

# Section 4



## 4.1 Non-Agriculture Business Sector

### 4.1.1 Introduction and Summary

#### Statewide

As significant as Hurricane Floyd's destruction was, the State of North Carolina's non-agriculture economy is expected to maintain its position as a high performer among southeastern states. The area of the State most heavily impacted by the disaster is primarily rural and relatively less densely populated. Due to the size, strength and diversity of the State's economy, negative economic impacts of Hurricane Floyd are expected to be localized and generally not long-term.

#### 44-County Area

There are an estimated 96,500 businesses in the 44-county area. The Business Impact Survey contacted 2,461 businesses (refer to Section 2.0 and Appendix I for sampling and methodology and to

Although economic impacts to North Carolina as a whole are expected to be limited, it is critical to remember that many individual Hurricane Floyd survivors were impacted economically, physically, and emotionally, and must now rebuild their lives literally from the ground up. Many lives will be altered forever.

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**Counties with Severe, Moderate, and Minor Damage**

Counties with Severe Damage	Counties with Moderate Damage	Counties with Minor Damage
Beaufort	Bertie	Camden
Brunswick	Bladen	Chowan
Columbus	Carteret	Currituck
Duplin	Craven	Dare
Edgecombe	Cumberland	Franklin
Greene	Halifax	Gates
Jones	Hertford	Harnett
Lenoir	Hyde	Perquimans
Nash	Johnson	Scotland
New Hanover	Martin	Tyrrell
Pender	Northampton	Vance
Pitt	Onslow	Wake
Wayne	Pamlico	Warren
Wilson	Pasquotank	Washington
	Robeson	
	Sampson	

Appendix D for a list of the questions included in the Survey). Based on reports from the sample survey of businesses, an estimate of over 60,000 (60 percent) businesses in the impacted area reported some type of economic impact from the Hurricane (including actual physical damage or losses of revenue due to disruption of business).

As a result of the large scale of Hurricane Floyd, which impacted 44 of the 100 counties of North Carolina, this report focuses on economic impacts at the county and regional level. The purpose of this section is to assess the overall economic impacts of Hurricane Floyd to the 44-county area. Appendix F provides a county-by-county synopsis of disaster impact as reported by local economic development representatives.

Economic evaluations were made at the State, regional and local levels using information from the following sources:

- A Business Impact Survey conducted by the ECU Survey Research Laboratory
- Telephone conversations with local economic development professionals and regional development districts
- Meetings and interviews with State and local officials, business and association executives
- Analysis of disaster-related data from FEMA's Teleregistration service, an automated telephone accessed system allowing disaster victims to register for assistance
- Analysis of disaster-related data from the Small Business Administration's (SBA) loan pipeline reports

### 4.1.2 Impacts to Economic Sectors And Businesses

Impacts to businesses can be estimated through a variety of methods such as reports of direct damage, information gathered using the Business Impact Survey, reports to the FEMA Teleregistration service, and by less direct methods, including the number of loan requests and number of business closures (temporary and/or permanent).

## Post-Disaster Economy

Within a month of the storm, the FEMA Teleregistration service received notifications of disaster-related damages from over 10,000 of the estimated 96,500 businesses (or 10 percent) in the 44-county impact area.

The Business Impact Survey, which was completed in mid-November 1999, reported that most businesses (93.0 percent) survived the storms and were operating. However, almost 10 percent of the small businesses in the most severely impacted region had not yet been able to resume normal operations. Across the 44 counties, almost 75 percent of the businesses shut down because of the storms and floods. The length of shutdown was much longer in the severely impacted counties (8.0 days) than in the counties with minor impacts (5.0 days). Less than one half of one percent are not planning to reopen and most (95 percent) are planning to stay in the same location. For many small businesses in the retail sector, missing the approaching holiday season sales would mean significant reduction in annual sales.

Extrapolations based on the Business Impact Survey indicate that of the 96,500 businesses located in the impact area, almost 20,000 incurred physical damage, 42,000 reported business disruption and 17,000 expected to lose market share because of the storms. Another 5,000 medium sized businesses are estimated to have had physical damage, 11,000 were disrupted and almost 4,000 expect to lose market share. Overall, the summary indicated that over an estimated 60,000 businesses suffered one or more types of losses.

### Impacts by Economic Sectors

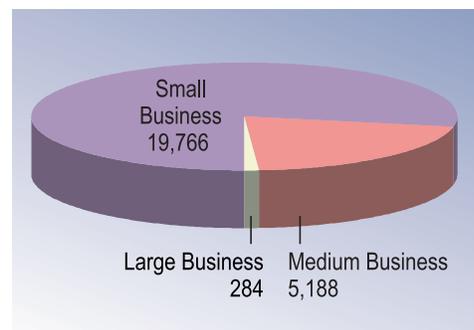
The Business Impact Survey did not develop the sample size necessary to analyze individual business sectors or counties, but did gather sufficient data to assess damage by business size (number of employees). The distribution of business sector sample percentages, by projected county impact level, is shown in Figure 4-1.

### Impacts by Business Size

Damages were reported for small (1 to 9 employees), medium (10 to 99 employees), and large businesses (100 or more employees) (refer to Figure 4-1, Table 4-1, and ECU report in

The **Business Impact Survey** is the primary source of information regarding direct and immediate impacts to the 44-county area. Many of the survey and interview respondents were unable to provide accurate (within the accuracy levels desired) dollar amounts of damage and economic loss because of how recently Hurricane Floyd had occurred. However, in order to provide a rapid assessment of economic impact to the 44-county area some accuracy has been sacrificed. A report summarizing the results of the ECU Business Impact Survey is included as Appendix I.

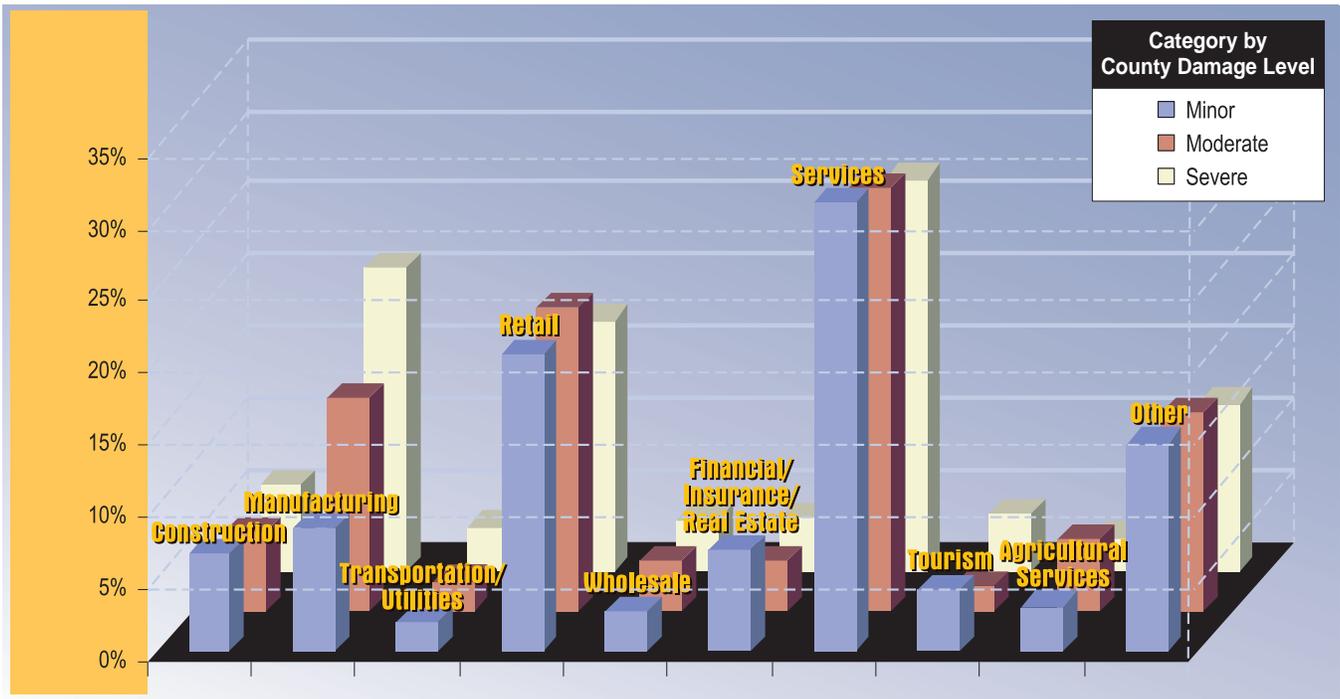
**Total Businesses Damaged**



Source: ECU Business Impact Survey, 1999

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**Figure 4-1 Existing Business Sectors in Impacted Area, by Percent**



Source: East Carolina University Business Impact Survey, Table 3-1, 11/12/99

Appendix I for more detailed information). The Business Impact Survey indicates:

- A projected 19,766 (or 78 percent) of the businesses damaged are categorized as small businesses
- A projected 5,188 (or 21 percent) of the businesses damaged are categorized as medium businesses
- A projected 284 (1 percent) of the businesses damaged are categorized as large businesses

Of businesses sampled, the average repair cost for physical damage was \$39,091 for the 375 firms reporting repair costs greater than zero. The weighted average lost revenue (due to the disruption of the business from closing, lost production, sales, and clients) for the 656 firms reporting is \$78,638. Overall, the results of the Business Impact Survey indicate an estimated \$1 billion dollars in physical damage and \$4 billion dollars in lost revenue.

Almost a quarter of the businesses reported physical damage or an expected loss of market. Approximately half reported that they had suffered losses due to a disruption of business.

Most businesses survived the storms and are currently operating, but almost 10 percent of the small businesses in the most severely

**Table 4-1 Summary of Business Losses**

Business Size	County Damage Category	Physical Damage		Business Interruption		Loss of Market	
		(in %)	(in numbers)	(in %)	(in numbers)	(in %)	(in numbers)
<b>Small</b>	Minor	12%	3,335	39%	10,672	13%	3,535
	Moderate	30%	7,247	62%	15,333	28%	6,887
	Severe	35%	9,184	60%	15,745	25%	6,560
			<b>Total: 19,766</b>		<b>Total: 41,750</b>		<b>Total: 16,982</b>
<b>Medium</b>	Minor	18%	1,138	48%	3,052	17%	1,052
	Moderate	27%	1,367	69%	3,464	25%	1,258
	Severe	48%	2,683	77%	4,272	27%	1,490
			<b>Total: 5,188</b>		<b>Total: 10,788</b>		<b>Total: 3,801</b>
<b>Large</b>	Minor	12%	62	33%	164	6%	30
	Moderate	25%	82	51%	167	12%	38
	Severe	34%	140	64%	262	16%	67
			<b>Total: 284</b>		<b>Total: 593</b>		<b>Total: 134</b>

Source: East Carolina University Business Impact Survey, Table 3-2, 11/12/99

impacted region had not yet been able to resume normal operations as of November 12, 1999 (refer to Table 4-2).

Most business carried some insurance, but almost one of every six small businesses reported having no business insurance (refer to Table 4-3). While most businesses had liability, property and casualty and fire insurance, most were not insured for loss of revenue or floods. Less than half report that their insurance covers the replacement cost of their losses. When asked to estimate the proportion of their losses covered by insurance, the average estimate was 18.2 percent. Large businesses had better coverage than small businesses (29 percent vs. 15 percent).

Table 4-4 provides an estimate by county of total housing and commercial structures as compared with flood insurance policies in force. For the 44-county impacted area, the estimated flood insurance coverage is about 6 percent of the structures.

### **Tourism Related Economic Impacts**

For some coastal areas, the month of September was reported to be a total loss due to the combined effect of Hurricanes Dennis and Floyd. Tourism sectors report concern that beach erosion and the public's fear of contaminants affecting shellfish and fisheries will impact what is left of this season and carry over into next season. The North Carolina Division of Tourism, Film and Sports Development reports that

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**Table 4-2 Impact on Business Operations**

Business Size	County Category by Damage Level	Percentage of Businesses Currently Operating	Percentage of Businesses That Shut Down	Number of Days Business Was Shut Down	Percentage With Infrastructure Issues	Percentage NOT Relocating
<b>Small</b>	Minor	96.18	62.30	3.53	17.83	96.82
	Moderate	96.77	73.96	6.35	27.08	95.85
	Severe	85.43	81.74	9.11	32.75	91.07
	<b>Total</b>	<b>92.30</b>	<b>73.90</b>	<b>6.90</b>	<b>26.84</b>	<b>94.28</b>
<b>Medium</b>	Minor	97.70	56.32	3.28	17.24	97.67
	Moderate	94.95	73.74	6.04	24.49	97.98
	Severe	93.16	78.45	6.83	30.17	94.87
	<b>Total</b>	<b>95.05</b>	<b>70.53</b>	<b>5.75</b>	<b>24.58</b>	<b>96.69</b>
<b>Large</b>	Minor	100.00	50.00	1.84	20.00	100.00
	Moderate	100.00	80.00	2.31	20.00	100.00
	Severe	100.00	71.43	3.90	28.57	100.00
	<b>Total</b>	<b>100.00</b>	<b>68.75</b>	<b>2.95</b>	<b>23.53</b>	<b>100.00</b>
<b>Total</b>	Minor	96.55	60.74	3.46	17.73	97.04
	Moderate	96.65	73.98	6.26	26.54	96.46
	Severe	87.16	80.99	8.61	32.19	91.78
	<b>Total</b>	<b>92.99</b>	<b>73.15</b>	<b>6.64</b>	<b>26.36</b>	<b>94.82</b>

Source: East Carolina University Business Impact Survey, Table 3.5, 11/12/99

**Table 4-3 Insurance Coverage Carried by Businesses Impacted by Hurricane Floyd**

Business Size	County Damage Category	Proportion (%) of businesses that have:						
		Any Insurance	Liability Insurance	Property & Casualty Insurance	Financial/ Insurance/ Real Estate Insurance	Loss of Revenue Insurance	Flood Insurance	Replacement Cost Coverage
<b>Small</b>	Minor	82.59	88.72	76.41	78.46	20.00	21.54	35.29
	Moderate	78.06	86.06	78.88	76.89	27.20	15.54	48.37
	Severe	87.01	80.47	80.70	70.85	17.20	7.29	38.34
	<b>Average</b>	<b>82.87</b>	<b>84.28</b>	<b>79.06</b>	<b>74.65</b>	<b>21.07</b>	<b>13.43</b>	<b>40.84</b>
<b>Medium</b>	Minor	90.77	86.67	85.25	85.00	39.34	32.79	35.00
	Moderate	94.67	87.67	82.19	80.82	38.36	13.70	43.06
	Severe	87.65	88.73	84.72	74.65	21.13	7.04	40.58
	<b>Average</b>	<b>90.95</b>	<b>87.75</b>	<b>83.98</b>	<b>79.90</b>	<b>32.68</b>	<b>17.11</b>	<b>39.80</b>
<b>Large</b>	Minor	100.00	100.00	100.00	100.00	50.00	33.33	33.33
	Moderate	100.00	75.00	75.00	75.00	50.00	33.33	33.33
	Severe	100.00	80.00	80.00	80.00	60.00	40.00	40.00
	<b>Average</b>	<b>100.00</b>	<b>83.33</b>	<b>83.33</b>	<b>83.33</b>	<b>53.85</b>	<b>36.36</b>	<b>36.36</b>

Source: East Carolina University Business Impact Survey, Table 3.8, 11/12/99

## Post-Disaster Economy

**Table 4-4 National Flood Insurance Coverage by County**

County	Estimated Housing Units	Merchants	Total Units and Merchants	Policies in Force	Percent of Coverage
Beaufort	20,714	1,067	21,781	3,612	16.58%
Bertie	8,897	299	9,196	80	0.90%
Bladen	13,625	576	14,201	51	0.37%
Brunswick	45,684	1,937	47,621	10,223	22.38%
Camden	2,859	120	2,979	1,077	37.67%
Carteret	39,781	1,865	41,646	12,057	30.31%
Chowan	6,212	268	6,480	200	3.22%
Columbus	21,868	1,079	22,947	277	1.27%
Craven	34,624	1,787	36,411	3,176	9.17%
Cumberland	113,124	4,583	117,707	334	0.30%
Currituck	9,186	422	9,608	3,296	35.88%
Dare	25,468	1,605	27,073	16,512	64.83%
Duplin	17,468	933	18,401	70	0.40%
Edgecombe	22,036	806	22,842	802	3.64%
Franklin	18,350	650	19,000	15	0.08%
Gates	4,078	130	4,208	10	0.25%
Greene	6,802	280	7,082	16	0.24%
Halifax	23,772	867	24,639	58	0.24%
Harnett	33,125	1,360	34,485	72	0.22%
Hertford	9,069	479	9,548	30	0.33%
Hyde	2,930	204	3,134	1,024	34.95%
Johnston	42,081	1,978	44,059	128	0.30%
Jones	4,277	150	4,427	53	1.24%
Lenoir	25,145	1,267	26,412	566	2.25%
Martin	10,969	470	11,439	45	0.41%
Nash	35,563	1,688	37,251	678	1.91%
New Hanover	67,056	4,553	71,609	9,257	13.80%
Northampton	9,445	277	9,722	20	0.21%
Onslow	46,308	2,033	48,341	2,183	4.71%
Pamlico	6,667	297	6,964	1,270	19.05%
Pasquotank	13,367	780	14,147	1,165	8.72%
Pender	20,206	796	21,002	2,972	14.71%
Perquimans	5,326	210	5,536	292	5.48%
Pitt	48,894	2,474	51,368	775	1.59%
Robeson	43,250	1,663	44,913	485	1.12
Sampson	21,176	1,058	22,234	29	0.14%
Scotland	13,528	590	14,118	10	0.07%
Tyrrell	1,955	71	2,026	283	14.48%
Vance	16,783	744	17,527	8	0.05%
Wake	230,091	13,323	243,414	1,504	0.65%
Warren	9,365	279	9,644	11	0.12%
Washington	5,775	253	6,028	175	3.03%
Wayne	42,244	2,056	44,300	522	1.24%
Wilson	28,188	1,383	29,571	215	0.76%
<b>TOTAL</b>	<b>1,227,331</b>	<b>59,710</b>	<b>1,287,041</b>	<b>75,638</b>	<b>6.16%</b>

### **HISTORICALLY SIGNIFICANT AFRICAN-AMERICAN COMMUNITY RAVAGED BY FLOOD**

September 16, 1999, is a date that will be forever etched into the memories of residents of Princeville, North Carolina. Situated along the banks of the Tar River, Princeville has the distinction of being the oldest incorporated African-American town in America. The great flood of 1999 that followed Hurricane Floyd drenched eastern North Carolina in 20 inches of rain and put Princeville under 15 feet of water. Totally engulfed by water, the damages to the town are estimated in excess of \$43 million leaving over 650 residents without housing, displacing 30 businesses and three churches. According to officials it will be at least January 2000 before the town will be fit for occupancy again.

Most residents and business owners in Princeville were not participating in the NFIP. For some residents and businesses, the impact of the disaster was such that they do not intend to rebuild and intend to leave Princeville. To exacerbate the situation, a majority of the residents of Princeville are elderly with limited incomes and/or are too “over leveraged” financially to rebuild.

The decision has been made to rebuild the levee. FEMA is working with community leaders to identify opportunities for providing mitigation and sustainable recovery planning assistance.

*(Information provided to Harriet Hines, currently with EDA, by residents and family members of Princeville.)*

business for coastal hotels and restaurants was down 40 to 50 percent in September.

### **Economic Impacts to Minority Populations**

The Business Impact Survey included a question to identify women owned or minority owned businesses. The survey results indicated that firms owned by minorities did have statistically different revenue losses than non-minority owned businesses; minority owned firms lost 70 percent more revenue than non-minority owned firms.

Following the disaster, minority groups formed partnerships with traditional local support networks including churches, non-profit organizations and ethnic associations. In a meeting with the directors of the State’s offices of Minority, Hispanic and Latino, and Indian Affairs, the directors reported concern over minority-owned small businesses’ ability to recover from the disaster and

reported that early recovery efforts were hampered by difficulties with trust, communication, and sensitivity to ethnic and cultural differences.

The North Carolina Institute of Minority Economic Development (NCIMED) reports that minority businesses will be greatly impacted due to their traditionally lower ability to obtain start-up capital, higher debt components, and difficulty in qualifying for and accessing loans. The typical minority business is noted as being capitalized with \$5,000. These factors combine to indicate minority-owned small businesses will be among the most economically impacted, slower to recover, and can expect higher failure rates.

### Impacts to Central Business Districts

Economic Development Districts (EDDs) in the impact area surveyed local governments and chambers of commerce to identify floodwater-impacted Central Business Districts (CBDs). Results indicate that 30 municipalities in 16 of the 44 counties reported significant flooding affecting a total of 698 CBD businesses. These businesses are reported as predominately retail and service sector businesses, the primary employment sectors statewide for small businesses.<sup>25</sup>

Some of the more severely impacted CBDs include Emerald Island, Carteret County; Town of Kinston, Lenoir County; Tarboro and Princeville, Edgecombe County; Elizabeth City, Pasquotank County; Washington, Beaufort County; and Windsor, Bertie County.

While flooding in CBDs presents a vivid picture of concentrated business damage and disruption, they represent a small portion of the damaged businesses as reported in the Business Impact Survey, indicating the widespread impact of the floodwaters in the coastal plain area.

### Loan Applications

As of October 29, 1999, the SBA had approved 4,304 loans (residential and business) for \$188,368,900; of these, over 1,000 business loan applications had verified damage to real estate and personal property totaling almost \$60 million. By October 31, 1999, the SBA received 1,705 business loan applications for economic injury (or lost revenue), of which 458 had been approved based on review of pre-disaster and post-disaster financials, for a total of \$8,505,400 (an average of \$18,571 per application).

Upon SBA's receipt of a business loan application for damaged real estate or personal property, a field inspection validates the actual dollar damage. A review of the individual data revealed verified real personal property damage in excess of \$100,000 in only 53 applications, about 5 percent, aggregating \$18 million. Another 50 applications (5 percent), had verified real and personal property damage exceeding \$100,000, aggregating \$11.8 million. The remaining personal property and real property loan applications represented average loan applications of \$15,000 and \$24,000, respectively. This supports the early perception

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<sup>25</sup> ANNUAL REPORT State of Small Business

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by local economic developers that the predominance of impact would be in the small business sector.

### Business Expansions and Permanent Business Closures

A month after Hurricane Floyd, the economic development community reported scattered indications of permanent closures of large and medium size firms located in the impacted area. Most firms interviewed requested confidentiality. It is unknown whether these businesses were considering closing prior to Hurricane Floyd; if this disaster was simply one of several deciding factors; if the disaster created an opportunity to close that was taken advantage of; or if closing was totally a function of the economic impact of the disaster.

The Business Impact Survey indicated that, before Hurricane Floyd, almost 15 percent of the small businesses and 17 percent of the medium sized businesses had plans to expand. After the hurricane, only 12 percent of the small businesses and 5 percent of the medium sized businesses still planned to expand. Almost 25 percent of the large businesses in eastern North Carolina planned to expand but this dropped to 7 percent after the hurricane (refer to Table 4-5).

The Business Impact Survey noted that this finding, taken from inquiry immediately following the hurricane, may be an indication of the impact of the hurricane on people's sense of the future more than an indicator of future actions.

**Table 4-5 Impact of Hurricane on Business Plans to Expand**

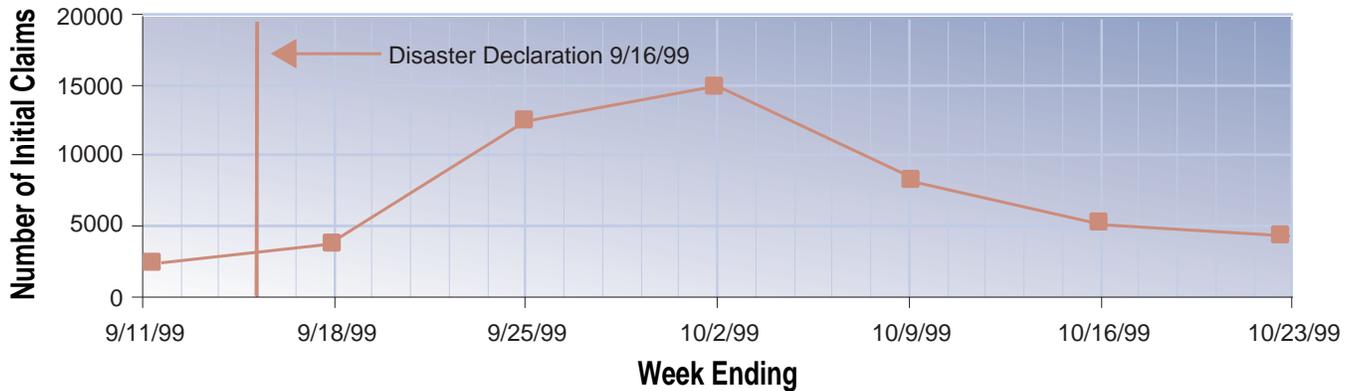
Business Size	County Category by Damage	Businesses Planning to Expand Before Disaster	Businesses Planning to Expand After Disaster	Percentage Change
<b>Small</b>	Minor	13.19%	12.14%	-1.05%
	Moderate	21.58%	1.96%	-19.62%
	Severe	9.17%	7.69%	-1.48%
	<b>Average</b>	<b>14.91%</b>	<b>12.14%</b>	<b>-2.77%</b>
<b>Medium</b>	Minor	19.74%	4.94%	-14.80%
	Moderate	18.52%	5.99%	-12.53%
	Severe	13.83%	3.13%	-10.70%
	<b>Average</b>	<b>17.13%</b>	<b>5.26%</b>	<b>-11.87%</b>
<b>Large</b>	Minor	25.00%	3.70%	-21.30%
	Moderate	20.00%	7.02%	-12.98%
	Severe	20.00%	9.17%	-10.83%
	<b>Average</b>	<b>21.43%</b>	<b>6.98%</b>	<b>-14.45%</b>

Source: East Carolina University Business Impact Survey, Table 3.1, 11/12/99

## 4.1.3 Impacts to Employment

The Business Impact Survey indicates that the physical and economic disruption to businesses also affected their employees. The ESC tracks the number of weekly initial claims for unemployment insurance compensation. Figure 4-2 shows the short-term effect Hurricane Floyd had on employment in the 44 county impact area. Tables H-3 and H-4 (see Appendix H) detail initial claims by county, demographics, and business sector for September 11, 1999 to October 3, 1999.

**Figure 4-2 Short-Term Effect of Hurricane Floyd on Employment in the 44-County Area**



Source: North Carolina Department of Commerce, Employment Security Commission

The Business Impact Survey indicates 10 percent of the businesses that experienced some storm damage reduced their labor force. Of the firms that reported a reduction in their labor force, over half reduced their employment by one or two employees. Less than 0.2 percent reported a reduction of 100 employees or more. The average loss was only 0.52 employee per business. Projected to the entire region, an average loss of 0.52 employee per affected business points to an overall reduction in the employed labor force of 31,000 jobs. The Business Impact Survey also indicates that businesses in the 44-county impacted area are reducing operating expenses through work force reductions as a means to fund losses incurred during the storms.

Hurricane-related employee injuries were rare. More businesses had to deal with disruptions caused by a displaced workforce. An estimated 31,000 employees were displaced by the flooding.

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The Business Impact Survey detailed employee impact due to Hurricane Floyd. Table 4-6 shows employee impact by business size and by county level of damage.

**Table 4-6 Hurricane Floyd's Impact on Employees in 44-County Area**

Business Size	County Level of Damage	Average Change in Number of Employees per Business	Number of Injured Employees per Business	Number of Displaced Employees per Business
<b>Small</b>	Minor	-0.25	0.03	0.12
	Moderate	-0.04	0.03	0.30
	Severe	-0.20	0.02	0.27
	<b>Total</b>	<b>-0.16</b>	<b>0.03</b>	<b>0.24</b>
<b>Medium</b>	Minor	-0.82	0.10	0.80
	Moderate	-0.84	0.18	0.98
	Severe	-3.22	0.09	1.96
	<b>Total</b>	<b>-1.76</b>	<b>0.12</b>	<b>1.30</b>
<b>Large</b>	Minor	-3.79	2.12	1.29
	Moderate	-0.72	0.45	5.24
	Severe	-8.20	2.23	14.22
	<b>Total</b>	<b>-4.81</b>	<b>1.69</b>	<b>7.98</b>

Source: East Carolina University Business Impact Survey, Table 3.4, 11/12/99

### 4.1.4 Collateral Impacts

Many businesses suffered economic losses from disruptions other than from direct floodwater damage. Based on results of the Business Impact Survey, an estimated 41,750 small businesses, 10,788 medium-size businesses, and 593 large businesses suffered business interruptions due to the storm; these numbers were significantly more than the estimated 25,238 businesses that reported direct physical damage. However, more disruptions were reported as a result of indirect economic impacts, such as lost production resources, including raw materials, utilities, product delivery lines, and workforce. The Business Impact Survey revealed that disruptions to businesses were two times more likely due to indirect business disruptions, such as damage to infrastructure caused by Hurricane Floyd and the subsequent flooding, rather than by direct damage.

#### Impacts to Infrastructure

Road closures had the greatest impact on businesses that identified infrastructure problems. Loss of water and electric power had the second and third greatest impact (refer to Table 4-7).

## Post-Disaster Economy

According to the Division of Water Quality (DWQ), the wastewater treatment and sewer infrastructure in the impacted region is aged and in need of replacement or reconstruction. Flooding closed roads throughout the region. The North Carolina Department of Transportation (DOT) reported that approximately 1,000 roads closed during the peak of the storm including major highways such as I-95, I-40, US 64, US 264 and US 70, which are major linkages into the 44-county area. Over 2,000 damaged locations have been identified by the North Carolina DOT that require road, pipe and/or bridge repairs.

Twenty-four wastewater treatment plant failures were documented by the DWQ. Many of these plants were back online within days. Within 3 weeks of the disaster, 12 remained off-line or in limited operational status. Two systems have been identified for relocation. It is expected

**Table 4-7 Impact of Infrastructure Disruptions**

Business Size	County Damage Category	Mean Number of Days Business was Impacted by Problems with Infrastructure						
		Water System	Sewer System	Telephone System	Electric Power	Road Closures	Parking	Trash Removal
<b>Small</b>	Minor	3.58	0.50	1.34	1.63	2.88	0.50	0.78
	Moderate	3.10	1.46	1.76	3.07	4.90	0.90	2.25
	Severe	5.94	1.78	4.67	4.89	6.89	1.44	3.39
	<b>Average</b>	<b>4.51</b>	<b>1.45</b>	<b>3.06</b>	<b>3.68</b>	<b>5.48</b>	<b>1.09</b>	<b>2.54</b>
<b>Medium</b>	Minor	2.18	0.60	2.73	1.49	2.80	0.43	1.23
	Moderate	5.93	0.97	1.82	2.28	6.15	0.26	1.84
	Severe	4.79	0.85	3.36	3.00	9.21	2.36	2.43
	<b>Average</b>	<b>4.63</b>	<b>0.84</b>	<b>2.73</b>	<b>2.47</b>	<b>6.93</b>	<b>1.29</b>	<b>1.99</b>
<b>Large</b>	Minor	1.50	0.13	1.13	2.13	2.71	0.47	0.20
	Moderate	2.65	0.23	1.04	2.29	4.59	0.48	0.04
	Severe	8.69	2.91	3.32	2.83	4.89	2.08	1.45
	<b>Average</b>	<b>5.87</b>	<b>1.73</b>	<b>2.34</b>	<b>2.56</b>	<b>4.43</b>	<b>1.36</b>	<b>0.83</b>
<b>Total</b>	Minor	3.26	0.52	1.64	1.60	2.86	0.48	0.87
	Moderate	3.58	1.37	1.77	2.93	5.11	0.79	2.17
	Severe	5.75	1.62	4.41	4.51	7.31	1.62	3.19
<b>Overall Average</b>		<b>4.54</b>	<b>1.34</b>	<b>2.99</b>	<b>3.44</b>	<b>5.74</b>	<b>1.13</b>	<b>2.43</b>

Source: East Carolina University Business Impact Survey, Table 3.6, 11/12/99

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### *After Hurricane Fran....*

Following Hurricane Fran in 1996, the State's water treatment systems faced similar stresses as they face now after Hurricane Floyd. After Hurricane Fran, it was only in the months following the disaster that the magnitude of system problems became apparent.

that system failures will continue to plague businesses during 2000, causing Hurricane Floyd related disruptions that cannot be anticipated or quantified at this time.

### **4.1.5 Environmental-Related Economic Impacts**

Following Hurricane Floyd, it was anticipated that floodwaters would have widespread, long-term environmental effects on the health, welfare and functionality of the impacted area. There was concern about the potential for widespread, significant environmental impacts resulting from dead animals, animal waste, petroleum, and chemical spills among other things. Fortunately, the quick action of emergency response teams to the immediate needs of the community appears to have resulted in less-than-anticipated environmental impacts. To better assess the short-term and long-term environmental damage, the NCDENR has extended its recreational water testing program and is conducting fish-tissue analyses and comprehensive water quality testing

in eastern North Carolina waterways. The NCDENR and United States EPA have coordinated efforts to address and control most of the flood-caused or flood-exacerbated environmental problems in the impacted area. Problems addressed include:

- restoration of public water treatment plants service,
- cleanup of minor contaminant spills,
- identification and cleanup of commercial underground storage tanks,
- capture of the majority of compromised hazardous materials containers,
- disposal of animal carcasses (accomplished through a combination of private resources and funding from the U.S. NRCS), and
- storm debris removal.

### *Neighboring Town Provides Water Protection To Hurricane-impacted Community*

When Hurricane Floyd hit the town of Grifton, North Carolina and eliminated their water service, the neighboring town of Ayden extended a hand to assist the community with water service. This was critical, as Grifton services approximately 3,000 customers, including providing water protection service for local industries. Ayden was able to offer such critical assistance because the Town of Ayden itself had already taken preventative actions through a grant from the EDA. The grant provided funding to upgrade and expand its water distribution system. Specifically, this project:

- increased Ayden's capacity to provide dependable potable water to its customers,
- positioned the town for future industrial development, and
- allowed the town to provide water service to Grifton during an emergency without sacrificing service to its customers.

Ayden's assistance was particularly critical for one Grifton industry, Weyerhaeuser Lumber – a major employer in the area – whose primary concern was the vulnerability of its highly flammable operations to fire.

Storm debris removal is on-going. The storm's destruction of existing landfill sites has created the need for expanded disposal capacity as well as operational and capital improvements.

Hurricane Floyd impacted dunes and berms all along the coast. As part of its mitigation and recovery planning process, North Carolina will be looking at issues of dune and berm restoration in coastal communities.

### **4.1.6 Public/Private Financing Impacts**

Moody's Investors Service reported their financial outlook for governmental jurisdictions remained unchanged for North Carolina localities hardest hit by recent storms. The financial market has two major elements that concern both public and private sector borrowers: access and pricing. Telephone inquiries of major lenders competing in the impacted area confirm that both private and public sectors' access to capital has not been impacted by the disaster. In both instances, public and private, pricing will be dependent upon credit quality. Indications are that there will be no marked difference in pricing between pre- and post-disaster periods.

#### **Public Sector Market**

Lenders and a national investment-rating service were interviewed to identify what concerns they had for North Carolina's local governments' borrowing capability as a result of the storm event. They reported that no capital market access difficulties are expected and pricing will not have any marked increase. North Carolina's Local Government Commission was credited for the strong financial position most local governments' enjoyed.

Lenders did report concerns over the potential for local governments to draw down their cash reserves to pay for recovery expenditures. They report that they will be monitoring local government's needs to restructure debt and will be available to advise their clients accordingly. Interviews with county, municipal and school associations that provide insurance pools for government-owned facilities indicate that uninsured losses will be minimal considering the storm's effects. Lenders expect some local governments to face tighter debt coverage ratios and possibly postponement of capital improvement programs. The State, through its Local Government Commission, closely monitors and takes action as needed to ensure that general and special purpose units of government do not take on more debt than their ability to repay.

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Numerous local governments in the impacted area have stagnant economies requiring the use of debt as the primary means to finance capital improvement projects. The storm's impact further dampens those economies where uninsured losses are significant.

The State and its local governments have historically taken a conservative approach to economic development financing. This traditional approach is the reason for the numerous non-profit development corporations established by local governments as a way to promote economic development. In the late 1980's, legislation was passed that broadened local governments' responsibilities to include financing infrastructure projects for economic development. The State's use of Industrial Revenue Bonds (IRB) has been limited to industrial use.

Consequently, the mechanisms that have resulted in the State's financial stability could be obstacles to economic recovery if:

1. private and public loan repayments on uninsured property lessen the ability of the State and local governments to pass bond referendums,
2. the Local Government Commission will not approve the issuance of additional debt based on its assessment of the government's ability to take on additional debt (even if the bond issue passes), or
3. the State shifts its new job emphasis to the service sector (IRB financing).

### **Private Sector Market**

The North Carolina Office of the Commissioner of Banks, following a post-disaster assessment of banks in the impacted region, reports that any losses are expected to be manageable, concurring with similar reports from major lenders serving that market. Lenders are currently assessing loan portfolio impacts resulting from Hurricane Floyd. They indicate their intention to continue serving the market.

Lenders report they are concerned that, other than consumers, small businesses and small farmers will have the most difficulty in recovery. On the positive side, lenders have not at this point found evidence of the significant widespread environmental impacts originally thought possible in early post-disaster reports. They report that capital access

by private sector borrowers will not change as a result of the storm's impact. Pricing will be on a case-by-case basis.

Lenders were quick to respond to market needs for loan payment forbearance and affordable loans.

### **4.2 Agriculture Business Sector**

#### **Statewide**

Hurricane Floyd did not drastically change agricultural commodity prices for most crops or livestock produced in North Carolina. Many commodities in 1999 had low prices due to excess supply. The amount of damage caused by Floyd was not enough to cause a large supply shortage. The exception to this was sweetpotatoes, since North Carolina grows 40 percent of the U.S. supply and most of the growing areas were affected. Consumers may have noticed higher prices during the Thanksgiving season.

#### **44-County Area**

While at the State level Hurricane Floyd did not have a big impact on commodity prices, the individual farmers in the 44 counties covered in this report were significantly impacted. Many of these farmers were already deeply in debt from previous poor years. While it is unknown how many farms may go out of business as a result of Hurricane Floyd, those that do will likely blame Hurricane Floyd as being the final loss after many years of loss, but not as the sole reason. One reason for failure will likely be the damages to permanent facilities and equipment. This is based on the idea that crops and livestock are typically grown and sold each year, so damages only impact this year's sales. Facilities, on the other hand, are typically not replaced each year, so damages will have a much larger impact on the survivability for a given farm. Those farmers that can afford to rebuild these facilities will likely need many years to fully recover. However, some farms may fail due to the loss of this year's sale of crops or livestock. For example, a livestock producer may lose all of the livestock that was to have been sold. Therefore, the producer will not have any new income until after the sale of the new livestock, which will take months to reach maturity. The producer's farm may fail unless the farm has a sufficient combination of assets, credit and debt-relief to sustain it. The total agricultural losses are

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estimated to be over \$970 million in the 44-county area. Table 4-8 summarizes the agricultural losses.

**Table 4-8 Summary of Agricultural Losses for the 44-County Area**

Agricultural Category	Estimated Loss (as of 10/19/99)	
	Estimated Value	% of total
Crops	\$520 million	55%
Nurseries	\$16 million	1.7%
Livestock	\$12.7 million	1.3%
Farm Facilities	\$310 million	33.7%
<b>Subtotal</b>	<b>(\$858.7 million)</b>	<b>(89.5%)</b>
Freshwater Aquaculture	< \$100 thousand	
Saltwater Fisheries	\$25 million	2.6%
Forestry	\$90 million	9.5%
<b>Total</b>	<b>\$973.7 million</b>	<b>100%</b>

Source: NCDA&CS Agricultural Statistics Service; NCDENR Divisions of Marine Fisheries and Forest Resources

Losses of crops, livestock, farm structures, and farm equipment totaled approximately \$859 million.<sup>26</sup> Freshwater aquaculture losses are anticipated to be less than \$100 thousand<sup>27</sup>, while saltwater fisheries losses totaled \$25 million.<sup>28</sup> Forestry losses are estimated to be around \$90 million.<sup>29</sup> Economic losses to larger agricultural businesses are described in the Non-Agricultural section of this report. Figure 4-3 shows agricultural losses for the 44-county area.

### 4.2.1 Agricultural Businesses and Employment

There are very few sources of information about the number of farms impacted and workers unemployed by Hurricane Floyd. The only estimates available at the time of this reporting are estimates from the North Carolina Governor's Office,<sup>30</sup> which estimates that around 90,000 agricultural workers and 30,000 farms were affected statewide. However, the Governor's Office report notes that the 30,000 farms cited

<sup>26</sup> North Carolina Farm Service Agency: Estimated Losses from Hurricane Floyd (10/19/1999) (<http://www.agr.state.nc.us/stats/c&lloss.htm>)

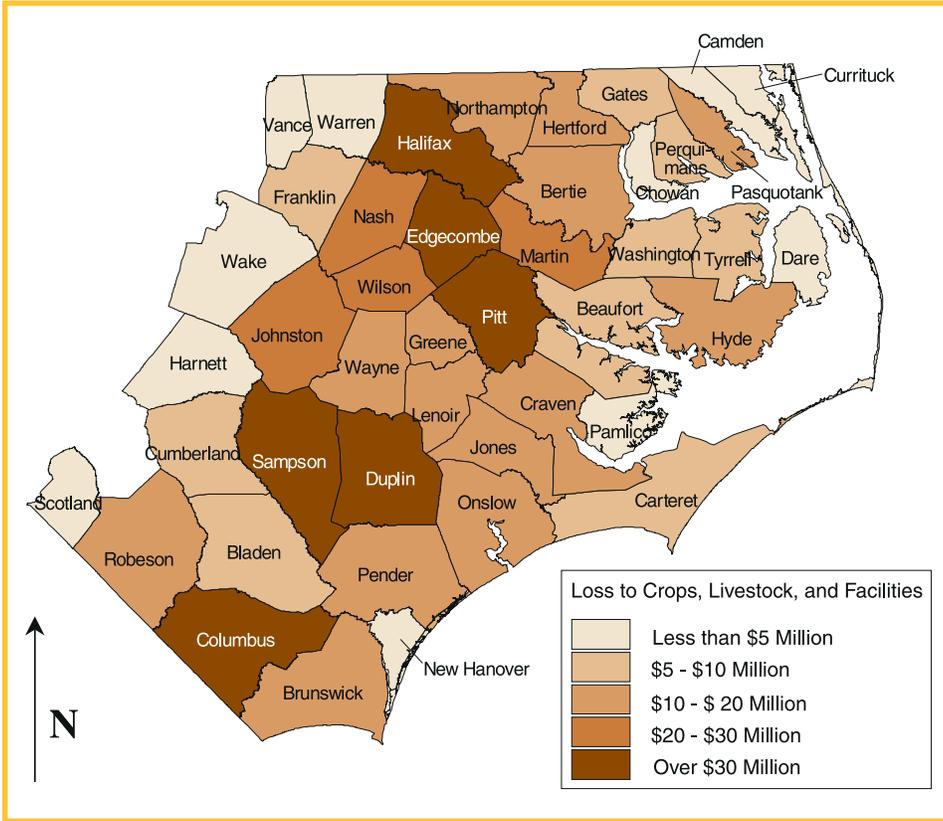
<sup>27</sup> Tom Ellis, Director, personal communication, North Carolina Department of Agriculture and Consumer Affairs: Aquaculture (PH: 919-733-7125)

<sup>28</sup> Preston Pate, Director, personal communication, North Carolina Division of Marine Fisheries. (PH: 252-726-7021)

<sup>29</sup> Derryl Walden, Deputy Director, personal communication, North Carolina Division of Forest Resources (PH: 919-733-2162 Ext: 204)

<sup>30</sup> North Carolina Governor's Office, October 1999. *Rebuilding Eastern North Carolina - Supplement Federal Assistance for Unmet Needs in the State of North Carolina in the Aftermath of Hurricane Floyd.*

**Figure 4-3 Estimated Agricultural Losses from Hurricane Floyd, by County**



Source: USDA Farm Service Agency (10/19/99)

in this report is the number of farms that were affected by Hurricane Floyd; this number does not reflect the amount of damage on those farms.

It is difficult to obtain accurate numbers of farm workers that were affected by Hurricane Floyd. One reason is that many farm workers are migrants and do not qualify for unemployment, so unemployment applications cannot be used to accurately determine the number of affected farm workers. It is equally difficult to obtain accurate information on the amount of damage that individual farms have suffered. Information related to hurricane damage to the agriculture industry has thus far been compiled not by farm, but by commodity (i.e., acres of corn loss) at the county level. The next three sections will describe losses to crops, livestock, and farm facilities, respectively.

## 4.2.2 Crops

Table 4-9 shows estimated crop losses in the 44-county region covered in this report as determined by the USDA FSA of North Carolina and EarthSat. The FSA estimates are based on county-level damage

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**Table 4-9 Agricultural Crop Losses from Hurricane Floyd**

Crops	Acres Affected <sup>(a)</sup>		Estimated Value (\$)	
	Farm Service Agency	Earth Satellite Corporation	Farm Service Agency	Earth Satellite Corporation
Cotton	759,385	151,319	\$190,446,886	\$54,271,972
Tobacco	76,815	17,229	\$93,700,306	\$61,544,153
Fruit & Vegetables <sup>(b)</sup>	54,815	10,292	\$77,778,520	\$13,928,766
Soybeans	1,077,186	266,286	\$69,252,223	\$32,140,018
Corn	375,367	145,653	\$49,085,168	\$29,505,070
Peanuts	114,133	32,015	\$38,896,565	\$16,837,588
Hay/Alfalfa	-----	11,066	-----	\$1,714,560
<b>Total</b>	<b>2,457,701</b>	<b>633,860</b>	<b>\$519,159,668</b>	<b>\$209,942,127</b>

Sources: NCDA&CS Agricultural Statistics Service and Earth Satellite Corporation

<sup>(a)</sup> As of 10/19/99 for the 44 counties

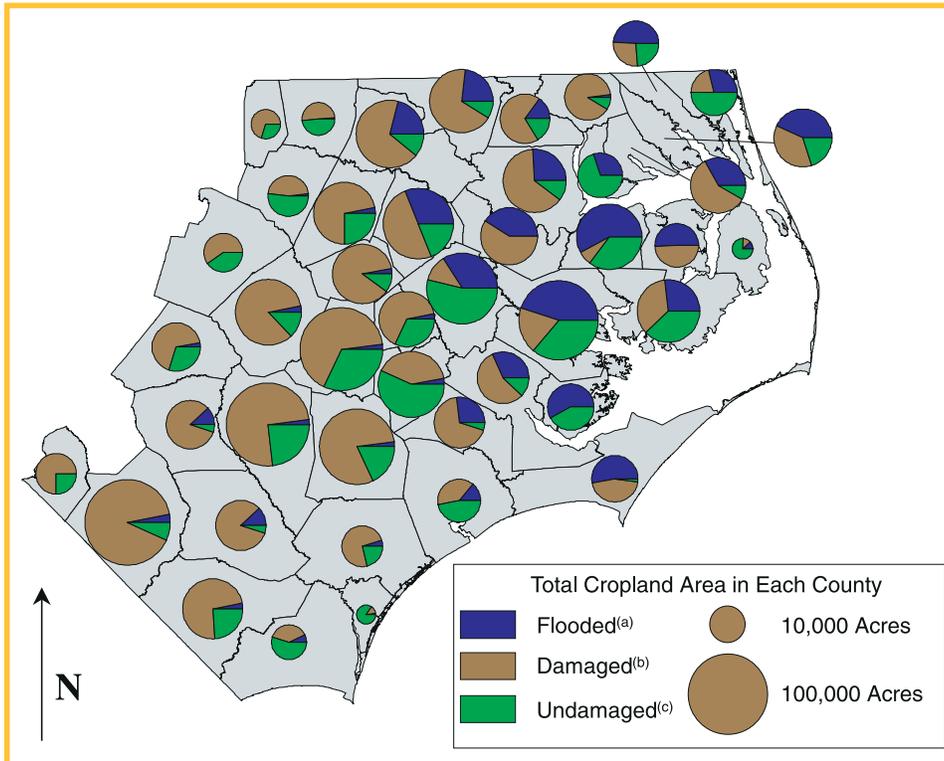
<sup>(b)</sup> Includes sweetpotatoes: Farm Service Agency - 36,089 acres/ \$41,533,603; Earth Satellite Corporation - 1,751 acres / \$3,085,270

assessments performed by FSA staff. The EarthSat estimates are based on aerial and satellite imagery used to determine the flooding extent in agriculture areas. The EarthSat values are consistently lower than the FSA values because the EarthSat methods assumed crop loss only for those agricultural areas that had standing water. The EarthSat values indicate the minimum of crop losses and serve to demonstrate how much of the crop losses were not directly due to flooding, but to other hurricane impacts including blow-down and crop rot.

Figure 4-4 shows the cropland areas that were affect by Hurricane Floyd. Each county's total cropland is represented by a proportionally sized pie chart based on information from the NCASS. Within each pie chart, the land area is split into flooded land (from EarthSat), other damaged land (from FSA), and land not damaged. For the 44 counties shown in Figure 4-4, almost all had over half of their cropland damaged by Hurricane Floyd. Coastal counties tended to have a larger portion flooded than inland counties. Many of the inland counties with larger areas of cropland (Sampson, Duplin, Robeson) had over two-thirds of their cropland damaged, but not flooded. The two main crop types affected in these counties were soybeans and cotton. Several counties had all their cropland areas flooded or damaged.

Looking at individual crops, cotton and tobacco crop losses account for over 55 percent of the total crop loss in dollars. The average loss per acre was over \$1,100 per acre for tobacco and \$250 per acre for cotton. The NCASS reports that the predicted cotton loss will decrease

**Figure 4-4 Estimated Percent of Cropland Affected**



Sources: Earth Satellite Corporation; USDA Farm Service Agency (10/19/99); North Carolina Agricultural Statistics Service

<sup>(a)</sup> Earth Satellite Corporation data

<sup>(b)</sup> Total damaged acres (reported by USDA Farm Service Agency) and North Carolina Agricultural Statistics Service) minus flooded acres (reported by EarthSat)

<sup>(c)</sup> Total harvested acres in 1998 minus the total flooded and damaged acres (reported by USDA Farm Service Agency)

the State's production in dollars by one-third.<sup>31</sup> Soybeans accounted for the largest acreage impacted with an average loss per acre of \$65. The NCASS also predicts that peanut production will be reduced by 22 percent, soybeans and corn by 17 percent, and tobacco by 9 percent. Nurseries had losses of \$16 million.

Hurricane Floyd is not expected to impact agricultural commodity prices, with the possible exception of sweetpotatoes. North Carolina produces around 40 percent of the sweetpotatoes in the U.S., and almost all the State's growing areas were affected.<sup>26, 32</sup> If sweetpotato prices are affected, only a slight increase is anticipated.

<sup>31</sup> North Carolina Agriculture Statistics Service; Field Crops – 10/99 Crop Production ([http://www.agr.state.nc.us/stats/crop\\_fld/fldcpr10.htm](http://www.agr.state.nc.us/stats/crop_fld/fldcpr10.htm))

<sup>26</sup> Ibid

<sup>32</sup> North Carolina Sweetpotato Commission (<http://www.ncsweetpotatoes.com/>)

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### 4.2.3 Livestock

Livestock losses from Hurricane Floyd were significant, but not as severe as initially forecast. Table 4-10 shows the major livestock losses estimated by the FSA. The loss of \$12,703,000 accounts for less than 2 percent of the total agricultural loss. Animal losses resulted from a combination of drowning and starvation when animals were isolated by flood waters and electric feeding equipment did not have power. Initially, losses as high as 500,000 hogs were estimated based primarily on the number of flooded livestock facilities counted during aerial assessments; many farmers, however, were able to move animals and to provide feed in time, resulting in substantially less loss than originally anticipated.

As farmers returned after the floodwaters receded, they were faced with the challenge of animal disposal. Most animals were incinerated or buried. Poultry could also be composted where feasible. The main program to assist and guide animal disposal efforts is through the Emergency Watershed Protection (EWP) program at the NRCS, which provided livestock producers with financial assistance for animal disposal provided they complied with State and Federal animal disposal guidelines. Table 4-10 also shows the number of disposal efforts assisted by NRCS funds. Many farmers chose to dispose of animals through their own means, through private companies, or through State-contracted abatement teams and incinerators. Some other environmental impacts unique to agricultural flooding include structural failure or leaking of animal waste facilities, erosion of agricultural lands, and associated surface water quality problems.

**Table 4-10 Estimates of Livestock Losses from Hurricane Floyd <sup>(a)</sup>**

Livestock	Dead Livestock (number of animals)	NRCS Funded Disposal (number of animals)	Estimated Value
Poultry (total)	2,861,000	1,900,000	
<i>(Turkeys)</i>	<i>(753,000)</i>		\$7,153,000
<i>(Chickens)</i>	<i>(2,108,000)</i>		\$3,584,000
Hogs	28,000	12,000	\$1,680,000
Cattle	700	100	\$286,000
<b>Total</b>	<b>2,889,700</b>	<b>1,912,100</b>	<b>\$12,703,000</b>

Source: NC DA&CS Agricultural Statistics Service and USDA North Carolina Natural Resource Conservation Service

(a) As of 10/19/99, per Farm Service Agency estimates

### 4.2.4 Farm Facilities

In addition to crop and livestock losses, the FSA also tracks damage to farm equipment and facilities. The loss from farm structures, equipment, and land damage of \$309,638,000 accounts for over 33 percent of the total agricultural loss.

Manure storage facilities were one of the types of farm structures most adversely affected by floodwaters. Large livestock operations, especially hog production, produce large amounts of liquid waste that is typically stored in large lagoons. In the lagoons, solids tend to settle to the bottom and the upper liquids are sprayed on fields. The solids are periodically scraped out of the lagoons and also spread on fields. Concerns over the environmental effects of the lagoons and the over-application of wastes on fields have led to new State regulations limiting new hog facilities and manure management methods. Officials of the NCDENR DWQ estimate that 50 manure storage facilities were flooded to some extent by Hurricane Floyd, including the failure of at least 3 hog waste lagoons.<sup>33</sup>

In response to these concerns, the NCDENR developed an emergency waste management strategy. This strategy required growers to either meet current water guidelines by October 31, 1999 or to apply to the DWQ for permission to use a temporary emergency strategy. The DWQ was to review applications and qualified applicants were required to document actions taken to handle animal wastes by January 31, 2000. The emergency waste management strategy includes requirements such as not allowing producers to restock animals to facilities that cannot handle the waste load. The DWQ also provides technical assistance to facilities for assessing lagoon structural stability.<sup>34</sup> NCDENR can also provide financial assistance through the Clean Water Management Trust Fund. Press releases from the Fund indicate that grants have been approved to purchase conservation easements on swine operations, helping protect waters from lagoon overflow.

### 4.2.5 Fisheries

The fisheries sector includes freshwater aquaculture and the commercial saltwater fishing industry. The impact on freshwater

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<sup>33</sup> Ernest Seneca, personal communication. NCDENR Division of Water Quality (Phone: 919-733-7015)

<sup>34</sup> NCDENR Division of Water Quality, *Floyd Rebuild Policy* (<http://www.enr.state.nc.us/ENR/floyd/rebuild.htm>)

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aquaculture was minor, with losses of only \$100 thousand.<sup>26</sup> The commercial saltwater fishing industry suffered losses in excess of \$25 million. Table 4-11 shows losses to five different fisheries and to two other categories. The five fisheries listed in Table 4-11 were declared as

**Table 4-11 Saltwater Fishery Losses from Hurricane Floyd**

Type	Lost Harvest	Estimated Value
<b>Finfish</b>		
Inshore Flounder	4,500,000 pounds	\$2,000,000
Snapper and Grouper	550,000 pounds	\$700,000
<b>Shellfish</b>		
Blue Crab	3,000,000 pounds	\$4,000,000
White Shrimp	4,500,000 pounds	\$10,600,000
Oysters and Scallops	100,000 bushels	\$3,300,000
Crab Traps	80,000 lost/destroyed	\$2,500,000
Charter Boat Trips	1,500 trips	\$2,000,000
<b>Total</b>		<b>\$25,100,000</b>

Source: NCDENR Division of Marine Fisheries

fishery resource disasters by the U.S. Secretary of Commerce. This declaration allows the authorization of financial aid through the Magnuson-Stevens Fishery Conservation and Management Act.<sup>35</sup> Of the total saltwater fishery loss, about 40 percent (in dollars) was due to a reduction in the shrimp harvest. Although this loss to the shrimp harvest may result in a localized increase in shrimp prices, the reduction in the total North Carolina shrimp harvest is not expected to impact regional, State or national shrimp prices. Shellfish harvest was prohibited immediately following Hurricane Floyd and remained closed until October 6, 1999, when most of the coastal waters were reopened after extensive water quality sampling.

### 4.2.6 Forestry

Forestry losses are summarized in Table 4-12. Some of these losses will be offset by recovering the salvage value of the “lost” harvest. The \$90 million in damages is significant, but relatively low compared to the \$1.3 billion of damages to forestry caused by Hurricane Fran in 1996.<sup>36</sup> Hurricane Fran had much stronger and more sustained

<sup>35</sup> U.S. Department of Commerce News Release, 9/22/99. “Clinton Administration acts to help North Carolina fishermen hurt by Hurricane Floyd, Dennis.”

<sup>36</sup> North Carolina Cooperative Extension Service: Forest Resources Letter, 9/1996 ([http://www.ces.ncsu.edu/nreos/forest/forestnews/fr196\\_9.html](http://www.ces.ncsu.edu/nreos/forest/forestnews/fr196_9.html))

**Table 4-12 Forestry Losses from Hurricane Floyd**

Damage Category	Lost Harvest	Estimated Value
Wind Blow-Down	71 million cubic feet	\$48,000,000
Flooding	80.2 million cubic feet	\$40,000,000
Reforestation Projects Damage	14,775 acres	\$2,000,000
<b>Total</b>		<b>\$90,000,000</b>

Source: NCDENR Division of Forest Resources

winds than Hurricane Floyd and eliminated most of the weaker trees, thereby lessening Hurricane Floyd's impact.

### 4.3 Indirect Economic Impacts

Natural disasters, such as Hurricane Floyd, create indirect impacts on the regional economy. These indirect economic impacts affect immediate customers and suppliers of damaged businesses. Additionally, there may be indirect economic impacts to customers of customers and suppliers of suppliers. This type of chain reaction can be transmitted throughout the regional economy. Many of these impacts will have a negative economic effect, while others may stimulate the economy of the region.

Any unemployment caused by damage to a business, and the subsequent reduction in production or closure, will reduce the personal income of the impacted community thereby reducing normal household expenditures. Unemployment will also result in a loss of tax revenue for the community. Indirect economic impacts will also affect economic sectors of the region that did not sustain direct damage from the disaster. Since businesses rely on customers and suppliers, they are potentially vulnerable to interruption of their business even though they were not physically damaged by the disaster.

The extent of these types of indirect negative economic impacts depends on many factors, including the availability of alternate supplies or suppliers and alternate markets, the length of any disruptions and the deferability of the production. In many instances, affected firms have been able to temporarily

#### *Indirect Impacts*

For example, if a major manufacturing facility is shutdown for a period of time after a disaster, there are major direct and immediate negative impacts on the regional economy due to lost wages and lost tax revenue. Indirect economic impacts will be experienced by companies that supply the closed facility with raw materials; indirect economic impacts will also be experienced by firms in the community that depend on the purchasing power of the closed facility's employees.

### ***Warren County, North Carolina Indirect Impacts of Hurricane Floyd***

Arcola Hardwood Company knows first hand what the devastation of a natural disaster like as Hurricane Floyd can have on its bottom line. Located in Warren County, North Carolina, this small (32 employees) manufacturer makes boxes for farmers to use in shipping their potatoes. Since Hurricane Floyd destroyed most of the State's potato crop, the company is searching for new markets for their boxes in Mississippi and Louisiana.

#### ***Impacts to Arcola***

- Arcola has laid off half its employees and anticipates more layoffs if no new product orders arrive.
- According to company officials, if Federal financial assistance is made available it will take at least a year and a half to recover from Hurricane Floyd. If no Federal assistance is available, Arcola's future may be bleak.

Arcola Lumber company, parent company to Arcola Hardwood, has also been adversely impacted by Hurricane Floyd since it was unable to get logs to its mill due to wet conditions.

circumvent a disrupted market by finding alternative outlets for their product or by building up inventory. Hurricane Floyd's major effects on the long-term manufacturing production in the 44-county region are: delays in planned expansions to existing firms; business concerns about locating in the State in light of recent natural disasters; and the ability of local governments to finance economic development projects.

Some positive indirect economic impacts can result from post-disaster reconstruction. Post-disaster spending on reconstruction of damaged buildings, businesses, and regional infrastructure can stimulate the regional economy and reduce indirect economic losses. In some cases, this reconstruction may even produce economic gains in the regional economy.

Consumer spending on the replacement of personal items damaged or lost during the disaster will also aid in stimulating the regional economy. These types of positive economic impacts are particularly true when outside financial aid is made available for financing reconstruction costs. Generous government disaster relief policies serve to supplement the impacted economies, thereby limiting significant long-term negative impact to the impacted communities.

Federal assistance and insurance payments will provide the bulk of the financial resources for reconstruction. Regional household spending will be supplemented throughout the reconstruction period by individual disaster assistance, unemployment and insurance compensation, and by limited low-interest short-term borrowing. The potential negative economic impact of

additional loan repayments by the large number of residential and business owners damaged by flooding without flood insurance is being closely monitored. It remains to be seen whether the positive economic impacts resulting from regional reconstruction will offset the negative economic impacts produced by the reduction in regional trade and/or disposable incomes. Ultimately, the impacts will be determined by the magnitude of the direct effects and the associated indirect effects of Hurricane Floyd.