

Chapter 30

Wastewater Treatment and Disposal

30.1 NPDES Wastewater Discharge Permit Summary

The primary pollutants associated with point source discharges are:

- * oxygen-consuming wastes,
- * nutrients,
- * color, and
- * toxic substances including chlorine, ammonia and metals.

Discharges that enter surface waters through a pipe, ditch or other well-defined point of discharge are broadly referred to as 'point sources'. Wastewater point source discharges include municipal (city and county) and industrial wastewater treatment plants and small domestic wastewater treatment systems serving schools, commercial offices, residential subdivisions and individual homes. Point source dischargers in North Carolina must apply for and obtain a National Pollutant

Discharge Elimination System (NPDES) permit. Discharge permits are issued under the NPDES program, which is delegated to DWQ by the Environmental Protection Agency.

Types of Wastewater Discharges

Major Facilities: Wastewater Treatment Plants with flows ≥ 1 MGD (million gallons per day); and some industrial facilities (depending on flow and potential impacts to public health and water quality).

Minor Facilities: Facilities not defined as Major.

100% Domestic Waste: Facilities that only treat domestic-type waste (from toilets, sinks, washers).

Municipal Facilities: Public facilities that serve a municipality. Can treat waste from homes and industries.

Nonmunicipal Facilities: Non-public facilities that provide treatment for domestic, industrial or commercial wastewater. This category includes wastewater from industrial processes such as textiles, mining, seafood processing, glass-making and power generation, and other facilities such as schools, subdivisions, nursing homes, groundwater remediation projects, water treatment plants and non-process industrial wastewater.

Currently, there are 244 permitted wastewater discharges in the Cape Fear River basin with a permitted flow of approximately 425 MGD. Table 30 provides summary information (by type and subbasin) about the discharges. Various types of dischargers listed in the table are described in the inset box. Facilities are mapped in each subbasin chapter. For a complete listing of permitted facilities in the basin, refer to Appendix VI.

The majority of NPDES permitted wastewater discharges into the waters of the Cape Fear River basin are from major municipal wastewater treatment plants. Nonmunicipal discharges also contribute substantial wastewater into the Cape Fear River basin.

Table 30 Summary of NPDES Dischargers and Permitted Flows for the Cape Fear River Basin (as of 10/27/04)

	Catawba River Subbasin																								
Facility Categories	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
Total Facilities	11	30	6	6	11	4	16	23	13	3	7	4	6	9	6	7	41	2	8	2	6	13	7	3	244
Total Permitted Flow (MGD)	7.80	76.61	12.06	0.83	32.4	14.77	17.56	29.41	9.85	1.93	7.82	4.02	9.03	10.49	53.28	13.73	99.93	0.08	6.83	0.82	1.4	9.94	3.80	0.1	424.49
Major Discharges	2	6	1	0	2	1	6	2	1	1	1	1	3	2	4	3	13	0	1	0	1	3	2	0	56
Total Permitted Flow (MGD)	7.65	74.05	12.0	0.0	32.0	14.5	15.56	17.75	9.0	1.3	6.8	4.0	6.7	9.5	53.25	7.5	96.16	0.0	5.0	0.0	1.0	6.92	2.95	0.0	383.59
Minor Discharges	9	24	5	6	9	3	10	21	12	2	6	3	3	7	2	4	28	2	7	2	5	10	5	3	188
Total Permitted Flow (MGD)	0.15	2.56	0.06	0.83	0.4	0.27	2.0	11.67	0.85	0.63	1.02	0.02	2.33	0.99	0.03	6.23	3.77	0.08	1.83	0.82	0.4	3.02	0.86	0.1	40.92
100% Domestic Waste	8	11	3	2	6	1	3	8	6	0	2	3	1	4	1	1	8	1	1	1	0	1	2	0	74
Total Permitted Flow (MGD)	0.15	0.45	0.06	0.04	0.4	0.18	0.1	0.17	0.13	0.0	0.01	0.02	0.33	0.93	0.03	0.01	1.08	0.05	0.01	0.02	0.0	0.01	0.04	0.0	4.22
Municipal Facilities	1	5	1	2	2	1	6	2	3	2	1	1	2	2	3	1	9	0	6	1	1	5	1	1	59
Total Permitted Flow (MGD)	7.5	74.0	12.0	0.78	32.0	14.5	5.5	17.75	9.58	1.9	6.8	4.0	4.2	1.56	52.0	1.23	38.66	0.0	6.82	0.8	1.0	6.43	0.75	0.1	299.86
Nonmunicipal Facilities	10	25	5	4	9	3	10	21	10	1	6	3	4	7	3	6	32	2	2	1	5	8	6	2	185
Total Permitted Flow (MGD)	0.3	2.61	0.06	0.06	0.4	0.27	12.07	11.67	0.27	0.03	1.02	0.02	4.83	8.93	1.28	12.51	61.27	0.08	0.01	0.02	0.4	3.51	3.05	0.0	124.67

30.2 NPDES Wastewater Compliance Summary

There were 52 significant NPDES permit violations in the last two years of the assessment period. There are 156 Impaired stream miles where point sources may have negatively impacted the water quality. Facilities, large or small, where recent data show problems with a discharge are discussed in each subbasin chapter. DWQ will determine if the violations are ongoing and address them using the NPDES permitting process. Many other waters are adversely impacted by the cumulative affects of discharges and nonpoint source runoff.

30.3 NPDES Permitting Strategies

The following permitting strategies are to address specific water quality issues in receiving waters. Dischargers into tributaries of the following streams may also be required to adhere to recommendations presented below. Permitted facilities and new permit applications that are not discussed below will be treated on a case-by-case basis dependant upon local water quality conditions and use support ratings.

30.3.1 Haw River Jordan Reservoir

Jordan Reservoir is Impaired, and a TMDL and NSW strategy is being developed that will include changes to NPDES permit limits. This strategy is discussed in Chapter 36.

30.3.2 Randleman Watershed Permitting Strategy

The 2000 basin plan recommended that no new discharges be permitted and that only High Point Eastside WWTP be allowed to expand. Refer to Chapter 8 for more information on water quality issues in this watershed.

30.3.3 Deep River from Randleman Reservoir to Carbonton Dam

The 2000 basin plan recommended the following permit limits for oxygen-consuming waste in this segment of the Deep River:

New and expanding discharges ≥ 1 MGD: BOD₅ = 5 mg/l, NH₃-N = 1 mg/l, TP = 1 mg/l

New and expanding discharges <1 MGD: BOD₅ = 15 mg/l, NH₃-N = 4 mg/l

New and expanding discharges <1 MGD and >0.5 MGD: TP = 2 mg/l

DWQ continues to recommend the permit limits from the 2000 basin plan. The Deep River behind Carbonton Dam is Impaired because of chlorophyll *a* standards violations (Chapter 10) that are an indicator of excessive algal growth (Chapter 27). Because of this impairment, further reductions in nutrients from permitted facilities upstream of the dam as well as from nonpoint sources may be required. No additional TP or TN mass loading will be permitted for any discharges upstream of Carbonton Dam and below Randleman Dam.

30.3.4 Deep River from Carbonton Dam to the Haw River

No new discharges of oxygen-consuming wastes should be permitted into this segment since wastewater assimilative capacity no longer exists in this segment of the Deep River.

30.3.5 Cape Fear River from Jordan Dam to Buckhorn Dam

The Cape Fear River upstream of Buckhorn Dam is Impaired because of chlorophyll *a* standards violations (Chapter 7) that are an indicator of excessive algal growth (Chapter 27). A TMDL will be developed to address the chlorophyll *a* impairment that may require further reductions in nutrients from permitted facilities upstream of the dam as well as from nonpoint sources. No additional TP or TN mass loading will be permitted for any discharges upstream of Buckhorn Dam and below Carbonton Dam on the Deep River and Jordan Dam on the Haw River.

30.3.6 Cape Fear River from Buckhorn Dam to L&D 3

The Cape Fear River from Grays Creek to Lock and Dam 3 is Impaired because of chlorophyll *a* standards violations (Chapter 15) that are an indicator of excessive algal growth (Chapter 27). Because of this impairment, the following interim permitting policy will be used for discharges from Buckhorn Dam to L&D #3.

New discharges:

- Seasonal summer (April-October) mass nutrient loads based on permitted flow and concentrations of TN = 6 mg/l and TP = 2 mg/l.

Expanding discharges:

- Seasonal summer (April-October) mass nutrient loads based on the greater of either:
a) freezing current nutrient mass loading using actual flows and actual nutrient concentrations; or b) mass nutrient loadings based on permitted expansion flow and concentrations of TN = 6 mg/l and TP = 2 mg/l.

Because of this impairment, a TMDL will be developed which may require further reductions in nutrients from permitted facilities upstream of the dam as well as from nonpoint sources may be required.

The following permit limits from the 2000 basin plan continue to be recommended for other oxygen-consuming wastes.

New and expanding municipal discharges ≥ 1 MGD: BOD5 = 5 mg/l, NH₃-N = 1 mg/l
New and expanding municipal discharges < 1 MGD: BOD5 = 12 mg/l, NH₃-N = 2 mg/l
New industrial discharges ≥ 1 MGD: BOD5 = 5 mg/l, NH₃-N = 1 mg/l
New industrial discharges < 1 MGD: BOD5 = 5 mg/l, NH₃-N = 2 mg/l
Expanding industrial discharges: site specific best available technology or
BOD5 = 5 mg/l, NH₃-N = 2 mg/l

30.3.7 Cape Fear River from L&D 3 to L&D1

The following permit limits from the 2000 basin plan continue to be recommended for oxygen-consuming wastes.

New and expanding municipal discharges ≥ 1 MGD: BOD5 = 5mg/l, NH₃-N = 1mg/l
New and expanding municipal discharges < 1 MGD: BOD5 = 12mg/l, NH₃-N = 2mg/l
New industrial discharges ≥ 1 MGD: BOD5 = 5mg/l, NH₃-N = 1mg/l
New industrial discharges < 1 MGD: BOD5 = 5mg/l, NH₃-N = 2mg/l
Expanding industrial discharges: site specific best available technology or
BOD5 = 5mg/l, NH₃-N = 2mg/l

30.3.8 Cape Fear River from Lock and Dam #1 to the Lower Cape Fear River Estuary

The following permit limits from the 2000 basin plan continue to be recommended for oxygen-consuming wastes.

New and expanding municipal discharges ≥ 1 MGD: BOD5 = 5mg/l, NH₃-N = 1mg/l
New and expanding municipal discharges < 1 MGD: BOD5 = 5mg/l, NH₃-N = 2mg/l
New industrial discharges: BOD5 = 5mg/l, NH₃-N = 2 mg/l
Expanding industrial discharges: site specific best available technology or
BOD5 = 5mg/l, NH₃-N = 2mg/l

A TMDL is being developed to address low dissolved oxygen levels in the Cape Fear River estuary. This may require further reductions in permit limits for discharges of oxygen-consuming wastes into this segment of the Cape Fear River. Expanding discharges will be carefully considered on a case-by-case basis.

30.4 Animal Operations Wastewater Treatment and Disposal

In 1992, the Environmental Management Commission (EMC) adopted a rule modification (15A NCAC 2H.0217) establishing procedures for managing and reusing animal wastes from intensive livestock operations. The rule applies to new, expanding or existing feedlots with animal waste management systems designed to serve animal populations of at least the following size: 100 head of cattle, 75 horses, 250 swine, 1,000 sheep or 30,000 birds (chickens and turkeys) with a liquid waste system.

These systems are design to treat liquid waste and spray the waste at agronomic rates onto fields where the nutrients are assimilated by crops. Failures in the waste treatment systems that impact surface waters are discussed in the subbasin chapters.

Key Animal Operation Legislation (1995-2003)

- 1995 Senate Bill 974 requires owners of swine facilities with 250 or more animals to hire a certified operator. Operators are required to attend a six-hour training course and pass an examination for certification. Senate Bill 1080 established buffer requirements for swine houses, lagoons and land application areas for farms sited after October 1, 1995.
- 1996 Senate Bill 1217 required all facilities (above threshold populations) to obtain coverage under a general permit, beginning in January 1997, for all new and expanding facilities. DWQ was directed to conduct annual inspections of all animal waste management facilities. Poultry facilities with 30,000+ birds and a liquid waste management system were required to hire a certified operator by January 1997 and facilities with dry litter animal waste management systems were required to develop an animal waste management plan by January 1998. The plan must address three specific items: 1) periodic testing of soils where waste is applied; 2) development of waste utilization plans; and 3) completion and maintenance of records on-site for three years. Additionally, anyone wishing to construct a new, or expand an existing, swine farm must notify all adjoining property owners.
- 1997 House Bill 515 placed a moratorium on new or existing swine farm operations and allows counties to adopt zoning ordinances for swine farms with a design capacity of 600,000 pounds (SSLW) or more. In addition, owners of potential new and expanding operations are required to notify the county (manager or chair of commission) and local health department, as well as adjoining landowners. NCDENR was required to develop and adopt economically feasible odor control standards by March 1, 1999.
- 1998 House Bill 1480 extended the moratorium on construction or expansion of swine farms. The bill also requires owners of swine operations to register with DWQ any contractual relationship with an integrator.
- 1999 House Bill 1160 extended (again) the moratorium on new construction or expansion of swine farms, required NCDENR to develop an inventory of inactive lagoons. The Bill requires owners/operators of an animal waste treatment system to notify the public in the event of a discharge to surface waters of the state of 1,000 gallons or more of untreated wastewater.
- 2000 Attorney General Easley reached a landmark agreement with Smithfield Foods, Inc. to phase out hog lagoons and implement new technologies that will substantially reduce pollutants from hog farms. The agreement commits Smith field to phase out all anaerobic lagoon systems on 276 company-owned farms. Legislation will be required to phase out the remaining systems statewide within a 5-year period (State of Environment Report, 2000).
- 2001 House Bill 1216 extended (again) the moratorium on new construction or expansion of swine farms.

Table 31 and Figure 40 summarize, by subbasin, the number of registered livestock operations, total number of animals, number of facilities, and total steady state live weight as of October 2004. These numbers reflect only operations required by law to be registered, and therefore, do not represent the total number of animals in each subbasin.

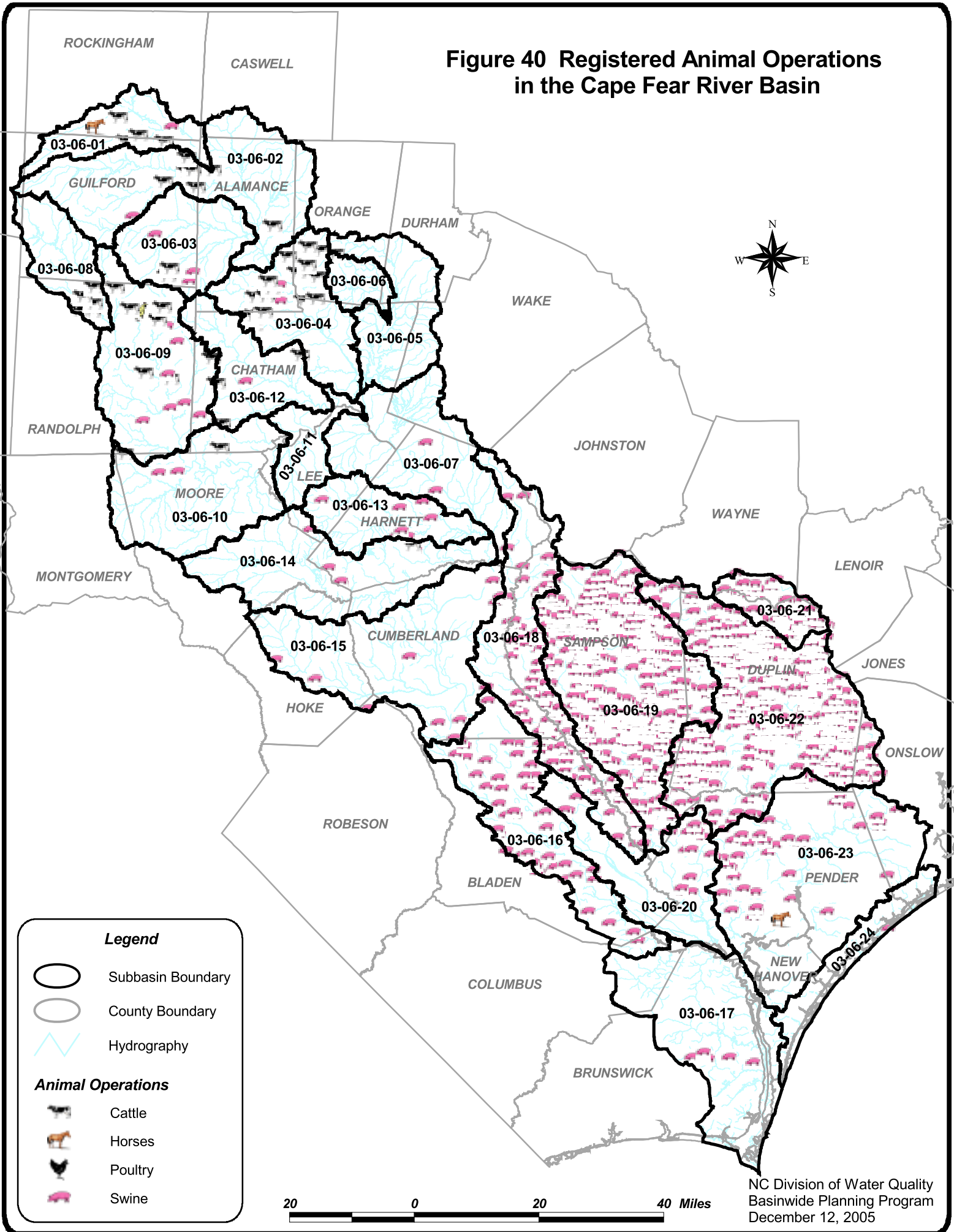
Overall the majority of registered animal operations are found in Sampson and Duplin counties in subbasins 03-06-18 and 03-06-22. Registered animal operations where recent data show problems are discussed in the appropriate subbasin chapter in Section B.

Table 31 Registered Animal Operations in the Cape Fear River Basin (October 2004)




Subbasin	Cattle			Poultry			Swine		
	No. of Facilities	No. of Animals	Total Steady State Live Weight	No. of Facilities	No. of Animals	Total Steady State Live Weight	No. of Facilities	No. of Animals	Total Steady State Live Weight
03-06-01	5	2,794	2,891,600	0	0	0	1	1,140	493,620
03-06-02	5	1,000	1,400,000	0	0	0	1	250	130,500
03-06-03	2	425	595,000	0	0	0	3	10,570	901,950
03-06-04	17	2,777	3,887,800	0	0	0	3	23,544	2,432,520
03-06-05	0	0	0	0	0	0	0	0	0
03-06-06	1	125	175,000	0	0	0	0	0	0
03-06-07	0	0	0	0	0	0	2	2,747	976,787
03-06-08	4	2,479	3,470,600	0	0	0	0	0	0
03-06-09	2	475	665,000	0	0	0	10	33,734	5,690,858
03-06-10	1	200	280,000	0	0	0	2	12,253	924,090
03-06-11	0	0	0	0	0	0	0	0	0
03-06-12	1	150	210,000	0	0	0	1	100	52,200
03-06-13	0	0	0	0	0	0	6	28,616	3,197,880
03-06-14	1	650	910,000	0	0	0	5	21,952	4,157,160
03-06-15	0	0	0	0	0	0	13	44,824	6,740,600
03-06-16	0	0	0	0	0	0	40	199,783	31,771,545
03-06-17	0	0	0	0	0	0	7	40,866	6,381,110
03-06-18	0	0	0	0	0	0	82	304,214	57,107,552
03-06-19	0	0	0	0	0	0	300	1,373,714	181,748,547
03-06-20	0	0	0	0	0	0	12	65,172	10,984,120
03-06-21	0	0	0	0	0	0	67	228,483	26,796,659
03-06-22	0	0	0	0	0	0	391	1,618,256	219,202,863
03-06-23	0	0	0	0	0	0	44	174,282	25,343,570
03-06-24	0	0	0	0	0	0	1	1,800	243,000
Totals	39	11,075	14,485,000	0	0	0	991	4,186,300	585,277,131

* Steady State Live Weight (SSLW) is in pounds, after a conversion factor has been applied to the number of swine, cattle or poultry on a farm. Conversion factors come from the US Department of Agriculture, Natural Resource Conservation Service guidelines. Since the amount of waste produced varies by hog size, this is the best way to compare the sizes of the farms.

Figure 40 Registered Animal Operations in the Cape Fear River Basin



Legend

-  Subbasin Boundary
-  County Boundary
-  Hydrography

Animal Operations

-  Cattle
-  Horses
-  Poultry
-  Swine

20 0 20 40 Miles

30.5 Septic Systems and Straight Piping

In the Cape Fear River basin, wastewater from many households is not treated at wastewater treatment plants associated with NPDES discharge permits, but is treated on the property through the use of permitted septic systems. Wastewater from some homes illegally discharges directly to streams through what is known as a "straight pipe". In other cases, wastewater from failing septic systems makes its way to streams or contaminates groundwater. Straight piping and failing septic systems are illegal discharges of wastewater into waters of the state.

With on-site septic systems, the septic tank unit treats some wastes, and the drainfield associated with the septic tank provides further treatment and filtration of the pollutants and pathogens found in wastewater. A septic system that is operating properly does not discharge untreated wastewater to streams and lakes or to the ground's surface where it can run into nearby surface waters. Septic systems are a safe and effective long-term method for treating wastewater if they are sited, sized and maintained properly. If the tank or drainfield are improperly located or constructed, or the systems are not maintained, nearby wells and surface waters may become contaminated, causing potential risks to human health. Septic tank systems must be properly sited, designed, installed and maintained to insure they function properly over the life of the system. Information about the proper installation and maintenance of septic tanks can be obtained by calling the environmental health sections of the local county health departments (Appendix VIII contains contact information).

Septic system permitting and site visits are tracked by county and not by watershed or basin. Currently, it is difficult to determine if septic system failures are directly causing water quality problems in any specific watershed. Information and data on septic system failures that can be related to surface waters are discussed in the subbasin chapters. For program information by county, visit the website at http://www.deh.enr.state.nc.us/oww/Program_improvement_team/2003forweb.xls.

2005 Recommendations

Efforts to create a permanent statewide septic maintenance and repair program similar to the straight pipe and failing septic system initiative currently active in western NC should be pursued. Additional monitoring of fecal coliform throughout tributary watersheds where straight pipes and failing septic systems are a potential problem should be conducted in order to narrow the focus of the surveys. For more information on the septic tank systems, contact the DENR On-Site Wastewater Section, NC Division of Environmental Health, toll free at 1-866-223-5718 or visit their website at <http://www.deh.enr.state.nc.us/oww/>.

Additionally, precautions should be taken by local septic system permitting authorities to ensure that new systems are sited and constructed properly and that an adequate repair area is available. Educational information should also be provided to new septic system owners regarding the maintenance of these systems over time. DWQ has developed a booklet that discusses actions individuals can take to reduce stormwater runoff and improve stormwater quality entitled *Improving Water Quality In Your Own Backyard*. The publication includes a discussion about septic system maintenance and offers other sources of information. To obtain a free copy, call (919) 733-5083, ext. 558. The following website also offers good information in three easy to follow steps: http://www.wsg.washington.edu/outreach/mas/water_quality/septicsense/septicmain.html.