# Tracking a Hurricane

*Hurricane Alert!!!* You work at the National Hurricane Center. It is your job to track the paths of hurricanes and try to predict when and where a hurricane is likely to strike land. Then you must decide whether to warn people in the area to evacuate and go to shelter.

**Real-World Problem**: How can you predict when and where a hurricane will come ashore?

Hurricanes are the most destructive storms on Earth. They develop from tropical storms and are classified as hurricanes once their wind speed reaches 74 mph. Typically, storms are about 300 miles wide. They usually last for a week or more.

Hurricanes contain a tremendous amount of energy. They gather this energy from warm ocean waters in the tropics. As the warm, humid air rises, it cools and condenses, releasing heat. This heat warms the surrounding air, making it lighter and causing it to rise even more. As the warm air rises, cooler air flows in to replace it, causing wind. This cooler air is warmed by the ocean, and the cycle continues. The heat from the warm ocean water is the fuel that hurricanes run on. For this reason, hurricanes die when they move inland or to cooler waters.

The exact location of a hurricane is easily tracked by scientists, but the direction, speed, and intensity of a storm can change quickly. Predicting exactly where a storm will travel in the future is not easy, though. Weather forecasters can warn people long in advance that a tropical storm is approaching, but the storm may change its path.

A hurricane watch means that hurricane conditions are likely to occur in the area within the next 36 hours. A hurricane warning means that hurricane conditions will happen in the next 24 hours. People living in coastal areas should evacuate as soon as these watches or warnings are issued.

**Materials**: Hurricane tracking map, hurricane data, and colored pencils.

**Goals**:
1) Graph and interpret hurricane data in the form of latitude and longitude coordinates.
2) Construct a track for Hurricane Andrew.
3) Predict where and when a hurricane will make landfall.

**Part A**: Plot the points from chart A onto your tracking map with a colored pencil. Make a key on your map to show what days are represented by this color. Fill in the last column of the chart.

| Date / Time | Latitude (°N) | Longitude (°W) | Wind Speed (mph) | Hurricane or Storm? |
|---|---|---|---|---|
| 8/21 – 12am | 23.2 | 62.4 | 52 | |
| 8/21 – 6am | 23.9 | 63.3 | 52 | |
| 8/21 – 12pm | 24.4 | 64.2 | 58 | |
| 8/21 – 6pm | 24.8 | 64.9 | 58 | |
| 8/22 – 12am | 25.3 | 65.9 | 63 | |
| 8/22 – 6am | 25.6 | 67.0 | 69 | |
| 8/22 – 12pm | 25.8 | 68.3 | 81 | |
| 8/22 – 6pm | 25.7 | 69.7 | 92 | |
| 8/23 – 12am | 25.6 | 71.1 | 104 | |

1. Based on how far the storm has traveled in the last 24 hours, you can try to predict its path. You can tell how far the hurricane has traveled in the last 24 hours by looking at the last 4-5 dots. Remember that the size of the hurricane is much larger than the dots you have drawn.

Locations with a warning: _____
Locations with a watch: _____

**Part B**: Plot the points from chart B onto your tracking map with a *DIFFERENT* colored pencil. Make a key on your map to show what days are represented by this new color. Fill in the last column of the chart.

| Date / Time | Latitude (°N) | Longitude (°W) | Wind Speed (mph) | Hurricane or Storm? |
|---|---|---|---|---|
| 8/23 – 6am | 25.5 | 72.5 | 121 | |
| 8/23 – 12pm | 25.4 | 74.2 | 138 | |
| 8/23 – 6pm | 25.4 | 75.8 | 155 | |
| 8/24 – 12am | 25.4 | 77.5 | 144 | |

2. Locations with a warning: _____
   Locations with a watch: _____

**Part C**: Plot the points from chart C onto your tracking map with a *DIFFERENT* colored pencil. Make a key on your map to show what days are represented by this new color. Fill in the last column of the chart.

| Date / Time | Latitude (°N) | Longitude (°W) | Wind Speed (mph) | Hurricane or Storm? |
|---|---|---|---|---|
| 8/24 – 6am | 25.4 | 79.3 | 138 | |
| 8/24 – 12pm | 25.6 | 81.2 | 127 | |
| 8/24 – 6pm | 25.8 | 83.1 | 132 | |
| 8/25 – 12am | 26.2 | 85.0 | 132 | |

3. Locations with a warning: _____
   Locations with a watch: _____

**Part D**: Plot the points from chart D onto your tracking map with a *DIFFERENT* colored pencil. Make a key on your map to show what days are represented by this new color. Fill in the last column of the chart.

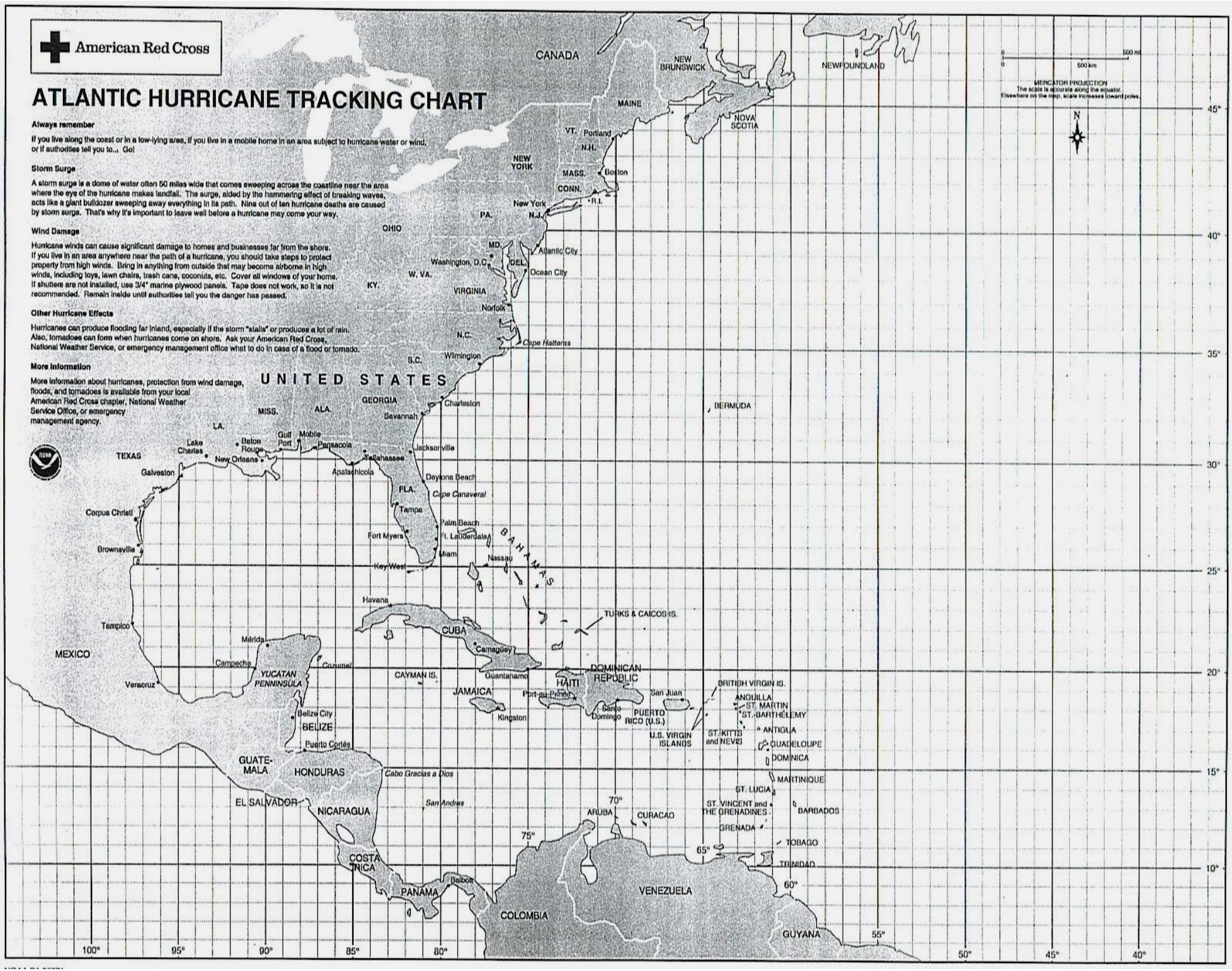
| Date / Time | Latitude (°N) | Longitude (°W) | Wind Speed (mph) | Hurricane or Storm? |
|---|---|---|---|---|
| 8/25 – 6am | 26.6 | 86.7 | 132 | |
| 8/25 – 12pm | 27.2 | 88.2 | 132 | |
| 8/25 – 6pm | 27.8 | 89.6 | 138 | |
| 8/26 – 12am | 28.5 | 90.5 | 138 | |

4. Locations with a warning: _____
   Locations with a watch: _____

**Part E**: Plot the points from chart E onto your tracking map with a *DIFFERENT* colored pencil. Make a key on your map to show what days are represented by this new color. Fill in the last column of the chart.

| Date / Time | Latitude (°N) | Longitude (°W) | Wind Speed (mph) | Hurricane or Storm? |
|---|---|---|---|---|
| 8/26 – 6am | 29.2 | 91.3 | 132 | |
| 8/26 – 12pm | 30.1 | 91.7 | 92 | |
| 8/26 – 6pm | 30.9 | 91.6 | 56 | |
| 8/27 – 12am | 31.5 | 91.1 | 35 | |

5. Locations with a warning: _____
   Locations with a watch: _____


American Red Cross
ATLANTIC HURRICANE TRACKING CHART
Always remember
If you live along the coast or in a low-lying area, if you live in a mobile home in an area subject to hurricane water or wind, or if authorities tell you to... Go!
Storm Surge
A storm surge is a dome of water often 50 miles wide that comes sweeping across the coastline near the area where the eye of the hurricane makes landfall. The surge, aided by the hammering effect of breaking waves, acts like a giant bulldozer sweeping away everything in its path. Nine out of ten hurricane deaths are caused by storm surge. That's why it's important to leave well before a hurricane may come your way.
Wind Damage
Hurricane winds can cause significant damage to homes and businesses far from the shore. If you live in an area anywhere near the path of a hurricane, you should take steps to protect property from high winds. Bring in anything from outside that may become airborne in high winds, including toys, lawn chairs, trash cans, coconuts, etc. Cover all windows of your home. If shutters are not installed, use 3/4" marine plywood panels. Tape does not work, so it is not recommended. Remain inside until authorities tell you the danger has passed.
Other Hurricane Effects
Hurricanes can produce flooding far inland, especially if the storm "stalls" or produces a lot of rain. Also, tornadoes can form when hurricanes come on shore. Ask your American Red Cross, National Weather Service, or emergency management office what to do in case of a flood or tornado.
More Information
More information about hurricanes, protection from wind damage, floods, and tornadoes is available from your local American Red Cross chapter, National Weather Service Office, or emergency management agency.
MERCATOR PROJECTION
The scale is accurate along the equator. Elsewhere on the map, scale increases toward poles.
CANADA
NEWFOUNDLAND
NEW BRUNSWICK
NOVA SCOTIA
MAINE
VT.
Portland
N.H.
NEW YORK
MASS.
Boston
CONN.
R.I.
New York
N.J.
PA.
OHIO
MD.
Atlantic City
Washington, D.C.
DEL.
Ocean City
W. VA.
KY.
VIRGINIA
Norfolk
N.C.
Cape Hatteras
Wilmington
S.C.
UNITED STATES
GEORGIA
Charleston
Savannah
BERMUDA
MISS.
ALA.
LA.
Gulf Port
Mobile
Lake Charles
Baton Rouge
Pensacola
Jacksonville
TEXAS
New Orleans
Tallahassee
Galveston
Apalachicola
Daytona Beach
FLA.
Cape Canaveral
Tampa
Corpus Christi
Palm Beach
Fort Myers
Ft. Lauderdale
Brownsville
Miami
BAHAMAS
Nassau
Key West
Havana
TURKS & CAICOS IS.
Tampico
CUBA
Mérida
Camagüey
MEXICO
Campeche
Cozumel
YUCATAN PENNINSULA
CAYMAN IS.
Guantanamo
DOMINICAN REPUBLIC
Veracruz
HAITI
JAMAICA
Port-au-Prince
San Juan
BRITISH VIRGIN IS.
ANGUILLA
ST. MARTIN
ST. BARTHELEMY
Belize City
BELIZE
Santo Domingo
PUERTO RICO (U.S.)
Kingston
ANTIGUA
U.S. VIRGIN ISLANDS
ST. KITTS and NEVIS
GUADELOUPE
Puerto Cortés
DOMINICA
GUATE-MALA
HONDURAS
MARTINIQUE
Cabo Gracias a Dios
ST. LUCIA
EL SALVADOR
San Andres
NICARAGUA
ARUBA
CURACAO
ST. VINCENT and THE GRENADINES
BARBADOS
GRENADA
TOBAGO
COSTA RICA
TRINIDAD
Bolboa
PANAMA
VENEZUELA
COLOMBIA
GUYANA
100°
95°
90°
85°
80°
75°
70°
65°
60°
55°
50°
45°
40°
45°
40°
35°
30°
25°
20°
15°
10°

Hurricane Andrew was the second most destructive hurricane in U.S. history, and the final of three Category 5 hurricanes to make landfall in the United States in the 20th century. Striking as the first named storm of the 1992 Atlantic hurricane season in August, Andrew caused damage in the northwestern Bahamas, southern Florida south of Miami, and south-central Louisiana. Andrew's damage cost totaled $26 billion in 1992 ($45 billion in 2005 US dollars), mostly in south Florida. The storm caused 65 deaths. With a central pressure ranking as the fourth lowest in U.S. landfall records, Andrew remained the most devastating natural disaster in U.S. history until it was surpassed by Hurricane Katrina in the 2005 season.

**6. Where all did Andrew make landfall?**

**7. Where did Andrew do the most damage before striking the United States?**

**8. What happened to the direction of Andrew after it struck Louisiana?**

**9. a. What happened to the wind speed of Andrew after it made landfall in Louisiana?**

**b. Why did this happen?**

**10. a. When and what time did Andrew first become a hurricane? (look at the wind speed)**

**b. When and what time was it downgraded to a tropical storm? (look at the wind speed)**

**11. Why might it have been less destructive if it had hit farther north on the coast of the US (North Carolina)? Think about the temperatures…**

**12. Between the afternoon of August 24 and the morning of August 26, the wind speed for Andrew remained essentially the same. Where was Andrew located during this time?**

**13. How did Andrew's wind speed change after it made landfall both times?**

**14. Why did Andrew's wind speed increase when it began to cross over the Gulf of Mexico?**

**15. Explain how the type of surface under Andrew affected its wind speed?**

**16. Why do most hurricanes start around the Equator?**