

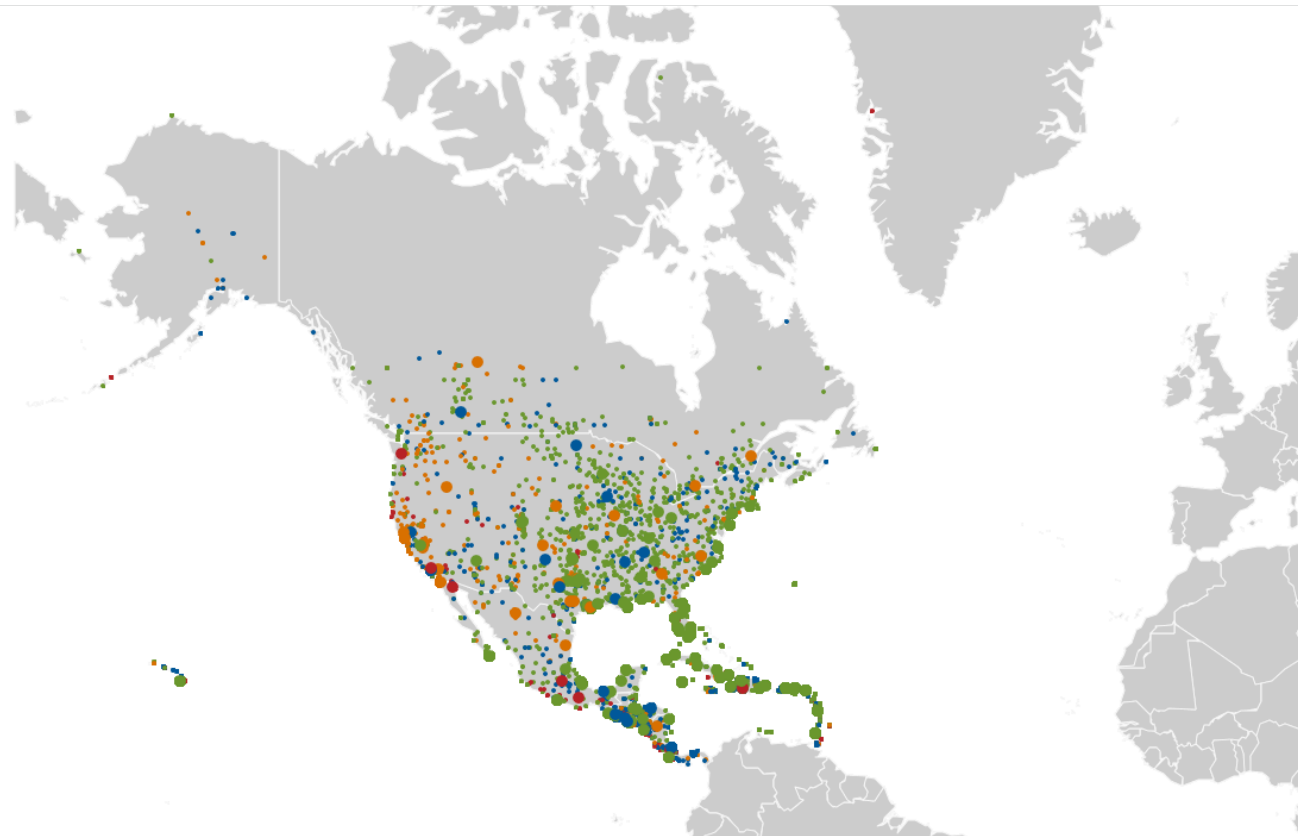


# NatCatSERVICE

## Relevant natural loss events in North America 1990 - 2017

# Geographical overview

Relevant natural loss events  
in North America 1990 - 2017

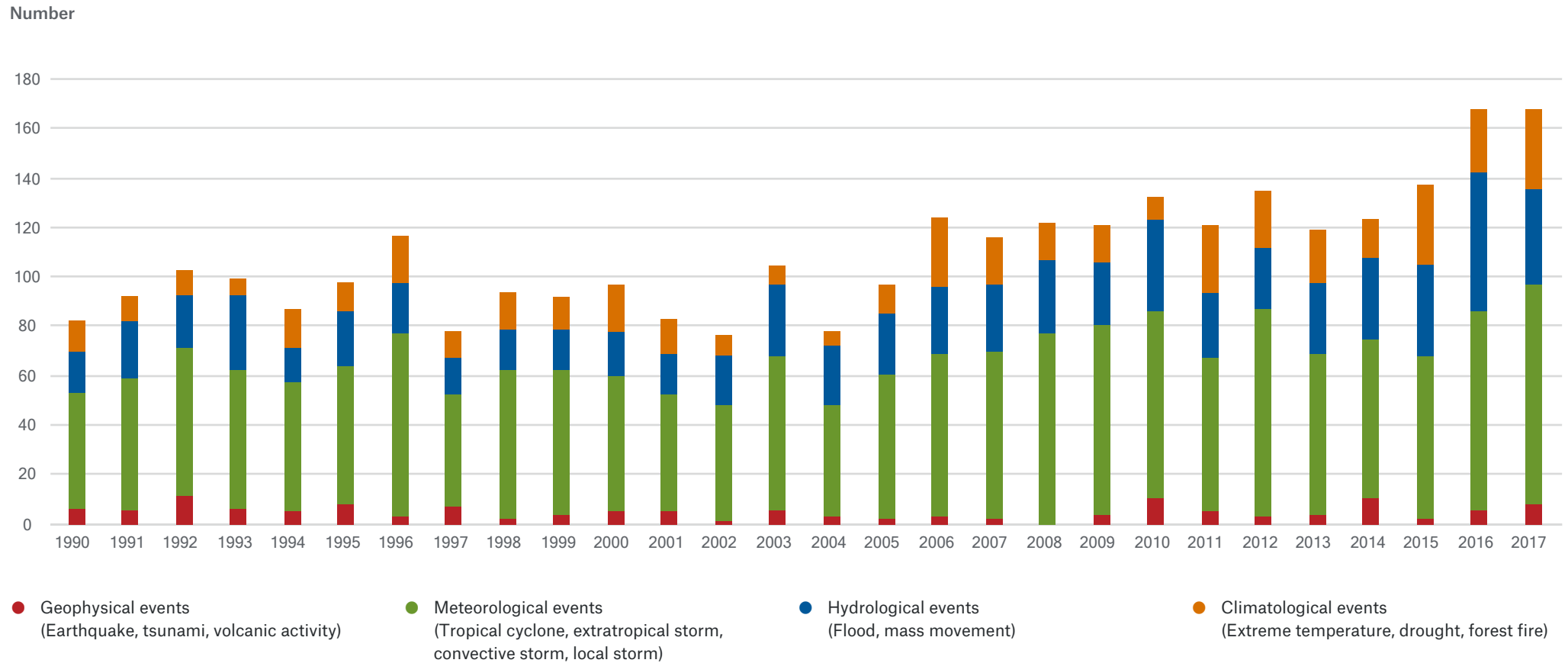


Source: Munich Re, NatCatSERVICE, 2018

- Small, medium and large loss events
- Catastrophes
- **3,063** registered events
- Geophysical events (Earthquake, tsunami, volcanic activity)
- Meteorological events (Tropical cyclone, extratropical storm, convective storm, local storm)
- Hydrological events (Flood, mass movement)
- Climatological events (Extreme temperature, drought, forest fire)

# Number of events

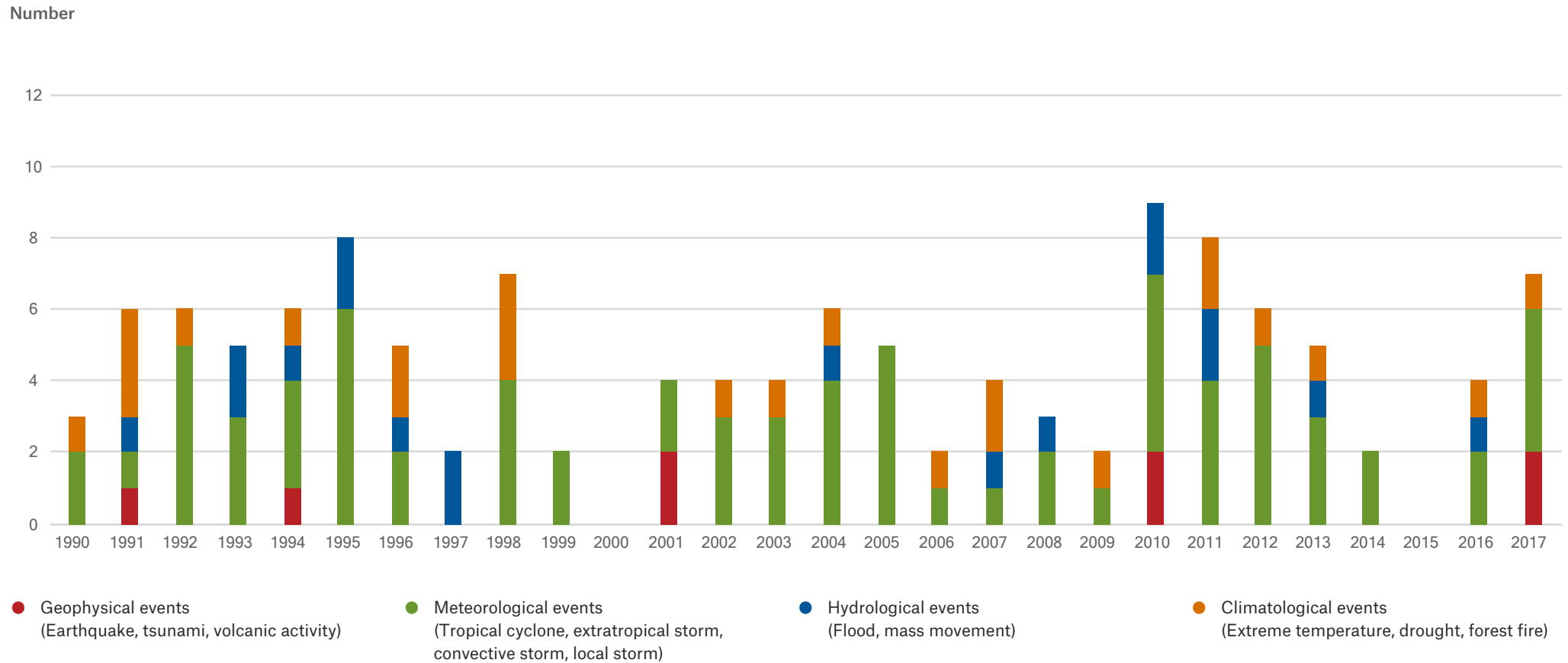
## Relevant natural loss events in North America 1990 - 2017



Accounted events have caused at least one fatality and/or produced normalised losses  $\geq$  US\$ 100k, 300k, 1m, or 3m (depending on the assigned World Bank income group of the affected country).

# Number of events

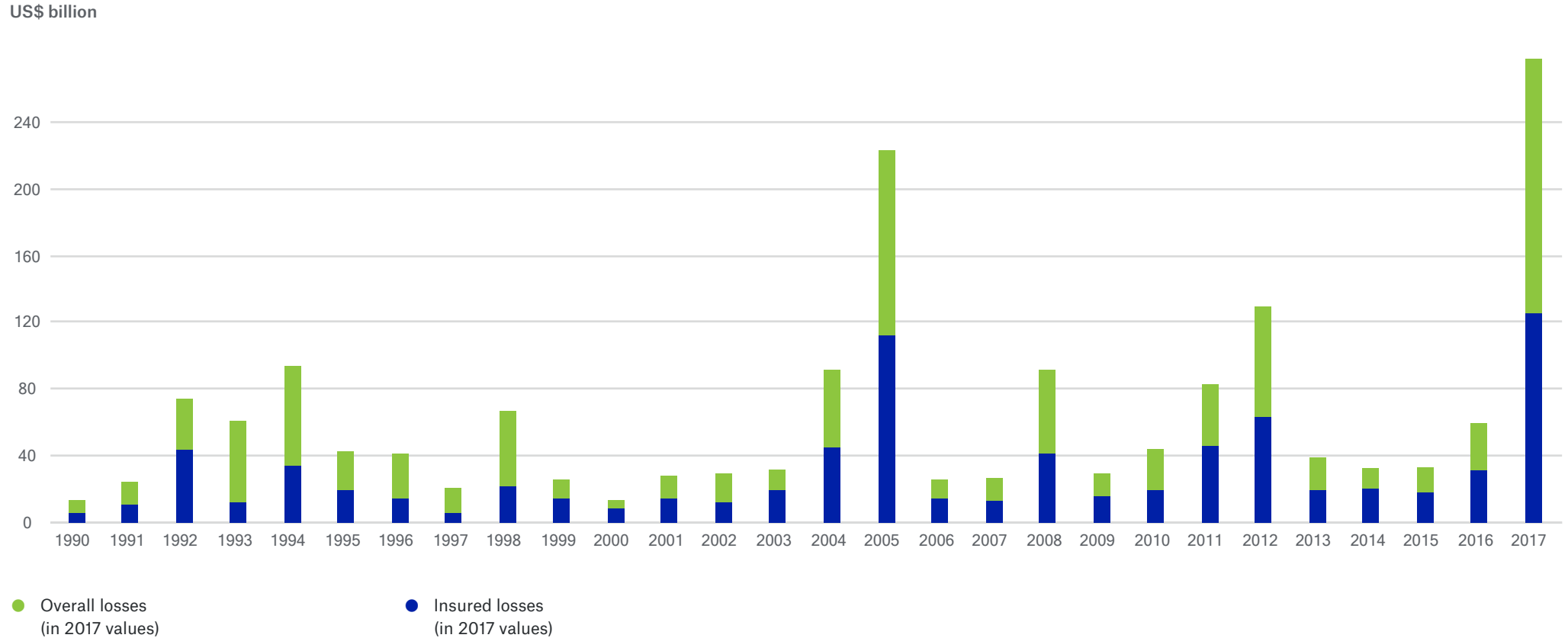
## Catastrophic natural loss events in North America 1990 - 2017



Accounted events have caused  $\geq 1,000$  fatalities and/or produced normalised losses  $\geq$ US\$ 100m, 300m, 1bn, or 3bn (depending on the assigned World Bank income group of the affected country).

# Overall and insured losses in US\$

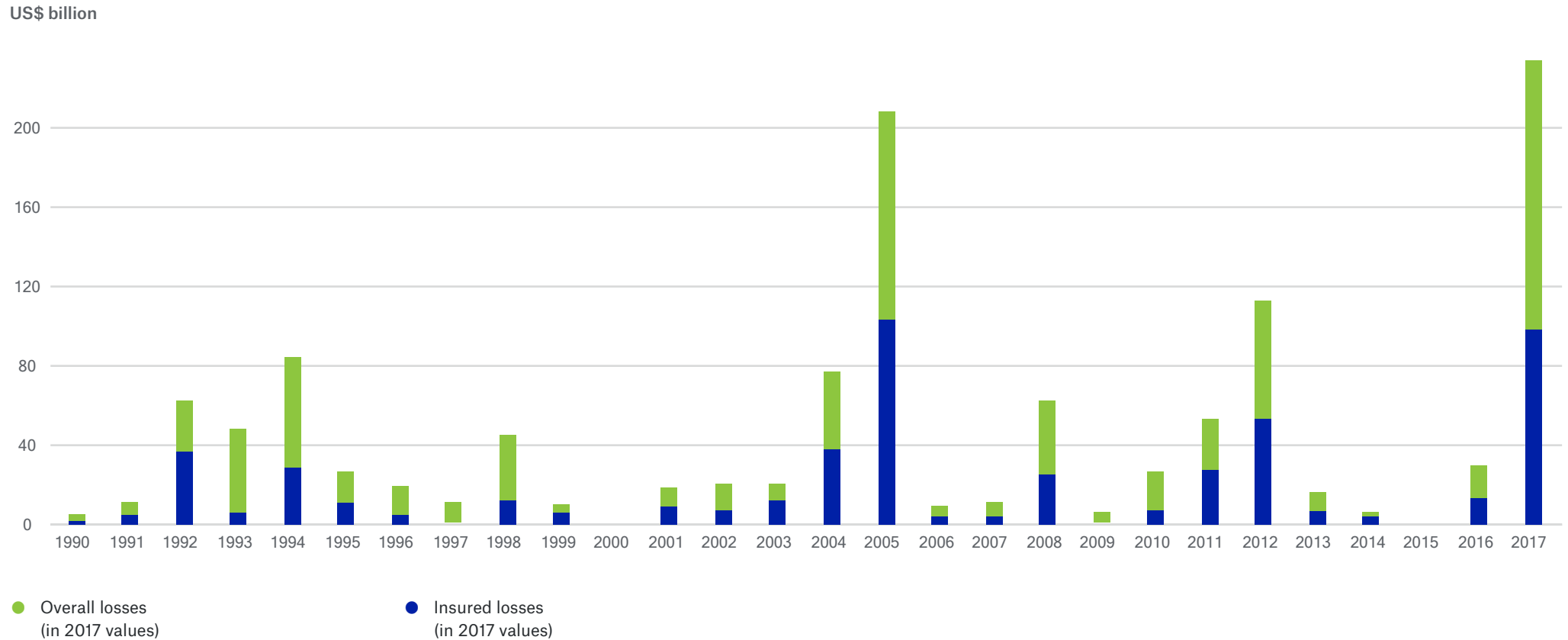
Relevant natural loss events  
in North America 1990 - 2017



Inflation adjusted via country-specific consumer price index and consideration of exchange rate fluctuations between local currency and US\$.

# Overall and insured losses in US\$

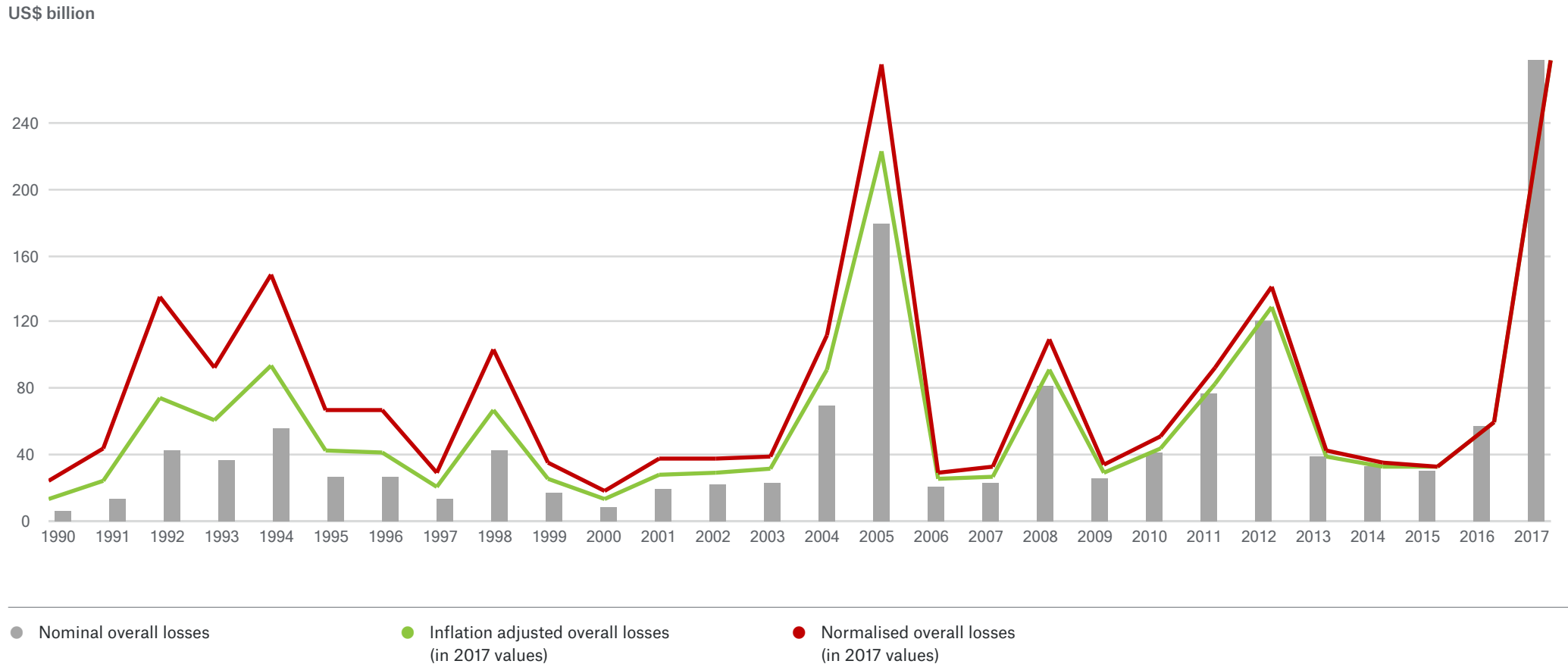
## Catastrophic natural loss events in North America 1990 - 2017



Inflation adjusted via country-specific consumer price index and consideration of exchange rate fluctuations between local currency and US\$.

# Overall losses in US\$: nominal, inflation adjusted, and normalised

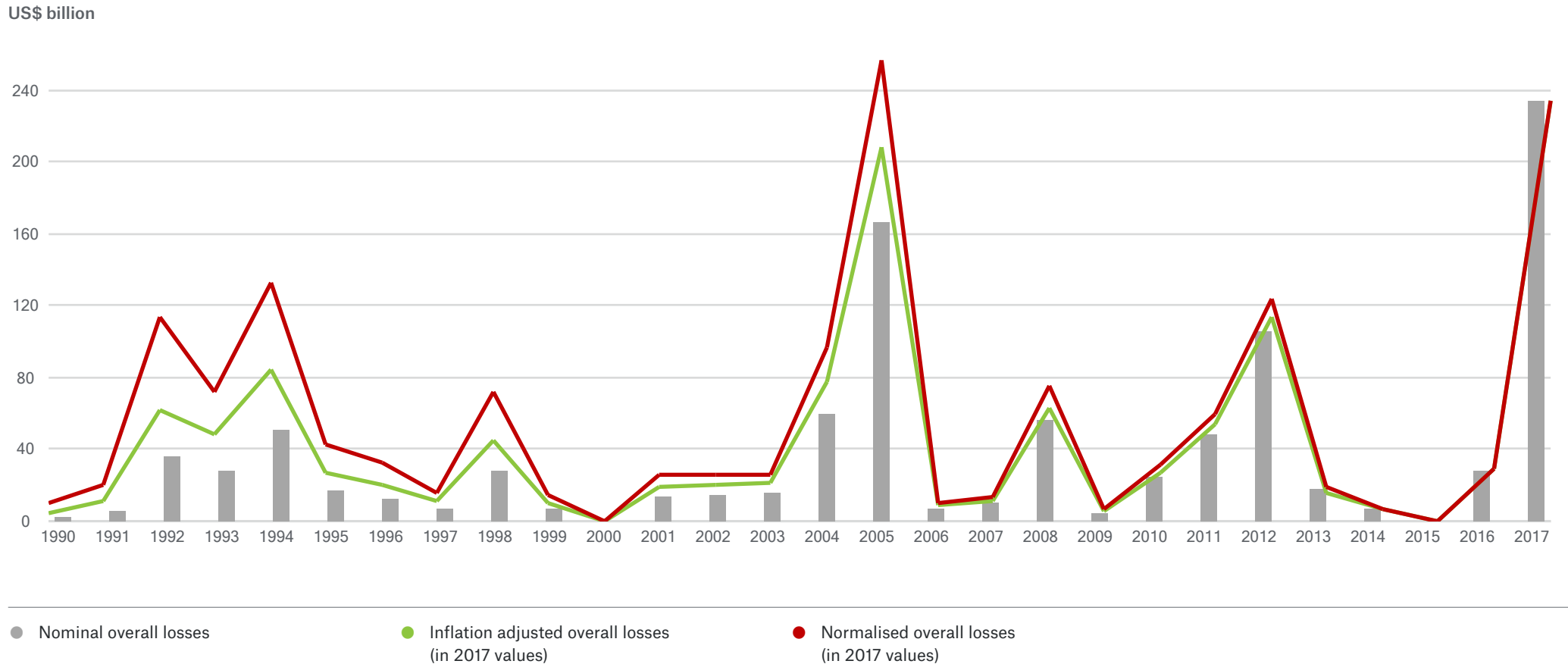
Relevant natural loss events  
in North America 1990 - 2017



Inflation adjusted via country-specific consumer price index and consideration of exchange rate fluctuations between local currency and US\$.  
Normalization via local GDP developments measured in US\$.

# Overall losses in US\$: nominal, inflation adjusted, and normalised

## Catastrophic natural loss events in North America 1990 - 2017



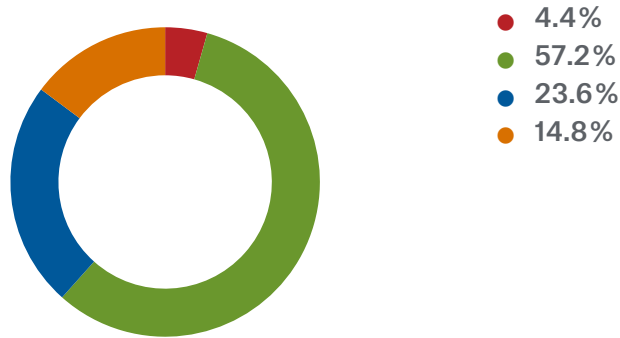
Inflation adjusted via country-specific consumer price index and consideration of exchange rate fluctuations between local currency and US\$.  
 Normalization via local GDP developments measured in US\$.



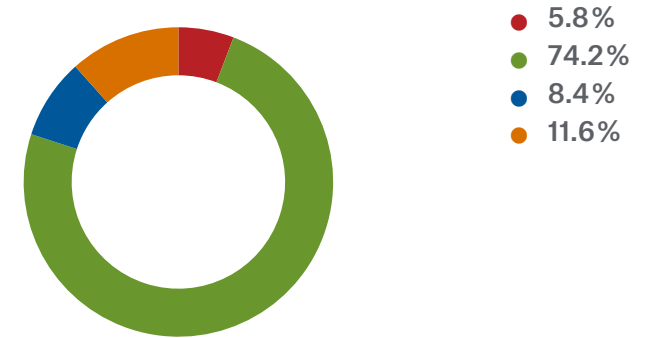
# Percentage distribution by event family

Relevant natural loss events  
in North America 1990 - 2017

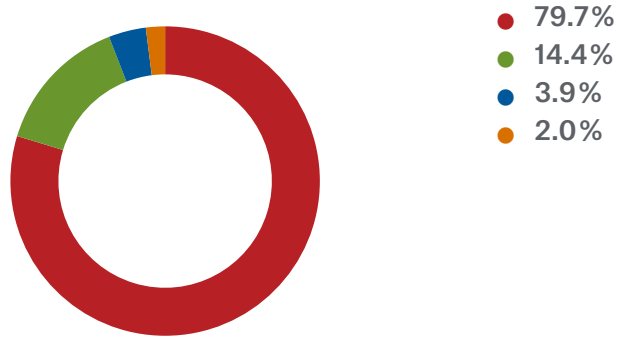
Number of events:  
**3,063**



Overall losses:  
**US\$ 1,743bn**



Fatalities :  
**202,898**



Insured losses :  
**US\$ 811bn**



- Geophysical events  
(Earthquake, tsunami, volcanic activity)
- Meteorological events  
(Tropical cyclone, extratropical storm, convective storm, local storm)
- Hydrological events  
(Flood, mass movement)
- Climatological events  
(Extreme temperature, drought, forest fire)

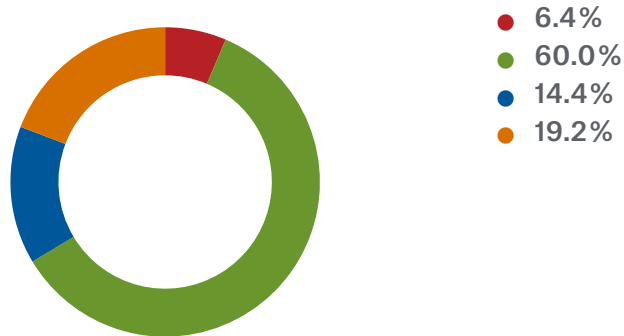
Accounted events have caused at least one fatality and/or produced normalised losses ≥ US\$ 100k, 300k, 1m, or 3m (depending on the assigned World Bank income group of the affected country).

Inflation adjusted via country-specific consumer price index and consideration of exchange rate fluctuations between local currency and US\$.

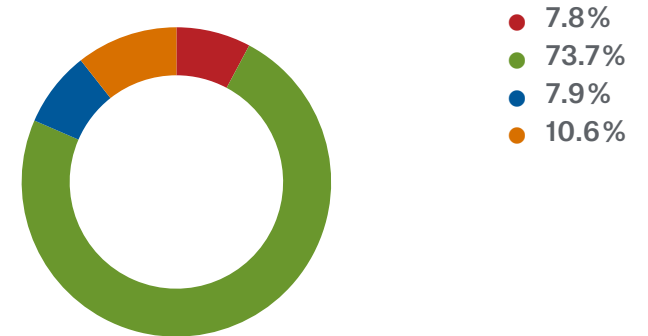
# Percentage distribution by event family

Catastrophic natural loss events  
in North America 1990 - 2017

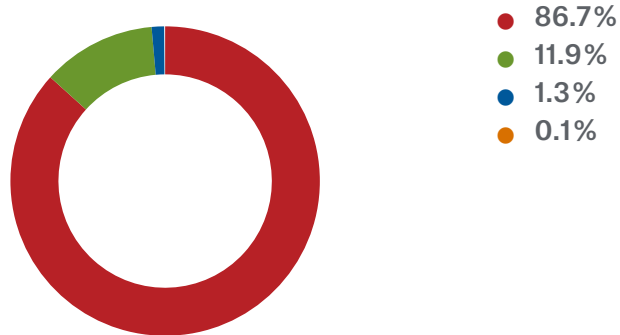
Number of events:  
**125**



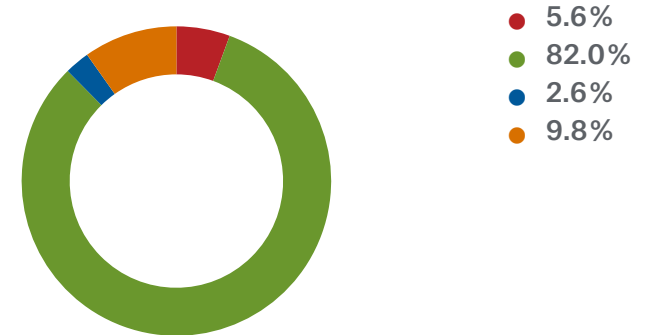
Overall losses:  
**US\$ 1,229bn**



Fatalities :  
**185,040**



Insured losses :  
**US\$ 522bn**



- Geophysical events (Earthquake, tsunami, volcanic activity)
- Meteorological events (Tropical cyclone, extratropical storm, convective storm, local storm)
- Hydrological events (Flood, mass movement)
- Climatological events (Extreme temperature, drought, forest fire)

Accounted events have caused ≥ 1,000 fatalities and/or produced normalised losses ≥US\$ 100m, 300m, 1bn, or 3bn (depending on the assigned World Bank income group of the affected country).

Inflation adjusted via country-specific consumer price index and consideration of exchange rate fluctuations between local currency and US\$.

## 5 costliest events ordered by nominal overall losses

### Relevant natural loss events in North America 1990 - 2017

Date	Event	Affected Area	Overall losses (US\$m, original values)	Insured losses (US\$m, original values)	Fatalities
25 - 30 Aug 2005	Hurricane Katrina, storm surge	United States: LA, New Orleans, Slidell, MS, Biloxi, Pascagoula, Waveland, Gulfport, Bay St. Louis, Hattiesburg, McComb, AL, FL	125,000	60,500	1,720
25 Aug - 1 Sep 2017	Hurricane Harvey, storm surge, flood	United States: TX, Harris County, Houston, Rockport, Refugio, Corpus Christi, Galveston, Crosby, LA, Lake Charles, Evangeline, AL, LA, MS, NC, TN, Nashville, Davidson County	95,000	30,000	88
23 - 31 Oct 2012	Hurricane Sandy, storm surge	United States, Cuba, Haiti, Bahamas, Canada, Jamaica, Dominican Republic, Puerto Rico	68,400	29,200	207
19 - 22 Sep 2017	Hurricane Maria, flood	Puerto Rico, Dominica, Virgin Islands, U.S., Guadeloupe, Dominican Republic, Martinique, Haiti	68,000	29,600	108
6 - 14 Sep 2017	Hurricane Irma, storm surge, flood	United States, Virgin Islands, U.S., Virgin Islands, British, Cuba, Saint Martin, Sint Maarten, Saint Barthelemy, Anguilla, Puerto Rico, Turks and Caicos Islands, Antigua and Barbuda, Bahamas, Bonaire, Sint Eustatius, Saba, Dominican Republic, Haiti, Saint Kitts and Nevis	57,200	28,900	128

## 5 costliest events ordered by nominal insured losses

### Relevant natural loss events in North America 1990 - 2017

Date	Event	Affected Area	Overall losses (US\$m, original values)	Insured losses (US\$m, original values)	Fatalities
25 - 30 Aug 2005	Hurricane Katrina, storm surge	United States: LA, New Orleans, Slidell, MS, Biloxi, Pascagoula, Waveland, Gulfport, Bay St. Louis, Hattiesburg, McComb, AL, FL	125,000	60,500	1,720
25 Aug - 1 Sep 2017	Hurricane Harvey, storm surge, flood	United States: TX, Harris County, Houston, Rockport, Refugio, Corpus Christi, Galveston, Crosby, LA, Lake Charles, Evangeline, AL, LA, MS, NC, TN, Nashville, Davidson County	95,000	30,000	88
19 - 22 Sep 2017	Hurricane Maria, flood	Puerto Rico, Dominica, Virgin Islands, U.S., Guadeloupe, Dominican Republic, Martinique, Haiti	68,000	29,600	108
23 - 31 Oct 2012	Hurricane Sandy, storm surge	United States, Cuba, Haiti, Bahamas, Canada, Jamaica, Dominican Republic, Puerto Rico	68,400	29,200	207
6 - 14 Sep 2017	Hurricane Irma, storm surge, flood	United States, Virgin Islands, U.S., Virgin Islands, British, Cuba, Saint Martin, Sint Maarten, Saint Barthelemy, Anguilla, Puerto Rico, Turks and Caicos Islands, Antigua and Barbuda, Bahamas, Bonaire, Sint Eustatius, Saba, Dominican Republic, Haiti, Saint Kitts and Nevis	57,200	28,900	128

## 5 deadliest events

### Relevant natural loss events in North America 1990 - 2017

Date	Event	Affected Area	Overall losses (US\$m, original values)	Insured losses (US\$m, original values)	Fatalities
12 Jan 2010	Earthquake	Haiti: Port-au-Prince, Petionville, Jacmel, Carrefour, Leogane, Petit Goave, Gressier	8,000	200	159,000
24 Oct - 8 Nov 1998	Hurricane Mitch, flood	Honduras, Nicaragua, El Salvador, Guatemala, United States, Belize, Jamaica, Mexico, Panama, Costa Rica	5,700	150	9,068
20 - 30 Sep 1998	Hurricane Georges	Puerto Rico, United States, Cuba, Dominican Republic, Saint Kitts and Nevis, Haiti, Antigua and Barbuda, Virgin Islands, U.S.	13,300	4,300	3,665
25 - 26 May 2004	Flood	Dominican Republic, Haiti			2,074
14 - 29 Sep 2004	Hurricane Jeanne, flood	United States, Bahamas, Dominican Republic, Puerto Rico, Virgin Islands, U.S., Haiti	9,200	5,000	1,844

## 5 costliest events ordered by inflation adjusted overall losses

### Relevant natural loss events in North America 1990 - 2017

Date	Event	Affected Area	Overall losses (US\$m, in 2017 values)	Insured losses (US\$m, in 2017 values)	Fatalities
25 - 30 Aug 2005	Hurricane Katrina, storm surge	United States: LA, New Orleans, Slidell, MS, Biloxi, Pascagoula, Waveland, Gulfport, Bay St. Louis, Hattiesburg, McComb, AL, FL	157,000	75,900	1,720
25 Aug - 1 Sep 2017	Hurricane Harvey, storm surge, flood	United States: TX, Harris County, Houston, Rockport, Refugio, Corpus Christi, Galveston, Crosby, LA, Lake Charles, Evangeline, AL, LA, MS, NC, TN, Nashville, Davidson County	95,000	30,000	88
23 - 31 Oct 2012	Hurricane Sandy, storm surge	United States, Cuba, Haiti, Bahamas, Canada, Jamaica, Dominican Republic, Puerto Rico	73,100	31,100	207
17 Jan 1994	Earthquake	United States: CA, Northridge, Los Angeles, San Fernando Valley, Ventura, Orange	72,800	25,300	61
19 - 22 Sep 2017	Hurricane Maria, flood	Puerto Rico, Dominica, Virgin Islands, U.S., Guadeloupe, Dominican Republic, Martinique, Haiti	68,000	29,600	108

## 5 costliest events ordered by inflation adjusted insured losses

### Relevant natural loss events in North America 1990 - 2017

Date	Event	Affected Area	Overall losses (US\$m, in 2017 values)	Insured losses (US\$m, in 2017 values)	Fatalities
25 - 30 Aug 2005	Hurricane Katrina, storm surge	United States: LA, New Orleans, Slidell, MS, Biloxi, Pascagoula, Waveland, Gulfport, Bay St. Louis, Hattiesburg, McComb, AL, FL	157,000	75,900	1,720
23 - 31 Oct 2012	Hurricane Sandy, storm surge	United States, Cuba, Haiti, Bahamas, Canada, Jamaica, Dominican Republic, Puerto Rico	73,100	31,100	207
25 Aug - 1 Sep 2017	Hurricane Harvey, storm surge, flood	United States: TX, Harris County, Houston, Rockport, Refugio, Corpus Christi, Galveston, Crosby, LA, Lake Charles, Evangeline, AL, LA, MS, NC, TN, Nashville, Davidson County	95,000	30,000	88
23 - 27 Aug 1992	Hurricane Andrew	United States, Bahamas	46,700	29,700	66
19 - 22 Sep 2017	Hurricane Maria, flood	Puerto Rico, Dominica, Virgin Islands, U.S., Guadeloupe, Dominican Republic, Martinique, Haiti	68,000	29,600	108

## 5 costliest events ordered by normalised overall losses

### Relevant natural loss events in North America 1990 - 2017

Date	Event	Affected Area	Overall losses (US\$m, in 2017 values)	Fatalities
25 - 30 Aug 2005	Hurricane Katrina, storm surge	United States: LA, New Orleans, Slidell, MS, Biloxi, Pascagoula, Waveland, Gulfport, Bay St. Louis, Hattiesburg, McComb, AL, FL	189,000	1,720
17 Jan 1994	Earthquake	United States: CA, Northridge, Los Angeles, San Fernando Valley, Ventura, Orange	112,000	61
25 Aug - 1 Sep 2017	Hurricane Harvey, storm surge, flood	United States: TX, Harris County, Houston, Rockport, Refugio, Corpus Christi, Galveston, Crosby, LA, Lake Charles, Evangeline, AL, LA, MS, NC, TN, Nashville, Davidson County	95,000	88
23 - 27 Aug 1992	Hurricane Andrew	United States, Bahamas	87,000	66
23 - 31 Oct 2012	Hurricane Sandy, storm surge	United States, Cuba, Haiti, Bahamas, Canada, Jamaica, Dominican Republic, Puerto Rico	79,400	207



## Explanation for the interpretation of loss data statistics

### Number statistics and loss thresholds

Number statistics are influenced by a constantly improved reporting of small-scale loss events over the time (*reporting bias*). There is a need to distinguish between **registered** and **relevant** loss events.

- **Registered loss events** are all events recorded by NatCatSERVICE. The range extends from *insignificant* to *catastrophic* loss events expressed in overall losses and / or fatalities. The reporting bias is particularly high for high frequency and low impact events.
- **Relevant loss events** exceed defined thresholds of *normalised* overall losses and/or fatalities. These events are considered in number statistics and trend analyses. Threshold values are:
  - Fatalities  $\geq 1$
  - Normalized overall loss  $\geq$  US\$ 100k, 300k, 1m, or 3m (depending on assigned World Bank income group of each affected country)
- **Type of data filtering is helpful for** reduction/elimination of reporting bias and for conclusions on changes in frequency of occurred loss events.

## Explanation for the interpretation of loss data statistics

### Inflation adjustment and normalization of NatCat loss data

#### Three ways of presenting loss data:

- Nominal losses: values as they originally occurred
- Inflation adjusted losses: accounting for changes in monetary equivalent
- Normalized losses: accounting for growth of values and assets

#### Inflation adjustment:

- Loss value in local currency is *adjusted to inflation* via the country's consumer price index (CPI) under consideration of exchange rate fluctuations between the local currency and the US\$.

#### Normalization:

- Loss value in US\$ is *normalized* via the development of locally resolved (1° x 1°) nominal gross domestic product data in US\$ between year of occurrence and today.

#### Inflation adjusted loss data is helpful for...

- How high would a historic loss value be in today's money?

#### Normalized loss data is helpful for...

- What losses would a historic event cause when exposing today's values and assets?
- Conclusions on loss drivers like changes on the hazard side or effectivity of prevention measures

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