

## Disaster relief management of companion animals affected by the floods of Hurricane Floyd

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On September 16, 1999, Hurricane Floyd caused widespread flooding through a largely rural area of North Carolina. More than 40 of 100 counties experienced some flooding (Fig 1); the most severe was in the eastern third of the state. Interstate highways and divided 4-lane US highways, as well as hundreds of state highways and local roads, were closed at multiple sites because of flooding or washed-out bridges, hampering transportation of supplies and animals.

The affected area included a portion of the state that had many large poultry and pork production farms, cattle, horses, dogs, cats, indigenous wildlife, and smaller populations of other species such as pet birds, ferrets, and exotic wildlife. Calls for evacuation, both mandatory and voluntary, were ignored by many persons in the area because hurricane and flood warnings had been issued in the past but substantial damage did not occur, or because the media reported major problems associated with the evacuation. Evacuation from all areas expected to be affected by the hurricane would have required driving to Tennessee (> 500 miles from some parts of the state), because the storm was moving in a northerly direction. Because North Carolina does not presently have means of providing pet-friendly evacuation shelters or pet evacuation shelters located near human evacuation shelters, some persons unprepared or unable to evacuate pets declared that they would not leave their pets alone and without care. As a result, a large number of people and their animals were either trapped within flooded areas or by surrounding flooded access roads. For the most part, county emergency management resources were quickly overwhelmed. An additional 7 inches of rain that fell 11 days after the hurricane exacerbated flooding and dam failures throughout the region, adding to the need for additional rescue and evacuation of animals. The purpose of this report was to describe disaster relief management performed by the North Carolina State University College of Veterinary Medicine (CVM) for approximately 375 dogs, 75 cats, and 17 animals of other species affected by flooding.

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### Logistics

**Facilities**—A warehouse (area, 149 m<sup>2</sup>) for surplus materials of the CVM was used as the primary facility for a field hospital. The building was furnished with 84 canine research cages in 42 racks, 4 examination tables, and multiple shelving units. The warehouse included a 4.2 × 4.2-m room that was used for cats, small dogs, and critically affected animals. This room held 24 cages at maximum occupancy, 1 examination table, and 2 shelving units for supplies. The warehouse also had a 4.2 × 3.2-m office area with a sink and 2 desks, in which basic laboratory (eg, microscope, centrifuge) and office (eg, computer, copier) equipment were placed.

Eleven days after the hurricane, additional heavy rains and flooding forced a rapid and complete evacuation of a crowded county animal shelter to our facility. To house this rapid influx of animals, a 32.4 × 8.4-m pole barn in the same location as the warehouse was emptied of surplus equipment, cleaned, and outfitted with cages.

Two methods of quarantine were used to isolate animals with potentially infectious diseases. Large wire crates with bedding and bowls were placed in a 2-horse trailer for dogs suspected of having canine parvovirus infection. The trailer was placed prominently in the parking lot so that these dogs would not be overlooked. A fan was used to cool the trailer on warm days. Another facility, referred to as the greenhouse, was used to house dogs suspected of having kennel cough. The greenhouse was formed by 2 parallel rows of cages draped with heavy plastic sheeting. Local companies and the CVM Laboratory Animal Resources donated the use of 224 canine research cages, 22 cat cages, and other assorted animal cages, on 24-hour notice.

**Medications and medical supplies**—When the field hospital first opened, the CVM authorized access to the hospital pharmacy and central supply to stock necessary items immediately. Access to these facilities continued during the ensuing weeks as needed for our use and as requested by the Veterinary Medical Assistance Team (VMAT) as they assessed veterinary facilities in the flood zone. Within a few days, however, numerous medical supply and pharmaceutical companies contacted the hospital to make donations. As a

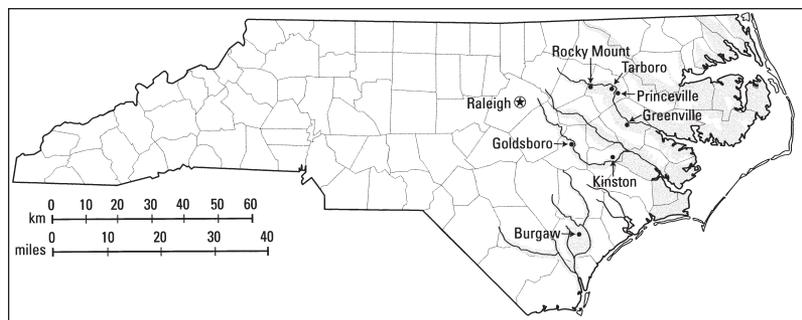


Figure 1—Map of North Carolina. Shaded portions indicate areas of flooding caused by Hurricane Floyd. Raleigh, the capital, is the location of the College of Veterinary Medicine and the emergency field hospital that was created to handle animals affected by the hurricane.

result, the authors were offered and received needed vaccines, test kits, medications, surgery instruments, disinfectant, microchips and reader, and related materials. In addition to donated microchips, the organization responsible for registration of identification waived all fees for these animals. Nevertheless, it was necessary to purchase some supplies, such as approximately \$800 worth of gloves, each week.

**Animal food**—Dog and cat food and litter donations were estimated at > 400,000 lb; approximately half of this amount came from individuals who donated a few bags of feed or litter at a time. Donations were also received from local retailers such as grocery and pet supply stores. Small donations were unloaded from cars onto pallets, then handloaded onto large pickup trucks or loaded via forklift onto a CVM dumptruck and transported to 1 of 3 storage sites.

Several national companies sent tractor-trailer loads of high-quality dog and cat food, which was initially diverted to a large warehouse facility. These high-quality foods were used at the field hospital to feed the animals on site until it was determined that sufficient food to finish the operation was available; the remaining food was then offered to animal shelters in the flood zone.

**Newspaper**—Newspaper was used to line the lower removable tray of the cages. In addition to donations by individuals, the local newspaper company arranged for delivery of unsold papers via their recycling unit.

### Transportation

Volunteered trucks and horse trailers were used to transport approximately 95% of the animals that were admitted to the field hospital. Response to an e-mail request made before the field hospital was activated generated a list of approximately 30 persons willing to transport and foster stranded horses. When requested, most of these people were willing to transport any species of animal and supplies.

On September 27, the authors were asked to evacuate an entire county animal shelter in 1 day. The VMAT anticipated that the shelter would flood as the result of a very heavy rain (this necessitated the pole barn facility). All scheduled trailers and backup trailers were mobilized to transport more than 130 animals out

of the expanding flood zone and back to the animal field hospital in Raleigh. Additional trucks were used during the day to transfer healthy animals from the shelter to area veterinarians and kennels in order to provide more space at the field hospital for evacuated animals and other recently rescued animals. These volunteers made multiple trips that day and evening; the last truck arrived just after midnight with approximately 40 dogs.

### Communications

**Shelter telephones**—Personal cellular telephones were used for approximately 1 week. Two local cellular telephone companies then donated cellular phones and free minutes and deleted charges for previous services from the personal telephones. Most people who were transporting animals in trailers also had personal cellular phones and were in contact with the field hospital. This allowed preparation for a specific number of animals before they arrived or diversion of personnel to other locations when needed. A hard-line telephone was not connected until October 12. With only 1 phone line, e-mail and Internet were not available at the field hospital itself.

**Hotline**—The CVM was allotted 3 telephone lines at the emergency operations center, which was later expanded to 5 lines. Questions involving donations, volunteers, volunteer scheduling, owners looking for dogs, and people offering to foster or adopt animals were all routed to this number, which allowed the authors to keep the field hospital telephone line available for other business.

**Media relations**—All media requests were routed through the CVM public relations specialist. The first request for a story came on September 22, the day after the field hospital was opened. Media attention was intense initially; it was not unusual to have 3 network affiliates or 2 or 3 print reporters wanting to interview our director each day. The attention remained fairly constant through November and was, for the most part, quite positive. Radio stations in central North Carolina responded to our requests to disseminate information and our requests for specific items. One local talk radio program invited the authors on the air 4 times in 4 weeks, allowing us to make requests for specific items. A local television station carried pic-

tures of 3 animals daily for 5 weeks on their morning program in hopes that their owners might see and identify them.

**Animal identification and tracking**—Temporary pet identification bands, sequentially numbered and prepared in advance with an identification number marked in indelible ink, were placed on each animal as it arrived at the field hospital and received an initial physical examination. The identification numbers matched the medical records number, database number, and photography numbering system. After an initial delay, we had an adequate supply of microchips,<sup>a</sup> and all animals received a microchip upon arrival. The microchip number was also entered into the database.

An Internet link to the CVM website was established and operating on October 12. The website contained information about the shelter, an address for monetary donations, and photographs of most animals. Because of concern about reclamation or adoption of American Staffordshire Terriers (Pit Bulls) for illegal dog fighting, these dogs were not pictured, nor were animals with identified owners. The website also indicated which animals had been reunited or adopted.

Two photobooks were sent to the 2 animal shelters that were the source of most of our animals. The photobooks contained an explanation of our operation, including the fact that people would not be charged for their animal's care, indication of the date when adoptions of unclaimed animals would begin, and the procedure to claim American Staffordshire Terriers.

A database was established that included identification number, species, sex, location found, breed (or best guess), color, physical location (field hospital vs a particular clinic), date of neutering, microchip number, owner information if known, and adoption information. The database was backed up several times each week and protected by a password known to 3 people.

Each night a volunteer with a blank cage list recorded the individual number of each animal in each cage at the field hospital. This was necessary because animals were moved from the field hospital to the clinic or between cages on an almost daily basis.

## Donations

**Monetary donations**—The North Carolina Veterinary Medical Foundation at the CVM, which already had all necessary tax and charitable organization information on file, established a separate fund for the "animal relief effort" and processed donations. The foundation provided the field hospital with receipt forms for cash contributions. The final tally for monetary contributions to the fund was \$290,000.

**In-kind donations**—Appropriate tax information was provided to retailers and manufacturers who donated goods such as kennels, fencing, portable toilets, and construction lights. Because most people who dropped off in-kind donations such as leashes, collars, and pet food did not want receipts, the estimated value of \$39,000 for donated items was definitely low.

**Food for people**—The addition of an army tent allowed us to remove all human food from the field

hospital itself, and the tent became the break and meeting room. Regular hot meals for the volunteers were scheduled and delivered to this tent.

## Professional Staff

**Field hospital directors**—The directors were 4 CVM veterinarians with diverse areas of expertise (small animal clinician, anatomist, physiologist, and equine clinician). Schedules were arranged to meet ongoing responsibilities such as clinic duty or lectures and to have at least 1 director on duty at all times when the field hospital was open. The directors had the final responsibility for medical care decisions, arranged transportation, ordered, requested, and accepted supplies and deliveries, released animals to owners, screened adoptive owners, met with media representatives, and signed off on bills.

**Head technician**—An experienced, retired veterinary technician provided assistance during most of the time that the field hospital was in operation. When she was not available, a volunteer (ie, not assigned from the teaching hospital) technician from the CVM or one of the directors took over this function. This person had the responsibility for feeding animals, trained volunteers, supervised cleaning and walking activities, prepared animals for and recorded movement to outlying clinics or within the field hospital, supervised recovery of animals from surgery, and performed midday medical treatments.

**Additional professional staff**—The North Carolina Veterinary Medical Association scheduled volunteer veterinarians from around the state to staff our field hospital with 1 or 2 veterinarians daily from October 4 to October 29. These veterinarians frequently also brought their technical staff, and technicians also volunteered individually. The veterinary technician program at a nearby community college also encouraged their students to participate at the field hospital. Medical teams performed examinations on animals that developed clinical problems subsequent to initial examinations, interpreted results of diagnostic procedures, altered treatment plans according to updated information, and checked that each animal had a readable microchip. They also performed or supervised minor surgical procedures such as placement of drains and debridement of shallow wounds. Two volunteer technicians stayed overnight for late treatments.

Twenty-seven practices and kennels within 2 hours driving distance of Raleigh housed 141 dogs and 47 cats and handled adoptions of most of the animals that were unclaimed by November 1. These clinics and kennels also performed the spays and neuters of most of the animals that were adopted. Transfers were documented on paper and computer medical records.

**Veterinary students**—Students from each year of the veterinary program at North Carolina State University volunteered their assistance. Three senior students regularly came in the evenings and nights during the weeks that animals were evacuated to the field hospital; they were teamed with a technician and, under supervision, received and examined new arrivals

and planned treatments. Five senior students coordinated a large spay and neuter program for approximately 300 animals that were adopted (only 3 had been neutered before the hurricane). Two junior students were in charge of creating student treatment crews for 7:00 AM and 7:00 PM treatments that were performed between September 30 and October 24.

## Volunteers

More than 750 volunteers worked at the field hospital or hotline during a 3-month period. Some volunteers only worked on 1 occasion, whereas others worked regularly for many weeks, which provided a cadre of trained persons. At the field hospital, workers were required to be at least 18 years old, because of university concerns about liability and possible zoonoses such as ringworm and scabies. Volunteers were asked to sign liability release forms.

**Organization**—Prior to establishment of the hotline, volunteers generally called the college and the teaching hospital to find out where and how they could help, which put a great burden on the staff at those locations. After the hotline was operational, lists of names and telephone numbers were compiled and 20 to 30 volunteers were scheduled to begin work at 7:30 AM or 6:00 PM. Volunteers were usually organized into teams of 3 (1 animal walker and 2 cage cleaners), provided with cleaning supplies, and assigned to a row of cages.

**Training**—The head technician, or in her absence one of the directors, had the responsibility of meeting volunteers and organizing teams. New volunteers were collected into small groups and given a short talk about safety, cleaning method, and how to use a choke chain. Whenever possible, new volunteers were placed with experienced volunteers. The trainer needed to be able to judge volunteers quickly and be unafraid of asking people to describe any physical limitations. People with limitations could perform many duties, even if they were unable to walk large strong dogs or handle heavy cages.

Initially, because of fears of rabies exposure, unvaccinated volunteers were not allowed to walk the dogs. On October 10, this policy was abandoned, except for a small group of dogs that arrived after that date.

## Safety

**Lighting and security**—The warehouse area only had 1 streetlight for the entire location, but 2 companies donated the use of 3 large construction lights with generators, which permitted illumination of the parking lots and the dog walking area. One shelter director received 2 death threats. One, recorded on her office voice mail, relayed a message not to return any animals to agribusinesses. In response, the university provided an overnight guard and a panic alarm. The second death threat came the day after an erroneous e-mail began circulating, which stated that unclaimed animals were being euthanatized as of November 1. This threat came directly to the shelter phone (the number was not generally publicized). After the second death threat, the university arranged for armed officers to be present 24 hours per day via several local law enforcement agencies.

**Animal handling concerns**—After lay volunteers began walking the dogs, the incidence of loose dogs greatly increased, so a choke chain was required. Approximately 15 dogs got loose and 13 were recovered. Six sexually intact male dogs (Rottweiler cross [n =2], Chow Chow cross [2], German Shepherd Dog cross [1]) bit people; 5 incidents had no apparent provocation. These bites were reported, as required by state law, to the local county animal control officer, as well as to a CVM faculty member who was responsible for animal bites on CVM property. The dogs were transferred to the local county animal shelter for quarantine.

## Miscellaneous Problems

The authors were strongly advised to treat animals that originated from Princeville, a town that had been completely flooded and was inaccessible for 10 days, because animals may have been contaminated with hazardous material. Rescuers who worked in this area and did not have protective clothing received chemical burns. For this reason our personnel wore disposable coveralls, boots, gloves, face shields, and heavy-duty garbage bags with holes cut out for neck and arms. Dogs were bathed with medical soft soap<sup>b</sup> immediately upon arrival and before any examination.

The authors did not realize that North Carolina did not have a Good Samaritan law that addressed animal issues. The various groups that handled animal issues for the state were not officially part of the state emergency management process at that time. This meant that statutes regarding emergency declarations by the governor, which could have suspended requirements for licensure and registration and liability issues, were not in effect; therefore, veterinarians and technicians providing medical care had to be licensed or registered, respectively, in North Carolina.

An accurate list of public animal shelters with correct addresses and phone numbers was not available from government agencies. Therefore, trying to contact shelters and inform them of our services was mostly done via the VMAT and word of mouth.

## Animal Care

**Basic medical care**—Medical care provided to rescued animals ranged from initial triage to advanced diagnostics, surgical intervention, and medical treatment. If greater medical care was needed than could be administered at the field hospital, the animal was taken to one of the local emergency clinics for more intensive care and monitoring. The first tier of treatment consisted of a complete physical examination; medical problems were noted on a medical record. All animals were vaccinated against rabies except for 4 animals that had current rabies tags. Dogs were also vaccinated against distemper, hepatitis, leptospirosis, and infection with parvovirus, parainfluenza, and *Bordetella bronchiseptica* unless contraindicated. Cats were also vaccinated against panleukopenia and viral upper respiratory diseases caused by herpesvirus and calicivirus unless contraindicated. Any necessary medications or medical procedures (laceration repair, wound bandaging) were then dispensed or completed, and the animal was

placed in a cage with accompanying treatment and feeding instructions. Animals were treated for endoparasites with pyrantal or fenbendazole after an initial recovery period. Placards on their cage identified animals that had possible contagious or zoonotic diseases.

The second tier of treatment included testing all animals for heartworm infection and performing any other diagnostic tests necessary. On-site tests included CBC, skin scraping analysis, cytologic examination, antibody tests for heartworm, feline immunodeficiency virus, and FeLV; fecal flotation for endoparasites, urinalysis, and determinations of blood glucose concentration, BUN concentration, and serum or plasma protein concentration were also performed. For other diagnostic tests, such as serum biochemical analyses, an off-site testing company offered reduced fees. Typically, radiographs were taken on-site by use of the portable equipment from the equine field service and processed at the CVM hospital. Occasionally, animals were transported to the CVM hospital for more specialized procedures. Ultrasonographic examinations were also performed on-site by use of portable equipment.

Tertiary treatment of rescued animals included surgical or further medical management of conditions identified at time of rescue. Surgical treatment of animals ranged from spay and neuter to abdominal, ophthalmic, reconstructive, and orthopedic procedures. All animals were spayed or neutered prior to release, with the exception of animals returned to original owners who did not request this procedure. Neutering was performed in a surgical tent erected at the field hospital site, whereas more invasive surgeries were performed at the CVM. In addition to the surgical procedures, medical treatment of adult heartworm infections, various dermatologic conditions, pulmonary conditions, neoplasia (transmissible venereal tumors, mammary and prostatic tumors), acute renal failure, and anemias were treated at the field hospital. Necropsy was performed on all animals that died or were euthanatized for health reasons.

Behavioral screening was performed on a continuous basis. Except for a few extremely aggressive dogs, most animals responded to behavior training, including walking on a leash and responding to commands such as sit, stay, and down, instituted by the veterinarians, students, technicians, and lay volunteers.

**Adoptions**—People who were interested in an animal housed at the field hospital filled out an adoption form at the field hospital or via the hotline; this information was entered into the database almost daily. It was not unusual for multiple people to want a particular animal. People who had volunteered at the shelter or the hotline were given priority, if qualified. If more than 1 qualified volunteer desired the same animal, the request for adoption with the earliest date had priority. For the rest of the unclaimed animals (approx 60%), forms from non-volunteers were entered and qualifications checked. Persons who had not had a chance to interact with a selected animal were invited to the field hospital where a volunteer brought the animal out, allowed the person and animal to meet and perhaps walk. They would proceed if still interested.

**Qualifying**—Because there was often a long gap between filling out an adoption form and release of animals for adoptions, the person was first contacted to confirm that they were still interested and that they had adequate housing and fencing for dogs. Cats were expected to be indoor animals. It was explained that references would be checked, particularly references from their veterinarian; if owners didn't have a veterinarian, they were required to contact one. The veterinarian was required to take the animal into their practice, and a veterinary appointment was required within 3 days of adoption. At that point, appointments were made to pick up the animals.

**Returns**—Persons who adopted animals were required to agree that if the adoption was not successful, the animal would be surrendered to the field hospital or their veterinarian. Approximately 12 animals were returned by the end of December for various reasons, including dogs that had aggression against cats, aggression between adopted pets and pets that presently resided in a home, and adoptions that had not been agreed upon among spouses, parents, or housemates.

### **Advance Planning**

Within 72 hours of request, we were able to provide an operational field hospital, without benefit of a preexisting plan, source of materials, transportation, or communication. Of this, we are justifiably proud, although the approach was not consistent with accepted emergency management. We would have been even more effective had there been advance planning. Presently, several state offices, various veterinary-related associations and boards, and the CVM are formulating a plan for a State Animal Response Team to work within the existing framework of the state emergency operations center. This group is preparing an emergency operation plan that will be tested in tabletop and simulation exercises in conjunction with other emergency personnel.

Additional information and ideas on management of animals during disasters is available through the **Federal Emergency Management Agency (FEMA)** at [www.fema.gov](http://www.fema.gov) (FEMA has on-line courses related to animals in disasters); the **American Academy of Veterinary Disaster Medicine** at <http://www.cvmb.colostate.edu/clinsci/wing/aavdm.aavdm.htm#Welcome>; the **AVMA** at [www.avma.org](http://www.avma.org); **United Animal Nations Emergency Animal Rescue Service** at [www.uan.org](http://www.uan.org); **Animals in Disaster** at [www.animaldisasters.com](http://www.animaldisasters.com); **Animal Disaster Planning Advisory Committee** at [www.fl-adpac.org](http://www.fl-adpac.org); and the book *Animal Management in Disasters*.<sup>1</sup>

Important factors for the operation reported here included the fact that the field hospital had a core of professionals with animal expertise and lay volunteers who were dedicated to the operation, and that a shelter site, medical equipment, and supply sources, most of which were donated, were quickly identified. A designated media relations or public information person was used to generate positive exposure for the operation. The authors developed initial examination, admissions, and medical treatment plans that, once in

place, were quite effective. The hospital also benefited from generous community donations of supplies that were integral to the operation of the shelter, and an existing efficient system of monetary donation management through the North Carolina Veterinary Medical Foundation. As an established nonprofit organization, accounting systems for tax-deductible donations were already in place. The authors followed up with participation in the formation of an officially recognized State Animal Response Team, which in turn is actively encouraging formation of county animal response teams. It is

recommended that veterinarians concerned with disaster management take similar proactive steps to prepare for an emergency before it happens in their communities.

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<sup>a</sup>Home Again companion animal retrieval system, Schering-Plough, Kenilworth, NJ.

<sup>b</sup>Tincture of Green Soap, Perrigo Co, Allegan, Mich.

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## References

1. Heath SE. *Animal management in disasters*. St Louis: Mosby-Year Book Inc, 1999.