

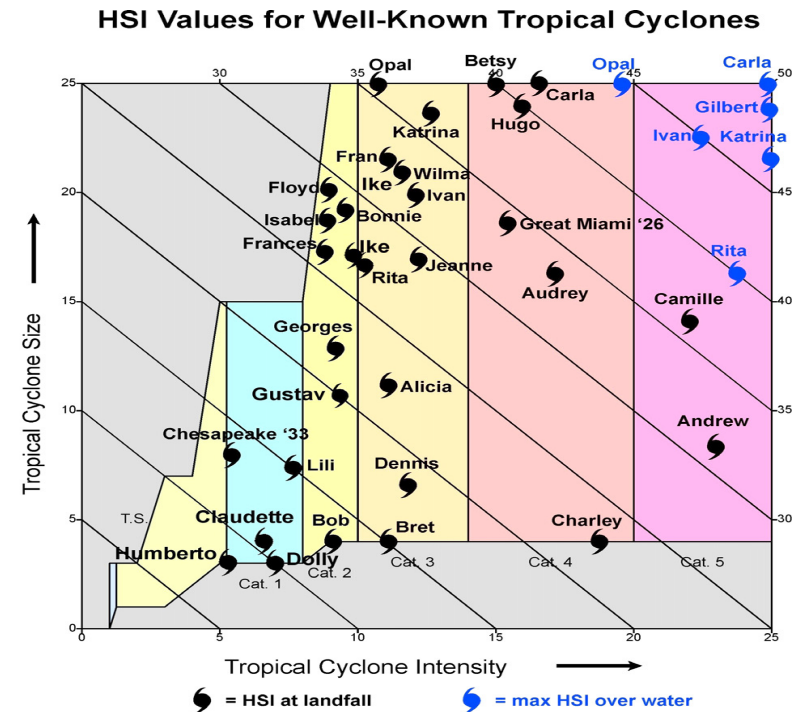
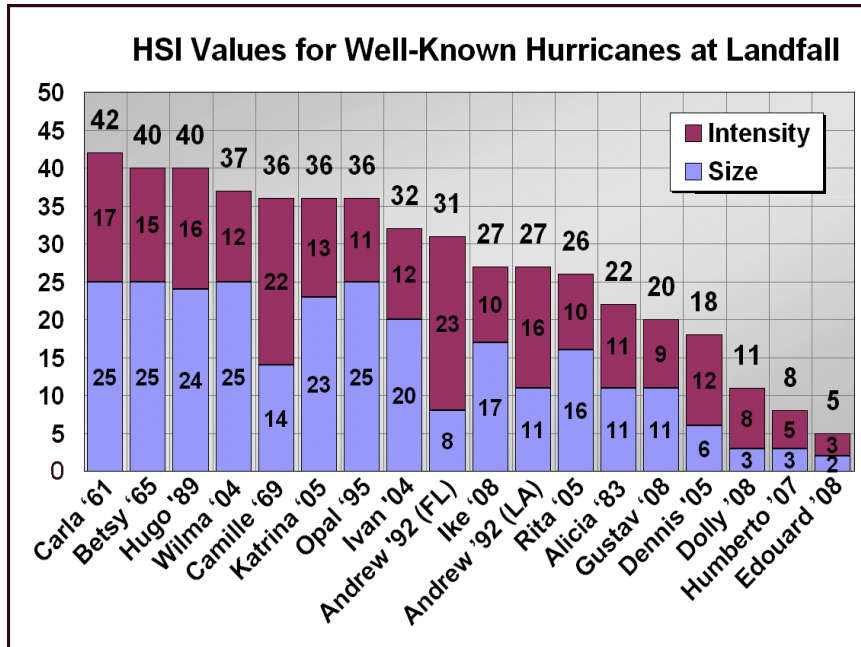


Your Weather DepartmentSM

The Hurricane Severity Index

ImpactWeather, Inc. introduced its Hurricane Severity Index in 2006. The Hurricane Severity Index is an enhanced hurricane rating system which more accurately defines the strength and destructive capability of a given storm than other scales currently utilized.

The Hurricane Severity Index was developed by Chris Hebert and Bob Weinzapfel, two ImpactWeather meteorologists and hurricane experts. The Hurricane Severity Index uses comprehensive equations which incorporate not only the intensity of the winds but the size of the area the winds cover.



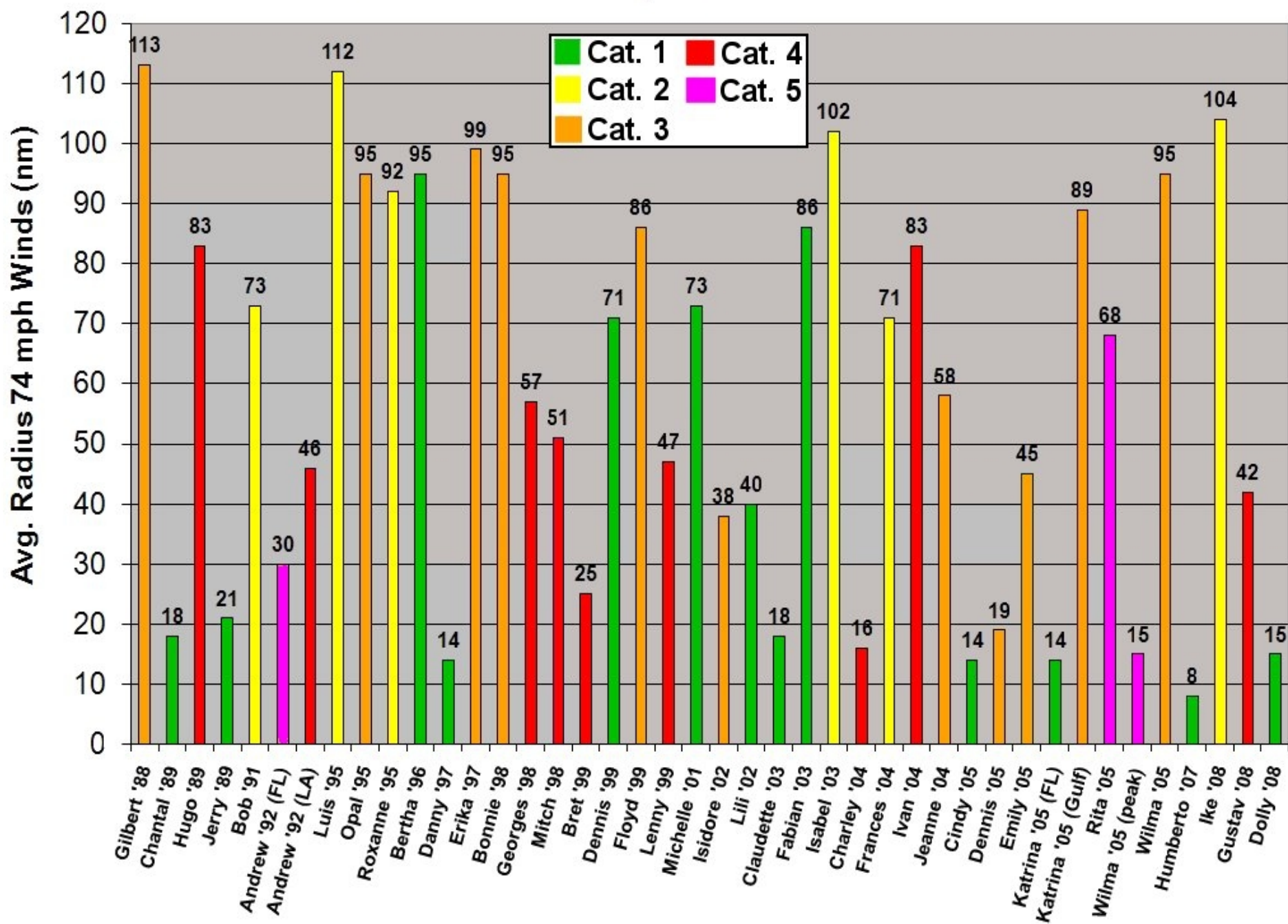
Identifying the Problem

- Hurricane response plans tied to Saffir-Simpson category
- Storm surge evacuation zones associated with Saffir-Simpson category
- What really is a “Major Hurricane”?

Hurricane Size Implications

- Duration of the event
- Scope of and type of damage
- Height and extent of storm surge
- Offshore wave heights
- Rainfall amounts
- Likelihood of being impacted

Hurricane Size Comparison 1988-2008





Why is There a Need for a New Hurricane Scale?

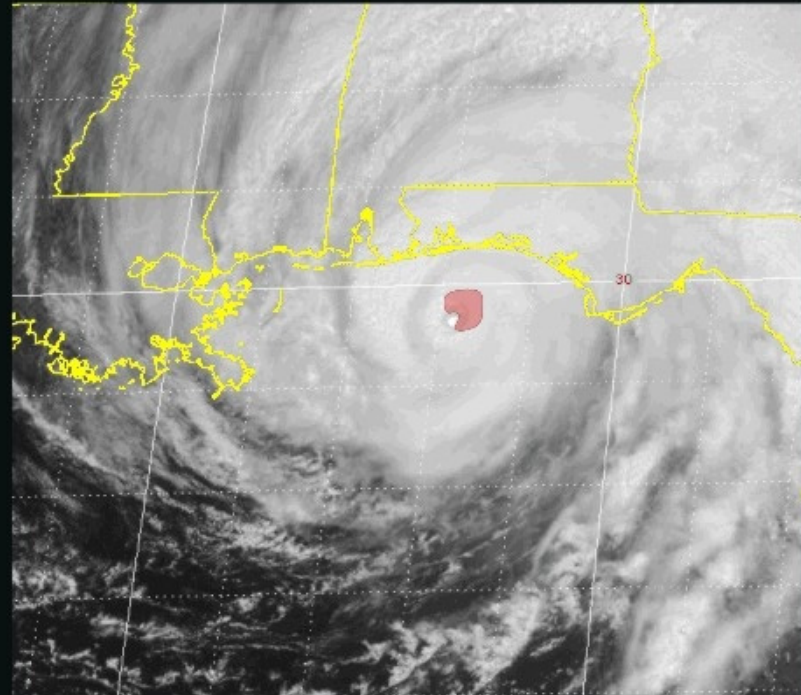
The Saffir-Simpson scale has problems...

Saffir-Simpson Hurricane Intensity Scale			
Strength	Wind Speed	Central Pressure	Storm Surge
Category 1	74-95 mph	> 980 mb	4-5 ft.
Category 2	96-110 mph	965-979 mb	6-8 ft.
Category 3	111-130 mph	945-964 mb	9-12 ft.
Category 4	131-155 mph	920-944 mb	13-18 ft.
Category 5	156+ mph	< 920 mb	< 18 ft.

- Based only on max winds
- Max winds may be isolated
- Storm surge is more related to a hurricane's size
- Does not consider size and scope of a hurricane's wind field
- Not a good estimate of potential damage
- Doesn't consider tropical storms

Assumes that all hurricanes are alike

Ivan / Dennis Comparison



Ivan (2004)

105 kts / 120 mph

Category 3

HSI at landfall: **32** (20 size)

Damage: \$15 billion

Dennis (2005)

105 kts / 120 mph

Category 3

HSI at landfall: **18** (6 size)

Damage: \$2.2 billion



Hurricane Severity Index (HSI)

A new scale for classifying hurricanes that takes into consideration more than just maximum surface winds.

Size (1-25 points)

- Examines the total coverage of the 39+, 58+, 74+ and 100mph+ wind fields

Intensity (1-25 points)

- Points assigned using the exponential relationship between wind speed and the force exerted on an object

The Result: A 50-point scale that better represents the true destructive potential, the **Hurricane Severity Index.**

Determining Size Points

- Wind radii data from 1988-present studied
- Defined typical wind radii for 39, 58, 74 and 100 mph wind fields
- Points heavily-weighted toward 74+ mph winds

Wind Radii	Size Point Range
39 mph	1-3
58 mph	1-4
74 mph	1-8
100 mph	1-10

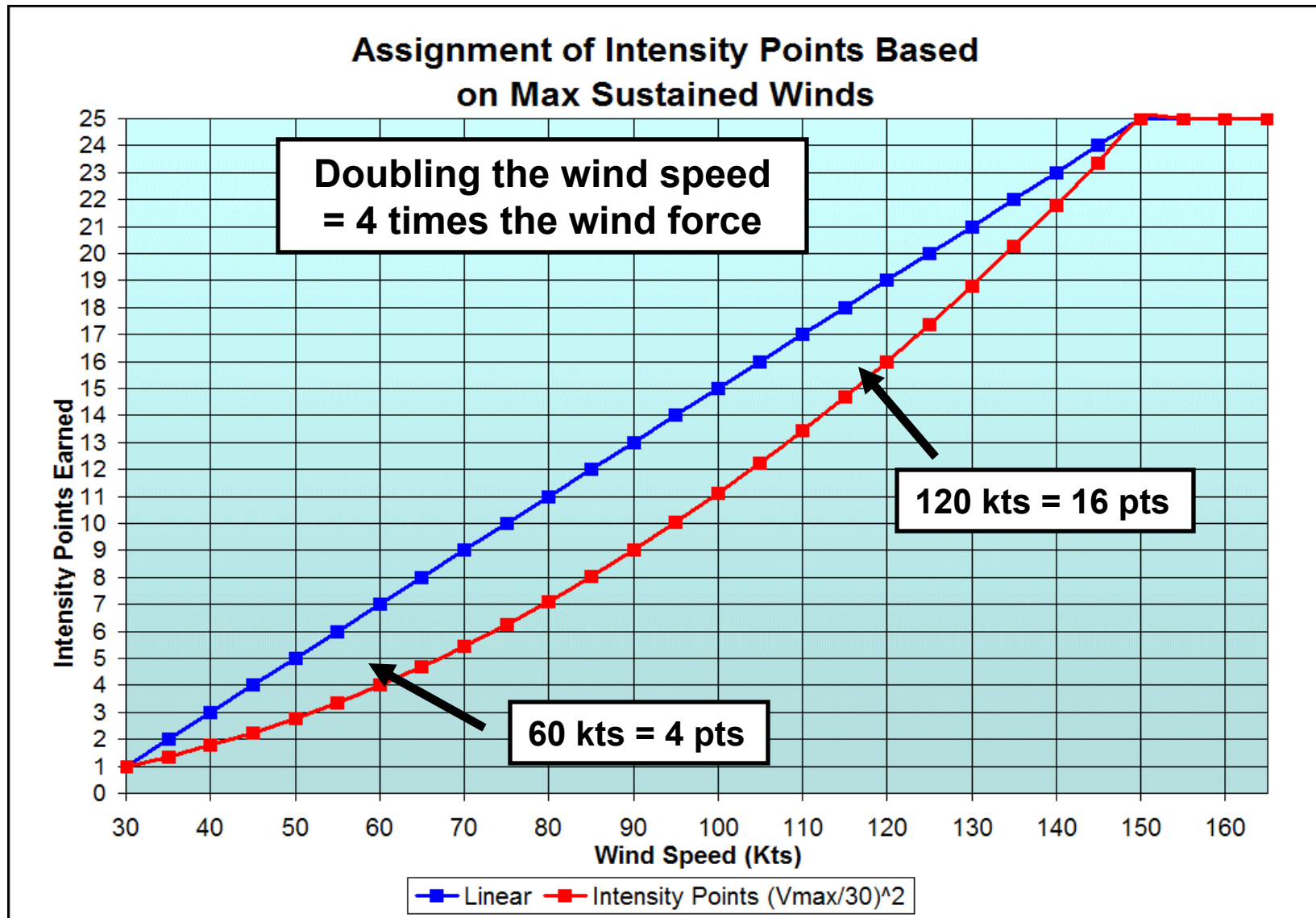
A total of 25 size points is possible

Determining Intensity Points

- Wind force on an object is an exponential function (twice the wind speed equals four times the wind force)
- Developed an exponential intensity scale that assigns 1 point for a 30 kt (35 mph) tropical depression and up to 25 points for a hurricane with winds above 150 kts (175 mph)

A total of 25 intensity points is possible

Determining Intensity Points

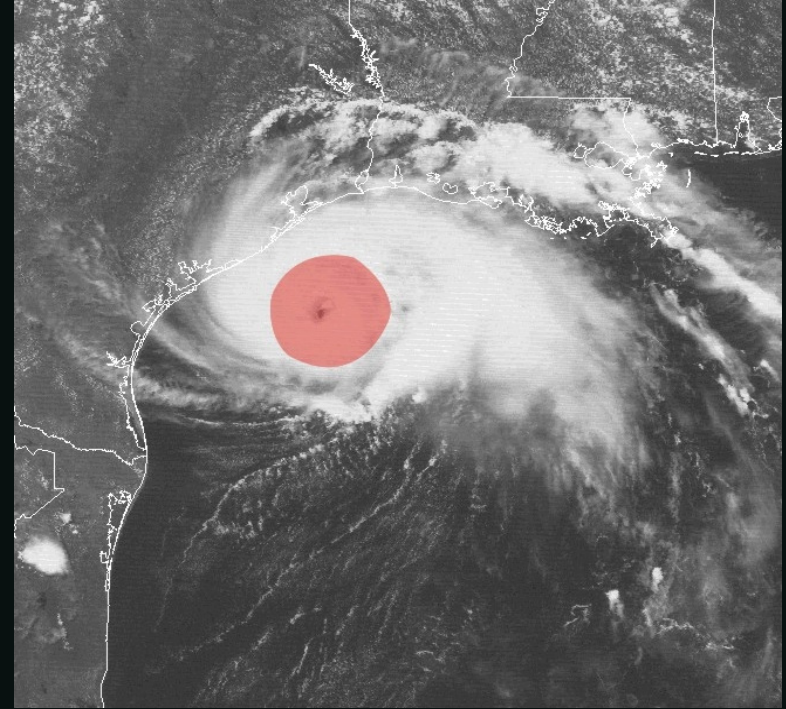
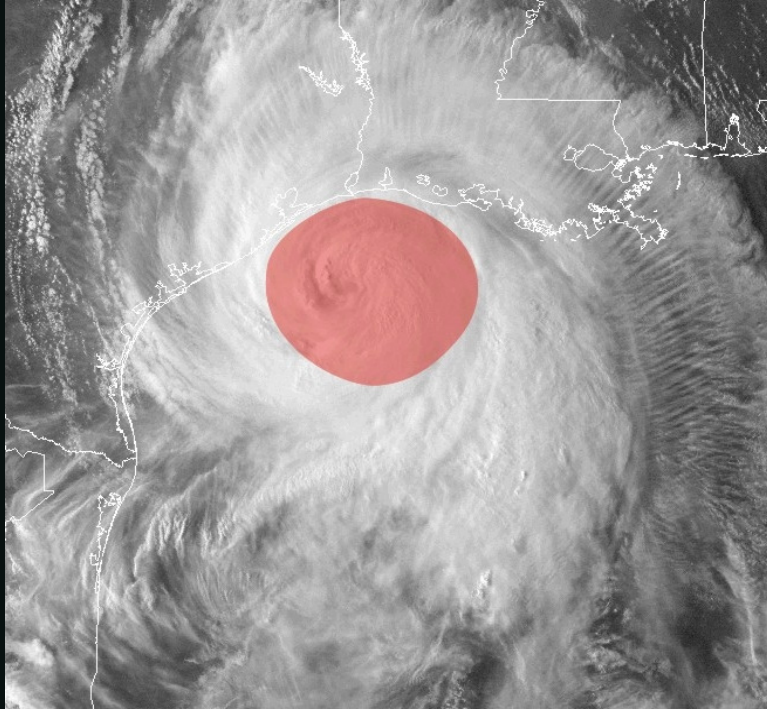


Comparing HSI Points to Saffir-Simpson

Saffir-Simpson Hurricane Scale vs. HSI

Classification	HSI Size		HSI Intensity		Total HSI	
	Low	High	Low	High	Low	High
Depression	0	0	1	1	1	1
Tropical Storm	1	7	1	4	2	11
Cat. 1 Hurricane	3	15	5	7	8	22
Cat. 2 Hurricane	3	25	8	10	11	35
Cat. 3 Hurricane	4	25	11	13	15	38
Cat. 4 Hurricane	4	25	15	20	19	45
Cat. 5 Hurricane	4	25	22	25	26	50

Ike / Alicia Comparison



Ike (2008)

95 kts / 110 mph

Category 2

HSI Near Landfall: **28** (19 size)

Damage: \$28.1+ Billion



Alicia (1983)

95 kts / 110 mph

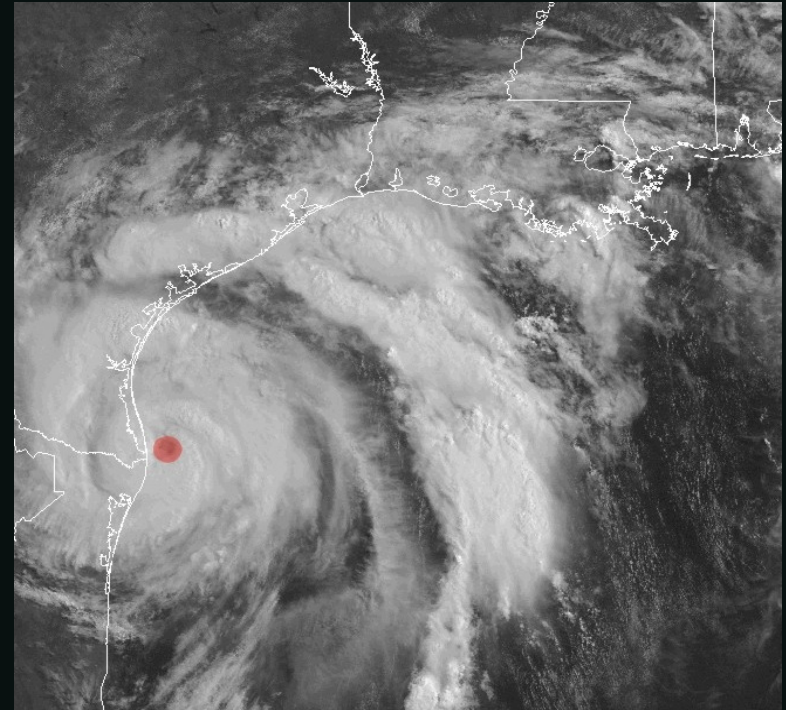
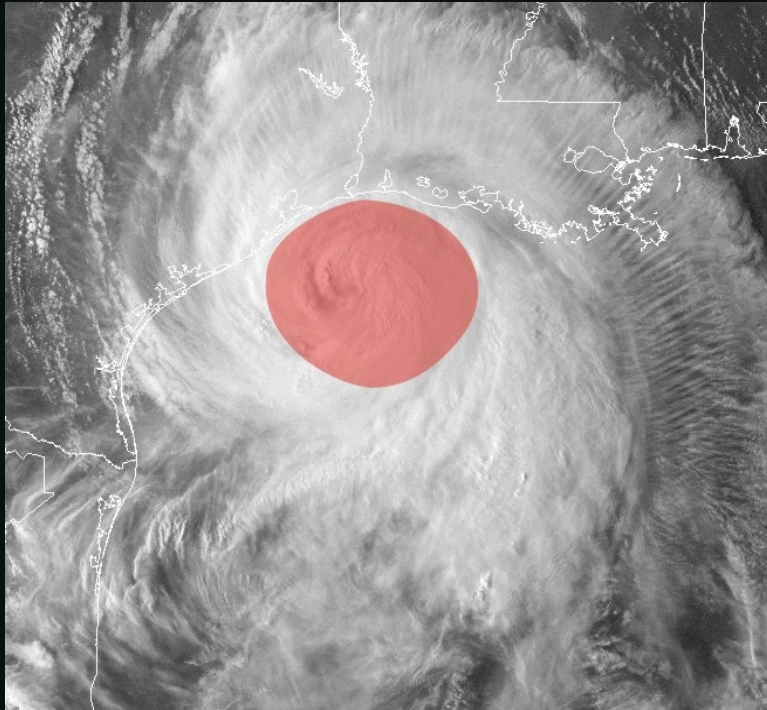
Category 2

HSI Near Landfall: **20** (11 size)

Damage: \$4.8 Billion

Alicia damage computed in 2006 dollars

Ike / Dolly Comparison



Ike (2008)

95 kts / 110 mph

Category 2

HSI Near Landfall: **28** (19 size)

Damage: \$28.1+ Billion

Dolly (2008)

85 kts / 100 mph

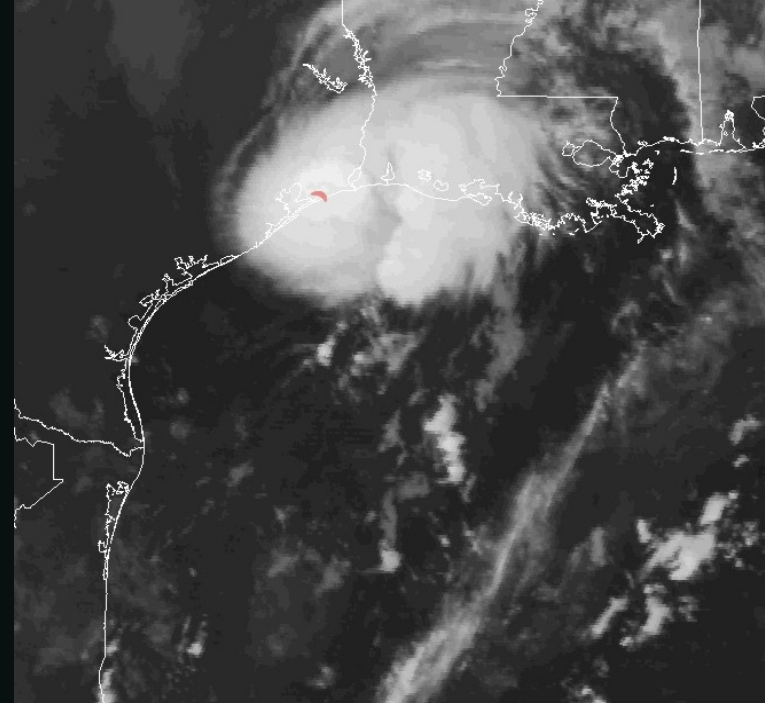
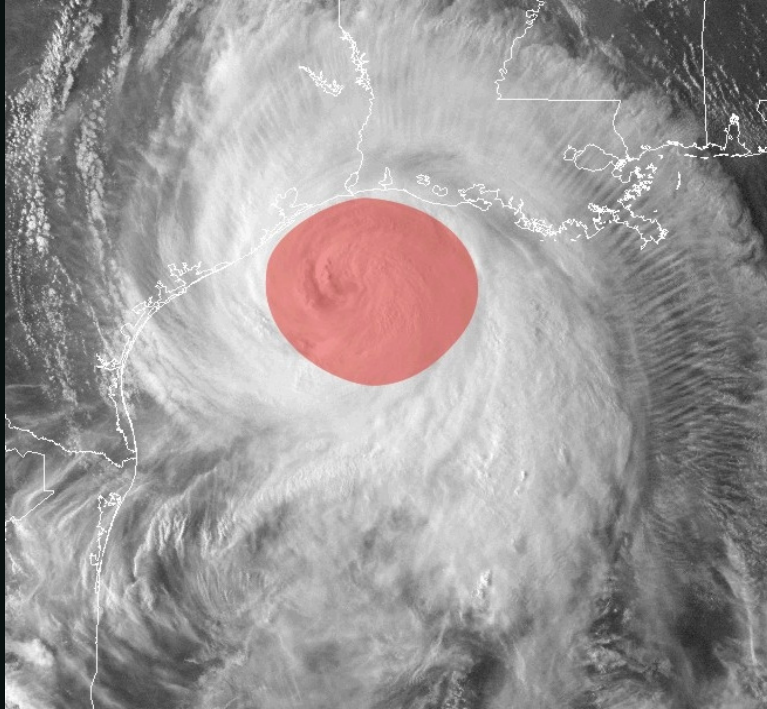
Category 2

HSI Near Landfall: **12** (4 size)

Damage: \$1.05 Billion



Ike / Humberto Comparison



Ike (2008)

95 kts / 110 mph

Category 2

HSI Near Landfall: **28** (19 size)

Damage: \$28.1+ Billion

Humberto (2007)

80 kts / 90 mph

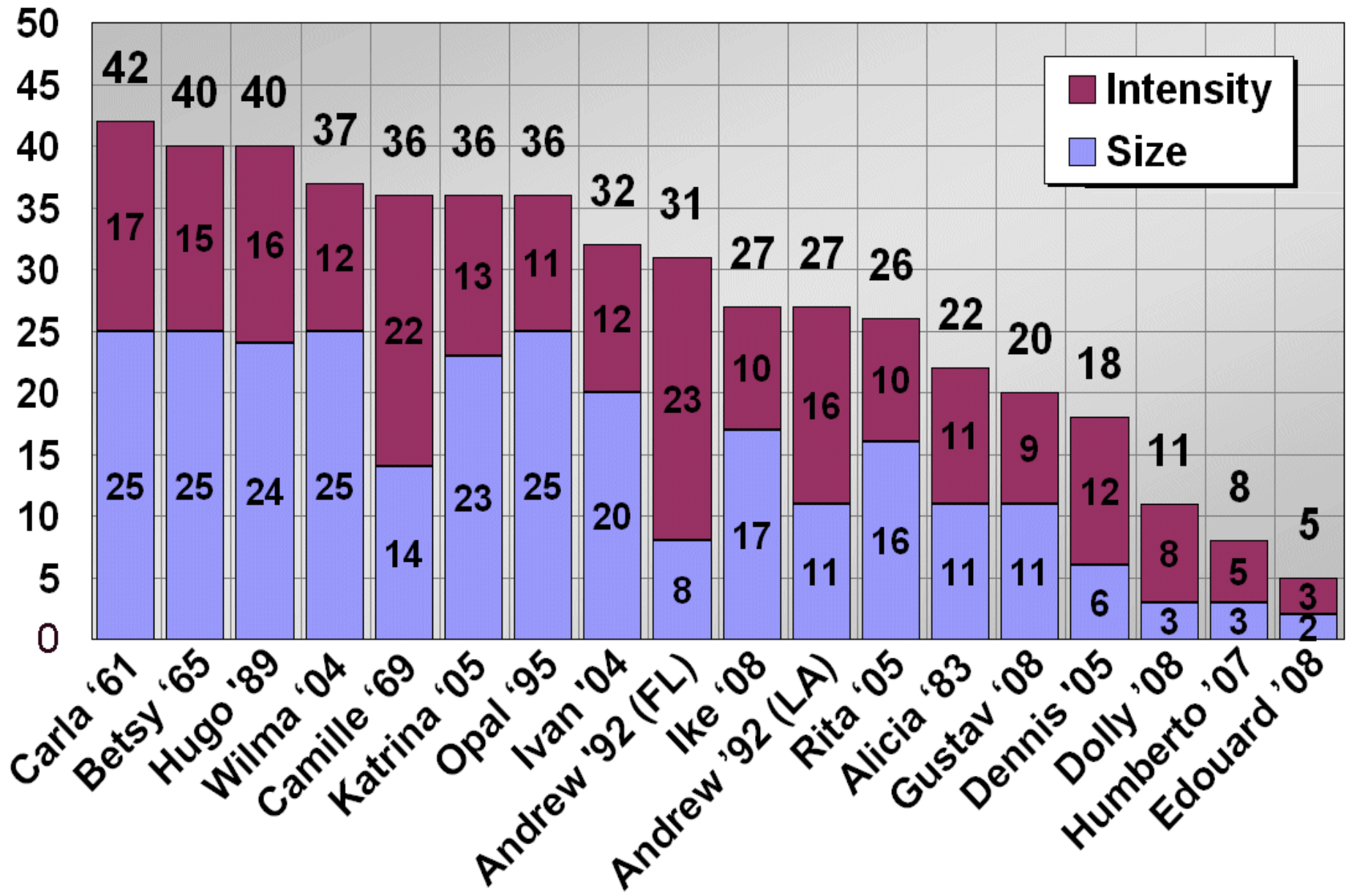
Category 1

HSI at Landfall: **8** (3 size)

Damage: \$50 Million

Humberto damage in 2007 dollars

HSI Values for Well-Known Hurricanes at Landfall



In Conclusion

Uses for HSI:

- Scheduling post-storm resources
- Objective guidance in implementation of a phased hurricane plan
- A way to quantify offshore wave development potential

Future Work:

- Compile a searchable database of past HSI values for comparison purposes
- Correlate HSI values to scope of damage
- Quantify HSI values with size/extent of storm surge