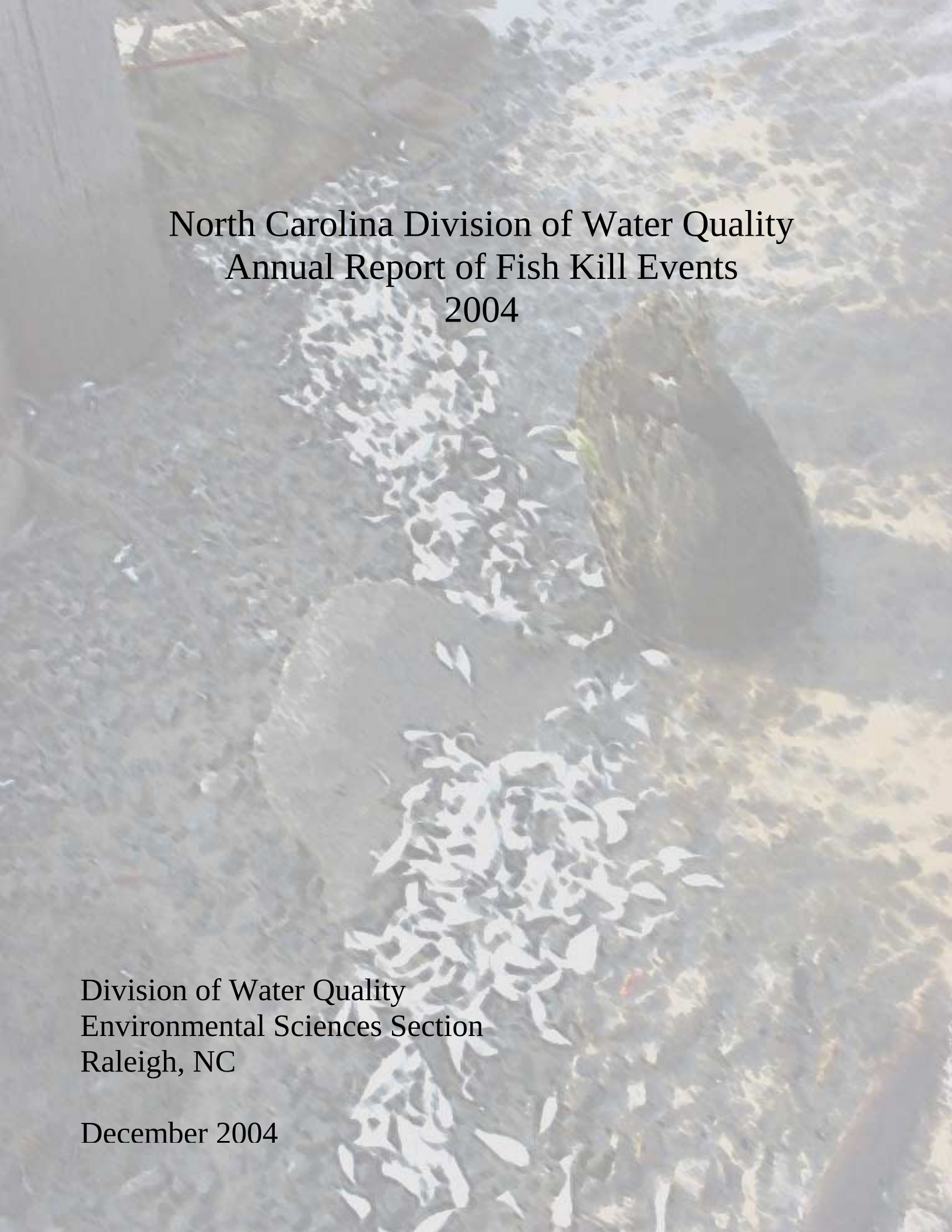


North Carolina Division of Water Quality
Annual Report of Fish Kill Events
2004

Division of Water Quality
Environmental Sciences Section
Raleigh, NC

December 2004

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, reported kill information is updated weekly on the ESS website at: **http://h2o.enr.state.nc.us/esb/Fishkill/fishkillmain.htm**.

DWQ fish kill protocols have proven successful in standardizing the methods for investigations and enhancing the quality and quantity of information reported from kill events. Meaningful conclusions about where and why fish kills occur across North Carolina demand accurate and timely data. It is the intent of DWQ to generate this information through the current investigation process.

This document is a summary of fish kill events reported to the DWQ from January to mid December, 2004. The report is mandated under Section 4 of Chapter 633 of the 1995 North Carolina General Assembly Session Laws.

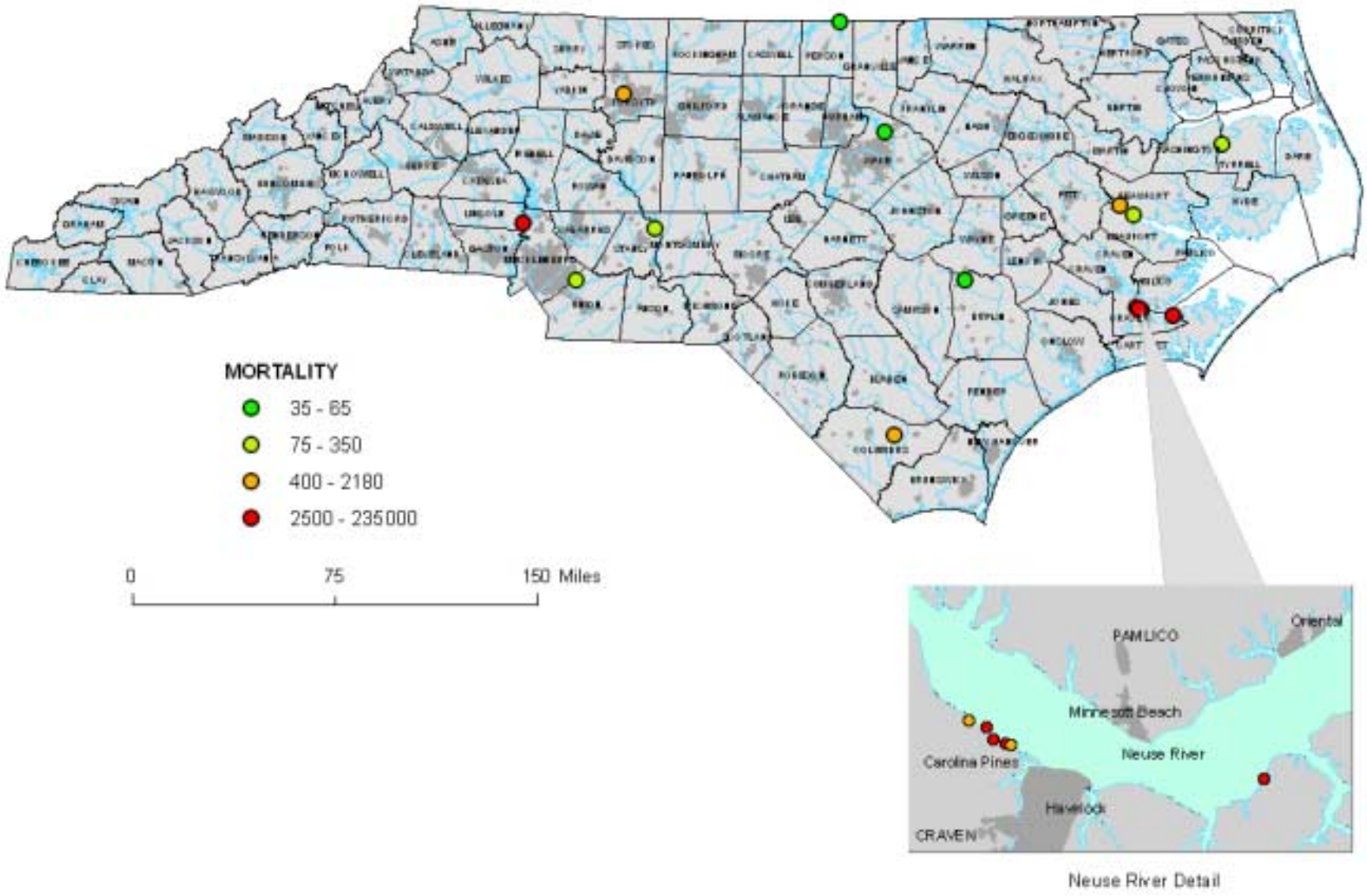
2004 Fish Kill Summary

Field investigators reported 18 fish kill events from January to December, 2004. Kill events were reported from coastal estuarine waters westward as far as Union County in freshwaters. 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 2004 reports was 732,863. This figure represents a significant decrease from the total reported in 2003. Mortality counts for individual events ranged from 35 to 235,000 with a median mortality of 500. Reporting was equivalent in freshwater and estuarine waterbodies although the largest events occurred in the estuaries. No events were observed in the Atlantic Ocean.

• **Total Kill Events for 2004**	**18**
• **Cumulative Mortality for 2004**	**732,863**
▪ ***Estuarine***	***727,612***
▪ ***Freshwater***	***5,251***
• **Report Mortality Range**	**35 to 235,000**
• **Report Median Mortality**	**500**
• **Basins with Activity**	**8(of 17)**
• **Freshwater Kills**	**9**
• **Estuarine Kills**	**9**
• **Ocean Kills**	**None**

Figure 1 : Fish Kill Events Reported to NCDWQ During 2004



Basin Activity

Investigators reported fish kill events in 8 of the state's 17 major river basins during 2004 (Figure 1, Table 1). One-half of the year's kills occurred in the Neuse Basin with activity being especially heavy below New Bern in the Neuse River estuary. A total of 7 kills were reported in the area of the Neuse stretching from Flanner's Beach to Long Creek. This area has been plagued by environmental factors such as low dissolved oxygen, high water temperatures, and fluctuating salinities. Activity in other river basins across the state was extremely light although sizable events were reported in the Lumber, Tar, Yadkin, and Catawba basins. Since 1996 annual totals of statewide events peaked in 2001 with 77 reports but continued to decreased in 2004 to only 18, the lowest total for this time period.

Table 1: Fish kill reports by basin, 1996 – 2004

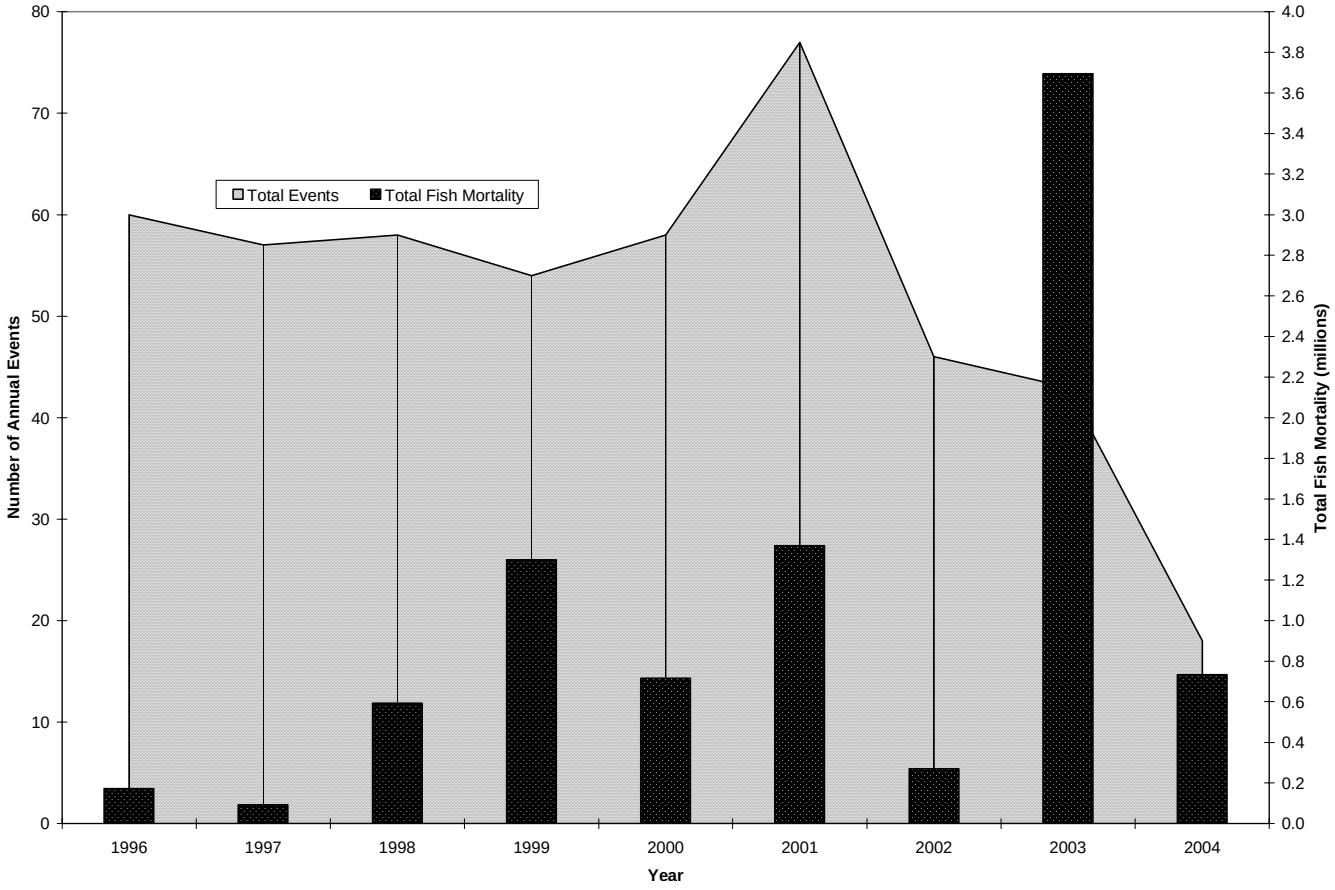
	YEAR									
River Basin	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**Basin Totals**
Broad	None	None	None	1	None	None	None	None	None	**1**
Cape Fear	21	16	23	14	12	5	8	3	1	**103**
Catawba	None	3	1	3	2	4	1	None	1	**15**
Chowan	2	2	1	1	None	1	2	2	1	**12**
French Broad	None	2	3	1	None	None	1	1	None	**8**
Neuse	14	12	8	16	23	37	9	21	8	**148**
Lumber	4	3	5	None	2	None	None	2	1	**17**
Pasquotank	10	2	8	2	None	1	6	2	None	**31**
Roanoke	2	None	1	None	None	None	None	2	1	**6**
Tar/Pamlico	3	6	5	11	14	23	8	6	2	**78**
New/Watauga	None	None	None	1	None	None	None	2	None	**3**
White Oak	3	3	1	3	3	3	3	None	None	**19**
Yadkin	1	10	2	1	2	3	8	2	3	**32**
Yearly Totals	**60**	**57**	**58**	**54**	**58**	**77**	**46**	**43**	**18**	**471**

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

Fish Mortality

The 2004 season produced a cumulative fish mortality of less than one million fish. (Figure 2). The majority of the year's total was reported from 7 events in the lower Neuse River from Flanners Beach to Long Creek. Fish mortality figures on 2004 reports ranged from 35 to 235,000 with a median mortality of 500 fish.

Figure 2: Reported annual fish kill events and mortality, 1996 to 2004



Finfish and Other Species Reported

Fish kill events in 2004 involved 20 different species of fish in both estuarine and fresh waters (Figure 3). Freshwater species most commonly identified during investigations included sunfishes, shad, and carp. Estuarine species most commonly reported included menhaden, perch, and croaker. Atlantic menhaden have historically been involved in a majority of estuarine kill events and have exhibited stress and disease in conjunction with fish kills. Four fish kills in the lower Neuse River also affected blue crab in addition to finfish species.

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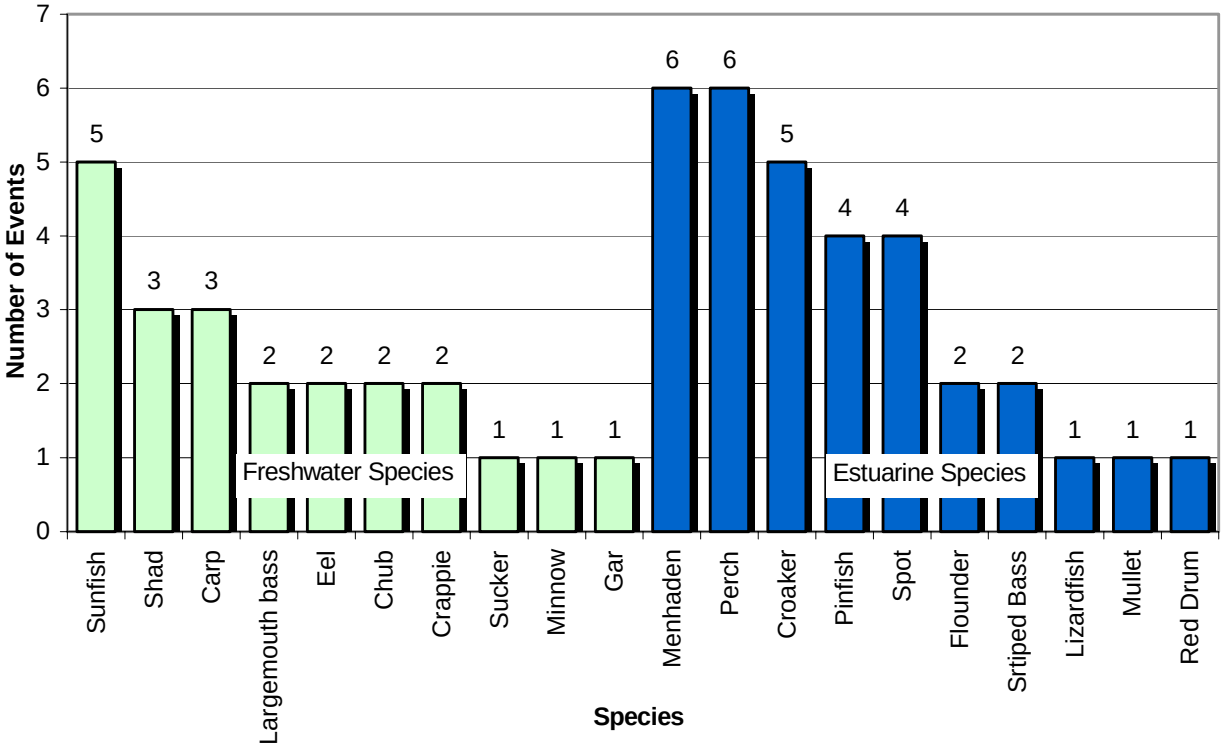
Figure 3: Finfish observed during 2004 fish kill events



Suspected Causes of 2004 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 suspected causes on reports along with supporting information. This information aids in evaluating potential water quality trends and problems, and assist 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 2004 kill events included dissolved oxygen (DO) depletion, a wastewater spill, and a suspected algal bloom. Those events where no specific causes could be determined were reported as “unknown” (Table 2).

Table 2: Major causes reported for 2004 fish kill events

Reported Cause	Number of Events
Unknown	8
Dissolved Oxygen Depletion	8
Algal Blooms	1
Spills	1

Dissolved Oxygen Depletion: Low dissolved oxygen (DO) was cited as a factor in 8 kill events during 2004. DO depletion was reported as a factor in the year's largest fish kills observed in the lower Neuse estuary during May and July (see Notable Events). Events in the lower Neuse were associated with upwelling of hypoxic water from the river bottom or depletion of DO in warm shallow areas. DO depletion and the subsequent loss of adequate physical habitat was reported as a cause for significant kills of striped bass in Badin Lake and Lake Norman.

ESS Examinations for Harmful Algae: During 2004, the ESS staff routinely examined water samples associated with estuarine fish kills for the presence of *Pfiesteria* and *Pfiesteria*-like organisms. ESS examinations were performed using light and epifluorescent microscopy. Suspect samples warranting further confirmation for toxic *Pfiesteria* species were also forwarded to UNC-Greensboro and the NCSU Center for Applied Aquatic Ecology for further tests. These tests include fish bioassays, scanning electron microscopy, and an RNA probe that can discern the presence of actual *Pfiesteria* cells. *Pfiesteria*-like cells examined by ESS staff during 2004 appeared as nontoxic obligate autotrophs and not forms historically associated with fish health events. At the time of this report, all confirmatory tests results have been reported as negative and all involved laboratories have reported that toxic *Pfiesteria* was not a causal factor in any of the 2004 events.

Spills: Toxic spills may deplete DO levels in receiving streams or induce kills outright through physical or chemical toxicity. During March, a sanitary sewer overflow from the City of Winston-Salem released an estimated 40,080 gallons of wastewater that eventually reached tributaries to Mill Creek (Forsyth Co.) Investigators reported depleted DO levels below the spill and a kill of over 700 fish. DWQ issued a Notice of Violation for the event to Winston-Salem, Forsyth City/County Utilities. No other enforcement action was taken.

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 8 of the year's reports. Reports with unknown causes were received from estuarine and fresh waters. Two larger events with unknown factors involved Atlantic

menhaden in the Neuse River estuary with a high incidence of lesions. Another event was observed in Lake Waccamaw and appeared specific to white perch.

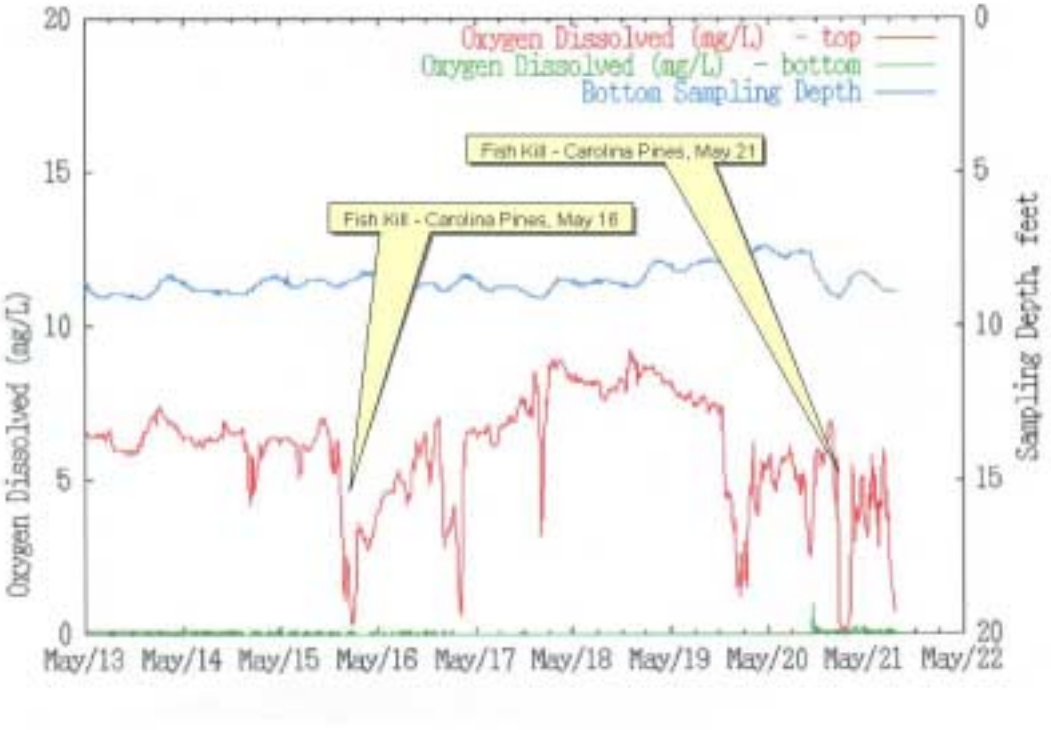
Notable Events

Frequent Fish Kill Events, Neuse River near Flanners Beach and Carolina Pines, May to September 2004: The section of the lower Neuse River below New Bern has historically been a trouble spot for fish kill activity. From May to September, 2004 the Neuse River Response Team (NRRT) investigated a series of seven kill events near Flanners Beach and Carolina Pines downstream to Courts Creek (Craven County). Together the events involved at least 727,000 individuals comprised of menhaden and other estuarine species and represented 99% of the fish mortality reported statewide for the year.

Figure 4 : Large fish kill events and fish mortality reported on lower Neuse River – May to September, 2004

Prior to five of the events, data from US Geological Survey monitoring equipment indicated a drop in DO levels often associated with hypoxic water. Hypoxic conditions have historically occurred in North Carolina's estuaries as nutrient and organic loading coupled with water column stratification deplete DO levels during warm months. Sudden shifts in wind direction and velocity when these conditions are present can cause mixing of the water column or an upwelling of the hypoxic layers (Figure 5). During September, NRRT members also documented a large menhaden kill near Carolina Pines where DO levels appeared normal but over 90% of the affected fish experienced lesions in various stages of development. The observed lesions are consistent with ulcerative mycosis described by Noga, et al (1993). The causes related to the initiation and development of these lesions is uncertain at this time.

Figure 5: USGS Neuse River monitoring data near Carolina Pines showing depletion of dissolved oxygen prior to fish kill events – May, 2004



Striped Bass Kill, Badin Lake (Stanly/Mongomery County), June 2004 : North Carolina Wildlife Resource Commission investigators reported a substantial kill of striped bass (750 individuals) on Badin Lake during June. The event was similar in scope and location to historical kills on Badin and other large reservoirs in the state where striped bass occur. A temperature and DO "squeeze" resulting from warm conditions in the lake was cited as the likely cause for the event. Temperature and DO profiles performed near the location of the kill indicated inadequate physical habitat for striped bass. DO readings

were reported at less than 3 mg/L with temperatures near 27 degrees C. Badin Lake is a 1968 ha impoundment and is characterized as having less thermal habitat in the summer for striped bass than other larger reservoirs in the region.

Striped Bass Kill, Lake Norman (Mecklenburg/Lincoln County), July-August 2004 :
Duke Power personnel first observed an abnormally high number of dead striped bass on July 22 during their weekly survey of the lake. NC Wildlife Resources Commission biologists investigated the ongoing kill and worked with personnel from Duke Power to collect data throughout the event. Nearly 2500 dead striped bass were collected between July 22 and August 13. All but 40 fish were collected within several miles of Cowan's Ford Dam, which impounds Lake Norman. The die-off resulted when a large group of striped bass became trapped in deep area of the lake by a shallower anoxic zone. As water temperatures began to rise in the late spring, the lake stratified. The surface layers of the lake remained oxygenated throughout the summer. Dissolved oxygen levels deeper in water column were fixed as the lake stratified and continued to decrease throughout the summer due to normal biological processes. However, these processes occurred at a slightly faster rate in the mid-level layers and by late July this portion of the water column was nearly devoid of oxygen. The striped bass located in the deep layers became trapped in pockets of water that had cool temperatures, forage, and sufficient oxygen. As many of the striped bass reached the surface, they were already in the later stages of decomposition. This was consistent with fish that had died deep in the water column and surfaced after several days. The presence of a parasitic copepod affecting striped bass was also considered as factor. Although nearly all striped bass collected were infected, infection rates for individual fish were relatively low. A small sample of freshly dead fish was sent to the Auburn University Department of Fisheries and Allied Aquacultures for analysis, and there was no indication that the copepod was responsible for the kill. In addition, organs from several freshly dead fish were sent to North Carolina State University for analysis and the results indicated nothing atypical related to disease or pathogens.

2004 Summary

Investigators reported fish kill events in 7 of the state's major river basins during 2004. Kill activity in most basins across the state was extremely light when compared to yearly activity reported since 1996. The number of fish kills reported during 2004 decreased to 17, the lowest total since the DWQ began systematically tracking fish kill activity. Reported fish mortality also reached the lowest level since 1997 with less than one million fish killed. The vast majority of the year's mortality occurred in the Neuse estuary. Nearly one-half of the 2004 reports indicated DO depletion as a causal factor.

Notable events included the familiar phenomenon of fish kills in the Neuse River near Flanners Beach and Carolina Pines. This area continued to exhibit the water column stratification and subsequent hypoxia that plague shallow, poorly flushed estuaries. As a result, investigators documented a series of large and concentrated events in the area from May to September. Significant die-offs of striped bass were observed on Badin Lake and Lake Norman during the summer months and were attributed to a loss of adequate habitat (temperature and DO) for the species during warm conditions.

The surprising absence of fish kills associated with the year's hurricane events is also notable. Hurricanes Frances, Ivan, and Jeanne occurred in late August and September causing torrential rains and flooding, especially in the western half of the state. Investigators in the region did not report a single significant kill event associated with the any of the storms. A similar absence of post-hurricane activity was observed in 1999 after Hurricanes Dennis, Floyd, and Irene. The insignificant role that these events play as a cause for fish kills appears closely tied to favorable environmental conditions (adequate DO, dilution, habitat, etc.) that exist immediately after the storms.

Total 2004 Fish Kills: 18

Total 2004 Fish Mortality: 732863

2004 Fish Kill Events (by County)

Date	Kill Number	Waterbody	Location	Mortality	Comments
Beaufort					
3/21/2004	WA04001	Jacks Creek	near mouth	500	Cause of kill unknown. Kill limited to gizzard shad. Kill reported on Sunday, 3/21 by WRC, but residents in the area first noticed dead fish as early as Friday, 3/19. At the time of investigation, dissolved oxygen levels appeared normal.
10/29/2004	WA04008	Pamlico River	mouth of Broad Creek	78	Upon investigation PRRT found 78 eels from 8- 22 in. washed up on the shore and in the rock rip-rap. High surface DO and pH levels indicate an algae bloom. PRRT suspect the algae bloom may have caused the DO to drop out the night before and the eels beached themselves in an effort to get oxygen and eventually suffocated.
					Total Kills for County: 2 Total Mortality for County: 578
Columbus					
5/1/2004	WL04003	Lake Waccamaw	Weavers Landing	1000	Additional water quality parameters: Site #2; Midpoint between Dale's and Cove boat landing: DO = 7.7 ppm, Tempt. = 23.3 C, % saturation = 90.0 %; Site #3; Cove Boat Landing: DO = 7.94 ppm, Tempt. = 23.4 C, % saturation = 93.4 %. Most probable cause of kill: natural causes specific to white perch as better than 98 % of observed dead fish were white perch.
					Total Kills for County: 1 Total Mortality for County: 1000
Craven					
5/16/2004	WA04009	Neuse River	Carolina Pines	400	NRRT recieved a report of a fishkill at Carolina Pines from Mr. Rick Dove. When DWQ arrived at the site of the kill, approximately 400 juvenile Croaker were found. The fish showed no signs of lesions, and had been dead for approximately 12-24 hours. No sign of algae bloom activity was found in the area, although samples were collected for analysis. USGS monitors at Channel Marker # 11 indicated a drop in surface dissolved oxygen on the evening of 5/15/04. This drop was most likely caused by an increase in windspeed which was measured at the same time. Weather patterns most likely caused a mixing or upwelling of water from the bottom, which had been anoxic for a week prior to this event. These type of circulation patterns which can create areas of low dissolved oxygen are usually short lived and spatially erratic. It was this kind of event which is believed to have caused the fishkill.
5/21/2004	WA04003	Neuse River	Carolina Pines	235000	Kill was investigated on 5/21/04. Fish were observed on the beach along a 3.3 mile span of the Neuse River in the Carolina Pines area. Species of fish included Spot, Croaker, Pinfish, Atlantic Menhaden, Silver Perch, and Blue Crabs. Fish appeared to be 24-48 hrs. old with a size range of 30-90mm. A historical graph from USGS monitors shows periods of low disolved oxygen in the area of the kill. No lesions were observed.
5/21/2004	WA04002	Neuse River	Carolina Pines	98954	Kill was investigated on 5/21/04. Investigation covered a 2.2 mile span of the Neuse River in the Carolina Pines area. Species of fish included Spot, Pinfish, Croaker, Atlantic Menhaden, and Silver Perch. Fish were approximately 24hrs. old with no lesions. USGS monitors in the area recorded low readings of disolved oxygen in the area at the time of the kill.

2004 Fish Kill Events (by County)

Date	Kill Number	Waterbody	Location	Mortality	Comments
7/2/2004	WA04005	Neuse River	Carolina Pines	59500	NRRT received a fish kill call approx 8:00 a.m. July 2nd. The kill was located near the Carolina Pines area towards Flanner's Beach. It was approximately 1.4 miles in length and was comprised of, in order of highest percent abundance, juvenile spot, croaker, menhaden, flounder, blue crabs and some popeye mullet. Data from the nearest USGS in situ monitor (channel marker 11) indicated a drop in dissolved oxygen (DO) for approximately 2 hours the previous evening. At the time of the investigation, there were no other physical or biological parameters found to be out of the ordinary. It is believed that a short-term drop in DO was responsible for the fish kill.
7/31/2004	WA04010	Neuse River	near Courts Creek	200000	NRRT received a report of a fishkill on the Morning of July 31 regarding dead fish washed ashore near Courts Cr. Upon investigation, dead fish were found along a 0.5 mile stretch of beach between Courts Cr. and Long Cr. along the Neuse River. Residents in the area reported observing various species of fish trying to leave the water the previous evening, along with a strong hydrogen sulfide (rotten egg smell). Noting the behavior of the fish during the kill event, the hydrogen sulfide smell, and the wind conditions present at that time, the kill could most likely be attributred to an upwelling of anoxic water from the lower portion of the water column. Field staff experienced strong easterly winds in that area on the afternoon of July 30. This would have created a upwelling current along the shoreline where the fishkill occurred. All fish in the kill were either juvenile or bottom dwelling species which inhabit shoreline areas.
8/28/2004	WA04006	Neuse River	Flanners Beach	2180	A fish kill call was received on Saturday evening at 6:43 from Lynn Gurganous, a campground supervisor at the Croatan National Forest. The arrival time of 7:43 did not allow much time for pictures or sonde readings. The kill consisted of only menhaden in the small size range near 100 mm. The dried condition of the fish and human activities on the beach indicated the kill may have occurred late morning. No lesions were observed. The extent of the kill was near 1759 feet (0.33 miles). Three 50 foot transects revealed an approximate total of 2,180 fish. There were two wind shifts, one early morning, and the other before noon that same day. The USGS channel marker monitors indicated a slight drop in DO found during these times, along with an overturn of surface and bottom waters. This data is not conclusive, as the kill may have resulted from a localized event.
9/7/2004	WA04007	Neuse River	Carolina Pines	131000	Due to continued concern of lesioned and dead menhaden, NRRT investigated a fish kill in the Carolina Pines area. This concern was communicated on Tuesday of the following week. This kill extended for approximately 3.5 miles. Five 60 foot transects were performed, resulting in 131,000 dead menhaden. Prolonged exposure indicated time of death near the previous weekend. Schools of lesioned menhaden were evident in a large radius, extending from Slocum Creek to Flanner's Beach. Several cast nets indicated over 90% lesioned fish, some of which were in various stages of lesion development. Some of the lesioned fish were observed swimming lethargically and dying. Fish samples and ambient water samples were taken for NOAA, DWQ, NCSU, and UNCG to determine presence of other stressors. Other in situ parameters did not indicate any substantial drop in dissolved oxygen.
					Total Kills for County: 7 **Total Mortality for County: 727034**
Duplin					
1/2/2004	WL04002	Farm Pond	near Mt. Olive	65	Multiple species and sizes of fish killed (mostly sunfish 100-200mm TL). No lesions or evidence of parasites apparent. Fish kill apparently began approximately 2 weeks ago corresponding to heavy (2-3") rains. Pond not originally stocked per NCWRC guidelines, so difficult to determine if the kill affected all fish in the pond.
					Total Kills for County: 1 **Total Mortality for County: 65**

2004 Fish Kill Events (by County)

Date	Kill Number	Waterbody	Location	Mortality	Comments
Forsyth					
3/29/2004	WS04001	UT to Mill Creek	near Winston Salem	791	Kill caused by sanitary sewer overflow from City of Winston Salem and an estimated 40080 gallons of wastewater reached UT to Mill Creek. Investigators reported depleted DO levels below the spill. DWQ issued an NOV for the event to Winston Salem, Forsyth Co. City/County Utilities.
					Total Kills for County: 1 **Total Mortality for County: 791**
Lincoln					
7/22/2004	MO04002	Lake Norman	near Cowans Ford Dam	2500	NC Wildlife Resources Commission biologists investigated this kill and worked with personnel from Duke Power to collect needed data throughout the event. Duke Power personnel first observed an abnormally high number of dead striped bass on July 22 during their weekly survey of the lake. A total of 2,497 dead striped bass were collected between July 22 and August 13. All but 40 fish were collected within several miles of Cowans Ford Dam. The die-off resulted when a group of striped bass became trapped in the hypolimnion by an anoxic metalimnetic layer. As water temperatures began to rise in the late spring, the lake stratified. The epilimnion, from the surface to a depth of about 10 m, remained oxygenated throughout the summer. Dissolved oxygen levels deeper in water column from about 10 m to the bottom (about 34 m near the dam), were fixed as the lake stratified and continued to decrease throughout the summer due to normal biological processes. However, these processes occurred at a slightly faster rate in the metalimnion from about 10 to 20 m, and by late July this portion of the water column was nearly devoid of oxygen. The striped bass located in the hypolimnion below 20 m were trapped in pockets of water that had cool temperatures, forage, and sufficient oxygen. Over the following weeks, mortality occurred as hypolimnetic dissolved oxygen levels decreased, and dead striped bass were observed at the surface. Measurements of dissolved oxygen indicated that by the second week of August, metalimnetic and hypolimnetic dissolved oxygen values were at or near 0 mg/L, and a majority of the striped bass mortality was observed over the next several days. As many of the striped bass reached the surface, they were already in the later stages of decomposition. The operations of Duke Power facilities at Lake Norman were within the limits of their permits and were similar to previous years.□Presence of a parasitic copepod affecting only striped bass was also considered as factor. Although nearly all striped bass collected were infected, infection rates for individual fish were relatively low. A small sample of freshly dead fish was sent to Auburn University for analysis, and there was no indication that the copepod was responsible for the kill. In addition, organs from several freshly dead striped bass were sent to North Carolina State University for analysis, and the results indicated nothing atypical related to disease or pathogens.
					Total Kills for County: 1 **Total Mortality for County: 2500**
Montgomery					
6/29/2004	FA04001	Badin Lake		250	Kill was most likely caused by a temperature/oyxgen squeeze that eliminated adequate physical habitat for striped bass. Oxygen readings below 12m indicated that no oxygen was available for stripers occuping this depth in the water column.
					Total Kills for County: 1 **Total Mortality for County: 250**

2004 Fish Kill Events (by County)

Date	Kill Number	Waterbody	Location	Mortality	Comments
Person					
3/30/2004	RA04001	Mayo Creek	Below Reservoir Spillway	60	A site visit was conducted at 0900 hrs on 30 March 2004. Observed approximately 60 dead common carp in various stages of decay witin 500 meters of the spillway. There were also approximately 200 live carp congregating in the shallow areas and around spillway. Approximately 50% of the live carp had sores on top of their head and body. Many carp were very lethargic and unresponsive, as was the bluehead chub. Live carp were in spawning condition, but no spawning activity was observed. Four specimens were sent to Warm Springs Fish Health Center, Georgia, for analysis.
					Total Kills for County: 1 **Total Mortality for County: 60**
Union					
3/24/2004	MO04001	Ut to Paddle Branch	near Goose Creek	200	Cause not specified on report
					Total Kills for County: 1 **Total Mortality for County: 200**
Wake					
12/9/2004	RA04002	Neuse River	At SR 2000 near Falls	35	There were approx 30-35 dead or dying Crappie and Gizzard Shad on shore in the park below the bridge on the upstream side. More dead fish were observed on shore, on the same side upstream, but were not counted. Also, some dead fish were observed in the stream running through the park into the Neuse. Measurements were taken at a depth of 0.1 meters and three water samples were collected to be tested for: N&P, coliform, and turbidity.
					Total Kills for County: 1 **Total Mortality for County: 35**
Washington					
5/26/2004	WA04004	Somerset Canal	near Creswell	350	The fish kill may be the result of rapidly declining DO levels after heavy rainfall events and subsequent runoff that occurred within previous days. Land application of herbicides and/or pesticides in this area was unknown.
					Total Kills for County: 1 **Total Mortality for County: 350**