

Situation Update One: 21 August through 23 August 2001

Briefing Date: 23 August 2001, 1200 EDT

Background

On 17 August 2001, meteorologists at the National Hurricane Center began monitoring a weather system that spawned a tropical depression just north of Colombia, South America. The depression continued on a north/northwest track, entering the Gulf of Mexico on 20 August, where it was upgraded to a tropical storm. Tropical Storm Jackson rapidly intensified to a Category 2 Hurricane on 21 August with wind speeds reaching 98 mph (Figure 1-1). Although present models predict landfall within three days near Matagorda Island, landfall can occur anywhere from Corpus Christi, Texas, to New Orleans, Louisiana (Table 1-1).



Figure 1-1: Storm Track at 21 August

Forecast Period	Storm Track Error (Either Side of Track)	Storm Intensity Error
72 Hours	200+ Miles	23 MPH
48 Hours	150 Miles	18 MPH
36 Hours	100 Miles	15 MPH
24 Hours	75 Miles	12 MPH
12 Hours	50 Miles	9 MPH

Table 1-1: Uncertainty Table- This table reflects the variability associated with predicting a storm's track and intensity at incremental forecast periods.

Current Situation

As of today, 23 August, Hurricane Jackson has been upgraded to a Category 3 storm with wind speeds upwards of 125 mph. Meteorologists estimate the storm to be 110 nautical miles in diameter, with an inner eyewall diameter of 36 nautical miles and a central pressure of 985 mb (29.1 inches of Hg). Over the past 48 hours, the track of Hurricane Jackson has shifted slightly to the east. The storm is presently moving at a speed of 12 mph through the Gulf (Figure 1-2), and if it continues on the present track, meteorologists predict landfall within the next 24 hours between Matagorda Bay and Freeport (Figure 1-3). Cities along the coast such as Victoria, Galveston, Freeport, and Beaumont have already started to feel the effects of Hurricane Jackson and are busy preparing for the strong winds and storm surges that it will likely generate. The Houston area is also feeling the effects of the storm, with up to 8 inches of rain and flash flooding in low-lying areas. This latest batch of rain is further complicating the recovery efforts still underway from recent flooding caused by Tropical Storm Allison. In June, Allison hit the Galveston/Houston area, depositing as much as three feet of rain and causing unprecedented flooding and billions of dollars in damages.



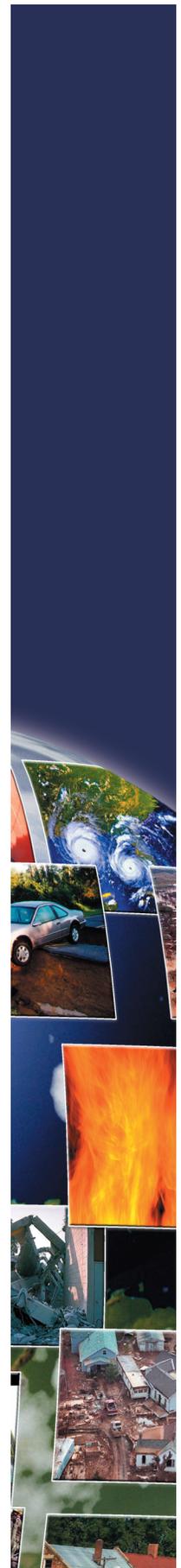
Figure 1-2: Storm Track at 23 August



Figure 1-3: Predicted Landfall as of 23 August

State and Local Activities

The State of Texas Division of Emergency Management (DEM) has been actively following Hurricane Jackson and activated its Emergency Operations Center (EOC) in Austin on 20 August. The storm's track and intensity are reminiscent of Hurricane Carla, a fierce Category 4 storm that ravaged the Texas coast in September of 1961, prompting the immediate evacuation of all islands just offshore and low coastal areas. With landfall predicted within 36 hours, the Texas DEM strongly encouraged all island residents near the storm's path to evacuate, in particular, the west end of Galveston Island due to the limited means for exiting off the island (Figure 1-4, next page). Ferry services off the island were discontinued when wind speeds reached 45 mph, and portions of San Luis Pass are reportedly submerged, rendering it useless as an evacuation route. As of 23 August, access off the island is limited to I-45, the Galveston Causeway. Motorists traveling on the Causeway have reported difficult driving conditions resulting from intense winds and rain.



The American Red Cross (ARC) has been working closely with the State, preparing for mass evacuation and demand for shelters (Table 1-2).

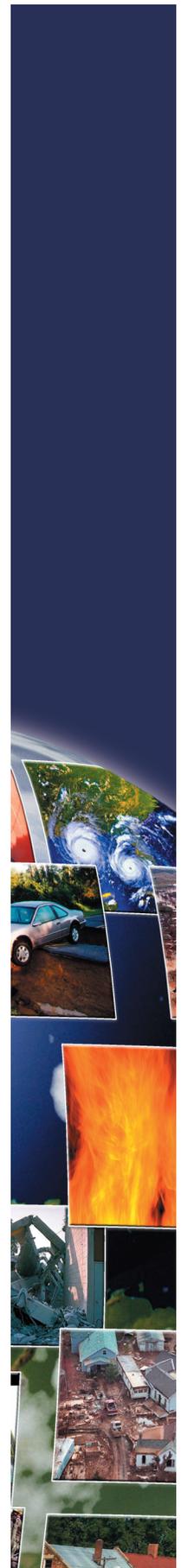
Storm Category	Brazoria Co.	Galveston Co.	Harris Co.	Total
1	1,104	49,624	33,370	84,098
2	6,871	97,407	47,056	151,334
3	71,443	211,110	89,143	371,696
4	120,207	225,845	147,155	493,207
5	129,441	248,021	264,278	641,740

Table 1-2: Population Evacuation Potential

National Activities

FEMA activated the Emergency Support Team (EST) on 22 August and is coordinating the configuration and deployment of Initial Response Resources for Texas. EST representatives are evaluating contingency plans for time-phased force deployment and locating appropriate staging areas and mobilization centers. An advance element of the ERT–National (ERT–N) has been alerted in preparation for deployment to the ROC in Denton.

On 23 August, Headquarters USACE (HQUSACE) activated the USACE Operations Center (UOC) and deployed a liaison to the EST. It has notified its Crisis Management Team (CMT) and is conducting daily internal status briefings for the Command Group. USACE Cold Regions Research Engineering Laboratory (CRREL) has been running models to assist Division and District decision makers in anticipating the scope and magnitude of mission assignments.



Situation Update Two: 24 August through 26 August 2001

Briefing Date: 26 August 2001, 1200 EDT

Background

In the early morning hours of 24 August, Hurricane Jackson made an abrupt turn to the north and intensified rapidly. Originally heading for Freeport, Hurricane Jackson instead made landfall in Galveston, Texas, at 0600 hours on 24 August as a Category 4 storm (Figure 2-1). The eye of the storm passed over Jamaica Beach, approximately 15 miles south of Galveston. Overall, Hurricane Jackson spanned 180 nautical miles, with the inner eye wall diameter of 45 nautical miles. The eye wall exerted wind speeds upwards of 148 mph, causing significant damage. Sustained winds between 138-152 mph were experienced from Bay City to Beaumont, TX. Peak wind gusts were estimated at 158 mph in Galveston and 139 mph at the Port of Houston.

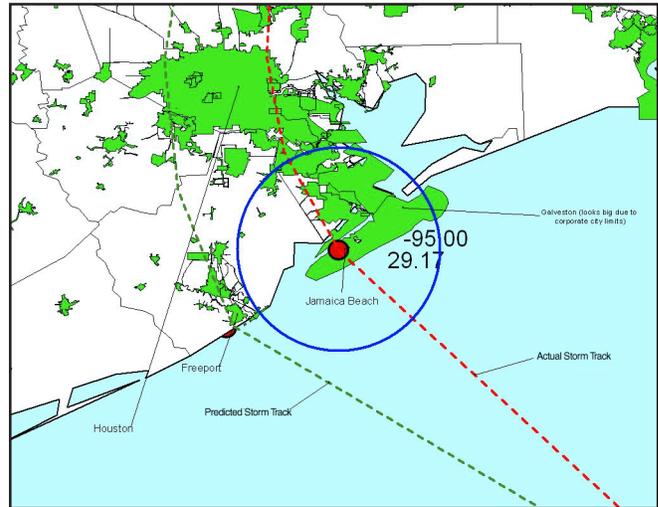


Figure 2-1: Storm Track at 24 August

With the intense wind and low pressure, storm surge was a major problem. The highest storm surge was reported on Galveston Island, with a surge of more than 18 feet. Along the coast from Matagorda Bay to the Texas-Louisiana border, tides were up as much as 15 feet above normal.

Current Situation

Shortly after making landfall, the storm abruptly turned to the east and is currently following a northeast trek across Texas and Louisiana, dropping locally heavy rains (Figure 2-2). High winds and rain continue as Hurricane Jackson, now a tropical depression, continues inland. Rainfall amounts were heaviest from Freeport up the coast to Galveston and 50 miles inland, ranging from 10 to 16 inches in some spots.

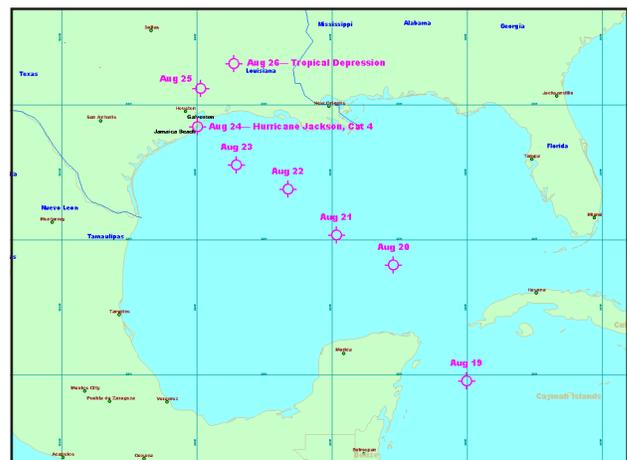


Figure 2-2: Storm Track at 26 August

Flash flood warnings remain in effect in the City of Houston. In addition, numerous tornadoes have been reported along the storm's path, causing fatalities and massive property damage.

Impact and Damage

Hurricane Jackson impacted an area of more than 200 square miles, with an area of heavy damage more than 80 miles in diameter. Preliminary reports note severe damage to coastal residences, hotels, businesses, beaches, piers, boats, and mobile homes. Initial media reports have attributed 71 deaths in Texas directly to Hurricane Jackson, many from drowning. Coupled with fatalities resulting from tornado activity, a total of 90 people have lost their lives.

Transportation to Galveston Island is limited to the Galveston Causeway (I-45), as the San Luis Pass–Vacek Bridge has suffered structural damage and is partially submerged (Figure 2-3). Ferry service has not been restored. Route 146 along the Galveston Bay and Route 87 along the Bolivar Peninsula are impassable due to high tides and shore erosion.

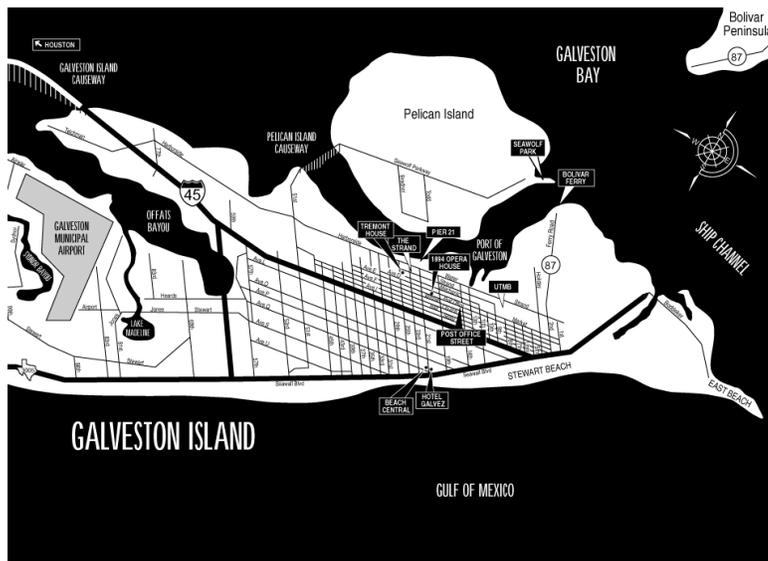


Figure 2-3: Galveston Island Map

Severe damage to the Houston Ship Channel, the Gulf Inter-Coastal Waterway, and the Ports of Houston and Galveston has resulted in debris and channel blockages. The Bayport Industrial Complex is reporting damage to its chemical and petroleum facilities, and hazardous materials have leaked into the Bay.

Johnson Space Center has suffered wind and storm surge damage. Assessments are currently underway to determine the extent of damages.

Across the Houston metropolitan area, most of the damage was to roofs, power and telephone lines, trees, and signs. In Galveston and Brazoria counties, flooding from heavy rain in low-lying areas has caused even more extensive damage than the wind and storm surges. The above normal tides and storm surges produced extensive beach and inland damage to houses and businesses. Preliminary damage estimates show the vast majority of destruction stemming from Harris, Galveston, Chambers, Brazoria, and Fort Bend counties.

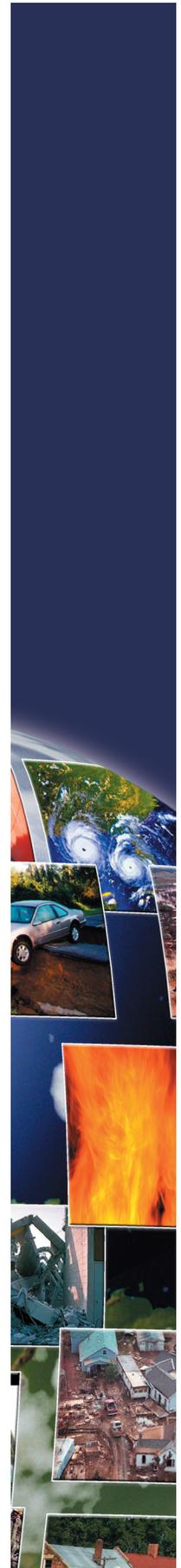




Table 2-1:
CATS
Damage
Estimates

Multi Family Homes		Single Family Homes		Mobile Homes	
County	Units	County	Units	County	Units
Brazoria	15197	Brazoria	48791	Austin	745
Chambers	324	Chambers	5447	Brazoria	10516
Fort Bend	6548	Fort Bend	5694	Chambers	1742
Galveston	27045	Galveston	66805	Colorado	832
Harris	322650	Harris	325500	Fort Bend	4058
Matagorda	1202	Liberty	2145	Galveston	5601
Totals	372966	Matagorda	4386	Hardin	3902
		Wharton	1892	Harris	28654
		Totals	460660	Jefferson	3423
				Liberty	5437
				Matagorda	3271
				Montgomery	9892
				Polk	2301
				San Jacinto	1874
				Waller	1507
				Wharton	1949
				Totals	85704

In the hardest hit areas of Galveston, Harris, and Brazoria counties, more than 500,000 people were forced to evacuate their homes, with up to 75,000 people staying in public shelters. The Catastrophic Tool Set (CATS) models indicate that more than 900,000 homes have been severely damaged (Table 2-1). Damage assessments are validating model estimates and accuracy is fairly good thus far.

The media has reported that numerous public schools, health facilities, and hospitals in the Galveston/Houston area were destroyed or severely damaged by Hurricane Jackson. Buildings and office complexes in downtown Houston suffered major damage from the wind, which shattered windows and littered the streets with broken glass and debris.

Utility damage assessment efforts so far have determined that approximately 800,000 people are without power, 500,000 people are without water, and the vast majority of Galveston Island is without telephone service. Several cellular towers in the Galveston/Houston region were knocked out by high winds and flying debris, and service is expected to remain disrupted for several days. Wastewater treatment plants throughout southern Texas have been flooded by the storm surge, leaving plants non-operational.

Early predictions estimate that more than 220,000 liters of water will be required daily until water treatment plants return to service (Table 2-2, below; Figure 2-7, next page), with approximately 90,000 liters each going to Harris and Galveston counties.

STATE	Total Liters	COUNTY	Total Liters (County)
Texas	226,504		
		Brazoria	43,775
		Chambers	130
		Galveston	92,400
		Harris	90,199
TOTAL			226,504

Table 2-2: Water Mission by County

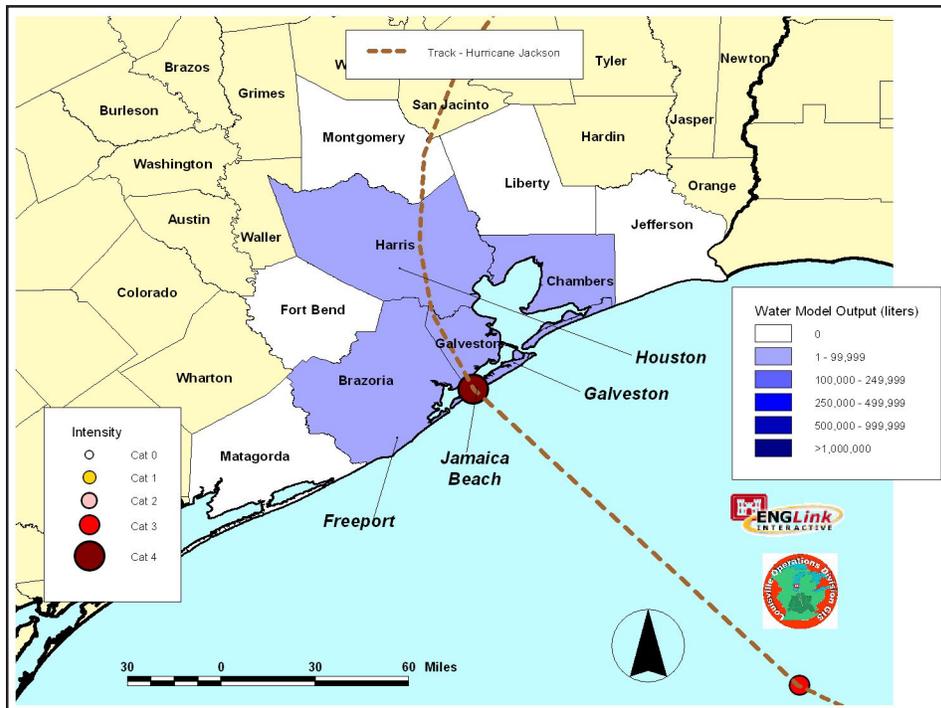


Figure 2-7: Water Mission Model

Additionally, models show the potential need for more than 350,000 pounds of ice daily during the initial days of the response (Figure 2-8, below; Table 2-3, next page). The demand for structural assessments and temporary power far exceed anticipated numbers, mostly due to extensive tornado damage. Residents are clamoring for temporary roofing supplies in an effort to thwart further rain damage. Hundreds of island residents are stranded and missing person reports indicate that search and rescue services are needed as well.

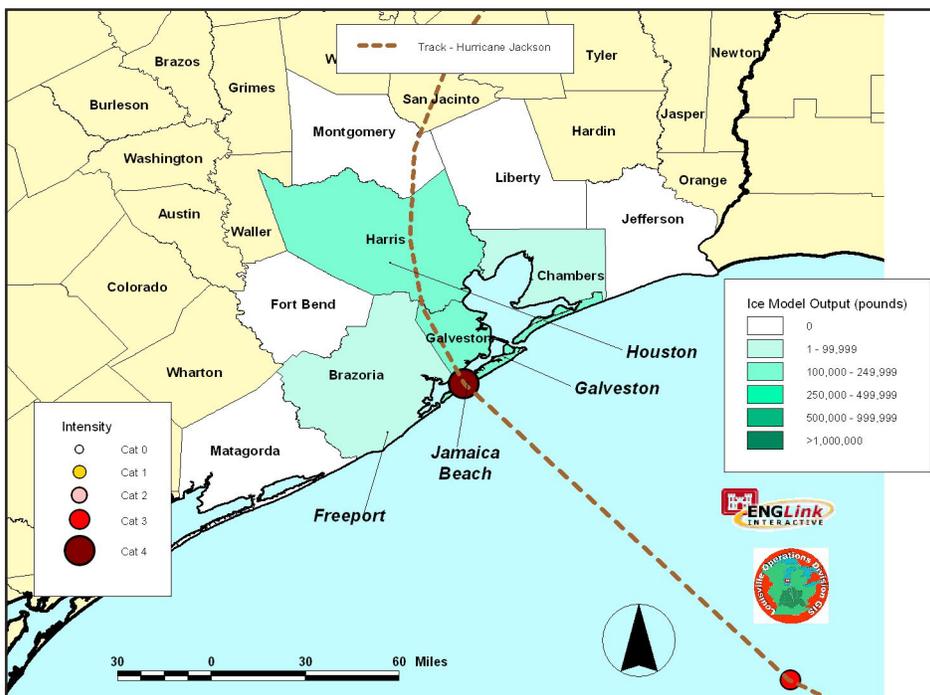


Figure 2-8: Ice Mission Model



STATE	Total Pounds	COUNTY	Total Pound (County)
Texas	362,406		
		Brazoria	70,040
		Chambers	207
		Galveston	147,841
		Harris	144,318
TOTAL			362,406

Table 2-3: Ice MISSION by County

Local Activities

Local damage assessments began in the early morning of 25 August. Early estimates of debris placed the tally well above 16 million cubic yards (Figure 2-9). First responders were impeded by massive amounts of debris strewn about by the storm. The City of Houston Department of Public Works was unable to get its crews out to clear debris due to the significant damage to its facilities. Police have been patrolling the streets in an attempt to maintain order and public confidence. Galveston County has exhausted its emergency response capabilities and has made multiple requests for mutual aid from the neighboring counties of Harris, Brazoria, and Fort Bend, all of which have suffered damages of their own. All four counties have requested immediate assistance from the State.

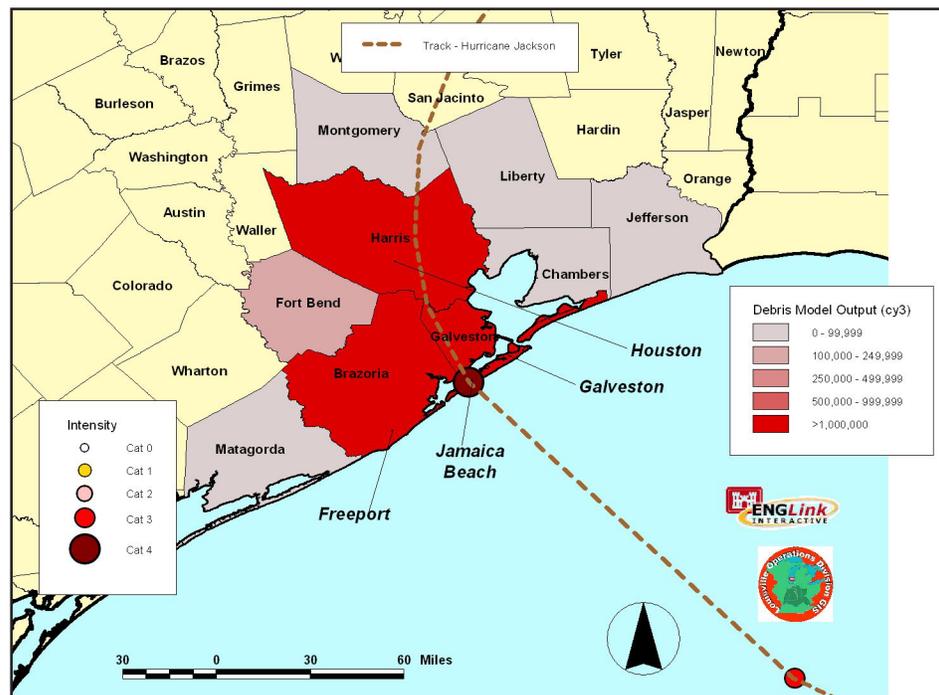


Figure 2-9: Debris Model

Immediately following the storm's passing, Texas DEM deployed its damage assessment teams to the vicinity of Galveston and Houston to begin needs assessment. The Governor of Texas has declared a State of Emergency and requested a Presidential Disaster Declaration for Galveston, Harris, Brazoria, and Fort Bend counties.

An additional 2,500 coastal and island residents inundated ARC and church shelters in Harris and Brazoria counties, and most motels in the region are full with storm victims. Galveston hospitals are operating at less than 50 percent capability, and public schools remain closed.

Regional Activities

FEMA Region VI has requested assistance from Region VIII, its backup Region, and has deployed a rapid needs assessment team to the Galveston/Houston area to coordinate with State and local emergency management agencies on early needs assessment. Aerial imagery has been requested from the EST along with Catastrophic Assessment Tool Set model runs on a Galveston landfall. All Federal regional agencies have been mobilized to support the response.

SWD has deployed PRTs and begun executing Pre-scripted Mission Assignments (PSMAs). Galveston District has been declared a victim district, leaving Ft. Worth District as the primary response district. An Emergency Support Function (ESF) #3 representative in the State EOC is coordinating requests for assistance for ESF #3 missions. SWD is considering the need to establish an Emergency Response and Recovery Office near Galveston while a suitable location for the Disaster Field Office (DFO) is determined. The PRTs for ice, water, and emergency power are coordinating with their ESF counterparts at the State EOC and with FEMA Infrastructure Branch representatives in the ROC. Until the DFO is established, PSMAs will be issued from the ROC. USACE has also been assessing Federal flood control works in preparation for flood fighting due to continued heavy rain across the region.

National Activities

At the EST, FEMA and other Federal agencies (OFA) are receiving preliminary reports on damages to local, State, and Federal facilities. The EST is coordinating with the Region VI ROC on movement of Federal resources into Texas. The Initial Response Resources (IRR) team has been deployed to the mobilization center at Fort Sam Houston.



Situation Update Three: 27 August through 24 September 2001

Briefing Date: 24 September 2001, 1200 EDT

Background

Hurricane Jackson dissipated on 28 August over Louisiana. More than 50 tornadoes were produced in the aftermath, rivaling the number produced by Hurricane Carla in 1961. Rains along the Gulf Coast and central Texas have tapered off and have left behind 15 to 20 inches of water in low-lying areas. In the Greens, Halls, and White Oak bayous, water continued to overtop banks several days after the storm, even as all six of the local bayous and the San Jacinto River receded.

Current Situation

Little rain fell on Houston after the storm dissipated, and within a week after the storm, the weather was nearly back to normal. Skies are clear across Texas. Temperatures have returned to the mid-eighties, and no rain has been forecasted for the next seven days.

Impact and Damage

In the aftermath of the disaster, it has been determined that Hurricane Jackson has taken 103 lives and has caused property damage of nearly \$15 billion.

In addition to the destruction from the hurricane, tornado damages are widespread and devastating in some communities (Figure 3-1). Due to the large number of touchdowns and wide distribution of damages, it is difficult to assess the damages quickly and there are still not enough trained inspectors available to keep up with the requirements. Federal and State damage assessment teams continue to survey homes, businesses, and public facilities in the disaster area.

More than 2.6 million people have been displaced from their homes across the impacted area and there is a shortage of temporary housing alternatives to accommodate these people. The ARC, Salvation Army, and a variety of volunteer, church, and civic organizations opened shelters to house the nearly 200,000 people that were immediately in need of shelter. FEMA has asked ESF #3 to assist in the assessment of housing alternatives and to begin installing travel trailers in locations where it is feasible. Also, USACE has been asked to begin the design of several group mobile home sites. USACE is having difficulty locating trained environmental specialists to inspect each site before the installation of travel trailers and mobile homes.

Downtown Houston, home to a number of major energy companies, sustained heavy flood damage when a nearby bayou spilled over its banks. Several skyscrapers, along with the Federal courthouse, remained closed for several days following landfall of the storm.

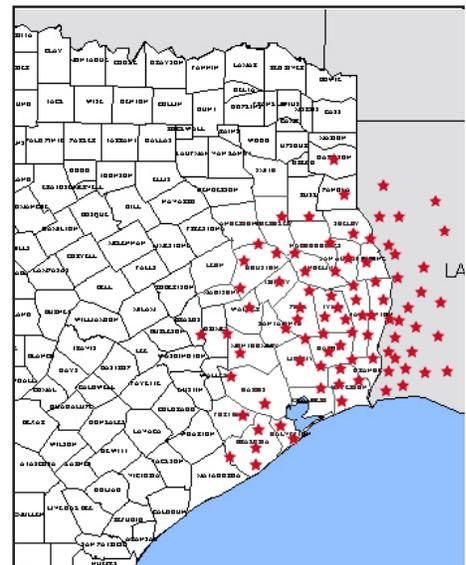


Figure 3-1: Tornado Impact



Throughout the city center, crews pumped out still-flooded basements that officials said held a combined 83 million gallons of water.

Many of the areas flooded by Tropical Storm Allison were reflooded by Hurricane Jackson. The Texas Medical Center, a cluster of hospitals known worldwide for its heart disease and cancer research, was forced once again to transfer patients to other locations when high water knocked out all power. DoD has been asked to assist with field hospitals and medical supplies. Disaster Medical Assistance Teams (DMATs) that were initially called in have been relieved to return home.

Millions of dollars in damages have occurred to equipment and other assets at the Johnson Space Center. NASA engineers are currently examining the implications of damages to facilities on space programs.

Power outages in outlying areas are scattered but continue to significantly impact large populations in rural areas. Requests for small output generators are still unfulfilled. Verizon, AT&T, and Sprint have reported several cell towers damaged by the storm, cutting off communications for thousands of customers and hampering communication among emergency response personnel. Restoration has been slowly occurring during the past month, but some areas are still without service.

Local Activities

Requests for assistance have leveled off as damage assessment activities have progressed. Nearly a month after the devastating hit, the operation has moved into the recovery phase. Activities continue in the area of temporary roofing and temporary housing. Power has been restored to 75 percent of the impacted area.

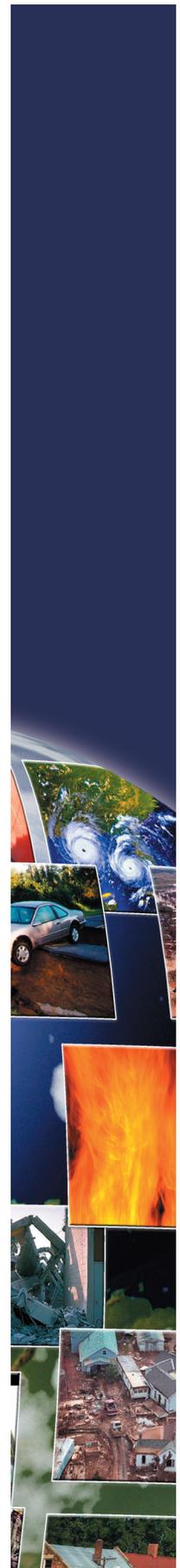
As cleanup continues, it has been projected that more than 16 million cubic yards of debris was produced, with nearly 90% generated in Harris and Galveston counties (Table 3-1). Contractor disputes have arisen from the attempts to manage debris removal operations in many locations.

Initially, local contractors could not handle the huge workload and outside contractors were brought in to handle the mission. Local contractors are now complaining that they are losing work to outsiders. Monitoring the numerous debris contracts is difficult and the media is beginning to report that contractors are taking advantage of the lack of dumpsite monitoring. Reporters have concluded that contractors are getting rich at the expense of taxpayers. Finding acceptable dumpsites for debris has been a serious problem as environmental assessments are moving slowly. The separation, reduction, and disposal of debris, including hazardous waste has complicated the process and some operations have been shut down for not conforming with environmental requirements.

Fundraising on the part of the Houston Chronicle, several local television and radio stations, and private business and individuals has provided more than \$5 million to assist the ARC relief effort for victims of Hurricane Jackson.

COUNTY	Total Cubic Yards (County)
Brazoria	1,602,173
Chambers	44,248
Fort Bend	130,844
Galveston	6,417,364
Harris	8,400,446
Jefferson	194
Liberty	17,818
Matagorda	986
Montgomery	31,078
TOTAL	16,645,151

Table 3-1: Debris by County in Texas





Regional Activities

Disaster recovery operations are well underway as State and Federal agencies and their contractors have moved into the hardest hit areas with supplies and equipment. The Federal Coordinating Officer has been on television daily and has met with local officials to review progress and learn of new requirements. The FEMA Individual Assistance and Public Assistance programs are now in place and experiencing heavy demand.

USACE PRT personnel are providing technical assistance and direct contractor support in the form of temporary roofing, emergency generator support for public facilities and field operations, emergency ice, and water supplies. Preliminary planning is underway for restoration of public water supplies and emergency power. USACE has PRTs on site to manage debris removal operations and work on temporary housing requirements.

USACE, the U.S. Department of Transportation, and the U.S. Department of Energy are working together on the coordination of shipping, receiving, and distribution of materials and supplies. USACE and the Texas National Guard continue to distribute roofing materials to local governments and individuals capable of completing their own repairs. Nearly 400 members of the Texas National Guard are supporting State relief operations.

The Natural Resources Conservation Service, USACE, and FEMA are providing assistance for flood control project repair and restoration. There are reports that locals are “shopping” among the Federal programs looking for the best deal. There seems to be some confusion over eligibility for Federal assistance among the agencies.

FEMA has begun discussions with Texas about the Hazard Mitigation Grant Program and opportunities for moving structures out of the floodplain in some areas. Meanwhile, USACE has been working with communities to restore the damaged flood control projects in the same areas under PL 84-99. These activities appear to have conflicting objectives.

National Activities

President Bush issued a Presidential Disaster Declaration for more than 30 counties in Texas, including Galveston, Brazoria, Harris, Chambers, and Fort Bend, as well as 10 parishes in Louisiana, opening the door to Federal recovery aid (Figure 3-2). Four DMATs arrived from Arkansas, North Carolina, New Mexico, and Oklahoma and initially operated 24 hours a day at the Astrodome, the Houston Police Academy, and in Harris County. The teams also are assessing local and regional hospitals to determine their capabilities for treating victims.

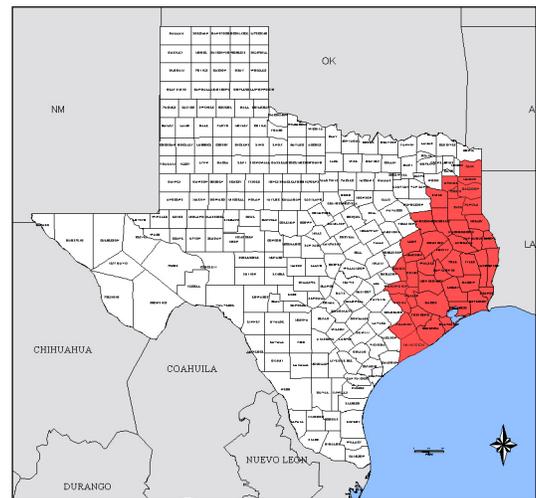


Figure 3-2: Texas Disaster Counties

The U.S. Environmental Protection Agency (EPA) has gathered and disposed of hundreds of loose drums, recovered by the U.S. Coast Guard, which may contain hazardous materials. EPA and the Coast Guard are also responding to reported leaks in an oil pipeline and large crude oil tank in the Houston area and are initiating a household hazardous waste program.

The U.S. Department of Agriculture has supplied more than 300 cases of food for distribution to flood victims by the Salvation Army. A total of 8,000 ready-to-eat meals have been received at the ARC Houston Chapter, and an additional 27,000 meals have been ordered through the U.S. General Services Administration. The ARC has 28 shelters open throughout Galveston, Harris, and Brazoria counties, and is deploying additional relief supplies. More than 25 emergency response vehicles have been deployed to the disaster area.

The EST continues to monitor resource and commodity allocation. The management of human resources deployed to the area has been very difficult. Finding qualified volunteers particularly real estate specialists, environmental and architectural experts, and civil engineers with debris contract management experience to deploy to the hot conditions in Texas is difficult. Vector control has been a real problem with such a wide spread disaster and mosquitoes are swarming in many locations, causing many to fear that they will be exposed to diseases. Some older employees are not willing to deploy to the uncomfortable and potentially unhealthy field conditions. Those who did deploy have been on site for some time and need to be rotated out of the operations.

