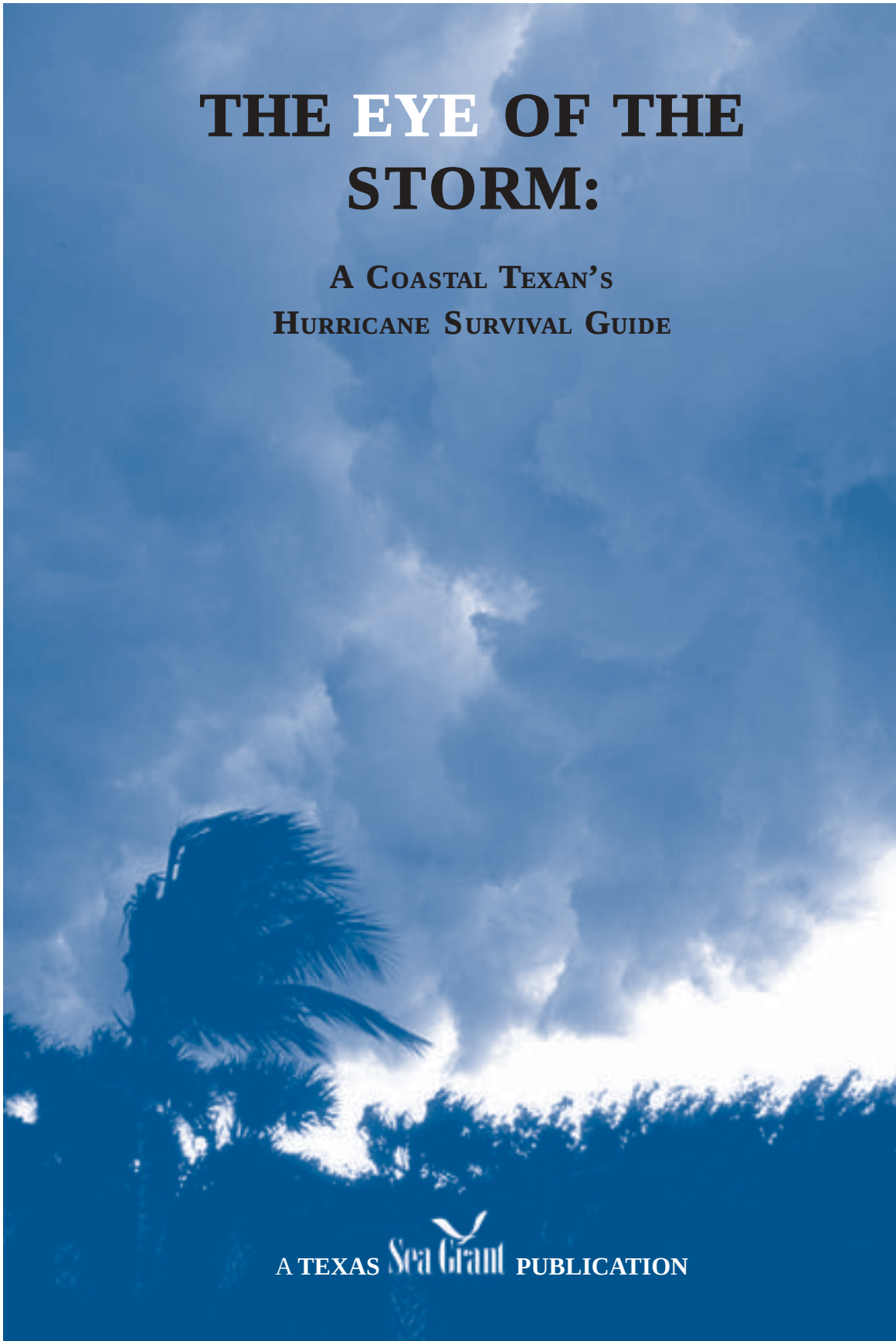
THE EYE OF THE STORM:

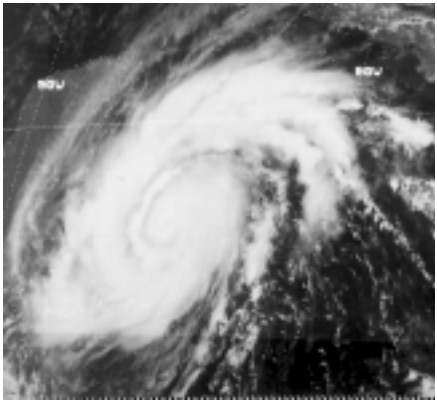
A Coastal Texan's Hurricane Survival Guide



A TEXAS Sea Grant PUBLICATION

THE EYE OF THE STORM:

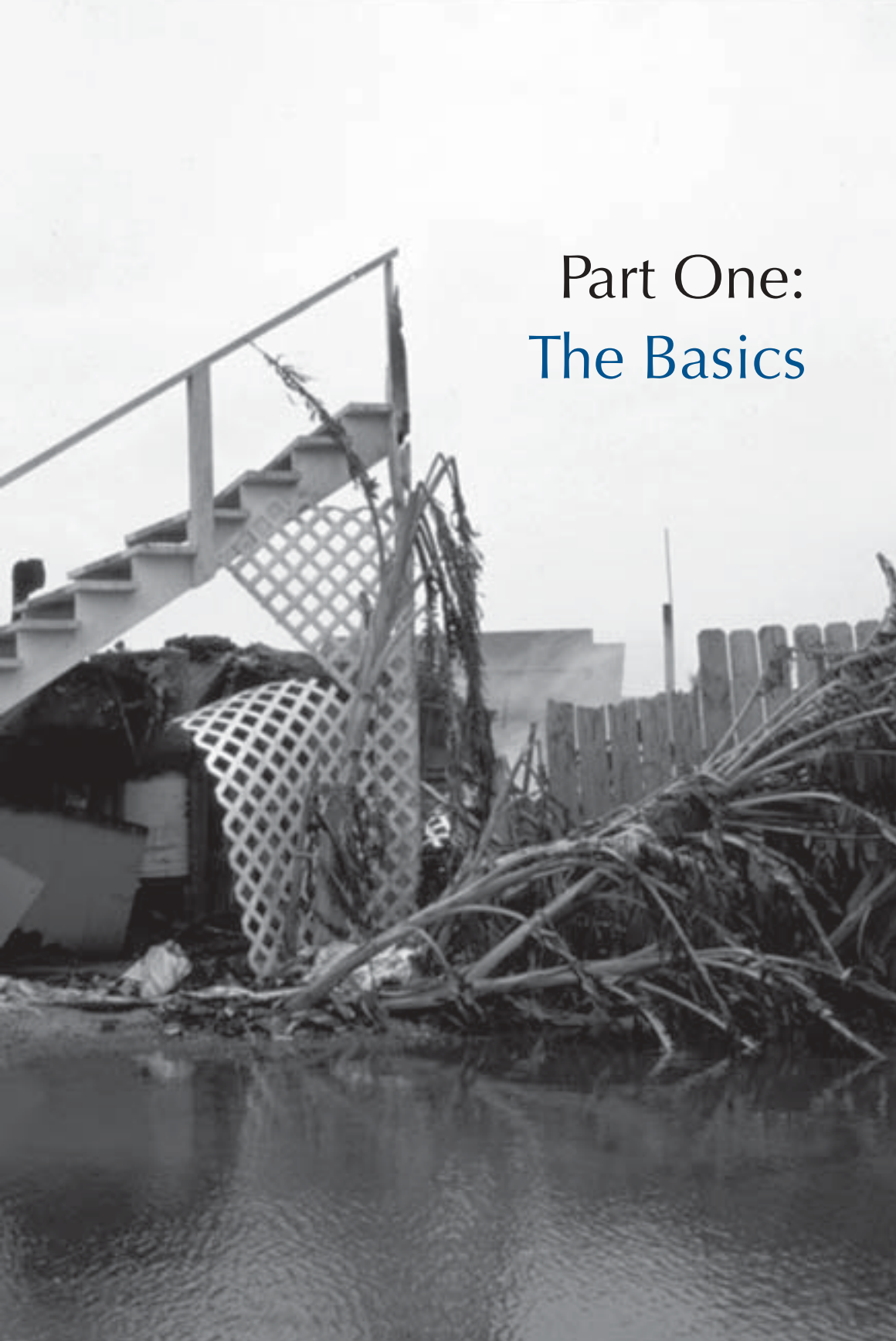
A Coastal Texan's Hurricane Survival Guide



Publication supported in part by Institutional Grant NA16RG1078 to Texas A&M University from the National Sea Grant Office, National Oceanic and Atmospheric Administration, U.S. Department of Commerce.

Single copies free; order from
Texas Sea Grant College Program
2700 Earl Rudder Freeway South,
Suite 1800
College Station, Texas 77845
http://texas-sea-grant.tamu.edu

TAMU-SG-03-501
5M August 2003
NA16RG1078
A/I-1



Part One:
The Basics

Saffir-Simpson Hurricane Scale

The Saffir-Simpson Hurricane Scale is a 1-5 rating based on the hurricane's present intensity. This is used to give an estimate of the potential property damage and flooding expected along the coast from a hurricane landfall. Wind speed is the determining factor in the scale, as storm surge values are highly dependent on the slope of the continental shelf in the landfall region. Note that all winds are using the United States one-minute average.

Category One Hurricane:

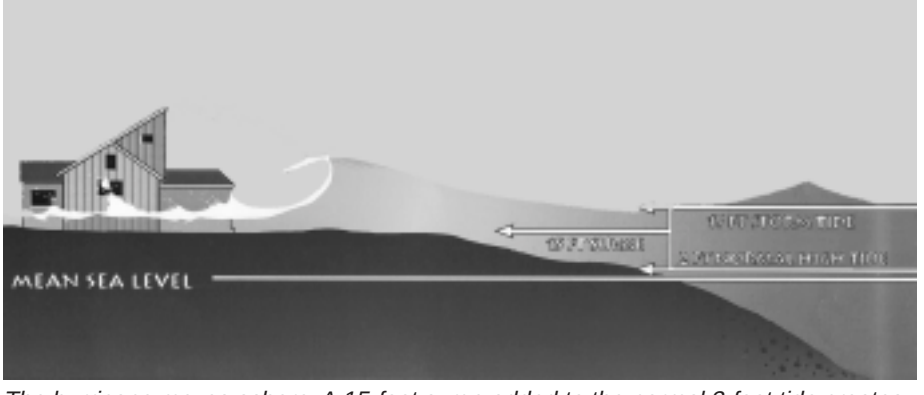
Winds 74-95 mph (119-153 kph). Storm surge generally 4-5 feet above normal. No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery and trees. Some damage to poorly constructed signs. Also, some coastal road flooding and minor pier damage. Hurricanes Allison of 1995 and Danny of 1997 were Category One hurricanes at peak intensity.

Category Two Hurricane:

Winds 96-110 mph (154-177 kph). Storm surge generally 6-8 feet above normal. Some roofing material, door and window damage of buildings. Considerable damage to shrubbery and trees with some trees blown down. Considerable damage to mobile homes, poorly constructed signs and piers. Coastal and low-lying escape routes flood 2-4 hours before arrival of the hurricane center. Small craft in unprotected anchorages break moorings. Hurricane Bonnie of 1998 was a Category Two hurricane when it hit the North Car olina coast, while Hurricane Georges of 1998 was a Category Two Hurricane when it hit the Florida Keys and the Mississippi Gulf Coast.

Category Three Hurricane:

Winds 111-130 mph (178-209 kph). Storm surge generally 9-12 feet above normal. Some structural damage to small residences and utility buildings with a minor



The hurricane moves ashore. A 15-foot surge added to the normal 2-foot tide creates a storm tide of 17 feet. This mound of water, topped by battering waves,moves ashore along an area of the coastline as much as 100 miles wide. The combination of the storm surge, battering waves and high winds is deadly.

amount of curtainwall failures. Damage to shrubbery and trees with foliage blown off trees and large tress blown down. Mobile homes and poorly constructed signs are destroyed. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the hurricane center. Flooding near the coast destroys smaller structures with larger structures damaged by battering of floating debris. Terrain continuously lower than 5 feet above mean sea level may be flooded inland 8 miles (13 km) or more. Evacuation of low-lying residences with several blocks of the shoreline may be required. Hurricanes Roxanne of 1995 and Fran of 1996 were Category Three hurricanes at landfall on the Yucatan Peninsula of Mexico and in North Carolina, respectively.

Category Four Hurricane:

Winds 131-155 mph (210-249 kph). Storm surge generally 13-18 feet above normal. More extensive curtainwall failures with some complete roof structure failures on small residences. Shrubs, trees and all signs are blown down. Complete destruction of mobile homes. Extensive damage to doors and windows. Low-lying escape routes may be cut by rising water three to five hours before arrival of the hurricane center. Major damage to lower floors of structures near the shore. Terrain lower than 10 feet above sea level may be flooded requiring massive evacuation of residential areas as far inland as 6 miles (10 km). Hurricane Luis of 1995 was a Category Four hurricane while moving over the Leeward Islands. Hurricanes Felix and Opal of 1995 also reached Category Four status at peak intensity.

Category Five Hurricane:

Winds greater than 155 mph (249 kph). Storm surge generally greater than 18 feet above normal.

Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. All shrubs, trees and signs blown down. Complete destruction of mobile homes. Severe and extensive window and door damage. Low-lying escape routes are cut by rising water three to five hours before arrival of the hurricane center. Major damage to lower floors of all structures located less than 15 feet above sea level and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5-10 miles (8-16 km) of the shoreline may be required. Hurricane Mitch of 1998 was a Category Five hurricane at peak intensity over the western Caribbean. Hurricane Gilbert of 1988 was a Category Five hurricane at peak intensity and is the strongest Atlantic tropical cyclone of record.

Essential Storm Terms

Bulletin: A public release from a Weather Service Hurricane Warning Office issued at times other than those when advisories are required. A bulletin is similar inform to an advisory but includes additional general newsworthy information.

Coastal Flood Watch: An alert that significant wind-forced flooding is to be expected along low-lying coastal areas if weather patterns develop as forecast.

Coastal Flood Warning: A warning that significant wind-forced flooding is imminent along low-lying coastal areas.

Cyclone: A closed system of cyclonic (counterclockwise direction) circulation characterized by low pressure and inclement weather.

Eye: The relative calm area in the center of a storm. Winds are light in this area and the sky often is only partly covered by clouds.

Gale Warning: A warning of sustained winds within the range of 39 to 54 mph (34 to 47 knots).

Hurricane: A tropical cyclone with sustained winds of 74 mph (64 knots) or greater.

Hurricane Advisories: Messages issued simultaneously by the Hurricane Warning Offices and the National Hurricane Center in Miami every six hours describing the storm, its position, anticipated movement and prospective threat.

Hurricane Watch: The first alert when a hurricane poses a possible, but as yet uncertain, threat to a certain coastal area, or when a tropical storm threatens the watch area and has a 50-50 chance of intensifying into a hurricane. Small craft advisories are issued as part of a hurricane watch advisory.

Hurricane Warning: Notice that within 24 hours or less a specified coastal area may be subject to (a) sustained winds of 74 mph (64 knots) or higher and/or (b) dangerously high water or a combination of dangerously high water and exceptionally high waves, even though expected winds may be less than hurricane force.

Land Subsidence: The sinking of the land, caused mainly by the withdrawal of underground water from wells supplying cities and industries. This phenomenon may cause coastal areas to become more vulnerable to tropical storm flooding.

Landfall: The position at a seacoast where the center of a hurricane passes from sea to land.

Local Action Statement: A public release prepared by a Weather Service Office in or near a threatened area giving specific details for its area of responsibility on weather conditions, evacuation notices and other precautions necessary to protect life and property.

Severe Thunderstorm Watch: Indicates that conditions are right for lightning, damaging winds greater than 58 mph, hail and/or heavy rain.

Severe Thunderstorm Warning: Indicates that severe thunderstorms have been sighted or indicated on radar.

Storm Warning: A warning of sustained winds in the range of 55 to 73 mph (48 to 63 knots) inclusive.

Damage from a Category One hurricane, Claudette, in Surfside, Texas, July 2003.

Storm Surge: An abnormal rise in the level of the sea produced by a hurricane or tropical storm.

Tornado: A violently rotating column of air, nearly always observable as a funnel cloud.

Tornado Watch: Indicates that weather conditions are right for a tornado to develop and the sky should be watched.

Tornado Warning: Indicates a tornado has been sighted or is indicated on radar.

Tropical Disturbance: A moving area of thunderstorms of tropical origin that maintains its identity for 24 hours or more.

Tropical Depression: A tropical cyclone with sustained winds of 39 to 73 mph (34 to 63 knots).

Tropical Storm: A tropical cyclone with sustained winds of 39 to 73 mph (34 to 63 knots).

Part Two:
Safety

Before a Hurricane Threatens:

Know Elevation of Your Home Above Sea Level

This information is available from local Emergency Management offi-cials. Your nearest Weather Station office can supply flood-stage data for area streams and bayous.

Learn Potential Maximum Storm Surge

Find out if your home is subject to storm surge (tidal) flooding. Information about the potential for inland flooding and storm surge is available through the nearest Weather Station office.

How Safe is Your Home?

Plan to relocate during a hurricane emergency if you live near the seashore. Always plan to relocate if you live in a mobile home.

Know Location of Nearest Shelter

Emergency Management or Red Cross personnel can give you the location of the shelter nearest your home and explain what you should bring with you.

Plan for your family's safety. Know how to contact family members should the need arise.

Plan Route to Safety If You Must Leave

Plan your escape route early. Check with Emergency Management personnel for low points and flooding history of your route. Check the number of hours it could take you to evacuate to a safe area during peak evacuation traffic.

Inventory Your Property

A complete inventory of personal property will help in obtaining insurance settlements and/or tax deductions for losses. Inventory checklists can be obtained from many sources, including your insurance representative. Do not trust your memory. List descriptions and take pictures. Store these and other important insurance papers in waterproof containers or in your safety deposit box.

Check Insurance Coverage

Review your insurance policies and your coverage to avoid misunderstandings later. Take advantage of flood insurance. Separate policies are needed for protection against wind and flood damage, which people frequently do not realize until too late. Do not wait until a hurricane is in the Gulf—by then, it is too late. When a storm is heading to shore, insurance offices are too busy preparing for the emergency and won't be able to respond to individual requests, and insurance cannot be obtained.

When a Watch Is Issued:

Make Plans Early

Listen Constantly to Radio or TV

Monitor storm reports and keep a log of hurricane position.Remember —evacua-

tion routes sometimes can be closed up to 20 hours before landfall by wind gusting or storm surge flooding. If considering moving to a shelter, make arrangements for all pets. Pets are not allowed in shelters. Refill needed prescriptions.
If evacuation has not already been recommended, consider leaving the area early to avoid long hours on limited evacuation routes.

Check Supplies

Transistor Radio with Fresh Batteries

A radio will be your most useful source of information. Have enough batteries to last several days. There may be no electricity.

Flashlights, Candles or Lamps, and Matches

Store matches in a waterproof container. Have enough lantern fuel for s everal days, and know how to use it safely.

Full Tank of Gasoline

Never let your vehicle gas tank be less than half-full during hurricane season. Fill the tank as soon as a hurricane watch is posted. Remember — when there is no electricity, gas pumps won't work.

Canned Goods and Non-perishable Foods

Store packaged foods that can be prepared without cooking and need no refrigeration. There may be no electricity or gas.

Containers for Drinking Water

Have clean, air-tight containers to store sufficient drinking water for several days. The city supply will probably be interrupted or contaminated.

Materials to Protect Glass Openings

Have shutters or lumber to protect large windows and doors and masking tape for use on small windows.

Materials for Emergency Repairs

Your insurance policy may cover the cost of materials used in temporary repairs so keep all receipts. These also will be helpful for any tax deductions.

When a Warning Is Issued:

Continue Listening to Radio or TV

Continue to monitor hurricane position, intensity and expected landfall.

If You Live in a Mobile Home

Check tie-downs and leave immediately for a safer place. Mobile homes are not safe in hurricane force winds.

Prepare for High Winds

Brace your garage door. Lower antennas. Be prepared to make repairs.

Anchor Outside Objects

Garbage cans, awnings, loose garden tools, toys and other loose objects can become deadly missiles. Anchor them securely.

Protect Windows and Other Glass

Board up or shutter large windows securely. Tape exposed glass to reduce shattering. Draw drapes across windows and close doors to protect against flying glass if shattering does occur.

Move Boats on Trailers Close to House

Fill boats with water to weight them down. Lash securely to trailer and use tie-downs to anchor the trailer to the ground or house.

Check Mooring Lines of Boats in Water — Then leave them.

Store Valuables and Personal Papers

Put irreplaceable documents in waterproof containers and store in the highest possible spot. If you evacuate, be sure to take them with you.

Prepare for Storm Surge, Tornadoes and Floods

Storm surge, tornadoes and flash floods are the worst killers associated with a hurricane. During a tornado warning, seek shelter inside, below ground level if possible, or in an interior hallway, closet or bathroom on ground level. If outside, move away at right angles from the tornado; if escape is impossible, lie flat in a ditch or low spot. The surge of ocean water plus flash flooding of streams and rivers due to torrential rains combine to make drowning the greatest cause of hurricane deaths.

Check Your Survival Supplies Again

If You Stay at Home:

Stay Indoors

Please stay in an inside room away from doors and windows, even if they are covered. Take refuge in a small interior room, closet or hallway. Don't go outside in the brief calm during passage of the eye of the storm. The lull sometimes ends suddenly as winds return from the opposite direction. Winds can increase in seconds to 75 mph or more.

Take Precautions

Turn refrigerator to maximum cold and open only when necessary. Turn off utilities if told to do so by authorities. Turn off propane tanks. Unplug small appliances. Fill bathtub and large containers with water for sanitary purposes.

Protect Property

Without taking any unnecessary risks, protect your property from damage. Temporary repairs can reduce your losses.

Stay Away from Windows and Glass Doors

Move furniture away from exposed doors and windows.

Stay Tuned to Media Broadcasts

Keep a radio or television tuned for information from official sources. Unexpected changes can sometimes call for last minute relocations.

If Winds Become Strong:

Close all interior doors. Secure and brace external doors.

If you are in a two-story house, go to an interior first-floor room, such as a bathroom or closet.

If you are in a multiple-story building and away from the water, go to the first or second floor and take refuge in the halls or other interior rooms away from windows.

Lie on the floor under a table or other sturdy object.

Remain Calm

Your ability to meet emergencies will help others.

If You Must Evacuate:

Know Where You Are Going

Please leave early, in daylight, if possible.

Let Someone Else Know Where You Are Going

Notify neighbors and a family member outside of the warned area of your evacuation plans.

Move your most valuable possessions that you can't take with you to higher points within your home.

Make Pet Preparations

Put food and water out for a pet if you cannot take it with you. Public health regulations do not allow pets in public shelters and most hotels/motels will not allow them.

For Shelters

Take one blanket or sleeping bag per person; special dietary foods; special items for infants, elderly or disabled family members; and lightweight folding chairs. Register every person arriving with you at the shelter. Do not take pets, alcoholic beverages or weapons of any kind to shelters. Be prepared to offer assistance to shelter workers if necessary, and stress to all family members their obligations to keep the shelter clean and sanitary.

Don't Travel Farther than Necessary

Roads may be jammed. Don't let your stranded auto become your coffin.

Claudette, July 2003, Surfside, Texas

Lock Windows and Doors

Turn off gas, water and electricity in your home. Check to see that you have done everything possible to protect your property from damage and loss.

Take Survival Supplies With You

First-aid kit
Flashlights and extra batteries
Canned or dried provisions, can opener, spoons, etc.
Bottled water (one gallon per person per day)
Extra family medications, prescriptions
Spare eyeglasses, hearing aids and batteries, if needed

Keep Important Papers With You At All Times

Driver's license and other identification
Insurance policies
Property inventory
Medic-alert or device to convey special medical information
Maps to your destination

Take Warm, Protective Clothing

One change of clothing and footware per person.

After the Hurricane:

If You Were Evacuated

Please delay your return until it is recommended or authorized by local authorities.

Beware of Outdoor Hazards

Moving water only 6 inches deep can sweep you off your feet. Also, standing water

may be electrically charged from underground or downed power lines. Report loose or dangling power lines immediately to the proper authorities. Many lives are lost through electrocution.

Walk or Drive Cautiously

Debris-filled streets are dangerous. Snakes and poisonous insects will be a hazard. Washouts may weaken road and bridge structures which could collapse under vehicle weight.

Guard Against Spoiled Food

Food may spoil if refrigerator power is off more than a few hours. Freezers will keep food several days if doors are not opened after power failure, but do not refreeze food once it begins to thaw.

Do Not Use Water Until Safe

Use your emergency supply or boil water before drinking until official word that the water is safe. Report broken sewer or water mains to the proper authorities.

Inspect Indoors

Check gas, water and electrical lines and appliances for damage. Use the phone to report life-threatening emergencies only.

Take Extra Precautions to Prevent Fire

Avoid using candles and other open flames indoors because of possible gas leaks. Use a flashlight to inspect damage. Keep in mind, too, lowered water pressure in city mains and the interruption of other services may make fire fighting extremely difficult after a hurricane.

The Recovery

Insurance

Insurance representatives will be on the scene immediately following a major disaster to speed up the handling of claims. Notify your insurance agent or broker of any loses — and leave word where you can be contacted.

Take Steps to Protect Property

Make temporary repairs to protect property from further damage or looting. Use only reputable contractors (sometimes in the chaotic days following a disaster, unscrupulous operators will prey on the unsuspecting). If possible check contractors through the better business bureau. Keep Receipts for material used.

Be Patient

Hardship cases will be settled first by insurance representatives. Don't assume your settlement will be the same as your neighbor's. Policy forms differ and storm damage is often eratic. In a major catastrophe, the insurance industry will have emergency

offices and extra manpower to expedite claim settlements and to speed recovery. Everyone cannot be first.

It Takes A Team Effort

Responsiblity for the clean-up falls to numerous locals. State and federal agencies. A local Emergency Management coordinator (the mayor, county judge or a designated representative) will be on hand to help residents in this effort.

Price Gouging

As unscrupulous as it may sound, some people take advantage of the misfortune of a hurricane, often times in the form of price gouging. For example, immediately following Hurricane Alicia in 1983, it was discovered that one Houston-Galveston area business was charging $1 per pound for ice. As if that weren't bad enough, a 92-year-old man was charged $5,000 to have one tree removed.

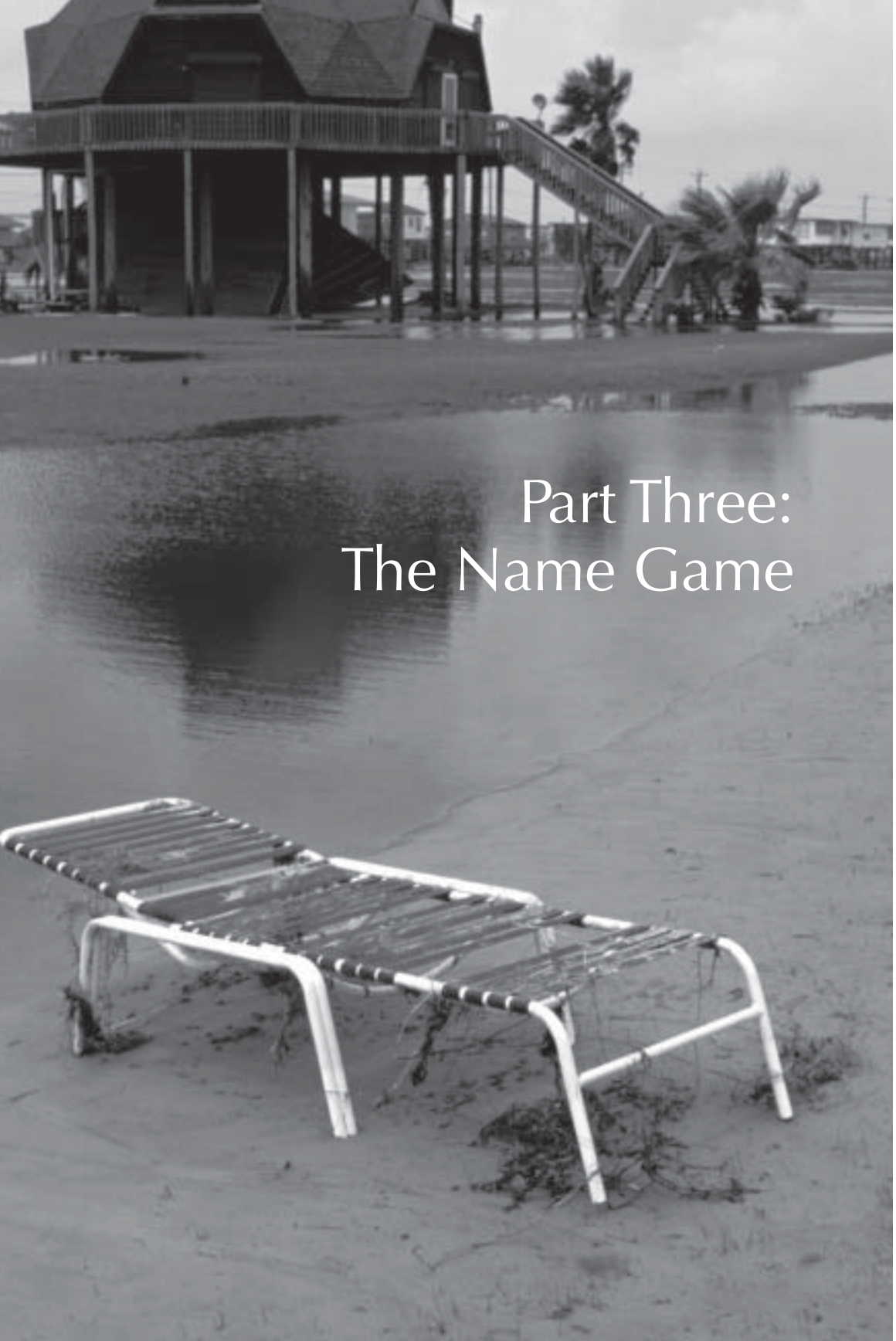
The Attorney General's Office admits price gouging happens frequently following a natural disaster, such as a hurricane or flood.

The Office also warns of "'fly-by-night operators' who promise to do great work, take your money up front and then never return to do this great work." If it sounds too good to be true, call the Better Business Bureau to find out if it is.

Price gouging is punishable by law, with penalties of up to $2,000 per occurrence with a maximum $10,000 fine per individual. Businesses may also be required to pay restitution and damages to consumers.

If you feel you have been victimized by price gougers, call the Attorney General's office at 1-800-621-0508 or write to: Consumer Protection Division, Office of the Attorney General, P.O. Box 12548, Austin, TX 78711-2548.

Surfside, Texas, in aftermath of Hurricane Claudette.



Part Three: The Name Game

Atlantic Hurricane Names

The names of tropical storms and hurricanes in the Atlantic Basin come from one of six lists. Storm names used in 2003 will be used again in the year 2009.

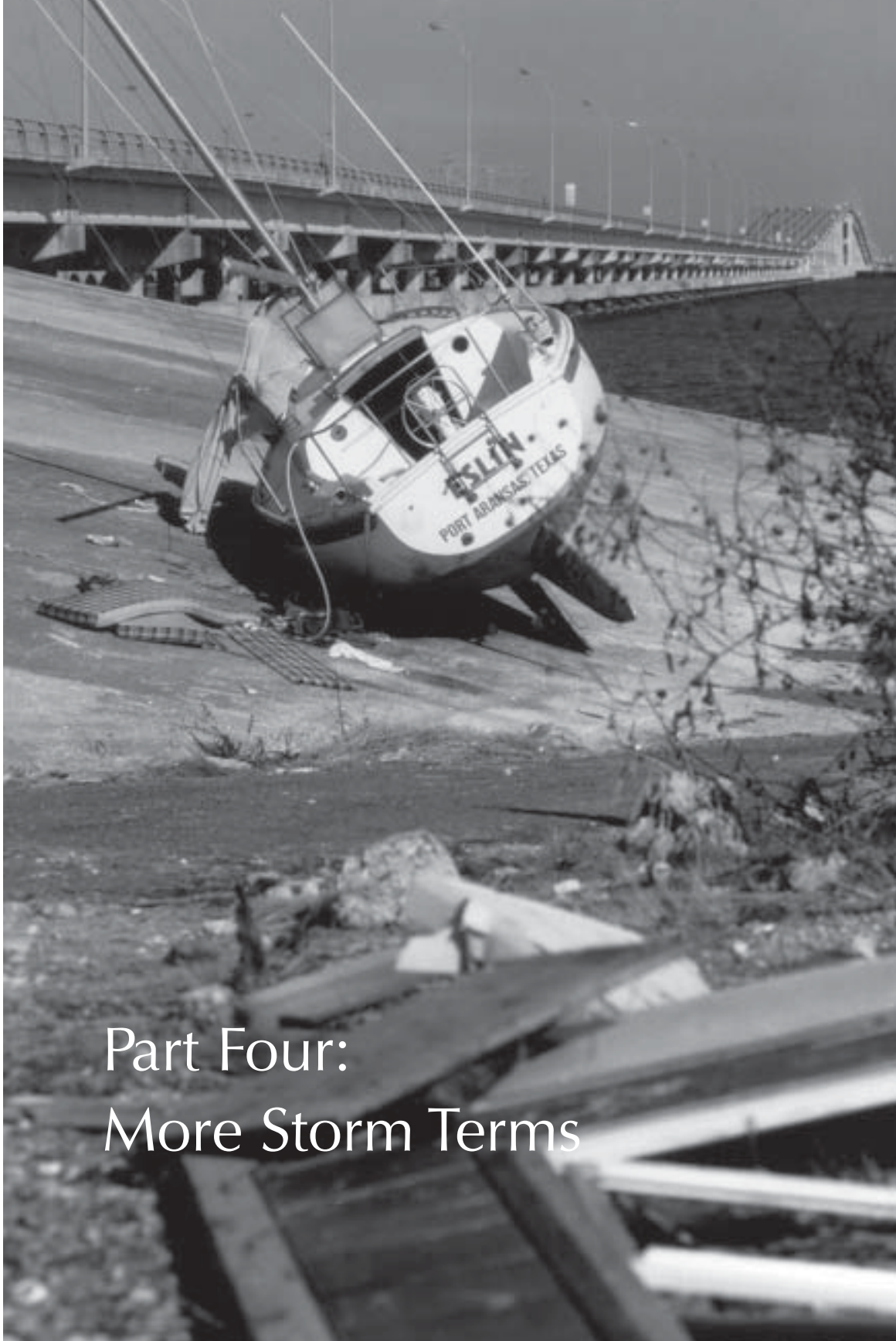
2003	2004	2005
Ana	Alex	Arlene
Bill	Bonnie	Bret
Claudette	Charley	Cindy
Danny	Danielle	Dennis
Erika	Earl	Emily
Fabian	Frances	Franklin
Grace	Gaston	Gert
Henri	Hermine	Harvey
Isabel	Ivan	Irene
Juan	Jeanne	Jose
Kate	Karl	Katrina
Larry	Lisa	Lee
Mindy	Matthew	Maria
Nicholas	Nicole	Nate
Odette	Otto	Ophelia
Peter	Paula	Philippe
Rose	Richard	Rita
Sam	Shary	Stan
Teresa	Tomas	Tammy
Victor	Virginie	Vince
Wanda	Walter	Wilma

2006	2007	2008
Alberto	Andrea	Arthur
Beryl	Barry	Bertha
Chris	Chantal	Cristobal
Debby	Dean	Dolly
Ernesto	Erin	Edouard
Florence	Felix	Fay
Gordon	Gabrielle	Gustav
Helene	Humberto	Hanna
Isaac	Ingrid	Isidore
Joyce	Jerry	Josephine
Kirk	Karen	Kyle
Leslie	Lorenzo	Lili
Michael	Melissa	Marco
Nadine	Noel	Nana
Oscar	Olga	Omar
Patty	Pablo	Paloma
Rafael	Rebekah	Rene
Sandy	Sebastien	Sally
Tony	Tanya	Teddy
Valerie	Van	Vicky
William	Wendy	Wilfred

Atlantic Storms Retired Into Hurricane History

Agnes (1972§*): Florida, Northeast U.S.
Alicia (1983*): North Texas
Allen (1980*): Antilles, Mexico, South Texas
Andrew (1992*): Bahamas, South Florida, Louisiana
Anita (1977): Mexico
Audrey (1957§*): Louisiana, North Texas
Betsy (1965§*): Bahamas, Southeast Florida, Southeast Louisiana
Beulah (1967*): Antilles, Mexico, South Texas
Bob (1991*): North Carolina & Northeast U.S.
Camille (1969§*): Louisiana, Mississippi and Alabama
Carla (1961§*): Texas
Carmen (1974): Mexico, Central Louisiana
Carol (1954§*): Northeast U.S.
Celia (1970*): South Texas
Cleo (1964*): Lesser Antilles, Haiti, Cuba, Southeast Florida
Connie (1955§): North Carolina
David (1979): Lesser Antilles, Hispañola, Florida and Eastern U.S.
Diana (1990): Mexico
Diane (1955§*): Mid-Atlantic U.S. & Northeast U.S.
Donna (1960§*): Bahamas, Florida and Eastern U.S.
Dora (1964*): Northeast Florida
Elena (1985*): Mississippi, Alabama, Western Florida
Eloise (1975*): Antilles, Northwest Florida, Alabama
Flora (1963): Haiti, Cuba
Frederic (1979*): Alabama and Mississippi
Gilbert (1988): Lesser Antilles, Jamaica, Yucatan Peninsula, Mexico
Gloria (1985*): North Carolina, Northeast U.S.
Hattie (1961): Belize, Guatemala
Hazel (1954§*): Antilles, North and South Carolina
Hilda (1964§*): Louisiana
Hugo (1989*): Antilles, South Carolina
Ione (1955*): North Carolina
Inez (1966): Lesser Antilles, Hispanola, Cuba, Florida Keys, Mexico
Janet (1955): Lesser Antilles, Belize, Mexico
Joan (1988): Curacao, Venezuela, Colombia, Nicaragua (Crossed into the Pacific and became Miriam)
Klaus (1990): Martinique
Mitch (1998): Central America, Nicaragua, Honduras
Opal (1995): Florida Panhandle
Roxanne (1995): Yucatan Peninsula
Under consideration: Allison (2001), Iris (2001) and Michelle (2001)

§Within the list of top 37 deadliest U.S. hurricanes
*Within the list of the top 31 costliest U.S. hurricanes (in 1990 dollars) Measurements only available through 1992 for storms that affected the U.S.)



Part Four:
More Storm Terms

Glossary

Advisory: Official information issued by tropical cyclone warning centers describing all tropical cyclone watches and warnings in effect along with details concerning tropical cyclone locations, intensity and movement, and precautions that should be taken. Advisories are also issued to describe: (a) tropical cyclones prior to issuance of watches and warnings and (b) subtropical cyclones.

Best Track: A subjectively-smoothed representation of a tropical cyclone's location and intensity over its lifetime. The best track contains the cyclone's latitude, longitude, maximum sustained surface winds, and minimum sea-level pressure at 6-hourly intervals. Best track positions and intensities, which are based on a post-storm assessment of all available data, may differ from values contained in storm advisories. They also generally will not reflect the erratic motion implied by connecting individual center fix positions.

Center: Generally speaking, the vertical axis of a tropical cyclone, usually defined by the location of minimum wind or minimum pressure. The cyclone center position can vary with altitude. In advisory products, refers to the center position at the surface.

Center / Vortex Fix: The location of the center of a tropical or subtropical cyclone obtained by reconnaissance aircraft penetration, satellite, radar, or synoptic data.

Central North Pacific Basin: The region north of the Equator between 140W and the International Dateline. The Central Pacific Hurricane Center (CPHC) in Honolulu, Hawaii is responsible for tracking tropical cyclones in this region.

Cyclone: An atmospheric closed circulation rotating counter-clockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.

Direct Hit: A close approach of a tropical cyclone to a particular location. For locations on the left-hand side of a tropical cyclone's track (looking in the direction of motion), a direct hit occurs when the cyclone passes to within a distance equal to the cyclone's radius of maximum wind. For locations on the right-hand side of the track, a direct hit occurs when the cyclone passes to within a distance equal to twice the radius of maximum wind. Compare indirect hit, strike.

Eastern North Pacific Basin: The portion of the North Pacific Ocean east of 140W. The National Hurricane Center in Miami, Florida is responsible for tracking tropical cyclones in this region.

Eye: The roughly circular area of comparatively light winds that encompasses the center of a severe tropical cyclone. The eye is either completely or partially surrounded by the eyewall cloud.

Eyewall / Wall Cloud: An organized band or ring of cumulonimbus clouds that surround the eye, or light-wind center of a tropical cyclone. Eyewall and wall cloud are used synonymously.

Explosive Deepening: A decrease in the minimum sea-level pressure of a tropical cyclone of 2.5 mb/hr for at least 12 hours or 5 mb/hr for at least six hours.

Extratropical: A term used in advisories and tropical summaries to indicate that a cyclone has lost its "tropical" characteristics. The term implies both poleward displacement of the cyclone and the conversion of the cyclone's primary energy source from the release of latent heat of condensation to baroclinic (the temperature con-

trast between warm and cold air masses) processes. It is important to note that cyclones can become extratropical and still retain winds of hurricane or tropical storm force.

Fujiwhara Effect: The tendency of two nearby tropical cyclones to rotate cyclonically about each other.

Gale Warning: A warning of 1-minute sustained surface winds in the range 34 kt (39 mph or 63 km/hr) to 47 kt (54 mph or 87 km/hr) inclusive, either predicted or occurring and not directly associated with tropical cyclones.

High Wind Warning: A high wind warning is defined as 1-minute average surface winds of 35 kt (40 mph or 64 km/hr) or greater lasting for 1 hour or longer, or winds gusting to 50 kt (58 mph or 93 km/hr) or greater regardless of duration that are either expected or observed over land.

Hurricane / Typhoon: A tropical cyclone in which the maximum sustained surface wind (using the U.S. 1-minute average) is 64 kt (74 mph or 119 km/hr) or more. The term hurricane is used for Northern Hemisphere tropical cyclones east of the International Dateline to the

Greenwich Meridian: The term typhoon is used for Pacific tropical cyclones north of the Equator west of the International Dateline.

Hurricane Local Statement: A public release prepared by local National Weather Service offices in or near a threatened area giving specific details for its county/parish warning area on (1) weather conditions, (2) evacuation decisions made by local officials, and (3) other precautions necessary to protect life and property.

Hurricane Season: The portion of the year having a relatively high incidence of hurricanes. The hurricane season in the Atlantic, Caribbean, and Gulf of Mexico runs from June 1 to November 30. The hurricane season in the Eastern Pacific basin runs from May 15 to November 30. The hurricane season in the Central Pacific basin runs from June 1 to November 30.

Hurricane Warning: A warning that sustained winds 64 kt (74 mph or 119 km/hr) or higher associated with a hurricane are expected in a specified coastal area in 24 hours or less. A hurricane warning can remain in effect when dangerously high water or a combination of dangerously high water and exceptionally high waves continue, even though winds may be less than hurricane force.

Hurricane Watch: An announcement for specific coastal areas that hurricane conditions are possible within 36 hours.

Indirect Hit: Generally refers to locations that do not experience a direct hit from a tropical cyclone, but do experience hurricane force winds (either sustained or gusts) or tides of at least 4 feet above normal.

Landfall: The intersection of the surface center of a tropical cyclone with a coastline. Because the strongest winds in a tropical cyclone are not located precisely at the center, it is possible for a cyclone's strongest winds to be experienced over land even if landfall does not occur. Similarly, it is possible for a tropical cyclone to make landfall and have its strongest winds remain over the water. Compare direct hit, indirect hit, and strike.

Post-storm Report: A report issued by a local National Weather Service office summarizing the impact of a tropical cyclone on its forecast area. These reports include

information on observed winds, pressures, storm surges, rainfall, tornadoes, damage and casualties.

Preliminary Report: Now known as the "Tropical Cyclone Report". A report summarizing the life history and effects of an Atlantic or eastern Pacific tropical cyclone. It contains a summary of the cyclone life cycle and pertinent meteorological data, including the post-analysis best track (six-hourly positions and intensities) and other meteorological statistics. It also contains a description of damage and casualties the system produced, as well as information on forecasts and warnings associatedwith the cyclone. NHC writes a report on every tropical cyclone in its area of responsibility.

Present Movement: The best estimate of the movement of the center of a tropical cyclone at a given time and given position. This estimate does not reflect the short-period, small scale oscillations of the cyclone center.

Probability of Tropical Cyclone Conditions: The probability, in percent, that the cyclone center will pass within 50 miles to the right or 75 miles to the left of the listed location within the indicated time period when looking at the coast in the direction of the cyclone's movement.

Radius of Maximum Winds: The distance from the center of a tropical cyclone to the location of the cyclone's maximum winds. In well-developed hurricanes, the radius of maximum winds is generally found at the inner edge of the eyewall.

Rapid Deepening: A decrease in the minimum sea-level pressure of a tropical cyclone of 1.75 mb/hr or 42 mb for 24 hours.

Relocated: A term used in an advisory to indicate that a vector drawn from the preceding advisory position to the latest known position is not necessarily a reasonable representation of the cyclone's movement.

Storm Surge: An abnormal rise in sea level accompanying a hurricane or other intense storm, and whose height is the difference between the observed level of the sea surface and the level that would have occurred in the absence of the cyclone. Storm surge is usually estimated by subtracting the normal or astronomic high tide from the observed storm tide.

Storm Tide: The actual level of sea water resulting from the astronomic tide combined with the storm surge.

Storm Warning: A warning of 1-minute sustained surface winds of 48 kt (55 mph or 88 km/hr) or greater, either predicted or occurring, not directly associated with tropical cyclones.

Strike: For any particular location, a hurricane strike occurs if that location passes within the hurricane's strike circle, a circle of 125 n mi diameter, centered 12.5 n mi to the right of the hurricane center (looking in the direction of motion). This circle is meant to depict the typical extent of hurricane force winds, which are approximately 75 n mi to the right of the center and 50 n mi to the left.

Subtropical Cyclone: A non-frontal low pressure system that has characteristics of both tropical and extratropical cyclones. The most common type is an upper-level cold low with circulation extending to the surface layer and maximum sustained winds generally occurring at a radius of about 100 miles or more from the center. In comparison to tropical cyclones, such systems have a relatively broad zone of maxi-

mum winds that is located farther from the center, and typically have a less symmetric wind field and distribution of convection. A second type of subtropical cyclone is a mesoscale low originating in or near a frontolyzing zone of horizontal wind shear, with radius of maximum sustained winds generally less than 30 miles. The entire circulation may initially have a diameter of less than 100 miles. These generally short-lived systems may be either cold core or warm core.

Subtropical Depression: A subtropical cyclone in which the maximum sustained surface wind speed (using the U.S. 1-minute average) is 33 kt (38 mph or 62 km/hr) or less.

Subtropical Storm: A subtropical cyclone in which the maximum sustained surface wind speed (using the U.S. 1-minute average) is 34 kt (39 mph or 63 km/hr) or more.

Synoptic Track: Weather reconnaissance mission flown to provide vital meteorological information in data sparse ocean areas as a supplement to existing surface, radar, and satellite data. Synoptic flights better define the upper atmosphere and aid in the prediction of tropical cyclone development and movement.

Tropical Cyclone: A warm-core non-frontal synoptic-scale cyclone, originating over tropical or subtropical waters, with organized deep convection and a closed surface wind circulation about a well-defined center. Once formed, a tropical cyclone is maintained by the extraction of heat energy from the ocean at high temperature and heat export at the low temperatures of the upper troposphere. In this they differ from extratropical cyclones, which derive their energy from horizontal temperature contrasts in the atmosphere (baroclinic effects).

Tropical Cyclone Plan of the Day: A coordinated mission plan that tasks operational weather reconnaissance requirements during the next 1100 to 1100 UTC day or as required, describes reconnaissance flights committed to satisfy both operational and research requirements, and identifies possible reconnaissance requirements for the succeeding 24-hour period.

Tropical Depression: A tropical cyclone in which the maximum sustained surface wind speed (using the U.S. 1-minute average) is 33 kt (38 mph or 62 km/hr) or less.

Tropical Disturbance: A discrete tropical weather system of apparently organized convection — generally 100 to 300 nmi in diameter — originating in the tropics or subtropics, having a nonfrontal migratory character, and maintaining its identity for 24 hours or more. It may or may not be associated with a detectable perturbation of the wind field.

Tropical Storm: A tropical cyclone in which the maximum sustained surface wind speed (using the U.S. 1-minute average) ranges from 34 kt (39 mph or 63 km/hr) to 63 kt (73 mph or 118 km/hr).

Tropical Storm Warning: A warning that sustained winds within the range of 34 to 63 kt (39 to 73 mph or 63 to 118 km/hr) associated with a tropical cyclone are expected in a specified coastal area within 24 hours or less.

Tropical Storm Watch: An announcement for specific coastal areas that tropical storm conditions are possible within 36 hours.

Tropical Wave: A trough or cyclonic curvature maximum in the trade-wind easterlies. The wave may reach maximum amplitude in the lower middle troposphere.

Hurricane tracking chart

Hurricane positions are given by latitude and longitude to the nearest one-tenth of one degree. As soon as you receive an advisory, mark the position and the time on your tracking chart. Center a dime on your mark and draw a circle around it to approximate the impact of a hurricane. This is approximately 225 miles in diameter, showing you the area than can be affected.

Keep in mind, too, that because hurricanes change direction very quickly, you should concentrate more on where the storm could go than on where it has been.