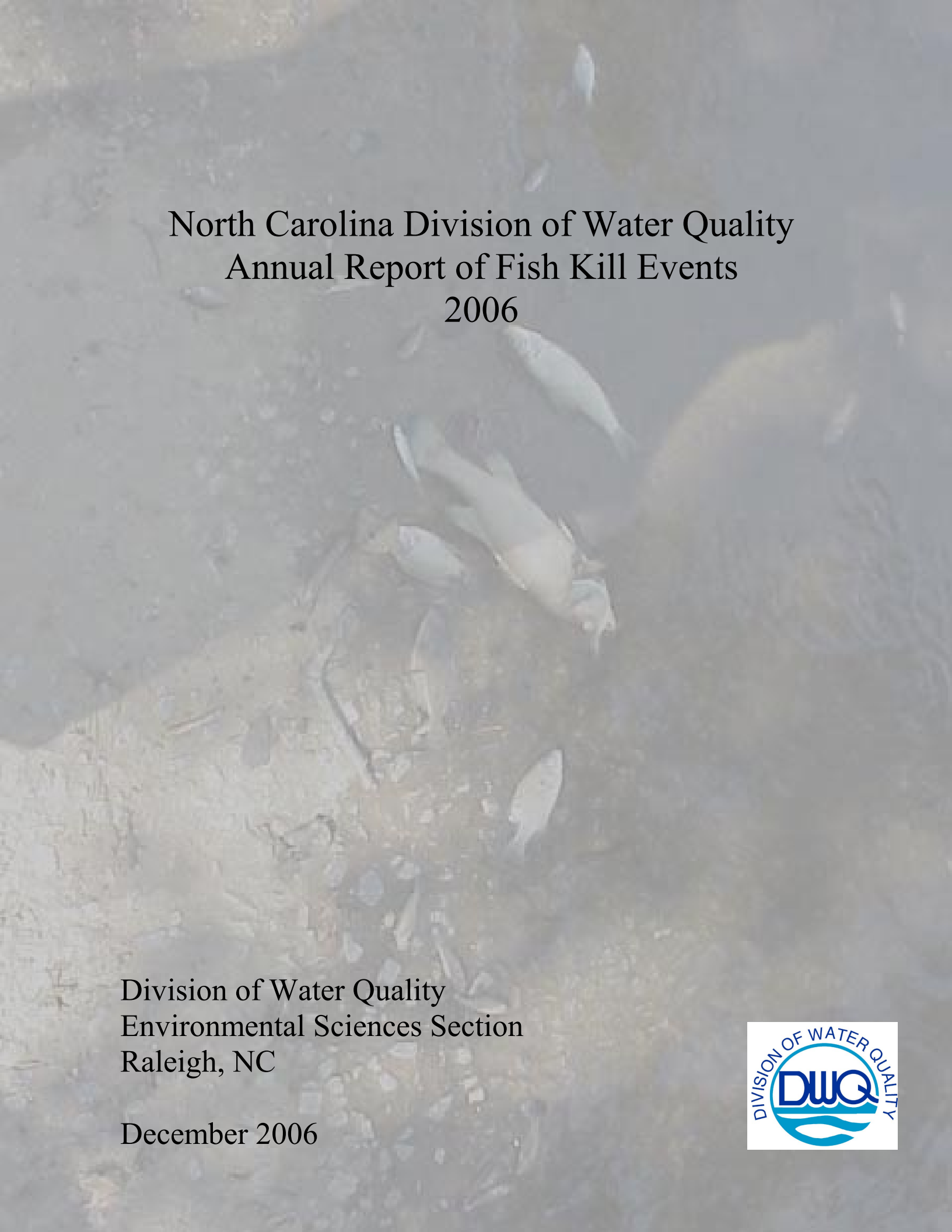


North Carolina Division of Water Quality
Annual Report of Fish Kill Events
2006

Division of Water Quality
Environmental Sciences Section
Raleigh, NC

December 2006

Introduction

The investigation of fish kill activity across North Carolina currently involves protocols established by the North Carolina Division of Water Quality (DWQ) in 1996. The protocols were developed with assistance from DWQ Regional Office staff, North Carolina Wildlife Resources Commission biologists, and Division of Marine Fisheries personnel as a means to improve the tracking and reporting of fish kill events throughout the state. Fish kill and fish health investigation data are recorded on a standardized form and sent to the Division's Environmental Sciences Section (ESS) where the data are reviewed and compiled. Data from fish kill investigation forms, laboratory test results and supplemental information sent to the ESS are entered into a central database where the information can be managed, queried and reported. The procedure also requires the notification of appropriate state officials and scientists associated with the investigation of such events. In addition, fish kill information is posted weekly from June to November on the ESS website: http://h2o.enr.state.nc.us/esb/Fishkill/fishkillmain.htm. The following report will also be available at this website after submittal.

This year marks a complete decade during which DWQ protocols have been in place for kill investigations. The protocols have proven successful in standardizing reporting methods and enhancing the quality and quantity of information reported from kill events. It is the intent of DWQ to generate accurate information regarding fish kill activity across the state through the current investigation process.

This document is a summary of fish kill events reported to the DWQ from January to early December, 2006. The report is mandated under Section 4 of Chapter 633 of the 1995 North Carolina General Assembly Session Laws.

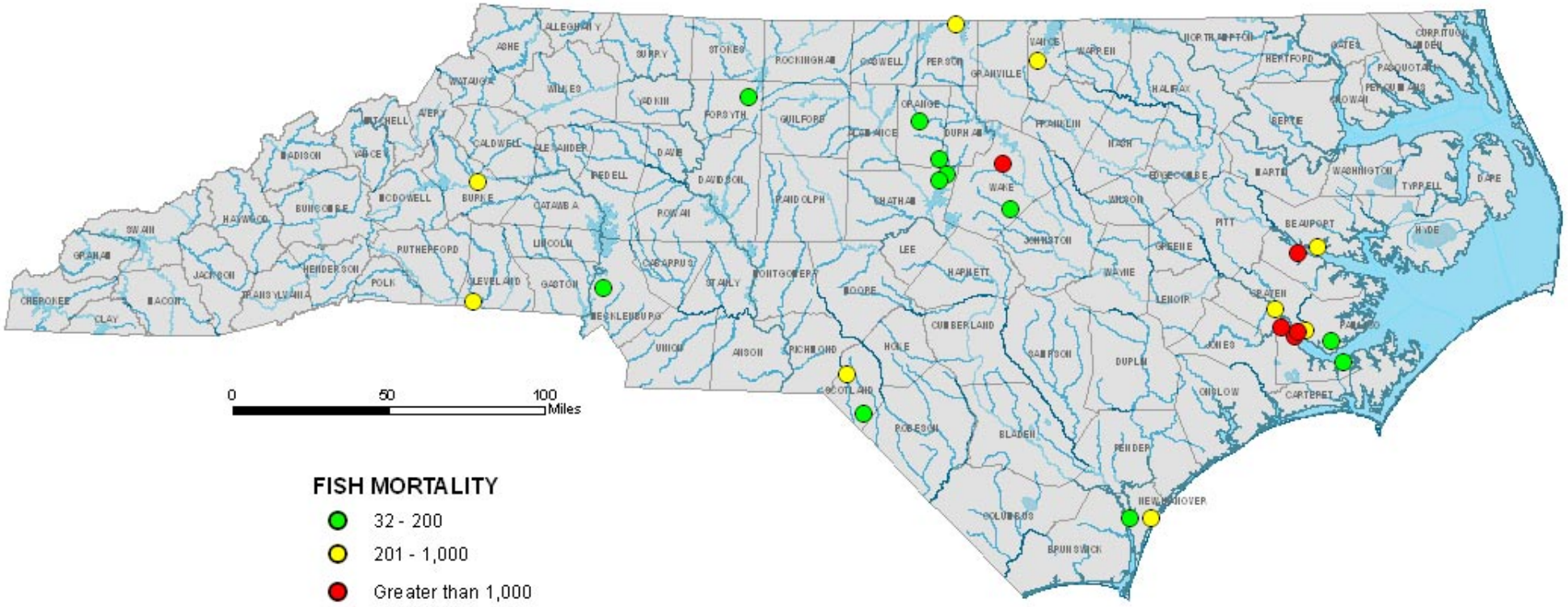
2006 Fish Kill Event Summary

Field investigators reported 25 fish kill events from January to December, 2006. Kill events were reported from coastal waters westward to the Piedmont as far as Burke County. Kill activity was documented during the year in 8 of the state's 17 major river basins. The ESS tracks fish kill events when at least 25 fish are affected and the event is confirmed by trained investigators.

The cumulative fish mortality for all 2006 reports was 35,395 individuals. This figure represents a continued downward trend in total annual fish mortality reported since 2003. Mortality counts for individual events ranged from 32 to 13,220 with a median mortality of 340. The majority of events were observed in fresh waterbodies, however, the three largest events for the year occurred in estuarine waters.

• **Total Kill Events for 2006**	**25**
• **Freshwater Kills**	**17**
• **Estuarine Kills**	**8**
• **Cumulative Mortality for 2005**	**35,395**
▪ ***Estuarine***	***24,453***
▪ ***Freshwater***	***10,942***
• **Report Mortality Range**	**32 to 13,220**
• **Report Median Mortality**	**340**
• **Basins with Activity**	**8 (of 17)**

Figure 1 : Fish Kill Events and Observed Mortality Reported to NCDWQ During 2006



Basin Activity

Investigators reported fish kill events in 8 of the state's 17 major river basins during 2006 (Figure 1, Table 1). Kill activity was most frequent in the Neuse Basin, especially in the river section below New Bern. This section of the Neuse, as well as the lower Pamlico estuary, have historically been plagued by adverse environmental factors such as low dissolved oxygen, high water temperatures, and fluctuating salinities. These factors have played a significant role in the frequency of events reported annually for the two areas. Activity in other river basins across the state remained light or absent throughout the 2006 season. Since 1996, annual totals of statewide events peaked in 2001 with 77 reports, but have since decreased and remained relatively low over the last five years (Table1).

Table 1: Fish kill reports by basin, 1996 – 2006

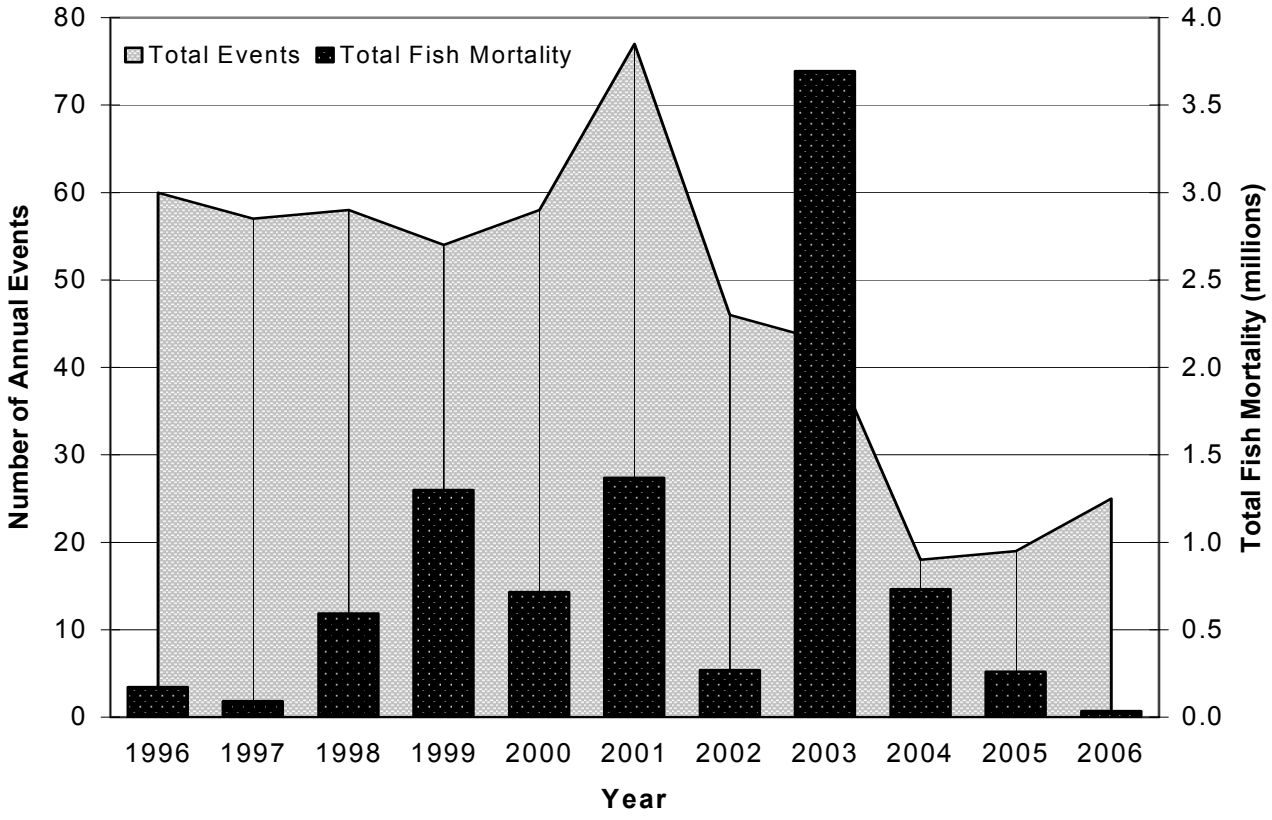
	YEAR											
River Basin	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**Basin Total**
Broad	None	None	None	1	None	None	None	None	None	None	1	**2**
Cape Fear	21	16	23	14	12	5	8	3	1	2	5	**110**
Catawba	None	3	1	3	2	4	1	None	None	None	2	**16**
Chowan	2	2	1	1	None	1	2	2	1	1	None	**13**
French Broad	None	2	3	1	None	None	1	1	None	None	None	**8**
Neuse	14	12	8	16	23	37	9	21	8	9	10	**167**
Lumber	4	3	5	None	2	None	None	2	1	1	2	**20**
Pasquotank	10	2	8	2	None	1	6	2	None	2	None	**33**
Roanoke	2	None	1	None	None	None	None	2	1	1	2	**9**
Tar/Pamlico	3	6	5	11	14	23	8	6	2	1	2	**81**
New/Watauga	None	None	None	1	None	None	None	2	None	None	None	**3**
White Oak	3	3	1	3	3	3	3	None	None	1	None	**20**
Yadkin	1	10	2	1	2	3	8	2	3	1	1	**34**
Yearly Totals	**60**	**59**	**58**	**54**	**58**	**77**	**46**	**43**	**17**	**19**	**25**	**516**

***** *No fish kill reports have been received from the Hiwassee, Little Tennessee., and Savannah basins since 1996.*

Fish Mortality

The 2006 season produced a fish mortality total of over 35,000 individuals reported in 25 events. (Figure 2). Although there was a slight increase in reported events from 2005, the total mortality figure is the lowest since DWQ protocols were implemented in 1996. Over one half of those fish reported killed in 2006 were observed in just two events on the Pamlico and Neuse rivers. Fish mortality figures on all 2006 reports ranged from 32 to 13,220 with a median mortality of 340 fish.

Figure 2: Reported annual fish kill events and mortality, 1996 to 2006

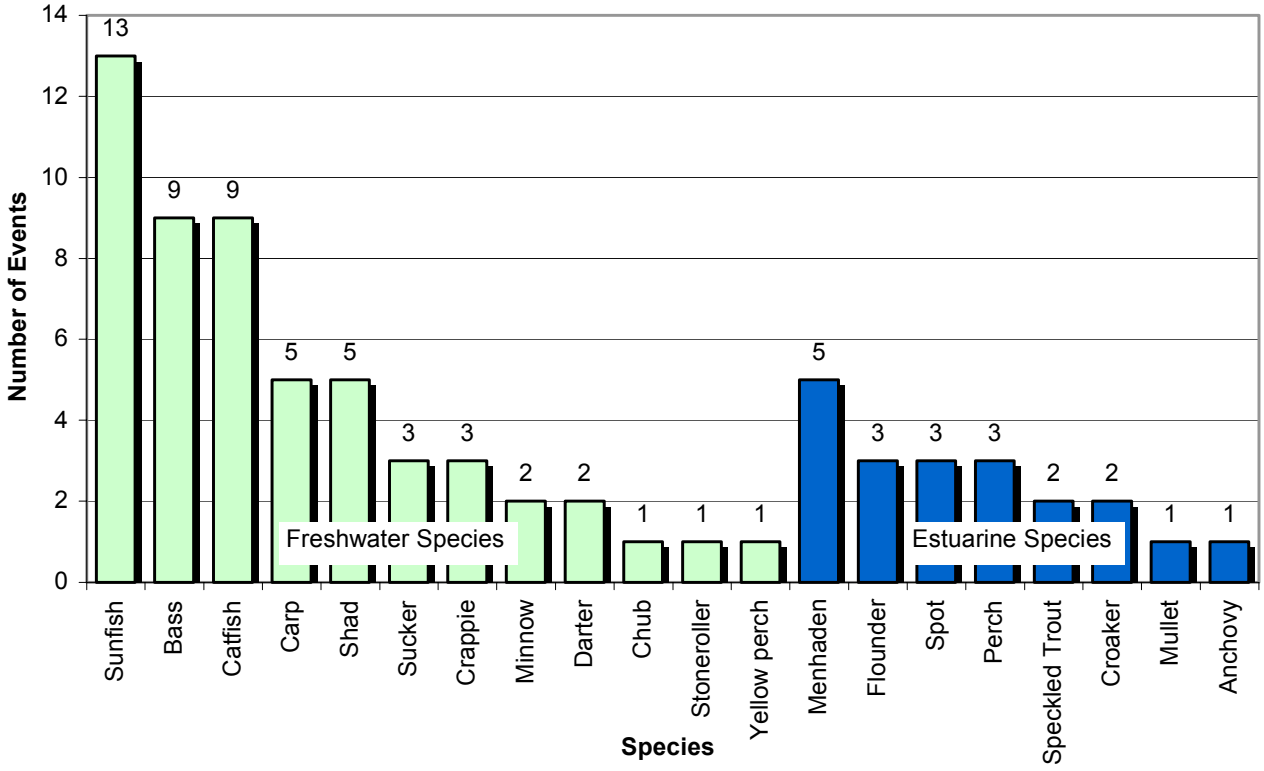


Finfish and Other Species Reported

Fish kill events in 2006 involved over 20 different species of fish in both estuarine and fresh waters (Figure 3). Freshwater species most commonly identified during investigations included sunfishes, largemouth bass, and catfish. Estuarine species most frequently reported included Atlantic menhaden and flounder. Menhaden have historically been the most common species reported in estuarine kill events and have exhibited various stages of stress and disease in conjunction with the events.

Reports of non-finfish species involved in fish kills were infrequent during 2006 (only five events). A gasoline spill into Paw Creek (Mecklenburg County) affected frogs, snakes, salamanders and crayfish. Species appearing on other reports included crayfish, salamanders, and blue crab.

Figure 3: Finfish observed during 2006 fish kill events



Suspected Causes of 2006 Events

Specific causes of fish kill events may or may not be obvious to investigators depending on a number of factors. Causes are often identified, but others remain unconfirmed or unclear due to an investigation occurring hours or days after the actual event. Kill events often result from many environmental factors, and sorting out the major reason(s) why a fish kill occurs is frequently a difficult and often subjective task. Investigators generally monitor environmental conditions surrounding an event and are encouraged to submit this information on reports along with observations regarding a suspected cause. This information aids in evaluating potential water quality trends and problems, and assists scientists and decision-makers with formulating future courses of action. Reported causes should not be viewed as a definitive label for a particular event.

Reported causes of 2006 kill events are listed in Table 2 in order of frequency. Those events where no specific causes could be determined were reported as “unknown”.

Table 2: Major causes reported for 2006 fish kill events

Reported Cause	Number of Events
Dissolved Oxygen Depletion	7
Spills	6
Harmful Algal Blooms	5
Unknown	4
Temperature	2
Bycatch	1

Dissolved Oxygen Depletion: Low dissolved oxygen (DO) was cited as a factor in seven kill events during 2006. DO depletion was reported as a likely cause in the year's two largest fish kills observed during early August in the Pamlico and Neuse estuaries (see Notable Events). Estuarine fish kills have historically been associated with upwelling of hypoxic water from the river bottom or a depletion of DO in warm shallow areas, especially during the season's warmest months. .

Spills: Toxic spills may deplete DO levels in receiving streams or induce kills outright through physical or chemical toxicity. During 2006 investigators reported six events where the release of toxic substances induced a fish kill. These substances included concrete sealer, gasoline, runoff from facility fires, and sewage. Spill induced kills were limited to the Piedmont and western regions of the state.

Harmful Algae: Harmful algae was cited as a factor in five freshwater events during 2006. The most significant event (3800 fish killed) occurred in Pembroke Lake, New Bern as a result of an assemblage of euglenoid algae and diatoms. Additional phytoplankton species associated with kills in 2006 included non-filamentous and filamentous green algae, blue-green algae, diatoms, and cryptomonads. It should be noted that the presence of these species alone does not infer toxicity or environmental concerns. Algae and other phytoplankton begin to negatively affect water quality when excessive growths impair aquatic systems through physical and chemical means.

ESS staff routinely examine water samples associated with kills for the presence of harmful species. Samples that contain significant amounts potentially harmful algae are often sent to research laboratories throughout the state. The Center for Applied Aquatic Ecology in Raleigh has the ability to examine samples under scanning electron microscopy. Laboratories at the University of North Carolina at Greensboro and the National Oceanic and Atmospheric Administration laboratory in Beaufort can examine samples with molecular probes. Laboratories at UNC-Chapel Hill and UNC-Wilmington provide valuable taxonomic expertise. Algal samples and results are collected, exchanged, and discussed between DWQ and research laboratories as a professional courtesy.

Temperature: Two relatively minor freshwater fish kills were attributed to extremes in water temperature. A winter kill of shad was reported on Greenfield Lake, Wilmington during February, and high temperatures in the Broad River (Cleveland Co.) were reported as a cause for a kill of suckers and catfish during August.

Bycatch: Discarded fish from nearby fishing operations was reported as a cause in one event during the year. A small event involving menhaden in Long Creek (Craven County) was determined to be bycatch due to the presence of net marks on the carcasses. Water quality measurements were reported as normal and active fish were observed in the area during the investigation.

U*nknown Causes*: Causes for kill events are reported as unknown when investigators fail to cite specific reasons for an event. Investigations may not provide definitive causes when they are conducted too long after an event and no clear factors are determined, or when causes are suspected but not confirmed. Investigators failed to cite or confirm causes for four of the year's events. Events with unknown causes were all reported from estuarine waters during 2006. Investigations for such events yielded few clues and environmental conditions or water quality measurements were often reported as normal by the time personnel arrived on scene.

Notable Events

Pamlico River at Blounts Bay (Beaufort Co.), August: A multi-species kill consisting primarily of juvenille spot and croaker was reported over a half mile section of shoreline near the mouth of Blounts Creek in western Blounts Bay. Investigators also observed dead menhaden and blue crab. They estimated over 13,000 dead fish including 11,000 spot and over 1,000 croaker. At the time of the investigation the fish appeared to be less than 24 hours old. Measurements from the real time monitoring platform a few miles downstream revealed a sudden drop in dissolved oxygen the previous night. Water quality measurements during the investigation indicated dissolved oxygen had rebounded in the area and subsequently fish mortality appeared to cease. Recent heat and calm weather resulted in surface water temperatures exceeding 90 degrees Farenheit. Deeper waters throughout the river were reported as hypoxic (less than 1.0 mg/L).

Neuse River, Johnson Point (Craven Co.), August: The kill, reported by the Neuse River Response Team, involved primarily silver perch and other species including croaker, menhaden, flounder, spot and blue crab. Most of the observed fish were juvenile, had no lesions, and appeared to be 24 hours old. The fish kill covered approximately 2 miles of shoreline from Johnson Point downstream and included approximately 5000 fish. The event coincided with a drop in dissolved oxygen levels measured at Channel Marker 11 located 3.5 miles downstream. Real-time monitoring equipment recorded hypoxic conditions near the area for almost 4 hours on the previous morning.

Bent and Mine Creeks (Wake Co.), April: Fish were killed after the release of concrete sealer via a storm drain from adjacent dwellings upstream of Bent Creek. Fish species included sunfish, catfish, suckers, darters, and minnows. Over 2000 fish were observed dead along a 1.2 mile stretch downstream of the storm drain.

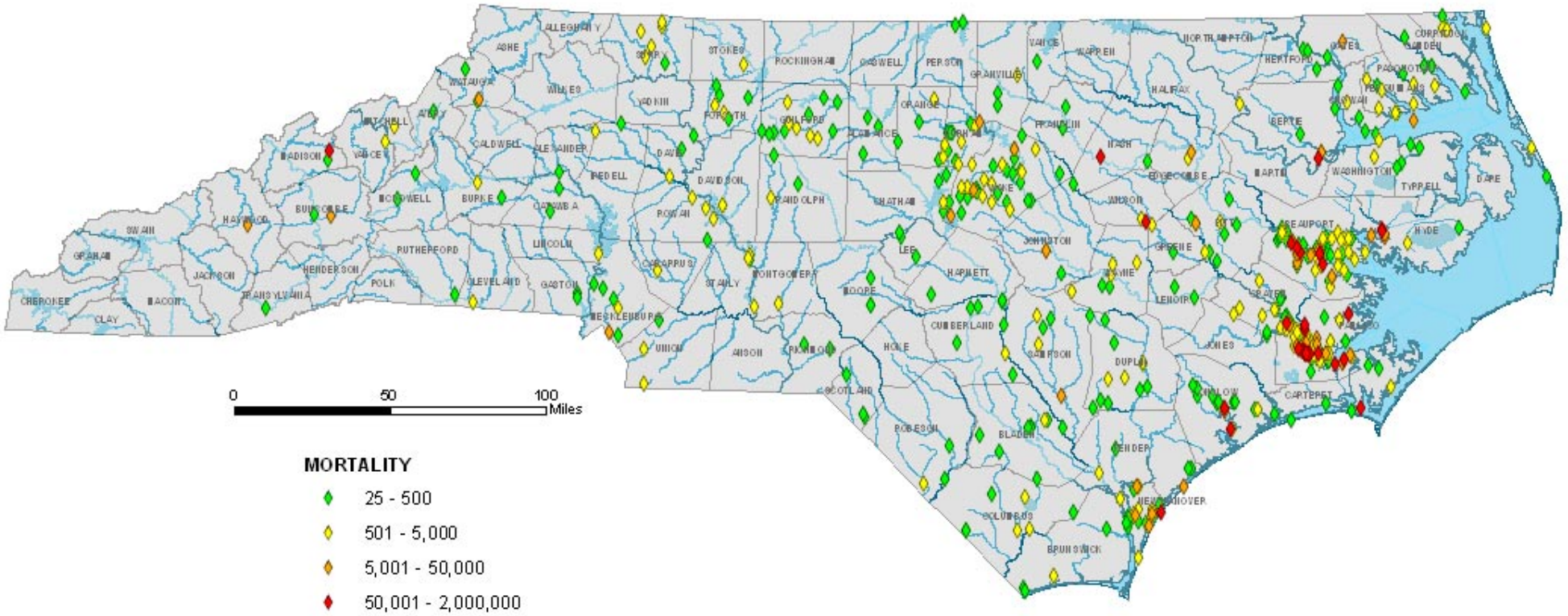
Hunting Creek (Burke Co.), February: The event was the result of runoff from an explosion and fire at the Synthron chemical manufacturing facility in Morganton, NC and was investigated by both Catawba River Keeper Foundation and North Carolina Wildlife Resources staff. The fish kill began at site of Synthron explosion downstream to the confluence of Hunting Creek and Catawba River. The Catawba River Keeper Foundation estimated over 1,000 fish were killed along a 2 mile stretch of Hunting Creek. Catawba Foundation staff identified dead creek chubs, suckers, and sunfish species.

2006 Summary

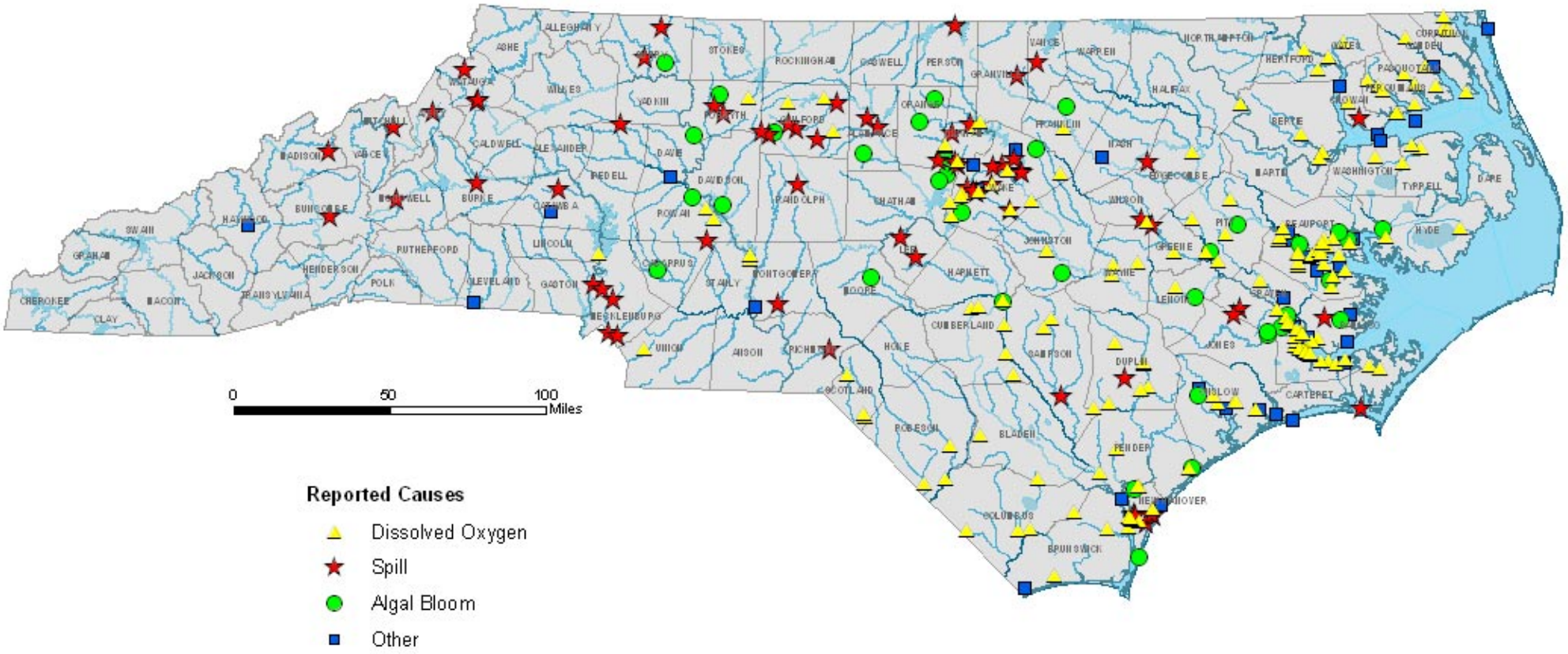
Investigators reported fish kill events in 8 of the state's major river basins during 2006. In general, kill activity in basins across the state was light when compared to yearly activity reported since 1996. The number of fish kills reported during the year totaled 25, a slight increase from 2005 but a figure consistent with low totals reported for the last five years. Total fish mortality was reported near 35,000 individuals. This count represents the lowest since DWQ protocols were implemented in 1996.

A decrease in the reported frequency and intensity of fish kill activity over recent years remains unclear based on report data. Empirically, reports suggest that a majority of North Carolina's annual kill activity (or lack thereof) may depend on environmental conditions in certain key areas of the state, namely, the coastal basins and estuaries. Since 1996, these areas have produced the majority of reported activity statewide (see Appendix 1). Reports indicate that DO depletion, while occurring statewide in any given year, is more common in coastal waters and plays a significant role in kill activity in the region (Appendix 2). Conversely, favorable environmental conditions (ie: DO, weather, hydrology, water chemistry) have been documented in the states coastal waters during the current period of low fish kill activity. Determining if a decrease in fish kill reports reflects natural changes or is the result of improved water quality requires continued long term monitoring and research.

Appendix 1 : Fish Kill Events and Observed Mortality Reported to NCDWQ, 1996 to 2006



Appendix 2: Reported Causes for Fish Kill Events, 1996 to 2006



Note: Events with unknown causes are not shown.

Appendix 3: 2006 Fish Kill Event Summaries (by County)

Total 2006 Fish Kills: 25

Total 2006 Fish Mortality: 35395

Date	Kill Number	Waterbody	Location	Fish Species	Mortality	Comments
Beaufort						
7/19/2006	WA06005	Duck Creek	near Bath	Perch, Catfish	210	The kill involved about 100 silver perch about 3-6 inches in length and 10 catfish from 5-9" long. Dissolved Oxygen at middaywas above 130% saturation, and the pH was 7.6 suggesting an algal bloom was present. Water temperature was about 91degrees F. Algal samples were collected and forwarded to DWQ/ESS. The fish were fresh and likely died the previous night or early morning. No lesions were observed. ESS staff identified a dense bloom of the filamentous bluegreen alga Pseudanabaena (previously identified as Oscillatoria limnetica). This is a harmless algawhich frequently blooms in the state's coastal rivers during summer.
8/2/2006	WA06003	Pamlico River	Blounts Bay	Spot, Croaker, Menhaden, Pumpkinseed	13220	A citizen reported the kill at about 9:30am. It was a multi-species kill made up primarily of juvenille spot and croaker about 3-4" in length. Investigators also saw Blue Crab and Menhaden. They estimated over 13,000 dead fish over about a 1/2 mile section of shoreline near the mouth of Blounts Creek in Western Blounts Bay. This included about 11,000 spot and over 1,000 croaker. The fish appeared to be less than 24 hours old. Measurements from the real time monitoring platform at marker number 5 (a few miles downstream) revealed a sudden drop in dissolved oxygen the previous night between midnight and 3:AM. Water quality measurements during the investigation indicated dissolved oxygen had rebounded in the area and fish ceased to die. The recent heat and calm weather resulted in threatening conditions for fish in the area. Surface water temperatures approaching and exceeding 90 degrees Farenheit were measured. The deeper waters throughout the river were reported as hypoxic.
					Total Kills for County: 2	**Total Mortality for County: 13430**
Burke						
2/2/2006	AS06001	Hunting Creek	near Morganton	Suckers,Chub,Sunfish,Darter, Stoneroller	1000	The event was the result of an explosion and fire at the Synthron chemical manufacturing facility in Morganton NC and was investigated by both Catawba River Keeper Foundation and NCWRC staff. The fish kill began at site of Synthron explosion (intersection of Kirksey and Amherst Roads) downstream to the confluence of Hunting Creek and Catawba River. The Catawba Riverkeeper Foundation estimated over 1,000 fish were killed in approximately 2 miles of Hunting Creek. Catawba Foundation observed large fish, some as long as 14 inches during the assessment. They identified dead creek chubs, suckers, and sunfish species. On February 2, NCWRC staff examined Hunting Creek to determine the extent of the fish kill and the feasibility of executing a formal investigation. NCWRC staff were able to inspect two sites along the approximately 3-km reach of the fish kill. NCWRC staff walked the stream bank which consisted of approximately 775 m of stream below the input source (Synthron, Inc). Evaluation of this reach resulted in the visual location of approximately 130 dead sucker species; no live fish were observed within this reach. NCWRC staff also visually examined the confluence of Hunting Creek and Catawba River. No dead or moribund fish were observed, but one live fish (unidentified species) was observed surfacing approximately 70 m below the culvert on Hunting Creek. NCWRC staff were forced to halt further examination due to the development of physical ailments (headache and nausea) that were probably caused by exposure to fumes from ongoing chemical fires at the Synthron facility.
					Total Kills for County: 1	**Total Mortality for County: 1000**

Date	Kill Number	Waterbody	Location	Fish Species	Mortality	Comments
Chatham						
3/20/2006	RA06001	Jordan Lake	New Hope Creek Arm	Catfish,shad	50	Samples examined by ESS staff showed phytoplankton density at 45,000 units/ml which is considered a severe bloom (>30,000 units/ml). The assemblage was diverse and comprised of blue greens, greens, diatoms, and cryptomonads. The dominant taxon (>30% of total density) was the filamentous blue green Pseudanabaena at 17,000 units/ml. RRO staff received reports of more dead fish at Farrington Point on the same arm. Fisherman reported crappie piping for air.
3/25/2006	RA06002	Jordan Lake	Farrington Point	Catfish	60	Surface water readings taken at Farrington Point boat ramp showed high dissolved oxygen and ph. Fisherman stated seeing ~ 200 other fish washed up on rip rap area that was not accessible by foot. They stated they were primarily catfish with a few crappie. Water appeared to have greenish brown color and very thick.
					Total Kills for County: 2	**Total Mortality for County: 110**
Cleveland						
8/4/2006	MO06001	Broad River	NC 150 S. of Boiling Springs	Sucker, Catfish	700	Fish began dying on 8/2/06 High water temperatures recorded at time of investigation. Dissolved oxygen levels within acceptable range. Investigators suspected heat stress as cause for event.
					Total Kills for County: 1	**Total Mortality for County: 700**
Craven						
3/23/2006	WA06001	Batchelor Creek	near Bellair	Menhaden	700	The kill was approximately 2 days old and extended for 1.8 miles. It affected menhaden from 6-10 inches in length and no lesions were observed. Physical water quality data showed no obvious reason for the event. Cause unknown.
6/7/2006	WA06002	Pembroke Lake	New Bern	Shad, Carp, Sunfish, Largemouth Bass, Catfish	3850	Investigators suspected an algal bloom as a factor in kill event. ESS staff examined water samples and identified a bloom of euglenoid algae and diatoms. Green cloudy water and a dissolved oxygen level of < 2mg/L was observed during the investigation.
8/2/2006	WA06004	Neuse River	Johnson Point	Silver Perch, Croaker, Flounder	5000	The Neuse River Response Team investigated a fish kill in the Neuse River n the Johnson Pt. area along the south side of the river. The fish kill was reported by a local resident. The kill involved primarily silver perch, and other species including croaker, menhaden, flounder, blue crab, and spot. Most of the fish observed were juvenile from 3-8" in length, had no lesions, and appeared to be 24 hours old. The fish kill covered approximately 2 miles of shoreline from Johnson Pt. downstream and included approximately 5000 fish. The event coincided with a drop in dissolved oxygen levels measured at Channel Marker 11 located 3.5 miles downstream. Real-time monitoring equipment recorded hypoxic (less than 1.0 mg/L) conditions near the area for almost 4 hours on the morning of 8/2/06.
10/24/2006	WA06007	Upper Broad Creek		Speckled Trout, S. Flounder, Atlantic menhaden, Spot, Largemouth Bass, Pumpkinseed	502	The reporting source contacted NRRT to report a multi species fish kill in Broad Creek. They noted that fish were gulping at the surface on 10-23-06. Cause was not determined. Additional decomposed fish reported in Fairfield Harbor on 11/1/06. Investigators suspected Fairfield Harbor fish originated from this event and WA06008.

Date	Kill Number	Waterbody	Location	Fish Species	Mortality	Comments
10/25/2006	WA06008	Northwest Creek		Spot, Gizzard shad, S. Flounder, Atlantic menhaden, Pumpkinseed, Largemouth bass, Crappie, Yellow perch, Mullet, Anchovy, Speckled trout	4720	While NRRT members were responding to a fish kill in Broad Creek, a citizen reported a similar event occuring in neighboring, Northwest Creek. Upon investigation the following morning, team members found dead fish the entire stretch of the creek (2.17 miles) and estimated a total of 726 fish that included multiple species. Additional decomposed fish reported in Fairfield Harbor on 11/1/06. Investigators suspected Fairfield Harbor fish originated from this event and WA06007.
11/9/2006	WA06009	Long Creek	near Batchelor	Menhaden	50	The Neuse River Response Team investigated a fish kill in Long Creek after a call from a resident from the area. Long Creek is located 1.5 miles east of Clubfoot Creek off the Neuse River. Approximately 50 Atlantic Menhaden were found along the eastern shoreline of the creek. The fish were 8-9 inches in length and had no lesions. They appeared to be 3-4 days old, and had what appeared to be net marks on them. Water quality measurements did not indicate anything unusual at the time of investigation, and healthy fish were observed swimming in the area. No exact cause could be determined due to the age of the fish, although bycatch is the most likely culprit.
					Total Kills for County: 6	**Total Mortality for County: 14822**
Forsyth						
5/9/2006	WS06001	Spurgeon Creek	Unamed Tributary	Crappie	200	Investigators suspected pond turnover. Rain and wind observed before event. No obvious contamination at the site or upstream during investigation.
					Total Kills for County: 1	**Total Mortality for County: 200**
Mecklenburg						
11/29/2006	MO06002	Paw Creek	Charlotte	Bass, Sunfish, Sucker, Minnow	180	Fish kill due to gasoline release from the BP Delivery Line (7401 Old Mt. Holly Rd) owned by Plantation Pipeline in Paw Creek, Mecklenburg County. State Incident No. 20060415S, EPA Incident # 819250. A site investigation was conducted along the impacted stream segment on 11/29/2006 and 12/4/2006 by CH2MHill consultants.
					Total Kills for County: 1	**Total Mortality for County: 180**
New Hanover						
2/10/2006	WL06002	Greenfield Lake	Wilmington	Shad	200	Die-off of shad suspected as a result of low water temperatures or "winter kill". Water temperatures around the time of the investigation were recorded near 40 degrees F. No visible health problem seen on fish.
9/8/2006	WL06001	Bradley Creek	Airlee Gardens	Largemouth Bass, Perch	900	Investigators observe fish from various size ranges. Suspected runoff from Hurricane Ernesto rains caused low dissolved oxygen and subsequent fish kill.
					Total Kills for County: 2	**Total Mortality for County: 1100**
Orange						
4/7/2006	RA06003	Eno River	Lake Ben Johnson dam	Sunfish	32	Investigators observed a layer of scum impounded by some fallen trees (immediately upstream of the dam). Investigators suspected kill occurred in the impoundment and later flowed into the river. Because the kill was reported late, no samples were taken.

Date	Kill Number	Waterbody	Location	Fish Species	Mortality	Comments
8/3/2006	RA06006	Morgan Creek	Chapel Hill	Carp, Sunfish, Catfish	60	Plant bypass occurred putting 450,000 gallons of primary treated wastewater into Morgan Creek. Water samples were taken by OWASA staff.
						Total Kills for County: 2 Total Mortality for County: 92
Pamlico						
7/9/2006	WA06006	Dawson Creek	near Janeiro	Gizzard Shad	51	NRRT & PRRT team members responded to a fish kill in Dawson Creek. The kill was approximately 2-3 days old and extended for .725 miles . It affectected gizzard shad of 254-304 mm in length and no lesions were observed. Physical water quality data showed no obvious reason for the event. Cause of event is unknown to due to the old age of the fish. An oily surface film was observed at the same time.
						Total Kills for County: 1 Total Mortality for County: 51
Person						
6/15/2006	RA06007	Bowes Branch	Fire pond at La. Pacific Corporation	Largemouth Bass, Sunfish, Carp,	340	The La. Pacific Corporation plant near Roxboro experienced a serious fire within the production facility. A subsequent fish kill occurred in the company's fire pond. During the fire, large quantities of water were pulled from the pond to spray on the fire. Runoff was at times about 3 to 4" deep running from the building to the stormwater system, thereby returning to the pond. The fire began at 2:41 AM on 6/13, and the use of water ended about 4:30 PM, a period of just under 14 hours. Production units experiencing fire included mixers in which the chemicals Methyl Diisocyanate, Paraformaldehyde, and Paraffin Wax were being applied to wood. Some undetermined quantity of these materials returned to the pond with the recycling firewater. There was heavy rain from the remnants of tropical depression Alberto most of the day of 6/14, as well. Dead fish were observed and reported at about 7:35 AM on 6/15. The pond was also observed at that time to have a reddish material floating along one edge where the wind had moved it. A total of 290 fish were observed killed the first day: 113 bass, 50 carp, and 127 sunfish. None was observed to be diseased, malformed, or otherwise abnormal. The next day, another 50 were gathered, 20 bass and 30 sunfish. About half were "fresh" enough to have expired overnight.
						Total Kills for County: 1 Total Mortality for County: 340
Scotland						
8/4/2006	FA06001	Private Pond	near Johns	Largemouth bass, Catfish, Sunfish, Crappie	100	Investigators suspected low dissolved oxygen resulting from pond turnover as a cause for the event. The event occurred after a heavy rainstorm.
9/5/2006	FA06002	Gattis Pond	near Laurel Hill	Largemouth bass, Sunfish, Carp	360	Investigators suspected low dissolved oxygen resulting from pond turnover as a cause for the event. Fish seen gasping at surface and acting lethargic. Some fish had been removed from the pond by owner at time of investigation.
						Total Kills for County: 2 Total Mortality for County: 460
Vance						
8/24/2006	RA06008	Private Pond	UT to Crooked Creek	Bass, Sunfish, Catfish	500	Pond is located on a spring fed tributary to Nutbush creek. An upstream neighbor had failing septic system and it had been piped into tributary for undetermined length of time. Low D.O. and Nitrates noted in water samples taken by private pond management company prior to calling DWQ. Aerators had been put in the pond by the time DWQ was contacted so D.O. Levels were acceptable upon investigation. DWQ followed the progression of the pond for several weeks. Correcting the upstream problem appeared to solve the problems in the pond.

Date	Kill Number	Waterbody	Location	Fish Species	Mortality	Comments
					Total Kills for County: 1	Total Mortality for County: 500
Wake						
4/1/2006	RA06004	Mine Creek	above Shelly Lake, Raleigh	Sunfish, Minnows, Darters, Bullhead Catfish	2260	Fish were killed after the release of concrete sealer via a storm drain from adjacent dwellings upstream of Bent Creek, including sunfish, catfish, suckers, darters, and minnows. The sealant release most likely occurred on March 29, 2006. NCWRC staff was contacted on March 31 and arrived at the accident site on April 1, 2006 to observe a consistent number of dead fish within a 1.2 mile stretch downstream of the storm drain. The NCWRC costs associated with the fish kill investigation, associated fish loss, and report preparation were $1,420.60. The NCWRC requested a total reimbursement of $1,420.60.
8/7/2006	RA06005	Swift Creek	below Lake Benson Dam	Carp	150	No water observed flowing over spillway at Lake Benson. Water below dam was stagnant and Swift Creek was very low below spillway. Some fish were traped in pools of water isolated from the creek. Dead fish were noted in shallow pools.
					Total Kills for County: 2	Total Mortality for County: 2410