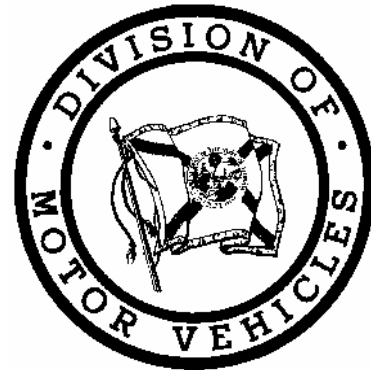


**MOBILE/MANUFACTURED HOME  
DAMAGE  
ASSESSMENT FROM  
HURRICANE DENNIS  
2005**



**BUREAU OF MOBILE HOME AND RV CONSTRUCTION  
DIVISION OF MOTOR VEHICLES  
DEPARTMENT OF HIGHWAY SAFETY AND  
MOTOR VEHICLES**

**July 20, 2005**

# **MOBILE HOME DAMAGE ASSESSMENT FROM HURRICANE DENNIS: 2005**

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# **MOBILE HOME DAMAGE ASSESSMENT FROM HURRICANE DENNIS: 2005**

## **NOTE: LIMITATIONS OF THE REPORT**

The purpose of this report is strictly for the use of the Florida Department of Highway Safety and Motor Vehicles to determine the effectiveness of current department administrative rules governing the installation of mobile/manufactured homes.

All statistics reported here are from a sample of mobile home parks. In addition, due to debris, entry into some of the mobile homes observed was not possible to make more specific determinations. Consequently, the statistics reported here are estimates. There may be differences between what is reported here and determinations by local building departments, insurance companies or other government agencies

When reporting the number of homes "destroyed or non-repairable" the totals represent homes with severe roof damage to the point of the roof being blown from the home, one or more exterior walls being separated from the home or water completely penetrating the unit.

## **EXECUTIVE SUMMARY**

Staff of the Bureau of Mobile Home and Recreational Vehicle (RV) Construction in the Division of Motor Vehicles (DMV), Department of Highway Safety and Motor Vehicles (DHDMDV), assessed mobile home damage caused by Hurricane Dennis in a sample of 21 mobile home parks in the path of this hurricane. One central focus of this assessment was how the amendments to mobile home construction standards adopted by the U.S. Department of Housing and Urban Development (HUD) in 1994 held up to the wind, rain and storm surge forces of this hurricane. The other was how the new mobile home installation standards adopted by the DHSMV in 1999 held up to these storm forces.

The assessment found that of the 1,170 mobile homes located in the mobile home parks visited, 15 were destroyed or were not repairable. Of these 15 destroyed mobile homes, 8 were destroyed by falling trees rather than by wind or water forces. Only one destroyed home was built subsequent to the 1994 amendments to HUD's mobile home construction standards and it was destroyed by a falling tree rather than by wind or water forces.

The minimal damage to mobile homes caused by Hurricane Dennis was, in part, due to the fact that it was a very compact storm with a fast forward speed; much more compact and faster moving than Hurricane Ivan which hit the same area in 2004. In addition, compared to the other hurricanes that hit Florida in 2004, Hurricane Dennis caused less damage because the mobile homes in the Northwest panhandle of Florida had far fewer carports, awnings and sheds attached to the homes compared to their South Florida counterparts. The damage that was caused by Hurricane Dennis was disproportionately caused by falling trees which appear in much greater number in the Northwest Panhandle compared to Central and South Florida.

# **BACKGROUND**

## **Regulation of Mobile/Manufactured Home Construction**

The National Manufactured Housing Construction and Safety Standards Act of 1974 authorized the U.S. Department of Housing and Urban Development (HUD) to regulate the construction of mobile homes which are now called manufactured homes. This law required HUD to develop construction standards for manufactured homes and regulate the construction process. HUD implemented this program in 1976.

HUD regulates manufactured home construction through its agents which are called Production Inspection and Primary Inspection Agencies (IPIA). In 8 of the states where manufactured home construction occurs, the IPIAs are state agencies. In the other 10 states where manufactured home construction occurs the IPIAs are private contractors. Manufactured home complaints are handled by State Administrative Agencies (SAA). There are 38 state agencies which serve as SAAs. In the other 12 states, HUD handles manufactured home complaints directly. In Florida, the Bureau of Mobile Home and Recreational Vehicle (RV) Construction (BMHRVC) in the Division of Motor Vehicles (DMV), Department of Highway Safety and Motor Vehicles (DHSMV) serves as both the IPIA and SAA.

In reaction to the devastation caused by Hurricane Andrew in Dade County, Florida in 1992, HUD amended its regulations governing manufactured home construction to ensure that they were more resistant to wind damage. These new regulations in HUD's National Manufactured Housing Construction and Safety Standards, which appear in Title 24 Code of Federal Regulations, Part 3280, went into effect in July, 1994.

In its regulation revisions, HUD created a third Wind Zone category for the areas which receive the most severe winds. Wind Zone I areas are those with the least wind and Wind Zone III areas those with the most severe winds. HUD specified the Wind Zones for all areas of the United States. These regulations required that manufactured homes must be designed by a professional engineer or architect to withstand winds up to certain speeds in the three Wind Zone areas. Manufactured homes built for Wind Zone I must be able to withstand winds of up to 90 miles per hour. Mobile homes built for Wind Zone II must be able to withstand winds of up to 100 miles per hour. Manufactured homes built for Wind Zone III must be able to withstand winds of up to 110 miles per hour. In Florida 53 counties are designated Wind Zone II and 14 counties are designated Wind Zone III (see Figure 1). In addition, HUD has specified "Exposure D" areas. These areas are located within 1,500 feet of the coastline. Homes constructed for these areas require some additional strengthening. A manufactured home dealer may not sell a manufactured home to a customer that is not designed for the Wind Zone area where the customer intends to install the home.

Revisions in federal construction requirements for mobile/manufactured homes went into effect in 1994 along with the new wind zone designations. These revisions significantly enhanced the wind resistance of mobile/manufactured homes.

The following is an overview of the new construction standards:

1. Increased strength in the tie-down connections between the roof and walls and between the walls and the floor assembly.
2. Wind Zone III homes required to have larger studs (2x6) and studs to be placed closer together. All homes build prior to 1976 have 2x3 studs. Wind Zone II homes built after 1976 have 2x4 studs.
3. Additional design provisions required for the attachment of exterior coverings and sheathings. Siding is now required to be structurally supported, thereby helping to keep siding in place during wind events.
4. Increased resistance of windows to high wind forces. Density of window panes required to be thicker for improved wind deflection.
5. Extra framing is added in window and door openings to allow the inclusion of storm shutters, thereby reducing impact damage due to flying debris.

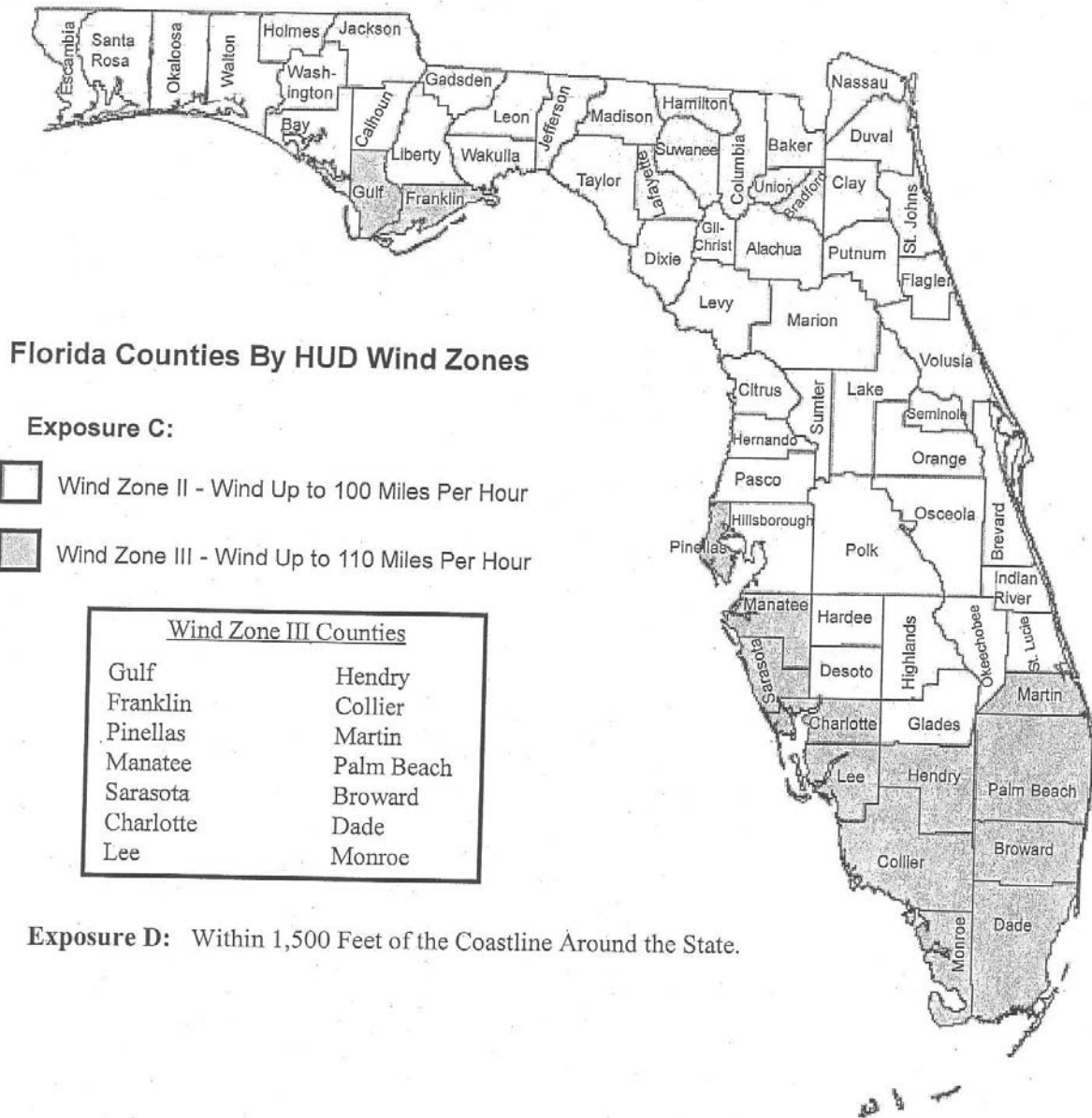
### **Regulation of Mobile/Manufactured Home Installation**

In 1996, pursuant to section 320.8249, Florida Statutes (F.S.), the DHSMV began to regulate manufactured home installation in an effort to improve the safety of mobile/manufactured home tie-downs. DHSMV promulgated administrative rules which govern the structural standards of manufactured home piers, anchors, tie-down straps, and site preparation. These rules also specify the number of tie-downs required to install a manufactured home. The bureau licenses and regulates manufactured home installers. Section 320.8249, F.S., provides that all manufactured homes installed in Florida must be installed by a licensed installer. In 1999, the department amended its manufactured home installation standards to make them more stringent. Key elements of these amendments include the following:

- All anchors must be galvanized.
- Minimum stabilizer plates 180 square inches, galvanized.
- Minimum height of 18 inches.
- Ground anchors/Florida Only.
- Type I 4 feet for use above 276 pounds inch torque value
- Type II 5 feet for use below 275 pounds inch torque value
- I-Beam clamp that pivots top of frame only.
- Sidewall and frame ties 5 feet 4 inches on center.
- Longitudinal anchors, 2 per I-Beam per end.
- Centerline ties within 2 feet each end.
- Galvanized straps, 60 ounces both sides or nominal G115
- Radius clip protection.
- Soil test by installer to determine proper anchor.
- Installer plan for 1,000 pounds per square foot soil.

In December, 2005, HUD will promulgate regulations governing manufactured home installation. Any state that does not have a program in this regard will be regulated directly by HUD. Florida's manufactured home installation program is generally considered a model for the United States.

**FIGURE 1**





**State of Florida**  
**DEPARTMENT OF**  
**HIGHWAY SAFETY AND MOTOR VEHICLES**  
**TALLAHASSEE, FLORIDA 32399-0500**

FRED O. DICKINSON  
Executive Director

**DATE:** July 18, 2005

**TO:** Phil Bergelt, Program Manager

**FROM:** Wayne Jordan, Community Assistance Consultant

**SUBJECT:** Manufactured Home study from Hurricane Dennis

The National Oceanic and Atmospheric Administration reported Hurricane Dennis making landfall at 2:25pm CDT on July 10, 2005, between Pensacola Beach and Navarre Beach with wind speeds ranging from 115 to 120 MPH. The Pensacola News-Journal compared Hurricane Dennis with Hurricane Ivan and found both storms to be Category 3 with sustained winds up to 120 MPH. It was reported that Hurricane Dennis's eye was eight miles across with hurricane-force winds extending 40 miles from the center and a storm surge of four to 5.5 feet. Hurricane Ivan's eye was 40 to 50 miles across with hurricane-force winds extending 105 miles from the center and a storm surge of 10 to 15 feet.

Our observations indicate that Hurricane Dennis did not produce as much damage as Hurricane Ivan last September. Electrical lines and trees suffered the most damage. Manufactured homes did not have significant damage when compared to Ivan. Even older parks in the eye of the storm sustained little damage. The damage to manufactured homes was usually limited to vinyl siding and skirting.

Twenty-one parks or subdivisions (real property with manufactured homes) were visited in eleven communities covering four counties. Approximately 1,170 homes were assessed with 15 homes being destroyed. Of the 15 destroyed homes 8 were from falling trees. Three oak trees had fallen into one singlewide pre HUD home. Two pre HUD homes were found to have shifted on their foundation, but inspections showed both homes were installed many years ago (late 70s or early 80s). One home had only 3 anchors on each side and the other had only 5 anchors per side with no stabilizer plates. Both homes were installed years prior to the current installation standards which now require an anchor ever 5 feet 4 inches. Of the 15 homes destroyed only 1 was a post-1994 home and it was destroyed by a falling tree.

Several items were unique to the Panhandle manufactured/mobile home parks. The parks are occupied with more working families unlike the retirement parks of south Florida. More parks were in mixed neighborhoods (mobiles, site built, and modulares). There were fewer carports,



Phil Bergelt  
Page Two  
July 18, 2005

awnings and sheds than in southern Florida's mobile home communities. There are a large number of trees in the panhandle parks which may have been helpful in keeping high winds aloft.

Other contributing factors to less damage were the following: Dennis was a more compact storm, its forward speed was faster than Ivan and the area the eye passed over was east of Escambia County causing little storm surge. Also, as reported by an Escambia county commissioner, was the fact that Dennis came ashore in a relatively unpopulated area.

**NOTE:**

The purpose of this report is strictly for the use of the Florida Department of Highway Safety and Motor Vehicles to determine the effectiveness of current department administrative rules governing the installation of mobile/manufactured homes.

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**FIGURE 2**  
**THE PATH OF HURRICANE DENNIS**



**Source:** Wikipedia – The Free Encyclopedia at: [http://en.wikipedia.org/wiki/Hurricane\\_Dennis](http://en.wikipedia.org/wiki/Hurricane_Dennis)

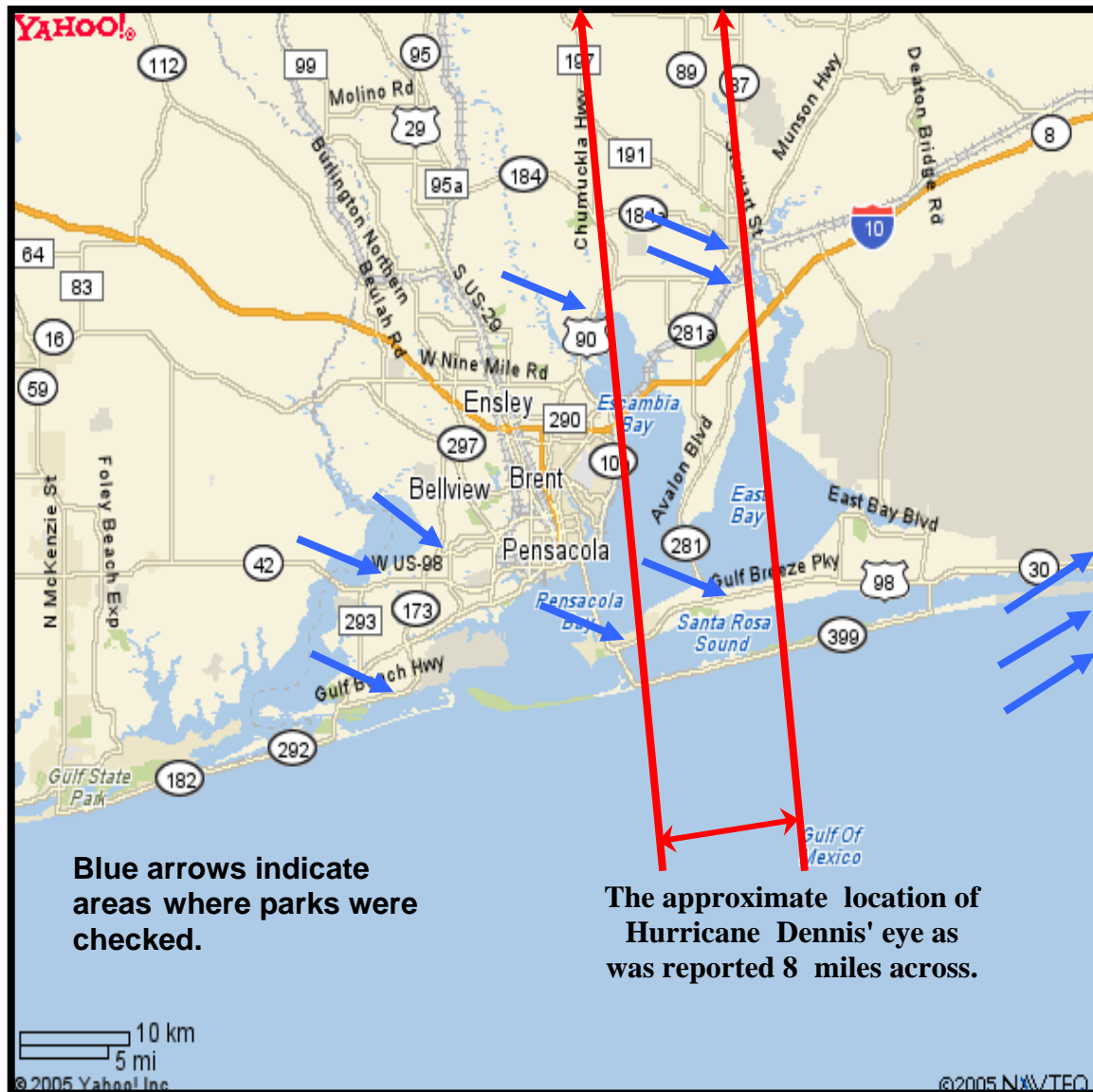
# TABLE 1

## A Study of Damage to Mobile/Manufactured Homes Caused by Hurricane Dennis

DATA ESTIMATES									
Date	Mobile Home Park	Address	City	County	Age of park by decade	# Homes in park	# Homes destroyed or non repairable	# of 94 or newer homes	# Homes flooded
7/11	Plantation Place	106 CR 393	Santa Rosa Bch	Walton	80s - 00s	21	0	4	0
7/11	Destin East	9950 US HWY 98 W	Destin	Walton	90s - 00s	200	0	150	0
7/11	Destin Marina/TrailerPk	7 Calhoun Ave	Destin	Okaloosa	pre HUD	10	0	0	0
7/12	R/P Subdivision	Hickory Hammock	Milton	Santa Rosa	90s - 00s	25	0	15	0
7/12	R/P Subdivision	Persimmon Hollow	Milton	Santa Rosa	70s - 00s	20	1 *	15	0
7/12	Marlborough Village R/P	Palomino	Milton	Santa Rosa	80s - 00s	55	0	10	0
7/12	North Side Trailer Park	205 Alabama St.	Milton	Santa Rosa	80s - 00s	10	2 **	7	0
7/12	The Oaks MHP	4351 Garcon Point Rd	Milton	Santa Rosa	70s - 90s	8	6 *	1	0
7/12	Ponderosa MHP	4382 Trailer Pk Ct	Milton	Santa Rosa	60s - 70s	18	0	0	0
7/12	R/P Subdivision	Hwy 10 & Tamarind	Milton	Santa Rosa	60s - 70s	16	5 *	0	0
7/12	Bay Breeze Trailer Pk	3952 Bayview PK Ct	Pace	Santa Rosa	70s	14	0	0	0
7/12	Bayview Park	3952 Bayview PK Ct	Pace	Santa Rosa	pre HUD	11	0	0	0
7/12	Barefoot Bay	Blue Angles Pkwy	Pensacola	Escambia	90s - 00s	68	0	68	0
7/12	Admiral MH Park	8121 Lillian Hwy	Pensacola	Escambia	70s - 90s	107	0	0	0
7/12	FEMA Park	Hwy 98 & 173	Pensacola	Escambia	00s	40	0	0	0
7/12	Bayou Grande Villa	Gulf Beach Hwy	Pensacola	Escambia	60s - 00s	218	0	30	0
7/12	East Bay MHP	1160 Pine St.	Gulf Breeze	Escambia	60s - 70s	6	0	0	0
7/12	East Bay Heights R/P	US 98 & America Av	Holly	Santa Rosa	70s 00s	100	0	20	0
7/12	Colonial Pines Estates	2101 Colonial Av	Navaree	Santa Rosa	80s - 00s	176	1 *	90	0
7/12	Laurent	2496 Hwy 98	Mary Esther	Okaloosa	pre HUD	30	0	0	0
7/12	Roses Trailer Park	3398 Hwy 98 W	Mary Esther	Okaloosa	pre HUD	17	0	0	0
<b>Total of 21 parks visited</b>					<b>Totals</b>	<b>1,170</b>	<b>15</b>	<b>450</b>	<b>0</b>
* pre July 1994 models									
**1 pre July 1994 and 1 post July 1994 models - tree damage									
<b>NOTE:</b> When reporting the number of homes "destroyed or non-repairable" the totals represent homes with severe roof damage to the point of the roof being blown from the home, one or more exterior walls being separated from the home, or water completely penetrating the unit.									
Date prepared July 19, 2005									

FIGURE 3

# THE PATH OF HURRICANE DENNIS OVER FLORIDA



**PHOTOS OF  
MOBILE/MANUFACTURED HOME  
DAMAGE CAUSED BY  
HURRICANE DENNIS**





Other than tree damage, homes built after July 1994 performed well. The only damage was to vinyl siding and vinyl skirting.





Vinyl siding and vinyl skirting damage.







Our observations indicate Rule 15C-1 installations  
are very effective







**Our observations found approximately 8 homes destroyed by falling trees.**







A new FEMA home destroyed by an oak tree.





**A home destroyed by a tree. This home was built before HUD took over the construction of manufactured homes.**









**This older home (before HUD) was installed many years ago and was pushed approx. 1 foot off its foundation.**





**This home had only three anchors per side. The anchors were installed 1 foot out of the ground and had no stabilizer plates.**





This home was damaged during Hurricane Ivan and Hurricane Dennis peeled more of the roof off.





**A home built before HUD took over the manufactured home program. The floor and foundation remained intact, but the walls were pushed in.**





**This home in Bayou Grande Villas had been heavily damaged from Hurricane Ivan as a result of 10 to 15 feet of storm surge. The home was replaced. Since Hurricane Dennis hit east of Escambia Bay, no manufactured homes were found to have been flooded in Escambia, Santa Rosa, Okaloosa or Walton Counties.**







**While assessing damage from Hurricane Dennis, we noticed this home survived two trees being blown onto the roof from Hurricane Ivan. This home was in Bayou Grande Villa in Pensacola.**





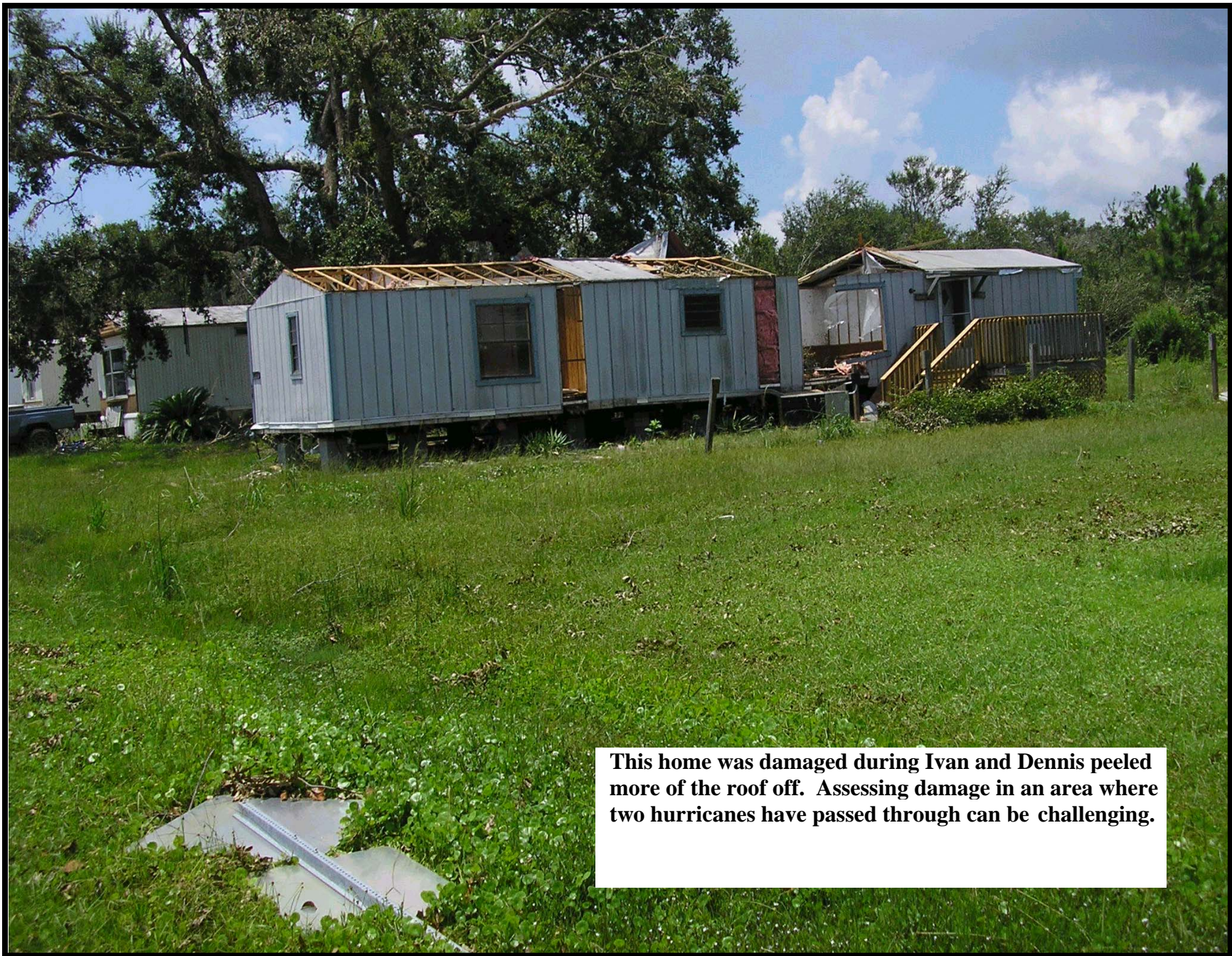
**Assessing storm surge  
damage at Bayview and Bay  
Breeze MHPs located in Pace  
at the north end of Escambia  
Bay.**

**The National Oceanic and Atmospheric Administration reported  
storm surges at 4 to 5.5 feet.**









**This home was damaged during Ivan and Dennis peeled more of the roof off. Assessing damage in an area where two hurricanes have passed through can be challenging.**