2011 Hurricane Irene

Hurricane Irene was a large and destructive tropical cyclone, which affected much of the Caribbean and East Coast of the United States during late August 2011.

Irene is ranked as the seventh-costliest hurricane in United States history.

The ninth named storm, first hurricane, and first major hurricane of the 2011 Atlantic hurricane season, Irene originated from a well-defined Atlantic tropical wave that began showing signs of organization east of the Lesser Antilles.

Due to development of atmospheric convection and a closed center of circulation, the system was designated as Tropical Storm Irene on August 20, 2011.

After intensifying, Irene made landfall in St. Croix as a strong tropical storm later that day. Early on August 21, the storm made a second landfall in Puerto Rico.

While crossing the island, Irene strengthened into a Category 1 hurricane. The storm paralleled offshore of Hispaniola, continued to slowly intensify in the process.

Shortly before making four landfalls in the Bahamas, Irene peaked as a 120 mph (195 km/h) Category 3 hurricane.

Thereafter, the storm slowly leveled-off in intensity as it struck the Bahamas and then curved northward after passing east of Grand Bahama.

Continuing to weaken, Irene was downgraded to a Category 1 hurricane before making landfall on the Outer Banks of North Carolina on August 27, becoming the first hurricane to make landfall in the United States since Hurricane Ike in 2008.

Early on the following day, the storm re-emerged into the Atlantic from southeastern Virginia. Although Irene remained a hurricane over land, it weakened to a tropical storm while making yet another landfall in the Little Egg Inlet in southeastern New Jersey on August 28.

A few hours later, Irene made its ninth and final landfall in Brooklyn, New York City. Early on August 29, Irene transitioned into an extra

tropical cyclone hitting Vermont/New Hampshire after remaining inland as a tropical cyclone for less than 12 hours.

Throughout its path, Irene caused widespread destruction and at least 56 deaths.

Damage estimates throughout the United States are estimated near $15.6 billion, which made it the seventh costliest hurricane in United States history, only behind

Hurricane Andrew of 1992

Hurricane Ivan of 2004

Hurricanes Wilma 2005

Katrina of 2005

Hurricane Ike of 2008

Hurricane Sandy in 2012

In addition, monetary losses in the Caribbean and Canada were $830 million and $130 million respectively for a total of nearly $16.6 billion in damage.

How Irene Lived Up to the Hype

By NATE SILVER

Do hurricanes receive too much media coverage? Are they more or less newsworthy than airplane crashes? The avian flu? The iPhone 5? Shark attacks? The Dominique Strauss-Kahn case? The Libyan civil war? The royal wedding? Global warming? Anthony Weiner? The Dallas Cowboys?

I don't know. What's easier to evaluate is how much coverage Hurricane Irene received in comparison with other hurricanes. By that standard, the coverage was quite proportionate to the amount of death and destruction that the storm caused.

The Web site NewsLibrary.com is a searchable database of millions of news accounts — mostly newspaper and magazine articles, but also some sources like television transcripts. While it lacks representation of things like blogs and social media, it contains a highly comprehensive sample of what we might think of as the traditional media.

It's easy enough to conduct a series of searches on NewsLibrary.com in order to determine how much press coverage past Atlantic hurricanes have received. The only tricky part is that the

further you go back in time, the fewer sources the database has available, so we'll have to adjust for this.

We'll accomplish this by creating a statistic which I'll call the **News Unit** (or NU). This is defined by taking the total number of stories that mentioned the storm by name (for instance, "Hurricane Hugo" or "Tropical Storm Hugo"; either one is considered acceptable) and dividing by the average number of stories per day that were available in the NewsLibrary.com database during that period. I then multiply the result by 10 just to make things a little bit more legible — so essentially, a News Unit consists of one-tenth of all the stories published on a given day.

For instance, there were 13,326 stories published that used the term "Hurricane Gustav" or "Tropical Storm Gustav" during the period when that storm was active, from Aug. 25 through Sept. 4, 2008. And on average, there were 56,200 stories published per day during that period in the NewsLibrary.com database. Dividing 13,326 by 56,200, and then multiplying by 10, gives a result of 2.37. So Gustav produced 2.37 News Units worth of coverage while the storm was active.

Irene's score by this measure is 2.25 News Units, which is on the high side but not extraordinary.

Specifically, it ranks 10th from among the 92 named tropical cyclones that made landfall in the United States since 1980.

Atlantic Hurricanes Receving Most Media Coverage Since 1980

Among cyclones making landfall in U.S. as hurricanes or tropical storms

Rank	Storm	Year	News Coverage (NUs)
1	Ivan	2004	4.43
2	Andrew	1992	3.68
3	Floyd	1999	3.40
4	Rita	2005	3.13
5	Georges	1998	3.04
6	Frances	2004	3.00
7	Hugo	1989	2.72
8	Gilbert	1988	2.67
9	Gustav	2008	2.37
10	Irene	2011	2.25
11	Ike	2008	2.04
12	Isabel	2003	1.88
13	Wilma	2005	1.78
14	Katrina	2005	1.56
15	Fran	1996	1.47
16	Bertha	1996	1.43
17	Jeanne	2004	1.42
18	Bonnie	1998	1.23
19	Dennis	2005	1.22
20	Erin	1995	1.16

To be sure, this is quite a lot of press coverage, and most of it was concentrated in a 72-hour period over the weekend. (Irene had received rather little attention before Friday, despite having a fairly dangerous-looking forecast track.) One unflattering comparison is to Hurricane Katrina, which received just 1.56 News Units worth of coverage while the storm was active, ranking it only 14th from among the 92 storms. (Katrina received lots and lots of coverage *after* the full effects of the storm had become manifest, but that's not what we're looking at here — instead, how much coverage each hurricane received while it was still in the atmosphere.)

Nevertheless, there are nine storms that rank ahead of Irene and which got as much or more media attention. What did they look like?

All nine were at least Category 4 hurricanes at some point during their lifespans, which Hurricane Irene never was (it topped out as a Category 3). And all but one made landfall as a Category 2 storm or higher, which Irene did not; it was a Category 1 when it hit land, first in North Carolina and then again in New Jersey. (The other exception is Hurricane Gilbert, which made landfall as a tropical storm in 1988 — but which had once been a very powerful Category 5 storm that did a lot of damage to the Caribbean.)

So Irene was not as powerful as most of these other storms — as measured by wind speed. On the other hand, it was at least as destructive as many of them.

So far, 21 fatalities have been directly attributed to Irene. It's plausible that the number will rise some, particularly given that there is still quite a bit of active flooding in New England, New Jersey, and upstate New York. (Flooding, not wind, is normally responsible for most deaths in hurricanes.) Even if we're fortunate and the number does not increase any further, 21 deaths would put Irene in a tie for the 10th-worst United States death toll for all Atlantic hurricanes since 1980.

Top Atlantic Hurriacanes Ranked by Direct U.S. Fatalities, 1980-

Rank	Storm	Year	News Coverage (NUs)	Direct U.S. Fatalities
1	Katrina	2005	1.56	1500+
2	Floyd (1999)	1999	3.40	56
3	Allison (2001)	2001	0.63	41
4	Hugo	1989	2.72	35
5	Alberto	1994	0.61	25
6	Ivan	2004	4.43	24
	Allen	1980	0.21	24
8	Juan	1985	0.68	23
9	Andrew	1992	3.68	22
10	Fran	1996	1.47	21
	Irene (2011)	2011	2.25	21+
11	Alicia	1983	0.71	20
12	Ike	2008	2.04	16
13	Isabel	2003	1.88	13
	Chantal	1989	0.29	13
15	Bob (1991)	1991	0.61	11
16	Charley (1998)	1998	0.10	10
17	Gustav (2008)	2008	2.37	9
18	Allison (1989)	1989	0.21	8
	Marco	1990	0.16	8
	Charley (2004)	2004	1.08	8

Note that these figures reflect directly induced fatalities in the United States only; there have been several storms during this period that had tragic effects in the Caribbean. Hurricanes in the United States just don't kill that many people unless they're Hurricane Katrina, which is responsible for about 70 percent of all United States hurricane fatalities since 1980.

What hurricanes do cause is a lot of economic damage: about $365 billion in direct and indirect economic losses since 1980, according to a technique that adjusts for inflation and other factors.

Loss estimates for Irene are going to take some time to calculate — but the early figures are quite bad. Estimates in an ABC News article are of property losses of between $7 billion and $13 billion — and the rule of thumb is that total economic losses are equal to about twice property losses, which would imply a total price-tag of between $14 billion and $26 billion.

Using the low end of that range — $14 billion in total losses — would rank Irene as the 8th-most destructive storm since 1980, adjusted for inflation and the growth in wealth and population.

Top Atlantic Hurriacanes Ranked by Normalized U.S. Economic Damage, 1980-

Rank	name	Year	News Coverage (NUs)	Normalized Damage (US $B)
1	Katrina	2005	1.56	$93.7
2	Andrew	1992	3.68	$66.7
3	Ike	2008	2.04	$39.8
4	Wilma	2005	1.78	$23.8
5	Charley (2004)	2004	1.08	$18.9
6	Ivan	2004	4.43	$17.9
7	Hugo	1989	2.72	$17.7
8	Irene (2011)	2011	2.25	$14.0??
9	Rita	2005	3.13	$11.6
10	Frances (2004)	2004	3.00	$11.2
11	Alicia	1983	0.71	$8.7
	Jeanne	2004	1.42	$8.7
13	Floyd (1999)	1999	3.40	$7.8
14	Allison (2001)	1995	0.63	$7.6
15	Opal	2008	0.95	$7.1
16	Gustav (2008)	1996	2.37	$6.9
17	Fran	2003	1.47	$6.7
18	Isabel	1985	1.88	$4.6
19	Juan	1998	0.68	$4.5
20	Georges	1985	3.04	$4.4

So Irene right now ranks as the 10th-deadliest storm since 1980, with some possibility of that number going higher. And it ranks as the 8th most destructive storm economically, give or take. Meanwhile, it received about the 10th-most media coverage.

What's the problem with that? Actually, I don't see any problem with it whatsoever. The level of coverage given to Irene received seems quite appropriate given what we know about its impact.

But you can find some plenty of critiques of the press coverage given to Irene – like from Howard Kurtz, the media critic for The Daily Beast, who decried "the tsunami of hype" in the media coverage of the storm.

There are some things in Mr. Kurtz's article that I agree with. Certainly the tone and tenor of media coverage could be improved when it comes to hurricanes and other types of disasters. In particular, as you might expect, I think the coverage could stand to be a quite a bit more data-driven and less narrative-driven (if you can call it "narrative" to have some television correspondent mugging for the camera in his Windbreaker from the middle of a storm zone).

Data-driven, among other things, would imply informing the public when the prognosis had gotten better — as it did, for instance, on Friday afternoon, when it became apparent that Irene was failing to add much strength over the open ocean, and was unlikely to hit the Carolinas as more than a strong Category 1 storm or the Northeast as more than a weak Category 1. On the

other hand, wind speeds don't tell the whole story about a hurricane. Irene was likely to be much more damaging than implied by its wind speed alone for three basic reasons that I outlined on Friday: because it was an unusually large storm, because it was an exceptionally slow-moving storm, and because it was headed for the most populous part of the country.

On average, hurricanes that make landfall in the United States as Category 1 storms have produced about $600 million in economic damage. The losses from Irene look as though they'll be something like 25 times that. In terms of the amount of economic damage it caused, in fact, Irene is much more like a typical Category 3 hurricane than a weak Category 1.

Average Economic Damage
U.S. Hurricanes, 1980-2011

Category at Landfall	Normalized Damage (US $B)
Tropical Storm	$0.4
Category 1 Hurricane	$0.6
Category 2 Hurricane	$7.5
Category 3 Hurricane	$12.7
Category 4 Hurricane	$18.3
Category 5 Hurricane	$66.7

Could it have been worse? Sure — but I'm not sure if that really bolsters Mr. Kurtz's critique.

The computer models that projected Irene's track actually did very well. They had predicted several days ago that the most likely scenario was that Irene would come quite close to New York City and would be right on the fringe of a strong tropical storm and a weak Category 1 hurricane when it did. That's pretty much exactly what happened.

Computer models of hurricane trajectories have gotten a lot better over the years — however, there is uncertainty in any forecast, including this one. The difference with a hurricane is that, because economic damage accumulates as a very steep exponential function of wind speed, the impact of the uncertainty is asymmetrical.

Imagine, for instance, if Irene had been about 20 percent stronger when it hit New York — that it had wind speeds of about 90 miles an hour instead of 75 miles an hour. That doesn't sound like a huge difference and from a meteorological perspective, and it isn't.

But from an economic perspective, that may have mattered quite a lot. Some of the scholarly literature suggests that the economic damage resulting from hurricanes is a function of wind speeds raised to the *eighth power*. I'll spare you the math: what that means is that hurricane with wind speeds of 90 miles an hour might be as much a 4 or 5 times more destructive as one with wind speeds of 75 miles per hour. So if Irene had been just a bit stronger, we might be talking about economic losses on the order of $55 billion to $70 billion, rather than a "mere" $14 billion.

Fortunately, that does not mean that every hurricane with wind speeds of 90 miles per hour would present that much of a threat to New York. But it does mean that Irene, because of its size, speed and trajectory, was an exceptionally dangerous storm. Had its wind speeds been only a little higher, Irene could have caused monumental problems. One does get the sense that we narrowly avoided the worst; there was quite a bit of flooding in Manhattan and Brooklyn on Sunday morning despite the storm surge having come in toward the low end of published estimates. Had Irene not nicked New Jersey on its way up the coast … who knows.

As it stands, the problems are really pretty bad. There may not have been as many fireworks as the Weather Channel might have implied. But there is a lot of flooding, there are a lot of people without power, and there is economic damage tantamount to a Category 3 hurricane. A couple dozen families have lost loved ones.

It wasn't the worst-case scenario – either for Irene in particular or for hurricanes hitting New York in general. But I don't see how you dismiss it as hype. If, as Mr. Kurtz says, "the prophets of doom were wrong," I'm not looking forward to seeing what happens when they're right.