

FOURTH REPORT TO THE GOVERNOR AND THE GENERAL ASSEMBLY

Regarding the Progress of the:

DELAWARE WATER SUPPLY COORDINATING COUNCIL

May 1, 2002

Prepared by the:

**University of Delaware, College of Human Services, Education, and Public Policy
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Delaware Geological Survey

Delaware Department of Natural Resources and Environmental Control

(This report may be viewed on-line at www.wr.udel.edu, www.udel.edu/dgs, or www.dnrec.state.de.us.)

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DELAWARE WATER SUPPLY COORDINATING COUNCIL
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Introduction

During this winter and spring drought, the Delaware Water Supply Coordinating Council advanced toward the goal to develop 1 billion gallons of additional water supply storage in northern New Castle County by 2003. The City of Newark awarded contractor bids to construct the 317 million gallon (mg) Newark Reservoir and broke ground to upgrade its South Wellfield Treatment Plant to provide an additional 60 mg of water. The City of Wilmington wrote an operating plan and signed an agreement with United Water Delaware to provide an additional 500 mg of water from the top wedge of Hoopes Reservoir to meet regional drought needs. Artesian Water Company drilled new wells and plans to store about 100 mg of water in its aquifer storage and recovery wells for use this summer. The members of the WSCC must continue to cooperate in a common goal to provide safe and plentiful drinking water during this drought of record.

This is the fourth report to the Governor and the General Assembly summarizing the progress of the Delaware Water Supply Coordinating Council. Gerald Kauffman (State Water Coordinator) and Martin Wollaston (Senior Planner) of the Water Resources Agency at the University of Delaware - Institute for Public Administration; John Talley (Associate Director) of the Delaware Geological Survey; and Stewart Lovell (Manager of the Water Supply Section) of the Delaware DNREC authored this report on behalf of the WSCC. The first, second, and third reports were issued on May 31, 2000, March 1, 2001, and July 27, 2001 (available at www.wr.udel.edu).

State Water Coordinator

In July 2000, Governor Carper signed HB 549, which appointed the Water Resources Agency at the University of Delaware - Institute for Public Administration as the State's first Water Coordinator. The appointment expires December 31, 2003 when the new water supply projects discussed in this report are scheduled for completion. The mission of the Water Coordinator is to work cooperatively with the water purveyors to ensure that new water supplies are developed on schedule by the end of 2003. Along with the Water Coordinator, HB 549 appointed the DGS and the DNREC as a triad of water advisors to the Delaware Water Supply Coordinating Council.

Water Supply Coordinating Council

HB 549 also appointed the Delaware Water Supply Coordinating Council for a tenure extending until December 31, 2003. This state law appointed the following public and private entities to the WSCC:

Office of the Governor
Secretary of the Delaware Dept. of Natural Resources & Environmental Control (Chair)
Secretary of the Delaware 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
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 Board of Water and Light (now 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

The Delaware Water Supply Coordinating Council has met on the following dates:

2000

- March 3 Carvel State Office Building, Wilmington, DE
- March 24 Carvel State Office Building, Wilmington, DE
- May 22 Delaware Geological Survey, Newark, DE
- July 31 New Castle County Chamber of Commerce, Churchmans Crossing, DE
- October 4 Artesian Water Company, Churchmans Crossing, DE

2001

- January 10 United Water Delaware, Stanton, DE
- March 14 Artesian Water Company, Churchmans Crossing, DE
- June 14 United Water Delaware, Stanton, DE
- October 4 Artesian Water Company, Churchman's Crossing, DE

2002

- February 5 United Water Delaware, Stanton, DE
- April 17 Artesian Water Company, Churchman's Crossing, DE

The charges to the Water Supply Coordinating Council are to:

- By December 31, 2003, implement new water supplies (1,020 million gallons or 17 mgd over a 60-day drought) in northern New Castle County to meet peak demands based on the drought of record.
- Work cooperatively in a public-private effort between government and water purveyors to manage water supplies more efficiently in Delaware.

Water Conditions Update

Delaware is in a rare winter and spring drought of historic proportions. The second half of 2001 was the driest on record at Wilmington Airport according to rain gage records kept since 1895. During the first week of April 2002, daily stream flows reached record lows (based upon records that date back to World War II) along the Brandywine Creek at Wilmington and White Clay Creek near Newark. April 2002 stream flows as measured by the DGS gages along the Brandywine Creek and White Clay Creek are

lower than similar periods entering the droughts of 1995 and 1999. Despite the historic low stream flows, water supplies in Delaware are adequate right now to meet the low demands common in winter and early spring.

On February 26, 2002 the Governor's Drought Advisory Committee (DAC) met to evaluate water conditions in Delaware. Due to the worsening drought conditions, on March 5, 2002 Governor Ruth Ann Minner declared a statewide drought warning asking Delaware residents to voluntarily conserve water. The DAC met again on April 15, 2002 in Dover to reevaluate water conditions. The DAC recommended that Delaware continue in drought warning with voluntary water conservation measures because water demands were still low but scheduled a public hearing in late May 2002 to consider the need to go to drought emergency should the dry conditions persist. The adjoining states of Maryland, New Jersey and Pennsylvania have declared drought emergencies with mandatory restrictions in parts of their states.

Precipitation – Cumulative precipitation for the first seven months of the 2002 Water Year (October 1, 2001 – April 30, 2002) was significantly below normal across Delaware with cumulative deficiencies of 9.66 inches at New Castle, 7.85 inches at Dover, and 10.97 inches at Georgetown. Total precipitation for the 7-month period August 2001 through February 2002 at Wilmington and Georgetown was the driest 7-month period since at least 1949. Record low monthly precipitation occurred in November at Greenwood, Georgetown, and Lewes, and in February at New Castle, Wilmington, Dover, and Greenwood.

Ground-Water Levels – Ground-water levels in shallow water-table observation wells have generally been declining since April and May 2001. April 2002 water levels are two to three feet lower than those recorded during the corresponding period in 1999, the last drought year. Record and near record low ground-water levels have been occurring throughout Delaware since February. Water levels generally start to rise during late fall, winter, and early spring in response to ground-water recharge; however, because of significantly below normal rainfall, water levels continue to fall unseasonably and there is little likelihood that ground-water recharge will occur during the next four to five months. If dry conditions persist, the amount of ground water available to support streamflow during the upcoming hot summer months will remain at or near record low levels.

Streamflows – Monthly mean streamflows on Brandywine, White Clay, and Red Clay creeks, and the Christina River, which are used for public drinking water supplies in New Castle County, have been substantially below normal since October 2001. Record low monthly mean flows were established on all four watercourses in February and near record low flows since October. Record low daily streamflows were established on Brandywine Creek on 84 individual days since November 2001. If precipitation remains below normal or near normal during the next several months, it is highly likely that streamflow will remain substantially below normal and that base flows will continue to decline.

Pennsylvania has released water from Marsh Creek Reservoir into Brandywine Creek on 123 days since October 2001. Such releases are required when streamflows on Brandywine Creek at Chadds Ford, Pennsylvania decline below 140 cubic feet per second or 90 million gallons per day.

Chlorides – On November 15, 2001 the salt front (250 ppm sodium chloride) migrated upstream along the tidal portion of White Clay Creek to within 3,000 feet of United Water Delaware's surface water intake at its Stanton Filter Plant. The salt front is currently in the vicinity of New Castle along the Delaware River several miles downstream from the mouth of the Christina River.

Hoopes Reservoir – Hoopes Reservoir, owned and operated by the City of Wilmington, is currently full with a usable capacity of 1.8 billion gallons.

DGS Water Conditions Index for New Castle County - The Index has exhibited an unusual declining trend since April 2001 in response to substantially below normal precipitation, streamflows, and ground-water levels. The Index entered into the “Potential Shortage” range in September 2001, and into the “Shortage” range in November 2001. Record low Indexes were established in November and December 2001, and February 2002. The second lowest indexes of record were recorded in January/March 2002.

Public Water Demand

Regional Summary - During early April 2002, public water demands in northern New Castle County fluctuated between 60 and 65 mgd indicating little outdoor water use given the cool spring conditions. Water demands spiked briefly above 70 mgd on April 19 due to record setting hot temperatures in the 90's and have since returned to 65 mgd. Demands normally increase with outdoor water use beginning in May. The peak demand recorded last summer was 91 mgd on August 9, 2001. Water purveyors recorded the historic peak day demand of 93 mgd on July 18, 1997.

Peak Demands - The water purveyors recorded the following peak daily demands during 2001:

<u>Water Purveyor</u>	<u>Peak Daily Demand (mgd)</u>	<u>Date (2001)</u>
Artesian Water Co.	27.1	August 9
City of Newark	6.0	August 9
City of Wilmington	34.4	August 9
New Castle MSC	1.2	August 9
United Water Delaware	29.1	August 9

The peak water transfer by the purveyors through interconnections was 7.2 mgd on August 9, 2001.

Future Supply/Demand Projections (2020)

The December 2, 1999 Governor's Water Supply Task Force Report compiled estimates of public water supply and demand in northern New Castle County for drought conditions for the planning years 2000, 2010, and 2020. The estimate assumes a worst case historic drought scenario with environmental standards for minimum instream flows (7Q10) in effect along the Brandywine Creek and White Clay Creek. The supply and demand curves forecast a deficit of 17 million gallons per day (mgd) or 1,020 million gallons (mg) for a 60-day drought period by the year 2020:

<u>Scenario</u>	<u>Supply</u>	<u>Demand</u>	<u>+/-</u>	<u>Volume</u>
<u>Year</u>	<u>(mgd)</u>	<u>(mgd)</u>	<u>(mgd)</u>	<u>(mg)</u>
2000	73	86	-13	-780
2010	73	88	-15	-900
2020	73	90	-17	-1,020

Future Water Supply Options

The Water Supply Coordinating Council is working to develop a series of water supply projects to close the 17 mgd (1,020 mg) gap between supply and demand for the year 2020 in northern New Castle County. The water purveyors have committed to the following “A” list options which have few environmental constraints, enjoy community support, and can be implemented by 2003:

"A" List Alternative	Targeted Capacity 12/2/99 Report	Capacity in Service April 2002	Status of Completion
Newark Reservoir	200 mg (3 mgd)	-0-	Groundbreaking May 14, 2002 317 mg reservoir by 2003
Wilmington Hoopes Reservoir	500 mg (8 mgd)	500 mg (8.3 mgd)	Complete - Operating Plan provides top wedge for drought
Artesian Water Co. Wells North C&D Canal	120 mg (2 mgd)	100 mg (1.7 mgd)	0.4 mgd new wells planned completion 2002
Newark South Wellfield Iron Treatment Plant	60 mg (1 mgd)	-0-	Construction began April 2002 completion Dec. 2002
Artesian Water Co. Aquifer Stor. & Recovery	300 mg (5 mgd)	100 mg (1.7 mgd)	Next addition of ASR when customer demand warrants.
Total	1,180 mg (19 mgd)	700 mg (11.7 mgd)	
2020 Deficit	1,020 mg (17 mgd)		

Progress and Activities

The WSCC has made the following progress toward securing 1,020 billion gallons of water by 2003:

Artesian Water Company

- In July 1999, AWC placed into service 0.4 mgd from a well located in Middle Run Crossing and was granted an increased allocation of 0.7 mgd for its Old County Road Wellfield available during the summer months.
- In late 2001, AWC placed in service a new 0.2 mgd well at Artisans Village. AWC has also added a new well at Middle Run Crossing adding 0.4 mgd to its supply during late 2002.
- AWC has completed several cycles of its Aquifer Storage and Recovery (ASR) testing program at a maximum rate of 1.7 mgd (100 mg for 60 days). AWC expects 1.7 mgd to be available from the Llangollen ASR wells to meet peak demands during the summer of 2002.

City of Newark

- On April 22, 2002, the City of Newark Council awarded a \$ 9.7 M construction contract to Donald Durkin Inc. of Southampton, PA to build a 317-mg reservoir (5 mgd over a 60 day drought) which would make the City nearly self-sufficient. This will be the first major water supply reservoir built in Delaware in almost 70 years. The City worked closely with state and federal permitting agencies to address specific environmental and historic preservation concerns which has enabled the reservoir project to stay on schedule. Groundbreaking for reservoir construction is scheduled for May 14, 2002 with a planned fill up and operation date of September 2003. Estimated cost of the project is \$8M for land and \$10M for construction.
- On March 22, 2002 the City of Newark broke ground and started construction on an iron and manganese removal plant at its South Wellfield. This project is expected to increase drinking water supplies from the South Wellfield by 1.0 mgd. The City is on schedule for this \$ 3 M project with a planned completion date in December 2002.

City of Wilmington

- The City contracted with Metcalf and Eddy to conduct a dam safety inspection of Hoopes Reservoir. The City also considered authorizing a study to evaluate the structural and hydraulic feasibility of raising the existing water level five feet to provide an additional 300 mg (5 mgd) of storage.
- The City of Wilmington completed an "Operating Plan for Hoopes Reservoir" 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 elevation 210 the City will reserve the remaining contents of the reservoir for its internal use.
- The Delaware Geological Survey conducted an investigation of water quality at various depths at five locations in Hoopes Reservoir. Based on the water quality analyses and review of the operation of the lower gates, the City concluded that 1,800 mg of Hoopes Reservoir water can now be considered usable in the event of extreme drought, a volume 500 mg greater than thought previously available.

New Castle Municipal Services Commission

- With a supply of 1.7 mgd and a peak demand of 0.5 mgd, the City of New Castle has excess capacity from its wells and can presently sell water to AWC through interconnections as needed. New Castle is constructing a new 1.0 mg interconnection with the AWC at the Riveredge Industrial Park.

United Water Delaware

- UWDE retained consultants to conduct preliminary geotechnical and wetland evaluations for a potential 320 mg reservoir at Bread and Cheese Island. UWDE has contacted various State and Federal agencies necessary to determine the extent of permitting for this project. A Request for Proposals (RFP) is being developed to determine costs associated with a detailed wetlands study. Funding for the necessary environmental studies remains at issue as ownership of Bread and Cheese Island is in the hands of private individuals (non-UWDE) with little or no funding interest.
- UWDE and the City of Wilmington have agreed on a new contract for UWDE to purchase up to 500 mg of raw water from Hoopes Reservoir. The contract would provide water from the top wedge of Hoopes Reservoir for release to the Red Clay Creek to supplement the UWDE Stanton intake during low stream flow and/or elevated salt levels in the tidal creek. The reservoir release rate is 5 mgd from elevation 220 to 215 feet and 3 mgd from elevation 215 to 210 feet.
- UWDE has implemented a chloride-monitoring plan that includes three stations along the tidal Christina River and White Clay Creek to provide early warning of elevated salt levels at the Stanton intake. This plan was activated during the fall and winter of 2001 due to drought conditions and is designed to optimize fresh water withdrawals from the creek and minimize sodium and chloride levels in drinking water supplies during low flows.
- UWDE is evaluating the future use of aquifer storage and recovery technology in its southern service areas just north of the C & D Canal.
- UWDE and Artesian Water Co. have exchanged letters of interest and met for the purpose of discussing a future bulk water transfer/sales agreement for use during times of need.

- UWDE has begun preliminary evaluation of upgrades to the Christiana Water Treatment Plant at Smalley's Pond for the purposes of making more efficient use of the existing allocation and meeting impending drinking water regulations.
- UWDE sought and recently received an operating permit from DNREC for an existing well (200 gpm) at the Christiana Treatment Plant to be used for dilution during high chloride events.
- UWDE signed an agreement with the City of Wilmington in October 2000 for the purchase of 3 mgd finished water through 2 interconnections. The Chatham interconnection was upgraded in 2001 and the Atlas interconnection upgrades are underway.
- UWDE has had on-going discussions with Delaware City concerning the possibility of a future interconnection between the two distribution systems.

Interconnected System

The water purveyors conducted hydraulic testing and modeling to increase the northern New Castle County interconnected system capacity to move water during drought. In April 2002, there are 25 interconnections in place and another under construction compared to 1999 when 23 interconnections were in place.

Conservation Water Rates

- The DNREC signed an agreement with the University of Delaware Center for Energy and Environmental Policy to evaluate the potential for adopting conservation water rates to reduce peak water demands. This work is under the direction of the Water Conservation Oriented Rate (WCOR) Subcommittee and was completed in March 2001. The study concluded that pricing mechanisms are effective demand management tools and the water utilities are encouraged to further investigate methods of implementation.
- AWC continues its conservation water rate structure that has been in place since 1992.
- Newark has raised its water rates as of July 2001 to fund its proposed reservoir and water treatment plant improvements and has temporarily discontinued its seasonal conservation water rate structure in place since 1999.
- The New Castle Municipal Services Commission has recently instituted a new conservation water rate structure.

Northern New Castle County Ground-Water Modeling Study

- The DNREC Division of Water Resources signed a contract on May 23, 2000 with the US Army Corps of Engineers to estimate the long-term safe yield of ground-water for supply in northern New Castle County. The Corps will update earlier studies by the USGS and DGS which indicated ground-water availability from northern New Castle County in the coastal plain was 32 mgd. The capacity of wells allocated by DNREC in this area is 31 mgd. The ground-water modeling area is in the Coastal Plain and extends from Wilmington to Middletown and from New Jersey across New Castle County

into Maryland. The ground-water investigation is currently nearing the end of the model construction phase with initial results planned for August and full project completion by the end of 2002.

Green Industry Guidelines

- The DNREC Division of Water Resources, the UD Water Resources Agency, and the Delaware Geological Survey agreed with the Green Industry to revise the rules for water use during drought as they pertain to the State's nurseries, golf courses, and landscaping firms. These rules have been approved by the Governor's office, subject to public hearing, for implementation if mandatory restrictions are imposed.

Transfer of CPCN Water Supply Franchise Area Jurisdiction to Public Service Commission

- In July 2000, Governor Carper signed SB 370, which transferred the jurisdiction for issuing water supply franchise areas (Certificates of Public Convenience and Necessity or CPCNs) from DNREC to the PSC effective July 1, 2001. On June 5, 2001 the PSC adopted regulations governing the award of CPCNs to public and investor-owned water purveyors statewide.

Summary

The Delaware Water Supply Coordinating Council continued working to develop additional water supplies in northern New Castle County. To date, 700 mg of the goal to meet the projected deficit of 1,020 mg or 68% has been put into service and is available to meet peak water demands if needed during drought. At least 320 million gallons of additional new storage are needed to meet projected peak demands during drought in northern New Castle County. When the Newark Reservoir and South Wellfield Treatment projects are completed as scheduled, this remaining storage will be developed by the end of 2003.

Currently the State of Delaware is in drought warning with voluntary water restrictions in effect. Water demands are at seasonal lows due to the cool April weather but demands are expected to increase with the warmer spring and summer weather. The Water Supply Coordinating Council plans to cope with the drought of 2002 by:

- Counting on the reserve supplies that have been developed in recent years,
- Continuing to develop the remaining supplies on the "A" List by 2003 and,
- Employing good water conservation practices by the public and businesses in accordance with the Governor's drought advisory.

Continued cooperation is expected between the water utilities on the WSCC to ensure that safe and plentiful water will be delivered to the residents and businesses during this spring drought of record.

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Exhibit 1. Public Water Supply System Service Areas in Northern New Castle County

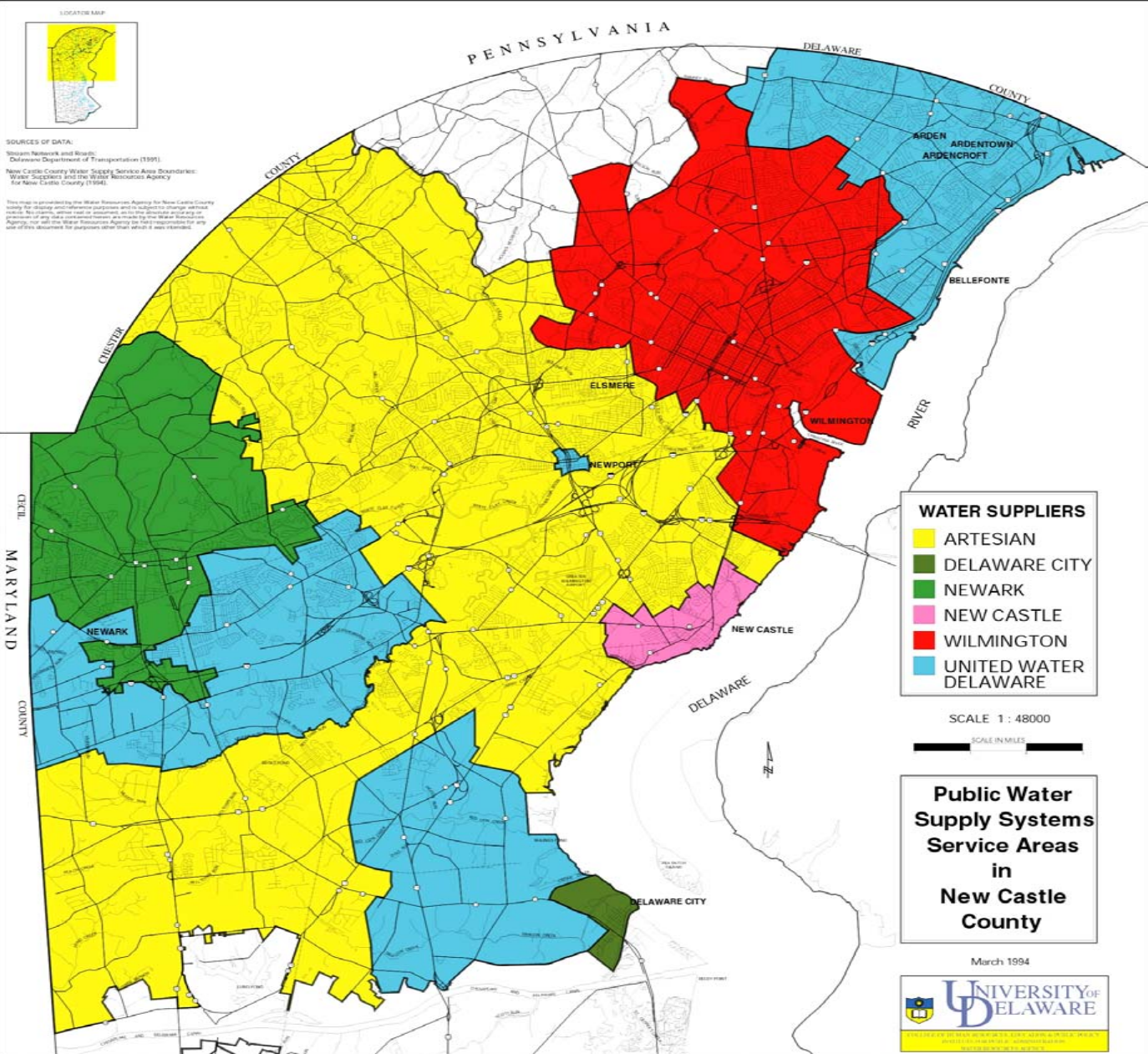


Exhibit 2. Brandywine Creek at Wilmington Stream Flow Data April 2002

Brandywine Creek Streamflow Data, April 2002

*The 7Q10 is the minimum flow necessary to protect fishery and habitat that is likely to occur for 7 consecutive days, once every 10 years

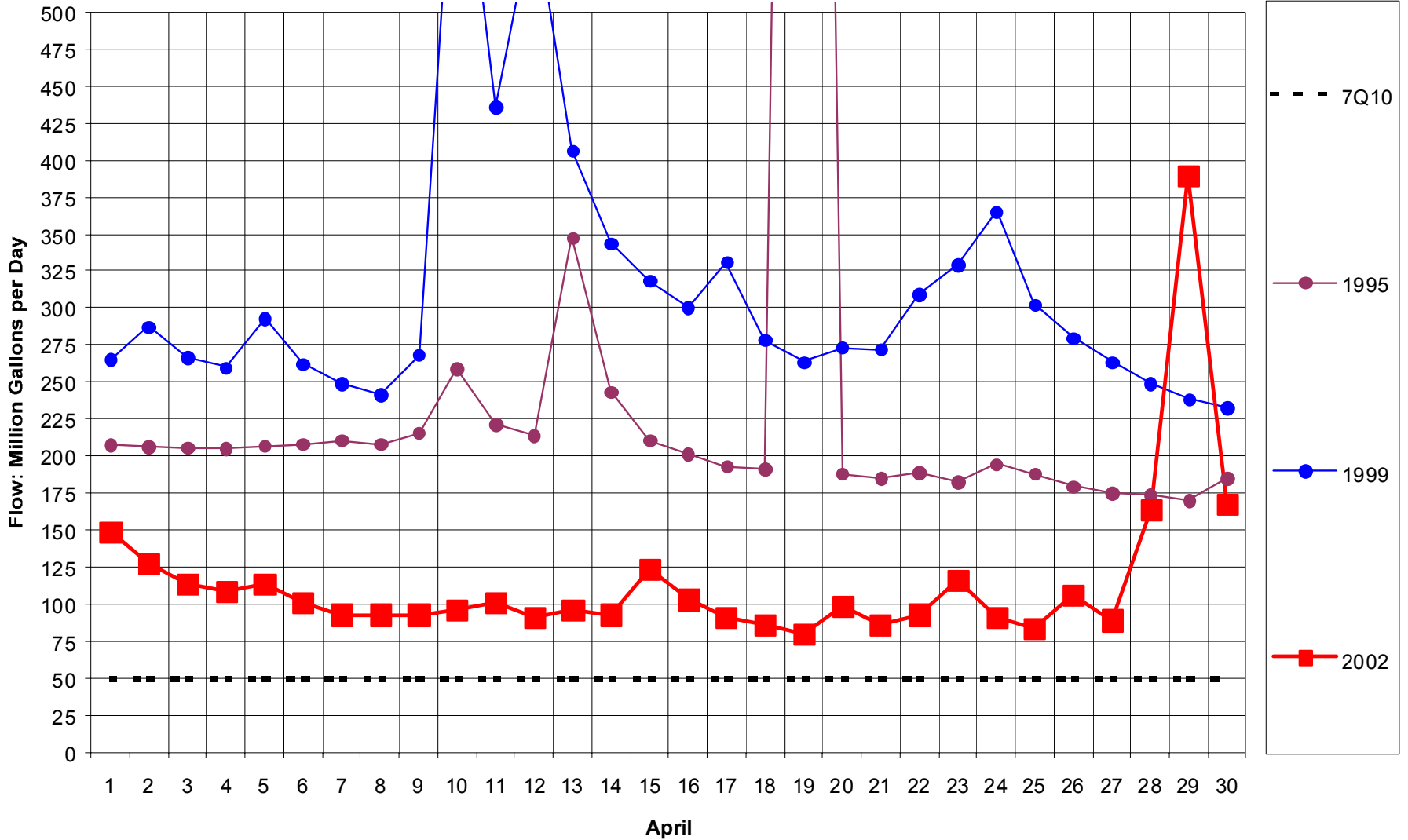


Exhibit 3. White Clay Creek at Stanton Stream Flow Data April 2002

White Clay Creek at Stanton Streamflow Data, April 2002

*The 7Q10 is the minimum flow necessary to protect fishery and habitat that is likely to occur for 7 consecutive days, once every 10 years

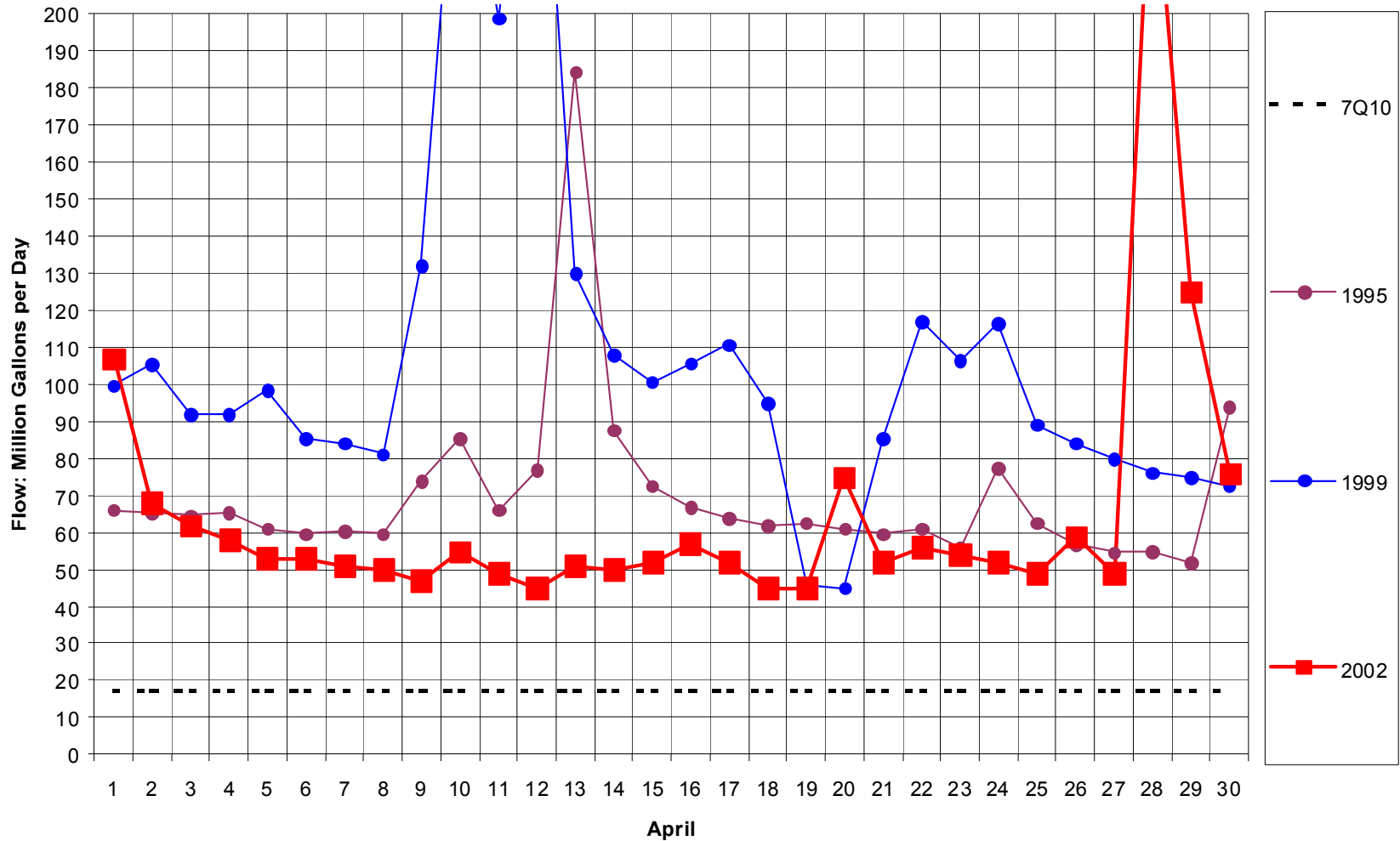


Exhibit 4. White Clay Creek at Newark Stream Flow Data April 2002

White Clay Creek at Newark Streamflow Data, April 2002

*The 7Q10 is the minimum flow necessary to protect fishery and habitat that is likely to occur for 7 consecutive days, once every 10 years

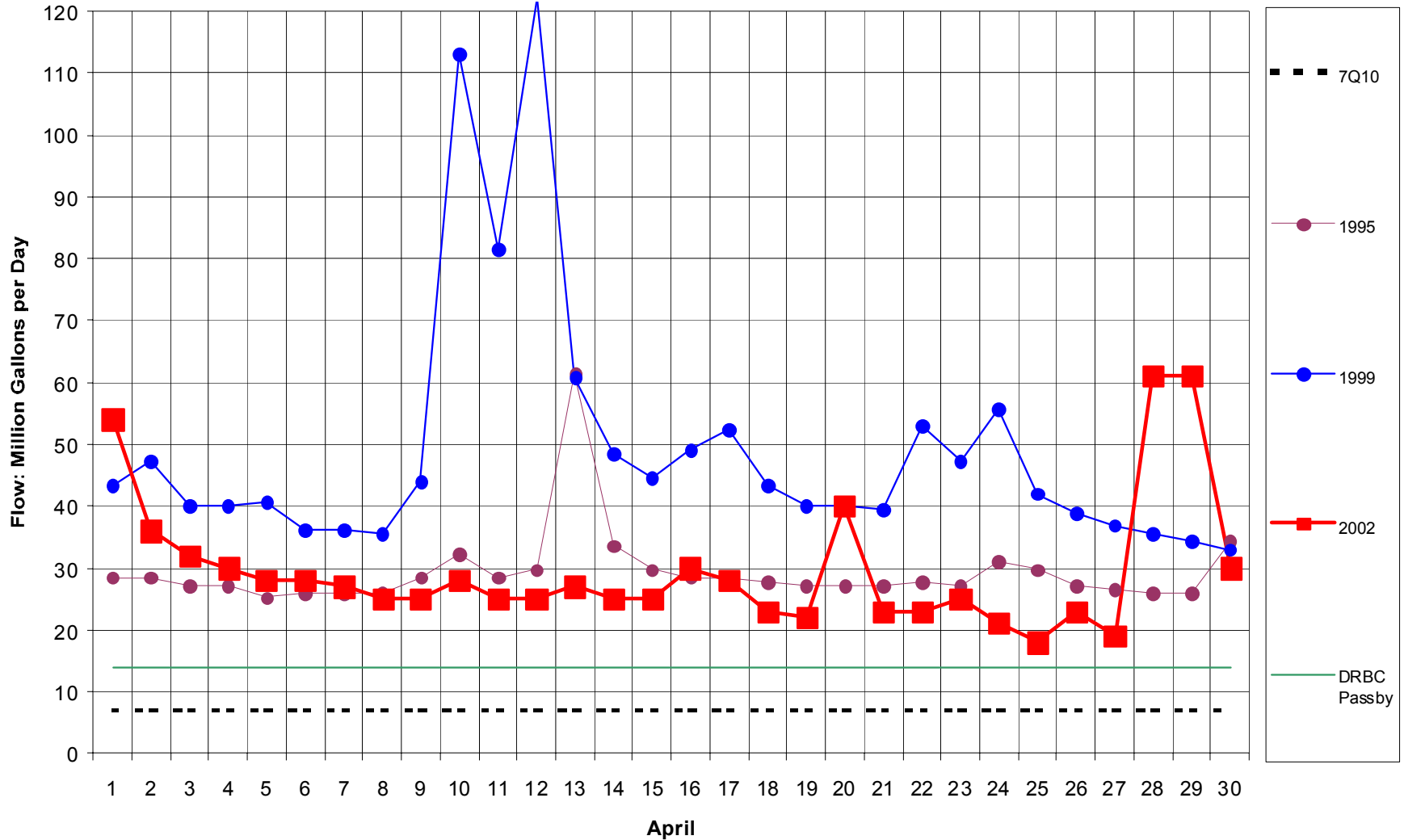


Exhibit 5. DGS Water Conditions Index for New Castle County, Delaware

*Water Conditions Index for New Castle County
October 1998 – April 2002*

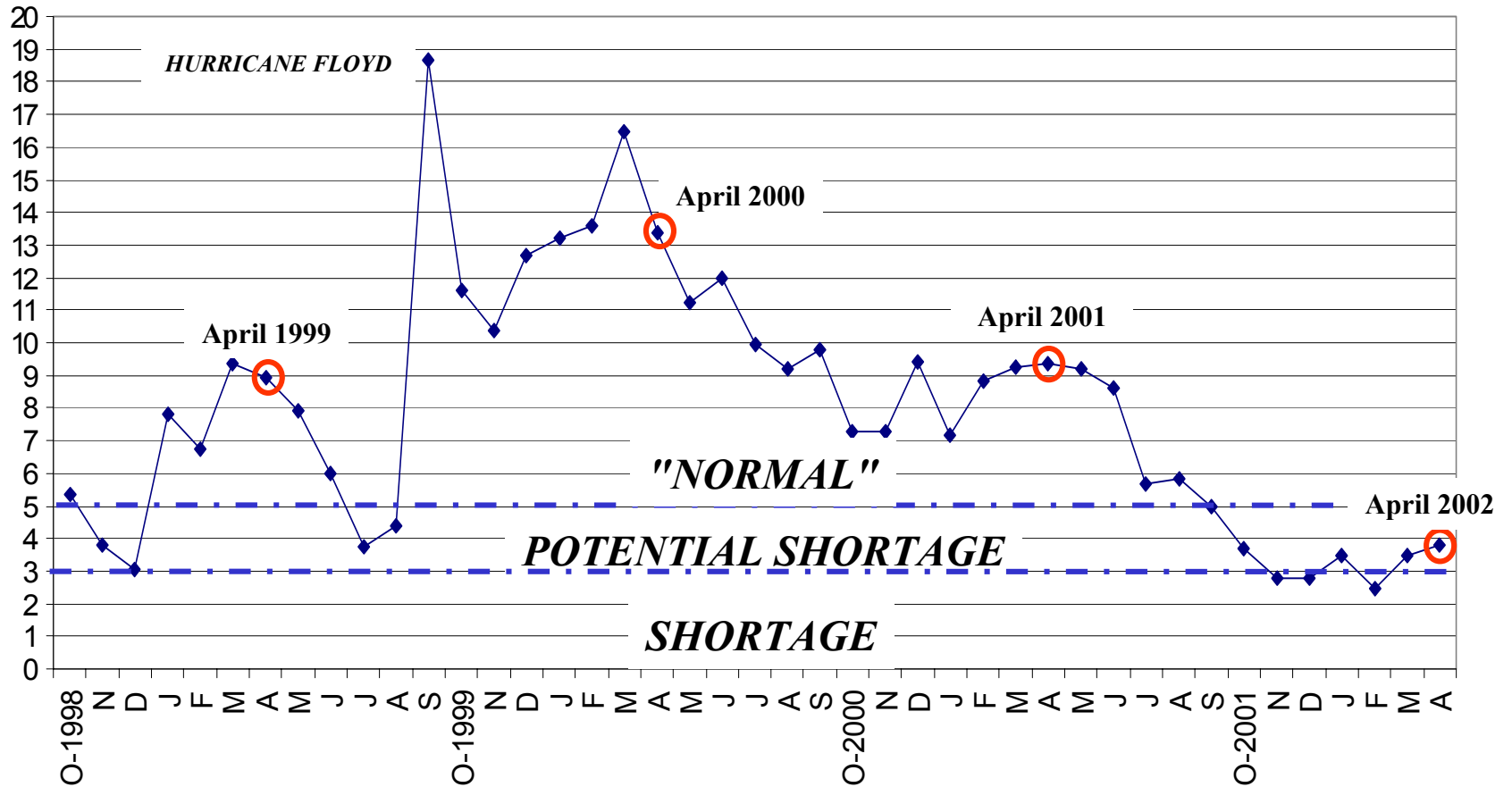
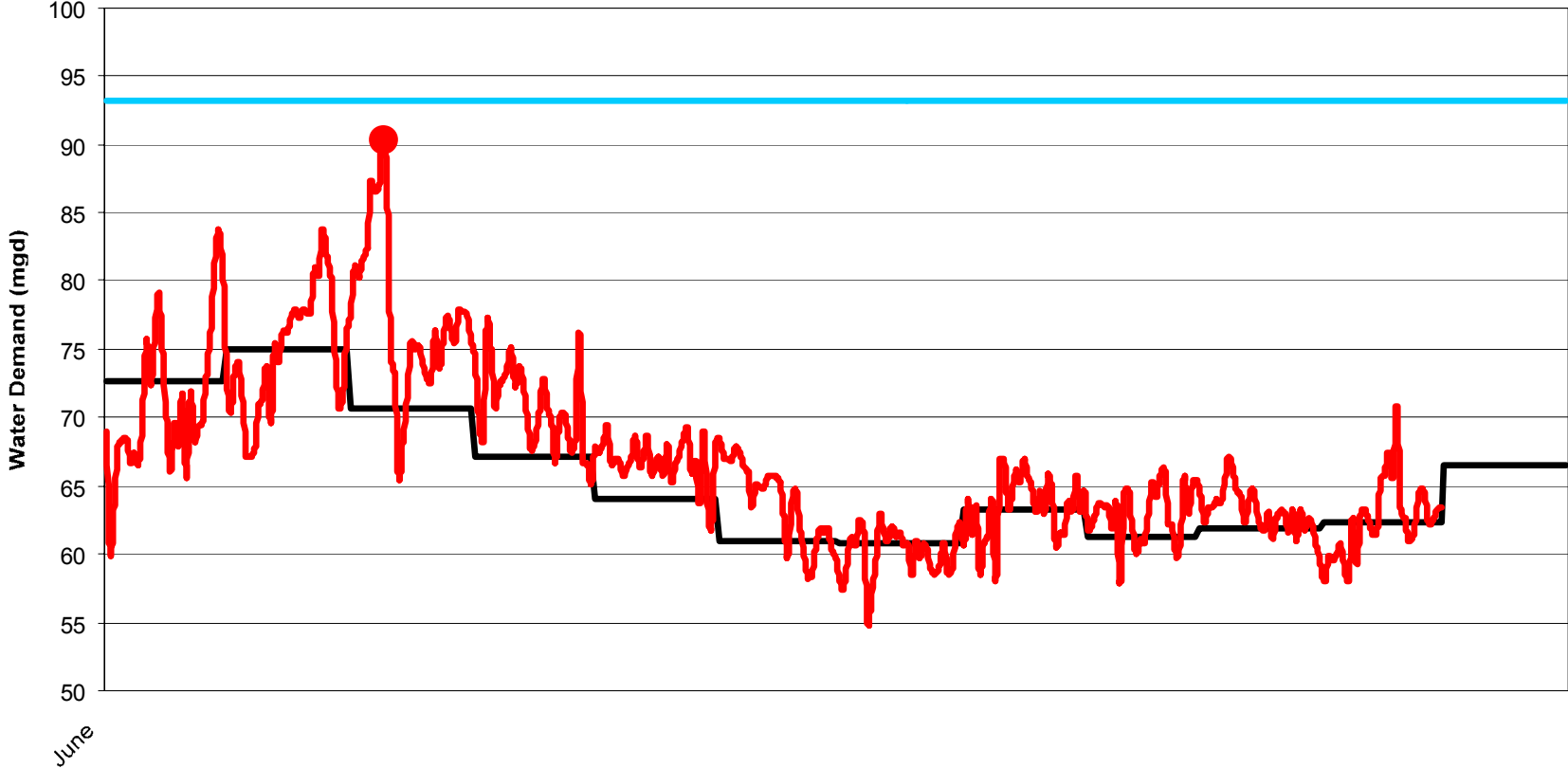


Exhibit 6. Public Water Demand Northern New Castle County, June 2001 - April 2002

Public Water Demand: New Castle County, June 2001 - April 2002

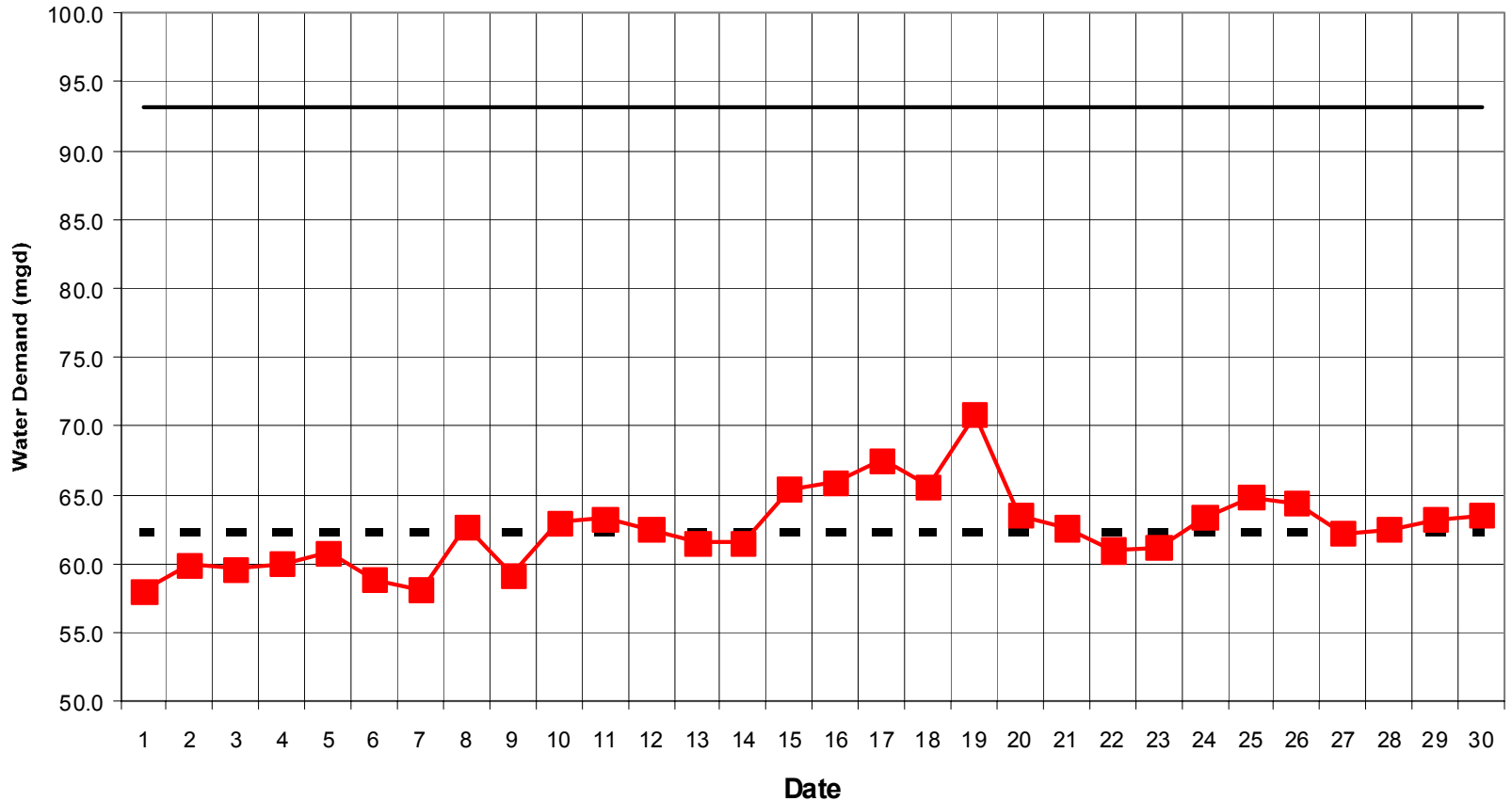


Compiled by the University of Delaware, Institute for Public Administration, Water Resources Agency, using data from: Artesian Water Co., City of Newark, City of Wilmington, New Castle Municipal Services Commission, and United Water Delaware



Exhibit 7. Public Water Demand Northern New Castle County, April 2002

Public Water Demand: New Castle County, April 2002



Compiled by the University of Delaware, Institute for Public Administration, Water Resources Agency, using data from: Artesian Water Co., City of Newark, City of Wilmington, New Castle Municipal Services Commission, and United Water Delaware

- - 'April Normal

— Peak (7/18/97)

—■— 2002

Exhibit 8. Proposed Newark Reservoir (317 mg)

