# 1.3. Uncertainty Ranges Associated with EPA's Estimates of the Area of Land Close to Sea Level

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## Introduction

Digital Elevation Model output allows one to easily generate a point estimate ("best guess") of the amount of land below a particular elevation X by simply tabulating the number of points below X and multiplying by the cell size that each point represents. The accuracy of available elevation data varies, however, so the accuracy of these point estimates of the area estimates will vary as well. For some purposes, it may be sufficient to have a "best guess" estimate. But for other purposes, one needs some sort of uncertainty range. Fortunately, most elevation data come with a precision estimate, which makes it possible to develop an uncertainty range.

Section 1.3 explains how Dave Cacela and this author generated an uncertainty range for the estimates of the amount of land close to sea level within different shore protection categories and different elevations, which form the basis of this report. Section 1.3.1 explains the assumptions and the basic approach for estimating uncertainty; Section 1.3.2 explains how the approach was implemented. Section 1.3.3 provides the results. The final results constitute the three appendices to this section.

Like Section 1.2, by Jones and Wang, the starting point is the elevation data set developed in Section 1.1 by Titus and Wang. The approach for specifying uncertainty is based on the most important sources of error in that analysis. The actual implementation, however, uses the output from Section 1.2, in which Jones and Wang overlay the elevation study by Titus and Wang with the eight state-specific shore protection studies that Titus and Hudgens developed in their unpublished analysis mentioned in Section 1.2. Section 1.1 provided cumulative elevation distributions for dry land and nontidal wetlands;

Section 1.2 subdivided the dry land into the various shore protection categories. Our exposition of the approach taken focuses on the elevation distribution of dry land. But not only did we apply the procedure to the totals for dry land, we also applied it to all the other shore protection categories and nontidal wetlands.

We warn the reader at the outset that this section switches between metric (standard international) and English (imperial) units of measurement. The final results are in metric units—but most of the underlying elevation data were based on topographic maps with contour intervals measured in feet. The point of measurements provided in this section is generally to explain the relationship between input data and assumptions, not to inform the reader about the magnitude of any particular effect. Therefore, the reader unfamiliar with one or the other system of measurements need not attempt to make conversions. In the few cases where that actual magnitude may matter, our convention is metric.

## Background

Previous assessments of the land vulnerable to sea level rise have provided an uncertainty range; but the uncertainty range did not include uncertainty associated with topographic information. EPA's 1989 *Report to Congress* provided an uncertainty range about the area of land lost for a rise in sea level of 50, 100, or 200 cm. In Appendix B to that *Report to Congress*, Titus and Greene (1989) developed the uncertainty range, based on a study by Park et al. (1989), who used a sample of study area sites, and calculated a point estimate of land loss of each site. The published uncertainty range used a simple sampling error approach, treating the study sites as a random sample from the entire population of USGS quads. Because Park et al. did not report an uncertainty range for their

sample sites, Titus and Greene made no attempt to include that uncertainty. In effect, Titus and Greene assumed that Park et al. accurately estimated the amount of land at particular elevations in those areas they assessed. The true uncertainty associated with their estimates included both sampling and measurement error; but the published uncertainty range considered only the sampling error.

This study uses the elevation data from Section 1.1, as formatted by the analysis explained in Section 1.2. That data set estimated the elevations of all land above spring high water. That is, it estimated elevations for dry land and nontidal wetlands, but did not estimate elevations for tidal wetlands. (Knowing that land is tidal wetland tells us that the land elevation is below spring high water and above mean low water, which provides a narrower uncertainty range about the elevation than if we know only that the land is below, for example, the 10-ft contour on a topographic map.) Because they obtained data for the entirety of the study area, there is no sampling error. The source of error stems entirely from the limitations in precision of the Section 1.1 results.

The overall approach is to make an assumption about the potential vertical error of the elevation data and the extent to which that error is random versus systematic. The magnitude of the error varies by data source: because we assume that error is a function of contour interval, which in turn varies by topographic quad, we calculate error separately for each topographic quad. Let us first explain our basis for focusing on vertical error of the elevation data, and then explain how low and high estimates for areas were calculated where the input data were USGS contour maps and other data with relatively coarse contour intervals (1 meter or worse), as well as our procedure for when the data had higher quality (2 feet or better).

**Horizontal and Vertical Precision**

Figure 1.3.1 depicts the various sources of data used to estimate elevations and the areas of land at particular elevations. In most locations, Titus and Wang relied on USGS 1:24,000 scale maps with various contour intervals. The second most common source of data was LIDAR provided by Maryland or North Carolina, which give elevations at various points in a grid.

USGS maps follow the national mapping standards for vertical and horizontal precision. The vertical standard is that 90 percent of the well-defined points along a contour must be within one-half the contour interval above or below the stated elevation of the contour. The horizontal standard is that 90 percent of the points should be within one fiftieth of an inch (about half a millimeter). On a 1:24,000 scale map, the allowable horizontal accuracy would be 12 meters. The LIDAR data sources generally have vertical precision on the order of 10–30 cm and horizontal error of less than 1 meter.

To keep the analysis reasonably manageable, this study ignores the horizontal error and focuses entirely on the vertical errors. Inspection of the USGS maps and the maps produced by Titus and Wang shows that most lowland is in an area where the contours are hundreds—and often thousands—of meters apart. Random error on the order of 12 meters is very small by comparison and not likely to substantially change an estimated error range. The horizontal error of LIDAR seemed even less likely to matter. In an assessment of the impacts of rising sea level, what matters is that most of the input data had contour intervals of 5 feet (150 cm) or worse, and we are interested in the implications of a 50-cm rise.
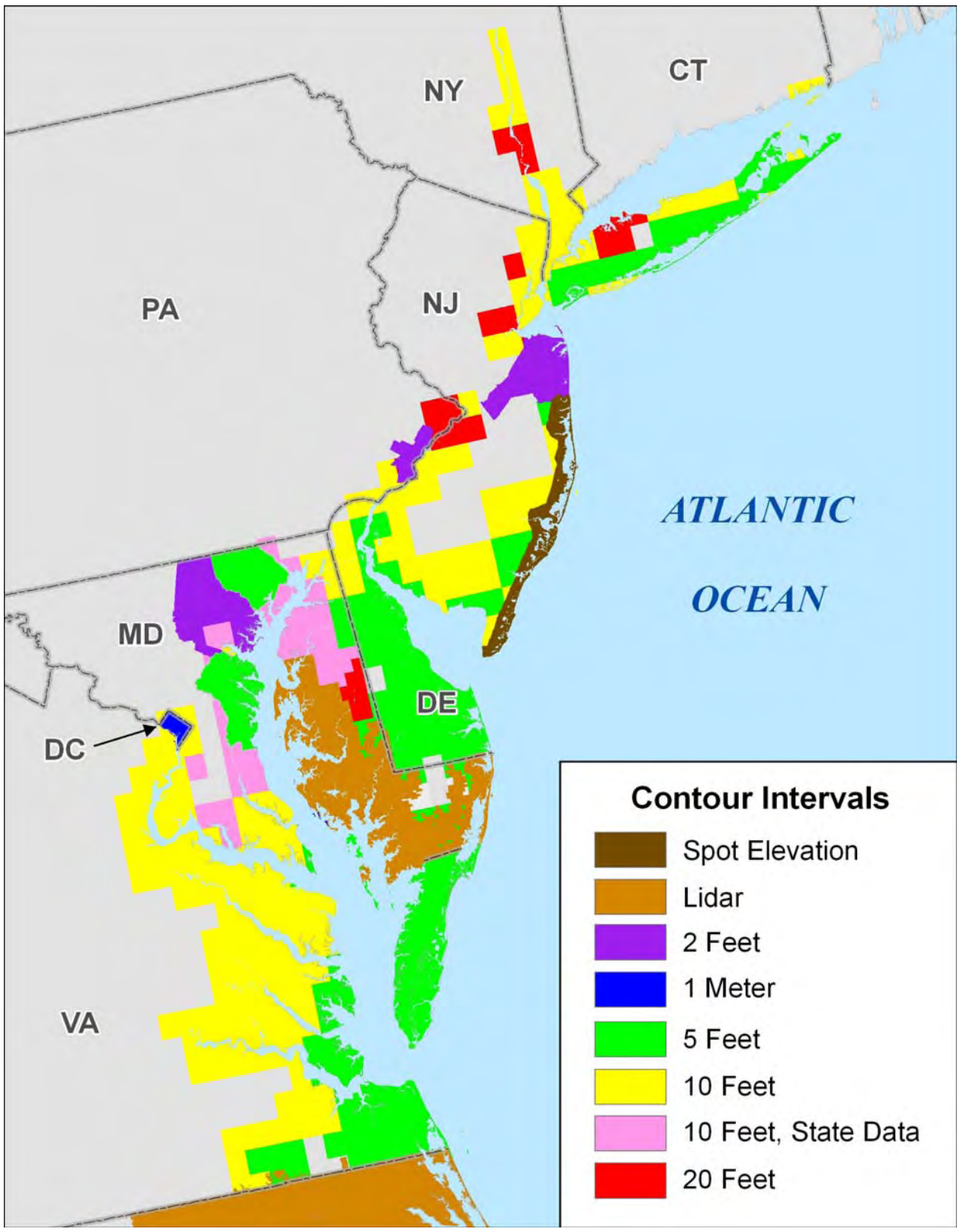
**Figure 1.3.1. Input Elevation Data used in Section 1.1 to Estimate Area of Land Close to Sea Level.**
Quadrangles with a 10-ft contour interval and a 5-ft supplemental contour are shown as 5 feet. The Maryland data included 5-ft contours drawn from spot elevation with RMS error of 5 feet; hence the legend calls the data "10 feet, State Data"; USGS 5-ft contours have an RMS error of 2.5 feet.

**Areas with USGS Maps as the Input Data**

This analysis assumes that the standard deviation of error within a neighborhood is one-half the contour interval, based on National Map Accuracy standards. For reasons discussed below, the calculations also assume that half the error is random and half is systematic, so that the standard deviation of the uncertainty is one-quarter the contour interval for areas the size of a county or larger. These assumptions are adjusted to address possible error in the estimate of spring high water (SHW).

**Our Initial Model of Vertical Error**

Based on a comparison of their model results with LIDAR from Maryland and North Carolina (see Section 1.1, Jones 2007, and Jones et al. 2008), Titus and Wang report that the root mean square (RMS) error[1] of their elevation data sets tended to be approximately one-half the contour interval of the input contour. (Strictly speaking, their comparison measured the root mean square of the difference between the DEM and the LIDAR, which overestimates the error of the DEM.[2]) That finding seems roughly consistent with the National Map Accuracy Standard that 90 percent of the well-defined points should be within one-half contour interval of the stated elevation (Bureau of the Budget 1947)—"roughly" because they are not identical: If mean error is zero, a 90 percent confidence limit will almost always be a wider interval than the range defined by an estimate plus or minus the RMS

error. In a normal distribution, the 90 percent interval would encompass a range ±1.64 times the RMS error (generally called standard deviation or σ in this case).[3] But one would expect the error across all elevations to be greater than the error at those elevations where we have a contour. For example, if a USGS map says that one contour is 5 feet above the vertical datum and that another contour is 10 feet above the vertical datum, and then one estimates an 8-ft contour through interpolation, we would expect the USGS contours to be somewhat more accurate than the 8-ft contour derived from the two USGS contours. So the assumption that 90 percent of the points along the contour are within one-half the contour interval of the stated elevation would be roughly consistent with the assumption that the standard deviation of error for all elevations is one-half the contour interval.[4] Because Titus and Wang did not know whether their estimates have a mean error or not, the more general term "RMS error" better describes the uncertainty. The contour intervals vary from place to place—but we know the contour interval at all locations. Therefore, this study assumes that RMS error equals one-half the contour interval for all locations where contour maps were the underlying source of the data.

Given that the availability of an estimate of the RMS error, this author's first thought was that the low and high estimates could be derived by simply (a) adding and subtracting the RMS error from the DEM[5] data set developed by Titus and Wang, cell by cell, and then (b) retabulating the data. In effect, this approach would add and

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[1]RMS error is calculated by taking the difference between the estimated and actual values for each point, squaring that difference, taking the sum of squares, dividing that sum by the total number of data points, and taking the square root. If the mean error is zero, RMS error is equal to the standard deviation of the error. If the mean error is not zero, then RMS error is equal to the square root of the sum of (a) the square of the mean error plus (b) the square of the standard deviation of the error.

[2] In general, whenever one has two independent measurements $M_1$ and $M_2$, with random error $e_1$ and $e_2$,

variance($M_1$-$M_2$) = variance ($e_1$) + variance ($e_2$).

Thus, the variance of one error is equal to the variance of the difference minus the variance of the other error.

[3]The RMS error band includes about 68 percent of all data points.

[4]In the case of normally distributed error, we are saying, in effect, that 90 percent of the points along the contour are within 0.5 contour interval, while 90 percent of all points are within 0.82 (1.64/2) the contour interval of the stated elevation.

[5]DEM is an abbreviation for digital elevation model. Literally, that means the model used to calculate elevations. People in the business of making elevation maps, however, often use this term when referring to the actual set of elevation data points calculated by their model. The Titus and Wang data set we used has data points on a 30-m grid.

subtract the RMS error from the cumulative distribution of elevations. However, as those authors discuss in Section 1.1, their DEM contained plateaus along the input contours, which were artifacts of the interpolation algorithm, with no physical basis.[6] Therefore, they concluded that a linear interpolation of elevations between the contours would give a better estimate of the area of land below a particular elevation



**Figure 1.3.2. Interpolated Elevation Estimates Relative to NGVD29.** Central estimate and high contour error (with and without SHW error, relative to NGVD, ignoring model error). This case assumes a 5-ft contour interval, a 1-ft error in estimating the elevation of spring high water, and contour error of 2.5 feet. Red dots represent positive contour error and negative SHW error, both of which cause a positive error in our estimates of elevation relative to SHW.

than the cumulative distribution of their cell-by-cell DEM output. Therefore, their elevation density distribution

assumed that elevations were uniformly distributed between contours. If the input data said that there are 100 ha of land between the 5- and 10-ft contours, for example, then there are 20 ha between the 5- and 6-ft contours, they assumed. Thus, their cumulative elevation distribution function was a series of line segments connecting a few points that represent actual observations based on the contour interval and the area of land above spring high water land below specific contours.[7] (See the green line in Figure 1.3.2, discussed below.)

This study assumes that the same logic that applies for the "point estimates" would apply to

EPA's effort to estimate an uncertainty range. Choosing instead to add or subtract one-half contour interval from the DEM, would (for example) create data sets with plateaus at 2.5, 7.5, 12.5, and 17.5 feet in those areas where the USGS data had a contour interval of 5 feet, just as the Titus and Wang output had plateaus at SHW, 5, 10, 15, and 20 feet.[8]

Let us go back to the source information. For each quad, Titus and Wang provide

- the areas of land that lie below specific elevation contours from the input data set (e.g., the area between the 5- and 10-ft contours in a given quad), and

- their estimate of the elevation of spring high water relative to NGVD29 (derived from NOAA tidal datum).

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[6]See Section 1.1.3 at Step 4, and especially Table 1.1.3 in Section 1.1.4. The large horizontal error but small vertical error in replicating contours is indicative of large plateaus.

[7]In an area with a 5-ft contour interval, those points would be (SHW, 0) , (5, A(5)), (10, A(10)), (15, A(15)), (20, A(20)) … etc., where A(x) is the area of land between spring high water and elevation x.

[8]Their data set also created plateaus just above their spring high water supplemental contour. Thus, if spring high water is 2 feet (NGVD29), then the high-elevation estimate would have a plateau at 4.5 feet; the low-elevation estimate would have a plateau at 2.5 feet below spring high water, that is, –0.5 feet (NGVD29).
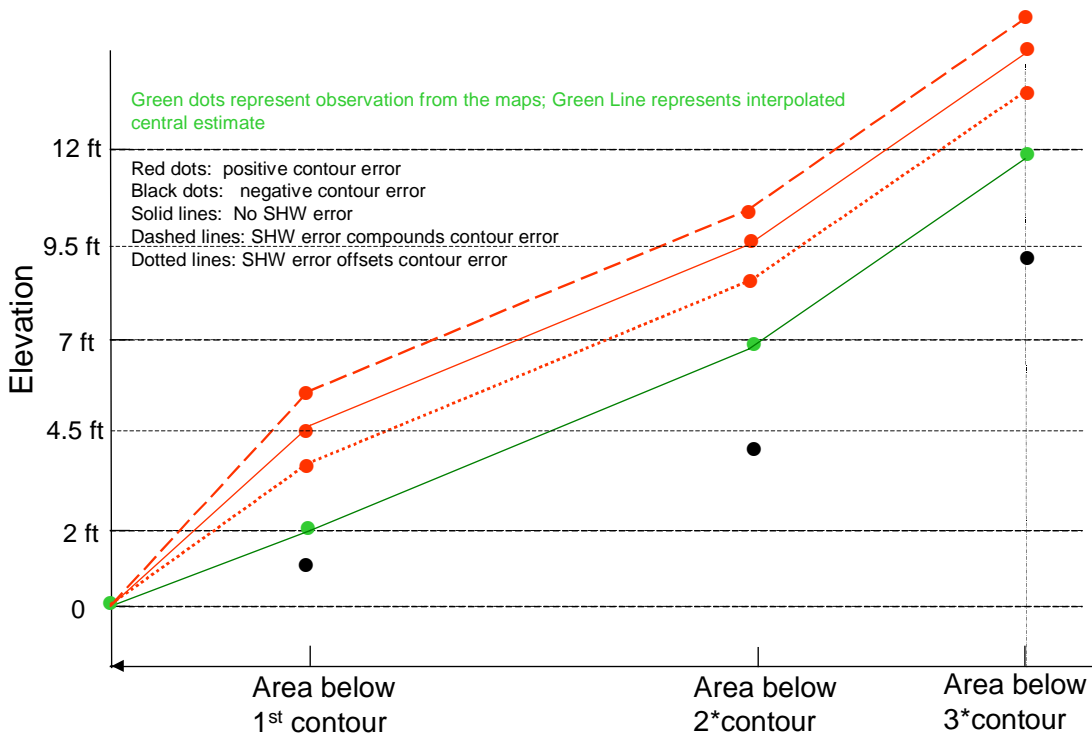
**Figure 1.3.3. Interpolated Elevation Estimates Relative to Spring High Water**. Central estimate and high contour error (with and without SHW error, relative to SHW, ignoring model error). This case assumes a 5-ft contour interval, a 1-ft error in estimating the elevation of spring high water, and contour error of 2.5 feet.

The estimates of the land below various elevations were based on simple linear interpolation of this information.[9] Figures 1.3.2 through 1.3.4 illustrate a proposed approach to generating high and low elevation estimates, respectively. But before discussing that

approach, let us examine a depiction of the Titus and Wang analysis (see Section 1.1) used as input to this study. In Figure 1.3.2 (as well as Figures 1.3.3 and 1.3.4), the four green dots represent the values of the input data. This example quad has a 5-ft contour interval, and spring high water is estimated to be 3 feet above NGVD29. The first green dot shows the estimated elevation of spring high water; this dot

appears along the vertical axis because all the dry land and nontidal wetlands are above spring high water (by definition). The other three points show the amount of land (other than tidal wetlands) below the 5-, 10-, and 15-ft contours. The green line is the cumulative elevation distributions that Titus and Wang derived through interpolation—but transposed so that the cumulative elevation is on the horizontal axis and elevation on the vertical axis. The figures are transposed from the traditional way of depicting cumulative distribution functions, because the transposed version gives us the actual profile of a typical transect or cross section of the land.

Now let us consider a possible way to think about high and low error. In Figure 1.3.2, the three red dots with elevations of 7.5, 12.5, and 17.5 feet represent high estimates of the elevation of the contours. That is, given the RMS error of one-half the contour interval (2.5 feet), the 5-ft contour could actually be as high as 7.5 feet. Along the vertical axis, we see three dots.

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[9]In some cases, the 5-ft contour was seaward of the wetland boundary and the Titus and Wang interpolation disregarded the 5-ft contour on the assumption that it was obsolete. In those cases, the interpolation created—in effect—a new 5-ft contour farther inland, which was used in quantifying the land below 5 feet in a given quad.

Green dots represent observation from the maps; Green Line represents interpolated central estimate
Red dots represent positive contour error or negative SHW error
Black dots represent negative contour error or positive SHW error

Solid lines:  No SHW error or all three SHW error estimates coincide
Dashed lines:  SHW error compounds contour error (relative to SHW)
Dotted lines:  SHW error offsets contour error (relative to SHW)

**Figure 1.3.4. Interpolated Elevation Estimates Relative to NGVD29.** Central estimate and low contour error (with and without SHW error, relative to NGVD, ignoring model error). This case assumes a 5-ft contour interval, a 1-ft error in estimating the elevation of SHW, and contour error of 2.5 feet
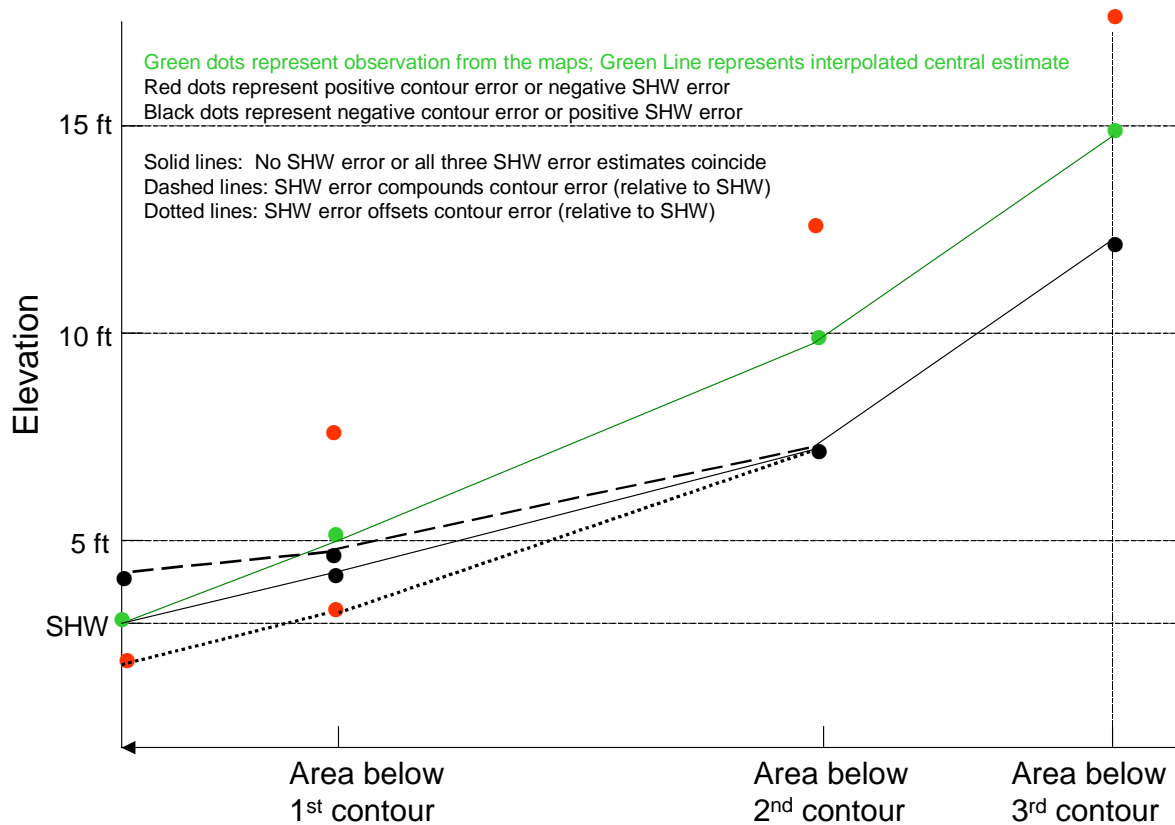
As previously mentioned, the green dot is the estimate of spring high water (3 feet). The red and black dots at 2 and 4 feet, respectively, represent the possibility that Titus and Wang over- or underestimated SHW, respectively. The three red lines represent the alternative high-elevation cumulative elevation distributions (and average profile) implied by the three different estimates of the elevation of SHW. In all these cases, the profile is steeper than the profile implied by the input data. The dashed line—where spring high water is less than estimated—provides the steepest profile and hence the greatest error. Put another way, the dashed line assumes that SHW is lower—and the contour is higher—than assumed by Titus and Wang; i.e., the errors compound. Figure 1.3.3 shows the same four cases, but with elevations relative to spring high water instead of NGVD29. Comparing Figures 1.3.2 and 1.3.3 may help one visualize the impact of SHW error on the land profile (cumulative elevation distribution) assumed in the calculations. Each of the four

profiles has the same shape in Figure 1.3.3 as it has in Figure 1.3.2. When measured against NGVD (Figure 1.3.2), the three high-contour error profiles start at different elevations (reflecting uncertainty about the elevation of the lowest spot of dry land, SHW) but coincide after the first contour (because SHW error has no impact on the topographic contours). When measured against SHW (Figure 1.3.3), the profiles all start out at zero, because error in estimating SHW has no impact on the definitional assumption that dry land extends down to SHW. But the profiles diverge because errors in SHW have a 1:1 impact on elevations measured relative to SHW. Whatever the true elevation of the 5-ft contour relative to

NGVD29, overestimating SHW by 1 foot lowers the estimated elevation relative to SHW by 1 foot.[10]

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[10]The error of elevations relative to spring high water would be 1 foot greater if the red dot (in Figure 1.3.2) was

All the figures show the implications of errors in spring high water and elevation estimates. There is no reason to think that these errors are correlated and every reason to assume that they are independent: two different federal agencies (USGS and NOAA) compiled the underlying data.[11] Therefore, when calculating uncertainty, we should assume that these errors are independent. It follows that the total elevation error is calculated as the square root of the sum of squares. Thus, in areas where the contour error is significant, the error in spring high water makes very little difference. But in areas with precise elevation data, error in spring high water can account for about one-half the total error.

Figure 1.3.4 presents a story similar to Figure 1.3.2 but for the low elevation case. The story is not completely symmetrical because of the first contour. The contour interval of the USGS maps at this location is 5 feet; but it is almost impossible for the USGS contour to have overestimated the actual elevations by 2.5 feet. Substantial dry land ("area below 1st contour") is above SHW (approximately 3 feet NGVD) and below the first contour. If the low elevation estimate were to assume that the lowest contour is at 2.5 feet, there would be an impossible result: the land above SHW (3 feet) cannot also be below 2.5 feet. This analysis avoids such an anomaly by assuming that RMS error is one-half the actual contour interval used. Thus, if SHW is between 2 and 4 feet, the lowest contour interval is 1 to 3 feet; so the low case assumes that the lowest contour is between 3.5 and 4.5 feet above NGVD (depending on the error in estimating SHW) rather than at 2.5 feet.

Although map accuracy standards provide a basis for the contour-error assumption, the literature does not provide a good estimate of uncertainty for SHW. This exposition has looked at the case where the error in SHW is 1 foot,

because whole numbers can help simplify numerical illustrations. Our final results, however, assume that uncertainty for spring high water is approximately 15 cm (6 inches). Section 1.1 suggests that error is likely to be less than 6 inches, pointing out that the estimates are based on interpolation of spring tide ranges from more than 750 sites, and that the variation from site to site tends to be about 5 cm (2 to 3 inches), or less. Within a given quad—the unit of analysis for this study—those errors should cancel to some extent, causing the error to be less.

## Using an Error Function to Represent Low and High Cumulative Distributions

The previous discussion explains the low and high estimates as alternative possibilities for the average shore profile, given the points along the profile for which observations are available. That is, the discussion compared the "best guess" profile estimated by Titus and Wang, with proposed high and low profiles. Recall, however, that although one usually displays $y = f(x)$, in this case, the argument of the function is shown on the vertical axis. That is, in Section 1.1, Titus and Wang estimated the area as a function of elevation. Similarly, this study needs to estimate the low and high estimates as a function of elevation.

For computational purposes, it may be useful to think of error as a function of the best-guess central estimate. Viewed together, Sections 1.1 and Section 1.2 estimate the area of land within each shore protection category within each quad by 0.1-ft elevation increments. Thus, if one can express low = f(central estimate) and high = g(central estimate), then one need merely assign low and high elevations to each area. That is:

$$A\_low_{ik,low,f(E)} = A_{ik,E}$$

$$A\_high_{ik,high,g(E)} = A_{ik,E}$$

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the actual value, and 1 foot less if the black dot was the actual value.

[11] The Section 1.1 estimates of spring high water are based entirely on NOAA tidal observations and NOAA analysis relating mean sea level to the fixed reference elevations used by topographic data (i.e., NAVD88 and NGVD29).
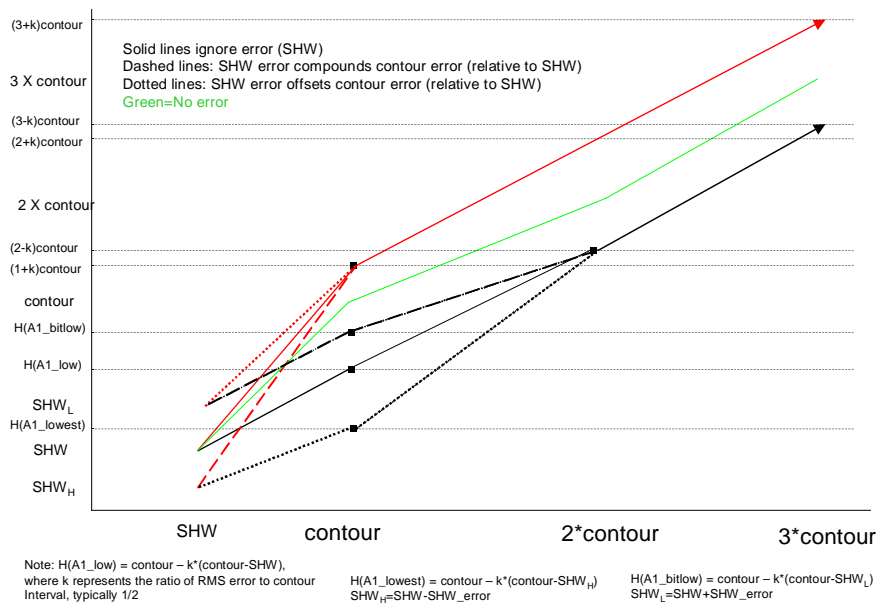
**Figure 1.3.5. High and Low Estimates as a Function of the Best Guess.** The difference between the red line and the green is the high vertical error; the difference between the black line and the green is the low vertical error. High error is constant beyond the first contour; low error is constant beyond the second contour. The vertical scale of this drawing is exaggerated below one contour to better display the relationships at low elevations.

where $A_{ij,E}$ represents the area of land in the $i^{th}$ shore protection category in the $k^{th}$ USGS quad at elevation E, as estimated in Section 1.2[12]; f and g are the error functions that express low and high elevation estimates as a function of the central estimate of elevation, and A_low and A_high represent the areas of land at elevation E in the low and high elevation cases. Figure 1.3.5 shows the low and high elevations as a function of the central estimate of elevation, i.e., functions f and g.

**Refinements**

Our initial model has two important flaws: it assumes that precision in modeling a single point is the same as our precision in estimating the total, and it ignores the model error of our linear

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[12]Jones and Wang overlaid the elevation data from Titus and Wang with the shore protection likelihood maps from an unpublished analysis to create cumulative elevation distribution functions for each of the shore protection categories. In effect, they subdivided the cumulative elevation distribution functions estimated by Titus and Wang, into the separate cumulative distribution functions for the different categories of likelihood of shore protection. Thus, all the uncertainties we analyze here result from the Titus and Wang analysis; but the actual input data came from Jones and Wang.

interpolation. Let us examine each of these issues.

**Systematic and random error**. Intuitively, one might assume that the precision with which one can reasonably estimate the area of vulnerable land is the same as the precision of the input data. But that is true only if all errors are perfectly correlated. If we think that all elevations are likely to have been over- or underestimated by the same amount, then the ability to estimate the total is no more precise than the ability to estimate the elevation of a particular location. In such a case, there is no random error; all error is systematic. But that should rarely be the case.

Most elevation estimates include both a random and a systematic component. Along the contour, random errors would be expected as a human being attempts to trace a contour while viewing aerial photographs through a stereoplotter; systematic error might occur through biases caused by settings in the instrumentation or by subsiding benchmark elevations. Between the contours, systematic errors are likely because the actual "lay of the land" often departs from what one would expect from a linear interpolation. In developed areas, people have often filled and

bulkheaded the shore, increasing the amount of land 50–100 cm above the tides at the expense of land 0–50 cm above the tides; in undeveloped areas bluffs occur in some areas, and the land follows a more gentle slope in other areas.

A sophisticated treatment of this question is beyond our time and budget constraints. Therefore, we need a simple parameterization. Figures 1.3.6 compares the cumulative elevation distributions of LIDAR collected by the state of Maryland (see Section 1.1, Jones 2007, and Jones et al. 2008 for additional details) to the interpolated results for the area on the Eastern Shore of Maryland where LIDAR was available (see Figure 1.3.1), subdivided into four subareas with varying data quality. The vertical axes omit magnitudes, which are unimportant for the purposes here.

The four figures all suggest that systematic error is well less than one-half the contour interval. In the areas with a 5-ft contour interval (Figure 1.3.6a), the DEM interpolation is about 1 foot lower (to the left) than the LIDAR below 3 feet; but above 4 feet the interpolation and LIDAR are less than 0.5 feet (15 cm) apart. In the areas with a 1-m contour (Figure 1.3.6b), the DEM interpolation and LIDAR are less than 10 cm (4 inches) apart below 1 meter. Above that point, the DEM interpolation increases to 50 cm greater than the LIDAR, but the difference is generally 25 cm. In the area that used the Maryland DNR data—which have an RMS error of 5 feet—the difference is less than 1 foot (30 cm) below the 10-ft contour (Figure 1.3.6c). It increases to 2.5 feet at the 15-ft contour before declining. In those areas that rely on USGS 20-ft contours (Figure 1.3.6d), the DEM underestimates the elevation by 2 to 3 feet, on average.

These comparisons (as well as the comparison with North Carolina LIDAR reported by Jones [2007] and Section 1.1.) lead to two insights worth applying in this error assessment. First, in areas the size of a county or two, the cumulative elevation distribution is within one-half the nominal RMS error of the data most of the time; and it almost never exceeds the reported RMS error. Therefore, one would expect that when there are many counties (e.g. results for entire states), the cumulative elevation distribution would continue to converge and almost never exceed one-half the nominal RMS error of the data set. That is, *it seems safe to assume that the systematic error over a large area is no more than one-half the reported RMS error of the data*. Therefore, this error assessment assumes that when USGS maps are the input data set, the low and high estimates are one-quarter the contour below and above the central estimates derived by interpolating between those contours in Section 1.2. that the high error may be greater than the low error, as displayed in Figures 1.3.2 and 1.3.4.

**Model error from linear interpolation.** The potential for linear interpolation to understate elevations appears to be particularly pronounced at very low elevations. The approach described so far assumes, in effect, that below the first contour, error is proportional to elevation (relative to SHW). But there is no reason to assume that precision increases at low elevations; that was simply an artifact of linear interpolation in a scheme designed to prevent assuming the impossible, such as dry land being below spring high water. These assumptions seem more defensible on the low end than on the high end. That is, assuming that the area of land below elevation X is proportional to X below the first contour is more unreasonable for the high-elevation uncertainty than the low-elevation uncertainty:
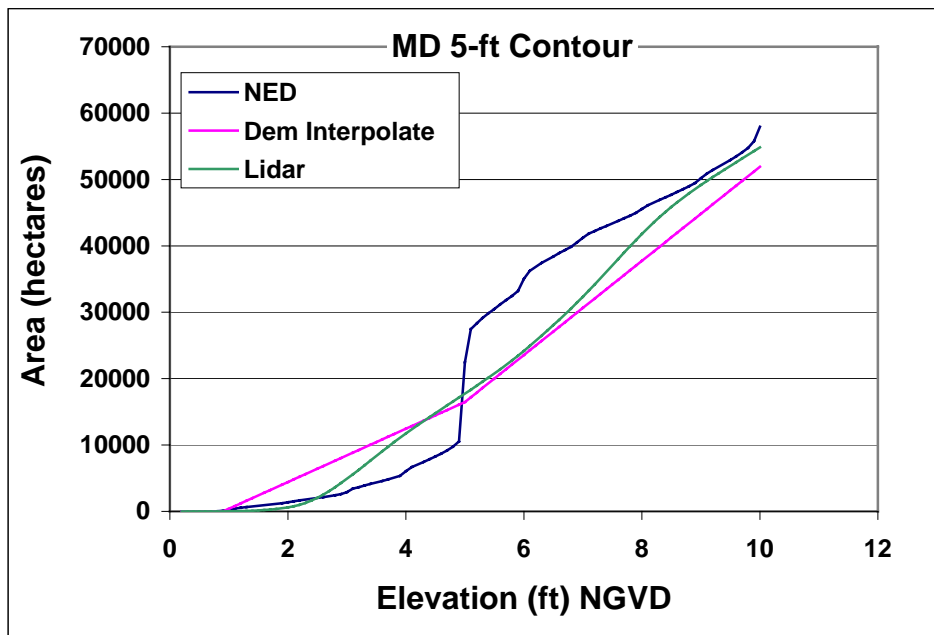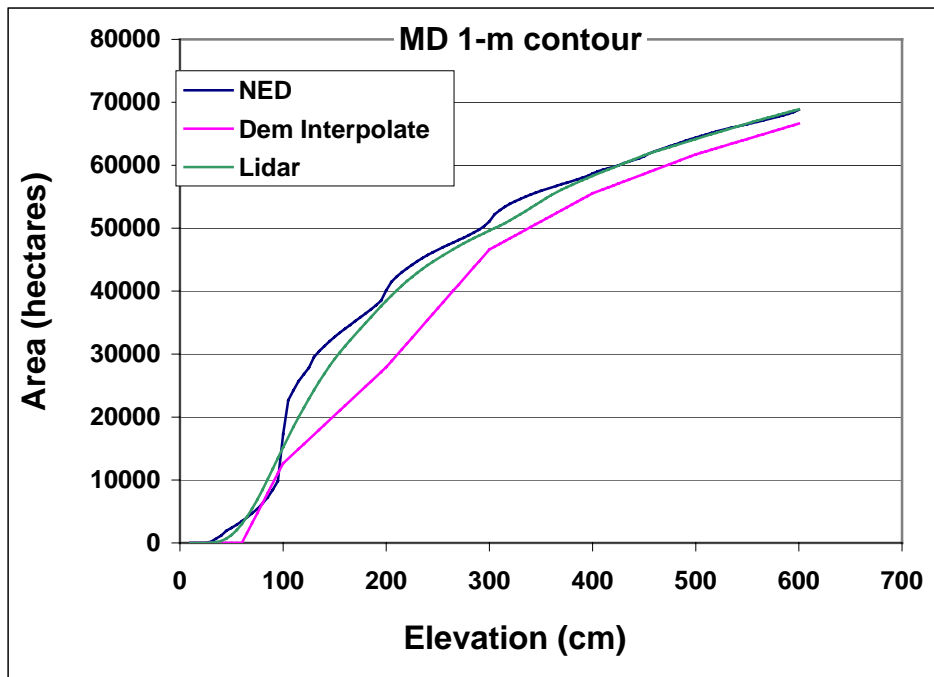
Figure 1.3.6. Cumulative Area of Land Close to Sea Level according to USGS National Elevation Data (NED), interpolation of the Titus and Wang DEM, and State of Maryland's LIDAR in the area where LIDAR was available (see Figure 1.3.1). The data are divided according to the best available data other than LIDAR: (a) USGS maps with 5- ft contours; (b) USGS maps with 1 meter contours, (c) 5-foot contours created from MD-DNR data in areas where USGS maps had 20-ft contours; and (d) USGS 20-ft contours. See Section 1.1 and accompanying metadata for more details.

Figure 1.3.6. Cumulative Area of Land Close to Sea Level according to USGS National Elevation Data (NED), interpolation of the Titus and Wang DEM, and State of Maryland's LIDAR in the area where LIDAR was available (see Figure 1.3.1). The data are divided according to the best available data other than LIDAR: (a) USGS maps with 5- ft contours; (b) USGS maps with 1 meter contours, (c) 5-foot contours created from MD-DNR data in areas where USGS maps had 20-ft contours; and (d) USGS 20-ft contours. See Section 1.1 and accompanying metadata for more details.

Second, the tendency for the DEM interpolation to underestimate elevations appears to be somewhat more pronounced than any tendency to overestimate elevations. In Maryland this is clearly the case. (Titus and Wang, and Jones, found that in North Carolina, the interpolation overestimated elevations of very low land; but they concluded that the unique situation of North Carolina was probably to blame in that case. [13]) That tends to reinforce our inclination to assume

- The wetlands boundary is at the kink of the most common concave-up profile. So the use of wetlands data means that interpolation already accounts for cases where the profile is below a linear trend.

- The accuracy assessment shows the Section 1.1 DEM to underestimate elevations close to spring high water (see Figure 1.3.6):

   – In Maryland, they generally found that more than half of the land between spring high water and the first contour was above the midpoint between spring high water and the elevation of the first contour.

   – The error was particularly great when the contour interval was large.

- USGS contour selection also creates a downward bias: Consider an area with a 10-ft contour. If there is much land below the 5-ft contour, USGS is likely to reduce the contour interval to 5 feet or at least collect a 5-ft supplemental contour. This does not always occur, but the tendency is enough for a high-elevation scenario to assume that there is no land below the 2.5-ft contour.

[13]Much of North Carolinas coastal wetlands are truly are classified as nontidal wetlands, and hence the interpolations in Section 1.1 treated them as uniformly distributed between SHW and the 5-ft contour, which is generally more than 1 meter above SHW. (The final results used LIDAR and hence are not affected directly by this problem.) Much of those wetlands are at sea level, and classified as nontidal because the rivers and sounds along which they are found have an astronomical tide so small that, for most practical purposes, it is nontidal. When considering the impact of sea level rise, it would be more accurate to consider these areas to be "nanotidal wetlands."

- The mathematics limits downside uncertainty: Because elevations must be above spring high water, they can only be a little bit less than the very low elevations under consideration, while they could be much higher.

Thus, if the point estimate assumes 100 hectares within 0.5 feet above spring high water, it is desirable that the low estimate does not assume 100 hectares to be 2 feet below spring high water. That does not mean, however, that the high estimate ought to rule out the possibility that this land is actually 3 feet above spring high water. Low bluffs really are common along the coast—so a high scenario that assumes a low bluff with an elevation of contour/4 is actually quite realistic. (By contrast, a high scenario that assumes an unmapped dike protecting low land that it contour/4 below spring high water is not realistic.) Put another way, there is good reason to not think that there is a large amount of dry land below high tide—but there is no reason to think that there is a significant amount of land just above spring high water. Therefore, the high scenario should allow for the possibility that there is no significant amount land barely above the tides.

Figure 1.3.6 supports this concern. In Figures 1.3.6a and 1.3.6c, the interpolation understates elevations by about 1 foot below 4 feet in elevation, and then declines. In Figure 1.3.6d, where the underlying USGS maps have a 20-ft contour interval, the interpolation finds as much land below 3 feet as LIDAR finds below 5 feet, and as much land below 17 feet as the LIDAR finds below 20 feet. Thus, at an elevation of one-quarter the contour interval, the error is about two-thirds the error seen at the contour. (In Figure 1.3.6b, the error is fairly minor at all elevations.)
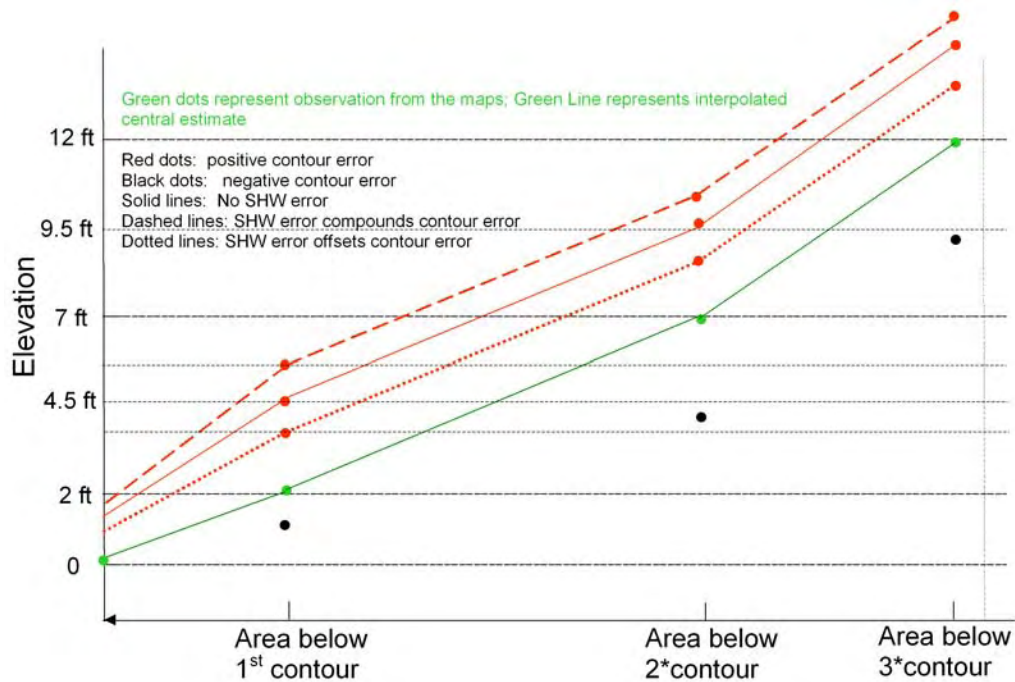
**Figure 1.3.7. High Elevation Estimates Relative to Spring High Water, including Possible Model Error** (with and without SHW error, relative to NGVD, ignoring model error). This case assumes a 5-ft contour interval, a 1-ft error in estimating the elevation of SHW, a contour error of 2.5 feet, and a high-end error that is always at least one-quarter the contour interval

There is no completely satisfactory way to model this possibility. The simplest approach would have been to simply add and subtract one-quarter the contour interval to the entire distribution, but this analysis employs a more complicated approach in part to avoid impossible results in the low case (e.g., dry land up to one-quarter the contour interval below SHW). But this is not a problem with the high scenario. Therefore, *the high scenario assumes that all land is at least one-quarter times the contour interval above SHW*. In effect, the high estimate assumes that one can not rule out a bluff with an elevation at one-quarter the lowest contour interval. Comparing Figure 1.3.7 to Figure 1.3.3 shows that this assumption has no impact on elevations above the first contour.

**Areas with Higher Precision Data**

In areas with higher precision data, these considerations are less important. They mostly apply to problems between contours; and EPA does not need elevations in increments finer than 50 cm. What is important is that no matter how precise the elevation data, we will report some uncertainty because LIDAR measures elevations relative to a fixed reference plane, while we report elevations relative to spring high water, which we estimate imprecisely. As mentioned above, this analysis assumes that the estimates of spring high water have an error of 15 cm (6 inches).

In Section 1.1, Titus and Wang used the LIDAR, spot elevation, and actual DEM results where contour intervals were 2 feet (60 cm) or less. Therefore, the interpolation model did not apply and it would be reasonable to simply add or subtract the systematic error. We saved some time, however, by applying the algorithm developed for USGS data to these results as well rather than rewriting a separate algorithm.

# Section 1.3.2. Implementing the Approach using Geographically Specific Error Functions Approach

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The objective of elevation uncertainty analyses is to acknowledge uncertainty about the actual elevation of any particular geographic region and to quantify it so that the elevation in a particular region can be expressed as a range of plausible values. Consequently, estimates of flooded areas under any particular scenario of sea level rise can also be expressed as a range of plausible values.

This section reports the actual methods used to calculate ranges of plausible elevation that reflect the reasoning about landscapes, interpretation of map accuracy, and between-contour interpolation methods described in Section 1.3.1. It is intended to describe the essential features of methodology introduced in Section 1.3.1 that were actually applied in the uncertainty analysis in a manner that includes specific mathematical definitions that allow for reproducibility.

The reasoning in Section 1.3.1 about uncertainty is described in terms of two generalized error functions. One of the functions defines the lower limit of plausible elevation and the other defines the upper limit. Considered jointly, the error functions define the amount of uncertainty about elevation (vertical error) associated with any geographic point. To quantify uncertainty in a particular geographic location, the generalized error functions are used with parameters that are specific to that particular location to define plausible ranges of elevation for that location. Plausible ranges of elevation determine in this manner are subsequently translated into plausible ranges of area that may be inundated by various sea level rise scenarios.

## Magnitude of Uncertainty in the Data Sources

Uncertainty analyses consider two main sources of uncertainty. The analyses consider both types of uncertainty jointly to generate an estimate of total uncertainty that is specific to each geographic area in the study.

One source of uncertainty derives from imprecision in elevation values in the source data. Each location in the study area is represented by one of several types of source data with differing amounts of inherent precision. As described in Section 1.3.1, the inherent precision of each type of source data is a known value that is expressed as the root mean square error (RMSE) and in the same units of measure as the vertical units provided (Table 1.3.1). Data with greater inherent precision have less uncertainty with regard to the true elevation of a particular geographic point and, conversely, source data with lesser inherent precision have more uncertainty with regard to the true elevation of a particular point. (See Figure 1.3.8 and Table 1.3.1; and Section 1.1 and Section 1.2 for additional details concerning the precision of the source data used in the study area.)

The second source of uncertainty derives from the estimated elevation of SHW relative to the NGVD29 for any particular section of coastline as derived from local tide gage data. The elevation of SHW is relevant because the elevations provided by the source data are expressed relative to the NGVD29 datum, but the estimation of inundation is expressed relative to SHW (see Section 1.1 for a description of how the elevations relative to SHW were derived).

## Aggregate Uncertainty

All NGVD29 elevations from the source data are converted to elevations relative to SHW by:

$$E_{jk} = E_{ngvd,jk} - SHW_k \quad (1)$$

where:

$E_{jk}$ is the derived nominal elevation of point j in region k relative to SHW

$E_{ngvd,jk}$ is the nominal elevation of point j in region k relative to NGVD29, as provided in the source data

$SHW_k$ is the estimated (NGVD29) elevation of SHW for region k.

$SHW_k$ is not known with absolute certainty; thus the precision of $E_{jk}$ is a function of two sources of uncertainty: (1) the magnitude of uncertainty inherent in $E_{ngvd,jk}$ and (2) the magnitude of uncertainty in $SHW_k$. In principle, the magnitude of uncertainty in $SHW_k$ could vary by region k, but in this study $SHW_k$ is defined as a constant value of 0.5 feet. These two sources of uncertainty were assumed to be statistically independent; thus, the magnitude of total uncertainty is estimated with the basic equation:

$$P_{jk} = \sqrt{P_{mshw,k}^2 + P_{ngvd,jk}^2} \quad (2)$$

where:

$P_{mshw,k}$ is the magnitude of uncertainty in $SHW_k$ expressed as RMSE, defined as a constant value of 0.5 feet

$P_{ngvd,jk} = kC_{jk}$ or

$P_{ngvd,jk}$ is a specified the magnitude of uncertainty in $E_{ngvd,jk}$ expressed as RMSE (feet)[14]

$P_{jk}$ is the magnitude of total effective uncertainty in $E_{jk}$ (feet)

$C_{jk}$ is the magnitude of contour intervals represented in the relevant source data for point j,k[15]

$k$ is a scalar that varies by source data (e.g., 0.5; see Table 1.3.1).

The basic definition of $P_{jk}$ was not applied universally to all points in region k. In some subregions within region k, $P_{jk}$ is associated with points j,k, but in other subregions, particularly regions of low elevation, $P_{jk}$ is redefined by an ad hoc function of $E_{jk}$ that is described below.

## Estimating Elevation Uncertainty

The magnitude of uncertainty about $E_{jk}$ was defined as $P_{jk}$ at all relatively high elevations. In such regions, upper and lower bounds on $E_{jk}$ were defined simply as:

$$E_{jk,l} = E_{jk} - P_{jk} \quad (3)$$

$$E_{jk,u} = E_{jk} + P_{jk} \quad (4)$$

where:

$E_{jk}$ is the nominal elevation of point j,k [16]

$E_{jk,l}$ and $E_{jk,u}$ represent the lower and upper bounds on $E_{jk}$, respectively.

However, the simple formulations in Equations 3 and 4 were considered inadequate for providing realistic bounds for $E_{jk}$ in locations with low elevation, where "low elevations" are defined to be lower than selected reference elevations. For estimating $E_{jk,u}$, a reference elevation was taken to be $E'_{jk}$, the elevation of "first contour," which is $E_{jk}$ corresponding to $E_{ngvd,jk}$ equal to the lowest nonzero elevation contour in the source data for region k. For estimating $E_{jk,l}$, an additional reference elevation was taken to be $E''_{jk}$, the elevation of "second contour," which is $E_{jk}$ corresponding to $E_{ngvd,jk}$ equal to the second-lowest nonzero elevation contour in the source data for region k.

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[14]For areas described by some types of source data, e.g., USGS topographic maps, $P_{ngvd,jk}$ is defined as a certain fraction of the contour intervals used in the base maps, but for other types of source elevation data not based on contour intervals, e.g., elevations derived from LIDAR data, $P_{ngvd,jk}$ is a constant (Table 1.3.1). For USGS maps, $P_{ngvd,jk} = kC$.

[15]For source data not based on a contour interval, such as SPOT and LIDAR, contour interval was derived from the RMSE of the source data.

[16]Nominal elevations were determined from the source data using interpolation methods described in Section 1.1.

The general uncertainty modeling procedure can be succinctly described as two complex error functions. One such function describes the error in a positive direction, i.e., the amount by which the "true" elevation, $E^*_{jk}$, could exceed the nominal elevation $E_{jk}$. The other such function describes the error in a negative direction, i.e., the amount by which the "true" elevation, $E^*_{jk}$, could lie below the nominal elevation $E_{jk}$. The functions are asymmetrical because of the assumption that the magnitude of errors in the negative direction will tend to be relatively dampened if $E_{jk}$ is lower than $E'_{jk}$ or $E''_{jk}$ (defined below; see Section 1.3.1 for the justification of this assumption).

The error function for determining an upper bound on $E_{jk}$ is a set of line segments defined as:

$$E'_{jk} = (C_{jk} - MSWH_k) \tag{5}$$

$$P_{jk,u} = \begin{cases} gE'_{jk} + E_{jk} \times (P_{jk} - gE'_{jk})/E'_{jk} & \textit{If } E_{jk} < E'_{jk} \\ P_{jk} & \textit{If } E_{jk} \geq E'_{jk} \end{cases} \tag{6}$$

$$E_{jk,u} = E_{jk} + P_{jk,u} \tag{7}$$

where:

SHW is the elevation of mean spring high water for point j,k

$g$ is a constant (e.g., 0.25)

$E'_{jk}$ is the elevation (relative to SHW) of "first contour"

$P_{jk,u}$ is the magnitude of error in a positive direction

$E_{jk,u}$ is the upper bound on $E_{jk}$.

The error function for determining a lower bound on $E_{jk}$ is a set of line segments defined by:

$$E''_{jk} = (2C_{jk} - MSWH_k) \tag{8}$$

$$P'_{jk} = \sqrt{((1-k)P_{mshw})^2 + (kE'_{jk})^2} \tag{9}$$

$$P_{jk,l} = \begin{cases} P'_{jk} E_{jk}/E'_{jk} & \textit{If } E_{jk} > 0 \textit{ and } E_{jk} < E'_{jk} \\ P'_{jk} + ((E_{jk} - E'_{jk})(P_{jk} - P'_{jk}))/(E''_{jk} - E'_{jk}) & \textit{If } E_{jk} \geq E'_{jk} \textit{ and } E_{jk} < E''_{jk} \\ P_{jk} & \textit{If } E_{jk} \geq E''_{jk} \end{cases} \tag{10}$$

$$E_{jk,l} = \max(0, (E_{jk} - P_{jk,l})) \tag{11}$$

where:

$P'_{jk}$ is a measure of uncertainty analogous to $P_{jk}$

$E''_{jk}$ is $E_{jk}$ corresponding to $E''_{ngvd,jk}$, the elevation of the second-lowest non-zero elevation contour in the base map for region k

$P_{jk,l}$ is the magnitude of error in a negative direction

$E_{jk,l}$ is the lower bound on $E_{jk}$.

The typical shape of the error functions defined by Equations 1 through 11 are depicted in Figure 1.3.8.
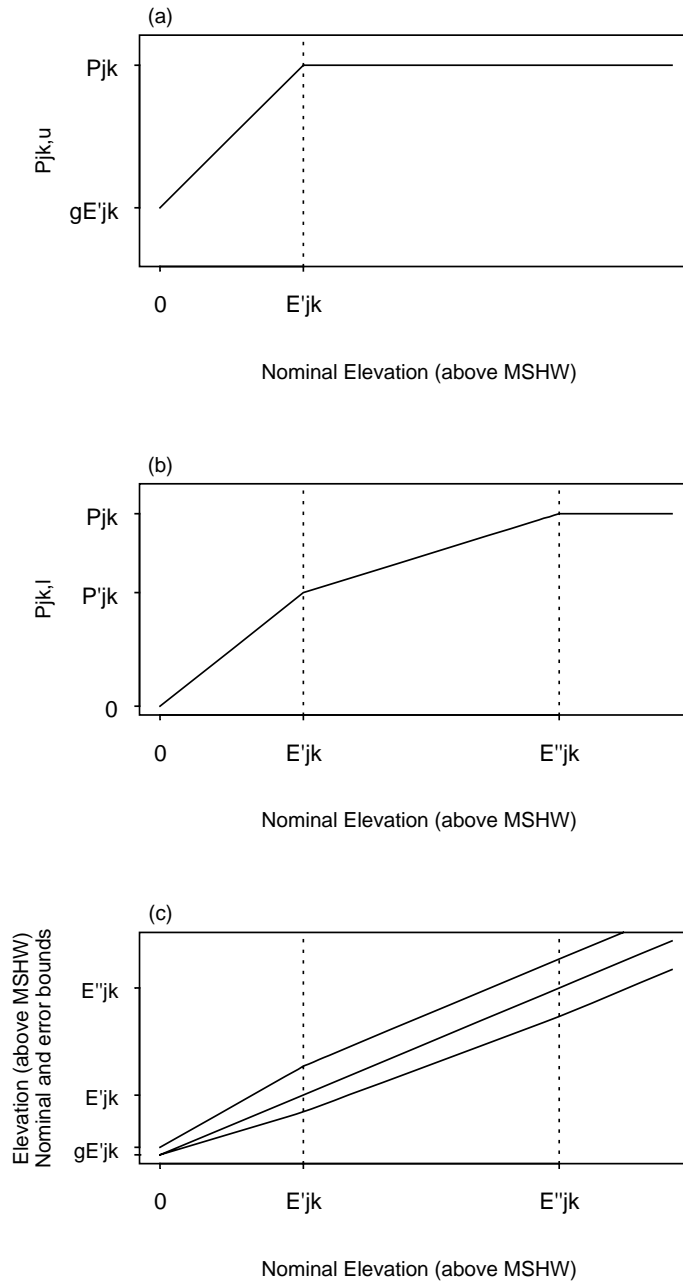
**Figure 1.3.8. Generalized Error Functions Used to Estimate Uncertainty Bounds on Elevation.**
Panel (a) depicts magnitude of uncertainty in a positive direction; panel (b) depicts magnitude of
uncertainty in a negative direction; and panel (c) describes the net effect of the functions depicted in
panels (a) and (b), expressed as positive and negative uncertainty bounds relative to the nominal
elevation.

## Estimating Ranges of Plausible Elevation

Before the uncertainty analyses, acreages for a particular region and protection scenario were compiled into bins corresponding to elevations above SHW 0.1-ft increments.[17] For example, for scenarios,

$A_{k,s,0.1}$ = area between $E_{jk}$ = 0 feet and $E_{jk = 0.1}$ foot (hectares)

$A_{k,s,0.2}$ = area between $E_{jk}$ = 0.1 feet and $E_{jk = 0.2}$ foot (hectares), etc.

Thus, collectively the $A_{k,s}$ values can be considered as a density[18] with each element associated with a particular $E_{jk}$. Considering the meaning of $E_{jk,l}$ and $E_{jk,u}$, each $A_{k,s}$ can be associated with all three values: $E_{jk}$, $E_{jk,l}$, and $E_{jk,u}$. By extension, each $E_{jk}$ elevation can be associated with three alternative values of $A_{k,s}$ by aligning with cases where $E_{jk} = E_{jk,l}$ and $E_{jk} = E_{jk,u}$. In this manner, two additional "densities" are generated such that for each $E_{jk}$ there are

three alternative corresponding $A_{k,s}$. The alternative densities have little implicit meaning, but converting each of the alternative densities to cumulative distributions provides alternative elevation profiles that are meaningful for generating a range of estimates of total flooded area under various amounts of sea level rise.

## Procedural Notes

Data processing and calculations related to the elevation uncertainty analyses were conducted with S-Plus software (Professional Developer version 7; Insightful Corporation, Seattle, WA). In addition to quality control procedures used during development of the S-Plus algorithms used to solve for the uncertainty endpoints, quality control procedures were conducted independently from the S-Plus algorithms using MS-Excel spreadsheets for selected test cases.

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[17]The data used as the basis for the uncertainty analyses were expressed with a resolution of 0.1 feet (see footnote 14), and the general processing of those data to develop uncertainty limits were conducted with a resolution of 0.1 feet. Prior to comparisons with elevations of interest (e.g., a selected amount of sea level rise), the basic results with 0.1 foot resolution were further subdivided into 10 bins of equal size to provide a quasi-resolution of 0.01 feet.

[18]Not strictly a probability density because the sum of all $H_k$s equal a total area in region k for scenarios, not one.

**Table 1.3.1. Features of distinct base map data sources related to estimation of elevation uncertainty**

| State | Quadrangle | County | Source | Contour interval (ft) | k (base)[a] | g | RMS cm (base) | SHW (ft)[b] |
|-------|-----------|--------|--------|------------------------|-------------|-----|----------------|-------------|
| DC | Alexandria | Washington DC | 1 m | 3.280839 | 0.5 | 0.25 | 50 | 3.49 |
| DC | Anacostia | Washington DC | 1 m | 3.280839 | 0.5 | 0.25 | 50 | 3.51 |
| DC | Washington East | Washington DC | 1 m | 3.280839 | 0.5 | 0.25 | 50 | 3.39 |
| DC | Washington West | Washington DC | 1 m | 3.280839 | 0.5 | 0.25 | 50 | 3.22 |
| DE | Assawoman Bay | Sussex | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.71 |
| DE | Bennetts Pier | Kent | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.89 |
| DE | Bethany | Sussex | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.76 |
| DE | Bombay Hook | Kent | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 4.22 |
| DE | Cape Henlopen | Sussex | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.89 |
| DE | Clayton | Kent | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 4.07 |
| DE | Delaware City | New Castle | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.89 |
| DE | Dover | Kent | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 4.13 |
| DE | Ellendale | Sussex | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.67 |
| DE | Fairmount | Sussex | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.88 |
| DE | Frankford | Sussex | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.78 |
| DE | Frederica | Kent | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.95 |
| DE | Georgetown | Sussex | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.2 |
| DE | Greenwood | Kent | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.79 |
| DE | Greenwood | Sussex | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.79 |
| DE | Harbeson | Sussex | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.01 |
| DE | Harrington | Kent | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.92 |
| DE | Hickman | Kent | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.82 |
| DE | Kenton | Kent | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 4.18 |
| DE | Laurel | Sussex | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.53 |
| DE | Lewes | Sussex | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.13 |
| DE | Little Creek | Kent | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 4.06 |
| DE | Marydel | Kent | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 4.03 |
| DE | Milford | Kent | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.89 |
| DE | Millsboro | Sussex | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.8 |
| DE | Milton | Sussex | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.45 |
| DE | Mispillion | Kent | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.85 |
| DE | Penns Grove | New Castle | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 4.06 |
| DE | Rehoboth | Sussex | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.83 |
| DE | Seaford East | Sussex | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.37 |
| DE | Seaford West | Sussex | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.5 |
| DE | Selbyville | Sussex | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.75 |
| DE | Sharptown | Sussex | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.24 |
| DE | Smyrna | Kent | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 4.2 |
| DE | Taylorsbridge | New Castle | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 4.05 |
| DE | Trap Pond | Kent | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.79 |
| DE | Trap Pond | Sussex | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.79 |
| DE | Wilmington S | New Castle | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.89 |
| DE | Wyoming | Kent | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.98 |
| DE | Cecilton | New Castle | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.92 |
| DE | Elkton | New Castle | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.83 |
| DE | Marcus Hook | New Castle | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.05 |
| DE | Middletown | New Castle | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.98 |
| DE | Newark East | New Castle | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.84 |
| DE | Saint Georges | New Castle | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.85 |
| DE | Wilmington N | New Castle | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.99 |
| MD | Aberdeen | Cecil | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 2.36 |
| MD | Anacostia | Prince George S | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 2.5 |

**Table 1.3.1. Features of distinct base map data sources related to estimation of elevation uncertainty**

| State | Quadrangle | County | Source | Contour interval (ft) | k (base)[a] | g | RMS cm (base) | SHW (ft)[b] |
|---|---|---|---|---|---|---|---|---|
| MD | Baltimore East | Baltimore City | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.6 |
| MD | Baltimore West | Baltimore City | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.6 |
| MD | Benedict | Calvert | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.9 |
| MD | Betterton | Kent | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 2 |
| MD | Bowie | Prince George S | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 2.1 |
| MD | Bristol | Calvert | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 2.1 |
| MD | Centreville | Kent | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.6 |
| MD | Charlotte Hall | Charles | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.7 |
| MD | Chestertown | Kent | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.8 |
| MD | Church Hill | Kent | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 2.2 |
| MD | Claiborne | Talbot | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.5 |
| MD | Conowingo Dam | Cecil | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 2.4 |
| MD | Earleville | Cecil | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 2.1 |
| MD | Edgewood | Harford | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.9 |
| MD | Galena | Cecil | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 2.3 |
| MD | Gunpowder Neck | Harford | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.6 |
| MD | Hanesville | Harford | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.6 |
| MD | Havre De Grace | Cecil | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 2.2 |
| MD | Langford Creek | Kent | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.5 |
| MD | Lower Marlboro | Calvert | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 2.1 |
| MD | North Beach | Calvert | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.5 |
| MD | Perryman | Harford | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.9 |
| MD | Piscataway | Prince George S | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 2.5 |
| MD | Popes Creek | Charles | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.7 |
| MD | Price | Caroline | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 2.4 |
| MD | Prince Frederick | Calvert | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.7 |
| MD | Relay | Baltimore City | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.5 |
| MD | Ridgely | Caroline | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 2.3 |
| MD | Rock Hall | Kent | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.6 |
| MD | Rock Point | Charles | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.8 |
| MD | Spesutie | Cecil | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.8 |
| MD | Swan Point | Kent | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 1.5 |
| MD | Washington East | Prince George S | 20 ft DNR | 5 | 1 | 0.5 | 152.4 | 2.6 |
| MD | Aberdeen | Harford | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.2 |
| MD | Annapolis | Anne Arundel | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 0.5 |
| MD | Bloodsworth Island | Somerset | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.8 |
| MD | Bowie | Anne Arundel | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.2 |
| MD | Bristol | Anne Arundel | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.3 |
| MD | Conowingo Dam | Harford | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.4 |
| MD | Curtis Bay | Anne Arundel | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 0.7 |
| MD | Deale | Anne Arundel | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 0.6 |
| MD | Deale Oe E | Anne Arundel | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 0.5 |
| MD | Edgewood | Harford | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.9 |
| MD | Gibson Island | Anne Arundel | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 0.6 |
| MD | Havre De Grace | Harford | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.1 |
| MD | Kedges Straits | Somerset | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.6 |
| MD | Millington | Cecil | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.3 |
| MD | North Beach | Anne Arundel | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 0.6 |
| MD | Odenton | Anne Arundel | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1 |
| MD | Perryman | Harford | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.9 |
| MD | Point Lookout | St. Mary S | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.6 |
| MD | Point No Point | St. Mary S | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.6 |

**Table 1.3.1. Features of distinct base map data sources related to estimation of elevation uncertainty**

| State | Quadrangle | County | Source | Contour interval (ft) | k (base)[a] | g | RMS cm (base) | SHW (ft)[b] |
|---|---|---|---|---|---|---|---|---|
| MD | Relay | Anne Arundel | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 0.7 |
| MD | Round Bay | Anne Arundel | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 0.6 |
| MD | Saxis | Somerset | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2 |
| MD | South River | Anne Arundel | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 0.6 |
| MD | Sparrows Point | Anne Arundel | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 0.6 |
| MD | Spesutie | Harford | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2 |
| MD | Sudlersville | Kent | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.2 |
| MD | White Marsh | Harford | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.8 |
| MD | Alexandria | Prince George S | 10 ft | 5 | 1 | 0.25 | 152.4 | 2.6 |
| MD | Broomes Island | Calvert | 10 ft | 5 | 1 | 0.25 | 152.4 | 1.7 |
| MD | Cecilton | Cecil | 10 ft | 5 | 1 | 0.25 | 152.4 | 2.3 |
| MD | Colonial Beach North | Charles | 10 ft | 5 | 1 | 0.25 | 152.4 | 1.7 |
| MD | Cove Point | Calvert | 10 ft | 5 | 1 | 0.25 | 152.4 | 1.5 |
| MD | Curtis Bay | Baltimore City | 10 ft | 5 | 1 | 0.25 | 152.4 | 1.5 |
| MD | Elkton | Cecil | 10 ft | 5 | 1 | 0.25 | 152.4 | 2.3 |
| MD | Hollywood | St. Mary S | 10 ft | 5 | 1 | 0.25 | 152.4 | 1.7 |
| MD | Indian Head | Charles | 10 ft | 5 | 1 | 0.25 | 152.4 | 1.9 |
| MD | King George | Charles | 10 ft | 5 | 1 | 0.25 | 152.4 | 1.5 |
| MD | Leonardtown | St. Mary S | 10 ft | 5 | 1 | 0.25 | 152.4 | 1.8 |
| MD | Mathias Point | Charles | 10 ft | 5 | 1 | 0.25 | 152.4 | 1.7 |
| MD | Mechanicsville | Calvert | 10 ft | 5 | 1 | 0.25 | 152.4 | 1.8 |
| MD | Mount Vernon | Charles | 10 ft | 5 | 1 | 0.25 | 152.4 | 2.2 |
| MD | Nanjemoy | Charles | 10 ft | 5 | 1 | 0.25 | 152.4 | 1.6 |
| MD | North East | Cecil | 10 ft | 5 | 1 | 0.25 | 152.4 | 2.2 |
| MD | Piney Point | St. Mary S | 10 ft | 5 | 1 | 0.25 | 152.4 | 1.8 |
| MD | Port Tobacco | Charles | 10 ft | 5 | 1 | 0.25 | 152.4 | 2 |
| MD | Quantico | Charles | 10 ft | 5 | 1 | 0.25 | 152.4 | 1.8 |
| MD | Saint Clements Island | St. Mary S | 10 ft | 5 | 1 | 0.25 | 152.4 | 1.8 |
| MD | Saint George Island | St. Mary S | 10 ft | 5 | 1 | 0.25 | 152.4 | 1.6 |
| MD | Saint Marys City | St. Mary S | 10 ft | 5 | 1 | 0.25 | 152.4 | 1.7 |
| MD | Solomons Island | Calvert | 10 ft | 5 | 1 | 0.25 | 152.4 | 1.6 |
| MD | Stratford Hall | St. Mary S | 10 ft | 5 | 1 | 0.25 | 152.4 | 1.8 |
| MD | Widewater | Charles | 10 ft | 5 | 1 | 0.25 | 152.4 | 1.6 |
| MD | Barren Island | Dorchester | Lidar | 1[b] | 0.47 | 0.25 | 14.3 | 0[b] |
| MD | Blackwater River | Dorchester | Lidar | 1[b] | 0.47 | 0.25 | 14.3 | 0[b] |
| MD | Bloodsworth Island | Dorchester | Lidar | 1[b] | 0.47 | 0.25 | 14.3 | 0[b] |
| MD | Cambridge | Dorchester | Lidar | 1[b] | 0.47 | 0.25 | 14.3 | 0[b] |
| MD | Centreville | Kent | Lidar | 1[b] | 0.47 | 0.25 | 14.3 | 0[b] |
| MD | Chicamacomico River | Dorchester | Lidar | 1[b] | 0.47 | 0.25 | 14.3 | 0[b] |
| MD | Church Creek | Dorchester | Lidar | 1[b] | 0.47 | 0.25 | 14.3 | 0[b] |
| MD | Claiborne | Queen Anne S | Lidar | 1[b] | 0.47 | 0.25 | 14.3 | 0[b] |
| MD | Crisfield | Somerset | Lidar | 1[b] | 0.47 | 0.25 | 14.3 | 0[b] |
| MD | Deal Island | Somerset | Lidar | 1[b] | 0.47 | 0.25 | 14.3 | 0[b] |
| MD | Delmar | Wicomico | Lidar | 1[b] | 0.47 | 0.25 | 14.3 | 0[b] |
| MD | Dividing Creek | Somerset | Lidar | 1[c] | 0.47 | 0.25 | 14.3 | 0[b] |
| MD | East New Market | Dorchester | Lidar | 1[b] | 0.47 | 0.25 | 14.3 | 0[b] |
| MD | Easton | Talbot | Lidar | 1[b] | 0.47 | 0.25 | 14.3 | 0[b] |
| MD | Eden | Somerset | Lidar | 1[b] | 0.47 | 0.25 | 14.3 | 0[b] |
| MD | Ewell | Somerset | Lidar | 1[b] | 0.47 | 0.25 | 14.3 | 0[b] |
| MD | Federalsburg | Caroline | Lidar | 1[b] | 0.47 | 0.25 | 14.3 | 0[b] |
| MD | Fowling Creek | Caroline | Lidar | 1[b] | 0.47 | 0.25 | 14.3 | 0[b] |
| MD | Golden Hill | Dorchester | Lidar | 1[b] | 0.47 | 0.25 | 14.3 | 0[b] |

**Table 1.3.1. Features of distinct base map data sources related to estimation of elevation uncertainty**

| State | Quadrangle | County | Source | Contour interval (ft) | k (base)[a] | g | RMS cm (base) | SHW (ft)[b] |
|---|---|---|---|---|---|---|---|---|
| MD | Hebron | Wicomico | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Honga | Dorchester | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Hudson | Dorchester | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Kedges Straits | Somerset | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Kent Island | Queen Anne S | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Kingston | Somerset | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Langford Creek | Kent | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Love Point | Queen Anne S | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Mardela Springs | Dorchester | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Marion | Somerset | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Monie | Somerset | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Nanticoke | Dorchester | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Ninepin Branch | Wicomico | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Oxford | Dorchester | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Pocomoke City | Somerset | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Preston | Caroline | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Princess Anne | Somerset | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Queenstown | Queen Anne S | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Rhodesdale | Dorchester | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Richland Point | Dorchester | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Ridgely | Caroline | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Saint Michaels | Queen Anne S | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Salisbury | Wicomico | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Saxis | Somerset | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Seaford West | Caroline | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Sharptown | Dorchester | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Taylors Island | Dorchester | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Terrapin Sand Point | Somerset | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Tilghman | Dorchester | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Trappe | Caroline | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Wango | Wicomico | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Wetipquin | Dorchester | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Whaleyville | Wicomico | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Wingate | Dorchester | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Wye Mills | Queen Anne S | Lidar | 1 [b] | 0.47 | 0.25 | 14.3 | 0 [b] |
| MD | Assawoman Bay | Worcester | Lidar | 1 [b] | 0.98 | 0.25 | 30 | 0 [b] |
| MD | Berlin | Worcester | Lidar | 1 [b] | 0.98 | 0.25 | 30 | 0 [b] |
| MD | Boxiron | Worcester | Lidar | 1 [b] | 0.98 | 0.25 | 30 | 0 [b] |
| MD | Dividing Creek | Worcester | Lidar | 1 [b] | 0.98 | 0.25 | 30 | 0 [b] |
| MD | Girdletree | Worcester | Lidar | 1 [b] | 0.98 | 0.25 | 30 | 0 [b] |
| MD | Hallwood | Worcester | Lidar | 1 [b] | 0.98 | 0.25 | 30 | 0 [b] |
| MD | Kingston | Worcester | Lidar | 1 [b] | 0.98 | 0.25 | 30 | 0 [b] |
| MD | Ninepin Branch | Worcester | Lidar | 1 [b] | 0.98 | 0.25 | 30 | 0 [b] |
| MD | Ocean City | Worcester | Lidar | 1 [b] | 0.98 | 0.25 | 30 | 0 [b] |
| MD | Pocomoke City | Worcester | Lidar | 1 [b] | 0.98 | 0.25 | 30 | 0 [b] |
| MD | Public Landing | Worcester | Lidar | 1 [b] | 0.98 | 0.25 | 30 | 0 [b] |
| MD | Selbyville | Worcester | Lidar | 1 [b] | 0.98 | 0.25 | 30 | 0 [b] |
| MD | Snow Hill | Worcester | Lidar | 1 [b] | 0.98 | 0.25 | 30 | 0 [b] |
| MD | Tingles Island | Worcester | Lidar | 1 [b] | 0.98 | 0.25 | 30 | 0 [b] |
| MD | Wango | Worcester | Lidar | 1 [b] | 0.98 | 0.25 | 30 | 0 [b] |
| MD | Whaleyville | Worcester | Lidar | 1 [b] | 0.98 | 0.25 | 30 | 0 [b] |
| MD | Whittington Point | Worcester | Lidar | 1 [b] | 0.98 | 0.25 | 30 | 0 [b] |

**Table 1.3.1. Features of distinct base map data sources related to estimation of elevation uncertainty**

| State | Quadrangle | County | Source | Contour interval (ft) | k (base)[a] | g | RMS cm (base) | SHW (ft)[b] |
|---|---|---|---|---|---|---|---|---|
| MD | Baltimore East | Baltimore | 2 ft | 1 [b] | 1 | 0.5 | 30.5 | 0 [b] |
| MD | Curtis Bay | Baltimore | 2 ft | 1 [b] | 1 | 0.5 | 30.5 | 0 [b] |
| MD | Edgewood | Baltimore | 2 ft | 1 [b] | 1 | 0.5 | 30.5 | 0 [b] |
| MD | Gunpowder Neck | Baltimore | 2 ft | 1 [b] | 1 | 0.5 | 30.5 | 0 [b] |
| MD | Middle River | Baltimore | 2 ft | 1 [b] | 1 | 0.5 | 30.5 | 0 [b] |
| MD | Relay | Baltimore | 2 ft | 1 [b] | 1 | 0.5 | 30.5 | 0 [b] |
| MD | Sparrows Point | Baltimore | 2 ft | 1 [b] | 1 | 0.5 | 30.5 | 0 [b] |
| MD | White Marsh | Baltimore | 2 ft | 1 [b] | 1 | 0.5 | 30.5 | 0 [b] |
| MD | Barren Island | Dorchester | MTR | 3.28084 | 0.5 | 0.25 | 50 | 1.6 |
| MD | Honga | Dorchester | MTR | 3.28084 | 0.5 | 0.25 | 50 | 1.4 |
| MD | Hudson | Dorchester | MTR | 3.28084 | 0.5 | 0.25 | 50 | 1.5 |
| MD | Taylors Island | Dorchester | MTR | 3.28084 | 0.5 | 0.25 | 50 | 1.5 |
| MD | Burrsville | Caroline | 20 ft USGS | 20 | 0.5 | 0.25 | 304.8 | 2.4 |
| MD | Denton | Caroline | 20 ft USGS | 20 | 0.5 | 0.25 | 304.8 | 2.3 |
| MD | Federalsburg | Caroline | 20 ft USGS | 20 | 0.5 | 0.25 | 304.8 | 2.3 |
| MD | Fowling Creek | Caroline | 20 ft USGS | 20 | 0.5 | 0.25 | 304.8 | 2.1 |
| MD | Goldsboro | Caroline | 20 ft USGS | 20 | 0.5 | 0.25 | 304.8 | 2.4 |
| MD | Hickman | Caroline | 20 ft USGS | 20 | 0.5 | 0.25 | 304.8 | 2.37 |
| MD | Hobbs | Caroline | 20 ft USGS | 20 | 0.5 | 0.25 | 304.8 | 2.2 |
| MD | Marydel | Caroline | 20 ft USGS | 20 | 0.5 | 0.25 | 304.8 | 2.3 |
| MD | Preston | Caroline | 20 ft USGS | 20 | 0.5 | 0.25 | 304.8 | 2.1 |
| MD | Ridgely | Caroline | 20 ft USGS | 20 | 0.5 | 0.25 | 304.8 | 2.3 |
| MD | Seaford West | Caroline | 20 ft USGS | 20 | 0.5 | 0.25 | 304.8 | 2.3 |
| NC | Fictitious Nocar | Chowan | Lidar | 1 [b] | 0.36 | 0.089 | 10.9 | 0 [b] |
| NC | Fictitious Nocar | Carteret | Lidar | 1 [b] | 0.37 | 0.092 | 11.2 | 0 [b] |
| NC | Fictitious Nocar | Bertie | Lidar | 1 [b] | 0.37 | 0.093 | 11.3 | 0 [b] |
| NC | Fictitious Nocar | Pitt | Lidar | 1 [b] | 0.38 | 0.096 | 11.7 | 0 [b] |
| NC | Fictitious Nocar | Currituck | Lidar | 1 [b] | 0.4 | 0.099 | 12.1 | 0 [b] |
| NC | Fictitious Nocar | Washington | Lidar | 1 [b] | 0.4 | 0.101 | 12.3 | 0 [b] |
| NC | Fictitious Nocar | Brunswick | Lidar | 1 [b] | 0.41 | 0.102 | 12.4 | 0 [b] |
| NC | Fictitious Nocar | Columbus | Lidar | 1 [b] | 0.41 | 0.103 | 12.5 | 0 [b] |
| NC | Fictitious Nocar | Pasquotank | Lidar | 1 [b] | 0.42 | 0.105 | 12.8 | 0 [b] |
| NC | Fictitious Nocar | Perquimans | Lidar | 1 [b] | 0.42 | 0.106 | 12.9 | 0 [b] |
| NC | Fictitious Nocar | Pamlico | Lidar | 1 [b] | 0.45 | 0.112 | 13.7 | 0 [b] |
| NC | Fictitious Nocar | Martin | Lidar | 1 [b] | 0.47 | 0.118 | 14.4 | 0 [b] |
| NC | Fictitious Nocar | Hyde | Lidar | 1 [b] | 0.48 | 0.119 | 14.5 | 0 [b] |
| NC | Fictitious Nocar | Camden | Lidar | 1 [b] | 0.48 | 0.12 | 14.6 | 0 [b] |
| NC | Fictitious Nocar | Duplin | Lidar | 1 [b] | 0.48 | 0.121 | 14.7 | 0 [b] |
| NC | Fictitious Nocar | Craven | Lidar | 1 [b] | 0.49 | 0.121 | 14.8 | 0 [b] |
| NC | Fictitious Nocar | Bladen | Lidar | 1 [b] | 0.49 | 0.122 | 14.9 | 0 [b] |
| NC | Fictitious Nocar | Dare | Lidar | 1 [b] | 0.52 | 0.131 | 16 | 0 [b] |
| NC | Fictitious Nocar | Onslow | Lidar | 1 [b] | 0.54 | 0.135 | 16.4 | 0 [b] |
| NC | Fictitious Nocar | Lenoir | Lidar | 1 [b] | 0.57 | 0.144 | 17.5 | 0 [b] |
| NC | Fictitious Nocar | New Han | Lidar | 1 [b] | 0.59 | 0.147 | 17.9 | 0 [b] |
| NC | Fictitious Nocar | Pender | Lidar | 1 [b] | 0.61 | 0.152 | 18.5 | 0 [b] |
| NC | Fictitious Nocar | Beaufort | Lidar | 1 [b] | 0.66 | 0.164 | 20 | 0 [b] |
| NC | Fictitious Nocar | Halifax | Lidar | 1 [b] | 0.66 | 0.165 | 20.12 | 0 [b] |
| NC | Fictitious Nocar | Northampton | Lidar | 1 [b] | 0.87 | 0.217 | 26.5 | 0 [b] |
| NC | Fictitious Nocar | Gates | Lidar | 1 [b] | 1.06 | 0.265 | 32.3 | 0 [b] |
| NC | Fictitious Nocar | Hertford | Lidar | 1 [b] | 1.11 | 0.276 | 33.7 | 0 [b] |
| NJ | Alloway | Salem | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.7 |
| NJ | Arthur Kill | Middlesex | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.09 |

**Table 1.3.1. Features of distinct base map data sources related to estimation of elevation uncertainty**

| State | Quadrangle | County | Source | Contour interval (ft) | k (base)[a] | g | RMS cm (base) | SHW (ft)[b] |
|---|---|---|---|---|---|---|---|---|
| NJ | Atsion | Atlantic | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.93 |
| NJ | Bridgeport | Gloucester | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.77 |
| NJ | Bridgeton | Cumberland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.48 |
| NJ | Cape May | Cape May | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.79 |
| NJ | Cedarville | Cumberland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.72 |
| NJ | Central Park | Bergen | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.34 |
| NJ | Dividing Creek | Cumberland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.75 |
| NJ | Dorothy | Atlantic | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 5 |
| NJ | Egg Harbor City | Atlantic | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.19 |
| NJ | Elizabeth | Essex | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.15 |
| NJ | Five Points | Cumberland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.23 |
| NJ | Forked River | Ocean | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.67 |
| NJ | Frankford | Burlington | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.74 |
| NJ | Green Bank | Atlantic | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.15 |
| NJ | Hackensack | Bergen | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.24 |
| NJ | Jenkins | Atlantic | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.04 |
| NJ | Jersey City | Essex | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.16 |
| NJ | Marcus Hook | Gloucester | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.78 |
| NJ | Millville | Cumberland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.37 |
| NJ | New Brunswick | Middlesex | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.54 |
| NJ | New Gretna | Atlantic | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.24 |
| NJ | Nyack | Bergen | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.59 |
| NJ | Oswego Lake | Burlington | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.01 |
| NJ | Park Ridge | Bergen | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.24 |
| NJ | Port Elizabeth | Cape May | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.83 |
| NJ | Rio Grande | Cape May | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.93 |
| NJ | Runnemede | Camden | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.66 |
| NJ | Salem | Salem | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.68 |
| NJ | Sea Isle City | Cape May | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.4 |
| NJ | Shiloh | Cumberland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.06 |
| NJ | Ship Bottom | Ocean | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.03 |
| NJ | South Amboy | Middlesex | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.25 |
| NJ | Stone Harbor | Cape May | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.53 |
| NJ | Toms River | Ocean | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.68 |
| NJ | Tuckahoe | Atlantic | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.39 |
| NJ | Tuckerton | Ocean | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.94 |
| NJ | Weehawken | Bergen | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.2 |
| NJ | West Creek | Ocean | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.43 |
| NJ | Wildwood | Cape May | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.65 |
| NJ | Woodbury | Gloucester | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.83 |
| NJ | Woodstown | Gloucester | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.33 |
| NJ | Yonkers | Bergen | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.59 |
| NJ | Asbury Park | Monmouth | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.56 |
| NJ | Atlantic City | Atlantic | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.58 |
| NJ | Ben Davis Point | Cumberland | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 4.16 |
| NJ | Bombay Hook Island | Cumberland | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 4.24 |
| NJ | Brigantine Inlet | Atlantic | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.32 |
| NJ | Canton | Cumberland | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.81 |
| NJ | Delaware City | Salem | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.92 |
| NJ | Heislerville | Cape May | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.99 |
| NJ | Lakewood | Monmouth | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.68 |
| NJ | Marmora | Atlantic | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.39 |

**Table 1.3.1. Features of distinct base map data sources related to estimation of elevation uncertainty**

| State | Quadrangle | County | Source | Contour interval (ft) | k (base)[a] | g | RMS cm (base) | SHW (ft)[b] |
|-------|-----------|--------|--------|----------------------|-------------|-----|---------------|-------------|
| NJ | Mays Landing | Atlantic | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.69 |
| NJ | Ocean City | Atlantic | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.5 |
| NJ | Oceanville | Atlantic | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.46 |
| NJ | Penns Grove | Gloucester | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.42 |
| NJ | Pleasantville | Atlantic | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.62 |
| NJ | Point Pleasant | Ocean | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.01 |
| NJ | Port Norris | Cumberland | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 4.32 |
| NJ | Taylors Bridge | Salem | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 4.05 |
| NJ | Wilmington South | Salem | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.82 |
| NJ | Woodbine | Cape May | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.58 |
| NJ | Asbury Park | Monmouth | MMTH | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Asbury Park Oe E | Monmouth | MMTH | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Farmingdale | Monmouth | MMTH | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Keyport | Monmouth | MMTH | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Lakewood | Monmouth | MMTH | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Long Branch East | Monmouth | MMTH | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Long Branch West | Monmouth | MMTH | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Point Pleasant | Monmouth | MMTH | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Sandy Hook East | Monmouth | MMTH | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Sandy Hook West | Monmouth | MMTH | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Atlantic City | Atlantic | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Avalon | Cape May | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Barnegat Light | Ocean | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Beach Haven | Ocean | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Brigantine Inlet | Atlantic | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Cape May | Cape May | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Forked River | Ocean | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Lakewood | Ocean | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Long Beach NE | Ocean | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Marmora | Cape May | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | New Gretna | Atlantic | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Ocean City | Atlantic | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Oceanville | Atlantic | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Pleasantville | Atlantic | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Point Pleasant | Ocean | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Rio Grande | Cape May | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Sea Isle City | Cape May | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Sea Isle City Oe E | Cape May | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Seaside Park | Ocean | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Ship Bottom | Ocean | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Stone Harbor | Cape May | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Toms River | Ocean | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Tuckerton | Ocean | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | West Creek | Ocean | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Wildwood | Cape May | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Woodbine | Cape May | SPOT | 1 [b] | 1 | 0.5 | 30.48 | 0 [b] |
| NJ | Beverly | Burlington | 20 ft | 20 | 0.5 | 0.25 | 304.8 | 4.9 |
| NJ | Bristol | Burlington | 20 ft | 20 | 0.5 | 0.25 | 304.8 | 5.3 |
| NJ | Camden | Burlington | 20 ft | 20 | 0.5 | 0.25 | 304.8 | 4.05 |
| NJ | Keyport | Middlesex | 20 ft | 20 | 0.5 | 0.25 | 304.8 | 3.94 |
| NJ | Orange | Bergen | 20 ft | 20 | 0.5 | 0.25 | 304.8 | 4.28 |
| NJ | Perth Amboy | Middlesex | 20 ft | 20 | 0.5 | 0.25 | 304.8 | 4.07 |

**Table 1.3.1. Features of distinct base map data sources related to estimation of elevation uncertainty**

| State | Quadrangle | County | Source | Contour interval (ft) | k (base)[a] | g | RMS cm (base) | SHW (ft)[b] |
|---|---|---|---|---|---|---|---|---|
| NJ | Plainfield | Middlesex | 20 ft | 20 | 0.5 | 0.25 | 304.8 | 4.27 |
| NJ | Roselle | Union | 20 ft | 20 | 0.5 | 0.25 | 304.8 | 4.09 |
| NJ | Trenton West | Burlington | 20 ft | 20 | 0.5 | 0.25 | 304.8 | 5.63 |
| NY | Amityville | Nassau | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.88 |
| NY | Bay Shore East | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.51 |
| NY | Bay Shore East Oe S | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.28 |
| NY | Bay Shore West | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.44 |
| NY | Bay Shore West Oe S | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.06 |
| NY | Bellport | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.39 |
| NY | Brooklyn | Kings | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.69 |
| NY | Coney Island | Kings | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.88 |
| NY | East Hampton | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.24 |
| NY | Eastport | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.69 |
| NY | Far Rockaway | Kings | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.98 |
| NY | Freeport | Nassau | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.52 |
| NY | Gardiners Island East | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.12 |
| NY | Greenport | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.46 |
| NY | Howells Point | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.19 |
| NY | Jamaica | Kings | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 4.08 |
| NY | Lynbrook | Nassau | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.5 |
| NY | Mattituck | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.66 |
| NY | Mattituck Hills | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.53 |
| NY | Montauk Point | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.05 |
| NY | Montauk Point Oe E | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.25 |
| NY | Moriches | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.62 |
| NY | Napeague Beach | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.12 |
| NY | Orient | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.55 |
| NY | Patchogue | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.96 |
| NY | Pattersquash Island | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.48 |
| NY | Quogue | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.18 |
| NY | Sag Harbor | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.29 |
| NY | Sayville | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.83 |
| NY | Southampton | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.35 |
| NY | Southold | Suffolk | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.77 |
| NY | Arthur Kill | Richmond | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.93 |
| NY | Brooklyn | New York | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.42 |
| NY | Central Islip | Suffolk | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.07 |
| NY | Central Park | Bronx | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.21 |
| NY | Elizabeth | Richmond | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.97 |
| NY | Flushing | Bronx | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 5.09 |
| NY | Gardiners Island West | Suffolk | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.34 |
| NY | Glenville | Westchester | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.34 |
| NY | Haverstraw | Rockland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.82 |
| NY | Jersey City | Ellis | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.61 |
| NY | Jones Inlet | Nassau | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.72 |
| NY | Keyport | Richmond | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.83 |
| NY | Lawrence | Nassau | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.37 |
| NY | Mamaroneck | Nassau | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 5.2 |
| NY | Middle Island | Suffolk | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.12 |
| NY | Mount Vernon | Bronx | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.64 |
| NY | Mystic | Suffolk | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.23 |
| NY | New London | Suffolk | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.15 |

**Table 1.3.1. Features of distinct base map data sources related to estimation of elevation uncertainty**

| State | Quadrangle | County | Source | Contour interval (ft) | k (base)[a] | g | RMS cm (base) | SHW (ft)[b] |
|---|---|---|---|---|---|---|---|---|
| NY | Nyack | Rockland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.02 |
| NY | Ossining | Westchester | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.87 |
| NY | Perth Amboy | Richmond | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.04 |
| NY | Plum Island | Suffolk | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.27 |
| NY | Plum Island Oe E | Suffolk | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.09 |
| NY | Port Jefferson | Suffolk | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.6 |
| NY | Riverhead | Suffolk | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.06 |
| NY | Saint James | Suffolk | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.65 |
| NY | Sea Cliff | Nassau | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 5.15 |
| NY | Shinnecock Inlet | Suffolk | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.42 |
| NY | South Amboy | Richmond | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4 |
| NY | The Narrows | Kings | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.72 |
| NY | Wading River | Suffolk | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.47 |
| NY | Weehawken | New York | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.45 |
| NY | West Gilgo Beach | Nassau | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.15 |
| NY | White Plains | Westchester | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.04 |
| NY | Yonkers | Bronx | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.33 |
| PA | Beverly | Bucks | 20 ft | 20 | 0.5 | 0.25 | 304.8 | 5.25 |
| PA | Bristol | Bucks | 20 ft | 20 | 0.5 | 0.25 | 304.8 | 5.42 |
| PA | Langhorne | Bucks | 20 ft | 20 | 0.5 | 0.25 | 304.8 | 5.4 |
| PA | Trenton West | Bucks | 20 ft | 20 | 0.5 | 0.25 | 304.8 | 5.59 |
| PA | Beverly | Philadelphia | 2 ft | 2[c] | 0.5 | 0.25 | 30.48 | 0[c] |
| PA | Camden | Philadelphia | 2 ft | 2[c] | 0.5 | 0.25 | 30.48 | 0[c] |
| PA | Frankford | Philadelphia | 2 ft | 2[c] | 0.5 | 0.25 | 30.48 | 0[c] |
| PA | Langhorne | Philadelphia | 2 ft | 2[c] | 0.5 | 0.25 | 30.48 | 0[c] |
| PA | Lansdowne | Philadelphia | 2 ft | 2[c] | 0.5 | 0.25 | 30.48 | 0[c] |
| PA | Philadelphia | Philadelphia | 2 ft | 2[c] | 0.5 | 0.25 | 30.48 | 0[c] |
| PA | Woodbury | Philadelphia | 2 ft | 2[c] | 0.5 | 0.25 | 30.48 | 0[c] |
| PA | Bridgeport | Delaware | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.02 |
| PA | Lansdowne | Delaware | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.12 |
| PA | Marcus Hook | Delaware | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.99 |
| PA | Philadelphia | Delaware | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.2 |
| PA | Trenton East | Bucks | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 5.65 |
| PA | Woodbury | Delaware | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 4.08 |
| PA | Ficticious | Philadelphia | 2 ft | 2[c] | 0.5 | 0.25 | 30.48 | 0[c] |
| VA | Accomac | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.2 |
| VA | Achilles | Gloucester | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.2 |
| VA | Bethel Beach | Mathews | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.51 |
| VA | Bloxom | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.37 |
| VA | Bowers Hill | Chesapeake | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.47 |
| VA | Boxiron | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.22 |
| VA | Cape Charles | Northampton | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.79 |
| VA | Cape Henry | Virginia Beach | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.78 |
| VA | Cheriton | Northampton | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.29 |
| VA | Chesapeake Channel | Virginia Beach | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.08 |
| VA | Chesconessex | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.75 |
| VA | Chincoteague East | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.09 |
| VA | Chincoteague East Oe S | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.81 |
| VA | Chincoteague West | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.71 |
| VA | Cobb Island | Northampton | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.84 |
| VA | Courtland | Southampton | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.7 |

**Table 1.3.1. Features of distinct base map data sources related to estimation of elevation uncertainty**

| State | Quadrangle | County | Source | Contour interval (ft) | k (base)[a] | g | RMS cm (base) | SHW (ft)[b] |
|-------|-----------|--------|--------|-----------------------|-------------|---|---------------|-------------|
| VA | Creeds | Chesapeake | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 0.88 |
| VA | Crisfield | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.82 |
| VA | Deep Creek | Chesapeake | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.16 |
| VA | Deltaville | Lancaster | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.38 |
| VA | Elliotts Creek | Northampton | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.93 |
| VA | Ewell | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.56 |
| VA | Exmore | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.02 |
| VA | Fentress | Chesapeake | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.15 |
| VA | Fishermans Island | Northampton | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.37 |
| VA | Franklin | Franklin City | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.7 |
| VA | Franktown | Northampton | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.73 |
| VA | Gates | Suffolk City | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.7 |
| VA | Girdletree | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.31 |
| VA | Great Machipongo Inlet | Northampton | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.85 |
| VA | Hallwood | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.12 |
| VA | Hampton | Hampton City | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.17 |
| VA | Holland | Isle of Wight | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 15 |
| VA | Jamesville | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.55 |
| VA | Kempsville | Chesapeake | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.21 |
| VA | Knotts Island | Virginia Beach | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 0.94 |
| VA | Knotts Island Oe E | Virginia Beach | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.58 |
| VA | Lake Drummond SE | Chesapeake | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.04 |
| VA | Little Creek | Norfolk City | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.13 |
| VA | Mathews | Mathews | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.83 |
| VA | Metompkin Inlet | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.72 |
| VA | Moyock | Chesapeake | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 0.9 |
| VA | Mulberry Island | Isle of Wight | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.37 |
| VA | Nandua Creek | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.57 |
| VA | Nassawadox | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 3.1 |
| VA | New Point Comfort | Mathews | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.08 |
| VA | Newport News North | Hampton City | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.29 |
| VA | Newport News South | Hampton City | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.27 |
| VA | Norfolk North | Hampton City | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.22 |
| VA | Norfolk South | Chesapeake | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.39 |
| VA | North Bay | Virginia Beach | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.54 |
| VA | North Virginia Beach | Virginia Beach | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.24 |
| VA | Parksley | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.01 |
| VA | Pleasant Ridge | Chesapeake | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 0.88 |
| VA | Pocomoke City | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 5 |
| VA | Poquoson East | Poquoson City | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.13 |
| VA | Poquoson West | Gloucester | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.14 |
| VA | Princess Anne | Virginia Beach | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.31 |
| VA | Pungoteague | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.63 |
| VA | Quinby Inlet | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.91 |
| VA | Riverdale | Southampton | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.7 |
| VA | Saxis | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.05 |
| VA | Ship Shoal Inlet | Northampton | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.74 |
| VA | Tangier Island | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 1.62 |
| VA | Townsend | Northampton | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.42 |
| VA | Virginia Beach | Virginia Beach | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.07 |
| VA | Wachapreague | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.79 |
| VA | Wachapreague Oe E | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.83 |

**Table 1.3.1. Features of distinct base map data sources related to estimation of elevation uncertainty**

| State | Quadrangle | County | Source | Contour interval (ft) | k (base)[a] | g | RMS cm (base) | SHW (ft)[b] |
|---|---|---|---|---|---|---|---|---|
| VA | Wallops Island | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.78 |
| VA | Ware Neck | Gloucester | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.18 |
| VA | Whittington Point | Accomack | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.79 |
| VA | Yorktown | Gloucester | 5 ft | 5 | 0.5 | 0.25 | 76.2 | 2.2 |
| VA | Alexandria | Alexandria | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.63 |
| VA | Aylett | King and Queen | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 3.32 |
| VA | Bacons Castle | Isle of Wight | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.25 |
| VA | Benns Church | Isle of Wight | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.47 |
| VA | Boykins | Southampton | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.7 |
| VA | Brandon | Charles City | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.12 |
| VA | Buckhorn | Suffolk City | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 20 |
| VA | Burgess | Northumberland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.39 |
| VA | Capron | Southampton | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.7 |
| VA | Champlain | Essex | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.84 |
| VA | Charles City | Charles City | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.38 |
| VA | Chuckatuck | Isle of Wight | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 10 |
| VA | Church View | King and Queen | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 20 |
| VA | Claremont | Charles City | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.98 |
| VA | Clay Bank | Gloucester | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.34 |
| VA | Colonial Beach North | Westmoreland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.89 |
| VA | Colonial Beach South | Westmoreland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.87 |
| VA | Corapeake | Suffolk City | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 20 |
| VA | Dahlgren | King George | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.78 |
| VA | Disputanta North | Prince George | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.48 |
| VA | Drewrys Bluff | Chesterfield | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 10 |
| VA | Dunnsville | Essex | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.84 |
| VA | Dutch Gap | Charles City | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.87 |
| VA | East of Reedville | Northumberland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.33 |
| VA | Fleets Bay | Lancaster | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.4 |
| VA | Fort Belvoir | Fairfax | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.25 |
| VA | Fredericksburg | Fredericksburg | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.84 |
| VA | Gloucester | Gloucester | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.38 |
| VA | Gressitt | Gloucester | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.46 |
| VA | Guinea | Spotsylvania | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.73 |
| VA | Haynesville | Richmond | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.82 |
| VA | Heathsville | Northumberland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.45 |
| VA | Hog Island | Isle of Wight | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.19 |
| VA | Hopewell | Charles City | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.72 |
| VA | Indian Head | Fairfax | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.91 |
| VA | Irvington | Lancaster | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.5 |
| VA | King and Queen Court House | King and Queen | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.98 |
| VA | King George | King George | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.74 |
| VA | King William | Hanover | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 10 |
| VA | Kinsale | Northumberland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.5 |
| VA | Lake Drummond | Chesapeake | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 10 |
| VA | Lake Drummond NW | Chesapeake | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 10 |
| VA | Lancaster | Lancaster | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.59 |
| VA | Lively | Lancaster | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.65 |
| VA | Loretto | Caroline | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.97 |
| VA | Lottsburg | Northumberland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.49 |
| VA | Machodoc | Westmoreland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.61 |

**Table 1.3.1. Features of distinct base map data sources related to estimation of elevation uncertainty**

| State | Quadrangle | County | Source | Contour interval (ft) | k (base)[a] | g | RMS cm (base) | SHW (ft)[b] |
|---|---|---|---|---|---|---|---|---|
| VA | Mathias Point | King George | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.7 |
| VA | Millers Tavern | Essex | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.9 |
| VA | Montross | Richmond | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.79 |
| VA | Morattico | Essex | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.77 |
| VA | Mount Landing | Essex | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.83 |
| VA | Mount Vernon | Fairfax | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.42 |
| VA | New Kent | King William | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.55 |
| VA | Norge | James City | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.04 |
| VA | Occoquan | Fairfax | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.34 |
| VA | Passapatanzy | Caroline | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.6 |
| VA | Piney Point | Westmoreland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.76 |
| VA | Port Royal | Caroline | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.23 |
| VA | Prince George | Petersburg | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 10 |
| VA | Providence Forge | Charles City | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.56 |
| VA | Quantico | Prince William | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.87 |
| VA | Rappahannock Academy | Caroline | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.56 |
| VA | Raynor | Isle of Wight | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 10 |
| VA | Reedville | Northumberland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.33 |
| VA | Rollins Fork | Caroline | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.1 |
| VA | Roxbury | Charles City | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.68 |
| VA | Runnymede | Surry | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 20 |
| VA | Saint Clements Island | Westmoreland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.81 |
| VA | Saint George Island | Northumberland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.52 |
| VA | Saluda | Gloucester | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.7 |
| VA | Savedge | Prince George | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.23 |
| VA | Sebrell | Southampton | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.7 |
| VA | Sedley | Isle of Wight | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.7 |
| VA | Shacklefords | Gloucester | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.14 |
| VA | Smith Point | Northumberland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.34 |
| VA | Smithfield | Isle of Wight | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.52 |
| VA | Stafford | Stafford | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.93 |
| VA | Stratford Hall | Westmoreland | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.84 |
| VA | Suffolk | Suffolk City | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.99 |
| VA | Sunbeam | Southampton | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.7 |
| VA | Supply | Caroline | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 10 |
| VA | Surry | James City | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.9 |
| VA | Tappahannock | Essex | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.82 |
| VA | Toano | James City | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.42 |
| VA | Truhart | King and Queen | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.31 |
| VA | Tunstall | King William | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.76 |
| VA | Urbanna | Lancaster | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.55 |
| VA | Vicksville | Southampton | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 10 |
| VA | Walkers | Charles City | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.43 |
| VA | Washington West | Arlington | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.64 |
| VA | West Point | King and Queen | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.57 |
| VA | Westover | Charles City | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.59 |
| VA | Whaleyville | Suffolk City | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 20 |
| VA | Widewater | Stafford | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.79 |
| VA | Williamsburg | Gloucester | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 2.46 |
| VA | Wilton | Gloucester | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.48 |
| VA | Windsor | Isle of Wight | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 20 |

**Table 1.3.1. Features of distinct base map data sources related to estimation of elevation uncertainty**

| State | Quadrangle | County | Source | Contour interval (ft) | k (base)[a] | g | RMS cm (base) | SHW (ft)[b] |
|---|---|---|---|---|---|---|---|---|
| VA | Zuni | Isle of Wight | 10 ft | 10 | 0.5 | 0.25 | 152.4 | 1.76 |

a. The values of k listed here are the "base" value of k that relates contour interval to RMS as RMS = k(base) $H$ contour interval. The procedures for conducting uncertainty analyses allow for universal rescaling of k. These values were scaled by a factor of 0.5 in the analysis; i.e., we assume that error = 0.25 times the contour interval in most quads.

b. For these locations, the values of 1 for contour interval and 0 for SHW were provided to trick the algorithm into calculating "contour error" as RMSE/2. This was necessary because of the format in which Jones and Wang had saved the central estimate results for those areas with high precision data. The value of g doe not matter because g had no effect above the contour interval, which is less than the 50 cm increment with which our results are reported.

c. For these locations, the values of 2 for contour interval and 0 for SHW were provided to trick the algorithm into calculating "contour error" as RMSE/2. This was necessary because of the format in which Jones and Wang had saved the central estimate results for those areas with high precision data.

The results from this section are displayed in Appendices A, B, and C (along with regional summaries). *What we call "low" and "high"(elevation) as we explain our approach in this section are reversed in the tables, because the high elevation means less vulnerability and a lower area close to sea level, and vice versa.*

We encourage the reader to examine these tables and think about both the ratio of the high to the low estimate and the vertical error implied by a given line in the table. If the high estimate at 50 cm is greater than the low estimate for 100 cm, then the vertical error is greater than 25 cm. If the high estimate at 50 cm is greater than the low estimate for 150 cm, then the vertical error is greater than 50 cm.

If the ratio of high to low at 50 cm is great, that may mean that the uncertainty is great; but it may also mean that there is an inflection point nearby. For example, if the data (e.g., LIDAR) show several times as much land between 50 and 65 cm as between 0 and 50 cm, then even if the error is only 15 cm, the ratio of high to low could be very large.[19] This happens in some areas with LIDAR. As a result, if one considers only the ratio of high to low, one might be surprised that the areas with LIDAR do not always seem much more precise than the areas that relied on USGS 5-ft contours. (A second reason that the LIDAR does not always appear more precise than areas with 5-ft contours is that the first contour interval is only 2–3 feet in areas where spring high water is 2–3 feet above NGVD29. Although the subsequent contour intervals are greater, the ratios of high to low get closer to 1 as elevations

increase.) Nevertheless, variations in precision are palpable when one looks at areas with a 10- or 20-ft contour interval. See the Pennsylvania tables in Appendix A, where Bucks County has mostly 20-ft contours but Philadelphia has 2-ft contours.

Overall, we estimate between 8,792 and 10,882 square kilometers of land within 50 cm above the tides, and 11,032 to 12,985 square kilometers within 1 meter above the tides in the middle Atlantic (see Appendix C). Our input data and assumptions are based on RMS error; but at the state and regionwide level, much of the errors should cancel. The true amount of land close to sea level is very likely to fall within the ranges we have estimated.

One final warning: The available output provided by Jones and Wang (explained in Section 1.2), which this effort used as input, extended only to an elevation of 20 feet above SHW. Therefore, we cannot literally apply our formula for the high-elevation (low-area) case for elevations above 20 feet minus "error." In cases with a 20-ft contour interval, error is 5 feet; so we cannot apply the low-area formula above 15 feet. The algorithm explained in Section 1.3.2 treats no data as zero, assuming in effect that there is no land above 20-ft SHW. We considered suppressing all calculations above 4.5 meters in such cases, but opted instead to provide the results with an asterisk. That approach seems more reasonable: In these cases, assuming that there is no land above 20-ft SHW is clearly an extreme lower bound. But we doubt that it seriously distorts the statewide results. Typically, a state has only a few quads with a 20-ft contour interval—generally in areas that have very little low land. So even if we had been able to correctly apply our formula (i.e., if Jones and Wang in Section 1.2 had interpolated above 20-ft SHW) the calculated area would not be much

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[19]For example, if the LIDAR shows 10 ha between 0 and 50, and 100 ha between 50 and 65, if error is 15 cm, the high estimate would be 110 ha, and the low estimate would be less than 10. The ratio of high to low would this be more than 11.

greater than zero when considered at the statewide level. Thus, instead of suppressing our "low area" estimate, we provide an estimate that is slightly lower than a rigorous application of our approach.

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# Appendix A

## Low and High Estimates of the Area of Land Close to Sea Level, by State[a]
## (square kilometers)

[a]Low and high are an uncertainty range based on the contour interval and/or stated root mean square error (RMSE) of the input elevation data.  Calculations assume that half of the RMSE is random error and half is systematic error. For a discussion of these calculations, see Section 1.3 of this report.

**Table A.1 Low and High Estimates of the Area of Land Close to Sea Level in New York**

| County | Tidal | low 0.5 | high 0.5 | low 1.0 | high 1.0 | low 1.5 | high 1.5 | low 2.0 | high 2.0 | low 2.5 | high 2.5 | low 3.0 | high 3.0 | low 3.5 | high 3.5 | low 4.0 | high 4.0 | low 4.5 | high 4.5 | low 5.0 | high 5.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Meters above Spring High Water | | | | | | | | | | | |
| **Cumulative (total) amount of Dry Land below a given elevation** | | | | | | | | | | | | | | | | | | | | | |
| Bronx | | 0.4 | 3.2 | 2.2 | 6.3 | 4.1 | 9.4 | 5.9 | 13 | 8.1 | 16 | 11 | 19 | 14 | 22 | 17 | 25 | 19 | 26 | 22 | 27 |
| Brooklyn | | 3.1 | 10 | 8.5 | 17 | 14 | 24 | 20 | 34 | 28 | 43 | 37 | 52 | 46 | 57 | 53 | 63 | 59 | 68 | 64 | 69 |
| Manhattan | | 0.03 | 2.2 | 1.4 | 4.3 | 2.8 | 6.4 | 4.2 | 8.3 | 5.5 | 10 | 7.2 | 12 | 8.9 | 14 | 11 | 16 | 12 | 17 | 14 | 17 |
| Nassau | | 2.2 | 19 | 13 | 44 | 31 | 70 | 51 | 85 | 71 | 95 | 85 | 104 | 94 | 113 | 103 | 121 | 111 | 128* | 119 | 132* |
| Queens | | 6.2 | 17 | 15 | 28 | 23 | 39 | 32 | 49 | 41 | 58 | 51 | 67 | 60 | 72 | 66 | 77 | 71 | 80 | 77 | 81 |
| Staten Island | | 0.3 | 7.8 | 5.1 | 15 | 10 | 22 | 15 | 25 | 20 | 28 | 23 | 31 | 26 | 34 | 29 | 37 | 31 | 38 | 34 | 39 |
| Suffolk[2] | | 14 | 51 | 43 | 97 | 78 | 140 | 115 | 181 | 152 | 217 | 189 | 251 | 222 | 286 | 256 | 316 | 289 | 345* | 319 | 371* |
| Westchester | | 0.2 | 2.9 | 1.7 | 5.7 | 3.4 | 8.4 | 5.2 | 11 | 7.1 | 13 | 9.2 | 15 | 11 | 17 | 13 | 19 | 15 | 20* | 16 | 21* |
| Ellis & Liberty Islands | | <0.01 | 0.05 | 0.03 | 0.1 | 0.06 | 0.14 | 0.09 | 0.14 | 0.13 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 |
| **Statewide** | | **26** | **114** | **90** | **218** | **166** | **320** | **248** | **405** | **333** | **479** | **412** | **551** | **482** | **615** | **548** | **672** | **608** | **722*** | **665** | **757*** |
| **Wetlands** | Tidal | **Cumulative (total) amount of Nontidal Wetlands below a given elevation** | | | | | | | | | | | | | | | | | | | |
| Bronx | 1.2 | 0.00 | 0.01 | 0.01 | 0.02 | 0.01 | 0.03 | 0.02 | 0.06 | 0.03 | 0.09 | 0.04 | 0.11 | 0.07 | 0.14 | 0.1 | 0.2 | 0.1 | 0.2 | 0.1 | 0.2 |
| Brooklyn | 10 | 0.03 | 0.08 | 0.07 | 0.11 | 0.09 | 0.14 | 0.12 | 0.15 | 0.14 | 0.16 | 0.15 | 0.17 | 0.17 | 0.17 | 0.17 | 0.17 | 0.17 | 0.17 | 0.17 | 0.17 |
| Nassau | 44 | 0.1 | 0.4 | 0.3 | 0.7 | 0.5 | 1.2 | 0.8 | 1.5 | 1.1 | 1.8 | 1.4 | 2.1 | 1.7 | 2.3 | 2.0 | 2.6 | 2.2 | 2.9* | 2.6 | 3.2* |
| Putnam | 1.3 | 0 | <0.01 | 0.00 | <0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.02 | 0.01 | 0.02* | 0.01 | 0.02* |
| Queens | 12 | 0.0 | 0.2 | 0.1 | 0.3 | 0.2 | 0.4 | 0.4 | 0.5 | 0.4 | 0.6 | 0.5 | 0.6 | 0.6 | 0.7 | 0.6 | 0.7 | 0.6 | 0.7 | 0.67 | 0.69 |
| Rockland | 2.3 | 0.0 | 0.02 | 0.01 | 0.04 | 0.02 | 0.06 | 0.03 | 0.07 | 0.05 | 0.08 | 0.06 | 0.09 | 0.07 | 0.09 | 0.07 | 0.10 | 0.08 | 0.11* | 0.1 | 0.2* |
| Staten Island | 4.0 | 0.01 | 0.5 | 0.3 | 0.9 | 0.6 | 1.3 | 0.9 | 1.4 | 1.2 | 1.5 | 1.3 | 1.6 | 1.4 | 1.7 | 1.5 | 1.8 | 1.6 | 1.9 | 1.7 | 1.9 |
| Suffolk | 72 | 1.5 | 5.7 | 4.9 | 9.8 | 8.5 | 13 | 11 | 15 | 13 | 17 | 15 | 18 | 17 | 20 | 18 | 21 | 19 | 23* | 21 | 24* |
| Westchester | 1.7 | <0.01 | 0.04 | 0.03 | 0.08 | 0.05 | 0.12 | 0.08 | 0.13 | 0.10 | 0.14 | 0.1 | 0.2 | 0.1 | 0.2 | 0.1 | 0.2 | 0.15 | 0.21* | 0.16 | 0.23* |
| **Statewide** | **149** | **1.7** | **6.9** | **5.7** | **12** | **10** | **16** | **13** | **19** | **16** | **21** | **19** | **23** | **21** | **25** | **23** | **27** | **25** | **29*** | **26** | **30*** |
| **Cumulative (total) amount of land below a given elevation[3]** | | | | | | | | | | | | | | | | | | | | | |
| Dry Land | | 26 | 114 | 90 | 218 | 166 | 320 | 248 | 405 | 333 | 479 | 412 | 551 | 482 | 615 | 548 | 672 | 608 | 722* | 665 | 757* |
| Nontidal Wetlands | | 2 | 7 | 6 | 12 | 10 | 16 | 13 | 19 | 16 | 21 | 19 | 23 | 21 | 25 | 23 | 27 | 25 | 29* | 26 | 30* |
| **All Land** | **149** | **176** | **269** | **244** | **379** | **325** | **485** | **410** | **573** | **498** | **649** | **579** | **722** | **652** | **788** | **719** | **848** | **781** | **899*** | **840** | **936*** |

*This value is probably too low because of a data limitation. See Section 1.3 of this report.

Note: A peer reviewer noticed that the draft maps showed Gardiners Island as "likely" even though the text said that it had been changed to "unlikely". The effect of that error was to overstate the area of land below one meter where shore protection is likely, and understate the area where shore protection is unlikely, by 0.7, 0.9, and 1.1 square miles for the land within 50, 100, and 200 cm above spring high water. We corrected the maps, but not the quantitative results in this report.

Table A.2 Low and High Estimates of the Area of Land Close to Sea Level in New Jersey

| | Meters above Spring High Water | | | | | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high |
| | 0.5 | | 1.0 | | 1.5 | | 2.0 | | 2.5 | | 3.0 | | 3.5 | | 4.0 | | 4.5 | | 5.0 | |
| County | ----------------Cumulative (total) amount of dry land below a given elevation--------------- | | | | | | | | | | | | | | | | | | | |
| Atlantic | 4 | 13 | 14 | 29 | 29 | 42 | 41 | 54 | 50 | 63 | 57 | 71 | 65 | 79 | 73 | 88 | 81 | 96 | 88 | 106 |
| Bergen | 0.9 | 16 | 10 | 31 | 20 | 42 | 29 | 44 | 39 | 47 | 43 | 49 | 45 | 51 | 47 | 54 | 49 | 56* | 51 | 58* |
| Burlington | 0.1 | 6.3 | 1.7 | 12 | 5.1 | 18 | 9.3 | 25 | 13 | 33 | 18 | 40 | 24 | 47 | 29 | 55 | 35 | 63* | 41 | 69* |
| Camden | <0.01 | 3.8 | 0.1 | 7.3 | 1.7 | 11 | 4.3 | 15 | 6.9 | 19 | 9.5 | 22 | 12 | 26 | 15 | 29 | 18 | 32* | 20 | 35* |
| Cape May | 8 | 25 | 26 | 50 | 48 | 69 | 65 | 93 | 80 | 117 | 99 | 139 | 120 | 161 | 141 | 182 | 161 | 199 | 180 | 212 |
| Cumberland | 3 | 16 | 12 | 29 | 21 | 41 | 30 | 53 | 39 | 65 | 50 | 77 | 61 | 88 | 71 | 98 | 81 | 107 | 91 | 114 |
| Essex | 0.4 | 6.1 | 3.9 | 12 | 7.6 | 17 | 11 | 20 | 15 | 23 | 18 | 25 | 20 | 28 | 23 | 31 | 25 | 32* | 28 | 32* |
| Gloucester | 0.2 | 9.2 | 6.1 | 18 | 12 | 27 | 18 | 33 | 23 | 40 | 30 | 47 | 36 | 53 | 42 | 60 | 48 | 65 | 54 | 69 |
| Hudson | 0.6 | 16 | 10 | 32 | 21 | 45 | 31 | 49 | 41 | 53 | 46 | 57 | 50 | 61 | 53 | 65 | 57 | 66* | 60 | 67* |
| Mercer | 0 | 0.1 | 0 | 0.1 | 0.03 | 0.19 | 0.1 | 0.2 | 0.1 | 0.3 | 0.2 | 0.4 | 0.2 | 0.4 | 0.2 | 0.4 | 0.3 | 0.4* | 0.3 | 0.4* |
| Middlesex | 0.4 | 8.8 | 4.3 | 17 | 9.2 | 25 | 15 | 31 | 20 | 37 | 25 | 44 | 30 | 50 | 36 | 55 | 41 | 59* | 46 | 62* |
| Monmouth | 4.1 | 10 | 11 | 20 | 21 | 30 | 31 | 39 | 40 | 47 | 49 | 57 | 58 | 65 | 66 | 73 | 74 | 80 | 82 | 87 |
| Ocean | 4.6 | 19 | 22 | 44 | 47 | 66 | 67 | 81 | 81 | 94 | 93 | 107 | 105 | 119 | 117 | 129 | 127 | 139 | 137 | 149 |
| Passaic | 0 | 0.2 | 0.1 | 0.3 | 0.2 | 0.5 | 0.3 | 0.7 | 0.4 | 0.9 | 0.6 | 1.1 | 0.7 | 1.3 | 0.9 | 1.5 | 1.1 | 1.7* | 1.3 | 1.9* |
| Salem | 5.9 | 27 | 21 | 49 | 38 | 70 | 54 | 84 | 69 | 99 | 84 | 114 | 98 | 127 | 111 | 139 | 123 | 151 | 135 | 160 |
| Somerset | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0.1* | 0 | 0.2* |
| Union | 0.4 | 6.9 | 4.2 | 14 | 8.4 | 19 | 13 | 23 | 17 | 26 | 20 | 29 | 23 | 33 | 26 | 36 | 29 | 39* | 32 | 41* |
| **Statewide** | **32** | **184** | **148** | **365** | **289** | **522** | **418** | **645** | **536** | **764** | **642** | **878** | **748** | **989** | **850** | **1096** | **949** | **1185*** | **1046** | **1265*** |

*This value is probably too low because of a data limitation.  See Section 1.3 of this report.

Table A.2 Low and High Estimates of the Area of Land Close to Sea Level in New Jersey (continued)

| | | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.5 | | 1.0 | | 1.5 | | 2.0 | | 2.5 | | 3.0 | | 3.5 | | 4.0 | | 4.5 | | 5.0 | |
| Wetlands | Tidal | --------Cumulative (total) amount of Nontidal Wetlands below a given elevation--------- | | | | | | | | | | | | | | | | | | | |
| Atlantic | 204 | 4.8 | 18 | 15 | 29 | 23 | 41 | 32 | 50 | 40 | 59 | 48 | 68 | 57 | 77 | 65 | 86 | 74 | 94 | 82 | 103 |
| Bergen | 15 | 0.04 | 0.6 | 0.4 | 1.2 | 0.8 | 1.5 | 1.1 | 1.5 | 1.48 | 1.54 | 1.52 | 1.55 | 1.5 | 1.6 | 1.5 | 1.6 | 1.5 | 1.8* | 1.6 | 2.1* |
| Burlington | 43 | 0.2 | 10 | 6.2 | 20 | 13 | 30 | 19 | 35 | 26 | 40 | 32 | 45 | 36 | 50 | 40 | 54 | 45 | 59* | 49 | 63* |
| Camden | 2 | <0.01 | 0.3 | 0.1 | 0.7 | 0.3 | 1 | 0.5 | 1.3 | 0.7 | 1.6 | 0.9 | 1.9 | 1.2 | 2.2 | 1.4 | 2.4 | 1.6 | 2.5* | 1.8 | 2.7* |
| Cape May | 201 | 7.2 | 27 | 22 | 45 | 37 | 63 | 50 | 73 | 63 | 84 | 74 | 94 | 83 | 102 | 92 | 109 | 99 | 115 | 106 | 119 |
| Cumberland | 213 | 4.7 | 24 | 18 | 42 | 31 | 58 | 44 | 65 | 55 | 73 | 63 | 81 | 71 | 87 | 77 | 94 | 84 | 99 | 90 | 103 |
| Essex | 0 | <0.01 | 0.03 | 0.02 | 0.05 | 0.04 | 0.07 | 0.05 | 0.07 | 0.07 | 0.07 | 0.07 | 0.08 | 0.07 | 0.08 | 0.07 | 0.08 | <0.08 | 0.08* | <0.08 | 0.08* |
| Gloucester | 18 | 0.2 | 8.8 | 5.9 | 17 | 11 | 24 | 17 | 26 | 22 | 27 | 25 | 29 | 26 | 30 | 28 | 32 | 29 | 33 | 30 | 34 |
| Hudson | 12 | 0.01 | 0.2 | 0.1 | 0.3 | 0.19 | 0.42 | 0.3 | 0.4 | 0.38 | 0.45 | 0.4 | 0.5 | 0.4 | 0.5 | 0.4 | 0.5 | 0.46 | 0.49* | 0.47 | 0.49* |
| Mercer | 2 | 0 | <0.01 | 0 | 0.01 | <0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.02 | 0.01 | 0.03 | 0.01 | 0.03 | 0.02 | 0.03 | 0.02 | 0.03* | 0.02 | 0.03* |
| Middlesex | 22 | 0.1 | 1.2 | 0.7 | 2.3 | 1.4 | 3.3 | 2.1 | 3.9 | 2.9 | 4.6 | 3.5 | 5.3 | 4 | 5.9 | 4.6 | 6.5 | 5.1 | 7.2* | 5.7 | 7.8* |
| Monmouth | 12 | 0.6 | 1.3 | 1.4 | 2 | 2.1 | 2.6 | 2.7 | 3.3 | 3.4 | 3.9 | 4 | 4.5 | 4.5 | 5 | 5.1 | 5.7 | 5.8 | 6.3 | 6.4 | 6.9 |
| Ocean | 125 | 2.3 | 12 | 10 | 22 | 19 | 31 | 26 | 38 | 33 | 44 | 39 | 49 | 44 | 54 | 48 | 58 | 53 | 63 | 56 | 66 |
| Passaic | 0 | <0.01 | 0.02 | 0.01 | 0.03 | 0.02 | 0.04 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.05* | 0.04 | 0.05* |
| Salem | 110 | 9.6 | 25 | 22 | 36 | 30 | 46 | 38 | 49 | 45 | 52 | 49 | 55 | 52 | 58 | 55 | 61 | 58 | 64 | 60 | 68 |
| Somerset | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.01 | 0 | 0.03* | 0 | 0.04* |
| Union | 2 | 0.01 | 0.2 | 0.1 | 0.3 | 0.2 | 0.4 | 0.3 | 0.5 | 0.4 | 0.6 | 0.4 | 0.6 | 0.5 | 0.7 | 0.5 | 0.7 | 0.6 | 0.8* | 0.6 | 0.8* |
| **Statewide** | **980** | **30** | **128** | **102** | **219** | **169** | **301** | **233** | **348** | **293** | **393** | **341** | **436** | **381** | **474** | **420** | **513** | **455** | **546*** | **491** | **576*** |
| | | Cumulative (total) amount of land below a given elevation | | | | | | | | | | | | | | | | | | | |
| Dry Land | | 32 | 184 | 148 | 365 | 289 | 522 | 418 | 645 | 536 | 764 | 642 | 878 | 748 | 989 | 850 | 1096 | 949 | 1185* | 1046 | 1265* |
| Nontidal Wetlands | | 30 | 128 | 102 | 219 | 169 | 301 | 233 | 348 | 293 | 393 | 341 | 436 | 381 | 474 | 420 | 513 | 455 | 546* | 491 | 576* |
| All Land | 980 | 1043 | 1292 | 1231 | 1564 | 1438 | 1803 | 1632 | 1974 | 1810 | 2137 | 1964 | 2294 | 2109 | 2443 | 2250 | 2589 | 2385 | 2712* | 2517 | 2822* |

*This value is probably too low because of a data limitation.  See Section 1.3 of this report.

Table A.3 Low and High Estimates of the Area of Land Close to Sea Level in Pennsylvania

| County | Tidal | Meters above Spring High Water | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high |
| | | 0.5 | | 1.0 | | 1.5 | | 2.0 | | 2.5 | | 3.0 | | 3.5 | | 4.0 | | 4.5 | | 5.0 | |
| | | ---------------Cumulative (total) amount of Dry Land below a given elevation--------------- | | | | | | | | | | | | | | | | | | | |
| Bucks | | 0.04 | 4.4 | 0.2 | 8.5 | 2.5 | 13 | 5.3 | 18 | 9 | 23 | 12 | 27 | 15 | 32 | 19 | 36 | 22 | 39* | 25 | 42* |
| Delaware | | 0.4 | 6.1 | 4 | 12 | 7.9 | 17 | 12 | 18 | 15 | 19 | 17 | 21 | 18 | 22 | 20 | 24 | 21 | 25 | 22 | 26 |
| Philadelphia | | 3.6 | 6.1 | 6.8 | 12 | 13 | 19 | 20 | 25 | 26 | 31 | 32 | 37 | 37 | 42 | 42 | 46 | 47 | 51 | 51 | 55 |
| **Statewide** | | **4** | **17** | **11** | **33** | **24** | **49** | **37** | **61** | **50** | **73** | **61** | **85** | **71** | **96** | **81** | **106** | **90** | **115*** | **99** | **123*** |
| **Wetlands** | Tidal | ---------Cumulative (total) amount of Nontidal Wetlands below a given elevation--------- | | | | | | | | | | | | | | | | | | | |
| Bucks | 1.9 | 0.04 | 0.9 | 0.1 | 1.9 | 0.6 | 3 | 1.2 | 4.1 | 2 | 5.2 | 2.9 | 6.3 | 3.7 | 7.2 | 4.5 | 7.6 | 5.4 | 7.9* | 6.2 | 8.2* |
| Delaware | 3.6 | 0.1 | 0.8 | 0.6 | 1.7 | 1.1 | 2.2 | 1.6 | 2.2 | 2.1 | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 | 2.2 | 2.3 | 2.25 | 2.27 | 2.26 | 2.28 |
| Philadelphia | 0.6 | 0.5 | 0.6 | 0.6 | 0.9 | 0.9 | 1.2 | 1.2 | 1.4 | 1.5 | 1.61 | 1.62 | 1.69 | 1.71 | 1.78 | 1.79 | 1.84 | 1.85 | 1.89 | 1.89 | 1.93 |
| **Statewide** | **6.1** | **0.6** | **2.4** | **1.3** | **4.5** | **2.7** | **6.4** | **4.1** | **7.7** | **5.6** | **9.1** | **6.7** | **10** | **7.7** | **11** | **8.6** | **12** | **9.5** | **12*** | **10** | **12*** |
| | | Cumulative (total) amount of land below a given elevation | | | | | | | | | | | | | | | | | | | |
| Dry Land | | 4 | 17 | 11 | 33 | 24 | 49 | 37 | 61 | 50 | 73 | 61 | 85 | 71 | 96 | 81 | 106 | 90 | 115* | 99 | 123* |
| Nontidal Wetlands | | 1 | 2 | 1 | 4 | 3 | 6 | 4 | 8 | 6 | 9 | 7 | 10 | 8 | 11 | 9 | 12 | 9 | 12* | 10 | 12* |
| All Land | 6 | 11 | 25 | 18 | 44 | 32 | 61 | 47 | 75 | 62 | 88 | 74 | 101 | 85 | 113 | 95 | 124 | 106 | 133* | 115 | 141* |

*This value is probably too low because of a data limitation.  See Section 1.3 of this report

Table A.4 Low and High Estimates of the Area of Land Close to Sea Level in Delaware

| | | Meters above Spring High Water | | | | | | | | | | | | | | | | | | |
| | | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high |
| County | | 0.5 | | 1.0 | | 1.5 | | 2.0 | | 2.5 | | 3.0 | | 3.5 | | 4.0 | | 4.5 | | 5.0 | |
| | | ---------------Cumulative (total) amount of Dry Land below a given elevation--------------- | | | | | | | | | | | | | | | | | | | |
| Kent | | 8.8 | 25 | 22 | 41 | 35 | 57 | 48 | 78 | 66 | 98 | 86 | 119 | 107 | 144 | 129 | 168 | 154 | 191 | 178 | 210 |
| New Castle | | 7.1 | 19 | 17 | 30 | 26 | 41 | 34 | 52 | 44 | 64 | 54 | 75 | 65 | 87 | 77 | 98 | 88 | 110 | 99 | 119 |
| Sussex: Chesapeake Bay | | 0.5 | 1.6 | 1.4 | 3.3 | 2.7 | 5.2 | 4.3 | 7.1 | 6 | 11 | 8.5 | 14 | 12 | 18 | 15 | 24 | 20 | 29 | 26 | 36 |
| Sussex: Delaware Bay | | 6.4 | 18 | 16 | 31 | 27 | 43 | 37 | 55 | 48 | 67 | 60 | 79 | 72 | 89 | 83 | 99 | 93 | 109 | 103 | 120 |
| Sussex: Atlantic Coast | | 11 | 32 | 28 | 54 | 46 | 74 | 65 | 95 | 83 | 117 | 104 | 140 | 126 | 163 | 149 | 187 | 173 | 211 | 197 | 234 |
| **Statewide** | | **34** | **96** | **84** | **158** | **136** | **221** | **188** | **287** | **246** | **356** | **313** | **426** | **382** | **499** | **453** | **575** | **527** | **647** | **603** | **719** |
| **Wetlands** | Tidal | ---------Cumulative (total) amount of Nontidal Wetlands below a given elevation--------- | | | | | | | | | | | | | | | | | | | |
| Kent | 169 | 4.9 | 11 | 10 | 17 | 15 | 22 | 19 | 25 | 23 | 28 | 26 | 31 | 29 | 34 | 32 | 37 | 36 | 41 | 39 | 44 |
| New Castle | 74 | 1.8 | 3.8 | 3.5 | 4.8 | 4.3 | 5.8 | 5.1 | 6.7 | 5.8 | 7.6 | 6.7 | 8.4 | 7.5 | 9.2 | 8.3 | 9.9 | 9 | 11 | 9.7 | 11 |
| Sussex: Chesapeake Bay | 6.7 | 0.6 | 1.8 | 1.6 | 2.7 | 2.4 | 3.5 | 3.1 | 4.4 | 3.8 | 5.4 | 4.8 | 6.4 | 5.8 | 7.7 | 6.9 | 9.4 | 8.4 | 11 | 10 | 13 |
| Sussex: Delaware Bay | 67 | 2.1 | 4.8 | 4.6 | 6.2 | 5.7 | 7.5 | 6.8 | 8.6 | 8 | 9.6 | 9 | 11 | 10 | 11 | 11 | 12 | 12 | 13 | 12 | 13 |
| Sussex: Atlantic Coast | 41 | 1.7 | 4.9 | 4.2 | 7.5 | 6.6 | 10 | 8.8 | 12 | 11 | 14 | 13 | 16 | 15 | 17 | 16 | 18 | 18 | 20 | 19 | 21 |
| **Statewide** | **357** | **11** | **27** | **24** | **38** | **34** | **48** | **43** | **56** | **52** | **64** | **59** | **72** | **67** | **80** | **75** | **87** | **82** | **95** | **90** | **102** |
| | | Cumulative (total) amount of land below a given elevation | | | | | | | | | | | | | | | | | | | |
| Dry Land | | 34 | 96 | 84 | 158 | 136 | 221 | 188 | 287 | 246 | 356 | 313 | 426 | 382 | 499 | 453 | 575 | 527 | 650 | 603 | 719 |
| Nontidal Wetlands | | 11 | 27 | 24 | 38 | 34 | 48 | 43 | 56 | 51 | 64 | 59 | 72 | 67 | 80 | 75 | 87 | 82 | 95 | 90 | 102 |
| All Land | 357 | 402 | 480 | 465 | 553 | 527 | 626 | 588 | 701 | 655 | 778 | 730 | 855 | 806 | 936 | 885 | 1019 | 967 | 1102 | 1050 | 1178 |

Table A.5 Low and High Estimates of the Area of Land Close to Sea Level in Maryland

| | Meters above Spring High Water | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high |
| County | 0.5 | | 1.0 | | 1.5 | | 2.0 | | 2.5 | | 3.0 | | 3.5 | | 4.0 | | 4.5 | | 5.0 | |
| | ----------------Cumulative (total) amount of Dry Land below a given elevation--------------- | | | | | | | | | | | | | | | | | | | |
| Anne Arundel | 1.7 | 7.2 | 6.7 | 15 | 12 | 26 | 20 | 39 | 32 | 50 | 44 | 59 | 54 | 68 | 63 | 77 | 72 | 86 | 81 | 94 |
| Baltimore County | 2.3 | 6.6 | 7.3 | 13 | 14 | 20 | 21 | 27 | 28 | 36 | 37 | 46 | 47 | 56 | 57 | 65 | 66 | 73 | 75 | 81 |
| Baltimore City | 0.2 | 2.1 | 0.9 | 3.9 | 1.7 | 5.7 | 2.7 | 7.5 | 4.2 | 9.7 | 5.7 | 12 | 7.4 | 14 | 9.6 | 17 | 12 | 19 | 14 | 21 |
| Calvert | 0.4 | 3.9 | 1.7 | 5.8 | 3.1 | 7.6 | 4.6 | 10 | 6.1 | 14 | 7.6 | 17 | 10.0 | 21 | 14 | 26 | 17 | 31 | 21 | 36 |
| Caroline | 0.7 | 3.2 | 2.2 | 6.1 | 4.1 | 9.2 | 6.9 | 13 | 9.9 | 16 | 13 | 20 | 16 | 23 | 19 | 27 | 23 | 30* | 26 | 33* |
| Cecil | 0.2 | 2.5 | 1.0 | 5.2 | 1.8 | 7.9 | 3.7 | 12 | 5.7 | 16 | 7.8 | 20 | 11 | 25 | 16 | 29 | 20 | 34 | 24 | 38 |
| Charles | 0.7 | 12 | 4.8 | 21 | 9.0 | 30 | 15 | 40 | 22 | 53 | 30 | 67 | 40 | 77 | 53 | 85 | 66 | 93 | 77 | 99 |
| Dorchester | 30 | 120 | 150 | 215 | 231 | 269 | 282 | 313 | 322 | 348 | 358 | 386 | 396 | 416 | 423 | 439 | 445 | 457 | 462 | 474 |
| Harford | 0.7 | 17 | 7.6 | 25 | 15 | 33 | 22 | 40 | 28 | 49 | 34 | 57 | 42 | 64 | 50 | 69 | 59 | 74 | 65 | 78 |
| Howard | 0 | 0.01 | 0.01 | 0.03 | 0.01 | 0.05 | 0.02 | 0.07 | 0.04 | 0.1 | 0.05 | 0.14 | 0.07 | 0.2 | 0.1 | 0.2 | 0.1 | 0.3 | 0.2 | 0.3 |
| Kent | 0.2 | 8.4 | 4.8 | 16 | 10 | 23 | 16 | 33 | 23 | 45 | 29 | 56 | 37 | 68 | 48 | 80 | 59 | 93 | 71 | 105 |
| Prince George's | 0.2 | 2.2 | 0.9 | 3.9 | 1.6 | 5.6 | 2.9 | 7.2 | 4.3 | 8.9 | 5.6 | 11 | 7.1 | 13 | 8.9 | 16 | 11 | 19 | 13 | 21 |
| Queen Anne's | 0.6 | 4.1 | 5.3 | 12 | 14 | 22 | 24 | 35 | 37 | 50 | 52 | 68 | 69 | 88 | 89 | 107 | 107 | 126 | 125 | 143 |
| Somerset | 17 | 58 | 70 | 101 | 113 | 153 | 168 | 193 | 198 | 210 | 215 | 233 | 240 | 260 | 268 | 289 | 297 | 318 | 327 | 345 |
| St. Mary's | 2.4 | 16 | 8.0 | 28 | 14 | 41 | 24 | 58 | 35 | 79 | 46 | 101 | 62 | 118 | 83 | 129 | 104 | 139 | 120 | 148 |
| Talbot | 2.2 | 7.8 | 11 | 24 | 30 | 54 | 64 | 99 | 110 | 139 | 149 | 175 | 184 | 210 | 218 | 239 | 245 | 260 | 266 | 279 |
| Wicomico | 5.0 | 15 | 18 | 29 | 32 | 43 | 47 | 58 | 62 | 72 | 76 | 86 | 90 | 101 | 105 | 115 | 119 | 129 | 133 | 142 |
| Worcester | 4.4 | 21 | 25 | 48 | 53 | 83 | 88 | 119 | 124 | 153 | 158 | 183 | 187 | 209 | 213 | 235 | 239 | 261 | 265 | 288 |
| **Statewide** | **69** | **307** | **326** | **570** | **560** | **832** | **812** | **1104** | **1053** | **1350** | **1267** | **1596** | **1500** | **1833** | **1737** | **2045** | **1960** | **2243*** | **2165** | **2425*** |

*This value is probably too low because of a data limitation.  See Section 1.3 of this report

Table A.5 Low and High Estimates of the Area of Land Close to Sea Level in Maryland (continued)

| County | Tidal | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.5 | | 1.0 | | 1.5 | | 2.0 | | 2.5 | | 3.0 | | 3.5 | | 4.0 | | 4.5 | | 5.0 | |
| Wetlands | Tidal | --------Cumulative (total) amount of Nontidal Wetlands below a given elevation-------- | | | | | | | | | | | | | | | | | | | |
| Anne Arundel | 12 | 0.2 | 0.7 | 0.6 | 1.6 | 1.1 | 4.8 | 3.1 | 8.1 | 6.3 | 11 | 9.5 | 12 | 12 | 14 | 13 | 15 | 14 | 16 | 15 | 17 |
| Baltimore County | 10 | 0.1 | 0.3 | 0.3 | 0.7 | 0.7 | 1.0 | 1.0 | 1.3 | 1.3 | 1.5 | 1.5 | 1.7 | 1.7 | 1.8 | 1.8 | 2.0 | 2.0 | 2.2 | 2.2 | 2.3 |
| Baltimore City | 0.2 | <0.01 | 0.03 | 0.01 | 0.04 | 0.02 | 0.05 | 0.03 | 0.1 | 0.04 | 0.1 | 0.05 | 0.1 | 0.06 | 0.1 | 0.06 | 0.1 | 0.07 | 0.1 | 0.08 | 0.1 |
| Calvert | 15 | 0.1 | 0.9 | 0.4 | 1.3 | 0.7 | 1.7 | 1.1 | 2.2 | 1.4 | 3.0 | 1.7 | 3.8 | 2.2 | 4.7 | 3.0 | 5.7 | 3.8 | 6.6 | 4.7 | 7.5 |
| Caroline | 14 | 0.3 | 1.4 | 0.7 | 2.6 | 1.3 | 4.0 | 2.5 | 5.3 | 3.5 | 6.4 | 4.4 | 7.5 | 5.3 | 8.6 | 6.2 | 9.8 | 7.1 | 11* | 8.0 | 12* |
| Cecil | 13 | 0.01 | 0.2 | 0.04 | 0.7 | 0.1 | 1.2 | 0.4 | 1.7 | 0.8 | 2.3 | 1.2 | 2.8 | 1.7 | 3.5 | 2.2 | 4.2 | 2.8 | 4.9 | 3.5 | 5.5 |
| Charles | 24 | 0.1 | 3.8 | 1.5 | 6.5 | 2.9 | 9.2 | 4.8 | 12 | 7.0 | 14 | 9.3 | 16 | 12 | 18 | 14 | 20 | 16 | 21 | 18 | 23 |
| Dorchester | 425 | 15 | 46 | 53 | 70 | 76 | 90 | 94 | 104 | 107 | 112 | 114 | 121 | 124 | 129 | 131 | 136 | 137 | 139 | 140 | 143 |
| Harford | 29 | 0.2 | 2.5 | 1.2 | 3.8 | 2.3 | 5.0 | 3.3 | 6.2 | 4.3 | 7.6 | 5.2 | 9.0 | 6.4 | 10 | 7.8 | 11 | 9.1 | 11 | 10 | 12 |
| Howard | 0 | 0 | 0.03 | 0.01 | 0.04 | 0.02 | 0.04 | 0.03 | 0.05 | 0.04 | 0.06 | 0.04 | 0.06 | 0.05 | 0.07 | 0.06 | 0.08 | 0.06 | 0.09 | 0.07 | 0.10 |
| Kent | 18 | 0.1 | 1.1 | 0.9 | 2.6 | 2.0 | 4.1 | 3.3 | 5.4 | 4.3 | 6.8 | 5.2 | 7.9 | 6.1 | 9.3 | 7.2 | 11 | 8.3 | 13 | 9.7 | 14 |
| Prince George's | 14 | 0.1 | 0.8 | 0.3 | 1.4 | 0.6 | 2.0 | 1.0 | 2.5 | 1.5 | 3.2 | 2.0 | 3.8 | 2.5 | 4.7 | 3.2 | 5.6 | 3.8 | 6.5 | 4.6 | 7.2 |
| Queen Anne's | 21 | 0.2 | 1.1 | 1.5 | 3.0 | 3.2 | 4.8 | 4.9 | 6.5 | 6.5 | 8.1 | 7.9 | 9.6 | 9.5 | 12 | 11 | 14 | 13 | 16 | 15 | 18 |
| Somerset | 265 | 6.6 | 16 | 17 | 21 | 23 | 31 | 35 | 40 | 41 | 43 | 45 | 52 | 54 | 60 | 62 | 69 | 71 | 78 | 81 | 90 |
| St. Mary's | 19 | 0.5 | 2.8 | 1.7 | 5.3 | 2.8 | 7.8 | 4.6 | 11 | 6.7 | 15 | 8.8 | 19 | 12 | 22 | 16 | 25 | 20 | 28 | 23 | 31 |
| Talbot | 26 | 0.1 | 0.3 | 0.5 | 1.0 | 1.3 | 2.1 | 2.5 | 4.2 | 4.8 | 6.2 | 6.8 | 8.5 | 9.1 | 12 | 13 | 15 | 16 | 17 | 18 | 20 |
| Wicomico | 67 | 5.4 | 9.9 | 11 | 13 | 16 | 22 | 24 | 29 | 30 | 35 | 37 | 44 | 47 | 54 | 56 | 60 | 62 | 66 | 67 | 70 |
| Worcester | 142 | 0.7 | 5.2 | 6.0 | 10 | 11 | 16 | 17 | 22 | 23 | 29 | 30 | 36 | 37 | 42 | 43 | 48 | 49 | 54 | 54 | 58 |
| **Statewide** | **1116** | **29** | **93** | **97** | **146** | **145** | **207** | **203** | **261** | **249** | **304** | **289** | **355** | **341** | **406** | **390** | **451** | **435** | **490*** | **474** | **531*** |
| | | Cumulative (total) amount of land below a given elevation | | | | | | | | | | | | | | | | | | | |
| Dry Land | | 69 | 307 | 326 | 570 | 560 | 832 | 812 | 1104 | 1053 | 1350 | 1267 | 1596 | 1500 | 1833 | 1737 | 2045 | 1960 | 2243* | 2165 | 2425* |
| Nontidal Wetlands | | 29 | 93 | 97 | 146 | 145 | 207 | 203 | 261 | 249 | 304 | 289 | 355 | 341 | 406 | 390 | 451 | 435 | 490* | 474 | 531* |
| All Land | 1116 | 1214 | 1516 | 1539 | 1832 | 1820 | 2155 | 2130 | 2481 | 2418 | 2769 | 2672 | 3067 | 2957 | 3354 | 3243 | 3612 | 3510 | 3849* | 3754 | 4071* |

*This value is probably too low because of a data limitation.  See Section 1.3 of this report

**Table A.6** Low and High Estimates of the Area of Land Close to Sea Level in **Washington, D.C.**

| | Tidal | Meters above Spring High Water | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high |
| | | 0.5 | | 1.0 | | 1.5 | | 2.0 | | 2.5 | | 3.0 | | 3.5 | | 4.0 | | 4.5 | | 5.0 | |
| | | ----------------Cumulative (total) amount of Dry Land below a given elevation--------------- | | | | | | | | | | | | | | | | | | | |
| Washington, D.C. | | 1.6 | 3.0 | 2.8 | 4.4 | 4.1 | 5.8 | 5.5 | 7.4 | 7.0 | 9.3 | 8.9 | 11 | 11 | 13 | 13 | 15 | 14 | 16 | 16 | 18 |
| **Wetlands** | Tidal | ---------Cumulative (total) amount of Nontidal Wetlands below a given elevation--------- | | | | | | | | | | | | | | | | | | | |
| Washington, D.C. | 0.5 | 0.03 | 0.05 | 0.05 | 0.07 | 0.07 | 0.1 | 0.09 | 0.12 | 0.12 | 0.14 | 0.13 | 0.16 | 0.15 | 0.19 | 0.18 | 0.24 | 0.2 | 0.3 | 0.28 | 0.32 |
| | | Cumulative (total) amount of land below a given elevation | | | | | | | | | | | | | | | | | | | |
| Dry Land | | 2 | 3 | 3 | 4 | 4 | 6 | 5 | 7 | 7 | 9 | 9 | 11 | 11 | 13 | 13 | 15 | 14 | 16 | 16 | 18 |
| Nontidal Wetlands | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| All Land | 0.5 | 2 | 3 | 3 | 5 | 5 | 6 | 6 | 8 | 8 | 10 | 9 | 12 | 11 | 14 | 13 | 15 | 15 | 17 | 17 | 19 |

**Table A.7 Low and High Estimates of the Area of Land Close to Sea Level in Virginia**

| Jurisdiction | Meters above Spring High Water | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high |
| | 0.5 | | 1.0 | | 1.5 | | 2.0 | | 2.5 | | 3.0 | | 3.5 | | 4.0 | | 4.5 | | 5.0 | |
| | ---------------Cumulative (total) amount of Dry Land below a given elevation--------------- | | | | | | | | | | | | | | | | | | | |
| **Eastern Shore** | **21** | **63** | **56** | **111** | **93** | **159** | **137** | **204** | **180** | **243** | **221** | **279** | **258** | **315** | **294** | **349** | **329** | **382** | **362** | **416** |
| Accomack | 13 | 41 | 37 | 78 | 65 | 115 | 98 | 149 | 131 | 172 | 160 | 192 | 180 | 211 | 200 | 227 | 218 | 242 | 233 | 257 |
| Northampton | 7.4 | 22 | 20 | 33 | 29 | 44 | 39 | 55 | 49 | 71 | 61 | 87 | 78 | 104 | 94 | 122 | 111 | 140 | 129 | 159 |
| **Northern Virginia** | **0** | **5.1** | **2.8** | **10** | **6.3** | **15** | **9.7** | **20** | **13** | **25** | **17** | **29** | **21** | **34** | **25** | **39** | **30** | **44** | **35** | **49** |
| Arlington | 0 | 0.2 | 0.1 | 0.5 | 0.3 | 0.7 | 0.5 | 1.3 | 0.6 | 1.9 | 0.8 | 2.6 | 1.4 | 3.3 | 2.1 | 4 | 2.7 | 4.7 | 3.4 | 5 |
| Alexandria | 0 | 0.4 | 0.3 | 0.9 | 0.6 | 1.3 | 0.9 | 1.7 | 1.2 | 2.1 | 1.5 | 2.5 | 1.8 | 2.9 | 2.2 | 3.2 | 2.5 | 3.6 | 2.9 | 4 |
| Fairfax | 0 | 2 | 1.1 | 3.9 | 2.5 | 5.9 | 3.8 | 7.6 | 5.2 | 9.2 | 6.6 | 11 | 8 | 12 | 9.5 | 14 | 11 | 15 | 12 | 18 |
| Prince William | 0 | 1 | 0.5 | 2 | 1.2 | 3 | 1.9 | 3.9 | 2.6 | 4.7 | 3.3 | 5.5 | 4 | 6.3 | 4.8 | 7.2 | 5.6 | 8 | 6.4 | 8.8 |
| **Rappahannock Area** | **0** | **3.3** | **1.8** | **6.5** | **4.1** | **9.9** | **6.4** | **14** | **8.7** | **20** | **11** | **26** | **15** | **31** | **20** | **37** | **26** | **43** | **32** | **49** |
| Stafford | 0 | 1.4 | 0.8 | 2.7 | 1.7 | 4.2 | 2.7 | 5.4 | 3.6 | 6.8 | 4.6 | 8.1 | 5.7 | 9.4 | 6.9 | 11 | 8.2 | 12 | 9.5 | 14 |
| Fredericksburg | 0 | 0.1 | 0.04 | 0.1 | 0.1 | 0.2 | 0.1 | 0.2 | 0.2 | 0.3 | 0.2 | 0.3 | 0.3 | 0.4 | 0.3 | 0.4 | 0.3 | 0.5 | 0.4 | 0.5 |
| King George | 0 | 2.7 | 1.5 | 5.4 | 3.3 | 8.1 | 5.2 | 11 | 7.1 | 16.7 | 9 | 22 | 12 | 27 | 17 | 32 | 22 | 37 | 27 | 43 |
| Spotsylvania | 0 | 0.09 | 0.05 | 0.2 | 0.1 | 0.3 | 0.2 | 0.3 | 0.2 | 0.4 | 0.3 | 0.5 | 0.3 | 0.5 | 0.4 | 0.6 | 0.5 | 0.7 | 0.5 | 0.8 |
| Caroline | 0 | 0.4 | 0.3 | 0.9 | 0.6 | 1.3 | 0.9 | 1.8 | 1.2 | 2.3 | 1.5 | 2.8 | 1.9 | 3.3 | 2.4 | 3.8 | 2.9 | 4.4 | 3.4 | 5.2 |
| **Northern Neck** | **0.1** | **22** | **11** | **43** | **27** | **66** | **42** | **92** | **58** | **141** | **74** | **190** | **100** | **239** | **147** | **287** | **193** | **336** | **240** | **378** |
| Westmoreland | 0 | 4.7 | 2.4 | 9.3 | 5.7 | 14 | 9 | 21 | 12 | 37 | 16 | 53 | 24 | 69 | 39 | 84 | 54 | 100 | 69 | 112 |
| Richmond | 0 | 4.6 | 2.4 | 8.9 | 5.5 | 13 | 8.7 | 18 | 12 | 25 | 15 | 32 | 20 | 38 | 26 | 44 | 32 | 51 | 38 | 57 |
| Northumberland | 0 | 5.9 | 2.8 | 11 | 6.9 | 17 | 11 | 24 | 15 | 44 | 19 | 64 | 27 | 84 | 46 | 104 | 65 | 124 | 85 | 141 |
| Lancaster | 0.1 | 7 | 3.6 | 14 | 8.5 | 21 | 14 | 28 | 19 | 35 | 24 | 42 | 29 | 48 | 36 | 55 | 42 | 61 | 48 | 68 |
| **Middle Peninsula** | **9.1** | **42** | **33** | **89** | **66** | **139** | **108** | **190** | **149** | **230** | **186** | **268** | **220** | **307** | **258** | **336** | **292** | **364** | **319** | **392** |
| Essex | 0 | 3.8 | 2 | 7.3 | 4.6 | 11 | 7.1 | 15 | 9.7 | 22 | 12 | 28 | 17 | 34 | 22 | 40 | 28 | 46 | 34 | 53 |
| King and Queen | 0 | 2.9 | 1.7 | 5.7 | 3.7 | 8.6 | 5.5 | 12 | 7.5 | 15 | 9.6 | 19 | 13 | 22 | 16 | 26 | 19 | 30 | 23 | 33 |
| King William | 0 | 1.6 | 0.9 | 3.2 | 2 | 4.8 | 3.1 | 8.4 | 4.2 | 13 | 5.4 | 18 | 9.6 | 22 | 14 | 27 | 18 | 32 | 23 | 36 |
| Middlesex | 0.2 | 3.4 | 2 | 6.8 | 4.4 | 11 | 7 | 14 | 10 | 19 | 13 | 23 | 16 | 27 | 20 | 31 | 24 | 35 | 28 | 39 |
| Gloucester | 4.1 | 16 | 13 | 33 | 26 | 50 | 41 | 67 | 55 | 76 | 67 | 84 | 75 | 93 | 84 | 99 | 91 | 104 | 96 | 111 |

Table A.7 Low and High Estimates of the Area of Land Close to Sea Level in Virginia (continued)

| | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.5 | | 1.0 | | 1.5 | | 2.0 | | 2.5 | | 3.0 | | 3.5 | | 4.0 | | 4.5 | | 5.0 | |
| Mathews | 4.7 | 15 | 13 | 33 | 26 | 54 | 44 | 73 | 62 | 85 | 79 | 97 | 90 | 108 | 101 | 113 | 111 | 117 | 115 | 121 |
| **Hampton Roads** | **24** | **91** | **78** | **200** | **154** | **333** | **264** | **469** | **381** | **650** | **519** | **848** | **711** | **1045** | **907** | **1192** | **1089** | **1307** | **1215** | **1424** |
| James City | 0.1 | 3.8 | 2 | 7.2 | 4.7 | 11 | 7 | 14 | 9.4 | 18 | 12 | 22 | 15 | 26 | 19 | 30 | 23 | 34 | 27 | 39 |
| York | 1.4 | 6 | 5 | 13 | 9.9 | 21 | 16 | 28 | 23 | 33 | 28 | 37 | 33 | 42 | 38 | 45 | 42 | 48 | 44 | 51 |
| Newport News | 2.2 | 6.9 | 6 | 11 | 9.7 | 15 | 13 | 18 | 16 | 21 | 19 | 25 | 23 | 28 | 26 | 33 | 30 | 38 | 35 | 42 |
| Poquoson | 1.4 | 4.5 | 4 | 8.8 | 7.4 | 13 | 11 | 16 | 15 | 16 | 16 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 |
| Hampton | 1.9 | 5.9 | 5 | 18 | 13 | 32 | 25 | 45 | 38 | 60 | 51 | 74 | 65 | 88 | 80 | 93 | 90 | 98 | 95 | 102 |
| Surry | 0 | 1.4 | 1 | 2.7 | 1.7 | 4.1 | 2.7 | 5.3 | 3.6 | 6.2 | 4.6 | 7.1 | 5.5 | 8 | 6.4 | 9 | 7.2 | 9.9 | 8.1 | 11 |
| Isle of Wight | 0.2 | 3.4 | 2 | 6.2 | 4.2 | 9.1 | 6 | 12.8 | 8 | 17 | 10 | 22 | 14 | 26 | 18 | 31 | 22 | 35 | 27 | 42 |
| Norfolk | 1.9 | 5.8 | 5 | 17 | 13 | 30 | 24 | 42 | 35 | 67 | 52 | 91 | 77 | 115 | 101 | 120 | 118 | 124 | 122 | 128 |
| Virginia Beach | 9.3 | 33 | 30 | 69 | 55 | 117 | 94 | 163 | 138 | 219 | 185 | 273 | 241 | 327 | 295 | 368 | 347 | 393 | 378 | 418 |
| Suffolk | 0.7 | 4.3 | 3.1 | 7.1 | 5.4 | 10 | 7.5 | 15 | 10 | 23 | 13 | 31 | 21 | 39 | 28 | 50 | 37 | 60 | 47 | 73 |
| Portsmouth | 1.2 | 3.9 | 3.5 | 9.6 | 7.6 | 15 | 13 | 22 | 18 | 33 | 27 | 45 | 38 | 56 | 50 | 61 | 58 | 65 | 63 | 70 |
| Chesapeake | 3.5 | 12 | 11 | 31 | 22 | 57 | 45 | 87 | 69 | 137 | 100 | 205 | 162 | 272 | 229 | 337 | 298 | 385 | 353 | 430 |
| **Other Jurisdictions** | **0** | **9.9** | **5.7** | **19** | **12** | **29** | **19** | **40** | **26** | **54** | **32** | **67** | **44** | **80** | **56** | **93** | **68** | **106** | **81** | **122** |
| Charles City | 0 | 3.2 | 1.8 | 6.3 | 4 | 9.6 | 6.2 | 13 | 8.4 | 18 | 11 | 23 | 15 | 28 | 19 | 32 | 23 | 37 | 28 | 43 |
| Chesterfield | 0 | 1.3 | 0.8 | 2.6 | 1.7 | 3.9 | 2.5 | 4.8 | 3.4 | 5.5 | 4.3 | 6.2 | 5 | 7 | 5.7 | 7.7 | 6.3 | 8.4 | 7 | 8.9 |
| Colonial Heights | 0 | 0.04 | 0.02 | 0.1 | 0.05 | 0.1 | 0.07 | 0.12 | 0.09 | 0.14 | 0.12 | 0.15 | 0.1 | 0.2 | 0.1 | 0.2 | 0.15 | 0.19 | 0.16 | 0.24 |
| Hanover | 0 | 0.02 | 0.02 | 0.05 | 0.03 | 0.1 | 0.05 | 0.2 | 0.1 | 0.3 | 0.1 | 0.4 | 0.2 | 0.5 | 0.3 | 0.6 | 0.4 | 0.7 | 0.5 | 0.7 |
| Henrico | 0 | 0.8 | 0.5 | 1.5 | 1 | 2.3 | 1.5 | 2.8 | 2 | 3.2 | 2.5 | 3.7 | 2.9 | 4.1 | 3.3 | 4.6 | 3.8 | 5.1 | 4.2 | 6.3 |
| Hopewell | 0 | 0.4 | 0.2 | 0.8 | 0.5 | 1.1 | 0.7 | 1.3 | 1 | 1.4 | 1.2 | 1.6 | 1.4 | 1.7 | 1.5 | 1.8 | 1.6 | 1.9 | 1.7 | 2.2 |
| New Kent | 0 | 2.1 | 1.2 | 4.1 | 2.6 | 6.2 | 4 | 9.4 | 5.4 | 13 | 6.9 | 17 | 10 | 21 | 14 | 25 | 18 | 29 | 22 | 34 |
| Petersburg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <0.01 | 0 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.02 | 0.01 | 0.03 |
| Prince George | 0 | 1.9 | 1.1 | 3.8 | 2.4 | 5.7 | 3.7 | 8.1 | 5 | 11 | 6.3 | 14 | 8.8 | 17 | 12 | 20 | 15 | 23 | 17 | 26 |
| Williamsburg | 0 | 0.05 | 0.03 | 0.1 | 0.06 | 0.1 | 0.1 | 0.2 | 0.1 | 0.3 | 0.2 | 0.3 | 0.2 | 0.4 | 0.3 | 0.4 | 0.3 | 0.5 | 0.4 | 0.6 |
| **Statewide** | **54** | **236** | **189** | **479** | **362** | **751** | **585** | **1029** | **816** | **1362** | **1060** | **1707** | **1368** | **2051** | **1708** | **2332** | **2028** | **2582** | **2283** | **2830** |

Table A.7 Low and High Estimates of the Area of Land Close to Sea Level in Virginia (continued)

| Jurisdiction | Tidal | Meters above Spring High Water | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high |
| | | 0.5 | | 1.0 | | 1.5 | | 2.0 | | 2.5 | | 3.0 | | 3.5 | | 4.0 | | 4.5 | | 5.0 | |
| | | --------Cumulative (total) amount of Nontidal Wetlands below a given elevation--------- | | | | | | | | | | | | | | | | | | | |
| **Eastern Shore** | 946 | 7 | 22 | 20 | 48 | 39 | 76 | 63 | 101 | 87 | 114 | 107 | 126 | 119 | 137 | 131 | 146 | 141 | 153 | 149 | 161 |
| Accomack | 484 | 7 | 21 | 19 | 45 | 36 | 70 | 58 | 92 | 80 | 104 | 98 | 114 | 108 | 124 | 119 | 132 | 128 | 138 | 134 | 145 |
| Northampton | 462 | 0.4 | 1.2 | 1 | 3.4 | 2.5 | 5.9 | 4.7 | 8.1 | 7 | 9.7 | 8.8 | 11 | 10 | 13 | 12 | 14 | 14 | 15 | 15 | 16 |
| **Northern Virginia** | 17 | 0 | 1 | 0 | 2 | 1 | 3 | 2 | 3 | 2 | 4 | 3 | 4 | 3 | 5 | 4 | 5 | 4 | 6 | 5 | 6 |
| Stafford | 6.8 | 0 | 0.5 | 0.3 | 1 | 0.6 | 1.5 | 1 | 1.9 | 1.3 | 2.3 | 1.7 | 2.6 | 2 | 2.9 | 2.3 | 3.3 | 2.6 | 3.6 | 3 | 3.9 |
| Alexandria | 0.2 | 0 | 0.03 | 0.02 | 0.07 | 0.04 | 0.1 | 0.06 | 0.11 | 0.09 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.12 |
| Fairfax | 4.9 | 0 | 0.2 | 0.1 | 0.4 | 0.2 | 0.6 | 0.4 | 0.7 | 0.5 | 0.8 | 0.6 | 0.9 | 0.7 | 1.1 | 0.9 | 1.2 | 1 | 1.3 | 1.1 | 1.4 |
| Prince William | 5.1 | 0 | 0.2 | 0.1 | 0.3 | 0.2 | 0.5 | 0.3 | 0.6 | 0.4 | 0.6 | 0.5 | 0.7 | 0.6 | 0.8 | 0.7 | 0.8 | 0.7 | 0.9 | 0.8 | 0.9 |
| **Rappahannock Area** | 20 | 0 | 0.6 | 0.3 | 1.2 | 0.7 | 1.7 | 1.1 | 2.4 | 1.5 | 3 | 1.9 | 3.6 | 2.5 | 4.2 | 3.1 | 4.9 | 3.7 | 5.5 | 4.3 | 6.2 |
| Fredericksburg | 0 | 0 | <0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| King George | 13 | 0 | 0.5 | 0.3 | 1 | 0.6 | 1.5 | 1 | 2 | 1.3 | 2.4 | 1.7 | 2.8 | 2.1 | 3.3 | 2.5 | 3.7 | 2.9 | 4.1 | 3.3 | 4.6 |
| Spotsylvania | 0.1 | 0 | 0.02 | 0.01 | 0.03 | 0.02 | 0.05 | 0.03 | 0.06 | 0.04 | 0.06 | 0.05 | 0.07 | 0.06 | 0.08 | 0.06 | 0.08 | 0.07 | 0.09 | 0.08 | 0.12 |
| Caroline | 6.3 | 0 | 0.1 | 0.03 | 0.1 | 0.1 | 0.2 | 0.1 | 0.3 | 0.2 | 0.5 | 0.2 | 0.7 | 0.3 | 0.9 | 0.5 | 1.1 | 0.7 | 1.3 | 0.9 | 1.5 |
| **Northern Neck** | 57 | 0 | 2.5 | 1.2 | 4.8 | 2.9 | 7.3 | 4.7 | 9.8 | 6.4 | 14 | 8.1 | 18 | 10 | 22 | 14 | 26 | 18 | 30 | 22 | 34 |
| Westmoreland | 14 | 0 | 0.5 | 0.3 | 1 | 0.6 | 1.5 | 1 | 2.2 | 1.3 | 3.9 | 1.7 | 5.6 | 2.5 | 7.2 | 4.1 | 8.9 | 5.7 | 10.6 | 7.3 | 12 |
| Richmond | 22 | 0 | 0.9 | 0.4 | 1.7 | 1 | 2.5 | 1.6 | 3.3 | 2.2 | 3.9 | 2.8 | 4.5 | 3.4 | 5.1 | 4 | 5.7 | 4.5 | 6.3 | 5.1 | 6.9 |
| Northumberland | 11 | 0 | 0.5 | 0.3 | 1.1 | 0.6 | 1.6 | 1 | 2.2 | 1.4 | 3.7 | 1.8 | 5.1 | 2.4 | 6.6 | 3.8 | 8 | 5.2 | 9.6 | 6.6 | 11 |
| Lancaster | 9.8 | <0.01 | 0.5 | 0.3 | 1.1 | 0.7 | 1.6 | 1.1 | 2.1 | 1.4 | 2.5 | 1.8 | 2.8 | 2.2 | 3.2 | 2.5 | 3.5 | 2.8 | 3.8 | 3.2 | 4.2 |
| **Middle Peninsula** | 165 | 2.6 | 12 | 9.5 | 26 | 19 | 40 | 31 | 54 | 44 | 66 | 55 | 78 | 67 | 90 | 79 | 98 | 90 | 106 | 98 | 113 |
| Essex | 28 | 0 | 0.8 | 0.4 | 1.5 | 0.9 | 2.3 | 1.5 | 2.9 | 2 | 3.4 | 2.5 | 3.9 | 3 | 4.4 | 3.5 | 4.8 | 3.9 | 5.3 | 4.4 | 5.9 |
| King and Queen | 22 | 0 | 0.9 | 0.5 | 1.7 | 1.1 | 2.5 | 1.6 | 3.1 | 2.2 | 3.5 | 2.8 | 4 | 3.2 | 4.4 | 3.6 | 4.8 | 4 | 5.3 | 4.4 | 5.8 |
| King William | 36 | 0 | 0.4 | 0.2 | 0.7 | 0.5 | 1.1 | 0.7 | 1.4 | 0.9 | 1.7 | 1.2 | 2 | 1.5 | 2.3 | 1.8 | 2.6 | 2 | 2.9 | 2.3 | 3.3 |
| Middlesex | 9.7 | <0.01 | 0.7 | 0.4 | 1.4 | 0.8 | 2.1 | 1.4 | 2.8 | 1.9 | 3.1 | 2.4 | 3.5 | 2.8 | 3.8 | 3.2 | 4.1 | 3.5 | 4.5 | 3.8 | 4.8 |
| Gloucester | 44 | 1.4 | 5.5 | 4.5 | 12 | 9.1 | 19 | 15 | 25 | 20 | 28 | 25 | 31 | 27 | 34 | 30 | 36 | 33 | 37 | 34 | 38 |

Table A.7 Low and High Estimates of the Area of Land Close to Sea Level in Virginia (continued)

| Jurisdiction | | Meters above Spring High Water | | | | | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high |
| | | 0.5 | | 1.0 | | 1.5 | | 2.0 | | 2.5 | | 3.0 | | 3.5 | | 4.0 | | 4.5 | | 5.0 | |
| Mathews | 27 | 1.2 | 3.8 | 3.5 | 8.6 | 6.7 | 14 | 11 | 19 | 16 | 26 | 22 | 34 | 29 | 41 | 37 | 46 | 44 | 51 | 48 | 55 |
| **Hampton Roads** | **329** | **12** | **42** | **38** | **74** | **64** | **96** | **84** | **127** | **104** | **167** | **127** | **205** | **164** | **245** | **202** | **285** | **242** | **326** | **279** | **391** |
| James City | 33 | <0.01 | 0.8 | 0.4 | 1.5 | 0.9 | 2.2 | 1.4 | 2.8 | 1.9 | 3.3 | 2.5 | 3.7 | 2.9 | 4.2 | 3.3 | 4.6 | 3.8 | 5.1 | 4.2 | 5.6 |
| York | 17 | 0.19 | 0.9 | 0.7 | 2.7 | 1.9 | 4.9 | 3.7 | 6.7 | 5.6 | 7.4 | 6.9 | 8 | 7.6 | 8.7 | 8.2 | 9.1 | 8.8 | 9.5 | 9.2 | 9.9 |
| Newport News | 15 | 0.1 | 0.3 | 0.3 | 0.7 | 0.5 | 1 | 0.9 | 1.3 | 1.2 | 1.4 | 1.35 | 1.42 | 1.4 | 1.5 | 1.4 | 1.5 | 1.5 | 1.6 | 1.6 | 1.7 |
| Poquoson | 24 | 0.02 | 0.1 | 0.1 | 0.4 | 0.3 | 0.8 | 0.6 | 1.1 | 0.9 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| Hampton | 14 | 0.06 | 0.2 | 0.2 | 0.4 | 0.3 | 0.6 | 0.5 | 0.9 | 0.7 | 1.5 | 1.1 | 2.2 | 1.8 | 2.9 | 2.5 | 4 | 3.3 | 5.1 | 4.4 | 6.2 |
| Surry | 11 | 0 | 0.6 | 0.3 | 1.3 | 0.8 | 1.9 | 1.2 | 2.4 | 1.7 | 2.5 | 2.1 | 2.7 | 2.4 | 2.9 | 2.6 | 3 | 2.7 | 3.2 | 2.9 | 3.4 |
| Isle of Wight | 29 | <0.01 | 0.3 | 0.2 | 0.6 | 0.4 | 0.9 | 0.6 | 1.4 | 0.8 | 2.2 | 1 | 3.1 | 1.5 | 4 | 2.4 | 4.8 | 3.2 | 5.7 | 4 | 7.3 |
| Norfolk | 4.7 | 0.1 | 0.3 | 0.2 | 0.5 | 0.4 | 0.8 | 0.7 | 1.1 | 0.9 | 1.3 | 1.1 | 1.5 | 1.3 | 1.7 | 1.5 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| Virginia Beach | 112 | 4.2 | 14 | 13 | 25 | 22 | 33 | 29 | 41 | 37 | 46 | 43 | 50 | 48 | 53 | 51 | 56 | 54 | 57 | 56 | 59 |
| Suffolk | 26 | 0.03 | 0.2 | 0.1 | 0.3 | 0.2 | 0.4 | 0.3 | 0.8 | 0.4 | 1.3 | 0.5 | 1.8 | 1 | 2.3 | 1.4 | 3.1 | 2.1 | 6.8 | 2.9 | 33 |
| Portsmouth | 3.7 | 2.4 | 7.7 | 6.8 | 8.9 | 8.9 | 9.2 | 9.1 | 9.5 | 9.3 | 9.9 | 9.6 | 10 | 10 | 11 | 10 | 11 | 10.7 | 11 | 10.9 | 11 |
| Chesapeake | 40 | 4.5 | 17 | 15 | 32 | 28 | 40 | 36 | 58 | 44 | 89 | 56 | 120 | 86 | 152 | 116 | 186 | 149 | 217 | 180 | 251 |
| **Other Jurisdictions** | **85** | **0** | **5.5** | **3.2** | **11** | **6.9** | **16** | **10** | **20** | **14** | **22** | **18** | **24** | **20** | **26** | **22** | **28** | **24** | **30** | **26** | **33** |
| Charles City | 22 | 0 | 1.9 | 1.1 | 3.7 | 2.4 | 5.6 | 3.6 | 6.8 | 4.9 | 7.4 | 6.2 | 8 | 6.9 | 8.6 | 7.5 | 9.2 | 8.1 | 9.8 | 8.6 | 11 |
| Chesterfield | 11 | 0 | 0.4 | 0.2 | 0.7 | 0.4 | 1.1 | 0.7 | 1.2 | 0.9 | 1.2 | 1.1 | 1.2 | 1.17 | 1.24 | 1.2 | 1.3 | 1.2 | 1.3 | 1.2 | 1.3 |
| Henrico | 4.2 | 0 | 0.04 | 0.02 | 0.08 | 0.05 | 0.12 | 0.1 | 0.2 | 0.1 | 0.2 | 0.1 | 0.2 | 0.2 | 0.3 | 0.2 | 0.3 | 0.2 | 0.4 | 0.3 | 0.4 |
| Hopewell | 0.7 | 0 | 0.1 | 0.1 | 0.2 | 0.1 | 0.3 | 0.2 | 0.3 | 0.3 | 0.4 | 0.3 | 0.4 | 0.3 | 0.4 | 0.36 | 0.4 | 0.37 | 0.41 | 0.38 | 0.42 |
| New Kent | 34 | 0 | 2.3 | 1.3 | 4.5 | 2.9 | 6.8 | 4.4 | 8.1 | 6 | 8.7 | 7.6 | 9.3 | 8.2 | 9.8 | 8.8 | 10.4 | 9.3 | 11 | 9.9 | 12 |
| Prince George | 11 | 0 | 0.8 | 0.5 | 1.5 | 1 | 2.3 | 1.5 | 3.1 | 2 | 3.9 | 2.6 | 4.7 | 3.3 | 5.5 | 4 | 6.3 | 4.8 | 7.1 | 5.5 | 7.5 |
| Williamsburg | 0.4 | 0 | 0.02 | 0.01 | 0.03 | 0.02 | 0.05 | 0.03 | 0.06 | 0.04 | 0.07 | 0.05 | 0.08 | 0.06 | 0.1 | 0.07 | 0.11 | 0.09 | 0.12 | 0.1 | 0.14 |
| **Statewide** | **1619** | **21** | **86** | **72** | **167** | **134** | **240** | **197** | **317** | **260** | **389** | **320** | **459** | **387** | **529** | **455** | **594** | **523** | **657** | **583** | **745** |
| | | Cumulative (total) amount of land below a given elevation | | | | | | | | | | | | | | | | | | | |
| Dry Land | | 54 | 236 | 189 | 479 | 362 | 751 | 585 | 1029 | 816 | 1362 | 1060 | 1707 | 1368 | 2051 | 1708 | 2332 | 2028 | 2582 | 2283 | 2830 |
| Nontidal Wetlands | | 21 | 86 | 72 | 167 | 134 | 240 | 197 | 317 | 260 | 389 | 320 | 459 | 387 | 529 | 455 | 594 | 523 | 657 | 583 | 745 |
| All Land | 1619 | 1694 | 1941 | 1881 | 2265 | 2115 | 2611 | 2401 | 2965 | 2694 | 3370 | 2999 | 3785 | 3374 | 4199 | 3782 | 4545 | 4170 | 4858 | 4486 | 5193 |

Table A.8 Low and High Estimates of the Area of Land Close to Sea Level in North Carolina

| County | Meters above Spring High Water |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high |
|  | \multicolumn{2}{c}{0.5} | \multicolumn{2}{c}{1.0} | \multicolumn{2}{c}{1.5} | \multicolumn{2}{c}{2.0} | \multicolumn{2}{c}{2.5} | \multicolumn{2}{c}{3.0} | \multicolumn{2}{c}{3.5} | \multicolumn{2}{c}{4.0} | \multicolumn{2}{c}{4.5} | \multicolumn{2}{c}{5.0} |
|  | ----------------Cumulative (total) amount of dry land below a given elevation--------------- |
| Beaufort | 46 | 90 | 107 | 153 | 174 | 232 | 254 | 314 | 338 | 398 | 419 | 479 | 502 | 573 | 597 | 652 | 669 | 708 | 719 | 741 |
| Bertie | 1.8 | 3.4 | 4.7 | 6.8 | 8.2 | 10 | 12 | 15 | 17 | 20 | 22 | 26 | 28 | 32 | 35 | 40 | 44 | 51 | 56 | 65 |
| Bladen | 0 | 0 | 0 | <0.01 | <0.01 | 0.01 | 0.02 | 0.06 | 0.1 | 0.2 | 0.2 | 0.4 | 0.5 | 1.1 | 1.5 | 3 | 4 | 8.2 | 10 | 16 |
| Brunswick | 13 | 18 | 22 | 28 | 33 | 40 | 45 | 52 | 57 | 65 | 70 | 79 | 85 | 95 | 102 | 112 | 119 | 130 | 136 | 145 |
| Camden | 10 | 21 | 25 | 45 | 59 | 100 | 115 | 147 | 157 | 188 | 201 | 231 | 240 | 256 | 261 | 281 | 290 | 313 | 321 | 336 |
| Carteret | 52 | 89 | 120 | 172 | 212 | 279 | 318 | 371 | 393 | 412 | 419 | 428 | 434 | 444 | 451 | 462 | 468 | 477 | 481 | 487 |
| Chowan | 2.9 | 5.0 | 6.5 | 9.2 | 11 | 15 | 17 | 22 | 27 | 35 | 42 | 55 | 65 | 85 | 100 | 122 | 137 | 159 | 173 | 188 |
| Columbus | <0.01 | 0.01 | 0.02 | 0.04 | 0.05 | 0.1 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.1 | 1.2 | 1.5 | 1.6 | 1.9 |
| Craven | 7.5 | 15 | 19 | 30 | 36 | 52 | 59 | 77 | 84 | 102 | 109 | 130 | 138 | 164 | 174 | 199 | 208 | 233 | 241 | 265 |
| Currituck | 20 | 34 | 46 | 67 | 83 | 115 | 140 | 174 | 197 | 231 | 248 | 269 | 282 | 297 | 303 | 309 | 312 | 316 | 318 | 322 |
| Dare | 43 | 60 | 66 | 80 | 84 | 96 | 100 | 111 | 115 | 124 | 127 | 134 | 136 | 140 | 141 | 144 | 145 | 147 | 147 | 148 |
| Duplin | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | 0.01 | 0.02 | 0.03 | 0.07 | 0.1 | 0.2 | 0.2 | 0.3 | 0.4 | 0.8 | 0.9 | 1.5 |
| Edgecombe | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | <0.01 | 0.01 | 0.02 | 0.03 |
| Gates | 5.3 | 11 | 11 | 16 | 17 | 22 | 22 | 27 | 28 | 35 | 36 | 50 | 52 | 69 | 72 | 85 | 87 | 103 | 107 | 130 |
| Greene | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | <0.01 | 0.01 | 0.01 | 0.02 |
| Halifax | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <0.01 | <0.01 | 0.06 |
| Hertford | 3.7 | 6.9 | 7.4 | 11 | 12 | 17 | 17 | 21 | 22 | 26 | 26 | 31 | 31 | 36 | 37 | 42 | 43 | 49 | 50 | 55 |
| Hyde | 276 | 405 | 428 | 476 | 490 | 528 | 543 | 581 | 594 | 627 | 635 | 654 | 661 | 676 | 680 | 690 | 692 | 696 | 698 | 702 |
| Jones | 1.8 | 2.7 | 3.0 | 4.0 | 4.4 | 5.6 | 6.1 | 7.7 | 8.4 | 11 | 11 | 14 | 15 | 19 | 20 | 25 | 27 | 32 | 35 | 41 |
| Lenoir | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.01 | 0.02 | 0.05 | 0.06 | 0.1 | 0.2 | 0.3 | 0.4 | 0.7 | 0.9 | 1.5 | 1.7 | 2.8 |
| Martin | 0.5 | 1.8 | 2.6 | 5.6 | 7.0 | 11 | 13 | 18 | 19 | 23 | 24 | 27 | 28 | 30 | 30 | 33 | 33 | 35 | 36 | 38 |
| New Hanover | 7.1 | 12 | 13 | 19 | 21 | 26 | 28 | 33 | 35 | 41 | 43 | 50 | 52 | 59 | 62 | 69 | 72 | 79 | 81 | 87 |
| Northampton | 0.05 | 0.1 | 0.2 | 0.3 | 0.3 | 0.4 | 0.4 | 0.8 | 0.9 | 1.5 | 1.6 | 2.6 | 2.8 | 3.8 | 4.0 | 5.1 | 5.3 | 6.5 | 6.7 | 8.0 |
| Onslow | 24 | 31 | 33 | 41 | 44 | 52 | 55 | 65 | 68 | 78 | 82 | 93 | 97 | 108 | 112 | 125 | 130 | 144 | 149 | 162 |
| Pamlico | 24 | 44 | 60 | 90 | 112 | 145 | 165 | 189 | 204 | 225 | 238 | 258 | 269 | 284 | 291 | 302 | 307 | 314 | 317 | 320 |
| Pasquotank | 11 | 26 | 40 | 65 | 83 | 112 | 131 | 161 | 178 | 202 | 221 | 259 | 290 | 350 | 382 | 418 | 432 | 449 | 457 | 460 |
| Pender | 5 | 9 | 11 | 16 | 18 | 24 | 27 | 35 | 39 | 50 | 54 | 68 | 73 | 88 | 93 | 109 | 115 | 130 | 135 | 147 |
| Perquimans | 5.0 | 8.8 | 12 | 18 | 24 | 39 | 52 | 79 | 97 | 124 | 145 | 189 | 227 | 296 | 335 | 381 | 402 | 420 | 427 | 432 |
| Pitt | 1.1 | 1.8 | 2.4 | 3.7 | 4.7 | 6.5 | 7.8 | 10 | 12 | 15 | 17 | 21 | 24 | 30 | 34 | 40 | 45 | 52 | 57 | 65 |
| Sampson | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.02 | 0.03 | 0.06 | 0.07 | 0.1 | 0.15 | 0.2 | 0.3 | 0.5 | 0.6 | 0.9 |
| Tyrrell | 130 | 235 | 269 | 321 | 331 | 351 | 358 | 369 | 371 | 374 | 375 | 378 | 378 | 379 | 380 | 380 | 380 | 380 | 380 | 380 |
| Washington | 5.6 | 14 | 22 | 38 | 49 | 68 | 81 | 106 | 128 | 165 | 192 | 238 | 272 | 340 | 387 | 452 | 484 | 519 | 535 | 556 |
| **Statewide** | **697** | **1144** | **1330** | **1717** | **1916** | **2346** | **2566** | **2986** | **3188** | **3571** | **3759** | **4164** | **4385** | **4854** | **5086** | **5484** | **5654** | **5956** | **6079** | **6304** |

Table A.8 Low and High Estimates of the Area of Land Close to Sea Level in North Carolina (continued)

| County | | Meters above Spring High Water | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high |
| | | 0.5 | | 1.0 | | 1.5 | | 2.0 | | 2.5 | | 3.0 | | 3.5 | | 4.0 | | 4.5 | | 5.0 | |
| **Wetlands** | Tidal | --------Cumulative (total) amount of Nontidal Wetlands below a given elevation--------- | | | | | | | | | | | | | | | | | | | |
| Beaufort | 35 | 65 | 95 | 105 | 131 | 139 | 162 | 171 | 202 | 215 | 244 | 252 | 272 | 278 | 290 | 294 | 306 | 310 | 320 | 323 | 330 |
| Bertie | 0.3 | 110 | 123 | 127 | 132 | 136 | 142 | 147 | 153 | 159 | 167 | 171 | 177 | 181 | 186 | 191 | 200 | 207 | 219 | 225 | 234 |
| Bladen | 0 | <0.01 | 0.1 | 0.2 | 0.6 | 0.9 | 1.8 | 2.1 | 3.3 | 4.1 | 6.3 | 7.3 | 10 | 11 | 15 | 16 | 21 | 23 | 29 | 31 | 36 |
| Brunswick | 109 | 38 | 44 | 47 | 52 | 55 | 58 | 61 | 65 | 67 | 71 | 73 | 77 | 79 | 82 | 85 | 88 | 90 | 93 | 95 | 98 |
| Camden | 7.1 | 137 | 146 | 149 | 155 | 157 | 165 | 168 | 175 | 177 | 184 | 187 | 194 | 197 | 201 | 203 | 210 | 214 | 233 | 243 | 258 |
| Carteret | 334 | 34 | 67 | 87 | 117 | 136 | 164 | 180 | 202 | 216 | 231 | 237 | 243 | 247 | 254 | 258 | 267 | 273 | 281 | 286 | 293 |
| Chowan | 0 | 29 | 32 | 34 | 37 | 38 | 40 | 42 | 44 | 46 | 49 | 51 | 56 | 59 | 64 | 70 | 79 | 84 | 91 | 96 | 104 |
| Columbus | 0 | 0.2 | 0.5 | 0.8 | 1.3 | 1.9 | 2.7 | 3.2 | 3.9 | 4.4 | 5.1 | 5.5 | 6.1 | 6.4 | 6.7 | 7 | 7.3 | 7.5 | 8.0 | 8.9 | 11 |
| Craven | 12 | 59 | 74 | 80 | 94 | 100 | 115 | 121 | 137 | 142 | 154 | 159 | 170 | 173 | 184 | 188 | 198 | 202 | 213 | 217 | 227 |
| Currituck | 125 | 129 | 144 | 150 | 159 | 164 | 172 | 178 | 184 | 188 | 194 | 196 | 199 | 201 | 203 | 204 | 206 | 209 | 215 | 219 | 221 |
| Dare | 168 | 376 | 525 | 553 | 604 | 619 | 651 | 659 | 664 | 664 | 665 | 666 | 666 | 666 | 666 | 666 | 666 | 666 | 666 | 666 | 666 |
| Duplin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.01 | 0.03 | 0.1 | 0.2 | 0.5 | 0.7 | 1.4 | 1.8 | 2.9 | 3.4 | 4.7 | 5.3 | 6.7 |
| Edgecombe | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | 0.01 | 0.03 | 0.05 | 0.09 |
| Gates | 0 | 78 | 89 | 89 | 93 | 94 | 98 | 99 | 102 | 103 | 107 | 108 | 114 | 115 | 121 | 122 | 126 | 126 | 129 | 129 | 132 |

Table A.8 Low and High Estimates of the Area of Land Close to Sea Level in North Carolina (continued)

| County | | Meters above Spring High Water | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high |
| | | 0.5 | | 1.0 | | 1.5 | | 2.0 | | 2.5 | | 3.0 | | 3.5 | | 4.0 | | 4.5 | | 5.0 | |
| Greene | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <0.01 | <0.01 | 0.01 | 0.01 | 0.02 | 0.03 | 0.1 | 0.1 | 0.2 |
| Halifax | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <0.01 | 0.03 | 0.3 | 0.5 | 1.6 |
| Hertford | 0 | 45 | 53 | 54 | 58 | 58 | 61 | 62 | 65 | 66 | 69 | 69 | 71 | 71 | 74 | 74 | 77 | 78 | 79 | 80 | 81 |
| Hyde | 199 | 325 | 461 | 488 | 538 | 549 | 571 | 578 | 592 | 598 | 614 | 619 | 634 | 638 | 653 | 660 | 672 | 675 | 682 | 685 | 689 |
| Jones | 3.5 | 7.8 | 10 | 11 | 13 | 14 | 16 | 16 | 18 | 19 | 21 | 21 | 23 | 24 | 26 | 26 | 28 | 29 | 31 | 31 | 33 |
| Lenoir | 0 | 0 | 0 | 0 | 0.07 | 0.13 | 0.38 | 0.5 | 1.1 | 1.5 | 2.8 | 3.3 | 4.9 | 5.6 | 7.6 | 8.4 | 11 | 12 | 14 | 15 | 17 |
| Martin | 0 | 58 | 67 | 73 | 88 | 93 | 103 | 106 | 114 | 117 | 124 | 126 | 130 | 132 | 136 | 137 | 140 | 142 | 145 | 147 | 150 |
| New Hanover | 56 | 28 | 35 | 36 | 39 | 40 | 42 | 43 | 45 | 46 | 48 | 49 | 51 | 52 | 53 | 54 | 56 | 57 | 58 | 59 | 60 |
| Northampton | 0 | 0.9 | 1.9 | 2.0 | 2.6 | 2.7 | 3.5 | 3.7 | 5.9 | 6.0 | 7.3 | 7.6 | 9.6 | 9.9 | 11 | 11 | 12 | 12 | 13 | 13 | 14 |
| Onslow | 69 | 25 | 30 | 31 | 35 | 36 | 40 | 41 | 45 | 46 | 49 | 51 | 54 | 55 | 59 | 60 | 64 | 65 | 68 | 69 | 72 |
| Pamlico | 112 | 52 | 67 | 73 | 81 | 86 | 97 | 106 | 123 | 131 | 142 | 148 | 161 | 171 | 186 | 192 | 201 | 206 | 215 | 221 | 232 |
| Pasquotank | 0.3 | 50 | 58 | 62 | 68 | 71 | 75 | 79 | 84 | 88 | 93 | 96 | 102 | 106 | 113 | 116 | 119 | 121 | 122 | 124 | 124 |
| Pender | 38 | 83 | 107 | 113 | 128 | 132 | 145 | 150 | 161 | 165 | 175 | 179 | 189 | 192 | 202 | 206 | 216 | 219 | 229 | 232 | 239 |
| Perquimans | 0.04 | 38 | 44 | 47 | 52 | 55 | 61 | 66 | 74 | 79 | 86 | 90 | 98 | 103 | 113 | 124 | 137 | 144 | 158 | 167 | 180 |
| Pitt | 0 | 21 | 25 | 27 | 30 | 32 | 35 | 36 | 39 | 41 | 44 | 46 | 49 | 51 | 54 | 57 | 60 | 62 | 65 | 67 | 70 |
| Sampson | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <0.01 | 0.02 | 0.4 | 0.6 | 1.4 | 1.6 | 2.3 | 2.6 | 3.6 | 4.0 | 5.2 | 5.7 | 6.8 |
| Tyrrell | 3.8 | 422 | 502 | 523 | 554 | 559 | 569 | 571 | 579 | 582 | 591 | 593 | 601 | 606 | 614 | 616 | 620 | 621 | 622 | 622 | 623 |
| Washington | 0.3 | 70 | 78 | 86 | 92 | 96 | 101 | 106 | 112 | 118 | 128 | 134 | 145 | 152 | 162 | 168 | 175 | 180 | 188 | 192 | 197 |
| **Statewide** | **1272** | **2280** | **2879** | **3048** | **3354** | **3465** | **3694** | **3794** | **3992** | **4087** | **4269** | **4347** | **4509** | **4583** | **4741** | **4818** | **4969** | **5041** | **5198** | **5273** | **5405** |
| | | Cumulative (total) amount of land below a given elevation | | | | | | | | | | | | | | | | | | | |
| Dry Land | | 697 | 1144 | 1330 | 1717 | 1916 | 2346 | 2566 | 2986 | 3188 | 3571 | 3759 | 4164 | 4385 | 4854 | 5086 | 5484 | 5654 | 5956 | 6079 | 6304 |
| Nontidal Wetlands | | 2280 | 2879 | 3048 | 3354 | 3465 | 3694 | 3794 | 3992 | 4087 | 4269 | 4347 | 4509 | 4583 | 4741 | 4818 | 4969 | 5041 | 5198 | 5273 | 5405 |
| All Land | 1272 | 4249 | 5296 | 5650 | 6343 | 6653 | 7312 | 7633 | 8250 | 8547 | 9112 | 9378 | 9945 | 10240 | 10867 | 11176 | 11725 | 11967 | 12426 | 12624 | 12981 |

# Appendix B

## Low and High Estimates for the Area of Dry and Wet Land Close to Sea Level, by Subregion[a] (square kilometers)

[a] The low and high estimates are based on the on the contour interval and/or stated root mean square error (RMSE) of the data used to calculate elevations and an assumed standard error of 30 cm in the estimation of spring high water. For details, see main text of this Section 1.3.

**Table B.1 Low and High Estimates for the Area of Dry and Wet Land Close to Sea Level – Long Island Sound, New York**

| Locality | Tidal | Elevations above spring high water | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 50 cm | | 1 meter | | 2 meters | | 3 meters | | 5 meters | |
| | | Low | High | Low | High | Low | High | Low | High | Low | High |
| | | Cumulative (total) amount of dry land below a given elevation | | | | | | | | | |
| Westchester | | 0.2 | 1.5 | 1.1 | 3.0 | 2.8 | 5.8 | 5.1 | 8.6 | 10.0 | 12.4 |
| Bronx | | 0.4 | 2.6 | 1.8 | 5.1 | 4.8 | 9.8 | 8.7 | 14.6 | 16.9 | 19.6 |
| Queens | | 6.2 | 17.0 | 14.6 | 28.1 | 31.7 | 48.6 | 50.7 | 66.6 | 76.5 | 80.8 |
| Brooklyn | | 3.1 | 9.1 | 8.0 | 15.6 | 18.8 | 30.5 | 34.0 | 47.4 | 58.9 | 62.8 |
| Nassau | | 2.2 | 19.2 | 12.9 | 44.5 | 50.9 | 85.4 | 85.4 | 104.1 | 119.3 | 132.1 |
| Suffolk | | 13.7 | 51.5 | 43.1 | 96.8 | 114.9 | 181.3 | 188.6 | 251.3 | 318.8 | 371.4 |
| **Total** | | **25.8** | **100.9** | **81.4** | **193.1** | **223.9** | **361.4** | **372.4** | **492.6** | **600.4** | **679.1** |
| | **Tidal** | Cumulative (total) amount of wetlands below a given elevation | | | | | | | | | |
| Westchester | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 |
| Bronx | 1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 |
| Queens | 11.9 | 0.0 | 0.2 | 0.1 | 0.3 | 0.4 | 0.5 | 0.5 | 0.6 | 0.7 | 0.7 |
| Brooklyn | 10.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 |
| Nassau | 43.7 | 0.1 | 0.4 | 0.3 | 0.7 | 0.8 | 1.5 | 1.4 | 2.1 | 2.6 | 3.2 |
| Suffolk | 72.1 | 1.5 | 5.7 | 4.9 | 9.8 | 10.8 | 15.2 | 15.1 | 18.3 | 20.8 | 23.8 |
| **Total** | **140.0** | **1.7** | **6.4** | **5.4** | **11.0** | **12.1** | **17.4** | **17.2** | **21.3** | **24.3** | **28.1** |
| Dry and nontidal wetland | | 27 | 107 | 87 | 204 | 236 | 379 | 390 | 514 | 625 | 707 |
| All land | 140 | 167 | 247 | 227 | 344 | 376 | 519 | 530 | 654 | 765 | 847 |

**Table B.2 Low and High Estimates for the Area of Dry and Wet Land Close to Sea Level in New York Harbor**

| Locality | State | Tidal | 50 cm Low | 50 cm High | 1 meter Low | 1 meter High | 2 meters Low | 2 meters High | 3 meters Low | 3 meters High | 5 meters Low | 5 meters High |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cumulative (total) amount of dry land below a given elevation |||||||||||
| Monmouth | NJ | | 2.0 | 5.4 | 5.9 | 10.5 | 15.8 | 18.7 | 22.4 | 24.7 | 31.2 | 32.5 |
| Middlesex | NJ | | 0.4 | 8.8 | 4.3 | 17.4 | 14.7 | 31.2 | 25.4 | 43.5 | 45.6 | 62.0 |
| Somerset | NJ | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 |
| Union | NJ | | 0.4 | 6.9 | 4.2 | 13.7 | 12.6 | 22.7 | 20.2 | 29.3 | 31.7 | 40.9 |
| Hudson | NJ | | 0.6 | 16.2 | 10.4 | 32.2 | 30.6 | 49.0 | 46.4 | 56.9 | 60.4 | 67.5 |
| Essex | NJ | | 0.4 | 6.1 | 3.9 | 12.0 | 11.3 | 19.6 | 17.8 | 25.3 | 27.8 | 32.2 |
| Bergen | NJ | | 0.9 | 15.6 | 10.2 | 31.0 | 29.4 | 44.2 | 42.5 | 49.0 | 51.1 | 58.2 |
| Passaic | NJ | | 0.0 | 0.2 | 0.1 | 0.3 | 0.3 | 0.7 | 0.6 | 1.1 | 1.3 | 1.9 |
| Ellis Island | NJ | | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Staten Island | NY | | 0.3 | 7.8 | 5.1 | 15.5 | 14.9 | 24.9 | 23.3 | 30.8 | 33.9 | 39.0 |
| Brooklyn | NY | | 0.0 | 0.8 | 0.5 | 1.6 | 1.6 | 3.1 | 2.7 | 4.5 | 5.3 | 6.4 |
| Manhattan | NY | | 0.0 | 2.2 | 1.4 | 4.3 | 4.2 | 8.3 | 7.2 | 12.1 | 14.1 | 17.5 |
| Bronx | NY | | 0.0 | 0.6 | 0.4 | 1.2 | 1.2 | 2.7 | 2.2 | 4.4 | 5.3 | 6.9 |
| Westchester | NY | | 0.0 | 1.3 | 0.7 | 2.6 | 2.3 | 4.7 | 4.1 | 6.1 | 6.4 | 8.3 |
| **Total** | | | **5.1** | **71.9** | **47.1** | **142.6** | **138.9** | **230.0** | **214.9** | **288.0** | **314.1** | **373.7** |
| | | Tidal | Cumulative (total) amount of wetlands below a given elevation |||||||||||
| Monmouth | NJ | 7.7 | 0.1 | 0.3 | 0.4 | 0.6 | 0.8 | 0.9 | 1.1 | 1.2 | 1.7 | 1.8 |
| Middlesex | NJ | 21.7 | 0.1 | 1.2 | 0.7 | 2.3 | 2.1 | 3.9 | 3.5 | 5.3 | 5.7 | 7.8 |
| Union | NJ | 2.3 | 0.0 | 0.2 | 0.1 | 0.3 | 0.3 | 0.5 | 0.4 | 0.6 | 0.6 | 0.8 |
| Hudson | NJ | 12.0 | 0.0 | 0.2 | 0.1 | 0.3 | 0.3 | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 |
| Essex | NJ | 0.3 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Bergen | NJ | 15.0 | 0.0 | 0.6 | 0.4 | 1.2 | 1.1 | 1.5 | 1.5 | 1.5 | 1.6 | 2.1 |
| Passaic | NJ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| Staten Island | NY | 4.0 | 0.0 | 0.5 | 0.3 | 0.9 | 0.9 | 1.4 | 1.3 | 1.6 | 1.7 | 1.9 |
| Bronx | NY | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 |
| Westchester | NY | 0.7 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Rockland | NY | 2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 |
| Orange | NY | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Putnam | NY | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Dutchess | NY | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Total** | | **67.6** | **0.2** | **3.0** | **2.0** | **5.8** | **5.6** | **9.0** | **8.6** | **11.1** | **12.2** | **15.5** |
| Dry and nontidal wetland | | | 5 | 75 | 49 | 148 | 145 | 239 | 223 | 299 | 326 | 389 |
| All land | | 68 | 73 | 142 | 117 | 216 | 212 | 307 | 291 | 367 | 394 | 457 |

**Table B.3 Low and High Estimates for the Area of Dry and Wet Land Close to Sea Level in New Jersey Shore**

| County | Tidal | Elevations above spring high water: | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 50 cm | | 1 meter | | 2 meters | | 3 meters | | 5 meters | |
| | | Low | High | Low | High | Low | High | Low | High | Low | High |
| | | Cumulative (total) amount of Dry Land below a given elevation | | | | | | | | | |
| Cape May | | 7.6 | 21.8 | 23.8 | 42.0 | 56.1 | 73.5 | 78.4 | 102.2 | 124.2 | 144.1 |
| Atlantic | | 4.0 | 13.5 | 14.0 | 29.0 | 40.8 | 53.9 | 57.3 | 71.0 | 88.5 | 105.8 |
| Burlington | | 0.0 | 2.1 | 1.3 | 4.1 | 4.0 | 8.9 | 7.0 | 15.1 | 18.4 | 27.1 |
| Ocean | | 4.6 | 18.7 | 21.8 | 44.0 | 67.3 | 80.6 | 93.2 | 106.8 | 136.6 | 149.1 |
| Monmouth | | 2.1 | 4.9 | 5.5 | 9.4 | 15.3 | 19.9 | 26.4 | 31.8 | 50.4 | 54.9 |
| **Total** | | **18.3** | **61.1** | **66.5** | **128.5** | **183.5** | **236.9** | **262.3** | **326.9** | **418.1** | **481.0** |
| | Tidal | Cumulative (total) amount of wetlands below a given elevation | | | | | | | | | |
| Cape May | 153.2 | 2.9 | 12.0 | 10.2 | 20.4 | 22.2 | 33.1 | 32.2 | 42.7 | 47.6 | 55.2 |
| Atlantic | 204.0 | 4.8 | 17.9 | 14.7 | 29.2 | 31.9 | 50.1 | 48.3 | 68.2 | 82.0 | 102.9 |
| Burlington | 37.3 | 0.2 | 9.7 | 6.2 | 19.1 | 18.7 | 32.7 | 30.0 | 41.3 | 45.8 | 57.2 |
| Ocean | 124.8 | 2.3 | 11.6 | 10.0 | 21.7 | 25.8 | 38.3 | 39.0 | 49.4 | 56.5 | 65.8 |
| Monmouth | 4.4 | 0.5 | 0.9 | 1.0 | 1.4 | 1.9 | 2.3 | 2.9 | 3.2 | 4.8 | 5.1 |
| **Total** | **523.6** | **10.7** | **52.1** | **42.1** | **91.9** | **100.5** | **156.5** | **152.4** | **204.9** | **236.5** | **286.3** |
| Dry and nontidal wetland | | 29 | 113 | 109 | 220 | 284 | 393 | 415 | 532 | 655 | 767 |
| All land | 524 | 553 | 637 | 632 | 744 | 808 | 917 | 938 | 1055 | 1178 | 1291 |

**Table B.4 Low and High Estimates for the Area of Dry and Wet Land Close to Sea Level in Delaware Estuary**

| Locality | State | Tidal | Elevations above spring high water: | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 50 cm | | 1 meter | | 2 meters | | 3 meters | | 5 meters | |
| | | | Low | High | Low | High | Low | High | Low | High | Low | High |
| | | | Cumulative (total) amount of dry land below a given elevation | | | | | | | | | |
| Sussex | DE | | 6.4 | 18.2 | 15.8 | 30.8 | 37.3 | 55.2 | 60.0 | 78.6 | 103.3 | 119.7 |
| Kent | DE | | 8.8 | 24.8 | 21.9 | 40.6 | 47.9 | 77.6 | 86.1 | 119.2 | 177.8 | 209.9 |
| New Castle | DE | | 7.1 | 19.0 | 16.8 | 29.9 | 34.4 | 52.2 | 54.2 | 75.0 | 99.0 | 119.0 |
| Delaware | PA | | 0.4 | 6.1 | 4.0 | 12.1 | 11.5 | 18.0 | 17.2 | 20.7 | 22.2 | 25.9 |
| Philadelphia[a] | PA | | 3.6 | 6.1 | 6.8 | 12.4 | 20.0 | 24.8 | 31.6 | 36.8 | 51.5 | 54.8 |
| Bucks | PA | | 0.0 | 4.4 | 0.2 | 8.5 | 5.3 | 18.0 | 11.9 | 27.4 | 25.3 | 42.1 |
| Mercer | NJ | | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.2 | 0.2 | 0.4 | 0.3 | 0.4 |
| Burlington | NJ | | 0.1 | 4.3 | 0.4 | 8.4 | 5.3 | 16.4 | 11.0 | 24.5 | 22.5 | 42.2 |
| Camden | NJ | | 0.0 | 3.8 | 0.1 | 7.3 | 4.3 | 14.8 | 9.5 | 22.4 | 20.4 | 34.5 |
| Gloucester | NJ | | 0.2 | 9.2 | 6.1 | 18.4 | 17.7 | 33.3 | 29.6 | 46.5 | 53.5 | 69.3 |
| Salem | NJ | | 5.9 | 26.9 | 21.3 | 48.7 | 53.8 | 84.4 | 83.9 | 114.0 | 135.5 | 160.3 |
| Cumberland | NJ | | 3.0 | 15.8 | 12.1 | 28.9 | 30.3 | 53.2 | 49.5 | 76.9 | 90.8 | 114.3 |
| Cape May | NJ | | 0.4 | 3.5 | 2.5 | 7.5 | 8.6 | 19.9 | 20.9 | 36.9 | 55.5 | 68.0 |
| **Total** | | | **35.9** | **142.0** | **108.0** | **253.7** | **276.5** | **468.0** | **465.7** | **679.2** | **857.7** | **1060.4** |
| | | Tidal | Cumulative (total) amount of wetlands below a given elevation | | | | | | | | | |
| Sussex | DE | 67.4 | 2.1 | 4.8 | 4.6 | 6.2 | 6.8 | 8.6 | 9.0 | 10.6 | 12.3 | 13.3 |
| Kent | DE | 168.7 | 4.9 | 11.4 | 10.4 | 16.6 | 19.0 | 24.6 | 25.9 | 30.9 | 38.8 | 43.5 |
| New Castle | DE | 73.5 | 1.8 | 3.8 | 3.5 | 4.8 | 5.1 | 6.7 | 6.7 | 8.4 | 9.7 | 11.1 |
| Delaware | PA | 3.6 | 0.1 | 0.8 | 0.6 | 1.7 | 1.6 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 |
| Philadelphia | PA | 0.6 | 0.5 | 0.6 | 0.6 | 0.9 | 1.2 | 1.4 | 1.6 | 1.7 | 1.9 | 1.9 |
| Bucks | PA | 1.9 | 0.0 | 0.9 | 0.1 | 1.9 | 1.2 | 4.1 | 2.9 | 6.3 | 6.2 | 8.2 |
| Mercer | NJ | 1.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Burlington | NJ | 5.4 | 0.0 | 0.6 | 0.0 | 1.2 | 0.7 | 2.3 | 1.5 | 3.4 | 3.1 | 5.8 |
| Camden | NJ | 1.5 | 0.0 | 0.3 | 0.1 | 0.7 | 0.5 | 1.3 | 0.9 | 1.9 | 1.8 | 2.7 |
| Gloucester | NJ | 18.0 | 0.2 | 8.8 | 5.9 | 17.4 | 16.8 | 25.9 | 25.0 | 28.8 | 30.4 | 33.5 |
| Salem | NJ | 110.1 | 9.6 | 25.1 | 22.3 | 35.8 | 38.2 | 49.0 | 48.9 | 55.4 | 60.3 | 67.6 |
| Cumberland | NJ | 212.6 | 4.7 | 23.6 | 18.1 | 42.1 | 43.6 | 65.5 | 63.5 | 80.6 | 89.8 | 103.2 |
| Cape May | NJ | 48.3 | 4.3 | 14.7 | 12.2 | 25.1 | 28.2 | 40.3 | 41.5 | 51.2 | 58.6 | 63.7 |
| **Total** | | **713.5** | **28.3** | **95.5** | **78.5** | **154.2** | **163.0** | **231.8** | **229.7** | **281.6** | **315.1** | **356.8** |
| Dry and nontidal wetland | | | 64 | 237 | 187 | 408 | 440 | 700 | 695 | 961 | 1173 | 1417 |
| All land | | 713 | 778 | 951 | 900 | 1121 | 1153 | 1413 | 1409 | 1674 | 1886 | 2131 |

[a] This number includes Philadelphia's 2.4 square kilometers of dry land below spring high water, of which 0.87, 0.26, 0.054, and 0.005 are at least 0.5, 1, 2, and 3 meters below spring high water, respectively. Most of this land is near Philadelphia International Airport.

**Table B.5 Low and High Estimates for the Area of Dry and Wet Land Close to Sea Level in DelMarVa Atlantic Coast**

| | | | Elevations above spring high water: | | | | | | | | | |
| | | | 50 cm | | 1 meter | | 2 meters | | 3 meters | | 5 meters | |
| | | | Low | High | Low | High | Low | High | Low | High | Low | High |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Locality | State | | Cumulative (total) amount of Dry Land below a given elevation | | | | | | | | | |
| Northampton | VA | | 5.1 | 14.5 | 13.0 | 16.8 | 17.9 | 20.6 | 21.4 | 24.6 | 30.5 | 35.0 |
| Accomack | VA | | 7.5 | 22.6 | 20.1 | 37.7 | 44.5 | 61.7 | 65.8 | 81.2 | 103.7 | 118.9 |
| Worcester | MD | | 3.7 | 18.6 | 21.7 | 42.4 | 77.5 | 102.8 | 134.0 | 154.6 | 219.1 | 234.6 |
| Sussex | DE | | 11.1 | 32.4 | 27.6 | 53.5 | 64.5 | 94.9 | 104.2 | 139.5 | 196.5 | 234.2 |
| **Total** | | | **27.4** | **88.1** | **82.5** | **150.3** | **204.4** | **280.0** | **325.4** | **399.9** | **549.9** | **622.7** |
| | | **Tidal** | Cumulative (total) amount of wetlands below a given elevation | | | | | | | | | |
| Northampton | VA | 436.4 | 0.3 | 0.8 | 0.7 | 2.1 | 2.8 | 4.4 | 4.6 | 5.2 | 5.8 | 6.1 |
| Accomack | VA | 327.3 | 1.3 | 4.1 | 3.5 | 10.4 | 13.5 | 20.7 | 21.9 | 26.2 | 31.2 | 33.7 |
| Worcester | MD | 118.5 | 0.4 | 4.3 | 5.0 | 8.8 | 14.1 | 18.1 | 23.4 | 27.0 | 36.0 | 37.6 |
| Sussex | DE | 41.0 | 1.7 | 4.9 | 4.2 | 7.5 | 8.8 | 12.2 | 12.9 | 15.7 | 18.9 | 20.7 |
| **Total** | | **923.3[a]** | **3.7** | **14.1** | **13.4** | **28.7** | **39.2** | **55.4** | **62.7** | **74.1** | **91.9** | **98.1** |
| Dry and Nontidal wetland | | | 31 | 102 | 96 | 179 | 244 | 335 | 388 | 474 | 642 | 721 |
| All Land | | 923 | 954 | 1025 | 1019 | 1102 | 1167 | 1259 | 1311 | 1397 | 1565 | 1644 |

[a] Includes 375 square kilometers of tidal mudflats in Northampton and Accomack counties.

**Table B.6 Low and High Estimates for the Area of Dry and Wet Land Close to Sea Level in Hampton Roads, Virginia**

| Locality | | Elevations above spring high water | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | 50 cm | | 1 meter | | 2 meters | | 3 meters | | 5 meters | |
| | | Low | High | Low | High | Low | High | Low | High | Low | High |
| | | Cumulative (total) amount of Dry Land below a given elevation | | | | | | | | | |
| Virginia Beach | | 9.3 | 33.0 | 30.3 | 68.7 | 93.6 | 163.2 | 184.7 | 272.9 | 378.1 | 418.2 |
| Chesapeake | | 3.5 | 11.9 | 10.8 | 30.6 | 44.6 | 86.6 | 100.4 | 204.5 | 353.0 | 429.7 |
| Norfolk | | 1.9 | 5.8 | 5.2 | 17.1 | 24.0 | 42.4 | 52.4 | 91.2 | 121.7 | 128.2 |
| Portsmouth | | 1.2 | 3.9 | 3.5 | 9.6 | 12.8 | 22.0 | 26.7 | 45.0 | 62.6 | 69.9 |
| Suffolk | | 0.7 | 4.3 | 3.1 | 7.1 | 7.5 | 15.2 | 13.0 | 31.0 | 47.3 | 73.3 |
| Isle of Wight | | 0.2 | 3.4 | 2.1 | 6.2 | 6.0 | 12.8 | 10.1 | 21.6 | 26.8 | 42.0 |
| Surry | | 0.0 | 1.4 | 0.7 | 2.7 | 2.7 | 5.3 | 4.6 | 7.1 | 8.1 | 11.2 |
| James City | | 0.1 | 3.8 | 2.2 | 7.2 | 7.0 | 14.2 | 11.8 | 22.1 | 26.7 | 38.7 |
| York | | 1.4 | 6.0 | 4.8 | 13.1 | 16.3 | 27.7 | 28.3 | 37.3 | 44.3 | 51.3 |
| Newport News | | 2.2 | 6.9 | 6.1 | 11.0 | 12.9 | 17.9 | 19.3 | 24.8 | 34.9 | 42.3 |
| Poquoson | | 1.4 | 4.5 | 4.1 | 8.8 | 10.9 | 16.3 | 16.4 | 16.6 | 16.7 | 16.7 |
| Hampton | | 1.9 | 5.9 | 5.3 | 18.1 | 25.4 | 45.3 | 51.2 | 73.8 | 94.7 | 102.4 |
| **Total** | | **23.8** | **90.8** | **78.2** | **200.2** | **263.6** | **468.9** | **519.0** | **847.9** | **1214.9** | **1423.8** |
| | **Tidal** | Cumulative (total) amount of wetlands below a given elevation | | | | | | | | | |
| Virginia Beach | 111.9 | 4.2 | 14.5 | 13.3 | 24.9 | 29.1 | 40.9 | 43.5 | 49.6 | 56.5 | 59.3 |
| Chesapeake | 39.7 | 4.5 | 16.6 | 15.4 | 32.1 | 36.4 | 58.3 | 55.7 | 120.2 | 180.3 | 250.8 |
| Norfolk | 4.7 | 0.1 | 0.3 | 0.2 | 0.5 | 0.7 | 1.1 | 1.1 | 1.5 | 1.7 | 1.7 |
| Portsmouth | 3.7 | 2.4 | 7.7 | 6.8 | 8.9 | 9.1 | 9.5 | 9.6 | 10.3 | 10.9 | 11.2 |
| Suffolk | 26.4 | 0.0 | 0.2 | 0.1 | 0.3 | 0.3 | 0.8 | 0.5 | 1.8 | 2.9 | 33.1 |
| Isle of Wight | 28.6 | 0.0 | 0.3 | 0.2 | 0.6 | 0.6 | 1.4 | 1.0 | 3.1 | 4.0 | 7.3 |
| Surry | 11.5 | 0.0 | 0.6 | 0.3 | 1.3 | 1.2 | 2.4 | 2.1 | 2.7 | 2.9 | 3.4 |
| James City | 32.8 | 0.0 | 0.8 | 0.4 | 1.5 | 1.4 | 2.8 | 2.5 | 3.7 | 4.2 | 5.6 |
| York | 17.0 | 0.2 | 0.9 | 0.7 | 2.7 | 3.7 | 6.7 | 6.9 | 8.0 | 9.2 | 9.9 |
| Newport News | 15.1 | 0.1 | 0.3 | 0.3 | 0.7 | 0.9 | 1.3 | 1.4 | 1.4 | 1.6 | 1.7 |
| Poquoson | 23.7 | 0.0 | 0.1 | 0.1 | 0.4 | 0.6 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| Hampton | 14.3 | 0.1 | 0.2 | 0.2 | 0.4 | 0.5 | 0.9 | 1.1 | 2.2 | 4.4 | 6.2 |
| **Total** | **329.4** | **11.7** | **42.4** | **38.0** | **74.2** | **84.5** | **127.1** | **126.5** | **205.4** | **279.5** | **391.1** |
| Dry and Nontidal wetland | | 35 | 133 | 116 | 274 | 348 | 596 | 645 | 1053 | 1494 | 1815 |
| All Land | 329 | 365 | 463 | 446 | 604 | 677 | 925 | 975 | 1383 | 1824 | 2144 |

Table B.7 Low and High Estimates for the Area of Dry and Wet Land Close to Sea Level in Middle Peninsula and Northern Neck Areas, Virginia

| Locality | Tidal | Elevations above spring high water | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 50 cm | | 1 meter | | 2 meters | | 3 meters | | 5 meters | |
| | | Low | High | Low | High | Low | High | Low | High | Low | High |
| | | Cumulative (total) amount of Dry Land below a given elevation | | | | | | | | | |
| Gloucester | | 4.1 | 16.0 | 13.2 | 32.9 | 40.5 | 66.9 | 66.9 | 84.2 | 96.4 | 110.8 |
| Mathews | | 4.7 | 14.8 | 13.4 | 33.1 | 43.9 | 73.1 | 78.6 | 96.8 | 114.7 | 120.7 |
| Middlesex | | 0.2 | 3.4 | 2.0 | 6.8 | 7.3 | 14.4 | 13.1 | 22.8 | 28.1 | 38.9 |
| King William | | 0.0 | 1.6 | 0.9 | 3.2 | 3.1 | 8.4 | 5.4 | 17.7 | 22.7 | 36.1 |
| King and Queen | | 0.0 | 2.9 | 1.7 | 5.7 | 5.5 | 11.9 | 9.6 | 19.0 | 22.7 | 32.9 |
| Essex | | 0.0 | 3.8 | 2.0 | 7.3 | 7.1 | 15.5 | 12.3 | 27.9 | 34.2 | 52.8 |
| Lancaster | | 0.1 | 7.0 | 3.6 | 13.8 | 13.8 | 28.0 | 24.0 | 41.5 | 48.4 | 67.9 |
| Northumberland | | 0.0 | 5.9 | 2.8 | 11.5 | 11.0 | 24.1 | 19.2 | 63.8 | 84.5 | 140.9 |
| Richmond | | 0.0 | 4.6 | 2.4 | 8.9 | 8.7 | 18.5 | 15.0 | 31.6 | 38.2 | 56.5 |
| Caroline | | 0.0 | 0.4 | 0.3 | 0.9 | 0.9 | 1.8 | 1.5 | 2.8 | 3.4 | 5.2 |
| Spotsylvania | | 0.0 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.3 | 0.5 | 0.5 | 0.8 |
| Fredericksburg | | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.4 | 0.5 |
| **Total** | | **9.2** | **60.5** | **42.4** | **124.2** | **142.1** | **263.2** | **246.0** | **409.0** | **494.2** | **664.0** |
| | Tidal | Cumulative (total) amount of wetlands below a given elevation | | | | | | | | | |
| Gloucester | 43.5 | 1.4 | 5.5 | 4.5 | 11.9 | 14.7 | 24.8 | 24.6 | 30.8 | 34.4 | 38.5 |
| Mathews | 27.0 | 1.2 | 3.8 | 3.5 | 8.6 | 11.4 | 19.0 | 21.6 | 33.6 | 48.1 | 55.1 |
| Middlesex | 9.7 | 0.0 | 0.7 | 0.4 | 1.4 | 1.4 | 2.8 | 2.4 | 3.5 | 3.8 | 4.8 |
| King William | 35.6 | 0.0 | 0.4 | 0.2 | 0.7 | 0.7 | 1.4 | 1.2 | 2.0 | 2.3 | 3.3 |
| King and Queen | 21.6 | 0.0 | 0.9 | 0.5 | 1.7 | 1.6 | 3.1 | 2.8 | 4.0 | 4.4 | 5.8 |
| Essex | 27.5 | 0.0 | 0.8 | 0.4 | 1.5 | 1.5 | 2.9 | 2.5 | 3.9 | 4.4 | 5.9 |
| Lancaster | 9.8 | 0.0 | 0.5 | 0.3 | 1.1 | 1.1 | 2.1 | 1.8 | 2.8 | 3.2 | 4.2 |
| Northumberland | 11.4 | 0.0 | 0.5 | 0.3 | 1.1 | 1.0 | 2.2 | 1.8 | 5.1 | 6.6 | 10.8 |
| Richmond | 21.7 | 0.0 | 0.9 | 0.4 | 1.7 | 1.6 | 3.3 | 2.8 | 4.5 | 5.1 | 6.9 |
| Caroline | 6.3 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.3 | 0.2 | 0.7 | 0.9 | 1.5 |
| Spotsylvania | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Fredericksburg | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Total** | **214.3** | **2.6** | **14.1** | **10.5** | **29.7** | **35.1** | **62.0** | **61.7** | **90.9** | **113.5** | **136.9** |
| Dry and Nontidal wetland | | 12 | 75 | 53 | 154 | 177 | 325 | 308 | 500 | 608 | 801 |
| All Land | 214 | 226 | 289 | 267 | 368 | 392 | 539 | 522 | 714 | 822 | 1015 |

**Table B.8 Low and High Estimates for the Area of Dry and Wet Land Close to Sea Level in Potomac River**

| Locality | State | Tidal | 50 cm Low | 50 cm High | 1 meter Low | 1 meter High | 2 meters Low | 2 meters High | 3 meters Low | 3 meters High | 5 meters Low | 5 meters High |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cumulative (total) amount of Dry Land below a given elevation | | | | | | | | | |
| Westmoreland | VA | | 0.0 | 4.7 | 2.4 | 9.3 | 9.0 | 21.2 | 15.5 | 53.0 | 69.2 | 112.3 |
| King George | VA | | 0.0 | 2.7 | 1.5 | 5.4 | 5.2 | 11.4 | 9.0 | 21.9 | 27.3 | 42.8 |
| Stafford | VA | | 0.0 | 1.4 | 0.8 | 2.7 | 2.7 | 5.4 | 4.6 | 8.1 | 9.5 | 13.5 |
| Prince William | VA | | 0.0 | 1.0 | 0.5 | 2.0 | 1.9 | 3.9 | 3.3 | 5.5 | 6.4 | 8.8 |
| Fairfax | VA | | 0.0 | 2.0 | 1.1 | 3.9 | 3.8 | 7.6 | 6.6 | 10.7 | 12.4 | 18.1 |
| Alexandria | VA | | 0.0 | 0.4 | 0.3 | 0.9 | 0.9 | 1.7 | 1.5 | 2.5 | 2.9 | 4.0 |
| Arlington | VA | | 0.0 | 0.2 | 0.1 | 0.5 | 0.5 | 1.3 | 0.8 | 2.6 | 3.4 | 5.0 |
| DC | | | 1.6 | 3.0 | 2.8 | 4.4 | 5.5 | 7.4 | 8.9 | 11.1 | 15.9 | 17.7 |
| Prince George's | MD | | 0.1 | 1.1 | 0.5 | 2.2 | 1.6 | 4.0 | 3.2 | 5.4 | 6.6 | 9.9 |
| Charles | MD | | 0.7 | 10.9 | 4.6 | 19.4 | 14.1 | 38.4 | 28.3 | 64.0 | 74.2 | 96.0 |
| St. Mary's | MD | | 1.6 | 12.0 | 5.6 | 19.8 | 14.9 | 39.2 | 27.9 | 70.1 | 81.2 | 99.8 |
| **Total** | | | **4.1** | **39.5** | **20.1** | **70.4** | **60.0** | **141.5** | **109.5** | **255.1** | **308.9** | **428.1** |
| | | Tidal | Cumulative (total) amount of wetlands below a given elevation | | | | | | | | | |
| Westmoreland | VA | 14.4 | 0.0 | 0.5 | 0.3 | 1.0 | 1.0 | 2.2 | 1.7 | 5.6 | 7.3 | 12.0 |
| King George | VA | 13.5 | 0.0 | 0.5 | 0.3 | 1.0 | 1.0 | 2.0 | 1.7 | 2.8 | 3.3 | 4.6 |
| Stafford | VA | 6.8 | 0.0 | 0.5 | 0.3 | 1.0 | 1.0 | 1.9 | 1.7 | 2.6 | 3.0 | 3.9 |
| Prince William | VA | 5.1 | 0.0 | 0.2 | 0.1 | 0.3 | 0.3 | 0.6 | 0.5 | 0.7 | 0.8 | 0.9 |
| Fairfax | VA | 4.9 | 0.0 | 0.2 | 0.1 | 0.4 | 0.4 | 0.7 | 0.6 | 0.9 | 1.1 | 1.4 |
| Alexandria | VA | 0.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Arlington | VA | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| DC | | 0.5 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.3 | 0.3 |
| Prince George's | MD | 1.6 | 0.0 | 0.3 | 0.1 | 0.5 | 0.4 | 0.8 | 0.7 | 0.9 | 1.2 | 2.1 |
| Charles | MD | 22.9 | 0.1 | 3.6 | 1.4 | 6.2 | 4.6 | 11.3 | 9.0 | 15.9 | 17.8 | 22.2 |
| St. Mary's | MD | 11.7 | 0.3 | 1.8 | 0.8 | 3.3 | 2.4 | 7.1 | 4.9 | 12.9 | 15.4 | 22.5 |
| **Total** | | **81.5** | **0.5** | **7.6** | **3.5** | **13.9** | **11.1** | **26.8** | **21.0** | **42.7** | **50.1** | **70.1** |
| Dry and Nontidal wetland | | | 5 | 47 | 24 | 84 | 71 | 168 | 130 | 298 | 359 | 498 |
| All Land | | 82 | 86 | 129 | 105 | 166 | 153 | 250 | 212 | 379 | 441 | 580 |

**Table B.9 Low and High Estimates for the Area of Dry and Wet Land Close to Sea Level – Maryland Western Shore**

| | | Elevations above spring high water | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | 50 cm | | 1 meter | | 2 meters | | 3 meters | | 5 meters | |
| | | Low | High | Low | High | Low | High | Low | High | Low | High |
| **Locality** | | Cumulative (total) amount of Dry Land below a given elevation | | | | | | | | | |
| Prince George's | | 0.0 | 1.1 | 0.4 | 1.7 | 1.3 | 3.2 | 2.3 | 5.3 | 6.5 | 10.8 |
| Charles | | 0.0 | 0.7 | 0.3 | 1.2 | 0.9 | 2.0 | 1.7 | 2.5 | 2.7 | 3.3 |
| St. Mary's | | 0.8 | 3.8 | 2.5 | 8.0 | 8.8 | 18.8 | 18.2 | 30.6 | 38.5 | 48.4 |
| Calvert | | 0.4 | 3.9 | 1.7 | 5.8 | 4.6 | 10.1 | 7.6 | 17.3 | 21.2 | 35.7 |
| Anne Arundel | | 1.7 | 7.2 | 6.7 | 14.6 | 20.2 | 38.7 | 43.5 | 59.1 | 80.5 | 94.3 |
| Howard | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.3 |
| Baltimore City | | 0.2 | 2.1 | 0.9 | 3.9 | 2.7 | 7.5 | 5.7 | 11.9 | 14.1 | 21.0 |
| Baltimore | | 2.3 | 6.6 | 7.3 | 13.0 | 20.8 | 27.0 | 37.0 | 45.8 | 74.5 | 80.7 |
| Harford | | 0.7 | 17.3 | 7.6 | 25.1 | 21.7 | 40.3 | 34.2 | 57.1 | 65.5 | 78.2 |
| **Total** | | **6.1** | **42.7** | **27.5** | **73.4** | **81.1** | **147.8** | **150.3** | **229.7** | **303.7** | **372.7** |
| | **Tidal** | Cumulative (total) amount of wetlands below a given elevation | | | | | | | | | |
| Prince George's | 12.3 | 0.0 | 0.5 | 0.2 | 0.9 | 0.7 | 1.8 | 1.3 | 2.9 | 3.5 | 5.1 |
| Charles | 1.3 | 0.0 | 0.2 | 0.1 | 0.2 | 0.2 | 0.4 | 0.3 | 0.4 | 0.5 | 0.6 |
| St. Mary's | 7.0 | 0.3 | 1.0 | 0.8 | 2.0 | 2.2 | 3.9 | 3.9 | 5.9 | 7.5 | 8.8 |
| Calvert | 14.6 | 0.1 | 0.9 | 0.4 | 1.3 | 1.1 | 2.2 | 1.7 | 3.8 | 4.7 | 7.5 |
| Anne Arundel | 12.1 | 0.2 | 0.7 | 0.6 | 1.6 | 3.1 | 8.1 | 9.5 | 12.4 | 15.3 | 17.1 |
| Howard | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 |
| Baltimore City | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 |
| Baltimore | 10.5 | 0.1 | 0.3 | 0.3 | 0.7 | 1.0 | 1.3 | 1.5 | 1.7 | 2.2 | 2.3 |
| Harford | 29.4 | 0.2 | 2.5 | 1.2 | 3.8 | 3.3 | 6.2 | 5.2 | 9.0 | 10.2 | 12.0 |
| **Total** | **87.3** | **0.8** | **6.2** | **3.7** | **10.5** | **11.6** | **24.0** | **23.5** | **36.4** | **43.9** | **53.6** |
| Dry and Nontidal wetland | | 7 | 49 | 31 | 84 | 93 | 172 | 174 | 266 | 348 | 426 |
| All Land | 87 | 94 | 136 | 119 | 171 | 180 | 259 | 261 | 353 | 435 | 514 |

**Table B.10 Low and High Estimates for the Area of Dry and Wet Land Close to Sea Level –** Chesapeake Bay Eastern Shore

| Locality | State | Tidal | 50 cm | | 1 meter | | 2 meters | | 3 meters | | 5 meters | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Low | High | Low | High | Low | High | Low | High | Low | High |
| **Locality** | **State** | | Cumulative (total) amount of Dry Land below a given elevation | | | | | | | | | |
| Cecil | MD | | 0.2 | 2.5 | 1.0 | 5.2 | 3.7 | 11.6 | 7.8 | 20.0 | 24.3 | 37.9 |
| Kent | MD | | 0.2 | 8.4 | 4.8 | 15.9 | 16.3 | 32.9 | 28.8 | 56.1 | 71.4 | 105.2 |
| Queen Anne's | MD | | 0.6 | 4.1 | 5.3 | 11.9 | 24.2 | 35.0 | 51.6 | 68.2 | 125.2 | 142.6 |
| Caroline | MD | | 0.7 | 3.2 | 2.2 | 6.1 | 6.9 | 12.5 | 13.2 | 19.7 | 25.9 | 32.9 |
| Talbot | MD | | 2.2 | 7.8 | 11.1 | 23.7 | 64.0 | 98.7 | 148.7 | 175.1 | 265.6 | 279.4 |
| Sussex | DE | | 0.5 | 1.6 | 1.4 | 3.3 | 4.3 | 7.1 | 8.5 | 13.8 | 26.0 | 36.3 |
| Dorchester | MD | | 30.1 | 120.0 | 150.4 | 214.9 | 281.9 | 312.9 | 358.4 | 386.2 | 461.6 | 474.0 |
| Wicomico | MD | | 5.0 | 14.9 | 18.3 | 28.6 | 47.1 | 58.5 | 76.0 | 86.2 | 133.2 | 141.6 |
| Somerset | MD | | 17.1 | 58.4 | 70.5 | 100.7 | 167.8 | 193.4 | 215.1 | 232.5 | 326.5 | 344.6 |
| Worcester | MD | | 0.7 | 2.7 | 3.1 | 5.8 | 10.6 | 16.5 | 23.6 | 28.4 | 46.1 | 53.4 |
| Accomack | VA | | 5.8 | 18.4 | 16.8 | 40.4 | 53.3 | 87.5 | 94.2 | 110.4 | 129.5 | 138.1 |
| Northampton | VA | | 2.3 | 7.2 | 6.5 | 15.8 | 20.8 | 34.5 | 39.9 | 62.8 | 98.7 | 123.7 |
| **Total** | | | **65.3** | **249.1** | **291.4** | **472.4** | **701.0** | **901.2** | **1065.8** | **1259.5** | **1734.0** | **1909.7** |
| | | **Tidal** | Cumulative (total) amount of wetlands below a given elevation | | | | | | | | | |
| Cecil | MD | 12.6 | 0.0 | 0.2 | 0.0 | 0.7 | 0.4 | 1.7 | 1.2 | 2.8 | 3.5 | 5.5 |
| Kent | MD | 18.3 | 0.1 | 1.1 | 0.9 | 2.6 | 3.3 | 5.4 | 5.2 | 7.9 | 9.7 | 14.4 |
| Queen Anne's | MD | 21.4 | 0.2 | 1.1 | 1.5 | 3.0 | 4.9 | 6.5 | 7.9 | 9.6 | 14.6 | 17.9 |
| Caroline | MD | 14.4 | 0.3 | 1.4 | 0.7 | 2.6 | 2.5 | 5.3 | 4.4 | 7.5 | 8.0 | 11.7 |
| Talbot | MD | 26.1 | 0.1 | 0.3 | 0.5 | 1.0 | 2.5 | 4.2 | 6.8 | 8.5 | 17.9 | 19.6 |
| Sussex | DE | 6.7 | 0.6 | 1.8 | 1.6 | 2.7 | 3.1 | 4.4 | 4.8 | 6.4 | 10.1 | 13.1 |
| Dorchester | MD | 424.8 | 14.9 | 45.8 | 53.4 | 70.1 | 94.4 | 104.0 | 113.8 | 120.6 | 140.1 | 142.5 |
| Wicomico | MD | 67.0 | 5.4 | 9.9 | 10.7 | 13.5 | 24.2 | 29.2 | 37.0 | 44.4 | 67.0 | 70.2 |
| Somerset | MD | 265.4 | 6.6 | 15.7 | 17.3 | 21.3 | 34.8 | 39.8 | 45.1 | 51.5 | 80.6 | 90.1 |
| Worcester | MD | 23.7 | 0.3 | 0.9 | 1.0 | 1.6 | 2.7 | 4.0 | 6.3 | 8.8 | 18.2 | 20.8 |
| Accomack | VA | 156.4 | 5.3 | 16.7 | 15.3 | 34.6 | 44.8 | 71.8 | 76.5 | 88.2 | 103.2 | 111.1 |
| Northampton | VA | 25.5 | 0.1 | 0.4 | 0.4 | 1.2 | 1.9 | 3.7 | 4.2 | 6.2 | 8.8 | 10.1 |
| **Total** | | **1062.4** | **33.8** | **95.3** | **103.3** | **155.0** | **219.5** | **279.9** | **313.0** | **362.4** | **481.7** | **526.9** |
| Dry and Nontidal wetland | | | 99 | 344 | 395 | 627 | 921 | 1181 | 1379 | 1622 | 2216 | 2437 |
| All Land | | 1062 | 1162 | 1407 | 1457 | 1690 | 1983 | 2244 | 2441 | 2684 | 3278 | 3499 |

# Appendix C

# Low and High Estimates of the Area of Land Close to Sea Level, by Region: Mid-Atlantic[a] (square kilometers)

[a] The low and high estimates are based on the on the contour interval and/or stated root mean square error (RMSE) of the data used to calculate elevations and an assumed standard error of 30 cm in the estimation of spring high water. For details, see main text of this Section 1.3.

Table C.1 Low and High Estimates of the Area of Land Close to Sea Level by Region

| Jurisdiction | | Meters above Spring High Water | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high |
| | | 0.5 | | 1.0 | | 1.5 | | 2.0 | | 2.5 | | 3.0 | | 3.5 | | 4.0 | | 4.5 | | 5.0 | |
| | | ----------------Cumulative (total) amount of Dry Land below a given elevation--------------- | | | | | | | | | | | | | | | | | | | |
| L.I. Sound and Peconic | | 6 | 31 | 22 | 59 | 42 | 86 | 63 | 111 | 85 | 135 | 106 | 158 | 127 | 181 | 149 | 200 | 170 | 216 | 190 | 229 |
| South Shore Long Island | | 19 | 70 | 59 | 134 | 108 | 198 | 161 | 250 | 216 | 293 | 266 | 335 | 309 | 369 | 347 | 400 | 380 | 429 | 410 | 450 |
| NY Harbor/ Raritan Bay Total | | 5 | 72 | 47 | 143 | 93 | 200 | 139 | 230 | 185 | 260 | 215 | 288 | 240 | 316 | 265 | 343 | 290 | 360 | 314 | 374 |
| New York | | 0 | 13 | 8 | 25 | 16 | 37 | 24 | 44 | 32 | 51 | 40 | 58 | 46 | 65 | 52 | 72 | 59 | 76 | 65 | 78 |
| New Jersey | | 5 | 59 | 39 | 117 | 77 | 163 | 115 | 186 | 153 | 209 | 175 | 230 | 194 | 251 | 213 | 271 | 231 | 284 | 249 | 295 |
| New Jersey Shore | | 18 | 61 | 66 | 129 | 131 | 186 | 184 | 237 | 223 | 283 | 262 | 327 | 304 | 369 | 344 | 409 | 382 | 445 | 418 | 481 |
| Delaware Bay Total | | 19 | 62 | 52 | 108 | 88 | 154 | 124 | 206 | 166 | 259 | 217 | 312 | 268 | 366 | 321 | 421 | 374 | 470 | 427 | 512 |
| New Jersey | | 3 | 19 | 15 | 36 | 27 | 53 | 39 | 73 | 52 | 94 | 70 | 114 | 90 | 134 | 109 | 154 | 127 | 170 | 146 | 182 |
| Delaware | | 15 | 43 | 38 | 71 | 61 | 101 | 85 | 133 | 114 | 165 | 146 | 198 | 178 | 232 | 212 | 267 | 247 | 300 | 281 | 330 |
| Delaware River Total | | 17 | 80 | 56 | 146 | 103 | 210 | 152 | 262 | 201 | 315 | 249 | 368 | 296 | 417 | 342 | 467 | 386 | 512 | 430 | 549 |
| Delaware: fresh | | 2 | 6 | 5 | 10 | 8 | 14 | 11 | 19 | 15 | 24 | 19 | 28 | 24 | 32 | 28 | 36 | 32 | 39 | 35 | 42 |
| Delaware: saline | | 5 | 13 | 12 | 20 | 17 | 27 | 23 | 33 | 29 | 40 | 35 | 47 | 41 | 54 | 49 | 62 | 56 | 70 | 64 | 77 |
| New Jersey: fresh | | 0 | 18 | 7 | 35 | 17 | 52 | 28 | 67 | 39 | 83 | 52 | 98 | 65 | 114 | 77 | 130 | 90 | 144 | 102 | 154 |
| New Jersey: saline | | 6 | 27 | 21 | 48 | 37 | 68 | 53 | 82 | 68 | 96 | 82 | 109 | 95 | 121 | 108 | 133 | 119 | 143 | 130 | 152 |
| Pennsylvania | | 4 | 17 | 11 | 33 | 24 | 49 | 37 | 61 | 50 | 73 | 61 | 85 | 71 | 96 | 81 | 106 | 90 | 115 | 99 | 123 |
| Atlantic Coast of Del-Mar-Va Total | | 27 | 87 | 81 | 148 | 140 | 212 | 200 | 275 | 259 | 334 | 318 | 390 | 373 | 443 | 425 | 495 | 477 | 548 | 529 | 599 |
| Delaware | | 11 | 32 | 28 | 53 | 46 | 74 | 64 | 95 | 82 | 117 | 104 | 139 | 126 | 163 | 149 | 187 | 172 | 210 | 196 | 234 |
| Maryland | | 3 | 17 | 20 | 40 | 44 | 69 | 74 | 97 | 101 | 123 | 126 | 145 | 148 | 163 | 165 | 180 | 182 | 196 | 199 | 211 |
| Virginia | | 13 | 37 | 33 | 55 | 49 | 69 | 62 | 82 | 75 | 94 | 87 | 106 | 99 | 117 | 111 | 129 | 122 | 141 | 134 | 154 |
| Chesapeake Bay Total | | 102 | 466 | 441 | 906 | 791 | 1357 | 1193 | 1827 | 1587 | 2334 | 1973 | 2859 | 2448 | 3378 | 2962 | 3818 | 3446 | 4234 | 3865 | 4633 |
| Delaware | | 1 | 2 | 1 | 3 | 3 | 5 | 4 | 7 | 6 | 10 | 9 | 14 | 12 | 18 | 15 | 24 | 20 | 29 | 26 | 36 |
| Maryland | | 66 | 290 | 306 | 530 | 515 | 763 | 738 | 1007 | 952 | 1227 | 1141 | 1451 | 1352 | 1670 | 1572 | 1865 | 1778 | 2047 | 1966 | 2213 |
| fresh | | 9 | 35 | 33 | 70 | 63 | 115 | 106 | 167 | 152 | 212 | 192 | 263 | 243 | 325 | 307 | 394 | 377 | 466 | 449 | 533 |
| vulnerable | | 49 | 187 | 234 | 344 | 379 | 477 | 515 | 605 | 633 | 704 | 731 | 804 | 830 | 892 | 911 | 958 | 974 | 1011 | 1024 | 1058 |
| saline | | 8 | 68 | 39 | 117 | 74 | 171 | 118 | 235 | 167 | 311 | 218 | 385 | 280 | 454 | 354 | 513 | 427 | 570 | 492 | 623 |

Table C.1 Low and High Estimates of the Area of Land Close to Sea Level by Region (continued)

| Jurisdiction | Tidal | Meters above Spring High Water | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high |
| | | 0.5 | | 1.0 | | 1.5 | | 2.0 | | 2.5 | | 3.0 | | 3.5 | | 4.0 | | 4.5 | | 5.0 | |
| District of Columbia | | 2 | 3 | 3 | 4 | 4 | 6 | 5 | 7 | 7 | 9 | 9 | 11 | 11 | 13 | 13 | 15 | 14 | 16 | 16 | 18 |
| Virginia | | 34 | 172 | 131 | 369 | 268 | 583 | 445 | 805 | 622 | 1088 | 815 | 1383 | 1073 | 1677 | 1362 | 1915 | 1634 | 2141 | 1857 | 2366 |
| fresh | | 1 | 26 | 15 | 50 | 33 | 75 | 50 | 106 | 67 | 152 | 89 | 198 | 125 | 244 | 169 | 292 | 214 | 340 | 260 | 394 |
| vulnerable | | 3 | 8 | 7 | 17 | 14 | 26 | 22 | 35 | 30 | 40 | 37 | 44 | 42 | 48 | 46 | 51 | 50 | 53 | 52 | 55 |
| saline | | 30 | 138 | 108 | 302 | 222 | 482 | 373 | 665 | 525 | 896 | 689 | 1140 | 906 | 1385 | 1147 | 1573 | 1370 | 1748 | 1545 | 1916 |
| Virginia Beach Atlantic Coast | | 7 | 27 | 25 | 56 | 45 | 99 | 78 | 142 | 118 | 180 | 158 | 219 | 196 | 257 | 235 | 288 | 272 | 299 | 293 | 310 |
| Pamlico Albemarle Sounds | | 602 | 1004 | 1160 | 1492 | 1657 | 2024 | 2211 | 2573 | 2746 | 3080 | 3246 | 3601 | 3798 | 4215 | 4421 | 4760 | 4903 | 5144 | 5241 | 5412 |
| Atlantic Coast of NC | | 94 | 140 | 170 | 225 | 259 | 322 | 355 | 413 | 442 | 491 | 514 | 563 | 586 | 639 | 666 | 724 | 751 | 812 | 838 | 892 |
| Total NY to NC | | 918 | 2101 | 2181 | 3545 | 3457 | 5047 | 4860 | 6526 | 6228 | 7964 | 7523 | 9418 | 8946 | 10949 | 10475 | 12325 | 11831 | 13470 | 12956 | 14441 |
| Wetlands | Tidal | --------Cumulative (total) amount of Nontidal Wetlands below a given elevation--------- | | | | | | | | | | | | | | | | | | | |
| L.I. Sound and Peconic | 36 | 1 | 2 | 2 | 4 | 3 | 6 | 4 | 7 | 6 | 8 | 7 | 9 | 8 | 10 | 9 | 11 | 10 | 12 | 11 | 13 |
| South Shore Long Island | 104 | 1 | 4 | 4 | 7 | 6 | 9 | 8 | 10 | 9 | 11 | 11 | 12 | 11 | 13 | 12 | 13 | 13 | 14 | 14 | 15 |
| NY Harbor/ Raritan Bay Total | 68 | 0 | 3 | 2 | 6 | 4 | 8 | 6 | 9 | 7 | 10 | 9 | 11 | 9 | 12 | 10 | 13 | 11 | 14 | 12 | 16 |
| New York | 9 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| New Jersey | 59 | 0 | 2 | 2 | 5 | 3 | 7 | 5 | 7 | 6 | 8 | 7 | 9 | 8 | 10 | 9 | 11 | 9 | 12 | 10 | 13 |
| New Jersey Shore | 524 | 11 | 52 | 42 | 92 | 72 | 129 | 101 | 157 | 128 | 181 | 152 | 205 | 174 | 227 | 196 | 249 | 216 | 269 | 237 | 286 |
| Delaware Bay Total | 497 | 16 | 54 | 45 | 90 | 72 | 121 | 98 | 139 | 121 | 156 | 140 | 173 | 157 | 188 | 172 | 202 | 186 | 214 | 199 | 224 |
| New Jersey | 261 | 9 | 38 | 30 | 67 | 51 | 92 | 72 | 106 | 91 | 119 | 105 | 132 | 118 | 142 | 129 | 153 | 139 | 161 | 148 | 167 |
| Delaware | 236 | 7 | 16 | 15 | 23 | 20 | 29 | 26 | 33 | 31 | 37 | 35 | 41 | 39 | 46 | 43 | 49 | 47 | 53 | 51 | 57 |
| Delaware River Total | 216 | 12 | 41 | 33 | 64 | 49 | 85 | 65 | 93 | 80 | 101 | 90 | 108 | 97 | 115 | 103 | 122 | 109 | 127 | 116 | 133 |
| Delaware: fresh | 5 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Delaware: saline | 69 | 1 | 3 | 3 | 3 | 3 | 4 | 4 | 5 | 4 | 5 | 5 | 6 | 5 | 6 | 6 | 7 | 6 | 7 | 7 | 8 |
| New Jersey: fresh | 29 | 0 | 10 | 6 | 20 | 12 | 29 | 19 | 31 | 25 | 34 | 29 | 37 | 32 | 40 | 34 | 43 | 37 | 46 | 39 | 48 |
| New Jersey: saline | 108 | 10 | 25 | 22 | 35 | 30 | 44 | 37 | 47 | 44 | 50 | 47 | 52 | 50 | 55 | 52 | 57 | 54 | 59 | 56 | 62 |
| Pennsylvania | 6 | 1 | 2 | 1 | 4 | 3 | 6 | 4 | 8 | 6 | 9 | 7 | 10 | 8 | 11 | 9 | 12 | 9 | 12 | 10 | 12 |
| Atlantic Coast of Del-Mar-Va Total | 757 | 3 | 13 | 13 | 26 | 24 | 38 | 36 | 49 | 47 | 57 | 55 | 64 | 62 | 70 | 68 | 74 | 73 | 78 | 77 | 82 |

Table C.1 Low and High Estimates of the Area of Land Close to Sea Level by Region (continued)

| Jurisdiction | | Meters above Spring High Water | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high | low | high |
| | | 0.5 | | 1.0 | | 1.5 | | 2.0 | | 2.5 | | 3.0 | | 3.5 | | 4.0 | | 4.5 | | 5.0 | |
| Delaware | 41 | 2 | 5 | 4 | 7 | 7 | 10 | 9 | 12 | 11 | 14 | 13 | 16 | 15 | 17 | 16 | 18 | 18 | 20 | 19 | 21 |
| Maryland | 105 | 0 | 4 | 5 | 8 | 9 | 13 | 14 | 17 | 18 | 22 | 22 | 26 | 26 | 28 | 29 | 31 | 31 | 33 | 33 | 34 |
| Virginia | 611 | 1 | 5 | 4 | 10 | 9 | 16 | 13 | 19 | 18 | 21 | 20 | 23 | 22 | 24 | 23 | 25 | 24 | 26 | 25 | 27 |
| **Chesapeake Bay Total** | **1903** | **44** | **151** | **143** | **259** | **231** | **375** | **334** | **489** | **425** | **590** | **510** | **699** | **618** | **809** | **724** | **911** | **827** | **1008** | **920** | **1132** |
| Delaware | 7 | 1 | 2 | 2 | 3 | 2 | 4 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 8 | 7 | 9 | 8 | 11 | 10 | 13 |
| Maryland | 1011 | 29 | 88 | 92 | 137 | 136 | 194 | 189 | 244 | 231 | 282 | 267 | 329 | 315 | 377 | 361 | 420 | 404 | 458 | 441 | 497 |
| fresh | 161 | 2 | 9 | 7 | 18 | 14 | 28 | 23 | 38 | 32 | 48 | 42 | 62 | 57 | 79 | 74 | 99 | 94 | 119 | 114 | 142 |
| vulnerable | 741 | 26 | 69 | 79 | 101 | 110 | 137 | 147 | 166 | 170 | 182 | 188 | 206 | 213 | 228 | 232 | 242 | 245 | 251 | 253 | 259 |
| saline | 109 | 1 | 10 | 6 | 18 | 12 | 29 | 19 | 40 | 28 | 51 | 36 | 61 | 45 | 70 | 55 | 79 | 64 | 87 | 73 | 95 |
| District of Columbia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Virginia | 884 | 14 | 60 | 49 | 119 | 92 | 178 | 141 | 240 | 190 | 302 | 239 | 363 | 296 | 424 | 356 | 481 | 415 | 539 | 469 | 622 |
| fresh | 168 | 1 | 12 | 8 | 21 | 14 | 30 | 21 | 37 | 27 | 44 | 34 | 52 | 40 | 59 | 47 | 70 | 56 | 83 | 66 | 118 |
| vulnerable | 88 | 2 | 5 | 4 | 11 | 9 | 18 | 15 | 25 | 21 | 28 | 26 | 31 | 30 | 35 | 33 | 38 | 36 | 41 | 39 | 45 |
| saline | 628 | 12 | 43 | 37 | 87 | 69 | 129 | 106 | 178 | 142 | 230 | 179 | 280 | 227 | 330 | 276 | 373 | 324 | 415 | 364 | 458 |
| **Virginia Beach Atlantic Coast** | **124** | **6** | **21** | **20** | **37** | **33** | **47** | **42** | **57** | **52** | **66** | **61** | **73** | **69** | **81** | **76** | **88** | **84** | **92** | **89** | **96** |
| **Pamlico Albemarle Sounds** | **829** | **2083** | **2625** | **2772** | **3039** | **3130** | **3320** | **3401** | **3562** | **3640** | **3789** | **3852** | **3984** | **4045** | **4173** | **4235** | **4352** | **4409** | **4532** | **4592** | **4695** |
| **Atlantic Coast of North Carolina** | **443** | **197** | **255** | **275** | **315** | **335** | **374** | **393** | **429** | **448** | **481** | **495** | **525** | **538** | **568** | **583** | **616** | **632** | **666** | **680** | **710** |
| **Total NY to NC** | **5500** | **2374** | **3221** | **3351** | **3940** | **3959** | **4512** | **4487** | **5001** | **4963** | **5449** | **5381** | **5864** | **5788** | **6266** | **6189** | **6652** | **6571** | **7026** | **6948** | **7401** |
| | | Cumulative (total) amount of land below a given elevation | | | | | | | | | | | | | | | | | | | |
| Dry Land | | 918 | 2101 | 2181 | 3545 | 3457 | 5047 | 4860 | 6526 | 6228 | 7964 | 7523 | 9418 | 8946 | 10949 | 10475 | 12325 | 11831 | 13470 | 12956 | 14441 |
| Nontidal Wetlands | | 2374 | 3221 | 3351 | 3940 | 3959 | 4512 | 4487 | 5001 | 4963 | 5449 | 5381 | 5864 | 5788 | 6266 | 6189 | 6652 | 6571 | 7026 | 6948 | 7401 |
| All Land | 5500 | 8792 | 10822 | 11032 | 12985 | 12915 | 15059 | 14847 | 17027 | 16690 | 18913 | 18404 | 20782 | 20234 | 22715 | 22163 | 24476 | 23902 | 25996 | 25403 | 27342 |