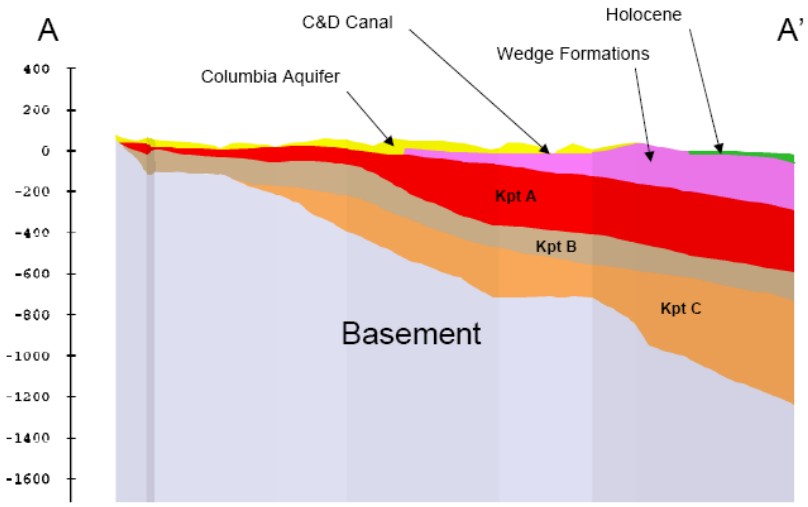
TENTH REPORT TO THE GOVERNOR AND THE GENERAL ASSEMBLY

Regarding the Progress of the

DELAWARE WATER SUPPLY COORDINATING COUNCIL

Almost 2 billion gallons of water storage implemented since the drought of 1999



DGS hydro-geologic cross-section

April 28, 2008

Prepared by the

Delaware Department of Natural Resources and Environmental Control

Delaware Geological Survey

University of Delaware, College of Human Services, Education, and Public Policy
Institute for Public Administration – Water Resources Agency

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL
89 KINGS HIGHWAY
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OFFICE OF THE
SECRETARY

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April 28, 2008

The Honorable Ruth Ann Minner
Governor of Delaware
Legislative Hall
Dover, Delaware 19901

144th General Assembly
Legislative Hall
Dover, Delaware 19901

Dear Governor Minner and Members of the 144th General Assembly:

Once again, I have the distinct pleasure of forwarding to you the latest progress report of the Delaware Water Supply Coordinating Council (WSCC). This current report provides detailed documentation of water conditions following the drought watch declaration of October 20, 2007, through to the present.

As you recall, rainfall through most of last summer was very sparse, particularly in southern Delaware, and was accompanied by several stretches of severe hot weather. The WSCC recommended a drought watch due to decreased streamflows and groundwater levels, anticipated dry conditions, and concern that at least normal precipitation levels over the winter would be needed in order to stave off a much worse water supply situation this summer. The Governor acted on the recommendation and declared a drought watch on October 20, 2007.

Fortunately, concerns over drought have eased. The Governor rescinded the drought watch on April 24, 2008, based on the Council's unanimous recommendation to lift the watch.

As detailed in the current report, progress continues with the development of additional storage capacity for northern New Castle County. I am pleased to report that we have exceeded the goal of developing over one billion gallons of storage for northern Delaware. Two remaining projects will shortly push reserves to nearly two billion gallons. These projects are the increasing of the storage level of Hoopes Reservoir by the City of Wilmington and an aquifer storage and recovery (ASR) system by United Water Delaware.

Additionally, the U.S. Army Corps of Engineers completed the groundwater modeling study this year. The study concluded that the groundwater in the coastal plain of northern New Castle County is essentially at full development. Because of this anticipated finding, we have purposely concentrated on storage systems for new sources of water rather than developing multiple new production wells. The study also found that critical geologic information is limited or absent in numerous portions of the deep Potomac aquifer. This prevents any accurate prediction of long-term trends in that critical water source. In other words, we cannot anticipate whether the aquifer will remain at consistent levels at expected pumping rates or whether there will be a steady decline in the supply. New observation wells eventually will be needed to answer that question, and a planning project is underway by a special project committee of the WSCC.

Finally, I wish to thank Mr. Kevin Donnelly for seven years of dedicated service as my designee as chair of the WSCC. He always maintained a sharp focus for the Council, and I accredit him with much of the success of the organization.

As always, please do not hesitate to contact me or my new designee as chair, Dr. Katherine Bunting-Howarth, at 739-9949.

Sincerely,

John A. Hughes
Secretary

Encl: *Tenth Progress Report to the Governor and the General Assembly*

cc: K. Bunting-Howarth–DNREC
K. Donnelly–NCCD

TENTH REPORT TO THE GOVERNOR AND THE GENERAL ASSEMBLY
Regarding the Progress of the
DELAWARE WATER SUPPLY COORDINATING COUNCIL

1. Executive Summary

This *Tenth Report to the Governor and General Assembly* records the progress of the Delaware Water Supply Coordinating Council (WSCC) in implementing almost 2 billion gallons of water supply storage in northern New Castle County since the drought of 1999. This report also tracks the progress of the water purveyors in complying with HB 118, the Water Supply Self-Sufficiency Act. In spring 2007, the United States Army Corps of Engineers (Corps) completed the northern New Castle County ground-water study which quantified the availability of water from aquifers. On April 24, 2008, Governor Minner lifted the Drought Watch in Delaware, a first stage alert calling for the voluntary conservation of water, which had been in effect since October 20, 2007.

Previous Delaware Water Supply Coordinating Council reports dating to 2000 are available online at www.wr.udel.edu.

Drought Watch

On October 20, 2007, Governor Ruth Ann Minner declared a Drought Watch in Delaware, requesting that all residents and businesses voluntarily conserve water. The Governor took this step, the first in a three - phase drought operating plan established after the drought of 2002, when the Delaware WSCC reviewed water supply and demand data and concluded that conditions were drier than normal. Deficit rainfall ranged from 39% to 72% of normal at Delaware stations between May and September 2007. Stream flows in the White Clay and Brandywine creeks declined to levels observed once every 2 to 5 years. The City of Newark began utilizing water from its reservoir on July 22, 2007 in response to significantly below normal streamflow in White Clay Creek. The salt front migrated up from the Delaware River and brackish water was detected in the tidal Christina River downstream from United Water Delaware's intake on White Clay Creek at Stanton.

Water conditions improved from October 2007 through March 2008, especially in northern Delaware where precipitation was above normal in February and March. The precipitation resulted in increased streamflows and rising ground-water levels. On March 13, 2008, the Water Supply Coordinating Council met in Dover and recommended that the Governor lift the Drought Watch due to improved precipitation, streamflow, and groundwater levels throughout Delaware. On April 24, 2008, Governor Minner lifted the Drought Watch in Delaware.

Water Supply

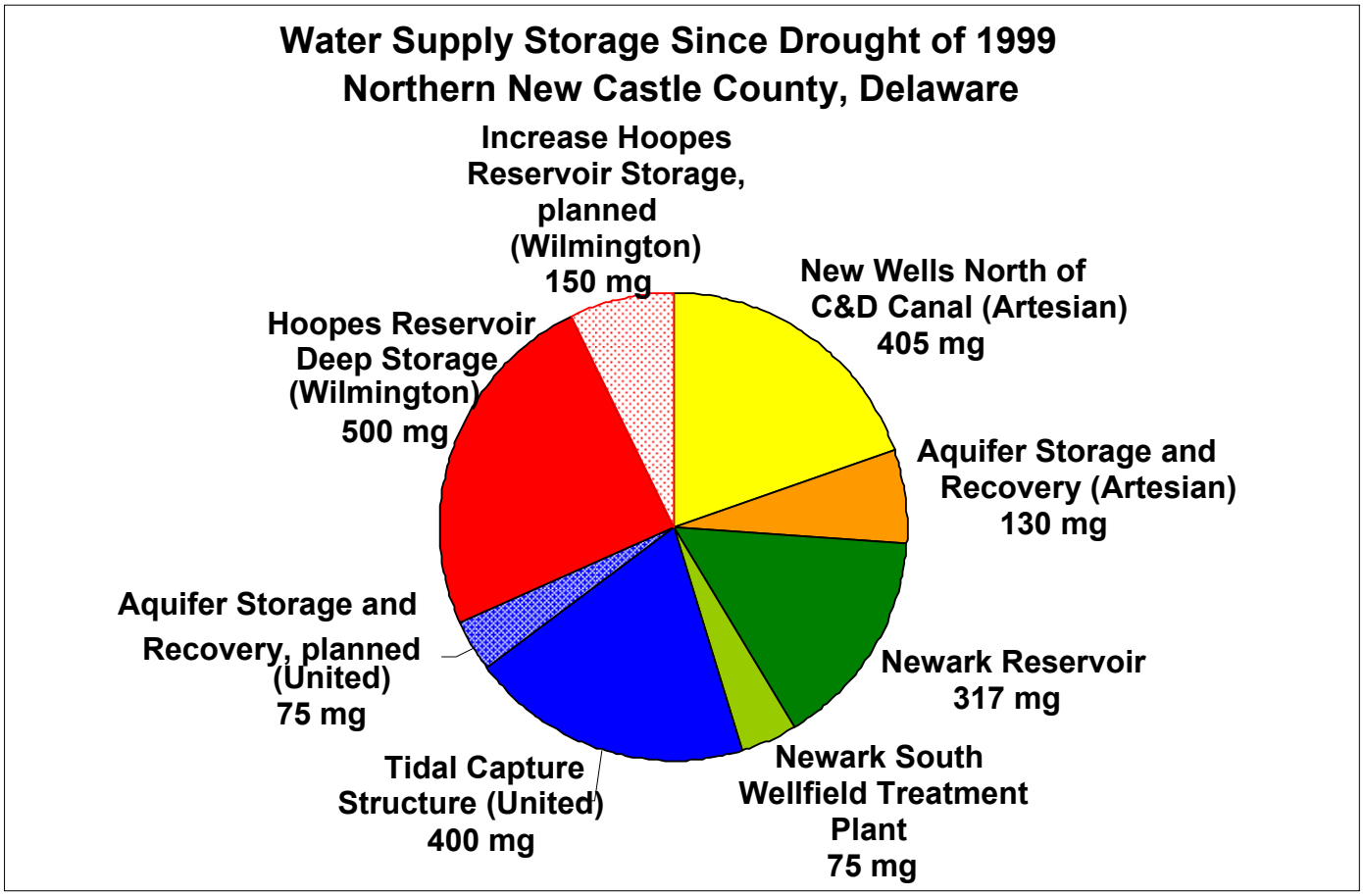
Following the blueprint set in Governor Minner's *2020 ON Tap: Ensuring Delaware's Fresh Water Supply* initiative announced in April 2003, water purveyors in northern New Castle County have developed over 1.8 billion gallons in new reserve water supplies since the drought of 1999 and reduced water demands by 10 to 15 percent as a cushion to meet future dry conditions. When the City of Wilmington completes the renovation of Hoopes Reservoir's spillway which will facilitate the raising of the reservoir pool by two feet thus adding 150 mg of new storage, and United Water Delaware completes an Aquifer Storage and Recovery project that will provide 75 mg, water purveyors will have developed over 2 billion gallons of additional water supply storage in northern New Castle County. These reserve

water supplies are designed to meet conditions experienced during the 2002 drought of record based on peak water demands forecast for the population in 2020.

Table 1. Water supply developed and planned since the drought of 1999.

Sponsor	*Project*	*Capacity (mg)*
Developed Since 1999		
Artesian Water Company	New Wells North of C&D Canal	405
Artesian Water Company	Aquifer Storage and Recovery	130
City of Newark	Newark Reservoir	317
City of Newark	South Wellfield Iron Treatment Plant	75
United Water Delaware	Modify Tidal Capture Structure Plan	400
City of Wilmington	Hoopes Reservoir Deep Storage Plan	500
Planned for 2008		**1,827**
United Water Delaware	Aquifer Storage and Recovery	75
City of Wilmington	Raise Hoopes Reservoir Water Level by 2 ft	150
		2,052 mg

Figure 1. Increases in actual and planned water supply storage since the drought of 1999.



Water Demand

On the demand side, the water purveyors have waged a campaign to conserve water. Since the 2002 drought, water demands in northern Delaware are down 10 percent and rarely peak above 80 mgd. Recent peak demands contrast with the historic peak demand of 93 mgd recorded in 1997. Leak detection, water pipe replacement projects, and implementation of efficient water use plumbing fixtures have cut water usage back substantially. A 10 percent water demand savings in northern Delaware amounts to 7 mgd, which accrued over a 75-day drought period, adds up to 500 mg or about 1 ½ times the capacity of Newark Reservoir.

Conservation oriented water rates such as the inclining block rates employed by Artesian Water Company, City of New Castle, City of Newark, and United Water Delaware have resulted in water demand reduction in their respective service areas. Many industries have installed recycling equipment and Delawareans have adopted a strong conservation ethic following the droughts of 1999 and 2002.

Delaware Water Supply Self Sufficiency Act

The water purveyors are complying with House Bill 118, the Delaware Water Supply Self Sufficiency Act, signed by Governor Minner in July 2003. HB 118 requires the WSCC to determine projected water demand for each water utility in northern New Castle County for 2009 and certify that the non-jurisdictional (municipal) water utilities are self-sufficient. The WSCC chair has accepted the certification of the City of Newark, and received a resubmission from the City of Wilmington.

The jurisdictional water utilities (investor owned purveyors) which are subject to regulation by the PSC, submitted applications certifying their self-sufficiency to the PSC by July 1, 2006. The PSC has since accepted the certifications of the jurisdictional water utilities. The updated supply and demand estimates indicate that the water purveyors have implemented enough water supply storage since 1999 (over 1.8 billion gallons) that they have achieved water supply self sufficiency in accordance with the 2003 law.

Table 2. Water supply and demand projections for northern New Castle County through 2009.

Purveyor	***2009 Projections***		
	Supply (mgd)	***Demand (mgd)***	***Surplus (mgd)***
Artesian	28.5	23.3	5.2
United Water Delaware	28.3	23.6	4.7
Wilmington	36.3	29.0	7.3
Newark	7.8	4.9	2.9
New Castle MSC	2.0	0.5	1.5
Total	**102.9**	**81.3**	**21.6**

Northern New Castle County Ground-Water Study (DNREC)

The DNREC Division of Water Resources signed a contract on May 23, 2000 with the U.S. Army Corps of Engineers to study the long-term availability of ground-water for supply in northern New Castle County. The ground-water modeling area is in the Coastal Plain and extends north-south from Wilmington to Middletown, Delaware and east-west from New Jersey across New Castle County into Maryland. Completion of the study was considerably delayed from the original schedule due to complex

project funding arrangements and significant technical hurdles. The key technical hurdle that was not overcome was the ability of the model to predict long-term (several decades) trends in water levels. As a result, the model represents near-term conditions based on existing and expected pumping rates.

The Corps completed the modeling phase and released its final draft report in February 2007. A presentation on the findings and recommendations was given by the Corps at DNREC on May 9, 2007. The final report with written comment responses and additional maps is expected in May 2008.

The conclusions are as follows. The overall ground-water system is considered to be fully developed. Of the water produced in Delaware, twenty percent is estimated to originate from the adjacent states. Water pumped from the lowermost Potomac aquifer affects heads in the uppermost Potomac aquifer in all three states. Streams in Delaware north of the C & D Canal are impacted by pumping. The maximum amount of available ground-water based on existing and proposed pumping rates is estimated to be 27.3 mgd.

Acknowledgements

The following staff co-authored this report on behalf of the Water Supply Coordinating Council: Kevin Donnelly and Stewart Lovell from the Delaware Department of Natural Resources and Environmental Control (DNREC), John Talley and Stefanie Baxter from the Delaware Geological Survey (DGS), and Gerald Kauffman and Martin Wollaston from the University of Delaware, Institute for Public Administration – Water Resources Agency (UDWRA).

2. Water Supply Coordinating Council

In August 2003 Governor Minner signed HB 203 which reauthorized the Delaware Water Supply Coordinating Council to January 1, 2010, expanded the WSCC to include statewide representation, and appointed the Delaware Geological Survey and University of Delaware Water Resources Agency as voting members. The WSCC was originally created in July 2000 when Governor Carper signed House Bill 549 which appointed the committee members and designated the UDWRA as State Water Coordinator (Temporary Water Coordinator for New Castle County) through the end of 2003. HB 549 also appointed the DGS, DNREC, and UDWRA to serve as technical advisors to the WSCC. HB 549 directed the WSCC to: 1) develop over 1 billion gallons of new water supplies in northern New Castle County, and 2) work cooperatively to manage water supplies more efficiently. HB 549 and later HB 203 appointed the following members to the Delaware Water Supply Coordinating Council.

Appointed by HB 549 (July 2000)

- Office of the Governor
- Secretary of the Delaware Department of Natural Resources & Environmental Control (Chair)
- Secretary of the Department of Public Safety
- Secretary of the Delaware Department of Agriculture
- Executive Director of the Public Service Commission
- Director of the Delaware Emergency Management Agency
- Director of the Delaware Geological Survey (State Geologist)
- Director of the Delaware Division of Public Health
- Public Advocate
- Executive Director of the Delaware River Basin Commission
- New Castle County Executive
- Artesian Water Company
- City of Newark
- City of Wilmington
- New Castle Municipal Services Commission
- Tidewater Utilities, Inc.
- United Water Delaware
- New Castle County Chamber of Commerce
- Delaware State Chamber of Commerce
- Delaware Nursery and Landscape Association
- Delaware Professional Grounds Management Society
- Delaware State Golf Association
- Delaware Nature Society
- Coalition for Natural Stream Valleys
- New Castle County Civic League

Appointed by HB 203 (August 2003)

- Center for Inland Bays
- Delaware Farm Bureau
- Delaware Rural Water Association
- Kent County
- Local Chamber of Commerce in Kent County
- Local Chamber of Commerce in New Castle County

- Local Chamber of Commerce in Sussex County
- National Association of Water Companies, Delaware Chapter
- Public Water Supply Utility in League of Local Governments, Kent County
- Public Water Supply Utility in Sussex County Association of Towns (SCAT)
- State Fire Marshal
- Sussex County
- University of Delaware, IPA, Water Resources Agency (Water Coordinator)

DNREC Secretary John Hughes and Division of Water Resources Acting Director Kathy Bunting Howarth (Alternate) serve as Chair of the WSCC. Kevin Donnelly served as alternate WSCC chair from 2001 through 2007. The WSCC may add members and establish subcommittees to address specific issues. The Water Coordinator continues by resolution of the WSCC. The WSCC has met on the following dates:

2000	March 3	Carvel State Office Building, Wilmington, Del. (met under Executive Order 74)
	March 24	Carvel State Office Building, Wilmington, Del. (met under Executive Order 74)
	May 22	Delaware Geological Survey, Newark, Del. (met under Executive Order 74)
	July 31	New Castle County Chamber of Commerce, Churchman's Crossing, Del.
	October 4	Artesian Water Company, Churchman's Crossing, Del.
2001	January 10	United Water Delaware, Stanton, Del.
	March 14	Artesian Water Company, Churchman's Crossing, Del.
	June 14	United Water Delaware, Stanton, Del.
	October 4	Artesian Water Company, Churchman's Crossing, Del.
2002	February 5	United Water Delaware, Stanton, Del.
	April 17	Artesian Water Company, Churchman's Crossing, Del.
	July 10	Artesian Water Company, Churchman's Crossing, Del.
	September 11	Artesian Water Company, Churchman's Crossing, Del.
	October 17	Delaware DNREC, New Castle, Del.
	November 21	Artesian Water Company, Churchman's Crossing, Del.
	December 12	Artesian Water Company, Churchman's Crossing, Del.
2003	May 22	Artesian Water Company, Churchman's Crossing, Del.
	July 16	Artesian Water Company, Churchman's Crossing, Del.
	October 9	Artesian Water Company, Churchman's Crossing, Del.
	December 11	Artesian Water Company, Churchman's Crossing, Del.
2004	January 13	University of Delaware Water Resources Agency, Newark, Del.
	February 25	University of Delaware Water Resources Agency, Newark, Del.
	June 24	Delaware Technical & Community College – Terry Campus, Dover, Del.
	September 30	DNREC Lukens Building, New Castle, Del.
	October 21	University of Delaware Water Resources Agency, Newark, Del.
2005	March 3	University of Delaware Water Resources Agency, Newark, Del.
	April 29	DELDOT – Felton-Farmington Room, Dover, Del.
	November 21	University of Delaware Water Resources Agency, Newark, Del.
	December 6	University of Delaware Water Resources Agency, Newark, Del.
	December 8	Kent County Administration Building, Dover, Del.

2006	January 12	University of Delaware Water Resources Agency, Newark, Del.
	January 26	Kent County Administration Building, Dover, Del.
	February 16	University of Delaware Water Resources Agency, Newark, Del.
	May 3	University of Delaware Water Resources Agency, Newark, Del.
	May 17	Kent County Administration Building, Dover, Del.
	June 13	University of Delaware Water Resources Agency, Newark, Del.
	June 20	DNREC Lukens Building, New Castle, Del.
2007	January 18	DELDOT – Felton-Farmington Room, Dover, Del.
	May 9	DNREC Auditorium, Dover, Del.
	June 26	DELDOT – Felton-Farmington Room, Dover, Del.
	October 18	DELDOT – Felton-Farmington Room, Dover, Del.
	December 11	DELDOT – Felton-Farmington Room, Dover, Del.
2008	March 13	DELDOT – Felton-Farmington Room, Dover, Del.

* The WSCC met under Executive Order 74 (12/30/99) before HB 549 was signed in July 2000.

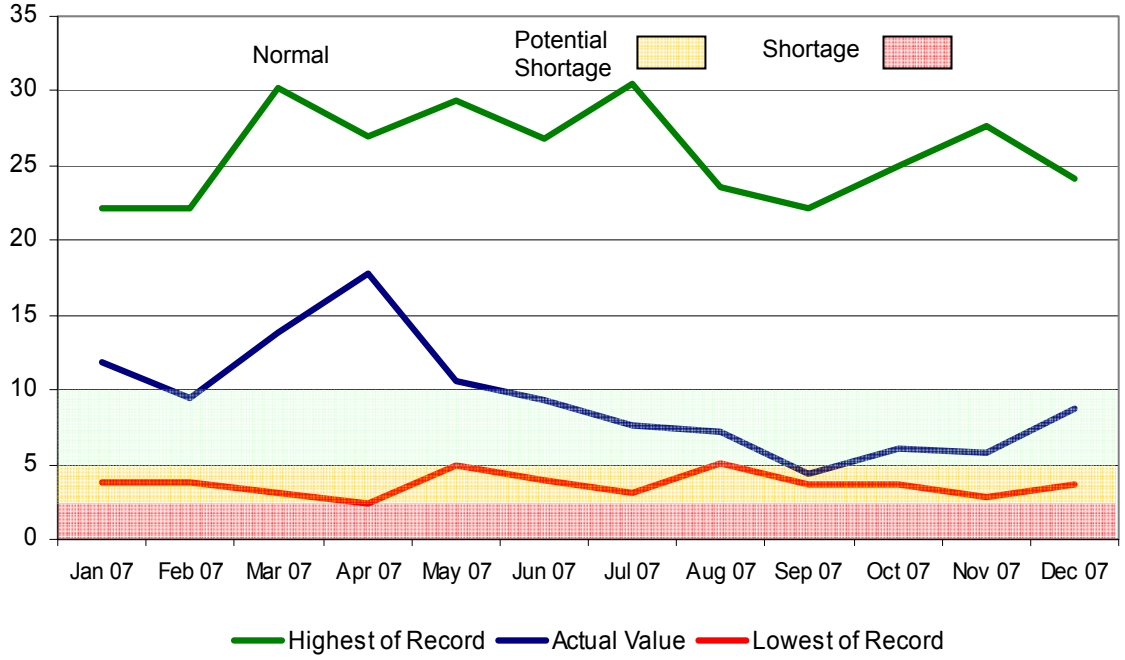
The Delaware Water Supply Coordinating Council and predecessor (Governor's Water Supply Task Force) filed the following reports to the Governor and General Assembly since the drought of 1999:

December 2, 1999	Report of the Governor's Water Supply Task Force The Drought of 1999
May 31, 2000	First Report to the Governor and General Assembly
March 1, 2001	Second Report to the Governor and General Assembly
July 27, 2001	Third Report to the Governor and General Assembly
May 1, 2002	Fourth Report to the Governor and General Assembly
January 17, 2003	Fifth Report to the Governor and General Assembly The Drought of 2002
June 7, 2004	Sixth Report to the Governor and General Assembly,
June 26, 2005	Seventh Report to the Governor and General Assembly Northern Delaware Drought Operating Plan
May 8, 2006	Eighth Report to the Governor and General Assembly Updated Water Supply & Demand Projections for Northern New Castle County
June 30, 2006	Ninth Report to the Governor and General Assembly Estimates of Water Supply and Demand in Southern New Castle County through 2030
April 28, 2008	Tenth Report to the Governor and General Assembly Almost 2 billion gallons of water storage implemented since the drought of 1999

3. Summary of Water Conditions (by DGS)

Delaware Geological Survey Water Conditions Index for New Castle County: The DGS Water Conditions Index for New Castle County was generally above the "normal" range from January through May. The Index declined into the normal range in June and remained there through August. The declining trend from April through September resulted from significantly below normal precipitation for the period May – September and associated declining streamflows and ground-water levels. The Index was in the "potential shortage" range during September. The Index exhibited a rising trend from October through December as normal precipitation returned.

Figure 2. DGS Water Conditions Index for New Castle County.



Precipitation: Monthly precipitation was highly variable monthly, seasonally, and geographically throughout Delaware during 2007. Annual precipitation was near normal in New Castle County, in the Dover area of Kent County, and near Lewes ranging from 103% of normal in Wilmington to 93% at Lewes. Annual precipitation was significantly below normal (shown in red in Tables 3 and 5) in southern Kent and most of Sussex County with totals ranging from 73% of normal (-12.10") at Georgetown to 71% of normal (-13.19") at Greenwood. The 32.80" recorded at Greenwood and 33.24" recorded at Georgetown were the lowest yearly totals recorded for the periods of record and represent eight months of below normal precipitation.

Table 3. Precipitation, January 1 – December 31, 2007.

Location	Total Precipitation	Normal Precipitation	Difference	% of Normal (normal = 90-110%)
Wilmington (Porter Reservoir)	46.94"	45.48"	+1.46"	103%
New Castle (Airport)	41.81"	42.81"	-1.00"	98%
Dover	41.48"	46.28"	-4.80"	90%
Greenwood	32.80"	45.99"	-13.19"	71%
Lewes	42.89"	46.00"	-3.11"	93%
Georgetown	33.24"	45.34"	-12.10"	73%

Table 4. Monthly Precipitation, January – December, 2007.

Location	2007 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Wilmington (Porter Reservoir)	AN	BN	N	AN	BN	N	BN	AN	BN	AN	BN	AN
New Castle (Airport)	N	BN	AN	AN*	BN	BN	BN	N	BN	AN	BN	AN
Dover	N	N	BN	AN	BN	AN	BN	BN	BN	AN	BN	AN
Greenwood	N	BN	BN	AN*	BN**	BN	BN	BN	BN	AN	BN	N
Lewes	N	N	BN	AN	BN	AN	AN	BN	BN	AN	BN	AN
Georgetown	N	BN	BN	AN	BN	BN	BN	BN	BN	AN	BN	AN

AN = above normal / N = normal / BN = below normal / * highest of record/ ** lowest of record

Precipitation during the five-month period May through September, which coincided with the growing season, was significantly below normal with totals ranging from 72% of normal at Wilmington (5.99" below normal) to 39% at Greenwood (12.64" below normal). This extended dry period had a very adverse impact on agriculture throughout Delaware.

Table 5. Precipitation, May 1 – September 30, 2007.

Location	Total Precipitation	Normal Precipitation	Difference	% of Normal (normal = 90-110%)
Wilmington (Porter Reservoir)	15.31"	21.30"	-5.99"	72%
New Castle (Airport)	10.76"	19.54"	-8.78"	55%
Dover	12.05"	21.51"	-9.46"	56%
Greenwood	8.25"	20.89"	-12.64"	39%
Lewes	14.48"	20.36"	-5.88"	71%
Georgetown	10.00"	20.28"	-10.28"	49%

Streamflows: Monthly mean streamflows were generally in the normal to above normal range from January through August in northern Delaware and from January through May in central and southern Delaware. Exceptionally dry conditions from May through September coupled with declining ground-water levels resulted in declining streamflows especially in southern Delaware. Monthly mean streamflows were below normal on the Nanticoke River near Bridgeville from June through December with the second lowest monthly mean of record recorded in November.

Table 6. Streamflow in Delaware during 2007.

Water Course	Years of Record	2007 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Brandywine Creek, Wilmington	62	N	BN	AN	AN	N	N	N	N	BN	AN	N	N
Red Clay Creek, Wooddale	65	N		AN	AN*	N	N	N	N	BN	AN	N	N
White Creek near Newark	69	N	N	AN	AN	N	N	N	N	BN	AN	N	N
Christina River at Coochs Bridge	65	N	BN	N	AN	BN	N	N	BN	BN	N	BN	N
St. Jones River, Dover	50	AN	N	N	AN	N	N	BN	BN	BN	N	BN	N
Nanticoke River near Bridgeville	65	AN	N	N	AN	N	BN	BN	BN	BN	BN	BN**	BN

AN = above normal / N = normal / BN = below normal / * highest of record/ ** lowest of record

Ground-water Levels: Ground-water levels were generally in the above normal to normal range throughout Delaware from January through June. Water levels generally declined into the below normal range from June into July and have remained in the below normal range since that time. Ground-water levels started to rise during late December in response to recharge associated with above normal precipitation in October and December. It was anticipated that ground-water levels would generally remain below normal or in the very low end of the normal range in the absence of normal to above normal precipitation in the coming months.

Table 7. Ground-water Levels in Delaware during 2007.

Well (nearest area)	Years of Record	2007 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Bc43-01 (Mt. Cuba)	34	AN	N	N	AN	N	N	N		N	AN		N
Db24-18 (Ogletown)	51	N	N	N	N	N	N	N	N	BN	N	N	BN
Hb14-12 (Blackbird)	51	AN	AN	AN	N	N	N	N	BN	BN	BN	BN	BN
Jd42-03 (Camden)	49	N	N	N	N	BN	N	BN	BN	BN	N	N	BN
Mc51-01 (Adamsville)	50	N	N	N	AN	N	N	BN	N	BN	BN	BN	BN*
Ng11-37 (Milton)	49	AN	AN	N	N	N	N	BN	BN	BN	BN	BN	BN
Qe44-01 (Trap Pond)	45	AN	AN	N	AN	N	N	BN	BN	BN	BN	BN	BN

AN = above normal / N = normal / BN = below normal / * lowest of record

The Delaware Geological Survey prepared the following analysis of Northern Delaware Drought Advisory Guidelines through April 30, 2008. The Water Conditions Index rose into the above normal or "Wetter" range during the month of February 2008 and remained in the Wetter range in March and April. Above-normal precipitation during February and March contributed to an increase in streamflows in New Castle County. Ground-water levels in well Db24-18 continues to rise in response to above-normal precipitation during the months of October, December, February, and March. Precipitation, streamflow, and ground-water indicators have improved and are not at drought watch levels, thus the WSCC recommended that the Governor lift the drought watch declaration.

Delaware Geological Survey
State of Delaware
University of Delaware • Delaware Geological Survey Building
Newark, Delaware 19716-7501
John H. Talley
Director and State Geologist

Analysis of Northern Delaware Drought Advisory Guidelines through April 30, 2008

WATER CONDITIONS INDEX April 2008: **8.46**

Drought Watch: 4.0 – 5.0
Drought Warning: 3.00 - 3.99
Drought Emergency: <3.00

PRECIPITATION 12-month running deficit

12- month**: -5.58"** 6-month: **-0.90"** 5-month**: 0.68"**

Drought Watch: -6.00 to -8.99″
Drought Warning: -9.00 to -11.99″
Drought Emergency: >-12.00″

STREAMFLOWS 30-day moving average

Brandywine at Wilmington: April 1 – April 30: **321.4 MGD**
Drought Watch: 85 MGD
Drought Warning: 70 MGD
Drought Emergency: 48 MGD

White Clay Creek at Stanton:[(RCC at Stanton) + (WCC near Newark * 1.1)]: April 1 – April 30: **115 MGD**
Drought Watch: 42 MGD
Drought Warning: 37 MGD
Drought Emergency: 31 MGD

White Clay Creek at Newark: April 1 – April 30: **57.1 MGD**
Drought Watch: 19 MGD
Drought Warning: 16 MGD
Drought Emergency: 13 MGD

CHLORIDES UWD not monitoring as streamflows are greater than 37 MGD.
Drought Watch: Streamflows ≤ 37 mgd for 5 consecutive days on WCC at Stanton Intake
Drought Warning: >250 ppm/3 consecutive days/Christina River at Newport
Drought Emergency: >250ppm/3 consecutive days/Stanton Intake

Delaware River Salt Front (DRBC) May 9, 2008
Current Location: River Mile 68 Normal Location: River Mile 64
(The Delaware Memorial Bridge is located at River Mile 69, and the DE-PA state line is located at River Mile 78)

GROUND-WATER LEVELS

DGS Well Db24-10: April 15, 2008: **11.75 ft** and rising
Drought Watch: 14.00 to 14.99 ft below land surface
Drought Warning: 15.00 to 15.99 ft below land surface
Drought Emergency: >16.00 ft below land surface

Aquifer Storage and Recovery Remaining water volume: March 5, 2008: 130 million gallons back in storage by May

RESERVOIR LEVELS

Hoopes (City of Wilmington) March, 2008: -5 feet (lowered for construction purposes)
Drought Watch: -5 feet (elev. 215 feet; 85% capacity)
Drought Warning: -7 feet (elev. 213 feet; 79% capacity)
Drought Emergency: -9 feet (elev. 211 feet; 72% capacity)

Newark (City of Newark) May 7, 2008: -3.0 feet (lower water levels discourage waterfowl, at 100% capacity by end of May.
Drought Watch: -10 feet (70% capacity)
Drought Warning: -17 feet (52% capacity)
Drought Emergency: -27 feet (28% capacity)

Octoraro (Chester Water Authority) May 7, 2008: 91% full (Storage does not reflect hydrologic conditions. CWA is drawing down storage for construction work on dam gates. Their plan is to maintain 80-85% storage during this construction work.

New York City Reservoirs (DRBC) May 2, 2008: ~98% full

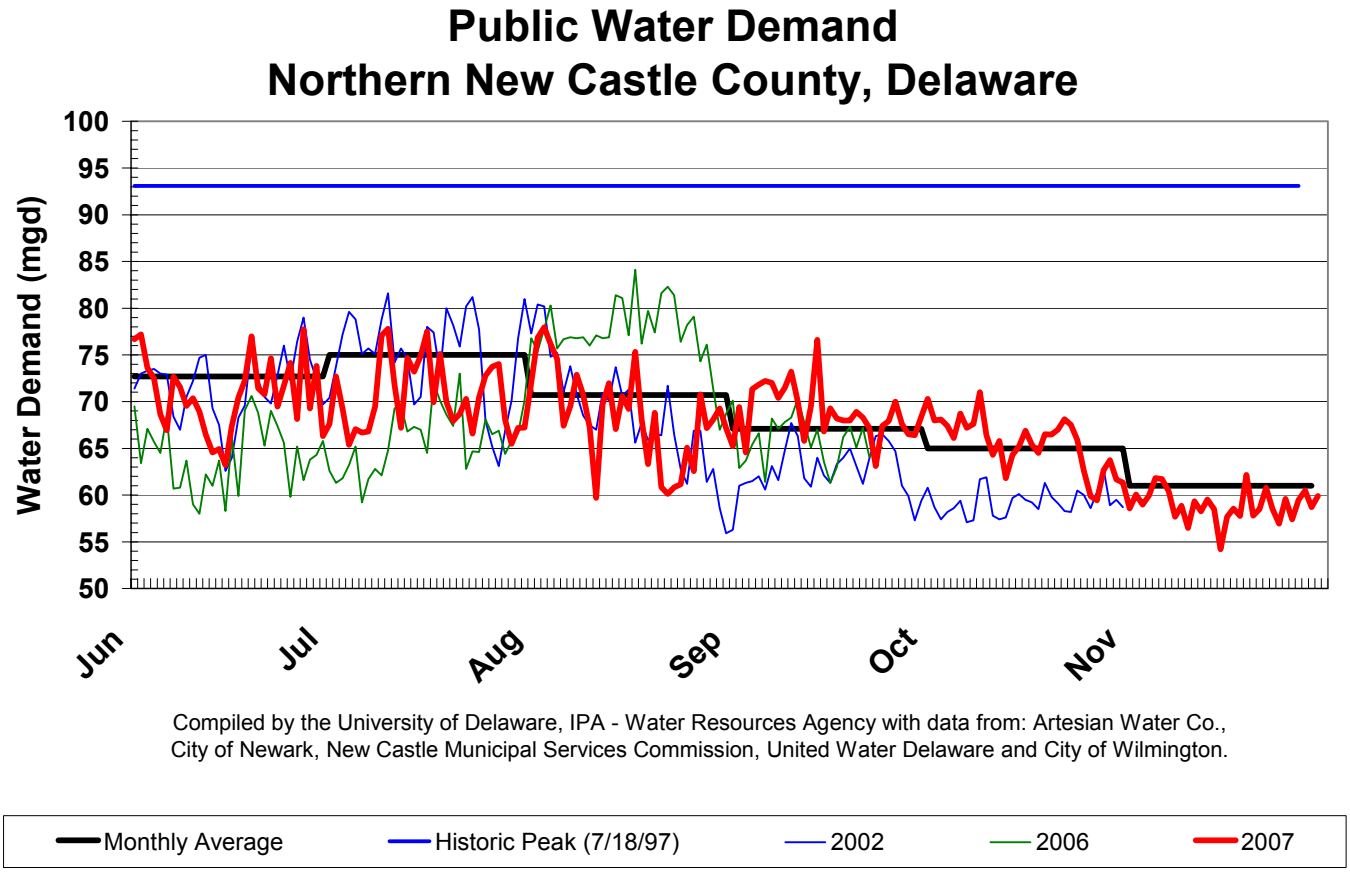
4. New Castle County Public Water Demand

2007 Public Water Demand: In 2007, the peak daily demand for northern New Castle County was 77.9 mgd on August 3. Water demands were above normal only in September 2007 when the recorded mean monthly demand of 69 mgd exceeded the normal demand of 67 mgd.

Table 8. Public water demand in northern New Castle County during 2007.

Water Purveyor	*Peak Daily Demand (mgd)*	*Date 2007*
City of Wilmington	26.3	June 19
Artesian Water Company	24.9	June 3
United Water Delaware	25.6	August 4
City of Newark	5.3	July 9
New Castle MSC	0.6	July 25

Figure 3. Public water demand in northern New Castle County.



In southern New Castle County, the peak daily demand in 2007 for the Artesian Water Company was 3.1 mgd on July 9. For Tidewater Utilities the peak daily demand was 1.3 mgd on August 4, 2007.

5. Progress and Activities Since the Drought of 1999

Artesian Water Company

New Wells: In December 1999, AWC was granted an increased seasonal allocation of 0.7 mgd for its Old County Road wellfield. In late 2001, AWC placed in service a new 0.2 mgd well at Artisans Village to re-distribute pumpage to fully utilize its wellfield allocation. AWC added two new wells at Middle Run Crossing in the Piedmont with an allocation of 1.0 mgd. The allocation permit for 3.5 mgd at Chesapeake City Road has been issued by DNREC after a technical and regulatory review period in coordination with the Maryland Department of the Environment. The total capacity provided by the new wells is 5.4 mgd.

Aquifer Storage and Recovery: AWC completed eleven cycles of its Aquifer Storage and Recovery (ASR) testing program at Llangollen at a rate of 2.0 mgd (120 mg over 60 days). Permanent underground injection control (UIC) and water allocation permits were issued for the Llangollen ASR well in 2004. AWC completed the first cycle under these permits in November 2004 and is currently injecting about 130 mg annually for use during the summer (1.7 mgd over a 75 day drought period). AWC completed ASR testing at the Wilmington Manor and Artisans Village sites. Even though injected water migrated fairly rapidly at Artisans Village, AWC estimates potential yield of 134 mg over 75 days for each site.

Chesapeake and Delaware Canal Pipeline: In 2004, AWC completed installation of two 20-inch diameter pipelines under the C&D Canal near the Summit Bridge to interconnect water systems on both sides of the canal for assurance of system reliability.

City of Newark

Newark Reservoir: The reservoir has been in operation now for nearly 2 years since it became operational in the spring of 2006. Water has been drawn from the reservoir on many occasions. Typical reasons include low stream flow; turbidity caused by rain events, upstream disturbances such as the hay fire outside Avondale, and elevated chloride levels in the stream caused by the winter use of road salt. The total volume of water used since the reservoir was put in service is in excess of 180 million gallons.

On July 22, 2007, stream flow in White Clay Creek at Newark stream gage declined below the Delaware River Basin Commission passby flow limit of 14 mgd. At that time, the City of Newark began utilizing water from the 317 mg Newark Reservoir. The reservoir declined to 60 percent of capacity on October 28, 2007. The City used a total of 134 mg from the Newark Reservoir during 2007, as follows: July (10 mg), August (26 mg), September (63 mg), and October (35 mg). Normal to above normal streamflows from October through December enabled Newark to refill its reservoir to a planned seasonal capacity of 96% full.

Newark Water Treatment Plant: The city has awarded a design build contract to refurbish and fit out the two remaining treatment units at the Newark Water Treatment Plant. This will bring the total capacity at the treatment plant to 5 million gallons per day. This will also allow the city to take out of service and repair the three original treatment units as needed. The addition of this extra capacity will provide a significant boost to production capacity and provide supply flexibility so repairs to other water supply facilities can be more easily scheduled.

South Well Field Iron Removal Plant: The plant is running well and no changes are anticipated. Water from well 16 is exhibiting high levels of 1,2, dichloroethane (DCA) after it has been run for a length of time. The city's treatment system is capable of removing the contaminant to drinking water standards.

However, because there is sufficient capacity in other wells, well 16 is pumped only when demands are at their highest. The city is coordinating with DNREC regarding the source of this problem and resolution.

City of Wilmington

Hoopes Reservoir: During 2008, the City plans to raise the water level in the reservoir two to three feet in conjunction with stability improvements to the dam to provide an additional 150 to 210 mg of water storage. In 2005, the City removed trees to halt root damage to the base of the dam and to facilitate refacing. The proposed work under Phase I (Improved Dam Safety) includes demolition of the spillway bridge, raising the spillway crest, installation of vertical post tensioned anchors, and a new terminal structure. The U.S. Army Corps of Engineers determined that a permit is not needed.

Hoopes Reservoir Operating Plan: The City completed an operating plan for Hoopes Reservoir which was approved by the Secretary of DNREC in 2001 which indicates that the City would release from 3 to 5 mgd (500 mg total) of raw water as requested by other utilities provided the reservoir level was between elevation 220 feet (full) and 210 feet (-10 feet). Below an elevation of 210 feet, the City reserves the right to retain the remaining contents of the reservoir for its internal use. The City also recommended reservoir level indicators for the WSCC to use in the Drought Advisory Guidelines. Obligations for Hoopes releases take priority over this operating plan.

Brandywine Creek to Hoopes Reservoir Pumping Station: In May 2005, DNREC, in partnership with project contributions from the City of Wilmington and United Water Delaware retained a consultant (Parsons) to evaluate pumping and infrastructure scenarios to increase the refill capacity for Hoopes Reservoir and develop an optimized operating plan. Two potential projects may be a new dedicated pumping station and transmission line for Hoopes, and re-routing of the transmission line from Hoopes to the Porter Filter Plant for gravity flow to Porter and elimination of the Old Mill Pumping Station.

United Water Delaware Contract: On August 28, 2002, Wilmington City Council approved a contract for the sale of water from Hoopes Reservoir to United Water Delaware (UWD) that authorizes UWD to purchase up to 200 mg of raw water annually from the reservoir. The contract provides water from Hoopes Reservoir for release to the Red Clay Creek to supplement water at the UWD intake during low stream flow and/or during times when elevated chloride levels are present at the UWD intakes. Prior to March of every year, the contract requires UWD to pay an annual "reservation charge" for an estimated volume of water ranging from 50 mg to 200 mg. There is an additional "usage charge" for the actual volume of water released from Hoopes for UWD. In the event UWD requests the City to release more than 200 mg, and the City agrees, UWD shall pay the City an "excess release charge."

New Castle Municipal Services Commission

Wells: With a supply of 1.7 mgd and a peak demand of 0.5 mgd, the New Castle MSC has excess capacity from its wells and can presently sell water to AWC through an existing 1.0 mgd interconnection.

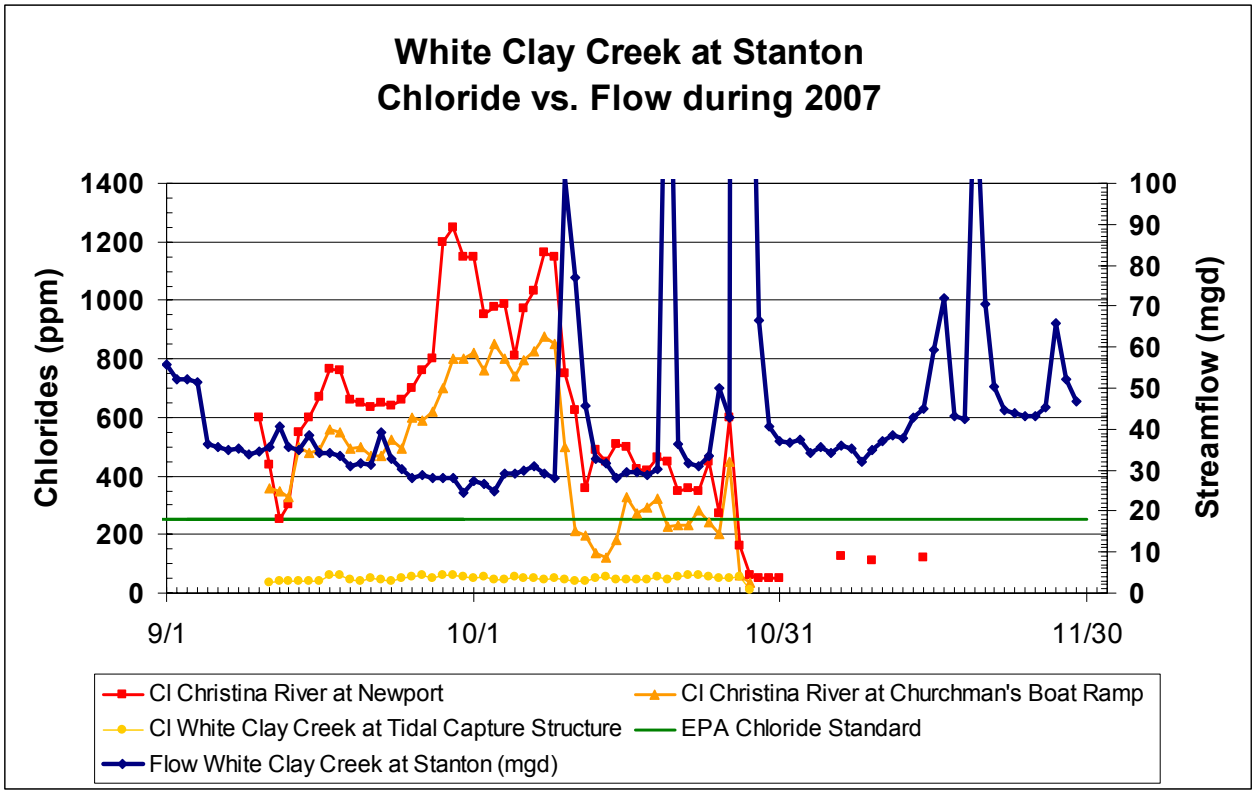
United Water Delaware

Chloride Monitoring: In June 2000, UWD established a chloride monitoring plan to provide early warning of approaching chlorides at its intake on White Clay Creek. As a result of declining stream flows in 2002, 2005, and 2007, UWD implemented the plan which monitors chlorides at three stations along the tidal Christina River and White Clay Creek. The plan was designed to provide operational information and data to optimize the use of Hoopes Reservoir releases for blending to minimize chloride levels in

drinking water supplies during low stream flows. Using the plan, UWD has been successful in meeting the USEPA standard (250 ppm) in treated water.

Due to low stream flows, tidal chlorides were monitored between September and November 2007. Declining precipitation that began in late April, in combination with extended unseasonably warm temperatures that continued into late October, contributed to a reduction in stream flows in the White Clay Creek and Red Clay Creek at Stanton that declined to less than 37 mgd for five consecutive days. This event triggered the initiation of UWD's Chloride Monitoring Plan on September 11, 2007. Chlorides were monitored during a high tide event once each day at stations along the Christina River at Newport Bridge (3.5 miles below the UWD Stanton intakes), at Churchman's boat ramp, and at the Tidal Capture Structure (TCS) along White Clay Creek about 2500 feet downstream of the intake. Chloride concentrations at Newport peaked at 1250 ppm on September 29, 2007. With surplus rain during October 2007, chloride levels in the Christina River and White Clay Creek returned to normal background chloride levels (below 50 ppm). Chloride concentrations did not increase at the downstream location of the TCS and all chloride samples at the Stanton plant intake have been normal, between 40 to 60 ppm.

Figure 4. Chloride levels along the White Clay Creek and Christina River.



Aquifer Storage and Recovery: Since 2001, UWD has conducted in depth evaluations of future use of ASR technology at two locations. Testing conducted in 2001 at the Christiana Water Treatment Plant determined that it would not be a feasible location for Aquifer Storage and Recovery. Testing conducted at a second location in UWD's River Road service area just north of the C & D Canal concluded good potential for a successful ASR facility. Design of the River Road ASR facility has been completed, one of the three proposed ASR wells has been dri1led and construction of the treatment facility will begin in Spring 2008. The targeted storage volume is 225 million gallons (75 million gallons per well). ASR-1 is expected to be in service in the Fall of 2008. ASR-2 and ASR-3 are planned for 2009.

Christiana Water Treatment Plant Well: UWD filed for and received an operating permit from DNREC for an existing well (0.3 mgd) at the Christiana Treatment Plant. This well is used for dilution during high chloride events in the Christina River.

Interconnections: UWD continues to evaluate the feasibility of additional interconnections with the City of Wilmington. Contact has been made with the City expressing UWD's interest in constructing an interconnection at Wilson Road. While a response is pending, additional locations are being identified.

Tidal Capture Structure (TCS) Operating Plan: UWD worked with DNREC to develop a new operating plan for the TCS that increases the water available while protecting the ecology and fishery in the tidal White Clay Creek. In January 2005, the Delaware River Basin Commission unanimously voted to approve the docket to replace the 7Q10 minimum flow with a standard based on minimum flow depth and chloride provisions. The revised TCS Operating Plan provides UWD with an additional 5.3 mgd during drought for 400 mg of additional supply as compared to 2002 drought conditions and operation. This number is derived from calculations performed by UWD and reviewed by the State Water Coordinator and based on the January 2005 DRBC 7Q10 docket decision using 2002 actual operations as the baseline.

Conservation Water Rates

HB 118: Governor Minner signed HB 118, the Water Supply Self-Sufficiency Act, in July of 2003. The law states that each water utility shall implement a conservation rate structure such as inclining block or seasonal rates for services provided to its residential customers in drought sensitive areas.

In summary, AWC continues its conservation water rate structure that has been in place since 1992. Newark increased its water rates in July 2001 to fund its reservoir and treatment plant improvements. When combined with sewer charges, Newark employs a conservation water rate structure. New Castle Municipal Services Commission instituted a conservation water rate structure in 2001. In January 2005, UWD implemented water conservation oriented rates and in 2006 a revised rate design was implemented which included a larger variance in the increasing rate block structures to further encourage consumer conservation. In February 2005, the City of Wilmington Council approved a resolution adopting conservation water rates effective July 2005.

Northern New Castle County Ground-Water Study (by DNREC)

The northern New Castle County Ground-Water Study had the following summary findings:

The Potomac Aquifer, the main source of water in the study area, is regulated as three separate aquifers designated as "A" (uppermost), "B" (middle), and "C" (lowermost). DNREC sets maximum permissible drawdown limits for each at the elevation of the top of the aquifer. Based on those drawdown limits, the Potomac A is full developed north of the C & D Canal except for a small area near Delaware City. The Potomac B is fully developed north of I-95. The Potomac C is fully developed in the northernmost area of the model near Wilmington Manor.

Pumping in New Castle County increases flows from Maryland and decreases flows to New Jersey and parts of Delaware south of the study area. Twenty percent of pumping demands in New Jersey are met from ground-water flows from adjacent states. Pumping in Delaware's Potomac C affects pressure heads in the Potomac A and B in both states. Total heads within the Potomac B and C are lower than the elevations of the top of the Potomac A.

Streams in direct contact with the Potomac aquifer are being impacted by pumping by reducing baseflows to streams north of the C &D Canal by 33% to 65% for the 2-year and 50-year baseflow respectively. If all water was pumped in adherence to Delaware's drawdown limits, regardless of the state it is drawn from, then 27.3 mgd is estimated to be available, with twenty percent of this flow from adjoining states. The Potomac aquifer system north of the C & D Canal is essentially fully utilized at current and near-future pumping rates.

Recommendations from the study are as follows:
1) A network of monitoring wells should be installed across northern New Castle County. These monitoring wells should be installed both inside and outside of pumping cones of influence. Well clusters should be installed to read total ground-water heads for all aquifers of interest.
2) Pumping impacts on streams should be investigated through field investigations and model studies.
3) Delaware, New Jersey, and Maryland are encouraged to continue cooperative management of their resources. Production rates for new wells should be evaluated and coordinated among neighboring states.

Drought Operating Plan and Guidelines

On June 26, 2005, the Seventh Report to the Governor and General Assembly recommended a new Drought Operating Plan (DOP) for water purveyors in northern Delaware. This DOP includes Drought Operating Guidelines that incorporate a three-phase drought advisory system. The DOP provides plans – submitted by the purveyors – to utilize surface and ground-water supplies and interconnections during drought.

*Northern Delaware Drought Advisory Guidelines**			
Advisories	**Drought Watch**	**Drought Warning**	**Drought Emergency**
Status	Potential	Imminent	Emergency
Demand Recommendations / Restrictions	Voluntary	Primarily Voluntary	Mandatory
Northern Del. Demand Conservation Goal	< 80 mgd	< 73 mgd	< 68 mgd
Indicators	**Drought Watch**	**Drought Warning**	**Drought Emergency**
DGS Water Conditions Index	4.0-5.0 (potential shortage)	3.0-3.99 (potential shortage)	<3.00 (shortage)
Precipitation: Running 12-month deficit			
New Castle County (Wilmington) Airport and Wilmington Porter Reservoir	6" to 8.99"	9" to 11.99"	>12.00"
Stream Flows: 30-day moving average			
Brandywine Creek at Wilmington	85 mgd (90% exceedance)	70 mgd (95 % exceedance)	48 mgd (98% to 99% exceedance)
White Clay Creek at Stanton (RCC+WCC)	42 mgd (85% exceedance)	37 mgd (90% exceedance)	31 mgd (95% exceedance)
White Clay Creek at Newark	19 mgd (85% exceedance)	16 mgd (90% exceedance)	13 mgd (95% exceedance)
Chlorides	Stream flows ≤ 37 mgd for 5 consecutive days on WCC at UWD Stanton Intake	Chlorides > 250 ppm for 3 consecutive days at the Christina River at Newport	Chlorides > 250 ppm for 3 consecutive days at the UWD Stanton Intake
Ground-Water Levels			
Shallow DGS Well Db24-10	14 - 14.99 feet (75% exceedance)	15 - 15.99 feet (90% exceedance)	> 16 feet (96% exceedance)
Aquifer Storage and Recovery	Report remaining water volume (mg) to GDAC	Report remaining water volume (mg) to GDAC	Report remaining water volume (mg) to GDAC
Reservoir Levels			
Hoopes Reservoir (City of Wilmington)	- 5 feet (elev. 215 feet) (85% capacity)	- 7 feet (elev. 213 feet) (79% capacity)	- 9 feet (elev. 211 feet) (72% capacity)
Newark Reservoir	- 10 feet (70% capacity)	-17 feet (52% capacity)	- 27 feet (28% capacity)
CWA Conditions (Octoraro Reservoir)	Report water levels to GDAC	Report water levels to GDAC	Report water levels to GDAC
DRBC Conditions (NY City Reservoirs)	Drought Watch	Drought Warning	Drought

- These drought operating guidelines are not "triggers" for specific advisory levels. Rather, they are designed to provide guidance to the Governor's Drought Advisory Committee (GDAC) and the Delaware Water Supply Coordinating Council (WSCC). Final declaration of drought advisories rests with the Governor based upon input from the GDAC.
-

Northern Delaware Drought Operating Plan							
% of Time Stream Exceeds Listed Flow	**80 %**	**85 %**	**90 %**	**95 %**	**98 %**	**99 %**	**Record**
					7Q10 flow	**1999 drought**	**2002 drought**
Section 1.01 I. Stream Flow	*mgd*	*mgd*	*mgd*	*mgd*	*mgd*	*mgd*	*mgd*
Brandywine Creek at Wilmington Intake	110	100	85	70	49	40	21
White Clay/Red Clay Creek at Stanton Intake	53	42	37	31	17	10	7
White Clay Creek at Newark Intake	20	19	16	13	7	5	3
Chlorides White Clay Creek at Stanton TCS	< 250	< 250	< 250	< 250	= 250	> 250	> 250
	ppm	*ppm*	*ppm*	*ppm*	*ppm*	*ppm*	*ppm*
(i) II. Available Water Supply							
Artesian Water Company	31	31	31	31	31	30	30
* Wells	25	25	25	25	25	25	25
* Chester Water Authority interconnection	4	4	4	4	4	3	3
* Aquifer Storage & Recovery wells	2	2	2	2	2	2	2
* New Castle interconnection							
* Wilmington interconnection							
United Water Delaware	34	34	34	34	32	31	31
* White Clay/Red Clay Stanton intake	30	30	30	30	17	10	7
* Inflate Tidal Capture Structure @ WCC	0	0	0	0	10	15	16
* Hoopes Reservoir release to Red Clay Cr.					3	5	7
* Smalleys Pond intake at Christina River	4	4	4	3	1	0	0
* Christiana Well					0.25	0	0
* Chester Water Authority interconnection	1	1	1	1	1	0.8	0.8
* Wilmington interconnection							
* Artesian Water Co. interconnection							
* City of Newark interconnection	-1	-1	-1				
City of Wilmington	35	35	35	35	35	35	30
* Brandywine Creek intakes	35	35	35	35	34	30	10
* Hoopes Reservoir release (1,800 mg)					1	5	20
City of Newark	7	7	7	7	7	7	7
* White Clay Creek intake	3	3	1	0	0	0	0
* Newark Reservoir release (300 mg)	0	0	2	3	3	3	3
* Wells	3	3	3	4	4	4	4
* United Water DE interconnection	1	1	1	0	0	0	0
* Artesian Water Co. interconnection							
New Castle Municipal Services Commission	2	2	2	2	2	2	2
* Wells	2	2	2	2	2	2	2
Available Water Supply (mgd)	109	109	109	109	107	105	100