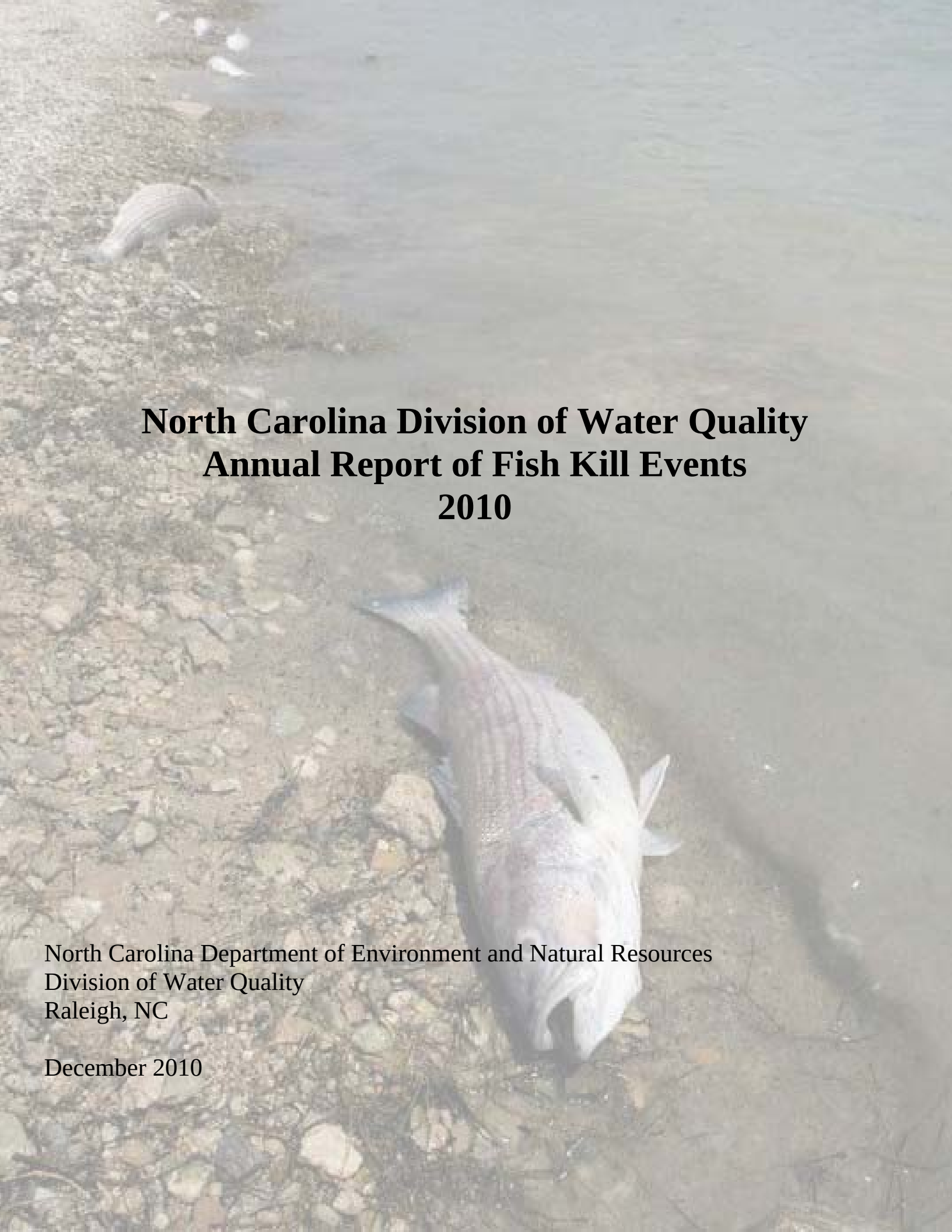


North Carolina Division of Water Quality
Annual Report of Fish Kill Events
2010

North Carolina Department of Environment and Natural Resources
Division of Water Quality
Raleigh, NC

December 2010

This page intentionally left blank

Introduction

The reporting of fish kill activity across North Carolina is based on 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 DWQ's Environmental Sciences Section (ESS) where the data are reviewed and compiled. 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. The protocols have proven successful in standardizing reporting methods and enhancing the quality and quantity of information reported from kill events.

Fish kill information for the current year is posted weekly from June to November on the ESS website: **http://portal.ncdenr.org/web/wq/ess/fishkillsmain**. Kill report locations for the current year are also available on the website as a Google Earth® coverage. The format provides better visual representations of current fish kill activity across the state and allows the user more control in the visualization process. This report will also be available at the ESS website after submittal.

This document is a summary of fish kill events reported to the DWQ from January to early December, 2010. The report is mandated under Section 4 of Chapter 633 of the 1995 North Carolina General Assembly Session Laws.

2010 Fish Kill Event Summary

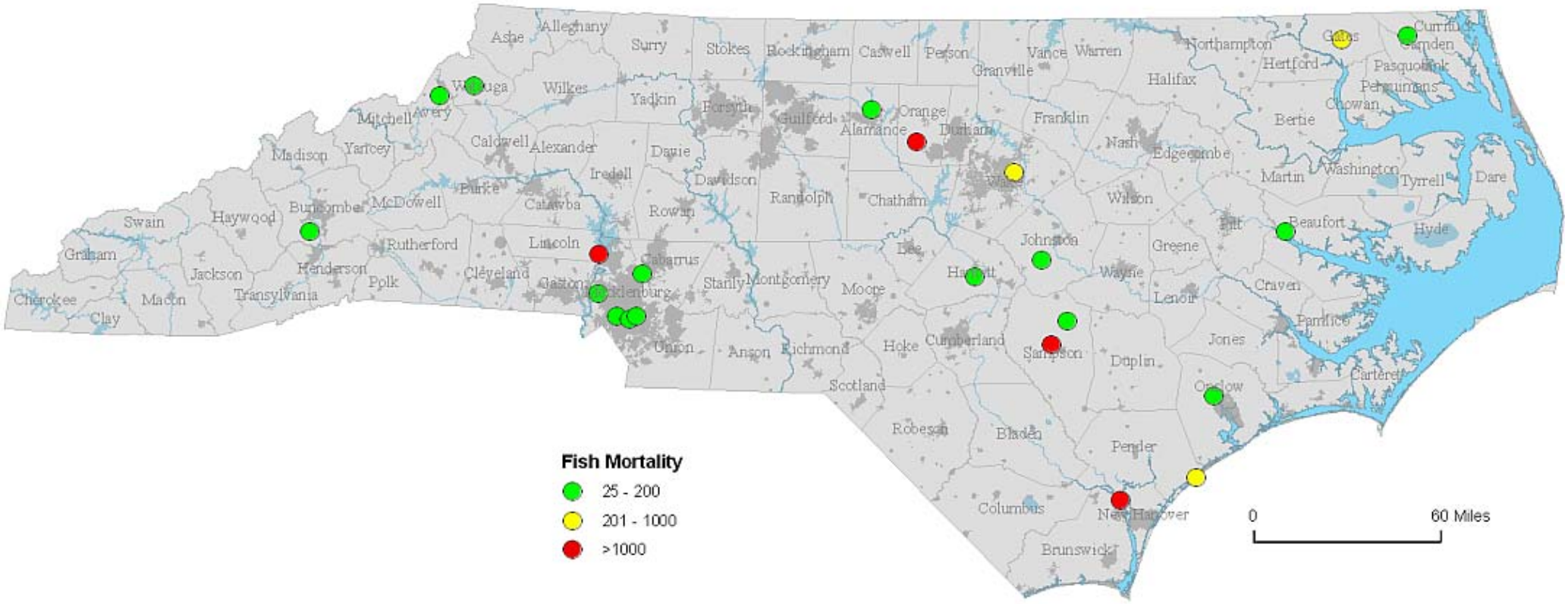
To date, investigators have reported 22 fish kill events statewide for 2010 (Figure 1). Kill events were reported from coastal and inland waters across the state as far west as Buncombe County. Kill activity was documented during the year in 10 of the state's 17 major river basins and most events were reported from inland, freshwaters.

Fish kill investigators reported relatively light activity and low fish mortality in all river basins during 2010. Both event and mortality totals were among the lowest observed since systematic reporting began in 1996. According to DWQ investigations, the total statewide mortality for the year was 15,700 fish. Mortality totals for individual events in 2010 ranged from 25 to around 2300.

ESS records fish kill events when at least 25 fish are affected and the event is confirmed by trained investigators from regional offices and cooperating agencies.

- **Total Reported Events for 2010** **22**
- **Freshwater Kills** **19**
- **Estuarine Kills** **2**
- **Ocean Kills** **1**
- **Total Fish Mortality for 2010** **15,700**
  - ***Ocean/Estuarine Mortality*** ***3,500***
  - ***Freshwater Mortality*** ***12,200***
- **Report Mortality Range** **25 to 2,340**
- **River Basins with Kill Activity** **10 (of 17)**

Figure 1 : Fish kill events and observed mortality reported to NCDWQ during 2010



Basin Activity

Investigators reported fish kill events in 10 of the state's 17 major river basins during the 2010 season (Figure 1, Table 1). Kill activity was most frequent in the Cape Fear and Catawba basins (7 and 5 events respectively). Kill activity in the Neuse and Tar/Pamlico basins was extremely light with only three reports for both. The lower Neuse, as well as the lower Tar/Pamlico estuary, have historically experienced adverse environmental factors such as low dissolved oxygen, high water temperatures, and fluctuating salinities. However, according to reports, these factors were not significant kill event drivers during 2010. Activity in other river basins across the state remained sporadic or absent throughout the 2010 season. The statewide event total decreased from previous years to 22. The 2010 total represents one of the lowest number of events since reporting began in 1996 (Figure 3).

Table 1: Fish kill reports by basin, 1996 – 2010

Year	Broad	Cape Fear	Catawba	Chowan	French Broad	Neuse	Lumber	Pasquotank	Roanoke	Tar/Pamlico	New/Watauga	White Oak	Yadkin	Annual Totals
1996	None	21	None	2	None	14	4	10	2	3	None	3	1	**60**
1997	None	16	3	2	2	12	3	2	None	6	None	3	10	**59**
1998	None	23	1	1	3	8	5	8	1	5	None	1	2	**58**
1999	1	14	3	1	1	16	None	2	None	11	1	3	1	**54**
2000	None	12	2	None	None	23	2	None	None	14	None	3	2	**58**
2001	None	5	4	1	None	37	None	1	None	23	None	3	3	**77**
2002	None	8	1	2	1	9	None	6	None	8	None	3	8	**46**
2003	None	3	None	2	1	21	2	2	2	6	2	None	2	**43**
2004	None	1	None	1	None	8	1	None	1	2	None	None	3	**17**
2005	None	2	None	1	None	9	1	2	1	1	None	1	1	**19**
2006	1	5	2	None	None	10	2	None	2	2	None	None	1	**25**
2007	1	1	2	1	3	10	None	1	1	5	None	None	2	**27**
2008	None	10	2	2	2	21	None	4	None	16	None	None	4	**61**
2009	None	3	None	2	None	15	None	None	None	11	None	None	2	**33**
2010	None	7	5	1	1	2	None	1	None	1	2	1	1	**22**
Total	**3**	**131**	**25**	**19**	**14**	**215**	**20**	**39**	**10**	**114**	**5**	**21**	**43**	**659**

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

Fish Mortality

The 2010 season produced a reported mortality total of 15,700 individuals. The 2010 total is the lowest since systematic reporting began in 1996 (Figure 4). The majority of the 2010 mortality was reported from the Catawba river basin where nearly one half of the annual total was reported from one prolonged event on Lake Norman (7,000 fish). Most 2010 fish kills were considered small with 17 of 22 events involving less than 1,000 individuals.

Figure 3: Reported annual fish kill events, 1997 to 2010

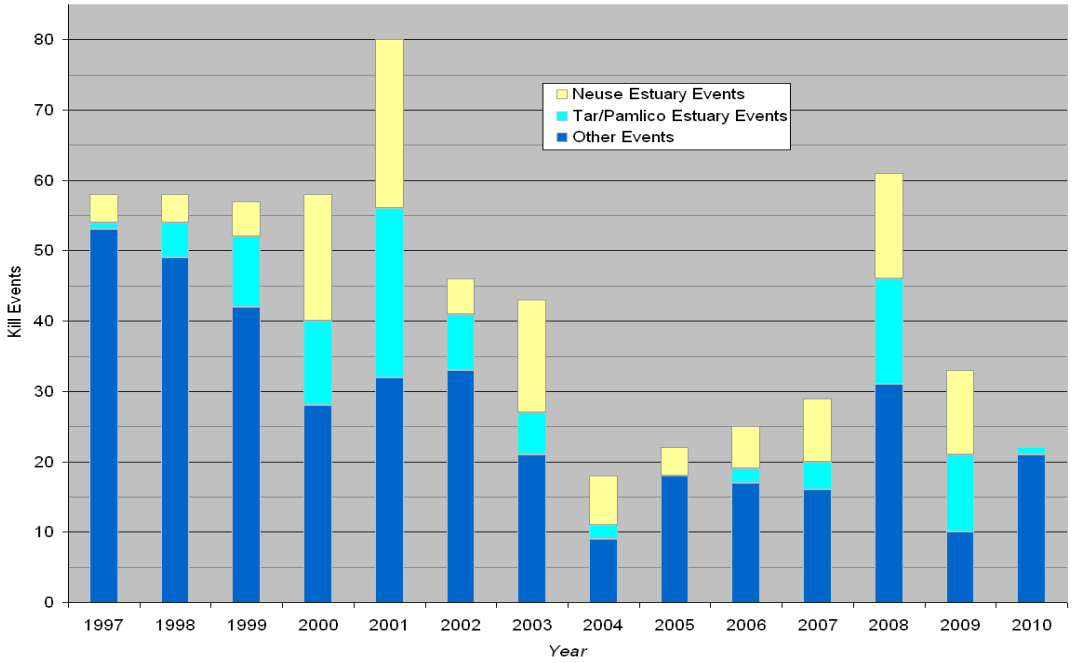
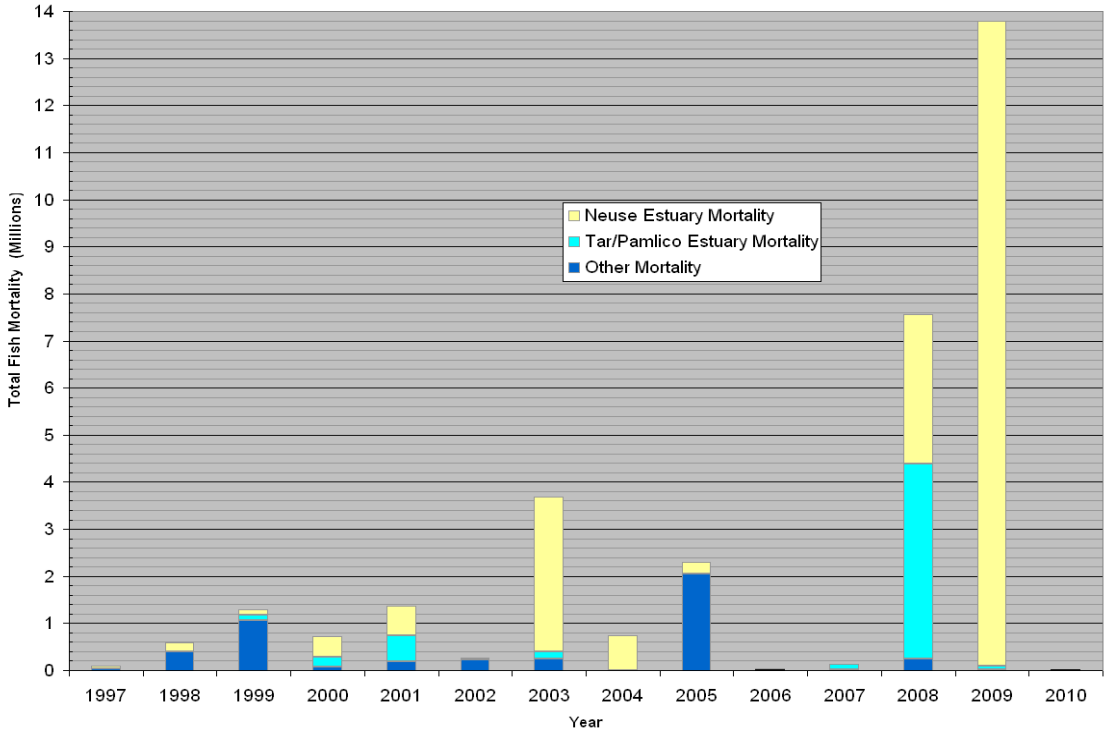


Figure 4: Reported annual fish kill mortality, 1997 to 2010

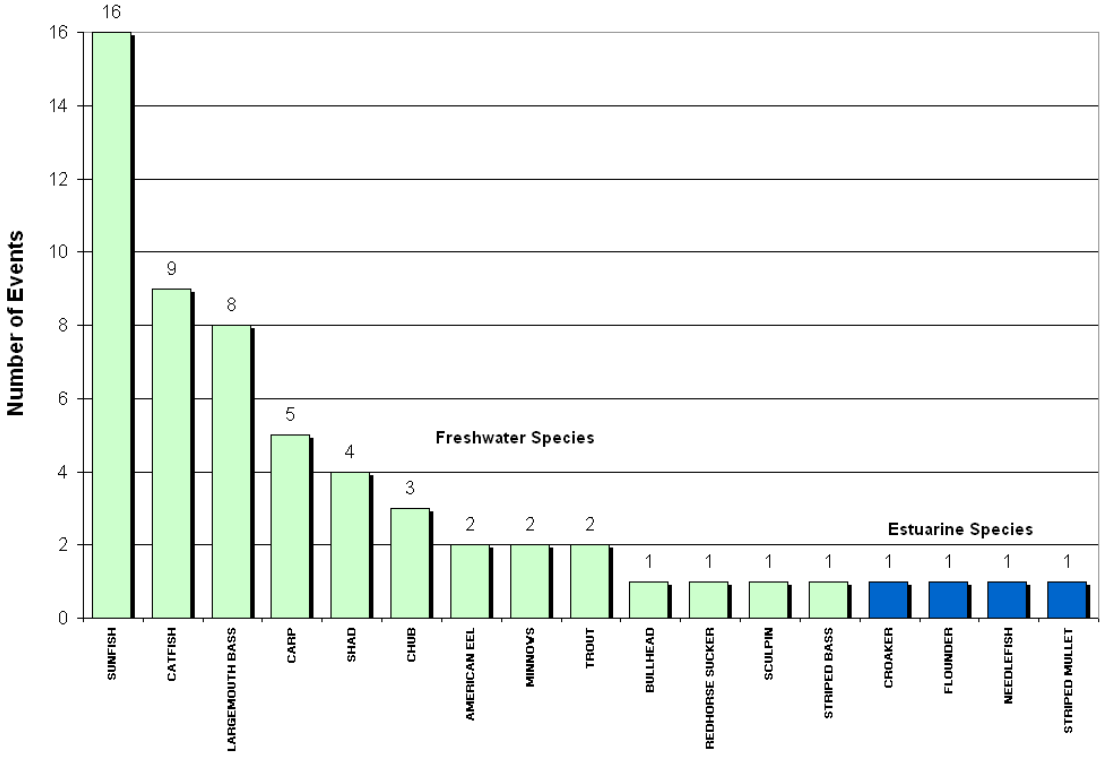


Finfish and Other Species Reported

Fish kill events in 2010 involved at least 22 species of fish in estuarine and freshwaters (Figures 5). Estuarine species reported included, flounder, needlefish, striped mullet and croaker. Freshwater species most frequently observed included sunfishes, largemouth bass, carp, and catfish. Atlantic menhaden were absent from all 2010 reports. Menhaden have historically been frequent victims in North Carolina fish kills and have often comprised the majority of the annual finfish mortality.

Non-finfish species were observed at four kill events during 2010. These included blue crab, crayfish, snails, and invertebrates. Numbers of non-finfish species in 2010 reports were insignificant and historically, the frequency of these animals reported in association with fish kills has remained relatively low.

Figure 5: Finfish and frequencies observed during 2010 fish kill events



Reported Causes for Fish Kill Events

Specific causes of fish kill events may or may not be obvious to investigators depending on a number of factors. Some are identified, but others remain unconfirmed or unclear due to an investigation occurring hours or days after the actual event. Kill events may 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 water quality and 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 2010 kill events are listed in Table 2 in order of frequency. The statewide fish mortality associated with each cause category is also shown.

Table 2: Reported causes, frequencies, and associated fish mortality for 2010 fish kill events

Reported Cause	Events	Mortality
Dissolved Oxygen Depletion	10	10473
Unknown*	6	1688
Spills	6	3544

** "Unknown" causes were reported for those events where no specific causes could be determined.*

Dissolved Oxygen Depletion: Low dissolved oxygen (DO) was the most frequently reported cause for fish kill events during the 2010 season. DO stress was cited as a factor in nearly half of the years events and associated with nearly 60 percent of the year's fish mortality. A prolonged die off of striped bass in Lake Norman was the most significant event attributed to DO stress (see Appendix). Striped bass mortality often occurs in Lake Norman during hot summers when the heat depletes the oxygen in the middle layers of the lake. This year the die-off may have intensified because of Duke Energy's need to take colder water from deeper in the lake to cool its McGuire Nuclear Station.

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. 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. Investigators failed to cite or confirm causes for 6 of the year's events. Kills with unknown causes occurred in both fresh and ocean waters and included a kill of 1000 croaker in the Atlantic Ocean near Surf City.

Spills: Toxic spills may deplete DO levels in receiving streams or induce kills outright through physical or chemical toxicity. During 2010, investigators reported six events where the release of toxic substances induced a fish kill. Spilled or released substances included algaecides, concrete, sewage, and industrial chemicals. Except for an event on Sutton Lake (New Hanover Co., see Appendix) all spill related kills involved less than 700 fish.

Algal Blooms: ESS staff members routinely examine water samples associated with kills for the presence of harmful algal 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 labs.

Algal samples were collected by investigators in conjunction with three fish kill events during 2010 (Table 3). Results indicated all algal species identified by DWQ staff were typical for local estuarine and fresh waters during the summer season and none were cited as a factor in any kill events.

Table 3: Algal species collected during 2010 fish kill events and identified by ESS staff.

Genus	Algae Type	Water Type
Skeletonema	Diatom	estuary/ocean
Microcystis	Bluegreen	freshwater pond
Microcystis	Bluegreen	freshwater pond

Notable Events

Duke Energy scientific services notified the NC Wildlife Resources Commission (NCWRC) that dead striped bass were appearing around Lake Norman's Cowan Ford Dam in early July. Duke staff collected approximately 7000 striped bass over a three week time period. Some fish appeared to have died from fishing related activities (catch and release), but many displayed signs of oxygen deprivation. An unusually hot summer coupled with Duke Energy's need to utilize oxygenated lake waters for the McGuire Nuclear Station were cited as factors in the intense kill of striped bass. Investigators

concluded that striped bass mortality appeared to be more significant than years past due to Duke Energy's utilization of deep, oxygenated water earlier in the summer season to meet thermal requirements for the nuclear station. Normally, Duke avoids using deeper water until August, but unusually hot weather in June and July forced deep water withdrawal in mid-July. Striped bass are not native to southeastern lakes and are stocked by the NCWRC. This species is particularly susceptible to low dissolved oxygen levels and higher water temperatures. Less extreme kills of striped bass related to dissolved oxygen depletion and summer heat have been documented in Norman and other inland lakes in North Carolina.

Progress Energy staff notified DWQ of a kill involving over 2400 fish on Sutton Lake (New Hanover Co.) in July. Aquatic vegetation and blue green algae had developed in the lake and Progress Energy staff applied several chemicals in accordance with label instructions. Progress Energy was encouraged to consider treating aquatic vegetation during those months of the year when water temperatures are not as elevated. They were also asked to investigate ways to alleviate the effects of adding chemicals to the lake to control aquatic weeds/algae.

2010 Summary

Investigators reported fish kill events in 10 of the state's major river basins during 2010. Kill activity was documented throughout the state and was heaviest in freshwaters located in the Catawba and Cape Fear basins. Historical trouble spots within the lower Neuse and Tar/Pamlico estuaries experienced little or no fish kill activity. The number of fish kills reported during the year totaled 22, a decrease from the previous years and among the lowest totals seen since systematic reporting was established in 1996.

DWQ investigations placed the total statewide mortality figure for the year at 15,700 fish. Over 75% of the total was reported from freshwater locations across the state. The annual total for 2010 represents the lowest fish count since 1996.

Feedback from investigators and review of fish kill reports provide few clues that may explain the decrease in fish kill mortality during the 2010 season. Some investigators reported that several conditions responsible for dissolved oxygen depletion in coastal estuaries were not present in 2010. According to reports, winds remained consistent throughout the summer and up to the fall season, resulting in mixed, moderately oxygenated estuarine waters. Other investigators reported that ambient water quality conditions in the estuaries were not dramatically different from previous years when DWQ recorded higher numbers of fish kills. Furthermore, as of this report, there is no clear explanation for the absence of large Atlantic menhaden kills so common in previous years.

Some have suggested the elimination of the Neuse Rapid Response Team contributed to fewer kill reports for 2010. Due to recurring state budget reductions, the Neuse Team was eliminated as of July, 2010. DWQ continued to maintain a presence in the lower Neuse River with the capability to investigate fish kills, however questions arose regarding DWQ's ability to receive and investigate fish kill information as a result of the reductions. Anecdotal information, as well as reports from other agencies, the press, and citizens indicate that no significant fish kill events were overlooked or unreported. DWQ fish kill records seem to closely match water quality incident records and data provided by other agencies.

Results from investigations continue to suggest that a majority of North Carolina's annual kill activity (or lack thereof) may depend on crucial environmental conditions in key areas of the state, namely, the coastal basins and estuaries. Reports indicate that dissolved oxygen depletion continues to play a key role in the bulk of the state's fish kill activity. Environmental conditions that determine dissolved oxygen levels in these areas may therefore be significant drivers of fish kill activity.

Appendix: 2010 Fish Kill Event Summaries Listed by County

Total 2010 Fish Kills: 22

Total 2010 Fish Mortality: 15715

2010 Fish Kill Events (by County)

Date	Kill Number	Waterbody	Location	Mortality	Comments
Alamance					
7/22/2010	WS10002	Haw River	near Glencoe	170	Initially 60 dead or dying fish were observed on 7-18-2010 between noon and 3 pm on the Haw River above Glencoe. Fishermen near Gerringer Mill Road indicated that they observed appx. 400 dead fish between 10 and 12 that morning. A total of 170 fish were observed by DWQ investigators at various sites over 2 days.
					Total Kills for County: 1 **Total Mortality for County: 170**
Avery					
6/25/2010	AS10001	Elk River	near Banner Elk	25	Only 15 trout were confirmed killed in this event. Manager of Elk River Club reported as many as 100 fish but numbers were not confirmed by DWQ. Public works director from Banner Elk reported parameters from WWTP normal at time of kill. Elk River Club reported spraying normal applications of the following fungicides: Daconil, Pentatheon and Spotrete. No abnormal applications were made nor was anything used that was not used numerous times in the past.
					Total Kills for County: 1 **Total Mortality for County: 25**
Beaufort					
5/6/2010	WA10001	Jacks Creek	Washington	77	The Pamlico Team responded to a fish kill call from the City of Washington, Thursday May 6th. Staff counted 76 decomposed Gizzard Shad and 1 Bluegill along ¼ mile of the shoreline of Jack's Creek. The fish were approximately 48 hours old. Dissolved oxygen values recorded 1.4 mg/L at the surface and 0.23 mg/L near the bottom (1 m down). Water temperatures were near 24 degrees C. Salinities were near zero (0.07 ppt).This ½ mile long Creek receives a large amount of the City's storm water runoff. Precipitation accumulated from 1/10th to 1/4th of an inch of rain late Monday and Tuesday in Washington. It is likely that the storm water runoff exacerbated pre-existing low DO levels. Ducks, otters, turtles, and juvenile fish were observed swimming in the area during the investigation. No lesions were observed, no samples were taken.
					Total Kills for County: 1 **Total Mortality for County: 77**
Buncombe					
11/4/2010	AS10002	Wesley Creek	south of Asheville	180	The fish kill appears to be the result of DOT working on a bridge just upstream of the WWTP. Concrete came in contact with the stream raising the pH. Dead were mostly creek chubs.
					Total Kills for County: 1 **Total Mortality for County: 180**

2010 Fish Kill Events (by County)

Date	Kill Number	Waterbody	Location	Mortality	Comments
Camden					
7/2/2010	WA10003	Dismal Swamp Canal	Downstream of Locks	200	Lynn Henry, DMF reported a fish kill in the Dismal Swamp Canal downstream of the locks at South Mills . The initial report estimated 50-200 dead fish and more fish in distress. The fish kill was apparently completed upon site visit. Investigator only observed one dead catfish in the area of the reported event. Hypoxic conditions persisted during the site visit and were likely the cause of the fish kill. Previous hot air and water temperatures likely accelarated the decrease in dissolved oxygen. Elevated conductivity readings in and near Joyce Creek, which is just downstream of the locks, are somewhat concerning and may indicate a source of nutrient loading.
					Total Kills for County: 1 **Total Mortality for County: 200**
Gates					
6/28/2010	WA10002	Bennetts Creek	Near Millpond Dam	335	Dissolved oxygen likely crashed in the creek because the millpond water level dropped below the dam elevation and flow from the millpond into Bennet's Creek ceased. Hot conditions and warm water likely accelarated the decrease in dissolved oxygen. Many small catfish were observed gasping at the surface and many small (3-4 in) American eels were observed swimming at the base of the dam. Opening the fish ladder gate seemed to improve conditions because DO concentrations in the fish ladder and downstream of the discharge point (2.1 and 1.1 mg/L, respectively) were higher than DO at the base of the dam where most dead fish were observed.
					Total Kills for County: 1 **Total Mortality for County: 335**
Harnett					
10/26/2010	FA10003	Upper Little River	near Lillington	200	Most of the 200 dead fish were redhorse suckers, ranging from 0.5 to 2 feet long. The conductivity upstream was 62.6 micro Semiens, but near the fishkill at 705 micro Semiens. Investigators suspected a spill or discharge in the area but could not confirm.
					Total Kills for County: 1 **Total Mortality for County: 200**
Johnston					
6/22/2010	RA10003	Private Pond	near Four Oaks	150	Goats and one horse have access to pond. Manure from horse and goats could be seen on pond's edge. Excessive algae mats noted however, measurements indicated no algae bloom. Most likely cause of fish kill is from excessive high temperature and possible high nutrient runoff.
					Total Kills for County: 1 **Total Mortality for County: 150**

2010 Fish Kill Events (by County)

Date	Kill Number	Waterbody	Location	Mortality	Comments
Lincoln					
7/12/2010	MO10004	Lake Norman	near Cowans Ford Dam	7000	Duke Energy scientific services notified the NC Wildlife Resources Commission (NCWRC) that dead striped bass were appearing around Cowans Ford Dam. Since July 12, Duke staff collected approximately 7000 stripers. Some appear to have died from fishing related activities (catch and release), but some displayed signs of oxygen deprivation. Striped bass are not native to southeastern lakes and are stocked by the Wildlife Resources Commission. This species is particularly susceptible to low dissolved oxygen levels and higher water temperatures, and, if severe enough, can die from these effects. Although this is a natural phenomenon, the combination of an unusually long stretch of early, hot weather and the operation of McGuire's lower-level intake (LLI) pumps may have contributed to this occurring slightly sooner than normal. On July 19, Duke began operating LLI pumps to use cooler water in their condenser cooling system to remain compliant with permitted thermal limits and continue operations to meet customer demand. Prior to the operation of the LLI pumps, Duke personnel observed incidental fish mortalities. Striped bass mortality is expected to continue into August as dissolved oxygen and temperature conditions worsen.
					Total Kills for County: 1 **Total Mortality for County: 7000**
Mecklenburg					
3/6/2010	MO10001	Private Pond	UT to Paw Creek	194	Pond impacted by sanitary sewer overflow.
4/28/2010	MO10002	Pond	Park Road Park	136	Fish kill was suspected to be caused by spring turn over in the pond. Many small fish and tadpoles were present at time of investigtion and did not appear to be stressed.
6/3/2010	MO10003	UT to Mallard Creek	near UNCC	100	Kill caused by spill of process/wastewater from Mallard Creek Polymers into storm drain. Investigators reported Styrene in spilled water. Stream was flushed by facility.
7/26/2010	MO10005	Private Pond	Charlotte	34	The fish kill is thought to be caused by low dissolved oxygen content in the pond water. Water in pond was green in color from algae and the temperature was observed to between 31.6^{0}C to 33.20^{0}C. Thirty-six Canadian Geese and 5 Mallard Ducks were observed at the pond during the investigation. The amount of waste generated by the waterfowl should provide adequate nutrients for the algae to grow. Algae samples were collected and sent to to DWQ ESS (Mark Vanderborgh). Location of pond: 5672 International Drive Charlotte, NC 28270
9/19/2010	MO10006	McAlpine Park Pond	Charlotte	153	Green /brown algal masses seen on the pond bottom. Hot dry weather reported days prior to event. Most affected fish were catfish.
					Total Kills for County: 5 **Total Mortality for County: 617**

2010 Fish Kill Events (by County)

Date	Kill Number	Waterbody	Location	Mortality	Comments
New Hanover					
7/23/2010	WL10001	Sutton Lake	Wilmington	2340	The fish kill was first reported on July 23, 2010 (Friday). The fish kill was first observed at 1800 hrs on July 22,2010, by Progress Energy staff. DWQ received a call at approximately 0800 on 7/23/2010. Linda Willis met with Bob Barwick, Justin Homan (NC Wildlife), and Kent Tyndall on 07/23/2010 at 1300 hrs at the Sutton Boat Ramp. Progress Energy appears to have applied Sonar (active ingredient Fluridone), in accordance with the label instructions. The target concentration for the active ingredient in Sonar was 15 ppb. The label cautions against a cumulative concentration (for the year) of 150 ppb. On July 17, a blue green algae had developed in Sutton Lake. Captain was used to treat the algae. DWQ asked Progress Energy to collect samples in bays 2, 4 and 8 at the bottom, middle and surface of the bays in order to establish a profile for the water column. The parameters requested were biological oxygen demand (5 day), chemical oxygen demand, toal Kjeldahl nitrogen, nitrate nitrogen, nitrite nitrogen, ammonia nitrogen, total phosphorus and copper. The data was collected on 7/23/2010. DWQ also requested physical parameters (pH, temperature, conductivity, dissolved oxygen, percent saturation) in bays 2, 4, 8 at the bottom, middle and top of the water column. Physical parameters were taken from 7/23/2010 through 7/29/2010. DWQ requested the sampling continue until the physical data suggested recovery. DWQ requested that Progress Energy pump water from the Cape Fear River into the lake in order to provide an increase in oxygenated water. On Saturday the dissolved oxygen continued to fall. On Sunday (07/25) the dissolved oxygen began to improve. Progress Energy was encouraged to consider treating aquatic vegetation during those months of the year when water temperatures are not as elevated and investigate ways to alleviate the effects of adding chemicals to the lake to control aquatic weeds/algae to avoid fish kills. The only method available at the time to increase DO in the lake was to pump water in from the Cape Fear River. **Total Kills for County: 1** **Total Mortality for County: 2340**
Onslow					
9/7/2010	WL10003	New River	above Jacksonville	150	Cause reported as unknown. Low dissolved oxygen detected by investigators at various locations along the river. Fish first observed 5 days prior to investigation. **Total Kills for County: 1** **Total Mortality for County: 150**
Orange					
6/8/2010	RA10002	Norther Pond	near Hillsborough	1100	Some fish observed with bulging eyes. Low dissolved oxygen observed at time of investigation. Extremely hot weather prior to event. **Total Kills for County: 1** **Total Mortality for County: 1100**
Pender					
4/7/2010	WL10004	Atlantic Ocean	Surf City	1000	Only croaker affected. A gill net was placed in the vicinity but no obvious net marks seen on carcasses. **Total Kills for County: 1** **Total Mortality for County: 1000**

2010 Fish Kill Events (by County)

Date	Kill Number	Waterbody	Location	Mortality	Comments
Sampson					
4/16/2010	FA10001	Boone Pond	near Great Coharie Creek	1400	FRO estimated that there were 1400 Bluegill involved in the fishkill; no other species. The immediate cause appeared to be low dissolved oxygen. Tom Rachel (Wildlife) was also present at the fishkill on Friday. His main recommendation was mechanical aeration. Algal samples revealed alarge quantity of flocculent organic matter. The assemblage was diverse and included, cryptomonads, greens, dinoflagellates and the colonial bluegreen, Microcystis. Excessive amounts of organic matter are known to create a high biological oxygen demand as it is decomposed by microorganisms.
8/25/2010	FA10002	Gautier Property Pond	near Newton Grove	41	Landowner advised to areate pond. High conductivity readings in upstream tributary. Red film noticed on water surface.
					Total Kills for County: 2 **Total Mortality for County: 1441**
Wake					
6/12/2010	RA10001	Branchwater Pond	Raleigh	630	Kill caused by sewer overflow from upstream manhole due to vandalism. The pond was pumped down and sewage/fish removed before arrival at site around 4:00PM. Pond was refilled with City Water and City of Raleigh reported that dechlorination tablets were randomly added to pond.
					Total Kills for County: 1 **Total Mortality for County: 630**
Watauga					
7/19/2010	WS10001	Hodges Creek	near Boone, NC	100	Kill occurred as a result of parking lot sealant runoff. The estimate of fish mortality is from Donna Lisenby who reported that the majority were trout and that 21 crayfish were also found dead. The fish kill was reported to NC Emer. Mgt. at 12:01 am 7-18-2010. The sealant runoff occurred during a rain event on 7-17-2010 at noon. A second rain event ocurred later that evening. Source of sealant runoff was 2458 NC Hwy. 105 South, Boone.
					Total Kills for County: 1 **Total Mortality for County: 100**