Accounting for Growth

The population of the Chesapeake Bay region continues to grow, driving land use changes such as increases in developed land areas and decreases in agricultural and natural land cover. How will these changes affect future pollutant loads in the watershed? Using modeling tools, the Chesapeake Bay Program has generated growth projections through the year 2025, which will help jurisdictions (Delaware, District of Columbia, Maryland, New York, Pennsylvania, Virginia and West Virginia) and local partners plan for what is to come. In this context, accounting for growth really means accounting for changes in pollution loads from any source category (e.g. wastewater) due to population growth and associated land use change.

What is the projected growth of the Chesapeake Bay watershed?

The number of people living in the Chesapeake Bay watershed has grown by one million every decade. Between 2010 and 2025, the population will increase by an estimated two million people, or 11.5 percent. The human population isn't the only one growing—livestock numbers are also expected to increase by 13 percent between 2013 and 2025, largely due to growth in poultry and swine operations across the watershed.

What are the impacts of population growth?

Changes in population are accompanied by changes in land use and increased demands on wastewater systems, both sewer and septic. With projected population growth, Chesapeake Bay Program modeling tools show a corresponding decrease in agricultural and natural land cover between 2013 and 2025. Over the same period, the models project an increase of seven percent in developed land acres throughout the watershed. Changes in land cover and increased demand on wastewater systems will impact the amount of nutrient pollution that ends up in the Chesapeake Bay—leading to an estimated increase of four million pounds of nitrogen and 0.15 million pounds of phosphorus by 2025.

How does the Chesapeake Bay Program track growth?

The Bay Program uses its Chesapeake Bay Land Change Model (CBLCM), one of the models in the Bay Program suite, to analyze and forecast the effects of urban land use and population growth on sewer and septic systems, and nutrient loading. Population growth forecasts are based on:

- Current zoning.
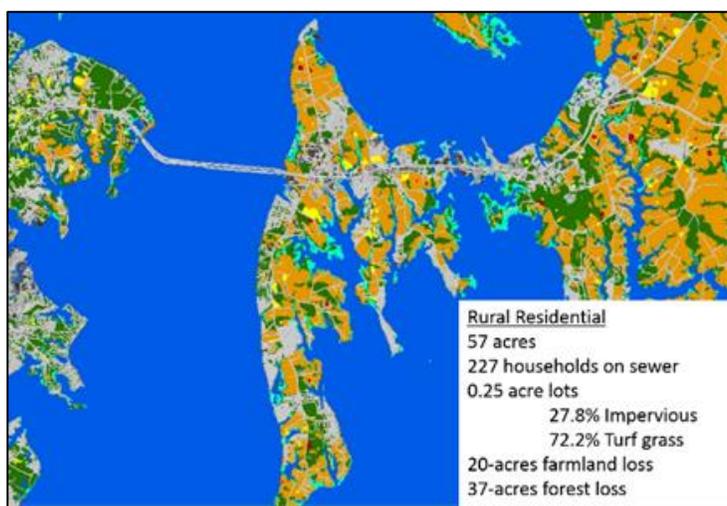- Reported changes from the U.S. Census Bureau in housing, population and migration.
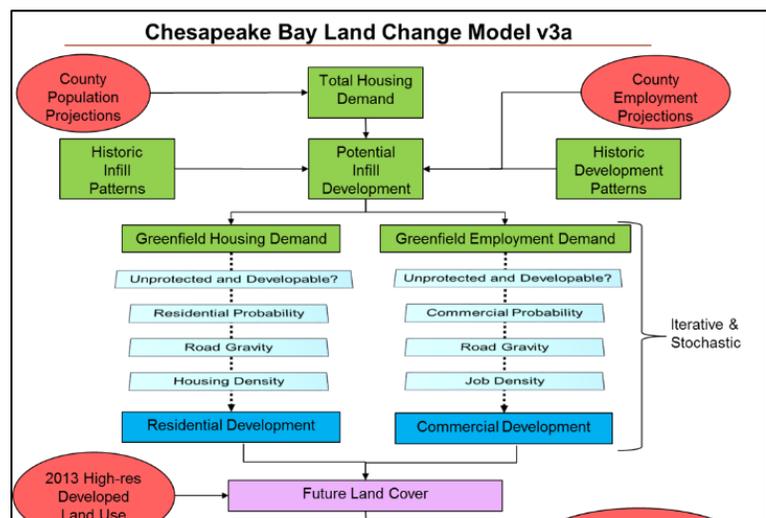
Flow chart explains the various elements that are included during a modeling run of the CBLCM.

- Sewer service areas.

- County-level population projections.

- CBLCM land cover trends (including the conversion of forests and farmland to development) that were derived from analysis of high-resolution land cover data and satellite imagery.

The CBLCM predicts estimated land use and wastewater impacts that are specific to each state, county and city in the watershed for a given future period. It can provide:

- Land cover predictions.

- Population change.

- Extent of areas with sewer and septic systems.

Rural Residential
57 acres
227 households on sewer
0.25 acre lots
    27.8% Impervious
    72.2% Turf grass
20-acres farmland loss
37-acres forest loss

CBLCM can predict the land cover changes in future time periods.

In turn, data from the CBLCM are input into the Phase 6 Watershed Model and the Estuary Model to analyze the pollution loading impacts that are likely to result from changing land use patterns and population growth.

How do the changes in the Phase 6 Model affect accounting for growth?

The Phase 6 Watershed Model has been updated to use high-resolution land cover data (one-meter by one-meter resolution), providing 900 times the amount of information that the previous model did. Due to its detailed resolution, this improvement will enable partners to prioritize and target restoration, conservation, education and public access efforts. Additional categories of land use data beyond these are included in the model. Accuracy will increase because of the addition of new inputs from the agricultural community, particularly the poultry industry, and improved and updated information on the application of fertilizer and manure. This upgraded data set will allow watershed implementation plan (WIP) writers, state officials and local governments to better understand and characterize the landscapes around them, enabling them to place conservation and restoration practices where they will have the maximum impact.

What are the implications for jurisdictions and local governments?

Jurisdictions and local partners will have the opportunity to review projections of future growth every two years. The high-resolution land use data will be updated every four years. The use of 2025 growth projections to track and account for growth in the Phase III WIPs has been approved by the Bay Program's Principals' Staff Committee. This means that the jurisdictions will use 2025 growth projections as their base conditions when creating their Phase III WIPs. The 2025 growth projections will be updated in future two-year milestones with the latest information and data from jurisdictions and local partners. Future growth projections will be updated every two years; in turn, jurisdictions will incorporate the updated projections into the next relevant round of two-year milestones.

View Results of the CBLCM at

http://chesapeake.usgs.gov/phase6/