

Disaster Medicine

Equine rescue and response activities in Louisiana in the aftermath of Hurricanes Katrina and Rita

Rebecca S. McConnico, DVM, PhD, DACVIM; Dennis D. French, DVM; Bonnie Clark; Ky E. Mortensen, BS; Martha Littlefield, MS, DVM; Rustin M. Moore, DVM, PhD, DACVS

The unprecedented devastation caused by Hurricanes Katrina and Rita presented a uniquely challenging situation for animals and their owners in southern Louisiana and the Mississippi Gulf Coast region during the fall of 2005. Animal issues and concerns that arose during the disaster response and recovery were addressed through the National Response Plan and the Louisiana Animal Disaster Plan, under the jurisdiction of ESF-11,¹ with efforts led by the LDAF. The LSART was the operational arm for response activities and was largely made up of veterinarians and volunteers from the LVMA and the LSU SVM, which is an active district organization member of the LVMA. The following is a report of the emergency response to equine disaster victims by faculty and staff members of the EHSP at the LSU SVM, members of the LSART and LVMA, state officials, and volunteers. This account is provided for the purpose of sharing information and lessons learned that may be useful to those in the veterinary and other animal-care professions in an effort to collectively enhance our abilities nationwide in providing optimum care and resources for animals and their owners when confronted with a natural or manmade disaster.

Anticipation and Storm Landfall

On Wednesday, August 24, 2005, Tropical Depression Katrina was located off the southern tip of Florida. The following day, it was upgraded to a category 1 hurricane. As Hurricane Katrina moved across the southern Florida peninsula, it accounted for the deaths of 6 people. After entering the Gulf of Mexico, Katrina was subsequently downgraded to the status of a tropical storm, with the result that on Friday, August 26, few people in the Baton Rouge area were paying attention to it, particularly because this was the first big weekend after the start of the fall semester at LSU. As weather

From the Equine Health Studies Program, Department of Veterinary Clinical Sciences, School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA 70803 (McConnico, French, Mortensen, Moore); the Louisiana Equine Council, PO Box 567, Baton Rouge, LA 70821 (Clark); and Animal Health Services, Louisiana Department of Agriculture and Forestry, PO Box 1951, Baton Rouge, LA 70821-4048 (Littlefield). Dr. Moore's present address is Department of Veterinary Clinical Sciences, College of Veterinary Medicine, The Ohio State University, Columbus, OH 43210-1089.

Address correspondence to Dr. McConnico.

ABBREVIATIONS

ESF	Emergency support function
LDAF	Louisiana Department of Agriculture and Forestry
LSART	Louisiana State Animal Response Team
LVMA	Louisiana Veterinary Medical Association
LSU	Louisiana State University
SVM	School of Veterinary Medicine
EHSP	Equine Health Studies Program
VTCH	Veterinary Teaching Hospital and Clinic
HHH	Horse Hurricane Helpline

channels warned of a sudden change in the course and strength of this potential hurricane, recreational activities soon shifted to storm preparations. Having become largely accustomed to the routine that goes along with having a storm move into the Gulf, however, most Louisiana residents were primarily concerned with the inconveniences associated with evacuation, such as congested traffic and longer lines at grocery stores and fuel stations.

On the morning of Saturday, August 27, television and radio reports shifted to describing a potentially worst-case scenario hurricane situation for the southeastern portion of Louisiana. By that afternoon, the mayor of New Orleans had announced a voluntary evacuation for New Orleans, while the mayors and parish presidents of the more vulnerable coastal parishes south of New Orleans ordered mandatory evacuations. Baton Rouge quickly became packed with evacuees from New Orleans and the lower southeastern portion of Louisiana. On Sunday, August 28, as the hurricane gained in strength to category 5 status and was targeting parishes at the mouth of the Mississippi River, Louisiana Governor Kathleen Blanco announced a mandatory evacuation for the city of New Orleans and surrounding areas. At the time Hurricane Katrina made landfall on August 29, Baton Rouge's population of roughly 250,000 people (600,000 in the entire surrounding metropolitan area) had nearly doubled.

As Hurricane Katrina made its way across the Gulf of Mexico, many horses from the New Orleans area were relocated to northern Louisiana parishes by their care providers, whereas others were evacuated to the west. At that time, the options available to Louisiana horse owners in the anticipated path of the storm were

limited to sheltering their animals in-place, turning their animals out on levees or other high-ground pastures, and immediately evacuating.

Sheltering horses in-place carried with it risks that the animals would be injured as a result of damage to the shelter during the storm or would drown as a result of subsequent flooding. Horses that survived the immediate effects of the storm were at risk for exposure to contaminated food or water or a lack of food or water if caretakers were not available. Similarly, turning horses out on levees or on pasture carried risks that the horses would be injured by storm debris or downed fences and buildings or that the horses would be drowned, lost, stolen, or misidentified. Similarly, horses that survived were at risk for exposure to contaminated food or water.

For these reasons, evacuation was the safest choice for most horses. However, this was costly, required that a vehicle and adequate fuel be available, and required that the owner be knowledgeable about appropriate facilities where evacuated horses could be stabled. In addition, traffic became an important issue, and some horse and livestock owners were prevented from evacuating their animals once New Orleans began mandatory evacuation of its residents. As an example, a carriage horse company located in downtown New Orleans encountered major traffic tie-ups while attempting to evacuate its last load of mules and horses. With little progress being made and time growing short before anticipated landfall of the storm, the owners had to turn back and seek shelter at their home stable near the historic French Quarter in New Orleans.

In the early morning of August 29, Katrina made landfall as a category 4 hurricane and crossed the southwestern portion of Mississippi and southeastern portion of Louisiana, causing a storm surge of more than 20 feet in Louisiana's St Bernard and Plaquemines parishes, leading to massive property destruction and flooding. A storm surge 8 to 12 feet high swept over areas east and south of Lake Ponchartrain. Areas in the north of the state and parishes in the west (as far as East Baton Rouge Parish) sustained moderate to severe wind damage. Horses and other livestock in the direct path of the storm surge were immediately impacted, and many perished; some of these were found drowned, entangled in fences and other equipment, ensnared in machinery, lodged in treetops, and trapped in stalls. Many others were, according to state and federal officials who performed poststorm aerial surveillance, washed into the Gulf of Mexico.

Many of the animals that survived the storm and subsequent flooding were stranded on high ground or left standing in water and mud. Initially, New Orleans sustained only wind damage and flooding caused by the storm surge. However, when the levees broke on the following day, flooding occurred in over 80% of Orleans Parish.^{2,3} Many horses that had survived the storm surge from Lake Ponchartrain and inland waters would later drown, trapped by the rising water caused by the levee breaks.

Prestorm Planning

According to ESF-11 of the National Response Plan, the LDAF is the lead agency for any animal di-

aster response or statewide emergency in Louisiana. The state veterinarian and USDA, APHIS, Veterinary Services area veterinarian in charge are responsible for all animals involved in a disaster or emergency disease outbreak, and they served as area co-commanders for the Incident Command Post established after Hurricanes Katrina and Rita. Their partner in disaster planning and operations, the LSART, was still in its organizational stages at the time of the 2005 hurricanes, and most of the plans up to that time had focused on identifying prestorm evacuation sites for small companion animals living in Louisiana's coastal parishes. The large animal plan was simple: equine and farm animal owners were required to have their own plans for providing for their animals during a disaster. In the days preceding Hurricane Katrina's landfall, LSART equine team members and the assistant state veterinarian assembled 10 veterinarians and other volunteers to manage veterinary needs at an equine response shelter to be created at a staging area located to the west of New Orleans. The initial plans made during this meeting were subsequently overwhelmed by the magnitude and complexity of the disaster caused by Hurricane Katrina. However, despite the minimal prestorm organization and planning for equine rescue and shelter operations, because of major adjustments made during the first few days, these activities evolved into a functional plan for dealing not only with the effects of Hurricane Katrina but also with the effects of Hurricane Rita, which made landfall 3 weeks later. The efforts of this team would eventually develop into one of the largest-scale hurricane- or flood-related equine rescue and recovery operations in recent US history.

When landfall of Hurricane Katrina appeared imminent, 3 shelter locations were identified as suitable sites to be used as staging areas for the response. The locations were selected by apportioning the lower part of the state into thirds, with the hypothesis being that at least 1 of the 3 facilities would be used as the primary response shelter and staging area, depending on the storm's path. Eventually, the Lamar-Dixon Expo Center in Gonzales, La, located 50 miles northwest of New Orleans, was chosen as the major response shelter. The initial Katrina equine response plan included staffing this response shelter with veterinarians and veterinary students from the LSU SVM under the direction of a shelter manager designated by the state veterinarian's office. A list of trailer owners and drivers and on-call equine veterinarians who would volunteer their services for 2-week shifts was developed to assist with equine response activities.

The Equine Branch of the Incident Command Post

Equine Branch communications—On August 30, the day after Hurricane Katrina made landfall, receptionists and faculty members at the LSU VTHC began receiving numerous calls from people wanting information concerning the needs of the VTHC and news of the current situation and from horse owners needing help or wanting to find out the status of their stables and horses. At the same time, telephones at the Incident Command Post established by the LDAF and the

state veterinarian's office became inundated with calls and requests for help from the public. When the state veterinarian's office received a call from a woman reporting that 67 horses near Kenner, La, just northwest of New Orleans, needed to be evacuated because of damage to their barn, flooding, and a lack of drinking water, Incident Command Post staff quickly realized the magnitude of the response effort that would be needed. After organizing the rescue of this initial herd of horses with USDA veterinarians and recognizing that federal and state personnel were being reassigned to help with the response to human victims, the state veterinarian asked the LSU EHSP, as part of the LSART, on August 31 to assume leadership responsibilities for the tactical operation of emergency response activities for equine storm victims, establishing this as the Equine Branch of the area Incident Command Post (Figure 1).

The number of telephone calls to the LSU VTHC continued to increase during the first 2 days after the storm. Thus, on August 31, faculty and staff members from the LSU EHSP organized the HHH as a communications arm to support and assist the Equine Branch. Because many landline and cellular telephone circuits were consistently giving a busy signal, EHSP leaders received authorization from LSU SVM administrators and the LDAF to publicize an LSU VTHC telephone number to be used as the HHH. That same day, the telephone number was distributed to the public and media outlets via LSU SVM and LDAF public information officers. A conference room adjacent to the LSU VTHC receiving office was converted to the Equine Branch communications center and was equipped with 3 telephones, large wall maps of the area, a computer with Internet access, a chalk board, and a 24-hour schedule for LSU EHSP personnel, veterinary students, and volunteers to answer the telephones. Approximately 32 volunteer LSU EHSP personnel, including faculty members, residents, interns, veterinary students, undergraduate students, clinic and research technicians, family members of LSU SVM employees, and lay volunteers, answered telephone calls during the 4 weeks that the HHH was maintained. Volunteers worked in 2- to 6-hour shifts, with at least 1 faculty member present at all times to serve in a supervisory role. An around-the-clock schedule was maintained throughout September, but as the number of telephone calls began to decrease approximately 14 days after the storm, 5 faculty members staffed the HHH on an on-call basis. Current lists and files were compiled and entered into a central database to support Equine Branch logistics and operations, including lists of volunteers, supplies, people willing to donate supplies and feed, contact information for important state and federal officials, and frequently asked questions. A regularly updated Web page was established and maintained by LSU SVM faculty, operating as part of the LSART, in an effort to inform the public of current animal rescue and response operations. The HHH was transferred back to the state veterinarian's office on October 1, 2005, 4 weeks after Hurricane Katrina made landfall and 1 week after Hurricane Rita made landfall.

Numerous calls came into the HHH from evacuees who wanted to check on the status of horses they had

left to weather the storm or that they had evacuated to an area that had also received storm damage. In addition, countless calls were received from individuals who simply wanted information on the status of something they had seen on television, often jamming the lines and hampering calls from people with valid needs. Calls came in day after day from distraught, distressed, and traumatized individuals. Because Red Cross telephone lines were overwhelmed during the first 10 to 14 days after the storm, calls were received asking the EHSP for assistance with rescues of all types, including rescues of trapped people. There were many calls from evacuated horse owners asking the Equine Branch's response teams to locate and rescue their horses. The psychological stress of dealing with these telephone calls was recognized in the first couple of days, as HHH volunteers often had to explain to horse owners that their barn or stable had been severely damaged or washed away or was currently under water. Equine Branch leaders consulted with the Incident Command Post regarding counseling for telephone volunteers and were directed to US Public Health Service officers located at 2 animal shelters in the Baton Rouge area.

Hard-copy records of individual HHH telephone calls were compiled by the volunteers. Although the exact number of calls coming into the HHH was not officially documented, hundreds of calls were processed during the 4 weeks the HHH was in operation. The information obtained through these telephone calls, combined with information obtained by Equine Branch response teams from on-the-ground military operations concerning horses and other animals encountered during human search-and-rescue operations, was used to plan each day's equine rescue missions. Additional information was gathered each day from the response teams' reconnaissance efforts. The Equine Branch's communications center activities expanded as the challenges grew in the aftermath of the storms, with rescue activities for Katrina-affected horses continuing through the third week of September.

As response efforts related to Hurricane Katrina were starting to diminish, the southwestern Louisiana Gulf coast was hit by a second storm, Hurricane Rita, on September 24. The HHH was immediately reactivated as Equine Branch activities and planning intensified in anticipation of the effects of this second major hurricane. Owners requested information regarding interstate restrictions on animal movement, not realizing that the Louisiana state veterinarian's office had obtained waivers from most of the states in the southern region to allow owners to evacuate their animals across their borders. Often, owners were unable to receive important information because so many cellular and landline telephone circuits were overwhelmed or still damaged. Compounding the telephone problem was the fact that radio, television, and Internet information continued to focus on the response to people affected by the storms, rather than the concerns of affected animals and the effects of the second storm. Rescue of horses affected by Hurricane Rita continued through September 29.

Equine Branch field operations—Following establishment of the Equine Branch, emergency equine rescue and response operations were coordinated through the operations unit.

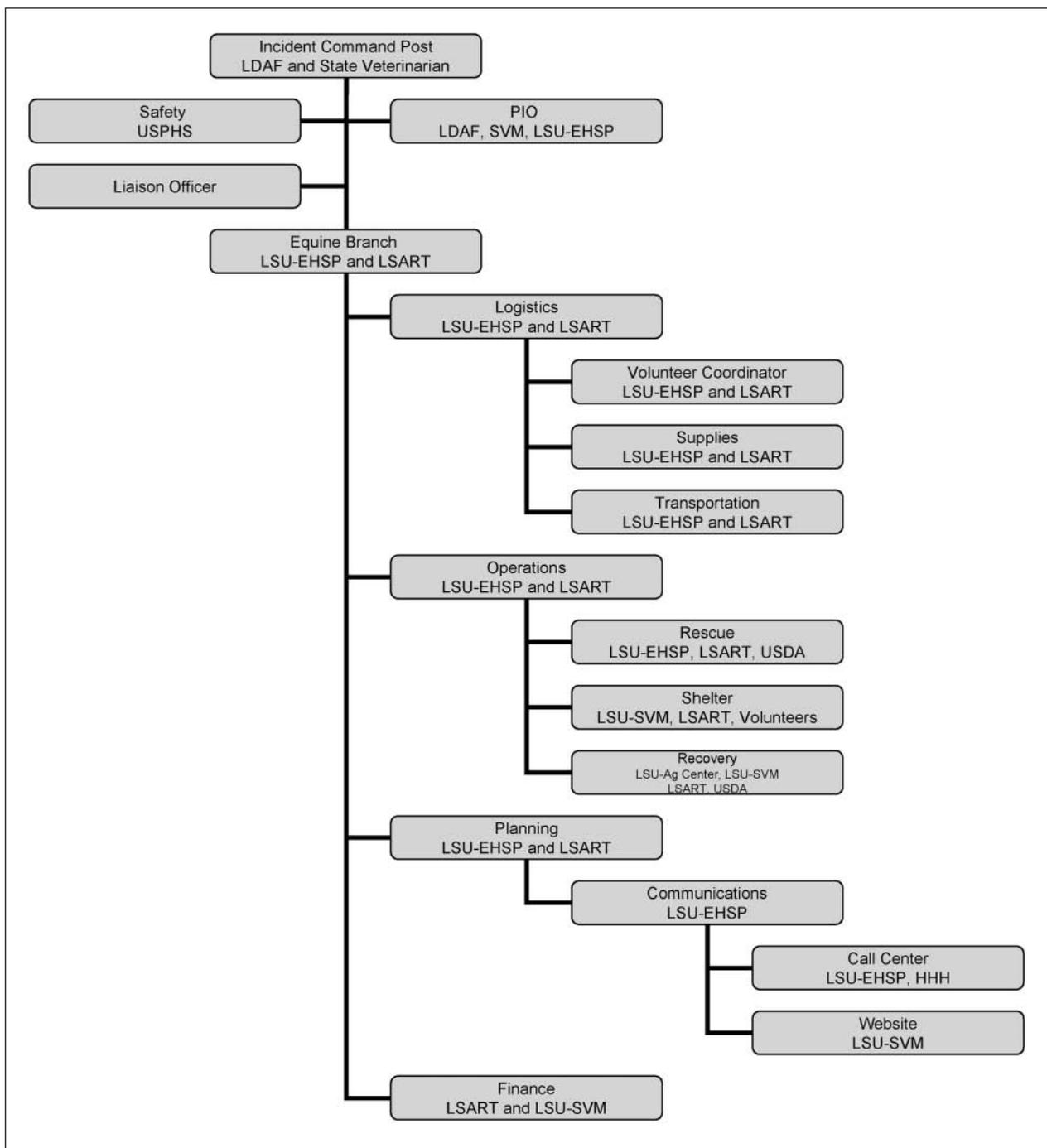


Figure 1—Organizational chart of the Equine Branch established to coordinate equine rescue and response operations following Hurricane Katrina. PIO = Public information officer. USPHS = US Public Health Service.

PLANNING

Daily planning for ongoing Equine Branch field operations was typically completed between 9 PM and 12 AM because response teams usually returned late at night. During these planning sessions, the following day's rescue plans were organized on the basis of the most current knowledge of animals in need of rescue. Compiled lists of rescue and response directives obtained from the HHH and from returning response teams were charted with the aid of Internet mapping sites, and response efforts were prioritized according to

urgency. Horses in need of emergency medical care, water, and food were attended to first, followed by horses whose care providers were evacuating.

Information gathered from the HHH and equine response teams was vital to planning each day's activities. Because of poor telecommunication capabilities, details of additional horses and owners needing response assistance (eg, supplies or rescue) were often not known until the equine response teams returned each day. Recently acquired direct-connect telephones that had a non-network, walkie-talkie feature proved

invaluable for communication during these times. Situation reports of Equine Branch activities (operations, planning, logistics, and finance) were reported to the Incident Command Post daily via e-mail.

SEARCH AND RESCUE

Equine Branch response teams were deployed daily for 18 days. Teams would meet at dawn at the equine response shelter (staging), where they would receive detailed instructions regarding the number, type, and location of the horses in need of rescue; driving directions; and necessary telephone numbers. When possible, the Equine Branch communications center maintained contact with dispatched rescue teams throughout the day to check on the status of their rescue missions, the number of animals being brought into the shelter, each team's anticipated time of return, and any problems that may have been encountered. Sometimes, teams would be asked to make detours on their return trips if other calls came into the communications center with reports of horses in need of rescue in the general area. Rescue missions were only conducted during daylight hours because a strict dusk-to-dawn curfew was being enforced for safety reasons.

During the period after Hurricane Katrina, many of the equine survivors in the area were being adequately cared for, but were in need of hay, water, and other supplies. Thus, equine response teams hauled needed supplies to care providers and owners who were continuing to shelter in-place and, after unloading, would retrieve horses, other livestock, and pets that needed to be evacuated. Each response team consisted of 1 or more LVMA or EHSP equine veterinarians, 1 to 4 trucks with trailers and drivers, and 1 to 3 additional lay volunteers. Veterinarians carried veterinary medical supplies with them, including those needed for first aid and for euthanasia. However, there were only 2 horses that were euthanatized at a rescue site, one because of a severe tibial fracture and another that was moribund because of dehydration. Response teams were restructured each day as needed on the basis of received intelligence and the available number of experienced team members.

The first known request for equine rescue was received on August 30, just 36 hours after Hurricane Katrina made landfall. Credentialed USDA veterinary medical officers were deployed as soon as they could garner the needed trailers, responders, and supplies to rescue horses stranded at a stable in Kenner, La. Before they departed, rescuers were informed by military personnel that they would have only 1 chance to get the horses out. Therefore, a team of 7 stock trailers was dispatched on September 1 to evacuate the 67 horses. The team identified the horses with numbers and photographed each as they were loaded onto the trailers. Microchip numbers were recorded and cross-referenced with numbers written on the hip of each horse with a paint stick. This was the first of countless rescue operations that would be carried out over the following 4 weeks.

CREDENTIALS

In most weather-related disasters, human rescues are completed in the first 1 to 3 days, after which ani-

mal rescues are conducted. Because of the unprecedented size of the Hurricane Katrina disaster, human rescues continued for 15 days, limiting efforts at animal rescue. Flooding that occurred after the levee breaches further hampered both human and animal response operations. Civil unrest necessitated the implementation of martial law in Orleans parish and parishes south of New Orleans shortly after Hurricane Katrina made landfall, limiting access to many affected areas. Thus, Equine Branch team members began to explore various options for obtaining the necessary credentials needed to access New Orleans and surrounding affected areas where equine rescue and response activities were known to be needed.

In a specific incident, Equine Branch communications team members had been contacted via the HHH and told that 21 carriage horses and mules from downtown New Orleans were in urgent need of evacuation because of rising flood waters, a lack of feed and fresh drinking water, and increasing violence and looting throughout the city. An Equine Branch volunteer was able to make contact with a personal friend in the Governor's office, and a request was made on Saturday, September 3, to allow an equine response team access to the carriage mules and horses. Ironically, at the same time, authorities from the Governor's office had contacted the Equine Branch communications center inquiring how they could provide resources to affected dairy herds in the southern parishes of St. Bernard and Plaquemines. As the Equine Branch provided information on how to address the dairy herd situation, they received a faxed letter of permission from the Governor's office authorizing an equine response team access to New Orleans in conjunction with the Louisiana State Police the next day. Thus, on September 4, the 21 carriage mules and horses were finally evacuated from New Orleans.

An important key to the success of the Equine Branch's rescue and response activities was having 2 local equine practitioners who were familiar with the geographic area involved in locating stranded and injured horses. Their familiarity with horse facilities in Orleans, St. Bernard, and Plaquemines parishes was invaluable to the rescue of approximately 100 horses. In particular, their knowledge of the local geography and roadways was extremely helpful in finding alternate access routes to storm-affected areas when the main roads were impassable.

VOLUNTEERS

Volunteers from the local area arrived within approximately 3 days after Hurricane Katrina made landfall, many donating their time, trucks, fuel, and trailers. Volunteers from outside the area began to arrive approximately 5 to 7 days later. Ground rules had to be set for response teams, with Equine Branch leaders in charge of response team make-up and deployment. Canine rescue became a regular activity for the equine response teams in certain areas where small animal rescue groups had not yet gained access.

Difficult and often dangerous situations were created by unauthorized rescuers. In 1 example, a horse trailer was taken from a neighbor's abandoned premises by a group of horse owners who had declined earlier

assistance from an Equine Branch response team to haul their own horses to the equine response shelter at the Lamar Dixon Expo Center in Gonzales, La. As they were bringing the horses onto Interstate 10 just south of the Huey P. Long Bridge in New Orleans, the waterlogged floor boards fell out of the trailer, and 1 horse was seriously injured. Equine Branch members were then contacted by these owners, asking for rescue of and medical care for the injured horse. The other horses had to be transferred to another trailer while on the interstate, while the injured horse required subsequent transfer to the LSU VTHC for surgery.

There were several other instances when other well-intentioned people or groups working independently obstructed efficient and effective rescue and response activities because of their attitudes and lack of experience or knowledge of the Incident Command System. Understandably, many rescue groups arrived in southern Louisiana with a real sense of urgency that animal lives were hanging in the balance. Many were unaware of the organized animal response efforts and system in place under the authority of the Incident Command Post. In addition, many groups wanted only to rescue storm-affected horses and did not understand the importance of and the need for assistance with transporting feed and supplies, unloading supplies, or cleaning stalls in the equine response shelter. These examples illustrated the need for training and credentialing of all personnel, including volunteers, involved in rescue and response activities.

Equine Branch logistics—Within the Incident Command System, the logistic section is tasked with meeting all support needs for the incident, including ordering resources through appropriate procurement authorities from off-incident locations. The logistics section is to provide facilities, transportation, supplies, equipment maintenance and fueling, food service, communications, and medical services for incident personnel.⁴ When an incident is very large, as occurred after Hurricanes Katrina and Rita, a number of facilities are necessary.

Following Hurricane Katrina, specific logistical support for Equine Branch operations was delegated by the area Incident Command Post to the Equine Response Shelter manager and coleaders of the Equine Branch communications center. A supply unit made up of Equine Branch volunteers provided the support required to receive, process, store, and distribute supply orders for the Equine Response Shelter and equine rescue and response operations. Donated supplies quickly became unmanageable because of the overwhelming public response, with numerous unrequested and unneeded items being donated and with requests for products made to pharmaceutical companies by unauthorized personnel; a lack of administrative processes for efficient supply distribution; and a lack of availability of storage space and supervised supply personnel. Supplies for Equine Branch operations were stored in several locations, including the LSU SVM, the Equine Response Shelter at the Lamar-Dixon Expo Center, an LDAF warehouse, and the Sugar-arena equine shelter established following Hurricane Rita in New Iberia, La.

Equine Branch finance and administration—Shortly after it was established, the HHH began to receive numerous calls from donors wanting to provide financial support for animal rescue and, specifically, equine rescue and response. On August 31, individuals from the LSART, LVMA, and LSU SVM met to discuss how monetary donations would be handled. Because a mechanism was needed to accommodate cash donations through a nonprofit organization, a decision was made to use the LVMA's Dr. Walter J. Ernst, Jr. Foundation for this purpose. This account had been established before Hurricane Katrina made landfall as a means to accept donations. Eventually, the LVMA Equine Committee established a separate equine rescue and response foundation account specifically to handle donations being made for storm-affected horses. A fund was also established within the LSU Foundation to accept monetary donations intended for small and large animal medical care for hurricane-affected animals admitted to the LSU VTHC.

Horse owners were not required to pay a fee for rescue or response assistance, and the financial burden for equine rescue and response activities was shared by several groups at many levels. Donations from various individuals and groups paid for most of the response. State and federal funds were used primarily to help facilitate the delivery of hay and feed. Money donated to the LVMA foundation accounts (ie, the Dr. Walter J. Ernst, Jr. Fund and the Equine Disaster Response Fund) was used to purchase supplies, equipment, fuel, and other resources related to Equine Branch rescue and response operations. Because the Equine Branch communications center was tasked with logistics and planning, this group managed most of the finances related to the equine response. The EHSP, LSU AgCenter, Louisiana Cattlemen's Association, and Louisiana Livestock Auction Association helped greatly with hay distribution well into October and November 2005. Animal owners affected by the hurricanes whose animals were treated at the LSU VTHC were eligible to apply for funding assistance provided through the LSU foundation. Individuals who owned horses and those involved in the equine industry that were affected by the hurricanes were eligible to apply for assistance from the LVMA foundation accounts. To this day, the EHSP, LSU AgCenter, and state and federal officials continue to assist with agricultural needs arising from the 2005 hurricanes.

Equine Response Shelter

Facilities—On September 1, the Equine Response Shelter was established at the Lamar-Dixon Expo Center in Gonzales, La, which was also a primary staging area for human and small animal evacuees. The site had 960 stalls; 2 large, covered arenas; hook-ups for recreational vehicles; and several large buildings equipped with restrooms, climate control areas, and storage capabilities. The supervising equine veterinarian and equine shelter manager worked in cooperation with the Lamar-Dixon Expo Center manager and others to establish the boarding facilities, husbandry and veterinary supplies, and volunteers needed to manage storm-affected horses. As Hurricane Rita was bearing down on the southwestern Louisiana Gulf Coast 3 weeks after Katrina, a

second equine shelter was established at Sugarena in New Iberia, La. This second shelter was managed by a second LSART large animal veterinary team.

The Lamar-Dixon Expo Center in Gonzales served as a massive human and animal staging operation, housing thousands of human evacuees, first responders, rescued and evacuated small and large animals, and military operations. Although this was an ideal site because of its geographic location, size, and capabilities, its large size and multiple uses led to a perceived loss of control because of the large number of rescue organizations that descended on the property without authorization from the Incident Command Post and a lack of a secure perimeter. Internal and external communications were hampered by a lack of cellular and land-based telephone connectivity, as well as difficulties in identifying appropriate Incident Command Post personnel who had authority over the various staging areas. To a large extent, the Equine Response Shelter was able to successfully operate by limiting volunteers to a core group, with the result that it was able to maintain continuity of leadership and animal husbandry and medical care during the 6 weeks that it was in operation. Shelter volunteers slept in stalls, tents, and vehicles on site because they took on the responsibility of providing security for the Equine Response Shelter and other accommodations were not available.

The Hurricane Rita equine response shelter was different than the shelter established after Hurricane Katrina, in that many owners took responsibility for caring for their own animals. Feed, hay, and medical supplies were made available via the Equine Branch operations center that had been activated after Hurricane Katrina. A secure perimeter around the Hurricane Rita equine response shelter, which was located approximately 60 miles west of the Katrina shelter, was established early on by a local security service hired by the LSART.

Supplies—There had been no prestorm assembly of supplies for the Katrina Equine Response Shelter. Therefore, a request for supplies went out through the established Incident Command System Logistics Section as well as to the general public. The assistant state veterinarian established an account at a regional farm and feed supply store where initial shelter supplies were obtained. Soon, water buckets, halters, lead ropes, grooming equipment, and medical supplies began to accumulate in 2 of the stalls at the Equine Response Shelter, with 3, and eventually 4, stalls becoming supply stockrooms. Because of the request for supplies that had gone out to the general public, by 10 days after Hurricane Katrina, so many equine supplies and hay and feed had been shipped into the staging area that supply and logistical management became an extremely labor-intensive and serious administrative problem. This was amplified by the fact that many of the volunteers were willing to assist with difficult reconnaissance and rescue missions into storm-affected areas or with providing first aid to rescued animals, but far fewer were willing to perform mundane assignments such as unloading hay and feed; feeding and watering horses; cleaning stalls; or sorting through the thousands of boxes of donations, most of which did not contain packing lists and some which contained opened or ex-

pired bottles of controlled drugs, biologics needing refrigeration, and used and dirty tack or equipment.

Triage—Shelter intake was a team effort. As rescued horses were unloaded from trailers, the attending veterinarians and LSU veterinary students would assess and catalog the general health status of individual animals before they were moved to their assigned stalls. Urgent medical needs were addressed immediately, whereas horses with less pressing medical needs were allowed to settle into their stalls first and examined more closely later. Horses that seemed to be in reasonably good condition were offered a half bucket of water and some hay and allowed to settle into their new surroundings in an attempt to minimize further stress.

Identifying rescued horses was often challenging because many horses were not wearing halters when they arrived at the Equine Response Shelter. Because Louisiana is one of a few states with a mandatory permanent equine identification requirement, by state law, every horse must have an individual permanent identification in the form of a microchip, lip tattoo, or brand.

Veterinary medical care—Under the guidance and supervision of attending veterinarians, LSU veterinary students were instrumental in handling day-to-day animal care at the Equine Response Shelter, and a course entitled Special Topics in Large Animal Shelter Management was added to the year 4 LSU SVM curriculum. Most horses were only mildly affected by the hurricane.

Under a directive from the state veterinarian's office, veterinary students vaccinated each horse against tetanus, influenza, eastern equine encephalitis, western equine encephalitis, and West Nile encephalitis, and horses were tested to confirm that they were seronegative for equine infectious anemia. In hindsight, there was a general consensus that tetanus vaccination was appropriate and necessary for rescued animals because of the high incidence of soft tissue injuries and contaminated wounds from submerged objects. However, in retrospect, vaccinating rescued horses with influenza and encephalitis vaccines probably was not necessary and may have contributed to adverse reactions observed in a few horses.

A specific animal identification team supervised by a veterinarian was organized during the first week after Hurricane Katrina, and permanent identification numbers were confirmed for all horses housed at the Equine Response Shelter. These permanent identification numbers were later invaluable when attempting to reunite owners with their horses. An information sheet was created for each horse, with a description of the animal, sex, breed, permanent identification number, shelter arrival date, and rescue location. Information sheets were stored in a secure location away from the public because imposters were attempting to claim some horses as their own. An animal release form was used to document owner retrieval of each horse removed from the shelter.

During the 6 weeks of shelter operation, equine medical problems encountered included colic, diarrhea, dehydration, laminitis, sole abscesses, mild skin lacerations, and abrasions. Three horses developed neuro-

logic signs after entering the shelter, 1 of which was euthanized because of a lack of response to anti-inflammatory medications and supportive care. Horses with diarrhea were treated orally with electrolytes and enteral adsorbents. Horses with colic typically responded to medical management (ie, administration of flunixin meglumine and nasogastric administration of mineral oil), although 2 horses with signs of severe colic were referred to the LSU VTHC for further treatment. Several of the horses had foot problems that were likely associated with standing in mud and water for several days, and others had roofing nails embedded in their feet and other debris-related injuries. Several horses had preexisting conditions, including lameness (eg, chronic laminitis and arthritis), intestinal parasites, poor dentition, and malnutrition. Unfortunately, because of the lack of specific administrative processes, individual medical records were not maintained on the 367 horses that were examined at the Equine Response Shelter.

Because of its close proximity to the Equine Response Shelter (23 miles), the LSU VTHC served as a resource and referral facility for horses with more serious injuries. Approximately 15 horses were admitted to the LSU VTHC as a direct result of injuries or illnesses sustained during and after the storms, including lacerations, a skull fracture, and colic. In addition, several horses with preexisting conditions that required treatment, such as chronic laminitis and other stress-related conditions, were admitted to the LSU VTHC.

Sanitation, safety, and infectious disease control—Public health and control of equine infectious diseases were serious concerns at the Equine Response Shelter. Attempts to isolate shelter horses with potentially infectious diseases became futile as available quarantine stalls were commandeered as shower and laundry areas for human evacuees and volunteers. Despite the lack of an appropriate quarantine facility at the shelter, no infectious disease outbreaks or nosocomial infections were observed, even though several horses developed transient colitis, fever, and upper respiratory tract disease.

The health and safety of Equine Response Shelter volunteers was monitored by commissioned officers of the US Public Health Service, including public health veterinary officers and nurses. Safety and environmental health issues that were addressed included increasing the availability of hand-washing stations, providing a full-time first aid station, offering mental health counseling, and ensuring safe usage of electric extension cords. Physical injuries to equine volunteers were limited to a few animal-handling mishaps, none of which were of a serious nature. Mental health counseling services were available from the US Public Health Service for storm evacuees and volunteers through the end of September 2005.

Security and access restriction—Establishing a secure and safe perimeter for shelter horses became nearly impossible at the Lamar-Dixon Equine Response Shelter because the population of human, pet, and horse evacuees increased exponentially during the first several days after Hurricane Katrina. Rescued horses became instant celebrities, with the media, various vol-

unteers, and the general public flocking to the staging area to try to see, look at, and even adopt these animals. Several horse-theft attempts were made, but none were successful, although there were unverified reports of stolen animals from other locations throughout the storm-affected region. Security personnel were in short supply as search-and-rescue efforts continued for the thousands of people stranded in New Orleans and the surrounding parishes. Unfortunately, because of the lack of a secure perimeter and the overwhelming administrative response that was required, many reports portrayed the response as unorganized, when, in fact, the outcome was generally successful.

Shelter demobilization plans and operational challenges—During a typical storm or flooding disaster, people and animals are evacuated or rescued as the water rises. Damage assessments are made, and people and animals are usually allowed to return home within 3 to 10 days. Following Hurricane Katrina, because so many owners were displaced, there were no short-term plans for returning most of the rescued horses to their homes. As the days and weeks passed, some horse owners began retrieving their animals, but others were content to leave them in parish custody, knowing that their horses would be safe and well fed. When Hurricane Rita hit 3 weeks after Hurricane Katrina, many of the demobilization plans for Equine Response Shelter horses had to be reorganized because stabling and pasture areas along the Interstate 10 corridor and southern regions of the state were no longer available for intake of horses. The shelter team, with the help of responsible horse owners, was eventually able to reunite all but 4 of the horses with their owners. Most owners were able to relocate their animals, although others elected to surrender their horses for subsequent adoption. Legal ownership of stray or abandoned animals in the state of Louisiana resides with the parish government, but this specific situation was more problematic because of the number of parishes affected by the 2 hurricanes, with the result that the normal capacity to absorb such animals was overwhelmed.

Overall Response

Compared with the resources used for the rescue of more than 30,000 people in southeastern Louisiana in the aftermath of Hurricane Katrina and the rescue of an additional 300 residents of south central Louisiana during the month of September, there were minimal state and federal resources available to assist with animal rescue and response. The LDAF delegated equine response activities for storm-affected parishes in the southeastern and south central portions of the state to the LSART, which worked with hundreds of LVMA and LSU veterinarians and volunteers. Agriculture animal response operations in coastal areas located to the west of Lake Charles that were impacted by Hurricane Rita were undertaken by USDA veterinarians, LSU AgCenter personnel, and local parish officials. Thousands of cattle, horses, and other farm animals were seriously affected or died in these areas. Feeding operations and carcass removal were major activities for animal disaster responders in all storm-affected areas of the state.

Approximately 500 horses were eventually rescued and cared for by the EHSP and LSART teams during the aftermath of Hurricanes Katrina and Rita. Additionally, the equine response teams assisted with the evacuation of more than 300 dogs and other animals, including cats, birds, iguanas, goats, and potbellied pigs, and even assisted in the rescue of some people. At the Katrina Equine Response Shelter, approximately 390 animals were handled by equine response teams, including 370 equids, 15 goats, and 3 pigs. The highest number of horses received on any single day was the 79 horses received on September 9. The mean number of horses cared for per day during this period was 157. Eighty horses were rescued and cared for by LSART equine response team members and care providers in central Louisiana following Hurricane Rita. Approximately 500 volunteers dedicated time with the Louisiana equine response team.

Lessons Learned for a Successful Equine Disaster Response

The size of the disaster that occurred following Hurricanes Katrina and Rita was unprecedented, stretching the limits of the response. However, several important lessons were learned:

- Animal response activities need to be coordinated locally, regionally, state-wide, and nationally through the use, as much as possible, of the National Incident Management System's Incident Command System.
- Communities should be educated on means to work together to establish community-wide disaster response plans that include animal management considerations.
- Although the Incident Command System is important for successful disaster response, personnel flexibility and communication at all levels of the response is also important.
- Even though state and local jurisdictions are required to participate in the National Animal Plan, Incident Command System leadership should anticipate that most volunteers will not have a work-

ing knowledge of disaster management procedural processes.

- State, regional, and local leadership must develop processes to effectively use minimally trained volunteers during disaster response.
- During any disaster, a public information officer must be appointed to process, filter, coordinate, and provide consistent and accurate media releases on a daily basis.
- The animal-owning public and animal care professionals must be encouraged to have an evacuation plan for their families, including their pets and other animals.
- The animal-owning public must be encouraged to obtain knowledge of and become involved with local and regional disaster activities critical for future disaster responses.
- Permanent forms of animal identification should be encouraged to assist with accurate animal recognition and owner-animal reunion.
- Disaster responders must realize that the immediate goal during disaster response efforts is to provide basic animal medical and husbandry needs.
- Potential disaster assistance volunteers should be encouraged to undergo appropriate minimum Incident Command System training⁴ so they will understand and appreciate how working outside of this system hampers response.

References

1. The National Response Plan. APHIS Web site. Available at: www.aphis.usda.gov/lpa/pubs/fsheet_faq_notice/fs_ahnrp.pdf. Accessed Apr 12, 2007.
2. USGS surface water information pages. US Geological Survey Web site. Available at: water.usgs.gov/osw/. Accessed Apr 12, 2007.
3. Climate of 2005, summary of Hurricane Katrina. National Climatic Data Center Web site. Available at: www.ncdc.noaa.gov/oa/climate/research/2005/katrina.html. Accessed Apr 12, 2007.
4. FEMA independent study program: IS-100 introduction to Incident Command System, I-100. Emergency Management Institute Web site. Available at: www.training.fema.gov/EMIWEB/is/is100.asp. Accessed Apr 12, 2007.