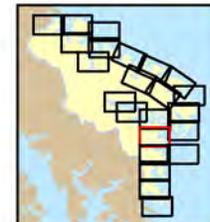


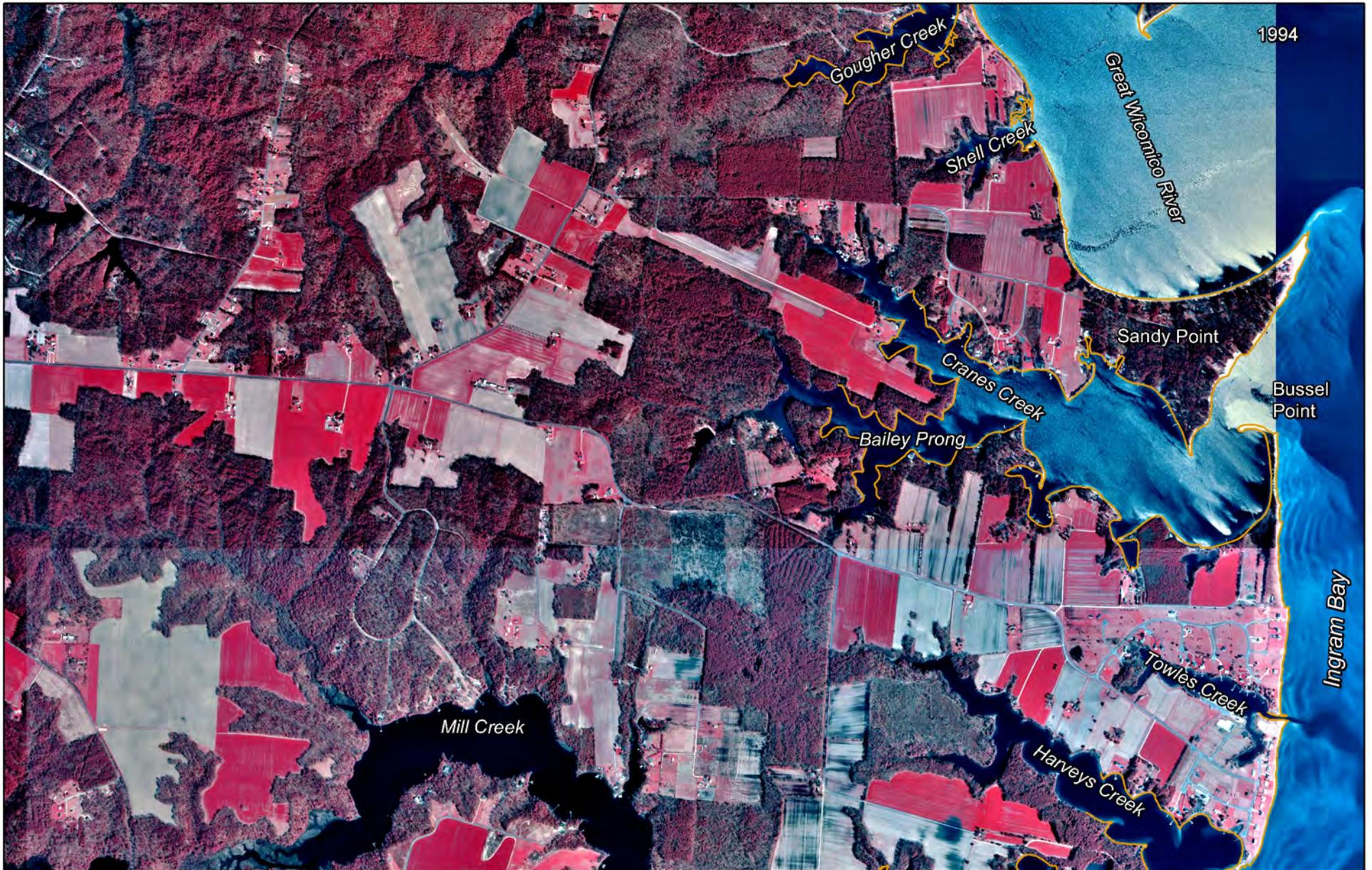
Legend
 — 1969 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 18**



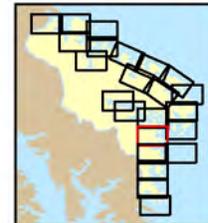


Legend
 — 1994 Shoreline



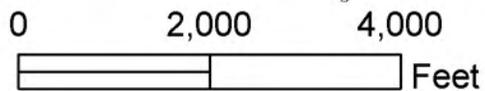
0 2,000 4,000
 Feet

Northumberland County, Virginia Plate 18

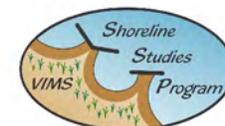
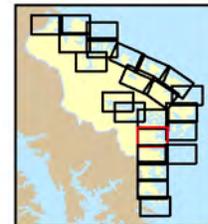




Legend
 — 2002 Shoreline



**Northumberland County, Virginia
 Plate 18**



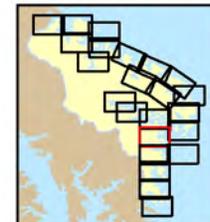


Legend
 — 2009 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 18**





2013

Gougher Creek

Shell Creek

Great Wicomico River

Sandy Point

Cranes Creek

Bussel Point

Bailey Prong

Ingram Bay

Mill Creek

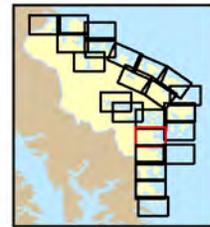
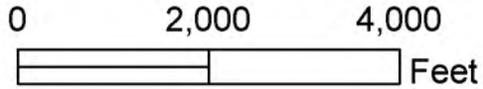
Towles Creek

Harveys Creek

Legend

- 1937 Shoreline
- 1953 Shoreline
- 1969 Shoreline
- 1994 Shoreline
- 2002 Shoreline
- 2009 Shoreline
- 2013 Shoreline

**Northumberland County, Virginia
Plate 18**



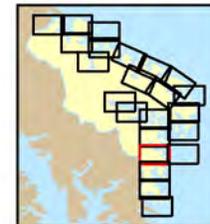


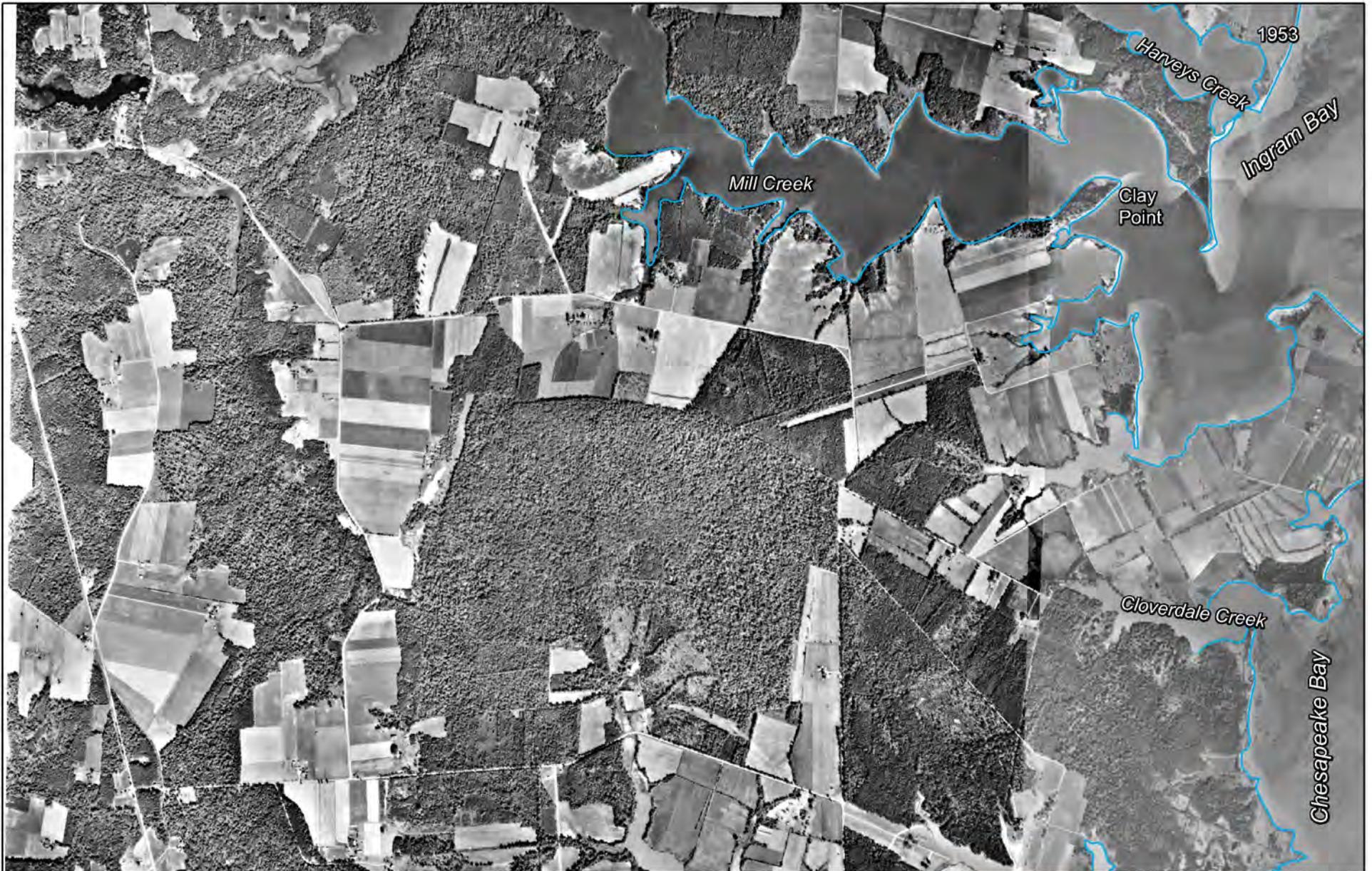
Legend
 — 1937 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 19**



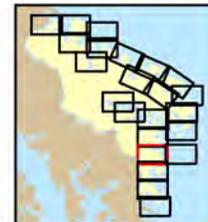


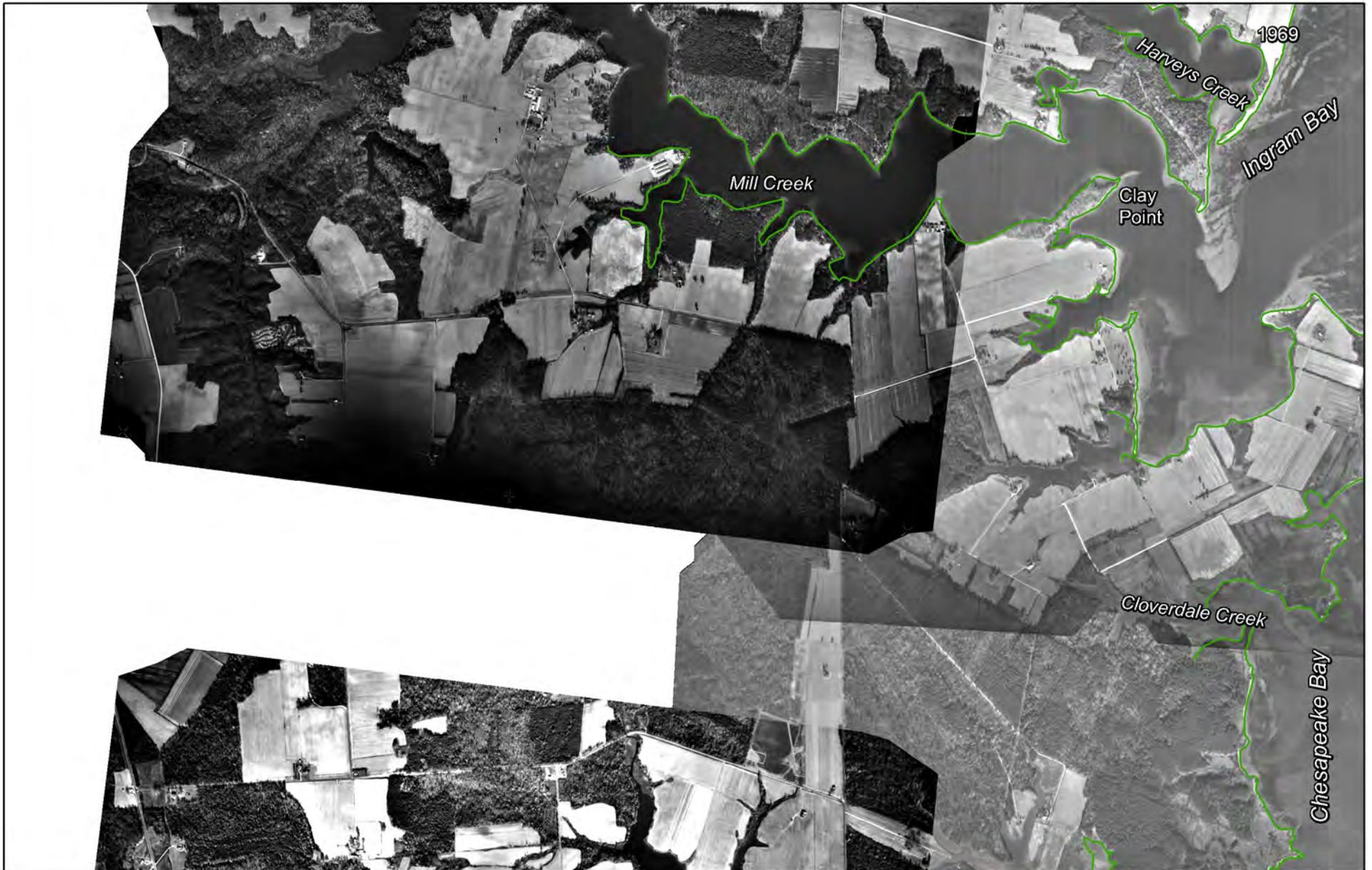
Legend
 — 1953 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 19**



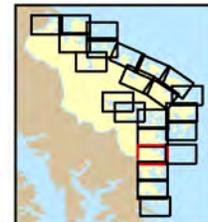


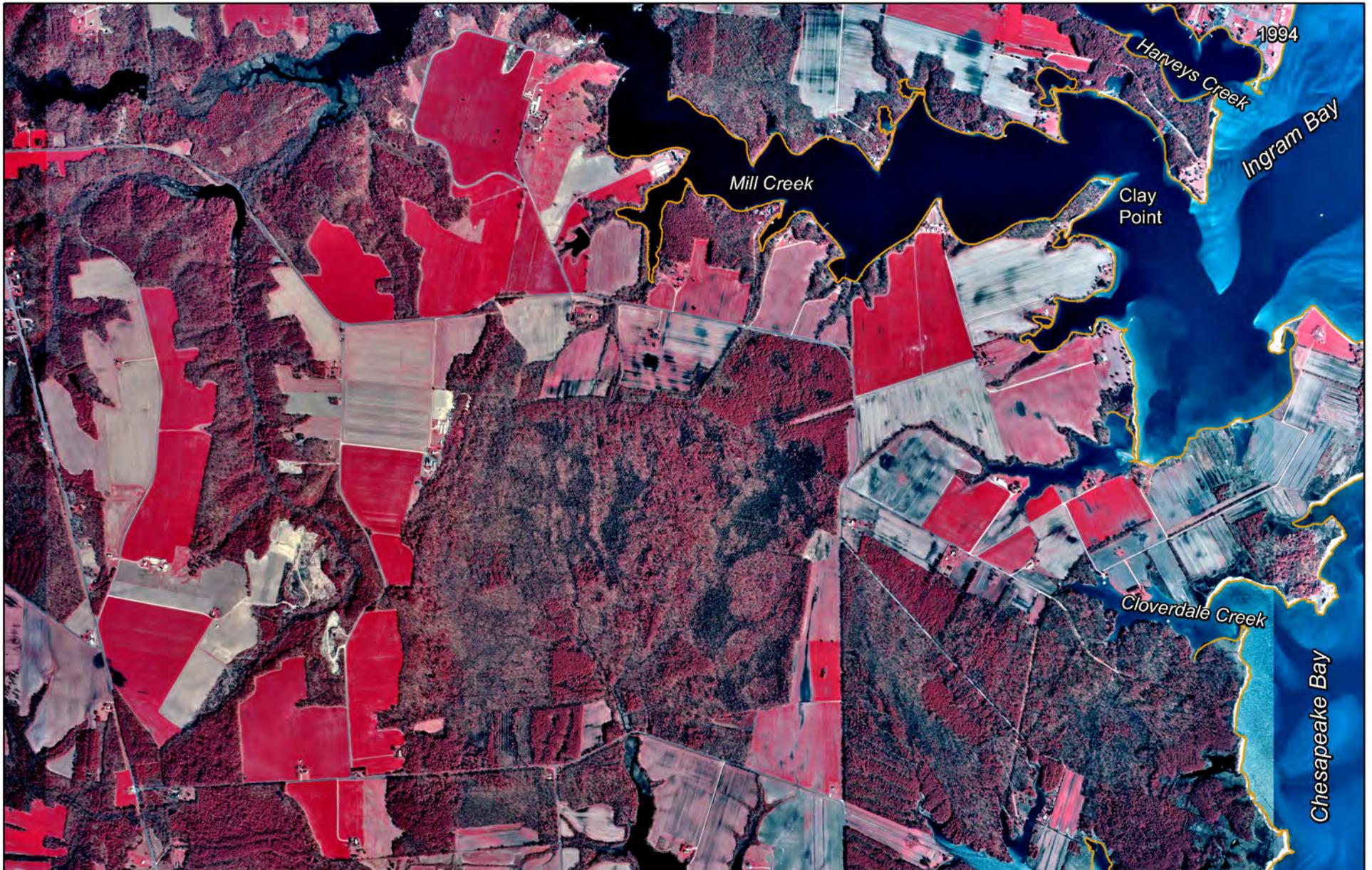
Legend
 — 1969 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 19**



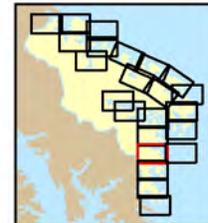


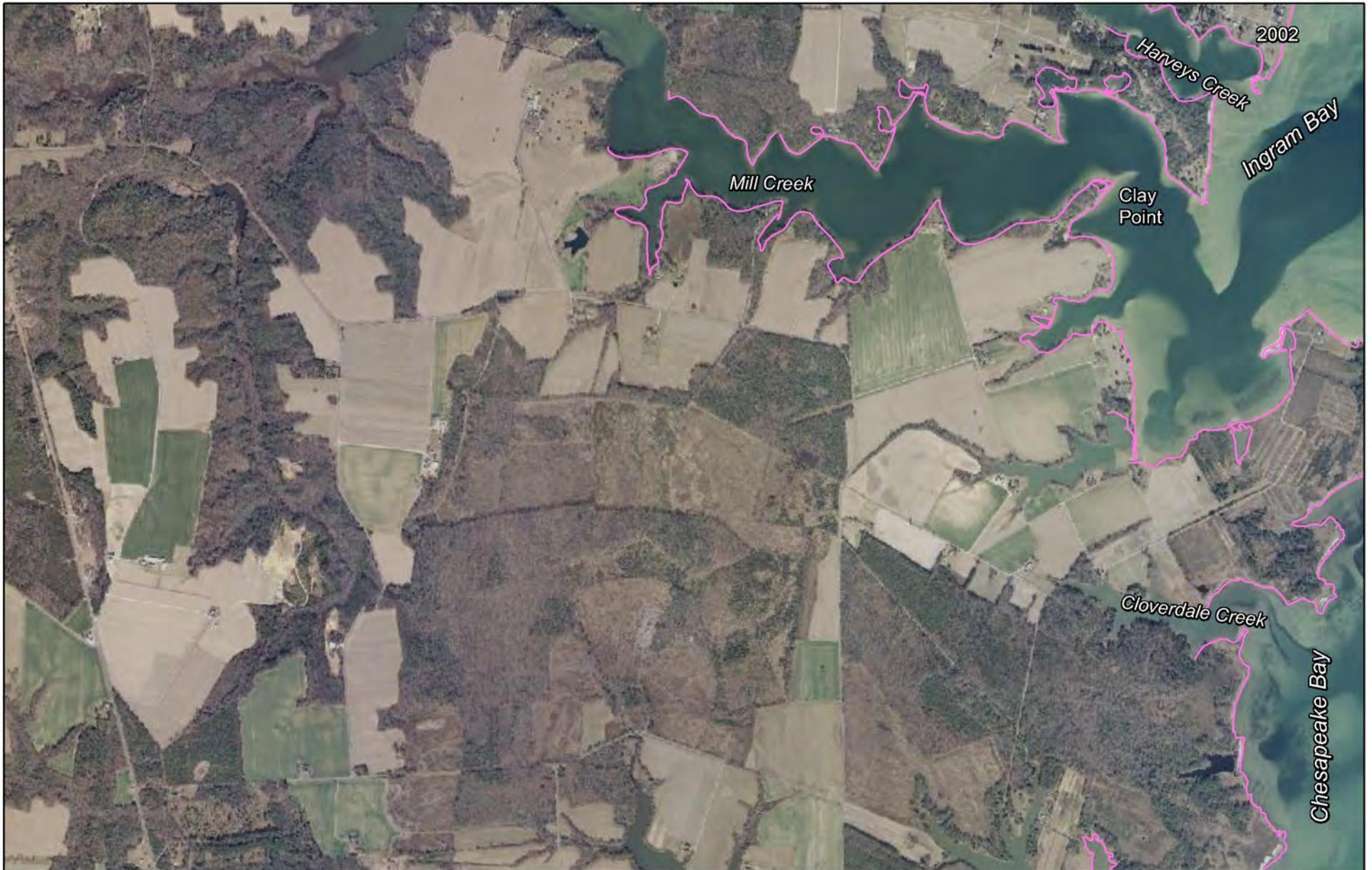
Legend
 — 1994 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 19**



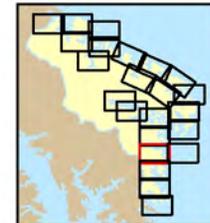


Legend
 — 2002 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 19**



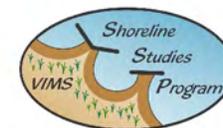
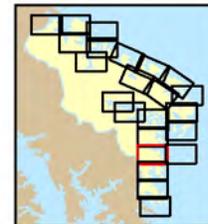


Legend
 — 2009 Shoreline



0 2,000 4,000
 Feet

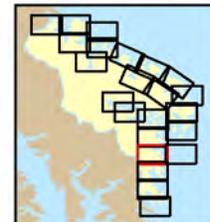
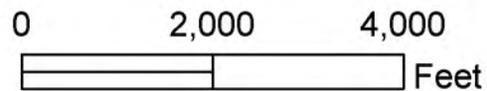
**Northumberland County, Virginia
 Plate 19**



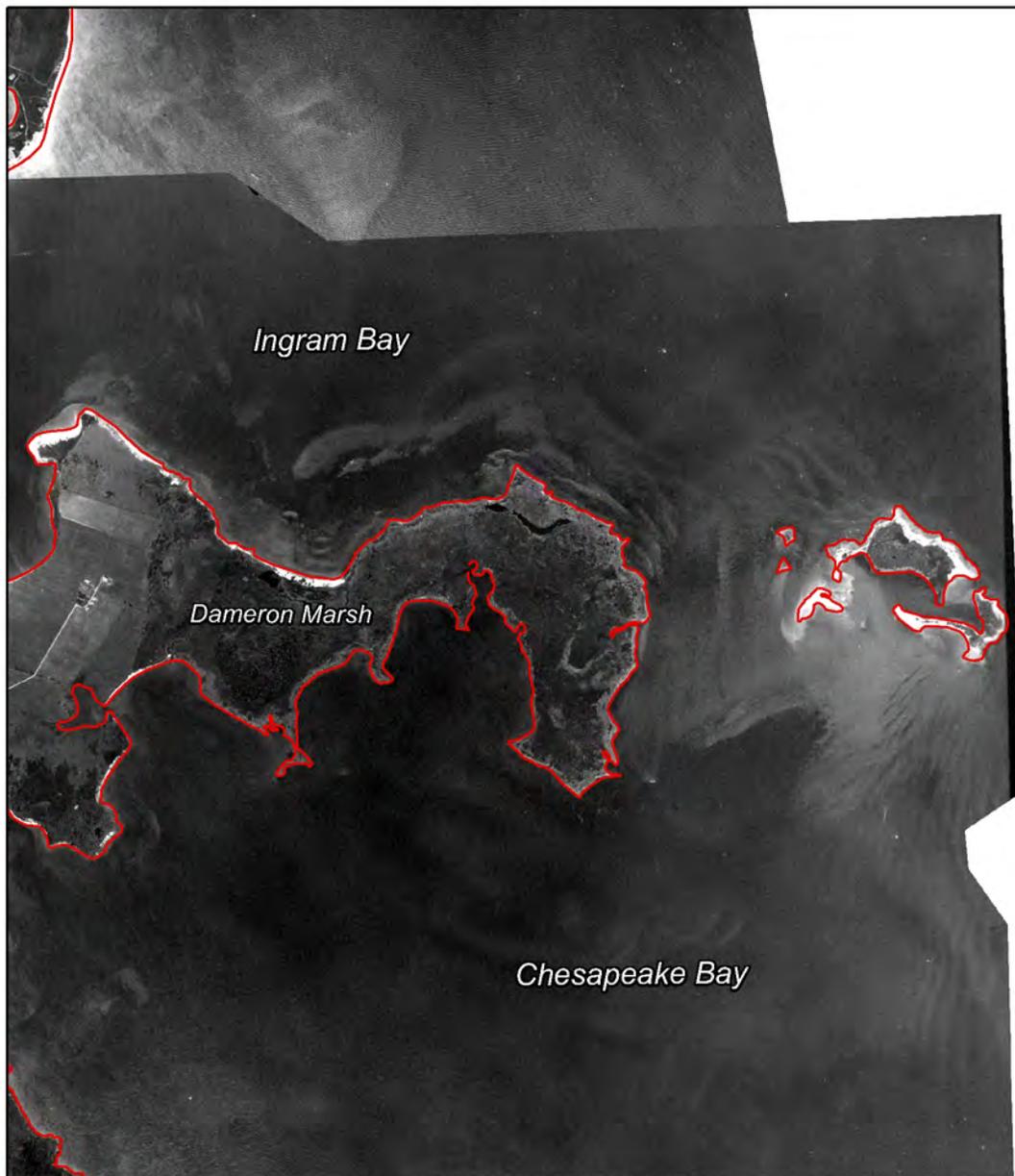


| Legend | | | |
|--------|----------------|--|----------------|
| | 1937 Shoreline | | 2002 Shoreline |
| | 1953 Shoreline | | 2009 Shoreline |
| | 1969 Shoreline | | 2013 Shoreline |
| | 1994 Shoreline | | |

Northumberland County, Virginia Plate 19



1987

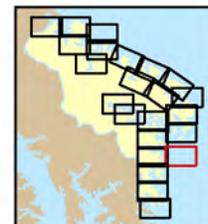


Legend
— 1937 Shoreline



0 2,000 4,000
Feet

Northumberland County, Virginia Plate 20



1953

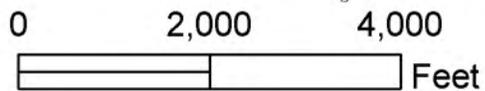


Ingram Bay

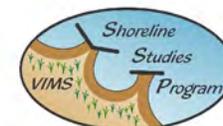
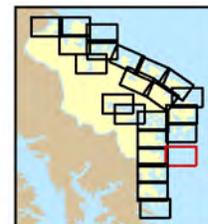
Dameron Marsh

Chesapeake Bay

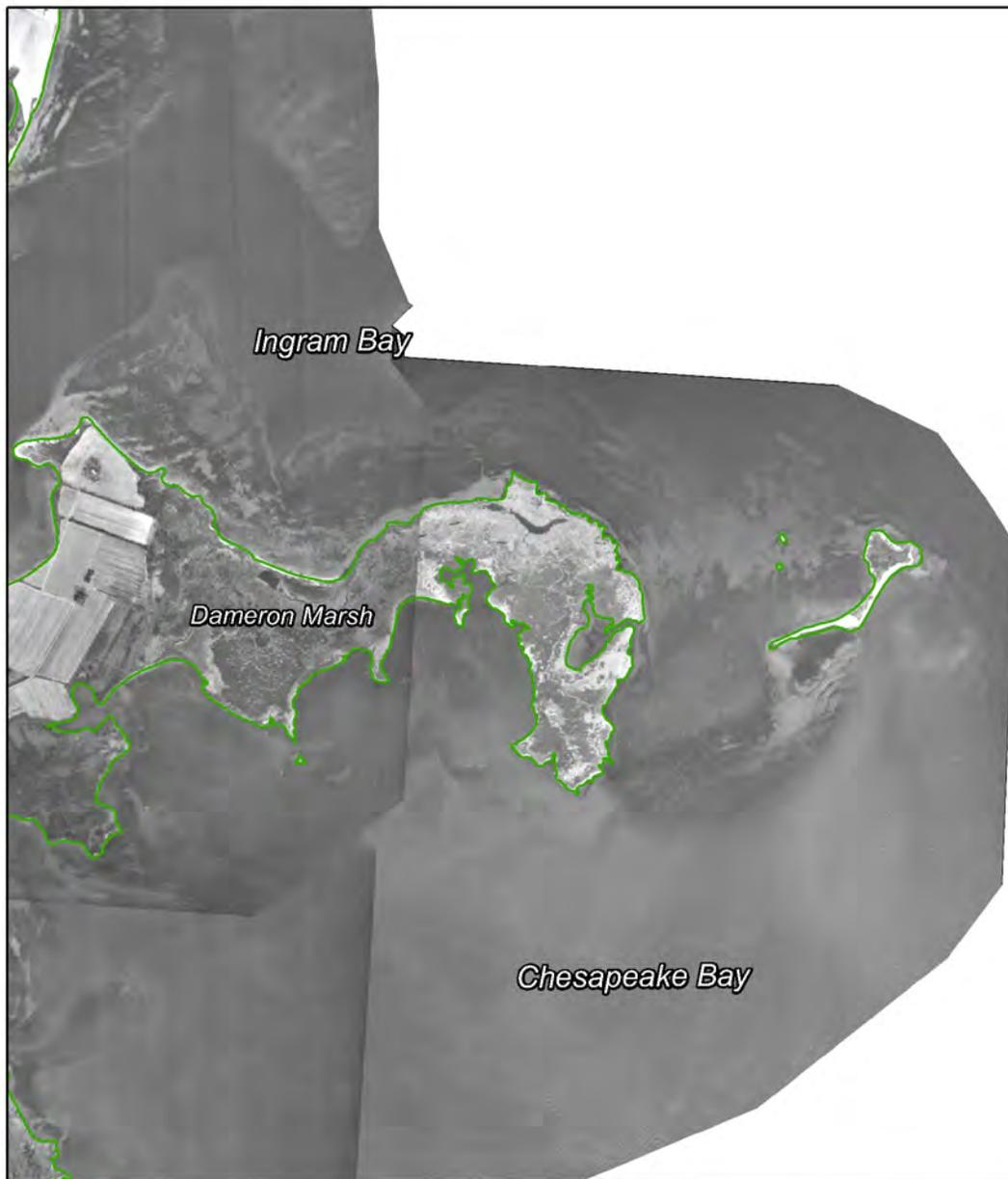
Legend
— 1953 Shoreline



Northumberland County, Virginia Plate 20



1969



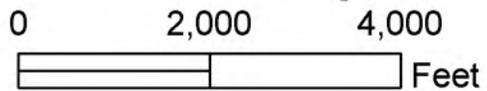
Ingram Bay

Dameron Marsh

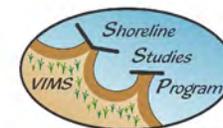
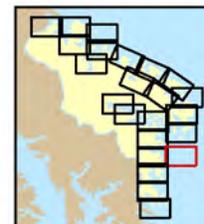
Chesapeake Bay

Legend

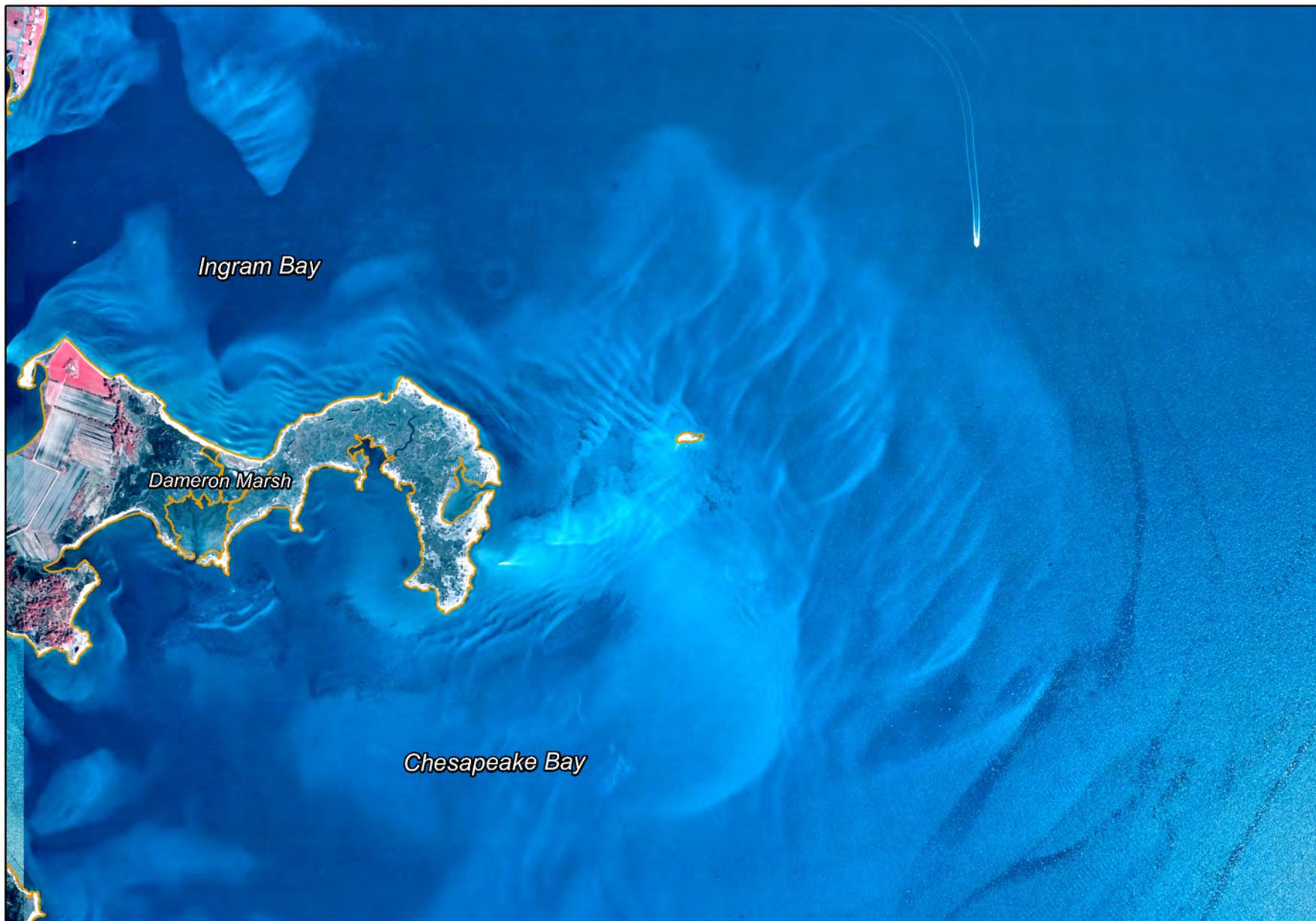
— 1969 Shoreline



**Northumberland County, Virginia
Plate 20**



1994

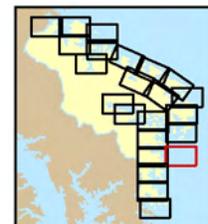


Legend
— 1994 Shoreline



0 2,000 4,000
Feet

Northumberland County, Virginia Plate 20



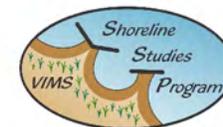
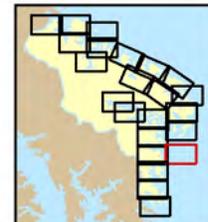


Legend
— 2002 Shoreline



0 2,000 4,000
Feet

Northumberland County, Virginia Plate 20



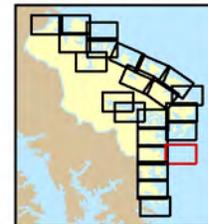


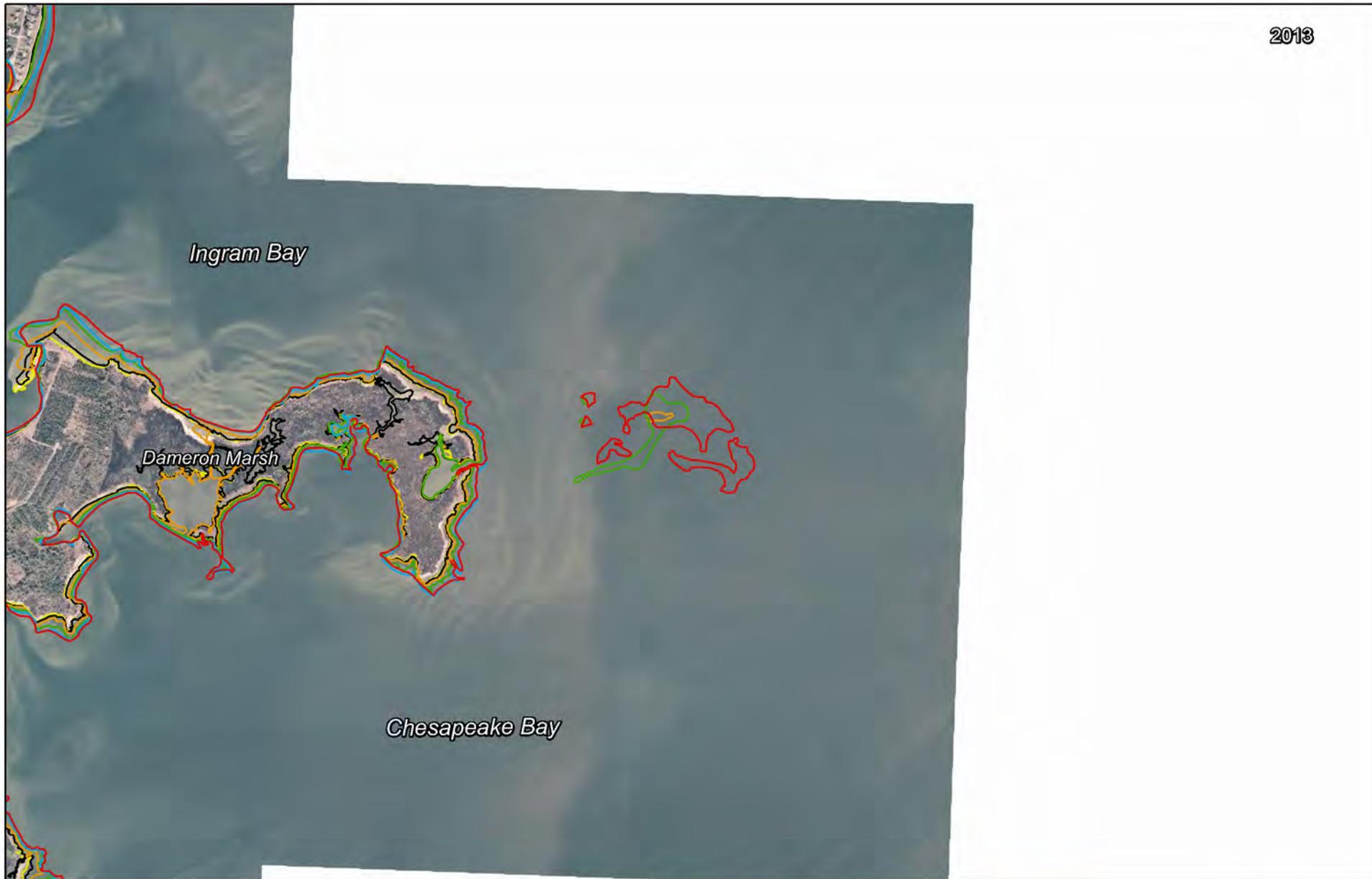
Legend
— 2009 Shoreline



0 2,000 4,000
Feet

Northumberland County, Virginia Plate 20

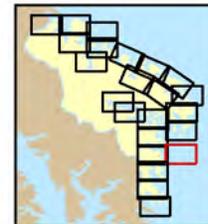
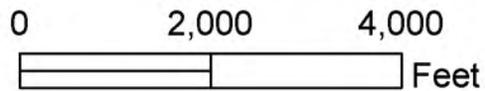


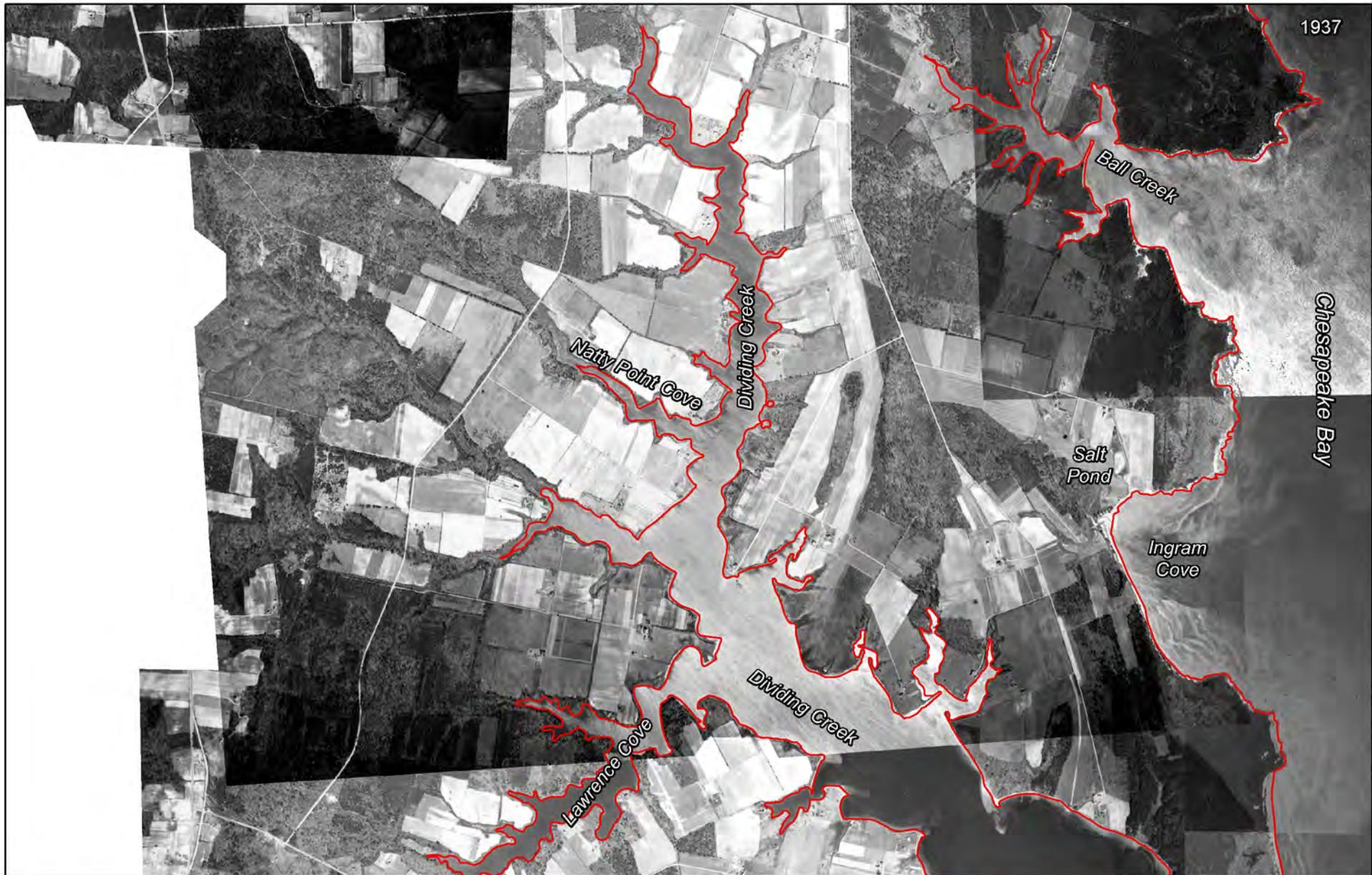


Legend

- | | |
|----------------|----------------|
| 1937 Shoreline | 2002 Shoreline |
| 1953 Shoreline | 2009 Shoreline |
| 1969 Shoreline | 2013 Shoreline |
| 1994 Shoreline | |

**Northumberland County, Virginia
Plate 20**





1937

Ball Creek

Chesapeake Bay

Natty Point Cove

Dividing Creek

Salt Pond

Ingram Cove

Dividing Creek

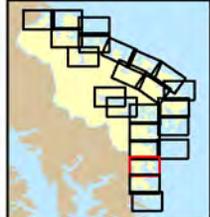
Lawrence Cove

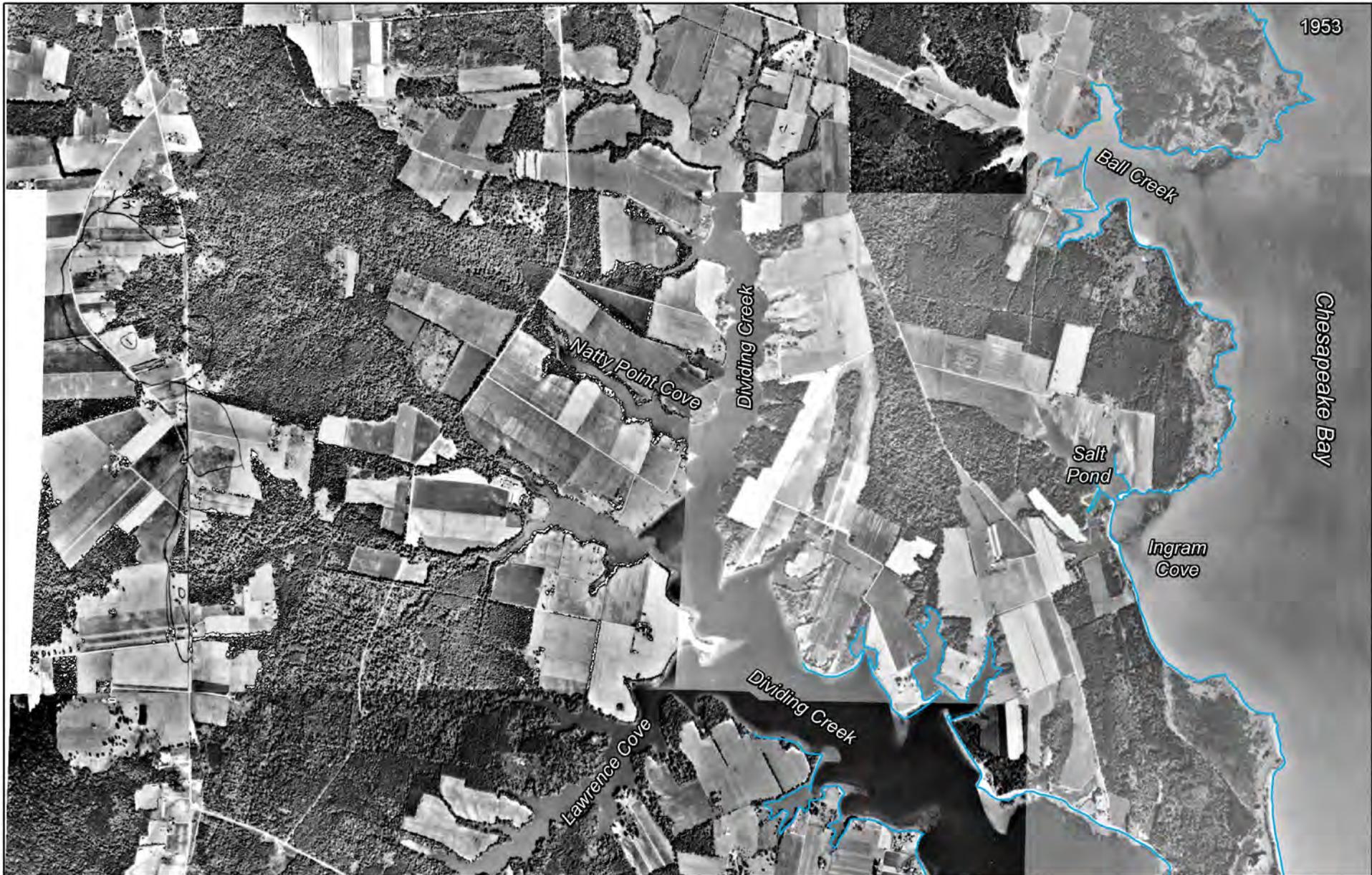
Legend
 — 1937 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 21**





1953

Ball Creek

Natty Point Cove

Dividing Creek

Salt Pond

Ingram Cove

Chesapeake Bay

Dividing Creek

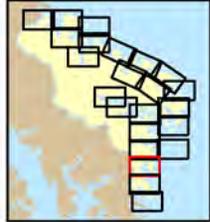
Lawrence Cove

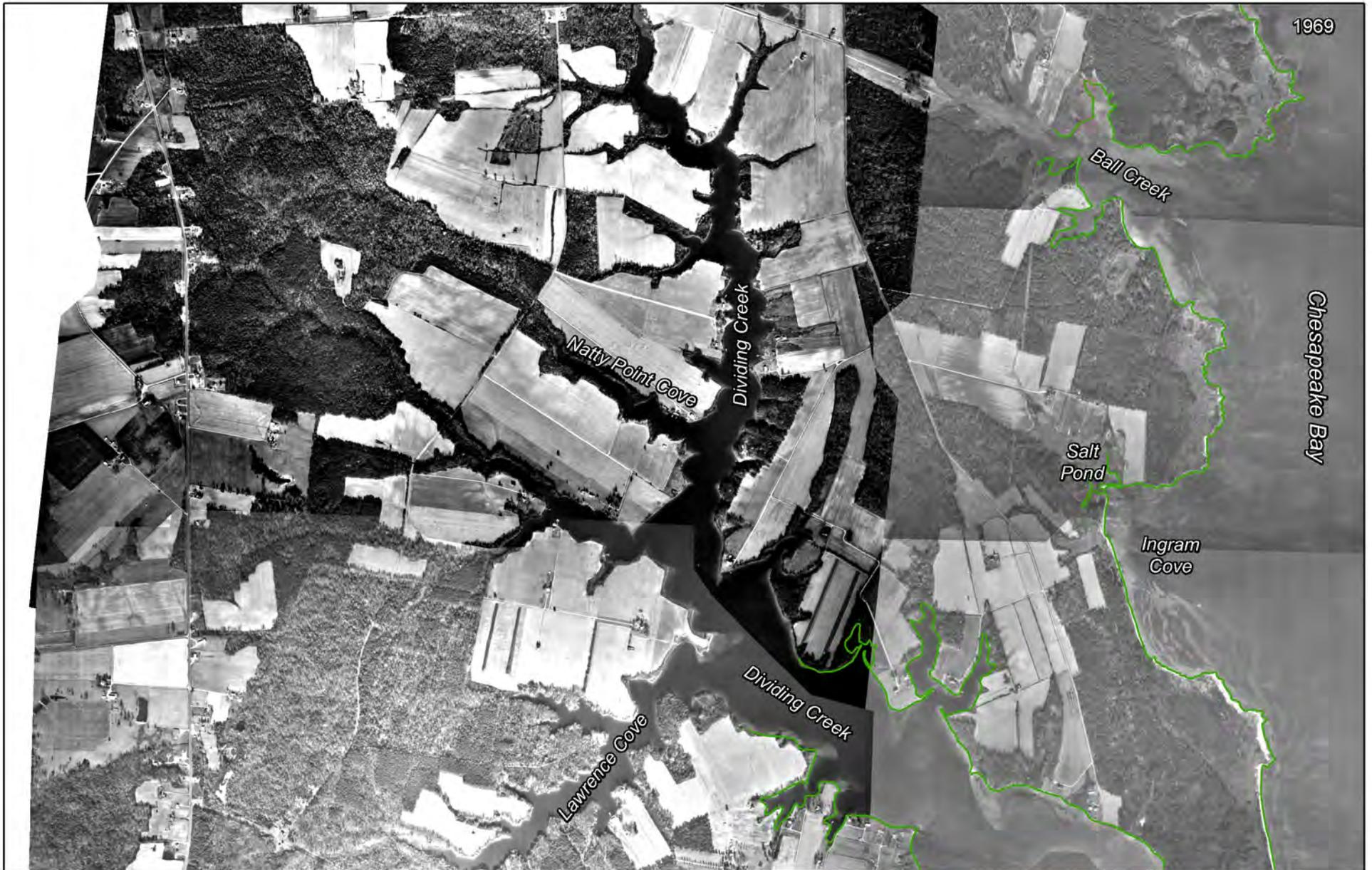
Legend
 — 1953 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 21**





1969

Ball Creek

Natty Point Cove

Dividing Creek

Chesapeake Bay

Salt Pond

Ingram Cove

Lawrence Cove

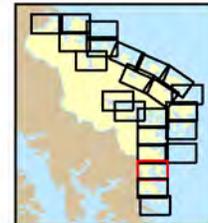
Dividing Creek

Legend
 — 1969 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 21**





1994

Chesapeake Bay

Ball Creek

Salt Pond

Ingram Cove

Dividing Creek

Natty Point Cove

Dividing Creek

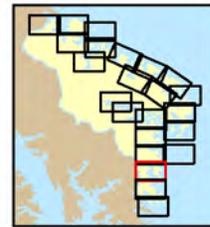
Lawrence Cove

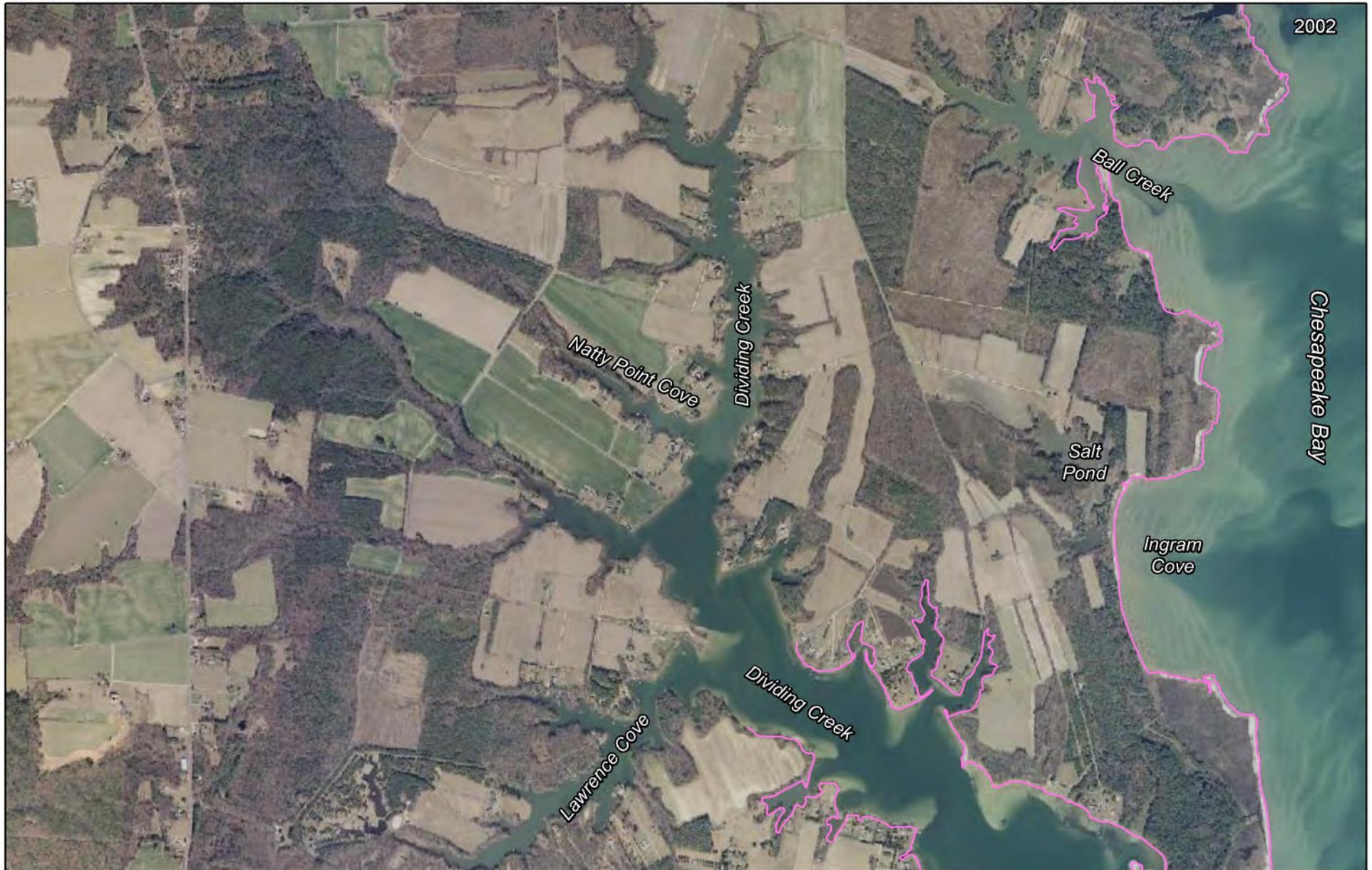
Legend
 — 1994 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 21**





Legend

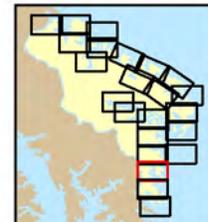
— 2002 Shoreline



0 2,000 4,000

Feet

Northumberland County, Virginia
Plate 21





2009

Chesapeake Bay

Ball Creek

Salt Pond

Ingram Cove

Dividing Creek

Natty Point Cove

Dividing Creek

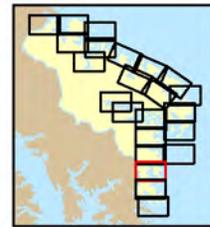
Lawrence Cove

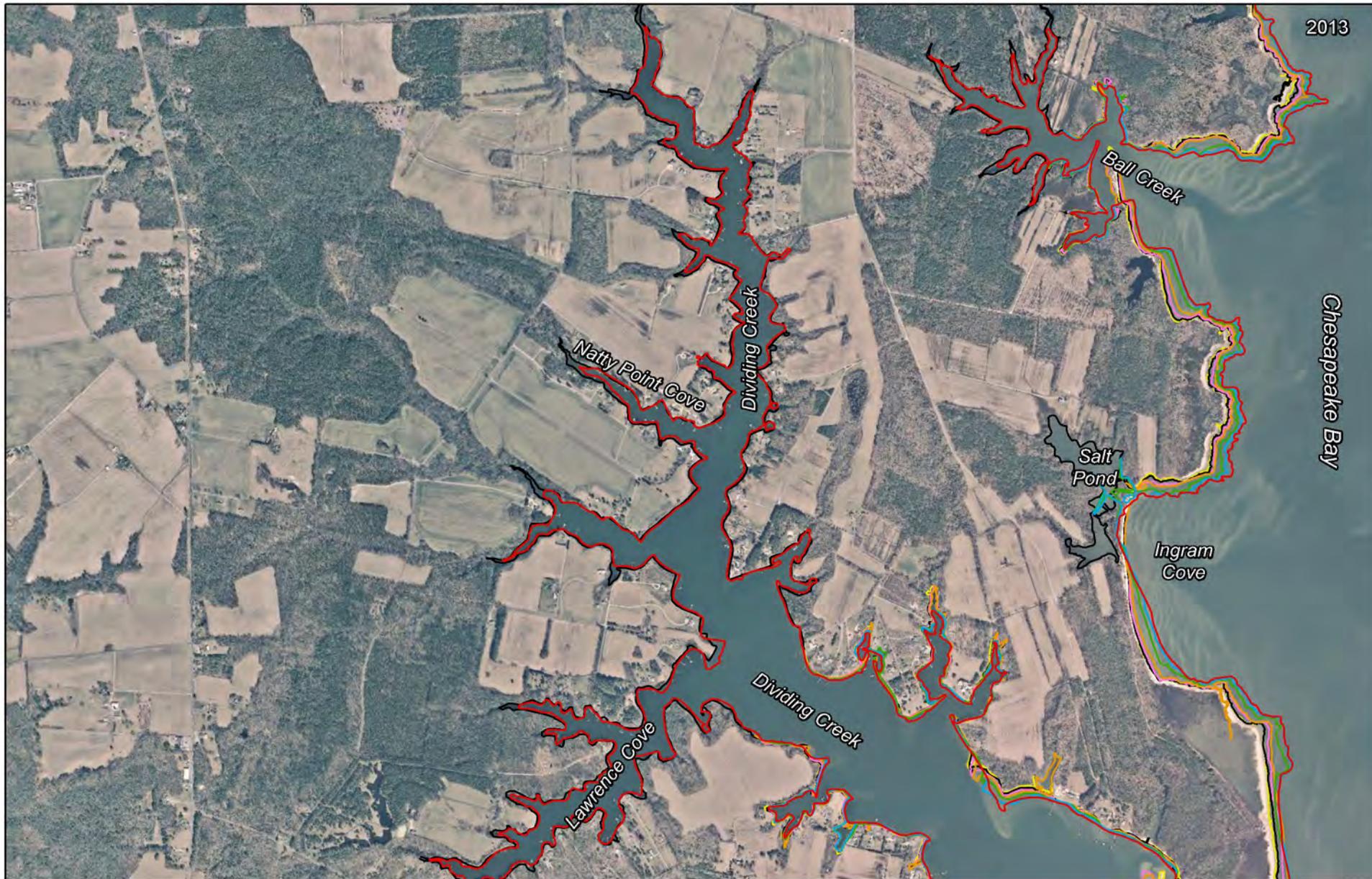
Legend
 — 2009 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 21**





2013

Chesapeake Bay

Ball Creek

Salt Pond

Ingram Cove

Dividing Creek

Natty Point Cove

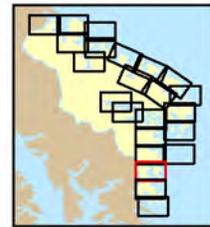
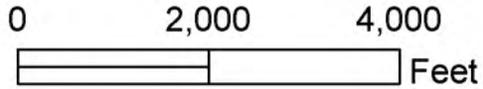
Dividing Creek

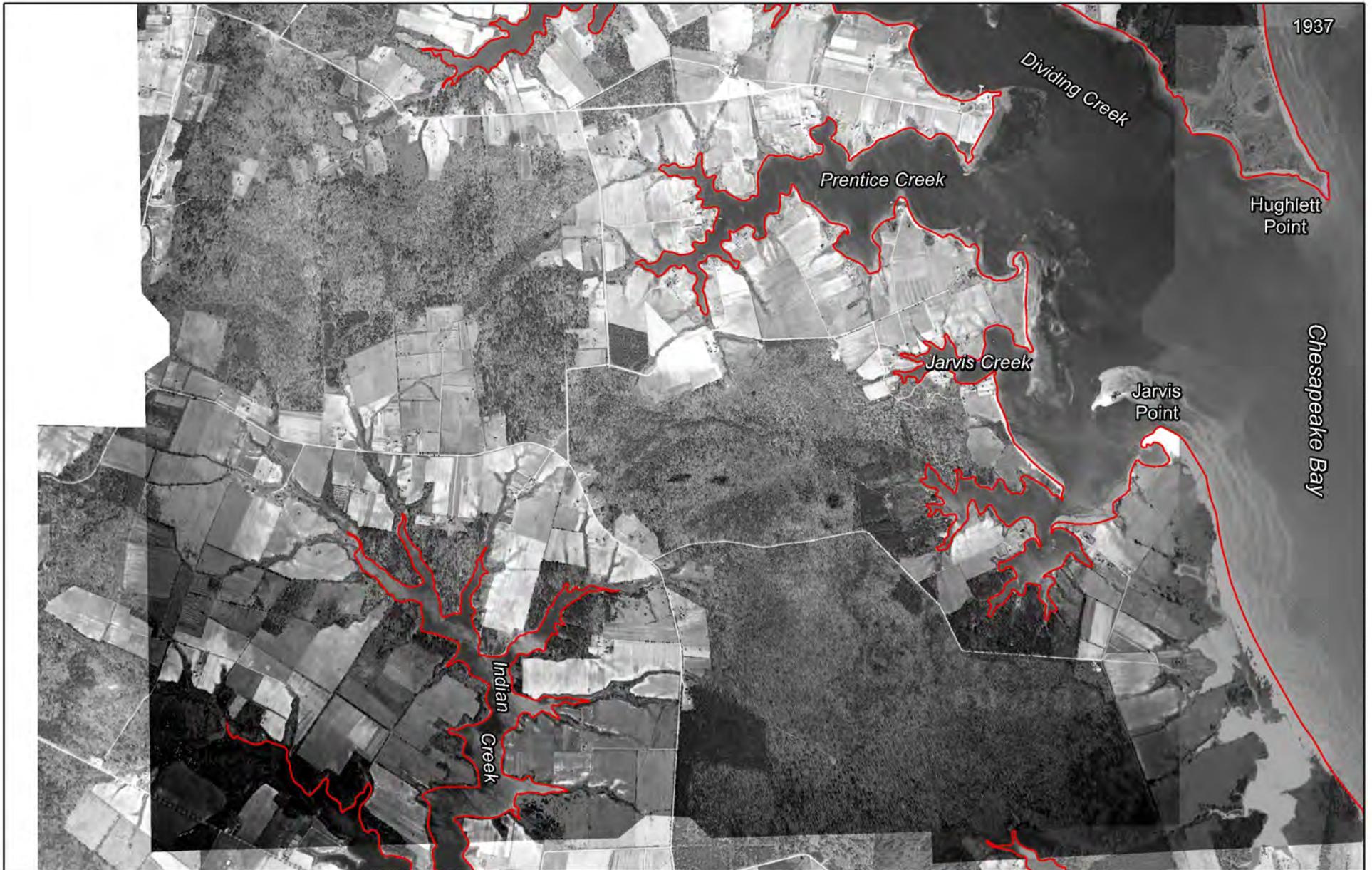
Lawrence Cove

Legend

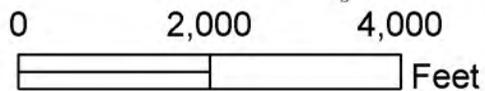
- 1937 Shoreline
- 1953 Shoreline
- 1969 Shoreline
- 1994 Shoreline
- 2002 Shoreline
- 2009 Shoreline
- 2013 Shoreline

**Northumberland County, Virginia
Plate 21**

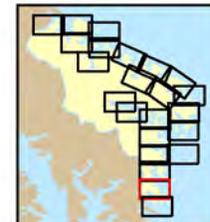


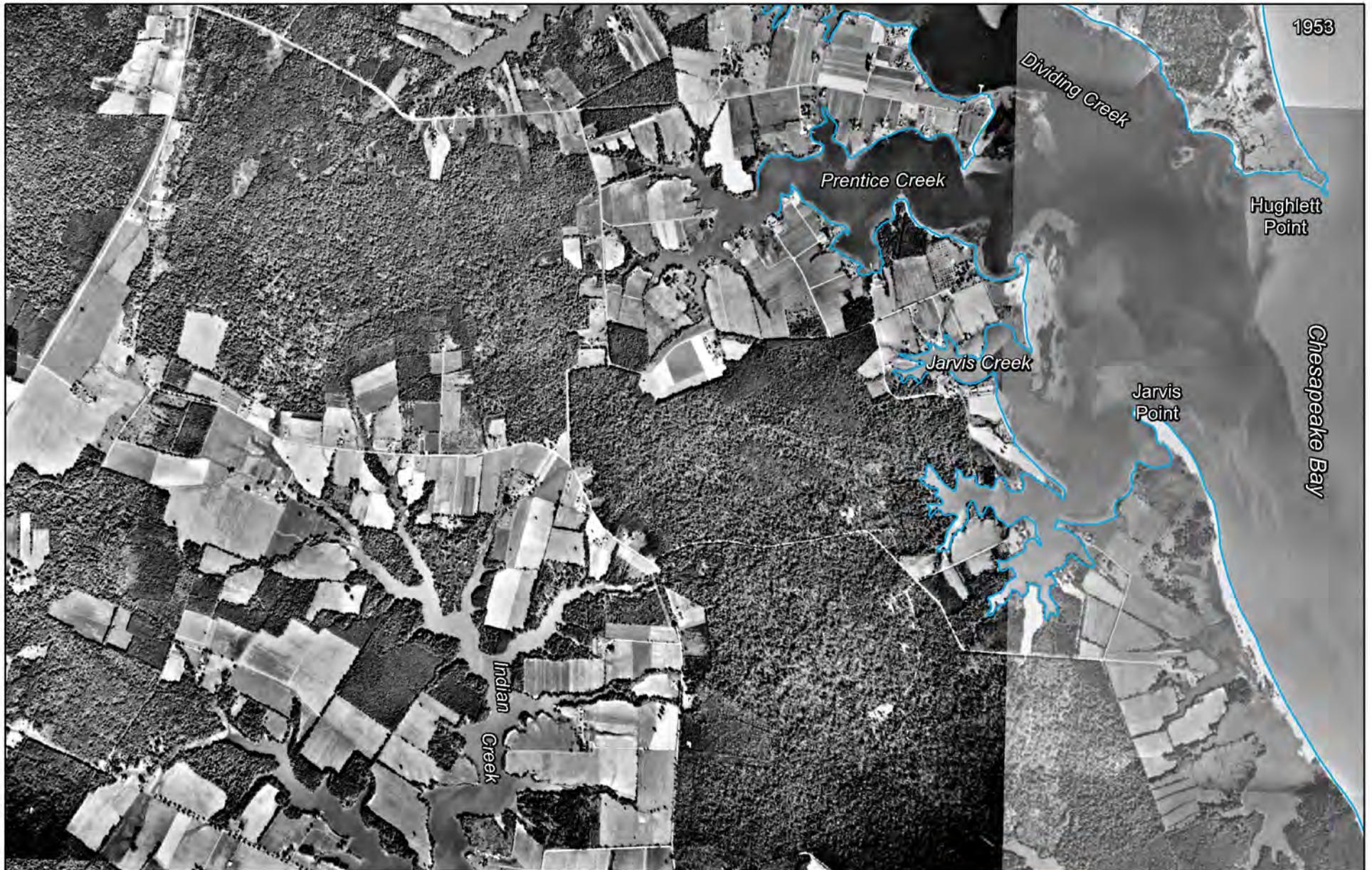


Legend
 — 1937 Shoreline



Northumberland County, Virginia Plate 22



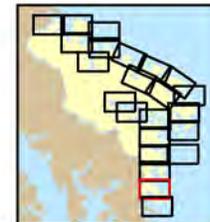


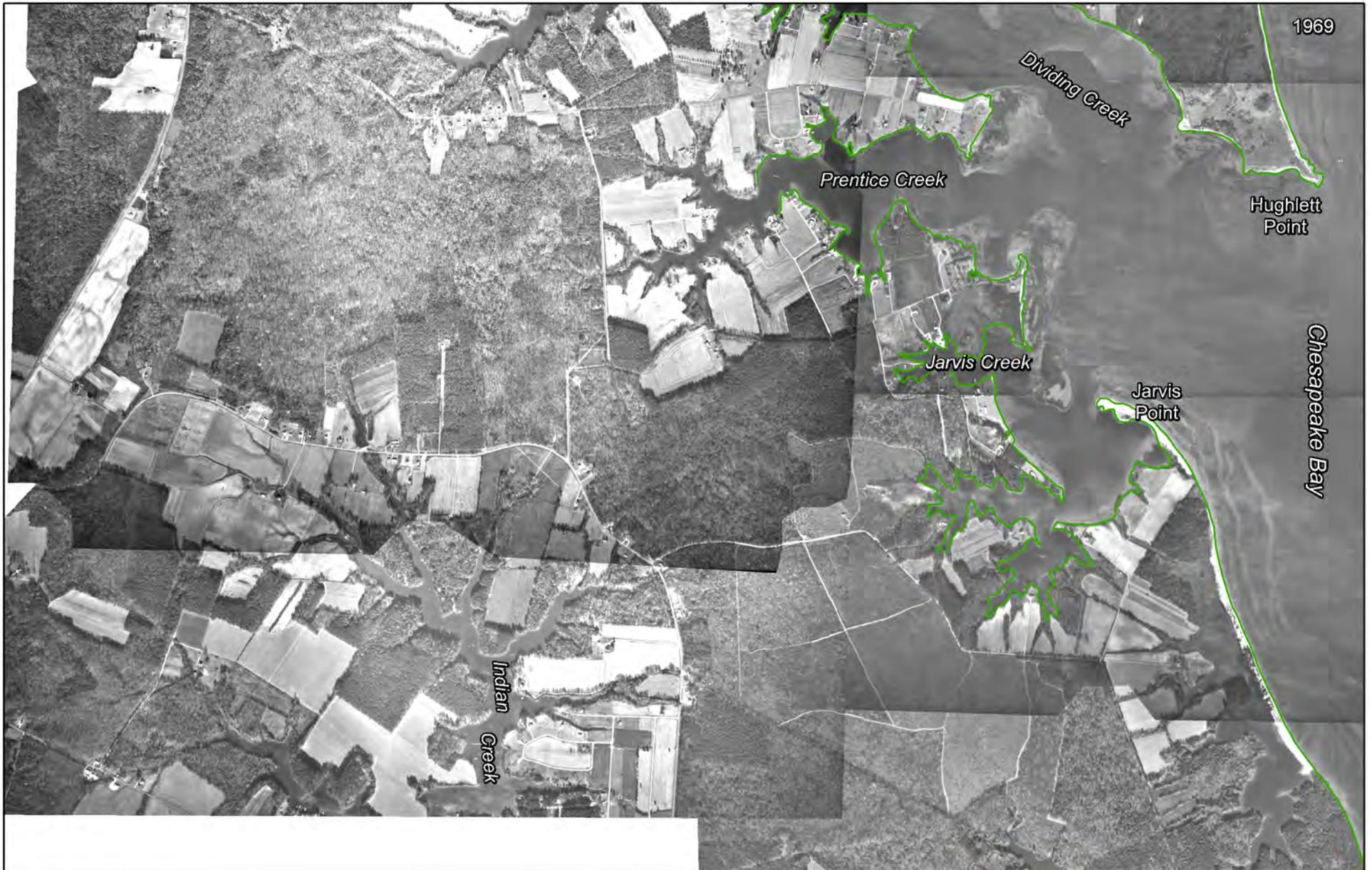
Legend
 — 1953 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 22**



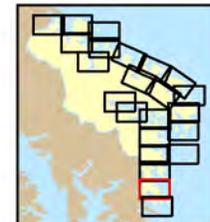


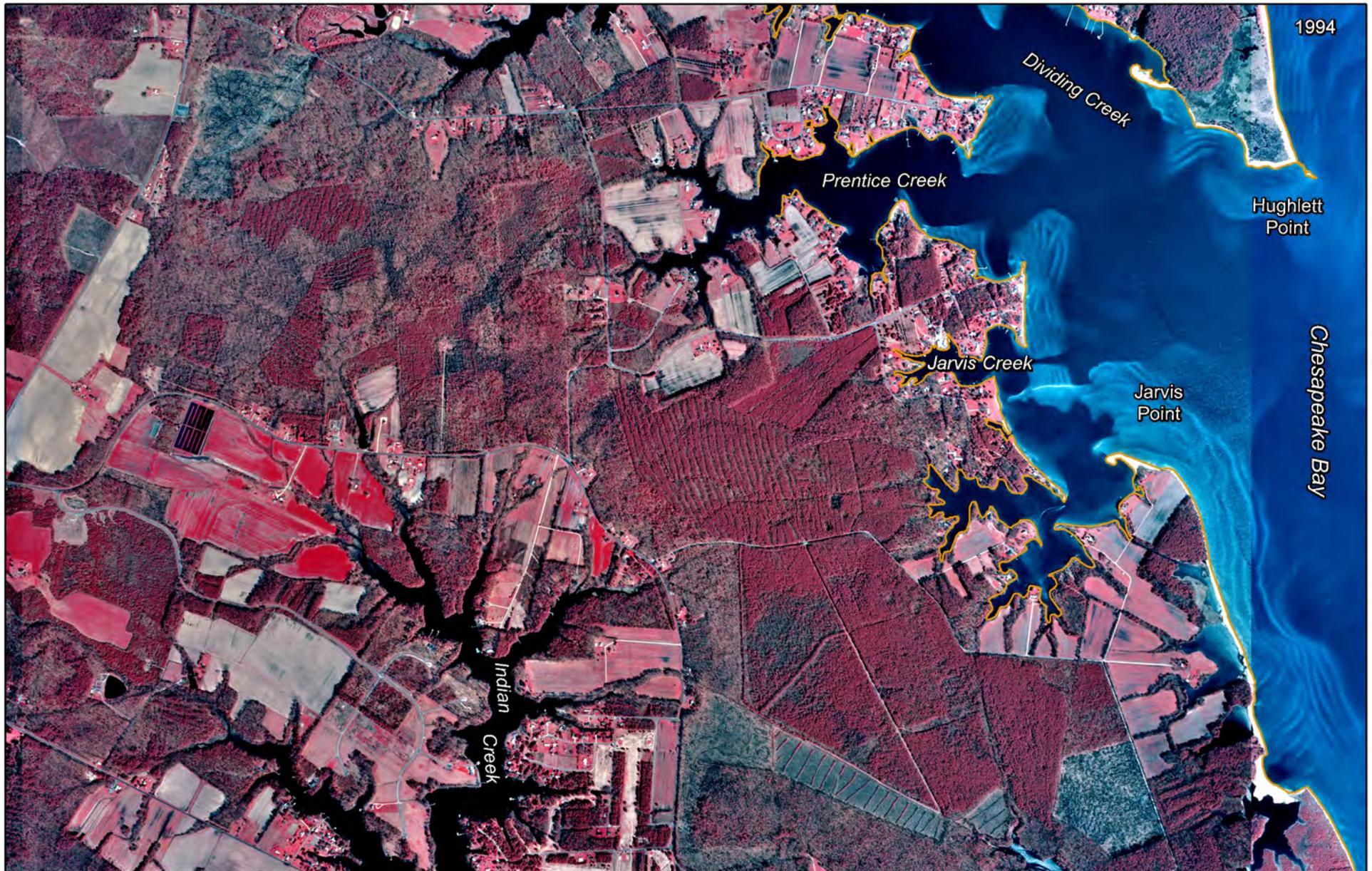
Legend
 — 1969 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 22**



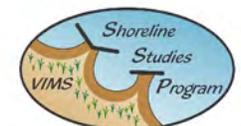
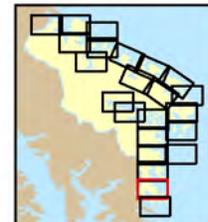


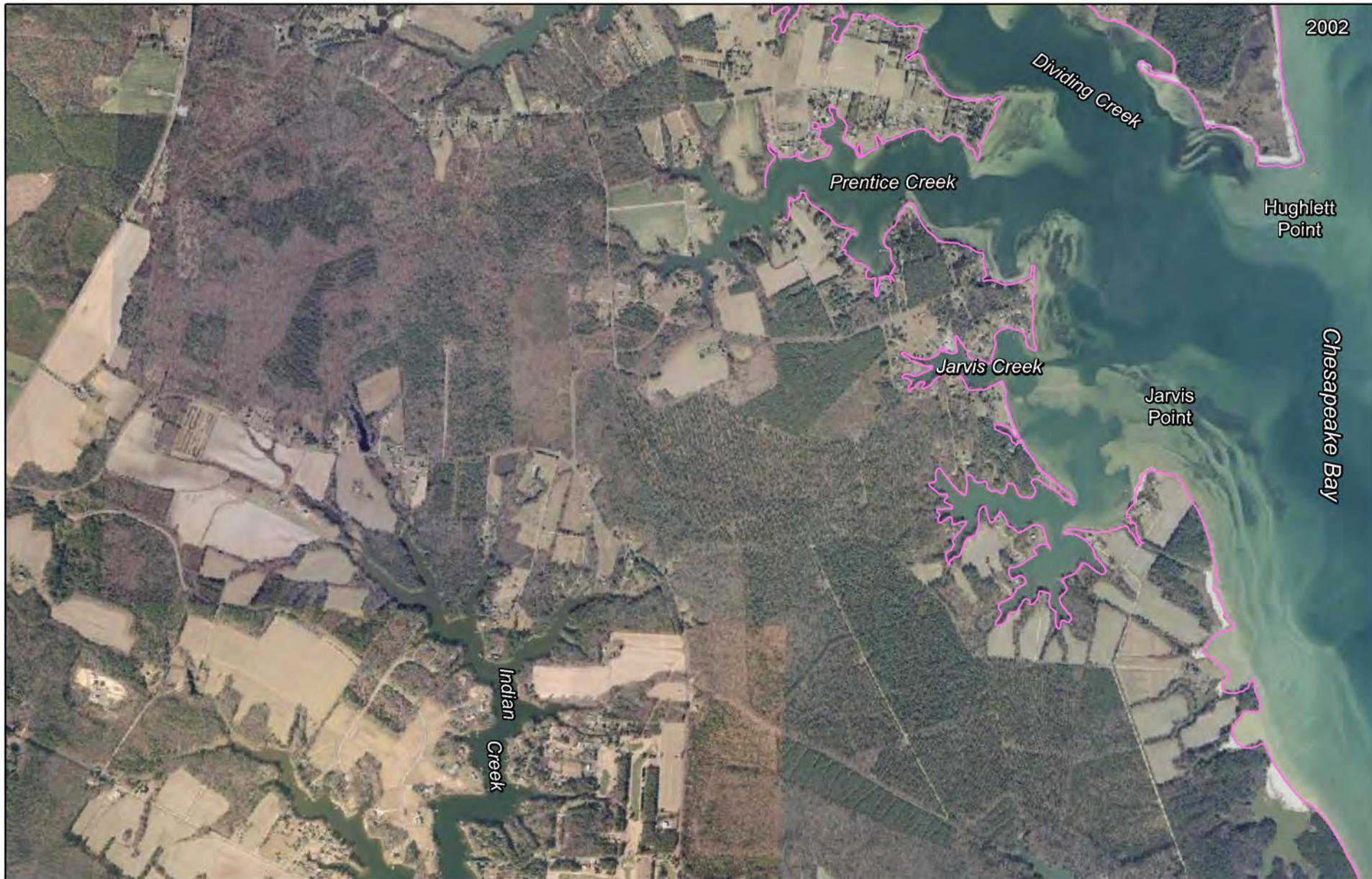
Legend
 — 1994 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 22**



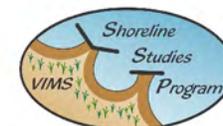
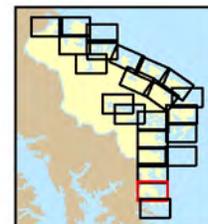


Legend
 — 2002 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 22**



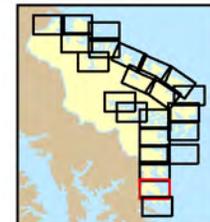


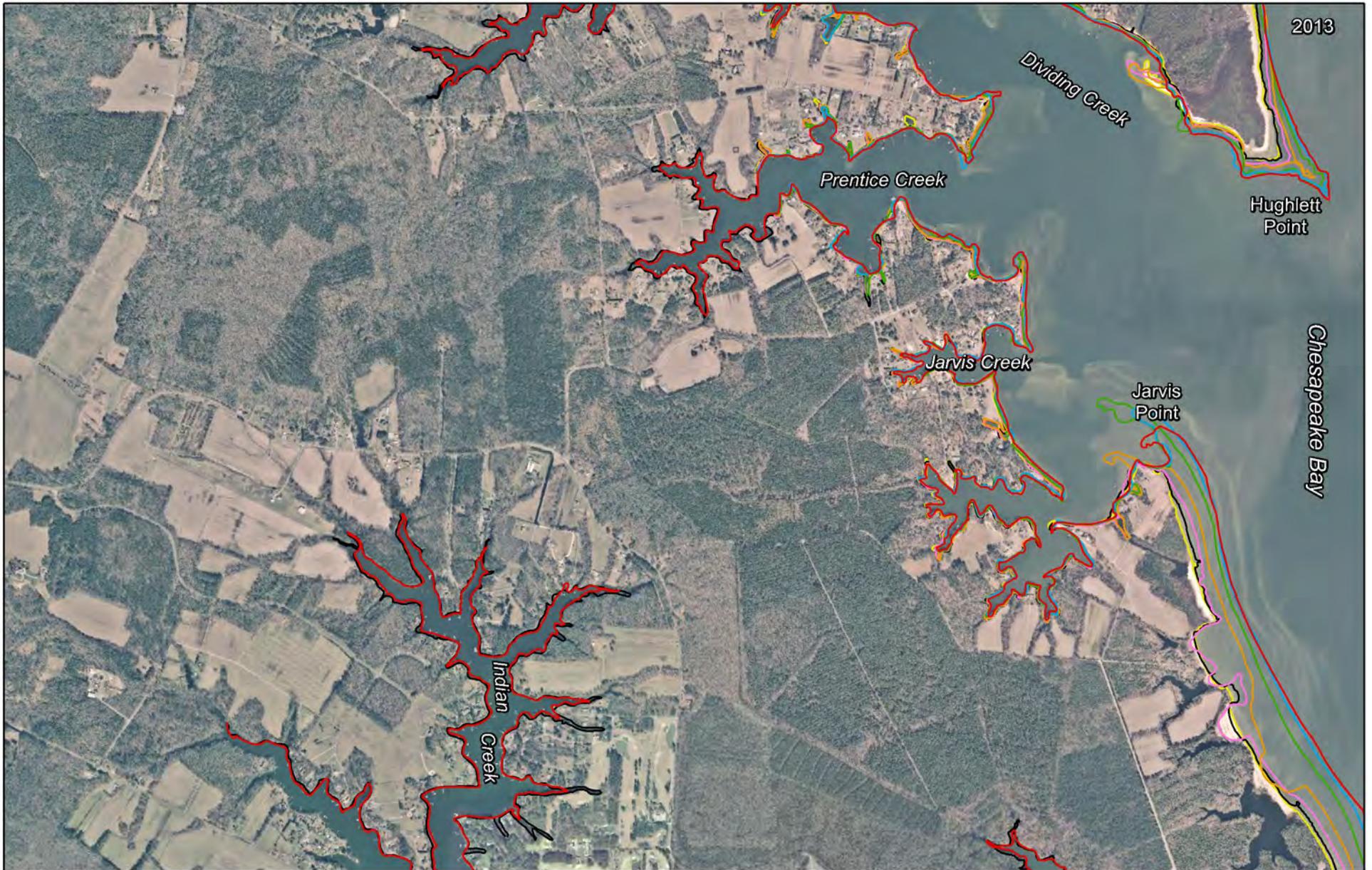
Legend
 — 2009 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 22**

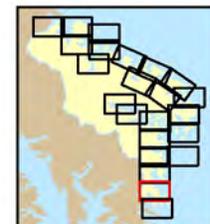
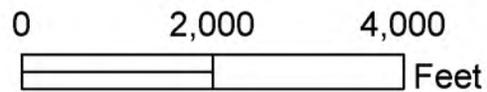


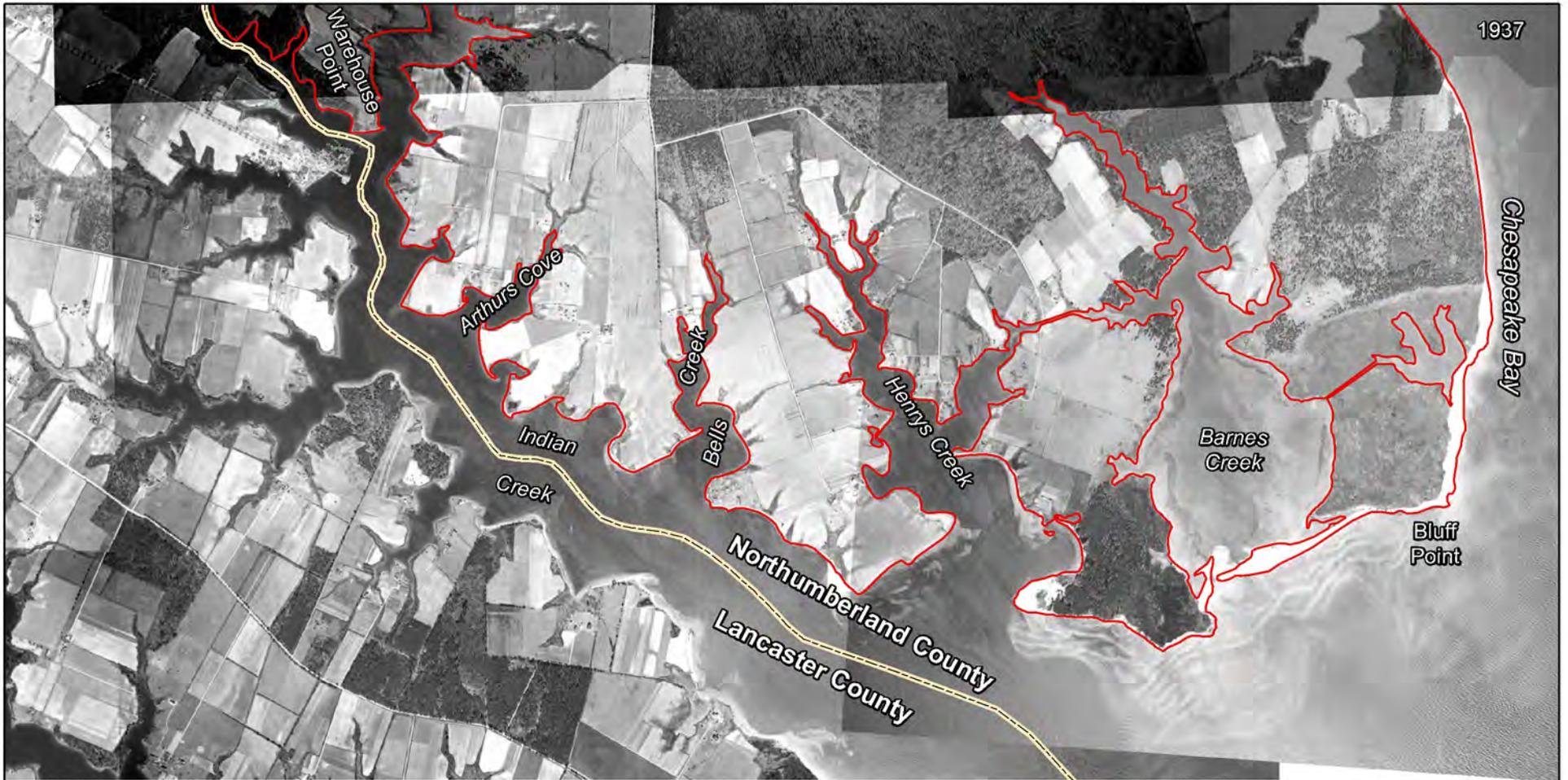


Legend

- 1937 Shoreline
- 1953 Shoreline
- 1969 Shoreline
- 1994 Shoreline
- 2002 Shoreline
- 2009 Shoreline
- 2013 Shoreline

**Northumberland County, Virginia
Plate 22**





Legend

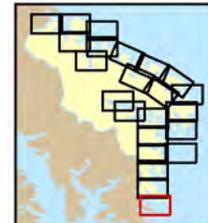
— 1937 Shoreline



0 2,000 4,000

Feet

**Northumberland County, Virginia
Plate 23**





1953

Chesapeake Bay

Bluff Point

Northumberland County
Lancaster County

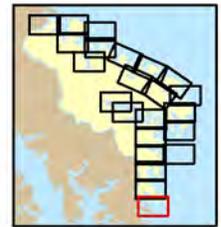
Legend
— 1953 Shoreline

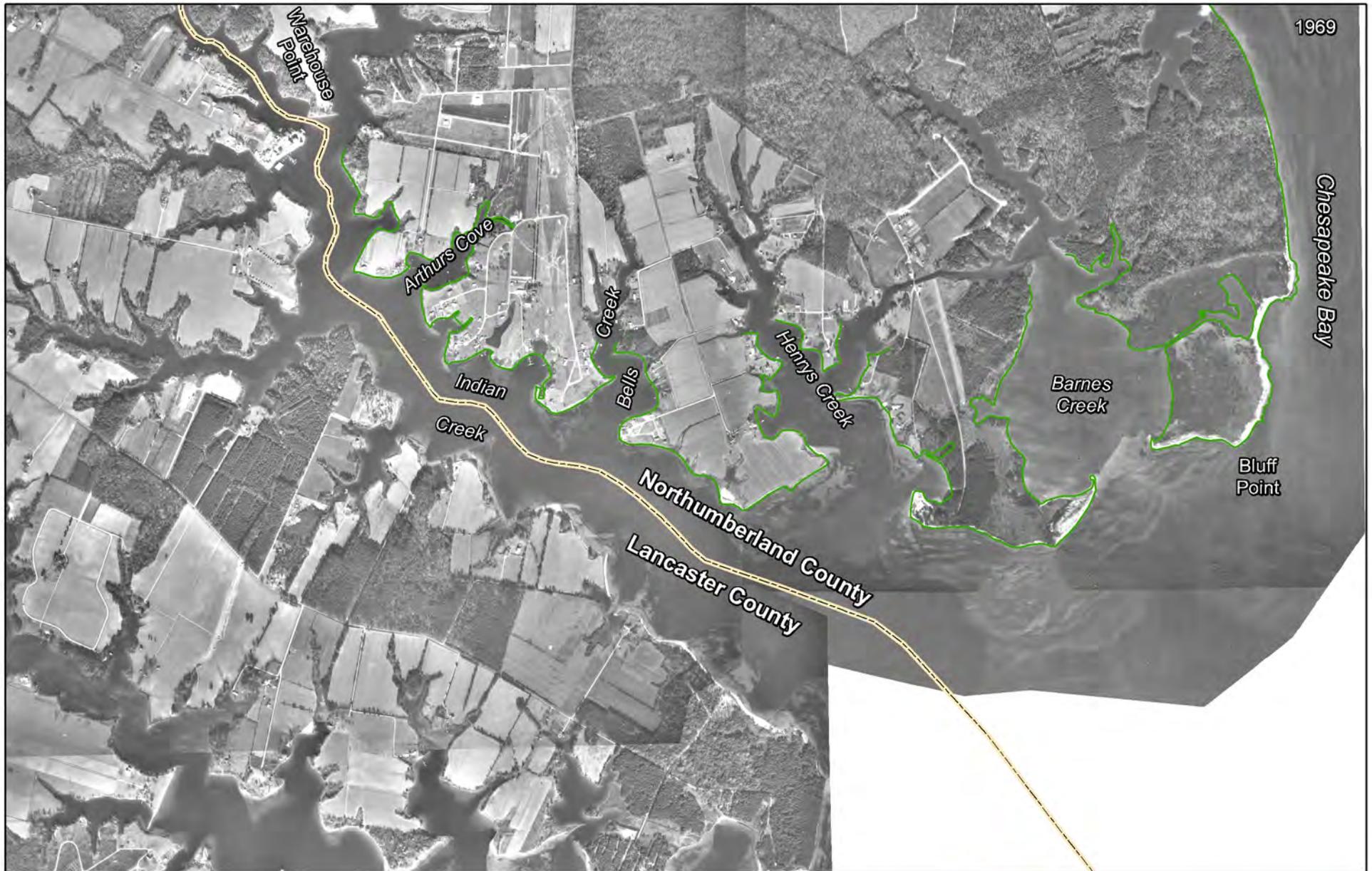


0 2,000 4,000

 Feet

**Northumberland County, Virginia
Plate 23**





1969

Chesapeake Bay

Bluff Point

Barnes Creek

Henrys Creek

Bells Creek

Arthurs Cove

Indian Creek

Warehouse Point

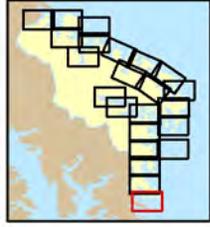
Northumberland County
Lancaster County

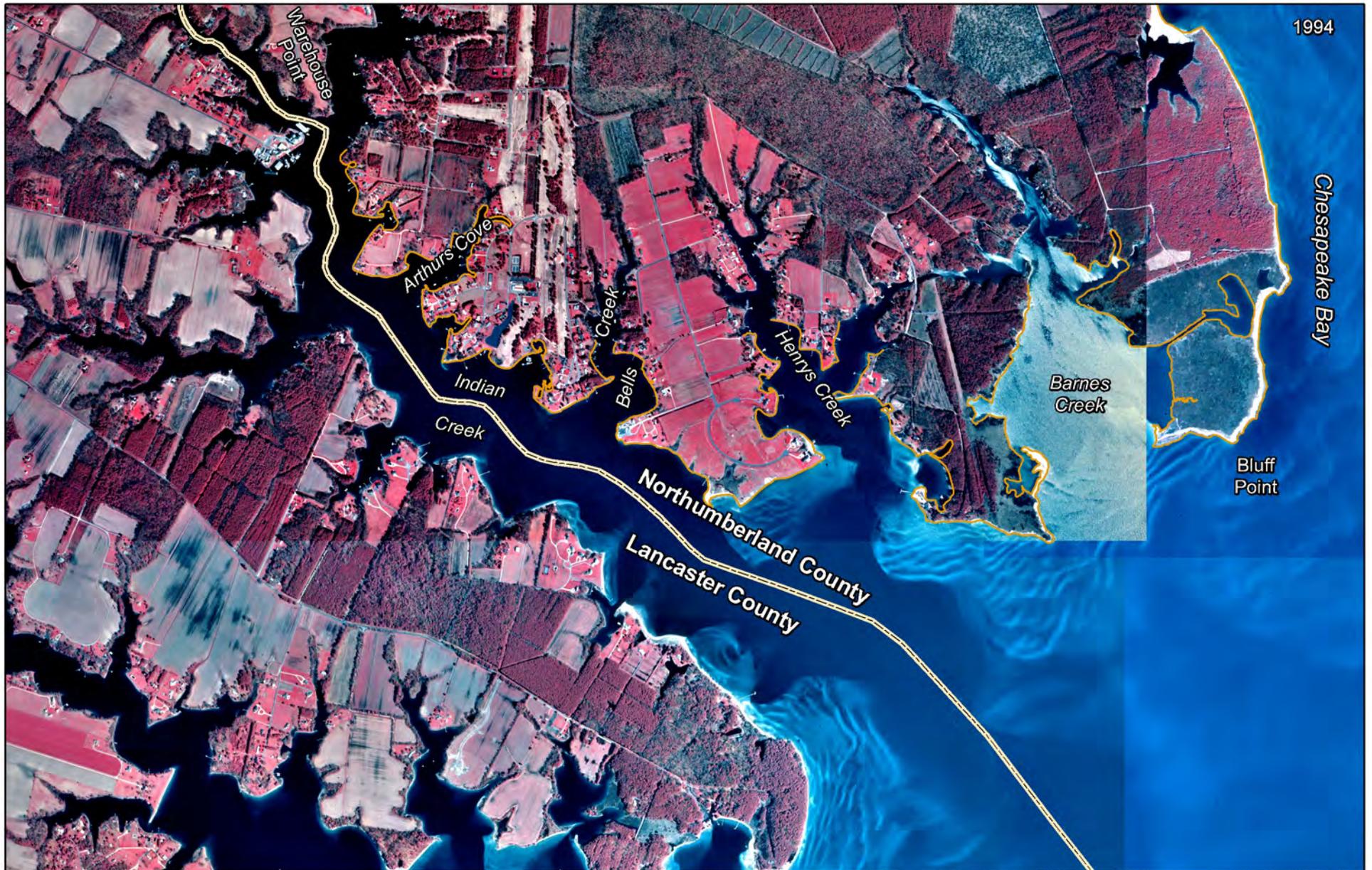
Legend
— 1969 Shoreline



0 2,000 4,000
Feet

**Northumberland County, Virginia
Plate 23**





1994

Chesapeake Bay

Bluff Point

Barnes Creek

Henrys Creek

Bells Creek

Arthur's Cove

Indian Creek

Warehouse Point

Northumberland County
Lancaster County

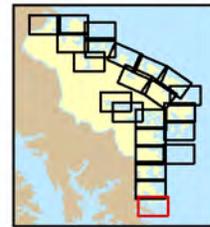
Legend

— 1994 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
Plate 23**





Legend

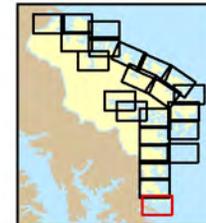
— 2002 Shoreline

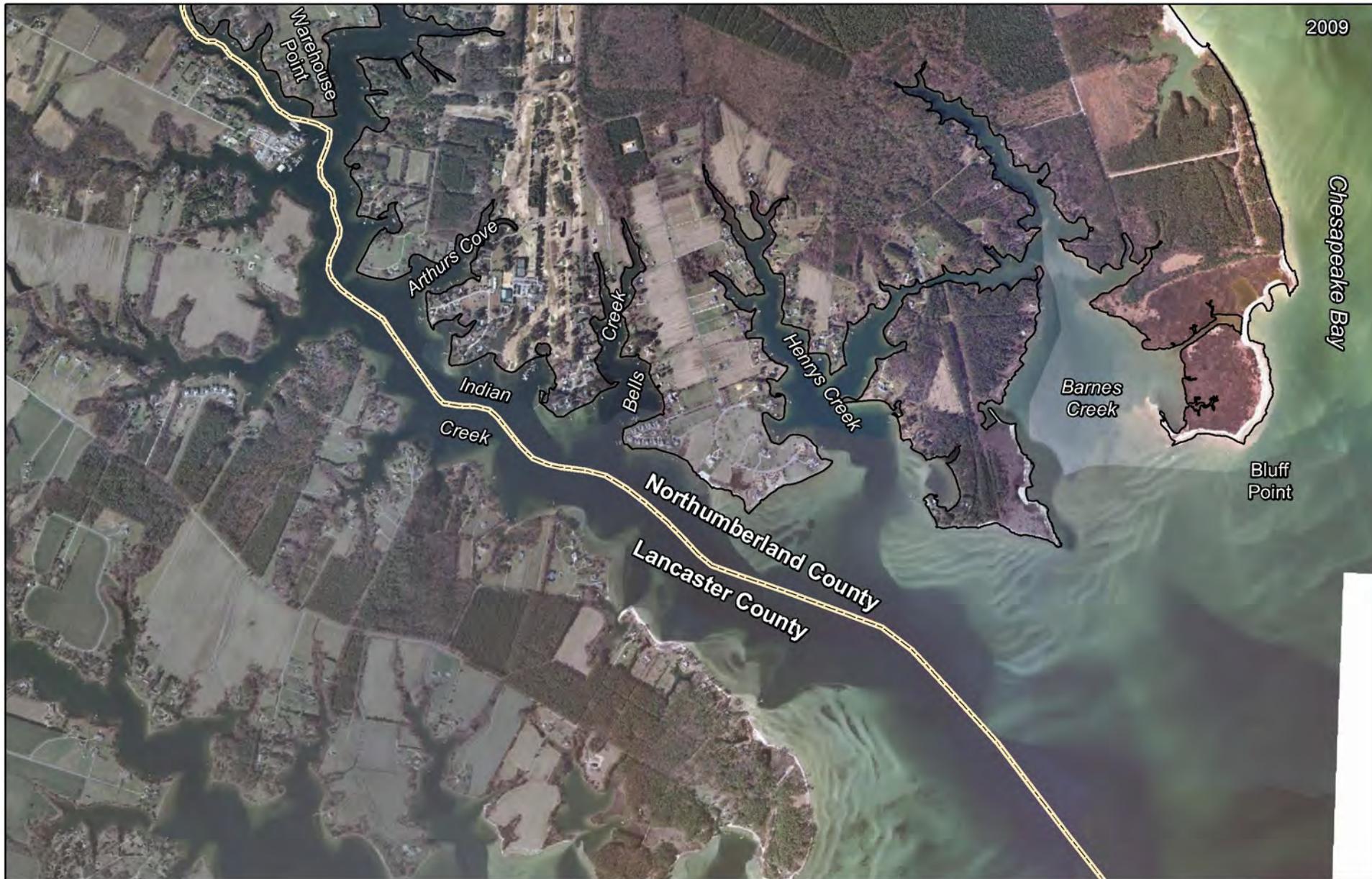


0 2,000 4,000

Feet

**Northumberland County, Virginia
Plate 23**



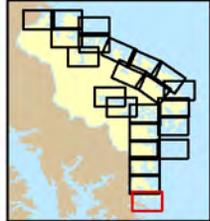


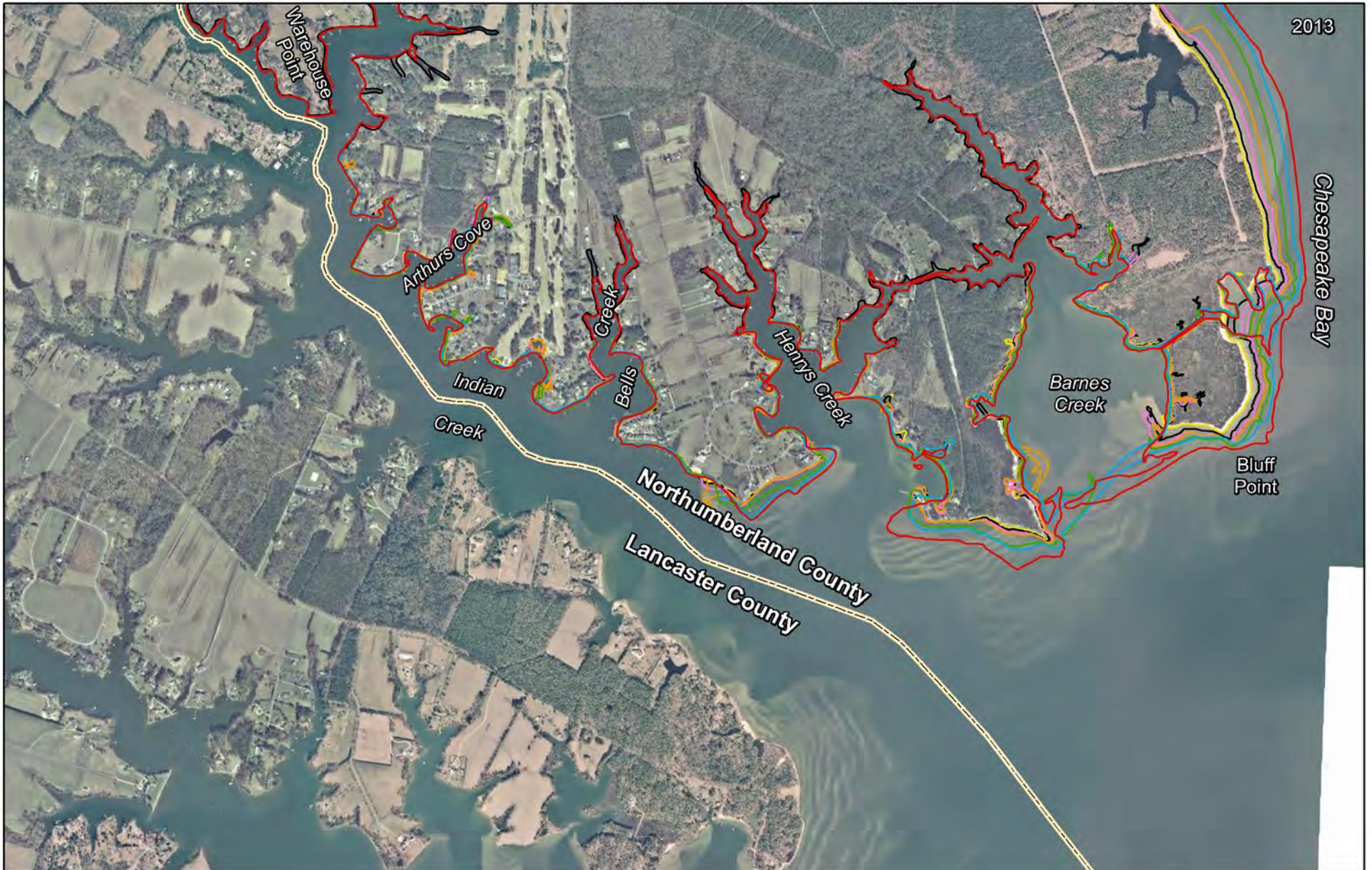
Legend
 — 2009 Shoreline



0 2,000 4,000
 Feet

**Northumberland County, Virginia
 Plate 23**





2013

Chesapeake Bay

Bluff Point

Barnes Creek

Henrys Creek

Bells Creek

Arthur's Cove

Indian Creek

Warehouse Point

Northumberland County
Lancaster County

| Legend | |
|------------------|------------------|
| — 1937 Shoreline | — 2002 Shoreline |
| — 1953 Shoreline | — 2009 Shoreline |
| — 1969 Shoreline | — 2013 Shoreline |
| — 1994 Shoreline | |

Northumberland County, Virginia Plate 23

