

# **Work Plan**

## **Estimates of Water Supply and Demand for Kent County and Sussex County, Delaware through 2030**

*October 31, 2009, rev. November 24, 2009*

### ***Prepared by:***

Subcommittee of the Delaware Water Supply  
Coordinating Council

### ***Prepared for:***

Delaware Water Supply Coordinating Council

# 10 years...

- Governor's Water Supply Task Force submits report Dec 2, 1999.
- Gov. Carper issues Executive Order No. 74, Dec 30, 1999.
- Appoints Delaware Water Supply Coordinating Council.
- Del. Geological Survey and Del. Dept. of Natural Resources & Environmental Control appointed as water advisory agencies.
- Appoints Secretary of DNREC (or designee) as chair.
- Appoints Water Resources Agency at University of Delaware as state's Temporary Water Coordinator (Water Master).
- HB No. 549, introduced April 13, 2000, appoints council until Dec 31, 2003.



**State of Delaware  
Office of the Governor**

**TO:** Water Supply Task Force Members  
**FROM:** Jeffrey W. Bullock  
**DATE:** November 22, 1999  
**RE:** **Final Task Force Recommendations**

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Accompanying this memo you will find the latest version of the Draft Report of the Task Force that has been developed over the last several meetings by staff of the Water Resources Agency (WRA), Delaware Geological Survey (DGS) and the Department of Natural Resources and Control (DNREC).

This version contains recommendations to the Governor based on the discussion among Task Force members at the last meeting on Thursday, November 18th.

Please review this document carefully and contact staff with any changes that you would recommend. I would ask that you provide your comments by no later than Monday, November 29<sup>th</sup>.

After your final comments are incorporated into this document, a copy of the signature page will be forwarded to you for signing and the report will be submitted to the Governor.

My sincere thanks to you for your participation in this important process. I hope you and your family have a pleasant Thanksgiving.

# FINAL REPORT

## GOVERNOR'S WATER SUPPLY TASK FORCE

December 2, 1999



Prepared by:



Water Resources Agency, Institute for Public Administration,  
University of Delaware

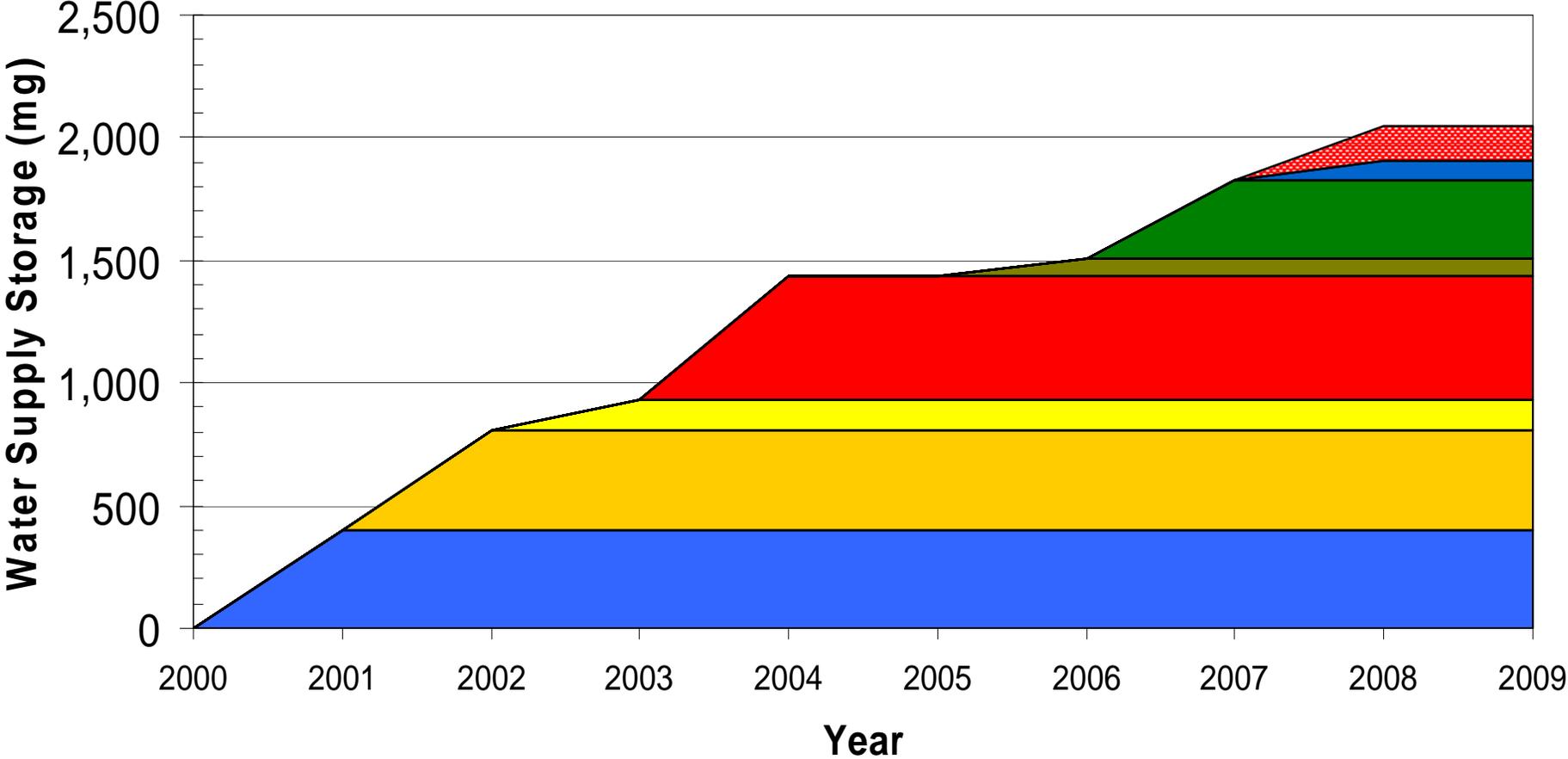


Delaware Geological Survey



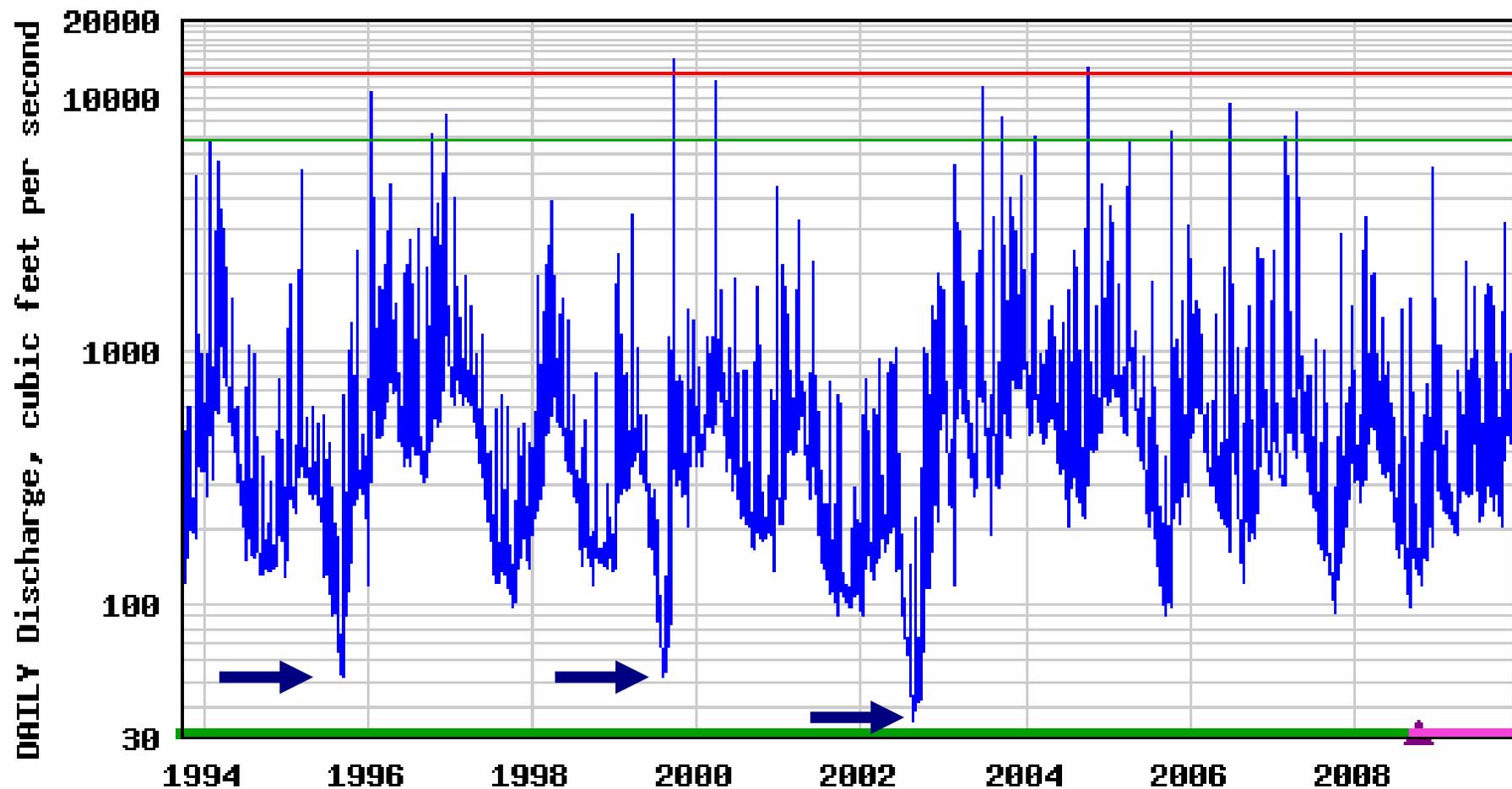
Delaware Department of Natural Resources and Environmental Control

# Delaware Water Supply Coordinating Council



- UWD TCS
  - Wilm. Hoopes Storage
  - UWD ASR Wells
- AWC New Wells
  - Newark South Wellfield
  - Wilm. Raise Hoopes
- AWC ASR Wells
  - Newark Reservoir

## USGS 01481500 BRANDYWINE CREEK AT WILMINGTON, DE

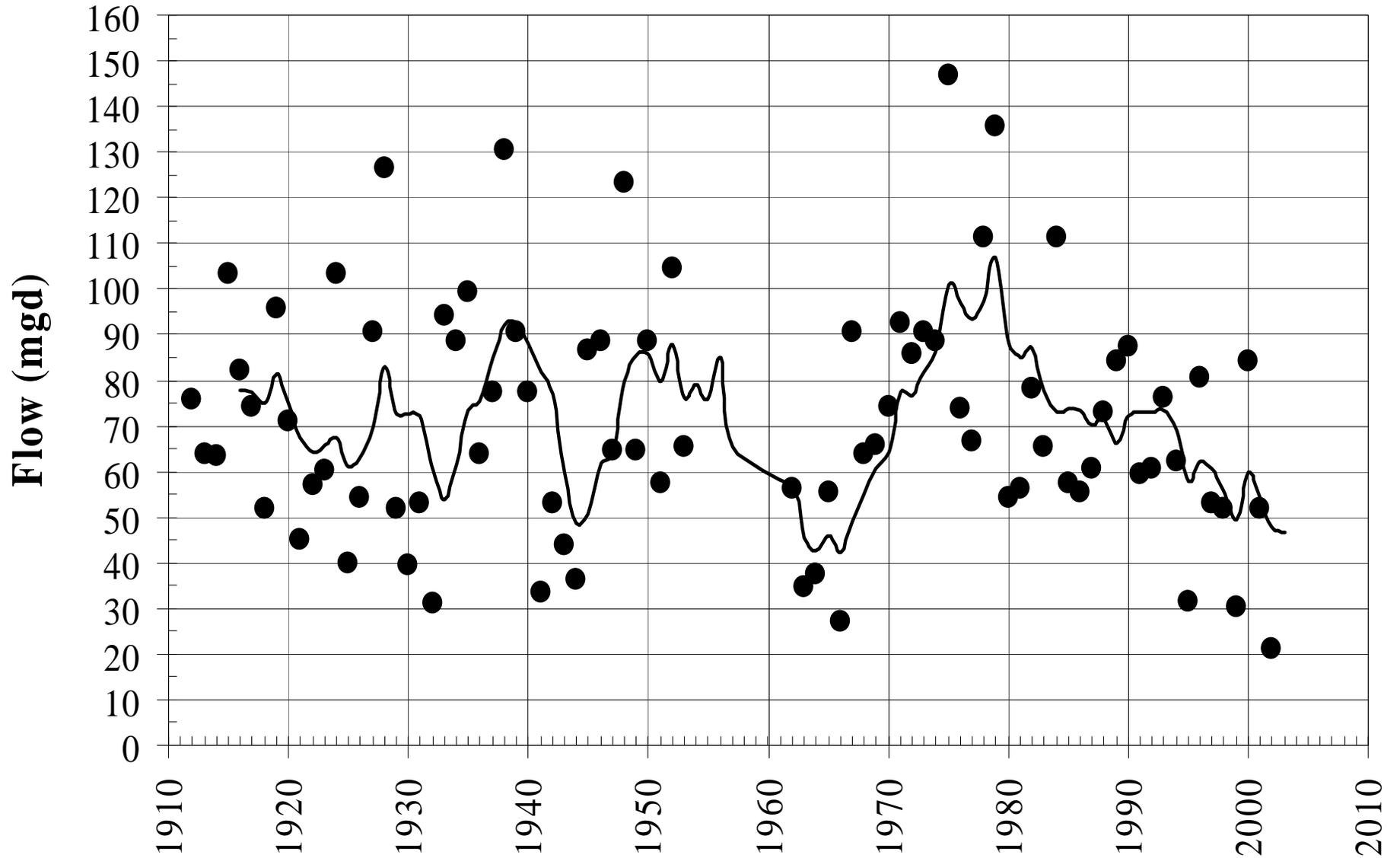


— Daily mean discharge  
— Period of approved data  
▲ Equipment malfunction

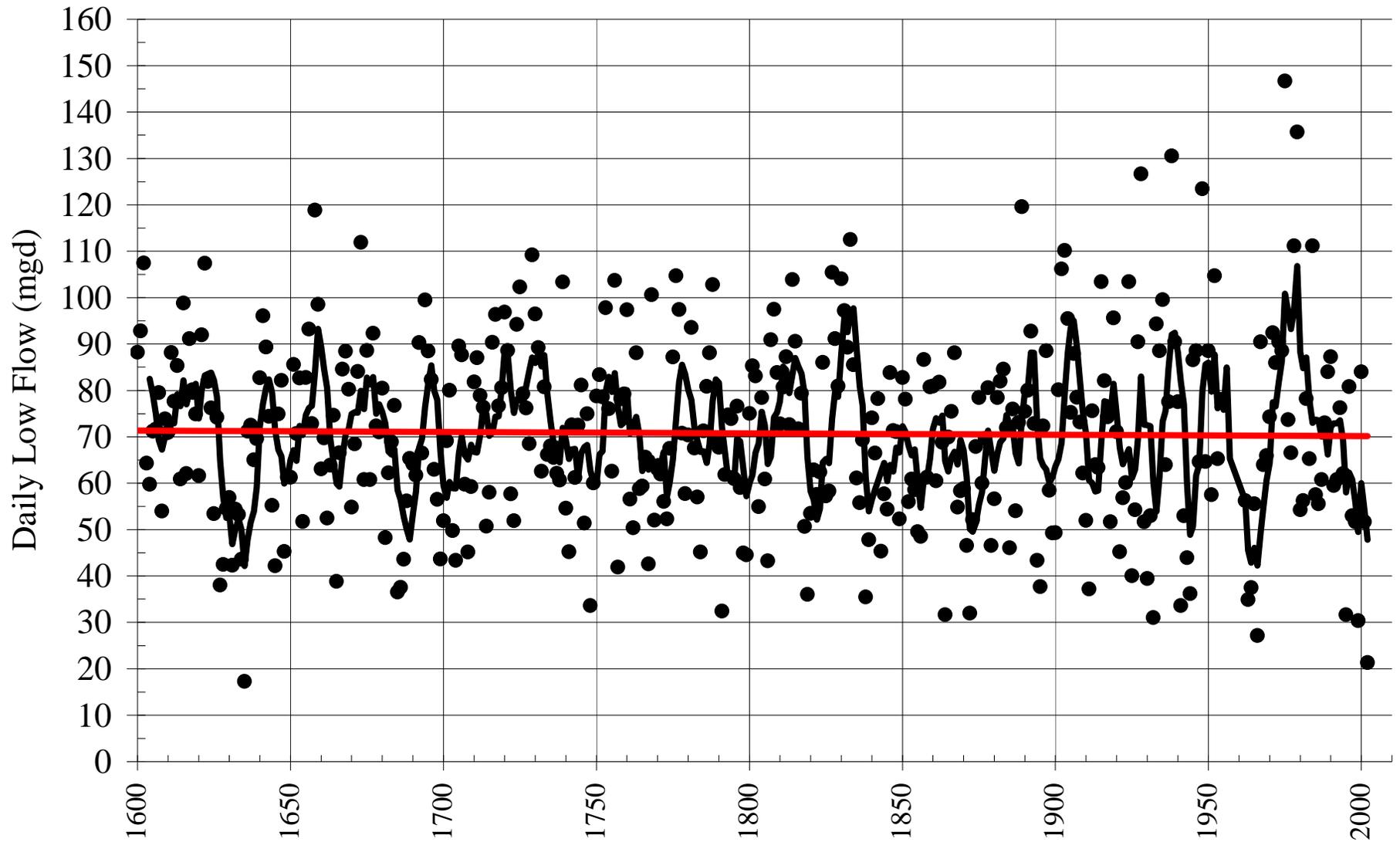
— Period of provisional data  
— discharge at flood stage  
— discharge at bank full stage

# Lowest Daily Mean Flow

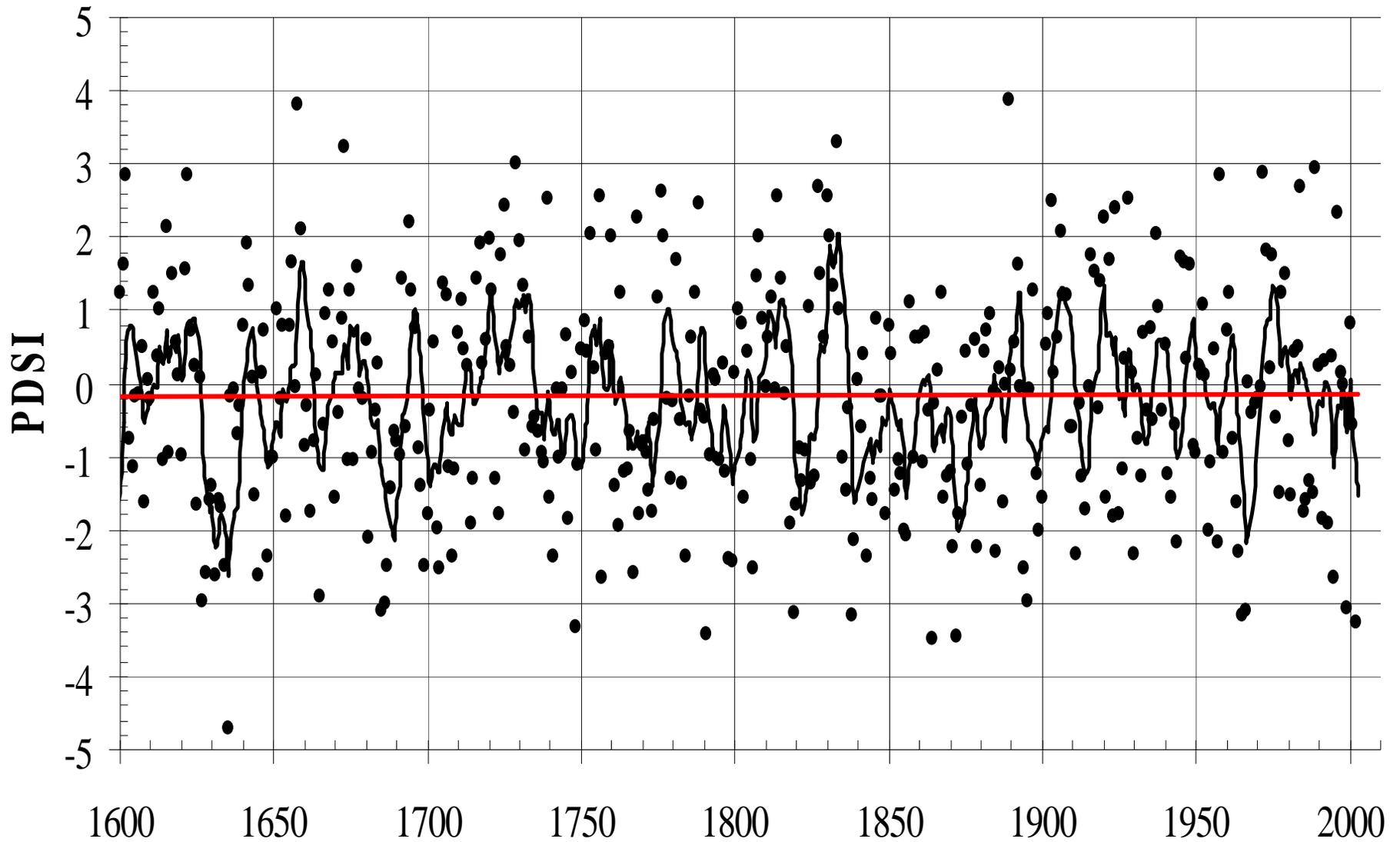
## Brandywine Creek at Chadds Ford, PA



# Recorded and Reconstructed Daily Mean Low Flows along Brandywine Creek at Chadds Ford, Pennsylvania, 1600 - 2002 A. D.



# Actual and Reconstructed PDSI in vicinity of Brandywine Creek, Delaware, 1600 - 2002 AD



# 1. Introduction

## 1.1. Purpose and Scope

## 1.2. Role of Delaware WSCC

# 2. Demographics/GIS Mapping (UDWRA)

## 2.1. Population

## 2.2. Housing Units

## 2.3. Land Use/Zoning

## 2.4. Comprehensive Plans

## 2.5. Water supply service areas CPCN map

## 2.6. Interconnected systems map

### 3. Hydrogeology and Groundwater Availability (DGS)

### 4. Water Quality (DNREC, DPH, UDWRA)

4.1. Existing water quality

4.2. Source water protection

## 5. Water Supply

### 5.1. Allocated water users (DNREC)

- Public community wells, over 50,000 gpd  
(Water utilities and Community systems)

- Public non-community systems  
(Nontransient/transient wells)

- Individual residential wells

- Irrigation wells

(farms, golf courses, nurseries, wastewater reuse)

- Self supplied industry wells

### 5.2. Domestic wells (DNREC)

### 5.3. Public non-community systems (not allocated) (DNREC and DPH)

## 6. Water Demands (DGS, DNREC, UDWRA, DDA, DSGA )

6.1. Existing public water demands

6.2. Existing domestic water demands

6.3. Existing irrigation water demands

6.4. Existing industry water demands

## 7. Future Water Demands through 2030 (UDWRA)

7.1. Future public water demands

7.2. Future individual residential demands

7.3. Future irrigation water demands

7.4. Future self supplied industry demands

7.5. Comparison of supply and demand

## 8. Conclusions/Recommendations

### 8.1. Conclusions

### 8.2. Recommendations

## 9. References

# Legislative Basis

- July 2009, Governor Markell signed Senate Bill 72 passed June 24, 2009 by the House of the 145th General Assembly.
- SB 72: “ ... reauthorizes the WSCC plans to develop water supply and demand plans for Kent County and Sussex County through 2030; and (5) extends the existence of the Water Supply Coordinating Council from January 1, 2010 to January 1, 2016”.
- Begin work during 2009, complete plan Dec 2010, June 2011?
- Transmitted as 11th or 12th Report to the Governor and General Assembly regarding the progress of the Delaware Water Supply Coordinating Council.

# Purpose

- Assess water resources in Kent & Sussex counties.
- Evaluate groundwater availability, historic/ current water use, water allocations, and projections of future water requirements through 2030.
- Address anticipated increases in water demands.
- Support programs/policies in management, development, conservation, and protection of the State's water resources.

# Challenges

- Population in Kent and Sussex counties projected to increase by 62,000 and 96,000 by 2030, respectively.
- Water demand increases with rising population as does wastewater treated/discharged to surface or groundwater.
- Land use change threatens availability of clean water due to human contamination (nutrients, chlorides, pharmaceuticals) and natural chemicals (arsenic, radium, iron, chlorides).
- Irrigated cropland increased from 58,700 acres in 1987 to 94,000 acres in 2002 with future increases in agric. water use possible. Cropland in Kent and Sussex counties decreased from 423,000 acres in **1987** to 398,000 acres in **2002**.

# Local Governments

Bethany Beach

Bridgeville

Camden

Cheswold

Clayton

Dagsboro

Delmar

Dewey Beach

Dover

Fenwick Island

Georgetown

Greenwood

Harrington

Laurel

Lewes

Milford

Millsboro

Millville

Milton

Ocean View

Rehoboth Beach

Seaford

Selbyville

Smyrna

South Bethany

Wyoming

Viola

# Water Supply Service Areas

## Kent County

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

## Sussex County

Artesian Water Company  
Bethany Beach  
Blades  
Bridgeville  
Dagsboro  
Delmar  
Frankford  
Georgetown  
Greenwood  
J.H. Wilkerson & Son  
Laurel  
Lewes Board of Public Works  
Long Neck Water Company  
Milford  
Millsboro  
Milton  
Rehoboth  
Seaford  
Selbyville

Sussex County Council  
Sussex Shores Water Co.  
Tidewater Utilities

## Task 2. Demographics/GIS Mapping (UDWRA)

2.1. Population

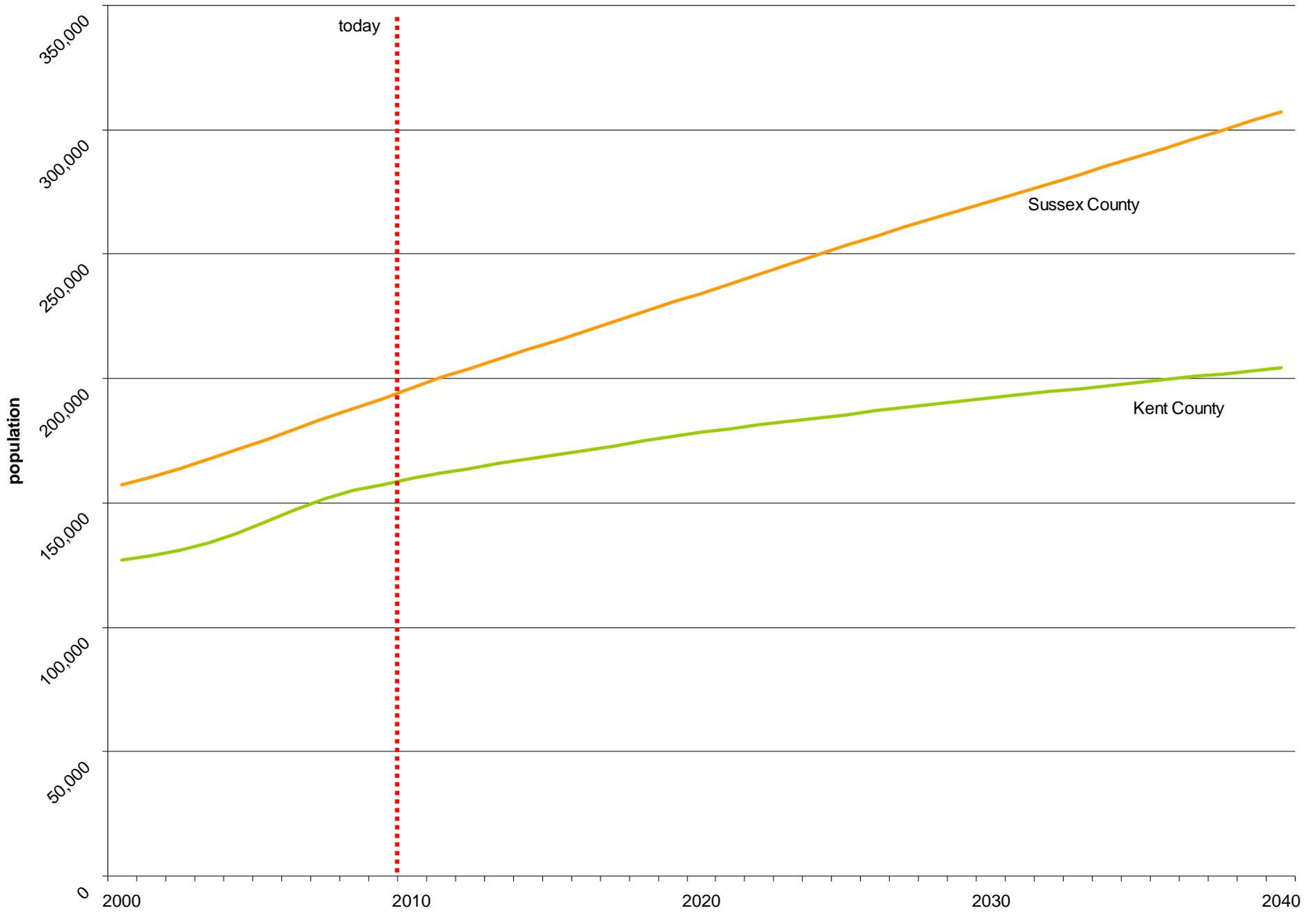
2.2. Housing Units

2.3. Land Use/Zoning

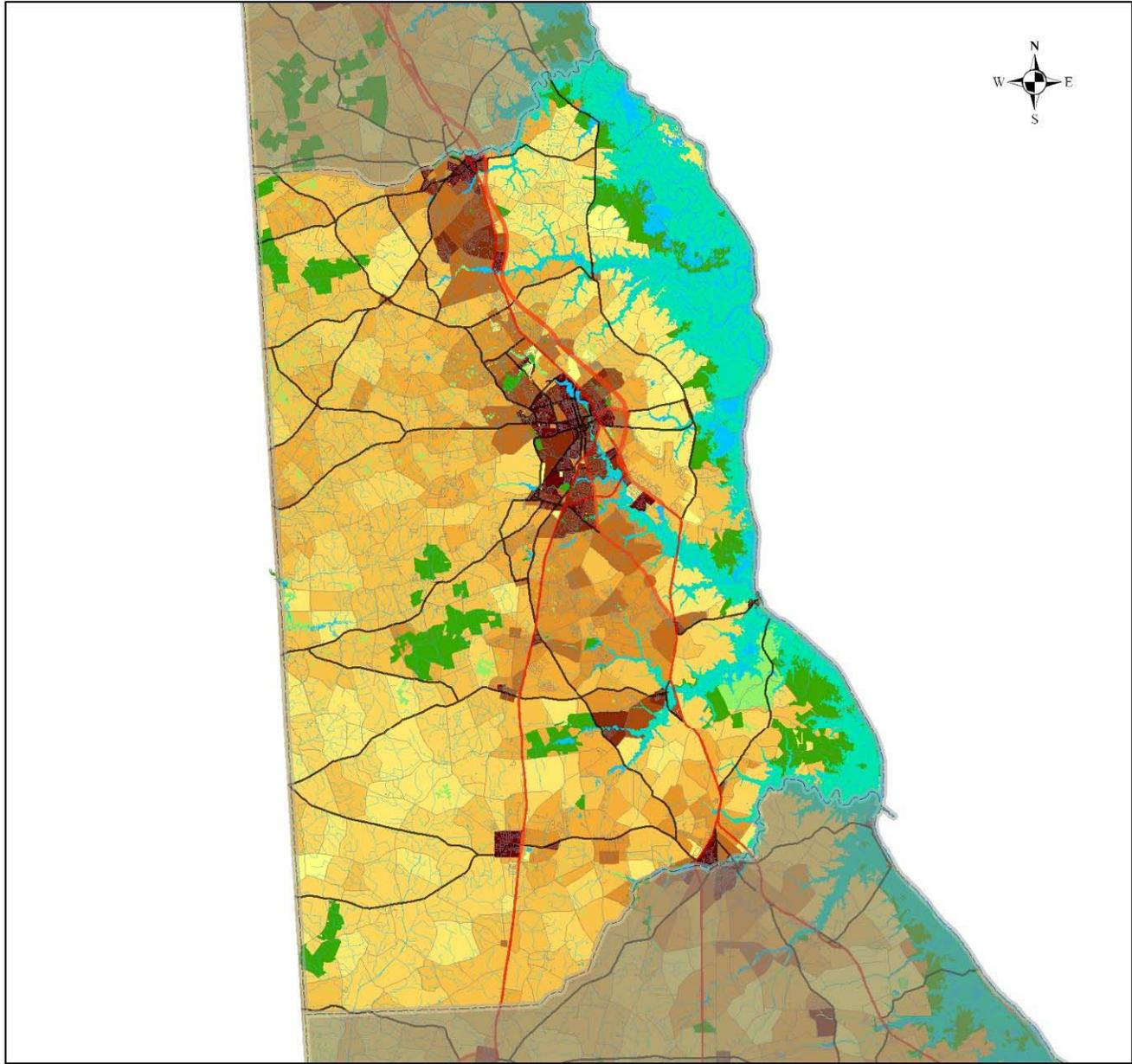
2.4. Comprehensive Plans

2.5. Water supply service areas CPCN map

2.6. Interconnected systems map



Based on Delaware Population Consortium projections, 2009



# Kent County Population Density 2030

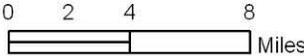
This map depicts population densities (people per square mile) by Modified Grid census unit.

Data are from the Delaware Population Consortium and the U.S. Census Bureau.

### Pop. per Sq. Mi.

- 0 - 10.00
- 10.01 - 50.00
- 50.01 - 100.0
- 100.1 - 250.0
- 250.1 - 500.0
- 500.1 - 1000
- 1001 - 1500
- 1501 - 2000
- 2001 - 3000
- 3001 - 20000

- Tidal Wetlands
- Non-tidal Wetlands
- Open Water
- Public Land

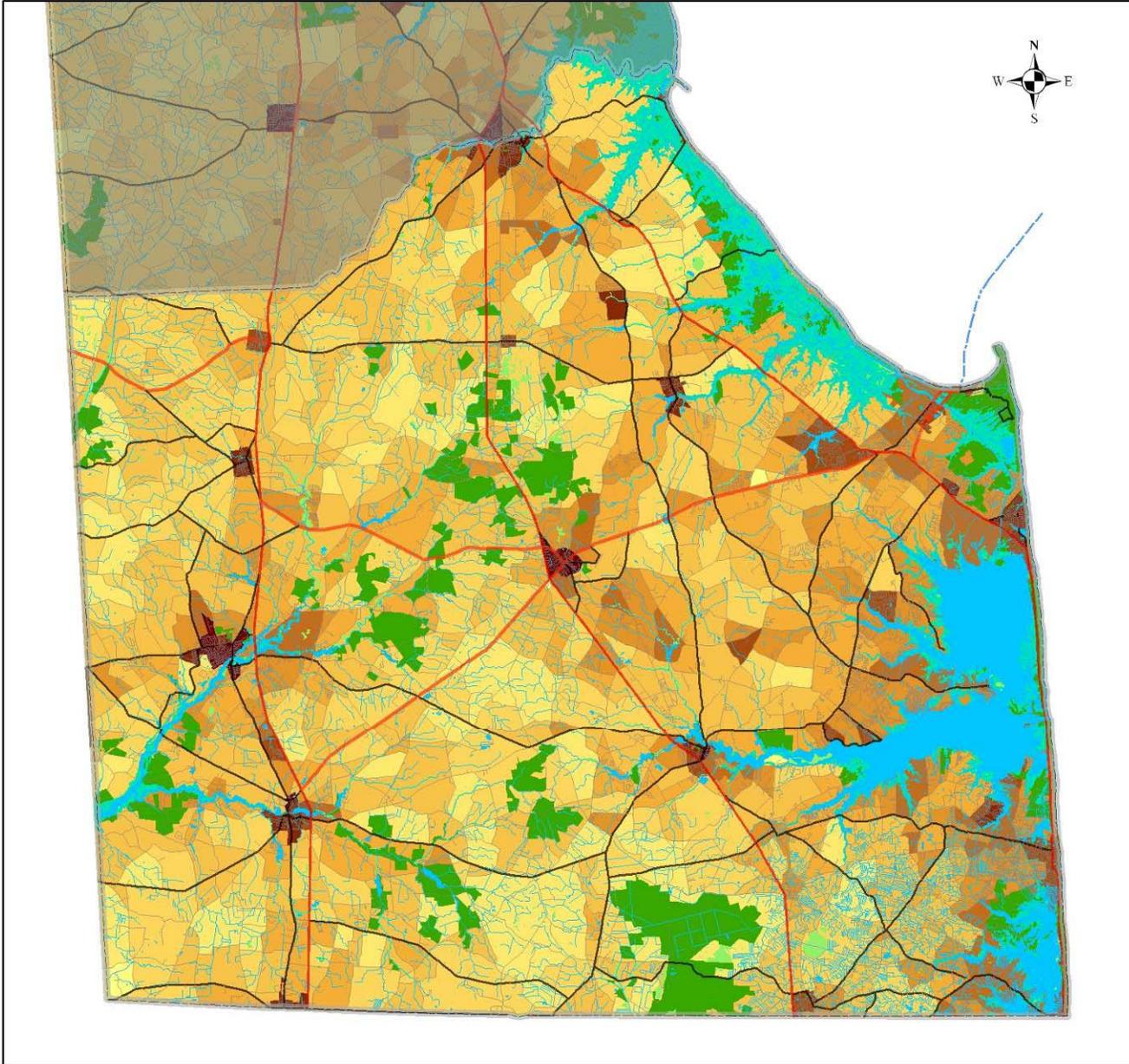
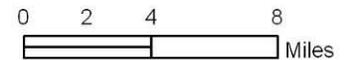


# Sussex County Population Density 2030

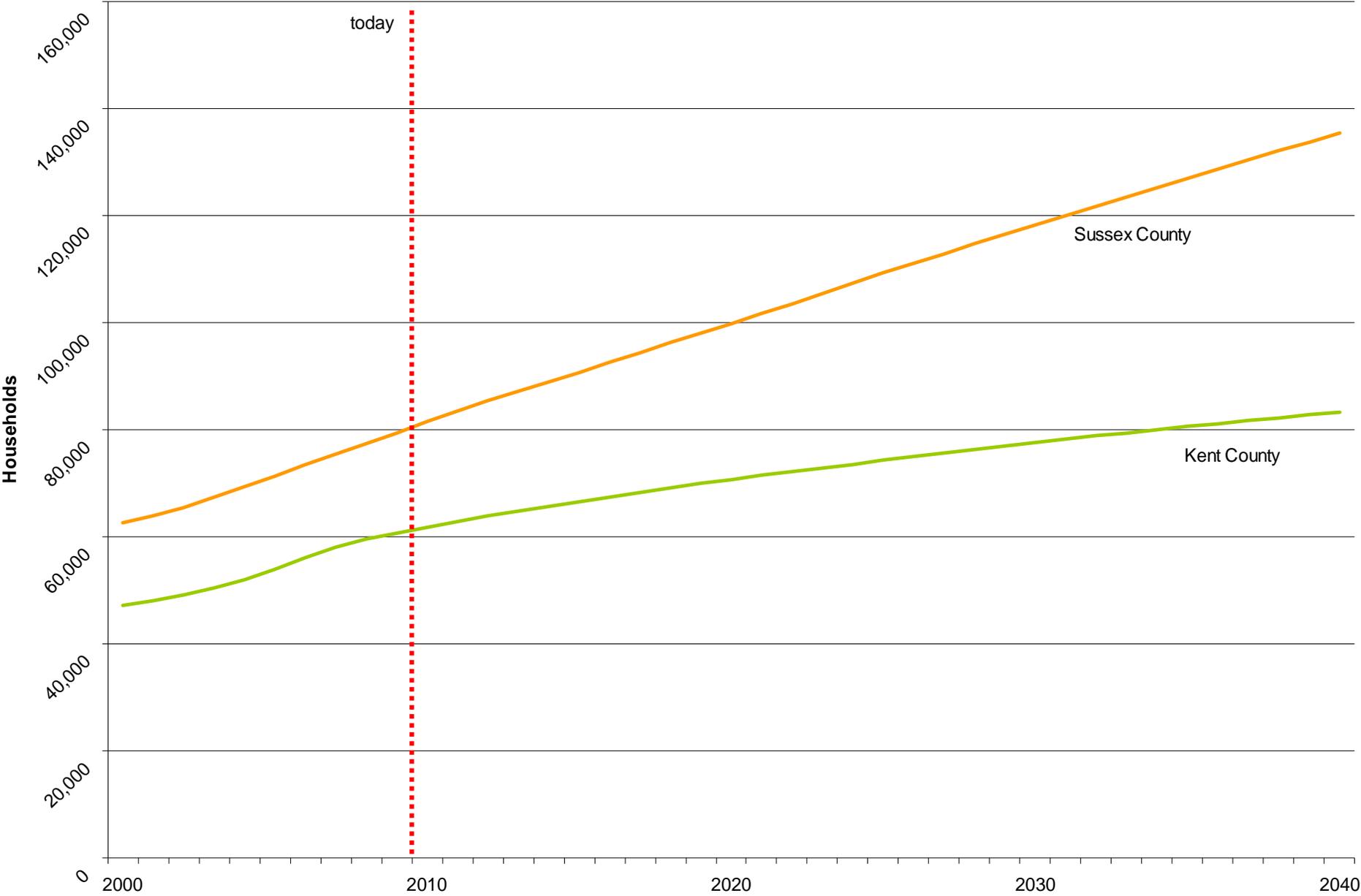
This map depicts population densities (people per square mile) by Modified Grid census unit.

Data are from the Delaware Population Consortium and the U.S. Census Bureau.

### Pop. per Sq. Mi.

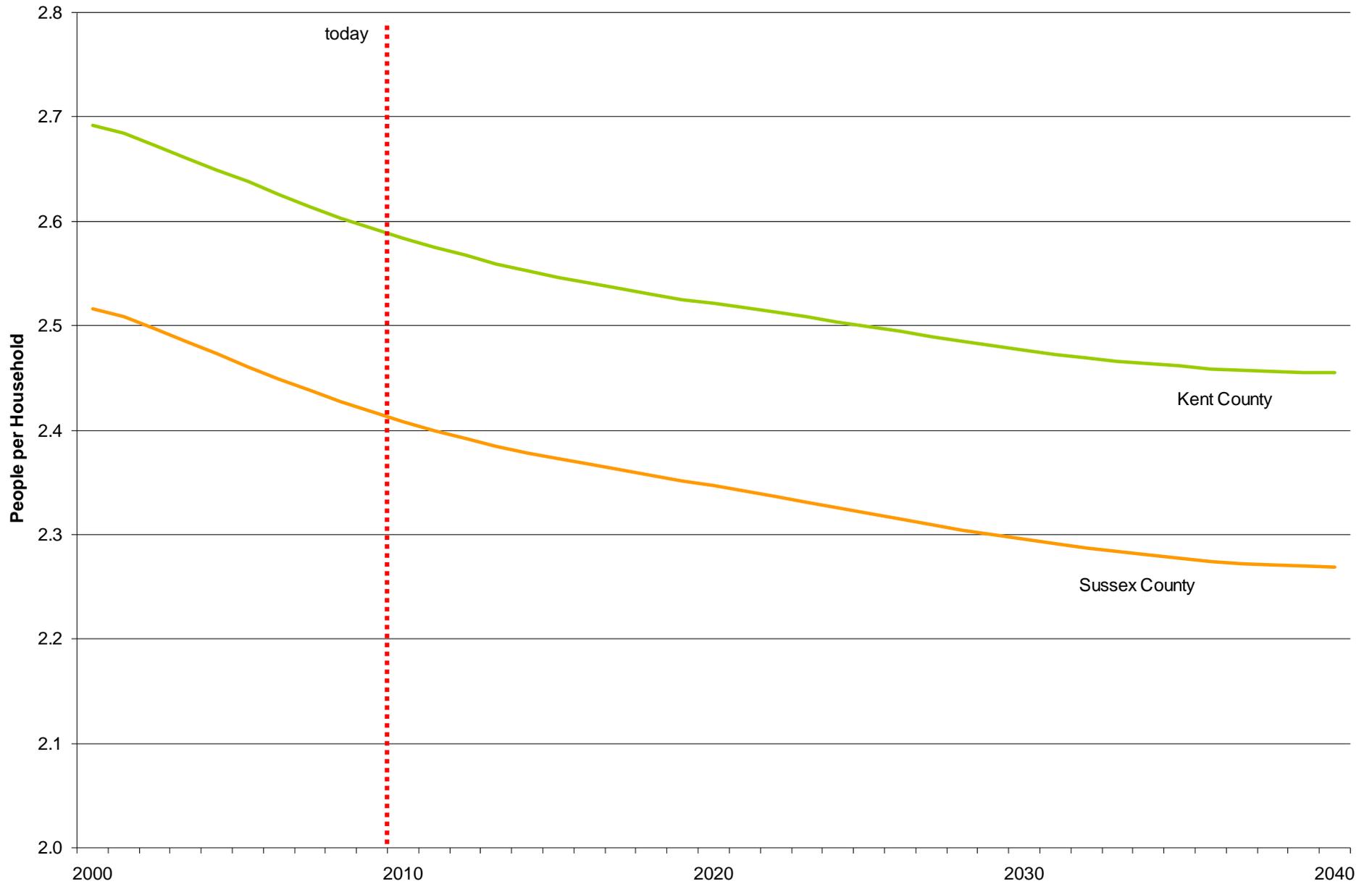


# Number of Households by County

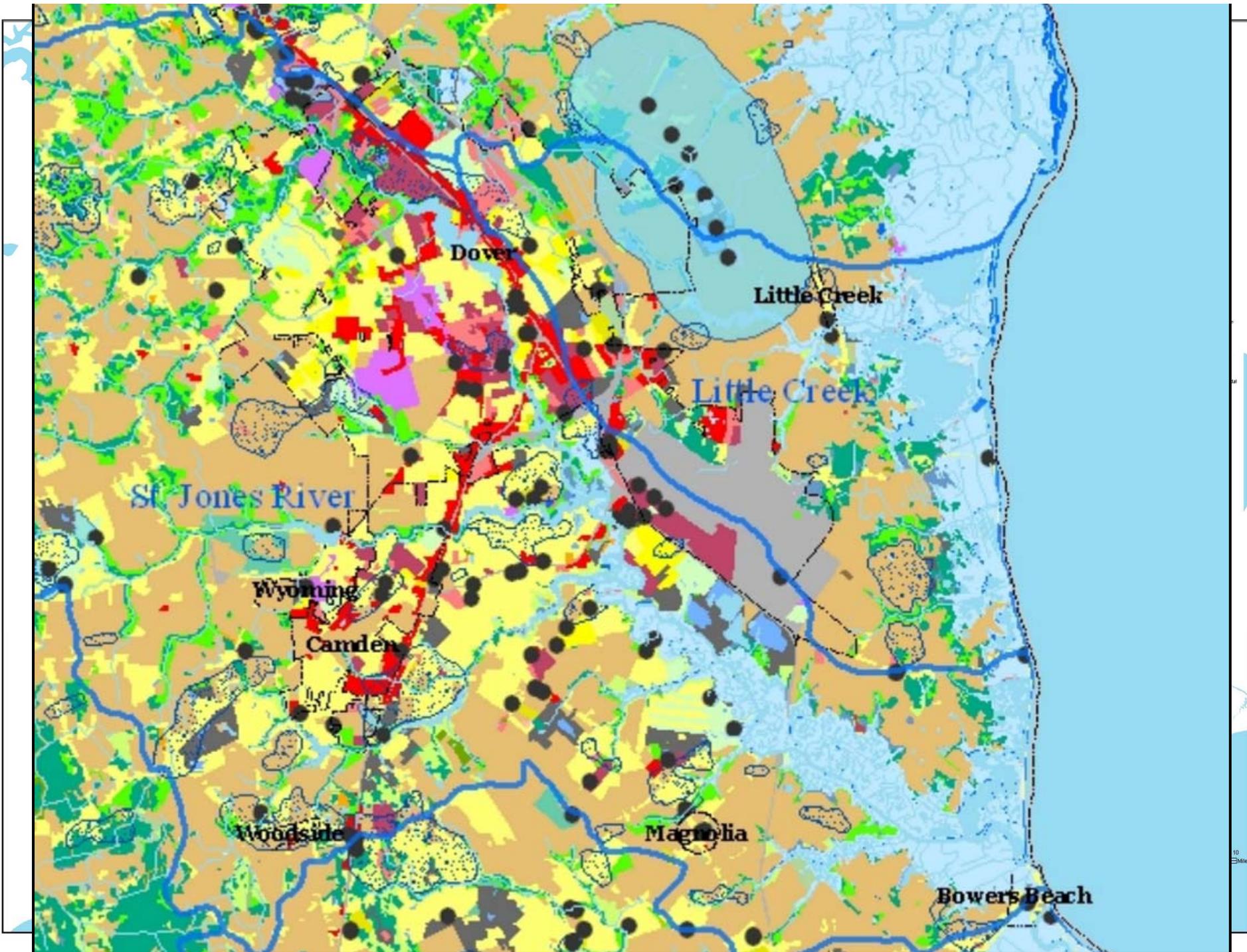


Based on Delaware Population Consortium projections, 2009

# Average Household Size, by County

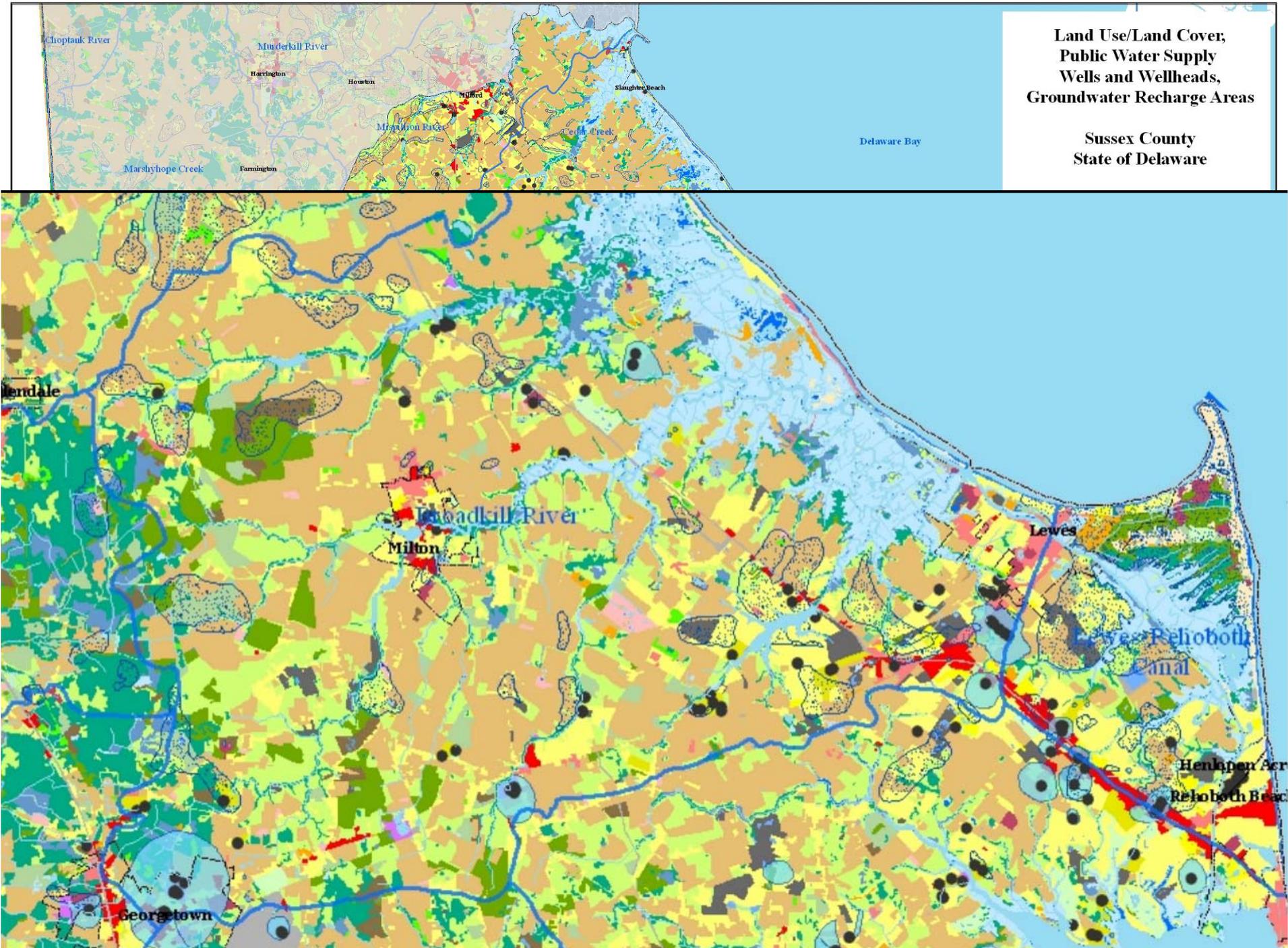


Based on Delaware Population Consortium projections, 2009



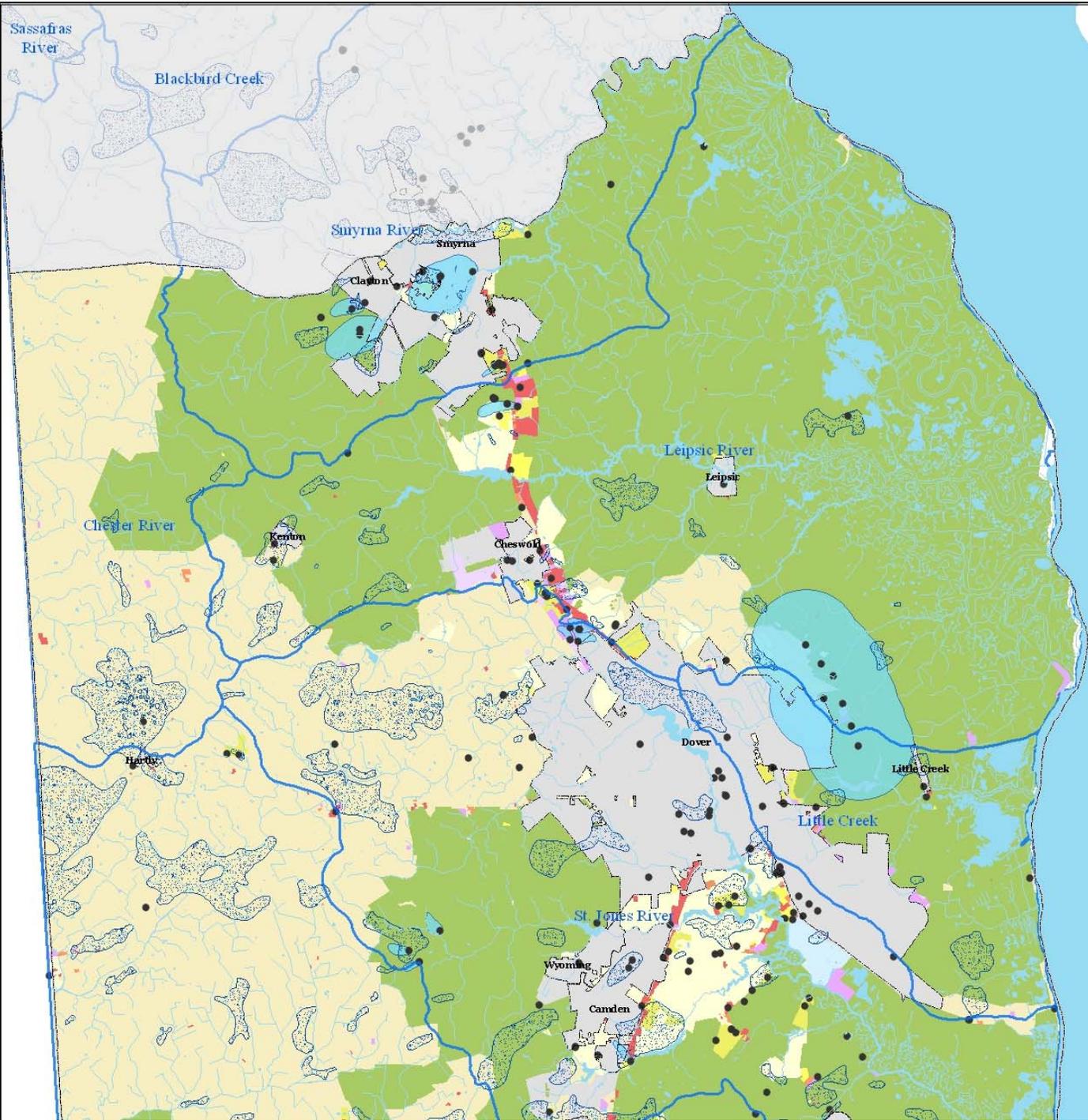
**Land Use/Land Cover,  
Public Water Supply  
Wells and Wellheads,  
Groundwater Recharge Areas**

**Sussex County  
State of Delaware**



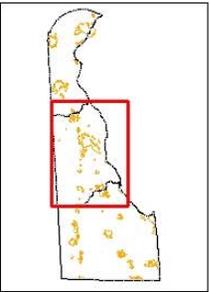
# County Zoning, Public Water Supply Wells and Wellheads, and Groundwater Recharge Areas

## Kent County State of Delaware



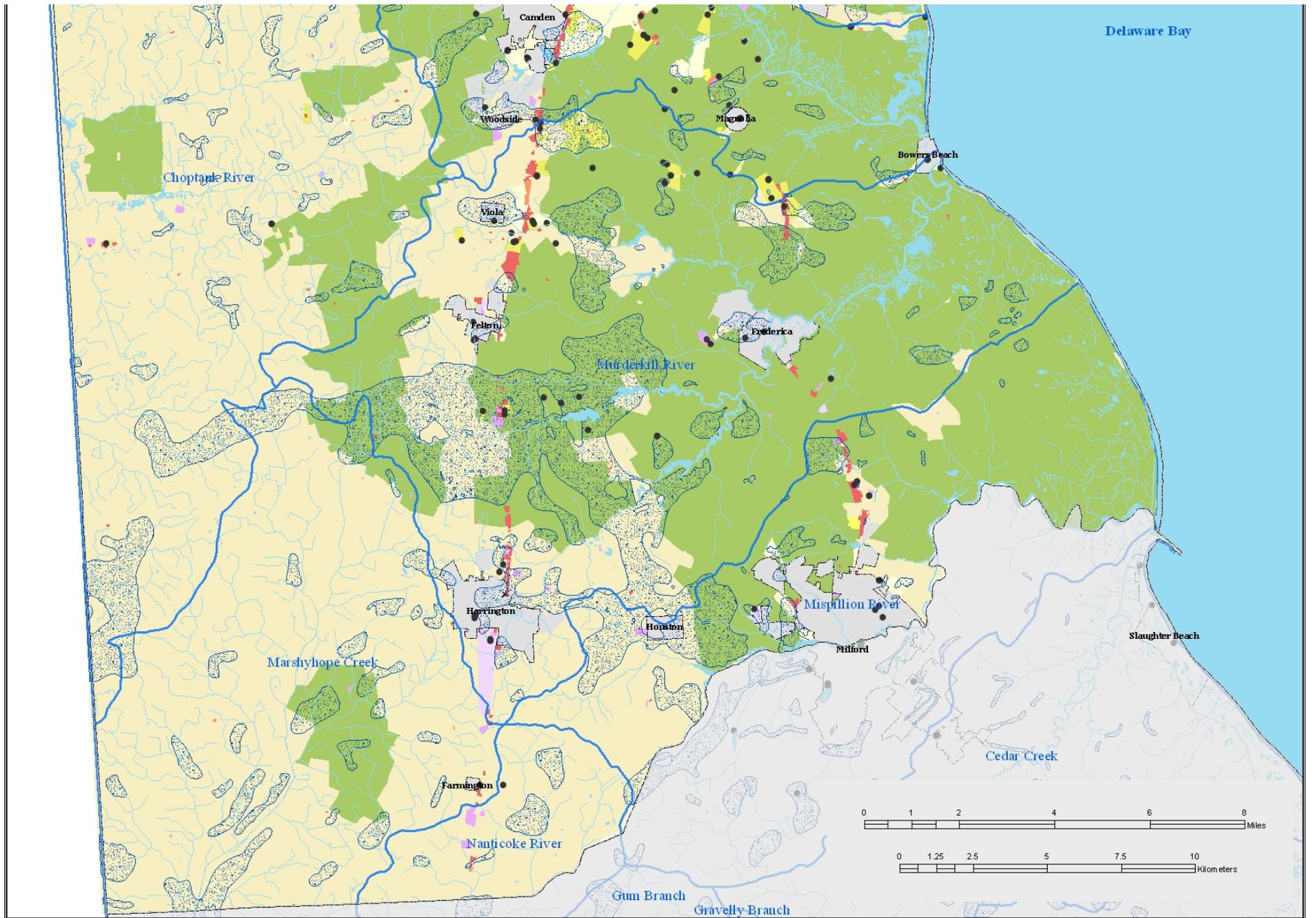
- |  |                           |  |                               |
|--|---------------------------|--|-------------------------------|
|  | Excellent Recharge Areas  |  | Dover Air Force Base          |
|  | Wellhead Protection Areas |  | General Business              |
|  | Public Supply Wells       |  | General Industrial            |
|  | Watersheds                |  | Limited Industrial            |
|  | Water                     |  | Medium Density Single Family  |
|  | County Boundary           |  | Multi Family Residential      |
|  | Towns                     |  | Neighborhood Business         |
|  | N/A                       |  | Office Complex                |
|  | Agricultural Conservation |  | Residential Manufactured Home |
|  | Agricultural Residential  |  | Single Family Residential     |

### Kent County Zoning

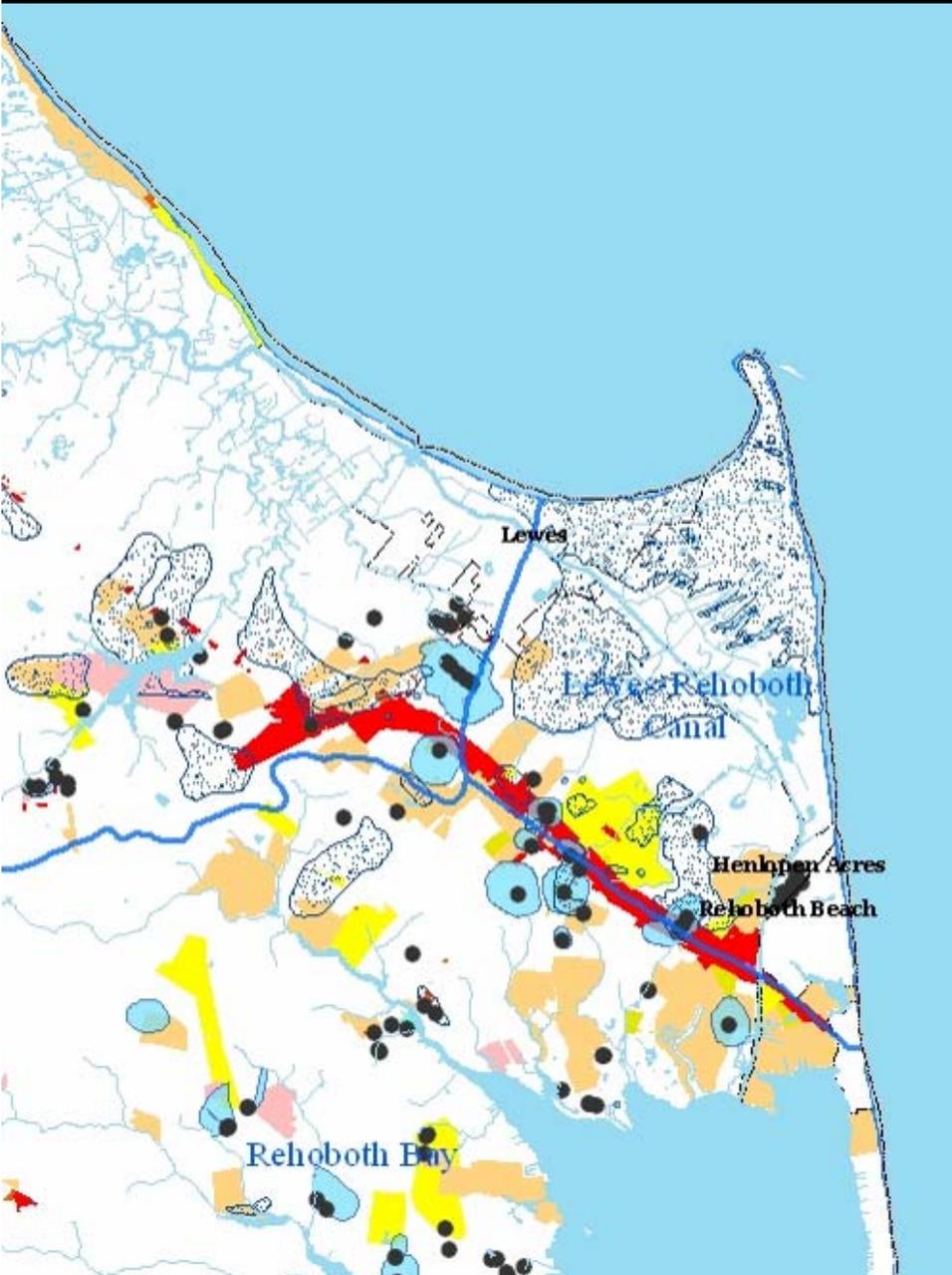


Kent County's Zoning data are confidential and only to be used for reference.  
 Map prepared by the Water Resources Agency, Institute for Public Administration,  
 University of Delaware, September, 2009.

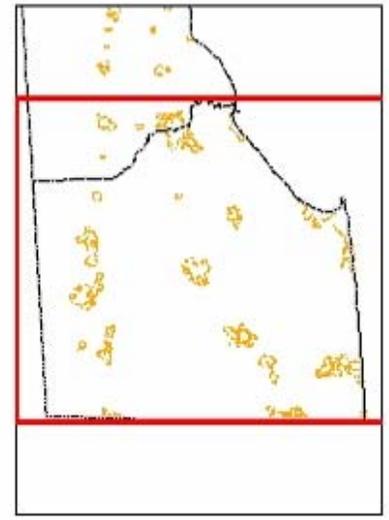
Delaware Bay



**County Zoning,  
Public Water Supply  
Wells and Wellheads, and**



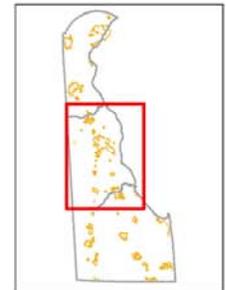
- |                      |                           |  |                               |
|----------------------|---------------------------|--|-------------------------------|
|                      | Excellent Recharge Areas  |  | General Residential           |
|                      | Wellhead Protection Areas |  | Heavy Industrial              |
|                      | Public Supply Wells       |  | High-Density Residential      |
|                      | Watersheds                |  | Light Industrial              |
|                      | Water                     |  | Limited Industrial            |
|                      | County Boundary           |  | Marine                        |
|                      | Towns                     |  | Medium Residential            |
| <b>Sussex Zoning</b> |                           |  | Neighborhood Business         |
|                      | Agricultural Residential  |  | Vacation, Retire, Residential |
|                      | General Commercial        |  |                               |



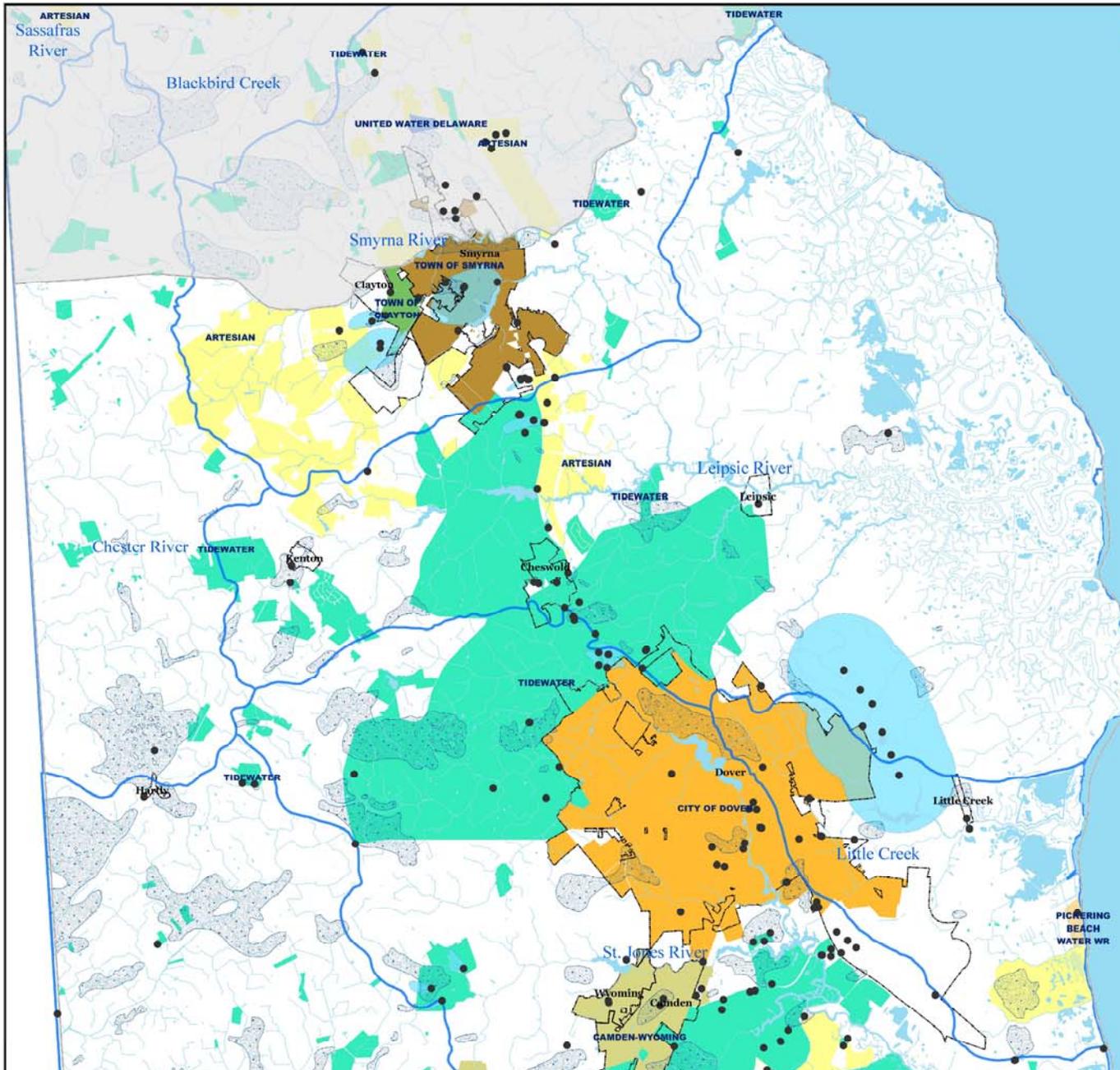
# Public Water Supply Wells and Wellheads, Water Service Areas, and Groundwater Recharge Areas

## Kent County State of Delaware

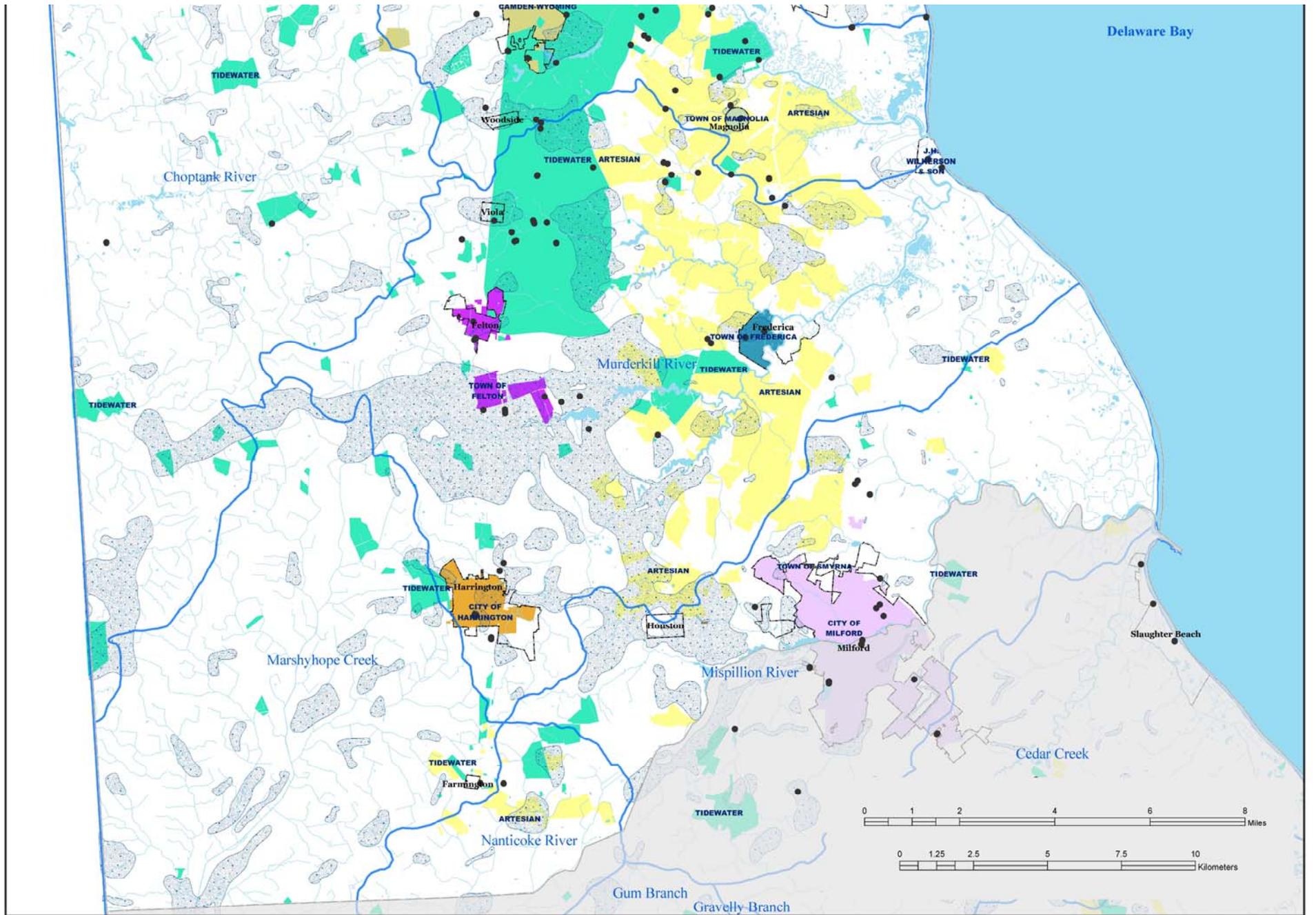
-  Excellent Recharge Areas
-  Wellhead Protection Areas
-  Public Supply Wells
-  Watersheds
-  Water
-  County Boundary
-  Towns

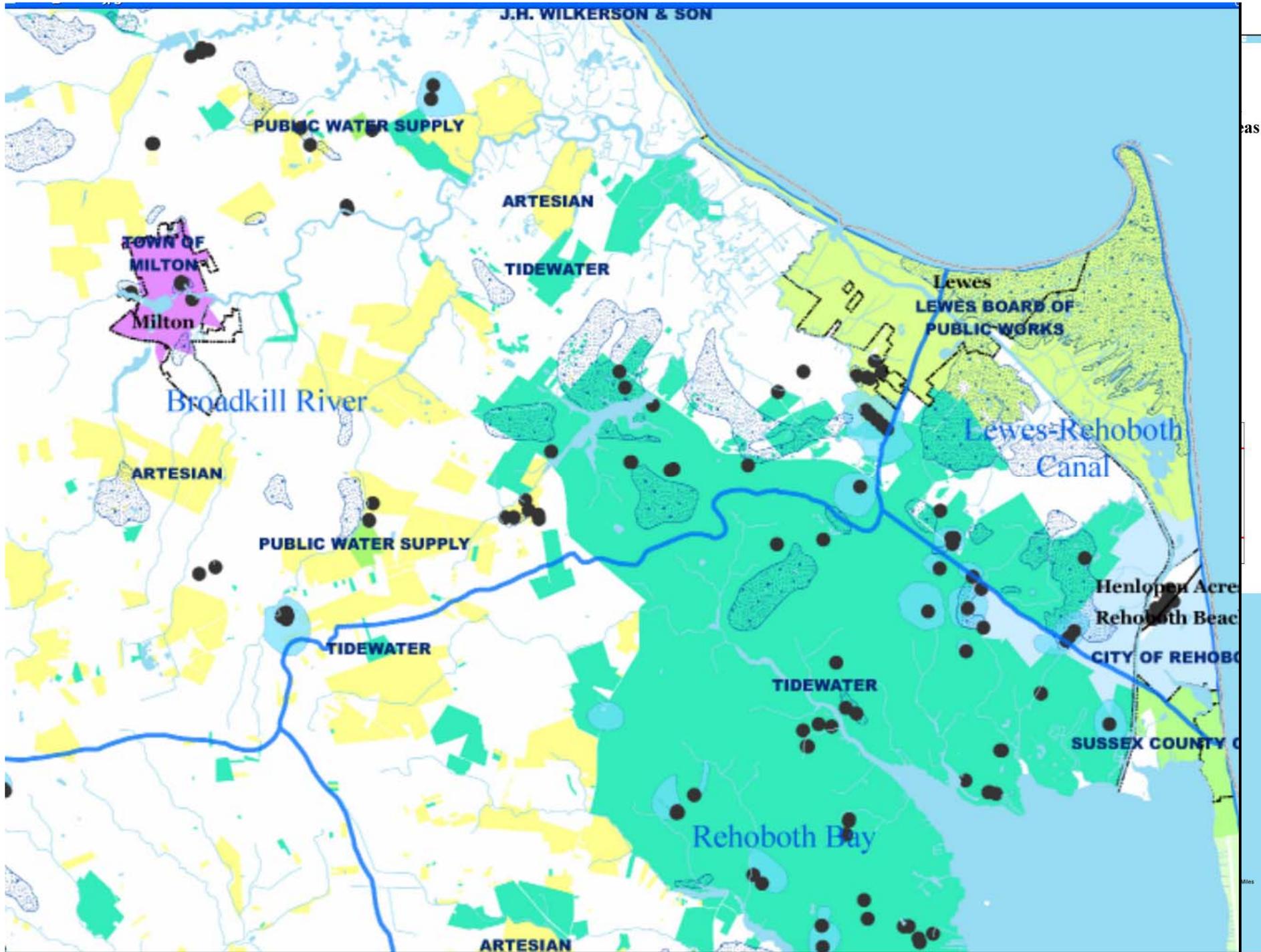


Map prepared by the Water Resources Agency, Institute for Public Administration, University of Delaware, September, 2008.



Delaware Bay





PRESERVE

CHARACTER

LAND

WATER

RESOURCES

HISTORY

CULTURE

OPPORTUNITY

FARM LAND

GROWTH

SAFETY

ENVIRONMENT

LIVE

WORK

SHOP

LEARN

PLAY

2007

ADOPTED

OCTOBER 7, 2008

# COMPREHENSIVE PLAN



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# Kent County Comprehensive Plan, 2008

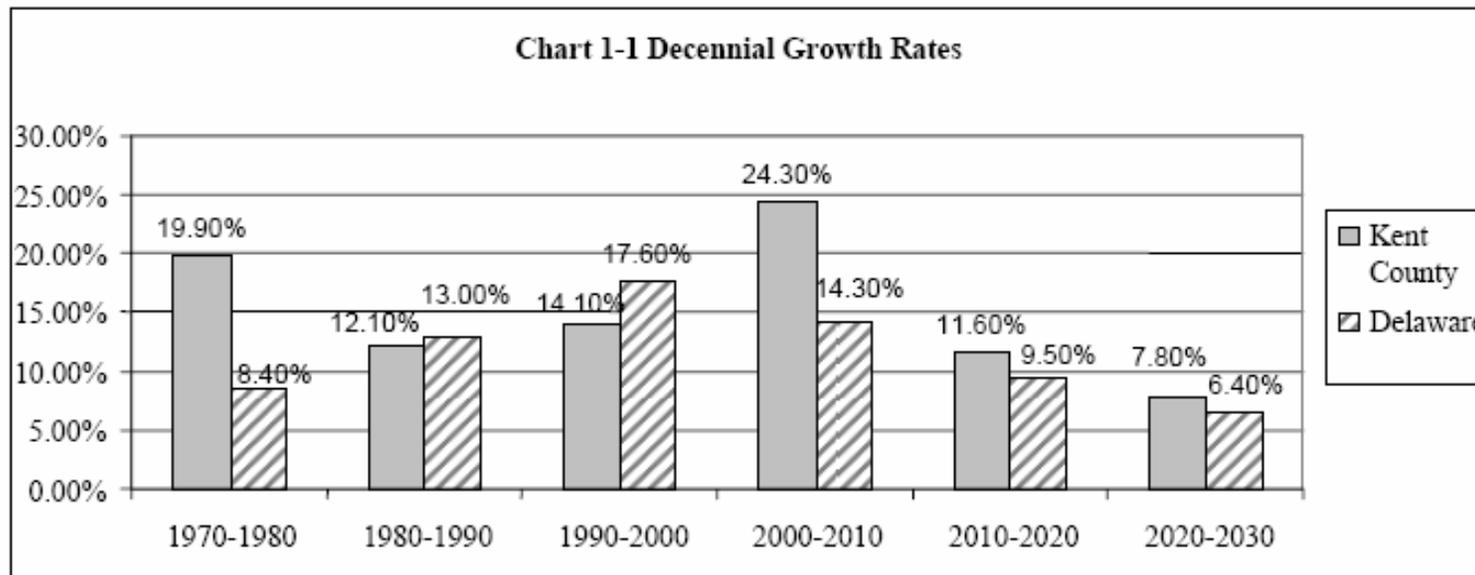
Population

16 mgd

19 mgd

| Table 1-1 Population Projections |         |         |         |         |         |         |         |
|----------------------------------|---------|---------|---------|---------|---------|---------|---------|
|                                  | 2000    | 2005    | 2010    | 2015    | 2020    | 2025    | 2030    |
| Population                       | 127,103 | 143,458 | 157,404 | 166,994 | 175,717 | 182,919 | 189,431 |
| Percent Change                   |         | 12.8    | 9.7     | 6.1     | 5.2     | 4.1     | 3.6     |

2007 Delaware Population Consortium Projections



# Kent County Comprehensive Plan, 2008

## Water

- Approximately 121,779 people in the County are served by public water systems. (77% of 157,000)

## Wastewater

- The sewer plant currently treats an average of 12.5 million gallons/day; serves 77,000 people

# Camden Comprehensive Plan, 2007

| <b>Year</b>                        | <b>2005</b> | <b>2010</b> | <b>2015</b> |
|------------------------------------|-------------|-------------|-------------|
| Projected Population               | 2206        | 2317        | 2422        |
| Increase in Population             | 106         | 112         | 104         |
| % Increase in Population from 2000 | 5%          | 10%         | 15%         |

Water Supply - Camden-Wyoming Sewer and Water Authority

Wastewater - 2006 flow rate: 706,000 gallons per day

| <b>Year</b>                                    | <b>2007</b> | <b>2012</b> | <b>2017</b> |
|--|-------------|-------------|-------------|
| Projected wastewater flow rate gallons per day | 737,000     | 893,000     | 1,490,000   |

# Cheswold Comprehensive Plan, 2003

## Population

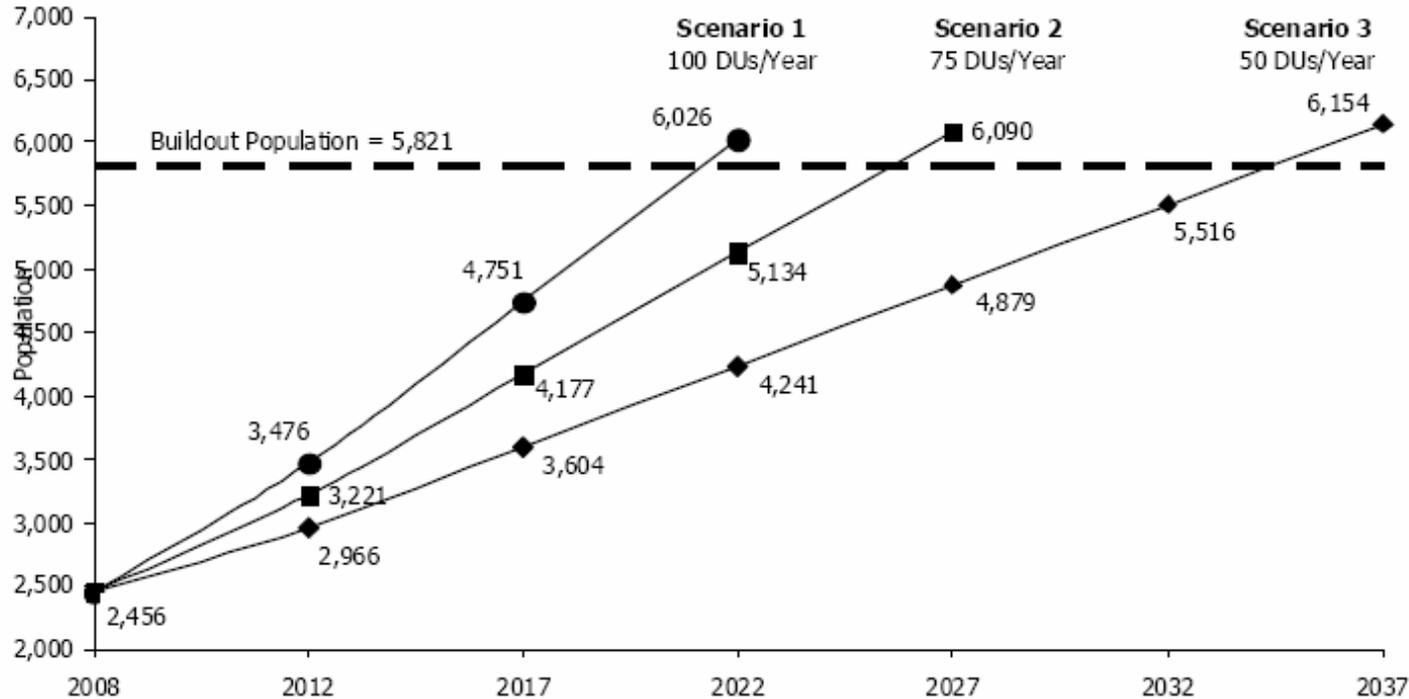
- Population in 2000: 313
- Projected population in 2010: 1,755

## Water

- Mostly provided by individual wells
- Tidewater constructed (done?) 5,000-gallon storage tank to supply new development

# Clayton Comprehensive Plan, 2009

Figure 4. Buildout Scenarios



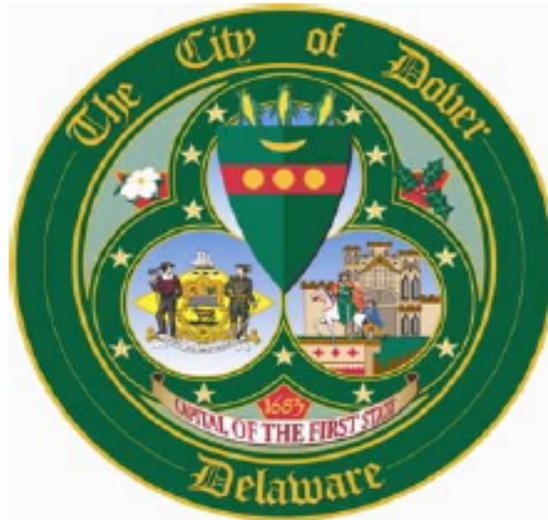
Compiled by IPA, March 2008

Water - 3 wells for residential and business customers

Wastewater- Part of Kent County Regional Wastewater System

# The Dover Plan

*From the People – For the People*



## City of Dover, Delaware 2008 Comprehensive Plan

Prepared by the City of Dover Department of Planning

Adopted by the Dover City Council  
February 9, 2009

Adopted by the Dover Planning Commission  
December 2, 2008

Certified by the State of Delaware  
April 24, 2009

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# Dover Comprehensive Plan, 2008

## Population

**Table 3-2: Population Projections 2010 - 2025**

| Census Place | 2008    | 2010    |          |      | 2015    |          |      | 2020    |          |       | 2025      |          |      |
|--------------|---------|---------|----------|------|---------|----------|------|---------|----------|-------|-----------|----------|------|
|              |         | People  | Increase |      | People  | Increase |      | People  | Increase |       | People    | Increase |      |
| Dover        | 36,359  | 37,479  | 1,120    | 2.9% | 38,053  | 574      | 1.5% | 38,635  | 582      | 1.5 % | 39,226    | 591      | 1.5% |
| Kent County  | 155,299 | 159,980 | 4,681    | 2.9% | 169,356 | 9,376    | 5.5% | 177,817 | 8,461    | 4.7%  | 184,748   | 6,931    | 3.7% |
| Delaware     | 875,953 | 896,880 | 20,927   | 2.3% | 943,924 | 47,044   | 4.9% | 986,296 | 42,372   | 4.3%  | 1,023,707 | 37,411   | 3.6% |

*Source: Delaware Population Consortium, 2008 Report*

## Water Supply

- 15 deep wells, 7 shallow wells
- Draw average 5.5 mgd

# Dover Comprehensive Plan, 2008

**Table 7-1: Water System Improvements**

| <b>Proposed Improvement</b>                            | <b>Proposed Year</b> |
|--|----------------------|
| <b>Production &amp; Storage Facility Improvements</b>  |                      |
| Cheswold Well #8 Replacement                           | 2008                 |
| Wellhead Redevelopment Program                         | 2008/2009            |
| Wellhead VFD Upgrades                                  | 2008/2009            |
| 1.0 MG Elevated Water Storage Tank                     | 2008/2010            |
| Piney Point Well                                       | 2008/2010            |
| Water Quality Improvements                             | 2008/2013            |
| Future Well Installation                               | 2013                 |
| Water Treatment Plant Improvements                     | 2013                 |
| <b>Transmission &amp; Distribution System Upgrades</b> |                      |
| Scarborough Road Interconnection                       | 2008/2009            |
| Water Quality Improvements                             | 2008/2013            |

*Source: City of Dover Utilities Department*

# Wyoming Comprehensive Plan, 2004

## Water Supply

- Camden-Wyoming Sewer and Water Authority
- Serves 2,900 residents
- 2 wells, combined maximum output 1,000 gpm
- 2 tanks, combined capacity of 380,000 gal

## Wastewater

- Flows from CWSWA to Kent Co. Regional Sewer System
- Current flow 300,000 gpd
- Using 75% of current allocation



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# Sussex County Comp. Plan

Estimated Projected Water Demand for Sussex County  
from Public Water Supplies to be as Follows:

| AREA                      | Current GPD | 2025 GPD   |
|---------------------------|-------------|------------|
| Ellendale SSD             | 89,550      | 215,600    |
| Ellendale Planning Area   | 37,500      | 90,000     |
| Town of Greenwood         | 94,000      | 225,700    |
| Greenwood Planning Area   | 120,000     | 289,000    |
| City of Seaford           | 900,000     | 2,162,600  |
| Seaford Planning Area     | 490,000     | 1,180,000  |
| Blades SSD                | 133,900     | 322,000    |
| Blades Planning Area      | 502,000     | 855,350    |
| Town of Bethel            | 22,500      | 38,300     |
| Delmar                    | TBA         | TBA        |
| Laurel                    | TBA         | TBA        |
| Bridgeville               | 148,000     | 355,800    |
| Bridgeville Planning Area | 161,000     | 388,250    |
| West Rehoboth             | 4,551,300   | 10,953,000 |
| Goslee Creek              | 397,200     | 955,900    |
| Angola                    | 1,018,500   | 2,451,150  |
| Herring Creek             | 267,900     | 644,700    |
| Long Neck                 | 1,831,200   | 4,407,000  |
| Oak Orchard               | 649,800     | 1,563,800  |
| Dagsboro                  | 585,600     | 1,409,300  |
| Frankford                 | 186,600     | 449,000    |
| North Bethany             | 332,400     | 799,900    |
| South Bethany             | 1,629,000   | 3,920,000  |
| Fenwick Island            | 1,533,900   | 3,691,500  |
| Ocean View                | 293,100     | 705,400    |
| Holts Landing             | 230,700     | 555,200    |
| Cedar Neck                | 507,600     | 1,221,600  |
| South Ocean View          | 90,000      | 216,600    |
| Miller Creek              | 150,600     | 362,400    |
| Millville                 | 536,400     | 1,290,900  |
| Bayard                    | 51,900      | 124,900    |
| West Fenwick              | 165,300     | 397,800    |

Source: Sussex County Engineering Department

Water Demand

Current = 17.7 mgd

2025 = 42.2 mgd

# Sussex County

Table 12  
Number of Wells by Type in the  
Inland Bays / Atlantic Ocean Basin

| WELL TYPE   | TOTAL  |
|---|--------|
| Soil Borings Standard   | 235    |
| Geothermal  | 319    |
| Fire Protection Standard  | 26     |
| Aquifer Storage & Recovery Std                                  | 1      |
| Industrial Standard   | 237    |
| Agricultural Within CPCN  | 1,263  |
| Irrigation Standard   | 2,273  |
| Well Construction Standard                                      | 8      |
| Public Standard   | 1,629  |
| Other Standard  | 578    |
| Geothermal Closed Loop  | 665    |
| Remediation Recovery  | 7      |
| Monitor Zone of Interest  | 38     |
| Public Miscellaneous  | 819    |
| Agricultural Standard   | 3,910  |
| Dewater Standard  | 938    |
| Observation Standard  | 4,246  |
| Geothermal Recharge   | 605    |
| Monitor Direct Push   | 296    |
| Monitor Standard  | 1,997  |
| Domestic Standard   | 37,100 |
| Remediation I Injection   | 39     |
| * There are approximately 626 allocated wells in Sussex County. |        |

Source: Sussex County Engineering Department

# Bethany Beach (2005)

- 2030 projected population (not including seasonal residents):
  - Scenario 1:  $4,426 \times 100\text{gpd} = 442,600\text{gpd}$
  - Scenario 2:  $1,538 \times 100\text{gpd} = 153,800\text{gpd}$
- Municipal water-supply system
- Five wells that can provide a combined water supply of 2.84mgd
- Water tower with capacity of 1mg
- Agreements with Sussex Shores and Tidewater to provide additional water supply in times of emergency

Table 13 – Water Well Data, Bethany Beach

| Well # | Year Constructed | Well Capacity | Aquifer  |
|--------|------------------|---------------|----------|
| 1A     | 2003             | 350 gpm       | Manokin  |
| 2      | 1967             | 500 gpm       | Pocomoke |
| 3      | 1959             | 300 gpm       | Pocomoke |
| 4      | 1980             | 500 gpm       | Pocomoke |
| 5      | 1990             | 325 gpm       | Manokin  |

Source: DNREC, Town of Bethany Beach

Table 14 – Water Use Data, 2004

| Month        | Total Usage (Gallons) | Average Usage (Gallons Per Day) |
|--------------|-----------------------|---------------------------------|
| January      | 5,394,000*            | 174,000*                        |
| February     | 5,041,000*            | 173,828*                        |
| March        | 5,565,000             | 179,516                         |
| April        | 7,641,000             | 254,700                         |
| May          | 12,810,000            | 413,226                         |
| June         | 19,754,000            | 658,467                         |
| July         | 26,892,000            | 867,484                         |
| August       | 24,031,000            | 775,194                         |
| September    | 14,481,000            | 482,700                         |
| October      | 9,694,000             | 312,710                         |
| November     | 6,661,000             | 222,033                         |
| December     | 6,100,000             | 196,774                         |
| May-Sept.    | 97,968,000            | 640,314                         |
| Oct.-Apr.    | 46,096,000            | 216,413                         |
| <b>TOTAL</b> | <b>144,064,000</b>    | <b>393,618</b>                  |

\*Estimates

Source: Town of Bethany Beach

# Bridgeville (2002)

- 2020 projected population:
  - Scenario 1: 1,562 x 100 gpd= 156,200 gpd
  - Scenario 2: 2,020 x 100 gpd= 202,000 gpd
- Municipal water supply system
- Three wells with annual allocation of 93 mg, 30 day allocation limit of 7.75 mg, and a daily limit of 250,000 gpd
- 125,000 gal water storage tank
- In 1999 annual water usage 43.7 mg, peak usage 4.8mg/month (June), average daily demand 120,000 gpd

**Table 22. Water Supply Wells in the Bridgeville Municipal Water Service**

| <b>Well #</b> | <b>Date Drilled</b> | <b>Screen Interval</b> | <b>Aquifer</b> | <b>Pumping Rate</b> |
|---------------|---------------------|------------------------|----------------|---------------------|
| 2             | January 1995        | 100 – 119 ft           | Columbia       | 245 gpm             |
| 2D            | July 1995           | 325 – 374 ft           | Frederica      | 240 gpm             |
| 5D            | October 1995        | 449 – 492 ft           | Cheswold       | 300 gpm             |

Source: DNREC, Division of Water Resources, 2000.

# Dagsboro (2003)

- 2000 population:  $519 \times 100 \text{ gpd} = 51,900 \text{ gpd}$
- 2020 projected population:
  - Scenario 1:  $693 \times 100 \text{ gpd} = 69,300 \text{ gpd}$
  - Scenario 2:  $883 \times 100 \text{ gpd} = 88,300 \text{ gpd}$
- Pop. at buildout 7,658 residents, with annexation.
- Not served by public water. Homeowners/business obtain water from individual private wells.
- Poor water quality with high levels of nitrates and iron
- Interconnection with Millsboro for 90,000 gpd.
- In 2004 creating public water system

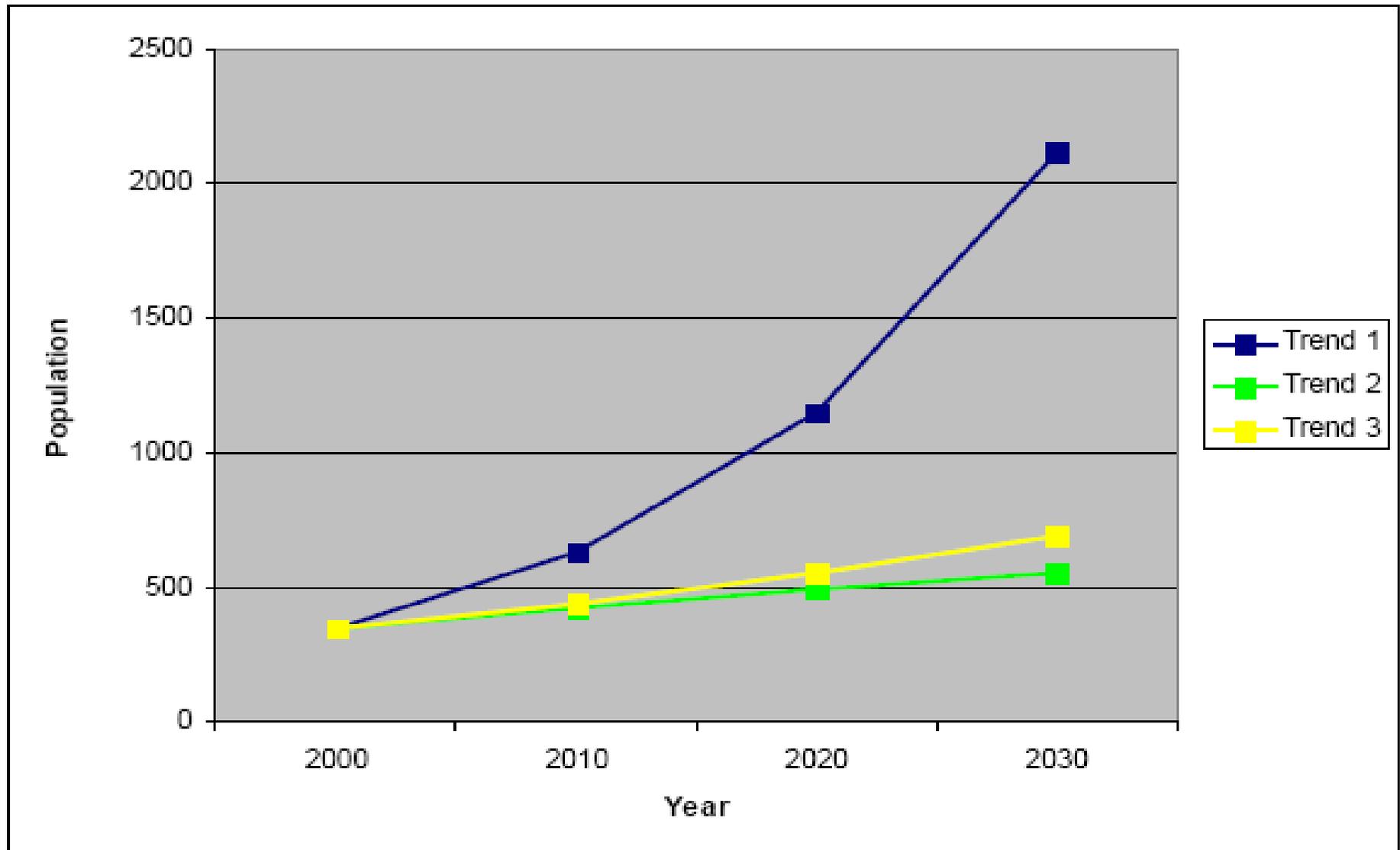
# Delmar (2005)

- 2010 projected population:  
3,901 (1,745 in Delmar, DE) x 100gpd = 390
- Single public water system from 3 wells
- Current water consumption: 400,000 gpd
- Capacity wells/treatment: 600,000 gpd
- 3,266 people utilize public water, per cap. 120 gpd.
- 2,300 new residents, add 575,000 gpd over 5-7 years
- Planning to construct new wells within next 5 years

# Dewey Beach (2007)

- 2030 projected population (not including seasonal residents):
  - Scenario 1:  $729 \times 100 \text{ gpd} = 72,900 \text{ gpd}$
  - Scenario 2:  $480 \times 100 \text{ gpd} = 48,000 \text{ gpd}$
- Water supplied by Sussex County
- Water demand
  - Fall and winter: average 250,000 gpd, peak of 300,000 gpd
  - Spring/summer: average 1.1 mgd, peak of 1.2 mgd
- Growth projections estimate that by 2030 combined average demand will reach 4.6 mgd and peak demand of 6.9 mgd

**Figure 2: Fenwick Island Population Projection Scenarios**



*Source: US Census 2000, Delaware Population Consortium*

# Georgetown (2001)

**Table 4. Georgetown Area – Draft Population Projections**

| <b>Residents</b>            | <b>2000 (est.)</b> | <b>2025 (est.)</b> | <b>Increase</b> | <b>% Change</b> |
|-----------------------------|--------------------|--------------------|-----------------|-----------------|
| Georgetown Area - Full Time | 4802               | 6479               | 1677            | 35%             |
| Georgetown Area - Part Time | 497                | 738                | 241             | 48%             |
| Georgetown Area - Total     | 5299               | 7217               | 1918            | 36%             |

- Municipal water supply system
- Six wells allocation: 300 mg/yr, 30 mg/30 days, 1.3 mgd
- 1999 annual water use 297 mg, peak 34 mg in July, average daily demand 0.81 mgd
- Town discussing with DNREC to increase its allocation permits

**Table 15. Water Wells and Capacity in Georgetown**

| <b>Well #</b> | <b>Date Drilled</b> | <b>Screen Interval</b> | <b>Aquifer</b> | <b>Pumping Rate (gallons per day)</b> |
|---------------|---------------------|------------------------|----------------|---------------------------------------|
| 1             | 1948, 1992          | 0 - 120 ft             | Columbia       | 720,000 gpd                           |
| 1A            | 1992                | 330 - 354 ft           | Manokin        | 288,000 gpd                           |
| 2             | 1996                | 40 - 92 ft             | Columbia       | 720,000 gpd                           |
| 2R            | 1948, 1985          | 90 - 129 ft            | Columbia       | 720,000 gpd                           |
| 3             | 1992                | 108 - 143 ft           | Columbia       | 720,000 gpd                           |
| 3A            | 1992                | 313 - 329 ft           | Manokin        | 288,000 gpd                           |

Sources: Delaware Department of Natural Resources & Environmental Control (DNREC); Town of Georgetown

# Greenwood (2007)

Table 11.1 Updated Population Projections for the Town of Greenwood

| Year                  | 2000 Census | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 |
|-----------------------|-------------|------|------|------|------|------|------|
| Population (persons)  | 837         | 881  | 970  | 1053 | 1132 | 1203 | 1264 |
| % change over 5 years |             | 5%   | 10%  | 9%   | 7%   | 6%   | 5%   |

(Source: Delaware Population Consortium Annual Population Projections, October 26, 2006, Version 2006.0 Accessed from the World Wide Web on 8-16-07: <http://stateplanning.delaware.gov/information/dpc.shtml>)

- Town improving its water system infrastructure
- Pump capacity: 400 gpm, surplus capacity 100 gpm
- 250,000 gal elevated water storage tank
- Expected daily water demands:
  - average 100,000 gpd in 2007 and 140,000 gpd by 2012

# Laurel (2004)

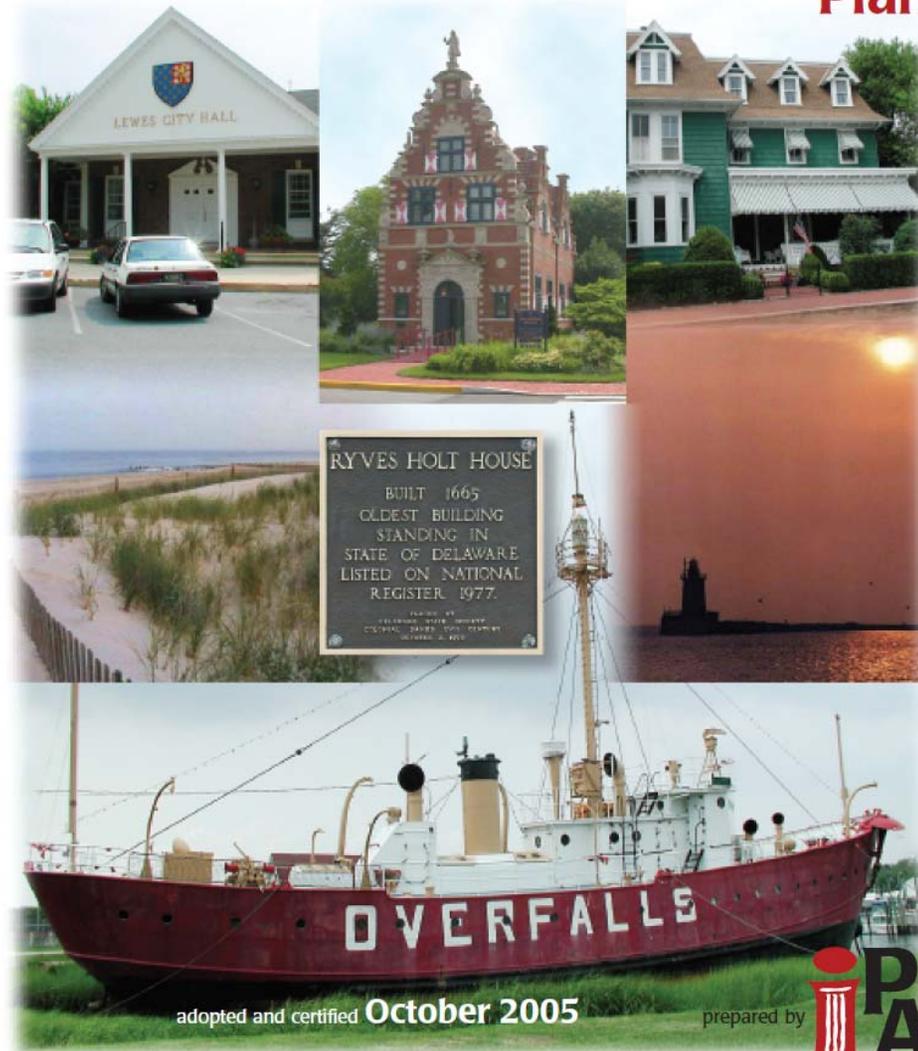
- 2000 population:  $3,668 \times 100 \text{ gpd} = 366,800 \text{ gpd}$
- 2024 projected population:  $5,943 \times 100 \text{ gpd} = 594,300 \text{ gpd}$
- Usage 415,200 gpd (85% residential, 15% industrial/comm.)

**The 2004 Greater Laurel Comprehensive Plan  
Town Well Location, Year Drilled and Capacity**

| <u>Town Well Location</u> | <u>Year Drilled</u> | <u>Capacity</u><br>(Gallons per minute) |
|---------------------------|---------------------|---|
| 8 <sup>th</sup> & Maple   | 1977                | 500 gpm                                 |
| Washington & Wilson       | 1991                | 500 gpm                                 |

- Theoretical daily discharge of 1,440,000 gpd
- 2 elevated water storage tanks, combined capacity 450,000 gal
- Town aggressively upgrading water system: fluoridation, water main replacement, emergency generators at well sites, etc.

# City of Lewes Comprehensive Plan



Institute for Public Administration  
College of Human Services, Education & Public Policy  
University of Delaware

[www.ipa.udel.edu](http://www.ipa.udel.edu)

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# Lewes (2005)

- 2020 projected population (not including seasonal residents):
  - Scenario 1:  $3,773 \times 100 \text{ gpd} = 377,300 \text{ gpd}$
  - Scenario 2:  $4,789 \times 100 \text{ gpd} = 478,900 \text{ gpd}$
- Municipal water supply system
- Five public wells, 18 private wells capable of 4 mgd
- 300,000 gal storage tank
- Water demands
  - Off season: average 800,000 gpd
  - 400,000 gpd to one industrial customer
  - Peak usage 1.6 mgd in summer 2002
- Planning new 750,000 gal water tower

# Milford (2008)

- 2000 population:  $6,732 \times 100 \text{ gpd} = 673,200 \text{ gpd}$
- 2015 projected population:  $8,415 \times 100 \text{ gpd} = 841,500 \text{ gpd}$
- Municipal water supply system
- System interconnected across Mispillion R. as unified system
- Among ten largest systems of Kent and Sussex Counties
  - 10 wells with pumping capacities from 80 to 530 gpm
  - Operates 4 water treatment plants
  - Two 250,000 gal water towers and one 500,000 gal tower
- Average water usage in 2006 ranged from 2.3 - 3.4 mgd
- all wells activated: maximum discharge 2,769 gpm utilized.

# Milford (2008)

**TABLE 9A: City of Milford Public Water Supply Wells**

| WELL ID                                   | DNREC PERMIT | CURRENT CAPACITY (GMP) | AQUIFER TYPE | SCREEN INTERVAL | PUMP CAPACITY (GPD) |
|---|--------------|------------------------|--------------|-----------------|---------------------|
| WELL NO 1                                 | 10250        | 317                    | CONFINED     | 220-236         | 456,480             |
| WELL NO 2                                 | 10187        | 131                    | CONFINED     | 220-236         | 188,640             |
| WELL NO 3                                 | 102338       | 82                     | CONFINED     | 312-342         | 118,080             |
| <b>WATER PLANT TOTAL</b>                  |              | <b>530</b>             |              |                 | <b>763,200</b>      |
| WELL NO 4R                                |              |                        |              |                 |                     |
| WELL NO 5R                                | 208591       | LESS 100               | CONFINED     | 293-328         | 432,000             |
| <b>KENTON PLANT TOTAL</b>                 |              |                        |              |                 | <b>432,000</b>      |
| WELL NO 9                                 | 10192        | 250                    | UN-CONFINED  | 39-59           | 360,000             |
| WELL NO 10                                | 69356        | 151                    | CONFINED     | 444-466         | 217,440             |
| WELL NO 11                                | 69357        | 99                     | CONFINED     | 317-335         | 142,560             |
| WELL NO 12                                | 69355        | 450                    | CONFINED     | 215-254         | 648,000             |
| <b>SEABURY PLANT TOTAL</b>                |              | <b>950</b>             |              |                 | <b>1,368,000</b>    |
| WELL NO 13                                | 69344        | 533                    | CONFINED     | 401-441         | 767,520             |
| WELL NO 14                                | 69343        | 456                    | CONFINED     | 284-309         | 656,640             |
| <b>10<sup>TH</sup> STREET PLANT TOTAL</b> |              | <b>989</b>             |              |                 | <b>1,424,160</b>    |
| <b>CITY TOTAL</b>                         |              | <b>2769</b>            |              |                 | <b>3,987,360</b>    |

# Millsboro (2004)

## Population Projection Scenarios Town of Millsboro, 2000-2030

| Scenario  | Rate | 2000  | 2010  | 2020  | 2030   |
|---|------|-------|-------|-------|--------|
| Trend Projection Based on Past Decade's Population Growth | 3.7% | 2,360 | 3,390 | 4,869 | 6,994  |
| Portion of Projected Sussex County Population             | 1.7% | 2,360 | 2,788 | 3,293 | 3,889  |
| Future Land Use Recommendations Build Out by 2030         | 7.3% | 2,360 | 4,770 | 9,642 | 19,489 |
|   |      |       |       |       |        |
| Average of the Three Scenarios                            | 4.2% | 2,360 | 3,568 | 5,393 | 8,153  |

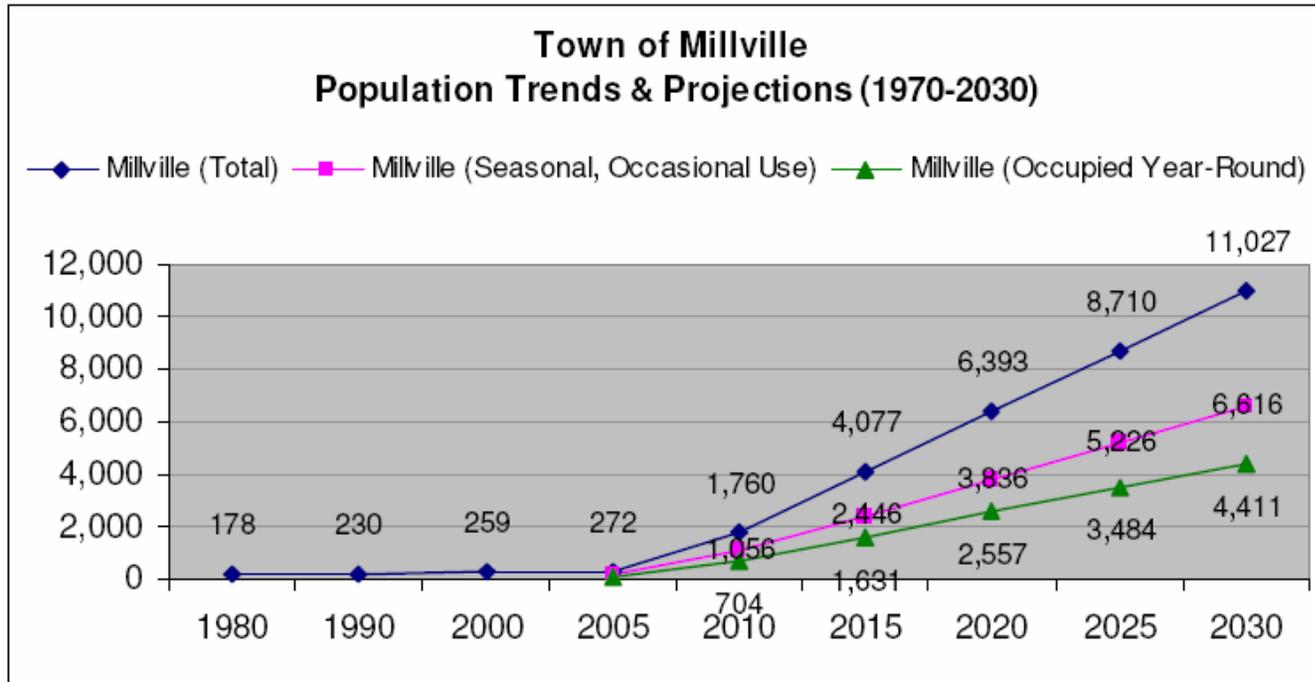
Source: University of Delaware, Institute for Public Administration, U.S. Census, 2000, and the 2003 Delaware Population Consortium Report

2030 population:  $8,153 \times 100 \text{ gpd} = 815,300 \text{ gpd}$

# Millsboro (2004)

- Municipal water system, 600 units served Mar 2004
- 100,000 gal and 250,000 gal water storage tanks
- 3 wells with annual allocation of 174 mg, 476,700 gpd
- Able to pump 1.15 mgd
- Water demand in 2003 155.75 mg, avg. 426,700 gpd
- Provides Dagsboro up to 90,000 gpd
- Submitted application to DNREC for increased allocation for both towns

# Millville (2008)



- Water services provided by Tidewater Utilities
- 2030 projected population:  $11,027 \times 100 \text{ gpd} = 1.1 \text{ mgd}$
- Town mix of individual wells and central water
- Town converting residents from wells to central water system.

# Milton (2003)

- 2000 population:  $1,657 \times 100 \text{ gpd} = 165,700 \text{ gpd}$
- 2030 projected population:  $2,631 \times 100 \text{ gpd} = 263,100 \text{ gpd}$
- Municipal water supply system: 4 wells and 2 storage tanks
- Capacity under normal operating conditions: 1,108,000 gpd
- Avg. water consumption: 220,000 gpd (unchanged from 1985)
- Peak flow of 150 gpcd, system can supply almost 7,400 people (over 2,000 new homes)
- Allocations: Wells combined not exceed 500,000 gallons in any 24-hour period or 10,000,000 gallons in any 30-day period

# Ocean View (2004)

- 2000 population:  $1,006 \times 100\text{gpd} = 100,600\text{gpd}$
- 2020 population projections:
  - Scenario 1:  $1,497 \times 100\text{gpd} = 149,700\text{gpd}$
  - Scenario 2:  $3,666 \times 100\text{gpd} = 366,600\text{gpd}$
- Water supplied by Tidewater Utilities or the Town of Bethany Beach
- Tidewater awarded contract, contingent on funding availability, to supply water to unserved area of Ocean View via Town-owned water system.

# Rehoboth Beach (2009 pending approval)

- 2006 pop. 1,554 full time x 100 gpd= 155,4000 gpd
- 2005 population: 7,386 Oct-Mar, 30,388 Apr -Sep, peak 49,612 in July
- Municipal water supply system
- Consumption from low in March of 0.66 mgd to high in July and August of 3.0 mgd
- Estimated water demand in 2010: 4.6 mgd with a maximum daily demand of 6.9 mgd
- As of 2002, a 6.5 mgd water supply capacity with an additional 1.9 mgd permitted.

# Seaford (2008)

The average daily water demand is as follows:

|                |               |
|----------------|---------------|
| Winter Months  | 1,000,000 gpd |
| Summer Months  | 1,300,000 gpd |
| Yearly Average | 1,100,000 gpd |

Peak day  $1.6 \times 1,500,000 = 2,400,000$  gpd

# Selbyville (2007)

- 2006 pop.:  $2,021 \times 100 \text{ gpd} = 202,100 \text{ gpd}$
- 2020 projected population:
  - Scenario 1:  $3,134 \times 100\text{gpd} = 313,400 \text{ gpd}$
  - Scenario 2:  $2,653 \times 100\text{gpd} = 265,300 \text{ gpd}$
- Treatment plant capacity: 1mgd
- 2 wells each with the capacity of 400 gpm
- 2 elevated storage tanks, 150,000 gal, 120,000 gal
- Water treatment and distribution systems recently improved

# South Bethany (2006)

- 2000 population:  $492 \times 100 \text{ gpd} = 49,200 \text{ gpd}$
- 2030 projected population,  $795 \times 100 \text{ gpd} = 79,500 \text{ gpd}$
- Water supply owned/operated by Artesian Water Co.
- 2 wells each with a capacity of 1,500 gpm
- Elevated tank with 500,000 gal capacity
- Water treatment plant capacity is 2.0 mgd
- In winter, South Bethany goes off line, water obtained from Artesian Bayville facility near Fenwick Island

## 6. Water Demands

- 6.1. Existing public water demands
- 6.2. Existing domestic water demands
- 6.3. Existing irrigation water demands
- 6.4. Existing industry water demands

Microsoft Excel - so NC KC and SC Water Demand 2009.xls

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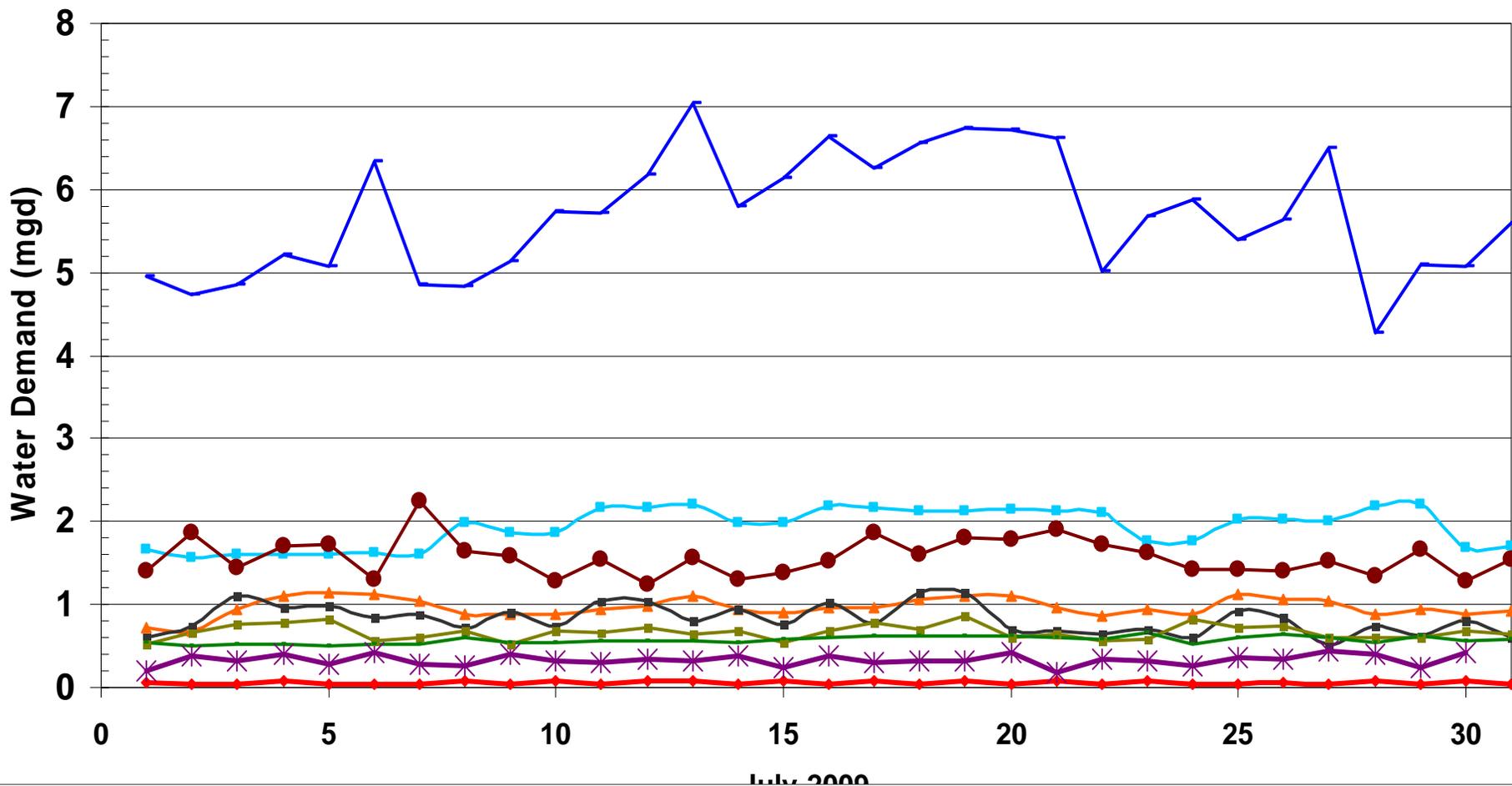
|    | A   | B           | D           | E           | F           | G           | H           | I           | J           | K           | L           |             |
|----|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1  | <b>Water Production in Southern New Castle, Kent, and Sussex Counties</b> |             |             |             |             |             |             |             |             |             |             |             |
| 2  | <b>Jul-09</b>   |             |             |             |             |             |             |             |             |             |             |             |
| 3  | <b>Water Purveyor</b>   |             |             |             |             |             |             |             |             |             |             |             |
| 4  |   | <u>1</u>    | <u>2</u>    | <u>3</u>    | <u>4</u>    | <u>5</u>    | <u>6</u>    | <u>7</u>    | <u>8</u>    | <u>9</u>    | <u>10</u>   | <u>11</u>   |
| 5  | <b>Southern New Castle Co</b>   |             |             |             |             |             |             |             |             |             |             |             |
| 6  | Artesian Water Co.  | 1.68        | 1.97        | 1.70        | 1.56        | 1.11        | 2.18        | 2.42        | 2.54        | 2.45        | 2.63        | 1.73        |
| 7  | Tidewater Utilities   | 0.57        | 0.54        | 0.58        | 0.58        | 0.58        | 0.58        | 0.69        | 0.69        | 0.68        | 0.68        | 0.77        |
| 8  | Middletown  |             |             |             |             |             |             |             |             |             |             |             |
| 9  | <b>Total</b>  | <b>2.25</b> | <b>2.51</b> | <b>2.28</b> | <b>2.13</b> | <b>1.69</b> | <b>2.75</b> | <b>3.10</b> | <b>3.23</b> | <b>3.13</b> | <b>3.31</b> | <b>2.51</b> |
| 10 | <b>Kent County</b>  |             |             |             |             |             |             |             |             |             |             |             |
| 11 | Artesian Water Co.  |             |             |             |             |             |             |             |             |             |             |             |
| 12 | Camden- Wyoming   |             |             |             |             |             |             |             |             |             |             |             |
| 13 | Clayton   |             |             |             |             |             |             |             |             |             |             |             |
| 14 | Dover   |             |             |             |             |             |             |             |             |             |             |             |
| 15 | Felton  |             |             |             |             |             |             |             |             |             |             |             |
| 16 | Frederica   |             |             |             |             |             |             |             |             |             |             |             |
| 17 | Harrington  | 0.53        | 0.50        | 0.51        | 0.52        | 0.50        | 0.52        | 0.52        | 0.61        | 0.55        | 0.55        | 0.57        |
| 18 | J.H. Wilkerson & Son  |             |             |             |             |             |             |             |             |             |             |             |
| 19 | Magnolia  | 0.054       | 0.039       | 0.036       | 0.072       | 0.039       | 0.037       | 0.037       | 0.075       | 0.037       | 0.074       | 0.040       |
| 20 | Milford   |             |             |             |             |             |             |             |             |             |             |             |
| 21 | Pickering Beach Water   |             |             |             |             |             |             |             |             |             |             |             |
| 22 | Smyrna  |             |             |             |             |             |             |             |             |             |             |             |
| 23 | Tidewater Utilities   | 1.66        | 1.56        | 1.61        | 1.61        | 1.61        | 1.62        | 1.61        | 1.98        | 1.86        | 1.87        | 2.16        |
| 24 | <b>Total</b>  | <b>2.24</b> | <b>2.10</b> | <b>2.16</b> | <b>2.20</b> | <b>2.14</b> | <b>2.18</b> | <b>2.17</b> | <b>2.67</b> | <b>2.44</b> | <b>2.49</b> | <b>2.77</b> |
| 25 | <b>Sussex County</b>  |             |             |             |             |             |             |             |             |             |             |             |

May 2009 June 2009 July 2009 August 2009 September 2009 October 2009

|    | A   | B            | C            | D            | E            | F            | G            | H            | I            | J            | K            | L            | M            | N            |
|----|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 1  | <b>Water Production in Southern New Castle, Kent, and Sussex Counties</b> |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 2  | <b>Jul-09</b>   |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 3  | <b>Water Purveyor</b>   |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 4  |   | <u>1</u>     | <u>2</u>     | <u>3</u>     | <u>4</u>     | <u>5</u>     | <u>6</u>     | <u>7</u>     | <u>8</u>     | <u>9</u>     | <u>10</u>    | <u>11</u>    | <u>12</u>    | <u>13</u>    |
| 25 | <b>Sussex County</b>  |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 26 | Artesian Water Co.  |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 27 | Bethany Beach   | 0.73         | 0.68         | 0.95         | 1.10         | 1.14         | 1.12         | 1.04         | 0.89         | 0.88         | 0.88         | 0.93         | 0.98         | 1.10         |
| 28 | Blades  |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 29 | Bridgeville   |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 30 | Dagsboro  |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 31 | Delmar  |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 32 | Frankford   |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 33 | Georgetown  |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 34 | Greenwood   |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 35 | J.H. Wilkerson & Son  |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 36 | Laurel  |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 37 | Lewes Bd. Public Works  |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 38 | Long Neck Water   | 0.60         | 0.75         | 1.10         | 0.97         | 0.99         | 0.85         | 0.87         | 0.71         | 0.89         | 0.74         | 1.05         | 1.04         | 0.81         |
| 39 | Milford   |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 40 | Millsboro   |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 41 | Milton  | 0.20         | 0.38         | 0.32         | 0.40         | 0.28         | 0.42         | 0.27         | 0.26         | 0.40         | 0.33         | 0.31         | 0.35         | 0.33         |
| 42 | Public Water Supply   |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 43 | Rehoboth  |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 44 | Southern Shores Water Co.   |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 45 | Seaford   | 1.40         | 1.86         | 1.45         | 1.71         | 1.73         | 1.30         | 2.25         | 1.64         | 1.58         | 1.28         | 1.54         | 1.25         | 1.57         |
| 46 | Selbyville  |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 47 | Sussex County Council   |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 48 | Sussex Shores Water   | 0.53         | 0.66         | 0.77         | 0.77         | 0.82         | 0.57         | 0.61         | 0.69         | 0.53         | 0.67         | 0.66         | 0.73         | 0.65         |
| 49 | Tidewater Utilities   | 4.96         | 4.72         | 4.85         | 5.21         | 5.07         | 6.34         | 4.86         | 4.82         | 5.13         | 5.73         | 5.71         | 6.19         | 7.04         |
| 50 | <b>Total</b>  | <b>8.42</b>  | <b>9.05</b>  | <b>9.44</b>  | <b>10.17</b> | <b>10.03</b> | <b>10.60</b> | <b>9.90</b>  | <b>9.02</b>  | <b>9.42</b>  | <b>9.63</b>  | <b>10.20</b> | <b>10.53</b> | <b>11.49</b> |
| 51 |   |              |              |              |              |              |              |              |              |              |              |              |              |              |
| 52 |   | <b>10.66</b> | <b>11.15</b> | <b>11.60</b> | <b>12.36</b> | <b>12.18</b> | <b>12.78</b> | <b>12.07</b> | <b>11.68</b> | <b>11.86</b> | <b>12.11</b> | <b>12.97</b> | <b>13.32</b> | <b>14.35</b> |

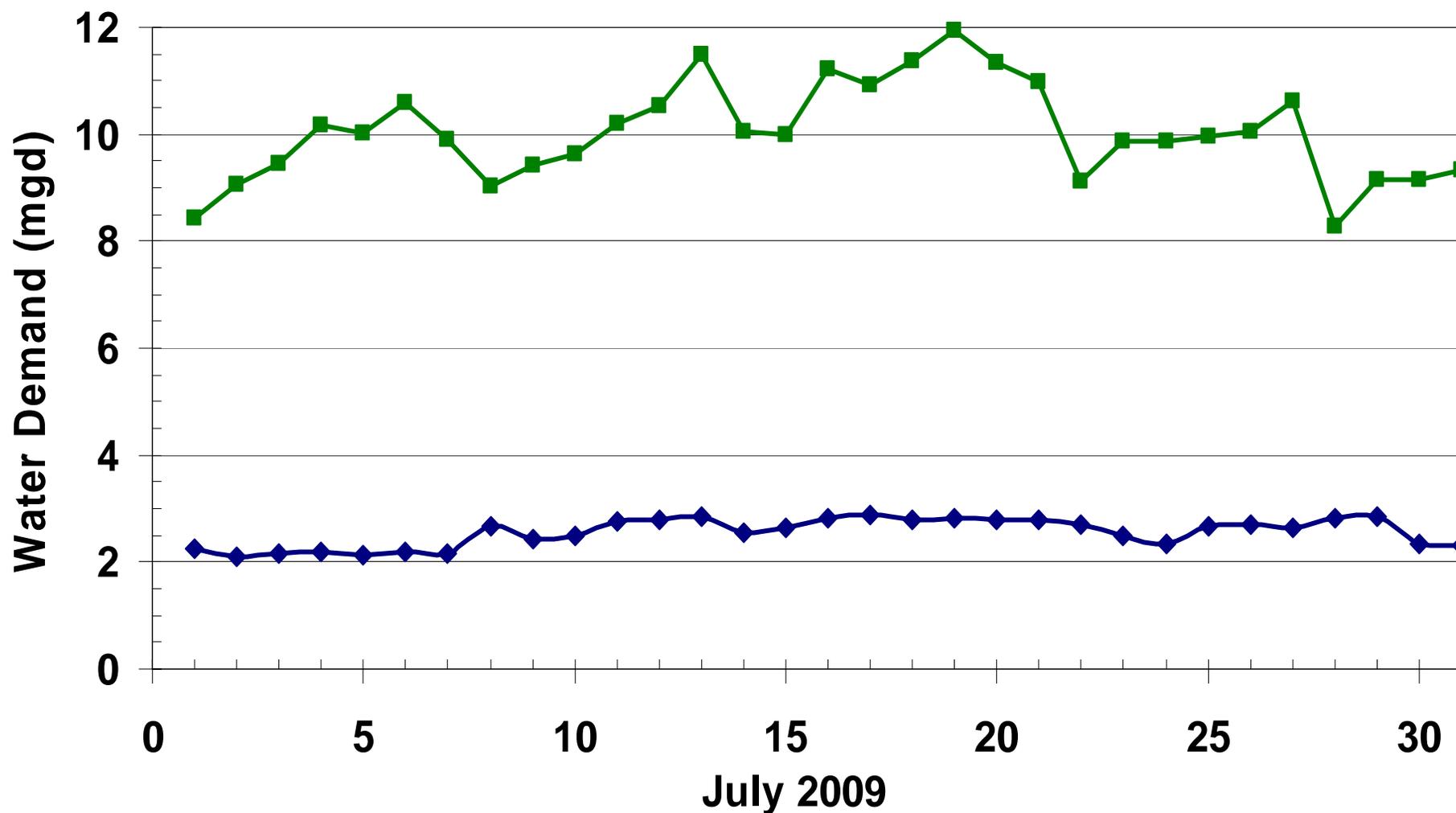
# Water Demand

## Kent County and Sussex County, Delaware.



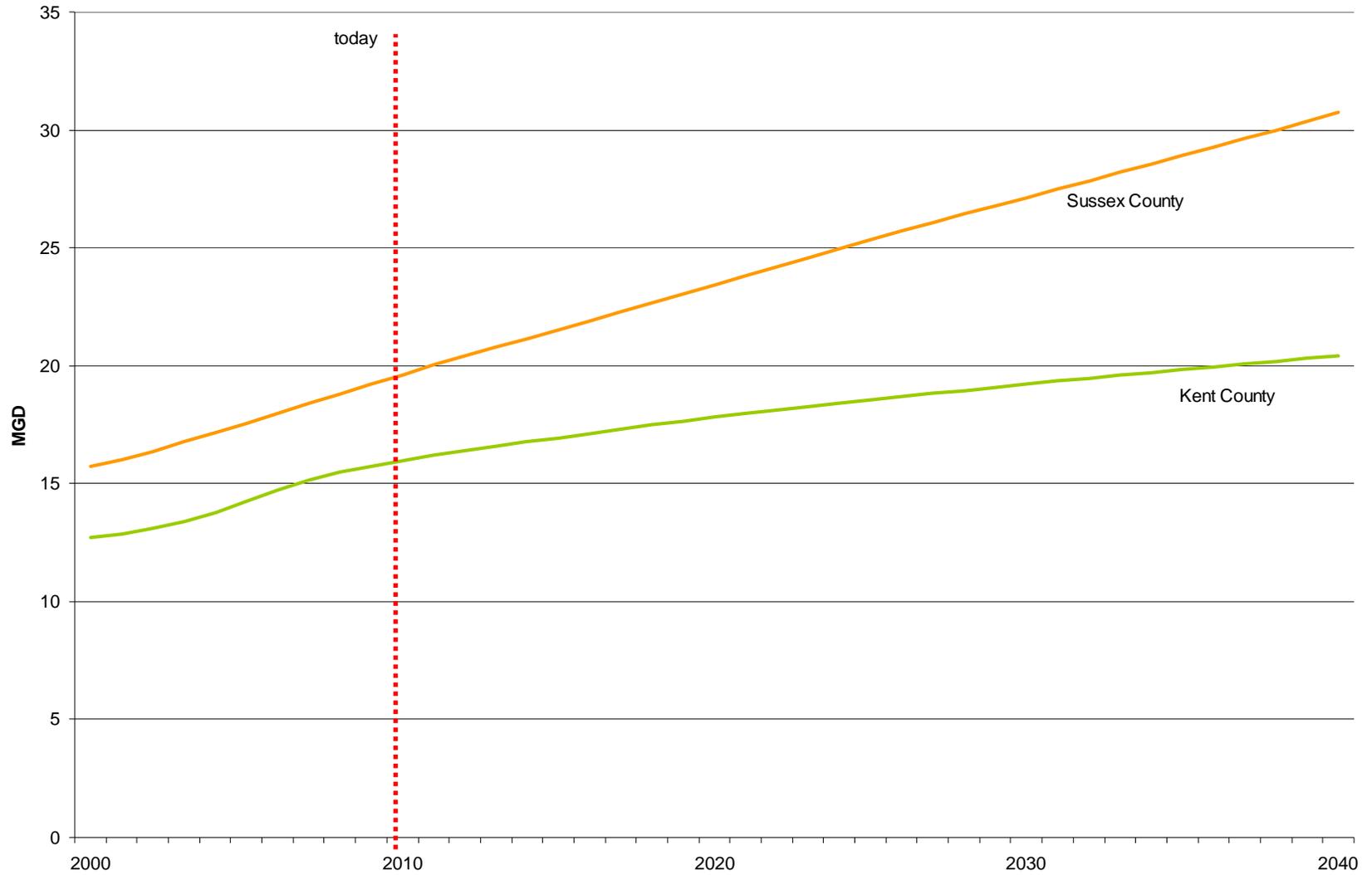
- ◆— Magnolia
- Tidewater Utilities
- ▲— Bethany Beach
- Long Neck Water
- \*— Milton
- Seaford
- Sussex Shores Water
- Tidewater Utilities
- Harrington

# Public Water Demand Kent County and Sussex County, Delaware



◆ Kent County ■ Sussex County

## Residential Water Demand, by County



Based on Delaware Population Consortium projections, 2009, and an average per capita usage of 100 GPD

# Schedule (TBDBWSCC)

| <u>Task</u>                                  | <u>Milestone</u> |
|--|------------------|
| Commence work                                | Oct 2009         |
| 1. Introduction                              | Dec 2009         |
| 2. Demographics and mapping                  | Jan 2010         |
| 3. Hydrogeology and Groundwater Availability | Jun 2010         |
| 4. Water Quality                             | Mar 2010         |
| 5. Water Supplies                            | Jun 2010         |
| 6. Water Demands                             | Jul 2010         |
| 7. Future Water Demands                      | Aug 2010         |
| 8. Conclusions/Recommendations               | Dec 2010         |
| Draft Report                                 | Mar 2011         |
| Final Report                                 | Jun 2011         |

# Delaware Water Supply Business Roundtable