

July 2006

COAST GUARD

Observations on the Preparation, Response, and Recovery Missions Related to Hurricane Katrina



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Highlights

Highlights of [GAO-06-903](#), a report to congressional committees

Why GAO Did This Study

Hurricane Katrina was one of the largest natural disasters in our nation's history. Significant federal, state, and local resources were mobilized to respond to the Hurricane Katrina disaster, including those of the U.S. Coast Guard. The Coast Guard played a key role in the planning, response, and recovery efforts for Hurricane Katrina in three mission areas: search and rescue, marine pollution response, and management of maritime commerce. This report discusses the activities undertaken by the Coast Guard, as well as the challenges and lessons learned as a result of the agency's efforts. More specifically, it focuses on (1) the factors that prepared the Coast Guard to perform these three mission areas in the aftermath of Hurricane Katrina; (2) the Coast Guard's response to Hurricane Katrina, the challenges it faced in performing its missions, and its efforts to mitigate these challenges; and (3) the implications and lessons learned, as identified by the Coast Guard, regarding the effect of Hurricane Katrina surge operations on its people, assets, financial resources, and operations.

To determine the Coast Guard's preparation factors, the challenges and lessons learned we interviewed officials responsible for preparing, and responding to disasters, and reviewed the Coast Guard's disaster guidance and plans.

GAO is not making any recommendations in this report.

www.gao.gov/cgi-bin/getrpt?GAO-06-903.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Stephen L. Caldwell at (202) 512-9610 or CaldwellS@gao.gov.

COAST GUARD

Observations on the Preparation, Response, and Recovery Missions Related to Hurricane Katrina

What GAO Found

Of the estimated 60,000 people left stranded by Hurricane Katrina, over 33,500 were saved by the Coast Guard. Precisely identifying why the Coast Guard was able to respond as it did may be difficult, but underpinning these efforts were factors such as the agency's operational principles. These principles promote leadership, accountability, and enable personnel to take responsibility and action, based on relevant authorities and guidance. Another key factor was the agency's reliance on standardized operations and maintenance practices that provided greater flexibility for using personnel and assets from any operational unit for the response. Up-to-date and regularly exercised hurricane plans were also key—preserving Coast Guard personnel and resources first, so they could then respond to search and rescue, marine environmental protection, and facilitation of commerce needs after the storm. These various factors are consistent with previous GAO findings on lessons learned from past catastrophic disasters.

GAO's work shows that the Coast Guard was most relevant in search and rescue, marine environmental protection, and management of maritime commerce missions. While the Coast Guard performs these missions daily, the severity of Hurricane Katrina presented the agency with several challenges that required innovative approaches. The Coast Guard was able to mitigate challenges caused by Hurricane Katrina's damage as a result of planning, preparation, and assistance from Coast Guard Auxiliary members.

According to Coast Guard officials, the agency incurred no significant damage to personnel, assets, operations, or financial resources as a result of sending people and assets to the Gulf region. Although continuing operations at ports nationwide while conducting Katrina operations presented challenges, these challenges have been addressed to mitigate negative impacts on the Coast Guard. Finally, the Coast Guard has collected after-action reports from Hurricane Katrina and has made them available to Coast Guard personnel through an internal database.

Helicopter Rescue



Source: U.S. Coast Guard.

Stranded Vessel in the Greater New Orleans Area



Source: GAO.

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Abbreviations:

ARSC	Aircraft Repair and Supply Center
ATC	Aviation Training Center
COTP	Captain of the Port
DHS	Department of Homeland Security
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
NRP	National Response Plan

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United States Government Accountability Office
Washington, DC 20548

July 31, 2006

Congressional Committees

Hurricane Katrina was one of the largest natural disasters in our nation's history. In terms of its combined casualties, damage, and disruption to the population, environment, and economy, Hurricane Katrina was clearly a catastrophe and arguably the most devastating natural disaster in United States history. More than 1,300 people lost their lives; damage stretched over a 90,000 square mile area; more than a million people were driven from their homes; buildings, bridges, roads, and power and communications infrastructure were destroyed or severely damaged; and millions of gallons of oil were spilled into the environment. We may never fully know the financial cost of Hurricane Katrina, but one projection has put it at more than \$200 billion.

Two congressional committees that investigated and reported on Hurricane Katrina activities were critical of several federal agencies' response.¹ In contrast to some other federal agencies, the Coast Guard has generally escaped criticism by these two investigations. Our work indicates that the Coast Guard's major response to Hurricane Katrina was in three mission areas: search and rescue, marine pollution response, and management of maritime commerce.

This report discusses the activities undertaken by the Coast Guard, as well as the challenges and lessons learned as a result of the agency's efforts. More specifically, it focuses on

- the factors that prepared the Coast Guard to perform in these three mission areas during Hurricane Katrina;

¹ House Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina, *A Failure of Initiative: Final Report of the House Select Bipartisan Committee to Investigate the Preparation for And Response to Hurricane Katrina*, (Washington, D.C.: February 15, 2006), and Senate Committee on Homeland Security and Governmental Affairs, *Hurricane Katrina: A Nation Still Unprepared* (Washington, D.C.: May 2006). These committees were also critical of nonfederal entities, including state and nongovernmental organizations.

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- the Coast Guard's response to Hurricane Katrina, the challenges it faced in performing its missions, and its efforts to mitigate the challenges; and
 - the implications and lessons learned, as identified by the Coast Guard, regarding the effect of Hurricane Katrina operations on its people, assets, financial resources, and operations.

In addition, we have undertaken a large body of work to address preparation, response, recovery, and rebuilding efforts related to Hurricane Katrina. Because of the widespread congressional interest in these subjects, our work is being completed under the Comptroller General's authority to conduct evaluations on his own initiative.²

To determine the factors used by the Coast Guard to prepare for Hurricane Katrina, we interviewed officials responsible for planning, preparing for, and responding to disasters, including Hurricane Katrina, as well as city and state officials in areas affected by Hurricane Katrina and assisted by the Coast Guard. In addition, we reviewed documents provided by two Coast Guard districts, the Atlantic Area Command, and Coast Guard headquarters, including national plans; Coast Guard severe weather, continuity-of-operation, and mission-specific response plans; and Coast Guard guidance and directives.

To obtain a more detailed understanding of the Coast Guard's response and challenges related to Hurricane Katrina, we visited and conducted interviews at Coast Guard locations, including districts and units that supported the Hurricane Katrina response effort, as well as the affected district and units in the Gulf Coast region. We also spoke with local government and port officials. We selected these specific locations based on several factors, including the proportion of Coast Guard assets allocated to respond to Hurricane Katrina; proximity to the area physically affected by the hurricane, specifically the Gulf Coast region; and the Coast Guard's responsibility for response, including the Atlantic Area Command and Coast Guard headquarters.

Finally, to determine the implications of sending people and assets to respond to Hurricane Katrina and lessons learned, we spoke to officials responsible for identifying and prioritizing the people and assets to send to

² 31 U.S.C. § 717(b)(1).

the Gulf Coast region, to personnel sent to the region to respond to Hurricane Katrina, and to personnel who were stationed in the region. We reviewed resource allocation data, and financial guidance and documents, and spoke with officials responsible for these areas within the Coast Guard. To assess the reliability of the personnel, asset, and financial data, we spoke with agency officials knowledgeable in these specific areas. We determined that the data were sufficiently reliable for the purposes of this report.

We conducted our work between October 2005 and June 2006 in accordance with generally accepted government auditing standards.

Results in Brief

Hurricane Katrina was one of the largest natural disasters to afflict the United States. Of the estimated 60,000 people needing to be rescued from rooftops and flooded homes, over 33,500 were saved by the Coast Guard. Precisely identifying why the Coast Guard was able to respond as it did to this disaster may be difficult, but underpinning these efforts were the agency's operational principles that promote leadership, accountability, and enable personnel to take responsibility and action, based on relevant authorities and guidance. Another significant factor that allowed the Coast Guard to confront the destruction brought on by Hurricane Katrina was the agency's reliance on standardized operations and maintenance practices that allowed the Coast Guard to respond with greater flexibility using a mix of personnel and assets from any operational unit. Having up-to-date and regularly exercised hurricane plans was another factor that the Coast Guard employed to prepare for Hurricane Katrina enabling the agency to implement its plans to confront the hurricane by first preserving Coast Guard personnel and resources and then quickly responding with search and rescue assistance, marine environmental protection response, and facilitation of commerce measures—missions that the Coast Guard conducts every day. GAO findings on lessons learned from past catastrophic disasters have highlighted similar factors including such things as the critical importance of (1) clearly defining and communicating leadership roles, responsibilities, and lines of authority; (2) conducting strong planning and robust training and exercise programs; and (3) strengthening response and recovery capabilities.

The Coast Guard's mission response to Hurricane Katrina centered most on three mission areas: search and rescue, marine environmental protection and management of maritime commerce. While the Coast Guard performs these missions daily, the severity of Hurricane Katrina presented the agency with several challenges that required innovative approaches—for example, conducting a full scale search and rescue

mission without its full communications capacity. The Coast Guard was able to mitigate the communication challenges caused by Hurricane Katrina's damage as a result of advance planning and preparation, as well as assistance from the Coast Guard Auxiliary. For example, to overcome challenges resulting from communications outages following the storm, Coast Guard personnel implemented plans that they had developed prior to the storm that were not dependent upon communication systems to execute, and they also relied on pre-staged communications equipment, pre-distributed satellite and cell phones. In addition, Coast Guard auxiliarists provided a critical communications relay for search and rescue operations.

According to Coast Guard officials, the agency incurred no significant losses to personnel, assets, operations, or financial resources as it moved people and assets to the Gulf Coast region in response to Hurricane Katrina. The Coast Guard conducted surge operations—which are high-intensity efforts often launched at short notice to address an emergency situation—in response to Hurricane Katrina while it continued operations at the homeports from where personnel and assets were borrowed. To address the health effects stemming from the mental stress that Coast Guard personnel experienced responding to Hurricane Katrina, the Coast Guard deployed Critical Incident Stress Management teams. These teams provided treatment to Coast Guard response personnel as well as to other Coast Guard personnel from the region whose homes had been damaged or destroyed. Finally, the Coast Guard has developed after action reports related to the Hurricane Katrina response and has disseminated this information to its personnel for use on other contingency planning efforts through the agency's Contingency Preparedness System database—known as CG SAILS.

Background

There are several federal legislative and executive provisions that support preparation for and response to emergency situations. The Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Stafford Act)³ primarily establishes the programs and processes for the federal government to provide major disaster and emergency assistance to states, local governments, tribal nations, individuals, and qualified private nonprofit organizations. The Federal Emergency Management Agency

³ 42 U.S.C. §§ 5121-5206.

(FEMA), part of the Department of Homeland Security (DHS), has responsibility for administering the provisions of the Stafford Act.

For Hurricane Katrina, the President issued emergency declarations under the Stafford Act for Louisiana on August 27, 2005, and Mississippi and Alabama on August 28, 2005. The President made major disaster declarations for Florida on August 28, 2005, and Louisiana, Mississippi, and Alabama on August 29, 2005, the same day that Hurricane Katrina made final landfall in the affected states.

The Homeland Security Act of 2002 required the DHS to consolidate existing federal government emergency response plans into a single, coordinated national response plan. In December 2004, DHS issued the National Response Plan (NRP), intended to be an all-discipline, all-hazards plan establishing a single, comprehensive framework for the management of domestic incidents where federal involvement is necessary. At the time of Hurricane Katrina, the NRP applied only to incidents of national significance, defined as actual or potential high-impact events that require a coordinated and effective response by an appropriate combination of federal, state, local, tribal, nongovernmental, or private sector entities in order to save lives and minimize damage, and provide the basis for long-term community recovery and mitigation activities.⁴ The NRP includes planning assumptions, roles and responsibilities, concept of operations, and incident management actions. The NRP also includes a Catastrophic Incident Annex, which provides an accelerated, proactive national response to a “catastrophic incident”—defined as any natural or manmade incident, including terrorism, resulting in extraordinary levels of mass casualties, damage, or disruption severely affecting the population,

⁴On May 25, 2006, DHS revised the NRP to address certain weaknesses or ambiguities identified following Hurricane Katrina. The revised NRP makes clear that the Secretary of Homeland Security is responsible for declaring and managing incidents of national significance such as Hurricane Katrina. Incidents of lesser severity requiring federal involvement are also subject to the NRP, but implementation of the NRP is to be scaled and flexible depending on the nature of the event.

infrastructure, environment, economy, national morale, or government functions.⁵

The Coast Guard's authority under federal law to conduct maritime operations, such as search and rescue and port security, is continuously in effect, rather than dependent upon a presidential Stafford Act declaration or the implementation of the NRP. This ongoing authority uniquely positioned the Coast Guard to respond to Hurricane Katrina before the President made emergency or major disaster declarations under the Stafford Act, or the Secretary of Homeland Security designated Katrina an incident of national significance under the NRP. Concurrent with the Coast Guard's historical missions and authorities, the NRP identifies the Coast Guard as a primary agency in the oil and hazardous materials response, and the support agency in six other emergency support functions, including urban search and rescue, and aspects of clearing waterways.

The Coast Guard is responsible for performing a variety of homeland and non-homeland security missions, including ensuring security in territorial and international waters, and within U.S. ports, conducting search and rescue, interdicting illegal drug shipments and illegal aliens, enforcing fisheries laws, ensuring the safety and facilitation of commerce, and responding to reports of marine pollution. According to Coast Guard officials, they train for and perform these missions every day, in units located all over the United States.

To conduct these missions, the Coast Guard employs a wide range of personnel. In 2005, the Coast Guard consisted of about 39,000 active duty, 7,000 civilian, and 8,100 reserve members, for a total of approximately 54,100 personnel. The Coast Guard also has access to approximately

⁵The responsibility for determining whether an incident of national significance meets the NRP's definition of a "catastrophic incident" rests with the Secretary of Homeland Security. The Secretary makes a "catastrophic incident" designation to activate the provisions of the annex. The Secretary declared Hurricane Katrina an incident of national significance on August 30, 2005, but never declared it a catastrophic incident. The revised NRP makes explicit that the Secretary could activate the annex to address events that are projected to mature to catastrophic proportions, such as strengthening hurricanes.

31,000 volunteer auxiliary members.⁶ During the peak response time period for Hurricane Katrina, August 26—September 16, 2005, the Coast Guard had approximately 5,600 personnel in the Gulf Coast region. About 53 percent of these were active duty and civilian personnel who came from other parts of the United States to assist in the response.

Table 1 shows the total number of personnel within the Coast Guard by type, compared to the number of personnel who responded in the Gulf Coast region during the August through September 2005 period.

⁶The Coast Guard Auxiliary is a nonmilitary volunteer organization administered by the Commandant of the Coast Guard under the direction of the Secretary of Homeland Security. The Coast Guard Auxiliary was created to assist the Coast Guard to promote safety and effect rescues on and over the high seas and on navigable waters; promote efficiency in the operation of motorboats and yachts; foster a wider knowledge of, and better compliance with, the laws, rules, and regulations governing the operation of motorboats and yachts; and facilitate other operations of the Coast Guard.

Table 1: Coast Guard Active Duty, Civilian, Reserve, and Auxiliary Personnel Compared to Number of Personnel Operating in the Gulf Coast region during Peak Response, August 26—September 16, 2005

Coast Guard personnel	Approximate total number of personnel	Number of personnel responding to Hurricane Katrina
Active duty	39,000	4,026 This includes Coast Guard personnel stationed in Alabama, Mississippi, and Louisiana (2,045); and the number of Coast Guard personnel sent to Gulf Coast region from other geographical areas (1,981)
Civilian	7,000	733 This includes Coast Guard personnel stationed in Alabama, Mississippi, and Louisiana (170); and number of Coast Guard personnel sent to Gulf Coast region from other geographical areas (563)
Reserve	8,100	541
Auxiliary	31,000	305
Total	85,100	5,605

Source: GAO analysis of Coast Guard data.

Note: The number of auxiliary personnel is an estimate based on a total of 13,510 hours (563 days based on a 16-hour day) of operational and administrative support for Hurricane Katrina operations.

Of the Coast Guard’s 11 mission program areas identified in the Homeland Security Act of 2002,⁷ three are particularly relevant to the Hurricane Katrina response.⁸ They are the following:

⁷ See 6 U.S.C. § 468(a). The Coast Guard’s 11 mission program areas include ports, waterways, and coastal security; illegal drug interdiction; undocumented migrant interdiction; defense readiness; other law enforcement; search and rescue; living marine resources; aids to navigation; ice operations; marine environmental protection; and marine safety.

⁸ The Coast Guard noted that activities associated with its ports, waterways, and coastal security mission program—which focus on protecting the maritime domain, preventing terrorist attacks, and responding to and recovering from those that do occur—were also heightened following Hurricane Katrina. Activities performed under this mission program include aerial, waterborne and shore surveillance patrols, vessel security boardings, vessel escorts, and enforcement of international and domestic security standards and regulations. According to the Coast Guard, ports, waterways, and coastal security program activities were heightened, both within the Gulf region and elsewhere, in recognition of the increased regional vulnerability and national risk that could have resulted from the consequences of an attack on the oil and chemical sector during this time. However, the scope of our review focused on the three mission programs that were most closely aligned and directly involved with the immediate response to the natural disaster presented by Hurricane Katrina.

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- Finding and rescuing mariners in distress—a mainstay of Coast Guard operations under its search and rescue mission. To conduct this mission, the Coast Guard operates aircraft and boats throughout the nation’s coastlines and interior waterways. The Coast Guard also operates a national distress and response communication system that facilitates communication with mariners in danger.
 - Marine environmental protection—a program area focused on preventing and responding to oil and chemical spills in the maritime environment, preventing the illegal dumping of plastics and garbage, and preventing biological invasions by aquatic nuisance species. The Coast Guard typically conducts this mission with locally based staff but also has specially trained and equipped teams that travel nationally and worldwide to attend to this mission when needed.
 - Managing waterways and providing a safe, efficient, and accessible marine transportation system—a mission area that includes such activities as maintaining the extensive system of navigation aids and monitoring and inspecting merchant vessels, among other activities.⁹

Several Factors Prepared Coast Guard for Hurricane Katrina Operations

Several factors, including operational principles, the use of standardized practices, and planning, contributed to preparing the Coast Guard to conduct its missions following Hurricane Katrina. The Coast Guard promotes principles of leadership and accountability, whereby personnel are trained to take responsibility and action, as needed, based on relevant authorities and guidance. Organizational structure and standardization—of training, assets, and exercises—allowed the Coast Guard to send personnel and assets to the Gulf Coast region from units across the United States. Also, the Coast Guard’s focus on planning enabled personnel to learn emergency processes and procedures to respond to situations like that of Hurricane Katrina. These factors, which prepared the Coast Guard

⁹ One of the Coast Guard’s key functions involves the facilitation of maritime commerce and ensuring the security of waterways and waterside facilities. These activities are typically conducted under several Coast Guard mission programs, including marine safety; ports, waterways, coastal security; and aids to navigation. Port security and commerce functions within ports resides with the Coast Guard Captain of the Port, whose responsibilities are summarized at 33 C.F.R. §1.01-30.

to conduct its Hurricane Katrina missions, are also reflected in previous GAO findings on lessons learned from past catastrophic disasters.¹⁰

Coast Guard Operational Principles Aided in Hurricane Katrina Preparations

The Coast Guard response was aided by basic operational principles. Throughout our fieldwork, Coast Guard officials referred to the seven principles of Coast Guard operations that guide the agency's operations, and though they were not necessarily always referred to by name, the themes were relayed to our staff frequently, and Coast Guard personnel view these principles as instrumental in their preparation for Hurricane Katrina. These principles collectively form the foundation of Coast Guard culture and actions during operations.¹¹

- *The Principle of Clear Objective* directs every operation toward a clearly defined and attainable objective. The Commander's Intent, a commanding officer's general instruction to his/her subordinates, defined the objectives for Coast Guard units with regard to hurricanes, including to ensure the safety of personnel and assets, respond to statutory responsibilities (e.g., search and rescue), and reopen waterways as soon as possible.
- *The Principle of Effective Presence* requires that the right assets and capabilities be at the right place at the right time. This also reflects the importance of assigning units depending on the anticipated need. For example, during the Hurricane Katrina response, the Coast Guard recognized the need to send security units to address security concerns during rescue operations.
- *The Principle of Unity of Effort* describes the performance of cooperative operational objectives, by working in concert with different Coast Guard units and coordinating these efforts with a diverse set of governmental and nongovernmental entities. For example, the Coast Guard units worked with members of local area

¹⁰ GAO, *Hurricane Katrina: GAO's Preliminary Observations Regarding Preparedness, Response, and Recovery*, [GAO-06-442T](#) (Washington, D.C.: March 8, 2006).

¹¹ U.S. Department of Transportation, Coast Guard Publication 1, *U.S. Coast Guard: America's Maritime Guardian*, (Washington, D.C.: 2002).

maritime security committees to address maritime-related issues and coordinate security planning efforts.¹²

- *The Principle of On-Scene Initiative* involves Coast Guard personnel being given latitude to act quickly and decisively within the scope of their authority, without waiting for direction from higher levels in the chain of command. For example, during the initial response to Hurricane Katrina, a junior-level C-130 pilot, who first arrived on-scene in New Orleans with the planned mission of conducting an environmental inspection overflight, recognized that search and rescue helicopters in the area could not communicate with officials on the ground, including those located at hospitals and at safe landing areas. This pilot took the initiative to redirect her planned mission, changing it from an environmental flight to creating the first airborne communication platform in the area. Doing so helped ensure that critical information was relayed to and from helicopter pilots conducting search and rescue so that they could more safely and efficiently continue their vital mission. Figure 1 is a picture of the type of aircraft flown by this Coast Guard pilot.

¹² Under the Maritime Transportation Security Act of 2002 (MTSA), the Secretary of Homeland Security has authority to create area maritime security committees at ports across the country to assist the Coast Guard in addressing vulnerabilities and risks at the port level. See 46 U.S.C. § 70112(a) (2), 33 C.F.R. § 103.310. Composed of representatives from the federal, state, local and private sector, these committees provide a forum for sharing information on issues related to port security. See 33 C.F.R. § 103.305.

Figure 1: Coast Guard C-130 Aircraft Used as a Communication Platform, Also the Type of Aircraft Used to Transport Food, Water, and Supplies to the Gulf Coast Region



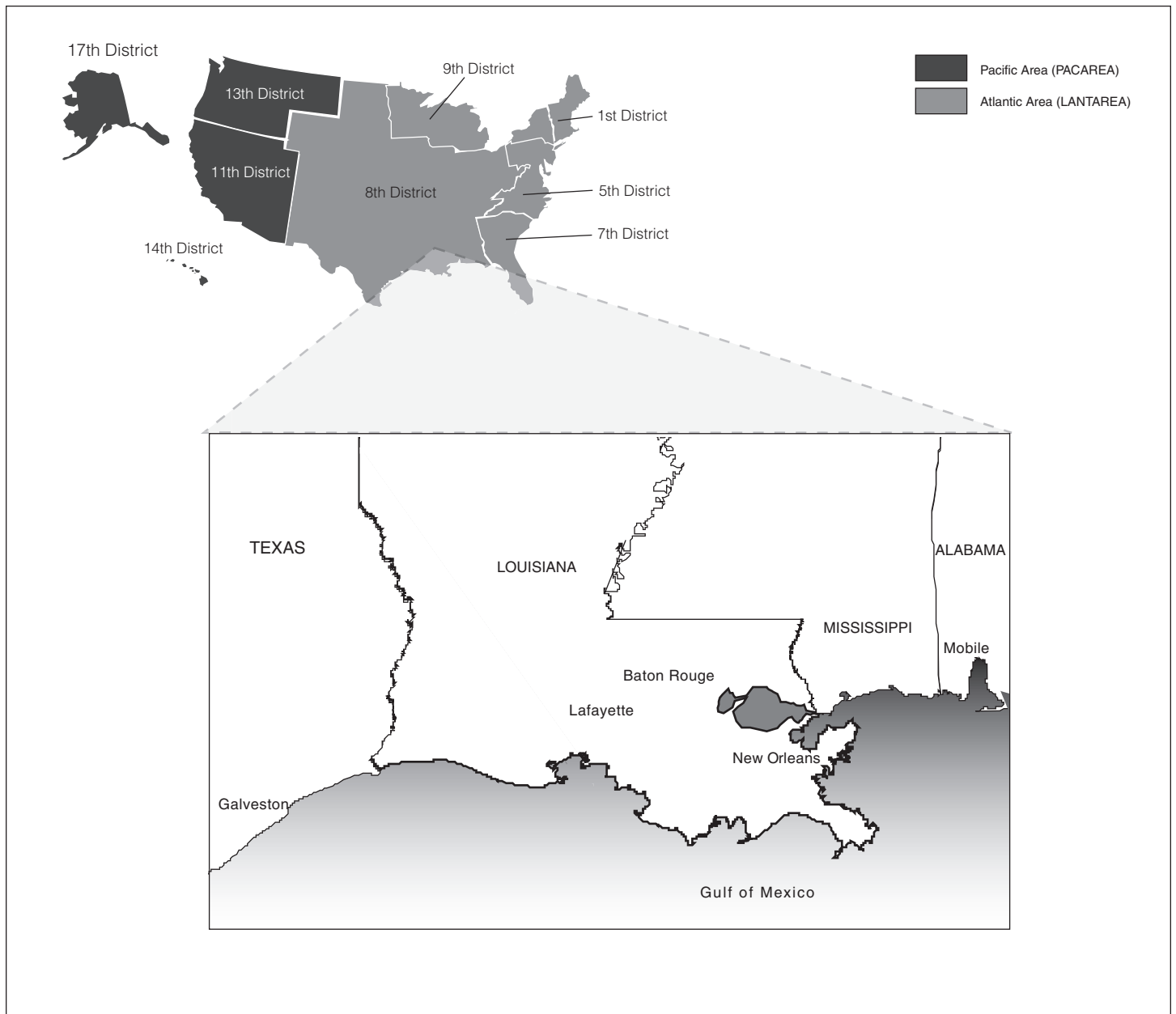
Source: GAO.

- *The Principle of Flexibility* describes how the Coast Guard pursues multiple missions with the same people and assets by adjusting to a wide variety of tasks and circumstances. Following this principle allows the Coast Guard to conduct “surge operations,” which are high-intensity efforts often launched at short notice in response to an emergency situation. The effect of surge operations is not only on people and units directly involved; it demands that the entire service adapt to find the resources to meet the needs of the surge operation while still continuing critical day-to-day operations. During the response to Hurricane Katrina, the Coast Guard found ways to send people and assets to the Gulf Coast region while maintaining required levels of readiness in homeports. For example, in District 1, Air Station Cape Cod, worked with Canadian counterparts to cover search and rescue needs in the area to minimize the impact of sending some air assets to respond to Hurricane Katrina.
- *The Principle of Managed Risk* involves two dimensions: First, the commander is obligated to ensure that units are properly trained, equipped, and maintained, and second, the commander is obligated to assess the crew and equipment capabilities against the

operational situation to determine whether and how to execute a mission. For example, Coast Guard units in District 8 are required to develop and exercise hurricane plans. Figure 2 illustrates Coast Guard Area Commands and Districts. In the face of an oncoming storm, the District Commander will order Coast Guard personnel and dependents to evacuate. Finally, once the storm passes, commanding officers have the discretion to assess the safety of deploying Coast Guard personnel and assets.

- *The Principle of Restraint* reflects the obligation of Coast Guard personnel to act with good judgment and treat American citizens and foreign visitors with dignity. For example, Coast Guard rescue swimmers we spoke to indicated that they made efforts to keep evacuated families together and to handle frustrated evacuees with sensitivity.

Figure 2: Map of Coast Guard Area Commands and Districts, Detail of Gulf Coast Region



Source: U.S. Coast Guard and GAO.

Coast Guard Organizational Structure and Standardization Practices Supported Hurricane Katrina Preparations

Building upon its principles of operations, the Coast Guard's organization and practice of standardization streamlines operations processes and works to efficiently maintain assets. The Coast Guard has a broadly dispersed organization and asset structure—that is, having personnel and assets located throughout the United States to expedite the movement of assets to respond to disasters.¹³ This organizational structure, coupled with the Coast Guard's standardized training, allows the mixing of personnel and assets from anywhere in the country to form operational response teams. For Coast Guard asset mechanics, standardization means that they can assess, repair, and maintain the same type of Coast Guard asset at any unit at any time because they are required to have a common understanding of the Coast Guard's standard maintenance and repair requirements for its assets.

To ensure this consistency, the Coast Guard conducts on-site inspections—called standardization reviews—at air and boat stations to evaluate crew members' skills and knowledge and to inspect air and boat assets. Standardization review teams are composed of experienced operators whose mission it is to teach, examine, and evaluate the principles of sound operations. For air operations, teams review standardized training to ensure that flight operations are conducted in the safest possible manner consistent with flight mission requirements, Coast Guard-wide. According to the Coast Guard's air operations manual, standardization also permits randomly selected aviators to form a disciplined, coordinated crew on any aircraft. This directly supports the Coast Guard's ability to provide a surge capability to meet rapidly escalating situations. Similarly, for boat operations, teams conduct inspections to evaluate the condition of boats and to review crew member proficiency in boat operations. For the Hurricane Katrina response, standardization enabled Coast Guard personnel from anywhere in the country to form unified crews to perform operations and maintenance. For example, a helicopter pilot from Florida, a copilot from Alabama, and a rescue swimmer from Alaska formed a crew to perform numerous search and rescue operations. Additionally, mechanics arriving at Aviation Training Center (ATC) Mobile in the days after Hurricane Katrina's landfall

¹³ The Coast Guard is organized into two major commands that are responsible for overall mission performance: one in the Pacific area and the other in the Atlantic area, including the Gulf of Mexico region. These commands are divided into nine districts, which in turn are organized into over 20 air stations and 35 sectors that provide more localized command and control of field units and resources, including approximately 188 multimission stations and 119 patrol boats.

were able to perform maintenance on air assets deployed to the Gulf Coast region from various Coast Guard units.

Coast Guard Contingency Planning and Exercises Contributed to Hurricane Katrina Preparations

Based on the Coast Guard's organizational structure and its practice of standardization, plans and complementary exercises are developed to clarify processes and procedures (to learn which elements of a plan work or need to be made more efficient) and to identify opportunities that benefit from the Coast Guard's unique characteristics. According to Coast Guard officials, prior to every hurricane season, specific severe weather guidance is provided to Coast Guard units to describe procedures for responding to a hurricane. For example, in the Gulf Coast region, units within District 8 rely on guidance from their leadership (known as the Commander's Intent), as well as the District Severe Weather/Hurricane Plan and their own unit-focused hurricane plans, which would include plans for continuity of operations in the event of an ordered evacuation.¹⁴ Coast Guard officials stated that these plans are reviewed annually in the spring to ensure an opportunity to practice evacuation, continuity of operations, and personnel and facility preparedness.

According to the guidance, during a pending storm situation, the Coast Guard maintains its ability to conduct search and rescue missions until it is unsafe to do so; efforts are made to warn boaters of the impending bad weather; dependents of Coast Guard personnel are evacuated in accordance with the continuity of operations plans; units and their equipment are secured; and assets (e.g., aircraft, including helicopters and planes, and cutters, and other smaller boats) are moved away from the storm. Once the storm clears the area, personnel and assets that were scattered will reconstitute forces and return to the affected area to begin search and rescue, homeland security, and other mission activities.

Consistent with these plans, before Hurricane Katrina made landfall, Coast Guard units in the Gulf Coast region moved their command and control centers out of the threat area, and staged assets and crews outside the predicted storm path. For example, District 8 headquarters moved from New Orleans, Louisiana, to St. Louis, Missouri, and Sector New Orleans Command moved from New Orleans to Alexandria, Louisiana. Air assets

¹⁴ The Coast Guard mandates annual exercises for these Severe Weather/Hurricane plans. For example, Districts 1 (New England), 5 (mid-Atlantic), 7 (Florida), and 8 (Gulf Coast region) must exercise their Hurricane Plan; while District 9 (Great Lake region) must exercise its Heavy Weather/Flood Plan.

were moved from Coast Guard air stations in the Gulf Coast region to locations in Shreveport, Louisiana, and Jacksonville, Florida. Cutters located in the Gulf Coast region moved to avoid the storm and into positions to assist with poststorm efforts. The Coast Guard also activated its mission-specific plans in preparation for Hurricane Katrina. For example, in the marine environmental protection area, the Coast Guard activated its area contingency plan and integrated the assistance of a Coast Guard Strike Team with its specialized environmental response capabilities. In particular, the Strike Team provided assistance in the response to Hurricane Katrina, using its inventory of specialized pollution response equipment and highly trained first response teams to combat environmental pollution.

Previous GAO work identifies critical disaster preparation factors

Many of the lessons emerging from Hurricane Katrina are similar to those GAO identified in past work on Hurricane Andrew, which destroyed much of South Florida. Based on our previous review of preparing for and responding to catastrophic disasters, we noted several critical factors necessary to confront catastrophic disasters: (1) clearly defined and communicated leadership roles, responsibilities, and lines of authority; (2) strong planning and robust training and exercise programs; and (3) strong response and recovery capabilities.¹⁵ In our review of the Coast Guard's hurricane preparation practices, it seems many of the factors we raised in the past, have been addressed by the Coast Guard.

Coast Guard Performed Hurricane Katrina Missions and Faced Several Challenges It Was Largely Able to Mitigate

During the response to Hurricane Katrina, the Coast Guard performed several functions, including search and rescue, marine pollution response, and management of maritime commerce—missions it performs every day. As the most destructive natural disaster in American history, Hurricane Katrina caused tens of thousands of people to be rescued during several weeks after the storm made landfall; spilled over 8 million gallons of oil, and produced considerable debris, which polluted the Gulf Coast region; and in the days following the storm, threatened maritime commerce. While conducting its missions during Hurricane Katrina, the Coast Guard experienced several unique challenges that required quick and innovative thinking. The Coast Guard was able to mitigate communication challenges caused by Hurricane Katrina's damage to communications infrastructure as a result of planning, preparation, and assistance from Coast Guard

¹⁵ GAO, *Hurricane Katrina: GAO's Preliminary Observations Regarding Preparedness, Response, and Recovery*, [GAO-06-442T](#) (Washington, D.C.: March 8, 2006).

Auxiliary members. Another challenge included the need to provide security protection, particularly for search and rescue operations. Logistics also proved a challenge as the Coast Guard worked to address food and water needs of rescuees, as well as its own need for fuel.

Search and Rescue Was Coast Guard's Initial Hurricane Katrina Mission

After Hurricane Katrina made landfall, the primary mission was search and rescue. As Hurricane Katrina caused damage and destruction for 90,000 square miles and precipitated an overwhelming flood in New Orleans, Louisiana, tens of thousands of people needed to be rescued from their homes. Some estimates are that about 60,000 people were rescued by federal, state, and local officials after Hurricane Katrina made landfall, and approximately 33,500 of them were rescued by the Coast Guard.¹⁶ The military, of which the Coast Guard is a member, sent massive resources to the Gulf Coast region to assist in Hurricane Katrina's response and recovery.¹⁷ According to data from Coast Guard officials, during the peak response period, the Coast Guard deployed approximately 4,000 of its 39,000 active duty personnel and deployed more than 45 percent of its air assets to the Gulf Coast region from across the United States. Notably, Coast Guard officials reported that air and boat operations, which involved rescuing or evacuating over 33,500 people, were conducted over a period of 17 days without any accidents or casualties. Rescue operations began quickly, with the first rescue occurring approximately 9 hours following Hurricane Katrina's landfall on August 29, 2005. By 12 hours after landfall, approximately 29 Coast Guard helicopters were conducting rescues over New Orleans.

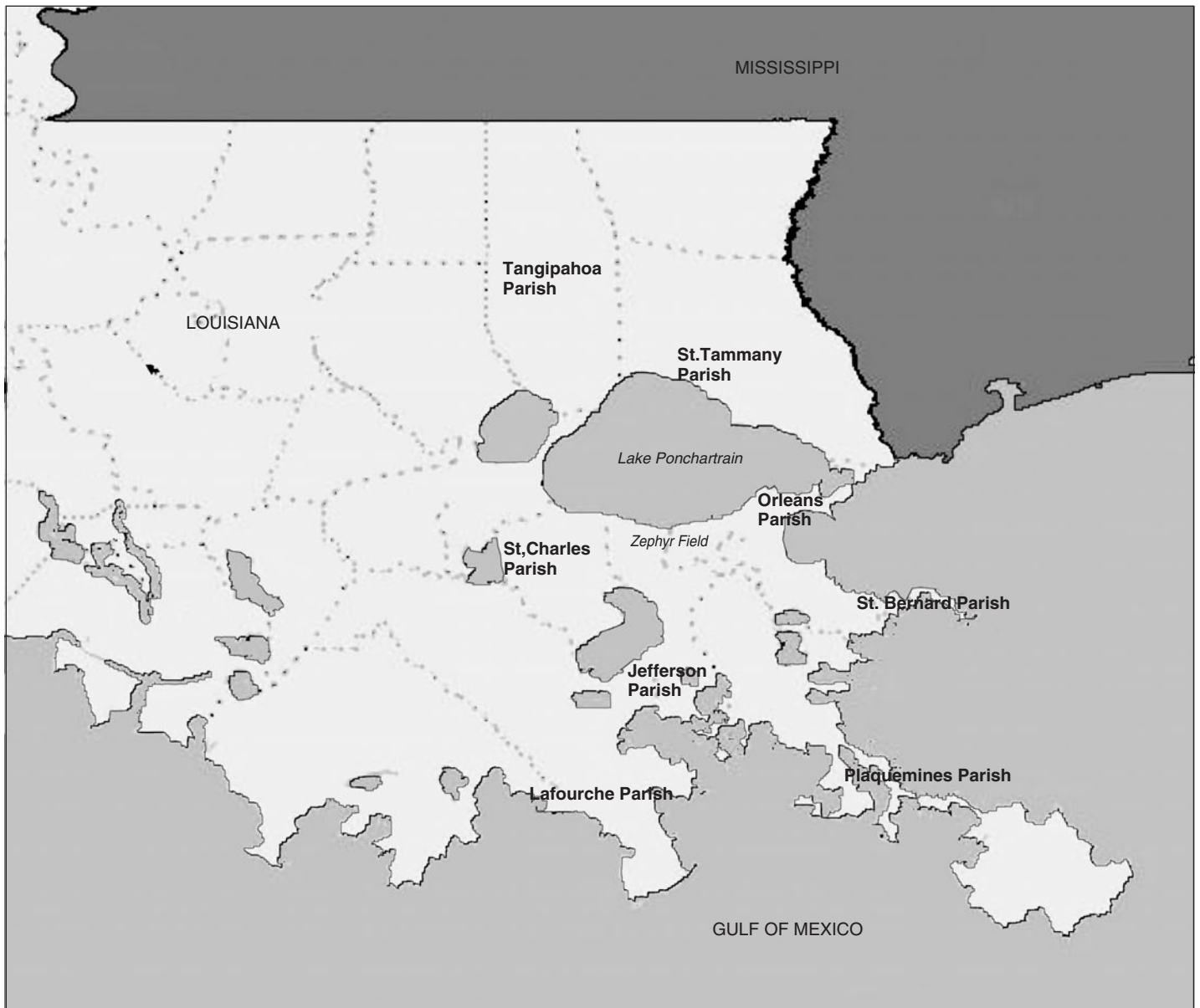
Search and rescue operations, including both air and boat rescues, were conducted by a number of agencies. Coast Guard officials involved in boat operations told us that they worked closely with federal, state, and local officials to conduct rescues. According to Coast Guard officials, the

¹⁶ Beginning on August 29, 2005 and continuing for about 17 days, Coast Guard officials reported conducting 24,135 rescues of people by boat and helicopter, and evacuating 9,409 people from hospitals, as a result of Hurricane Katrina. By comparison, for all of 2004, the Coast Guard responded to more than 32,000 calls for rescue assistance and saved nearly 5,500 lives.

¹⁷ To learn more about the Department of Defense and the National Guard response to Hurricane Katrina, please see GAO, *Hurricane Katrina: Better Plans and Exercises Needed to Guide the Military's Response to Catastrophic Natural Disasters*, [GAO-06-643](#) (Washington, D.C.: May 15, 2006).

agency leveraged approximately 130 boats and worked with FEMA teams to conduct urban rescues in flooded New Orleans neighborhoods. Attempts were also made to partner local responders with out-of-area responders in order to share local knowledge and facilitate rescues. According to Coast Guard officials involved in boat operations, personnel used Zephyr Field in Jefferson Parish, as a base of operations and deployed boat convoys from launching points such as bridges and highway overpasses. The boat rescues that they were involved with continued through September 16, 2005, almost 3 weeks after the storm.

Figure 3: Area Map of New Orleans, Louisiana



Source: USGS.

Coast Guard officials operating in the Gulf Coast region told us that 3 days into the response, approximately 43 aircraft and over 2,000 personnel had arrived at the Aviation Training Center in Mobile, Alabama, from other parts of the United States to join the Hurricane Katrina response. Rescue

swimmers—80 of whom were operating out of Air Station New Orleans at the peak of air operations—worked among power lines, flying debris, and other obstacles not routine to maritime rescues to hoist individuals from rooftops. Helicopter crews also conducted search and rescue operations in Mississippi, which, according to officials at the Aviation Training Center in Mobile, Alabama, were completed within the first 36 hours following Hurricane Katrina’s landfall. Pilots who conducted rescues in Mississippi explained that the first responder infrastructure in Mississippi was not destroyed, as it was in New Orleans, and thus Mississippi police and fire personnel were able to conduct many of the ground search and rescue operations—allowing for quicker completion of the mission.

Coast Guard officials told us that they coordinated closely with various responders for search and rescue operations. Specifically, the Louisiana State Police provided police escorts and shared information regarding 911 calls, and the Louisiana Department of Wildlife and Fisheries provided local knowledge of areas to be searched. The Louisiana Department of Transportation also assisted response operations by providing two ferries that were used to evacuate individuals across the Mississippi River to higher ground. Coast Guard officials also explained that the Louisiana Air National Guard provided assistance with transportation of evacuees by air in some locations, and both were located at Zephyr Field delivering large quantities of ready-to-eat meals and water to survivors at various locations. Coast Guard officials explained that at the local level, the New Orleans fire and police personnel accompanied search teams to provide assistance and local knowledge. In addition, sheriff’s office officials from Jefferson Parish provided police escorts, and St. Bernard Parish police and fire departments provided boat assets to Coast Guard disaster assistance teams. On the north side of Lake Pontchartrain, the Coast Guard coordinated search and rescue operations with the St. Tammany Parish Sheriff. Figure 4 shows a Coast Guard helicopter hoisting a rescuee to safety.

Figure 4: Helicopter Rescue in Response to Hurricane Katrina



Source: U.S. Coast Guard.

However, some aspects of search and rescue operations were not as efficient as they could have been.¹⁸ For example, different organizations involved in search and rescue did not always coordinate with each other. In New Orleans, there were two separate command centers for search and rescue operations, one being run by the Louisiana National Guard and one being run by the Coast Guard. In addition, there was a lack of clear search and rescue guidance across agencies because the National Response Plan and the National Search and Rescue Plan had never been fully integrated.¹⁹

Coast Guard Responded and Continues to Address Environmental Concerns

The Coast Guard oversaw the cleanup of over 8 million gallons of oil spilled as a result of Hurricane Katrina.²⁰ As the oil and chemical manufacturing industries have a significant presence in the Gulf Coast region, particularly in Louisiana, the potential for an unprecedented level

¹⁸ GAO, *Hurricane Katrina: Better Plans and Exercises Needed to Guide the Military's Response to Catastrophic Natural Disasters*, [GAO-06-643](#) (Washington, D.C.: May 15, 2006).

¹⁹ The National Search and Rescue Plan (1999) describes the roles and responsibilities of federal agencies during different search and rescue situations. The National Response Plan (2004), also provides guidance regarding search and rescue; it did not fully incorporate the roles previously described in the National Search and Rescue Plan.

²⁰ To put this amount into perspective, the 1989 Exxon Valdez spill was around 11 million gallons.

of oil and hazardous substance contamination, especially in and around New Orleans, grew as Hurricane Katrina approached. To manage this response, unified commands were set up with the Coast Guard and its partners in advance of the storm.²¹ These commands were involved in a range of decisions that allowed them to collectively assess the environmental situation and make tactical decisions. Coast Guard and state officials noted that persons representing federal, state, local, and industry entities were involved in these commands, and they worked together to manage the marine environmental protection response. As a result, Coast Guard officials told us that they were as prepared as possible to manage pollution events stemming from Hurricane Katrina.

According to Coast Guard and Louisiana Department of Environmental Quality officials, the initial response to environmental concerns following Hurricane Katrina involved multi-agency assessment teams. Following the hurricane's landfall, these teams surveyed the entire coastal zone, including all area ports, marinas, and related facilities. A state official noted that assessment teams recorded the location and size of oil spills and assessed the damage.²² He stated that it took two helicopters, flying full-time for 3 weeks, to document all the debris to be cleaned up. Coast Guard officials said they coordinated their environmental mission priorities with other pressing Coast Guard missions by contracting for rented commercial planes for their pollution assessment overflights, rather than competing for aircraft needed to conduct pressing search and rescue missions. In addition, boat crews involved in search and rescue missions collected water samples to help document the damage to infrastructure and threats to human health, such as sewage plant flooding.

Oil cleanup efforts were complicated by the magnitude of the spills and the location of the spills. According to the Coast Guard, the oil appeared as black film, covering dozens of neighborhoods and protected marshes and swamps along the Mississippi River. Most spills occurred south of

²¹ Unified command is a unified team that manages an incident by establishing a common set of incident objectives and strategies. It is a structure that brings together the incident commanders of all major organizations involved in an incident and provides a forum for these agencies to coordinate an effective response and make consensus decisions. This is accomplished without loss or abdication of agency or organizational authority, responsibility, or accountability.

²² Photographs of the oil spills and debris were taken to document their location and size. The photographs not only showed the progress of the cleanup but established a record of the pollution and discouraged illegal dumping of oil or hazardous material that could be intentionally released and then attributed to the storm.

New Orleans as a result of ruptured and spilled oil tanks. The Coast Guard estimated that 8 million gallons of oil were released, including 6 major spills, 4 medium spills, and about 1,000 minor spills.²³ For example, 1 spill in the city was notable because it affected approximately 1,800 homes. The oil residue could be seen on vacated homes months later, when the odor of oil in the earth and debris still permeated the air. Another significant spill came from the discharge of about 3 million to 4 million gallons of oil dispersed into remote marshes, which were difficult to reach and therefore difficult to clean up. In addition, the storm destroyed 115 oil platforms offshore, significantly damaged 52, and set 19 adrift. Although, according to Coast Guard officials, there were no spills of significance offshore.

To address the many spills, the Coast Guard reported that each pollution incident was prioritized, investigated, and resolved either through a private owner taking action to get it cleaned up or a rapid response team providing on-site mitigation. However, clean up in many cases was complicated by a number of environmental conditions, according to the Coast Guard. For example, responders faced heat stress and dehydration as well as a profusion of insects, poisonous snakes, and alligators as they conducted clean up operations in remote locations. Responders also faced uncertain communications, impassible roadways, and clogged waterways.

Overall, about 1,000 personnel from federal, state, and local agencies and private industry were involved in the response to oil spills resulting from Hurricane Katrina. At one sector, Mobile, Alabama, over 400 active duty and reserve personnel were brought in from Coast Guard commands throughout the United States, at various times, to assist with marine environmental protection response. Recognizing the Coast Guard's role in the prevention of spills, a Coast Guard official reported that numerous medium and major hazardous material releases and oil spills were prevented by response personnel. For example, response personnel removed oil and hazardous materials with the potential to be released into navigable waters from grounded vessels. In addition, Coast Guard Strike team members repaired piping, and multi-agency entry teams conducted entries into laboratories and chemical plants to recover hazardous

²³ A major spill contains at least 100,000 gallons, and a medium spill contains at least 10,000 gallons, while amounts less than 10,000 gallons would be considered minor spills.

materials.²⁴ Larger issues were addressed first, such as leaking propane tanks that posed a threat to human health. Coast Guard officials also noted that response personnel disposed of thousands of containers and drums, some filled with petroleum products and pesticides.

In addition to undertaking the oil pollution response, the Coast Guard also helped to address marine debris problems resulting from the over 620 commercial and recreational vessels that were sunk or grounded in the aftermath of the storm. A Coast Guard official described “piles” of shrimping vessels on dry ground. Figure 5 shows a damaged vessel stranded on a front lawn. The Coast Guard established a Vessel Recovery Branch to address those vessels leaking oil or having the potential to release oil into navigable waters. A vessel database was also developed and provided current information regarding vessel status and tracking information on vessel owners. At the height of the vessel recovery operations, 82 Coast Guard personnel supported this mission.

²⁴ The U.S. Coast Guard National Strike Force is composed of 168 highly trained professionals with specialized skills for combating environmental pollution from oil discharges, hazardous substance and biological releases, and weapons of mass destruction events. The Strike Force is composed of three Strike Teams located in the Atlantic, Pacific, and Gulf Coast regions to allow for rapid deployment.

Figure 5: Stranded Vessel in the Greater New Orleans Area



Source: GAO.

According to Coast Guard officials, marine pollution response, which began after Hurricane Katrina moved through the region, is ongoing, with full recovery not expected until at least 2007. For example, as of spring 2006, in Mississippi, marine pollution cleanup was 50 percent complete. According to Coast Guard personnel, members of the Gulf Strike Team continue to support marine hazardous material recovery operations involving abandoned drums and containers in Mississippi and Alabama. The Coast Guard is also participating in an Environmental Protection Agency (EPA)-led oil and hazardous waste removal and disposal effort inland along coastal states. As of February 2006, a Coast Guard official estimated that multi-agency environmental teams (consisting of Coast Guard, EPA, FEMA, and state and local agencies) had addressed over 5,100 hazardous material cases.

In addition, the Coast Guard has the mission assignment to remove all marine debris from along the entire coast of Mississippi. A team of federal and state partners identified over 235 sites in residential canals that required marine debris removal action. Cleanup work on the 9 worst sites has begun and is estimated to continue until at least 2007.

Limited Maritime Commerce Restored in Four Days

Despite the damage caused by Hurricane Katrina, the Coast Guard reopened a few ports and restored the movement of some commerce within days after Hurricane Katrina struck. This quick response was important because U.S. ports and waterways handle over 2 billion tons of cargo annually. Much of that commerce flows through Louisiana, Texas, Alabama, and Mississippi—the same coastal areas affected by Hurricane Katrina. For example, the Port of New Orleans serves as the focal point for waterborne transportation of cargo to 28 states, and its cargo activity supported \$37 billion in economic benefits to the country and generated \$2.8 billion in federal tax revenue, according to the American Association of Port Authorities. Senior Coast Guard officials commanding certain Coast Guard units possess broad authorities in their role as the Captain of the Port (COTP). This authority includes the power to close or reopen ports within their jurisdiction—an action taken by COTPs at Sector New Orleans, Mobile, and Miami. To do this, a COTP typically works collaboratively with key stakeholders, including the local Area Maritime Security Committee, Harbor Safety Committee, port authorities, and industry officials to determine when it is appropriate to close and then reopen a port for commerce. In preparation for Hurricane Katrina, COTPs in the Gulf Coast region issued Marine Safety Information Bulletins to provide information regarding hurricane conditions at the various ports and projected timelines for port closures. The bulletins informed the port communities of specific time frames for prohibited and authorized operations at the ports.

Before a port is reopened, the COTP is to ensure that the waterways are safe and navigable. One element of ensuring the safe facilitation of commerce is the Coast Guard's Aids to Navigation program and its system of aids. The aids to navigation system assists mariners in determining their position and a safe course of travel, and warns them of dangers and obstructions. The system typically consists of a series of devices, such as buoys, beacons, and lighthouses that facilitate safe navigation. Coast Guard officials reported that approximately 1,800 aids to navigation were missing, relocated, or destroyed because of Hurricane Katrina. The aids to navigation teams, which specialize in the maintenance of aids to navigation equipment, were deployed to assess the damage and repair the aids. Additionally, surveys conducted of the underwater and surface areas along the Gulf Coast were coordinated with the Coast Guard, the National Oceanic and Atmospheric Administration, the Army Corps of Engineers, and the U.S. Navy and helped to determine the conditions of the waterways. According to Coast Guard officials, the aids to navigation teams assisted the COTPs to reopen the ports. The criteria used to close or reopen ports consisted of a combination of factors such as the status of

the aids to navigation system, the status of various dock facilities, and the availability of electrical power and marine pilots.²⁵ The Coast Guard's Standard Operating Procedures for District 8 call for a prioritized list of aids to navigation in that district to help identify important repair decisions to ensure that the aids to navigation most critical to the waterways/facilitation of commerce are repaired first.

The damaged aids to navigation from Hurricane Katrina were a contributing factor in the temporary closure of 11 ports in Louisiana, Mississippi, Alabama, and Florida.²⁶ Meanwhile, the Coast Guard was aware of the importance of the Mississippi River to the nation's economy, particularly the export of bulk grain. Despite the shipping disruptions along the Gulf Coast, the Coast Guard reopened three ports 4 days after Hurricane Katrina struck. Both the Ports of New Orleans and Mobile reopened Friday, September 2, 2005, under travel restrictions.²⁷ As of September 29, 2005, about 4 weeks after Hurricane Katrina struck, 850 of the 1,350 aids to navigation discrepancies identified by the Coast Guard were repaired with permanent or temporary aids, and as of late June 2006, Coast Guard officials stated that 149 aids to navigation discrepancies still needed to be permanently or temporarily repaired. Of the 149 outstanding aids to navigation discrepancies, Coast Guard officials reported that 67 temporary repairs have been completed. The remaining discrepancies are planned for repair by the end of July 2006, contingent upon the completion of waterway dredging, calm weather, and availability of an appropriate inland construction cutter. Figure 6 shows the Coast Guard repairing aids to navigation.

²⁵ For the purposes of this report, a marine pilot is a person licensed under state or federal law who assumes responsibility for a vessel at a particular place for the purpose of navigating it through a river or a channel or from or into a port.

²⁶ Affected ports included New Orleans, Mobile, Gulfport, Baton Rouge, Pensacola, Panama City, Pascagoula, Biloxi, Bayou La Batre, Port Fourchon, and Morgan City.

²⁷ The COTP will activate maritime travel restrictions when waterways are difficult to navigate. These restrictions might include travel of ships only in the daytime or allowing only certain size ships to travel on the waterways.

Figure 6: Coast Guard Personnel Servicing Aids to Navigation



Source: U.S. Coast Guard.

Coast Guard Confronted Several Challenges in Conducting Hurricane Katrina Operations

The Coast Guard experienced personnel security, communications, and logistics challenges during the Hurricane Katrina response. However, it was able to adapt its existing capabilities to confront those challenges.

- *Personnel security concerns.* District 8 officials explained that as the days of operations lengthened and citizens remained stranded, security capabilities became an important component of rescue operations. For example, Coast Guard rescue swimmers we interviewed told us that their own personal security became a

concern as stranded individuals became increasingly frustrated because they had no food or water. In some instances, tensions among survivors became heated when rescue swimmers had to prioritize rescues of children, women, and the elderly over able-bodied men. To address such concerns, rescue swimmers employed various tactics, including deploying 2 swimmers at one time (which is not standard procedure)—one swimmer to triage victims, and the other swimmer to assist in hoisting victims into the helicopter. Rescue swimmers also learned to use their skills as negotiators by assigning a citizen leader from within a group of irritated survivors to promote order. For boat operations, officials explained that they deployed Coast Guard security teams to provide security coverage for both Coast Guard and FEMA search and rescue personnel.²⁸

- *Communication challenges.* The Coast Guard was able to mitigate communications challenges caused by Hurricane Katrina's damage to communications infrastructure as a result of planning, preparation, and assistance from Coast Guard Auxiliary members. Aware that communications systems could be heavily damaged or destroyed during a natural disaster, Coast Guard officials had developed plans that were not reliant on communications systems and allowed personnel to act independently or with limited guidance from commanding officers. In addition, Coast Guard personnel prestaged emergency communications equipment—such as a mobile communications unit—and distributed satellite phones and cell phones to mitigate communications infrastructure breakdowns.²⁹ After the storm passed, Coast Guard personnel procured two-way radios, utilized text messaging when cell phones could not make calls, and opened commercial e-mail accounts when the agency's own data network was down. In addition, the Coast Guard auxiliaries provided communications capabilities after the storm passed, including establishing a communications relay critical for conducting search and rescue operations.

²⁸ The security teams consisted of Maritime Safety and Security Teams (MSSTs), which were established after September 11, 2001, and designed to provide quick-response capabilities to protect U.S. ports and waterways; and Port Security Units (PSUs), which are composed of Coast Guard reserve personnel and trained to provide port security and harbor defense duties for military assets overseas.

²⁹ Although Coast Guard after-action reports indicate that mobile communications units did not provide communications capabilities needed for operations, officials in District 8 told us that these units were useful in providing communications support.

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- *Lack of food and water.* According to Coast Guard officials, addressing food and water shortages in the days following Katrina’s landfall became an important part of rescue operations. To address these shortages, Coast Guard personnel from other regions flew food and water to New Orleans, and personnel at Air Station New Orleans distributed their own emergency food and water supplies to survivors. Helicopter crews loaded food and water onto helicopters and distributed these supplies to individuals awaiting rescue. According to Air Station New Orleans’ commanding officer, shipments of water were also delivered to the Superdome on a daily basis. Coast Guard responders also provided food and water to individuals at evacuation sites.
 - *Difficulties securing fuel.* Coast Guard officials we interviewed explained that securing fuel was challenging in the days following Hurricane Katrina’s landfall. According to a senior official at Sector Mobile, fuel shortages presented a major obstacle to moving supplies into Mississippi. One response by the Coast Guard to the lack of fuel was to send responding units into the Gulf Coast Region with adequate fuel to conduct their missions. For example, aids to navigation teams sent from District 7, arrived in the Gulf Coast region as self-contained units with sufficient fuel, food, and other supplies to immediately begin work addressing compromised buoys and other navigational aids. Concurrent with this fuel shortage was the lack of electrical power, which rendered fuel pumps—dependent on electricity—inoperable. As part of their lessons learned, officials told us that in the future, emergency vehicles and first responders need to bring fuel with them in order to be self-sufficient. Officials also explained that having battery-operated fuel pumps could address problems associated with power outages and that this lesson would be applied to future contingency planning.

Coast Guard Managed the Impact of the Hurricane Response and Collected Information to Improve Future Responses

Because Hurricane Katrina was one of the largest natural disasters in our nation’s history, significant federal resources were mobilized to respond to the Hurricane Katrina disaster, including resources of the Coast Guard. According to Coast Guard officials, they managed the surge of people and assets to the Gulf Coast region in response to Hurricane Katrina without significant damage to personnel, assets, operations, or financial resources. The Coast Guard is also reviewing its actions during the Hurricane Katrina response in order to address challenges and prepare for future hurricane seasons.

Response to Hurricane Katrina Seemed to Have Had Limited Impact on Coast Guard

As of late September 2005, Coast Guard personnel sent to respond to Hurricane Katrina had returned to their homeports, with the exception of Coast Guard personnel specially trained in environmental protection issues, who remained in the Gulf Coast region. Coast Guard officials told us that personnel were certainly exhausted during the surge response, but at no time did they violate required safety standards. For example, they said all pilots adhered to aviation standards, flying no more than the maximum 8 hours within a 24-hour period. However, Coast Guard personnel did report several health-related issues as a result of their response to Hurricane Katrina. For example, during the Katrina response rescue swimmers reported that they suffered an assortment of medical problems, including pink eye, respiratory issues, skin rashes, infections, cuts, and scratches from nails, flying fiberglass (from the helicopter swirling around homes with loose insulation), and other windswept articles. Although the rescue swimmers we spoke to noted that most of these medical concerns seemed to clear up a week or two after their experiences in the Gulf Coast region, it remains uncertain whether some ailments (e.g., respiratory issues) could have long-term effects.

Health effects stemming from mental stress may also be a long-term issue for the Coast Guard Katrina responders. During the Katrina efforts, the Coast Guard recognized that personnel responding to Hurricane Katrina, as well as those personnel who experienced the loss of their homes, suffered from mental stress. Therefore, Critical Incident Stress Management teams were mobilized to treat those personnel who worked in or lived in the ravaged Gulf Coast region. For example, after every flight, the rescue swimmers underwent an assessment for stress, including a stress debriefing, in addition to a physical decontamination because of the pollutants they encountered in the flood waters of New Orleans. We were told that Critical Incident Stress Management teams also provided support to several District 8 staff who had lost their homes or had assisted colleagues in cleaning out their destroyed homes and are only now beginning to deal with the mental stress effects of the Katrina tragedy.

Coast Guard officials also told us that they complied with asset maintenance standards. For example, they said all required maintenance of aircraft took place at one of the maintenance hubs set up in either Mobile, Alabama; Houston, Texas; or Elizabeth City, North Carolina. According to an engineering official we spoke to at the Aviation Training Center in Mobile, Alabama, visiting Coast Guard aircraft from around the country were returned to their homeports with updated maintenance completed. One Coast Guard official did note a concern for the future availability of replacement parts. For example, hoists that pulled up

rescuees are usually replaced every 3 to 5 years. However, given the number of hoist rescues performed during the Hurricane Katrina response, the Coast Guard official speculated that replacement may need to occur in 2 years, affecting the number of hoists in Coast Guard inventory. Coast Guard officials also noted that for the Hurricane Katrina response the agency complied with vessel maintenance standards, adding that some maintenance can be accomplished by the crew while ships are under way. However for responses that require surging assets from around the country, like that of Hurricane Katrina, officials said that only ships that are ready and able to be deployed or those that can safely delay maintenance are sent. For example, Coast Guard officials told us that the cutter *Oak* delayed its maintenance for 10 days while it responded to Hurricane Katrina, because it could safely do so.

Data show that in fiscal year 2005, during which the Hurricane Katrina response occurred, operational hours for Coast Guard assets (ships and aircraft) increased over the previous year's total. For the fourth quarter of 2004, Coast Guard operational hours totaled 287,725 hours, while in the fourth quarter of 2005, they totaled 302,112 hours—a difference of 14,387 hours, due in part to the Hurricane Katrina response. According to a senior Coast Guard official, no Coast Guard asset was affected by Hurricane Katrina, meaning that assets were returned to their homeports able to perform routine missions.

A number of Coast Guard resources responded to Hurricane Katrina in the Gulf Coast region. Table 2 summarizes the types and total number of assets that the Coast Guard currently maintains, along with the number, name, and homeports of those assets that responded to the Gulf Coast region.³⁰

³⁰ Along with assets, a wide range of Coast Guard operational and support teams were sent to assist in the response to Hurricane Katrina. Port Security Units, Law Enforcement Detachment teams, and Maritime Safety and Security Teams assisted in security and force protection missions. Strike Teams addressed pollution concerns. Transportable Multi-Mission Communication Center and Transportable Multi-Agency Communication Center assets mitigated some of the communications challenges the Coast Guard experienced. Other teams deployed during the peak Coast Guard response included several Emergency Response Teams, Civil Engineering Unit Damage Assessment Teams, and Incident Management Assist Teams.

Table 2: Coast Guard Asset Type, Homeport, and Number That Responded to the Gulf Coast Region during the Peak Response, August 26–September 16, 2005

Coast Guard asset	Total number of Coast Guard assets for each category of asset	Number of Coast Guard assets responding in Gulf Coast region	Assets and homeport
Cutters			
Medium-endurance cutter, 270-foot	13	3	<i>Harriet Lane</i> from LANT ^a Portsmouth, Va. <i>Northland</i> from LANT/Portsmouth, Va. <i>Spencer</i> from LANT/Boston, Mass.
Seagoing buoy tender, 225-foot	16	2	<i>Cypress</i> from D8 ^b /Mobile, Ala. <i>Oak</i> from D7/Charleston, SC
Medium-endurance cutter, 210-foot	14	2	<i>Confidence</i> from LANT/Cape Canaveral, Fla. <i>Decisive</i> from LANT/Pascagoula, Miss.
Coastal buoy tender, 175-foot	14	3	<i>Barbara Mabrity</i> from D8/Mobile, Ala. <i>Harry Claiborne</i> from D8/Galveston, Tex. <i>Joshua Appleby</i> from D7/St. Petersburg, Fla.
Patrol coastals, 179-foot	4	2	<i>Tornado</i> from D8/Pascagoula, Miss. <i>Shamal</i> from D8/Pascagoula, Miss.
Inland construction tenders, 160-foot	4	3	<i>Hudson</i> from D7/Miami Beach, Fla. <i>Pamlico</i> from D8/New Orleans, La. <i>Saginaw</i> from D8/Mobile, Ala.
Inland construction tenders, 75-foot	8	3	<i>Clamp</i> from D8/Galveston, Tex. <i>Hatchet</i> from D8/Galveston, Tex. <i>Mallet</i> from D8/Corpus Christi, Tex.
Coastal patrol boat, 87-foot	65	9	<i>Bonito</i> from D8/Pensacola, Fla. <i>Coho</i> from D8/Panama City, Fla. <i>Pelican</i> from D8/Abbeville, La. <i>Pompano</i> from D8/Gulfport, Miss. <i>Razorbill</i> from D8/Gulfport, Miss. <i>Seahawk</i> from D8/Carrabelle, Fla. <i>Stingray</i> from D8/Mobile, Ala. <i>Sturgeon</i> from D8/Grand Isle, La. <i>Cobia</i> from D8/Mobile, Ala.
River buoy tender, 75-foot	12	2	<i>Greenbrier</i> from D8/Natchez, Miss. <i>Wedge</i> from D8/Demopolis, Ala.
Total cutters	150	29	
Small boats			
Boats under 65 feet	825	131	Districts 8 and 9
Aircraft^c			
HC-130 long-range surveillance aircraft	27	18	4 from D5/Elizabeth City, NC 5 from D7/Clearwater, Fla. 3 from D11/Sacramento, Calif. 1 from D17/Kodiak, Ark. 5 from ARSC ^d /Elizabeth City, NC

Coast Guard asset	Total number of Coast Guard assets for each category of asset	Number of Coast Guard assets responding in Gulf Coast region	Assets and homeport
HU-25 medium-range surveillance aircraft	23	19	5 from D1/Cape Cod, Mass. 5 from D7/Miami, Fla. 3 from D8/Corpus Christi, Tex. 2 from D11/San Diego, Calif. 4 from ATC Mobile/Mobile, Ala.
HH-60 medium-range recovery helicopter	41	19	4 from D1/Cape Cod, Mass. 3 from D5/Elizabeth City, NC 9 from D7/Clearwater, Fla. 3 from ATC Mobile, Mobile, Ala.
HH-65 multimission cutter helicopter	95	30	2 from D5/Atlantic City, NJ 1 D7/Savannah, Ga. 6 from D7/Miami, Fla. 1 from D8/Corpus Christi, Tex. 5 from D8/New Orleans, La. 5 from D8/Houston, Tex. 2 from D9/Detroit, Mich. 7 from ATC Mobile, Mobile, Ala. 1 from ARSC Elizabeth City, NC
Auxiliary aircraft	unknown	14 aircraft	Primarily from District 8
Total aircraft	186 Coast Guard operational plus any Auxiliary aircraft	86 Coast Guard, 14 Auxiliary, which totals 100 responding aircraft	

Source: GAO analysis of data provided by Coast Guard.

^a LANT refers to assets owned by Atlantic Area Command.

^b The Coast Guard is divided into geographical areas, or districts. D8 refers to District 8, which includes the Gulf Coast region and moves up the Mississippi River. D1 refers to Coast Guard's District 1, in the New England area; D5 refers to District 5, the mid-Atlantic region; D7 refers to District 7, southeastern region; D9 refers to District 9, Great Lakes region; and D11 refers to District 11, west coast area.

^c Number of aircraft as of February 2006.

^d The Coast Guard's Aircraft Repair and Supply Center (ARSC) in Elizabeth City, North Carolina, overhauls and makes major repairs and modifications to all Coast Guard aircraft and associated equipment.

With regard to operational impact, Coast Guard officials told us that in some cases, stations that sent personnel and assets to the Gulf Coast region experienced challenges in maintaining operations. Relative to other

military services, the Coast Guard is small,³¹ and when resources are shifted to any one specific mission area, other mission areas may suffer. Although Coast Guard officials noted that they were generally able to continue with their various missions across the nation, including boarding high-interest vessels approaching United States ports, there were instances where the movement of Coast Guard assets out of their normal areas of operation affected activity levels in these locations. For example, Coast Guard units in Florida sent many air and surface assets to the Gulf Coast region to respond to Hurricane Katrina, and while these assets were deployed to the Gulf Coast region, the Coast Guard observed a spike in the level of illegal migration activity off of the Florida coast. In response, according to Coast Guard officials, once the assets returned to the Florida region, the Coast Guard initiated a more intensive air and sea patrol schedule to markedly announce its return to the area and focus on interdicting illegal migrants.

Coast Guard Satisfied with Reimbursement of Hurricane Katrina Mission Costs

Part of Hurricane Katrina's impact on Coast Guard personnel, assets, and operations at its districts nationwide was that the Coast Guard incurred unexpected costs conducting Hurricane Katrina missions.³² When we discussed the amount of funding requested to reimburse the Coast Guard for its Hurricane Katrina activities, Coast Guard officials told us they were satisfied with the reimbursement process with both FEMA and EPA. According to these officials, as of April 12, 2006, the Coast Guard had received "dollar for dollar" the amounts requested for reimbursement, meaning that for every bill submitted and processed, the Coast Guard received the same amount in reimbursement. Coast Guard officials added that the review of billing documentation by FEMA and EPA officials can

³¹Consisting of approximately 39,000 active duty personnel, the Coast Guard is a multimission agency with a long-standing federal leadership role in protecting life and property at sea, such as directing search and rescue operations. Furthermore, the Coast Guard is a military service responsible for protecting U.S. ports and waterways. As of December 2005, other U.S. military branches were the U.S. Army, with approximately 489,000 active duty personnel; the U.S. Navy, with approximately 359,000 active duty personnel; the U.S. Air Force, with approximately 352,000 active duty personnel; and the U.S. Marines, with approximately 179,000 active duty personnel.

³² Coast Guard officials reported that as of April 12, 2006, its FEMA-directed missions in response to Hurricanes Katrina and Rita had a funding ceiling of \$191,913,001, meaning FEMA authorized the Coast Guard to spend up to this amount to conduct missions in response to Hurricanes Katrina and Rita. In addition, the EPA authorized the Coast Guard to spend up to \$171,327,000 to conduct specific pollution response missions. According to Coast Guard officials, this amount is likely to grow as mission assignments in the area of pollution response continue to be added, and could take at least a year to complete.

take 30 to 60 days. Coast Guard officials also stated that they met with representatives from FEMA this year to reconcile Hurricane Katrina mission assignments, funding ceilings, and costs, and these accounting lines and totals were consistent.

As table 3 shows, as of April 12, 2006, the Coast Guard reported that it had spent \$98,811,320 in its response to Hurricanes Katrina and Rita and had billed FEMA and EPA \$66,746,961 and received \$48,634,090 in reimbursements, given the 30-to 60-day delay in FEMA/EPA review of Coast Guard billing documentation. However, even with the delay, Coast Guard officials we spoke to were satisfied with the reimbursement process with both FEMA and EPA.

Table 3: Summary of Coast Guard Stafford Act Reimbursement Requests for Missions Conducted in Response to Hurricanes Katrina and Rita, as of April 12, 2006

Stafford Act funding	Description of mission assignments	Amount of Coast Guard expenditures	Amount of reimbursement request submitted	Amount of reimbursement funding received as of April 12, 2006
Coast Guard mission assignments (reimbursement from FEMA)	Search and rescue, wreck and debris removal, and deployment of strike forces, among other activities	\$49,746,004	\$34,701,729	\$16,588,858
Coast Guard mission assignments (reimbursement from the EPA)	Marine pollution response effort, including technical assistance, and direct support to EPA, among other activities	49,065,316	32,045,232	32,045,232
Total		\$98,811,320	\$66,746,961	\$48,634,090

Source: GAO analysis of Coast Guard and FEMA data.

Note: Tables 1 and 2 focused exclusively on the Coast Guard response to only Hurricane Katrina; table 3 focuses on the financial impact of the Coast Guard response to both Hurricanes Katrina and Rita missions. Coast Guard officials noted when accounting for costs associated with Hurricane Katrina, they included costs associated with Hurricane Rita. Note that table 3 does not include damages suffered by the Coast Guard, including the destruction of several stations, and damage to assets suffered during the storms. These infrastructure costs continue to be identified and updated by the Coast Guard, and supplemental funding has been requested to address these damages. Also note that the amount of reimbursement request submitted to EPA, and the amount of reimbursement funding received as of April 12, 2006, is the same. Coast Guard officials reported that the process of reimbursement from EPA allows for quick reimbursement because the missions are more typical of the types of environmental response conducted by the Coast Guard. We did not verify the accuracy of the data provided by the Coast Guard.

Coast Guard Collected Information to Improve Future Storm Preparations

According to Coast Guard officials, the agency has collected information regarding its response to Hurricane Katrina and included it in a Coast Guard database. In addition, while we conducted site visits for this review, we met with a wide range of Coast Guard personnel who participated in the response to Hurricane Katrina who shared with us their views on certain actions that the Coast Guard could take in the future to further improve the agency's response to an event like Hurricane Katrina. These actions include efforts to (1) improve the agency's systems to track Coast Guard personnel in real time in order to better recall personnel when an evacuation is over and forces are sent to respond to the emergency event; (2) become more "expeditionary" in nature by having evacuating forces remove such things as certain tools and equipment that would allow them to be more self-sustaining in order to assist in a disaster response; (3) be more flexible in identifying safe places for Coast Guard personnel to relocate to in the event of an evacuation; and (4) be flexible in drafting orders for personnel to report for duty at a specific time and place in order to respond to contingencies that may arise during the course of an emergency.

Furthermore, a senior Coast Guard official reported that the Coast Guard has developed a number of after-action reports that it has incorporated into its Contingency Preparedness System database—known as CG SAILS—the official Coast Guard database for lessons learned. According to this official, having these reports in this system allows Coast Guard personnel to access this information and incorporate it into other agency planning and contingency efforts.

Agency Comments

We provided a draft of this report to DHS, including the Coast Guard, for comment. DHS and the Coast Guard provided technical comments, which have been incorporated into the report as appropriate.

We are sending copies of this report to the appropriate congressional committees; the Secretary of Homeland Security; the Commandant of the Coast Guard; the Director, Office of Management and Budget; and other interested parties. In addition, this report will be available at no charge on the GAO Web site at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-9610 or Caldwells@gao.gov. Contact points for our Offices of

Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributors to this report are listed in appendix I.

A handwritten signature in black ink, appearing to read "Steve Caldwell", with a long, sweeping flourish extending to the right.

Stephen L. Caldwell
Acting Director, Homeland Security and Justice Issues

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Appendix I: GAO Contact and Staff Acknowledgments

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Individuals making key contributions to this report include Joel Aldape, Nancy Briggs, Lisa Canini, Billy Commons, Christine Davis, Josh Diosomito, Michele Fejfar, Kathryn Godfrey, Dawn Hoff, and Lori Kmetz.

Related GAO Products

Coast Guard: Observations on Agency Performance, Operations, and Future Challenges. [GAO-06-448T](#). Washington, D.C.: June 15, 2006.

Maritime Security: Enhancements Made, but Implementation and Sustainability Remain Key Challenges. [GAO-05-448T](#). Washington, D.C.: May 17, 2005.

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