

6 Mississippi Observations

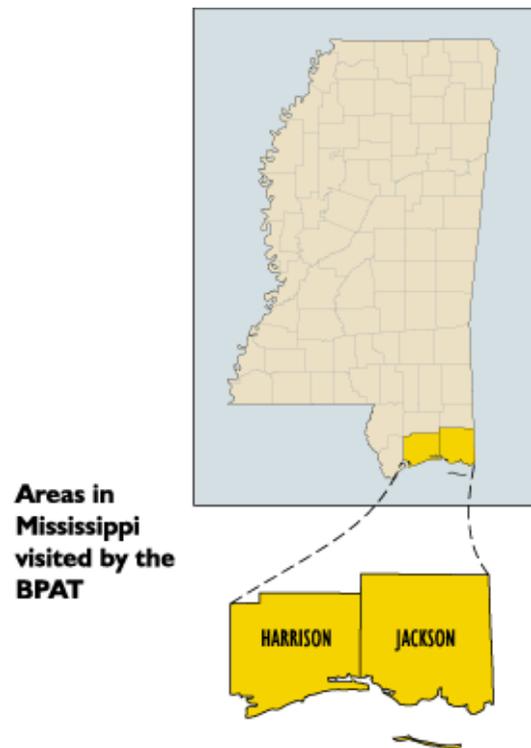
6.1 Flood Observations: Damages and Successes

The aerial survey and ground reconnaissance indicated that with the exception of damage in eastern coastal areas, minimal structural damage was observed in Mississippi. Damages to buildings inundated by riverine or coastal flooding was mostly limited to interior contents, finishes, wallboard, insulation, and electrical wiring.

6.1.1 Riverine Flooding

Flooding was significant in Mississippi in the Biloxi, Tchoutacabouffa, and Pascagoula River watersheds. With the exception of gage data recorded on the Tchoutacabouffa River at D'Alberville, Mississippi, and the Tuxachanie Creek near Biloxi (where floods were estimated over the 100-year recurrence) the recurrence intervals were estimated between 10 and 50 years in Mississippi.

The BPAT visited several low-lying areas flooded by Hurricane Georges, including the Pascagoula River, its tributaries, and Franklin Creek in Jackson County. Although there is no river gage on Franklin Creek, observations in the area suggest a recurrence interval of approximately 25 years for this creek. The Franklin Creek watershed is located between the Fowl River and the Big Creek watersheds, and all three have similar watershed characteristics. The Fowl River and Big Creek discharges recorded during Hurricane Georges are estimated to be at a 25-year recurrence interval. Franklin Creek is a tributary to the Escatawpa River, for which a 30,000-cfs discharge was measured, which was also estimated to be a 25-year recurrence interval. Based on these observations, it is reasonable to estimate that Franklin Creek experienced a 25-year flood. Since flood levels in most cases were at or below the 100-year flood level, most damage was confined to non-elevated pre-FIRM buildings.



Typical of the flood damage observed in the Pascagoula area is the home shown in Figure 6-1. In addition to flood damage, some homes in this area also suffered roof damage due to high winds. Many homes in low-lying areas of Pascagoula, such as those shown in Figures 6-2 and 6-3, have been flooded previously. The frequent flooding in this area is likely a result of the inability of the storm drains to convey the rainfall runoff and the inability of the storm drainage system to discharge into the Gulf during periods of coastal surge, or a combination of both of these factors. During Hurricane Georges these homes were flooded to a depth of 3 to 4 feet. No structural damage to homes was observed; however, there were significant losses to contents, interior finishes, wallboard, insulation, and electrical systems.



FIGURE 6-1 Home in Pascagoula that sustained wind and flood damage.



FIGURE 6-2 Typical pre-FIRM at-grade house flooded several feet in Pascagoula.



FIGURE 6-3 This home has suffered flood damage on numerous occasions. During Hurricane Georges it flooded several feet.

The house shown in Figure 6-4, located in the Franklin Creek watershed, was elevated in 1996 under FEMA's HMGP. It was elevated 40 inches, bringing the lowest floor to an elevation of 16 feet NGVD which is one foot above the 100-year flood elevation (approximately 15 feet NGVD). Prior to Hurricane Georges, floods have threatened the home four times since it was elevated but it has not sustained any damage. Unfortunately, flooding from Hurricane Georges inundated this house approximately 3 inches above the lowest floor (Figure 6-5). Given the estimated recurrence interval of approximately 25 years, flood elevations exceeding the 100-year flood could be attributed to backwater effects from where Franklin Creek meets the Escatawpa River.

While the 3 inches of flooding did cause damage, if the house had not been elevated it would have received 43 inches of flooding. Elevating homes has been proven to reduce flood damages; however, there is still a residual risk that a flood greater than the 100-year flood will cause damage. The only way to completely eliminate the risk is to relocate well outside the 100-year floodplain.



FIGURE 6-4 Home in eastern Jackson County elevated approximately 40 inches.



FIGURE 6-5 The high water mark on the air conditioner compressor indicates that the flood level was approximately 3 inches above the lowest floor.

6.1.2 Coastal Flooding

Coastal surge from Gulfport to Biloxi caused only minimal structural damage. In these areas, buildings are well set back from the shoreline as shown in Figures 6-6 and 6-7. The impacts of storm surge, wave action, erosion, and scour were reduced to set back structures. In addition, Hurricane Georges' impact on these beaches appeared to be minimal. As shown in these figures, no appreciable road damage or overwash of sand onto Highway 90 was observed where the road followed the shoreline in Gulfport and Biloxi.



FIGURE 6-6 Coastal area near Gulfport. Note how buildings are set back from the shore.



FIGURE 6-7 Another coastal area near Gulfport.

Casino barges in Gulfport and Biloxi suffered minimal damage and disruption of business from coastal surge. Some roof damage due to high winds, as discussed in Section 6.2, resulted in rain infiltration damage to some casinos (Figure 6-8). The shipyards in Pascagoula were inundated by coastal storm surge and suffered some damage (Figure 6-9). Ingalls Shipbuilders, the area’s largest employer, has already retrofitted its shipyard, thereby protecting its means of production from the effects of Hurricane Georges and making the region’s economic base more secure.



FIGURE 6-8 Casinos suffered minimal damage from coastal storm surge.



FIGURE 6-9 Ingalls shipyard only suffered minor damage due to coastal storm surge.

Further eastward along the Mississippi Gulf Coast in the Belle Fontaine/Fontaine Bleu area (located between Ocean Springs and Gautier), more significant damage due to coastal surge was observed. The shoreline in this area consists of alternating sections of natural beach and bulkheads, dominated by narrow beaches without dunes (Figures 6-10 and 6-11).



FIGURE 6-10 Scour behind bulkhead near Belle Fontaine.



FIGURE 6-11 Severe beach erosion caused by wave action and storm surge.

Rip-rap at a public beach, old abandoned bulkheads, and old foundation piles, suggest a history of episodic and long-term erosion issues. Overwash was common, covering the roadway in the western areas. Vertical beach loss of several feet occurred, as did localized scour around bulkheads. Lack of adequate building setbacks from the shoreline in combination with inadequate foundation systems left many houses extremely vulnerable to storm surge and wave-induced damage in the Belle Fontaine/Fontaine Bleau area (Figures 6-12 to 6-16). Adequately sited and elevated homes performed well (Figure 6-17).



FIGURE 6-12 Highly exposed structure that suffered damage from storm surge and high winds.



FIGURE 6-13 Only the deck remains standing on this home. House debris can be seen in the background. Storm-induced beach erosion and inadequate pile embedments contributed to the failure of this home.



FIGURE 6-14 The houses in this area were destroyed. Piles were embedded in concrete to a depth of only 2 feet. Storm-induced erosion of 2 to 3 feet resulted in complete failure of the foundation systems.



FIGURE 6-15 Inadequate embedment of piles from a destroyed home.



FIGURE 6-16 All that remains of this oceanfront manufactured home that was located on this lot is the bent metal frame. The foundation system was dry-stacked blocks. Tiedown anchors on the Gulf side of the home failed due to erosion and flood forces.



FIGURE 6-17 This house was set back 100 feet or more from the open coast out of reach of velocity flow and wave action. Note elevated utility platform.

6.2 Wind Observations: Damages and Successes

The effects of hurricane-force winds were more obvious in the Gulfport-Biloxi area than the BPAT observed in either Alabama or Florida. Numerous built-up flat roofs on large institutional buildings failed, leaving the buildings open to rain damage. For example, the roof of the Singing River Hospital, a regional medical center in Pascagoula, was partially torn off. The loss of portions of the roof resulted in the evacuation of patient rooms and other areas of the hospital, including delivery rooms. Figure 6-18 shows the roof of the hospital being repaired.



FIGURE 6-18 Singing River Hospital, where emergency roof repairs are underway.

Damage occurred to the roofs of several buildings at the Mississippi Gulf Coast Community College in Gautier. Infiltration of rainwater due to the roof damage resulted in damage to interior areas (Figure 6-19). Loss of roof shingles and damage to signs was evident throughout the area (Figures 6-20 to 6-22).



FIGURE 6-19 Mississippi Gulf Coast Community College in Gautier, where restoration services are underway to dry out interior areas.



FIGURE 6-20 Roof damage to a hotel in Pascagoula.



FIGURE 6-21 Shingle roof damage to homes along the open Mississippi coast.



FIGURE 6-22 Sign damage in Pascagoula.

The team assessed the performance of several window and door shutter projects funded under FEMA's HMGP. The shutters were installed on public buildings. While there was little evidence of damage to the windows and doors of buildings from wind loads and airborne debris in the areas where these shutters were installed, it is worth noting that the buildings with shutters showed no damage as well and provided safe and secure shelter during the hurricane (Figure 6-23).



FIGURE 6-23 Window and door shutters on the Harrison County Municipal Building.