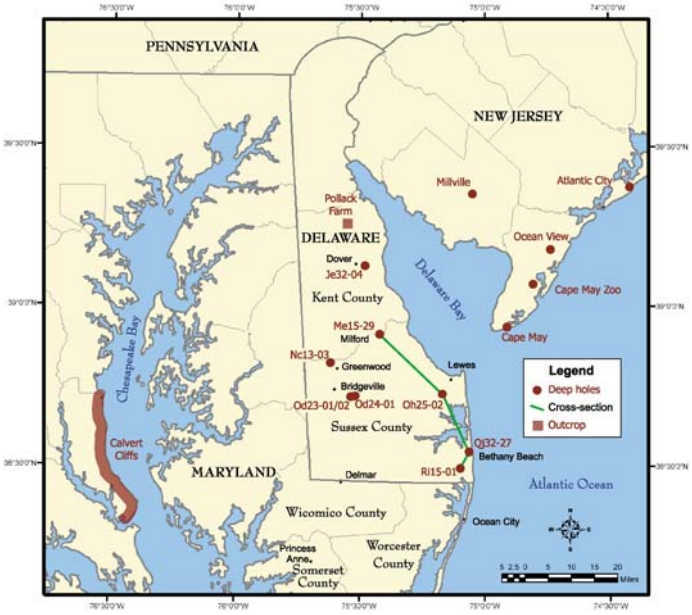
ELEVENTH REPORT TO THE GOVERNOR AND GENERAL ASSEMBLY

Regarding the Progress of the

DELAWARE WATER SUPPLY COORDINATING COUNCIL

Estimates of Water Supply & Demand for Kent County and Sussex County through 2030



June 14, 2011

Prepared by the

Delaware Department of Natural Resources and Environmental Control
Division of Water

Delaware Geological Survey

University of Delaware
Institute for Public Administration – Water Resources Agency

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DEPARTMENT OF NATURAL RESOURCES
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June 1, 2011

The Honorable Jack Markell
Governor, State of Delaware
Legislative Hall
Dover, Delaware 19901

146th General Assembly
Legislative Hall
Dover, Delaware 19901

Dear Governor Markell and Members of the 146th General Assembly:

I have the distinct pleasure of forwarding to you the latest draft progress report of the Delaware Water Supply Coordinating Council (WSCC), regarding *Estimates of Water Supply & Demand for Kent County and Sussex County through 2030.*

This is the eleventh report issued by the WSCC and is a summary document that highlights the ongoing work on updating the water supply and demand plans for Kent and Sussex Counties. The expected release date for the completed report is at the end of this calendar year, and the report is approximately 70% complete.

The forthcoming report will provide inventories of ground-water supplies in the two counties based on new research by the Delaware Geological Survey (DGS) and projected water demands for all major water users to year 2030. The production schedule is very timely as the latest census figures can be employed to provide the most accurate baseline for the projections. This will form an invaluable tool for municipal utilities, industries, agricultural interests, and all offices involved with water resources planning.

Also of note is the activity being undertaken at the recommendation of the WSCC on ground-water resources in southern New Castle County. Resource information in that area is sparse, and the WSCC saw an important need to expand the monitoring network to better assess the quality and quantity of the resource south of the canal to the Kent County line. DGS is conducting this work, and it is the first of three proposed phases with this one being reactivation of several idled observation wells. These wells soon will be used to collect water-level data and establish a long-term database on the condition of the aquifers in this future growth area.

Additionally, I wish to announce that Kathleen M. Stiller, Director of the Division of Water, will be DNREC's designee on the Water Supply Coordinating Council, serving along with alternate representative, Stewart Lovell, Manager of the Water Supply Section.

As always, please do not hesitate to contact me at 739-9000 or Ms. Stiller at 739-9949.

Sincerely,

Collin P. O'Mara
Secretary

Attachment: Report

cc: Gerald Kauffman, WRA
John Talley, DGS
Kathy Stiller, DNREC
Stewart Lovell, DNREC

SL:jf

Eleventh Report to the Governor and General Assembly
Regarding the Progress of the Delaware Water Supply Coordinating Council
Estimates of Water Supply & Demand for Kent County and Sussex County through 2030
June 14, 2011

Purpose and Scope

In July 2009, Governor Jack Markell signed Senate Bill 72 passed on June 24, 2009 by the House of the 145th General Assembly that reauthorized the Delaware Water Supply Coordinating Council to develop water supply and demand plans for Kent County and Sussex County through 2030 and extended the authority of the WSCC to January 1, 2016.

This *Eleventh Report to the Governor and General Assembly* provides a progress report on work completed to date by the Delaware Water Supply Coordinating Council regarding assessments of water supply and demand in Kent County and Sussex County through 2030 including:

- Groundwater availability and hydrogeology
- Groundwater quality
- Water allocations and water supply
- Existing and future water demands.

Previous reports from the Delaware Water Supply Coordinating Council are posted at www.wra.udel.edu.

The purpose of this investigation is to provide an assessment of water resources in Kent and Sussex counties and evaluate groundwater availability, historic/current water use, water allocations, and projections of future water requirements through 2030. This work is designed to address anticipated increases in water demands and provide information to support implementation of programs and policies in management, development, conservation, and protection of the State's water resources.

Challenges in conducting this assessment of water supplies in Kent and Sussex counties include:

1- Delaware's population is expected to continue to grow with a projected increase of 32,795 and 75,566 people in Kent and Sussex counties, respectively, by 2030 (DPC 2010). Water demand will increase with population growth as will the wastewater flow that must be treated and discharged to either surface water or groundwater.

2- Changes in land use may negatively influence the availability of clean water raising questions whether Delaware residents can afford the cost of cleanup and treatment. Contamination resulting from human activities (nutrients, chlorides, hydrocarbons) and natural substances (arsenic, iron, chlorides, etc.) may reduce the availability of water.

3- Irrigated cropland is expected to increase, especially during periods of drought. Although cropland in Kent and Sussex counties decreased from 398,000 acres in 2002 to 380,860 acres in 2007, the amount of irrigated cropland increased from 94,000 acres in 2002 to 101,851 acres by 2007 (USDA 2009). This increasing trend in irrigated cropland is expected to continue with an accompanying significant increase in irrigation water use.

On December 3, 2009, the WSCC approved a work plan for a subcommittee to prepare a report that estimates water supply and demand in Kent and Sussex counties through 2030.

The WSCC plans to prepare a draft report for review by Kent County and Sussex County governments and water purveyors in October 2011 and submit a final report to the Governor and General Assembly in March 2012 in accordance with the following schedule.

Schedule
Estimates of Water Supply & Demand for Kent County and Sussex County through 2030

Task	**Milestone**
Draft report for WSCC review	Oct 2011
2nd draft report to WSCC	Dec 2011
Final draft report to WSCC	Jan 2012
12th Report to Governor and General Assembly	Mar 2012
1. Delaware Water Supply Coordinating Council (UDWRA)	Jul 2011
1.1. Introduction	
1.2. Purpose and Scope	
1.3. Role of Delaware Water Supply Coordinating Council	
1.4. Acknowledgments	
1.5. Drought Operating Plan	
2. Demographics/Comprehensive Plans (UDWRA)	Aug 2011
2.1. Land Use/Zoning	
2.2. Population	
2.3. Housing Units	
2.4. Watersheds	
2.5. Comprehensive Plans	
2.6. Water Supply Service Areas (CPCN)	
2.7. Interconnected Water Systems map	
3. Hydrogeology and Groundwater Availability (DGS)	Sep 2011
3.1. Hydrogeology	
4. Water Quality (UDWRA, DNREC, DGS, DPH)	Sep 2011
4.1. Existing Water Quality	
4.2. Source Water Protection	
5. Water Supply (DNREC)	Sep 2011
5.1. Allocated Water Users	
Public community wells, over 50,000 gpd (water utilities/community systems)	
Public non-community systems (nontransient/transient wells)	
Irrigation wells (farms, golf courses, nurseries, wastewater reuse)	
Self supplied industry wells	
5.2. Individual Domestic Wells	
5.3. Public Non-Community Systems (not allocated)	
6. Existing Water Demands (UDWRA)	Aug 2011
6.1. Public Water Demands	
6.2. Individual Domestic Wells	
6.3. Irrigation Water Demands	
6.4. Comparison with Wastewater Flows	
6.5. Finished Water Storage/Fire Flow Demands	
7. Future Water Demands (UDWRA)	Sep 2011
7.1. Future Public Water Demands	
7.2. Future Irrigation Demand	
7.3. Effect of Climate Change	

Delaware Water Supply Coordinating Council

In July 2009, Governor Markell signed SB 72 passed in June 2009 by the 145th General Assembly that reauthorized the Water Supply Coordinating Council until January 1, 2016. In August 2003 Governor Minner signed HB 203 that reauthorized the WSCC to January 1, 2010 and expanded the WSCC to include statewide representation. In July 2000, Governor Carper signed House Bill 549 that formed the WSCC and appointed the DNREC, DGS and UDWRA as technical advisors and designated UDWRA as Temporary Water Coordinator. The mandate of the WSCC is to work cooperatively for water supply self sufficiency in Delaware. The Secretary of DNREC (or designee) serves as Chair. The Council may designate new members and establish subcommittees to address water supply issues. The law appointed the following members of the WSCC.

- 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
- Director of the Delaware Division of Public Health
- Public Advocate
- Director of the University of Delaware Water Resources Agency
- 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 Grounds Management Association
- Delaware State Golf Association
- Delaware Nature Society
- Coalition for Natural Stream Valleys
- New Castle County Civic League
- Kent County
- Sussex County
- Public Water Supply Utility in Sussex County Association of Towns (SCAT)
- Public Water Supply Utility in League of Local Governments, Kent County
- Delaware Rural Water Association
- National Association of Water Companies, Delaware Chapter (not represented in NCC)
- Local Chamber of Commerce in New Castle County
- Local Chamber of Commerce in Kent County
- Local Chamber of Commerce in Sussex County
- Delaware Farm Bureau
- Center for Inland Bays
- State Fire Marshal
- Delaware State Climatologist

Demographics

Population growth and conversion of open land to urban/suburban uses are projected to increase demand for drinking water in Kent County and Sussex County with accompanying increases in wastewater flow.

Population: The population of Kent and Sussex Counties was 357,003 in 2010 and may increase by 30% to 465,364 by 2030 (DPC 2010). The Kent County population may increase 20% from 160,058 in 2010 to 192,853 by 2030. Sussex County population may increase 38% from 196,945 in 2010 to 272,511 by 2030 (Figures 1 and 2).

Land Use: In 2007, Kent and Sussex counties were covered by 43% agriculture, 37% forest/wetland/open space, 15% urban/suburban, and 4% open water (Figure 3). By 2030, population projections indicate 52,474 dwelling units may replace rural land in the two counties, thus increasing urban/suburban land by 33%.

Comprehensive Plans: The Kent County Comprehensive Plan (2008) reports 121,779 people or 76% of the population are served by public water systems with estimated water demand of 18.3 mgd. The Sussex County Comprehensive Plan (2008) indicates normal public water demand is 17.7 mgd, projected to 42.2 mgd by 2025.

Public water supply service areas: The Public Service Commission has approved the following Certificates of Public Convenience and Necessity (CPCN) to provide public water service in Kent and Sussex counties:

Kent County

Artesian Water Company	Frederica	Pickering Beach Water
Camden –Wyoming	Harrington	Smyrna
Clayton	J.H. Wilkerson & Son	Tidewater Utilities
Dover	Magnolia	
Felton	Milford	

Sussex County

Artesian Water Company	Greenwood	Rehoboth Beach
Bethany Beach	J.H. Wilkerson & Son	Seaford
Blades	Laurel	Selbyville
Bridgeville	Long Neck Water	Sussex County
Dagsboro	Millsboro	Sussex Shores
Delmar	Milton	Tidewater Utilities
Frankford	Milford	Lewes BPW
Georgetown		

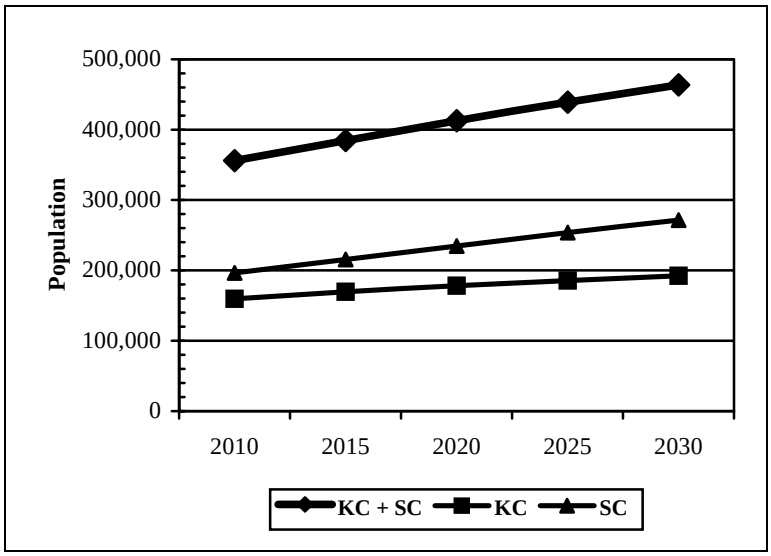


Figure 1. Projected population growth in Kent County and Sussex County, 2010-2030 (DPC 2010)

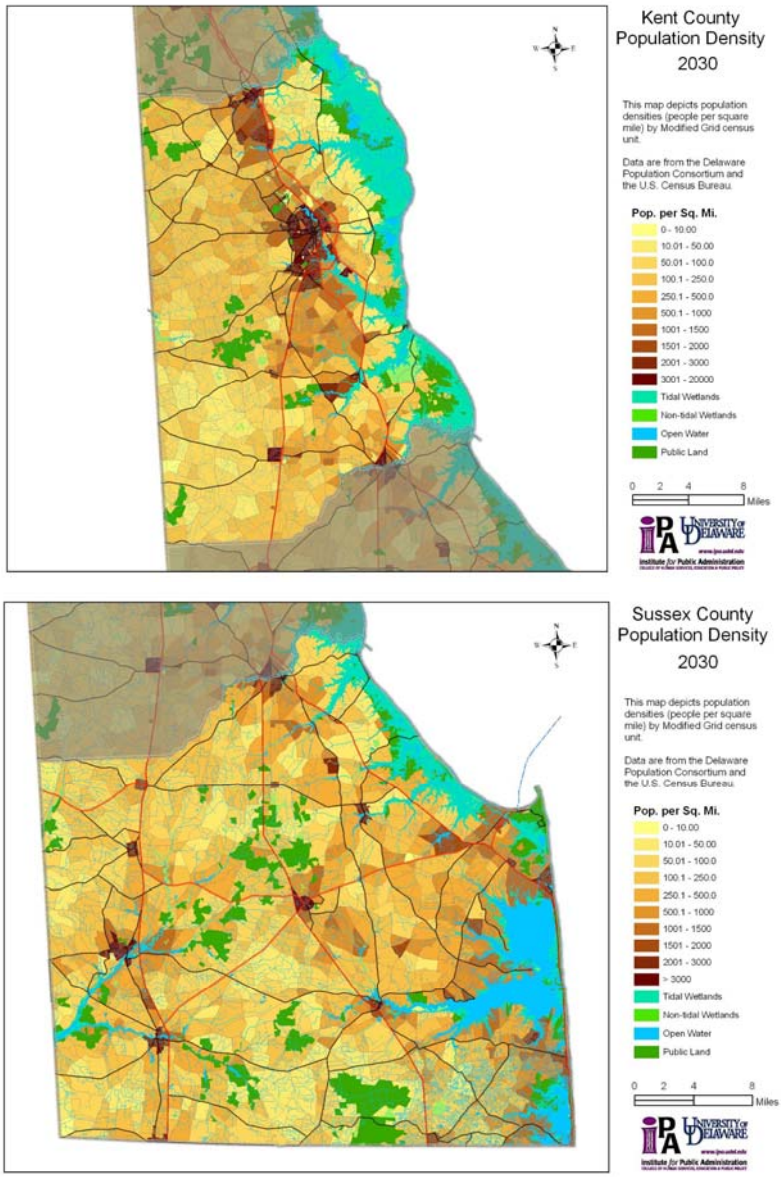


Figure 2. Population density projections in Kent County and Sussex County by 2030

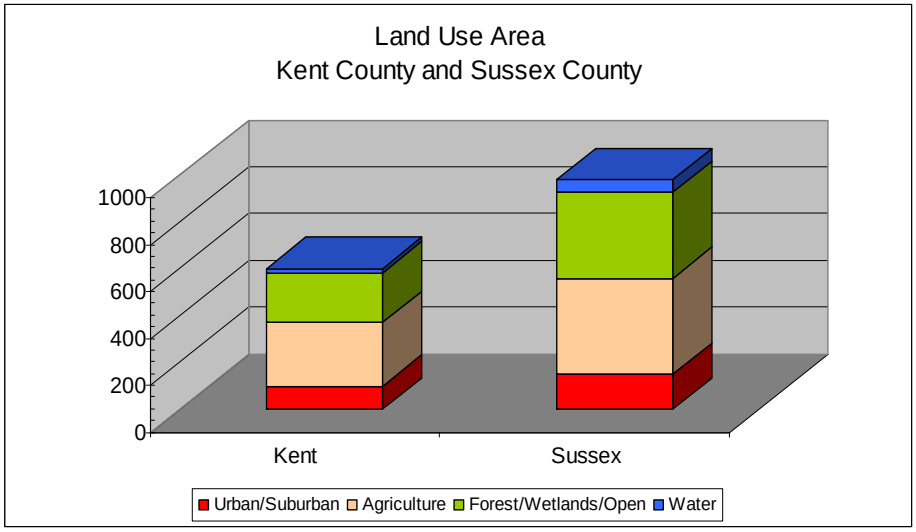


Figure 3. Land use (sq mi) in Kent County and Sussex County, 2007

Hydrogeology and Ground-Water Availability

Groundwater is an essential natural resource and the sole source of drinking water in Kent and Sussex counties. The Delaware Geological Survey is conducting an assessment of hydrogeology and ground-water availability in Kent and Sussex counties. Aquifers in Kent County and Sussex County have groundwater availability to provide 0.5 to 0.7 million gallons per day (mgd) per square mile based on current recharge rates. Figure 4 depicts the major water supply aquifers in Kent County and Sussex County including the Columbia (surficial), Rancocas, Piney Point, Cheswold, Federalsburg, Frederica, Manokin, Pocomoke/Ocean City formations. Figure 5 illustrates groundwater recharge potential areas in the two counties as defined and mapped by the DGS.

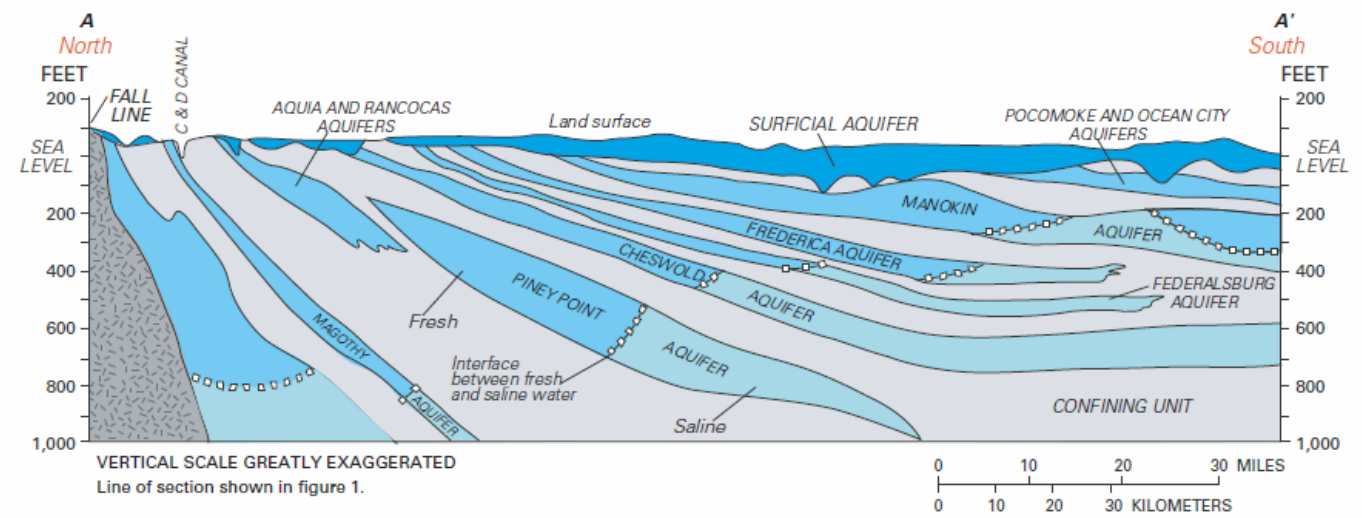


Figure 4. Coastal Plain aquifers in Delaware (DGS and USGS)

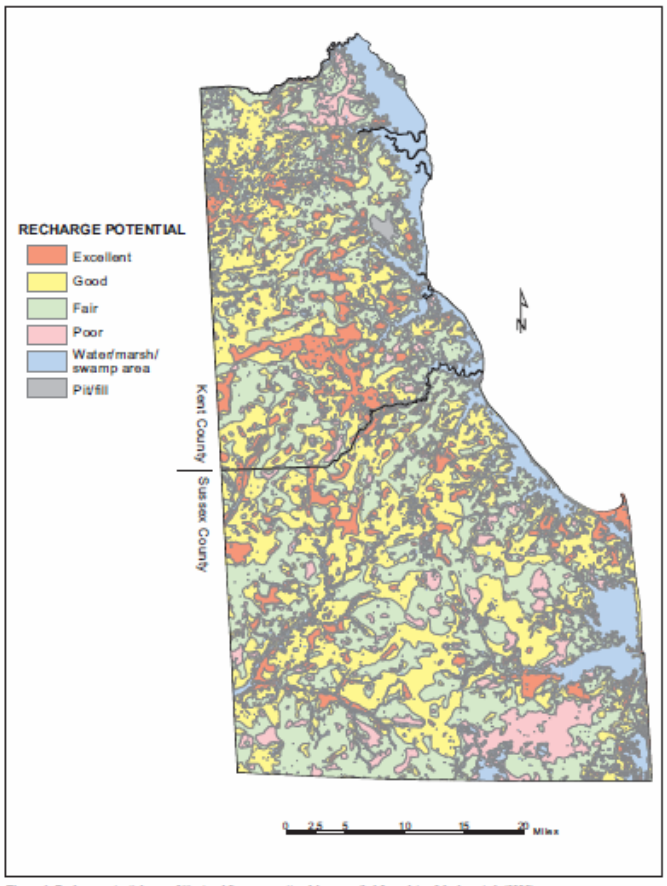


Figure 4. Recharge potential map of Kent and Sussex counties. Map compiled from data of Andres et al. (2002).

Figure 5. Recharge potential map in Kent and Sussex counties (DGS)

Water Quality

Studies prepared for the U.S. Geological Survey (1986, 1992, 1993, 2002, 2004, 2010), Delaware Geological Survey (1970, 1971, 1972, 1991, 2008), Delaware Division of Public Health (2009, 2010), and Delaware DNREC (1980) were reviewed to evaluate groundwater quality in Kent County and Sussex County. *Note: Public systems are required to treat raw water to meet EPA safe drinking water standards before water reaches the tap. Modern laboratories now detect chemicals at minimum detection limits that are far below safe drinking water standards.*

Chlorides: Groundwater high in chlorides and sodium may affect people with high blood pressure. High chlorides above the EPA standard (250 mg/l) are found in scattered shallow wells along Delaware Bay and Atlantic Ocean.

Nitrogen: High nitrogen levels above the 10 mg/l drinking water standard are thought to be a possible link to blue baby syndrome. Analysis of N levels in the shallow water table in Kent and Sussex counties indicate:

- 23% of wells in coastal Sussex County had nitrates above the 10 mg/l drinking water standard in 1991.
- One of 30 samples contained nitrite + nitrate above the 10 mg/l EPA drinking water standard in 2002.
- Nitrates were widespread in the surficial aquifer on the Delmarva Peninsula of Del., Md., and Va. in 2004.
- Nitrates were detected in 3 of 4 individual wells, 18% of wells exceeded the drinking water standard in 2008.
- Nitrogen levels have remained constant and did not increase or decrease between 2000 and 2008.

Volatile Organic Compounds: VOCs such as chloroform, tetrachloroethene, and methyl tert-butyl ether (MTBE) are suspected cancer-causing compounds detected in low levels but rarely above EPA drinking water standards.

- In 2002, 34 VOCs were detected in at least 1 of 30 wells. No wells exceeded EPA drinking water standards.
- In 2008, VOCs were detected in 75% of 200 shallow domestic wells. Just 2% of wells exceeded EPA standards.
- Just 7 of 31 VOCs had levels greater than 1 ug/l in 2010. All VOCs were below drinking water standards.

Pesticides: Low levels of pesticides were detected in Delaware shallow aquifers at detections less than EPA drinking water standards. Pesticides in high amounts above drinking water standards can be toxic to humans.

- Pesticides were detected in at least 1 of 30 samples in 2002, all less than EPA drinking water standards.
- Low levels of herbicides were detected in Delmarva Peninsula shallow aquifers in 2004.
- At least one pesticide was detected in 29 of 30 wells but levels did not exceed drinking water standards in 2010.

Radionuclides: Naturally occurring radon and radium are present at low levels in Delaware shallow groundwater that rarely exceed proposed EPA drinking water standards. High radon levels have been linked to lung cancer.

- Radon was detected in 10 wells in 2002. One well exceeded the proposed EPA standard of 300 picocuries/liter.
- Radium and radon were detected in 9 wells in 2010. No samples exceeded proposed EPA standards.

Public Drinking Water Annual Compliance Report: Of 486 public water systems, the Delaware Division of Public Health reported 15% of systems recorded a violation mostly due to high nitrate or bacteria levels in 2009.

Emerging Contaminants: The EPA is considering setting drinking water standards on emerging contaminants such as drugs and personal care chemicals that have been detected in very low levels in surface water and groundwater. In 2008 and 2009, a report for the Delaware Division of Public Health found:

- 17 drugs and personal care chemicals were detected in 55% of public water supply systems.
- At least 17 different drugs were detected in 101 treated and untreated water supplies.
- At least 95 farm wells had detected 14 compounds.

Source Water Protection: In accordance with the Delaware Source Water Protection Law of 2001:

- Source water protection ordinances were adopted by 9 governments in Kent County: Smyrna, Cheswold, Dover, Wyoming, Camden, Frederica, Harrington, Milford, and Kent County, and 9 governments in Sussex County: Sussex County, Milford, Lewes, Bridgeville, Georgetown, Seaford, Millsboro, Laurel, and Selbyville.
- Clayton and Milton are currently developing their ordinances.
- Source water assessments at 65 public systems in Kent and Sussex counties indicate untreated water exceeded standards for iron and manganese in 20% of systems, VOCs in 3% of systems, and bacteria in 2% of systems.

Water Supply

The Delaware DNREC is tabulating water allocations in Kent and Sussex counties in these sectors:

- Public community wells, public transient/nontransient wells, self-supplied non-community wells
- Individual domestic wells
- Industrial wells
- Non-potable water supplies such as farm, nursery and golf course irrigation wells.

Water Demand

The University of Delaware Water Resources Agency is working with water purveyors to estimate existing and future water demands in Kent and Sussex counties. Preliminary analyses indicates potable water demands in Kent and Sussex counties may increase from 61 mgd in 2010 to 83 mgd by 2030 based on population growth (Table 1 and Figure 6). Public water demand in Kent and Sussex counties may increase from 47 mgd in 2010 to 68 mgd in 2030 (Figure 7). Individual domestic well demand may increase from 13 mgd in 2010 to 14 mgd by 2030. Figures 8 and 9 map peak day public water demand in the two counties in 2010.

Table 1. Future potable water demand in Kent County and Sussex County, 2010-2030

County	2010	2020	2030
Kent County	**19.3**	**20.7**	**21.7**
Public Water Demand	15.4	16.5	17.4
Individual Wells	3.9	4.2	4.3
Sussex County	**41.7**	**51.3**	**61.3**
Public Water Demand	32.2	41.3	51.3
Individual Wells	9.5	10.0	10.0
Kent County and Sussex County	**61.0**	**72.1**	**83.0**
Public Water Demand	47.6	58.0	68.6
Individual Wells	13.4	14.1	14.4

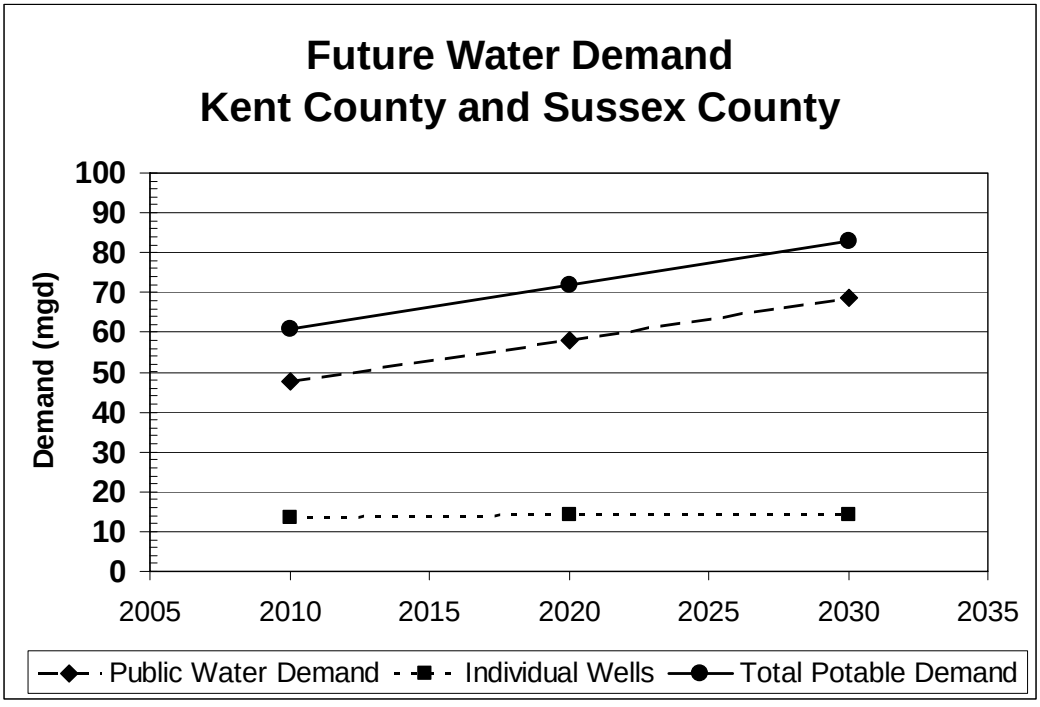
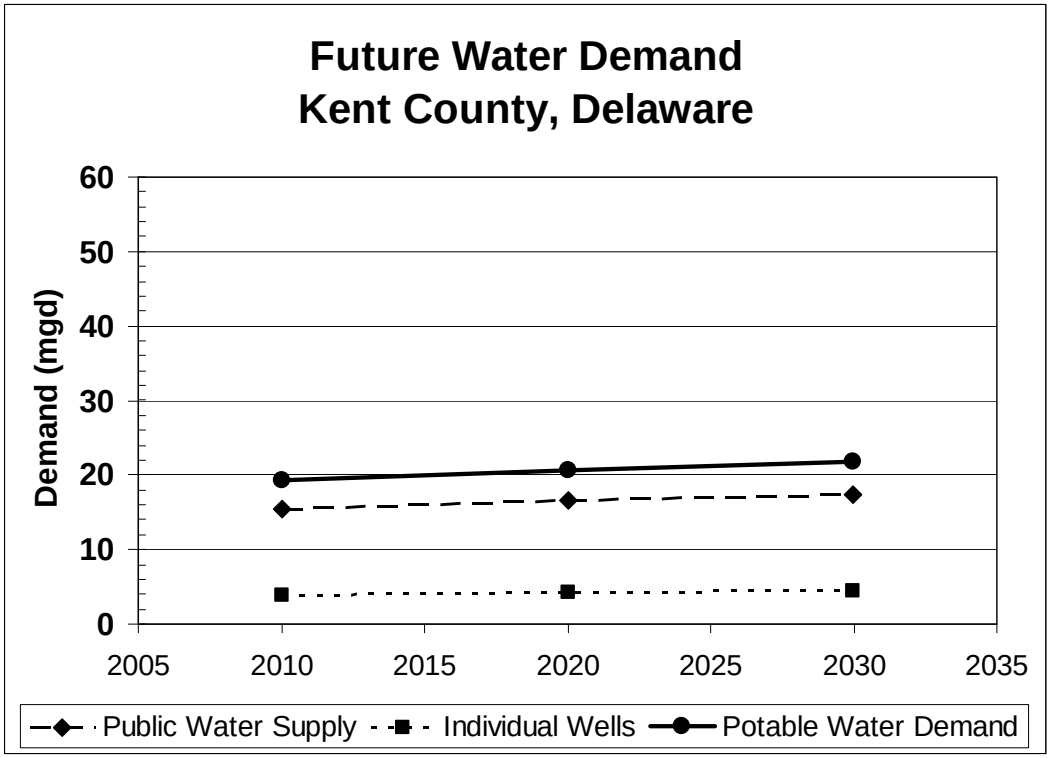


Figure 6. Existing and future water demands in Kent and Sussex counties, 2010-2030



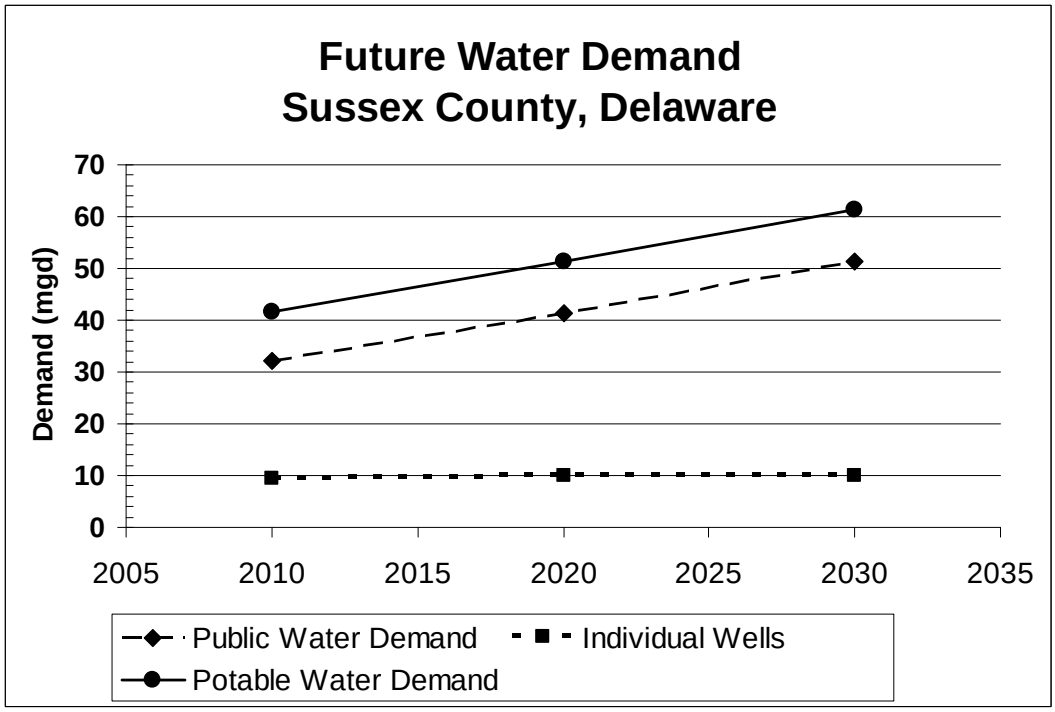


Figure 7. Existing and future water demand in Kent County and Sussex County, 2010 - 2030 (preliminary based on current available water demand data)

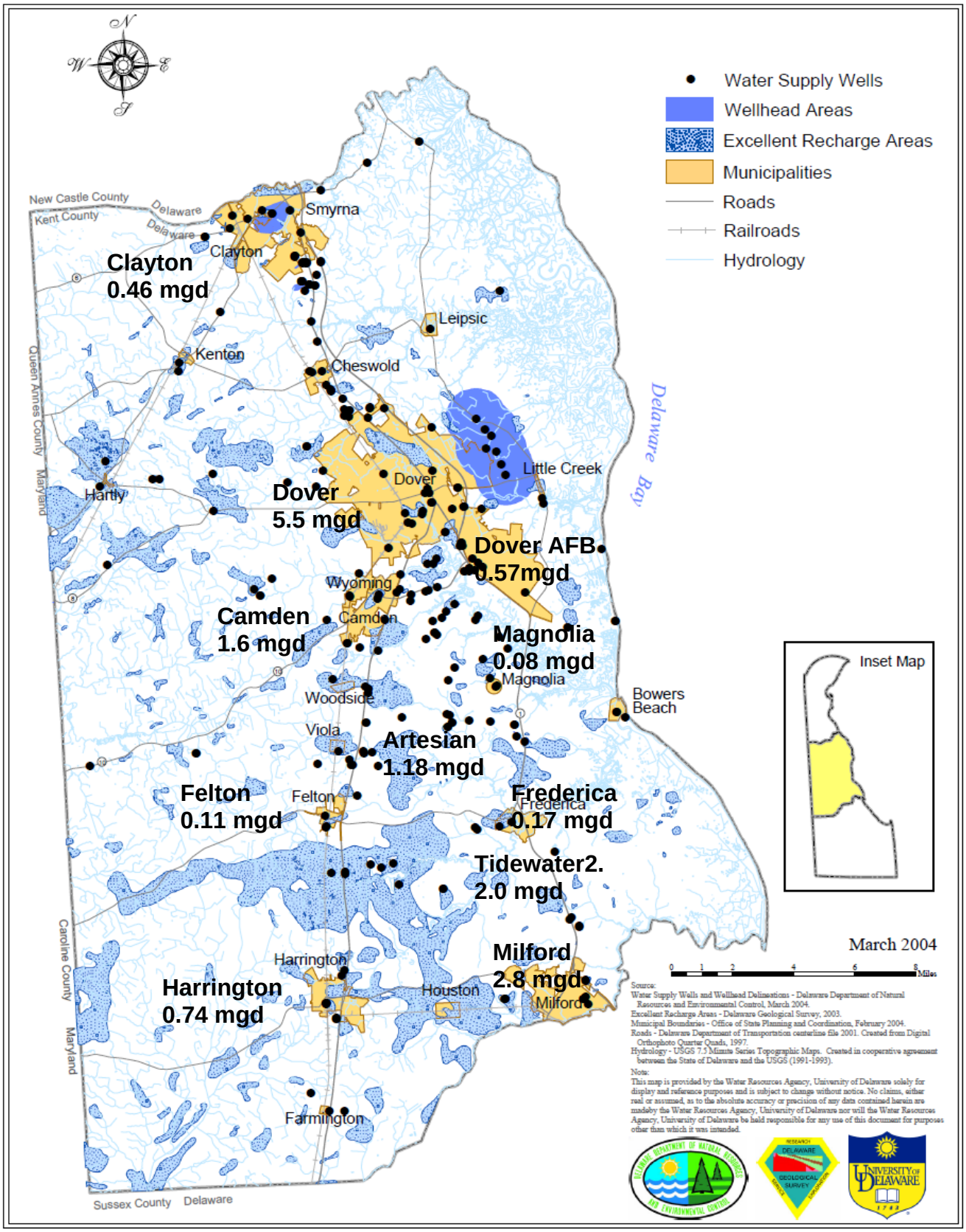


Figure 8. Peak day public water demand in Kent County, 2010

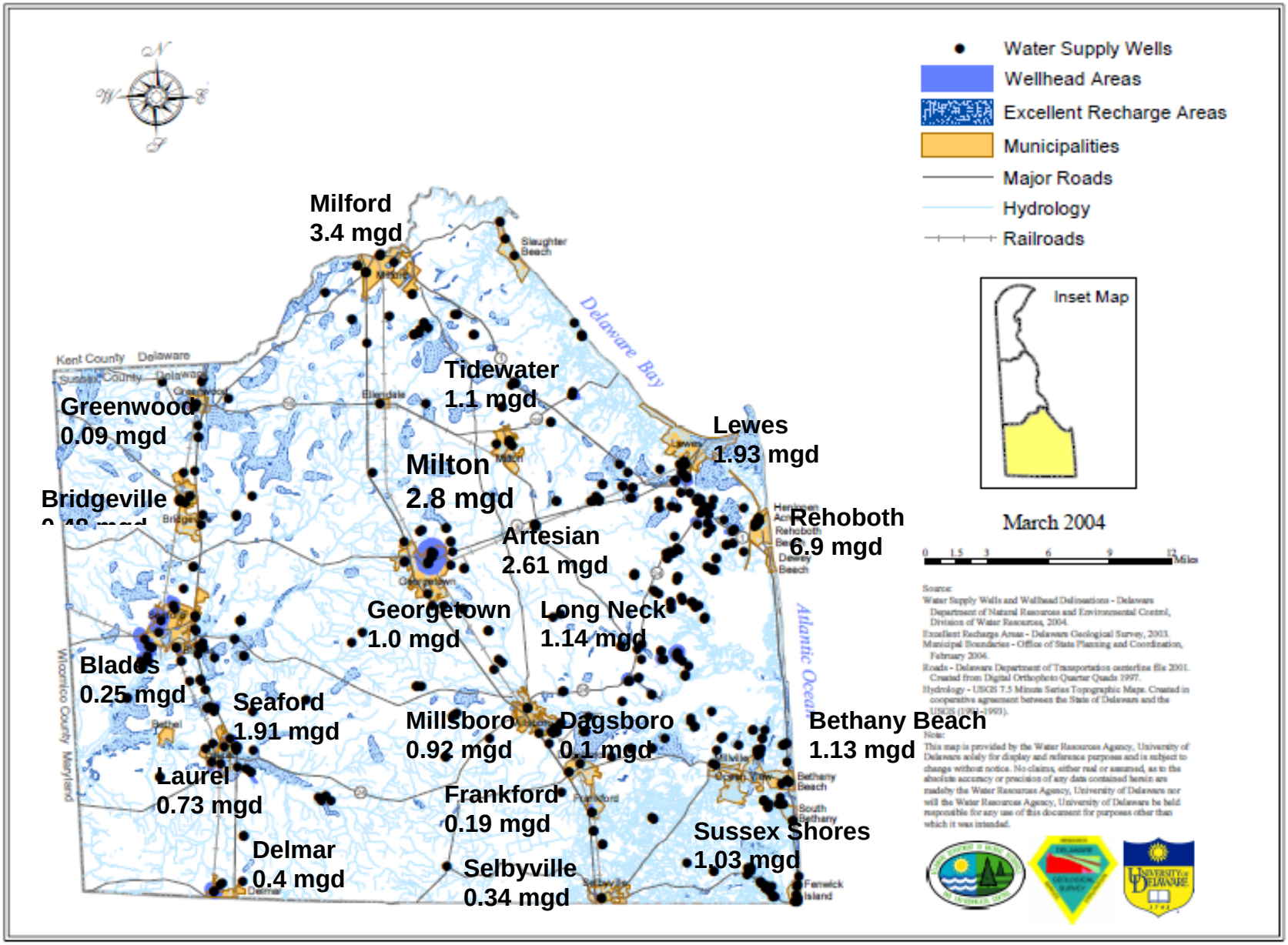


Figure 9. Peak day public water demand in Sussex County, 2010

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