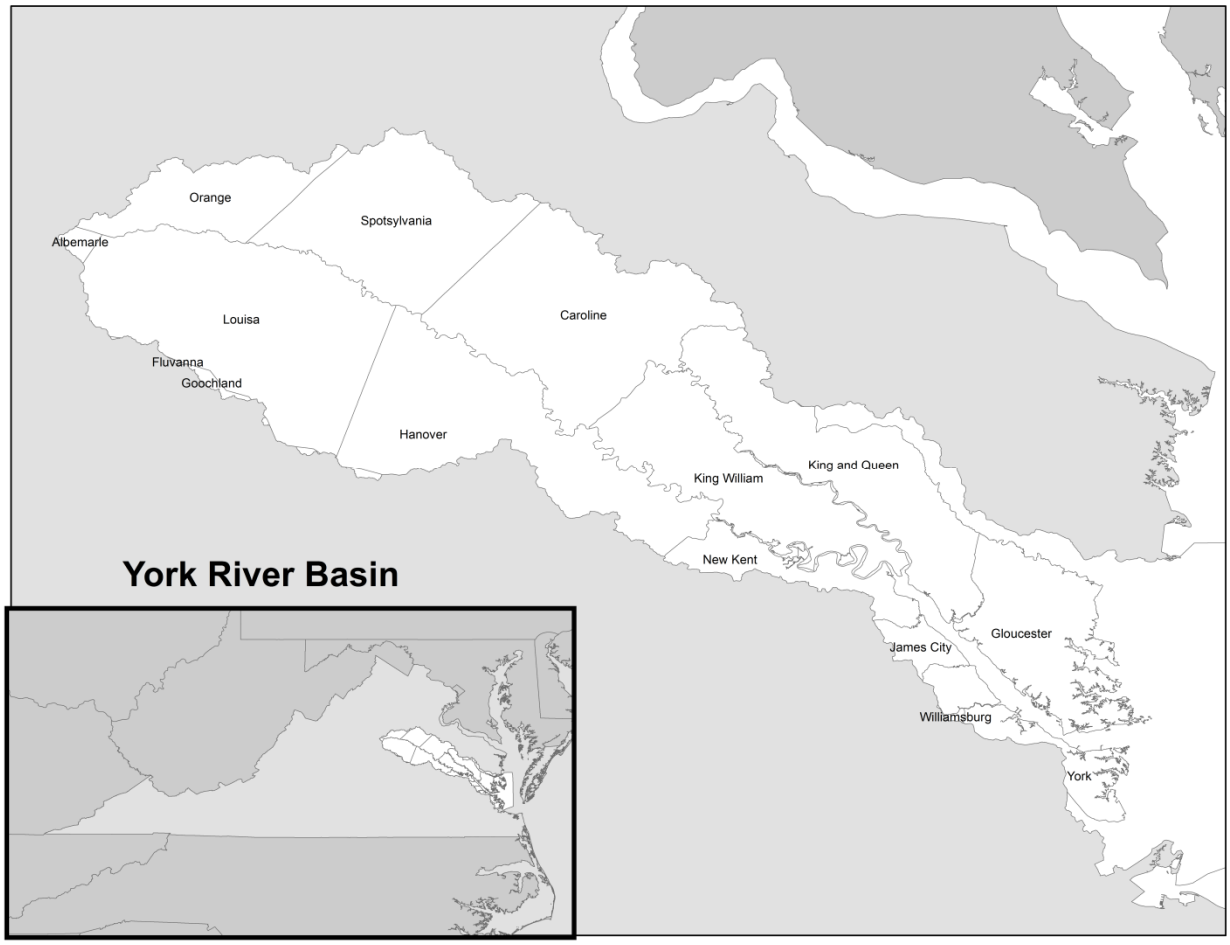
York River Basin Summary

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.

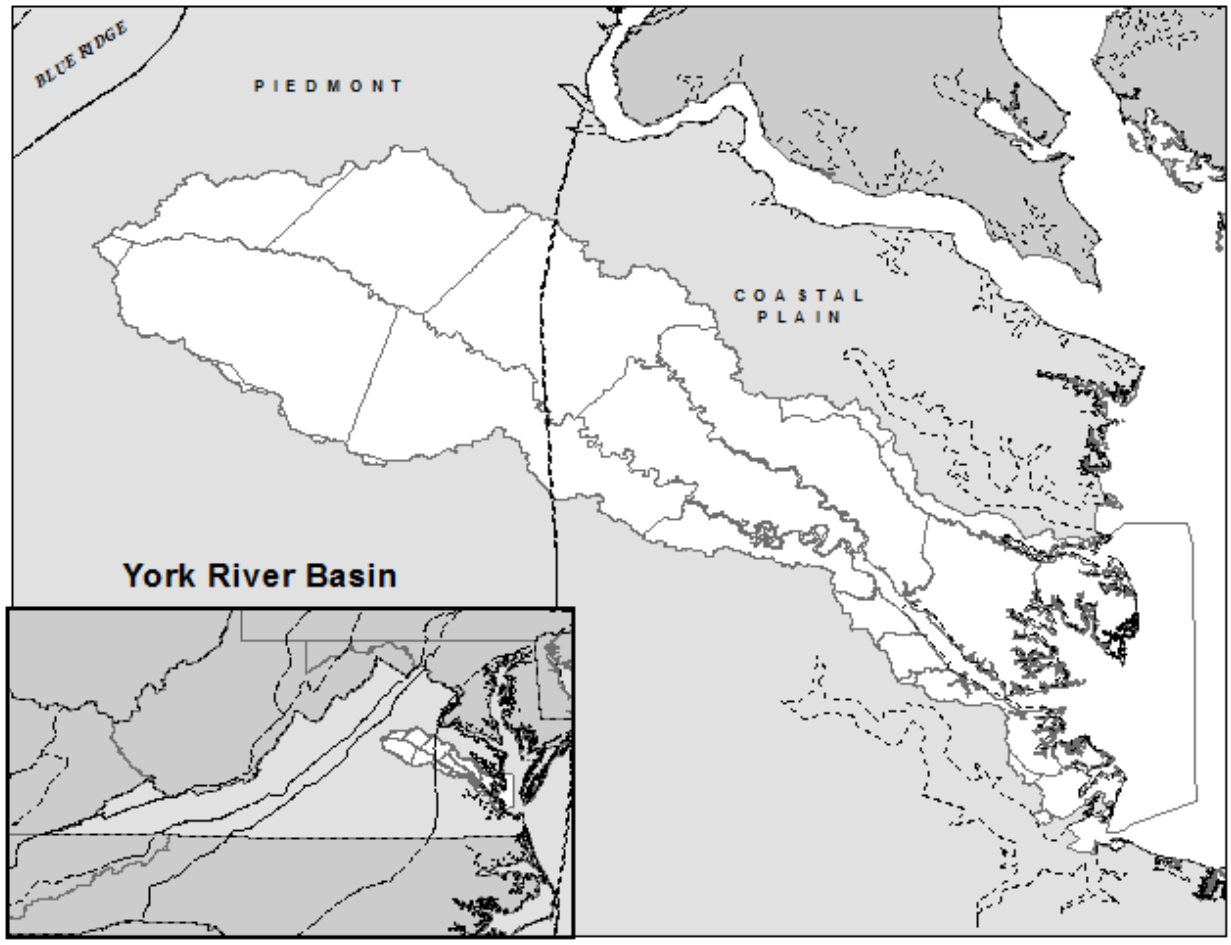
The York River Basin lies in the central and eastern section of Virginia and covers 2,674 square miles or 6% of the Commonwealth's total area. The Basin is bordered by the Rappahannock River Basin to the north, the James River Basin to the south and west, and the Chesapeake Bay-Small Coastal Basin to the east. The headwaters of the York River begin in Orange County and flow in a southeasterly direction for approximately 220 miles to its mouth at the Chesapeake Bay. The Basin's width varies from five miles at the mouth to 40 miles at its headwaters.

The following fourteen counties and one city are entirely or partially located within the Basin: Counties of Albemarle, Caroline, Fluvanna, Gloucester, Goochland, Hanover, James City, King and Queen, King William, Louisa, New Kent, Orange, Spotsylvania, and York; City of Williamsburg. These jurisdictions are represented within ten regional water supply plans (Hampton Roads, Hanover County and Town, Spotsylvania County and the City of Fredericksburg, Louisa County and Towns, Caroline County and Town, Orange County and Towns, Middle Peninsula, Goochland-Henrico-Cumberland-Powhatan, Albemarle County-Scottsville-Charlottesville, and Fluvanna County and Town) and one local water supply plan (New Kent County).



York River Basin Localities

The Basin is comprised of the York River and its two major tributaries, the Pamunkey and the Mattaponi Rivers. The York River itself is only about 30 miles in length. The Pamunkey River's major tributaries are the North and South Anna Rivers and the Little River, while the major Mattaponi tributaries are the Matta, Po, and Ni Rivers. Lying in the Piedmont and Coastal Plain physiographic provinces, the Basin's topography is characterized by slightly rolling hills at the headwaters or extreme western portion, to gently sloping hills and flat farmland near its mouth. Tributaries in the central Piedmont exhibit moderate and near constant profiles. Their flat slope largely characterizes streams in the Coastal Plain.



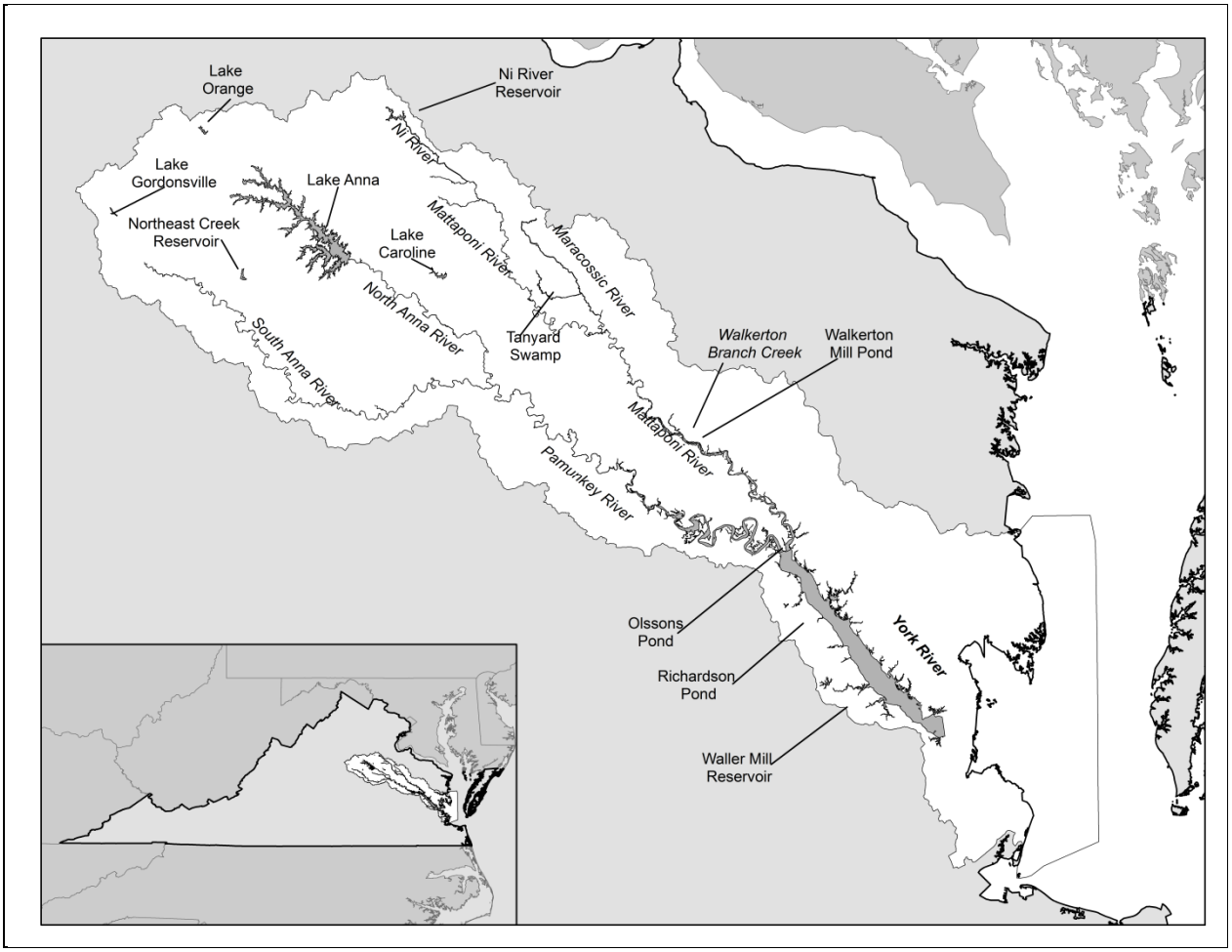
York River Basin Physiographic Provinces

Approximately 65% of the Basin's land area is forest, farmland, and pasture account for approximately 20%, and approximately 10% of the Basin land area is urban. The York River Basin is divided into three USGS hydrologic units: HUC 02080105 – Mattaponi; HUC 02080106 - Pamunkey and HUC 02080107 - York. The three hydrologic units are further divided into 27 water bodies or watersheds and 69 6th order sub-watersheds.

Existing Water Sources

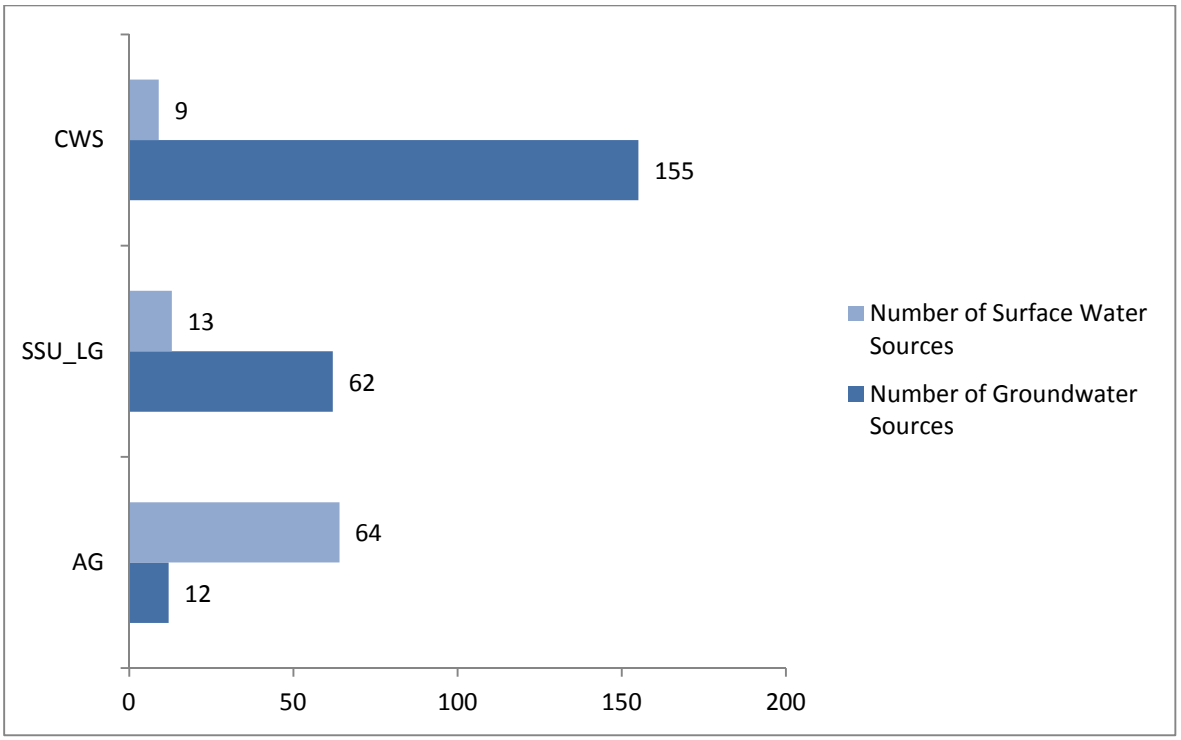
Water sources utilized in the Basin include stream intakes, reservoirs, private ponds, and groundwater wells. Surface water sources (stream intakes, reservoirs, private ponds) account for 86 withdrawals. Additionally, there are 229 groundwater withdrawals currently identified in the York River Basin. Source water reservoirs used in the Basin include Lake Anna, Lake Caroline, Beaverdam Reservoir, Northeast Creek Reservoir, Ni River Reservoir, Waller Mill Reservoir, Lake Gordonsville, Lake Orange, Richardson Pond, Walkerton Mill Pond, Glenwood Toddsberry Pond, Ruffens Pond, Bowlers Mill Reservoir, Olssons Pond, and the Gordonsville Quarry. Stream intakes used in the Basin include Lake Anna, Tanyard

Branch, Rappahannock River, Ni River, York River, Pamunkey River, Mattaponi River, North Anna River, Maracossic River, Dicks Creek, Courthouse Creek, Glenwood Chapel Creek, Walkerton Branch Creek, and Garnett's Mill Stream. Ponds and lakes on private property are used for irrigation on farms and golf courses in the Basin.



York River Basin Major Reservoir and Stream Sources

Reported groundwater sources outnumber surface water withdrawals in all use types except agriculture. 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 226,625 people in the Basin use groundwater wells for residential water supply.



York River Basin Source Type by User Type

Nontraditional water sources, such as water reclamation and reuse, are generated by New Kent County's Parham Landing Waste Water Treatment Plant (WTP). The WTP is permitted to generate and distribute up to 2 MGD of reclaimed water to non-municipal facilities for bulk irrigation reuse and dust suppression and irrigation.

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 intrabasin transfers between water providers and the entities to which they sell water (water purchaser).

User Type	Water Purchaser and System(s)	Water Provider
CWS	Town of Louisa	Louisa County WA
CWS	Town of Mineral	Louisa County WA
CWS	Aqua VA - Queens Lake	City of Williamsburg and York County

York River Basin Intrabasin Water Transfers

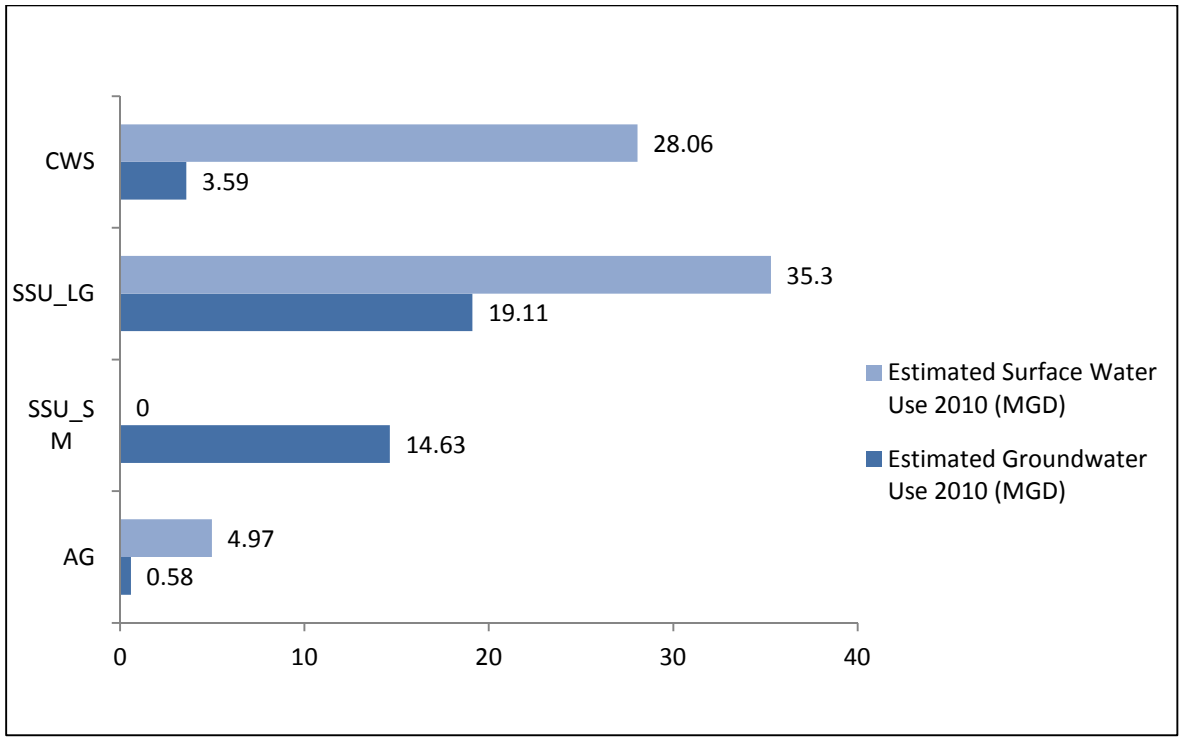
The following table lists interbasin transfers between water providers and the entities to which they sell water (water purchaser).

User Type	Water Purchaser and System(s)	Water Provider
CWS	Mountain Lake Company and Aqua Virginia (York Terrace, Nelson Park, Carver Gardens)	Newport News Waterworks and York County
CWS	Yorktown Naval Weapons Station - Cheatham Annex Naval Supply Center	Newport News Waterworks
CWS	Hanover Utilities - Overhill Estates-Holly Farms	Henrico County
CWS	Aqua VA - Holly Ridge	Henrico County
CWS	Town of Gordonsville	Rapidan Service Authority
CWS	Aqua VA - Country Club Estates	Spotsylvania County

York River Basin Interbasin Transfers

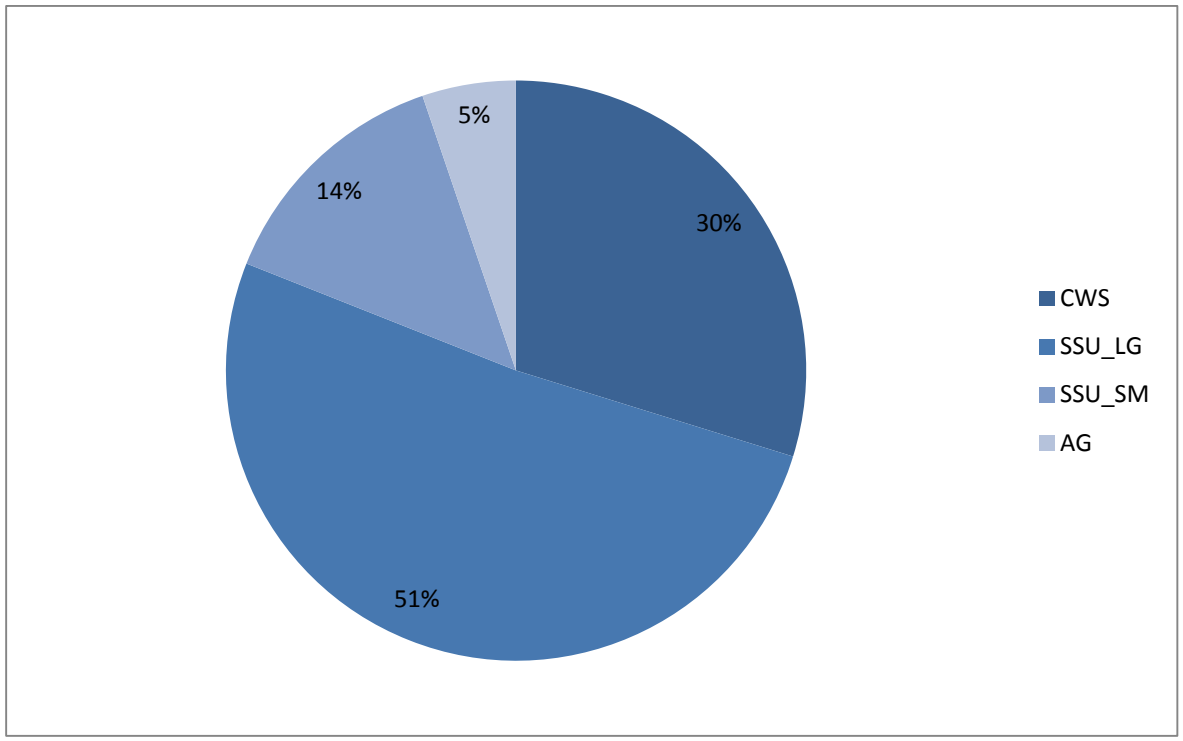
Existing Water Use

The total estimated water use provided in the water supply plans is summarized in the following figure. The total estimated water use is approximately 106 MGD with approximately 69 MGD of surface water use and 38 MGD of groundwater use.



York River Basin Estimated Use by Source and Type

SSU_LG use an estimated 51% of the total water in the Basin followed by CWS (30%), and SSU_SM (14%). AG use is the smallest at 5%.

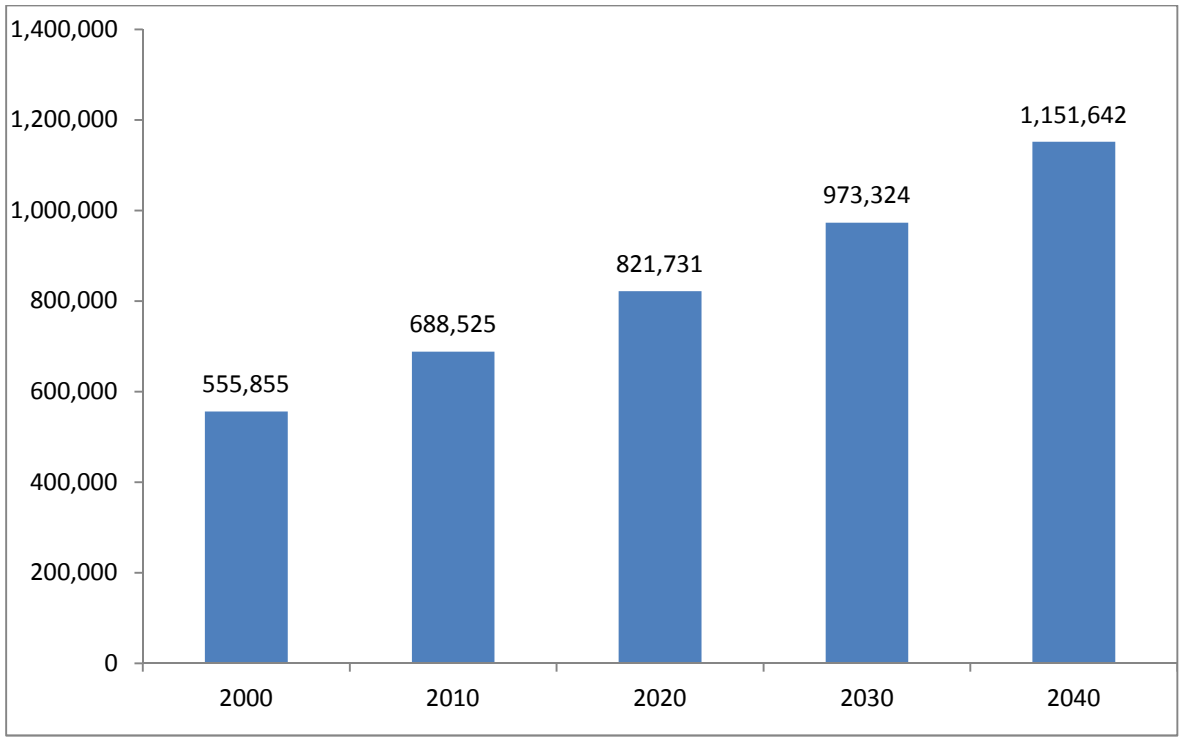


York River Basin Percentage of 2010 Estimated Use by User Type

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 as required. No assumption of 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

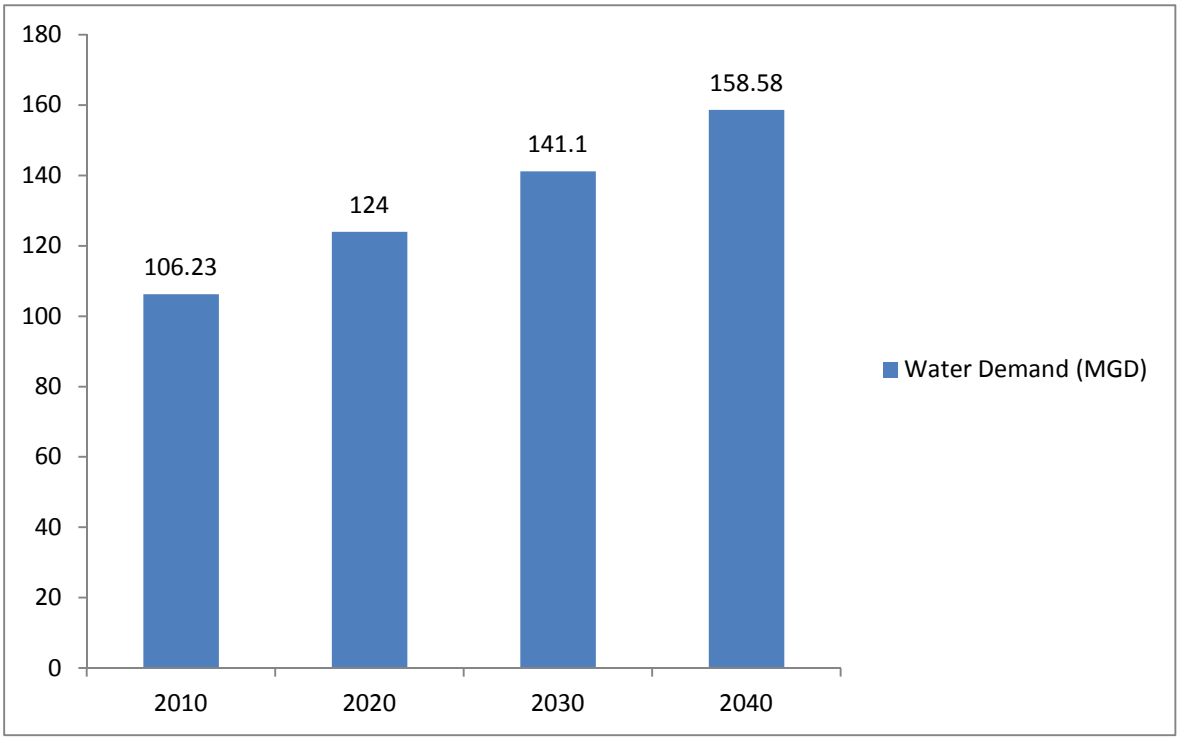
The projected population of the localities with at least a portion of their area in the York River Basin is displayed in the following figure. Population data is obtained from the Virginia Employment Commission's population estimates which rely on data produced by the United States Census Bureau. The 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 1,151,642. The percent change in population from the years 2000 through 2040 is estimated at 67.3%.



York River 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 York River Basin, as reported in the regional water supply plans,

is estimated to increase from approximately 106 MGD to 159 MGD in 2040. The percent change in water use during the 30-year timeframe is estimated at 49.9%.



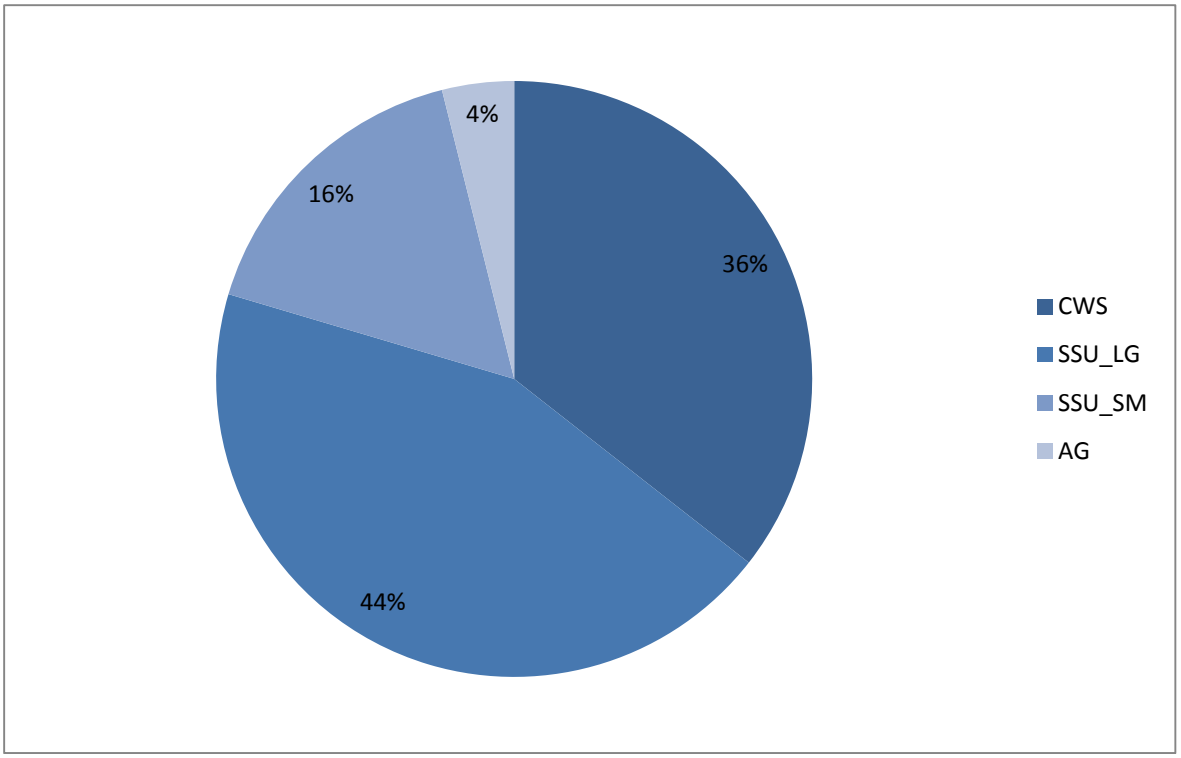
York River Basin Projected Water Demand

As depicted in the following table, CWS use shows the largest percent change (79.5%) in water demand over the 30-year period followed closely by SSU_SM (79%), SSU_LG (28.3%), and AG (11.4%).

User Type	Reported Use 2010 MGD	Projected Use 2020 MGD	Projected Use 2030 MGD	Projected Use 2040 MGD	Percent Change (2010-2040)
CWS	31.65	39.90	48.2	56.41	79.5%
SSU_LG	54.41	59.54	64.7	69.81	28.30%
SSU_SM	14.63	18.48	22.3	26.19	79.0%
AG	5.55	5.76	6	6.18	11.4%

York River Basin Projected Water Demand by User Type (2010-2040)

In 2040, the projected demand by user type in the York River Basin is similar to the 2010 use in that SSU_LG are projected to use the greatest percentage of water followed by CWS, SSU_SM, and AG.



York River 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 ten regional and one local water supply plans represented in the York River Basin. The information is presented below for all those localities with at least a portion of land area located within the York River Basin. The following lists the projected deficits in the Basin.

Albemarle County, the City of Charlottesville and the Town of Scottsville Regional Water Supply Plan

A deficit of 0.41 MGD is estimated by 2035 in the urban areas of the planning region due to future demands. The region's plan to address the projected shortfall of municipal supply includes the expansion of the existing Ragged Mountain Reservoir in two phases. The first phase, known as the intermediate-expanded height phase, is scheduled to be operational in March 2014. The region will continue water conservation as a way to reduce demands.

Caroline County and the Town of Bowling Green Regional Water Supply Plan

Caroline County notes the average daily demands of the municipal community water systems are estimated to exceed VDH permit capacities between 2020 and 2025 with a combined average daily deficit of 0.256 MGD by the year 2030. Alternative water supply sources listed in the plan include groundwater development, interconnection with other localities, and an intake on the Rappahannock River.

Cumberland, Goochland, Henrico, and Powhatan Regional Water Supply Plan

Goochland County anticipates existing sources will meet future demand.

Fluvanna County and the Town of Palmyra Regional Water Supply Plan

Fluvanna County water demands are projected through 2030 with a deficit anticipated in the Palmyra Community Water System. The other community water systems' sources are adequate for the next twenty years. The James River Water Authority is listed as one option to meet future demand. A reservoir site associated with the Rivanna River and the James River is also included. A specific site for a reservoir is not given.

Hampton Roads Regional Water Supply Plan

City of Williamsburg, Gloucester County, James City County, York County

The localities anticipate an increase in population as the region continues to grow; however, projected supply is adequate to meet projected demand for the region through the planning period. 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.

Hanover County and the Town of Ashland Long Range Water Resources Plan

Hanover County community water systems may experience a deficit of 0.34 MGD by the year 2032, based on total projected demands as compared to the current VDH permitted capacity for all community water systems in the planning region. A single alternative is mentioned in the plan, the Verdon Quarry side storage reservoir project, which includes: river intakes and raw water pumping stations on North Anna and Little Rivers and a reservoir intake and raw water pumping station on Verdon Quarry. If completed in 2037 as scheduled, water resources will be adequate to meet the community water system needs through the planning period.

Louisa County Long Range Water Supply Plan

Louisa County and the Towns of Mineral and Louisa

Louisa County's Northeast Creek Reservoir Service Area's average day demands can be met through the planning period; peak day water demand surpasses the permitted capacity in 2039. Water demand within the Zion Crossroads Service Area is expected to outpace the permitted supply by 2025. The small groundwater-based community water systems and Blue Ridge Shores do not predict a deficit in the planning period. The Northeast Creek Reservoir Service Area will need improvements in the Town of Mineral well and the Northeast Creek Water Treatment Plant would be required to meet this peak demand for the Northeast Creek Reservoir Service Area. If Northeast Creek Reservoir Service Area and Zion Crossroads Service Area were interconnected and all source capacity was developed, this deficit would be addressed

.

The County has partnered with Fluvanna County to create the James River Water Authority, which is authorized to withdrawal water from the James River under Virginia Water Protection Permit No. 04-0805. Louisa County Water Authority also has a pending application for an intake on Lake Anna to supply that area.

Six designated growth areas (Gum Spring, Ferncliff, Shannon Hill, Lake Anna, Boswells Tavern, and Gordonsville) do not currently have sources, but the Louisa County Water Authority is considering groundwater wells, surface water withdrawals, off-line reservoir, extension of water transmission lines from other growth areas, upgrades to the existing Northeast Creek Water Treatment Plant, a partnership with Fluvanna County, and an upgrade to Bowlers Mill Reservoir.

Middle Peninsula Regional Water Supply Plan

King and Queen County; King William County and the Town of West Point

King and Queen County anticipates existing sources to be adequate to meet current and projected demand in the planning period. King William County and the Town of West Point Water predict that demand projections will exceed current community water system supplies by 2020 for King William (deficit of 0.925 MGD) and 2030 for West Point (deficit of 0.036 MGD). Alternative sources listed for the Town of West Point include system upgrades and groundwater permit modifications that allow for greater use of existing wells. New well development and an intake on the Pamunkey River are King William County's preferred alternatives for source water.

New Kent County Water Supply Plan

Portions of the County may experience a water supply deficit as early as 2017, based on the current permitted withdrawal amount. In the short term, a waterline extension is being designed to connect two county-operated community water systems to alleviate the anticipated 2017 deficit. The two top ranked alternatives for future water supply listed in the plan are an intake on the Pamunkey River (reverse osmosis water treatment) and the purchase of water from the City of Richmond.

Orange County Regional Water Supply Plan

Orange County and the Towns of Gordonsville and Orange

Existing sources for each of the service areas may not be adequate to meet the projected maximum day demands. Depending on the source of the system (surface water impoundments, run-of-river intakes, groundwater) the deficit will be between 0.45 MGD and 4.61 MGD. The region's plan to address the projected shortfall of municipal supply includes increasing the existing, permitted surface water withdrawal, developing new raw water storage, and developing new groundwater supplies, as well as continuing the existing water conservation policies or developing new ones.

Spotsylvania County and the City of Fredericksburg Regional Water Supply Plan

Existing water sources are adequate to meet current and projected demand.

Locality	Estimated Year of Deficit	Estimated Deficit Amount (MGD)
Albemarle County - Charlottesville - Scottsville	2035	0.41
Caroline County	2030	0.256
Aqua VA – Palmyra	2030	0.067
Hanover County	2032	0.34
King William County	2020	0.925
Town of West Point	2030	0.036
Louisa County Water Authority	2050	0.841
Orange County	2050	4.61
New Kent County	2060	1.5

York River Basin Projected Water Deficits