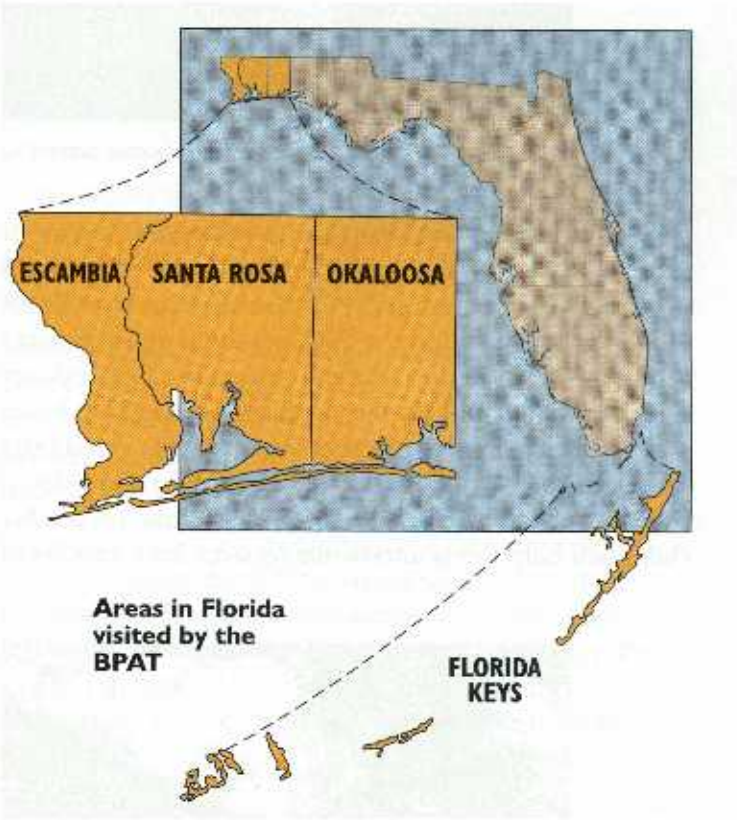
5 Florida Observations

5.1 Flood Observations: Damages and Successes

Based on the aerial survey and ground reconnaissance, the BPAT did not expect to observe any significant structural damage to buildings in Florida. Areas inundated by riverine or coastal flooding suffered losses to interior contents, finishes, wallboard, insulation, and electrical wiring.



5.1.1 Riverine Flooding

Flooding was extensive in the Yellow River, Perdido River, Escambia River, and Blackwater River watersheds in Florida. The recurrence intervals for the floods caused by Hurricane Georges exceeded the 100-year threshold for the Shoal and Yellow Rivers in the Yellow River watershed (see Figure 2-4, Section 2). Floods were estimated between the 50- and 100-year recurrence interval for the Perdido River in the Perdido River watershed, the 25-year recurrence interval for the Escambia River in the Escambia River watershed, and between the 25- and 50-year recurrence interval for the Blackwater River watershed.

The BPAT visited sites of riverine flooding along the Yellow and Shoal Rivers in Okaloosa and Santa Rosa Counties. The home shown in Figure 5-1 was flooded by several feet of water and is typical of the pre-FIRM, at-grade houses located in these areas.

FIGURE 5-1 Repetitively flooded home slated for acquisition under FEMA's HMGP.

In accordance with the County's NFIP compliant floodplain management requirements, the replacement home shown in Figure 5-2 was recently built to the BFE with a Small Business Administration (SBA) disaster loan after flooding damaged it earlier this year. Floodwaters exceeded the BFE, reaching approximately 3 feet above the first-floor elevation. While the construction of the home to the BFE reduced the damages from Hurricane Georges — and will protect against damage from less intense, future storms — a residual risk still remains from floods exceeding the BFE. A freeboard requirement would have further reduced the risk of flooding. Fortunately, a condition of the SBA loan required the property owner to maintain flood insurance coverage on the home. Proceeds from the insurance claim will help the homeowner recover from this flood.

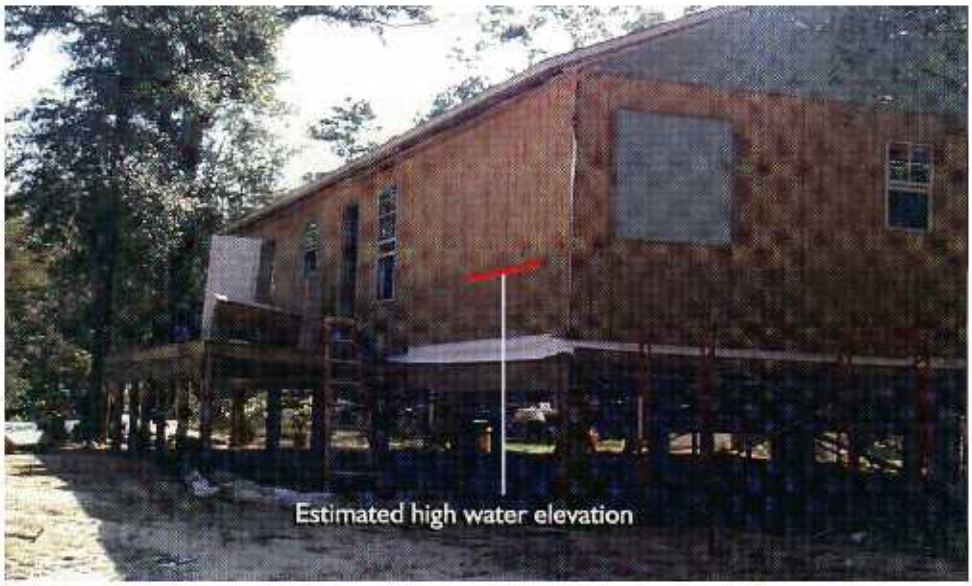


FIGURE 5-2 A high water mark is visible approximately 3 feet above the first floor elevation. The house, located along the Shoal River in Okaloosa County, suffered little damage because insulation and wallboard had not yet been installed.

The BPAT assessed damage from riverine flooding on the Shoal River that exceeded the base flood level by several feet. Homes elevated to the BFE flooded when water levels exceeded the BFE, as was the case with the home in Figure 5-2. Homes built outside, but adjacent to, the SFHA were flooded when water levels exceeded the limits of the SFHA. Homes in Figure 5-3 were built in the last five to seven years and they experienced significant flooding and damage when water levels exceeded the BFE and the limits of the SFHA.

The 100-year (24-hour) rainfall in the vicinity of Crestview is 13 inches [NWS 1961]. Hurricane Georges exceeded the 100-year rainfall by producing approximately 20 inches of rainfall in the Crestview area [NWS 1998]. A USGS river gaging station on the Shoal River near Crestview, Florida, is located just upstream of the neighborhood where the homes in Figure 5-3 are located. During the storm, a record height of 21.40 feet above the gage datum was recorded; the previous peak height was 15.58 feet. This new record corresponds to 68.61 feet, referenced to the National Geodetic Vertical Datum (NGVD). The neighborhood is located approximately 1,000 feet downstream of the gaging station, and the first floor elevations of the homes range from 62.0 to 64.5 feet (NGVD). The BFE at this site is 61.4 feet. The BPAT observed flooding depths of 3 to 4 feet in these homes, indicating that the flood was greater than a 100-year event.

The flood discharge along Shoal River is estimated to have reached 59,000 cfs, more than twice the previous peak discharge record. This discharge is estimated to have a 300- to 400- year recurrence interval, far exceeding the discharge of the 100-year flood event, which is estimated at approximately 32,000 cfs.

Several other rivers in the Florida Panhandle region experienced floods of equal magnitude. The Perdido River at Barrineau Park, near the Florida/Alabama border, reached flows of 44,000 cfs, which is estimated to have a recurrence interval of 50-100 years. The previous peak discharge of record was 39,000 cfs, occurring in 1995. Additionally, Elevenmile Creek near Pensacola, Florida peaked at about 13,000 cfs, which is also estimated as a 100- to 200-year event.

While locating homes directly adjacent to but outside the SFHA may eliminate both the mandatory flood insurance purchase requirement and floodplain management construction requirements, the risk of flooding is not completely eliminated. This residual risk, without the financial protection of flood insurance coverage, left many homeowners whose flooded homes were located outside the SFHA, ill-prepared to recover from flood damage caused by Hurricane Georges.

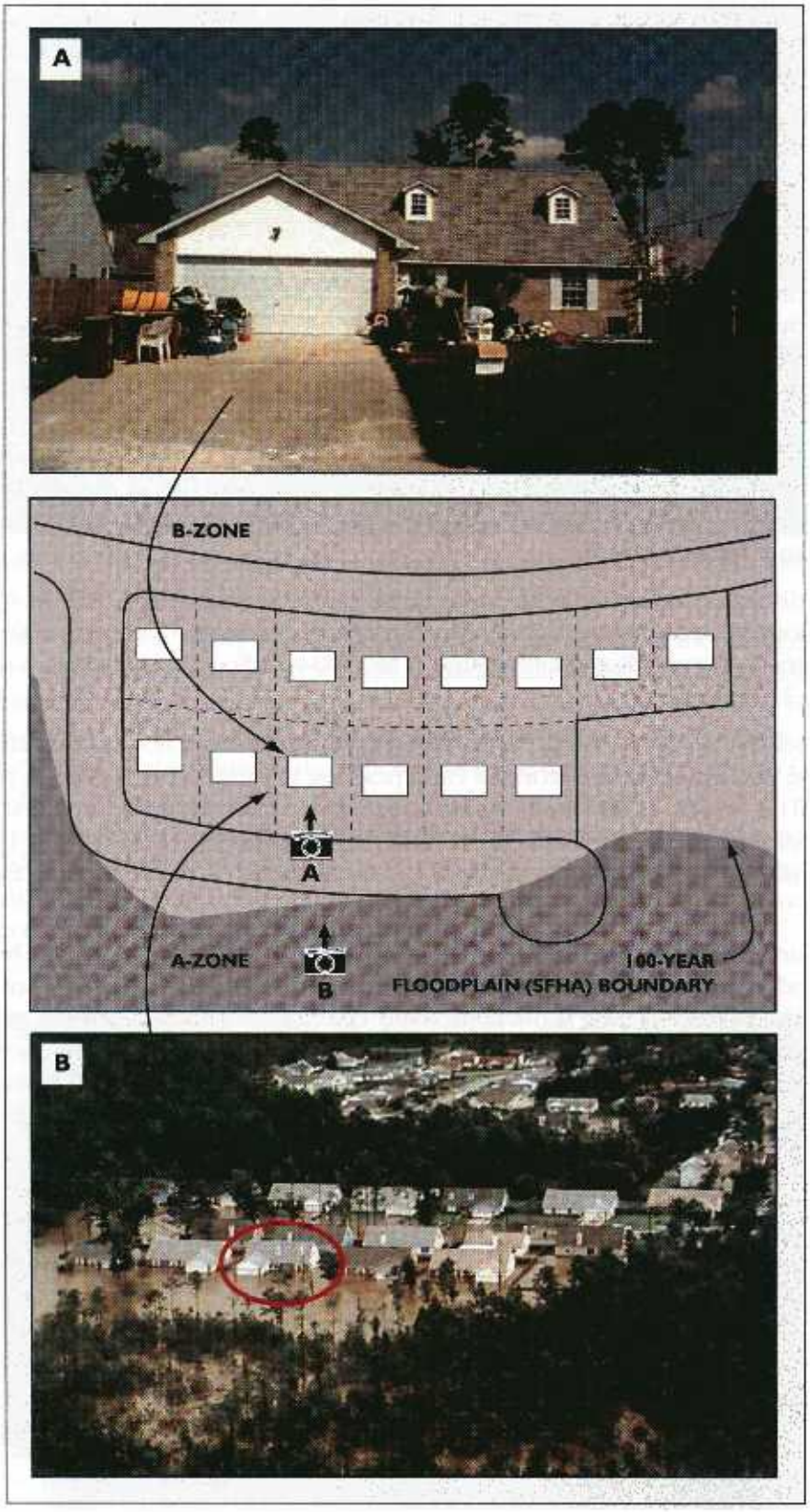


FIGURE 5-3 The home pictured above is one of approximately 10 homes in this subdivision which experienced flood depths of 2 to 3 feet when the water levels exceeded the BFE and extended beyond the limits of the SFHA.

5.1.2 Coastal Flooding

The BPAT conducted an aerial inspection of the coastal areas of Florida from Pensacola Beach to Navarre Beach On-the-ground inspections of coastal damages were confined to Pensacola Beach.

In Pensacola Beach, prolonged wave attack and storm-surge flooding associated with the hurricane eroded most of the primary dune system and narrowed the beach (Figures 5-4 and 5-5). Overwash was significant, but not as severe as experienced during Hurricane Opal. Vertical sand accretion beneath some structures was 3 to 5 feet. Even after Hurricane Georges, Pensacola Beach remains relatively wide with scattered residual dunes Offshore sandbars were observed migrating back onto the beach in some locations.

FIGURE 5-4 Pensacola Beach before Hurricane Georges.

FIGURE 5-5 Pensacola Beach after Hurricane Georges. Note the loss of dune and vegetation in the foreground of the photo.

Much of the sand that was washed inland buried roads, utilities and lower areas of buildings. As shown in Figure 5-6, homeowners removed excess sand.

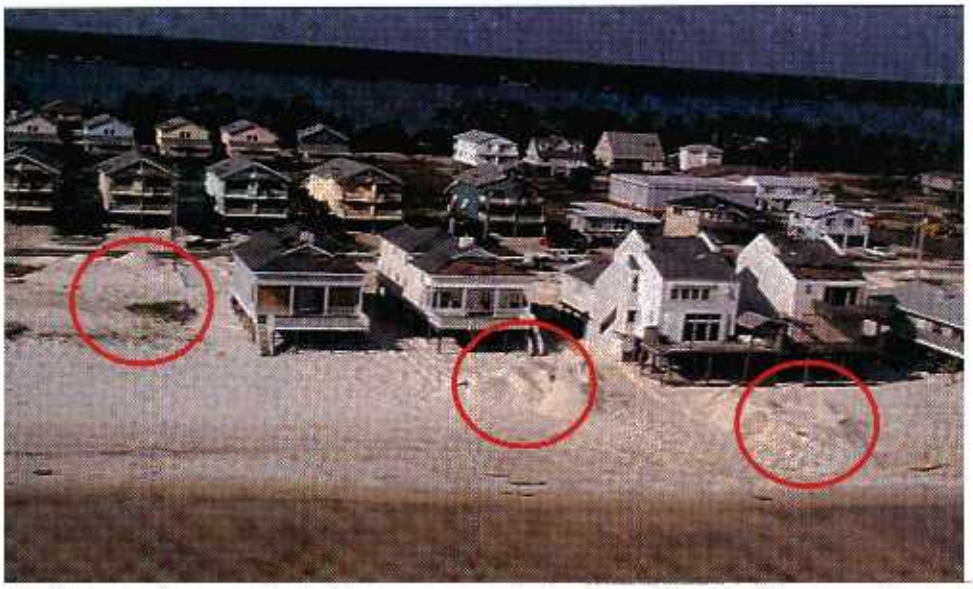


FIGURE 5-6 Excess sand (circled) from beneath houses and on roadways that was returned to the beach.

The volume of overwashed sand made the road from Pensacola Beach to Navarre Beach impassable. Reportedly, significant portions of the post-Hurricane Opal reconstructed dune in Navarre Beach were lost (Figures 5-7 and 5-8).

FIGURE 5-7 Navarre Beach before Hurricane Georges.

FIGURE 5-8 Navarre Beach after Hurricane Georges. Note the loss of revegetated dune.

In Pensacola Beach, post-FIRM elevated structures performed well, suffering only residual damage to storage, access, and parking areas below the first floor (Figure 5-9). In V-Zone areas, the BPAT observed minimal enclosures below the first floor of elevated structures Breakaway walls, where observed, performed as intended.

FIGURE 5-9 The structures to the left were elevated and set back and performed well.

The house in Figure 5-10 clearly illustrates the reduction in flood damages that occur when homes are properly elevated. The elevated addition suffered no damage while the pre-existing, at-grade portion of the home suffered extensive flood damage from overwash.

FIGURE 5-10 An existing slab-on-grade home was expanded with a properly elevated addition.

The BPAT also investigated the performance of several Pensacola Beach hotels. Older, pre-FIRM buildings, such as the hotel in Figure 5-11, suffered flood damage. Flood and rain damage forced the hotel in Figure 5-11 to close for repairs. The property management company reported that it would be closed for three to four months, forcing the layoff of approximately 50 housekeeping and support staff. In contrast, newer hotels with elevated first floors in compliance with the current floodplain management ordinance suffered minimal damage (Figure 5-12). The hotel in Figure 5-12 suffered minimal damage and was able to continue operations without disruption.

FIGURE 5-11 An older hotel that suffered significant damage to the interior due to storm surge and roof leakage.

FIGURE 5-12 A newer hotel with an elevated first floor that suffered minimal damage.

5.2 Wind Observations: Damages and Successes

In general, Hurricane Georges caused minimal wind damage in Florida. Buildings highly exposed along the open coast suffered some wind damage, including loss of sections of composition roof shingles and small sections of siding, which allowed rain infiltration to damage building interiors and contents (Figure 5-13).

FIGURE 5-13 The house on the left suffered wind damage to roofing shingles.

The BPAT assessed the performance of several window and door shutter projects funded under FEMA's HMGP. The shutter projects were applied to public buildings, including municipal office buildings, fire stations, and police stations. While there was little evidence that wind forces and airborne debris caused damage to windows and doors in the area, buildings with shutters showed no damage and provided a safe and secure shelter facility during the hurricane (Figures 5-14 to 5-16).

FIGURE 5-14 Window shutters on the Pensacola Fire Station No. 4.