Comprehensive Drought Management and Emergency Preparedness Plan

For the:

- **Town of Warrenton**
- **Town of Remington**
- **Town of The Plains**
- **Fauquier County Water and Sanitation Authority**
- **Fauquier County**
- **Large Agricultural Users**

Adopted August 11, 2016

Amended December 13, 2018

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1. INTRODUCTION

This is the integrated drought plan for the towns of Warrenton, The Plains and Remington, Fauquier County, and the Fauquier County Water and Sanitation Authority. Individual drought plans for these organizations and jurisdictions have been incorporated into this integrated "umbrella" document, so therefore, this integrated consolidated plan supersedes earlier drought plans produced by these partnering organizations.

While the concept of drought is easy to comprehend, its quantification, the assigning of the starting and ending points and the assessment of its severity becomes more problematic. However, most people would agree with the ability of drought to affect our society, safety, health and economy, as well as influence our day-to-day lives. The ability of a drought to negatively impact our lives is lessened when there is adequate pre-planning, preparation and coordination.

Drought managers often do not manage the drought, but instead monitor for its occurrence, plan and prepare for how people conduct their lives during droughts, and help communities cope in a manner that will get them through the drought with as little impact as possible. A drought management plan should also plan and prepare for the degree of inter-jurisdictional coordination, cooperation and communication that is necessary during a drought event. This cooperation will likely be required to smoothly transition through the phases of a drought, since droughts do not recognize political or jurisdictional boundaries. Another reason for the plan is that hydrologic and recharge boundaries usually do not follow jurisdictional boundaries. The scope of this plan is for all residents, organizations and industries within Fauquier County, including those in the towns of Warrenton, The Plains and Remington, served by public water sources or private wells, and all businesses, residents, and farmers engaged in agricultural operations and other activities within Fauquier County. The purpose of this integrated approach is to facilitate coordination and communication, and to reflect the realities of the wide-ranging impact often associated with drought.

While this consolidated plan supersedes all other drought plans by the various partnering jurisdictions, nothing in this document infringes upon the sovereignty or decision-making authority of any jurisdiction or implies any cross-jurisdictional sharing of resources or obligation. The intent is only to increase coordination and clarity. It is within this holistic integrated approach that this drought management and emergency preparedness plan is presented.

2. DEMOGRAPHICS

Fauquier County lies in northern Virginia, between the rural Blue Ridge Mountains to the West and the urban Washington, DC/MD/Northern Virginia Metropolitan Area to the East. While historically rural farm and horse country, significant suburban development has occurred that provides the homes for commuters employed in other northern Virginia communities.

Fauquier County contains three incorporated towns: Warrenton, The Plains and Remington. Outside of these towns, County land-use plans encourage residential and commercial development in the nine Service Districts, located throughout the County (Table 1).

Year 2010 Population for Communities in Fauquier County		
	2010 Dwelling Estimate	2010 Population
Bealeton Service District	1,549	4,435
Calverton Service District	119	239
Catlett Service District	125	296
Marshall Service District	534	1,480
Midland Service District	94	218
New Baltimore Service District	2,772	8,119
Opal Service District	232	691
Remington Service District*	617	1,441
Warrenton Service District*	1,871	5,480
Town of Remington	256	598
Town of The Plains	105	217
Town of Warrenton	3,744	9,611
Total	12,018	32,825
Sources: 1) U.S. Census Bureau, 2010 Census; 2) *Department of Community Development		

Table 1: Population within the Towns and Service Districts

The population of Fauquier County in 2010 was 65,203. This means that 32,378 Fauquier residents (50%) lived outside of Service Districts.

The Fauquier County Water and Sanitation Authority (WSA) estimated that an approximation of water demand may be obtained by multiplying the population by 100 gallons of water per day. Using this figure, the water demand for Fauquier County is approximately 6,600,000 gallons a day, or 2,409,000,000 (2.409 billion) gallons per year. It is also important to remember that this demand is not distributed evenly throughout the County. Instead, there is a heavy concentration within the Warrenton-New Baltimore region.

3. DEFINTIONS and BASIC DROUGHT PRINCIPLES

The key factor in droughts is the lack of availability of water that has the acceptable level of quality to serve the desired use. Whether a person's water supply is from groundwater wells or surface water reservoirs, the source of this water is invariably precipitation. As such, droughts are inherently linked to precipitation and the hydrologic cycle. Before the discussion of drought continues, it may be helpful to provide a brief summary of the hydrologic cycle.

Water is stored in a variety of locations, for example:

- surface water bodies such as oceans, streams, lakes, ponds and reservoirs;
- frozen water bodies such as ice caps and glaciers;
- groundwater, such as in soil particles and interstitial spaces and fractures in bedrock;
- tissues of living matter, such as plants, animals and humans;
- water vapor contained in the atmosphere; and
- human-constructed storage vaults.

The quantity of water stored within these six reservoirs is as follows: 96.5% within the oceans; 1.8% in ice; 1.7% in groundwater; and less than one percent for freshwater bodies, living matter and the atmosphere.

The water cycle describes the natural process of any given unit of water moving from one of these storage locations to another. A specific water unit in the natural water cycle is not consumed or "used up"; it simply is transferred from one storage location to another. For instance, a particular unit of water may come out of a groundwater spring to feed a surface water stream in Fauquier County; this same unit of water may then be pumped to a cattle trough which in turn is drunk by Fauquier cattle; these cattle expire, sweat and transpire the water as vapor into the atmosphere; this same unit of water then may be carried as water vapor off to the Arctic to eventually fall as snow on the icecap of Ellesmere Island; thousands of years later a large chunk of ice containing this same unit of water may fall into the ocean and drift as an iceberg in the Northern Atlantic until it melts and becomes a part of the Atlantic Ocean; this same unit of water may evaporate off the coast of Portugal and be transferred to the atmosphere where it may drift into the Mediterranean region; eventually this unit of water may fall as rain on karst terrain in Croatia and once again enter the groundwater, but this time in Europe.

Most of the water input to land surfaces takes place as precipitation (rain or snow). Meteorological events often create a condition that converts water vapor (a gas) in the atmosphere into liquid water. Atmospheric conditions may exist where the atmosphere may no longer be able to hold as much water vapor, so it condenses into a liquid and it falls as rain. Some of this rainfall runs directly into lakes and streams; and these lakes and streams flow into the ocean.

Other meteorological conditions evaporate liquid water in lakes, streams and the ocean into gaseous water vapor which moves the water stored in lakes, streams and the ocean back into the atmosphere.

Other rainfall that has fallen on land surfaces, seeps below the surface and is incorporated into groundwater storage. Groundwater in turn, often seeps out of springs and feeds the majority of lakes and streams.

Other rainfall that lands on the surface is absorbed by plants and animals and stored in living cells and tissues. All living matter transfer water vapor back into the atmosphere by either respiration (from animals) or transpiration (from plants). The large biomass of forests, shrubs and grasses that blankets the Earth's land surfaces ends up transpiring a significant quantity of water back into the atmosphere. The term used to describe the total quantity of water that cycles from living plants (transpiration) and that which evaporates from water and ground surfaces (evaporation), is called "evapotranspiration" or "ET" for short.

Humans also often pull water from lakes and reservoirs, and from groundwater. Humans only temporarily use this water for personal, industrial or economic purposes before it is eventually transferred back into streams (such as through a wastewater treatment plant's effluent discharge), into groundwater (such as septic systems), or into the atmosphere (such as through evaporation off human bodies or off watered lawns). Some of this water may be temporarily stored in cisterns, vaults or tanks, but eventually it too is returned to the natural water cycle.

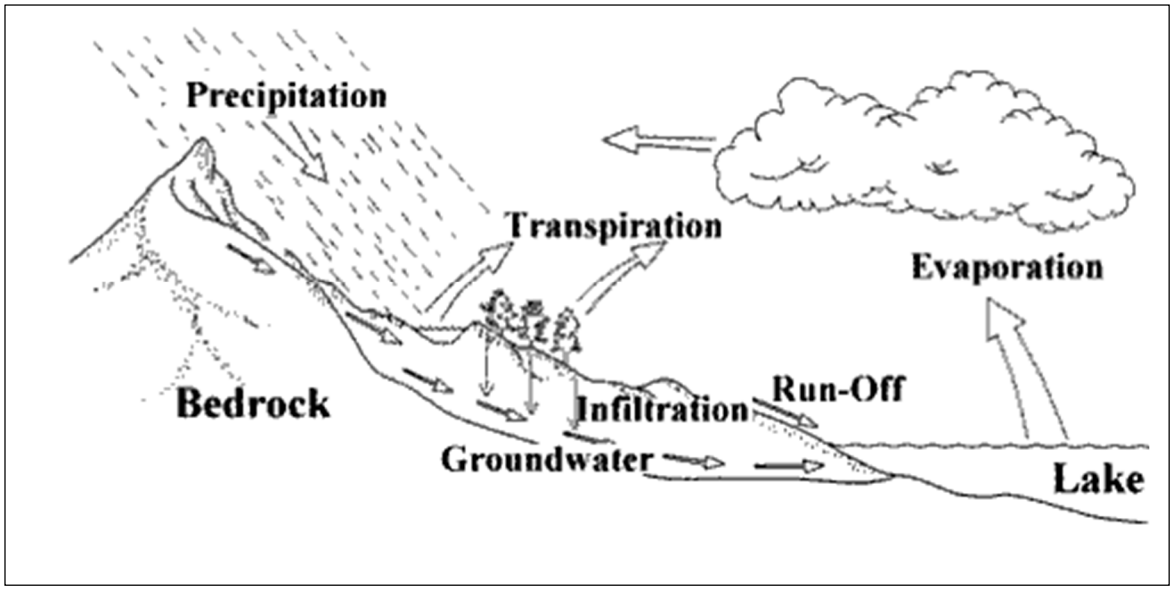

Figure 1: Generalized Hydrologic Cycle

Many hydrologists when calculating water usage on a watershed scale do not factor in human residential water usage, since any water removed and consumed within a particular watershed is likely to be returned to that same watershed through either their own septic system or else through local wastewater treatment plants. There is a concern if water supplies from one watershed are transferred to another. For instance, if water supply comes from surface water in the Cedar Run watershed (a part of the greater Potomac River watershed) and after being treated by a wastewater facility is returned to surface water in the Rappahannock River watershed, then this may create a water shortage in the Potomac River watershed. These inter-basin transfers may play a noticeable or significant role in water budget and water supply calculations.

Therefore a drought is not a lack of water, since the same quantity of water within the Earth's ecosystem is consistent, but instead, the water may be distributed on the Earth's surface in a manner that provides a localized shortage; or the water is held in a local storage unit (such as a higher quantity being stored in the atmosphere, or more in the oceans, and less in groundwater (and therefore the well may go dry, even though there's high humidity over the same area or floods in Ethiopia).

The hydrologic cycle becomes important in drought planning for two main reasons: to provide a basic understanding of the topic; and to find ways to conserve and manage water and the water cycle for the most beneficial use. One key aspect of a drought plan is to outline priorities for water usage. Another key aspect of a drought plan is to describe ways that water can be conserved by understanding and managing the water cycle. Some examples of this include the following:

- knowing that water bodies lose water to the atmosphere through evaporation, a person may discover ways that they may be able to limit their water loss (e.g. covering water storage vaults and tanks , by providing a shade structure to livestock troughs, or better yet, provide on-demand watering systems for livestock);

- knowing that water that runs off the surface into streams does not infiltrate into the ground and replenish groundwater sources that your well draws from, a person may choose to landscape differently, such as having less impervious surfaces, or by having more vegetation that captures run-off, or by designing a more effective stormwater management system for their lot (which directs surface water run-off to infiltrate into the localized groundwater reservoir rather than from running directly into streams that flow out of the area) ; or
- knowing that much water is lost through evaporation and transpiration, a person may choose to water their plants in cooler periods of the day or through drip irrigation systems that limit water loss to the atmosphere.

The general definition of a drought is a long period of abnormal low rainfall, especially one that adversely affects growing or living conditions. Even if we use this general definition of a drought, how do we go about quantifying it without the quantification of other terms and concepts, such as:

- How long of a period is "long" to count as a drought?
- How much precipitation is "normal" or "abnormal"?
- Is it not only a factor of "rainfall"? Droughts are highly dependent upon other factors such as water storage in snow pack, water storage in groundwater aquifers that may not be influenced by surface conditions, and meteorological parameters such as temperature, humidity, evaporation and wind.
- At what point does low-water availability begin adversely affecting growing or living conditions? In addition, how do you quantify this, especially when it is highly dependent upon the location or community in which you live (for instance, what would be considered a severe drought to a group of farmers may not even be noticeable to a community that is not as closely associated with or tied to field conditions)?

Due partly to these many ill-defined components or ways at looking at a drought, there has since become many categories of droughts, such as "meteorological drought," "agricultural drought" and "hydrological drought."

Meteorological drought:

> "A period of abnormally dry weather sufficiently prolonged for the lack of water to cause serious hydrologic imbalance in the affected area." (Huschke, R.E., ed., 1959, Glossary of meteorology: Boston, American Meteorological Society, 638 p.)

Agricultural drought:

> "A climatic excursion involving a shortage of precipitation sufficient to adversely affect crop production or range production." (Rosenberg, N.J., ed., 1979, Drought in the Great Plains--Research on impacts and strategies: Proceedings of the Workshop on Research in Great Plains Drought Management Strategies, University of Nebraska, Lincoln, March 26-28: Littleton, Colorado, Water Resources Publications, 225 p.)

Hydrologic drought:

"A period of below average water content in streams, reservoirs, Groundwater aquifers, lakes and soils." (Yevjevich Vujica, Hall, W.A., and Salas, J.D, eds., 1977, Drought research needs, in Proceedings of the Conference on Drought Research Needs, December 12-15, 1977: Colorado State University, Fort Collins, Colorado, 276 p.)

4. AUTHORITIES

The Virginia Administrative Code (9VAC25-780-120) states that all communities and water users that withdraw more than an average 300,000 gallons per month shall develop drought response and contingency plans. Several entities within Fauquier County fit within this description, so this requirement applies to residents of Fauquier County. The entire 9VAC25-25-780-120 is as follows:

9VAC25-780-120. Drought response and contingency plans.

A program that includes community water systems and self-supplied users who withdraw more than an average of 300,000 gallons per month of surface water and ground water shall contain drought response and contingency plans in accordance with the following requirements:

1. Drought response and contingency plans shall be structured to address the unique characteristics of the water source that is being utilized and the nature of the beneficial use of water.

2. Drought response and contingency plans shall contain, at a minimum, the following three graduated stages of responses to the onset of drought conditions:

a. Drought watch stage responses are generally responses that are intended to increase awareness in the public and private sector to climatic conditions that are likely to precede the occurrence of a significant drought event. Public outreach activities shall be identified to inform the population served by a community water system of the potential for drought conditions to intensify and potential water conservation activities that may be utilized.

b. Drought warning stage responses are generally responses that are required when the onset of a significant drought event is imminent. Voluntary water conservation activities shall be identified with the goal of reducing water use by 5-10%.

c. Drought emergency stage responses are generally responses that are required during the height of a significant drought event. Mandatory water conservation activities shall be identified with the goal of reducing water use by 10-15%.

3. Drought response and contingency plans shall include references to local ordinances, if adopted, and procedures for the implementation and enforcement of drought response and contingency plans.

Statutory Authority
§§ 62.1-44.15 and 62.1-44.38:1 of the Code of Virginia; Historical Notes
Derived from Virginia Register Volume 22, Issue 2, eff. November 2, 2005.

The combined Fauquier County, Remington and The Plains' Water Supply Plan was approved September 29, 2011. Section V(b) of this plan is an official drought response and management plan. Virginia Department of Environmental Quality (DEQ) approved the main Water Supply Plan part, but only provisionally approved the drought plan portion. Specifically, the drought part was found to be lacking in implementation and enforcement specifics, and needed the accompanying and supporting ordinances. The drought plan presented in the Water Supply Plan is superseded by this Drought Plan, which has more implementation and enforcement details, and more importantly, takes a more comprehensive approach by the inclusion of the WSA and the town of Warrenton.

Warrenton's Draft Water Supply Plan was released in February 2010, and their Water Conservation Ordinance (#1999-08) was adopted on August 10, 1999. This Ordinance is attached in the appendix of this document. Since this drought plan is an "umbrella plan" that incorporates other drought plans, such as Warrenton's; therefore, this drought plan supersedes any of their earlier drought plans.

WSA drafted its Water Preservation Program Plan in 2013, and it has been incorporated in this integrated drought plan.

5. HYDROLOGICAL AND ENVIRONMENTAL CONDITIONS

5.1 Precipitation

The single environmental factor controlling drought conditions is precipitation. Most of the National Oceanic and Atmospheric Administration (NOAA) weather stations located in Fauquier County, such as Marshall, Remington, The Plains, Delaplane and Warrenton, have been discontinued. Fortunately, two of these stations (The Plains and Warrenton) were only recently discontinued, so data from these stations were included in NOAA's recent 30-year Normal determinations. The lack of local data to support adjustments in precipitation Normal determinations in the future may be an issue.

"Normal" precipitation is a statistical mean of a moving 30-year interval. Therefore, mean Normal precipitation for the year 2011 would be 1982 through 2011, while the mean Normal precipitation for the year 2012 would be 1983 through 2012. However, these 30-year Normal values are updated only once every ten years, so the most recent of these "Normal" 30-year periods was from 1981 to 2010.

The 30-year Normal precipitation data determined that the Normal annual precipitation for Warrenton is 40.7 inches, and 42.24 inches for The Plains.

Since Fauquier County lacks approved NOAA weather stations, we must look elsewhere for relevant data. Data from the stations used to determine Normal precipitation may be used to assess which other nearby stations best represents precipitation totals within Fauquier County. To assess the current weather stations proximity and potential representative of Fauquier County's climate variables, the stations that passed the initial screening and analysis are as follows:

- Boston, VA
- Front Royal, VA
- Lincoln, VA
- Mount Weather VA
- Quantico Marine Corps Base
- Sperryville, VA
- Washington Dulles International Airport

The stations in Front Royal, Lincoln, Quantico MCB, and Sperryville were determined to be too far away and served little added value to the Boston, Mount Weather and The Dulles sites. The 30-year Normal data for each of these three sites was tabulated, graphed and assessed in comparison with the 30-year Normal precipitation data for The Plains and Warrenton. A summary of this data is depicted in Table 1 and Figure 2.

Month	Warrenton [el. 500 ft.]	The Plains [el. 530 ft.]	The Dulles [el. 290 ft.]	Mt. Weather [el. 1,659 ft.]	Boston [el. 590 ft.]
	inches	inches			
January	3.02	3.04	2.68	2.88	2.70
February	2.78	2.86	2.74	2.96	2.58
March	3.52	3.68	3.38	3.56	3.70
April	3.68	3.56	3.47	3.69	3.44
May	4.56	4.72	4.55	4.48	4.35
June	4.23	4.01	3.98	4.24	4.25
July	4.27	3.71	3.67	3.81	5.20
August	3.77	3.88	3.53	3.45	3.56
September	4.50	4.37	3.92	4.52	4.35
October	3.22	3.46	3.25	3.43	3.48
November	3.53	3.72	3.41	3.51	3.97
December	3.40	3.04	2.96	2.95	2.98
Total	44.48	44.05	41.54	43.48	44.56

Table 1

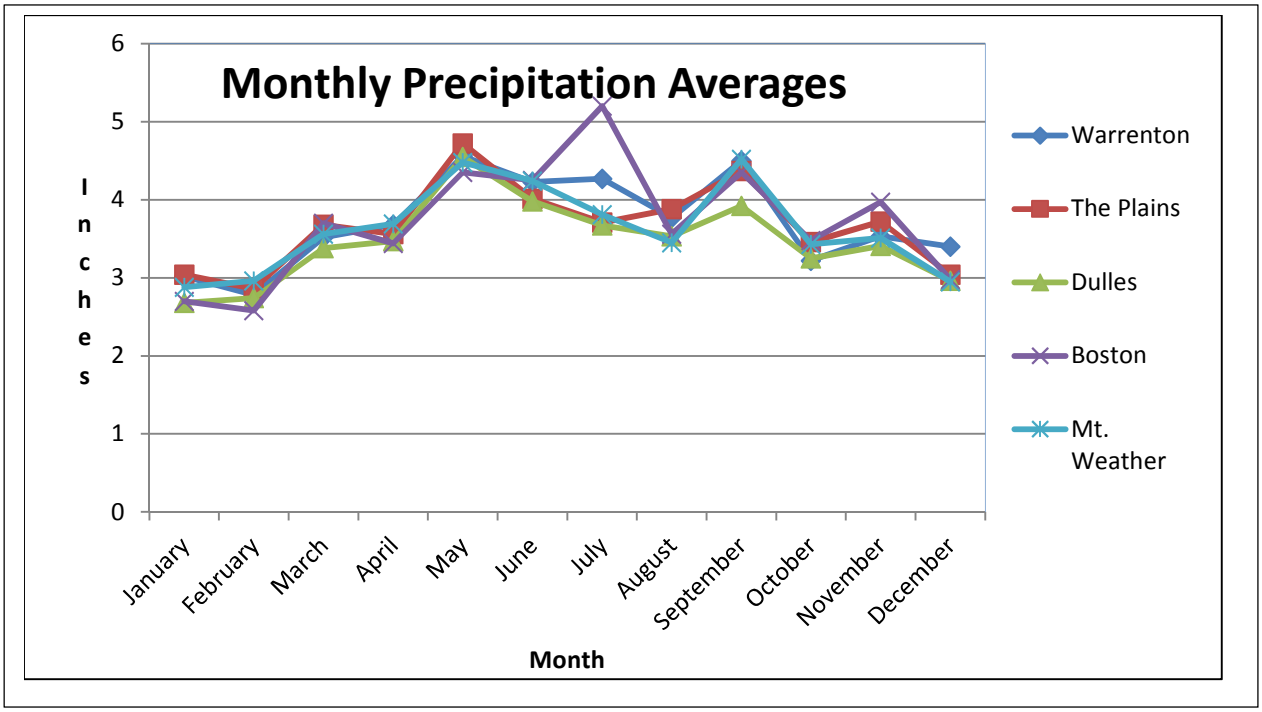

Figure 2

The closest station to the northern portions of the County is Mount Weather (the town of Marshall is located approximately 10 miles from the Mount Weather station). Marshall is located approximately 20 miles from the Dulles Airport station. The closest station to the central and southern portions of the county is the Boston station (Warrenton is located approximately 16 miles from the Boston station). The Dulles Airport station is located approximately 19 miles from Warrenton. Spatially, Fauquier County is located near the center of the triangle formed between the Mount Weather, The Dulles Airport and the Boston stations. Spatially, if two stations were picked to represent Fauquier County, then the Dulles Airport station to the northeast and the Boston station to the southwest would be logical. However, an evaluation of the precipitation Normals for these sites appears to indicate that spatial considerations are not significant factors, since there is no apparent correlation or trend. Elevation also does not appear to be a significant factor. The majority of the data is so similar to each other that significant differences, let alone correlations could not be found. Data from the Dulles Airport matches the annual trends of both Warrenton and The Plains, although precipitation at the Warrenton station is 7.1 percent more than the Dulles Airport station, and precipitation at The Plains is 6.0 percent more than the Dulles Airport station. Although the Normal July precipitation at the Boston station is noticeably higher than the other stations, taken as a whole, the Boston station represents the upper-end of the anticipated Fauquier County precipitations values, and the Dulles Airport station represents the lower-end; therefore, the mean of these two stations may be best predictor of precipitation within Fauquier County. The station at the Dulles Airport has also the advantage of being the most administratively stable of the weather stations, since it is one of NOAA's primary weather stations, while the others are

dependent on volunteer persistence. The other weather stations have a long history of being discontinued after a time, since NOAA relies upon volunteer cooperators.

The Warrenton-Fauquier Airport and the Culpeper Airport have automated weather stations in which data is accessible over the internet for a maximum of three days. In these stations, data going back more than three days is not retrievable, therefore, is of limited use for drought planning purposes.

Many volunteers in Fauquier County donate their weather data to the Weather Underground internet site. Weather Underground staff provide quality assurance and quality control over the temperature data, but not the precipitation data. As a consequence, reported precipitation data on the website vary considerably, with some nearby stations containing annual precipitation totals that differ by more than 1,100 inches (91 feet) of precipitation. Therefore, it remains of unknown reliability.

5.2 Stream Flow

Warrenton receives most of their potable water from surface water sources; however, the majority of other county residents obtain their potable water from groundwater sources. Some of Fauquier County's livestock and other components of the County's important agricultural industry rely upon surface water. In addition, surface water is a reliable means of assessing drought conditions, even for groundwater sources. For one, the majority of surface streams are derived from groundwater, so if the streams are running low, the groundwater is often low as well. However, there are other uses of and values to surface water beyond potable water supply, such as livestock, irrigation, treated waste disposal, fire protection, and environmental.

For instance, the County estimated that a drought in 2005 caused losses to Fauquier County ranchers and farmers in excess of 2.35 million dollars, and a drought in 2008 caused an estimated 7 million dollars loss. During these droughts, surface waters used for livestock were running dry and alternative water sources were developed to sustain livestock through the drought. Therefore, surface water conditions are important to evaluate and monitor within the context of this drought management and emergency response plan.

Fauquier County contains approximately 1,722 miles of streams, contained in two major watersheds, the Potomac River (950 miles of stream) and the Rappahannock River (772 miles of stream). A summary of the stream miles of the following watersheds is listed below:

Potomac River	Area (Square Miles)
Upper Goose Creek	
Goose Creek-Crooked Run-Gap Run	159.6
Goose Creek- Mitchells Branch	73.7
Goose Creek-Wancopin Creek	6.3
Cromwells Run	50.7
Panther Skin Creek	21.3
	311.6

Lower Goose Creek		
Little River	72.1	
	72.1	
Broad Run		
Broad Run-Trapp Branch	83.0	
Broad Run-Catletts Branch	36.8	
Kettle Run	26.0	
	145.8	
Bull Run		
Little Bull Run	2.3	
	2.3	
Cedar Run		
Cedar Run-Mill Run	69.8	
Cedar Run-Slate Run	16.2	
Cedar Run-Owl Run	121.9	
Cedar Run-Walnut Branch	36.5	
Town Run	103.9	
Licking Run	60.8	
	409.1	
Lower Potomac River		
Potomac River-Potomac Creek		
Upper Aquia Creek	9.1	
	9.1	
	Total =	950.0
Rappahannock River		
Carter Run	148.6	
Rappahannock River-Glascock Run	24.6	
Rappahannock River-Great Run	113.1	
	286.3	
Marsh Run	105.8	
Rappahannock River-Deep Run	46.5	
Rappahannock River-Ruffans Run	52.9	
Rappahannock River-Rock Run	84.7	
	289.9	
Thumb Run	93.9	
Rappahannock River-Buck Run	91.9	
Rappahannock River-Lake Mosby	9.8	
	195.6	
	Total =	771.8

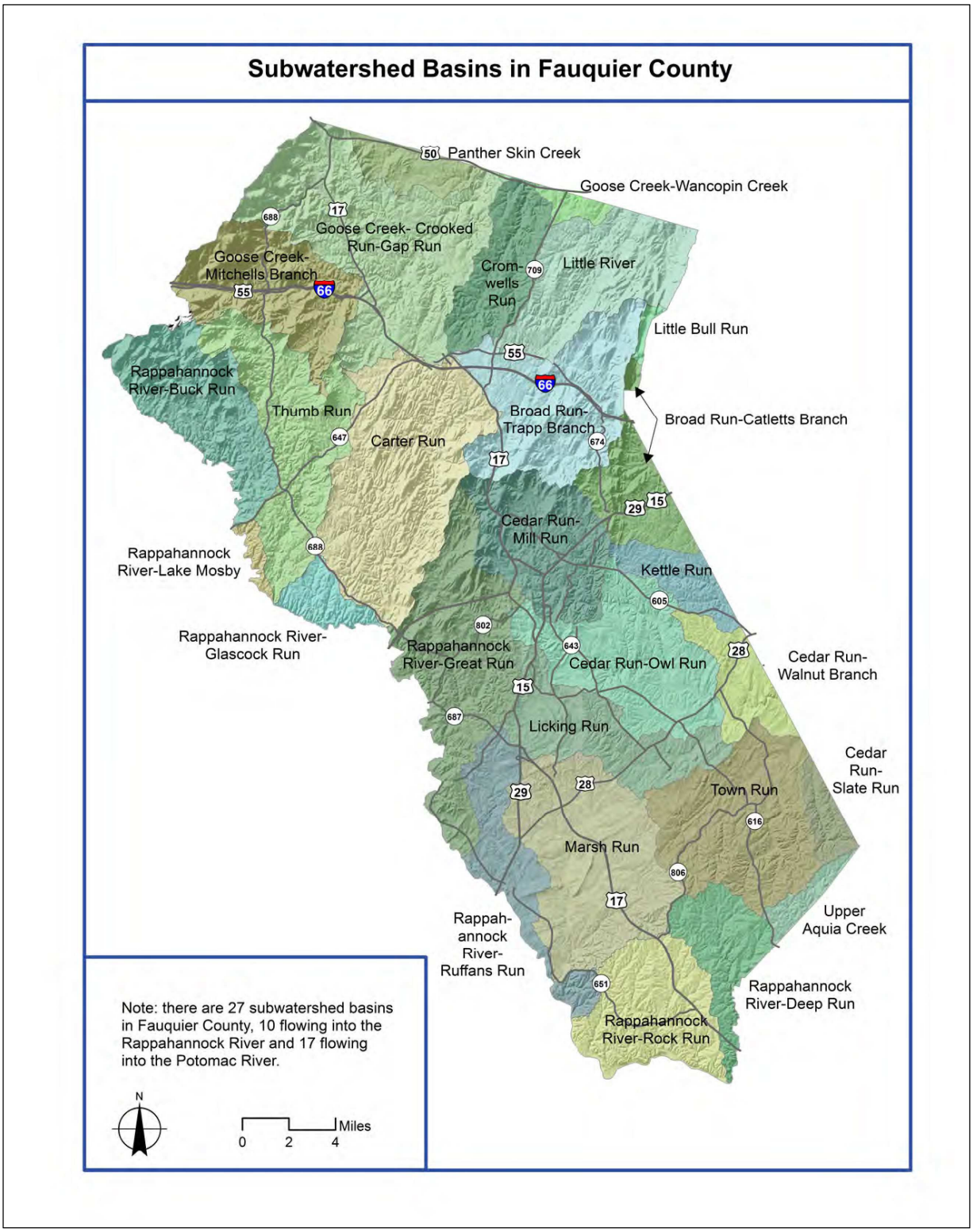

Figure 3: Subwatershed Basins of Fauquier County

SubWatershed	Area (square miles)	Stream Length (Miles)	Stream miles per Square	Estimated Precipitation Input (cf/yr.)	Estimated ET (cf per year)	Estimated Runoff (cf per year)	Estimated Infiltration (cf per year)	Estimated Annual Stream Discharge (cf)
Goose Creek-Crooked Run-Gap Run	59.57	159.56	2.67853	6,089,846,628	3,943,784,676	246,042,019	1,383,376,668	1,629,418,687
Goose Creek-Mitchells Branch	29.92	73.7	2.46324	3,058,724,377	1,980,829,906	123,578,600	694,823,399	818,401,999
Goose Creek- Wancopin Creek	3.11	6.26	2.01286	317,935,589	205,895,087	12,845,235	72,222,619	85,067,855
Little River	30.61	72.1	2.35544	3,129,263,141	2,026,510,810	126,428,507	710,847,067	837,275,575
Cromwells Run	18.45	50.74	2.75014	1,886,145,212	1,221,467,639	76,204,050	428,458,948	504,662,998
Panther Skin Creek	8.57	21.32	2.48775	876,111,895	567,370,063	35,396,678	199,018,601	234,415,279
Broad Run- Trapp Branch	37.78	82.98	2.19640	3,862,252,906	2,501,194,982	156,042,764	877,353,878	1,033,396,642
Broad Run- Catletts Branch	15.94	36.84	2.31117	1,629,547,679	1,055,295,077	65,836,995	370,169,953	436,006,948
Kettle Run	9.43	26.02	2.75928	964,029,775	624,305,682	38,948,737	218,990,129	257,938,865
Little Bull	1.18	2.28	1.93220	120,631,510	78,120,966	4,873,755	27,402,794	32,276,549
Cedar Run- Mill Run	28.82	69.85	2.42366	2,946,271,274	1,908,005,277	119,035,269	669,278,422	788,313,691
Cedar Run- Slate Run	5.45	16.2	2.97248	557,154,006	360,812,934	22,510,139	126,563,754	149,073,894
Cedar Run- Owl Run	36.94	121.93	3.30076	3,776,379,628	2,445,583,447	152,573,312	857,846,804	1,010,420,116
Cedar Run- Walnut Branch	12.29	36.49	2.96908	1,256,407,841	813,649,718	50,761,397	285,407,071	336,168,468
Town Run	39.92	103.93	2.60346	4,081,025,305	2,642,871,987	164,881,608	927,050,471	1,091,932,079
Licking Run	25.5	60.81	2.38471	2,606,867,366	1,688,207,306	105,322,670	592,179,034	697,501,704
Upper Aquia Creek	4.15	9.07	2.18554	424,254,885	274,747,464	17,140,748	96,374,235	113,514,983
Carter Run	55.4	148.6	2.68231	5,663,547,141	3,667,713,129	228,818,664	1,286,537,979	1,515,356,643
Rappahannock River- Glascock Run	6.81	24.55	3.60499	696,186,932	450,850,657	28,127,348	158,146,636	186,273,984
Rappahannock River- Great Run	43.68	113.1	2.58929	4,465,410,454	2,891,799,810	180,411,539	1,014,367,850	1,194,779,389
Marsh Run	46.56	105.76	2.27148	4,759,833,121	3,082,467,929	192,306,805	1,081,249,247	1,273,556,052
Rappahannock River- Deep Run	15.85	46.52	2.93502	1,620,346,971	1,049,336,698	65,465,268	368,079,909	433,545,177
Rappahannock River- Ruffans Run	20.02	52.93	2.64386	2,046,646,458	1,325,408,246	82,688,622	464,918,598	547,607,220
Rappahannock River- Rock Run	27.85	84.69	3.04093	2,847,108,084	1,843,787,196	115,028,877	646,752,396	761,781,273
Thumb Run	36.15	93.93	2.59834	3,695,617,855	2,393,282,123	149,310,374	839,500,865	988,811,239
Rappahannock River- Buck Run	29.09	91.86	3.15779	2,973,873,400	1,925,880,414	120,150,450	675,548,552	795,699,003
Rappahannock River- Lake Mosby	2.15	9.75	4.53488	219,794,700	142,339,047	8,880,147	49,928,820	58,808,967
	651	1,722	73	66,571,214,130	43,111,518,271	2,689,610,578	15,122,394,702	17,812,005,280

The preceding table summarizes various hydrological and meteorological values in an effort to estimate water-balance parameters within the subwatersheds of Fauquier County. USGS Stream discharge values for the years 2008 through 2012 were obtained from three stream gages: Goose Creek near Middleburg; Cedar Run near Catlett; and the Rappahannock River near Remington. Using this 15-minute interval data, the mean total volume of water discharged per year was calculated. This data displayed a strong correlation to watershed surface area; which turned out to be 27,360,991 cubic feet of stream volume per square mile of watershed.

The recharge zones for the streams of Fauquier County lie along the watershed and subwatershed boundaries depicted in Figure 3.

Streamflow is a watershed outflow. To determine the water inputs, Normal precipitation data (derived from 1981 to 2010 data) from NOAA's weather stations in The Plains and Warrenton was used to obtain the mean precipitation value for Fauquier County (44.265 inches per year).

An estimated evapotranspiration value (64.76 percent of annual precipitation) was derived from a mean of localized northern Virginia data obtained from Sanford and Selnick's (2012) "*Estimation of Evapotranspiration Across the Conterminous United States Using a Regression with Climate and Land-cover Data.*"

Similarly, an infiltration of ten inches of water per year was used based upon a mean of northern Virginia data.

Since streamflow is a sum of groundwater outflow and surface water run-off, and in most cases the groundwater outflow is in balance with the groundwater inflow (infiltration), then the estimated annual surface run-off was derived by subtracting infiltration from streamflow.

To verify the streamflow, evapotranspiration, infiltration and surface-water run-off estimates, a simple water-balance calculation was performed. Total annual precipitation should equal the sum of annual surface water run-off, annual groundwater infiltration and annual evapotranspiration. Estimates within ten percent of actual values should be considered good. Upon the calculation of these inputs, 8.5 percent of the total precipitation was unaccounted for, meaning that there should be an additional 8.5 percent outflow that is unaccounted for. This should be expected using this methodology, since the input values used was "Normal" precipitation, but the streamflow outputs used were actual. Taking in account that the previous year's precipitation was less than Normal, when the actual values were normalized, the water balance calculation came out almost precisely balanced. This implies that the values and assumptions made in these calculations appear to be valid.

5.3 Lakes and Reservoirs

There are many small private livestock and stormwater retention ponds within the county, but there are only four public reservoirs that will be discussed in this drought management and response plan: Germantown Lake; Warrenton Reservoir; Airlie Reservoir; and Lake Brittle. The 109-acre Germantown Lake is managed by the Fauquier County Parks and Recreation Department. It was created for flood control and as a potential future water supply. Both the 46-acre Warrenton Reservoir (260 million gallon volume) and the 55-acre Airlie Reservoir (124 million gallon volume) were created for water supply purposes. They are currently being used and managed for that purpose by the Town of Warrenton. The 77-acre Lake Brittle was created to enhance recreational fishing. It is managed by the Virginia Department of Game and Inland Fisheries.

Warrenton currently monitors the surface levels of Warrenton and Airlie Reservoirs. C.M. Crockett Park is currently monitoring the surface level of Germantown Lake and they are managing and monitoring the discharge of the dam's only outflow, which serves as the only source of the continuation of Licking Run. This may be a potential drought monitoring location; however, currently the electronic instrumentation on site records produces only on paper print-outs, and no digital version of this data exists. The Parks and Recreation Department retains a complete copy of these current and past paper reports. If there is an interest in having this information available to a wider audience or for use in drought management, an electronic transmitter would need to be installed to allow remote data retrieval.

5.4 Groundwater

Most rural county residents rely upon groundwater to meet their water supply needs. The majority of County residents living within one of the nine identified Service Districts obtain their water from public wells managed and maintained by Fauquier County Water and Sanitation Authority (WSA) or from surface water obtained from Warrenton's public utilities district. There are privately managed and maintained community water supplies that also utilize groundwater for their water supply needs. Most rural County residents have their own private water supply well located on their respective properties. A summary of Fauquier County's water supply and water availability is contained in the Fauquier County Regional Water Supply Plan (approved September 29, 2011). The 2011 Water Supply Plan does not include those portions of Fauquier County within the Town of Warrenton's jurisdiction. No attempts to restate the information in the Water Supply Plan will be made in this Drought Management and Response Plan. However, some key points contained in that plan that have special relevance for drought planning consist of the following:

- Demand for water was approaching the current capacity of some existing wells, and anticipated future demand appears to exceed current supply availability in most Service Districts;
- Finding suitable new groundwater sources takes time, due not only to funding issues, but also due to the nature of our aquifers, planning and permitting considerations, geophysical study constraints, public acquisition of real estate and easements, and water quality and water treatment concerns. Therefore, until new wells go on line, the County has very little flexibility to meet supply restraints brought on by drought or other related water supply complication;
- Clearly those Service Districts that are at or near the capacity of the existing wells would potentially suffer disproportionally during drought conditions than those communities and Service Districts with greater reserve capacities. Due to these and other reasons, a drought would likely not affect all County residents equally, and even a relative minor drought may cause significant hardship to some residents, especially for communities that have a high population and that are at or near their water supply capability. Therefore, the residents of New Baltimore may experience more hardships during a drought than a resident of Paris. Drought management within Fauquier County should be closely linked to the planning of future water supplies and water supply infrastructure, since they are integral to each other.

The recharge zone for an individual well may extend beyond the watershed divide of the surface in which the well is located. On the other end of the spectrum, many surface watersheds may contain a multitude of smaller groundwater aquifers. In addition, groundwater aquifer boundaries are not static; they may significantly change over different seasons and under different hydrologic

conditions. Few groundwater aquifers have been delineated within Fauquier County. Lacking more precise delineations, for the purpose of this plan, it will be assumed that the aquifer's boundary lies along the same watershed boundary in which the surface well is located.

It is important to recognize that the County's public water supplies are not located evenly across the land. There is a disproportionally high reliance upon water within the Cedar Run watershed, as depicted on Figure 4.

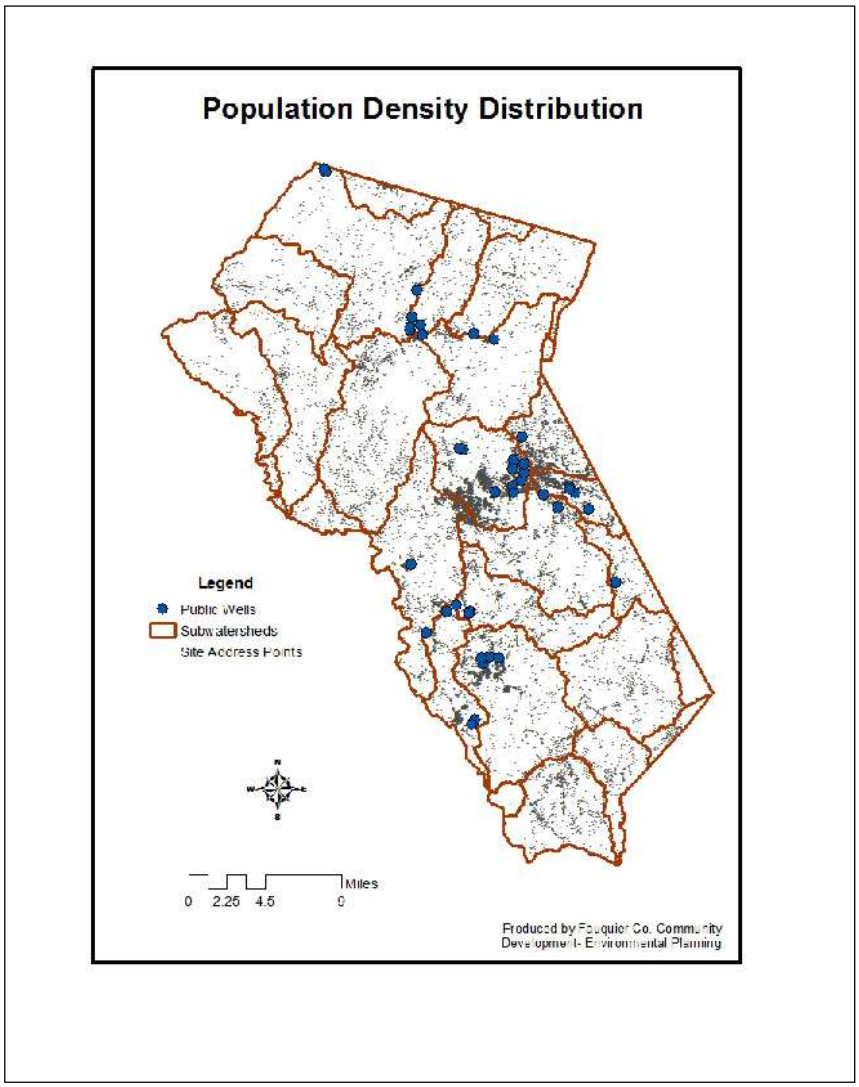

Figure 4: Population Density Distribution in Fauquier County

6. WATER DEMAND/AVAILABILITY

There are many social, economic, health, safety and operational impacts caused by droughts. For instance, the County estimated that a drought in 2005 caused losses to Fauquier County ranchers and farmers in excess of 2.35 million dollars, and one in 2008 caused an estimated 7 million dollars loss. During these droughts, surface waters used for livestock were running dry and farmers and other residents needed to develop alternative water sources to get them through the drought.

6.1 Water Availability for Human Consumption

A rough estimate of water demand in Fauquier County used to be 100 gallons of water per day, but in the last few years, Fauquier County Water and Sanitation Authority (WSA) has seen a noticeable increase in the per-household use of water. A one hundred (100) gallons of water per person per day equates to a Fauquier County water demand of 228,210,500 gallons per year. If the average precipitation is 43.48 inches, this would equate to 491,868,404,087 gallons falling on Fauquier County per year. However, most precipitation either evaporates, is absorbed by plants, or runs off into surface streams and eventually to the ocean. A rough estimate of the total available water for recharging both groundwater aquifers is ten percent of the area's total precipitation input. At that amount, the current county-wide demand for water is only 0.4 percent of the potential recharge supply. This would imply that there is likely never to be a water shortage in Fauquier County. However, these calculations and estimates are based upon an assumption that there is an even distribution of water demand. As Figure 4 indicated, the population within Fauquier County is not evenly distributed.

6.1.1 Public Water Systems within Fauquier County

The Environmental Protection Agency (EPA) defines *public water systems* as an entity that provides "water for human consumption through pipes or other constructed conveyances to at least 15 service connections or serves an average of at least 25 people for at least 60 days a year." EPA has defined three types of public water systems:

- Community Water System (CWS): A public water system that supplies water to the same population year-round.
- Non-Transient Non-Community Water System (NTNCWS): A public water system that regularly supplies water to at least 25 of the same people at least six months per year, but not year-round. Some examples are schools, factories, office buildings, and hospitals which have their own water systems.
- Transient Non-Community Water System (TNCWS): A public water system that provides water in a place such as a gas station or campground where people do not remain for long periods of time.

The Water Supply Plan identifies 23 Community Water Systems in 2009. This same plan identifies a number of NTNCWS and TNCWS systems as well (listed merely as "water users," but no specific quantification of them by water system category is provided). For the purposes of this drought plan, an updated list of Public Water Supplies in Fauquier County was obtained from the Health Department on October 29, 2013. This list contains the same 23 CWS entities, but lists 23 NTNCWS and 15 TNCWS; thereby bringing the total of Public Water Systems up to 61, with an estimated 11,802 people served. This seems low, considering that this would represent only 18.1 percent of Fauquier County residents being served by a Public Water System (and by default, 81.9 percent of Fauquier County residents having their water needs met by non-Public Water Supplies).

These 23 Community Water Systems are composed of ~~13~~ 14 owned and managed by WSA; they are as follows:

- Marshall Waterworks [Marshall vicinity]
- New Baltimore Regional [New Baltimore vicinity]
- WSA-Remington (The Meadows) [Remington vicinity]

- Bealeton Regional [Bealeton vicinity]
- Green Meadows [Opal vicinity]
- Catlett Subdivision [Catlett vicinity]
- Auburn Crossing [New Baltimore vicinity]
- Whitewood Forest [New Baltimore vicinity]
- Opal Regional [Opal vicinity]
- Bethel Academy [Warrenton vicinity]
- ~~Botha Subdivision [in the vicinity west of Opal]~~
- Paris Water System [Paris vicinity]
- Turnbull [Central West Fauquier County vicinity]
- The Plains [the town of The Plains]
- Waterloo Estates [Warrenton vicinity]

There are two public water systems which are owned by other entities, but managed by WSA. These are as follows:

- ~~The Plains [the town of The Plains]~~ Botha Subdivision [in the vicinity west of Opal]
- Buckland Water and Sanitation Assets Corporation (Vint Hill)

The preceding ~~15~~ 16 public water systems, since they are managed by WSA, will follow the WSA-specific provisions of this plan.

The Warrenton Water System is owned and managed by the Town of Warrenton. As such, the residents of Warrenton will follow the Warrenton-specific provisions of this plan.

The Remington Water System (separate from the "WSA-Remington" system mentioned earlier) is owned and managed by the Town of Remington, as such; the residents of Remington will follow the Remington-specific provisions of this plan.

There are another ~~six~~ five water systems that are owned and operated by private entities; these are as follows:

- Lakeway Subdivision Water System [currently a Community Water System, but transitioning into separate wells]
- ~~Waterloo Estates [currently a PWS, but in process of being taken over by WSA]~~
- The Drysdale Water System
- Baldwin Ridge Water System
- Marsh Run Mobile Home Park
- Fauquier Springs-Sulfur Springs Investment Corporation

These preceding ~~six~~ five Community Water Systems will follow the Fauquier County provisions of this plan.

According to the Public Health Department, the 23 Public Water Systems classified as Non-Transient Non-Community Water System are as follows:

- Airlie Foundation
- Southern Fauquier Child Development
- Chemetrics, Inc.

- Walnut Grove Child Care III
- Fresta Valley Christian School
- Maplewood Child Care Center
- Marshall/Coleman schools [Fauquier County School System]
- Claude Thompson Elementary School [Fauquier County School System]
- Mary Walter Elementary School [Fauquier County School System]
- H.M. Pearson Elementary School [Fauquier County School System]
- Southeastern Alternative Education Center [Fauquier County School System]
- Mountainside Montessori School
- Midland Christian Academy
- Midland Church of the Brethren
- McDonalds- Opal
- Piedmont Child Care
- Quarles Truck Stop
- Ross Industries
- Sheetz Station #221
- Smith-Midland Corporation
- TP Development Parcel, Inc. (formerly known as "Trinity Plastics")
- Virginia Power
- Walnut Grove Child Care

These 23 Public Water Systems will follow the Fauquier County portions of this drought plan. According to the Public Health Department, the 15 Public Water Systems classified as Transient Non-Community Water System are as follows:

- Phoebe Hall Knipling Outdoor Lab
- El Agave Restaurant (formerly known as Frog and Friends Restaurant)
- Camp Moss Hollow
- C.M. Crockett Park [Fauquier County Parks Department]
- Northern Fauquier Community Park [Fauquier County Parks Department]
- Hunter's Head Tavern
- Marriott Ranch
- Middleburg Tennis Club
- M&P Pizza
- Poplar Springs Inn
- Blackthorne Inn and Restaurant (formerly known as 1763 Inn)
- Spitony's Restaurant
- Northside 29 Restaurant (formerly known as Town and Country)
- Sky Meadows State Park [Virginia Parks Department]
- St. Stephen's Episcopal Church

These 15 Public Water Systems will follow the Fauquier County portions of this plan.

6.1.2 Other Non-Public Water Systems intended Primarily for Human Consumption

There are two known water users that were formerly classified as Public Water Systems, but now are not. The status of these water users is currently unknown:

- Pete's Park 'n Eat [Opal] (The Pete's Park 'n East restaurant has closed but the status of their public water system is unknown)
- Johnsons Motel (Warrenton, VA)

Lastly, many Fauquier County residents' water needs are serviced by individual private ground-water wells. There is not an accurate inventory of the number of these individual wells, but based upon the best estimate, the County's 2009 Water Supply Plan estimated that there were approximately 14, 425 separate individual private wells in Fauquier County that services an approximate 39,670 residents.

6.2 Non-agricultural Industrial Water Users

There are a few businesses that have their own groundwater systems that use the majority of their water for industrial purposes. Some of these dominant industrial water users include the following:

- Vulcan Sanders Quarry
- Kastle Green Golf Course (currently out of business, but maintaining turf by using surface water)
- Dominion Generation
- Marsh Run Old Dominion Electric Cooperative
- Fauquier Livestock Exchange (was formerly a Public Water System)

6.3 Agricultural Water Users

In spite of the dominance of agriculture within Fauquier County, agriculture has not been a dominant water user within the region. This is largely due to most agricultural operations not having traditionally irrigated crops. Crops relying upon direct precipitation are not included in this assessment of water demand, since this assessment focuses upon surface water and groundwater users. However, crops and other agricultural activities that solely rely upon precipitation are especially susceptible to drought-induced impacts. The following table summarizes the estimated water needs of various agricultural products within Fauquier County:

Agricultural Product	Water Requirement	Quantity of Product in County	Estimated Water Needs per Year (gallons)	Source of Water
Dairies	11,619 gallons per day per diary	26 dairies	110,259,930	Mostly Ground-Water (GW)
Beef Cattle	300 gallons per day per head	33,840 cattle	3,705,480	Surface Water (SW) & GW
Sheep	1.5 gallons per day per head	2,400 sheep	1,314,000	SW & GW
Horses	10 gallons per day per horse	14,800	54,020,000	SW & GW
Corn	25.9 in. per acre per year	10,700 acres	7,525,181,600	Rain

Soybeans	24 in. per acre per year	4,800 acres	3,128,140,800	Rain
Barley	17 in. per acre per year	1,100 acres	507,779,800	Rain
Alfalfa Hay	5 in. per ton	2,600 acres	1,341,407,600	Rain
Grass Hay	28 in. per acre per year	36,100 acres	27,447,263,200	Rain
Pasture	28 in. per acre per year	110,000 acres	83,634,320,000	Rain
Vineyards	360 gallons per vine per year	272 acres	70,992,000	Rain and Irrigation
Subtotal			**123.8 billion gallons of water per year**	

Traditionally, the majority of cattle within the County received their water directly from surface water sources. At an estimated 300 gallons per cow per day, this is a lot of water used within the County. The cattle simply waded into streams and drank directly from the surface water. While this practice is legal, there are a number of complications and problems associated with this practice. Some of the problems include:

- Cattle drinking from the same water that they are wading in, lying in (to stay cool), and defecating in, creates higher incidents of cattle diseases and health problems that are expensive to treat and reduces the economic potential of beef production;
- To access the streams, cattle often need to climb down stream embankments, which in turn causes soil erosion, bank failures, and stream sedimentation problems;
- Cattle walking and wading through sensitive wetlands causes soil compaction, destruction of wetlands, and turns the wetlands into mud holes; and
- Cattle accessing streams also impact fragile riparian buffers, which not only serve as wildlife habitat, but these buffers also protect and filter excess nutrients, sediment and other water contaminants from entering streams.

More farmers, especially the larger operations, are moving toward the trend of fencing streams off from cattle and providing dedicated wells for their livestock that are free from fragile and vulnerable resources, and provides their herd with high quality water, thus reducing medical expenses.

As a consequence to this trend, more surface waters are being restored and less surface water is being used, while at the same time more groundwater is extracted.

There are many agricultural users of both surface water and groundwater; some of the most dominant ones include the following:

- Marriott Ranch
- Virginia Beef
- Kettle Wind
- Woodland Turf Farm (uses exclusively surface water for irrigation)

In addition to these four, it is estimated that there are approximately 1,344 Fauquier County farms that utilize a mixture of groundwater and surface water.

In November 2013 Fauquier County staff updated the water needs information provided in the most recent Water Supply Plan. This new analysis indicates that the combined Fauquier County, WSA, Warrenton, Remington, and The Plains water needs from surface water and groundwater sources is approximately 3,000,000,000 gallons per year (this does not include precipitation needs of agricultural crops).

6.4 Biological and Ecological Water Needs

The focus of this drought management plan is ensuring an adequate supply of water for human use and consumption. However, although it is beyond the scope of this document, it should be recognized that there are also many other sometimes competing demands for water. Examples of some of these other uses include for fish and other aquatic organisms; ecological processes; recreational; transport via stormwater systems, our pollutants; and the disposal and dilution of treated effluent.

6.5 Water Demand/Availability Summary

Therefore, for the purposes of this plan, there are five categories of water users:

1) those served by Warrenton and therefore covered by the Warrenton sections of this plan;
2) those served by the Remington-owned and operated water system that covers part of the Town of Remington and are therefore covered by the Remington sections of this plan;
3) those served by WSA (both WSA owned/WSA managed and owned by others/managed by WSA- including The Plains); and therefore covered by the WSA sections of this plan;
4) those that obtain their potable, non-agricultural use water from other sources; and therefore covered by the County's non-agricultural portions of this plan; and
5) those agricultural uses not serviced by WSA, Remington or Warrenton (surface and ground-water); and therefore covered by the County's agricultural portions of this plan.

7. DROUGHT MANAGEMENT BACKGROUND

7.1 Indicators

<u>Total Precipitation</u>

One way of quantifying a drought is to measure total precipitation. However, a severe limitation with this parameter is the lack of a relationship to normal conditions and a relationship to other regional measurements. For instance, a one inch rainfall event in Fauquier County is a fairly routine occurrence; however, this same one inch rainfall event in Death Valley California would cause historic erosion and flooding, since their annual precipitation is only 2.91 inches.

Percent of Normal

The Percent of Normal is simply the statistics derived by dividing the actual accumulative precipitation over a given period (i.e. a month or a year) by the unit of time that you are interested in. For instance, if you wanted to know the normal precipitation for January, then you add the accumulative precipitation for all the Januarys in the last- say ten years, and divide that total by the number of "Januaries" involved in the total (in this case ten) to obtain the average or Mean January precipitation. The Percent of Normal can then be calculated for any accumulative January precipitation by subtracting the Mean Normal value from any actual January, and then converting this value into a Percent. [Note: the Commonwealth of Virginia uses a 30-year period to indicate their "Normal" values]. This indicator of drought is often reported in various media outlets, but since precipitation over this given period of time rarely follows a normal distribution, interpretations of the data may be confusing and hard to assimilate analytically and even harder to assess the rarity or the probability of the drought.

Standardized Precipitation Index

The Standardized Precipitation Index was developed to solve the statistical problems identified for the Percent of Normal data. The Standardized Precipitation Index (SPI) may be used statistically, and it may be used to assign the start and ending point of the drought, and it may be used to assess the rarity of the drought.

Crop Moisture Index

The Crop Moisture Index uses relatively short-term precipitation and temperature data to assign a drought indicator value designed to assess drought effects to agricultural products. Because it uses short-term (week-to-week) data, this indicator is highly influenced by short-term single events. As such, it is not as useful a long-term drought indicator.

Cumulative Severity Index/Keetch-Byrum Drought Index

The Cumulative Severity Index uses not only long-term precipitation data, but it also emphasizes short-term events in a manner that is designed to assess the dryness of the soil. This is a widely used drought indicator for assigning wildland fire hazard conditions, and may not be that useful as an indicator for general water supply purposes.

Palmer Drought Severity Index

The Palmer Drought Severity Index is calculated and administered by the National Oceanic and Atmospheric Administration (NOAA). The Palmer Drought Severity Index uses both precipitation and temperature values to determine long-term drought conditions. This Index is standardized to the local climatic conditions, but it is best used when looking at periods of several months. The Index assigns a value of "0" for normal conditions, and negative numbers equate to droughts. The following table describes the various terms used in the Palmer Drought Severity Index:

Extremely Moist	+4.00 and higher
Very Moist	+3.00 to +3.99
Moderate Moist	+2.00 to +2.99
Slightly Moist	+1.00 to 1.99
Normal	-0.99 to +0.99

Mild Drought	-1.99 to +1.99
Moderate Drought	-2.00 to -2.99
Severe Drought	-3.00 to -3.99
Extreme Drought	-4.00 and lower

There are more than one Palmer Drought Severity Indexes. The standard "Palmer Drought Index" depicts long-term meteorological drought conditions, while the "Palmer Hydrological Drought Index" depicts long-term hydrological conditions. Perhaps the latter index is more useful for Fauquier County, since it is concerned with groundwater conditions and other water supply conditions.

Non-precipitation-Based Drought Indicators

No matter how refined a national or regional drought index becomes, it may not effectively represent the water supply conditions at a local scale. This is especially true of water supply systems that rely upon small or localized water sources, such as that within Fauquier County. For instance, small watersheds often do not have the natural water storage capabilities as large watersheds. Therefore, the small watershed may experience wider extremes and may suffer disproportionally during even relatively mild drought conditions. Therefore, regional drought models and indexes are essential components of an effective local drought plan, but they should not be the sole trigger for local drought response.

There are drought indicators that do not utilize precipitation, such as reservoir or lake level, depth to groundwater in a well, and stream gage height; however, without having a reliable and accurate reference "Normal" value to compare it with, such data may be meaningless. Taken by itself, such data is often difficult to relate to other nearby data points in an effort to place the data in a regional context. These other indicators can be quite useful and powerful if there are reliable reference data, and when used as a companion with other drought indicators. An ideal drought management program for Fauquier County would incorporate statewide monitoring points; regional and local indexes, such as the Palmer Hydrological, coupled with locally monitored stream, well and surface water sites that are linked with reliable reference "normals" for each of these sites. Obtaining drought indicators from multiple sources and methodologies gives powerful collaborative strength to rely upon when implementing what could be disruptive water restrictions. In addition, having it scaled spatially provides a much more detailed and nuanced means of evaluating the drought conditions within Fauquier County.

Because of the narrow focus of some of these indexes, the localized nature of many of our water supplies, and the social hardships that would be created when there is an inadequate drought preparation or when water restrictions are imposed prematurely, or when not needed, it is wise to not rely only upon one indicator. Similar and consistent warnings from multiple indexes usually offer compelling indication of trends and potential concerns that should be professionally acted upon to lessen hardships for Fauquier County residents.

7.2 Indicators Used

7.2.1 Virginia

Virginia's drought management is directed and guided by the Virginia Drought Assessment and Response Plan dated March 28, 2003. A copy of Virginia's plan is included in the Appendix of this document. Virginia's plan designates drought management responsibilities for the Commonwealth of Virginia to lie with the multi-jurisdictional Virginia Drought Monitoring Task Force (DMTF) and the Virginia Department of Environmental Quality (DEQ). The DEQ monitors various environmental conditions throughout the state and produces monthly status reports. Based upon the crossing of designated drought triggers, the DMTF will activate drought procedures upon the first occurrence of moderate drought conditions. They will monitor the drought conditions using the following five indicators: Standardized Precipitation Index; Palmer Drought Severity Index; Crop Moisture Index; Keetch-Byrum Drought Index; and NOAA monthly and seasonal precipitation outlooks, as well as specific stream, groundwater and surface water monitoring locations.

Precipitation throughout the state is monitored and compared with the individual's Normal values. Besides using NOAA's 30-year Normal values, the DMTF determined that precipitation greater than 85% of this mean and less than 115% will be considered normal. Instead of a calendar year, precipitation is monitored by "water year," which is defined as October 1 to September 30 of each year.

For management purposes, the Commonwealth's Drought Assessment and Response Plan divided the state into thirteen different drought evaluation regions. Fauquier County lies in their "northern Virginia" region, along with Loudoun, Prince William, Arlington and Fairfax Counties.

The DMTF uses the Accotink Creek near Annandale as their reference stream to determine stream flow drought conditions for the Northern Virginia Region. Since this stream is a long way from Fauquier County, it is unknown how representative it is for stream flow within our county. The DMTF monitors ground water levels in two wells for their reference groundwater drought conditions for Northern Virginia Region: one near Harper's Ferry, WV and one near Arlington Cemetery. Due to the highly individualistic nature of many of the aquifers in the fractured groundwater aquifers that occur in Fauquier County, it is suspected that these wells do not adequately represent Fauquier County, although this has not been confirmed.

The DMTF monitors water levels in two reservoirs for their reference reservoir drought conditions for Northern Virginia Region: the Occoquan Water Supply Reservoir and Lake Manassas Water Supply Reservoir. While the Warrenton Reservoir is closer, the locations of these two monitored reservoirs are close enough to Fauquier County that they are assumed to be fairly representative of our needs.

Because the significance of a precipitation deficit changes as the water year progresses, drought response stages will trigger at different percentages of normal depending upon the date of evaluation, as depicted in the following table:

Months Analyzed	Normal (% of Normal Precipitation)	Watch (% of Normal Precipitation)	Warning (% of Normal Precipitation)	Emergency (% of Normal Precipitation)
October – December	>75.0	<75.0	<65.0	<55.0
October – January	>80.0	<80.0	<70.0	<60.0
October – February	>80.0	<80.0	<70.0	<60.0
October – March	>80.0	<80.0	<70.0	<60.0
October – April	>81.5	<81.5	<71.5	<61.5
October – May	>82.5	<82.5	<72.5	<62.5
October – June	>83.5	<83.5	<73.5	<63.5
October – July	>85.0	<85.0	<75.0	<65.0
October – August	>85.0	<85.0	<75.0	<65.0
October – September (and previous 12 months)	>85.0	<85.0	<75.0	<65.0

7.2.2 Fauquier County

The Fauquier County Regional Water Supply Plan (2011) established the three drought response stages that the state had established: Drought Watch; Drought Warning; and Drought Emergency. This plan does not cover Warrenton or agricultural water users. Besides the monitoring and triggers specific to WSA and Remington, this plan established that the following drought indicators will be monitored:

- Statewide Virginia drought indicators;
- USGS flow duration curves (Rappahannock River, Cedar Run and Goose Creek);
- NOAA drought monitor;
- NOAA Palmer Index;
- Surface water levels in Warrenton's reservoirs;
- Precipitation deficits;
- Local recommendations which would allow jurisdictions to act independently on a localized area of impact. Examples of local triggers might be slow recovery of WSA wells, the level of the Warrenton Reservoir and the Department of Forestry danger levels. If the County opts to undertake a groundwater program, the results of all groundwater monitoring will also be used by the Task Force in order to assess water quantity.

This current Drought Plan updates and supersedes the drought management portion of the 2011 Water Supply Plan. Some of the biggest deficiencies of the 2011 effort includes the lack of specific enforcement standards and protocols, and the adoption of ordinances that support such process, and the lack of comprehensiveness (it did not include the Town of Warrenton, WSA, or agricultural operations). It is for some of these reasons, that enforcement specific standards and

protocols will be included in this plan, and the development of ordinances will be prepared concurrent with or in conjunction with this plan.

Since the County does not directly manage any potable or public water, its ability to enforce or incentivize drought restrictions is limited. Therefore, the best approach is one of coordination, facilitation and support.

7.2.3 Fauquier County Water and Sanitation Authority

The Fauquier County Water and Sanitation Authority (FCWSA) currently use the following techniques to plan for water production shortages:

- Monitor and review well drawdown data, watch for any trends that suggest diminished production;
- If reduced water supplies are observed:
  - a reduced flushing schedule is implemented;
  - water use restrictions are implemented
- In extreme cases, water may be trucked between WSA systems as needed.

~~The WSA took over operation of the Marshall Water System from the now defunct Marshall Water Works in 2005. Because of the degraded infrastructure in the Marshall area as well as low supply, the WSA imposed water use restrictions on the Marshall Service area beginning in 2007. These restrictions include limitations on outdoor water use such as filling swimming pools, watering laws, and on commercial car washing.~~

7.2.4 Warrenton

The Town of Warrenton's drought monitoring is directly tied to water levels in their reservoirs. These triggers are discussed in greater depth in later sections of this plan.

7.2.5 Remington

The Town of Remington drought monitoring procedures are discussed in greater depth in later sections of this plan.

7.2.6 The Plains

The Town of The Plains currently has no known drought management guideline or plan. Since they receive water from the WSA, their drought provisions will follow those of WSA.

7.2.7 Private Individual Wells and Agricultural Water Users

Individual private wells were not covered in the drought provisions in the 2011 Fauquier County Regional Water Supply Plan. The Commonwealth of Virginia does not grant counties a lot of latitude in managing and regulating private groundwater wells. In spite of this limited authority over private wells, they are included in this current plan for the interest of being holistic. Clearly, people on private wells utilize water and place demands upon water, and it is believed that to be most effective in managing limited water during a drought, managers must be aware of the totality of water demands, and place all the demands into proper context. Even if the County has limited authority to regulate these water users, it appears irresponsible to simply ignore a significant

segment of water users and to factor them out of the equation in understanding drought and mitigating the negative effects of drought. It is for these reasons that private water wells and water users are included in this plan.

8. DROUGHT MANAGEMENT SPECIFICS

8.1 Operations

The central aspect of this drought plan is the coordinated and unified approach of the County; the WSA; the Towns of Warrenton, Remington, and The Plains; private self-supplied users; and the agricultural industry. The premise is that the effects of droughts will be less if all relevant organizations are prepared, coordinated and facilitate each other's goals.

~~Along this line, two specific functional duties are outlined here: a drought coordinator and drought monitors.~~ A **~~d~~Drought ~~t~~Team** will be selected and assigned the responsibility of managing droughts within the combined area of Fauquier County and the towns of Warrenton, The Plains and Remington, including the WSA and agricultural sectors. This ~~t~~Team, ~~should~~ shall consist of ~~representatives of~~ the following ~~organizations~~:

- Warrenton Town Manager, or his/her designee
- Remington Town Manager, or his/her designee
- The Plains Town Manager, or his/her designee
- WSA Executive Director, or his/her designee
- District Manager of the John Marshall Soil and Water Conservation District, or his/her designee
- ~~Fauquier County Agricultural Extension~~
- ~~Farm Bureau~~
- Fauquier County Fire Chief, or his/her designee ~~Department of Fire Rescue & Emergency Management~~
- ~~VA Department of Forestry~~
- Fauquier County Administrator, or his/her designee ~~Administration~~
- Fauquier County Office District Director of Commonwealth of Virginia Health Department, or his/her designee
- ~~Fauquier County Community Development~~
- ~~Fauquier County Parks and Recreation~~
- ~~Fauquier County Sheriff's Office~~
- ~~Fauquier County General Services~~
- ~~Fauquier County Environmental Health~~
- ~~Natural Resource Conservation Service~~
- ~~Fauquier County Public Schools~~
- ~~A private non-agricultural industrial water user that manages their own groundwater supply system~~

~~A representative of the Department of Fire Rescue & Emergency Management~~ The Director of the Fauquier County Department of Community Development, or his/her designee, shall be the **~~d~~Drought ~~c~~Coordinator**, and serve as the staff lead ~~on~~ for this team. The primary responsibilities of this team are drought management, public communication, and drought

education and public awareness. This team only convenes upon the initiation of a drought. The Drought Coordinator shall coordinate with representatives from the WSA, various towns located within the County, agricultural entities (either directly or through the County Agricultural Development Director), and private non-agricultural water users. If the Drought Coordinator receives a request from any of these representatives or information that any of the conditions that would trigger any level of drought pursuant to this plan has occurred, the Drought Coordinator shall call an emergency meeting of the Drought Team.

~~A drought monitor shall be selected from each of the following organizations: Community Development (monitors regional and state drought situations); Agricultural Extension (monitors farm drought conditions); Town of Warrenton (monitors their reservoirs and their drought triggers); Town of Remington (monitors their water supply); a private non-agricultural water user (that manages their own water supply system); and WSA (monitors their water supply). Representatives of these organizations will monitor the agreed upon environmental conditions and when these conditions cross the threshold for one or more of the action items outlined in the "trigger" section of this plan, then any or all of the monitors will call the entire Fauquier Drought Management Committee (FDMC) into action.~~

Once the entire Team is convened, the Team is responsible for implementing the action items identified in the plan and to coordinate and facilitate communication with other affected organizations, publics, and interested parties.

Once one of the drought triggers have been activated, the following process will be initiated:

1) Make sure the entire Drought ~~Management~~ Team is alerted~~. If any individual member is unavailable, then a suitable temporary replacement is needed. The Team reconvenes- the Department of Fire Rescue and Emergency Services is the lead. The Fauquier County Cooperative Extension Office shall be the sub-lead for agricultural factors~~;
2) Obtain detailed monitoring and status conditions from the monitoring subset of the group;
3) Generate a specific recommendation, compatible with the established procedures (see appendix);
4) Obtain needed authorizations from affected organizations;
5) Update, as needed, any website and other related public document;
6) Communicate with affected entities in a manner consistent with Drought Management public notifications procedures (see appendix);
7) Continue monitoring environmental conditions in a manner sufficient to determine at which point the drought has ended, or the work accomplished so far has reached its conclusion;
8) Obtain needed permission to end drought action; and
~~9)~~ Notify any entities needed to ensure the latest status has been communicated~~; and~~
~~10) Disband the full committee.~~
11) ~~Continue monitoring~~.

~~The FDMC will be responsible for monitoring the drought conditions within Fauquier County by a combination of the use of Virginia's monitoring program, combined with local sites more specific to, and applicable for, Fauquier County.~~

Fauquier County will employ four drought management levels: 1) Normal Conditions~~Non-drought~~; 2) Drought Watch; 3) Drought Warning; and 4) Drought Emergency.

8.2 Monitoring Sites:

Besides tracking the state's drought status, the ~~FDMC~~ representatives of Drought Team members will also monitor the following local sites and specific indexes:

1) Palmer Hydrologic Drought Indicator
2) Crop Index
3) Precipitation Index
4) Germantown Lake
5) Precipitation at Boston
6) Precipitation at Washington, DC Dulles International Airport
7) USGS stream gage on the Rappahannock River near Remington
8) USGS stream gage on the Cedar Run near Catlett
9) USGS stream gage on Goose Creek near Middleburg

8.3 Triggers (Summary):

County/WSA	**Drought Watch**	**~~n/a~~**	**Drought Warning**	**Drought Emergency**
Warrenton Condition	**1**	**2 *(Warrenton only)***	**3**	**4**
Warrenton	•Warrenton Reservoir at or below elevation 440.0; and •Airlie Reservoir down 2.5 feet below Normal Pool Elevation.	•Warrenton Reservoir at or below elevation 440.0; and •Airlie Reservoir down 5.0 feet below Normal Pool Elevation.	•Warrenton Reservoir at or below elevation 440.0; and •Airlie Reservoir down 8.0 feet below Normal Pool Elevation.	• Any situation that requires immediate and drastic action to preserve life, safety and health • Airlie Reservoir down 14.3 feet below Normal Pool Elevation.
Remington	•Well recharge times take longer than in Normal conditions, well pumping level below normal stable levels; •NOAA drought index DI (Drought Moderate); •Current demand requires the use of any Town water supplies above the safe	~~n/a~~	•Wells are not recharging to normal levels during their off times; •Pump levels within 150 feet of well pump location; •Tank is out of service for maintenance; •NOAA Drought Index of D2 (Severe Drought); •Current demand between 85 to 95	•One or more wells not functioning properly or with extreme drawdown, within 100 feet of the well pump; •Storage drawn below 65 percent of total capacity; •NOAA Drought Index of D3 (Extreme Drought); •Major waterline break;

	yield capacity for more than two consecutive days.		percent of system safe yield on average for a week; •Current demand required the use of any Town water supplies above the safe yield capacity for more than two consecutive days.	•Current demand at or above 95 percent of system safe field on average for a week.
WSA	- Water demand is between 75% and 85% of permitted capacity; - All WSA facilities operating within normal parameters; - No major well, storage or treatment facility is out of service for maintenance.	~~– n/a~~	• Water demand is between 85% and 95% of permitted capacity; • A major well, storage or treatment facility is out of service for maintenance.	• Water demand exceeds 95% of permitted capacity; • A major WSA waterline break; • A major well, storage or treatment facility is out of service for maintenance or an emergency condition to include related or manmade disaster.
County	At least two of the following indictors occurred: • Precipitation levels are at or below the percent of normal precipitation for the time period in precipitation table; • Streamflows fall between the 10th and 25th percentile;		At least two of the following indictors occurred: • Precipitation levels are at or below the percent of normal precipitation for the time period in precipitation table; • Streamflows fall between the 5th and 10th percentile;	At least two of the following indictors occurred: • Precipitation levels are at or below the percent of normal precipitation for the time period in precipitation table; • Streamflows are at or below the 5th percentile; • Measured ground water levels are at or below the 5th percentile for

	• Ground water levels fall between the 10th and 25th percentile for all historic levels; • Water Supply Reservoirs contain between 90 and 120 days of useable storage or appropriate criteria for non-water supply reservoirs. • ~~Stream discharge of stream A, B or C between the 10th and 25th percentile of Normal Flow.~~ • ~~Precipitation at A Station between 65 and 75 percent of Normal Precipitation.~~ • ~~The State, Warrenton or WSA calls a Drought Watch.~~		• Measured ground water levels fall between the 5th and 10th percentile for all historic levels; • Water supply reservoirs contain between 60 and 90 days of usable storage or appropriate criteria for non-water supply reservoirs. • ~~Stream A, B or C between the 5th and 10th percentile of Normal Flow.~~ • ~~Precipitation at A Station between 55 and 65 percent of Normal Precipitation.~~ • ~~The State, Warrenton or WSA calls a Drought Warning.~~	all historic levels • Reservoirs contain 60 days or less of useable storage or appropriate criteria for non-water supply reservoirs. • ~~Stream A, B or C less than the 5th percentile of Normal Flow.~~ • ~~Precipitation at A Station less than 55 percent of Normal.~~ • ~~The State calls a state-wide Emergency.~~ • ~~The State, Warrenton or WSA calls a Drought Emergency.~~
Agricultural	Varied, see the appendix for further information	~~Varied, see the appendix for further information~~	Varied, see the appendix for further information	Varied, see the appendix for further information

8.4 Guiding Principles in the Determination of Water Restrictions

- Ensure health and safety are not compromised;

- As much as possible, action items will be targeted to the most applicable scale to ensure blanket restrictions are not imposed on areas that are not needed;
- Implement and maintain an organized process to increase efficiency, promote communication and instill confidence;
- Demonstrate effective and efficient interorganizational communication and coordination;
- Avoid or minimize economic impacts where possible;
- Any measures taken are scaled to ensure least impactful actions are taken first and implemented progressively;
- Focus on cooperative work with large water users so as to reduce the hardships to the majority of the small users; and
- Encourage education and public awareness of water demands, usage and conservation measures.

8.5 Drought Management in Specific Locations

8.5.1 Fauquier County Water and Sanitation Authority

Normal Conditions (~~Observe~~ Voluntary Wise Water Use):

Management Actions

~~- These are voluntary actions, so no penalty will be assessed.~~

- Education and outreach about wise use of water.

~~Triggers~~ Normal conditions occur when all of the following three criteria are met:

- Water supply is adequate to meet all demands (demand <75% of permitted capacity);
- All facilities are operating within normal parameters;
- No major well, storage or treatment facility is out of service;

and no more than one of the following Commonwealth of Virginia drought indicators are outside of the normal range:

- Precipitation exceeds the percent of normal precipitation for the time period in precipitation table
- Streamflows are above the 25th percentile
- Ground water levels are above the 25th percentile for all historic levels
- Water Supply Reservoirs exceed 120 days of useable storage or appropriate criteria for non-water supply reservoirs

~~Water~~ Drought Watch (Voluntary Water Conservation):

Management Actions

- Education and outreach about voluntary water conservation measures which include encouraging:
  - § Limited watering of lawns ~~Watering of lawns is limited~~ to no more than three (3) days per week only during the night between 8 p.m. and 8 a.m. on any day.
  - § The avoidance of washing vehicles or wash no more than ~~Homeowners may wash cars~~ once a week.
  - § Limited replenishment of swimming pools only to levels necessary to maintain health and safety.

- § The avoidance of ~~No~~ washing of streets, roads, sidewalks, driveways, buildings, garages, parking areas or patios.
- § All restaurant related uses are permitted.
- § All agricultural irrigation or water for farm animals is permitted.
- § The limited ~~U~~use of fire hydrants for training purposes ~~is limited~~ to once a week upon coordination with WSA.

~~Triggers~~ Drought watch is triggered when, all WSA facilities are operating within normal parameters and no major well, storage or treatment facility is out of service for maintenance, and either:

- Water demand is between 75% and 85% of permitted capacity;

OR at least two of the following Commonwealth of Virginia drought indicators meet the following conditions:

- Precipitation levels are at or below the percent of normal precipitation for the time period in precipitation table
- Streamflows fall between the 10th and 25th percentile
- Ground water levels fall between the 10th and 25th percentile for all historic levels
- Water Supply Reservoirs contain between 90 and 120 days of useable storage or appropriate criteria for non-water supply reservoirs.

~~Water~~ Drought Warning (Voluntary and/or Mandatory Water Conservation):

Management Actions

- ~~For all these actions, the first offense is a written warning. Fines are imposed for subsequent offenses.~~
- Watering of lawns is limited to one day per week only during the night between 8 p.m. and 8 a.m. on any day.
- Homeowners may not wash cars. Commercial car washing is allowed only in facilities where at least 80 percent of water is recycled.
- ~~Replenish s~~Swimming pools may only be replenished to levels necessary to maintain health and safety.
- No washing of streets, roads, sidewalks, driveways, buildings, garages, parking areas or patios.
- Restaurants may serve water to customers only upon request.
- All agricultural irrigation or water for farm animals is permitted.
- Use of fire hydrants for training purposes is prohibited.

Drought warning is triggered when either:

- Water demand is between 85% and 95% of permitted capacity;
- A major well, storage or treatment facility is out of service for maintenance;

OR at least two of the following Commonwealth of Virginia drought indicators meet the following conditions:

- Precipitation levels are at or below the percent of normal precipitation for the time period in precipitation table
- Streamflows fall between the 5th and 10th percentile

- Measured ground water levels fall between the 5th and 10th percentile for all historic levels
- Water Supply Reservoirs contain between 60 and 90 days of useable storage or appropriate criteria for non-water supply reservoirs.

~~Water~~ Drought Emergency (Mandatory Water Conservation):

Management Actions ~~(for all these actions, the first offense is a written warning. Fines are imposed for subsequent offenses.~~

- Lawns may not be watered with the use of automatic sprinkler systems, whether installed in the ground or attached to a hose. Gardens may only be sprinkled with watering cans or a handheld hose.
- Homeowners may not wash cars. Commercial car washing is allowed only in facilities where at least 80 percent of water is recycled.
- Private pools may not be filled or topped off. Public pools serving health care facilities and residential pools serving more than 25 units may be filled or topped off. Newly constructed pools are exempted and may be filled.
- No washing of streets, roads, sidewalks, driveways, buildings, garages, parking areas or patios.
- Restaurants may serve water to customers only upon request.
- All agricultural irrigation or water from farm animals is permitted
- Use of fire hydrants for training purposes is prohibited.

Drought emergency is triggered when either:

- Water demand exceeds 95% of permitted capacity;
- A major well, storage or treatment facility is out of service for maintenance or an emergency condition to include related or manmade disaster;
- A major WSA waterline break;

OR at least two of the following Commonwealth of Virginia drought indicators meet the following conditions:

- Precipitation levels are at or below the percent of normal precipitation for the time period in precipitation table
- Streamflows are at or below the 5th percentile
- Measured ground water levels are at or below the 5th percentile for all historic levels
- Reservoirs contain 60 days or less of useable storage or appropriate criteria for non-water supply reservoirs.

8.5.2 Remington

Because the water system for the Town of Remington is operated independently of WSA, it currently uses the following procedure to monitor for drought conditions:

Normal Water Conditions

Management Actions:

- Observe wise water use.

Triggers:

- Wells are recharging to normal levels with stable pumping levels.

- Water Supply is adequate to meet demands (demand < 75 percent of capacity).
- NOAA drought index neutral to DO (abnormally dry)
- All Town facilities are operating within normal parameters.

Drought Watch

Management Actions:

- Voluntary water conservation.
- The Town announces voluntary water conservation recommendations.

Triggers:

- Well recharge times take longer than in Normal conditions, well pump below normal/stable levels.
- NOAA drought index level Moderate.
- Current demand requires the use of any Town water supplies above the safe yield capacity for more than two consecutive days.

Drought Warning:

Management Actions:

Voluntary water conservation plus some mandatory restrictions.

Triggers:

- Wells are not recharging to normal levels during their off times.
- Pumping levels within 150 feet of well pump locations.
- Tank is out of service for maintenance.
- NOAA Drought Index listed as Severe Drought.
- Current demand between 85 to 95 percent of safe yield on average for a week.
- Current demand requires the use of any Town water supplies above the safe yield capacity for more than two consecutive days.

Drought Emergency:

Management Actions:

- Mandatory water restrictions.

Triggers:

- One or more wells not functioning properly or with extreme drawdown, within 100 feet of the well pump.
- Storage drawn below 65 percent of total capacity.
- Major waterline break.
- Current demand at or above 95 percent of system safe yield on average for a week.
- NOAA Drought Index listed as Extreme Drought or higher.

8.5.3 Warrenton

The Town of Warrenton has a draft Water Supply (2010) that includes various water conservation practices that residents are encouraged to adopt. Their Drought Ordinance (January 20, 1999) is highly tiered to the pool-levels of Warrenton and Airlie Reservoirs. It has four management levels for drought, listed as "Conditions." They are as follows:

Condition 1 (Voluntary Conservation):

Management Actions:

- The public is requested to restrict water use. Conservation tips will be provided by the Town.

Triggers:

- 150 days storage remaining (this is defined as the Warrenton Reservoir is ½ full (elevation 440.0) and the Airlie Reservoir is 2.5 feet below normal pool elevation.

Condition 2 (Restricted Use):

Management Actions:

- The Town may restrict water use for outdoor use (car washing, lawn watering, filling swimming pools) or other uses. Mandatory restrictions with violations subject to fines.

Triggers:

- 120 days storage remaining (this is defined as the Warrenton Reservoir is ½ full (elevation 440.0) and the Airlie Reservoir is 5.0 feet below normal pool elevation

Condition 3 (Mandatory Reduction of Consumption):

Management Actions:

- In addition to restrictions in Condition 2, each customer will be limited to a specific volume or percentage reduction based upon prior billing history. A surcharge of $10 per 1,000 gallons above the allocation will be charged to the monthly bill.

Triggers:

- 90 days storage remaining (this is defined as the Warrenton Reservoir is ½ full (elevation 440.0) and the Airlie Reservoir is 8 feet below normal pool elevation.

Condition 4 (Emergency- any situation that requires immediate action to preserve health and safety):

Management Actions:

- The Town manager will restrict water use to only that absolutely essential to life, health and safety.

Triggers:

- This would be in response to catastrophic loss of one of the dams, treatment plant failure or multiple main breaks.

8.5.4 Fauquier County

Normal Conditions – the County will continue to educate about the wise use of water. This condition is found when no more than one of the following indicators is outside of the normal range:

- Precipitation exceeds the percent of normal precipitation for the time period in precipitation table
- Streamflows are above the 25th percentile
- Ground water levels are above the 25th percentile for all historic levels
- Water Supply Reservoirs exceed 120 days of useable storage or appropriate criteria for non-water supply reservoirs.

Drought Watch - the County will implement voluntary water restrictions to reach a goal of 10 percent reduction in water usage. Including:

- Public education ~~started~~ focused on how to reduce water usage.
- Notification of drought conditions posted on County website and ~~Fauquier County's Emergency Management Facebook page~~ press releases (Fauquier County's notification procedures are listed in the Appendix).

This level is triggered when at least two of the following indicators meet the following conditions:

- Precipitation levels are at or below the percent of normal precipitation for the time period in precipitation table
- Streamflows fall between the 10th and 25th percentile
- Ground water levels fall between the 10th and 25th percentile for all historic levels
- Water Supply Reservoirs contain between 90 and 120 days of useable storage or appropriate criteria for non-water supply reservoirs.

Drought Warning - the County will implement voluntary water restrictions to reach a goal of 20 percent reduction in water usage. In addition to the actions identified under the "Watch" level:

- Alert larger water users that have established water management action plans, so that they may activate the plans as appropriate.
- Establish voluntary water restrictions on watering lawns and washing cars (levels of restrictions to be determined by the drought team, depending on current conditions and drought indicators in each area).

This level is triggered when at least two of the following indicators meet the following conditions:

- Precipitation levels are at or below the percent of normal precipitation for the time period in precipitation table
- Streamflows fall between the 5th and 10th percentile
- Measured ground water levels fall between the 5th and 10th percentile for all historic levels
- Water Supply Reservoirs contain between 60 and 90 days of useable storage or appropriate criteria for non-water supply reservoirs.

Drought Emergency - the County will ~~adopt and~~ enforce ~~any~~ water use restrictions contained in the Drought Ordinance of the Fauquier County Code.~~that may have been issued by any drought emergency declaration issued by the Commonwealth of Virginia. Special circumstances may dictate that special restrictions may be needed to support water emergency restrictions issued by any or all of the governmental partners to this plan. Such individual case-specific exemptions shall only be initiated upon the prior approval of the Chair on the Fauquier County Board of Supervisors.~~ In addition to the actions taken under the "Drought Warning" level, there shall be:

- ~~Daily alerts~~ Alerts sent out on the Fauquier County's Emergency Notification System to include drought emergency updates.
- Mandatory water restrictions placed on activities as delineated in the Drought Ordinance of the Fauquier County Code, including but not limited to watering lawns and washing cars ~~(levels of restrictions to be determined by the drought team, depending on current conditions and drought indicators in each area)~~.
- ~~Warnings~~ Summonses and potential prosecutions and fines issued for violators of water restrictions (see the Appendix for enforcement guidelines).

This level is triggered when at least two of the following indicators meet the following conditions:

- Precipitation levels are at or below the percent of normal precipitation for the time period in precipitation table
- Streamflows are at or below the 5th percentile
- Measured ground water levels are at or below the 5th percentile for all historic levels
- Reservoirs contain 60 days or less of useable storage or appropriate criteria for non-water supply reservoirs.

Within Virginia, there is a separate but related process for the establishment of agricultural disaster designations. These processes are located in the Appendix.

8.5.5 Other Public Water Systems and Water Users

None of these water users have any known drought triggers; however, some of the businesses and agricultural operations may have established action plans in the event of droughts. These entities may include:

Parks and Recreation Sites
- Northern Fauquier Community Park
- C.M. Crocket Park
- Sky Meadows State Park
- Middleburg Tennis Club
- Camp Moss Hollow
- Phoebe Hall Knipling Outdoor

Schools
- Marshall/Coleman Schools
- H.M. Pearson Elementary School
- Southeastern Alternative High School

Midland Christian Academy
Fresta Valley Christian School
Claude Thompson Elementary School
Mary Walter Elementary School
Mountainside Montessori School

Restaurants

El Agave Mexican Restaurant (Frogs & Friends)
Northside 29 Restaurant (Town and Country)
Spitonys Restaurant
Blackthorne Inn & Restaurant (1763 Inn)
Hunters Head Tavern
Pete's Park 'n Eat (the restaurant is closed, but their well may still be active)
M & P Pizza
McDonald's Opal

Child Care

Maplewood Child Care Center
Piedmont Child Care
Walnut Grove Child Center
Walnut Grove Child Care III
Southern Fauquier Child Development

Churches

Midland Church of the Brethren
St. Stephens Episcopal Church

Businesses with Separate Water Systems

Fauquier Livestock Exchange
Chemetrics, Inc.
Ross Industries
Sheetz Station #221
Quarles Truck Stop
Johnsons Motel
Airlie Foundation
Dominion Generation
Marsh Run Old Dominion Electric Cooperative
TP Development Parcel (former Trinity Plastics)
Poplar Springs Inn
Fauquier Springs-Sulfur Springs Investment Corp.
Smith-Midland Corp.
Virginia Power

Agricultural

Marriott Ranch
Woodward Turf Farm
Virginia Beef Corp.
Kettle Wind Farm LLC

8.6 Common Actions that May be Taken during All Drought Situations

Normal Conditions:

No special actions are required other than to continue with the monitoring as prescribed by this plan; however, the best time for drought planning and preparation is during non-drought times. The County will continue to try to educate the public about the wise use of water.

Drought Watch:

- The Drought Coordinator will notify of the Drought Watch and advertise the drought conditions by posting on County website and press releases (Fauquier County's notification procedures are listed in the Appendix). Advertisements are primarily a public education campaign focused on how to reduce water usage in an effort to implement voluntary water restrictions to reach a goal of 10 percent reduction in water usage. These voluntary efforts can include, but not be limited to:
    - Suggesting that providers and users ~~P~~perform inspections of integrity of water lines and other potential sources of water loss~~. Fix~~ and repair any leaking pipes, fixtures or faucets.
  - The Drought Coordinator will prepare all notices and press releases required herein.
  - ~~Make monthly reports on drought condition to Drought Coordinator.~~
    - ~~Drought Coordinator will declare a county-wide Drought Watch and will issue a press release indicating the reasons for the declaration.~~
    - ~~The Fauquier County Drought Coordinator will notify the following entities: County Administrator; Warrenton; The Plains; Remington; WSA; Police; Fire; Schools; Agriculture; Forestry; and Health. Plus the [MEDIA]. Plus other water entities.~~
  - The Drought Coordinator will ~~E~~encourage water providers to review existing water conservation plans.
  - Agencies and departments represented on the Drought Team ~~Committee~~ should post Drought Watch notifications on their respective websites and through their other typical public outreach efforts.
    - ~~Leak detection and other water conservation measures.~~
  - Any private organization, entity or business that uses on average more than 1,000 gallons per day shall develop their own water reduction plan tiered to the drought notification levels contained in this plan, and that entity must, during periods of ~~drought~~Drought Watch, provide monthly reports to the ~~Committee~~ Drought Coordinator that summarizes their water conservation efforts taken and water reduction levels achieved. The Drought Coordinator, or designee, will notify these organizations of this requirement and will provide an annual reminder.

8.7 Potential Means of Water Conservation

No matter what drought level Fauquier County is in, residents, businesses, communities and government agencies can, and should, critically evaluate and explore more efficient water conservation practices. Upon the initiation of drought watches, warnings, emergencies or crisis, some of these practices may transition from voluntary to requirements. The emphasis of this Drought and Emergency Response Plan is to facilitate coordination and to set certain water

conservation goals, rather than being 100 percent prescriptive in how each person finds ways to conserve precious Fauquier County water resources. The important concern is the responsible conservation of water, not necessarily how one achieves this goal. However, for consistency purposes, for time management during emergency situations, and for other purposes, there will still be a need for specific bans or restrictions, if the situation warrants such an approach. Therefore, the following list of water conservation practices is not intended to be a complete or exhaustive list, but rather to provide some examples of what can be done to conserve water, and that may show up as requirements or restrictions during the higher levels of drought emergencies:

- Use dishwaters only when they are full.
- Wash only full loads of laundry (adjust water level if possible).
- Turn off faucets while brushing teeth, shaving, etc. (saves about five gallons per day).
- Reduce water used per toilet flush by installing toilet tank displacement inserts. A plastic jug may be used as an alternative. [Note: do not use bricks. They disintegrate when soaked and the resulting grit hinders closing of the flap value, causing leakage and subsequent water loss].
- Keep a bottle of water in the refrigerator, so as to limit the running of tap water to get cold water.
- If you have a water meter, monitor it to evaluate how much water you use and the timing of this use, so as to better inform you of how you may create additional water savings.
- Take shorter showers and baths (saves about 25 gallons per shower/bath).
- Do not use a garbage disposal.
- Do not use water to wash off driveways or sidewalks.
- Water before 10:00 a.m. to reduce evaporation during the hottest part of the day. Watering in the morning is better than the evening, because the dampness and coolness of the evening may promote fungal growth.
- When watering plants, use drip irrigation that directs water to the root system. If you do not have drip irrigation capabilities, then closely monitor your watering to ensure that the water is turned off when sufficient water has been delivered. Avoid run-off.
- When watering plants, water infrequently but thoroughly, because water penetrating deeper in the soil will be retained longer and it will encourage plants to grow deeper roots. Conversely, water from frequent light waterings often is lost due to evaporation, and it encourages plants to grow in the shallow soil zones that dry out quickly causing greater plant stress and the need for additional waterings.
- Water lawns only when necessary [note: grass that springs back when stepped on does not need water].
- Install automatic shut-off nozzles on outdoor water hoses.
- Aerate lawns by punching small holes approximately six inches apart. This will encourage water to soak into the soil rather than run off the surface.
- Position manually-placed sprinklers so that they do not water pavement, gravel, buildings or other non-plant surfaces.
- Know how to turn off an automatic irrigation system in case of rain.
- Weed gardens so that more desirable plants do not have to compete for limited moisture.
- Mulch garden beds to reduce evaporative water loss and weed growth, and cool the soil, which in turn creates less water-stress to plants.
- During dry periods postpone new plantings, since new plantings often require a higher quantity of irrigation.
- Use trash cans to dispose of used tissues rather than flushing them down the toilet.

- Avoid mowing grass at a very short height, since more water evaporates from short grass than taller grass.
- Do not allow children to play water games.
- Reduce or eliminate car washing.
- Encourage the use of rainbarrels and other means to capture and re-use water.
- Turn off ornamental water fountains.
- Avoid irrigation of athletic fields.
- Discourage the ~~F~~filling or topping off outdoor swimming pools ~~discouraged~~.
- Avoid washing car, boats, and other personal or recreational equipment.
- ~~Restaurant will serve~~ Serve water to restaurant patrons only upon request.

8.8 Alternate and Emergency Water Supplies/Sources

There are many situations within droughts that managers may want to find alternative water supplies to mitigate their shortages through their normal sources. In these situations, it is suggested that managers identify these sources before drought situations, and as much as possible, to obtain any permits, permission, contracts and other logistical obstacles before drought emergency situations kick in. It is recommended that the various agencies and organizations decide upon priorities, in order to reduce the potential of conflicts during droughts, since an emergency situation is not the best time for multiple organizations to be arguing over limited resources. For instance, it would be undesirable if a hospital was counting on the use of an emergency tank of water to supply critical life-support functions during a drought finds that someone had already tapped into this emergency supply in order to water a golf course. To avoid these problems, pre-planning and prioritization is important. The first step is to inventory potential emerge sources of water. Some potential sources may include the following:

Germantown Lake

One of the purposes of creating Germantown Lake is as an alternative water supply. Therefore, using it for drought emergencies is consistent with this purpose. There are no dry hydrants present to tap into Germantown Lake. To withdraw water from the lake would require hoses, pumps and other assorted equipment (such as filters), and to either drive up to the boat ramp or use the dam access road (both in C.M. Crockett Park).

Dry Hydrant Inventory

Fauquier County's Department of Emergency Services had started an inventory of the County's dry hydrants. It is recommended that this inventory be completed, incorporated into a Geographic Information System (GIS), shared with other organizations in the County, and to develop an approval and prioritization process.

Rappahannock River

Some withdrawals from the Rappahannock River may be a viable option; however, permits and coordination with the Virginia Department of Environmental Quality is required.

Other tanks, reservoirs, storage facilities

Some private businesses, such as the Sander's Vulcan Quarry, maintain large water tanks on site. Coordination, approval and agreements with these businesses would be required prior to their emergency usage for purposes beyond that designed by the landowner/owner.

Other localities

Purchasing or trading for water from other localities that are not experiencing as much of a drought as Fauquier County is always a possibility; however, prior permission and contractual arrangements would be required. In addition, sizeable transportation expenses may also be involved.

9.0 Updating the Plan

This plan will require periodic updating and/or revising. Since this is a multi-jurisdictional plan, the updating of this plan will not take the standard approach. If the standard approach is utilized, a small change in how one entity, such as the Town of Warrenton wanting to make a change on one of their triggers, would necessitate approved and re-signing by all the boards and signature authorities in all the other jurisdictions under the umbrella of this multi-jurisdictional plan. Such a scenario would be problematic and unworkable. Therefore, the approach taken on this plan is that if ANY of the jurisdictions covered by this plan (Warrenton, The Plains, Remington, Fauquier County (agricultural and non-agricultural) and Fauquier County Water and Sanitation Authority) wanted to change portions of this plan that dominantly pertain to that respective organization, such as management actions or response triggers, then they may do so with only that organization's approval authority. After such change is made, that organization would simply notify the Drought ~~Committee Chair~~ Coordinator of what changes to the master copy of the Drought Plan are to be made. The ~~Chair~~ Coordinator would then update the master copy accordingly and distribute the updated version to appropriate entities, including Virginia DEQ. However, in the interest of cross-jurisdictional cooperation and coordination, it is hoped that the other parties of the Drought Committee are solicited for input and comment upon any proposed plan amendments or updates prior to revision.

Summary: any signature organization to this plan does NOT need any other organization's permission or review in order to make policy and procedural changes that are primarily directed to the needs of that particular organization.

Appendix

Appendix A

Fauquier County's Drought Management Public Notification Procedure

- Notifications Procedures – During times of drought ~~warnings~~, drought levels (Drought Watch, Drought Warning or Drought Emergency) will be placed on the Fauquier County website and press releases issued ~~the Fauquier County Emergency Management (EM) Facebook page~~. ~~During times of Warnings, drought levels will be placed on the Fauquier County website and the Fauquier County EM Facebook page.~~ For Drought Warnings or Drought Emergencies, ~~N~~notifications may be sent via the Fauquier County Emergency notification system on worsening drought conditions and on possible water restrictions. During times of Drought Emergencies notifications will be sent to all affected ~~residence~~ residents via the Fauquier County Emergency notification system on these water restrictions. These notifications will be sent prior to restrictions being implemented and when changes occur to these restrictions to include the elimination of any restrictions.

- During times of Drought Emergencies notifications will also be sent to local TV and radio stations for additional public notification. Included in these notifications will be the restrictions placed, reasons why, where additional information on the emergency can be found, and measures households should take to reduce their water usage. Upon the reduction or elimination of any restrictions additional information will be sent to these TV and radios stations.

Appendix B

Fauquier County's Drought Management Enforcement Guidelines

~~o The following is a list of possible water restrictions to be placed on citizens during a drought. Any violation of these restrictions in accordance with Code of Virginia, Title 62.1-44.38.1 are subject to penalty of confinement of up to 12 months in jail and/or a fine no less than $2,500.00 and no more than $32,500.~~

~~1. Reduction or elimination of watering of lawns.~~
~~2. Reduction or elimination of washing of cars.~~
~~3. Reduction or elimination of the use of water of any kind outside the home with the exception of agricultural uses.~~
~~4. The reduction and implementation of water Emergency Plans by commercial water users.~~
~~5. The reduction or elimination for use of Fire Hydrants for the purposes of Training or Testing.~~

Subsequent to the adoption of this Plan, the County will adopt an ordinance that provides for a process for declarations of drought stages, establishes water use regulations based on drought stage and enforcement mechanisms for violations of mandatory water use restrictions. The ordinance shall set out specific water use restrictions based on drought stage and initial violations shall be deemed a Class 4 misdemeanor and subsequent violations a Class 3 misdemeanor punishable pursuant to *Code of Virginia* § 18.2-11.

Appendix C

Example Disaster Request Cover Letter

Fauquier County Office
24 Pelham Street, Suite 20
Warrenton, VA 20186-3234
(540) 341-7950, ext. 12, FAX (540) 349-1792

Chairman, Fauquier County Board of Supervisors
40 Culpeper Street
Warrenton, VA 20186

Dear Mr:

I am writing to you at this time to request that the Fauquier County Board of Supervisors resolve to file with the Governor of Virginia a request that Fauquier County be designated as drought disaster area. The Fauquier County Food and Agriculture Committee, consisting of, Natural Resources Conservation Service, Farm Service Agency, and myself have met and have determined that Fauquier County meets the criteria of a drought disaster area, as per Federal guidelines.

If Fauquier County is granted drought disaster status by the Governor's office, farmers in Fauquier County will be eligible for guaranteed low-interest loans from the Farm Service Agency, as well as any other disaster relief programs that are appropriated by Congress.

Enclosed you will find a suggested resolution for the Board to use in making this request of the Governor. If you have any questions or comments, please do not hesitate to call on me.

Regards,

Appendix D

Example Consent Agenda Request for Drought Emergency

CONSENT AGENDA REQUEST

Sponsor:	**Board of Supervisors Meeting Date:**
Raymond E. Graham, Chairman Cedar Run District Supervisor	July 14, 2005
Staff Lead:	**Department:**
Catherine M. Heritage, Assistant County Administrator	County Administration

Topic:

A Resolution Authorizing the County Administrator to File with the Governor of Virginia a Request To Designate Fauquier County as a Drought Area.

Topic Description:

The ongoing drought has reached critical proportions for the Fauquier County farming community. The Fauquier Food and Agricultural Council reports that approximately 100,000 acres of farmland have been adversely affected within Fauquier County and estimates crop and hay losses of $250,000.

Request Action of the Board of Supervisors:

Consider adoption of the attached resolution.

Financial Impacts Analysis:

None

Identify any Departments, Organizations or Individuals that would be affected by this request:

Cooperative Extension Service
Farm Services Agency
National Conservation and Recreation Services
Fauquier County Farm Bureau

Appendix E

Example Resolution for Agricultural Drought Emergency

RESOLUTION

A RESOLUTION AUTHORIZING THE COUNTY ADMINISTRATOR TO FILE WITH THE GOVERNOR OF VIRGINIA A REQUEST THAT FAUQUIER COUNTY BE DESIGNATED A DROUGHT DISASTER AREA

WHEREAS, the drought conditions in Fauquier County have severely affected farmers; and

WHEREAS, during the growing season of this year, Fauquier County received considerably less rain than normal; and

WHEREAS, the Fauquier County Food and Agriculture Council, made of up the Farm Services Agency, the National Resource Conservation Service, and the Virginia Cooperative Extension, reports that approximately 100,000 acres of pasture land and 45,000 acres of hay land have been adversely affected within Fauquier County, at an estimated loss of $3.6 million; and

WHEREAS, it is incumbent upon the Fauquier County Board of Supervisors to authorize the County Administrator to file with the Governor of Virginia a request that Fauquier County be designated as a drought disaster area; now, therefore, be it

RESOLVED by the Fauquier County Board of Supervisors this 18th day of June, 2007. That the County Administrator be, and is hereby, authorized to file a request with the Governor of Virginia to declare Fauquier County a drought disaster area.

Appendix F

AGRICULTURE - RELATED DISASTER DESIGNATIONS PROCESSES

I. Types of Designations

A. PRESIDENTIAL - Based on a request from the Governor of the State the President can declare a state or portions of a state a major disaster area. Usually this is due to a major widespread national disaster such as a hurricane or tornado.

B. SECRETARIAL - At the request of the State Governor the Secretary of Agriculture can declare a County, series of counties or an entire State a disaster area.

C. FARM SERVICE AGENCY ADMINISTRATOR - The Administrator, based on a request from the FSA State Executive Director, can designate a County or Counties eligible for Emergency Loan Assistance, however, this declaration is limited to physical loss only.

II. Designation Process

A. PRESIDENTIAL - The Presidential Declaration is made in response to a request of the Governor of the State. No local Food and Agriculture Council action is necessary, except for reporting purposes and estimation of dollar losses and is usually reported by a local government as a part of its initial damage assessment report to the Virginia Department of Emergency Services.

B. SECRETARIAL - When a natural disaster creates significant agricultural crop losses, the producers and growers in those localities affected by the disaster will need help in coping with their losses. Through the Farm Agency of the U.S. Department of Agriculture, farmers may apply to the Federal Government for emergency low interest loans provided their localities have been designated natural disaster areas by the Secretary of Agriculture.

Local government is responsible for initiating the disaster designation process when there is sufficient evidence that significant agricultural crop losses have been sustained or, in the case of frost/freeze damage, there is a potential for major losses to crops which will require time to fully assess. The following provides an outline of the procedure for obtaining a Secretarial disaster designation.

In responding to disasters caused by frost or freeze, local government should keep in mind that a Governor's written request for disaster designation must be received by the Secretary of Agriculture within three months of the last day of the disaster.

Procedure

1. Local government submits request to Governor:

   When a natural disaster occurs or develops, the County Board of Supervisors (or City Council in the case of cities that have agricultural production) submits a formal resolution and request to the Governor stating that the county is experiencing or has experienced significant losses to agricultural crop (specifying those crops if possible) due to a natural disaster and asking the Governor's help in obtaining federal disaster designation for that locality.

2. Governor's Office responds to request:

   a) Governor's Office writes representative of the County Board of Supervisors advising that request has been referred to appropriate state agencies for review and processing.

   b) Governor's Office refers the request for designation to Commissioner of the Virginia Department of Agriculture and Consumer Services through the Secretary of Commerce and Trade and copies the State Coordinator of Emergency Services (Director of the Virginia Department of Emergency Services) and the Secretary of Public Safety.

3. Farm Service Agency Damage Assessment Report is prepared:

   a) The Commissioner's Office requests the State Executive Director, Farm Service Agency (FSA), USDA, to prepare an FSA Damage Assessment Report (DAR), on the County.

   b) The Chairperson of the State Food and Agriculture Committee requests the FAC at the County level to prepare and submit a Disaster Assessment Report, on the disaster reported by the County Board of Supervisors. The FSA, DAR is different for the state initial Damage Assessment Report.

   c) Upon receiving the Damage Assessment Report, from the local Food and Agriculture Committee, the State Executive Director of FSA calls together the State FAC to review the DAR. A copy of the approved report is forwarded to the Commissioner of the Virginia Department of Agriculture and Consumer Services.

   d) When the necessary baseline data is available, the Virginia Department of Agriculture and Consumer Services places an estimated dollar value on the crops affected by the nature disaster.

4. Governor's request for USDA designation prepared:

   a) Given that the extent of losses are significant, the Commissioner's Office drafts the Governor's letter of transmittal to the Secretary of Agriculture requesting disaster designation for the County because of significant agricultural crop losses. This letter would be accompanied by the County damage assessment report.

   b) The Commissioner's Office notifies the Virginia Department of Emergency Services that the damage assessment report is completed and provides VDES with the report and additional data concerning crop losses for review and return through the Secretary of Public Safety.

   c) The draft letter and the damage assessment report are submitted to the Governor's Office by the Commissioner's Office through the Secretary of Commerce and Trade.

5. Governor's request is submitted to USDA Secretary. The Governor's letter is sent to the Secretary of Agriculture and copies are sent to the Secretary of Commerce and Trade. The Commissioner of Agriculture and Consumer Services, the Secretary of Public Safety, the Director of the Virginia Department of Emergency Services, the State Executive Director of FSA, the State Director of Rural Development and the County Board of Supervisors representatives.

6. Secretary of Agriculture responds to Governor's request:

   When the Secretary of Agriculture advises the Governor concerning approval or disapproval of the request for disaster designation, the Governor's Office notifies the County Board of Supervisors and sends copies of this response to those state and federal officials mentioned under # 5.