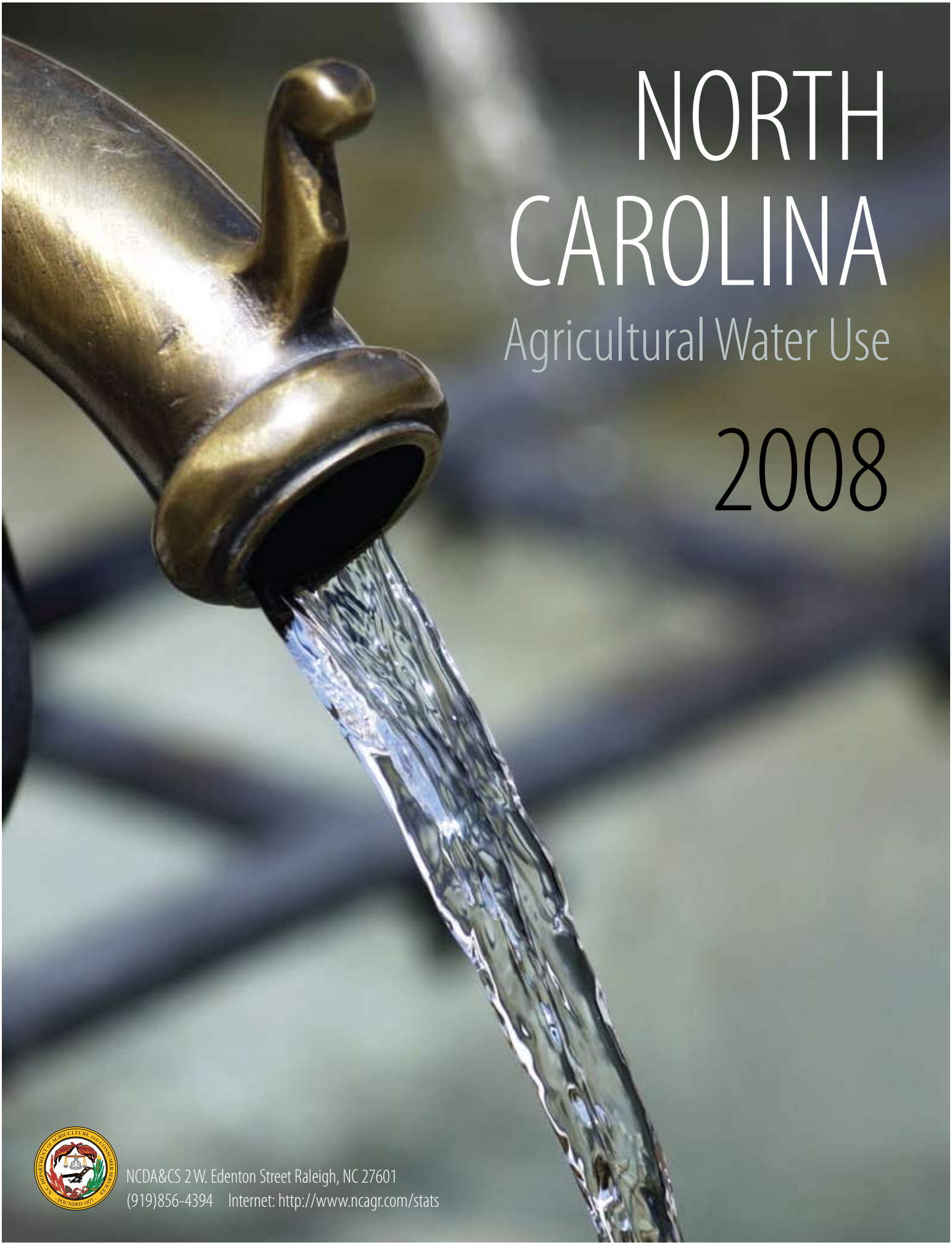

NORTH CAROLINA

Agricultural Water Use

2008

NCDA&CS 2 W. Edenton Street Raleigh, NC 27601
(919)856-4394 Internet: http://www.ncagr.com/stats

NORTH CAROLINA
2008 Agricultural Water Use Survey

The first statewide survey was conducted to document water use for the agricultural sector during 2008. As directed in legislation enacted in 2008 (SL2008-0143), the North Carolina Department of Agriculture and Consumer Services, Agricultural Statistics Division, is required to collect annual information from farmers who withdraw 10,000 gallons or more in any one day. Individual responses remain confidential and are only used in combination with other reports to produce county totals.

Farmers who use over 1,000,000 gallons in any one day are required to report their water usage directly to the Department of Environment and Natural Resources (DENR). DENR's report can be found on http://www.ncwater.org/Water_Withdrawals/ResultsTabJS?tab=data.

When looking at agricultural water use from a total volume withdrawn perspective, table 1 on page 3 is most representative of total water use. Because farms that withdraw the largest amounts of water do not make those withdrawals every day, the average daily use across all 365 days of the year is most representative of relative volumes used. On average, farm operations that use irrigation will withdraw water about 12-16 days each month. Field crop operations use water even less often, primarily to supplement rainfall. Western states rely on irrigation more frequently and in larger volumes throughout the year. To help put North Carolina water use in perspective, there were about 160,000 acres of farm land irrigated in 2008, compared to nearly 9 million total acres of land in farms. While there are other agricultural users of water, including livestock and poultry producers, aquaculture farms, and others, the largest volume of water use is from irrigators. The average North Carolina farm that uses water does so infrequently and in relatively small amounts. Table 2 displays "demand" use, which is calculated by dividing the total water withdrawn for the month by the days applied.

The results of this survey reflect water withdrawals from ground and surface sources. Many comparisons across sectors will incorporate an estimate of consumptive use of withdrawals. The definition of a consumptive use varies depending on the source. Most experts in agricultural sciences consider consumptive use to be the amount of water that is either taken up by plants, or evaporated. According to an Economic Research Service (USDA) report, irrigation consumptive use on farms is about 61 percent of total withdrawals nationally. This can vary greatly between regions depending on the type of system used and efficiency of the irrigation equipment.

Caution should be used when comparing the survey data within this report to other sources of water use statistics. For example, the data represented in this report reflects water use down to the 10,000 gallon per day threshold. Water use withdrawal data from the North Carolina Department of Environment and Natural Resources generally represents users of 100,000 gallons per day and higher.

Of the farms surveyed in the state, 1498 withdrew over 10,000 gallons of water in any one day. Extreme and severe drought conditions plagued the state through early April and then vacillated between moderate to severe levels through the end of September before improving to abnormally dry ratings throughout the end of the year. July was the largest water use month in 2008, averaging 183.5 million gallons daily, with a maximum daily withdrawal of 436.4 million gallons. The annual average daily water use for 2008 was 70.5 million gallons. The daily withdrawal capacity for the 1498 operations totals 1162.7 million gallons in 2008.

A questionnaire was mailed to operations which had potential for large water usage. Operations that did not respond were contacted by telephone follow-up. In addition, contractors in the state were contacted by email, phone, or mail.

The total number of operations by type, the annual average daily ground and surface demand usage, as well as the capacity is published by county and by hydrologic use codes (HUC). The type of operations will not add to the total in all counties or HUCs, because some operations had irrigated cropland and livestock. The capacity is the potential amount of ground and/or surface water that could be utilized in a 24-hour period. The published capacity represents the sum of capacities for all reporting operations in that county or HUC. In nearly all cases, this capacity was never met. Data was not disclosed if there were less than three operations in any category or if one report comprised 60 percent or more of the total.

One survey instrument was used to gather data for the whole state as well as for the Central Coastal Plain Capacity Use Area (CCPCUA). Results for the CCPCUA are summarized and published in a separate table. Caution should be used in comparing the 2008 summary with prior year summaries due the impact of a more comprehensive source of names, primarily from the 2007 Census of Agriculture.

Table 1: Total & Average Daily Water Withdrawn [1]
2008 North Carolina Water Use by Month

Month	# Operations	Monthly Total Ground	Monthly Total-Surface	Average Across All Days-Ground	Average Across All Days-Surface
	(count)	*(gallons)*	*(gallons)*	*(gallons)*	*(gallons)*
January	844	366,976,523	219,751,635	11,837,952	7,088,762
February	858	362,172,499	218,688,050	12,934,732	7,810,288
March	907	451,170,758	621,280,327	14,553,895	20,041,301
April	1,060	588,388,467	908,445,100	19,612,949	30,281,503
May	1,165	768,218,651	1,453,611,599	24,781,247	46,890,697
June	1,397	1,270,987,469	3,314,635,093	42,366,249	110,487,836
July	1,513	1,343,510,973	4,345,408,077	43,339,064	140,174,454
August	1,349	1,089,035,392	3,595,927,024	35,130,174	115,997,646
September	1,055	683,525,032	1,704,887,616	22,784,168	56,829,587
October	950	598,282,869	661,769,166	19,299,447	21,347,392
November	858	398,253,417	326,007,153	13,275,114	10,866,905
December	797	361,739,277	217,956,778	11,669,009	7,030,864
Annual Average				**22,632,000**	**47,903,936**

Operations [2]:

1,498 Total Operations
751 Livestock
801 Irrigation
54 Aquaculture

Daily Withdrawal Capacity (incl. ground & surface):
1,162,654,576 (gallons)

[1] Users of 10,000 gallons or more per day. Averages reported in this table reflect the average water withdrawn across all days of the month. Does not include farms that have reported their withdrawals directly to DENR by July 1, 2009. [2] The type and monthly number of operations will not add to the total. Some operations reported multiple types and others reported both surface and ground water.

Table 2: Demand Use for Days Applied [1]
2008 North Carolina Water Use by Month

Month	Average Days Applied Ground	Average Days Applied Surface	Total Avg. Daily-Ground	Total Avg. Daily-Surface	Total Max Daily-Ground	Total Max Daily-Surface
	(days)	*(days)*	*(gallons)*	*(gallons)*	*(gallons)*	*(gallons)*
January	29	16	15,437,944	18,486,355	19,528,901	19,431,981
February	25	15	17,311,332	20,899,000	22,684,899	21,954,354
March	26	16	26,278,661	65,908,847	32,368,802	86,447,733
April	26	15	36,143,817	92,745,073	49,665,894	121,191,087
May	25	16	49,639,222	131,254,942	64,835,011	153,263,997
June	26	16	76,938,479	241,306,416	92,052,359	288,838,822
July	26	16	79,529,803	285,904,645	98,291,558	338,158,068
August	26	17	64,109,829	228,946,521	77,541,215	268,598,601
September	26	18	44,301,488	113,466,308	55,099,503	130,094,975
October	27	19	38,302,748	55,607,710	46,822,267	62,429,006
November	27	17	22,028,747	23,629,452	38,379,422	27,995,723
December	27	17	19,103,207	18,612,536	24,453,088	21,583,812
Annual Average			**40,760,440**	**108,063,984**		

[1] Users of 10,000 gallons or more per day. Averages reported in this table reflect the average water withdrawn during the days of application. Does not include farms that have reported their withdrawals directly to DENR by July 1, 2009.

2008 North Carolina Water Use - County Summary

County	Unique Operations[1]	Livestock Operations	Irrigation Operations	Aquaculture Operations	Annual Average Daily Ground	Annual Average Daily Surface	Capacity
	(count)	*(count)*	*(count)*	*(count)*	*(gallons)*	*(gallons)*	*(gallons)*
Alamance	17	5	14	*	*	483,178	14,670,800
Alexander	10	8	3	*	102,535	*	414,680
Anson	14	13	*	*	75,028	*	754,400
Beaufort	12	*	3	7	2,214,258	*	7,813,680
Bertie	21	13	9	*	243,567	6,488,324	53,303,233
Bladen	44	24	21	*	4,636,302	7,446,163	170,327,857
Cabarrus	6	*	4	*	32,470	*	412,340
Caldwell	11	*	9	*	*	291,629	2,598,400
Caswell	17	*	16	*	*	1,153,511	7,495,000
Catawba	12	3	10	*	216,178	772,895	7,806,080
Chatham	18	12	6	*	87,326	*	1,682,960
Chowan	14	*	14	*	88,867	2,405,893	18,068,257
Cleveland	11	6	5	*	70,354	19,108	1,667,400
Columbus	18	13	6	*	291,615	*	3,143,668
Craven	10	*	5	4	295,900	*	2,554,200
Cumberland	16	6	11	*	345,633	590,423	12,941,300
Duplin	102	92	12	*	2,066,928	1,559,348	38,034,822
Edgecombe	19	7	14	*	24,693	3,181,076	20,309,140
Franklin	28	*	26	3	*	3,442,972	53,699,760
Gates	5	3	*	*	30,169	*	62,000
Granville	20	4	19	*	*	1,060,772	21,293,400
Greene	22	13	11	*	142,685	620,946	9,107,457
Guilford	18	*	17	*	233,222	899,733	10,995,520
Harnett	31	15	15	*	60,115	583,057	6,588,700
Haywood	10	*	10	*	*	328,833	3,502,220
Henderson	15	3	13	*	*	777,286	5,522,000
Hertford	15	8	8	*	291,298	1,505,471	20,401,463
Hoke	8	5	3	*	71,945	*	9,002,000
Iredell	14	9	9	*	126,799	468,448	5,026,395
Jackson	3	8	3	*	*	41,895	154,000
Johnston	52	16	37	*	656,629	3,265,314	30,719,124
Jones	11	10	*	*	85,512	*	1,119,600
Lee	14	4	12	*	18,415	115,787	6,719,460
Madison	6	*	6	*	5,906	27,333	985,800
Montgomery	18	13	5	*	116,689	*	1,469,300

2008 North Carolina Water Use - County Summary

County	Unique Operations[1]	Livestock Operations	Irrigation Operations	Aquaculture Operations	Annual Average Daily Ground	Annual Average Daily Surface	Capacity
	(count)	*(count)*	*(count)*	*(count)*	*(gallons)*	*(gallons)*	*(gallons)*
Moore	38	21	19	*	422,037	1,461,420	21,459,854
Nash	28	5	24	*	223,721	1,722,224	30,066,960
Northampton	24	14	10	*	531,159	1,274,000	11,473,855
Onslow	14	9	5	*	148,186	*	2,604,640
Orange	8	*	8	*	15,683	36,987	4,973,000
Pender	21	13	8	*	370,954	827,949	68,446,917
Perquimans	5	*	3	*	67,582	*	977,600
Person	17	4	15	*	*	792,414	11,525,400
Pitt	32	12	16	4	800,442	1,153,623	25,414,660
Randolph	36	24	14	*	318,616	489,764	11,152,546
Richmond	22	19	6	*	421,436	455,837	12,539,220
Robeson	32	24	10	*	1,134,225	*	14,489,680
Rockingham	37	6	35	4	43,018	1,987,793	19,795,780
Rowan	12	3	11	*	54,904	658,602	5,464,300
Sampson	110	91	29	*	4,408,618	*	28,950,660
Scotland	8	6	*	*	23,101	*	12,504,720
Stanly	4	4	*	*	28,275	*	389,120
Stokes	13	*	12	*	*	160,798	7,046,800
Surry	26	17	12	*	287,227	1,349,402	12,550,371
Union	41	33	8	*	666,686	244,443	12,425,510
Vance	12	*	12	*	6,164	373,284	12,385,000
Wake	40	3	38	*	180,497	3,773,822	21,356,296
Warren	12	6	11	*	44,999	263,606	10,291,300
Wayne	53	44	17	*	1,055,447	298,859	14,802,720
Wilkes	16	15	*	*	138,233	*	1,173,920
Wilson	16	*	15	*	25,890	1,621,577	19,822,560
Yadkin	14	7	8	*	86,895	392,464	5,565,800
Other[2]	145	44	93	16	16,625,412	51,195,725	212,638,970
State	**1498**	**751**	**801**	**54**	**40,760,440**	**108,063,984**	**1,162,654,576**

** disclosure - one operation is greater than 60% of total or less than 3 operations. [1] The type of operations will not add to the unique operations in all counties since some operations used water for multiple purposes. [2] Other counties include all data for Alleghany, Ashe, Avery, Brunswick, Buncombe, Burke, Camden, Carteret, Cherokee, Clay, Currituck, Dare, Davidson, Davie, Durham, Forsyth, Gaston, Graham, Halifax, Hyde, Lenoir, Lincoln, McDowell, Macon,Martin, Mecklenburg, Mitchell, New Hanover, Pamlico, Pasquotank, Polk, Rutherford, Swain, Transylvania, Tyrrell, Washington, Watauga, Yancey, as well as non-disclosed data from the published counties.*

2008 North Carolina Water Use - Hydrologic Unit Code Summary

Hydrologic Unit Code	Unique Operations[1]	Livestock Operations	Irrigation Operations	Aquaculture Operations	Annual Average Daily Ground	Annual Average Daily Surface	Capacity
	(count)	*(count)*	*(count)*	*(count)*	*(gallons)*	*(gallons)*	*(gallons)*
3010103	30	5	27	3	59,674	885,840	14,260,980
3010104	20	*	19	*	*	1,428,426	12,258,400
3010107	36	20	16	*	810,216	6,734,658	65,392,945
3010203	28	13	17	*	525,516	3,965,242	43,629,520
3010204	17	10	7	*	406,415	896,197	9,069,920
3010205	18	*	14	3	595,262	1,539,217	15,174,457
3020101	60	8	54	3	442,368	4,590,508	77,566,320
3020102	18	10	14	*	77,572	711,222	19,267,163
3020103	40	14	26	*	188,073	5,949,195	47,672,340
3020104	13	4	3	6	1,743,184	*	15,990,800
3020201	123	40	91	*	1,351,792	7,573,954	72,354,534
3020202	41	19	14	8	2,897,792	97,779	18,432,690
3020203	70	23	53	3	787,447	4,333,154	50,710,937
3020204	16	6	8	*	321,399	47,456	7,778,600
3020302	13	10	3	*	173,098	*	1,724,400
3030002	72	14	64	3	430,210	3,007,058	41,963,276
3030003	76	41	39	*	497,491	1,963,630	32,094,680
3030004	52	26	27	*	673,610	1,508,070	13,700,820
3030005	17	10	7	*	810,149	*	58,853,543
3030006	135	93	51	*	4,140,342	16,625,171	173,135,164
3030007	159	135	31	*	4,407,192	3,622,756	108,438,959
3040101	67	37	35	*	627,592	2,523,845	22,976,211
3040102	21	15	13	*	148,453	569,041	8,296,020
3040103	20	10	10	*	217,447	797,726	6,518,806
3040104	31	25	6	*	179,211	*	2,005,034
3040105	54	42	12	*	682,463	752,037	16,021,150
3040201	6	6	*	*	60,483	*	379,400
3040203	59	44	20	*	1,513,794	568,435	36,276,608
3040204	17	14	4	*	703,837	*	30,294,840
3040206	15	12	4	*	368,268	*	3,398,280
3050101	37	11	27	*	*	3,030,267	26,794,900
3050102	16	9	8	*	276,827	*	1,195,280
3050105	19	7	13	*	115,078	520,749	5,017,880
6010105	34	6	26	4	87,280	1,001,645	14,418,360
6010106	10	*	10	*	*	328,833	3,502,220
Other [2]	38	7	28	4	14,440,907	32,491,457	86,089,139
State	**1498**	**751**	**801**	**54**	**40,760,440**	**108,063,567**	**1,162,654,576**

** disclosure - one operation is greater than 60% of total or less than 3 operations. [1] The type of operations will not add to the unique operations in all counties since some operations used water for multiple purposes. [2] Other hydrologic unit codes include all data for 03010102, 03010106, 03010201 ,03020105, 03020301, 03040202, 03040208, 03050103, 03060101, 03060102, 05050001, 06010108 , 06010202, 06010203, 06020002, 06020003 as well as non-disclosed data from the published hucs.*

2008 Central Coastal Plain Total Water Use by Month[1]

Month	# Operations [2]	Total Avg. Daily-Ground	Total Avg. Daily-Surface	Total Max Daily-Ground	Total Max Daily-Surface
	(count)	*(gallons)*	*(gallons)*	*(gallons)*	*(gallons)*
January	217	5,722,350	1,138,431	6,923,440	1,173,431
February	218	4,951,750	1,113,684	5,943,593	1,160,156
March	232	9,462,709	6,866,244	10,548,378	7,239,812
April	248	12,520,537	11,006,986	13,597,867	11,866,114
May	265	13,650,895	22,798,010	17,012,944	26,210,679
June	326	23,110,175	39,880,273	27,770,214	46,531,124
July	320	22,961,999	40,030,271	28,029,909	47,420,198
August	284	20,817,339	27,320,165	25,258,319	33,230,170
September	244	11,122,932	7,921,706	14,365,240	9,623,979
October	235	13,051,579	3,078,201	14,963,962	3,818,318
November	222	7,021,287	2,200,626	18,855,215	2,562,183
December	211	5,272,326	2,215,612	6,662,523	2,250,612
Annual Average		**12,472,157**	**13,797,517**		

Operations [2]:

334 Total Unique Operations
202 Livestock
122 Irrigation
25 Aquaculture

Daily Withdrawal Capacity (incl. ground & surface):

175,038,489 (gallons)

[1] Users of 10,000 gallons or more per day. Does not include farms that have reported their withdrawals directly to DENR by July 1, 2009. [2] The type and monthly number of operations will not add to the total. Some operations reported multiple types and others reported both surface and ground water.