

# **DROUGHT MONITORING TASK FORCE**

## **Drought Status Report**

**October 21, 2002**

The Department of Environmental Quality compiled the following drought status report from information provided by the State Climatologist, the Virginia Departments of Agriculture and Consumer Services, Health, Forestry, Emergency Management, Game and Inland Fisheries; the Virginia Cooperative Extension Service, Farm Service Agency-USDA, the National Weather Service, and the U. S. Geological Survey.

### **OVERVIEW**

Drought conditions improved significantly throughout the Commonwealth due to rainfall since September 1. The majority of the Commonwealth is currently experiencing moderate to extreme drought conditions. Statewide rainfall for the first half of the month of October was 158% of long term average rainfall for this period. Rainfall for the same period was above average in each of the Commonwealth's climatic divisions. Rainfall during the last six weeks (since September 1) was above long term average in all climatic divisions except the western Piedmont. The long-range climatological outlook calls for equal chances of below average, average, and above average precipitation through January 2003. Most streamgages across the Commonwealth recorded peak flows near bank full due to recent rainfall, with streamflows declining into the normal range of flow. A few streamgages on larger rivers have recorded lower increases in streamflow. With the onset of cooler temperatures and lower evapotranspiration demands these streamflows will not decline as rapidly as they have in the recent past. Ground water levels have showed little improvements from the recent precipitation. Levels of large reservoirs such as Lake Moomaw, Smith Mountain Lake, Kerr Reservoir, and Philpott Reservoir have begun to stabilize or improve due to variances to required minimum discharges and recent rainfall. Normal to above normal rainfall since September 1 has improved hay and pasture conditions and has provided adequate soil moisture to support fall grain planting. Ninety-one requests for agricultural drought designation have been received from seventy-seven separate localities. Short term wildfire threats have significantly decreased due to increased forest fuel moisture. These short term improvements do not eliminate the potential for an extreme fall wildfire season. Reservoir and stream levels that support public water supplies have improved since the last report. Ground water based public water supplies west of Route 95 have reported dropping ground water levels or reduced yields. The Virginia Department of Health issued over 4000 private well replacement permits for private water supply wells that have failed during July and August. Water conservation savings at large public water supplies continue to be reported since the implementation of the Governor's Executive Order #33 on August 30. The Department of Environmental Quality met with large users on the Roanoke River twice during October to continue discussions regarding allocating the limited flow in this river. These discussions were initiated based on authority granted in Executive Order #33. The cooler temperatures combined with recent rainfall have significantly improved conditions at the Department of Game and Inland Fishery's hatcheries and allowed the stocking of trout as scheduled. Most public boat ramps and fishing piers have increased accessibility when compared to one month ago but 19 boat ramps are out of service due to low levels.

### **CLIMATOLOGICAL CONDITIONS**

#### National Weather Service

Remnants of tropical systems Hanna, Isidore and Kyle brought much needed precipitation to Virginia during the last thirty days. Western and Southeastern Virginia received significant amounts of rainfall. Rainfall totals over the last month were in excess of 5 inches in many locations, with several locations reporting amounts between 11 and 15 inches. The city of Norfolk received well over 5 inches of rain from Isidore and over 3 inches from Kyle. In addition, much of the Commonwealth received between 1 and 3 inches of rainfall during the last week.

The recent rainfall has provided significant short-term relief to the current drought situation. However the long term conditions continue to be a concern. Ground water has shown little response to recent rain and additional periodic and consistent rain throughout the fall and winter months are essential for overall improvement.

Over the next 7 to 14 days temperatures will be average to below average, with several opportunities for precipitation. The first chance for rain will occur from late October 19 into October 21, as a cold front stalls across the region. The potential exists for widespread one-half inch rainfall amounts from this system. Cool Canadian high pressure will build into the Commonwealth from late October 21 through October 25, bringing the coldest weather so far this fall, as well as the possibility of widespread frost west of Route 95. A second chance for showers exists October 25, with a better chance for widespread precipitation on October 28-29. A fourth chance of rain is currently forecast around Halloween. Overall, the weather pattern for the next 2 weeks is favorable for periodic rainfall. The amount of rainfall expected from these systems is unknown, but continued slow improvement in the overall drought situation appears likely.

The 30-day outlook through the month of November 2002 calls for equal chances of below average, average, and above average precipitation and temperatures.

The 90-day outlook through the month of January 2003 calls for equal chances of below average, average, and above average precipitation and temperatures.

The latest NOAA drought monitor indicates a significant improvement in drought conditions since the last report on September 19. The drought monitor now indicates the majority of the Commonwealth is covered by moderate to extreme drought and is included as Appendix A. Appendix B contains information from the national drought monitor with only Virginia displayed. The NOAA seasonal drought outlook through January 2003 calls for improvement in drought conditions throughout the Commonwealth. The seasonal drought outlook is included as Appendix C.

#### Report of the State Climatologist

Atmospheric circulation patterns have changed markedly since September 19 and now resemble a winter configuration that is conducive to below normal temperatures and more frequent precipitation. As a result, statewide rainfall has been considerably above average (158% of normal) since October 1, with every climatic division in the state above average.

Since September 1, rainfall has also been above average over most of the state, although the Piedmont is generally near long-term historic mean precipitation. The Shenandoah Valley has received approximately 125% of normal rain since September 1.

As a result of this recent rainfall forest-fire related problems have diminished, and short-term crop conditions, including pasture growth and germination of winter crops have improved dramatically. Other farm operations dependent upon standing water, such as livestock watering, remain precarious because there has yet to be a detectable increase in pond levels, with most in the Shenandoah Valley and many on the western Piedmont completely dry.

These very low pond levels are indicative of the long-term nature of the current drought. Substantial rains associated with the remnants of Tropical Storm Isidore in late September produced little, if any, rise in many urban reservoirs, particularly in the highly stressed Charlottesville system. This indicates extremely low deep soil moisture levels. More recent precipitation has resulted in deep soil saturation and reservoir levels are beginning to rise. It is very likely that the annual low values were observed on or near October 10, and that levels in general should rise for several months, absent a complete collapse in the current rainfall-producing mechanism.

A persistent pattern of high-pressure systems has developed in eastern Canada and New England. This pattern tends to be very conducive to general rainfall in our region when low-pressure systems develop along the southern margin of this high. Often these become substantial coastal cyclones ("northeasters") which produce a general rain. While medium and long-range forecast models do not accurately predict these events, they have the potential to provide significant drought relief to large areas of the Commonwealth. In addition, this pattern tends to be associated with below normal temperatures which reduce evaporation and result in more efficient surface water recharge.

While current conditions indicate that most surface water systems will recharge, water conservation measures may still be required for some time. For example, it is possible to recharge many systems with below-normal rain; but, the result will be systems that are full at the end of winter, embedded in an environment of below-normal streamflow and ground water. These systems will then decline very rapidly during any subsequent dry conditions next spring/summer. It is important to continue the water conservation message until we see the magnitude of winter rain and snow and its effects on current ground water levels and streamflows.

Appendix D contains tables of climatological division precipitation for various periods, from monthly, back to three years.

## PROVISIONAL ASSESSMENT OF HYDROLOGIC CONDITIONS IN VIRGINIA

### United States Geological Survey

Precipitation on October 15-16 resulted in 1-4 inches of rain across the Commonwealth. Most streamgages recorded peak flows near bank full, with streamflows declining into the normal range of flow. A few streamgages on larger rivers have recorded lower increases in streamflow. Streamflow at the James River at Cartersville, Va., and the Roanoke River at Randolph, Va., have increased only to the lower range of normal flow.

The substantial amount of precipitation over the entire Commonwealth and the relatively low intensity of the rainfall should help relieve both shallow and deep soil moisture deficits. The resulting higher soil moisture should increase ground-water recharge associated with future precipitation events this fall and winter. Streamflow recession following the peak flows should not be as steep as the previous recessions last summer, and streamflows should be sustained slightly longer as a result of reduced evaporation and transpiration.

Appendix E contains flow duration and current flow conditions for selected U.S. Geological Survey and Virginia Department of Environmental Quality surface-water gaging stations. Data are provisional and subject to revision. The normal range of flows is defined as flows in the middle two quartiles (between those flows equaled or exceeded 75 percent of the time and those flows equaled or exceeded 25 percent of the time).

### Department of Environmental Quality, Status of Major Reservoirs

In general, recent rains have reduced or reversed the declines in most major reservoirs, boding well for the prospects of refilling these sources of supply over the coming winter. Lake Philpott is an exception.

Smith Mountain Lake has stabilized at 3.88 feet below full. The lake continues to operate under a release variance. The current release varies between 300 and 350 cfs compared to a normal release of 650 cfs. Less water is released when runoff from storms result in increased levels of sideflow downstream of the dam. This practice accelerates lake refilling without harming the Roanoke River.

Heavy rain in North Carolina has raised Kerr Reservoir to 295.3 feet above mean sea level, up 2 feet from September. Current releases are 2200 cfs and will remain at this level. The reservoir is filling. Inflows are 7000 cfs two days after the rainfall on October 15<sup>th</sup> and 16<sup>th</sup>.

The elevation of Philpott Reservoir is 963.7; about the same as last report. Minimum releases have been cut back to one fourth of their normal condition.

Lake Moomaw in western Virginia has 31.5% of the conservation pool remaining and has been operating under reduced releases since August 23rd. This is a reduction in storage of 3.5% from the last report. Inflow is 370 cfs and outflow is 133 cfs. Concerns regarding completely utilizing the conservation pool this fall have diminished significantly.

Lake Anna was 4.8 feet down at an elevation of 245.2 feet on October 14. This lake level does not include any rain from the state-wide storm on October 15 and 16 which probably dropped about 2.0+ inches of rain on the watershed. This is down only 0.2 feet from the last report. Dominion Power now reports potential shutdown of the nuclear power station on Lake Anna will not occur until August of 2003.

Claytor Lake on the New River is about a foot below full and rising. This lake level will be back to normal soon.

## VIRGINIA AGRICULTURAL SITUATION

### Virginia Department of Agriculture and Consumer Services

#### Local Disaster Designation Requests

Ninety-one requests for federal drought disaster designation have been submitted to the Governor. This is up from seventy-three requests on September 16. These requests are from seventy-seven separate counties with fourteen of the seventy-seven submitting a second request for additional damages experienced since their original requests. The U.S. Secretary of Agriculture has approved primary disaster designation for 10 of the localities (Bedford, Brunswick, Buckingham, Cumberland, Fluvanna, Goochland, Louisa, Orange, Prince Edward, and Rockbridge counties) and has denied disaster designation for six localities (Augusta, Bland, Nelson, Page, Rockingham and Wythe counties) whose loss of production did not meet the 30% federal requirement. The Governor has submitted sixty-nine requests for federal designation for sixty-seven other localities whose approval is still pending (Accomack, Albemarle, Amelia, Amherst, Appomattox, Augusta (2<sup>nd</sup> request), Bedford (2<sup>nd</sup> request), Bland (2<sup>nd</sup> request), Botetourt, Buckingham (2<sup>nd</sup> request), Campbell, Campbell (2<sup>nd</sup> request), Caroline, Carroll, Charles City, Charlotte, Chesterfield, Craig, Culpeper, Cumberland (2<sup>nd</sup> request), Dinwiddie, Essex, Fauquier, Floyd, Franklin, Franklin (2<sup>nd</sup> request), Goochland (2<sup>nd</sup> request), Grayson, Greene, Greenville, Halifax, Hanover, Henrico, Henry, Isle of Wight, King and Queen, King George, King William, Lancaster, Lee, Louisa (2<sup>nd</sup> request), Lunenburg, Madison, Mecklenburg, Middlesex, Montgomery, Nelson (2<sup>nd</sup> request), New Kent, Nottoway, Page (2<sup>nd</sup> request), Patrick, Pittsylvania, Powhatan, Prince George, Prince William, Pulaski, Rappahannock, Richmond, Roanoke, Rockingham (2<sup>nd</sup> request), Russell, Scott, Spotsylvania, Stafford, Suffolk, Surry, Warren, Westmoreland and Wythe (2<sup>nd</sup> request) counties). Damage assessment reports (DAR) are pending from USDA for six localities (Alleghany, Giles, Northampton, Northumberland, Orange (2<sup>nd</sup> request) and Shenandoah counties). Thirty-eight different localities have received secondary designation because they are contiguous to counties that have primary designation. In addition, eight localities who have received primary designation have also received secondary designation.

United States Secretary of Agriculture Veneman announced on September 19, 2002, that the United States Department of Agriculture was allocating \$752 million for a Livestock Compensation Program that would provide immediate and direct disaster relief for qualifying American farmers in drought-impacted states. The Secretary also announced that this new program would be available only in localities named as primary disaster areas or that are covered by disaster designation requests submitted by a State Governor, no later than September 19, 2002, and are subsequently approved by the Secretary. Forty-five Virginia localities could meet the eligibility requirements for the Livestock Compensation Program. Approximately 30 other Virginia localities will not qualify based on this deadline for submission of disaster requests.

#### Crop Weather Summary

Virginia experienced cooler temperatures and welcomed rain. The rain greened up pastures and hay fields. This will provide for good fall grazing in some areas of the state if temperatures do not drop drastically over the next couple of weeks. The rain received helped maintain topsoil moisture for small grain seeding.

Tables describing topsoil moisture, crop condition, and crop progress are contained in Appendix F.

## FOREST SITUATION IN VIRGINIA

### Virginia Department of Forestry

#### Wildfire Conditions

Several successive rain events have helped to end an above normal summer wildfire season, and will help to delay the start of the normal fall wildfire season here in the Commonwealth. It is important to note that in spite of the rain, the fall wildfire season is not yet over. Dry weather following leaf fall remains the biggest concern, and November is historically the most active month during the fall wildfire season (see Appendix G). Recent rain has certainly helped to reduce the overall wildfire potential at this point; however more is needed in mid-November to really put an end to the threat for the fall. The Commonwealth's official fall wildfire season runs from October 15 until November 30.

There has been a great deal of interest generated regarding the potential for closing the fall hunting seasons. This is always a sensitive issue that must balance the interests of numerous parties throughout the Commonwealth. The State Forester and the Director of the Department of Game and Inland Fisheries remain in close contact regarding this issue. It is always hazardous to predict what will happen regarding wildfire activity, because the weather can and does change so dramatically over a short period of time. At this point, no steps have been taken to issue a forest closure or to close any part of hunting season.

Through October 15, the DOF has responded to 1,629 wildfires that burned 13,195 acres this calendar year. This activity remains well above the normal five and ten year averages.

## PUBLIC WATER SUPPLY SYSTEMS

### Virginia Department of Health

Mandatory water restrictions are in place in most of the Commonwealth due to Executive Order #33. Only southwest Virginia, parts of northern Virginia, and the Eastern Shore are not included in the order.

The Division of Drinking Water contacted community waterworks serving 10,000 or more customers and requested they provide a weekly report of the average daily water produced/purchased. In addition, VDH staff prepared baseline data for these waterworks which included the average daily water production data for each month in calendar year 2001 and for August 2002. The data obtained requires a cautious interpretation as there are many external factors such as some waterworks have been on various degrees of conservation for some time, water production facilities can be taken off-line for certain periods of time, many systems are highly interconnected with multiple suppliers, an expected lag between conservation orders and results, etc. An additional external factor that must be considered when examining these calculated conservation savings is the normal reduction in water demands as we move into the fall/winter season.

During the week of September 16 the data indicated an average conservation savings of 12.70% (71,671,974 gallons per day) occurred as compared to August 2002 (just prior to EO 33) and 9.65% (54,137,463 gallons per day) as compared to August 2001. Data from the week of September 16 was also compared to reported withdrawals from September 2001. This comparison indicated an average water conservation saving of 8.14% (43,032,110 gallons per day).

During the week of September 23 the data indicated an average conservation savings of 13.82% (81,968,297 gallons per day) occurred as compared to August 2002 (just prior to EO 33) and 10.92% (64,427,786 gallons per day) as compared to August 2001. Data from the week of September 23 was also compared to reported withdrawals from September 2001. This comparison indicated an average water conservation saving of 9.43% (53,328,433 gallons per day). In each comparison, water conservation increased by approximately 10,000,000 gallons per day when compared to the week of September 16.

During the week of September 30 the data indicated an average conservation savings of 11.81% (62,933,577 gallons per day) occurred as compared to August 2002 (just prior to EO 33) and 7.39% (34,293,713 gallons per day) as compared to September 2001. Data from the week of September 30 was

also compared to reported withdrawals from October 2001. This comparison indicated an average water conservation saving of 3.78% (15,182,911 gallons per day).

During the week of October 7 the data indicated an average conservation savings of 17.45% (93,841,348 gallons per day) occurred as compared to August 2002 (just prior to EO 33), 13.30% (65,214,911 gallons per day) as compared to September 2001 and 9.97% (46,239,843 gallons per day) as compared to October 2001.

Significant rainfall occurred across much of the state in the last week. Many surface water reservoirs are now reporting full conditions. Others have received substantial inflow. A total of 95 surface water systems are included in this report. Only 13 report worsening conditions, with the remainder reporting better or same/stable conditions.

Ground water conditions continue to remain low west of Interstate 95. Several water systems have lost wells and had new wells drilled or are having water hauled to their customers. A total of 24 ground water systems are included in this report. Only 2 report worsening conditions, with the remainder reporting better or same/stable conditions.

Several areas have reported both public and private wells are going dry. County Health Departments from across the Commonwealth report the issuance of more than 4,000 replacement well permits during July and August 2002.

Appendix H contains detailed reports of public water supply conditions in the six field offices as reported on October 16.

Appendix I lists sixteen waterworks that appear to be on the verge of critical drought conditions. The starting point for selecting the waterworks was the Drought Survey performed by the Division of Drinking Water in August, 2002. The "watch status" has been further defined as those that may fail in the next 90 days (through January 15, 2002) without adequate rainfall.

The following criteria were applied in developing the list contained in Appendix I:

- A. From the survey database a sort was performed for waterworks that answered YES to question #6(Are you having drought related supply problems?) and YES to question #7(...do you expect to have problems over the next 90 days?)
- B. A comparison was then made to our latest weekly drought reports.
- C. Consecutive waterworks were not included.
- D. Generally, only those that reported that they were on Voluntary or Mandatory conservation were included.
- E. No alternative sources (of any kind) were available or would be available within 90 days.
- F. For Surface sources <= 90 days remaining in reservoirs (as applicable).
- G. For groundwater sources-critical (subjective) production or well water levels.

## FISHERIES AND RECREATIONAL IMPACTS

### Virginia Department of Game and Inland Fisheries

Stream and river levels are at or above average across the majority of the Commonwealth for the first time in several months. As a result, canoe and small powerboat opportunities are available in many areas. Reservoir levels will require several more significant rainfall events to reach seasonal pool elevations. At this time, 19 Department boat ramps at public reservoirs are closed due to low water. Boaters are encouraged to check the Department's web site ([www.dgif.state.va.us](http://www.dgif.state.va.us)) for ramp conditions.

Flow variances remain in effect for Leesville Reservoir (Roanoke River/Smith Mountain Lake), Lake Anna (North Anna River) Claytor Lake (New River) and Lake Moomaw (Jackson River).

The cooler temperatures combined with recent rainfall have significantly improved conditions at the Department's hatcheries and allowed the stocking of trout as scheduled. The probability of fish kills in ponds and lakes due to low oxygen has decreased significantly.

All hunting seasons are going forward as scheduled with campers being reminded that a few days of dry conditions can increase fire hazards significantly.

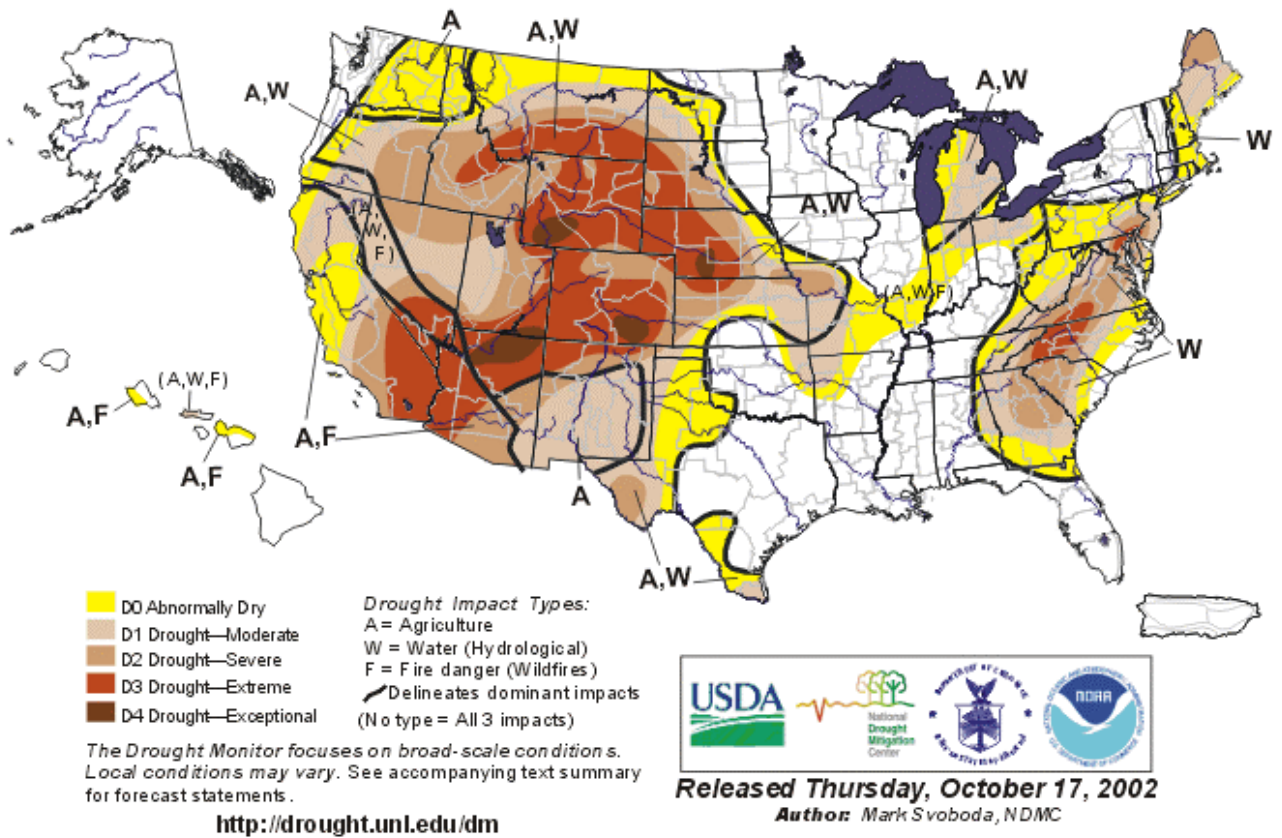
#### LOCAL EMERGENCY DECLARATIONS/REQUESTS FOR ASSISTANCE

##### Virginia Department of Emergency Management

The Towns of Orange, Gordonsville, and Gretna and Amherst County's requests for reimbursement under the Commonwealth's Emergency Relief to Localities program have been denied.

# APPENDIX A

## U.S. Drought Monitor October 15, 2002 Valid 8 a.m. EDT



### National Drought Summary – October 15, 2002

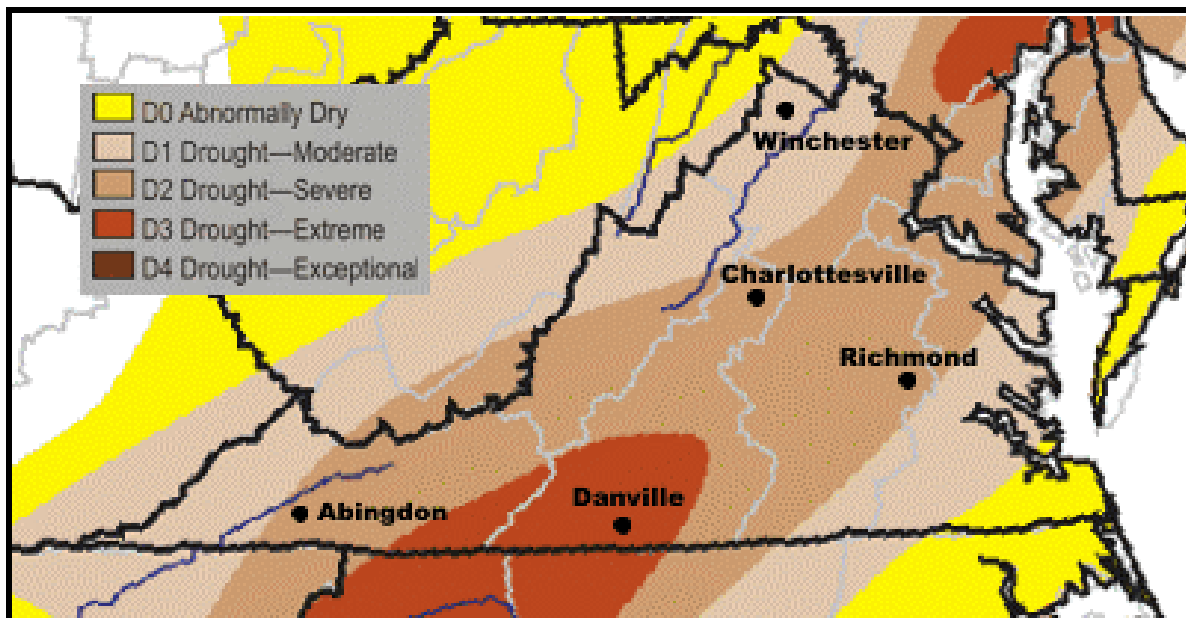
**The Mid-Atlantic and Southeast:** After missing out on the bulk of remnant hurricane rainfall each of the past two weeks, most of the Atlantic Seaboard welcomed widespread beneficial rains this last week. From central Georgia up to Long Island, rainfall reports of 2 to 4 inch soakings were widespread. Rain was heaviest (6" +) off the southeast coast (and just inland) as the formerly stronger Kyle sat off the Carolina and Georgia coastlines. This rainfall helped to start eroding away at the drought along the coastal areas of Georgia, the Carolinas and Virginia. While the rains were not as heavy further inland (or on the western Appalachian front), they were good enough to remove the exceptional (D4) drought in the Carolinas and southern Virginia. They also led to the reduction of the core area of extreme (D3) drought in the same region. Accordingly, the D0 and D1 areas were also reduced and pushed inland off of their respective coasts. Guarded optimism is the general rule here as overall improvement in the region this week is reflected by a general tightening and pushing (one category improvement) of the drought boundaries westward off the coastal stretches in the Carolinas and eastern Virginia. The rains brought a welcome reversal to an intensification pattern (dry) that was re-emerging in the region earlier this fall. While short-term numbers are positive, the region is still dealing with a drought of long-term proportions as year-to-date deficits still fall in the 6-12 inch range. Going back to October of 2001, we see many locations still facing deficits of 12-18 inches from southeast Georgia and east-central Alabama up through the Carolinas and into Virginia and Maryland. Fire danger has been reduced and top soil moisture conditions have improved considerably over the past few weeks leading to a removal of the "A" and "F" impact labels in the East. The recent rains have resulted in the region falling exclusively under the "W" (water/hydro) impact delineation. This signifies that while many areas have reduced their short-term deficits and resultant impacts, the long-term drought and its impacts will still persist unless this recent favorable wet trend continues over the coming weeks and months. Ground water levels remain at record lows at many locations and streamflow and reservoir levels need to continue to improve.



# APPENDIX B

## U.S. Drought Monitor - Virginia

October 15, 2002

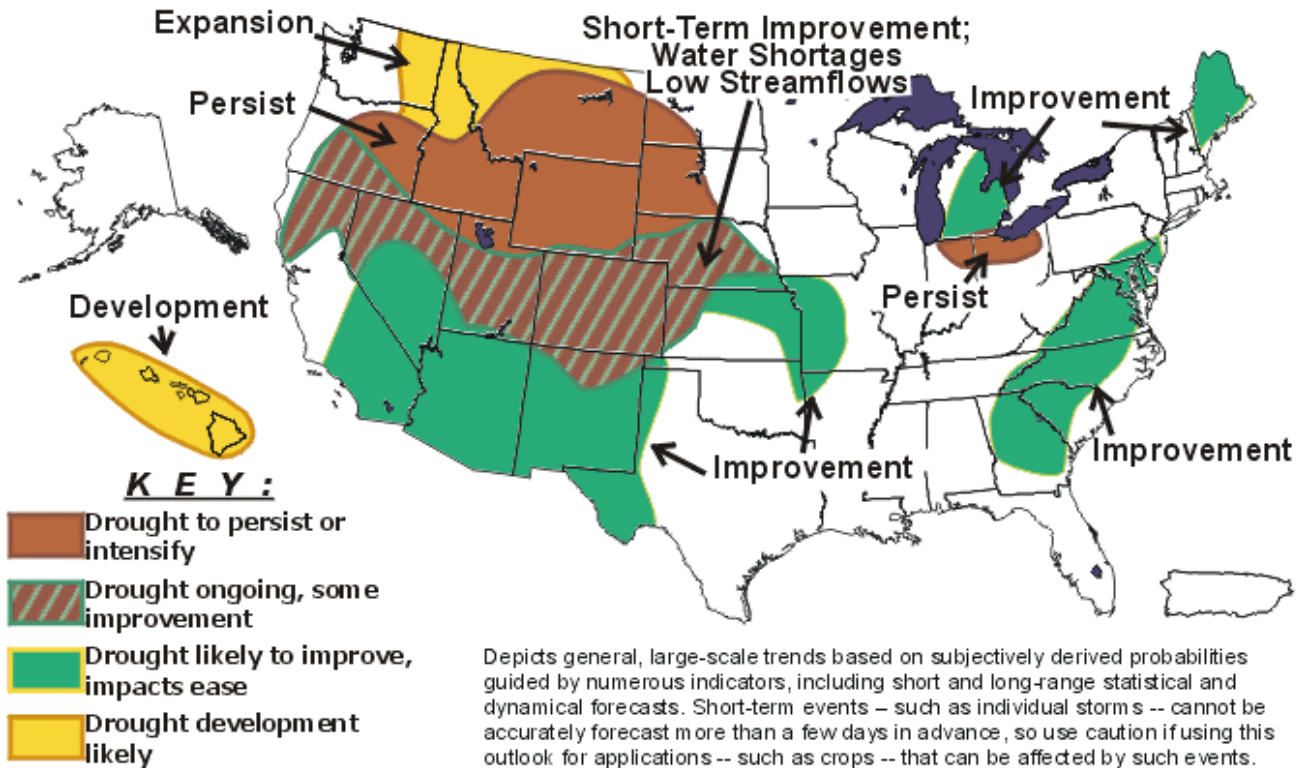


Note: The U.S. Drought Monitor focuses on broad-scale conditions. Local conditions may vary. Click on map to view complete U.S. Drought Monitor graphic.

# APPENDIX C



## U. S. Seasonal Drought Outlook Through January 2003 Released October 17, 2002



Depicts general, large-scale trends based on subjectively derived probabilities guided by numerous indicators, including short and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance, so use caution if using this outlook for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are schematically approximated from the Drought Monitor (D1 to D4). For weekly drought updates, see the latest Drought Monitor map and text.

Latest Seasonal Assessment - Heavy and widespread rains during October have led to major drought improvement across the East, and the outlook calls for continued improvement in coming months. Long-term precipitation deficits continue despite the recent rains and, as a result, some wells and reservoirs may remain at lower-than-average levels into winter but, at this point, the mild, dry pattern that took hold a year ago does not seem to be repeating. Confidence for improvement is greatest in the Southeast, where the precipitation outlook for November through January calls for above-normal precipitation.

# APPENDIX D

## Precipitation departures by Climatological Division.

### Two Week Precipitation Departures

Climatological Division	OCT 1-16 2002	OCT 1-16 NORMAL	OCT 1-16 DEPARTURE	OCT 1-16 % NORMAL
Tidewater	3.30	1.68	1.62	197%
Eastern Piedmont	3.30	1.71	1.59	193%
Western Piedmont	2.30	1.83	0.47	126%
Northern	2.60	1.79	0.81	145%
Central Mountain	2.00	1.72	0.28	117%
Southwestern	2.30	1.55	0.75	149%
Statewide	2.70	1.71	0.99	158%

### Six Week Precipitation Departures

Climatological Division	SEPT-OCT 16 2002	SEPT-OCT 16 NORMAL	SEPT-OCT 16 DEPARTURE	SEPT-OCT 16 % NORMAL
Tidewater	5.78	5.53	0.25	105%
Eastern Piedmont	5.31	5.16	0.15	103%
Western Piedmont	5.36	5.54	-0.18	97%
Northern	6.39	5.19	1.20	123%
Central Mountain	6.23	4.87	1.36	128%
Southwestern	6.13	4.63	1.50	132%
Statewide	5.84	5.17	0.67	113%

### Ten Week Precipitation Departures

Climatological Division	AUG-OCT 16 2002	AUG-OCT 16 NORMAL	AUG-OCT 16 DEPARTURE	AUG-OCT 16 % NORMAL
Tidewater	10.06	10.32	-0.26	97%
Eastern Piedmont	10.13	9.49	0.64	107%
Western Piedmont	8.68	9.81	-1.13	89%
Northern	9.60	9.27	0.33	104%
Central Mountain	7.78	8.82	-1.04	88%
Southwestern	8.51	8.56	-0.05	99%
Statewide	9.21	9.42	-0.21	98%

### Fourteen Week Precipitation Departures

Climatological Division	JULY-OCT 16 2002	JULY-OCT 16 NORMAL	JULY-OCT 16 DEPARTURE	JULY-OCT 16 % NORMAL
Tidewater	12.80	15.34	-2.54	83%
Eastern Piedmont	13.33	14.15	-0.82	94%
Western Piedmont	13.02	14.44	-1.42	90%
Northern	13.47	13.34	0.13	101%
Central Mountain	12.54	12.84	-0.30	98%
Southwestern	13.31	13.11	0.20	102%
Statewide	13.12	13.96	-0.84	94%

### Thirty-eight Week Precipitation Departures (Year to date)

Climatological Division	JAN-OCT 16 2002	JAN-OCT 16 NORMAL	JAN-OCT 16 DEPARTURE	JAN-OCT 16 % NORMAL
Tidewater	32.07	36.33	-4.26	88%
Eastern Piedmont	29.55	35.45	-5.90	83%
Western Piedmont	29.01	36.74	-7.73	79%
Northern	30.51	33.25	-2.74	92%
Central Mountain	28.33	32.57	-4.24	87%
Southwestern	35.30	35.62	-0.32	99%
Statewide	30.99	35.23	-4.24	88%

### One Year Precipitation Departures

Climatological Division	NOV 2001- OCT 16, 2002	NOV 2001- OCT 16, 2002 NORMAL	NOV 2001- OCT 16, 2002 DEPARTURE	NOV 2001- OCT 16, 2002 % NORMAL
Tidewater	34.26	42.26	-8.00	81%
Eastern Piedmont	32.11	41.56	-9.45	77%
Western Piedmont	32.31	42.94	-10.63	75%
Northern	33.15	39.06	-5.91	85%
Central Mountain	31.33	38.08	-6.75	82%
Southwestern	38.57	41.75	-3.18	92%
Statewide	33.82	41.19	-7.37	82%

### Two Year Precipitation Departures

Climatological Division	NOV 2000- OCT 16, 2002	NOV 2000- OCT 16, 2002 NORMAL	NOV 2000- OCT 16, 2002 DEPARTURE	NOV 2000- OCT 16, 2002 % NORMAL
Tidewater	70.49	85.89	-15.40	82%
Eastern Piedmont	67.15	84.52	-17.37	79%
Western Piedmont	66.21	87.37	-21.16	76%
Northern	69.66	79.59	-9.93	88%
Central Mountain	63.19	77.56	-14.37	81%
Southwestern	78.70	84.78	-6.08	93%
Statewide	69.62	83.77	-14.15	83%

### Three Year Precipitation Departures

Climatological Division	NOV 1999- OCT 16, 2002	NOV 1999- OCT 16, 2002 NORMAL	NOV 1999- OCT 16, 2002 DEPARTURE	NOV 1999- OCT 16, 2002 % NORMAL
Tidewater	117.24	129.52	-12.28	91%
Eastern Piedmont	106.75	127.48	-20.73	84%
Western Piedmont	105.53	131.80	-26.27	80%
Northern	107.69	120.12	-12.43	90%
Central Mountain	104.64	117.04	-12.40	89%
Southwestern	117.22	127.81	-10.59	92%
Statewide	110.33	126.35	-16.02	87%

## APPENDIX E

### Flow duration and current flow conditions for selected U.S. Geological Survey and Virginia Department of Environmental Quality surface-water gaging stations

	MINIMUM DAILY FLOW, PERIOD OF RECORD (CFS)	MINIMUM OCTOBER FLOW, PERIOD OF RECORD (CFS)	7Q2 (CFS)	7Q10 (CFS)	PERCENT OF TIME FLOW EQUALED OR EXCEEDED FOR OCTOBER DAILY MEAN FLOWS (CUBIC FEET PER SECOND)			CURRENT CONDITIONS FLOW (CFS)/ DURATION (PERCENT)
					75%	50%	25%	
October 18, 2002								
<u>SHENANDOAH RIVER BASIN</u>								
South River near Waynesboro, Va.	17	22	30	24	33	42	84	27
South Fork Shenandoah River at Front Royal, Va.	107	118	344	235	385	517	855	467
North Fork Shenandoah River at Cootes Store, Va.	0.2	0.4	3.2	0.77	4.6	12	52	261
North Fork Shenandoah River near Strasburg, Va.	35	35	-	-	114	159	274	1,550
<u>POTOMAC RIVER BASIN</u>								
Goose Creek near Leesburg, Va.	0.4	0.8	12	2.5	18	48	131	-
<u>RAPPAHANNOCK RIVER BASIN</u>								
Rappahannock River at Remington, Va.	2.9	5.0	50	11	80	174	385	479
Rapidan River near Culpeper, Va.	2.2	2.2	-	-	90	160	367	236
Rappahannock River near Fredericksburg, Va.	5.0	5.0	189	48	227	449	925	2,070
<u>YORK RIVER BASIN</u>								
Pamunkey River near Hanover, Va.*	45	18	-	-	115	215	442	220
Mattaponi River near Beulahville, Va.	.78	8.3	48	14	66	154	319	66

	MINIMUM DAILY FLOW, PERIOD OF RECORD (CFS)	MINIMUM OCTOBER FLOW, PERIOD OF RECORD (CFS)	7Q2 (CFS)	7Q10 (CFS)	PERCENT OF TIME FLOW EQUALED OR EXCEEDED FOR OCTOBER DAILY MEAN FLOWS (CUBIC FEET PER SECOND)			CURRENT CONDITIONS FLOW (CFS)/ DURATION (PERCENT)
					75%	50%	25%	
								October 18, 2002
<hr/>								
JAMES RIVER BASIN								
Jackson River near Bacova, Va.	13	17	26	20	25	32	61	112
Potts Creek near Covington, Va.	15	16	24	17	29	38	69	72
Cowpasture River near Clifton Forge, Va.	40	42	73	54	86	110	193	584
Craig Creek at Parr, Va.	25	29	43	31	50	70	131	169
James River at Buchanan, Va.*	207	239	378	271	429	563	922	2,140
Maury River near Buena Vista, Va.	22	22	89	62	110	158	263	259
Hardware River below Briery Run near Scottsville, Va	0.1	4.8	24	7.5	28	45	80	40
Rivanna River at Palmyra, Va.	5.2	13	-	-	118	204	424	188
James River at Cartersville, Va.	330	348	1,120	584	1,380	2,000	3,600	1,520
Appomattox River at Farmville, Va.	6.3	6.3	52	21	67	105	162	198
Appomattox River at Mattoax, Va.	13	13	86	30	119	206	335	400
Chickahominy River near Providence Forge, Va.	0.07	0.07	16	4.0	22	60	172	117
<hr/>								
CHOWAN RIVER BASIN								
Nottoway River near Sebrell, Va.	14	14	82	24	82	217	609	448
Blackwater River near Franklin, Va.	0.07	0.07	-	-	7	54	305	78
Meherrin River near Lawrenceville, Va.	4.2	4.2	52	16	62	115	212	620

	MINIMUM DAILY FLOW, PERIOD OF RECORD (CFS)	MINIMUM OCTOBER FLOW, PERIOD OF RECORD (CFS)	7Q2 (CFS)	7Q10 (CFS)	PERCENT OF TIME FLOW EQUALED OR EXCEEDED FOR OCTOBER DAILY MEAN FLOWS (CUBIC FEET PER SECOND)			CURRENT CONDITIONS FLOW (CFS)/ DURATION (PERCENT)
					75%	50%	25%	
								October 18, 2002
<hr/>								
<u>ROANOKE RIVER BASIN</u>								
Roanoke River at Roanoke, Va.*	19	30	58	35	77	107	186	103
Pigg River near Sandy Level, Va.	25	51	96	47	136	175	266	266
Roanoke River at Randolph, Va.*	179	282	847	426	1,020	1,310	1,980	1,000
Dan River at Paces, Va.	244	280	-	-	912	1,200	1,780	3,390
Hyc0 River near Denniston, Va.*	1.5	0.3	-	-	18	33	62	435
<hr/>								
<u>KANAWHA RIVER BASIN</u>								
New River at Allisonia, Va.	453	534	1,040	725	1,060	1,520	2,330	3,510
Little River at Graysontown, Va.	47	59	109	69	133	180	275	229
Walker Creek at Bane, Va.	24	30	44	33	46	62	107	245
<hr/>								
<u>BIG SANDY RIVER BASIN</u>								
Russell Fork at Haysi, Va.	0.2	0.5	8.7	1.0	12	27	62	94
<hr/>								
<u>TENNESSEE RIVER BASIN</u>								
South Fork Holston River near Damascus, Va.	40	66	99	73	100	132	202	312
North Fork Holston River near Saltville, Va.	2.0	2.0	34	24	35	50	94	213
Clinch River at Cleveland, Va.	37	42	81	54	89	122	223	479
Powell River near Jonesville, Va.	18	18	42	24	46	68	126	146
* indicates some regulation								



## APPENDIX F

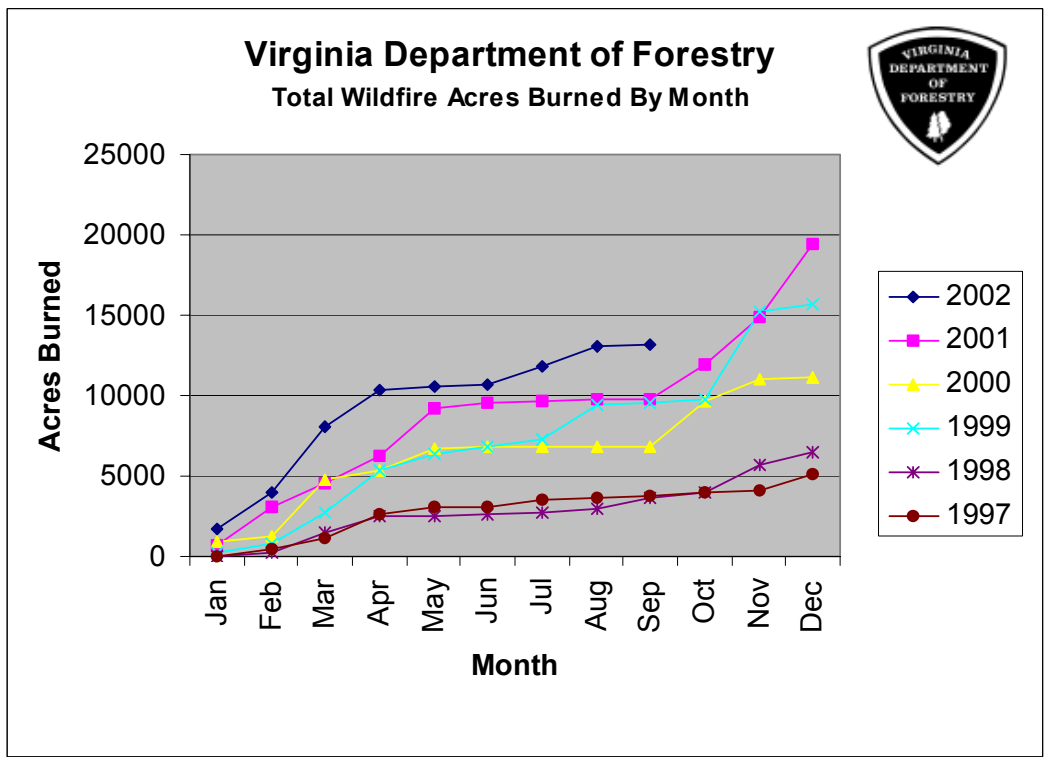
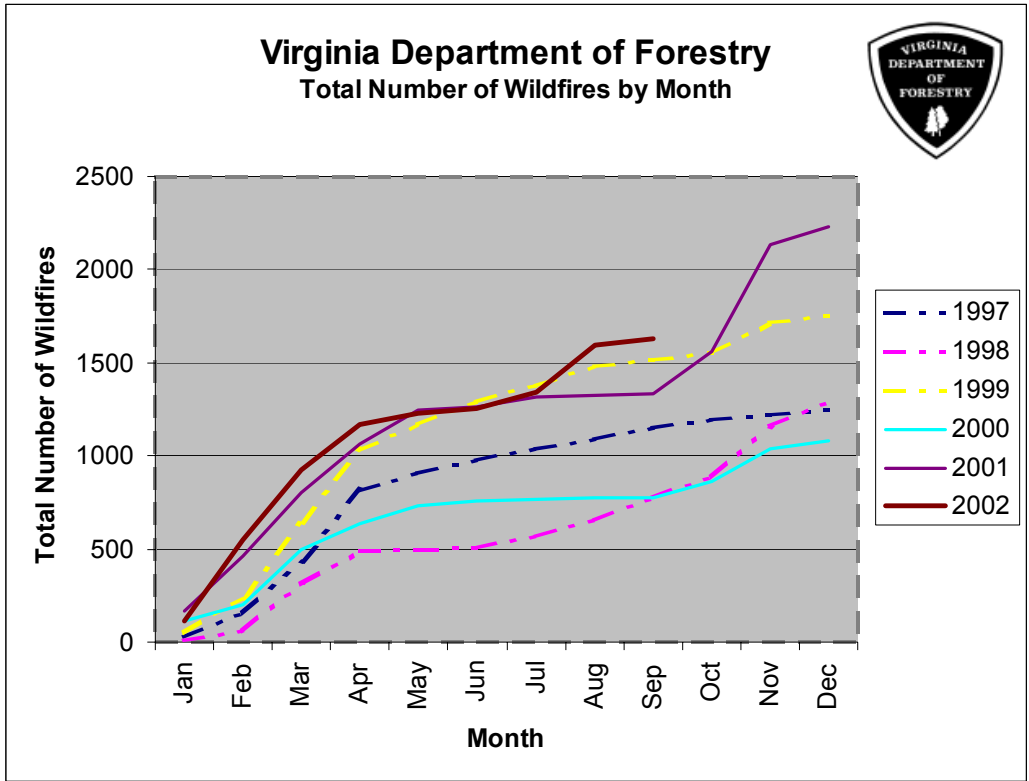
Virginia Agriculture Statistic Services report of topsoil moisture,  
crop condition and crop progress.

TOPSOIL MOISTURE PERCENT				
<i>Week Ending</i>	<i>Very Short</i>	<i>Short</i>	<i>Adequate</i>	<i>Surplus</i>
October 13	13	35	50	2
October 6	20	39	40	1
September 29	20	29	48	3
September 22	30	32	38	1

CROP CONDITION PERCENT					
Crop	Very Poor	Poor	Fair	Good	Excellent
Pastures	18	31	31	19	1
Livestock	1	16	35	43	4
Other Hay	19	29	32	19	1
Alfalfa Hay	11	18	37	33	1
Soybeans	18	34	32	13	3
Peanuts	13	28	26	30	3
Cotton	7	29	34	28	2
Apples, All	16	12	42	30	0

CROP PROGRESS PERCENT – WITH COMPARISONS				
Crop	This Week	Last Week	Last Year	5 Year Average
Corn Harvested for Grain	82	71	70	64
Soybeans Dropping Leaves	77	60	80	62
Soybeans Harvested	15	8	12	9
Winter Wheat Seeded	18	13	20	14
Barley Seeded	59	34	42	36
Flu Cured Tobacco Harvested	78	69	100	93
Peanuts Dug	62	40	72	71
Cotton Bolls Opening	97	92	84	87
Cotton Harvested	39	27	27	22
Fall Apples Harvested	86	77	70	71
Winter Apples Harvested	49	40	47	43

# APPENDIX G



# APPENDIX H

## Virginia Department of Health Field Office Reports for Public Water Systems (October 16, 2002)

(Note: The first digit in the PWSID number indicates the field office location of the waterworks. PWSID 2770650 is located in the Lexington Field Office, etc.)

<b>PWSID</b> 1-Abingdon 2-Lexington 3-Southeast VA 4-East Central 5-Danville 6-Culpeper	<b>Waterworks</b>	<b>Source Name</b>	<b>Restrictions</b> N: No M: Mandatory V: Voluntary	<b>Situation</b> B: Better, S: Same/Stable, W: Worse
2043629	Keystone Baptist Church	Drilled Wells	V	W: Well yields down significantly. Well 1 yield has fallen from 8 gpm to 1.5 gpm. Well 2 has yield of 1.5 gpm. Combined yields have periodically not meet demand. Instituted use of bottled water and increased emphasis to students and faculty to minimize water use. Currently investigating installation of storage and water hauling options. Estimated student/staff population 90.
2003725	Charlottesville/Albemarle County	South Rivanna (South Rivanna WTP)	M	W: Their main reservoir-South Rivanna (South Rivanna WTP) is 4.2 feet below full. Overall source water availability is at 55.5% of "full available capacity" (this includes both the South Rivanna system and the Sugar Hollow/Ragged Mountain system). Water restrictions are in excess of EO-33.
2003600	Charlottesville/Albemarle County	Sugar Hollow and Ragged Mountain Reservoirs (Observatory WTP)	M	W: The Sugar Hollow reservoir (Observatory WTP) is 16.3 feet below overflow. Ragged Mountain reservoir is 11.5 feet below normal. Overall source water availability is at 55.5% of "full available capacity" (this includes both the South Rivanna system and the Sugar Hollow/Ragged Mountain system). Water restrictions are in excess of EO-33.
6061320	Northwestern Elementary School	Groundwater (1 well)	M	W: Significant decline in well yield. Currently hauling water to meet demand. Inspection of nearby existing well conducted last week. CFO to work rapidly with owner to connect well.

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2770650	Roanoke City - Carvins Cove	Carvins Cove Reservoir/Tinker Creek/Catawba Creek	M	W: Reservoir level 34.1' below spillway - situation steadily worsening (22% of supply remaining). Approximately 200 days of storage remaining at the current rate. Mandatory restrictions imposed when reservoir level is between 26 and 30 feet below spillway (Stage 4). Suspension of all outdoor water uses with certain exceptions; cutting back on reservoir use by water purchases from Roanoke County (3-4MGD) and the City of Salem (1-2 MGD) and placing Crystal Spring (up to 2.8 MGD) into service; imposition of civil penalties and surcharge applied to base water rates. Suspension means no outside use of potable water for washing your own car, watering lawns and gardens and filling pools, etc. The 30-foot level would have triggered more drastic conservation measures (Stage 5); however, the City has maintained Stage 4 conservation measures at this time. Water restrictions are in excess of EO-33.
5680200	City of Lynchburg	Pedlar Reservoir	N	W: Pedlar Reservoir is 139" down. Drawing 3 MGD from reservoir and remainder from the James River.
1195050	Town of Appalachia	reservoir	V	W: Down 6 inches since 10/9/02; 52 MG and 91 days left, no alternate source, voluntary conservation measures. Similar conditions to '98 and '99 for this time of year.
1195950	Town of Wise	reservoir	N	W: Down 5 inches since 10/8/02; 146 MG and 225 days left; alternate creek source is still available but not in use due to turbidity in stream from runoff; no conservation measures. Worse shape than in '00 and '01 but better compared to '98 and '99 for this time of year.
1195100	Town of Big Stone Gap	Big Cherry Reservoir	V	W: Down 14 inches since 10/8/02; 115 MG or 57 days left; alternate well source is temporarily out of use after its turbidity rose drastically. Worse than normal for this time of year. Comparable to 1998 conditions for this time of year, except have alternate well source now.
1720076	City of Norton	two reservoirs in series	V	W: Down 1.5 ft 10/8/02; 44.8 MG and 67 days left. Alternate source is in use, voluntary conservation measures encouraged on public access TV channel. Better than in '98, '99, and '00 for this time of year.
6630050	City of Fredericksburg	Motts Run/Rappahannock River	M	W: City of Fredericksburg (consecutive system to Spotsylvania County) has asked for mandatory conservation based on Spotsylvania County's action.

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3800805	City of Suffolk	Central System	V	W: As of 10/16, reservoir system is 50.0% full in Crumps Mill. This is a 35.7% decrease from the last report. Suffolk has been pumping from Crumps Mill to Lone Star. Lone Star Lakes is at 76.5 % full a 2.5 % increase. Lone Star makes up the majority of the Northern Lakes. The Southern Lakes were at 22.5%. This is a 2.5% decrease from the last report. The city also purchases finished water from Portsmouth, which enters the central system in downtown Suffolk. As such, this system has followed the lead of the Portsmouth system and has adopted Voluntary Conservation. Suffolk will rescind Voluntary Conservation following Portsmouth's lead but not until the EDR is at full capacity. A decision concerning mandatory conservation is forthcoming.
3550051	Chesapeake - NW River system	NW River system	M	W: As of 10/16, chlorides levels in the Northwest River average 654. Monitoring well levels are at 91 % normal levels. Plant production averaged 8.35 MGD for the past week and 8.04 for the month. The ASR facility is in use to meet demand. Due to high salt and TOC levels all four surface membrane trains are in operation. 6.2 inches of rainfall this week. Because a portion of the city (a separate system from the NW River system) is served from Portsmouth, Chesapeake has decided to follow Portsmouth's lead, for ALL residents of the city. City Council voted to establish Mandatory Conservation at the meeting on 07/10/02. The restrictions took effect immediately.
3830850	Williamsburg	Waller Mill Reservoir	V	W: As of 10/16/02, Waller Mill reservoir is 29.5 inches below the spillway. Continuing to purchase 2 MGD raw water from Newport News. Supplemental well (361 gpm/0.52 MGD) has been pumping to the reservoir for about 21 months. Also getting 225,000 to 250,000 gallons per day delivered to the watershed from York County's Lightfoot water system. Voluntary conservation measures are in effect as of March 30, 2002.
5117800	Town of South Hill	Meherrin River	M	This plant has stopped operating as the new Roanoke River Service Authority waterworks began operating on 9/18/2002.
6153675	Quantico- Mainside	Lunga Reservoir/ Breckenridge reservoir	N	S: WL: Lunga 35 inches below overflow; Breckenridge full.
2171250	Stoney Creek Sanitary District		V	S: Well yield is off. Authority has reduced pumping capacity by 40% based on lower water table levels. Consumers have been asked to conserve water since February. Process of developing new 250 gpm well and water treatment plant.

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2023020	Apple Tree	Drilled wells	M	S: Well production is lower than usual; 2 wells not in service (Steeplechase 1 & 3); water imported from and exported to AquaSource's Highland Manor system (2023415). Water restrictions are in excess of EO-33.
2023480	Rainbow Forest	Drilled wells	M	S: Well production is lower than usual, Well No.4 pump lowered and now has production; however, exporting water to AquaSource's Clearview Estates system (2023194). Water restrictions are in excess of EO-33.
2161910	Mountain View Mobile Home Park	Drilled wells	M	S: well production is lower than normal. Water levels in the wells are not routinely measured. Water restrictions are in effect per EO-33.
2163550	Maury Service Authority	Maury River	N	S: Water level approximately 6 ft above the intake
3595250	Emporia	Meherrin River	V	S: Water is still flowing over the dam. River flow and reservoir level have increased. The power plant has not been operating (voluntarily) to conserve water.
3800787	City of Suffolk	Route 17 Corridor	V	S: This system is consecutive to (purchases water from) the Portsmouth system. As such, this system has followed the lead of the Portsmouth system, and has adopted Voluntary Conservation. Since Portsmouth has gone to Mandatory Conservation, Suffolk will probably switch the supply source to their Central System (groundwater).
3550050	Chesapeake - Western Branch system	Western Branch system	M	S: This portion of the city is consecutive to (receives water from) the city of Portsmouth. Because Portsmouth decided to go on mandatory restrictions, Chesapeake has decided to follow Portsmouth's lead, for ALL residents of the city. City Council voted to establish Mandatory Conservation at the meeting on 07/10/02. The restrictions took effect immediately. Purchased water from Portsmouth at the beginning of August was averaging 3.4 MGD. After reducing the service area on 8/14/02 purchased water averaged 2.15 MGD. A decrease of 1.25 MGD.
3550052	Chesapeake - South Norfolk system	South Norfolk system	M	S: This portion of the city is consecutive to (receives water from) the city of Norfolk. Because Portsmouth decided to go on voluntary restrictions, Chesapeake has decided to follow Portsmouth's lead, for ALL residents of the city. City Council voted to establish Mandatory Conservation at the meeting on 07/10/02. The restrictions took effect immediately. Purchases from Norfolk increased from 3.8 MGD to 4.3 MGD after the service area was enlarged to lessen the burden on Portsmouth. The normal average purchased water from Norfolk was 3.6 MGD. This volume should decrease once the service area decreases.

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2165765	Valley View MHP	Two drilled wells	N	S: The water system serving the park is starting to experience drought related shortages, but is not yet severe. A new waterline project that extends water service in the vicinity of this PWS has been recently completed and the water system is making the necessary arrangements with Rockingham County to connect to their new waterline. After this the MHP PWS will be inactive and will not be in a drought related problem.
2015550	Reynolds Metals Company (ALCOA)	Drilled wells	N	S: The water system has gone to a backup well due to low water production. A well site investigation was performed on 10/9/02 for a new well site; the well site approval is being forwarded on 10/16/02.
2003675	Albemarle County / Scottsville	Totier Creek Reservoirs (Scottsville WTP)	M	S: The Totier Creek Reservoir (Scottsville WTP) is full and overflowing. At this time there is adequate water to meet normal daily demands, however, the Albemarle County Service Authority has initiated mandatory water restrictions in Scottsville in addition to Crozet and the Urban area. Water restrictions are in excess of EO-33.
5083550	Town of Halifax	Banister River	V	S: the reservoir level is at full pond. Production has dropped by ~20% recently due to decreased demand.
2065250	Fluvanna Correctional Center	Mechunk Creek	M	S: The raw water impoundment is approximately 35.0% full (14 MGD available, 40 MG full capacity) and dropping. They are currently unable to pump raw water from Mechunk Creek due to low flows. The facility water demand has been reduced to approximately 95,000 due to additional use restrictions (laundry washing has been reduced from daily to 2 per week and the duration of inmate showers has been reduced). Approximately 100,000 gallons per day of water is being hauled from Lake Monticello. Water restrictions are in excess of EO-33.
2065520	Oakland School	Drilled Wells	M	S: The Oakland School waterworks provides water to approximately 150 students and staff. Four new wells have been drilled during the past two weeks. Two were dry, the third has an estimated yield of only 3 gpm, and the fourth has an estimated yield of 1 gpm. Work is underway to get these wells into operation ASAP. During this past week well production has met the daily demand and water hauling has not been necessary this past week. Water restrictions are in effect per EO-33.
2125910	NCSA - Wintergreen	Lake Monacan, Valley Ponds, Stoney Creek	M	S: The NCSA - Wintergreen waterworks source water is obtained from Lake Monacan and the Valley Ponds. Lake Monacan is 3.25 feet below normal; however, both Valley Ponds have been pumped down to minimum levels. The daily water demand is currently being met but mandatory restrictions are in effect.

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				Water restrictions are in excess of EO-33.
2125650	Nelson County Service Authority - Schuyler	Johnson's Branch	M	S: The NCSA - Schuyler waterworks source water is obtained from Johnson's Branch. The flow is currently approximately 15 gpm (normal treatment capacity is 70 to 90 gpm). Withdrawal from Rockfish River has been continued to supplement the flow from Johnson's Branch. They are currently meeting the normal daily demand with water from the Rockfish River. Water restrictions are in excess of EO-33.
2125325	Nelson County Service Authority - Lovingson	Drilled wells	M	S: The NCSA - Lovingson waterworks source water is obtained from 11-drilled wells. During this past weeks storage tank levels have been maintained at 100% full and the daily demand is being met. Supplemental water hauling has not been necessary during the past weeks. Water restrictions are in excess of EO-33.
2125202	Johnson's Senior Center	Drilled Wells	M	S: The Johnson's Senior Center waterworks provides water to 35 nursing home residents in Nelson County. During the past weeks the well production has not met the normal daily demand. Laundry is taken off site to save water. Sufficient water is available for flushing toilets, drinking, and bathing. Water restrictions are in excess of EO-33.
2065300	Fork Union Sanitary District	Drilled Wells	M	S: The FUSD waterworks source water is obtained from 6-drilled wells. Water production is significantly below normal levels. Water restrictions have been effective, as the normally daily demand has been reduced from approximately 180,000 to 130,000 GPD. Distribution system storage was maintained at 100% during this past week and available production has been in excess of the daily demand. Mandatory water restrictions have been in effect since August 9, 2002. Water restrictions are in excess of EO-33.
2015200	Augusta County Service Authority-Deerfield	Deerfield Spring	V	S: The Deerfield Spring is drying up and reduced to a small pool in the reservoir. The new suction intake is not adequately located to maximize water collection and is being adjusted. The reservoir housing leaks and the owner (USFS) has denied requests for previous repairs that would allow for the capture and retaining of additional waters. A supplemental well has been drilled and has been connected into the treatment system on an emergency basis. Submission of plans for approval will follow.
4760100	City of Richmond	James River	M	S: The current flow in the James River is 1150 cfs whereas the normal flow for this time of year is about 1600 cfs. Richmond is having no problems with water withdrawals. The City went to mandatory water conservation on August 27, 2002.
4075630	Pagebrook	Groundwater	N	S: Sydnor continues to haul 2 tanker loads



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	(Goochland)			of water per week (5,000 gallons).
6137500	Wilderness WTP	Rapidan River	M	S: Stream flow is very low. Temporary pumps are available to get water to intake structure.
6113200	Town of Madison	White Oak Run	M	S: Stream flow is very low, but no adverse impact on water treatment plant to this point.
6137500	Town of Orange	Rapidan River	M	S: Stream flow is very low, and temporary raw water pumps are available for use when flow recedes away from intake structure. Dam repair is continuing and completion date is approximately 7-10 days. Estimated that 400,000 GPD is lost through existing dam. Emergency raw water sources near Culpeper and Gordonsville have been sampled with no adverse contamination revealed thus far. Corps of Engineers met with town, county, and state officials several weeks ago to discuss various emergency water supply alternatives. COE can design, build, and pay for transporting raw or finished water. Town's options include hauling finished water from Culpeper and hauling or piping raw water from Culpeper or Gordonsville. Town and county officials met with USDA technical and financial staff last week to discuss money available to pay for temporary and long-term solutions.
2171750	Strasburg	North Fork Shenandoah River	V	S: Stream flow has increased due to recent rains - at 258 cfs (166.5 MGD) on 10/16; intake water level still above 1999 drought levels; considering measures to raise intake water levels; maintaining normal pumping rates.
2187522	High Knob Subdivision	Springs and wells	N	S: Spring yields have dropped significantly and wells are being increasingly relied upon to meet water demand.
2043250	Boyce-Millwood	Prospect Hill Spring	V	S: Spring yield is down from normal historical levels. Voluntary measures instituted to reduce water demand. Grouting of the outside area around the spring enclosure has stopped some of the water loss. Development of additional water sources is being investigated
1071525	Marville Subdivision	spring	N	S: spring is low to dry; Giles County is hauling water to residents.
6177280, 6177300	Spotsylvania County	Ni River Reservoir and Motts Run/Rappahannock River	M	S: Spotsylvania County declared a water emergency in mid November and instituted mandatory conservation. Ni River Reservoir is 47% full (64 inches below normal). Motts Run Reservoir is 69% full (6.9 feet below normal). Flow in Rappahannock River is at 1-3% mean annual flow. Estimated approximately 365-supply remaining.
5019400	High Point Subdivision	Smith Mountain Lake	N	S: Smith Mountain Lake is 3.5' below full pond
6179100, 6179775	Stafford County	Smith Lake and Abel Lake	M	S: Smith Lake is 101 inches below normal and Abel Lake is 101 inches below normal. Estimated 254-day supply remaining.

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2165300	Food Processors	North Fork Shen	N	S: Several feet above the intake, water is approximately at the level of the dam with very little flowing over the spillway.
5031175	Town of Brookneal	Phelps Creek Reservoir	N	S: Reservoir overflow at 100,000 GPD. Estimated reserve below spillway 287 days.
2161700	Roanoke County WTF	Spring Hollow Reservoir and 8 wells	M	S: Reservoir level 33.6 feet below normal; 196.4 feet of water remaining in the reservoir or approximately 180 days of storage left at the current usage rate and without pumping from the Roanoke River (average flow rate 40.65 cfs). Water restrictions general follow EO-33; except the county's rules are stricter on car washing but allow watering of golf courses and athletic fields. Water is exported to the City of Roanoke system (2770650).
5019250	Eagle Eyrie	Unnamed Reservoir	N	S: Reservoir is down 9.5'. Engineer estimates 50 days of storage. Looking into existing wells to supplement supply. Identified and repaired leak on the waterline from intake to plant. Long term plan is to connect to BCPSA.
5515050	City of Bedford	Stoney Creek Reservoir	M	S: Reservoir is 39 inches down. City is drawing about 0.50 MGD from four wells and river to supplement reservoir. City went to mandatory conservation.
6059500	FCWA- Lorton/occoquan WTPs	occoquan Reservoir	N	S: Reservoir 71% full, 5.69 billion gallons usable storage. All of FCWA service area is on "watch" status.
2023415	Highland Manor	Drilled wells	M	S: only two wells producing water (Rosemae and Carolyn); water exported to and imported from AquaSource's Apple Tree system (2023020). Water restrictions are in excess of EO-33.
5135110	Town of Burkeville	7 wells	M	S: one well has lost production others showed signs of stress. Water conservation in place for ~10 weeks. At reduced output wells seem to be working satisfactorily
3095490	James City Service Authority Central System	Approximately 30 wells	V	S: No significant impact on water levels in wells. Conservation due to high demands in distribution system.
2163250	Town of Goshen	Goshen Spring	M	S: No reported drop in spring yield, but a news article came out in the local weekly paper. Essentially mandating water conservation and setting an ordinance that residential customers may not allow water to be taken by or given to non-town residents. The Town Council is attempting to decide how to proceed with funding for several much-needed infrastructure improvements that will reduce leakage and unaccounted for water.
3183550	Jarratt	Nottoway River	N	S: No quality or quantity problems noted. The river level and rate of flow have decreased.

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3670800	Virginia-American, Hopewell	Appomattox River/James River	M	S: No problems with water quantity. Flow has increased this week in both the James River and Appomattox River. Dissolved minerals have decreased slightly, with some effect on industrial consumers and disinfection byproducts. Water quality is still fluctuating with changes in the tide. City of Hopewell enacted water conservation ordinance to mirror EO33 on September 10
6047500	Town of Culpeper	Lake Pelham	N	S: No problems at this time. Reservoir is near normal level for this time of year.
6061600	Town of Warrenton	Warrenton Reservoir	N	S: No problems at this time. Main reservoir is near normal level for this time of year.
2163075	Brownsburg Water Company	Drilled wells	V	S: No defined problems have occurred and they have requested voluntary restrictions as a precaution.
2165060	Broadway, Town Of	North Fork Of Shenandoah, Linville Creek	N	S: N. Fork and Linville approximately 1 foot above the intakes. Are using Linville creek only at this time.
2790600	Staunton	North River Dam, Middle River	N	S: Middle River is not in use, flow reduced last week from North River from 1.8 MGD to 1.0 MGD. No problems noted at Gardner Springs. Water level is approximately 3.9 feet lower than normal at the dam, but can drop to 17 feet below normal without much impact.
2165045	Bridgewater, Town Of	North River	N	S: lowest observed in 25 years, several feet above the intake, approximately 11MGD at the intake
5690400	City of Martinsville	Beaver Creek Reservoir	M	S: Last reservoir check at 9.1' below spillway--in order to help reduce loss in reservoir, the City continues to use Leatherwood source along with reservoir and pumping at ~2 MGD from this source--has been holding up since recent rainfall; Note City implemented voluntary conservation measures on 8/27/02
6033425	Lake Caroline	Lake Caroline	M	S: Lake Caroline is 23 inches below normal level. Estimated 280-day supply remaining.
6059501	FCWA-Corbals WTP	Potomac River	N	S: Jennings Randolph and Little Seneca reservoirs in the Potomac River watershed are at 64% full and 80% full, respectively, on 9/17/02. Flow In Potomac River at Little Falls (downstream of the Wash. Met.intakes) on 10/16/02 was 2500 MGD. Releases from upstream Jennings Randolph Reservoir were halted on September 23 due to increased river flow caused by rains in the upper watershed. Releases from Little Seneca were stopped on Sept 14. All of FCWA service area is on "watch" status. Voluntary conservation will be instituted when the upstream reservoirs drop below 60% full. No releases were made from the reservoirs in 2000 or 2001. Reservoir storage is adequate to meet the water supply needs in the event the 1930-31 drought of record were to re-occur.

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2187406	Front Royal	South Fork, Shenandoah River	M	S: Implemented mandatory restrictions per Governor's policy. Running 14-day average is well below 30% mean stream flow [17.51% with mean stream flow at 316 cfs (203.9 MGD) on 10/16]. VWPP requires conservation controls be implemented at 30% (voluntary), 17% (mandatory), 15% (emergency), and 13% (rationing) of mean stream flow based on 14-day running average.
4999999	Henrico County	Purchased from the City of Richmond	M	S: Henrico County has an emergency ordinance in place, which allows them to enact mandatory water restrictions. Henrico County's decision to go to mandatory restrictions is driven by demand (tank levels) or a decision by the City of Richmond to go to mandatory restrictions. Following the City's lead, the County went to mandatory water conservation on August 27, 2002, conservation measures are being enforced.
6033100	Caroline	Campbell's Creek (groundwater)	M	S: Hauling water (approx 10,000 GPD) from county system. Recently drilled well has yield of approx. 30 gpm and samples will be collected this week for complete chemical analysis. Waterline extension from county being considered.
4085398	Hanover County	North Anna River, wells, and purchased water from the City of Richmond	M	S: Hanover County has an ordinance in place with triggers for mandatory water restrictions. Mandatory water conservation is triggered if (1) either the City of Richmond or Henrico County goes to mandatory restrictions or (2) low flow in the North Anna River as determined by DEQ. Following the City's lead, the County went to mandatory water conservation on August 27, 2002. M - the County is enforcing the conservation measures in their main service area only.
6600100	City of Fairfax	Goose Creek/Beaver Dam	N	S: Goose Creek Reservoir is 1 inch over top of dam, and Beaver Dam Reservoir is 8.95 feet below full.
6107600	Purcellville	Hirst Reservoirs	V	S: Front reservoir 3.4 feet below full; back lake is 4.0 feet below full. Drought "watch" status still in effect. Mandatory restrictions go into effect when front lake reaches 5 feet below normal.
2065480	Lake Monticello Service Company Aqua Source	Rivanna River	M	S: Flows in the Rivanna River at the Lake Monticello Water Treatment Plant are extremely low, however there is currently a sufficient quantity of raw water to meet daily demands. Mandatory water restrictions are in effect. Water restrictions are in excess of EO-33.
2079625	Rapidan Service Authority	Rapidan River	M	S: Flows in the Rapidan River at the Greene Water Treatment Plant are extremely low, however there is currently a sufficient quantity of raw water to meet daily demands. Mandatory restrictions were initiated on August 23, 2002. Water restrictions are in excess of EO-33.
5089376	Fieldcrest Cannon	Smith River	M	S: flow subject to release from Philpott

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	WTP			Dam
5089852	Upper Smith River WTP	Smith River	M	S: flow subject to release from Philpott Dam
5007030	Amelia Academy	Well No.1 (bored)	M	S: Existing well is very low. We are awaiting plans for a new well, but will allow it's emergency connection if necessary.
2023194	Clearview estates	Drilled wells	M	S: currently no production from the two Clearview Estates wells - importing water from AquaSource's Rainbow Forest system (2023480). Water restrictions are in excess of EO-33.
6685100	City of Manassas	Lake Manassas (Broad Run)	N	S: Current WL 284.02 feet; Max is 290 feet. Mean elevation for September is 286.68 feet. Stage 1 conservation (voluntary) will start at reservoir elevation 279.72 feet.
6107300	Leesburg	Potomac River	V	S: Current river level at 188.2 feet. Normal level is 187.50 feet. Leesburg intake is located upstream of the FCWA and Wash. Met. Intakes. Signs requesting voluntary conservation have been placed around town and on town website.
2015575	South River S.D. (ACSA)	Coles Run	N	S: Coles Run reservoir level is reported to be almost full. No impact on system due to multiple sources.
2003250	Albemarle County / Crozet	Beaver Creek Reservoir	M	S: Beaver Creek Reservoir is currently down 5.3 feet from normal full. The RWSA currently able to meet normal demands. Water restrictions are in excess of EO-33.
5031200	Dan River, Inc. - Brookneal Plant	Falling River	N	S: Approx. 1 inch of water over spillway, though intakes still adequately covered. Going to connect to Town water system for drinking water.
5031150	CCUSA	Otter River	N	S: 19" above intake screen. Terminal Reservoir is full. Recent rain on watershed greatly improved reservoir levels.
5009050	Town of Amherst	Buffalo River	M	B: Water is being released from a County-owned upstream Mill Creek Reservoir into the Buffalo River to provide water for the Town. Mill Creek is down about 9". Recent rain has allowed Town to throttle reservoir valve. This should increase reservoir storage. Town is planning to drill well to supplement supply.
5111800	Town of Victoria	Nottoway Falls & Lunenburg Lake	M	B: Water is 4 inches over dam. They are trying to follow the Governors recommendations. Production has dropped by 20% after fixing leaks.
1071455	Giles County PSA membrane WTP	well	V	B: Two well standby sources still in use. New River well recharge is improving; water level at 80 ft above well pump at 2 MGD pumping rate.
5143210	Town of Gretna	Georges Creek Reservoir	M	B: Town reservoir full; No longer pumping from temporary impoundment of tributary to Whitethorn Creek or from Elba spring into the reservoir; Town initiated mandatory conservation measures beginning 8/7/02.

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4041035	Appomattox River Water Authority	Lake Chesdin	M	B: The water level is 62 inches below the top of the dam. A week ago the level was 69 inches below the top of the dam. Wholesale water provided - but following the Governor's EO for mandatory conservation
5147450	Town of Farmville	Appomattox River	M	B: The river depth increased 3 inches to ~38 inches. They are operating normally but still retain their water conservation measures as before. Their average reduction in usage is still ranging between 50,000 and 100,000 GPD less than normal. They still aren't using the Holiday Lake siphon. The 2 emergency wells are still awaiting the completion of analyses.
5111450	Town of Kenbridge	Flat Rock Creek & reservoir	M	B: The reservoir level is at 4 feet and increasing. They're pumping 1.5 MGD into the reservoir from Flat Rock Cr., which is at 7 inches above full pond.
4041845	Swift Creek WTP (Chesterfield County)	Swift Creek Reservoir	M	B: The reservoir level is 173.8 feet. The level is 0.1 feet higher than it was a week ago and 3.2 feet below the top of the dam. Mandatory water conservation has been in effect since August 16, 2002.
4075735	James River Correctional Center	Beaverdam Creek and the James River	M	B: The flow in the primary source of water (Beaverdam Creek) is now sufficient to meet the needs of the water treatment plant without being supplemented by water pumped from the James River. Besides supplying water to its normal customers, this WTP is now supplementing the water supply at Nottoway Correctional Center in Nottoway County. Trucks hauled 200,000 gallons from James River Correctional Center to the Nottoway Correctional Center last week. Mandatory water conservation is in effect for the correctional units. They are on "code yellow".
5780600	Town of South Boston	Dan River	V	B: The Dan River is a little higher, 3 feet deep at the intake screen. This is not restricting plant operation. They indicate they are utilizing the Governor's conservation guidelines but noted that little reduction in demand has been observed. They are discussing ways to improve enforcement.
4073311	Gloucester	Beaverdam Reservoir	V	B: The Beaverdam Reservoir water overflow elevation is 40.5. The water level was 39.13 on October 15, 2002. The reservoir level has risen since the last report. Note that about a million gallons of water is allowed to flow through the reservoir every day. V - but following the Governor's EO for mandatory conservation.
6107200	Town of Hillsboro	GWUDISW (Spring) and newly drilled well	V	B: Spring flow declined to approx. 3.25 gpm several weeks ago is now holding steady. New well drilled July 6-8, 2002, using DWSRF planning grant money; yield approx 8 gpm. Well temporarily connected to system. CFO continues to work with town to get well permanently connected ASAP.

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3650150	Ft. Monroe	Big Bethel Reservoir System	V	B: Reservoirs are full! Last report- the lower reservoir was 15.25 inches below the spillway; the upper reservoir was 20 inches below the spillway. Readings from 10/16/02.
5029085	Buckingham County Waterworks	Troublesome Creek Reservoir	V	B: Reservoir rose to ~29-inches below spillway. They are still using a portable pump to transfer water into the raw water pump station from the reservoir. They have passed an emergency ordinance as planned and will have a public hearing in November.
5037300	Town of Keysville	Spring Creek Impoundment	M	B: Reservoir is at full pond. They are following the Governors guidance criteria and passed an emergency ordinance this week to restrict water usage. <b>A recently constructed farm pond may have cut off a spring that recharges this 42-acre reservoir.</b>
5135160	Town of Crewe	Lazerretto Creek/Crystal Lake	M	B: Reservoir is 3 inches above the overflow. They had 1.4 inches of rain last night. Restrictions on water use still utilize the Governor's guidance criteria. They will return to more restrictive conservation measures if the reservoir falls more than 6 inches below the overflow. Piedmont Hospital has shut down their well system (not due to drought but because of long term contamination problems) and is supplied completely by the Town. Nottoway Correctional Center is fully on the Town's system now. The operator noted some sporadic increases from one or more of these State owned facilities.
5135100	Town of Blackstone	Nottoway River Reservoir	M	B: Nottoway Reservoir is full with minimal overflow.
5117310	Town of Clarksville	Kerr Lake	N	B: Kerr Lake is approximately 5 feet below normal pool.
5067840	Town of Rocky Mount	Blackwater Creek	M	B: Have 2.5 inches overflow at the check dam; The Town is not under any sort of conservation. If necessary the plant could cut back pumping rate and extend operating hours to maintain flow.
5025450	Town of Lawrenceville	Great Creek	N	B: Great Creek Reservoir is approximately 22" below maximum pool but this is not causing problems according to their operator.
5009250	Amherst County Service Authority	Graham Creek Res., Harris Creek	M	B: Drawing from creek as much as possible (a few hours a day), but almost entirely from reservoir, which is 55.5" down. Emergency line from the James River was completed on 9/16. Started mandatory water restrictions July 24, 2002. Pumping water from James River to reservoir.
5089487	Marrowbone Cr. WTP	Marrowbone Creek	M	B: Creek is still flowing over check dam and plant operating at design capacity of 1 MGD. Not pumping from upstream reservoir; Local mandatory conservation measures in place since 7/16/02 have been lifted (still complying with statewide mandatory conservation measures) & now using single interconnection with City of Martinsville to supplement status.

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				Martinsville to supplement system.
5031050	Town of Altavista	Staunton River, Reed Creek	V	B: Creek intake not in use because water level is too low; The two springs have lost capacity. Using Staunton River as primary source. Approximately 2.1 inches of rain over the weekend has improved flows.
1077240	Town of Fries	Eagle Bottom Creek & New River	N	B: Creek has recovered sufficiently so that pumping from New River is no longer necessary.
5143114	Town of Chatham	Cherrystone Creek	M	B: Creek flow improved some with recent rain- operating at full capacity at this time
5590100	City of Danville	Dan River, Schofield Dam	N	B: City is having no problems meeting their average demand of 7.0 MGD.
3700500	Newport News	Chickahominy, Little Creek, Diascund, Skiffes Creek, Harwoods Mill and Lee Hall Reservoirs	V	B: As of 10/15/02, the reservoirs were 59% full (in the previous report the reservoirs were 58% full). One pump on at the Chickahominy pump station. Blending river water with Little Creek Reservoir for chloride moderation. Upstream of the dam (intake), chlorides are about 840 PPM. Went to Voluntary Conservation effective 07/25/02. Mandatory Conservation starts 10/18. RO plant producing of about 3.65 MGD.
3740600	Portsmouth	Lakes Cohoon, Meade, Kilby, and Speights Run	M	B: As of 10/15, reservoirs are at 59% of useful capacity. This is a 4 % increase since 10/07. Historic avg. capacity for this time of year is 88% and the monthly median is 94%. Both emergency wells are ON, pumping an average of 4.5 MGD. Est. days of reservoir storage remaining at current raw water pumpage of 15.1 MGD is about 151 days. City Council voted to establish Mandatory Conservation (Condition II) at meeting of 07/09/02. An interim conservation step, before going to Condition III, will be brought before City Council should the reservoir capacity drop to 50%. Interim conservation step imposes a 25% surcharge on all customers who exceed 600 cu. ft. (avg. 74 GPD) per bimonthly billing cycle. Condition III trigger occurs when reservoir capacity reaches 40%. Condition III imposes a more severe rate penalty. Both the interim step and Condition III must be passed by City Council prior to implementation. City is beginning negotiations, and preliminary design of a raw water line, to provide Lake Gaston water to the treatment plant.



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3710100	Norfolk	Lake Prince, Lake Burnt Mills, Western Branch reservoir, Nottoway River, Blackwater River, 4 western wells; Little Creek reservoir, Lakes Smith, Lawson, Whitehurst, and Wright. Lake Gaston.	N	B: As of 10/14, reservoirs are at 82.7% of total capacity. This is a 2.7% increase since 10/07. Historic reservoir capacity at this time of year is 80.5%. Reservoirs are the Western Branch Reservoir, Lake Prince, Burnt Mills Reservoir, and the in-town lakes. Surface water sources pumped into the reservoirs are Lake Gaston, Nottoway River and Blackwater River. There are also four groundwater wells which discharge to the reservoirs. Avg. pumping into the reservoirs from Lake Gaston = 31.6 MGD; Blackwater River = 0 MGD (pump off 08/02); Nottoway River = 21.7 MGD. Deep wells = 0 MGD (pumps off 09/24). Estimated 176 days of storage on reservoirs alone with no pumpage from the surface water sources or wells into the reservoirs, based on current pumpage to the treatment plants. Currently not under locally imposed conservation measures but honoring Governor's Order.
5141640	Town of Stuart	South Mayo River	N	B: About 1.8 inches overflowing spillway. Started pump test and sampling of two inactive wells.

# APPENDIX I

## Virginia Department of Health Drought Watch Public Water Systems (October 18, 2002)

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1071525	Marleville Subdivision	spring	N	S: spring is low to dry; Giles County is hauling water to residents. Soon to connect to PSA.
1195050	Town of Appalachia	reservoir	V	W: Down 6 inches since 10/9/02; 52 MG and 91 days left, no alternate source, voluntary conservation measures. Similar conditions to '98 and '99 for this time of year.
1195100	Town of Big Stone Gap	Big Cherry Reservoir	V	W: Down 14 inches since 10/8/02; 115 MG or 57 days left; alternate well source is temporarily out of use after its turbidity rose drastically. Worse than normal for this time of year. Comparable to 1998 conditions for this time of year, except have alternate well source now.
3700500	Newport News	Chickahominy, Little Creek, Diascund, Skiffes Creek, Harwoods Mill and Lee Hall Reservoirs	V	B: As of 10/15/02, the reservoirs were 59% full (in the previous report the reservoirs were 58% full). One pump on at the Chickahominy pump station. Blending river water with Little Creek Reservoir for chloride moderation. Upstream of the dam (intake), chlorides are about 840 PPM. Went to Voluntary Conservation effective 07/25/02. Mandatory Conservation starts 10/18. RO plant producing of about 3.65 MGD.
3830850	Williamsburg	Waller Mill Reservoir	V	W: As of 10/16/02, Waller Mill reservoir is 29.5 inches below the spillway. Continuing to purchase 2 MGD raw water from Newport News. Supplemental well (361 gpm/0.52 MGD) has been pumping to the reservoir for about 21 months. Also getting 225,000 to 250,000 gallons per day delivered to the watershed from York County's Lightfoot water system. Voluntary conservation measures are in effect as of March 30, 2002.
4075630	Pagebrook (Goochland)	Groundwater	N	S: Sydnor continues to haul 2 tanker loads of water per week (5,000 gallons).
4087860	Tuckaway West Child Care Ctr.	well	M	S: Water system cannot handle high demand. Mandatory program implented for school. Also, voluntary conservation requested by all localities in greater Richmond area.
5007135	Amelia Courthouse	well	M	W: 1 well lost capacity- another larger well being developed- geologist recommended well be monitored closely-well levels have not been monitored, but will be.
5011050	Appomattox, Town Of	well	M	W: 4 of 7 wells are low 5-9 ft (one is 5' and three are 9') other 3 wells 1-3 ft

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5019425	Hillcrest Subdivision	well	M	W: near critical - periodic well failure under high demand
5029085	Buckingham County Waterworks	Troublesome Creek Reservoir	V	B: Reservoir rose to ~29-inches below spillway. They are still using a portable pump to transfer water into the raw water pump station from the reservoir. They have passed an emergency ordinance as planned and will have a public hearing in November.
5031825	Suburban Trailer Town, Inc.	well	M	W: Well 5 essentially non-producing; Well 4 lost ~80% of capacity; Well 3 lost !75% of capacity; contribution from Well 2 is negligible; has purchased some water
6033050	Campbell Creek Subdivision		M	W:
6061320	Northwestern Elem School		M	W: Believe that well has dried up.
6107033	Banneker Elementary School		M	W: water table down
6137500	Town of Orange	Rapidan River	M	S: Stream flow is very low, and temporary raw water pumps are available for use when flow recedes away from intake structure. Dam repair is continuing and completion date is approximately 7-10 days. Estimated that 400,000 GPD is lost through existing dam. Emergency raw water sources near Culpeper and Gordonsville have been sampled with no adverse contamination revealed thus far. Corps of Engineers met with town, county, and state officials several weeks ago to discuss various emergency water supply alternatives. COE can design, build, and pay for transporting raw or finished water. Town's options include hauling finished water from Culpeper and hauling or piping raw water from Culpeper or Gordonsville. Town and county officials met with USDA technical and financial staff last week to discuss money available to pay for temporary and long-term solutions.