



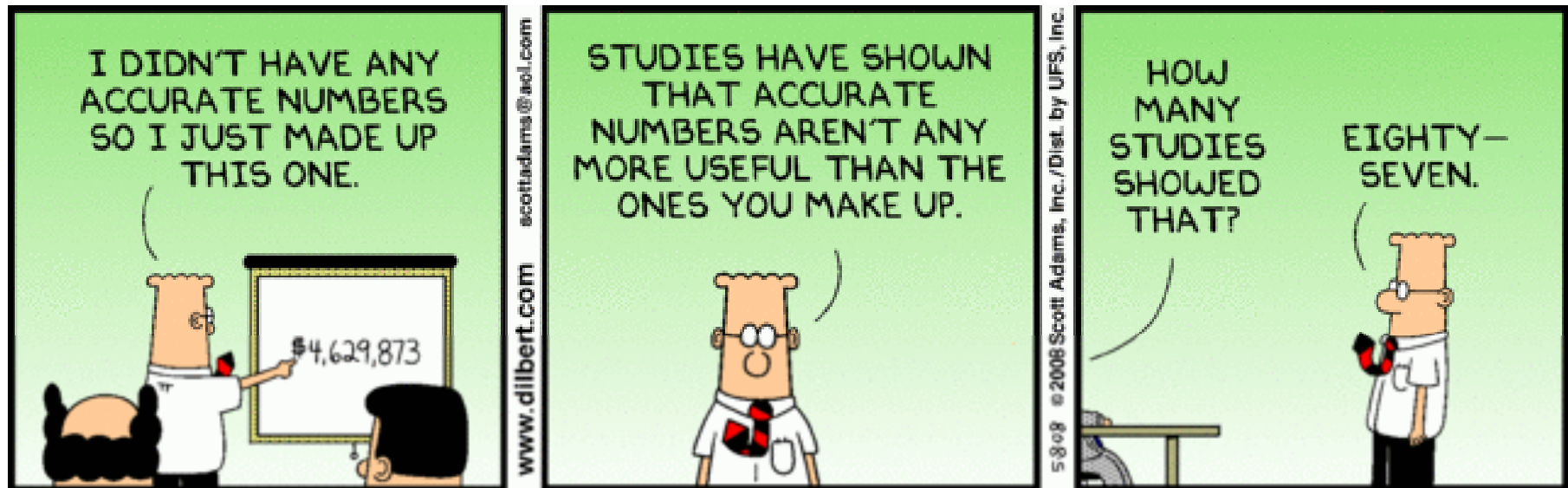
The Shifting Nature of Catastrophic Risk in the United States

Casualty Actuaries Special Interest Seminar
October 5, 2012 **Baltimore, MD**

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Not All Data in a PowerPoint Slide Are Accurate or Reliable



Until Recently (or so we thought),

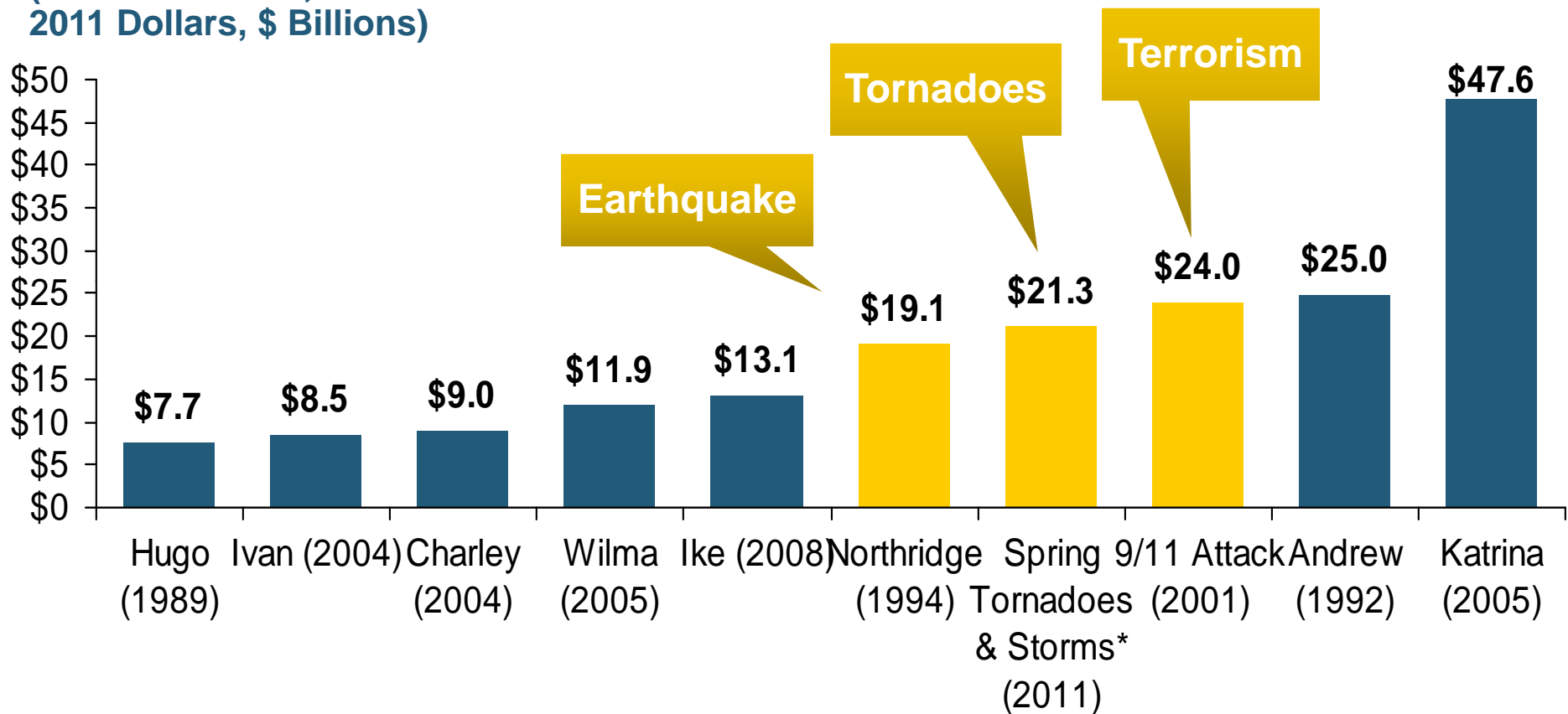
- **Only Hurricanes Caused Disasters**
- **Only a Small Part of the U.S. (the Gulf and South Atlantic Coasts) Was Vulnerable**
- **Only June-November (Hurricane Season) Was Worrisome**
- **Only Wind Damage Was Likely**

Are More Catastrophes Occurring?

It Certainly Seems That Way

7 of the 10 Most Costly Disasters in U.S. History Were Hurricanes

(Insured Losses, 2011 Dollars, \$ Billions)

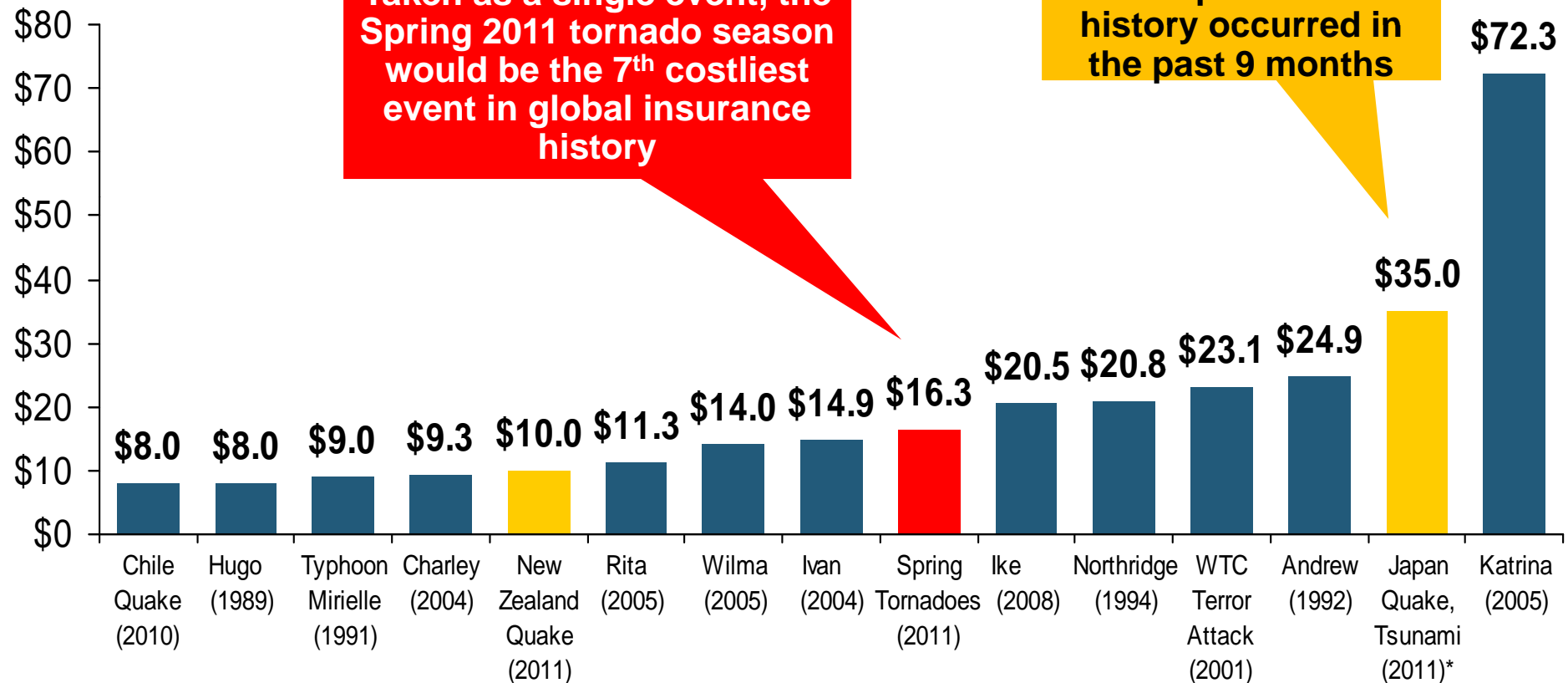


There have been larger disasters in our history, but none more costly than these, due to growth of exposures and insurance coverage

*Losses will actually be broken down into several "events" as determined by PCS. Includes losses for the period April 1 – June 30. Sources: PCS; Insurance Information Institute inflation adjustments.

15 Costliest World Insurance Losses, 1970-2011*

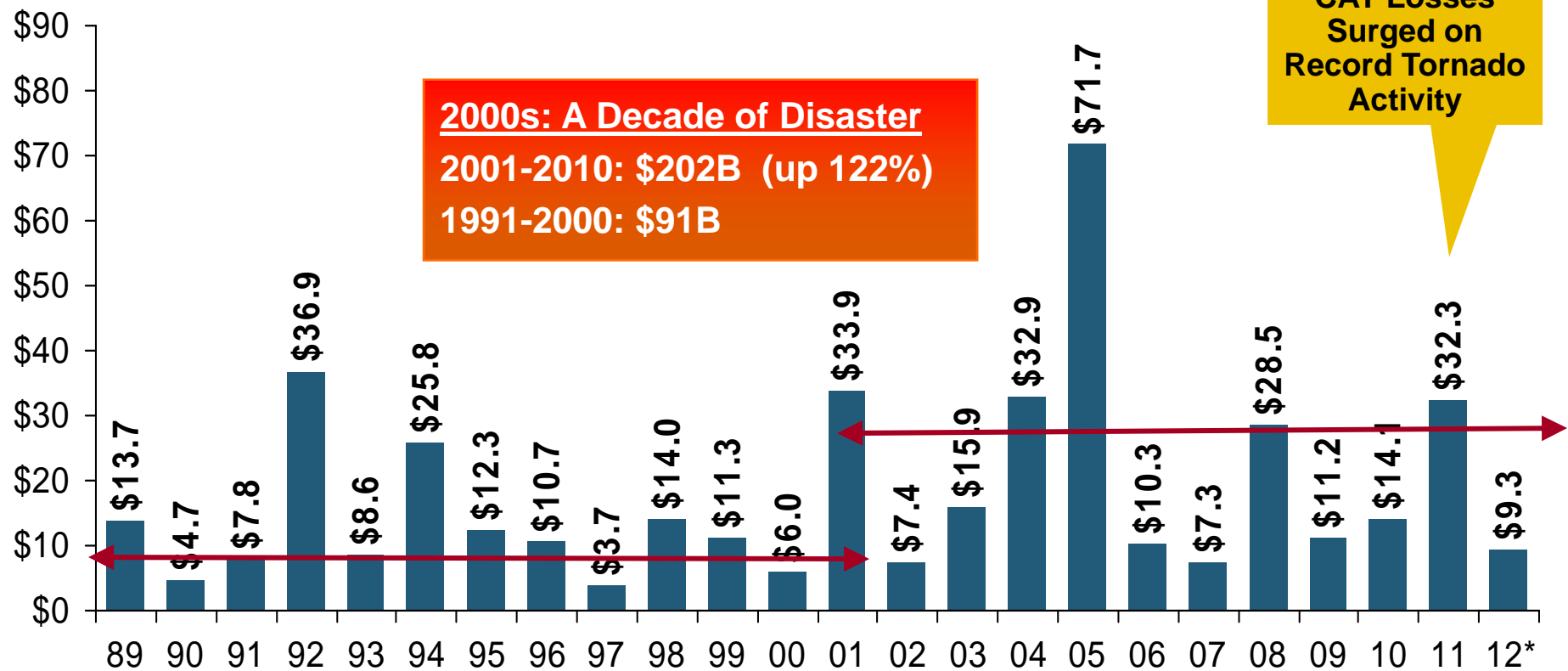
Insured Losses,
2010 Dollars,
\$ Billions



*Through June 20, 2011. 2011 disaster figures are estimates; Figures include federally insured flood losses, where applicable.
Sources: Swiss Re *sigma* 1/2011; AIR Worldwide, RMS, Eqecat; Insurance Information Institute.

US Insured Catastrophe Losses, Yearly, 1989-2011*

\$ Billions of 2011 dollars



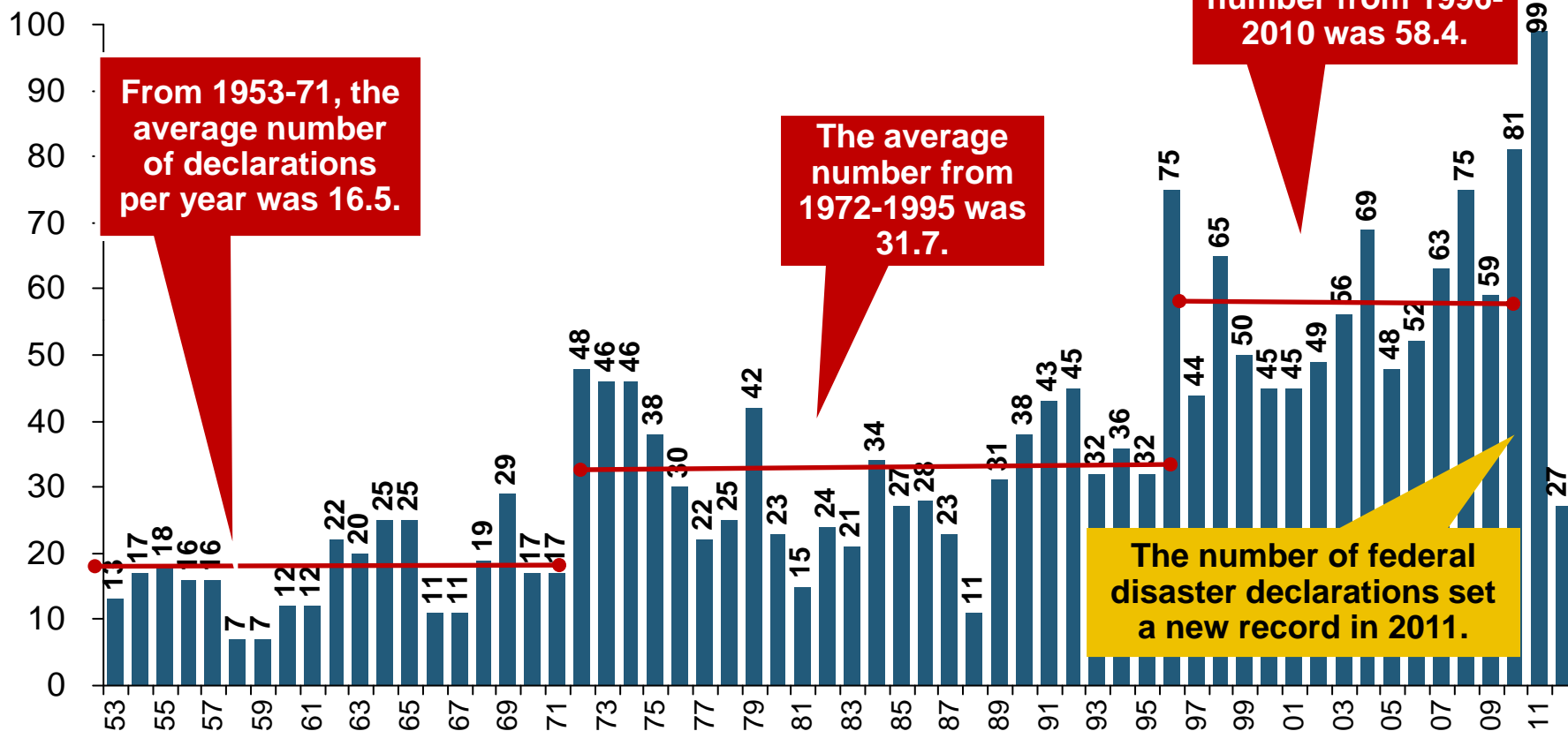
US CAT losses in 2011 were the 5th highest in US history on an inflation-adjusted basis

*Munich Re estimate for 2012 first half.

Note: 2001 figure includes \$20.3B for 9/11 losses reported through 12/31/01 (\$25.9B 2011 dollars). Includes only business and personal property claims, business interruption and auto claims. Non-prop/BI losses = \$12.2B (\$15.6B in 2011 dollars.)

Sources: Property Claims Service/ISO; Insurance Information Institute.

Number of Federal Major Disaster Declarations, Yearly, 1953-2012*

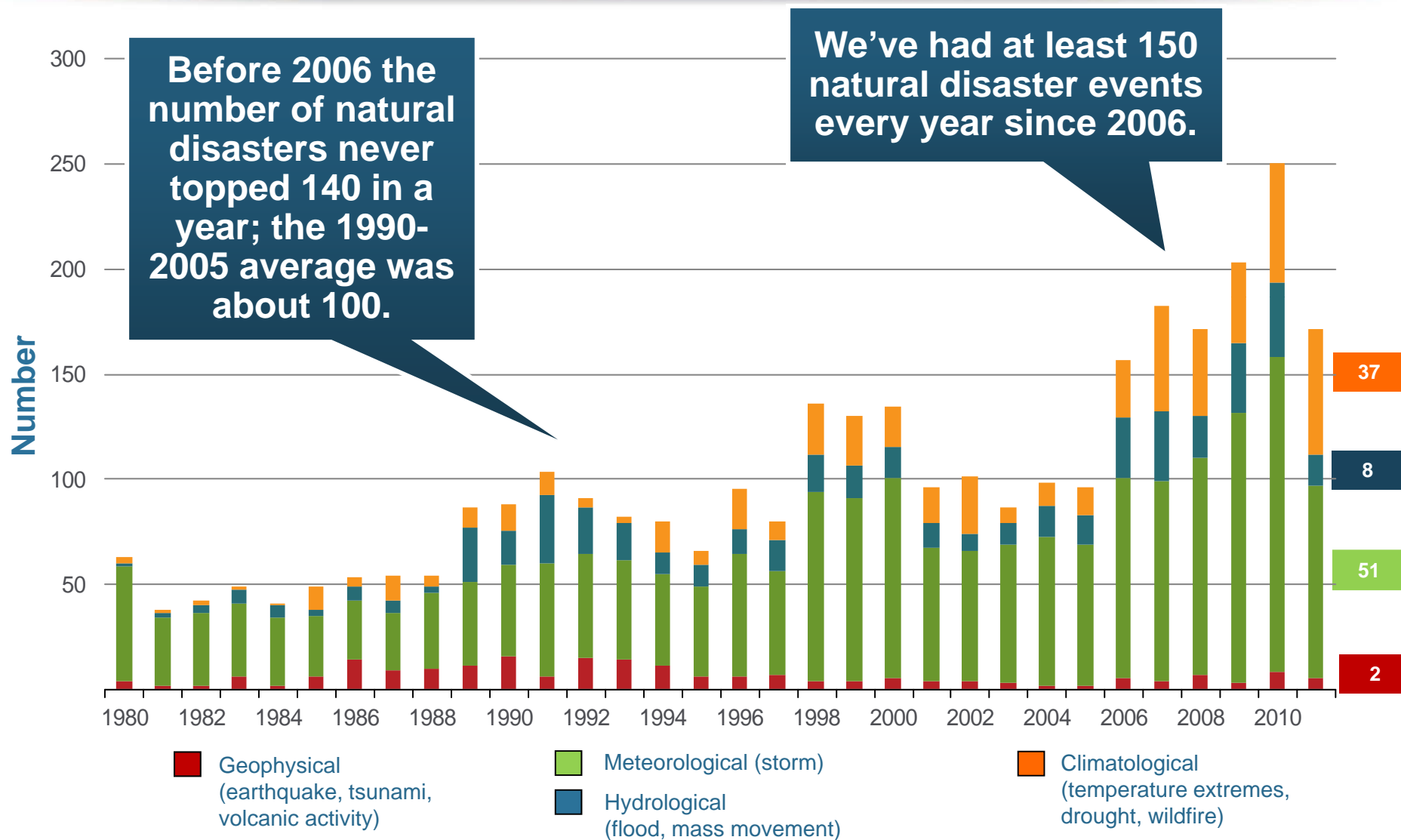


Some federal major disaster declarations cover the same storm in separate states; for example, there were 3 declarations for a “severe storm” that struck DC, Virginia, and West Virginia on June 29-July 1, 2012

*Through August 26, 2012. Sources: Federal Emergency Management Administration at http://www.fema.gov/disasters?field_state_tid=All&field_disaster_type_term_tid=All&field_disaster_declaration_type_value=All&items_per_page=60&=GO ; Insurance Information Institute.

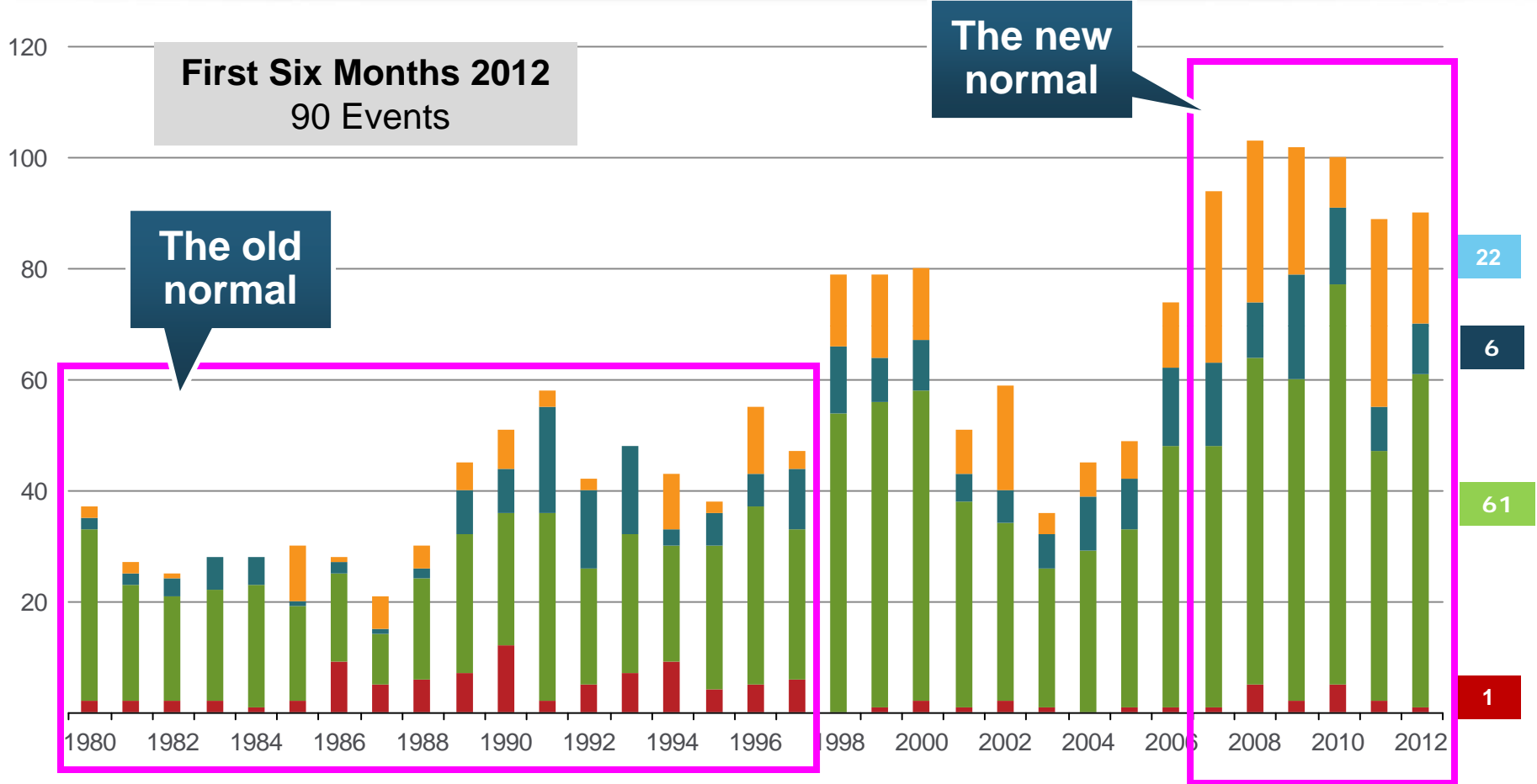
Natural Disasters in the United States, 1980 – 2011

Number of Events (Annual Totals 1980 – 2011)



Natural Disasters in the United States, 1980 – 2012

Number of Events, January – June only



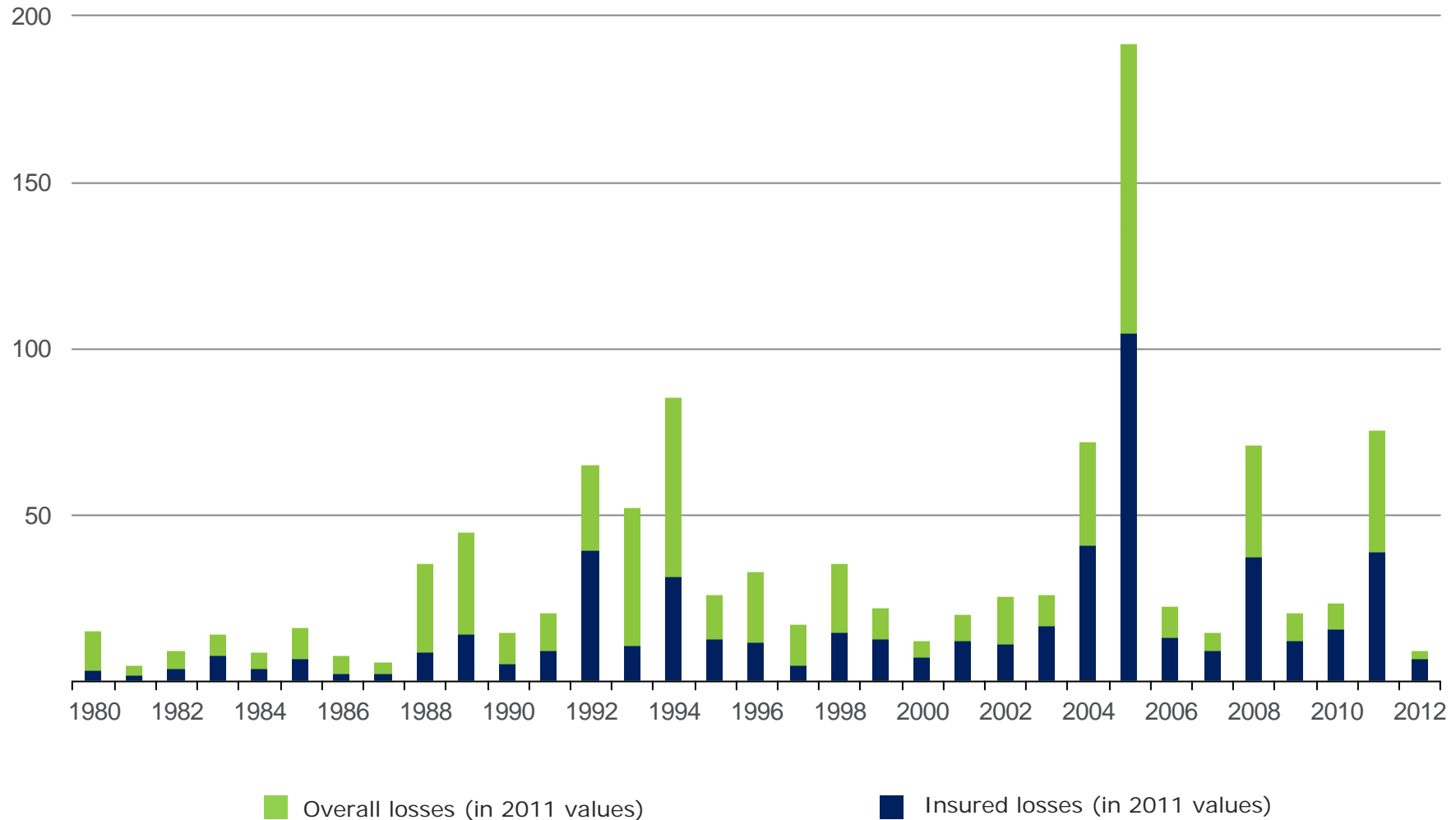
- Geophysical events** (Earthquake, tsunami, volcanic eruption)
- Meteorological events** (Storm)
- Hydrological events** (Flood, mass movement)
- Climatological events** (Extreme temperature, drought, forest fire)

Losses Due to Natural Catastrophes in the United States



1980 – 2012 (Annual Totals 1980 – 2011 vs. First Six Months 2012)

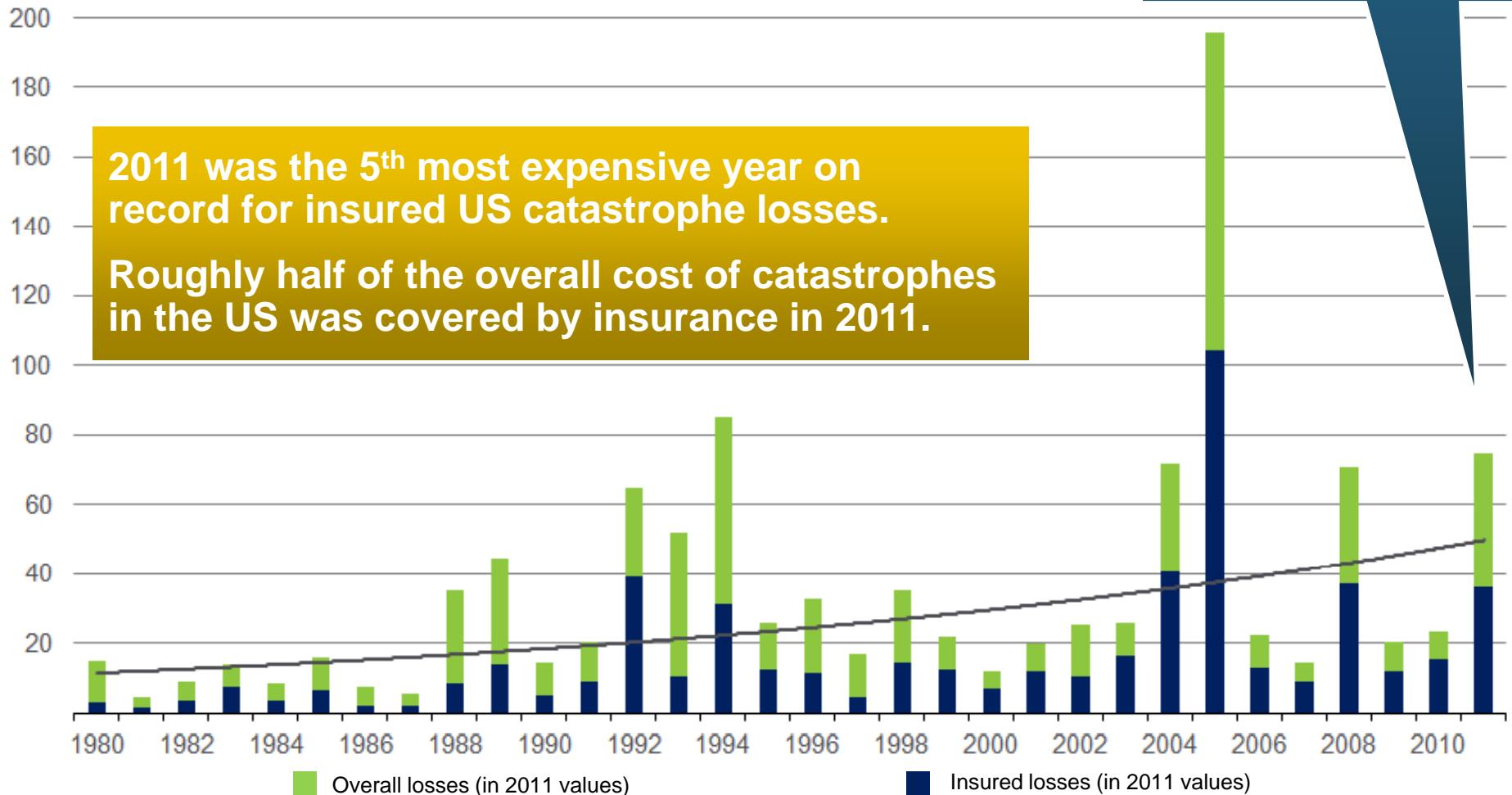
2012:1H insured losses in the US totaled US\$ 9.3bn.



An Upward Trend: Losses Due to Natural Disasters in the US, 1980–2011

(Overall and Insured Losses)
(2011 Dollars, \$ Billions)

2011
Overall Losses: \$72.8 B
Insured Losses: \$35.9 B



What Happened in 2011 and the 1st Half of 2012

Lately, Insured Claims from Tropical Storms in the US Have Decreased, but Other Causes of Catastrophes Have Risen

Natural Disasters in the United States, 2011



	Number of Events	Fatalities	Estimated Overall Losses (US \$m)	Estimated Insured Losses (US \$m)
Severe Thunderstorm	69	617	\$46,548	\$25,813
Winter Storm	9	67	\$2,708	\$2,017
Flood	14	20	\$2,705	\$535
Earthquake	5	1	\$257	\$50
Tropical Cyclone	3	0	\$10,700	\$5,510*
Wildfire	58	15	\$1,922	\$855
Other	2	33	\$8,000	\$1,000
Totals	160	753	\$72,840	\$35,780

Source: MR NatCatSERVICE

*Includes flood losses insured through the NFIP.

Natural Disasters in the United States, 2012 1st Half

	Number of Events	Fatalities	Estimated Overall Losses (US \$m)	Estimated Insured Losses (US \$m)
Severe Thunderstorm	56	69	13,550	8,760
Winter Storm	3	3	80	38
Flood	6	0	12	Minor
Earthquake	1	0	0	0
Tropical Cyclone	2	1	100	50
Wildfire	22	6	875	500
Totals	90	79	14,617	9,348

US Natural Catastrophes 2012

- US insured losses from the first half of 2012 totaled \$9.3billion.
 - ◆ This was well below the \$24.4b in the first half of 2011 (in 2012 Dollars).
 - ◆ Thunderstorms (including tornado/hail), account for almost all of this, estimated at \$8.8b,
 - ◆ Even though claims in 2012 were 1/3 of those from 2011, **the first half of 2012 was the third most costly spring thunderstorm season in US history**

US Natural Catastrophes 2012

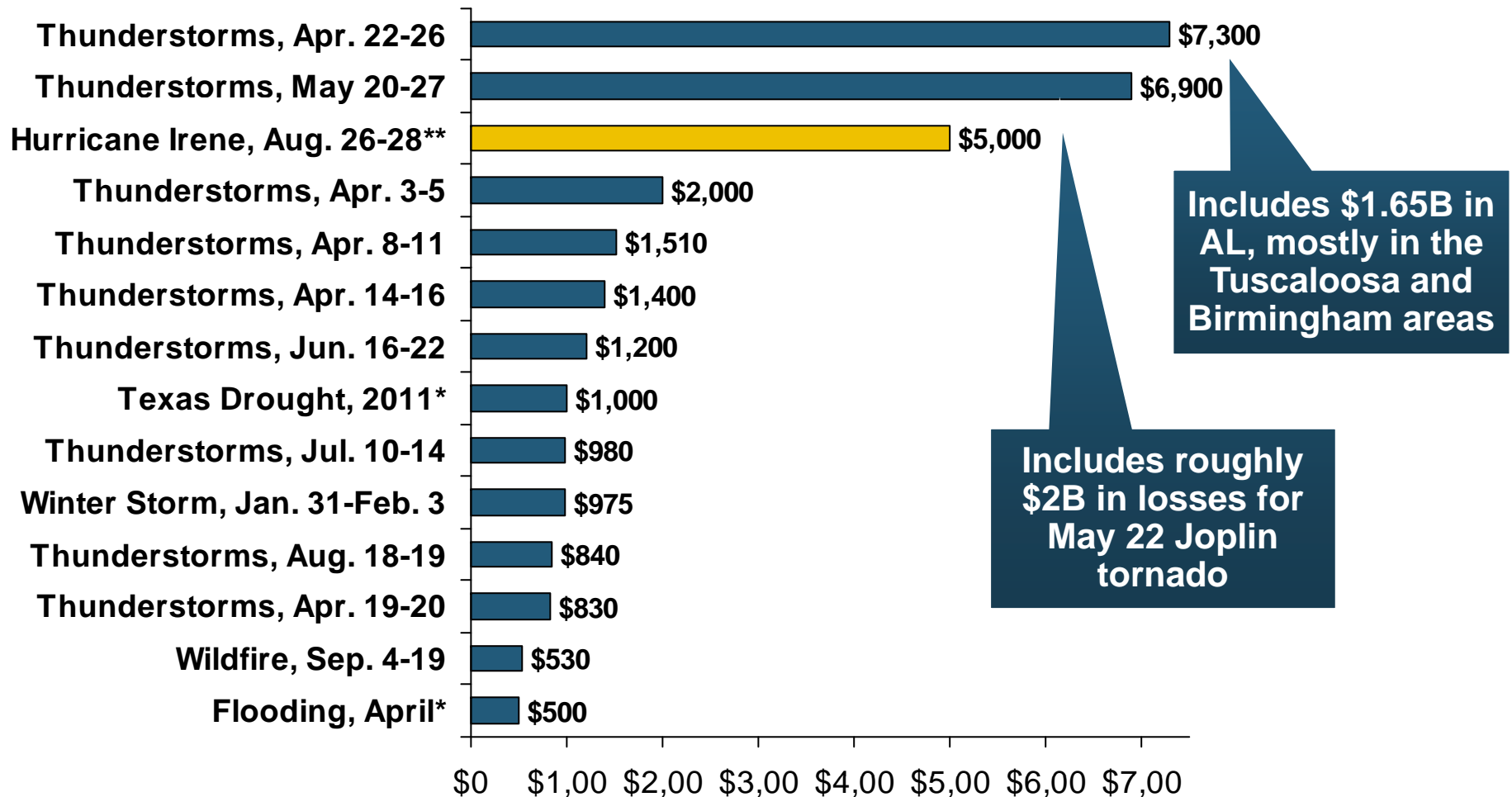
■ The Good News:

- ◆ Very mild winter over most of US caused only minor winter storm losses.
- ◆ Lack of heavy winter precipitation limited spring flooding.

■ The Bad News:

- ◆ Lack of heavy winter precipitation has exacerbated drought conditions.

2011's Most Expensive Catastrophes, Based on Insured Losses



**Includes \$700 million in flood losses insured through the National Flood Insurance Program.

Source: PCS except as noted by "*" which are sourced to Munich Re; Insurance Information Institute.

Shifting Patterns in Insured Catastrophe Losses

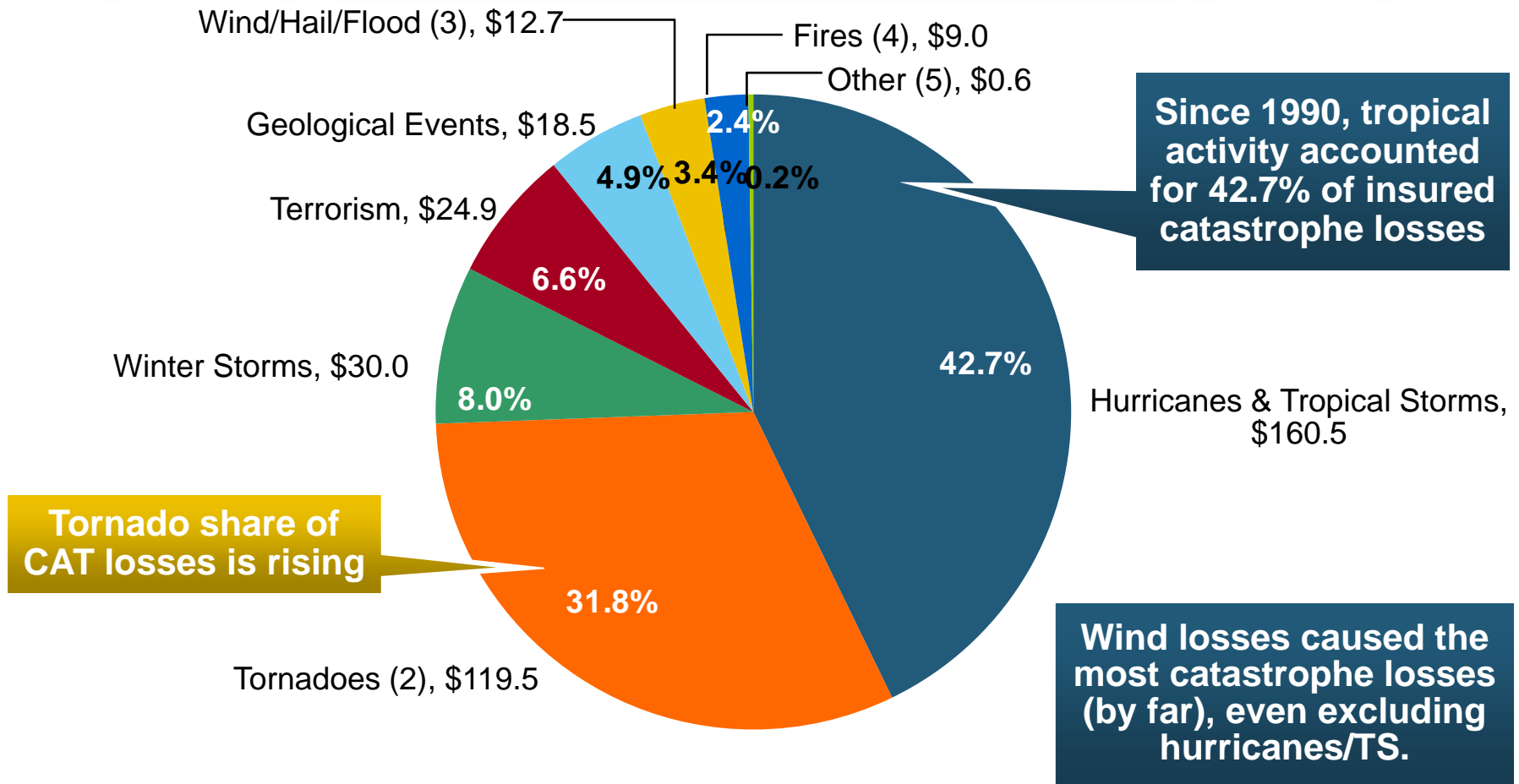
**Lately, Insured Claims from Tropical
Storms in the US Have Decreased,
but Other Causes of Catastrophes
Have Risen**

The Changing Nature of Insured Catastrophe Losses in the US

■ Historically Most of US Insured Catastrophe Losses Came From Hurricanes and Tropical Storms

- ◆ Hurricanes still account for the majority of the Top 15 catastrophes, but other types of catastrophes are displacing hurricanes
- ◆ Thunderstorms (including tornados, large and high winds) are the leading cause of insured loss from 2008-2011 and so far in 2012
- ◆ A trend/pattern appears to be emerging: More frequent and more intense thunderstorm activity
- ◆ It is unclear if the recent low level of landfalling tropical cyclones is part of a trend or a longer-term oscillation in activity

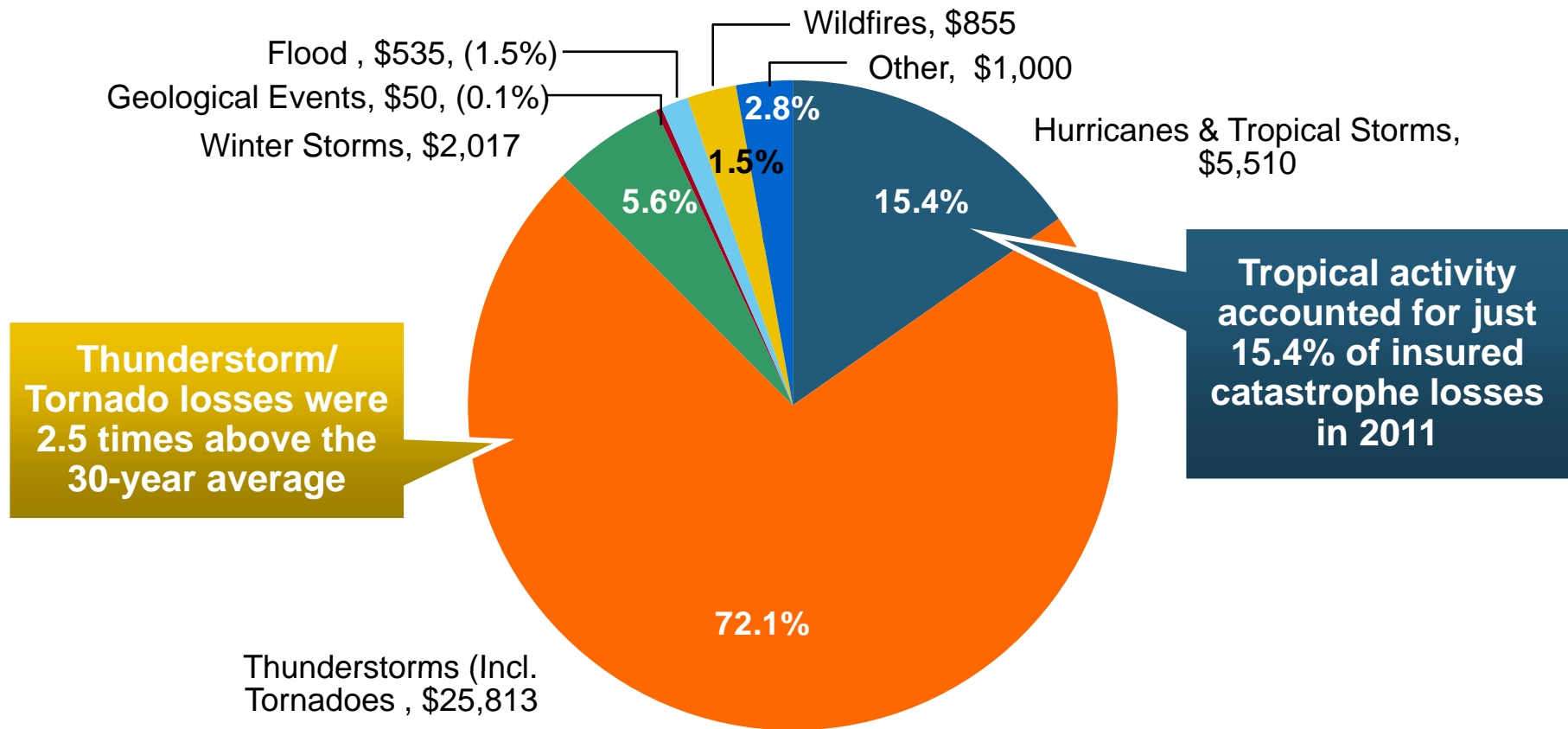
Inflation-Adjusted U.S. Catastrophe Losses by Cause of Loss, 1990–2011:H1¹



1. Catastrophes are defined as events causing direct insured losses to property of \$25 million or more in 2009 dollars.
2. Excludes snow.
3. Does not include NFIP flood losses
4. Includes wildland fires
5. Includes civil disorders, water damage, utility disruptions and non-property losses such as those covered by workers compensation.

Source: ISO's Property Claim Services Unit.

U.S. Insured Catastrophe Losses by Cause of Loss, 2011 (\$ Millions)



2011's insured loss distribution was unusual, with tornado and thunderstorm claims accounting for the vast majority of loss.

The Changing Nature of Insured Catastrophe Losses in the US (cont'd)

- **Since 2008, insured thunderstorm losses totaled roughly \$60 billion vs. about \$20 billion for tropical events**
 - ◆ This means that insured catastrophe losses over the past 4 years have occurred predominantly in non-coastal areas
 - ◆ Midwest, Plains, Mid-Atlantic regions have been hit hard
 - ◆ Inland sections of coastal states have also been hit hard (e.g., AL, MS, NC)

- **Higher Catastrophe Losses Are Pressuring Property Insurance Markets**
 - ◆ Rates are rising in many areas hit hard by catastrophe losses in recent years.

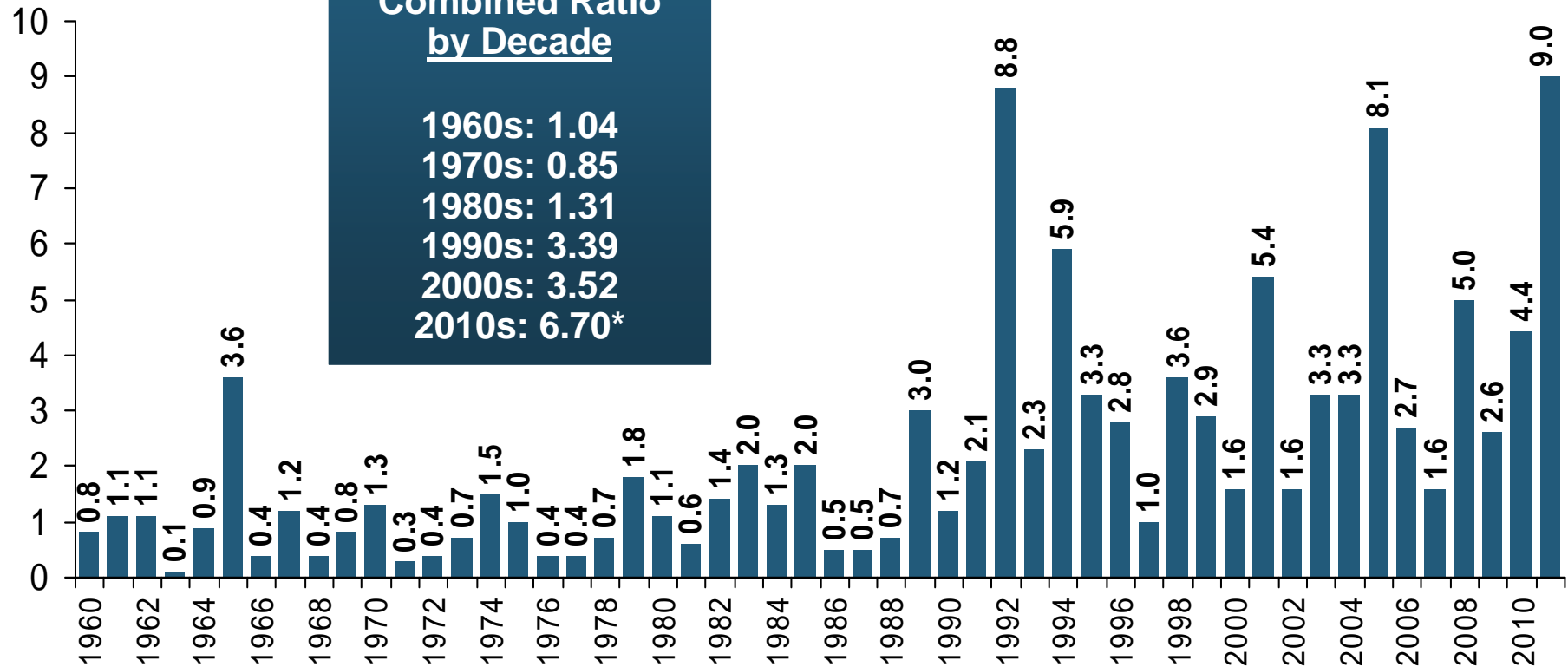
Combined Ratio Points Associated with Catastrophe Losses: 1960 – 2011*



Combined Ratio Points

Avg. CAT Loss Component of the Combined Ratio by Decade

1960s: 1.04
 1970s: 0.85
 1980s: 1.31
 1990s: 3.39
 2000s: 3.52
 2010s: 6.70*



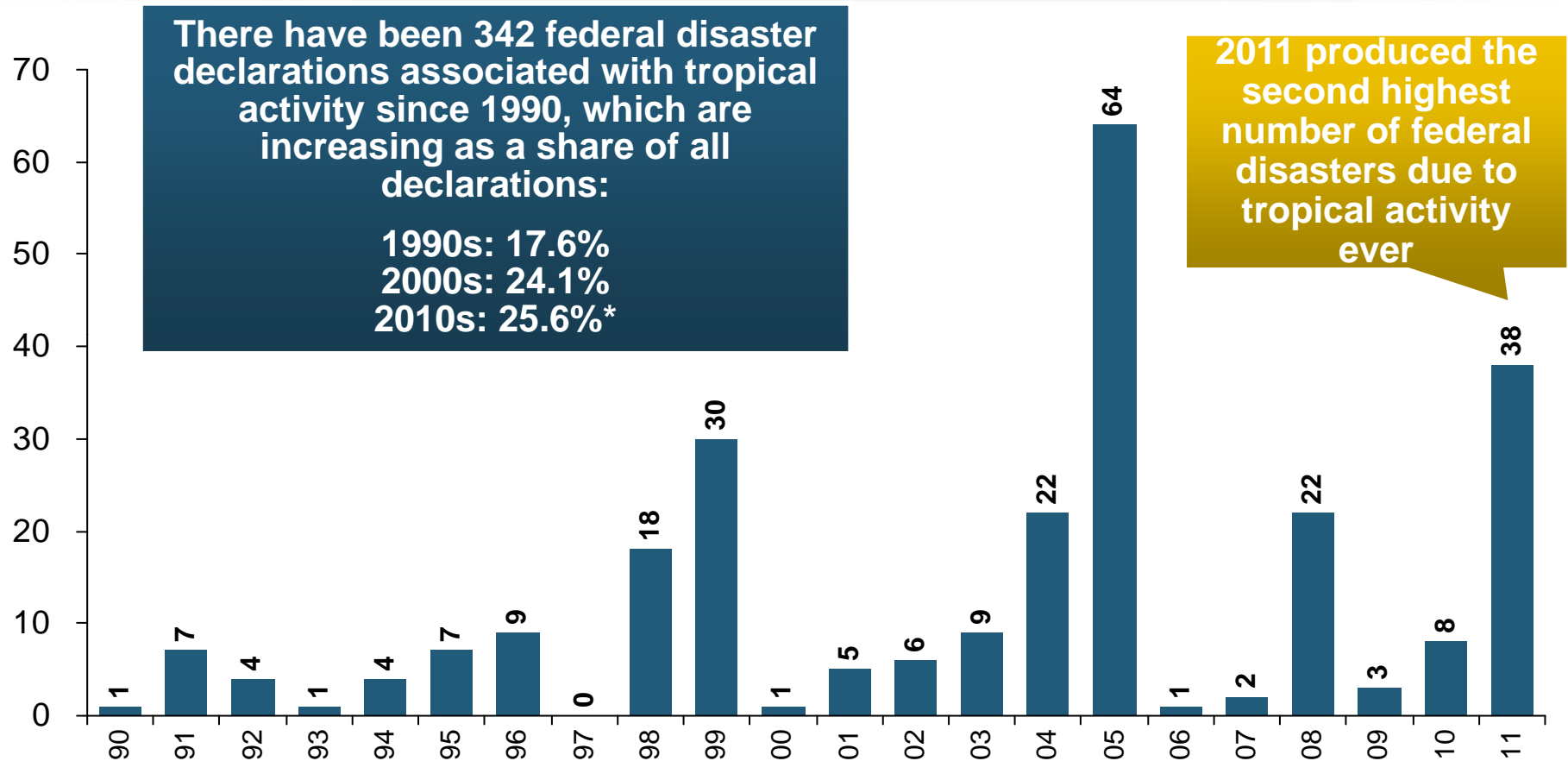
The Catastrophe Loss Component of Private Insurer Losses Has Increased Sharply in Recent Decades—Only in Part Due to Tropical Activity

*Insurance Information Institute estimates for 2010 and 2011 based on A.M. Best data.

Notes: Private carrier losses only. Excludes loss adjustment expenses and reinsurance reinstatement premiums. Figures are adjusted for losses ultimately paid by foreign insurers and reinsurers.

Sources: ISO; Insurance Information Institute.

Number of Federal Disaster Declarations Associated w/ Tropical Systems, 1990-2011



There have been 342 federal disaster declarations associated with tropical activity since 1990, which are increasing as a share of all declarations:

1990s: 17.6%
 2000s: 24.1%
 2010s: 25.6%*

2011 produced the second highest number of federal disasters due to tropical activity ever

The Share of Federal Disaster Declarations Associated with Tropical Activity Has Been Rising

*Consists of data for 2010 and 2011.

Source: Federal Emergency Management Administration: http://www.fema.gov/news/disaster_totals_annual.fema ; Insurance Information Institute research.

2011-12: Nowhere to Run, Nowhere to Hide

**Most of the Country East of
the Rockies Suffered Severe
Weather in 2011**

Tornadoes, Thunderstorms, and Large Hailstorms

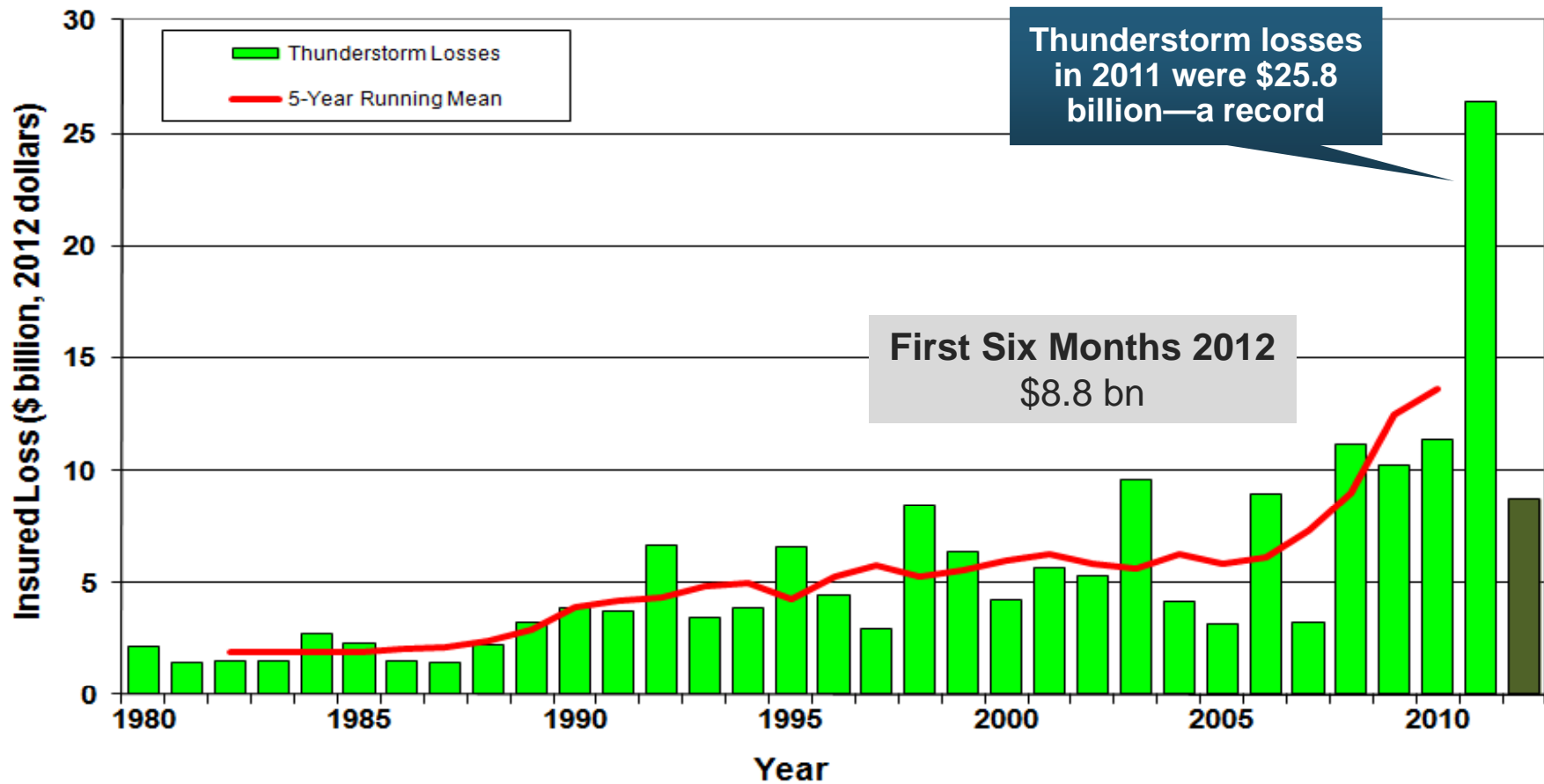
**2012 Is Off to a Worrisome Start, But
a Repeat of 2011 Is Unlikely**

US Thunderstorm Loss Trends

Annual Totals 1980 – 2011 vs. First Six Months 2012



Average thunderstorm losses have increased over fivefold since 1980

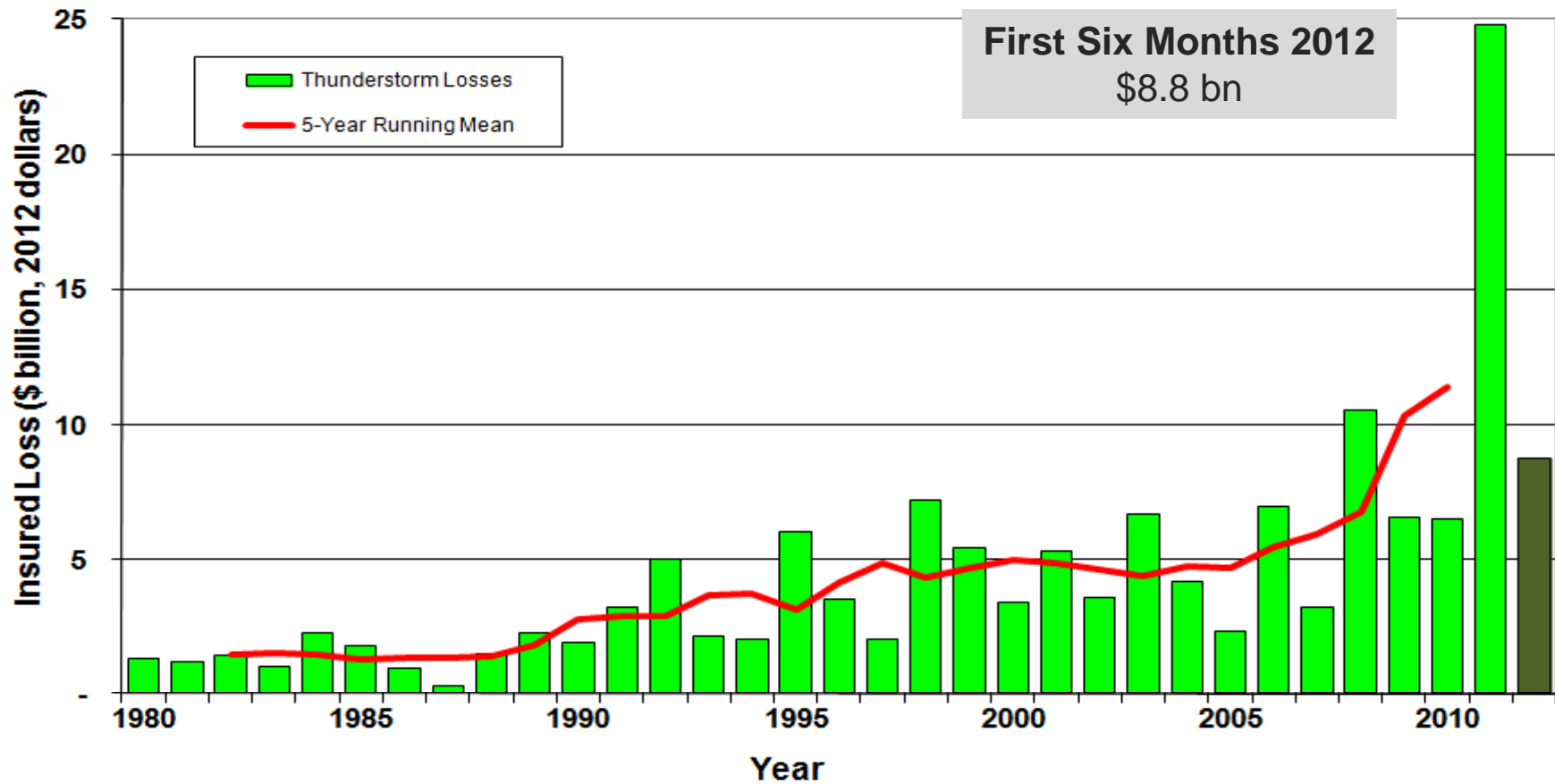


US Thunderstorm Loss Trends

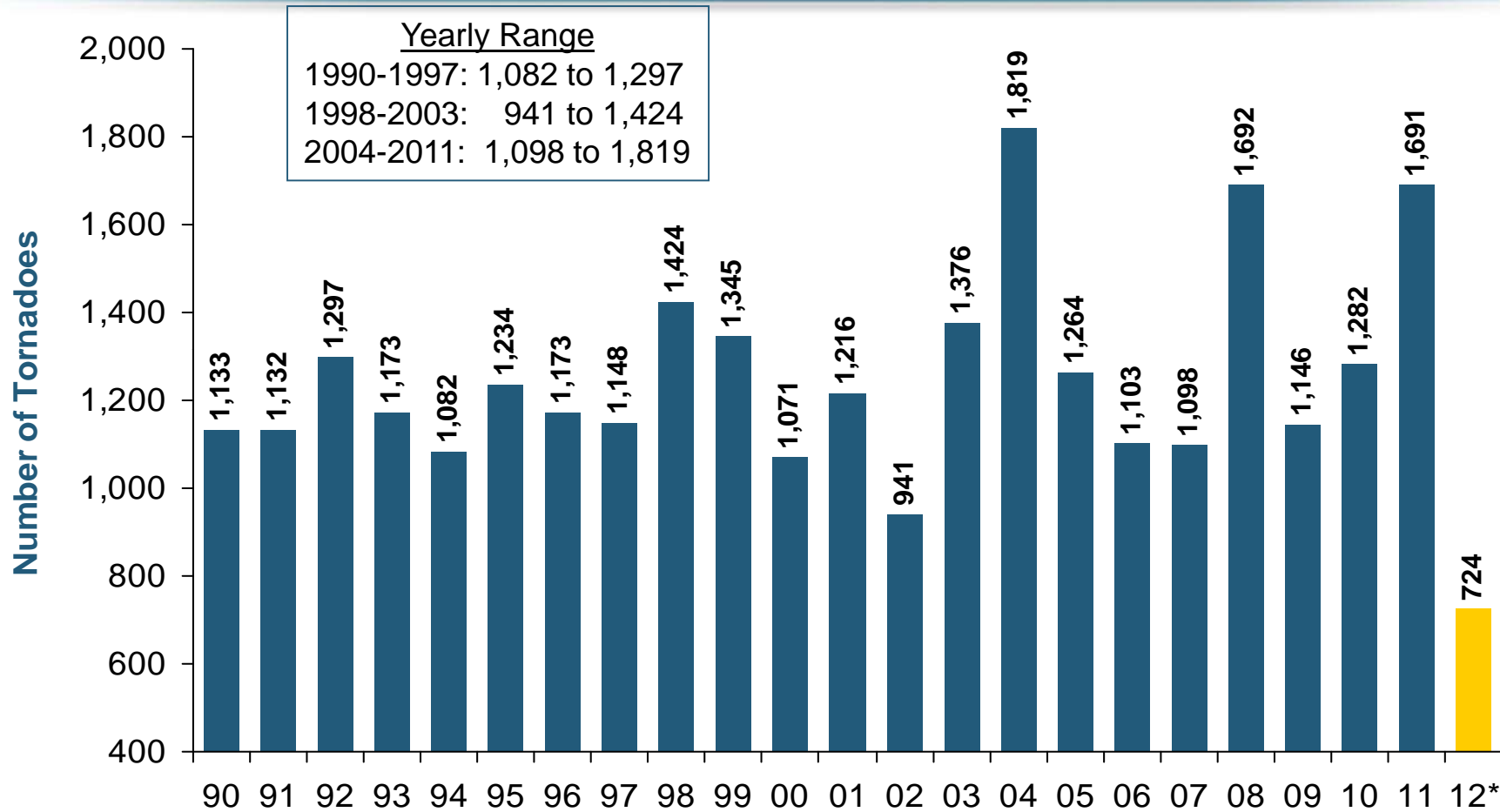
January – June Only, 1980 - 2012



Thunderstorm losses for January – June 2012 were much lower than 2011, but still the third worst spring thunderstorm season loss in history.



Increasing Variability: Number of Tornadoes, 1990 – 2012*

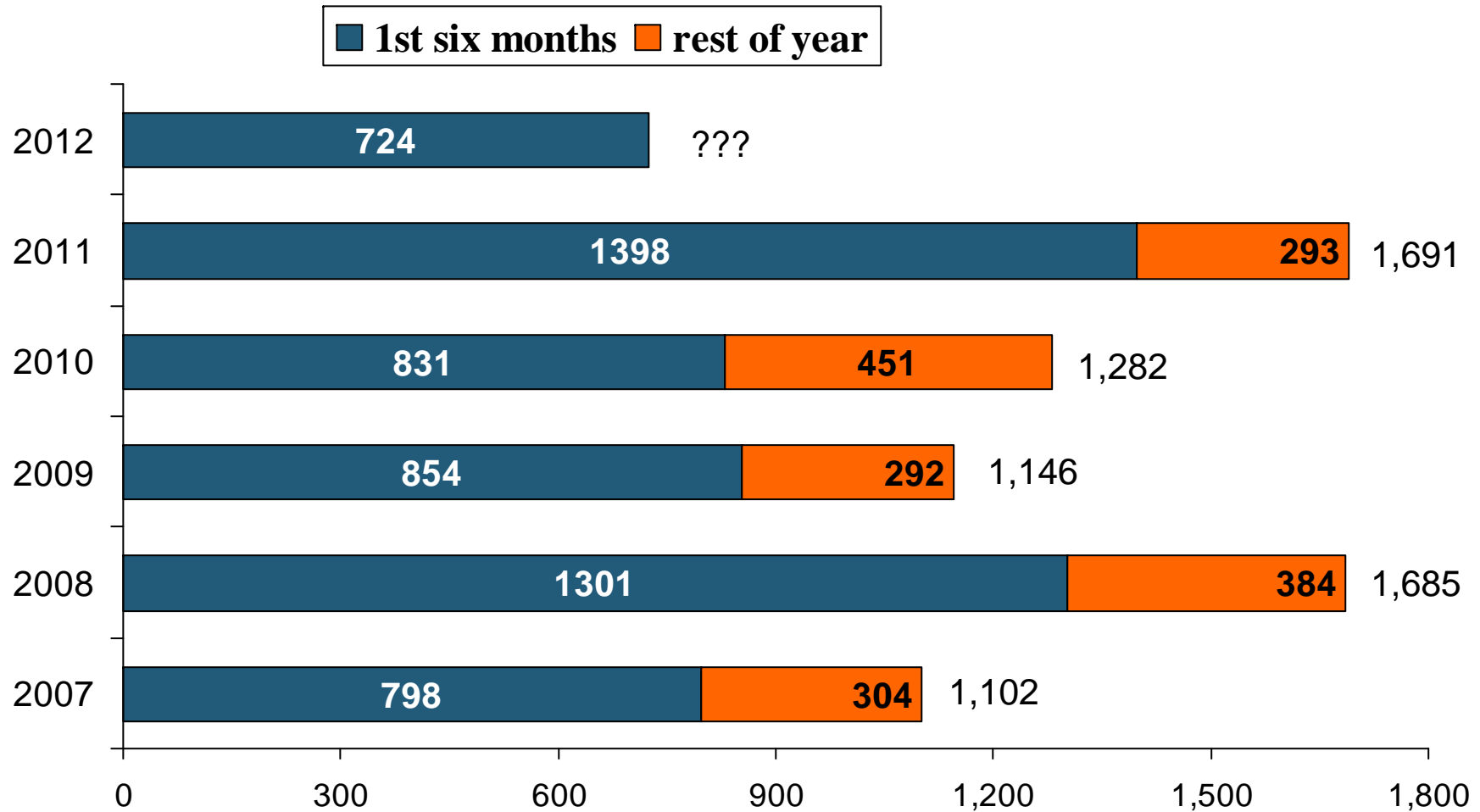


Insurers Expect to Pay at Least \$2 Billion for the April 2011 Tornadoes in Alabama and a Similar Amount for the May Storms in Joplin

*Through June 2012, latest data after adjusting sightings to actual, as of Sept 10, 2012

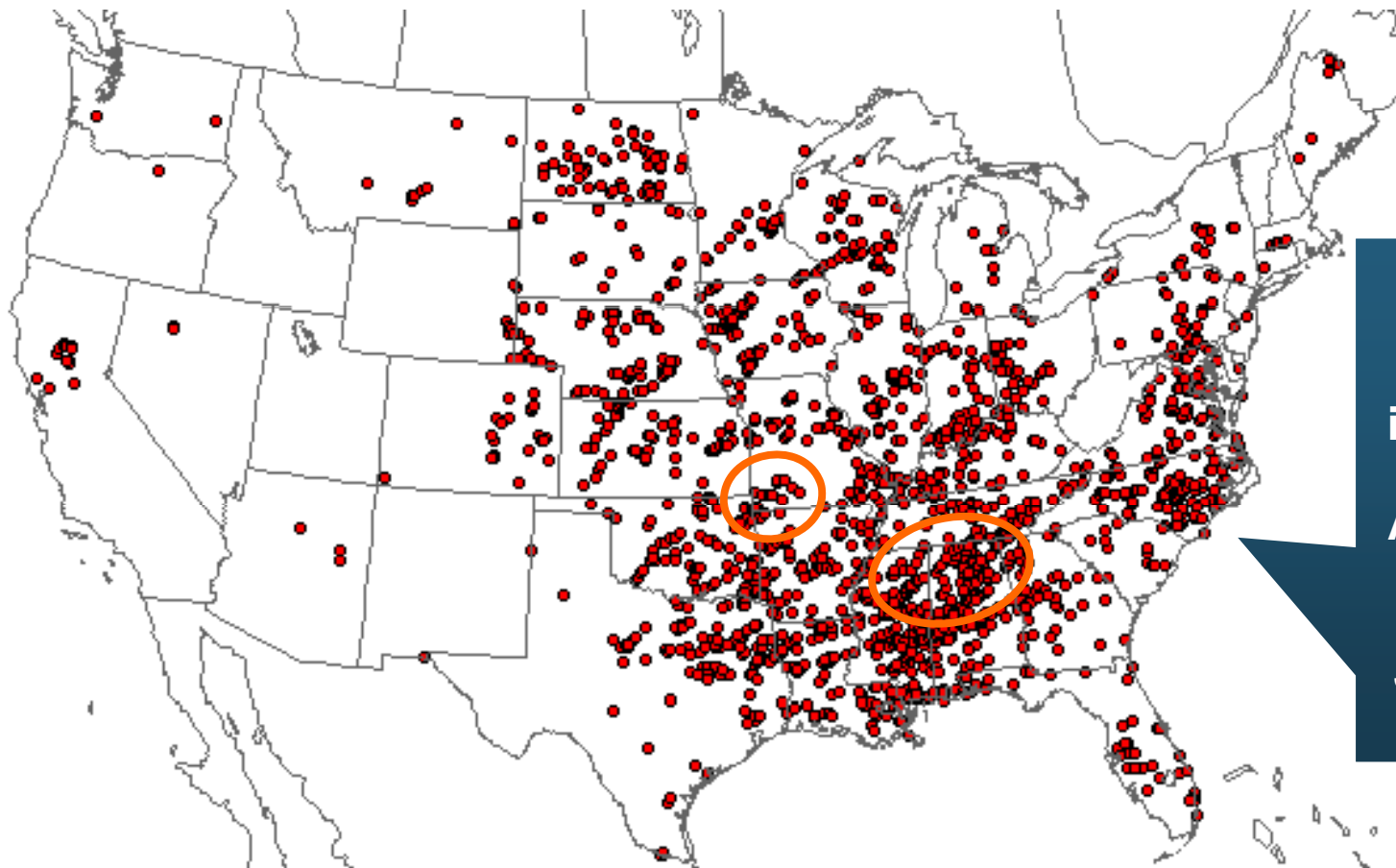
Source: U.S. Department of Commerce, Storm Prediction Center, National Weather Service at <http://www.spc.noaa.gov/climo/online/monthly/newm.html>

Number of Tornadoes, 1st Six Months of the Year vs. Full Year, 2007 – 2012



Source: <http://www.spc.noaa.gov/climo/online/monthly/newm.html> ; Insurance Information Institute.

Location of Tornadoes in the US, 2011



1,894 tornadoes killed 552 people in 2011, including at least 340 on April 26 mostly in the Tuscaloosa area, and 130 in Joplin on May 22



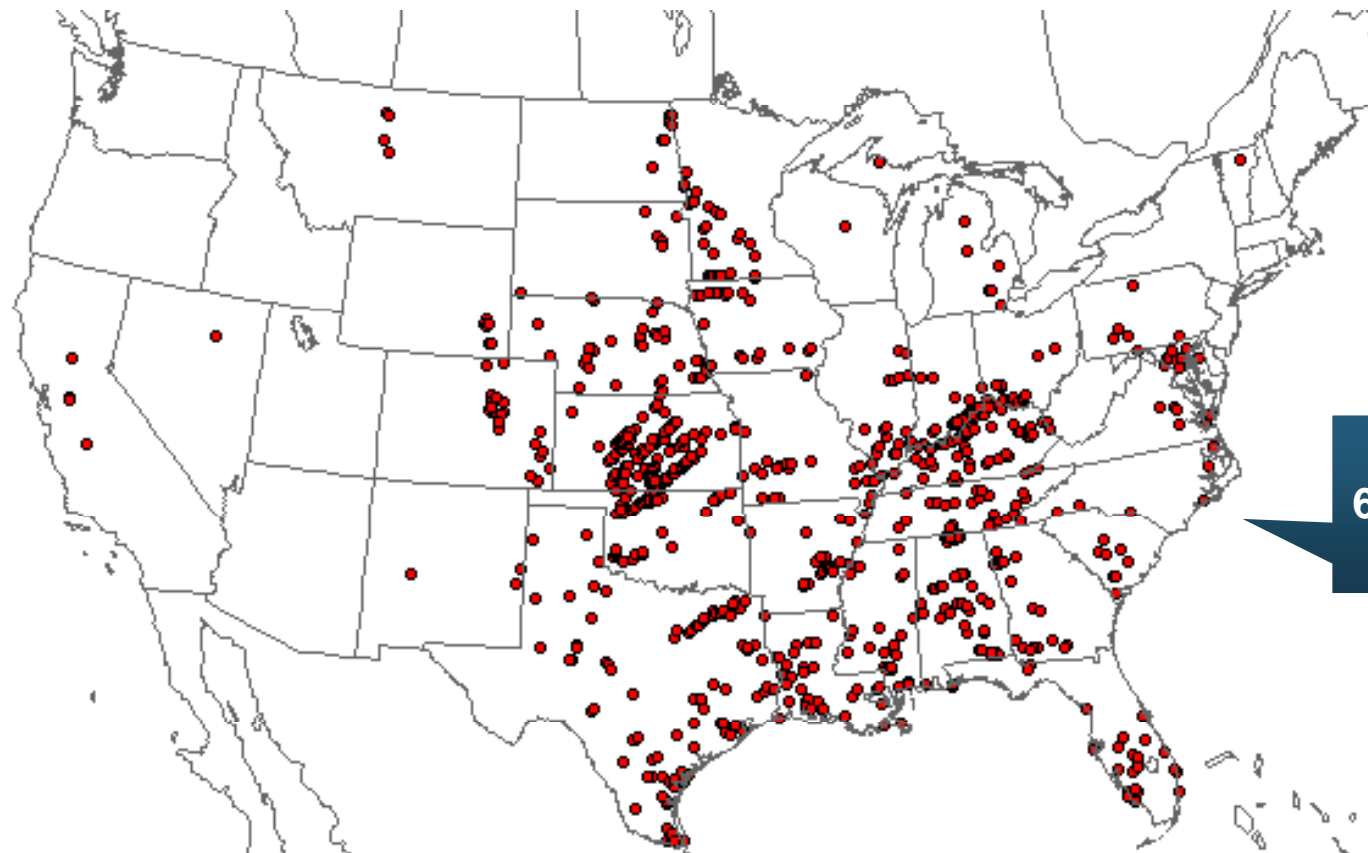
PRELIMINARY SEVERE WEATHER
REPORT DATABASE (ROUGH LOG)

NOAA/Storm Prediction Center Norman, Oklahoma

Tornado Reports
January 01, 2011 - December 27, 2011

Updated: Tuesday December 27, 2011 16:35 CT

Location of Tornadoes in the US, 2012*



Tornadoes killed
68 people through
July 4



PRELIMINARY SEVERE WEATHER
REPORT DATABASE (ROUGH LOG)

NOAA/Storm Prediction Center Norman, Oklahoma

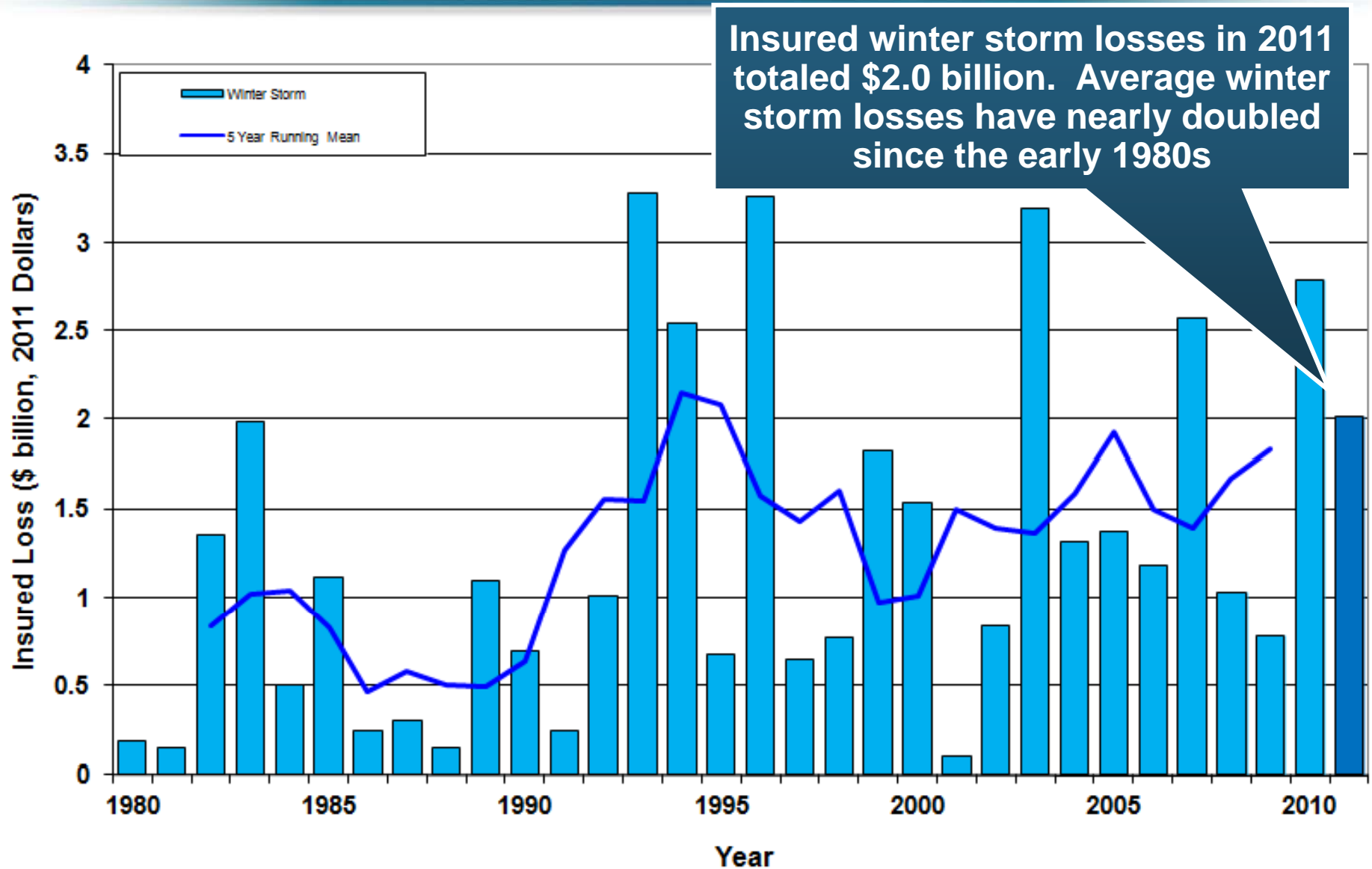
Tornado Reports
January 01, 2012 - July 04, 2012

Updated: Wednesday July 04, 2012 08:52 CT

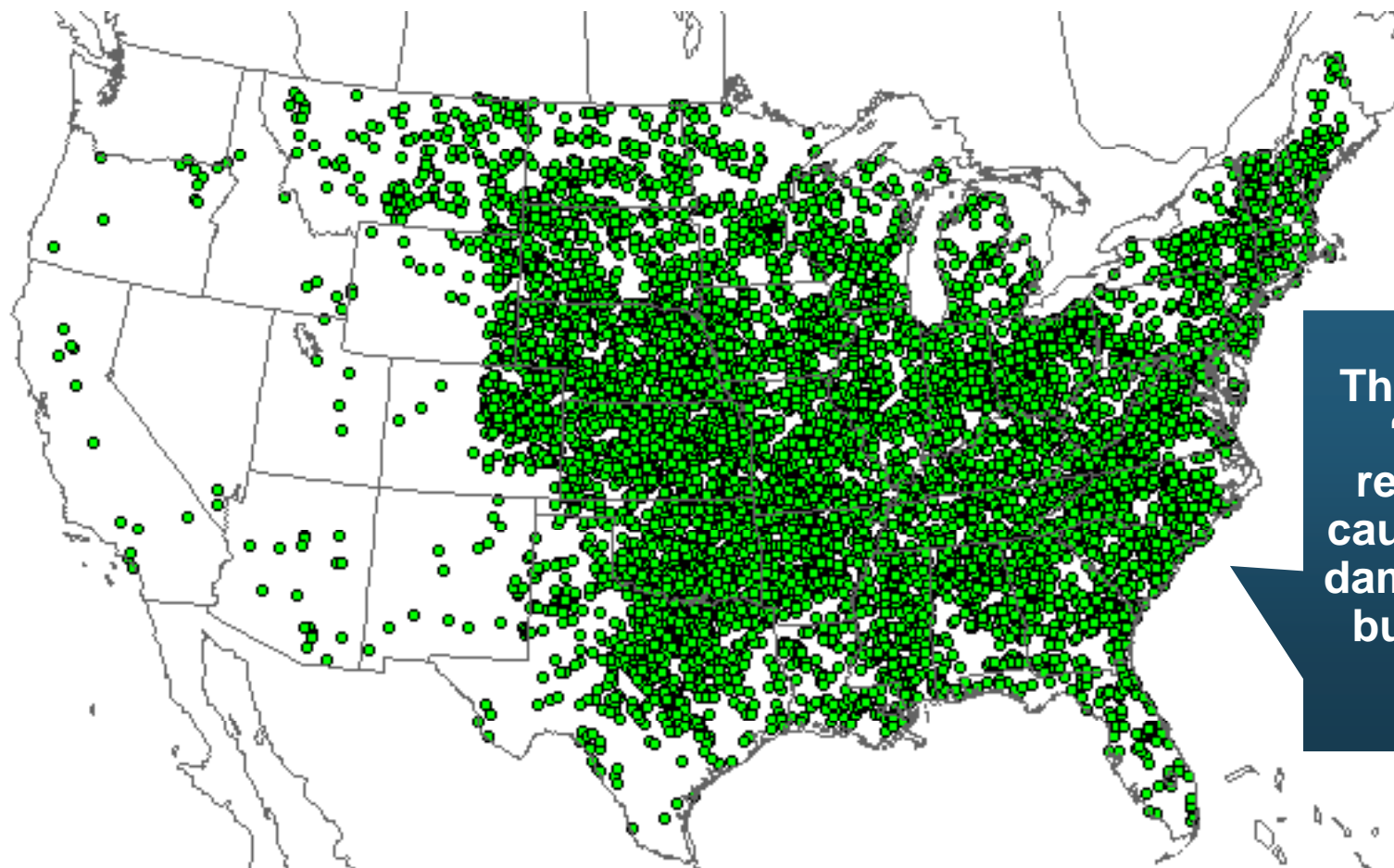
*Through July 4, 2012.

Source: NOAA Storm Prediction Center; http://www.spc.noaa.gov/climo/online/monthly/2012_annual_summary.html#

U.S. Winter Storm Loss Trends, 1980 – 2011



Location of Large Hail Reports in the US, 2011



There were 9,417
“Large Hail”
reports in 2011,
causing extensive
damage to homes,
businesses and
vehicles



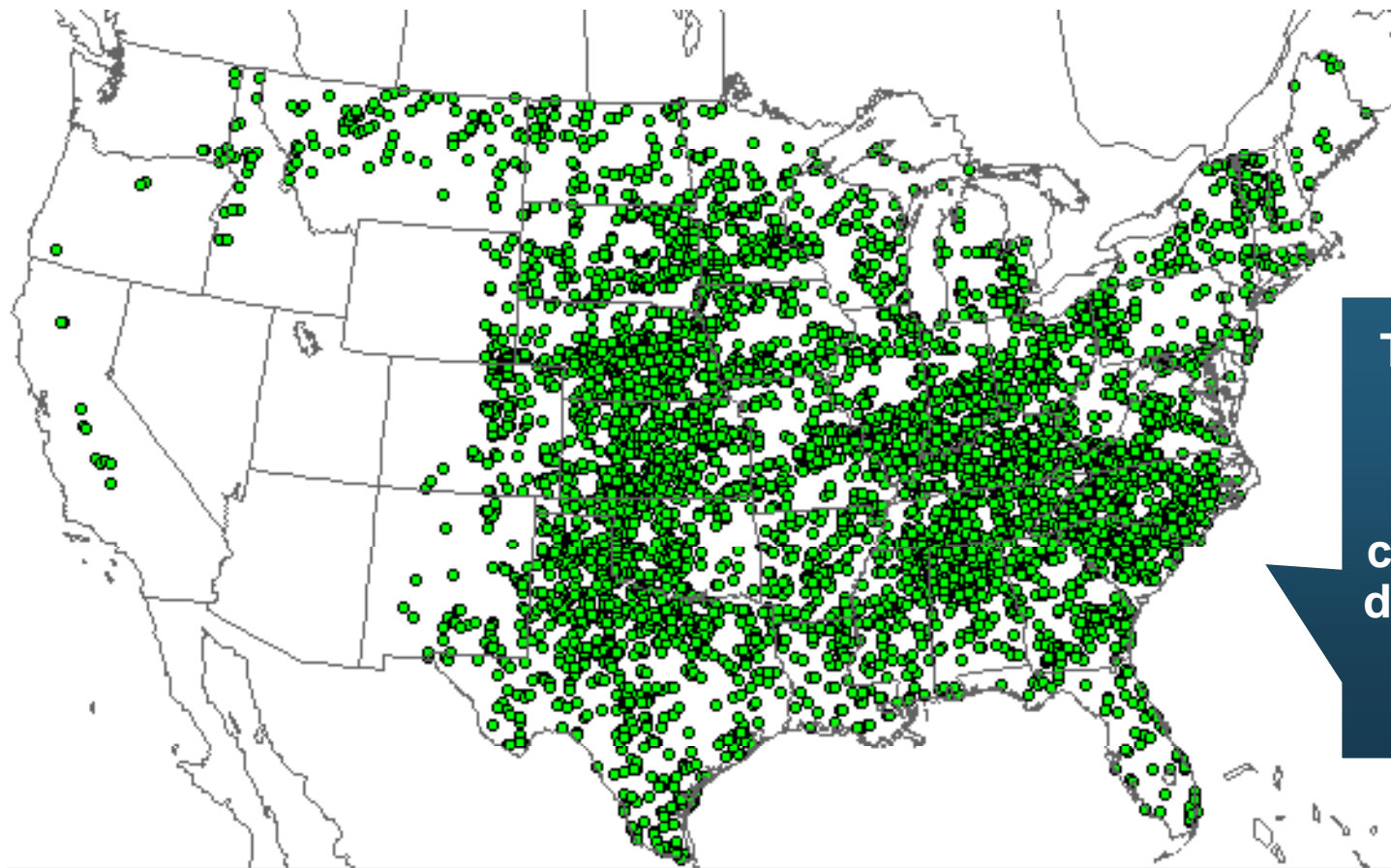
PRELIMINARY SEVERE WEATHER
REPORT DATABASE (ROUGH LOG)

NOAA/Storm Prediction Center Norman, Oklahoma

Hail Reports
January 01, 2011 - December 27, 2011

Updated: Tuesday December 27, 2011 16:35 CT

Location of Large Hail Reports in the US, 2012*



There were 5,452
“Large Hail”
reports through
July 4, 2012,
causing extensive
damage to homes,
businesses and
vehicles



PRELIMINARY SEVERE WEATHER
REPORT DATABASE (ROUGH LOG)

NOAA/Storm Prediction Center Norman, Oklahoma

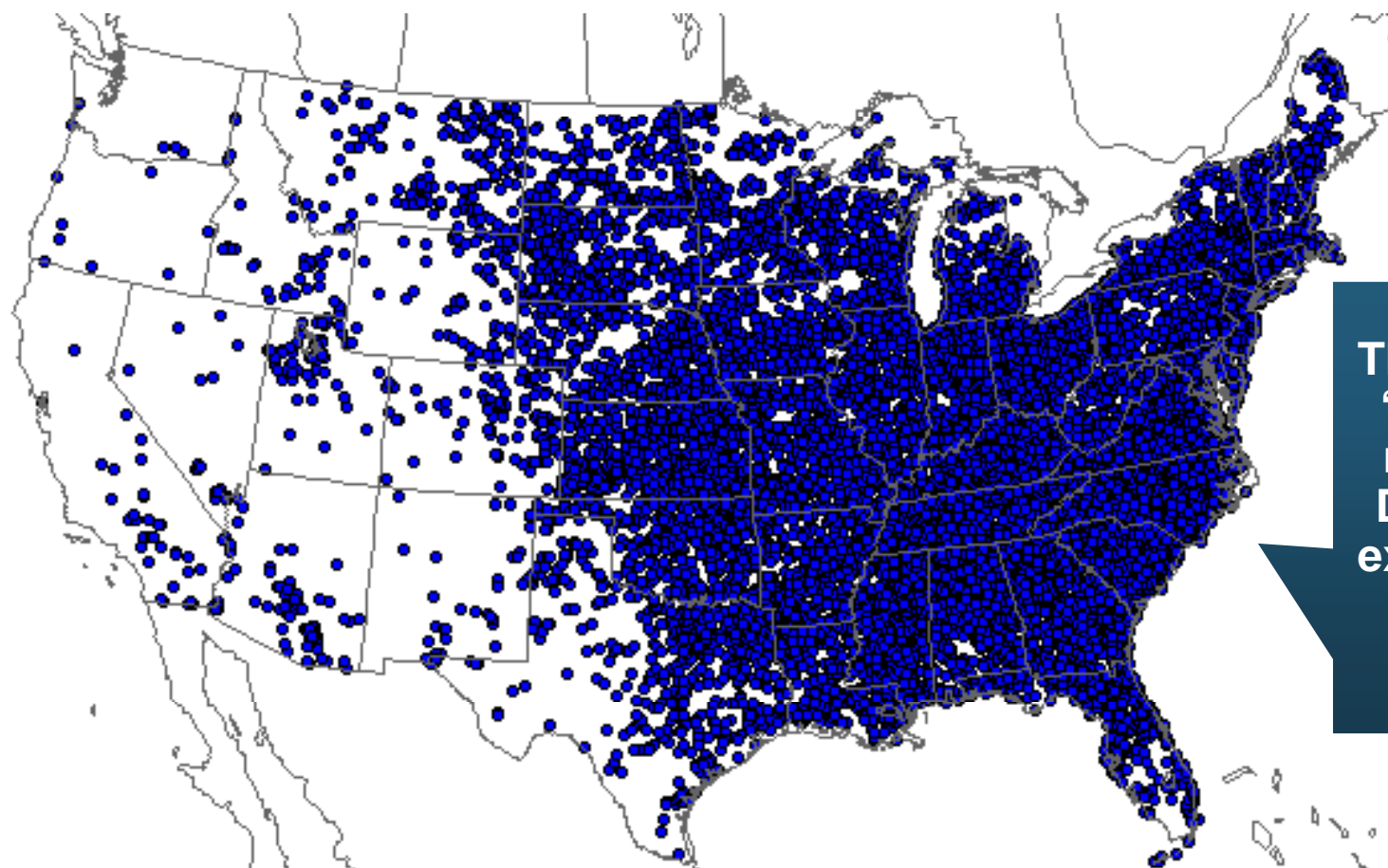
Hail Reports
January 01, 2012 - July 04, 2012

Updated: Wednesday July 04, 2012 08:52 CT

*Through July 4, 2012.

Source: NOAA Storm Prediction Center; http://www.spc.noaa.gov/climo/online/monthly/2012_annual_summary.html#

Location of Wind Damage Reports in the US, 2011



There were 18,685
“Wind Damage”
reports through
Dec. 27, causing
extensive damage
to homes and,
businesses



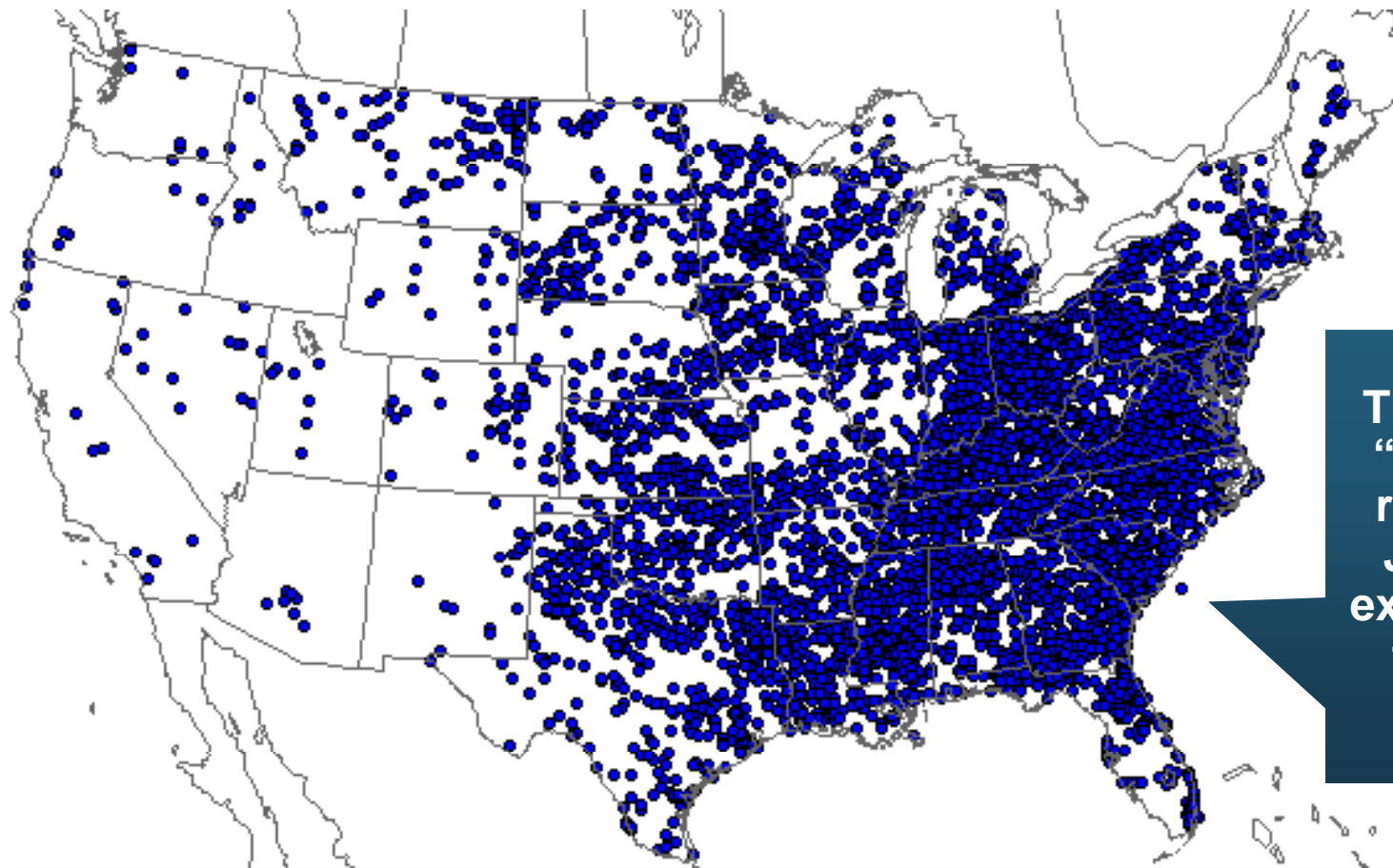
PRELIMINARY SEVERE WEATHER
REPORT DATABASE (ROUGH LOG)

NOAA/Storm Prediction Center Norman, Oklahoma

Wind Reports
January 01, 2011 - December 27, 2011

Updated: Tuesday December 27, 2011 16:35 CT

Location of Wind Damage Reports in the US, 2012*



There were 6,851
“Wind Damage”
reports through
July 4, causing
extensive damage
to homes and,
businesses



PRELIMINARY SEVERE WEATHER
REPORT DATABASE (ROUGH LOG)

NOAA/Storm Prediction Center Norman, Oklahoma

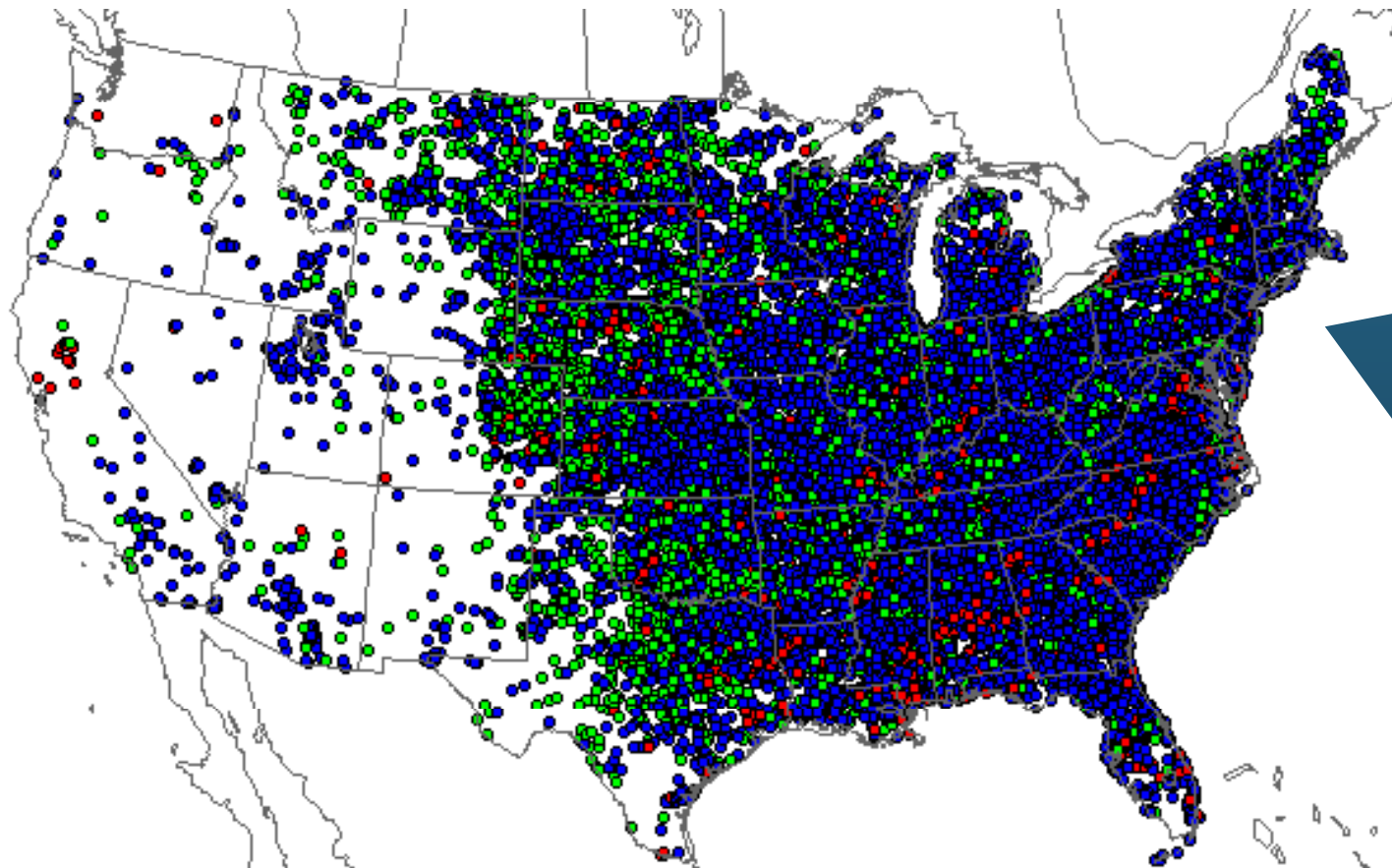
Wind Reports
January 01, 2012 - July 04, 2012

Updated: Wednesday July 04, 2012 08:52 CT

*Through July 4, 2012.

Source: NOAA Storm Prediction Center; http://www.spc.noaa.gov/climo/online/monthly/2012_annual_summary.html#

Severe Weather Reports, 2011



There were 29,996 severe weather reports in 2011; including 1,894 tornadoes; 9,417 “Large Hail” reports and 18,685 high wind events



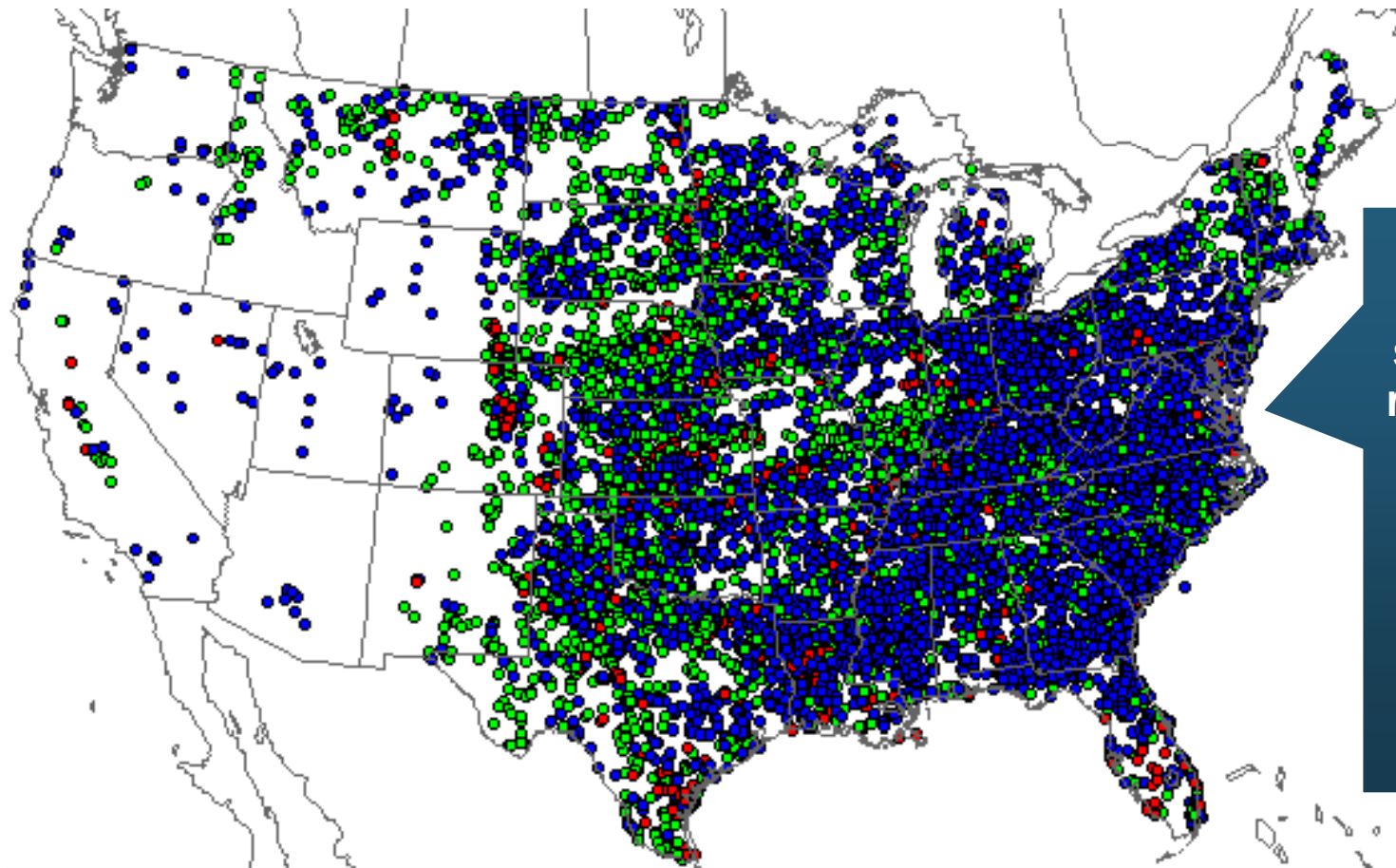
PRELIMINARY SEVERE WEATHER
REPORT DATABASE (ROUGH LOG)

NOAA/Storm Prediction Center Norman, Oklahoma

Severe Weather Reports
January 01, 2011 - December 27, 2011

Updated: Tuesday December 27, 2011 16:35 CT

Severe Weather Reports, 2012*



There were already 13,177 severe weather reports through July 4; including 874 tornadoes; 5,452 “Large Hail” reports and 6,851 high wind events



PRELIMINARY SEVERE WEATHER
REPORT DATABASE (ROUGH LOG)

NOAA/Storm Prediction Center Norman, Oklahoma

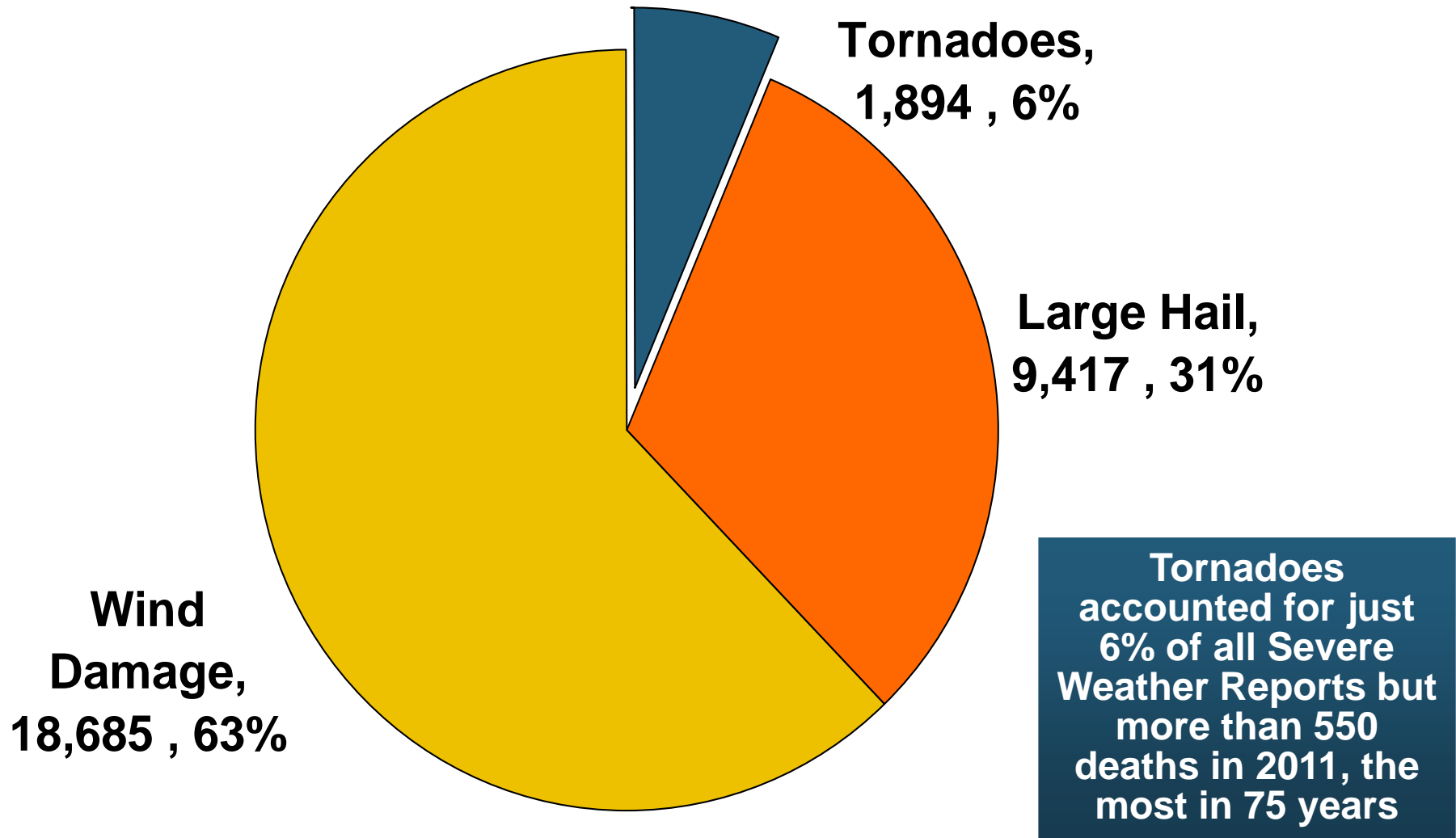
Severe Weather Reports
January 01, 2012 - July 04, 2012

Updated: Wednesday July 04, 2012 08:52 CT

*Through July 4, 2012.

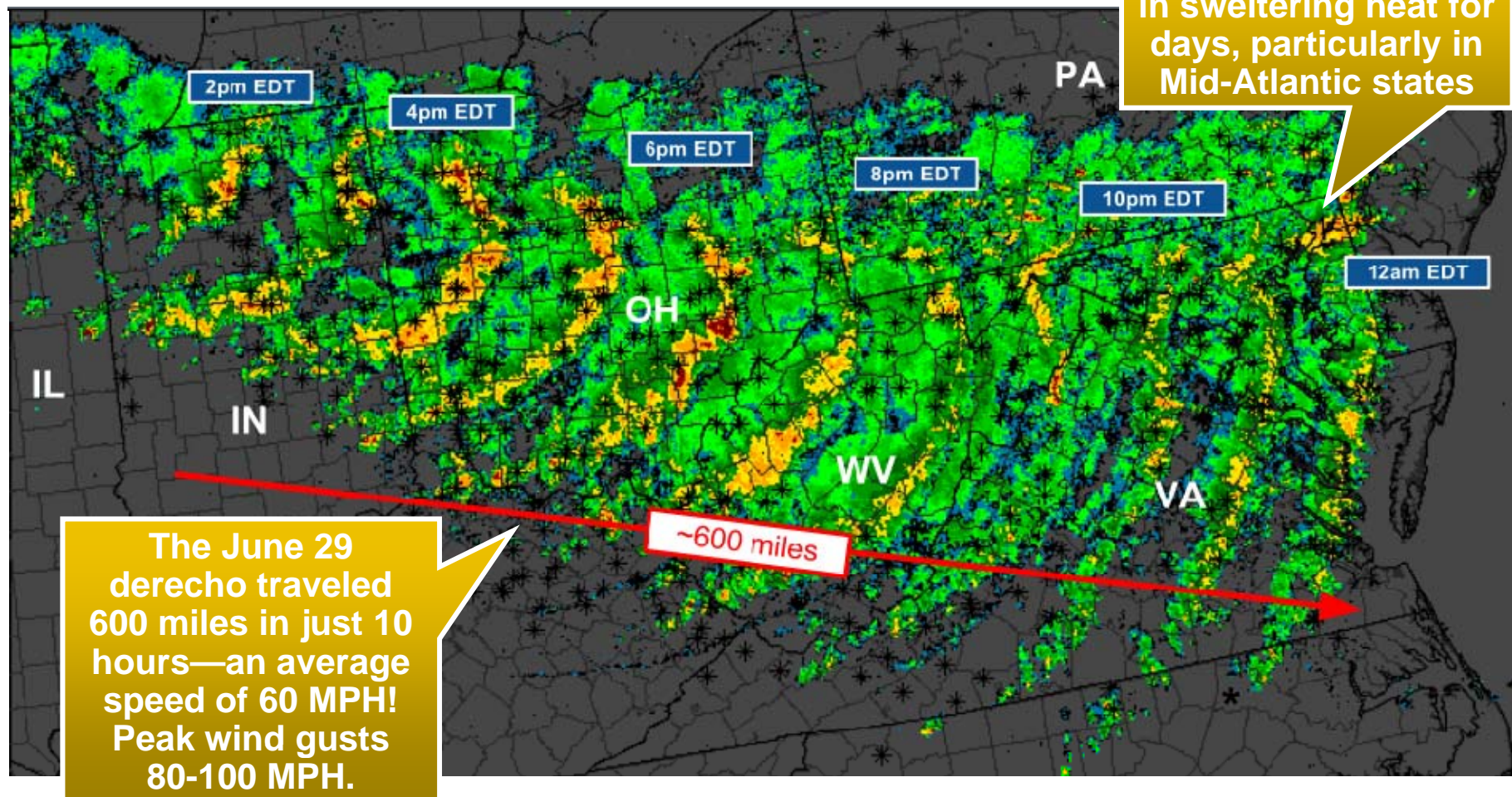
Source: NOAA Storm Prediction Center; http://www.spc.noaa.gov/climo/online/monthly/2012_annual_summary.html#

Number of Severe Weather Reports in US, by Type, 2011



June 29, 2012 Derecho: Traveled 600 Miles from Midwest to Mid-Atlantic

10-HOUR RADAR COMPOSITE (2PM – MIDNIGHT)



Source: National Weather Service: <http://www.spc.noaa.gov/wcm/2012/20120629-derecho.png>

Wildfires

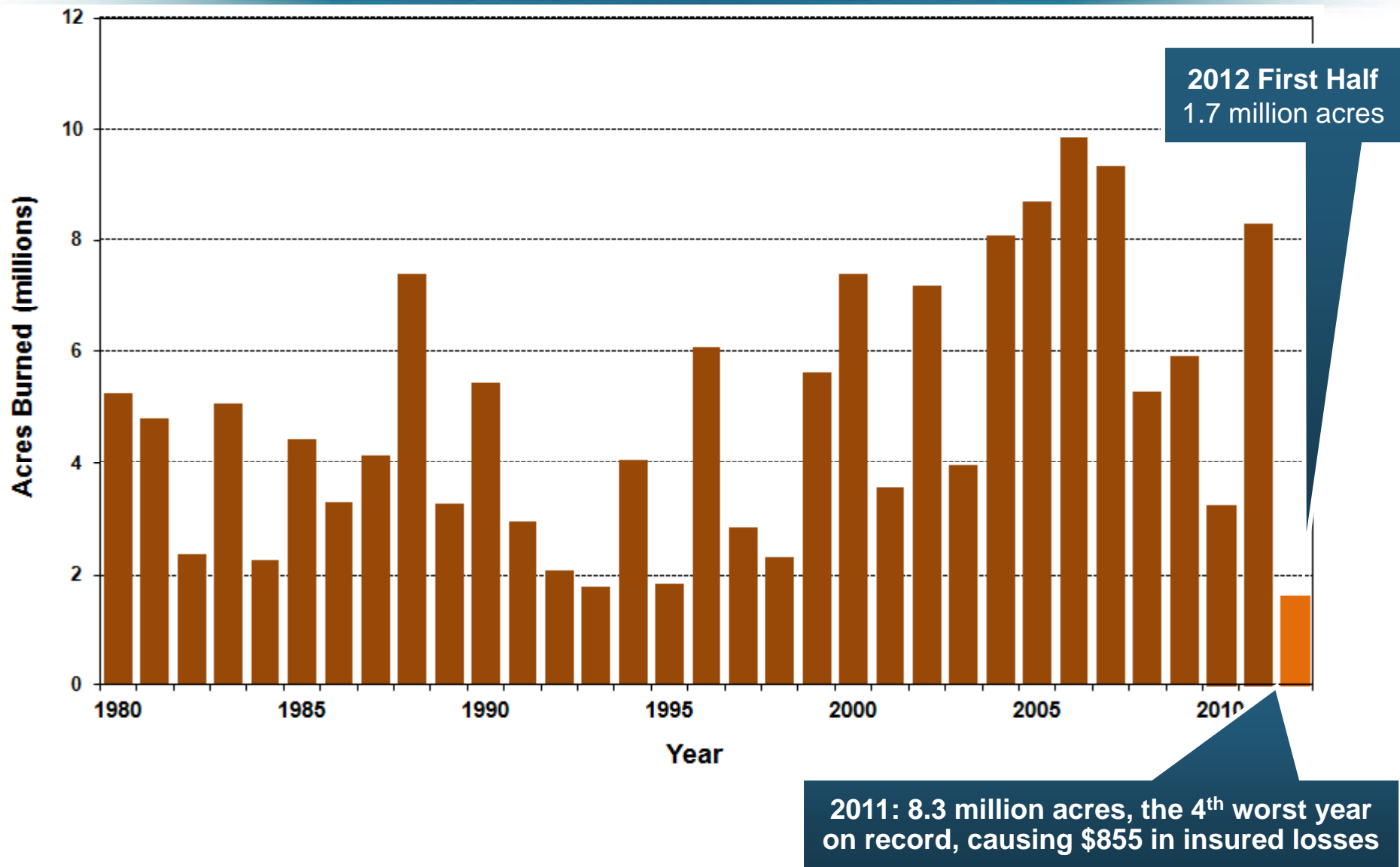
Headline: “Growing Wildfire Risk Requires a More Granular, Nationwide Data Solution for P&C Industry”



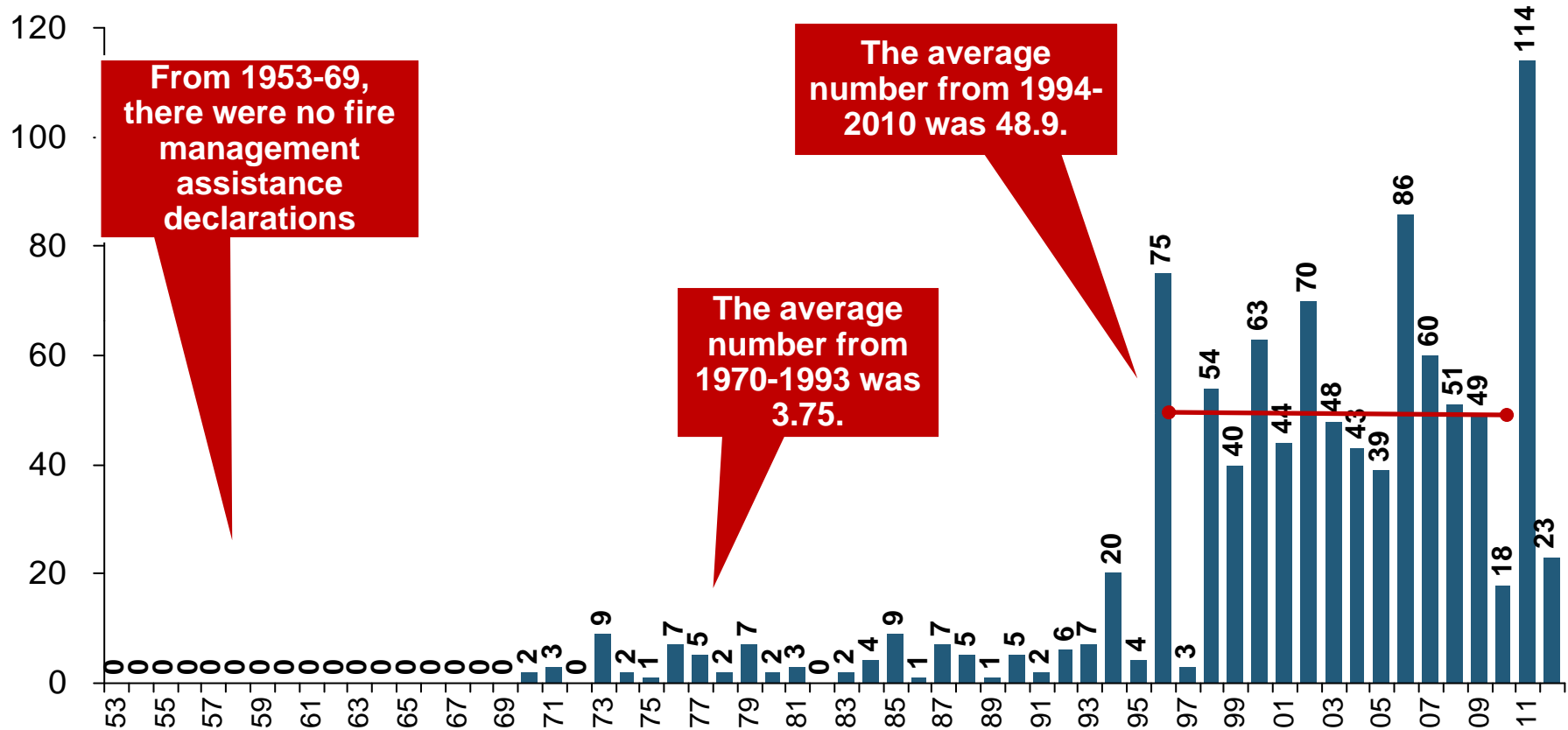
- **Subhead: “Wildfires used to be seasonal.**
- **They also used to be regional, pretty much limited to the more fire-prone areas of the country.**
- **Today, wildfires no longer have either characteristic—and that’s not a good thing.”**
- **Callout: “At one point, wildfires were burning continuously in...Texas over an 18-month time span.”**

Source: *Risk & Insurance* magazine, June 2012, p. 19

Number of Acres Burned in Wildfires, 1980 – 2012



Number of Federal Fire Management Assistance Declarations, 1953-2012*



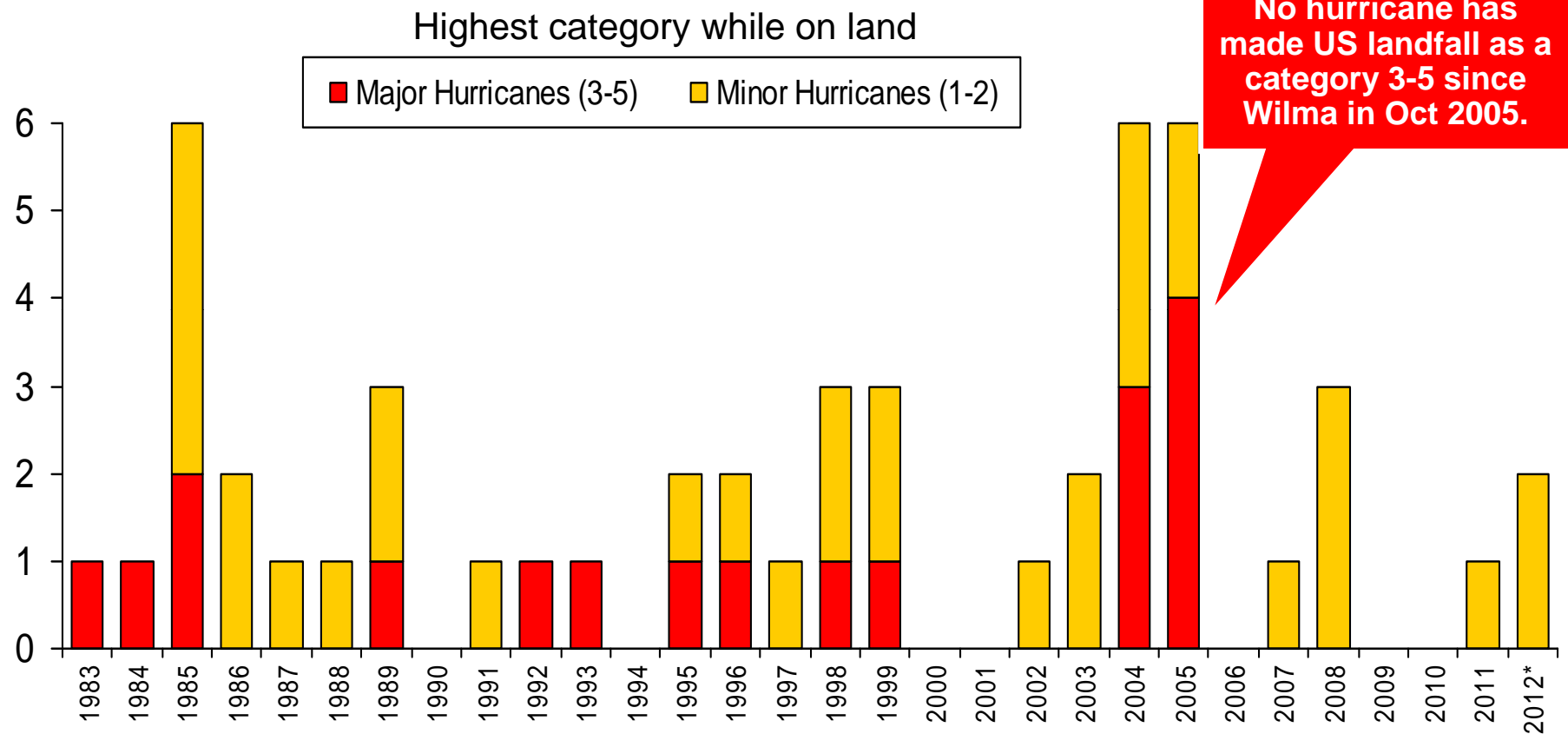
Some fire management assistance declarations cover separate fires in a single state; for example, there were 3 declarations in 2012 for the “Oil Creek,” “Squirrel Creek,” and “Arapahoe” fires in Wyoming

*Through July 31, 2012. Sources: Federal Emergency Management Administration at http://www.fema.gov/disasters?field_state_tid=All&field_disaster_type_term_tid=All&field_disaster_declaration_type_value=All&items_per_page=60&=GO; Insurance Information Institute.

**Let's not forget about
hurricanes**

**Whether they make landfall,
or not**

Number of Major & Minor Hurricanes Making US Landfall, 1983-2012

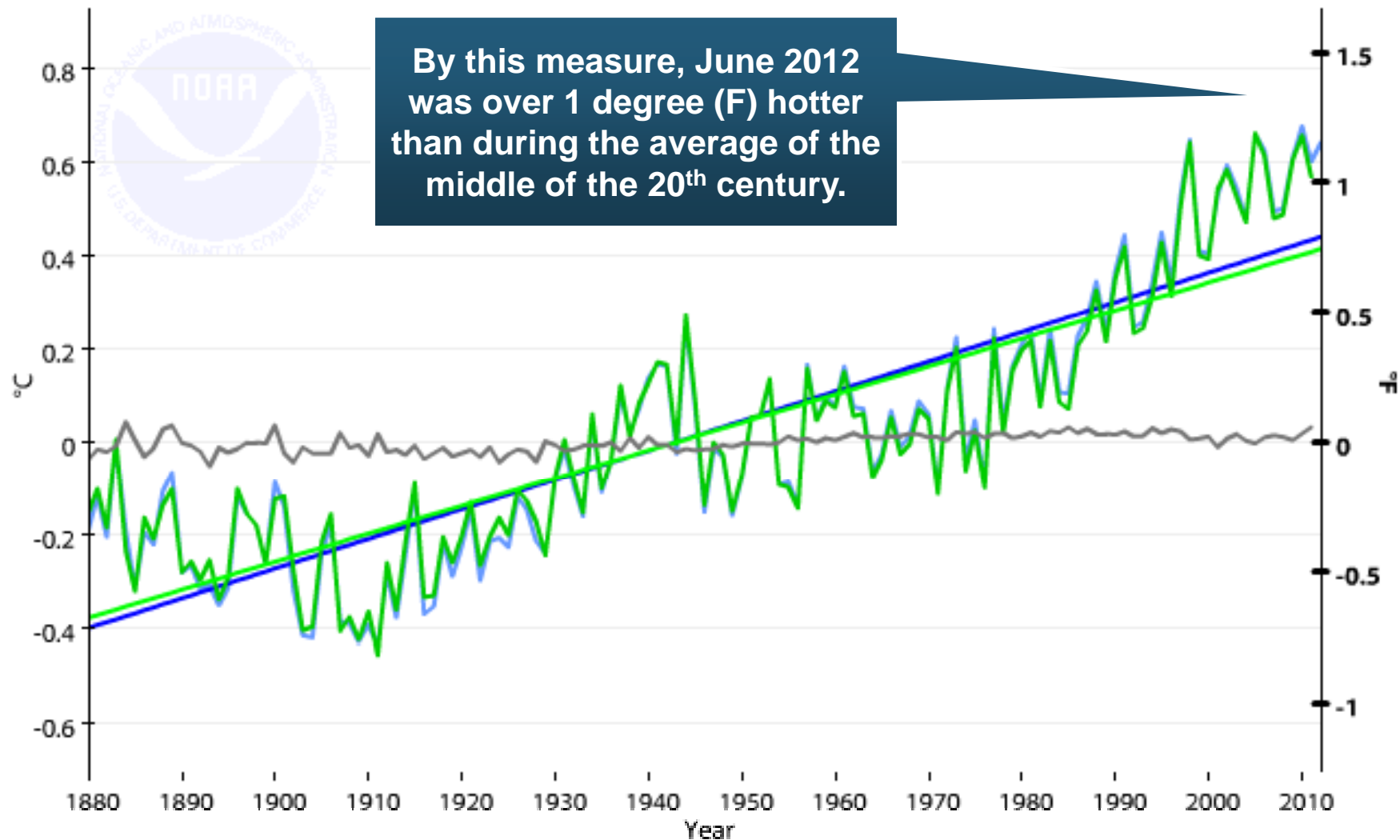


*Through August 31, 2011.

Sources: NOAA, at <http://www.aoml.noaa.gov/hrd/tcfaq/E23.html> ; Munich Re; Insurance Information Institute.

**And did you notice—
it's getting hotter (and,
in some places, drier)?**

Land/Ocean Average Temperatures vs. 20th Century Baseline*



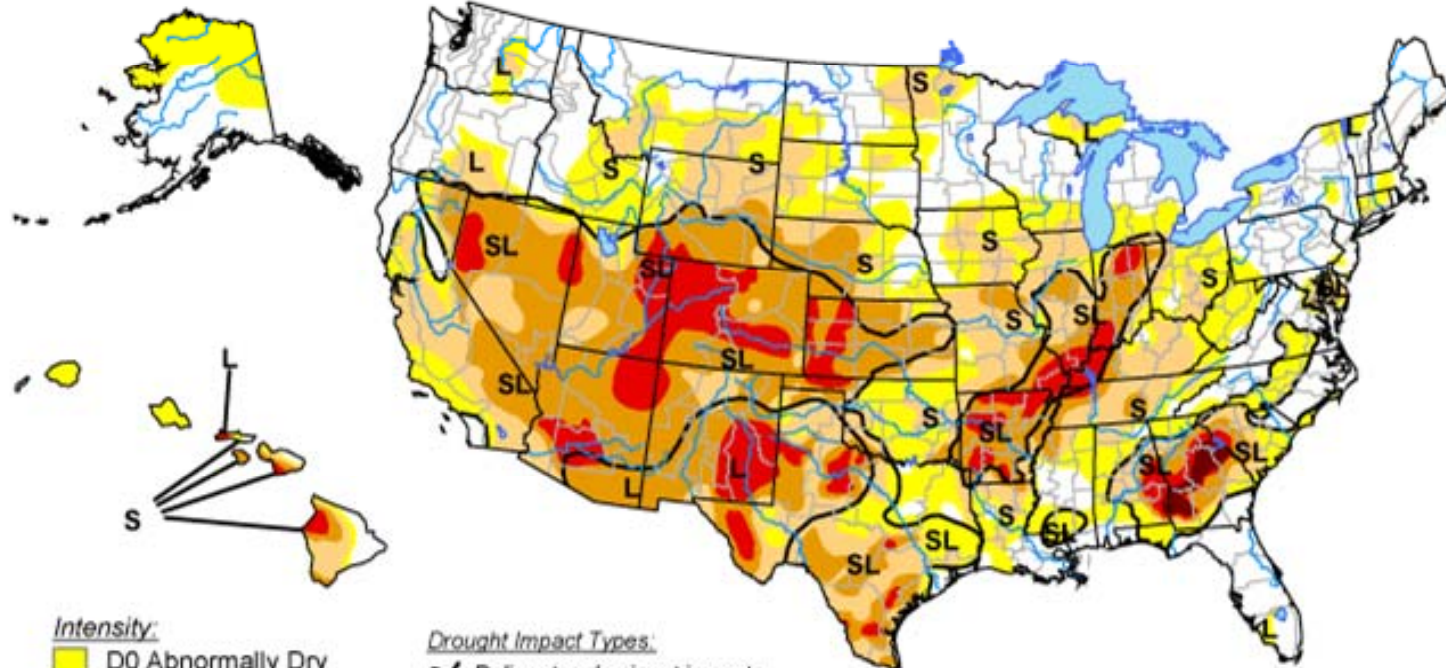
*Northern Hemisphere, month of June each year, through 2012

Source: NOAA, National Climatic Data Center, accessed at http://www.ncdc.noaa.gov/ghcnm/time-series/index.php?surface=land_ocean®ion=90S.90N&month=6&trend=true&beg_trend_year=1880&end_trend_year=2012&submitted=Submit

US Drought Conditions, June 26, 2012

U.S. Drought Monitor

June 26, 2012
Valid 7 a.m. EDT



Intensity:

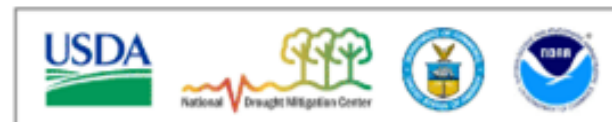
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:

- Delineates dominant impacts
- S = Short-Term, typically <6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically >6 months (e.g. hydrology, ecology)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://droughtmonitor.unl.edu/>



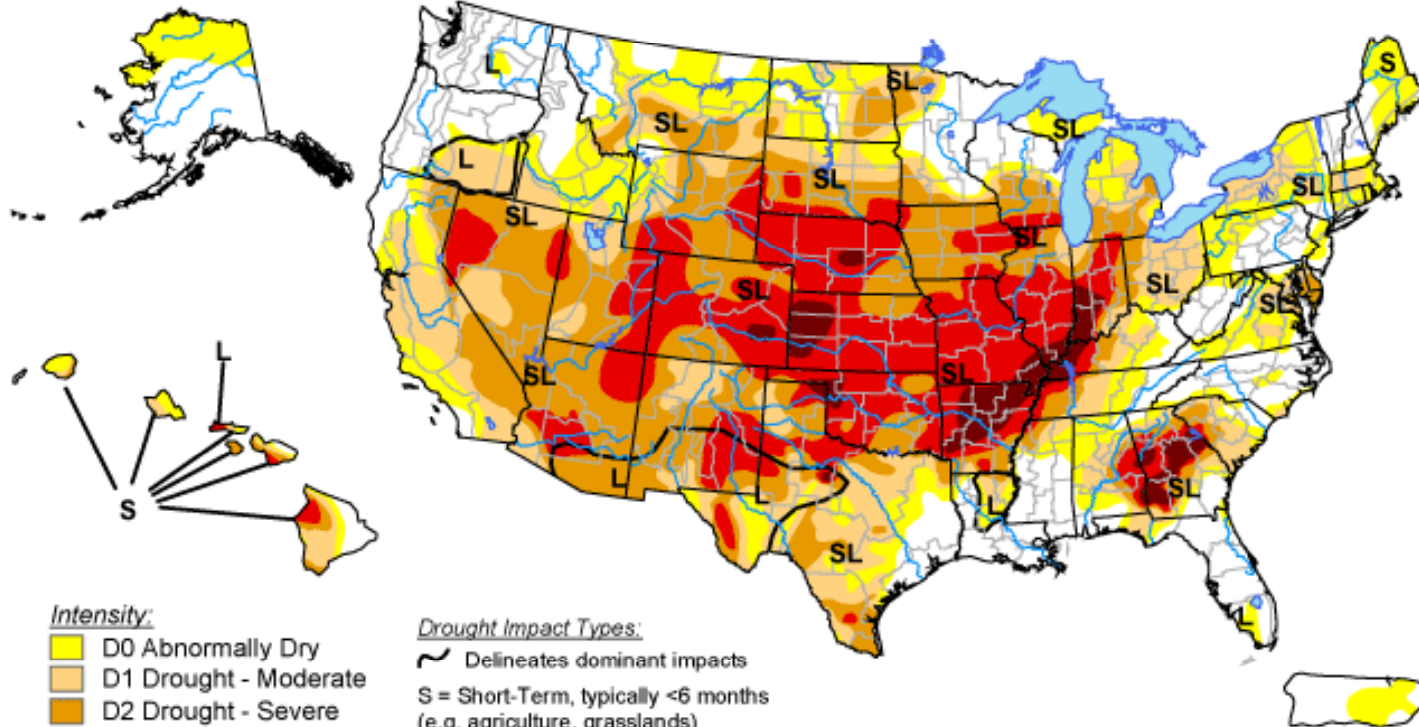
Released Thursday, June 28, 2012

Author: Richard Heim/L. Love-Brotak, NOAA/NESDIS/NCDC

US Drought Conditions, July 31, 2012

U.S. Drought Monitor

July 31, 2012
Valid 7 a.m. EDT



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:

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The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://droughtmonitor.unl.edu/>

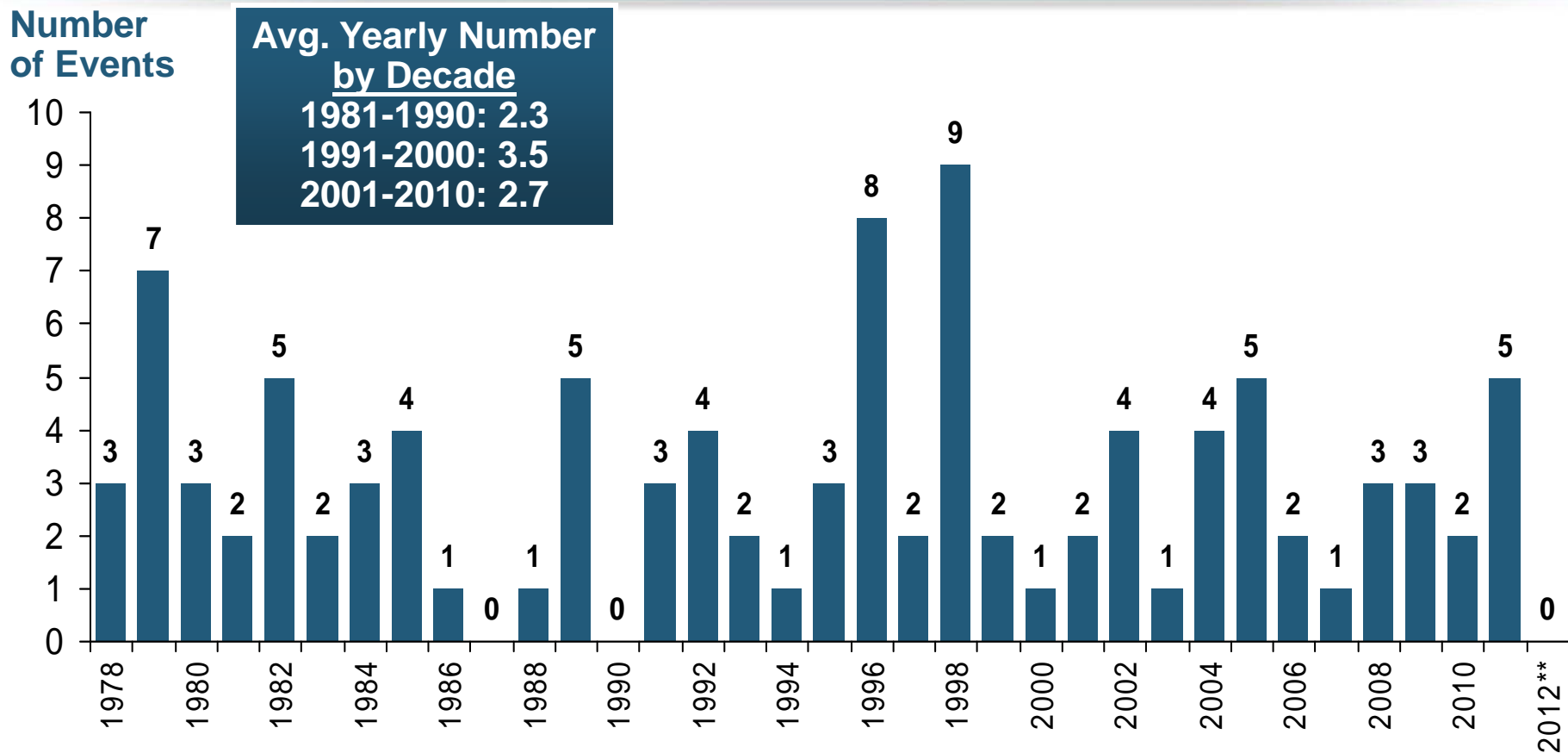


Released Thursday, August 2, 2012

Author: Mark Svoboda, National Drought Mitigation Center

**And don't forget the flood risk
(even though it's currently
mostly federally insured)**

Number of Significant Flood Events,* 1978-2012



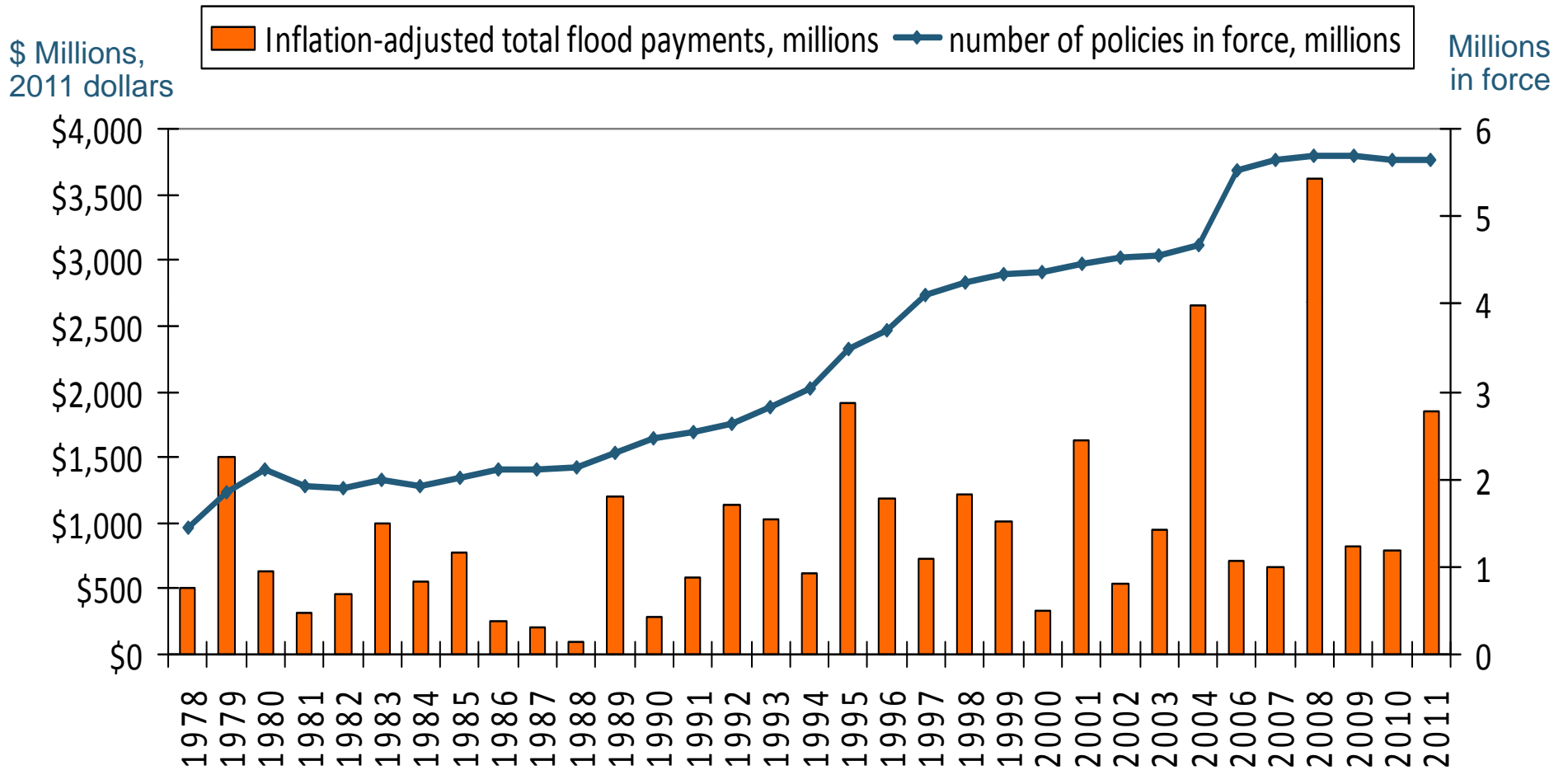
We appear to have had at least one “significant” flood every year since 1978, averaging about 3 per year.

*As determined by the NFIP, measured as an event with 1,500 or more paid losses “or occasionally one added for other reasons.”

**Through July 31, 2012

Sources: FEMA, at <http://www.fema.gov/policy-claim-statistics-flood-insurance/policy-claim-statistics-flood-insurance/policy-claim-13> ; Insurance Information Institute.

Upward Trend of Inflation-Adjusted Flood Loss Payments*, 1978-2012



*Excluding 2005 (which was \$20.4 billion in 2011 dollars).

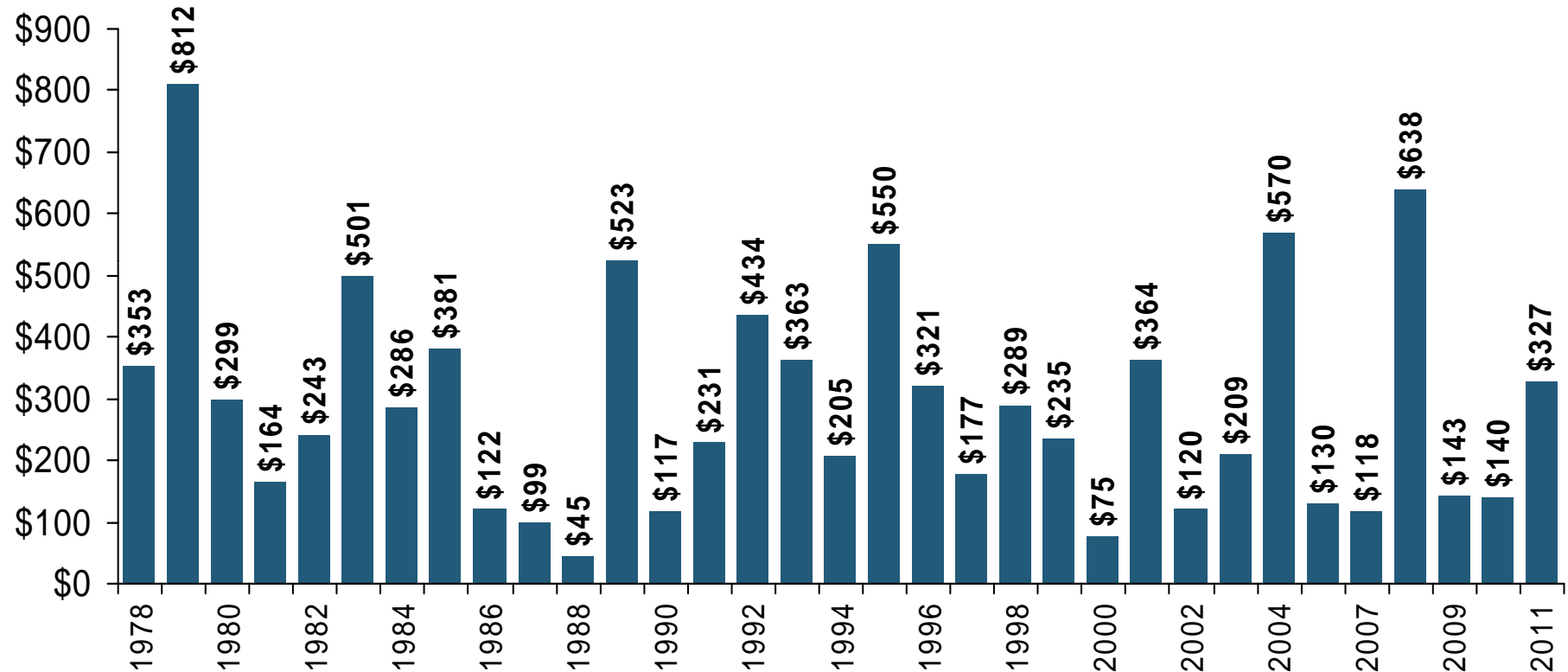
**Through July 31, 2012

Sources: FEMA, at <http://www.fema.gov/policy-claim-statistics-flood-insurance/policy-claim-statistics-flood-insurance/policy-claim-13>; Insurance Information Institute.

Adjusted* Flood Loss Payments, 1978-2011** : No Discernible Trend



2011 dollars



Some of the increase shown here is due to growth in the number of policies

*per million policies in force, in 2011 dollars

**Excluding 2005 (which was \$4,118 in 2011 dollars).

Sources: FEMA, at <http://www.fema.gov/policy-claim-statistics-flood-insurance/policy-claim-statistics-flood-insurance/policy-claim-13> ; Insurance Information Institute.

- **The frequency and severity of most catastrophes seems to be increasing**
- **In recent years, thunderstorms and other severe weather has caused most insured damage, supplanting tropical storms/hurricanes**
- **2011 was an especially expensive year for insured losses, and 2012 appears directionally similar**
- **Q&A**

Insurance Information Institute Online:

www.iii.org

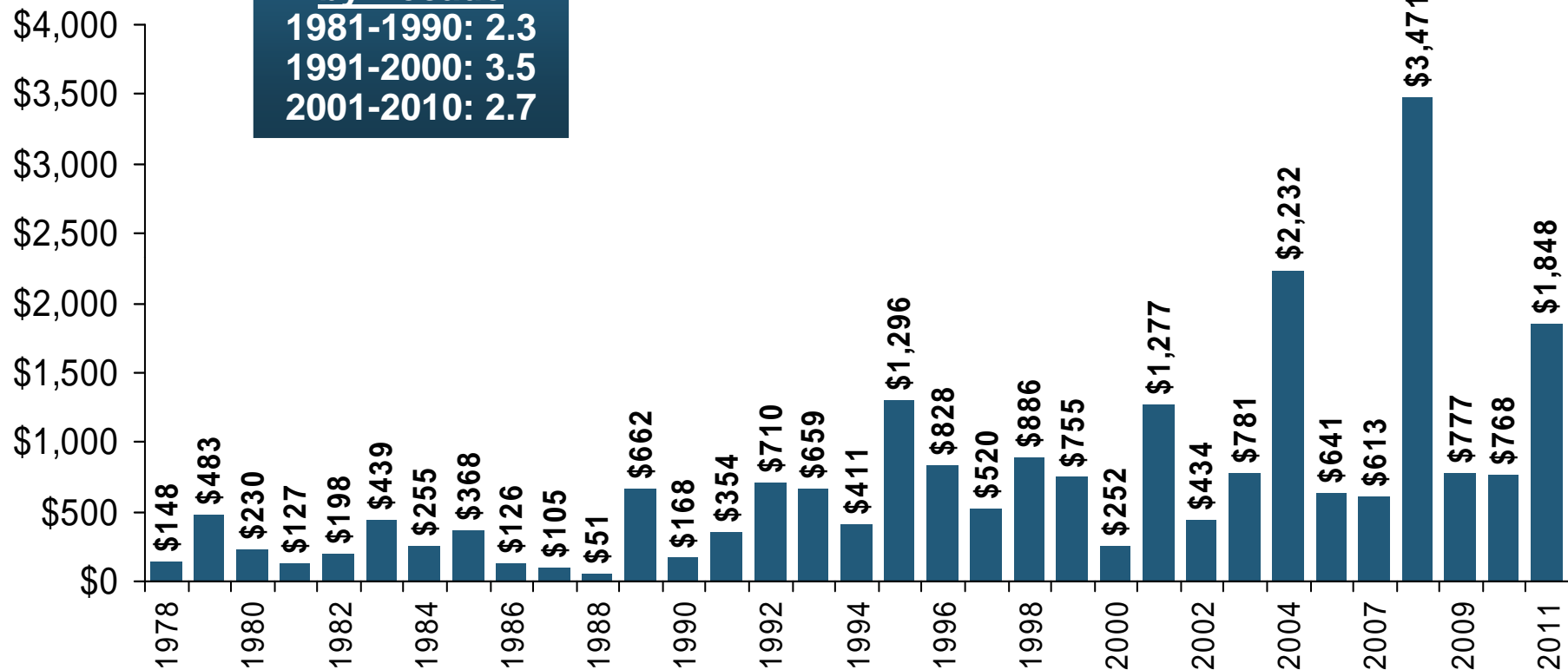
***Thank you for your time
and your attention!***

Upward Trend of Nominal Flood Loss Payments*, 1978-2012



\$ Millions

Avg. Number by Decade
 1981-1990: 2.3
 1991-2000: 3.5
 2001-2010: 2.7



We appear to have had at least one “significant” flood every year since 1978, averaging 3 per year.

*Excluding 2005, which was \$17,740.3 million.

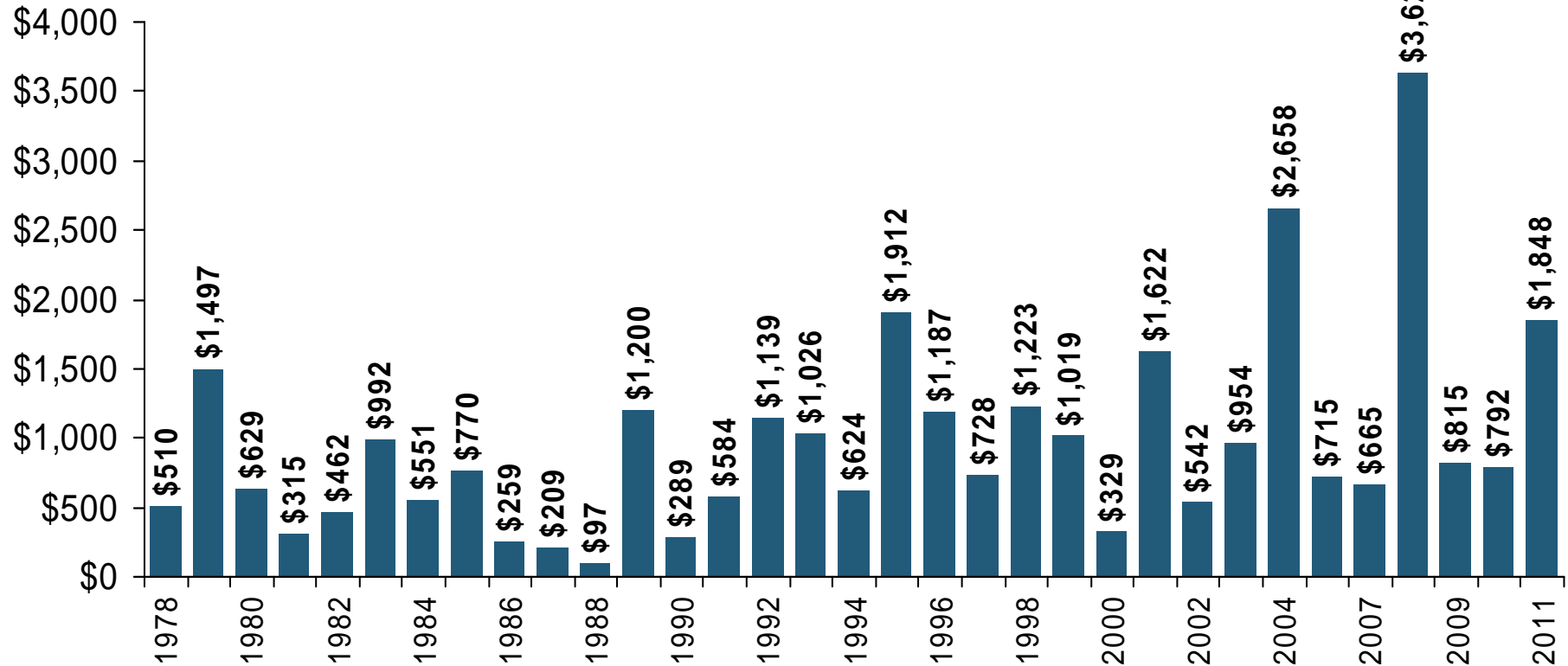
**Through July 31, 2012

Sources: FEMA, at <http://www.fema.gov/policy-claim-statistics-flood-insurance/policy-claim-statistics-flood-insurance/policy-claim-13> ; Insurance Information Institute.

Upward Trend of Inflation-Adjusted Flood Loss Payments*, 1978-2012



\$ Millions,
2011 dollars



Some of the increase shown here is due to growth in the number of policies

*Excluding 2005 (which was \$20.4 billion in 2011 dollars).

**Through July 31, 2012

Sources: FEMA, at <http://www.fema.gov/policy-claim-statistics-flood-insurance/policy-claim-statistics-flood-insurance/policy-claim-13> ; Insurance Information Institute.