

Central Coastal Plain Capacity Use Area Status Report



August 2004

North Carolina
Division of Water Resources
Environmental Management Commission

Central Coastal Plain Capacity Use Area Status Report

Introduction

Rule 15A NCAC 02E .0506 requires that the Division of Water Resources (DWR) publish a status report on the Central Coastal Plain Capacity Use Area (CCPCUA) two years after the effective date of the CCPCUA rules, which was August 1, 2004, and at five year intervals thereafter. This document is the first CCPCUA status report. Apart from being mandated by an administrative rule, this report is an important way for Central Coastal Plain (CCP) water users, the DWR, the Environmental Management Commission (EMC), and interested persons to gain a better understanding of the ground water situation that prompted the CCPCUA rules and of the ability of the CCPCUA to bring about use of more sustainable water sources. Figure 1 illustrates the CCPCUA which includes the following 15 counties: Beaufort, Carteret, Craven, Duplin, Edgecombe, Greene, Jones, Lenoir, Martin, Onslow, Pamlico, Pitt, Washington, Wayne and Wilson.

The main objective of the CCPCUA rules is to force a reduction of withdrawals from endangered aquifers (the Black Creek and Upper Cape Fear aquifers) in the CCP and to encourage investment in alternative sources of water. These aquifers are still being overdrawn by the many water users in the fifteen county area. All ground water sources in the 15 county area are regulated by permit so the over pumping problem is not shifted to other aquifers. Effects of the over pumping include dewatering, declining water levels, and salt water encroachment. These effects and the proposed capacity use designation were discussed at length in the Division's *Central Coastal Plain Capacity Use Investigation Report*, November 1998. This report can be downloaded off the Division's website at the following link: http://www.nwater.org/Reports_and_Publications/Ground_Water_Branch/cuainvestigation121598.pdf.

Although the water use permitting program is on schedule to complete application processing by the close of this year, it is too early to see improvements in the ground water situation. It is more likely that we will begin to report progress in 2008 when the EMC will be given an assessment of CCPCUA conditions or in 2009 as part of the next status report.

Permitting and Registration

One important result of the CCPCUA rules was the formation of the water use permitting process which sets up water withdrawal requirements for those that withdraw more than 100,000 gallons of ground water a day (any day of the year). Permits are issued with maximum withdrawal a day requirements for those using non-endangered aquifers, ground water sources outside the limits of the Cretaceous Aquifer Zones. Those who withdraw ground water from the endangered aquifers, the aquifers described by the CCPCUA Cretaceous Aquifer Zones map (see figure 2) and DWR's hydrogeologic database, are issued permits with maximum withdrawal per year requirements.

These permittees' yearly withdrawals will be reduced from their Approved Base Rate (ABR) according to schedules set up in rule 15A NCAC 02E .0503. Phased reductions toward the required 75% or 30% cutback over a 16 year period (2002 through 2018). Reductions vary depending upon location (which Cretaceous Aquifer Zone applies). An example is illustrated in figure 3. ABRs are determined starting with either 1997 or August 1, 1999 through July 31, 2000 annual use, whichever is greater.

At present, 29 of 45 permits have been issued that require an Approved Base Rate calculation and setting of reduction schedules. Since August 1, 2002, 90 permits have been issued or renewed. See table 1 for a detailed accounting of permittees and table 2 for a listing of applicants.

The permitting process achieves a schedule for each permittee toward withdrawal requirements, a better understanding of their ground water situation, plans for future water supplies, and reporting demands which place a heavier burden on each permittee to monitor the condition of their water supplies.

Registrations are required for those surface and ground water withdrawers of more than 10,000 gallons per day. Table 3 and 4 show registrations that have been received by the Division for 2002 and 2003, respectively. The Department of Agriculture and Consumer Services, Agricultural Statistics Division has completed CCP water use surveys for both those years and plans to continue those surveys annually. Both reports are available as PDF files for download from the Division's website (www.ncwater.org) at the following two URLs: http://www.ncwater.org/Reports_and_Publications/Ground_Water_Branch/AgStatReports/agstatccpreport2002rev.pdf and http://www.ncwater.org/Reports_and_Publications/Ground_Water_Branch/AgStatReports/agstatccpreport2003.pdf.

Although there are compliance issues associated with both the permitting and registration processes, important information about the overall water budget has and will continue to be obtained. Table 5 is a list of known water users that have not applied for a water use permit or registered their water use – DWR will be in contact with them as soon as possible.

Water Use

Registration information and permitting requirements have allowed the Division to compile water use information in various ways. Examples of water use data can be found on the Division's web site and in several tables and plots in this report. Use the links provided under the *Query the CUA Databases* portion of the Division's website to access the information on-line (see link provided in the next section). Table 6 shows county and CCP average daily water use totals for 2002 and 2003. It is important to notice the relatively high component of use by permitted users (those withdrawing more than 100,000 gallons per day) compared to registered or surveyed ground water users. Ground water use by permitted users equals over 96% of total ground water use. Table 7 shows CCP average daily water use in 2002 and 2003 aggregated by types of use.

Water users are spread throughout the CCP and often have several wells associated with their withdrawals. Figure 4 illustrates the geographic distribution of water users' wells thematically mapped by type of use.

An important goal for the CCPCUA rules is the reduction of Cretaceous aquifer use in preference for other sources of water. Figure 5 illustrates how current projections produce a reduction of about 70% from the combined ABRs by 2018.

Evaluation of Water Resources

Each permit requires reporting of withdrawals and ground water levels so that water users will track that information and the DWR makes it available to the public through the Division's website. Use the links provided under the *Query the CUA Databases* area of this page: http://www.ncwater.org/Permits_and_Registration/Capacity_Use/Central_Coastal_Plain/. Beyond that source of data, DWR is responsible for improving, operating, and maintaining a monitoring well network to gain knowledge of the hydrogeologic framework and to evaluate aquifer use. DWR gives the public access to this information as well. Potentiometric surface maps of each major aquifer are available as well as water level data through time for each of the Division's monitoring wells. Figure 6 and 7 are examples of each of these types of data presentations available on the web site.

As one might expect, water users are making plans to move to alternative water sources (see section devoted to that subject). So, this means that water level decline trends documented in 1998 are still prevalent now. The same areas of dewatering and threats of dewatering documented in 1998 are still around today.

Salt water encroachment or the threat of encroachment is still around at present. In September and October of 2004, DWR will collect another round of samples from more than 150 wells in the coastal plain to compare to a similar set of samples analyzed in 1999. That comparison along with data from our Time-Domain Electromagnetic soundings will help us map out current salt water – fresh water transition zones.

The recent drought that culminated in 2002 showed clearly that water providers needed to be prepared with efficiency measures and advisories as their surface or shallow ground water sources depleted rapidly. It was ironic that the users of the over pumped Cretaceous aquifers in the CCP were insulated from this problem. Rest assured that water suppliers now have a better measure of how bad a drought can be and have plans for a better response or additional supplies. Also, recognize that the CCP water providers reside over a much larger, longer term problem – over pumping of the Cretaceous aquifers.

DWR is planning basin wide, surface water analyses as part of upcoming Corps of Engineers studies in the Neuse and Tar river basins. These studies will fall under the Division's River Basin Water Supply Planning Strategy successfully implemented on the Cape Fear river basin and currently being applied to the Catawba and Yadkin river basins. In all of these basins a 50-year planning horizon was chosen and computer models have or will be developed to highlight potential problems with individual water systems projected demands.

Updates to Hydrogeologic Framework

Figure 8 illustrates the location of DWR monitoring stations in the CCP. Highlighted stations are those where automatic water level recorders are currently installed. Figure 9 shows locations of Black Creek and Upper Cape Fear aquifer wells in the CCP.

Preliminary drilling plans for fiscal year 2004-2005 include obtaining geophysical logs and adding additional wells at sites in Pitt and Martin counties. Water level data and new boreholes and geophysical logs help DWR improve our understanding of the hydrogeological framework. Also, CCP water users may provide DWR with information from boreholes they have installed. This framework establishes the elevations and thicknesses of all the aquifers in the coastal plain. Like the water use information, the DWR hydrogeologic database is available on the Division's website (use the following link: http://www.ncwater.org/Data_and_Modeling/Ground_Water_Databases/).

Summary of Alternative Water Sources by Region

There are significant alternative water sources available to water providers in the CCP. Some involve considerable investment such as surface water treatment plants. Others are more financially practical, yet still involve water treatment beyond the disinfection-only requirements of the Black Creek and Upper Cape Fear aquifers. The *North Carolina Central Coastal Plain Capacity Use Area: Regional Water Resource Study*, written by Golder Associates in 2002, provides helpful information on this subject.

From 1997 to 2003 Cretaceous aquifers supplied about 43% of public supply needs in the CCP and about 14% of all needs (these numbers will change as more of the ABR required permits are issued). So, even though the Cretaceous aquifers provide a large portion of public supply water, overall, it is a modest amount of the total ground water use – there are other ground water sources.

The Castle Hayne aquifer is available to water providers where it exists or it becomes part of the surficial aquifer. Figure 10 illustrates the current understanding of the Castle Hayne aquifer's limits. Significant portions of the demand now on the Cretaceous aquifers can be shifted to the Castle Hayne without harming existing users.

Surface water supplies are available from the Neuse, Tar, and Roanoke Rivers. Regional actions by many participants are needed to afford this type of solution. Within the CCP the Tar River is currently being tapped by Greenville, Tarboro and Rocky Mount. The Neuse River is used by Goldsboro, and no water provider is using the Roanoke River.

Bedrock wells might be a possible supply option for some of the western portion of the CCP, including Wayne, Wilson and Edgecombe counties.

The Peedee aquifer is available as shown in figure 11, however, significant testing of sands in this aquifer will be required. There are portions of this aquifer that contain isolated sand

units. These sands have very limited connection to the rest of the aquifer and thus only offer small users a source of water.

The surficial aquifer in portions of Wayne, Wilson, Greene, Duplin, and Edgecombe may offer significant yields, especially where it contains sand units that become the confined Black Creek or Upper Cape Fear down gradient.

Actions to Develop Alternative Water Supplies

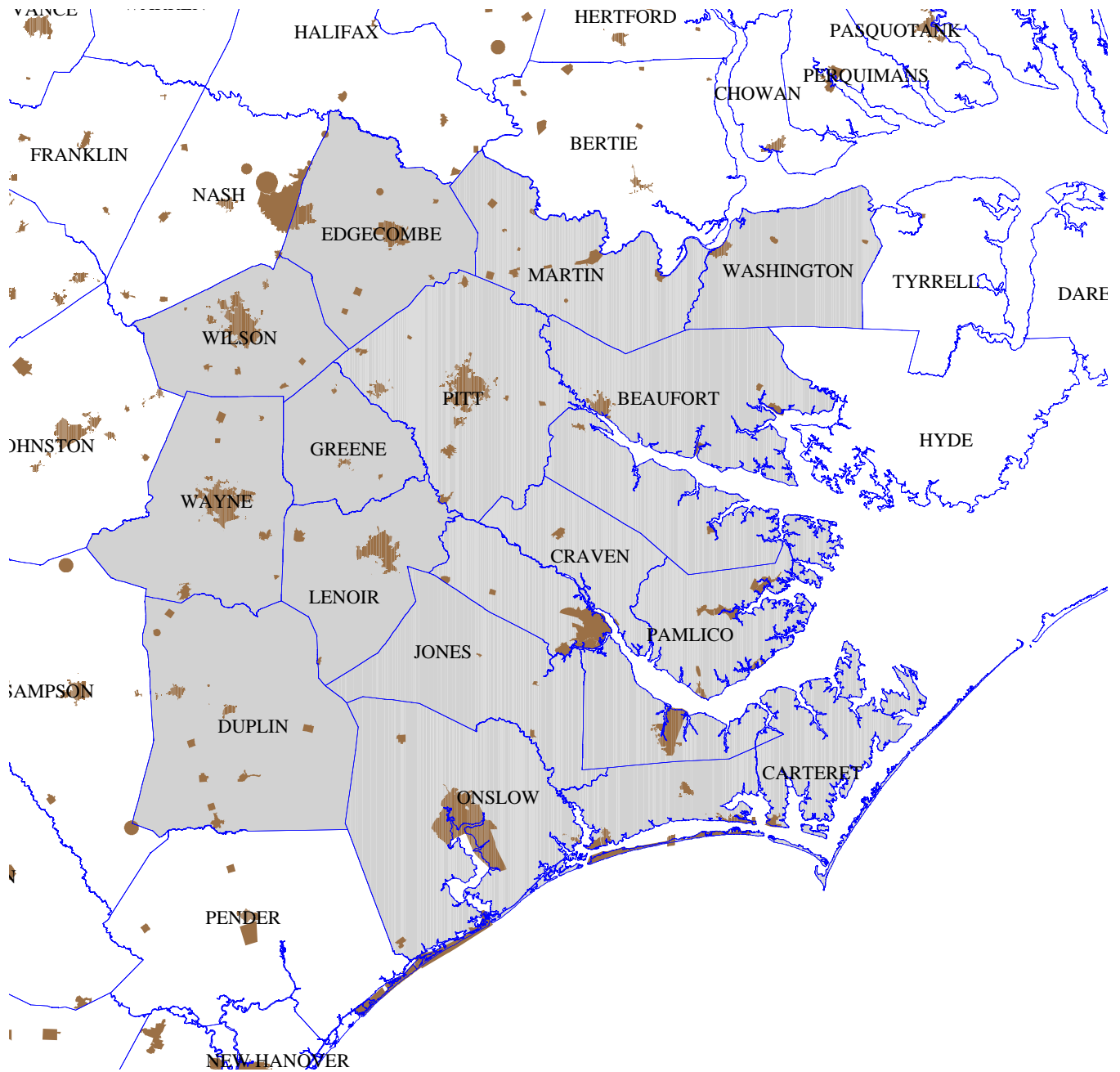
The following is a list of those alternatives being developed or explored:

- Neuse Regional Water and Sewer Authority will serve Lenoir County, and part of Pitt County with treated Neuse River water. This project is projected to be operational in 2007.
- Greenville Utilities will supply treated Tar River water to several new customers including Greene County and the Town of Farmville. They also are actively testing the use of aquifer storage and recovery to allow them to store vast amounts of treated surface water in confined aquifers.
- Onslow County has constructed well fields in the Castle Hayne and surficial aquifers to augment their water supply. They have plans in the works to expand those well fields.
- New Bern has plans in the works to construct a Castle Hayne well field.
- Wayne Water Districts have developed bedrock and surficial aquifer well fields.
- City of Jacksonville proposes to add Castle Hayne and surficial aquifer well fields and water treatment plant.
- A couple of agricultural users plan to construct surface water impoundments.
- Martin County water systems are leaning toward a water treatment plant and intake on the Roanoke River.
- Craven County has proposed new Peedee aquifer wells.
- Several water users plan to purchase water from other systems.
- Water reuse and conservation have been proposed by a couple of industries.

Conclusions

Although the threats of declining water levels, dewatering, and salt water encroachment to the ground water situation in the CCPCUA have not diminished since 2002, significant progress is being made by water users to plan and construct alternative water supplies. Whether alternative water supplies are obtained by individual systems, finding and using different aquifers, or brought about by groups of users, forming alliances to allow for planning and operation of a surface water treatment system, the results will lead to measurable improvements in the ground water conditions. The Division will record successful addition of alternative water supplies by measuring improvement of ground water levels in the network of wells.

Figure 1. Central Coastal Plain Capacity Use Area



■ Municipalities
■ Central Coastal Plain Capacity Use Area

20 0 20 40 Miles

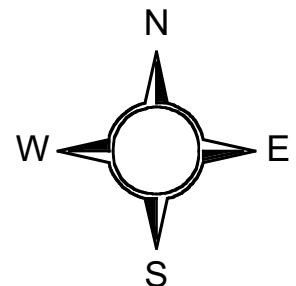


Figure 2. CCPCUA Cretaceous Aquifer Zones

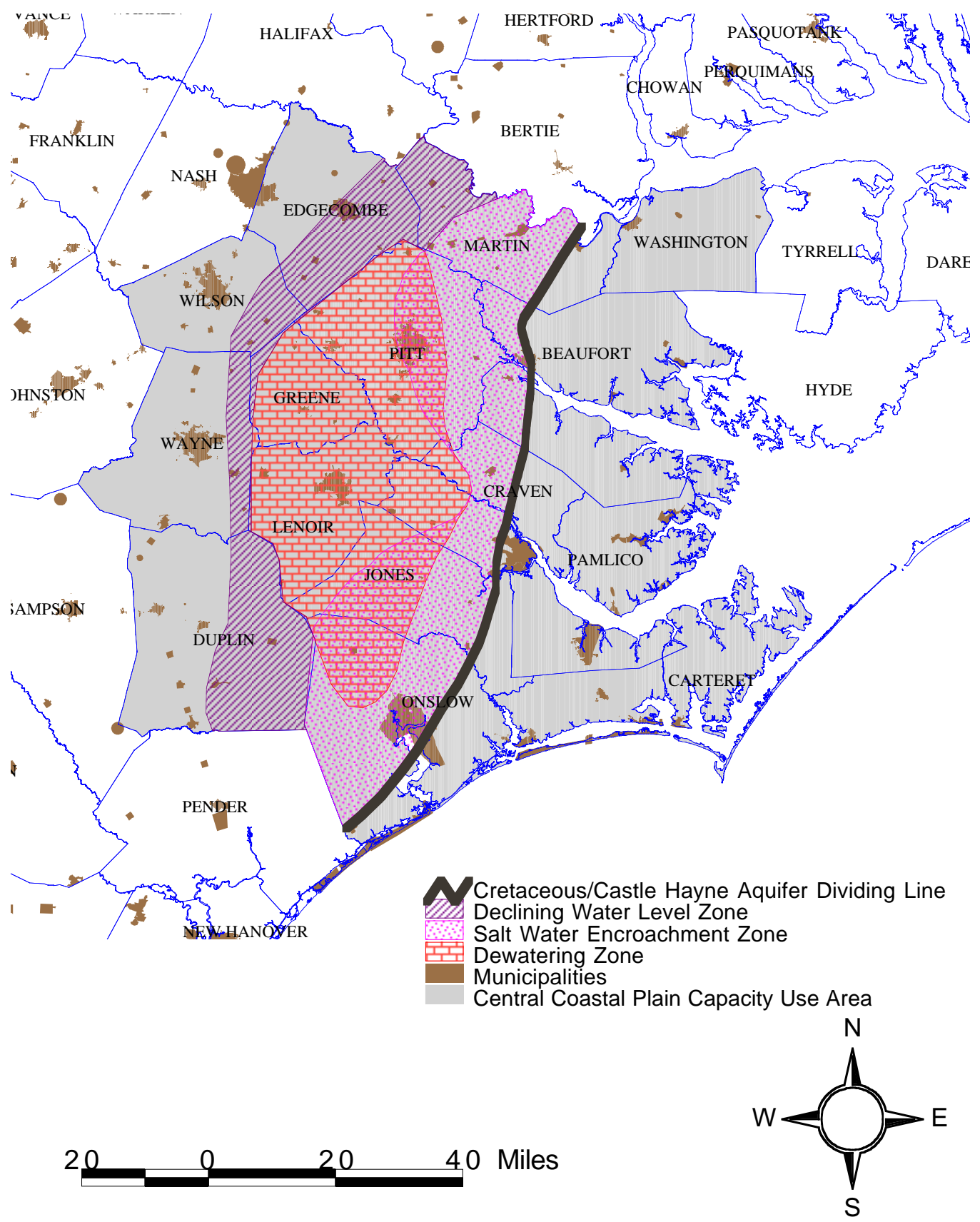
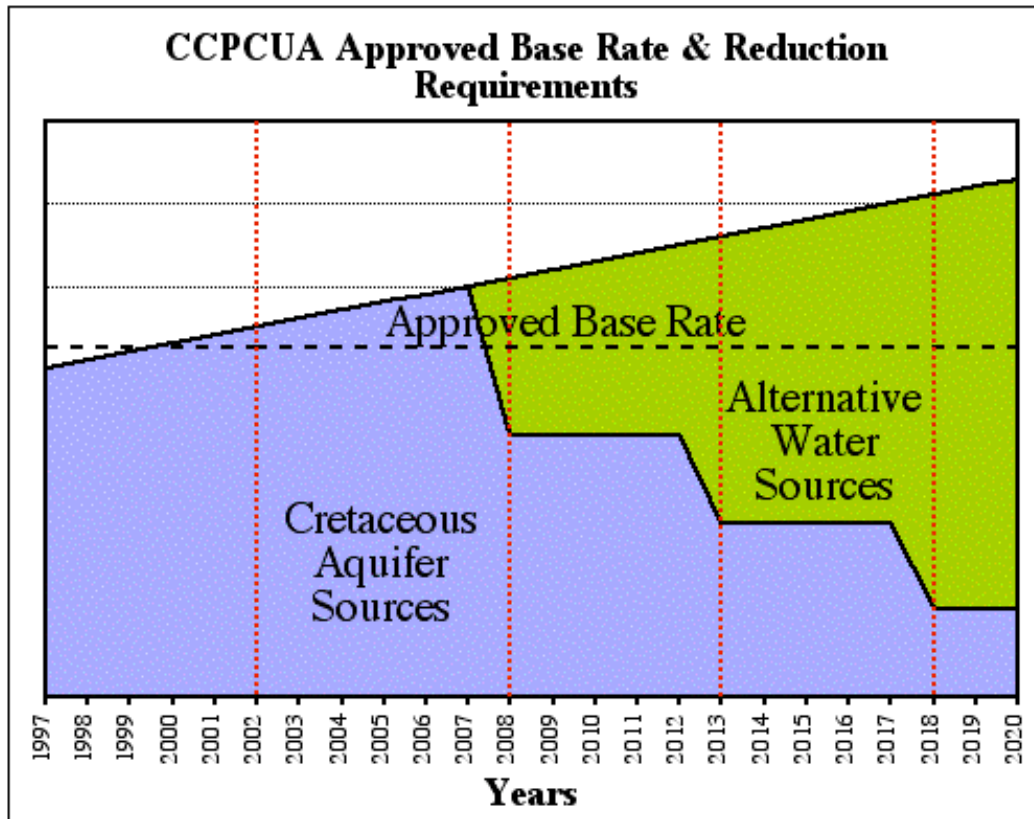


Figure 3. Example Reduction Schedule



In this illustration, the applicant has established their approved base rate (ABR) as their August 1, 1999 through July 31, 2000 annual water use and is located in the Dewatering Zone. In 2008, the first 25% reduction is phased in and demand is met by a combination of 75% of the ABR from the Cretaceous aquifer wells and alternative supplies. Reductions and changes in the levels of use of alternative supplies occur in 2013 and in 2018. In 2018, the permittee has shifted most of their demand to alternative supplies and withdraws a sustainable 25% of the ABR from their Cretaceous wells.

Table 1. CCPCUA Permit Holders as of August 20, 2004

Permittee	Permit #	County	Permitted Ground Water Withdrawal (in MGD)	Approved Base Rate (in MGY)	Type of Use
AGRESOURCE LTD DANNENBERG FARMS	CU1044	Washington	1.080		Irrigation, Agricultural
AGRESOURCE LTD GRACE FARMS	CU1047	Washington	0.720		Irrigation, Agricultural
ALSTON SPRUILL FARMS	CU1121	Pamlico	1.440		Irrigation, Agricultural
AMERICAN MATERIALS COMPANY, LLC	CU3065	Pitt	1.400		Mine Dewatering
AMERICAN TURF GRASS CORPORATION	CU1122	Washington	3.456		Irrigation, Golf Course
AURORA FISHERIES & HATCHERY	CU3116	BEAUFORT	1.080		Aquaculture
AUSTIN BROTHERS FISHERIES, INC.	CU1103	Beaufort	3.600		Aquaculture
BARRY KEATES FARM	CU1004	Beaufort	2.160		Aquaculture
BEAUF. CO. H2O DISTRICTS VI & VII	CU1119	Beaufort	1.080		Public Supply
BELL ARTHUR WATER CORPORATION	CU3077	Pitt		514.461	Public Supply
BERNARD F. KORNEGAY -DECLAR. OF TRUST	CU1081	Washington	0.504		Irrigation, Agricultural
CAROLINA CLASSICS CATFISH, INC.	CU3054	Pitt	0.684		Aquaculture
CAROLINA FISHERIES	CU1058	Beaufort	5.160		Aquaculture
CAROLINA STONE, LLC (GRIFTON MINE)	CU1024	Craven	3.000		Mine Dewatering
CAROLINA TURKEYS	CU3019	Duplin	2.700		Industrial, Public Supply
CAROLINA WATER SERVICE - BRANDYWINE BAY	CU3043	Carteret	0.275		Public Supply
CAROLINA WATER SERVICE-PINE KNOLL SHORES	CU3105	Carteret	0.900		Public Supply
CASEY NURSERY, INC.	CU3062	Wayne	0.310		Irrigation, Agricultural
CASTLE HAYNE FISHERIES	CU1073	Beaufort	2.780		Aquaculture
CHINQUAPIN WATER ASOCIATION, INC.	CU3014	Duplin	0.400	57.451	Public Supply
CITY OF HAVELOCK	CU1029	Craven	2.800		Public Supply
CITY OF JACKSONVILLE	CU3073	Onslow	0.216	1,481.894	Public Supply
CITY OF WASHINGTON	CU1009	Beaufort	4.200		Public Supply
COASTAL PLAINS CATFISH	CU1108	Craven	0.518		Aquaculture
COASTAL USA FISH COMPANY	CU1096	Carteret	0.280		Aquaculture
COUNTRY CLUB OF PLYMOUTH INC	CU1123	Washington	0.200		Irrigation, Golf Course
CRAVEN COUNTY WOOD ENERGY, L.P.	CU3055	Craven	1.800		Industrial
CRAVEN POND INC.	CU1112	Craven	1.000		Aquaculture
CWS SYSTEMS, INC. - FAIRFIELD HARBOUR	CU1087	Craven	1.000		Public Supply
CYPRESS LANDING MARINA	CU1128	Beaufort	0.520		Irrigation, Golf Course

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Permittee	Permit #	County	Permitted Ground Water Withdrawal (in MGD)	Approved Base Rate (in MGY)	Type of Use
CYPRESS SWAMP AQUAFARM, LLC	CU1101	Beaufort	0.760		Aquaculture
DAVID W WATERS	CU1094	Beaufort	0.864		Irrigation, Agricultural
DEEP RUN WATER CORPORATION	CU3050	Lenoir	0.290	562.755	Public Supply
DSM PHARMACEUTICALS, INC.	CU3074	Pitt		52.053	Industrial
EAGLE WATER LLC	CU1130	Beaufort	58.000		Public Water Supplier
EASTERN PINES WATER CORPORATION	CU3102	Pitt	0.288	742.045	Public Supply
FIRST CRAVEN SANITARY DISTRICT	CU1105	Craven	1.368		Public Supply
FISH AND CHICKS, INC.	CU3063	Pitt	0.360		Aquaculture
GHW WEYERHAEUSER NURSERY	CU1006	Beaufort	2.000		Irrigation, Agricultural
GREENE COUNTY REGIONAL WATER SYSTEM	CU3092	Greene		809.869	Public Supply
GREENVILLE UTILITIES COMMISSION	CU3004	Pitt		439.664	Public Supply
H L RESPASS FARMS	CU1093	Washington	0.406		Irrigation, Agricultural
HANSON AGGREGATES SOUTHEAST (ELM CITY QUARRY)	CU3078	Wilson	2.160		Mine Dewatering
HANSON AGGREGATES SOUTHEAST (NEVERSON QUARRY)	CU3029	Wilson	1.634		Mine Dewatering
HANSON AGGREGATES SOUTHEAST (ROCKY MOUNT QUARRY)	CU3030	Edgecombe	2.160		Mine Dewatering
HARVEY FARMS	CU3040	Jones	2.225		Irrigation, Agricultural
HAUGEN COMPANY	CU3060	Onslow	1.728		Mine Dewatering
ISLAND FISHERIES	CU1091	Pamlico	2.592		Aquaculture
JIMMIE L. MORRIS & SONS, INC.	CU1118	Pamlico	0.450		Mine Dewatering
K & J SIMONS, LLC	CU3048	Beaufort	0.216		Aquaculture
KINSTON COUNTRY CLUB	CU3018	Lenoir		31.240	Irrigation, Golf Course
MANNING FARMS INC	CU1085	Washington	1.296		Irrigation, Agricultural
MARTIN CO. WATER & SEWER DISTRICT #1	CU3079	Martin		81.760	Public Supply
MARTIN COUNTY WATER & SEWER DISTRICT #2	CU1129	Martin	1.400		Public Supply
MARTIN MARIETTA (BELGRADE QUARRY)	CU3031	Jones	11.808		Mine Dewatering
MARTIN MARIETTA (CLARKS QUARRY)	CU3033	Craven	16.000		Mine Dewatering
MARTIN MARIETTA (FOUNTAIN QUARRY)	CU3034	Pitt	2.304		Mine Dewatering
MARTIN MARIETTA (WILSON QUARRY)	CU3035	Wilson	2.304		Mine Dewatering
MCCOTTER FARMS	CU1099	Pamlico	3.500		Irrigation, Agricultural
MINNESOTT GOLF AND COUNTRY CLUB	CU1023	Pamlico	0.300		Irrigation, Golf Course

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Permittee	Permit #	County	Permitted Ground Water Withdrawal (in MGD)	Approved Base Rate (in MGY)	Type of Use
MORRIS FISH FARM, LLC	CU3009	Craven	0.763		Aquaculture
NATIONAL SPINNING CO	CU1005	Beaufort	2.000		Industrial
NCDA TIDEWATER RESEARCH CENTER	CU1016	Washington	3.673		Irrigation, Agricultural, Aquaculture, Livestock
NCDOT (PITT CO. MAINTENANCE)	CU4014	Pitt	2.000		Mine Dewatering
NCDOT R-1030AA	CU4008	Wayne	3.600		Mine Dewatering
NCDOT R-1030AB	CU4007	Wayne	0.570		Mine Dewatering
NCDOT R-1030BB	CU4006	Wayne/Wilson	0.140		Mine Dewatering
NCDOT R-1030D	CU4011	Wilson			Mine Dewatering
NCDOT R-2001A	CU4009	Lenoir			Mine Dewatering
NCDOT R-2539A	CU4010	Pamlico			Mine Dewatering
NCDOT R-2548A	CU4002	Washington	5.496		Mine Dewatering
NCDOT R-2548BC	CU4003	Washington	1.440		Mine Dewatering
NCDOT R-2548D	CU4004	Washington	2.016		Mine Dewatering
NCDOT U-2107A/BC	CU4005	Onslow	2.484		Mine Dewatering
NCDOT U-2107D	CU4013	Onslow			Mine Dewatering
NCDOT U-3329	CU4012	Edgecombe	2.500		Mine Dewatering
NCSU PAMLICO AQUACULTURE FIELD LAB	CU1031	Beaufort	1.008		Aquaculture
NICE PIT	CU3038	Edgecombe	1.200		Other
NORTH STATE FISHERIES	CU1117	Beaufort	2.000		Aquaculture
ONE FISH, TWO FISH CATFISH LLC	CU1114	Beaufort	0.691		Aquaculture
ONSLow COUNTY WATER AND SEWER	CU3027	Onslow	11.461	1,339.381	Public Supply
PAMLICO COUNTY WATER SYSTEM	CU1125	Pamlico	2.210		Public Supply
PAMLICO PACKING CO INC	CU1034	Pamlico	0.517		Industrial
PARSON MINE	CU1028	Craven	0.720		Mine Dewatering
PAUL FARMS INC	CU1057	Pamlico	1.584		Irrigation, Agricultural
PCS PHOSPHATE CO	CU1003	Beaufort	78.000		Mine Dewatering
PCS PHOSPHATE CO	CU1007	Beaufort	8.000		Mine Dewatering
PERFECT TURF INC.	CU3045	Martin		14.904	Irrigation, Agricultural
PLYMOUTH FARMS, LLC	CU1018	Washington	2.880		Aquaculture
POCOSIN LAKES WILDLIFE REFUGE	CU1131	Washington	2.160		Waterfowl Impoundments
RICHARD G. STILLEY MINE	CU1124	Pamlico	0.600		Mine Dewatering
ROANOKE COUNTRY CLUB	CU3044	Martin	0.216		Irrigation, Golf Course
ROGERS NURSERY & LANDSCAPING, INC.	CU3056	Beaufort	0.720		Mine Dewatering
RON SAWYER	CU1127	Washington	0.504		Aquaculture
SELVIE JAMES	CU1104	Washington	0.504		Irrigation, Agricultural

Table 1. CCPCUA Permit Holders

Permittee	Permit #	County	Permitted Ground Water Withdrawal (in MGD)	Approved Base Rate (in MGY)	Type of Use
SMITH FARM OF VANCEBORO, LLC	CU3008	Craven	1.000		Aquaculture
SULLIVAN FISH FARM	CU1056	Beaufort	0.540		Aquaculture
SWINDELL FISH FARMS	CU1002	Beaufort	0.576		Aquaculture
T L HARRIS JR	CU1010	Washington	1.440		Irrigation, Agricultural
TOWN OF ATLANTIC BEACH	CU3057	Carteret	2.018		Public Supply
TOWN OF AURORA	CU1011	Beaufort	0.200		Public Supply
TOWN OF AYDEN	CU3026	Pitt		207.636	Public Supply
TOWN OF BEAUFORT	CU1015	Carteret	1.600		Public Supply
TOWN OF BELHAVEN	CU1008	Beaufort	1.000		Public Supply
TOWN OF BETHEL	CU3070	Pitt		58.333	Public Supply
TOWN OF BLACK CREEK	CU3059	Wilson	1.058		Public Supply
TOWN OF CHOCOWINITY	CU1051	Beaufort	0.500		Public Supply
TOWN OF CRESWELL	CU1046	Washington	0.288		Public Supply
TOWN OF ELM CITY	CU3067	Wilson	0.536		Public Supply
TOWN OF FAISON	CU3058	Duplin	1.674		Public Supply
TOWN OF GRIFTON	CU3049	Pitt		103.348	Public Supply
TOWN OF LA GRANGE	CU3003	Lenoir		141.355	Public Supply
TOWN OF LUCAMA	CU3041	Wilson	0.182		Public Supply
TOWN OF MAYSVILLE	CU3051	Jones	0.173		Public Supply
TOWN OF MOREHEAD CITY	CU1014	Carteret	2.500		Public Supply
TOWN OF MOUNT OLIVE	CU3020	Wayne	2.448		Public Supply
TOWN OF NEWPORT	CU1012	Carteret	0.923		Public Supply
TOWN OF ORIENTAL	CU1022	Pamlico	0.360		Public Supply
TOWN OF PINETOPS	CU3053	Edgecombe		119.609	Public Supply
TOWN OF PINK HILL	CU3021	Lenoir		35.190	Public Supply
TOWN OF PLYMOUTH	CU1001	Washington	0.735		Public Supply
TOWN OF RIVER BEND	CU3052	Craven	0.792		Public Supply
TOWN OF ROBERSONVILLE	CU3016	Martin		469.059	Public Supply
TOWN OF ROPER	CU1086	Washington	0.300		Public Supply
TOWN OF SNOW HILL	CU3072	Greene		233.372	Public Supply
TOWN OF VANCEBORO	CU1097	Craven	0.412		Public Supply
TOWN OF WILLIAMSTON	CU3066	Martin		339.326	Public Supply
US MARINE CORPS CHERRY POINT	CU1060	Craven	8.000		Public Supply
VANGUARD FARMS INC.	CU1106	Craven	3.000		Aquaculture
W.O. WHITE MINE	CU3017	Craven	1.080		Mine Dewatering
WARNER'S AQUAFARM	CU3007	Beaufort	0.288		Aquaculture
WASHINGTON COUNTY WATER SYSTEM	CU1113	Washington	1.000		Public Supply
WEYERHAEUSER COMPANY	CU1013	Craven	3.000		Industrial, Public Supply

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Permittee	Permit #	County	Permitted Ground Water Withdrawal (in MGD)	Approved Base Rate (in MGY)	Type of Use
WEYERHAEUSER PLYMOUTH PLANT	CU1120	Martin	3.540		Industrial
WHITE ROCK FISH FARM INC	CU1090	Craven	0.448		Aquaculture
WIGGINS FISH FARM	CU3042	Pitt	0.576		Aquaculture
WIGHT NURSERIES OF NORTH CAROLINA	CU3061	Lenoir		365.000	Irrigation, Agricultural
WORTHINGTON FARMS, INC.	CU3064	Pitt		117.022	Irrigation, Agricultural
Total Permitted Ground Water Withdrawals not subject to .0503:			345.521		□
Total Approved Base Rates:				8,316.726	□
Total number of active permits:		138			□

Table 1. CCPCUA Permit Holders

Table 2. CCPCUA Permit Applicants as August 20, 2004

Permit ID	Permittee	County	Permitted Amount (MGD)	ABR (MGY)	Application Received	Renewal / New Application	Type of Use
CU3076	BOGUE BANKS WATER CORPORATION	Carteret	0.000	0.000	01-29-2003	New	Public Supply
CU3090	WEST CARTERET WATER CORPORATION	Carteret	0.000	0.000	01-31-2003	New	Public Supply
CU3071	CITY OF NEW BERN	Craven	0.460	1,549.790	01-29-2003	New	Public Supply
CU3087	SPOTTED DOG FISH FARM	Craven	0.000	0.000	01-31-2003	New	Aquaculture
CU3108	CRAVEN COUNTY	Craven	0.000	0.000	04-16-2003	New	Public Supply
CU3011	DEAN'S SPECIALTY FOODS GROUP	Duplin	0.000	0.000	01-28-2003	New	Industrial
CU3013	TOWN OF WALLACE	Duplin	0.000	0.000	01-30-2003	New	Public Supply
CU3091	TOWN OF KENANSVILLE	Duplin	0.000	0.000	01-31-2003	New	Public Supply
CU3010	TOWN OF ROSE HILL	Duplin	0.000	0.000	02-03-2003	New	Public Supply
CU3068	RIVERSIDE SAND CO., INC.	Duplin	0.000	0.000	01-28-2003	New	Mine Dewatering
CU3085	TOWN OF WARSAW	Duplin	0.000	0.000	01-30-2003	New	Public Supply
CU3086	TOWN OF BEULAVILLE	Duplin	0.000	0.000	01-30-2003	New	Public Supply
CU3093	CIRCLE S FOODS INC. (WALLACE PLANT)	Duplin	0.000	0.000	02-03-2003	New	Industrial
CU3094	GUILFORD MILLS INC., GUILFORD EAST PLANT	Duplin	0.000	0.000	02-04-2003	New	Industrial
CU3099	TOWN OF GREENEVERS	Duplin	0.000	0.000	02-13-2003	New	Public Supply
CU3100	NATIONAL SPINNING CO., INC. (BEAULAVILLE PLANT)	Duplin	0.000	0.000	02-24-2003	New	Industrial, Public supply
CU3112	COLTON WELLS LIMESTONE	Duplin	0.000	0.000	07-14-2003	New	Mine Dewatering
CU3114	DUPLIN COUNTY REGIONAL WATER SYSTEM	DUPLIN	0.000	0.000	10-21-2003	New	Public Supply
CU3115	MAGNOLIA GOLF COURSE	DUPLIN	0.000	0.000	11-03-2003	New	Irrigation, Golf Course
CU3089	CONETOE COMMUNITY WATER ASSOCIATION, INC.	Edgecombe	0.000	0.000	01-31-2003	New	Public Supply
CU3095	HASSELL THIGPEN	Edgecombe	0.000	0.000	02-05-2003	New	Irrigation, Agricultural
CU3110	BARNHILL CONTRACTING COMPANY	Edgecombe	0.000	0.000	06-10-2003	New	Mine Dewatering
CU3036	MARTIN MARIETTA (POLLOCKSVILLE QUARRY)	Jones	0.000	0.000	01-27-2003	New	Mine Dewatering
CU3023	JONES COUNTY REGIONAL WATER SYSTEM	Jones	0.000	0.000	02-03-2003	New	Public Supply
CU3024	CITY OF KINSTON	Lenoir	0.000	2,545.027	01-28-2003	New	Public Supply
CU3025	NORTH LENOIR WATER CORP	Lenoir	0.000	813.550	02-10-2003	New	Public Supply
CU3039	SMITHFIELD PACKING CO., INC.	Lenoir	0.000	0.000	02-18-2003	New	Industrial, Public Supply
CU3022	E.I. DUPONT DE NEMOURS INC.	Lenoir	0.000	0.000	01-29-2003	New	Public Supply

Table 2. CCPCUA Permit Applicants

Permit ID	Permittee	County	Permitted Amount (MGD)	ABR (MGY)	Application Received	Renewal / New Application	Type of Use
CU3069	MCMURRAY FABRICS JAMESVILLE, INC.	Martin	0.000	0.000	01-28-2003	New	Industrial
CU3002	TOWN OF RICHLANDS	Onslow	0.000	0.000	02-05-2003	New	Public Supply
CU3005	NORTHWEST ONSLOW WATER ASSOCIATION	Onslow	0.000	0.000	01-31-2003	New	Public Supply
CU3032	MARTIN MARIETTA (ONSLOW QUARRY)	Onslow	0.000	0.000	01-27-2003	New	Mine Dewatering
CU3080	MARINE CORPS BASE, CAMP LEJEUNE	Onslow	0.000	0.000	01-29-2003	New	Public Supply
CU3109	SPENCER FARMS, INC.	Pamlico	0.000	0.000	05-21-2003	New	Irrigation, Agricultural
CU3088	STOKES REGIONAL WATER CORPORATION	Pitt	0.000	0.000	01-31-2003	New	Public Supply
CU3096	TOWN OF FARMVILLE	Pitt	0.000	0.000	02-05-2003	New	Public Supply
CU3097	E.R. LEWIS CONSTRUCTION CO. - GAYLORD MINE	Pitt	0.000	0.000	02-06-2003	New	Mine Dewatering
CU3104	GREENVILLE COUNTRY CLUB	Pitt	0.000	0.000	03-25-2003	New	Irrigation, Golf Course
CU3111	SEXTON FARM	Washington	0.000	0.000	06-24-2003	New	Irrigation, Agricultural
CU3001	FORK TOWNSHIP SANITARY DISTRICT	Wayne	0.000	294.826	01-30-2003	New	Public Supply
CU3006	SOUTHEASTERN WAYNE SANITARY DISTRICT	Wayne	1.901	168.290	01-30-2003	New	Public Supply
CU3082	BELFAST-PATETOWN SANITARY DISTRICT	Wayne	0.000	311.619	01-30-2003	New	Public Supply
CU3081	EASTERN WAYNE SANITARY DISTRICT	Wayne	0.000	677.861	01-30-2003	New	Public Supply
CU3083	NORTHWESTERN WAYNE SANITARY DISTRICT	Wayne	0.000	90.966	01-30-2003	New	Public Supply
CU3084	SOUTHWESTERN WAYNE SANITARY DISTRICT	Wayne	0.504	0.000	01-30-2003	New	Public Supply
CU3098	JERICHO FARMS	Wayne	0.000	0.000	02-06-2003	New	Irrigation, Agricultural
CU3106	SOUTHERN WAYNE SANITARY DISTRICT	WAYNE	0.000	0.000	02-13-2004	New	Public Supply
CU3107	MT. OLIVE PICKLE COMPANY	Wayne	0.000	0.000	04-16-2003	New	Industrial
CU3101	TOWN OF STANTONSBURG	Wilson	0.000	0.000	02-25-2003	New	Public Supply
CU3103	ZELENKA CARO-GREEN NURSERY	Wilson	0.000	0.000	03-24-2003	New	Irrigation, Agricultural
CU3113	OLD SARATOGA, INC.	Wilson	0.000	0.000	08-05-2003	New	Industrial

Table 2. CCPCUA Permit Applicants

Table 3. CCPCUA Registrations for 2002

Registration	ID	County	Number of Days Used	Average Daily Use (in MGD)	Maximum Daily Use (in MGD)	Surface or Ground Water	Type of Use
NCSU Pamlico Aquaculture Field Lab	CUR0060	Beaufort	192	0.276	0.288	S	Aquaculture
River Road Estate MHP	CUR0006	Beaufort	365	0.044	0.060	G	Public Water System
Twin Lakes Campground	CUR0004	Beaufort	365	0.009	0.072	G	Public Water System
Whitley's MHP	CUR0005	Beaufort	365	0.006	0.018	G	Public Water System
Bryan Farms Pit	CUR0007	Carteret	6	0.020	0.020	G	Temporary Dewatering
Coastal USA Fish Company	CUR0061	Carteret	90	1.512	1.512	S	Aquaculture
Goose Creek Resort	CUR0031	Carteret	365	0.019	0.098	G	Public Water System
Mann Village MHP	CUR0032	Carteret	365	0.013	0.054	G	Public Water System
Newport Ridge MHP	CUR0033	Carteret	365	0.007	0.016	G	Public Water System
Ocean Spray	CUR0030	Carteret	365	0.012	0.028	G	Public Water System
Salter Path Camp Ground, Inc.	CUR0038	Carteret	261	0.011	0.019	G	Public Water System
Seagate I	CUR0023	Carteret	365	0.017	0.035	G	Public Water System
Seagate IV	CUR0024	Carteret	365	0.005	0.006	G	Public Water System
Snug Harbor on Nelson Bay	CUR0008	Carteret	153	0.008	0.016	G	Public Water System
Carolina Pines Golf Club	CUR0044	Craven	59	0.020	0.038	G	Golf Course Irrigation
Cieszko Construction Company, Inc.	CUR0025	Craven	4	1.000	1.200	S	Mining
National Council for Air and Stream Improvement	CUR0059	Craven	203	0.530	0.880	S	Other, Aquatic and Biological Studies
NCASI Southeastern Aquatic Biology Facility	CUR0002	Craven	356	0.520	0.880	S	Other, Aquatic Productivity Research
Weyerhaeuser	CUR0052	Craven	359	17.377	23.830	S	Industrial, Public Water System
National Spinning Co. Inc.	CUR0021	Duplin	365	0.028	0.082	G	Industrial, Public Water System
Old Courthouse Nursery LLC	CUR0037	Duplin	226	0.051	0.072	G	Agricultural Irrigation
Town of Calypso	CUR0029	Duplin	365	0.071	0.098	G	Public Water System
Silas Smith Farms	CUR0014	Edgecombe	30	4.426	5.295	S	Agricultural Irrigation
Town of Tarboro Water Treatment Plant	CUR0015	Edgecombe	365	2.376	3.651	S	Public Water System
Winstead Mobile Terrace	CUR0026	Edgecombe	184	0.011	0.017	G	Public Water System
Harris Farms	CUR0013	Greene	95	2.092	2.260	S	Agricultural Irrigation

Table 3. CCPCUA Registrations for 2002

Registration	ID	County	Number of Days Used	Average Daily Use (in MGD)	Maximum Daily Use (in MGD)	Surface or Ground Water	Type of Use
Jason-Shine Water Corporation	CUR0027	Greene	365	0.049	0.096	G	Public Water System
Town of Hookerton	CUR0017	Greene	200	0.037	0.051	G	Public Water System
Bear Grass Water Department	CUR0010	Martin	365	0.010	0.012	G	Public Water System
Copeland Farms	CUR0009	Martin	30	2.448	36.720	S	Agricultural Irrigation
Perfect Turf Inc.	CUR0045	Martin	80	0.258	0.272	S	Agricultural Irrigation
Town of Hamilton	CUR0034	Martin	365	0.035	0.068	G	Public Water System
Town of Jamesville	CUR0028	Martin	365	0.040	0.125	G	Public Water System
Weyerhaeuser	CUR0053	Martin	335	53.970	83.260	S	Industrial
Beacham Apartments #1	CUR0040	Onslow	365	0.021	0.060	G	Public Water System
Beacham Apartments #2	CUR0039	Onslow	365	0.036	0.078	G	Public Water System
Sherwood MHP	CUR0012	Onslow	363	0.042	0.131	G	Public Water System
Adams Sand Mine	CUR0016	Pamlico	44	0.074	0.090	G	Mining
Greenville Utilities Commission Water Treatment Plant	CUR0064	Pitt	365	10.470	14.573	S	Public Water System
Hudson Bros. Fish Farm	CUR0011	Pitt	28	0.086	0.086	G	Aquaculture
JP Davenport & Son	CUR0018	Pitt	30	2.376	2.376	S	Agricultural Irrigation
Laughinghouse Farms, Inc.	CUR0020	Pitt	49	0.098	0.098	G	Agricultural Irrigation
Town of Grimesland	CUR0003	Pitt	364	0.045	0.099	G	Public Water System
Weyerhaeuser Greenville Lumber Facility	CUR0019	Pitt	365	0.233	0.331	G	Industrial
Town of Creswell	CUR0058	Washington	1	8.160	8.160	S	Public Water System, Other, Flood Control
Bruton Nurseries	CUR0041	Wayne	181	0.005	0.010	G	Agricultural Irrigation
Claridge State Forest Nursery	CUR0048	Wayne	142	0.297	0.344	S	Other, Forest Tree Seedling Nursery
Goldsboro Water Treatment Plant	CUR0062	Wayne	365	5.948	9.174	S	Public Water System
H. F. Lee Steam Electric Plant	CUR0001	Wayne	280	22.798	31.680	S	Industrial
Walnut Creek Country Club	CUR0050	Wayne	227	0.447	0.711	S	Golf Course Irrigation
City of Wilson Water Treatment Plant	CUR0063	Wilson	365	9.098	13.179	S	Public Water System
Dean's Farm Market, Inc.	CUR0047	Wilson	54	0.301	0.600	S	Agricultural Irrigation
Fresh Pik Produce Inc.	CUR0046	Wilson	253	0.350	0.407	S	Agricultural Irrigation

Table 3. CCPCUA Registrations for 2002

Registration	ID	County	Number of Days Used	Average Daily Use (in MGD)	Maximum Daily Use (in MGD)	Surface or Ground Water	Type of Use
Old Saratoga, Inc.	CUR0022	Wilson	365	0.050	0.098	G	Industrial
Sharp Farms, Inc.	CUR0043	Wilson	39	6.192	7.500	S	Agricultural Irrigation
Sharp Farms, Inc.	CUR0042	Wilson	365	0.005	0.005	G	Livestock
Town of Saratoga	CUR0036	Wilson	365	0.042	0.111	G	Public Water System
Town of Sims	CUR0035	Wilson	363	0.019	0.053	G	Public Water System
Wilson Country Club, Inc.	CUR0049	Wilson	195	0.491	0.650	S	Golf Course Irrigation
Total Average Daily Registered Water Withdrawals:				154.995			
Total Average Daily Registered Ground Water Withdrawals:				1.281			
Total Average Daily Registered Surface Water Withdrawals:				153.715			
Total number of active registrations:		59					

Table 3. CCPCUA Registrations for 2002

Table 4. CCPCUA Registrations in 2003

Registration	ID	County	Number of Days Used	Average Daily Use (in MGD)	Maximum Daily Use (in MGD)	Surface or Ground Water	Type of Use
Twin Lakes Campground	CUR0004	Beaufort	365	0.008	0.036	G	Public Water System
Hunting Estates MHP	CUR0057	Carteret	365	0.008	0.025	G	Public Water System
Mann Village MHP	CUR0032	Carteret	365	0.021	0.038	G	Public Water System
Newport Ridge MHP	CUR0033	Carteret	365	0.007	0.020	G	Public Water System
NCASI Southeastern Aquatic Biology Facility	CUR0002	Craven	359	0.318	0.816	S	Other, Aquatic Productivity Research
Weyerhaeuser	CUR0052	Craven	31	16.650	21.060	S	Industrial, Public Water System
Linwood A. Webb Farms	CUR0056	Edgecombe	59	2.143	3.744	S	Agricultural Irrigation
Town of Tarboro Water Treatment Plant	CUR0015	Edgecombe	365	2.547	3.244	S	Public Water System
Winstead Mobile Terrace	CUR0026	Edgecombe	365	0.013	0.026	G	Public Water System
Town of Jamesville	CUR0028	Martin	365	0.040	0.076	G	Public Water System
Weyerhaeuser	CUR0053	Martin	304	55.240	86.930	S	Industrial
Adams Sand Mine	CUR0016	Pamlico	16	0.067	0.085	G	Mining
Lance Mining & Trucking Pit	CUR0051	Pitt	20	0.037	0.066	G	Mining
Weyerhaeuser Greenville Lumber Facility	CUR0019	Pitt	362	0.084	0.097	G	Industrial
Town of Creswell	CUR0058	Washington	40	17.376	24.480	S	Public Water System, Other, Flood Control
H. F. Lee Steam Electric Plant	CUR0001	Wayne	280	22.798	31.680	S	Industrial
Total Average Daily Registered Water Withdrawals:				117.359	□		
Total Average Daily Registered Ground Water Withdrawals:				0.286	□		
Total Average Daily Registered Surface Water Withdrawals:				117.073	□		
Total number of active registrations:		16	□				

Table 4. CCPCUA Registrations in 2003

Table 5. Missing CCPCUA Applications or Registrations

Missing CCPCUA Applications or Registrations (depending on withdrawal rate)

Craven

- Town of Dover

Duplin

- Town of Magnolia

Edgecombe

- Town of Whitakers
- Town of Princeville

Martin

- Town of Oak City
- Town of Everetts
- Town of Parmele

Onslow

- Town of Swansboro
- Town of Holly Ridge
- Scientific Water and Sewage, Inc.

Pitt

- Town of Fountain
- Town of Winterville

Wayne

- Town of Pikeville
- Town of Fremont
- Southern Wayne Sanitary District
- Town of West Mount Olive
- Community of Walnut Creek

Registrations are missing in table 4. Facilities were registered in 2002 (table 3) but not in 2003 (table 4). DWR will do a mailing before the end of 2004 to boost 2003 registration response and future year registrations.

Table 6. 2002 and 2003 Reported Average Daily Withdrawals Aggregated by County (Gallons per Day)

2002

County	Ground Water			Surface Water	
	by permit**	by registration	by survey	by registration	by survey
Beaufort	62,866,000	58,486	141,112	145,414	0
Carteret	5,705,000	85,154	*	372,822	*
Craven	17,800,000	3,182	*	17,904,899	*
Duplin	5,751,000	130,830	1,522,988	0	*
Edgecombe	430,000	5,402	*	2,739,617	*
Greene	1,704,000	69,283	155,745	544,493	0
Jones	2,831,000	0	282,305	0	0
Lenoir	7,304,000	0	71,038	0	226,432
Martin	2,868,000	84,824	42,764	49,792,297	*
Onslow	10,541,000	99,761	51,408	0	216,298
Pamlico	1,757,000	8,904	*	0	*
Pitt	5,996,000	297,217	185,549	10,665,529	697,581
Washington	4,837,000	0	171,355	22,356	0
Wayne	4,938,000	2,679	490,080	23,830,684	133,016
Wilson	2,147,000	116,974	14,990	10,308,808	856,990
Total	137,475,000	962,696	3,139,771	116,326,919	10,273,306

* Department of Agriculture nondisclosure policy -- one facility is greater than 60% of total or there are less than three facilities

** 134 applicants and permit holders reporting

2003

County	Ground Water			Surface Water	
	by permit***	by registration	by survey	by registration	by survey
Beaufort	62,715,000	8,018	*	0	*
Carteret	5,163,000	36,081	*	0	*
Craven	22,812,000	0	*	1,727,316	*
Duplin	4,381,000	0	1,789,350	0	77,872
Edgecombe	1,007,000	13,494	*	2,893,222	*
Greene	1,559,000	0	224,390	0	*
Jones	8,140,000	0	241,624	0	0
Lenoir	6,000,000	0	69,980	0	*
Martin	2,363,000	40,275	*	46,008,373	*
Onslow	21,173,000	0	125,046	0	*
Pamlico	1,333,000	2,937	*	0	*
Pitt	5,883,000	84,872	103,500	0	*
Washington	5,230,000	0	194,435	1,904,259	0
Wayne	5,406,000	0	421,782	17,489,096	*
Wilson	1,153,000	0	*	0	*
Total	154,318,000	185,677	3,218,679	70,022,266	4,316,967

* Department of Agriculture nondisclosure policy -- one facility is greater than 60% of total or there are less than three facilities

*** 153 applicants and permit holders reporting

Number of registrations were significantly lower in 2003 because people did not understand annual nature of registration. DWR will do mailing before the end of 2004 to boost response.

Table 7. 2002 and 2003 Reported Average Daily Withdrawals Aggregated by Type of Use (Gallons per Day)

2002

Type of Use	Ground Water			Surface Water	
	by permit **	by registration	by survey	by registration	by survey
Agricultural	9,392,000	58,720	3,139,771	3,745,775	10,273,306
Industrial	4,100,000	311,441		84,115,229	
Irrigation, Golf Course	564,000	3,182		540,759	
Mine Dewatering	66,074,000	8,904		10,959	
Public Supply	57,347,000	580,121		27,891,841	
Other		329		22,356	
Total	137,477,000	962,697	3,139,771	116,326,919	10,273,306

* Department of Agriculture nondisclosure policy -- one facility is greater than 60% of total or there are less than three facilities

** 134 applicants and permit holders reporting

2003

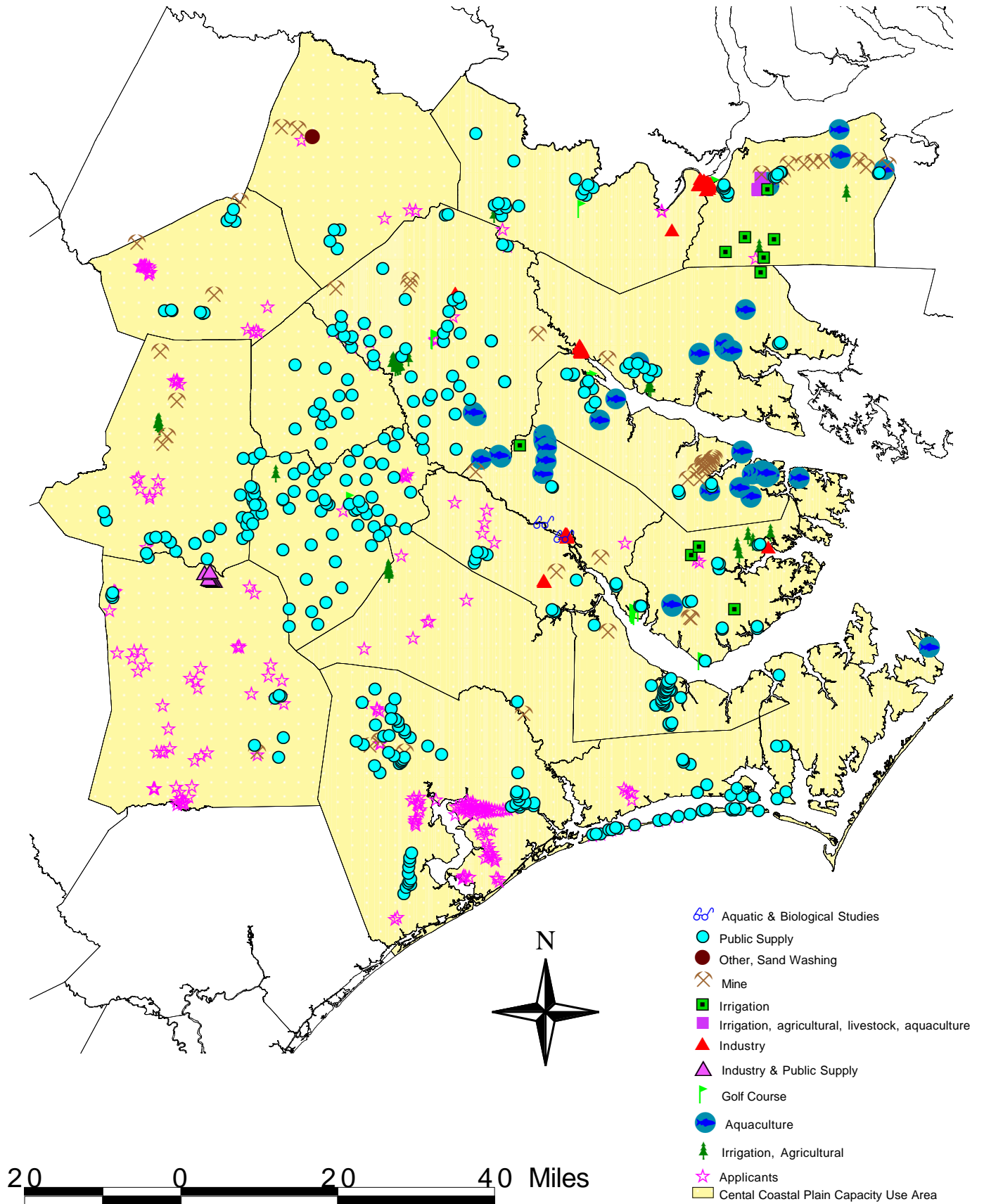
Type of Use	Ground Water			Surface Water	
	by permit ***	by registration	by survey	by registration	by survey
Agricultural	4,087,000	0	3,218,679	659,568	4,316,967
Industrial	4,706,000	82,838		64,911,605	
Irrigation, Golf Course	410,000	0		0	
Mine Dewatering	88,945,000	4,972		0	
Public Supply	55,997,000	97,867		2,546,833	
Other	172,000	0		1,904,259	
Total	154,317,000	185,677	3,218,679	70,022,265	4,316,967

* Department of Agriculture nondisclosure policy -- one facility is greater than 60% of total or there are less than three facilities

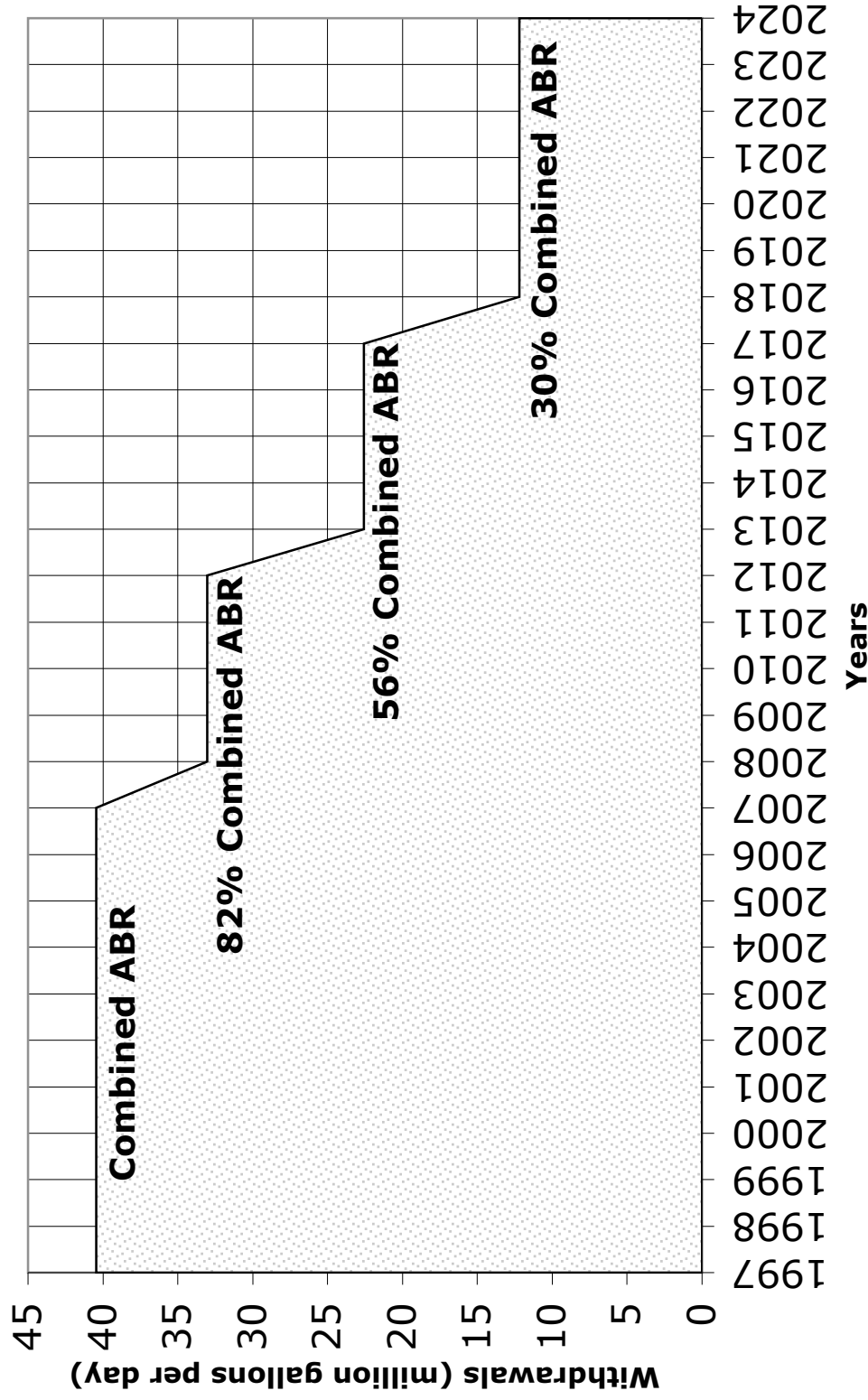
*** 153 applicants and permit holders reporting

The number of registrations were significantly lower in 2003 because people did not understand annual nature of registration. DWR will do mailing before the end of 2004 to boost response.

Figure 4. Central Coastal Plain Capacity Use Area All Wells by Types of Use



**Figure 5. Cretaceous Aquifer Withdrawals
Three Phases of Reduction**



• As of August 20, 2004 29 of 45 permits requiring ABR calculations have been issued

Figure 6. 2003 Potentiometric Surface of the Upper Cape Fear Aquifer (state plane meter coordinates, contour elevations in feet above or below mean sea level, contour interval = 10 feet)

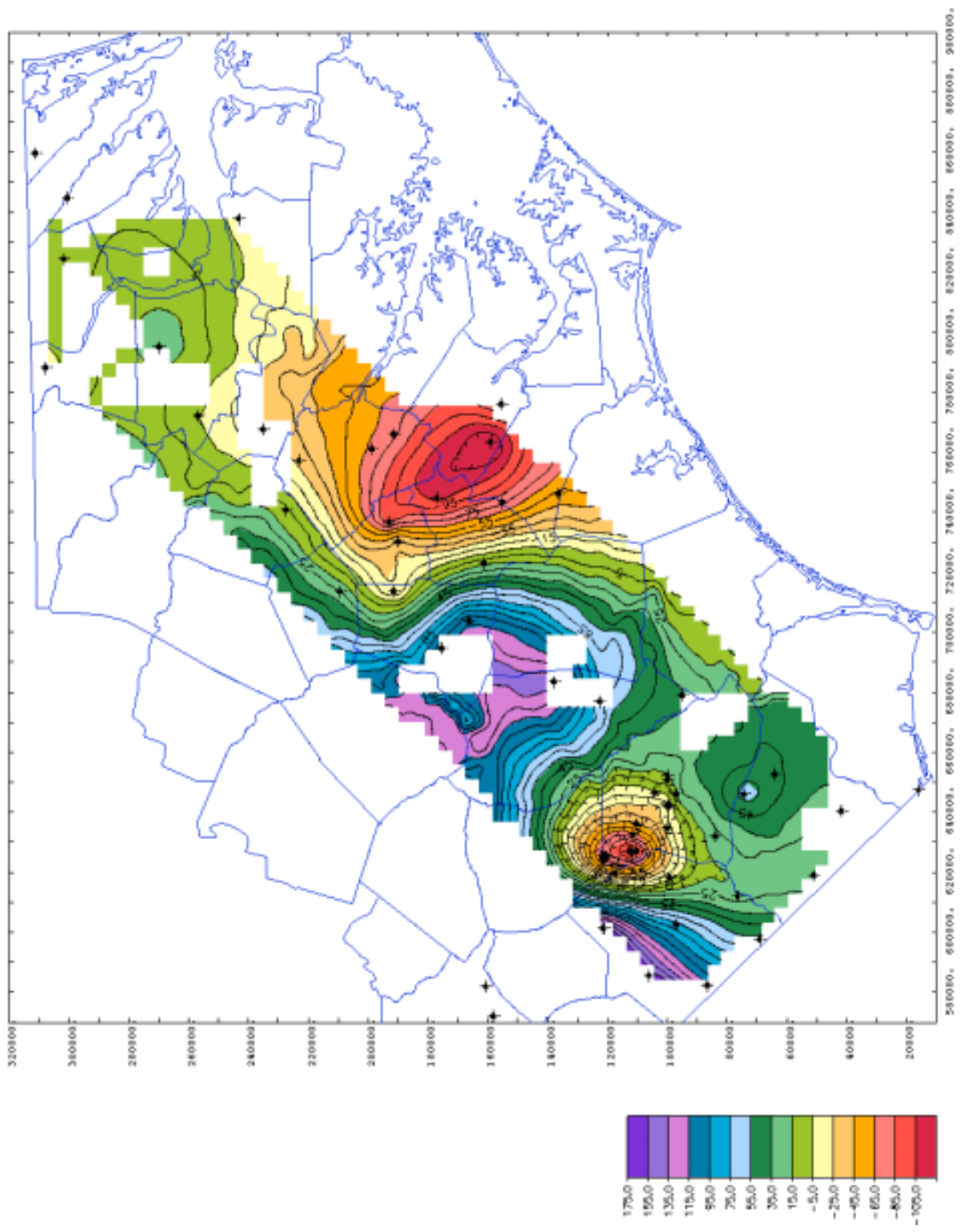


Figure 7. Example Monitoring Well Hydrograph from Web Site

Field	Data
County	Jones
USGS ID	345809077301404
Latitude	34.969429
Longitude	-77.503222
Location Accuracy	GPS
Quad (link to framework)	U 26J4
Netname (link to USGS data)	NC-172
Name (link to logs)	Comfort
Aquifer	Black Creek
Land Surface	68.00
Date Constructed	08/15/1979
Stickup, 08/03/2004	0.68
Depth	545.00
Diameter	6.00
Yield	75.00
Exists?	Y
Recorder Box?	Y
Top of Screen	506.00
Bottom of Screen	545.00
Number of Water Levels {date * feet below land surface * elevation}	541
Number of Chlorides {date * chlorppm * spcond_us * salin_ppt} 06/25/1998 to 11/01/2000	3

output files are tab-delimited text

DWR Monitoring Database Detail for U 26J4

[Show Map](#)
[Monthly Statistics Plot](#)

541 water level data points plotted

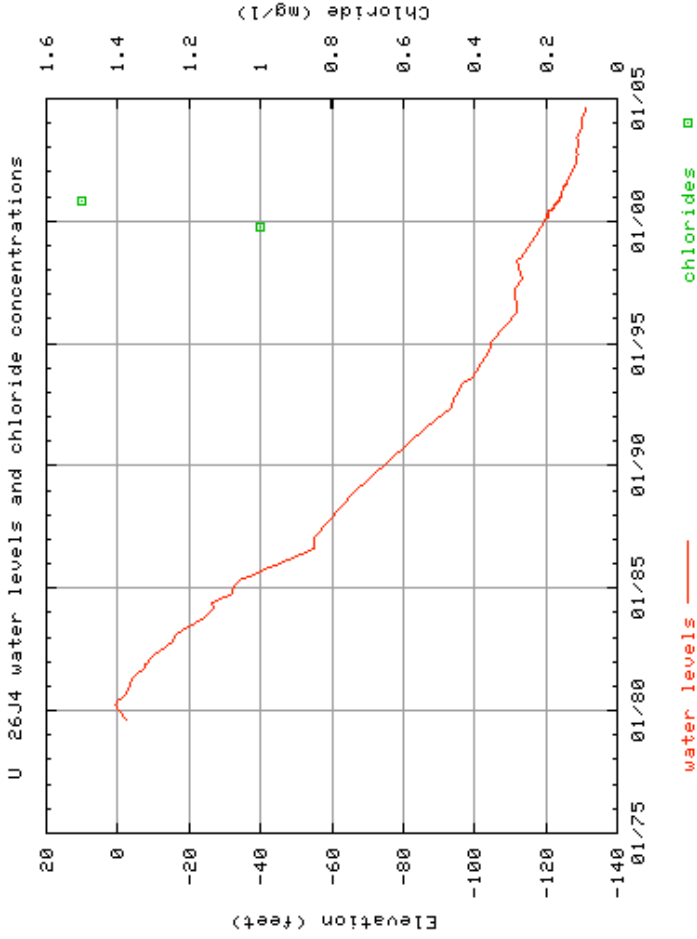


Figure 8. Division of Water Resources Monitoring Stations with Automatic Recorders Indicated on Wells August 2004

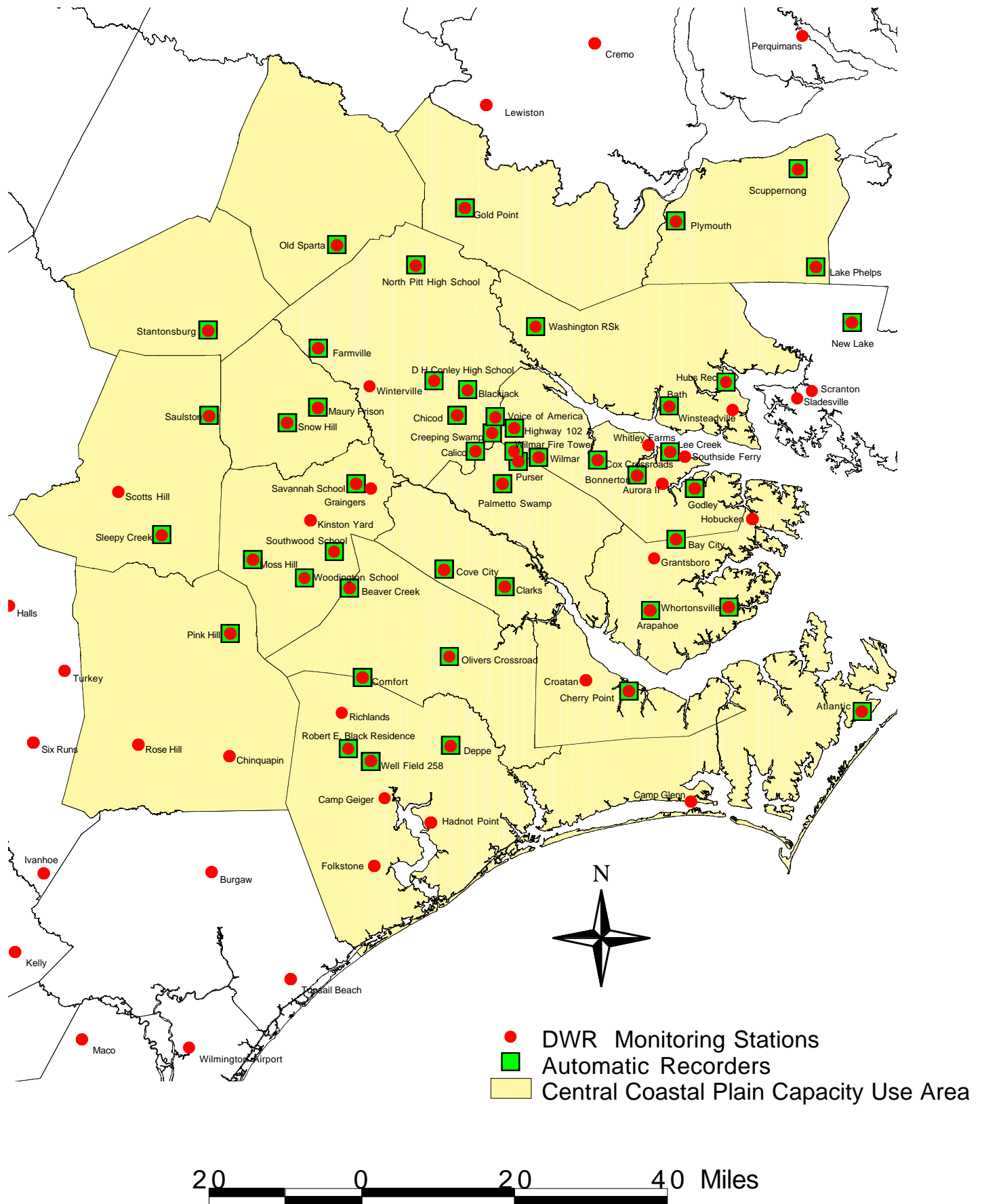


Figure 9. Division of Water Resources Black Creek & Upper Cape Fear Aquifer Monitoring Stations

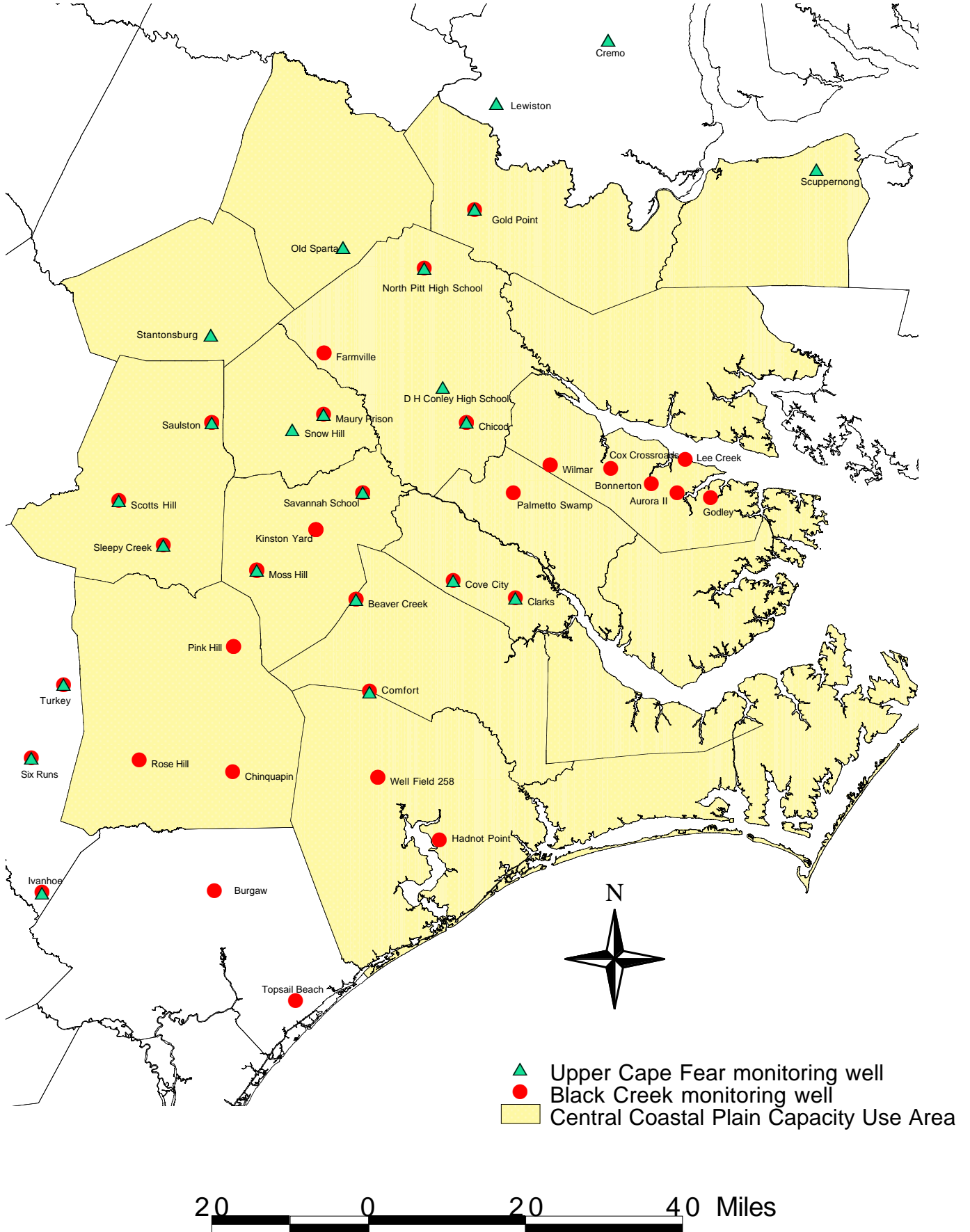


Figure 10. Castle Hayne Aquifer Map (state plane meter coordinates, contour elevations in feet above and below mean sea level)

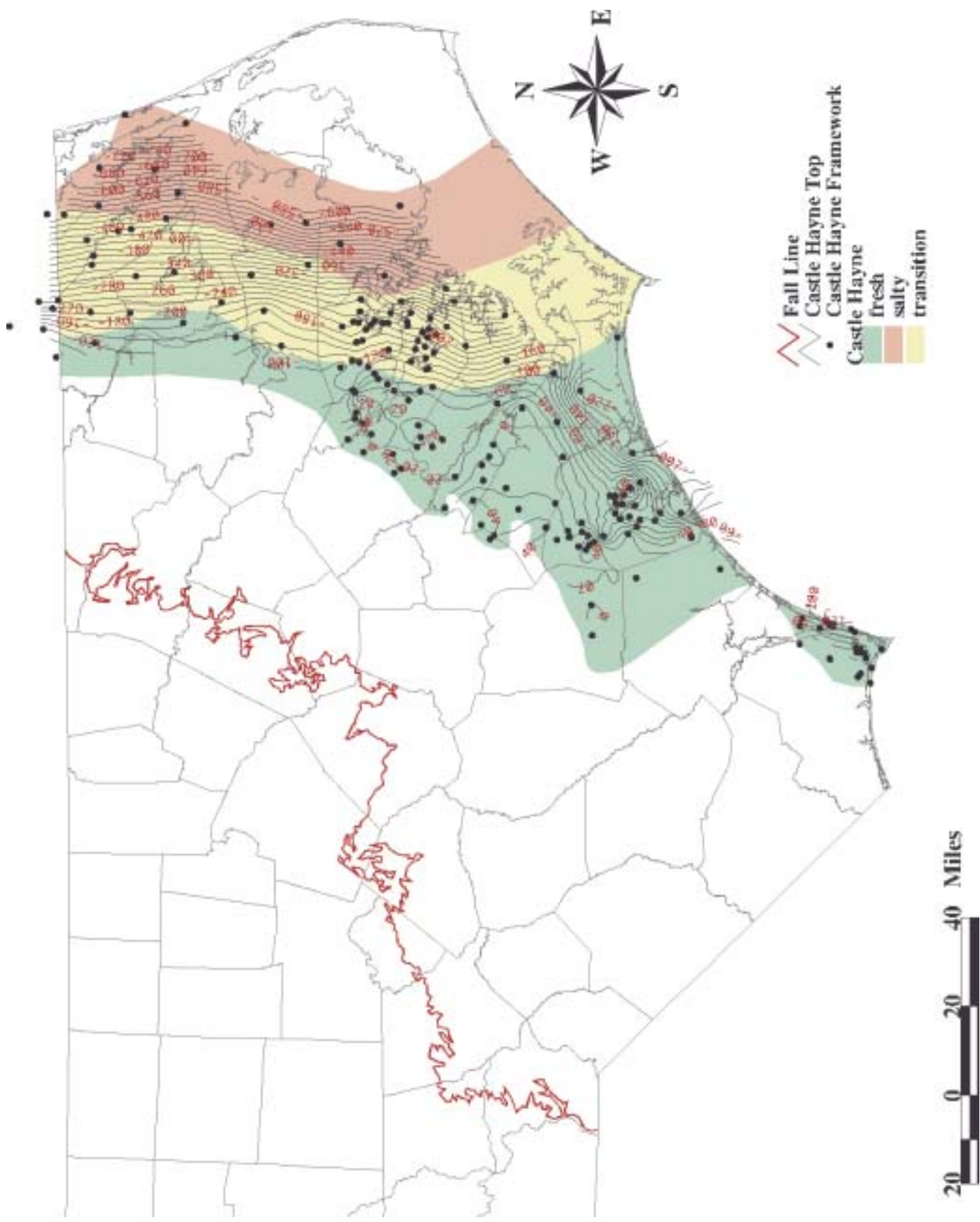


Figure 11. Peedee Aquifer Map (state plane meter coordinates, contour elevations in feet above and below mean sea level)

