# The Growing Impact of Secondary Perils


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# Primary vs. Secondary Perils

- **Primary Perils**
  - Natural catastrophes that happen less frequently but have a high loss potential
  - “Peak” perils that have known, severe loss potential for the insurance industry
  - Traditionally well monitored and modeled perils in developed (re)insurance markets
- **Secondary Perils**
  - Events that happen relatively frequently but typically generate low to medium size losses
  - Small-to-mid sized catastrophes or severe weather events not characterized as “peak”
  - Can include secondary events following primary perils
  - Historically, these perils have not been modeled significantly in comparison to primary perils

# Natural Catastrophe Peril Descriptions

| | Definition | Examples |
|---|---|---|
| **Primary Perils** | **Peak perils that have known severe loss potential for the insurance industry. Traditionally well monitored and modeled perils in developed (re)insurance markets.** | **Tropical cyclones, earthquakes, winter storms in Europe.** |
| **Independent Secondary Perils** | **Typically characterized as the group of catastrophe and severe weather perils that are not considered "peak". Historically, these perils have not been modeled to any significant extent, in comparison to primary perils.** | **The most prominent examples, particularly in recent years, include severe convective storms, floods, drought and wildfire outbreaks, snow and ice storms.** |
| **Secondary Effects of a Primary Peril** | **Events that are not captured well in primary peril modeling, at least not in proportion to their severity potential.** | **Some of the most common examples include storm surges, tropical cyclone-induced inland flooding, tsunamis and fire following an earthquake.** |

Source: Swiss Re Institute; AM Best data and research

# Secondary Effects of Primary Perils

- Events that have not historically been captured well in primary peril modeling, at least not to the extent of their potential severity
- Common examples include:
  - Storm surges
  - Hurricane-induced precipitation
  - Tsunamis
  - Fire-following an earthquake
- Tangential issues associated with these events that can increase loss costs for policyholders and insurers include contingent business interruption, demand surge, and supply chain disruptions

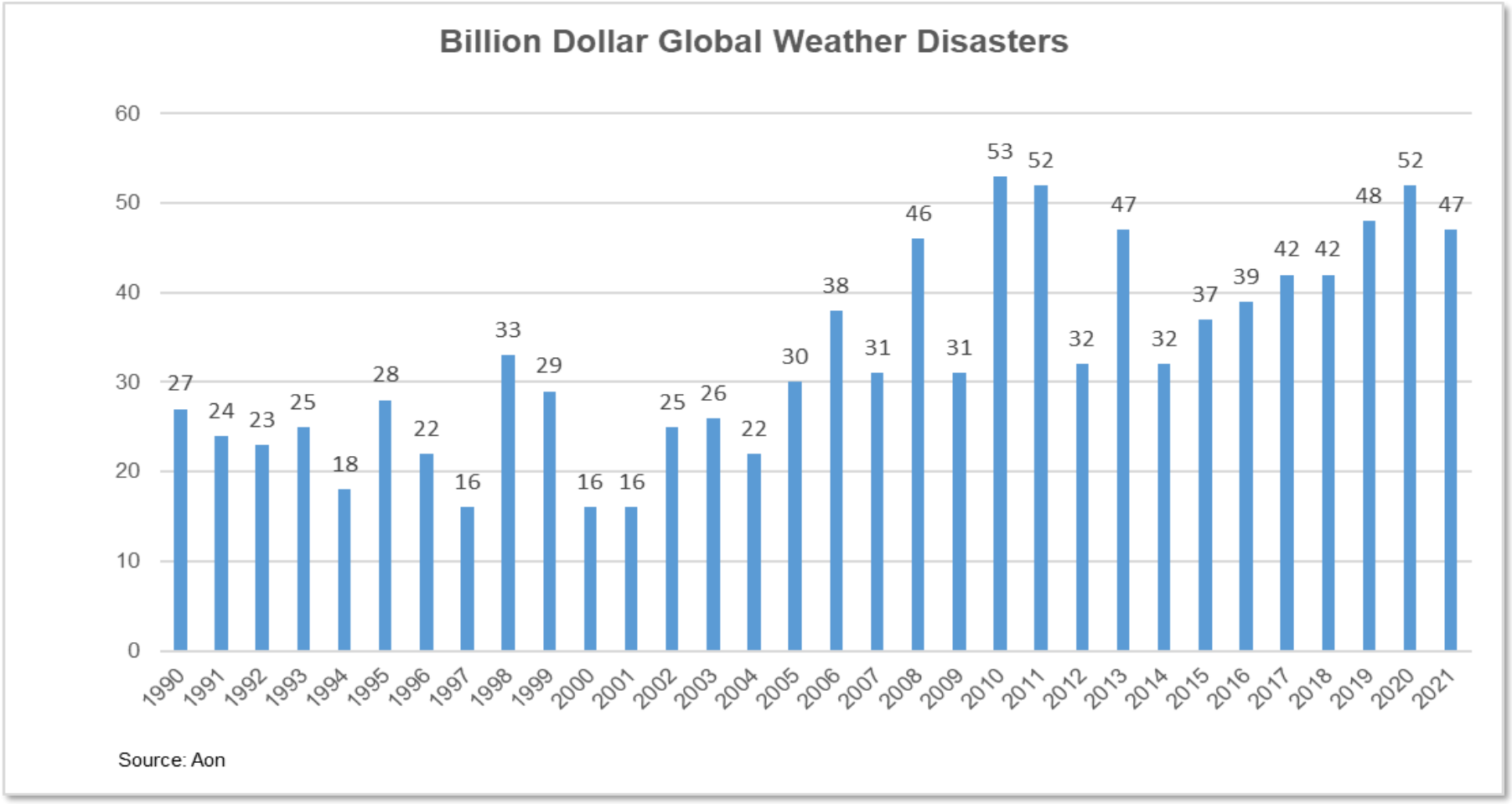
# Billion Dollar US Weather Disasters, 1980-2021

**US Weather and Climate Disasters Exceeding $1Billion in Total Costs, 1980-2021**
($ billions)

| Time Period | Billion-Dollar Disasters | Events per Year | Cost | % of Total Cost | Cost per Year |
|---|---|---|---|---|---|
| 1980s (1980-1989) | 29 | 2.9 | 190.2 | 8.8% | 19.0 |
| 1990s (1990-1999) | 53 | 5.3 | 293.0 | 13.6% | 29.3 |
| 2000s (2000-2009) | 63 | 6.3 | 556.8 | 25.8% | 55.7 |
| 2010s (2010-2019) | 123 | 12.3 | 872.9 | 40.4% | 87.3 |
| Last 5 Years (2017-2021) | 86 | 17.2 | 742.1 | 34.4% | 148.4 |
| Last 3 Years (2019-2021) | 56 | 18.7 | 295.9 | 13.7% | 98.6 |
| Last Year (2021) | 20 | 20.0 | 145.0 | 6.7% | 145.0 |
| All Years (1980-2021) | 310 | 7.4 | 2,159.9 | 100.0% | 51.4 |

All dollar values are inflation adjusted to 2021
Source: NOAA National Center for Environmental Information (NCEI)

# Billion Dollar Global Disasters



# Recent Natural Catastrophe Facts (Swiss Re)

- Global natural catastrophe losses in 2021 were $105 billion, the fourth highest annual total since 1970. With another $7 billion in man-made disasters, global catastrophe losses were $112 billion in 2021.
- Despite Hurricane Ida being the headline event, once again more than half of the global losses came from secondary perils.
- Extreme weather events in 2021, including a deep winter freeze, floods, severe thunderstorms, heatwaves and a major hurricane
- It has become the norm that at least one secondary peril event such as a severe flooding, winter storm or wildfire, each year results in losses of more than $10 billion.

# Recent Natural Catastrophe Facts (Aon)

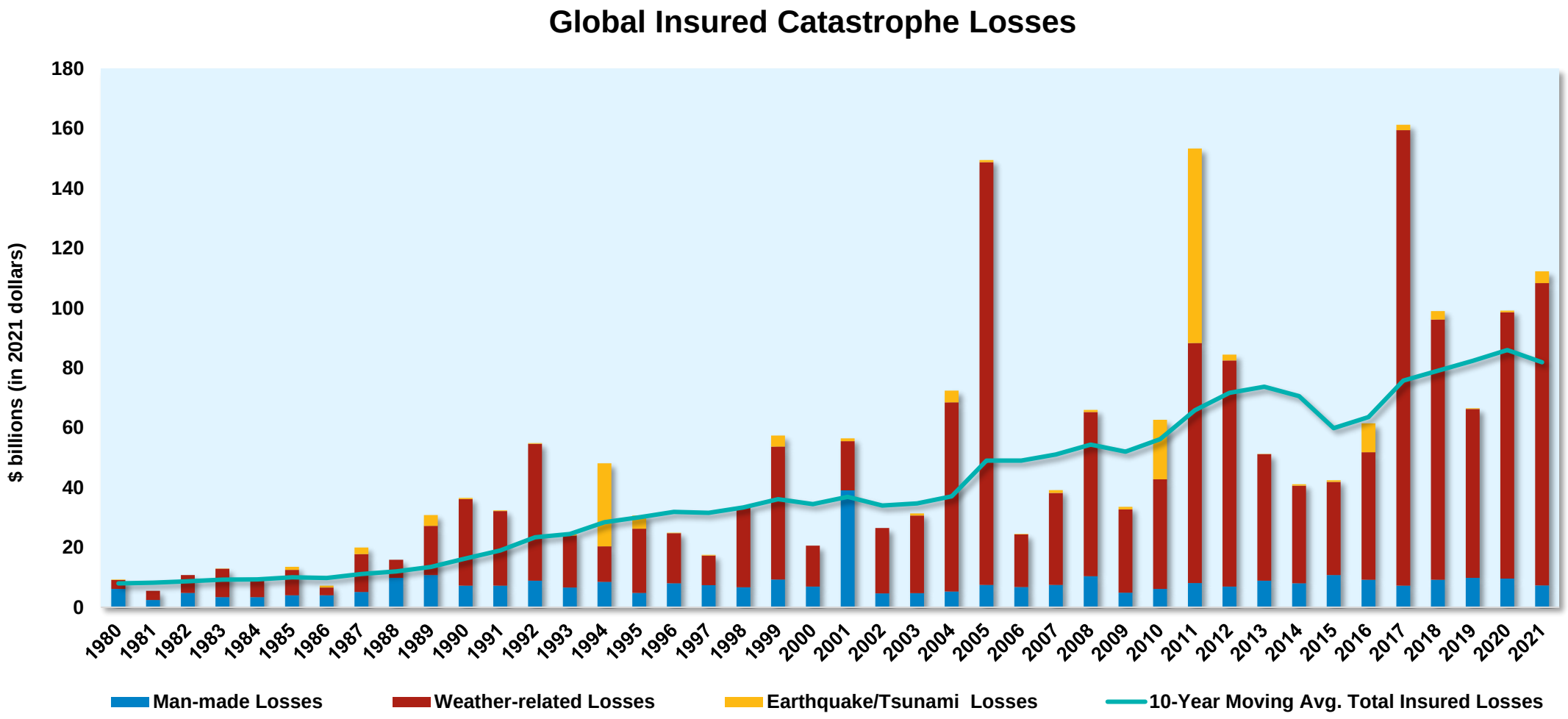
- Natural disasters cost global economies a total of $343 billion in 2021, compared with $297 billion in 2020. Insured losses from 2021's natural disasters reached $130 billion, well above the 21st century average ($74 billion), median ($66 billion), and 18% higher than in 2020.

- It is estimated that only 38% of global economic losses from natural catastrophes were covered by insurance, leaving a 62% protection gap (the protection gap is the difference between total economic losses and what is covered by insurance).

- Globally, there were 50 individual billion dollar economic loss events in 2021, the fourth year on record, with only 20 events reaching the billion dollar  insured loss threshold.

- The U.S. had a total of 23 billion-dollar economic loss events, the second year in a row with at least 20 such occurrences and only the third time on record (2017, 2020, 2021). Insured losses were 108% higher than average ($44 billion) and 227% higher than the median ($28 billion).

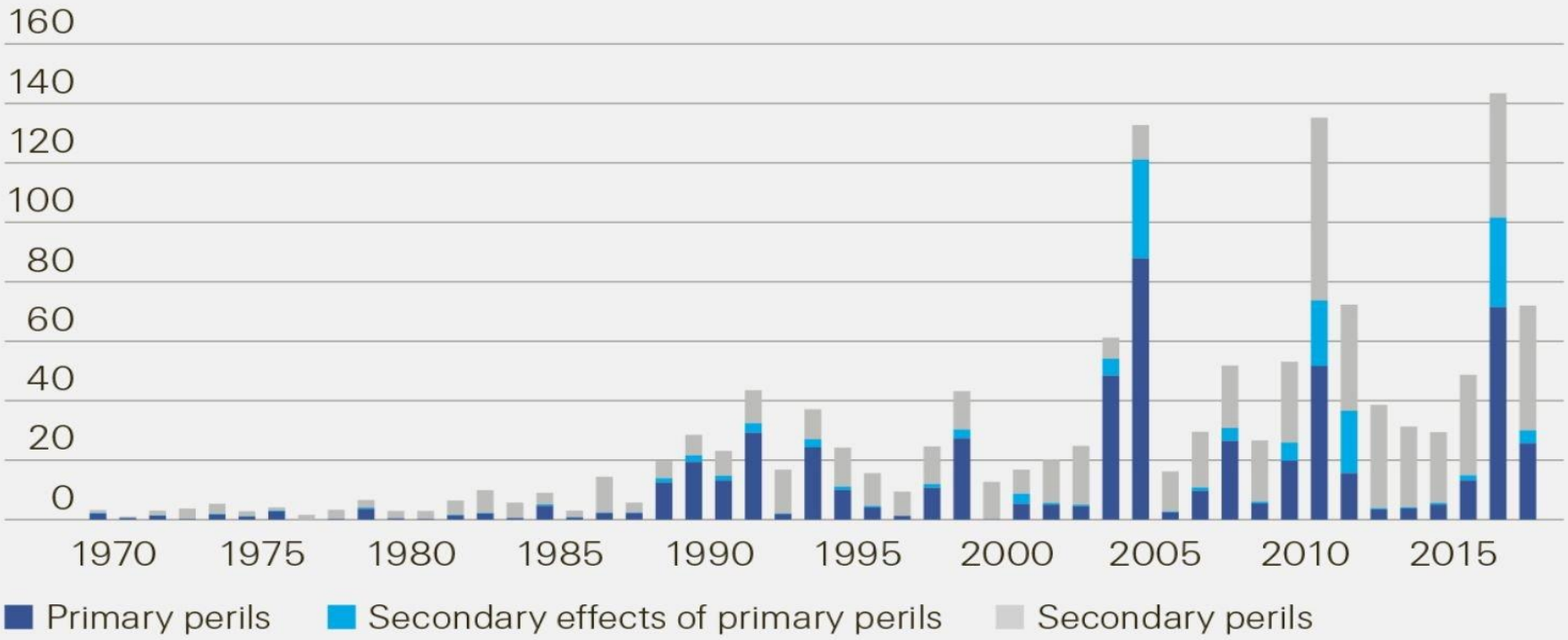
# Global Insured Catastrophe Losses




Source: Swiss Re Institute

# Secondary Perils Increasing in Prominence

**Figure 1: Primary and secondary peril insured losses since 1970 (USD billion, at 2018 prices)**




Source: Swiss Re Institute

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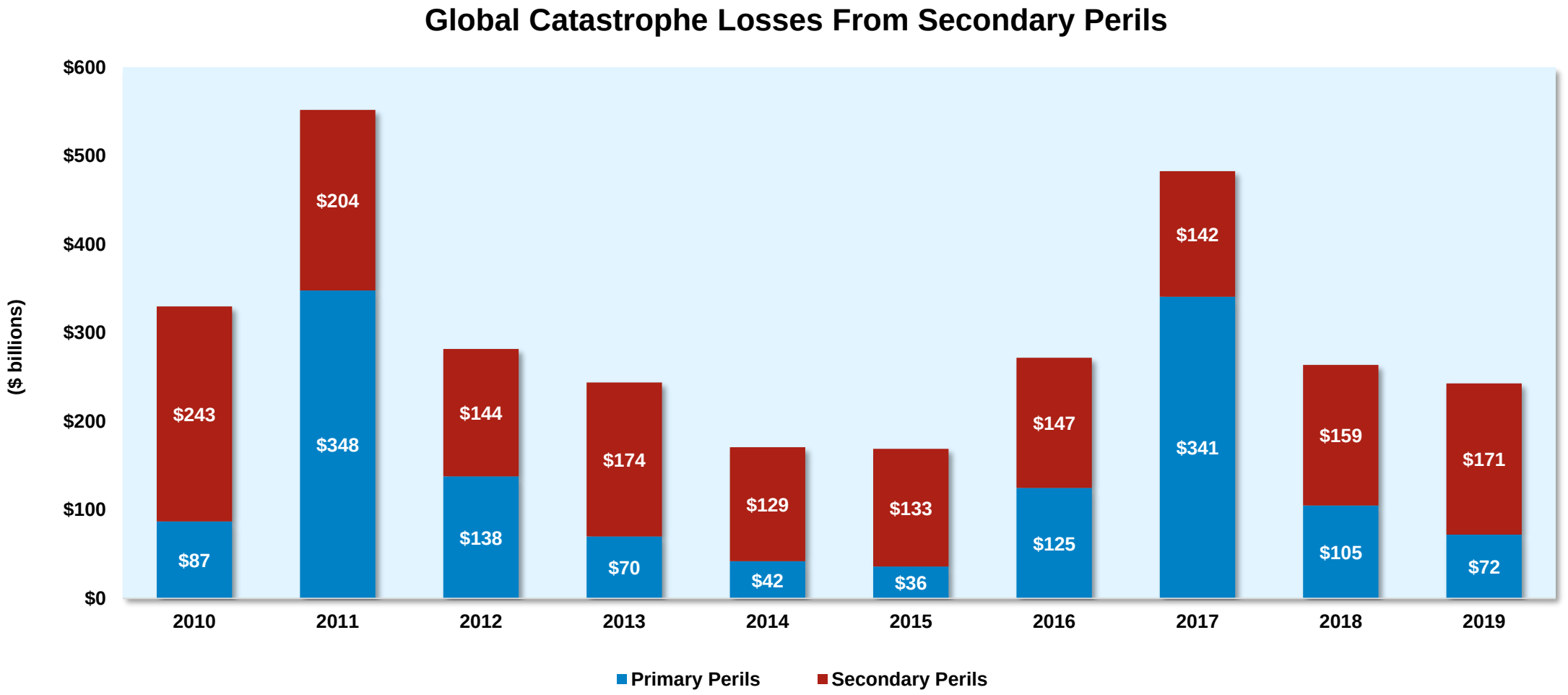
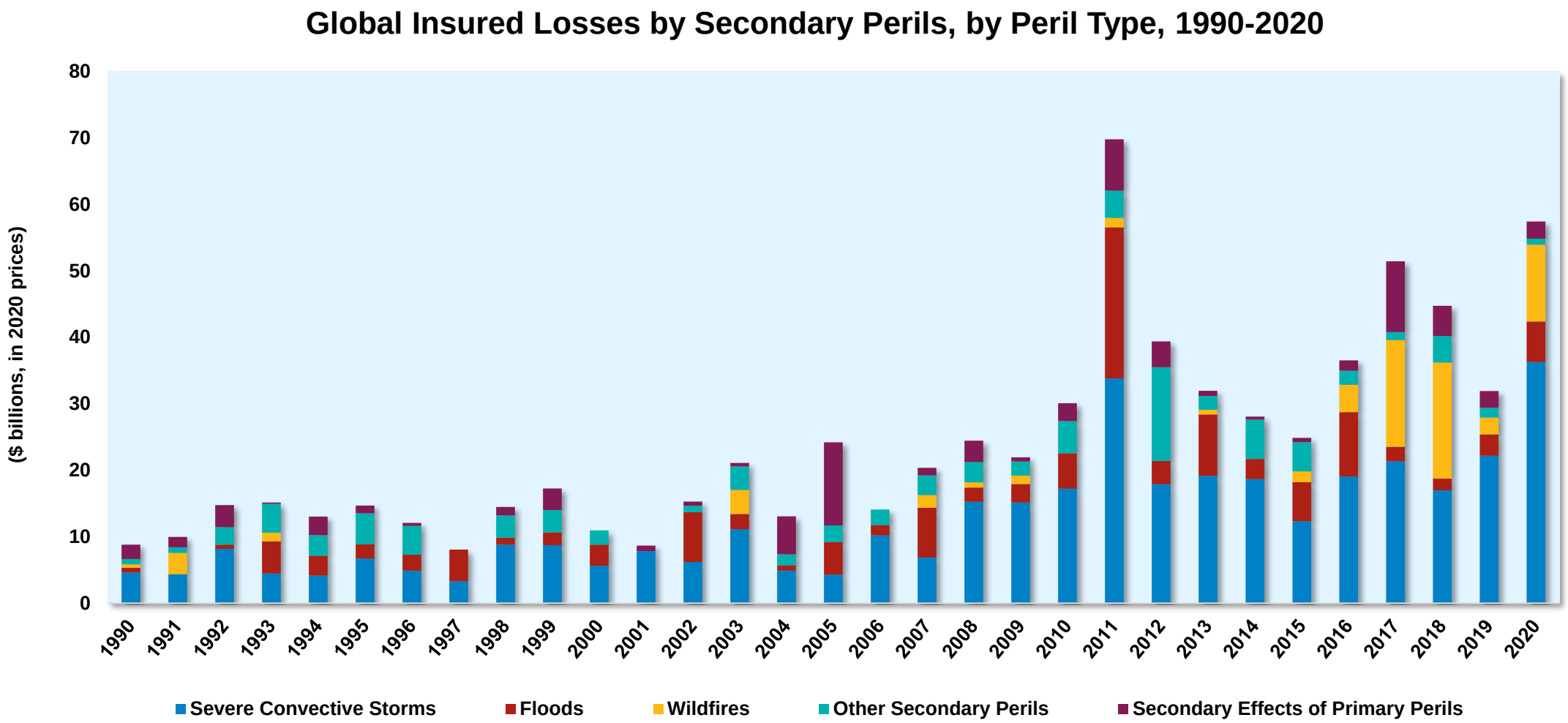


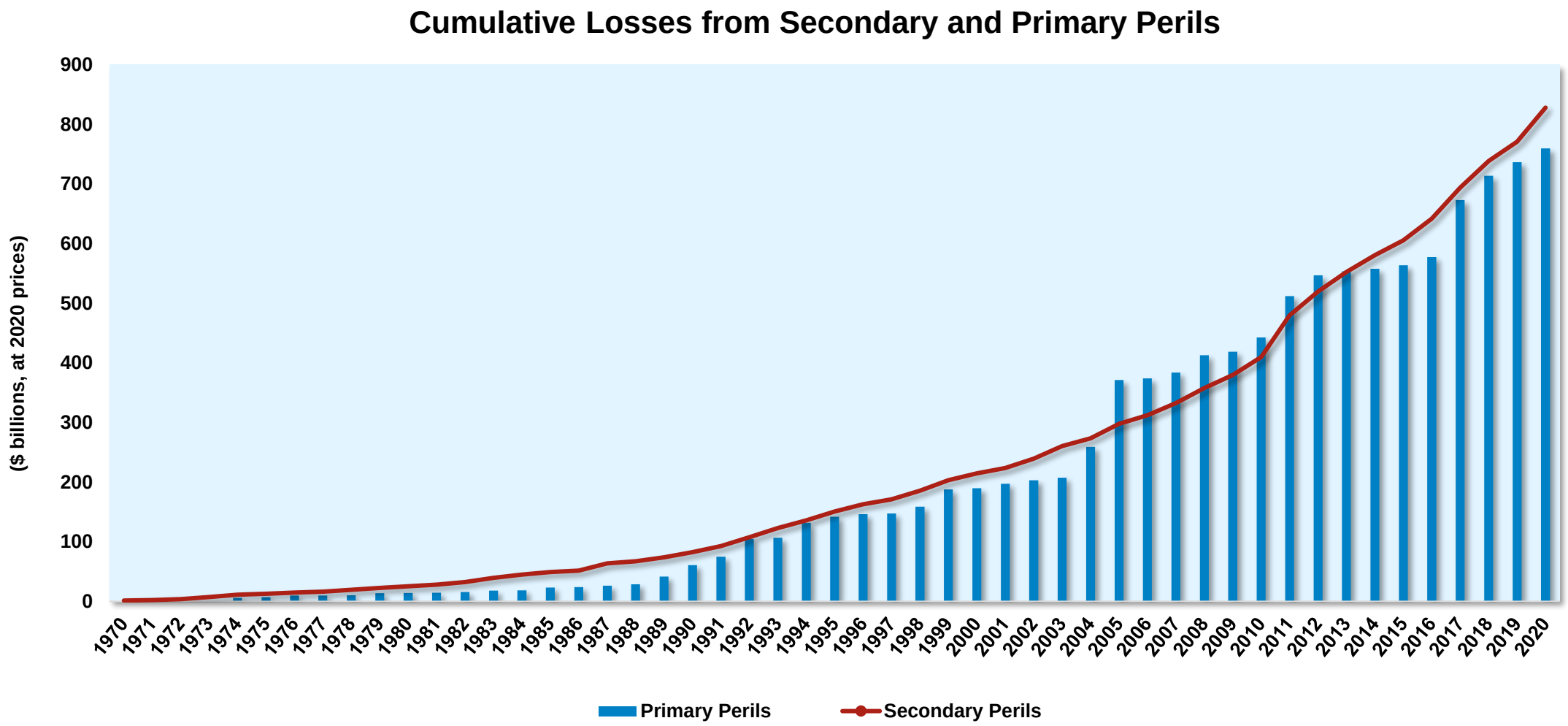

Source: Aon Catastrophe Insight

# Global Insured Losses by Secondary Peril Type




Source: Swiss Re Institute

# Cumulative Losses from Secondary Perils Since 1970




Source: Swiss Re Institute

# Top 10 Costliest US Wildfires

## Top 10 Costliest Wildland Fires In The United States

**(Including losses sustained by private insurers and government-sponsored programs such as the National Flood Insurance Program)**
**($ millions)**

| Rank | Year | Name | Estimated Insured Loss (in dollars when the event occurred) | Estimated Insured Loss in 2021 dollars (1) |
|---|---|---|---|---|
| 1 | 2018 | Camp Fire | $10,000 | $10,750 |
| 2 | 2017 | Tubbs Fire | 8,700 | 9,560 |
| 3 | 2018 | Woolsey Fire | 4,200 | 4,520 |
| 4 | 1991 | Oakland Fire (Tunnel) | 1,700 | 3,350 |
| 5 | 2017 | Atlas Fire | 3,000 | 3,300 |
| 6 | 2020 | Glass Fire | 2,950 | 3,070 |
| 7 | 2020 | CZU Lightning Complex Fire | 2,500 | 2,600 |
| 8 | 2017 | Thomas Fire | 2,250 | 2,470 |
| 9 | 2020 | LNU Lightning Complex Fire | 2,250 | 2,340 |
| 10 | 2007 | Witch Fire | 1,600 | 2,080 |

All fires on this list occurred in California. Includes Puerto Rico and the U.S. Virgin Islands.

Data is as of February 3, 2022.

Ranked on losses in 2021 dollars. Subject to change as loss estimates are further developed.

(1) Adjusted for inflation by Aon using the U.S. Consumer Price Index.

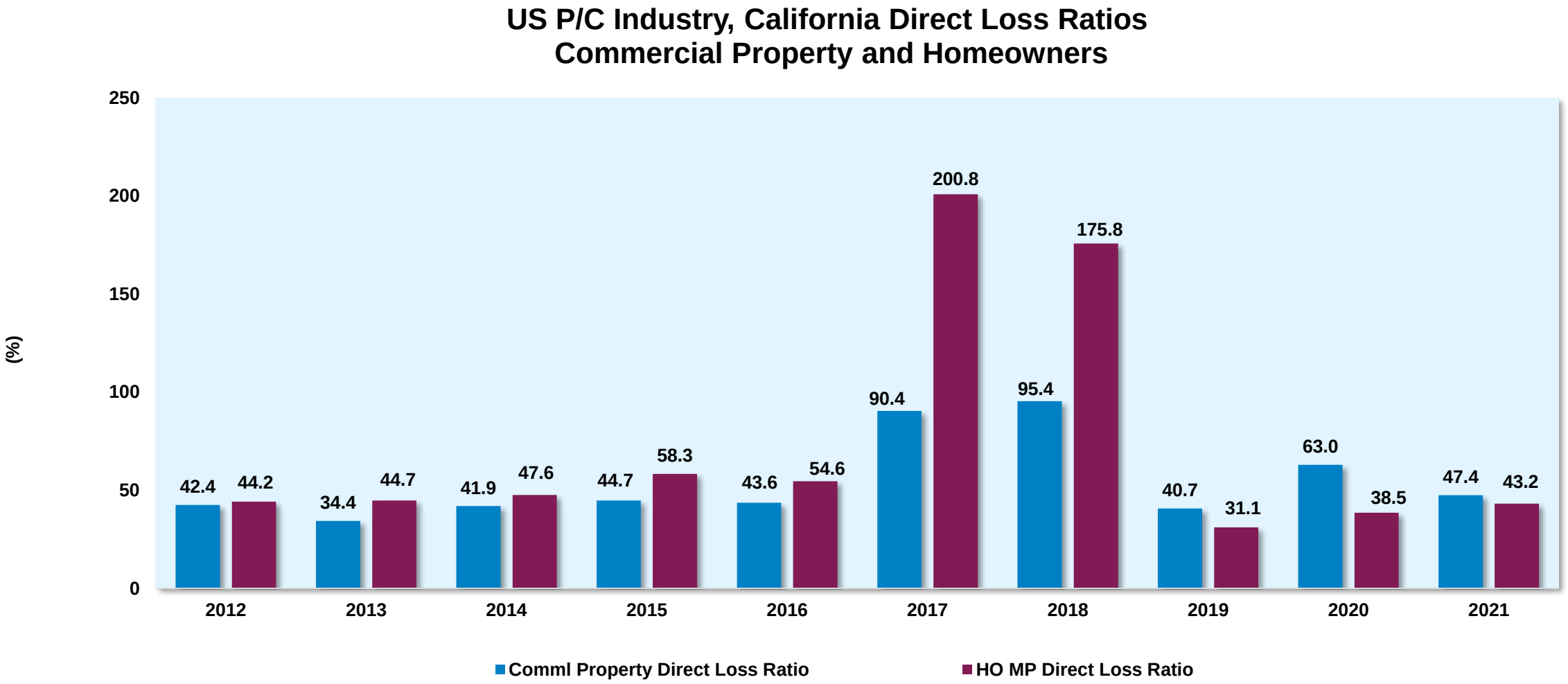
Source: Aon

# Top 20 Largest California Wildfires

| 20 Largest California Wildfires by Acreage Burned | | | |
|---|---|---|---|
| Rank | Fire Name (Cause) | Date | Acres Burned |
| 1 | August Complex (Lightning) | Aug-20 | 1,032,648 |
| 2 | Dixie (Powerlines) | Jul-21 | 963,309 |
| 3 | Mendocino Complex (Human Related) | Jul-18 | 459,123 |
| 4 | SCU Lightning Complex (Lightning) | Aug-20 | 396,624 |
| 5 | Creek (Undetermined) | Sep-20 | 379,895 |
| 6 | LNU Lightning Complex (Lightning) | Aug-20 | 363,220 |
| 7 | North Complex (Lightning) | Aug-20 | 318,935 |
| 8 | Thomas (Powerlines) | Dec-17 | 281,893 |
| 9 | Cedar (Human Related) | Oct-03 | 273,246 |
| 10 | Rush (Lightning) | Aug-12 | 271,911 CA / 43,666 NV |
| 11 | Rim (Human Related) | Aug-13 | 257,314 |
| 12 | Zaca (Human Related) | Jul-07 | 240,207 |
| 13 | Carr (Human Related) | Jul-18 | 229,651 |
| 14 | Monument (Lightning) | Jul-21 | 223,124 |
| 15 | Caldor (Human Related) | Aug-21 | 221,835 |
| 16 | Matilija (Undetermined) | Sep-32 | 220,000 |
| 17 | River Complex (Lightning) | Jul-21 | 199,343 |
| 18 | Witch (Powerlines) | Oct-07 | 197,990 |
| 19 | Klamath Theater Complex (Lightning) | Jun-08 | 192,038 |
| 20 | Marble Cone (Lightning) | Jul-77 | 177,866 |

Source: California Department of Forestry and Fire Protection

# California Commercial Property and Homeowners Loss Ratios




Commercial Property = Fire, Allied Lines and Commercial Multi Peril (Property)
Source: California Department of Forestry and Fire Protection

# Wildfire Facts and Trends

- Definition: Unplanned, uncontrolled fires that burn in wildland vegetation such as forests, shrublands or grasslands. Wildfires include:
  - Lightning-caused fires
  - Unauthorized human-caused fires
  - Escaped, prescribed fire projects
- Over the past several decades, wildfire activity, damages attributed to wildfires, and costs of managing wildfires have increased substantially in the United States.
- Between 1991 and 2020, the annual area burned in fires increased by roughly 192,000 acres per year despite the average annual number of fire ignitions decreasing by approximately 780 fires per year.

# Wildfire Facts and Trends

- Research has shown that more wildfire ignitions occur in eastern states than in the western states. However, eastern fires are typically smaller than those in the West.
- In 2020, over 33,000 fires burned approximately 700,000 acres in the East, while almost 26,000 wildfires burned approximately 9.5 million acres in Western states.
- Nearly 50% of all land across the 11 contiguous western states is owned and managed by the federal government. For that reason, the federal government plays a significant role in managing wildfires in the western part of the country.
- In 2020, more than seventy percent of all area burned by wildfires in the United States was on federal land.

# Wildfire Risk: Current Challenges and Opportunities for Improvement

- While more resources are being directed to study secondary perils, at present we still have an incomplete picture of what shapes them.
- We need a greater understanding of the degree to which secondary perils are driven by climate risk. Evidence concerning the link between the two remains imperfect.
- It is possible that as climate change becomes more pervasive, the impact on the global environment and catastrophe risks, including secondary perils, may increase.
- It appears clear that urban sprawl along with population growth in high risks areas have increased the number of assets and people in harm's way from these perils.

# Principal Takeaways

- Catastrophes, whether wet (hurricanes) or dry (wildfires) events are gaining in both intensity and frequency.
- Secondary perils such as wildfires, tornadoes and severe thunderstorms are accounting for a larger share of losses from catastrophes that primary perils such as hurricanes.
- Although this is a global issue, the US continues to suffer many of the most intense and most impactful natural disasters in terms of both total economic damage and insured losses.
- The risk landscape for catastrophes is clearly shifting and the risks posed by both primary and secondary perils is clearly not static.

# Principal Takeaways (continued)

- Man-made drivers have had a significant influence on the increasing economic and insured loss totals from catastrophe events.
- Demographic shifts and population growth in different areas has elevated the magnitude of both economic and insured losses by putting more people and more assets at risk. Prime examples:
  - Urban sprawl into wildland areas
  - Urban development along coastlines
- The higher number of significant weather events is an indication of the drastic and far-reaching effects of climate change.
- Natural catastrophe modeling has come a long way, even in just the last decade, but it is vital for the models to be continually re-calibrated because of how quickly the risk landscape changes.