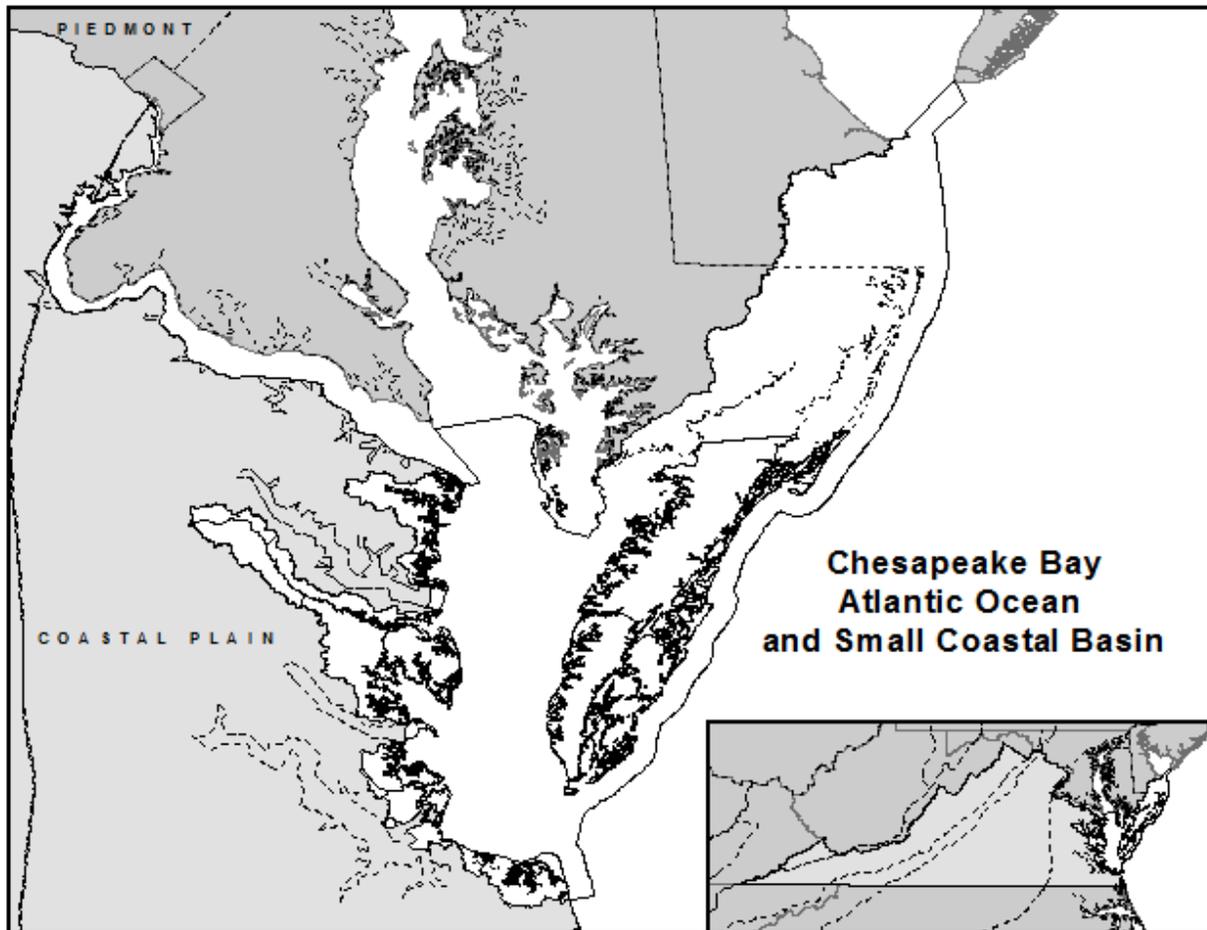


Chesapeake Bay-Small Coastal Basin Summary

For a full description of localities included in the water supply plans, as well as explanations of various terms and concepts used throughout this summary, please review the Introduction to the State Plan Appendices.

The Chesapeake Bay-Small Coastal Basin is located in the eastern part of Virginia, encompassing the small bays, river inlets, islands, and shoreline immediately surrounding the Chesapeake Bay, the southern portion of the Delmarva Peninsula, and the Chesapeake Bay itself. The Basin is defined by both hydrologic and political boundaries: the Potomac River, the Rappahannock River, the York River, the James River, and the Albemarle-Chowan River Basins border the small coastal basins to its west. The Eastern Shore portion is bordered on the west by the Chesapeake Bay, on the north by Maryland, and on the east by the Atlantic Ocean. The Basin covers 3,592 square miles, or approximately 8% of the Commonwealth's total land area.

The following ten counties and five cities are entirely or partially located within the Basin: counties of Accomack, Essex, Gloucester, King and Queen, Lancaster, Mathews, Middlesex, Northampton, Northumberland, and York; cities of Hampton, Newport News, Norfolk, Poquoson, and Virginia Beach. These jurisdictions are represented within five regional water supply plans (Middle Peninsula, Hampton Roads, Northern Neck, Accomack County and Towns, and Northampton County and Towns) and one local water supply plan (Town of Chincoteague).



Chesapeake Bay-Small Coastal Basin Physiographic Provinces

About 30% of the Chesapeake Bay-Small Coastal Basin is forested, while nearly 22% is in cropland and pasture. Approximately 24% is considered urban.

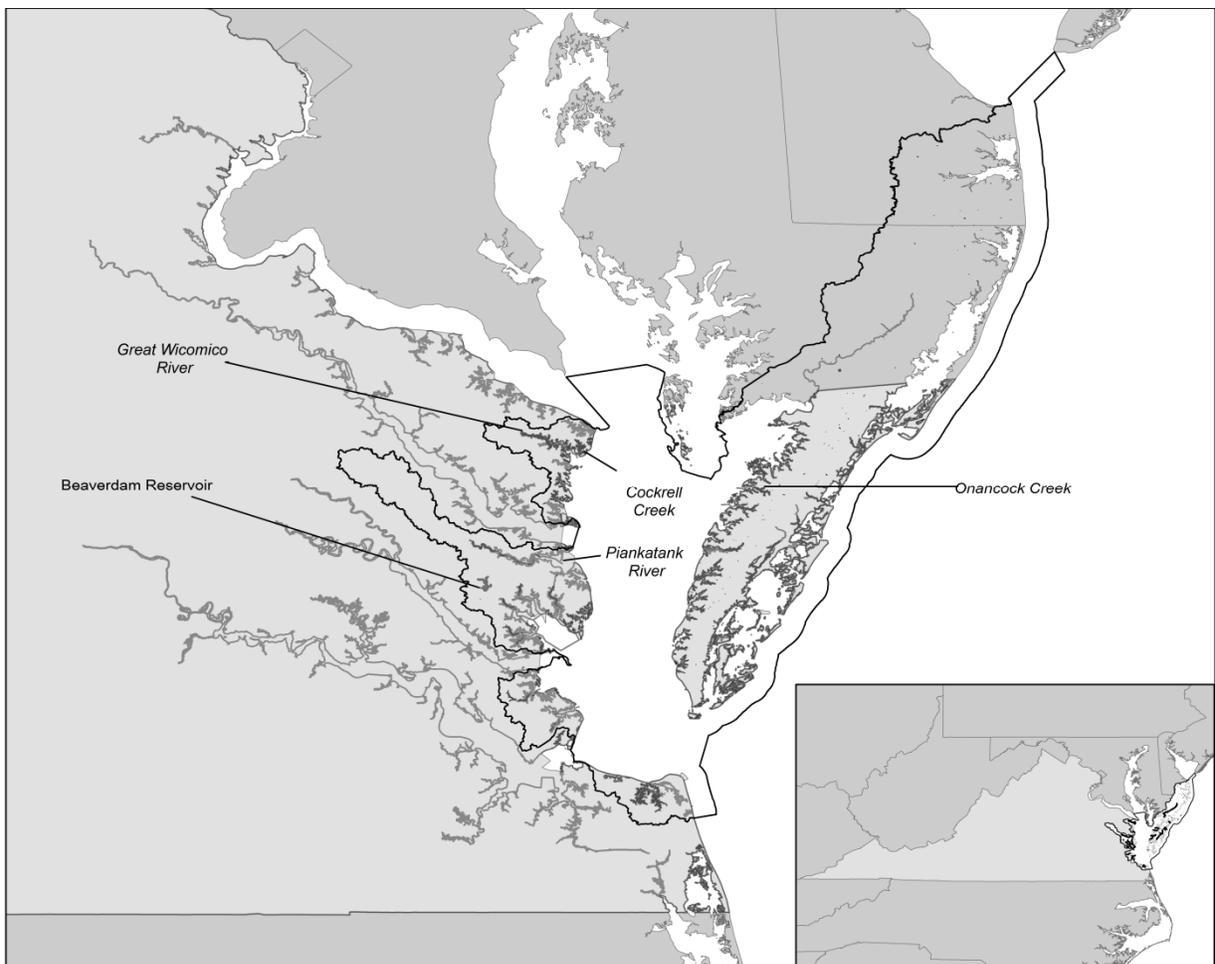
Tributaries in the Chesapeake Bay-Small Coastal Basin drain into the Chesapeake Bay or the Atlantic Ocean. Major tributaries flowing into the Chesapeake Bay from the western shore are the Great Wicomico River, Piankatank River, Fleets Bay, Mobjack Bay including the East, North, Ware, and Severn Rivers, Poquoson River, Back River, and Lynnhaven River. Tributaries in the Eastern Shore portion that drain into the Bay include the Pocomoke River, Onancock, Pungoteague, Occohannock, and Nassawadox Creeks. Machipongo River, Assawoman Creek, Parker Creek, Folly Creek, and Finney Creek drain east, directly into the Atlantic Ocean.

The Chesapeake Bay-Small Coastal Basin is divided into seven USGS hydrologic units as follows: HUC 02060009 – Pocomoke; HUC 02060010 – Chincoteague; HUC 02080101 – Lower Chesapeake Bay; HUC 02080102 – Great Wicomico-Piankatank; HUC 02080108 – Lower Lynnhaven-Poquoson; HUC

02080109 – Western Lower Delmarva; and HUC 02080110 – Tangier. The seven hydrologic units are further divided into 24 water bodies or watersheds and 73 6th order sub-watersheds.

Existing Water Sources

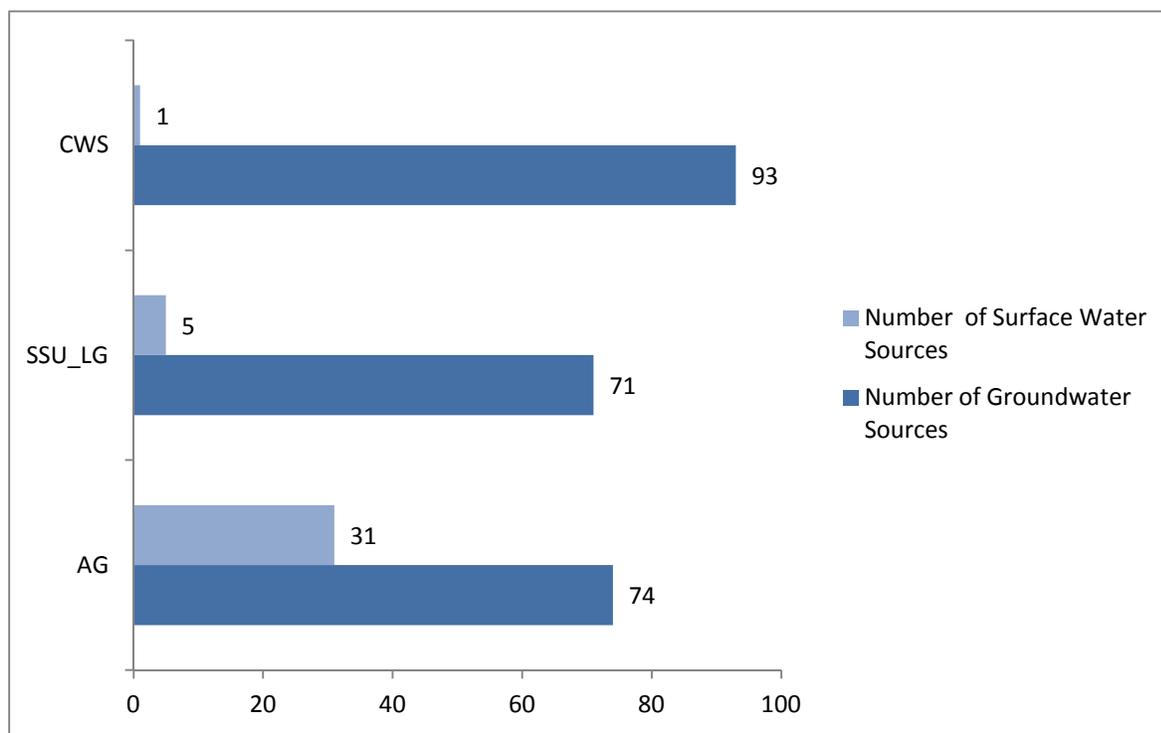
Water sources utilized in the Basin include stream intakes, reservoirs, private ponds, and groundwater wells. Surface water sources account for 37 withdrawals. Additionally, there are 238 groundwater withdrawals currently identified in the Chesapeake Bay-Small Coastal Basin. One municipal CWS uses source water from the Beaverdam Reservoir. Stream intakes used in the Basin include those on the Great Wicomico River, Piankatank River, Cockrell Creek, and Onancock Creek. Ponds, lakes, and groundwater wells on private property are used for irrigation on farms and golf courses.



Chesapeake Bay-Small Coastal Basin Major Reservoir and Stream Sources

Reported groundwater sources outnumber surface water withdrawals in all use types. The number of groundwater sources for the SSU_SM use type is unknown and, therefore, is not included in the figure

below. As estimated for the year 2010, approximately 114,129 people in the Basin use private groundwater wells for residential water supply.



Chesapeake Bay-Small Coastal Basin Source Type by User Type

Nontraditional water sources, such as water reclamation and reuse, desalination, and interconnection are not commonly utilized by localities in the Commonwealth. However, there are a few localities taking advantage of these options in this Basin. The first permitted industrial water reuse project in Virginia was a public-private partnership between Hampton Roads Sanitation District (HRSD) and Giant Industries, the former York River Western Refinery that was endorsed by Newport News Waterworks. The HRSD York River Treatment Plant began delivering 500,000 gallons a day of treated wastewater to the adjacent refinery in July 2002. Prior to closure of the refinery, the project received several awards, including the Water Reuse Association’s 2003 “Outstanding Project of the Year,” and the American Council of Engineering Companies of North Carolina’s 2004 “Honors Award for Engineering Excellence.” HRSD funded the \$3 Million York River project using a 20-year, low-interest loan from the Virginia Water Facilities Revolving Fund. HRSD also provides 14 million gallons per day (mgd) of effluent to the closed-loop heating and cooling systems of Dam Neck Naval Annex. A 66-inch diameter HRSD line through the Dam Neck Naval Annex transported between 32 to 40 mgd of effluent into the Atlantic Ocean. Following ribbon cutting in October 2008, the Navy began reusing 14 mgd of effluent water as a single pass heat sink, providing more efficient service for about the same cost. HRSD continues to pursue markets for water reuse. HRSD evaluates potential water reuse projects on a case-by-case basis in order to reduce

long-term demand. Water reuse projects are also implemented by the localities of Hampton Roads. For example, the City of Virginia Beach has a policy within the Comprehensive Plan to encourage city golf courses to maximize use of recycled water for irrigation instead of groundwater. The plan also seeks full Audubon certification for City golf courses that use recycled water, as a means to encourage private golf courses to do the same.

Transfers

Water withdrawn in the Basin may be used by the withdrawing user, or it may be transferred to another user. The transfer of water within and between river basins is a demand management practice that can address water supply and/or water quality needs by moving water from a basin or sub-basin with surplus supply to a basin or sub-basin with a supply deficit. Most often this practice of transferring water across sub-basin boundaries within a river basin - intrabasin transfers - occurs within a single county, but they can occur across county lines. Water movement that occurs when water is withdrawn from one major basin and transferred to a user in another major basin is called an interbasin transfer. Interbasin transfers of water are less common in Virginia.

The following table lists the Chesapeake Bay-Small Coastal intrabasin transfers between water provides and the entities to which they sell water (water purchases).

User Type	Water Purchaser and System(s)	Water Provider
CWS	Balford Langley Bolling Family Housing	Newport News Waterworks
CWS	U. S. Air Force – Langley	Newport News Waterworks

Chesapeake Bay-Small Coastal Intrabasin Transfers

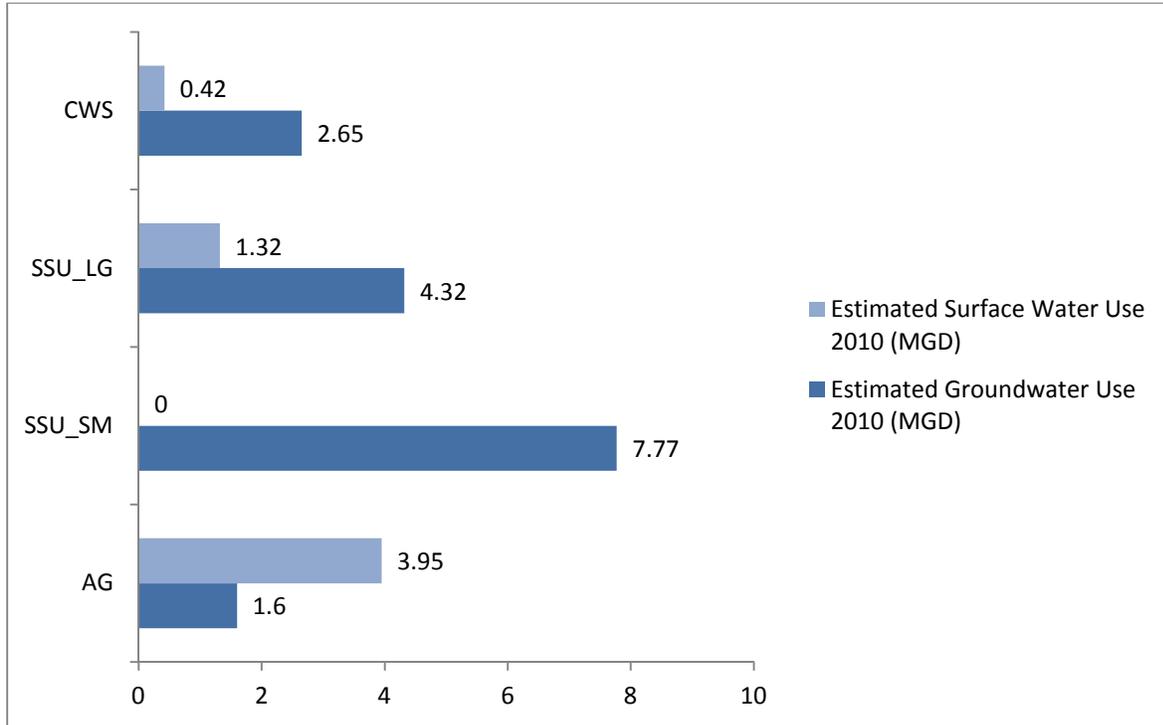
Interbasin transfers reported in the Chesapeake Bay-Small Coastal Basin are found in the table below.

User Type	Water Purchaser and System(s)	Water Provider
CWS	City of Virginia Beach	U. S. Army Corps of Engineers
CWS	U.S. Navy (Little Creek Amphibious Base and Oceana Naval Air Station) U.S. Army (Fort Story)	City of Norfolk

Chesapeake Bay-Small Coastal Interbasin Transfers

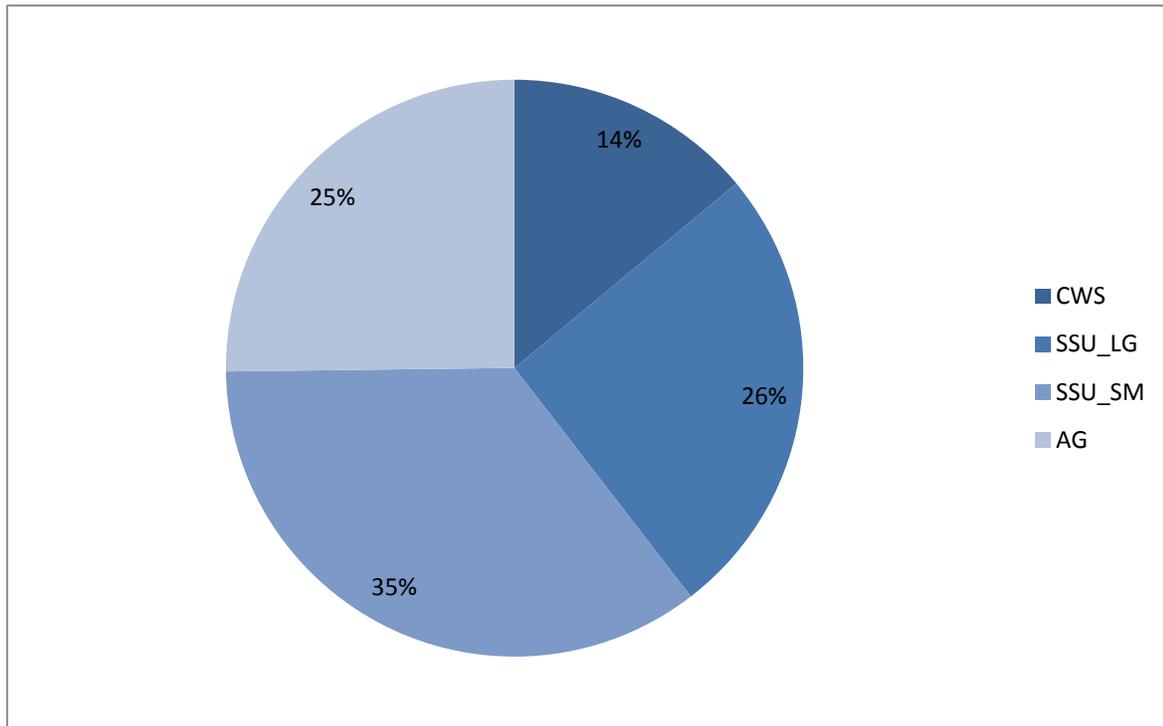
Existing Water Use

The total estimated water use provided in the six water supply plans is summarized in the figure below. The total estimated water use is 22 MGD, with approximately six MGD of surface water use and 16 MGD of groundwater use.



Chesapeake Bay-Small Coastal Basin Estimated Use by Source and Type

SSU_SM account for 35% of the 2010 estimated use followed by SSU_LG (26%) and AG (25%). CWS use accounts for 14% of estimated use.

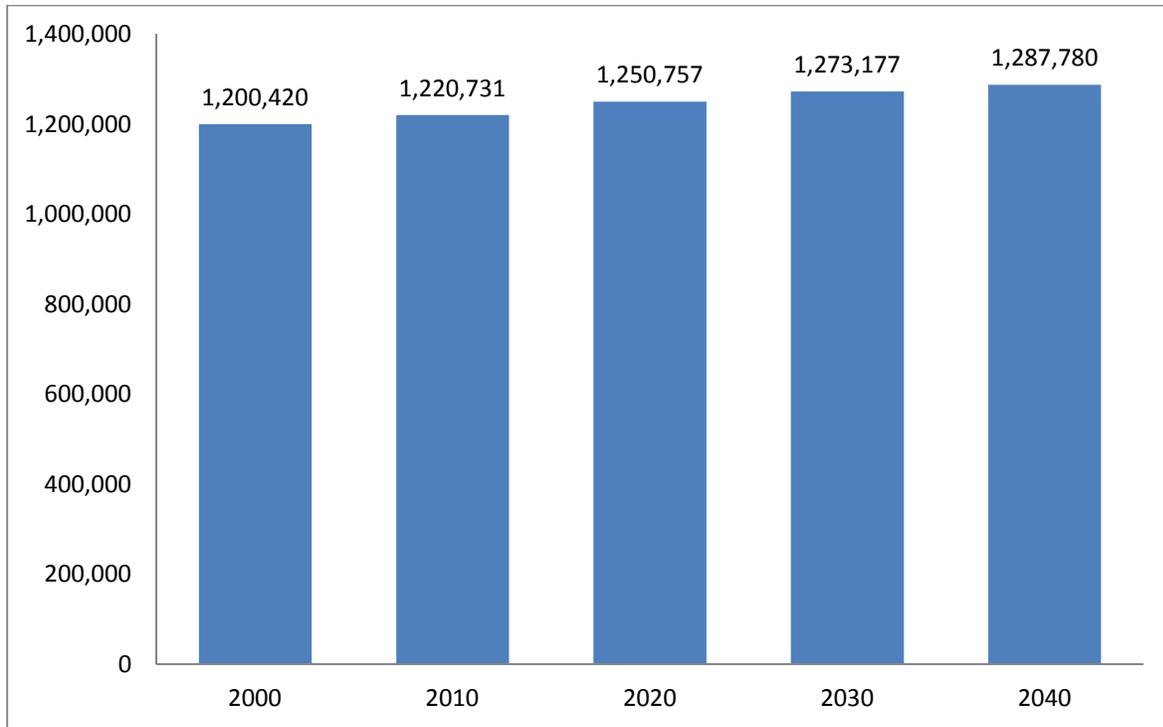


Chesapeake Bay-Small Coastal Basin Percentage of 2010 Estimated Use by User Type

CWS reported their water use disaggregated into categories of use appropriate for the system. Categories commonly used included Residential, Commercial/Institutional/Light Industrial (CIL), Heavy Industrial, Military, Unaccounted for Water Losses, Production Processes, and Sales to other CWS. In addition, some CWS chose to include a category for “Other” use. Many smaller CWS did not report disaggregated use. No assumption on disaggregated use was made for these systems; they are not included in this chart. The majority of water used by CWS is for residential supply.

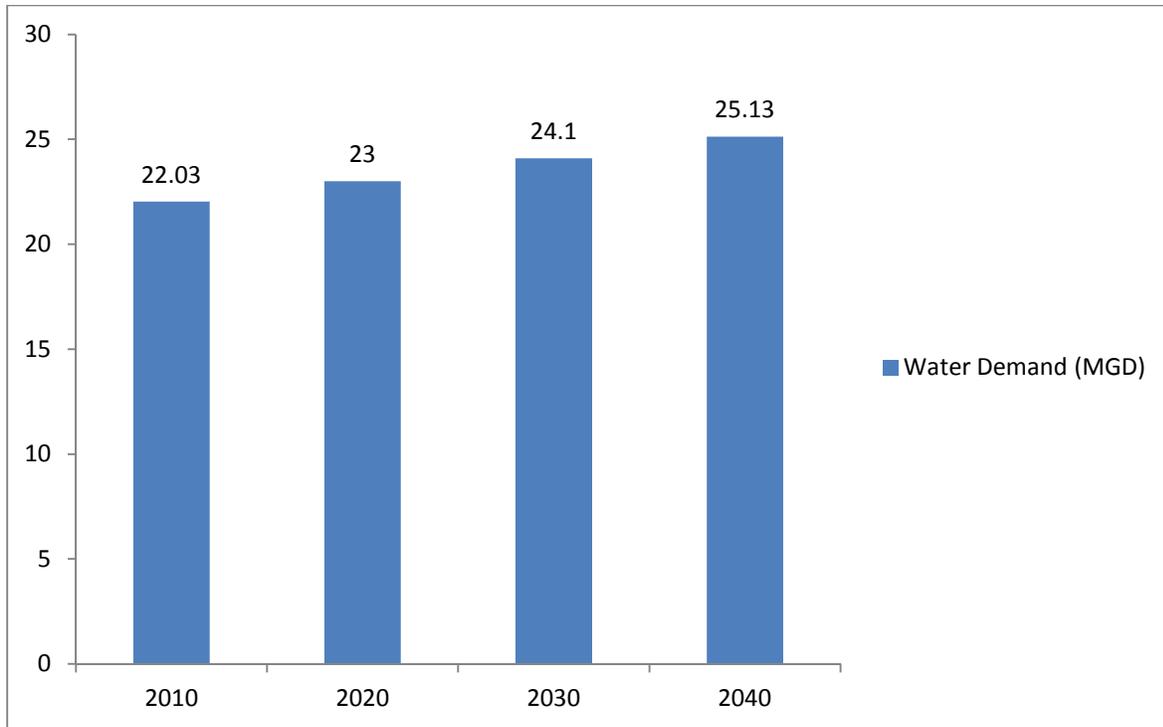
Projected Water Demand

The projected population of the localities with at least a portion of their area in the Chesapeake Bay-Small Coastal Basin is displayed in the figure below. Population data is obtained from the Virginia Employment Commission’s population estimates, which rely on data produced by the United States Census Bureau. The overall population of the localities is projected to increase through the year 2040. By the year 2040 the estimated basin-wide population is projected at 1,287,780. The percent change in population from the years 2000 through 2040 is estimated at 5.5%.



Chesapeake Bay-Small Coastal Basin Projected Population

A 30- to 50-year projection of future water demand is required by the WSP Regulation. Thirty years is the period of time common to all plans, so data is analyzed here for the timeframe of 2010 through 2040. The total projected water demand in the Chesapeake Bay-Small Coastal Basin as reported in the water supply plans is estimated to increase from approximately 22 MGD to approximately 25 MGD in 2040. The percent change in water use during the 30-year timeframe is estimated at 14.1%.



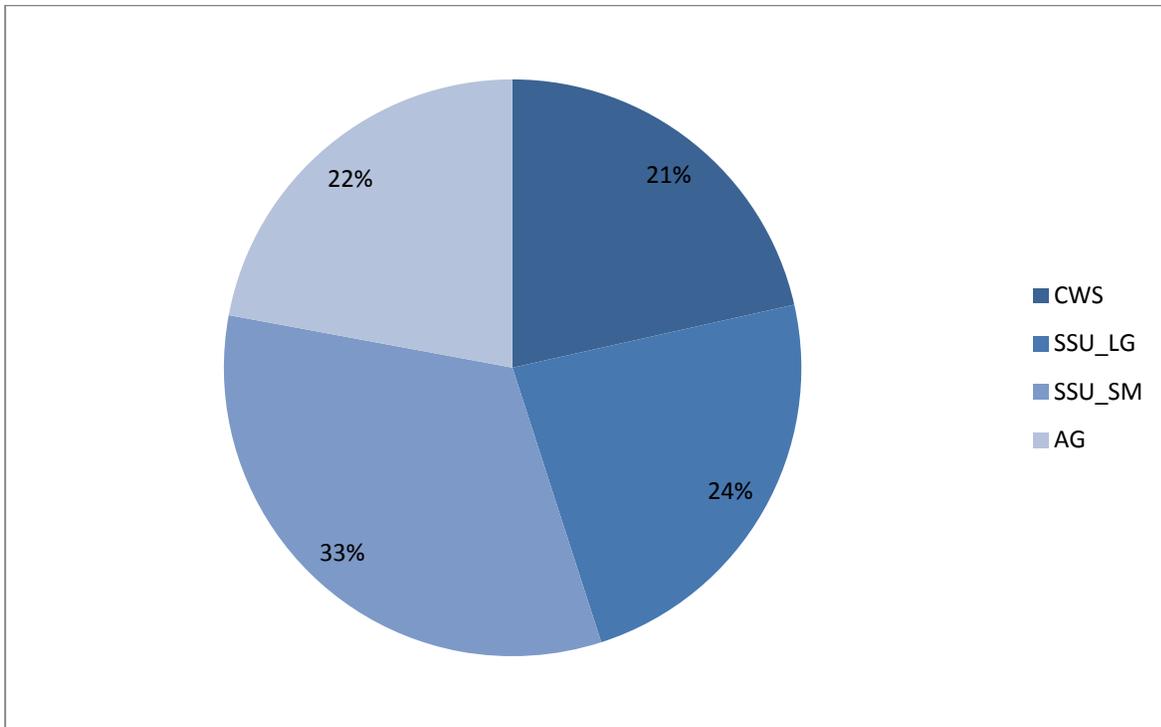
Chesapeake Bay-Small Coastal Basin Projected Water Demand

As depicted in the following table, CWS shows the greatest percentage of change (75.7%) in water demand over the 30-year planning period followed by SSU_SM (6.3%) and SSU_LG (5.10%). Agricultural demand is predicted to remain static over the thirty-year planning period.

User Type	Reported Use 2010 MGD	Projected Use 2020 MGD	Projected Use 2030 MGD	Projected Use 2040 MGD	Percent Change 2010-2040
CWS	3.07	3.85	4.6	5.4	75.70%
SSU_LG	5.64	5.73	5.8	5.92	5.10%
SSU_SM	7.77	7.94	8.1	8.27	6.30%
AG	5.55	5.55	5.5	5.55	0.00%

Chesapeake Bay-Small Coastal Basin Projected Water Demand by User Type (2010-2040)

In the year 2040, the projected water demand by user type in the Chesapeake Bay-Small Coastal Basin is similar to the 2010 use in that SSU_SM are still projected to use the greatest percentage of water followed by SSU_LG, AG, and CWS.



Chesapeake Bay-Small Coastal Basin Percentage of 2040 Projected Demand by User Type

Statement of Need and Alternative Water Sources

The following review of future water needs is obtained from the six water supply plans represented in the Chesapeake Bay-Small Coastal Basin. The information is presented for all those localities with at least a portion of land area located within the Chesapeake Bay-Small Coastal River Basin. The following lists the projected deficits in the Basin.

Accomack County Regional Water Supply Plan

Accomack County and the towns of Accomac, Belle Haven, Bloxom, Hallwood, Keller, Melfa, Onancock, Onley, Painter, Parksley, Saxis, Tangier, and Wachapreague

Existing sources are anticipated to meet the current and projected demand in the planning period. No additional sources were examined; however, there is mention of the use of the Columbia aquifer over the confined Yorktown-Eastover aquifer for all withdrawals, including some for public water supply, as a potential alternative source.

Town of Chincoteague Water Supply Plan

Town of Chincoteague's CWS may experience a summertime water deficit of approximately 0.10 MGD in 2015, based on the projected average daily demands in the summer months as compared to the system's VDH permitted capacity. Alternatives listed in the Town's Water Master Plan include development of up to three new wells in the town's easement area at NASA, the purchase of water from NASA or another

mainland source, and construction of a desalination facility to treat a well drilled on the Island. The plan describes short-term improvements to reduce water loss, improve efficiency, and increase storage capacity.

Hampton Roads Regional Water Supply Plan

Gloucester County; York County; Cities of Hampton, Newport News, Norfolk, Poquoson, and Virginia Beach

Demand is expected to increase as population in the region continues to grow; however, the projected supply is anticipated to meet projected demand for the region through 2050. There is potential for demand to exceed supply by 2040 in the York-James Peninsula sub-region as the projections are within a 10% margin of error and alteration of the assumptions could result in revised projections. Alternatives considered to meet the potential need in the Peninsula sub-region include additional surface water storage, additional groundwater withdrawals, desalination, aquifer storage and recovery, interconnection, reuse, and system optimization.

Middle Peninsula Regional Water Supply Plan

Essex County and the Town of Tappahannock; Middlesex County and the Town of Urbanna; King and Queen County; Mathews County

Existing sources appear adequate to meet current and projected demands through the planning period.

Northampton County Water Supply Plan

Northampton County and the Towns of Belle Haven, Cape Charles, Cheriton, Eastville, Exmore, and Nassawadox

Existing sources will provide adequate water supply through 2040. No additional sources were examined; however, there is mention of the use of the Columbia aquifer over the confined Yorktown-Eastover aquifer for all withdrawals, including some for public water supply, as a potential alternative source.

Northern Neck Regional Water Supply Plan

Lancaster County and the Towns of Irvington, Kilmarnock, and White Stone; Northumberland County
Regional water supply appears to be adequate to meet demand through the planning period.

Locality	Estimated Year of Deficit	Estimated Deficit Amount (MGD)
Town of Chincoteague	2015	0.10

Chesapeake Bay-Small Coastal Basin Projected Deficits