The Impact of Natural Catastrophes on Global (Re)insurance Markets.
USA
1950-2020

Toby Pughe ACII

What is looked at?

I start by looking at high-level market losses by year and state from 1950-2020, as coded by **PCS.** I then look at events from 1998-2020 in more detail – the number of claims vs. quantum and breakdown by line of business (*Commercial, auto, and personal lines*)**.** *See the last page for the data source*.

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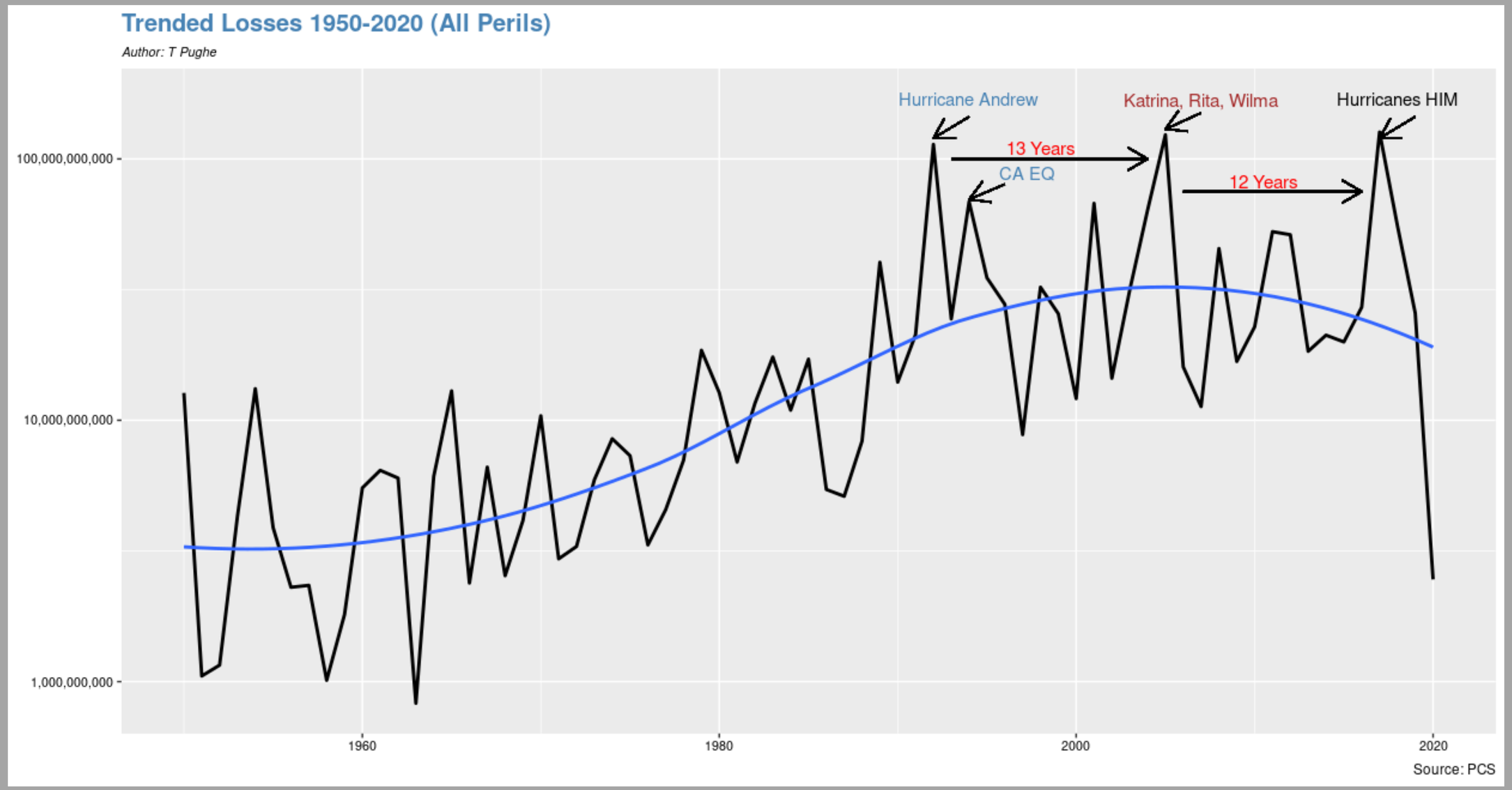
Any views are my own and not those of my employer.

1950-2020
High-level look at market losses by year and state.

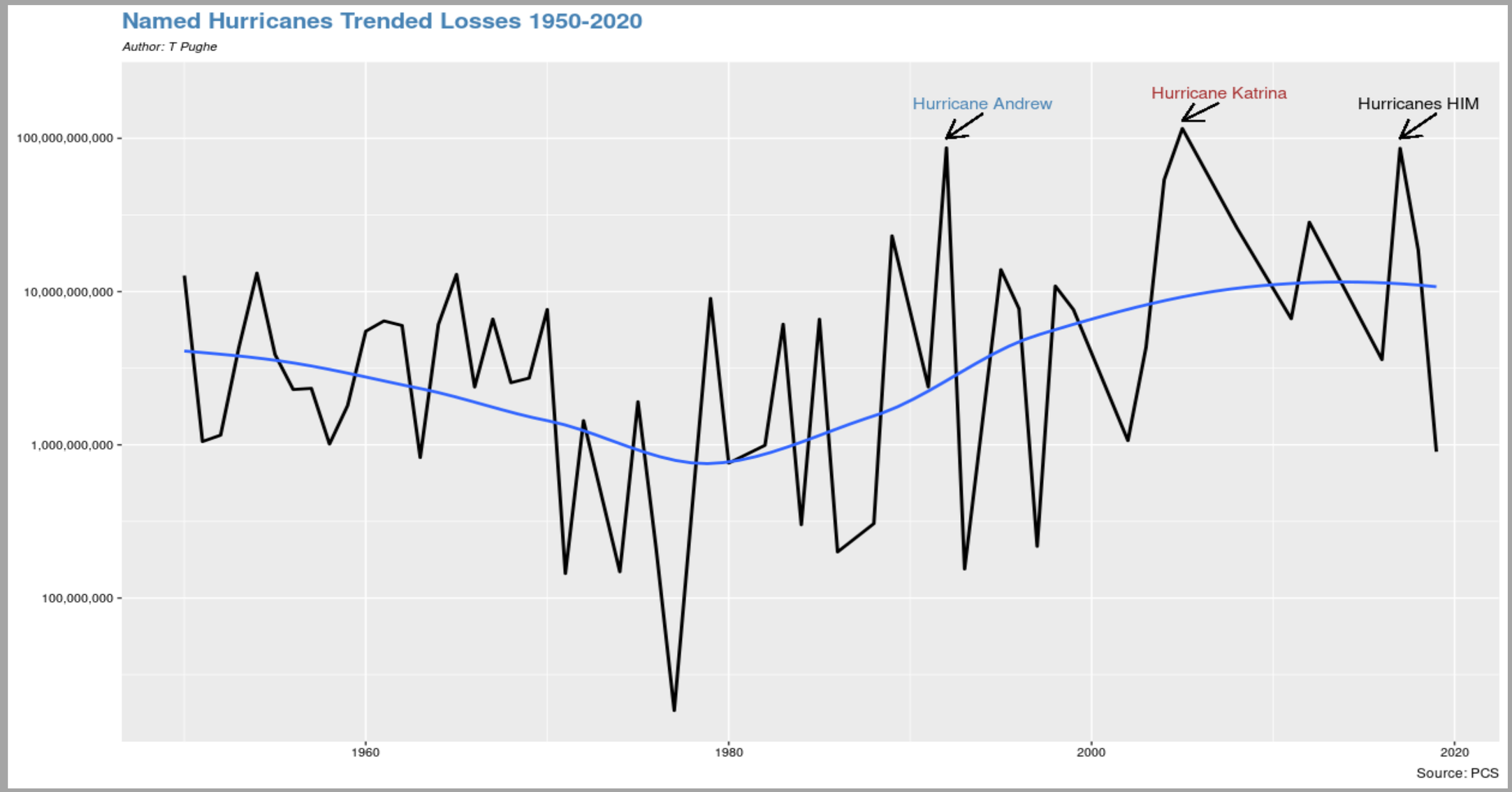
Market Losses by year (all perils)

Labels are for large losses in the year; the sum of Loss includes other events.



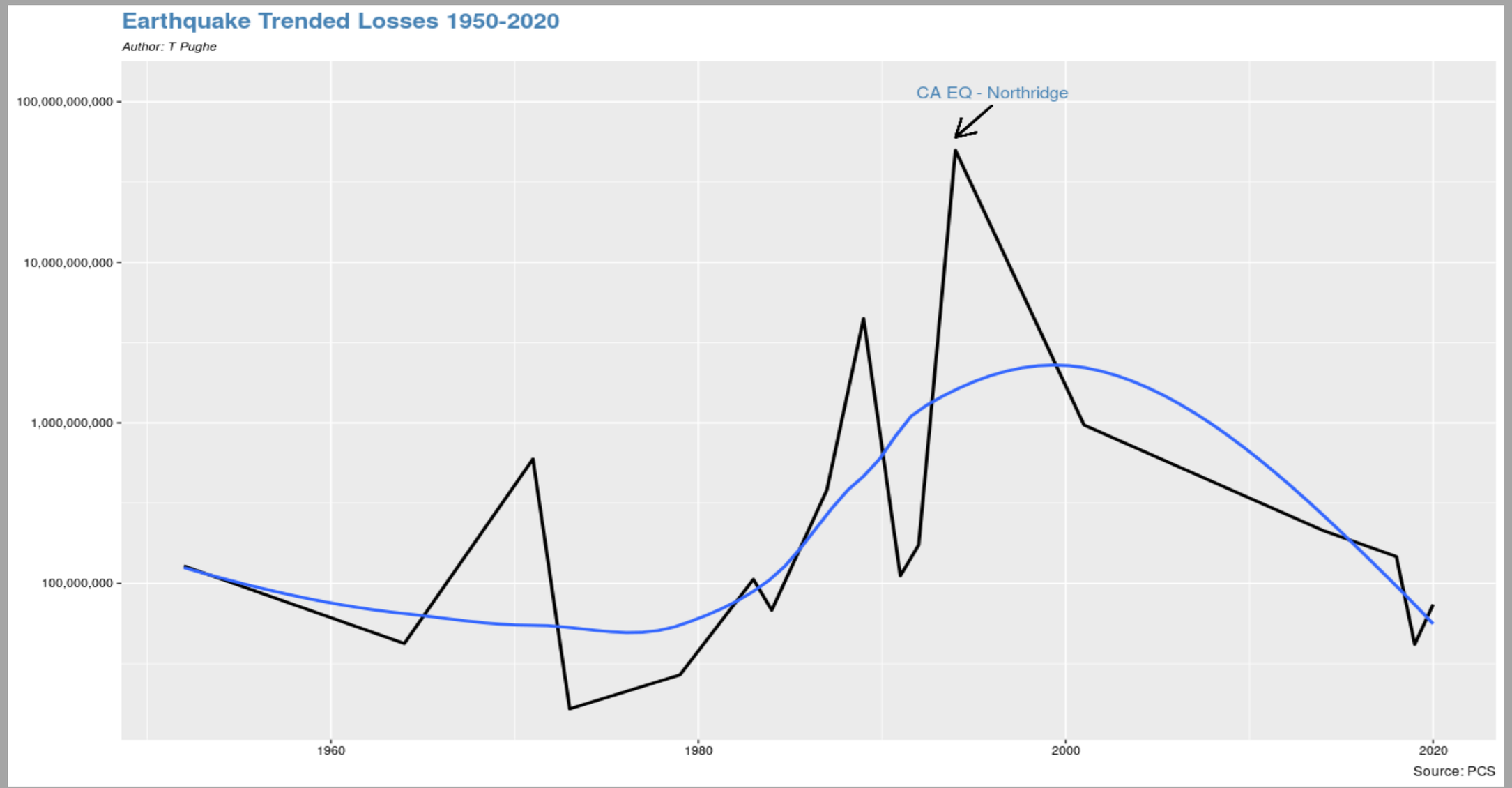
Named Hurricanes

Labels are for large losses in the year; the sum of Loss includes other events.



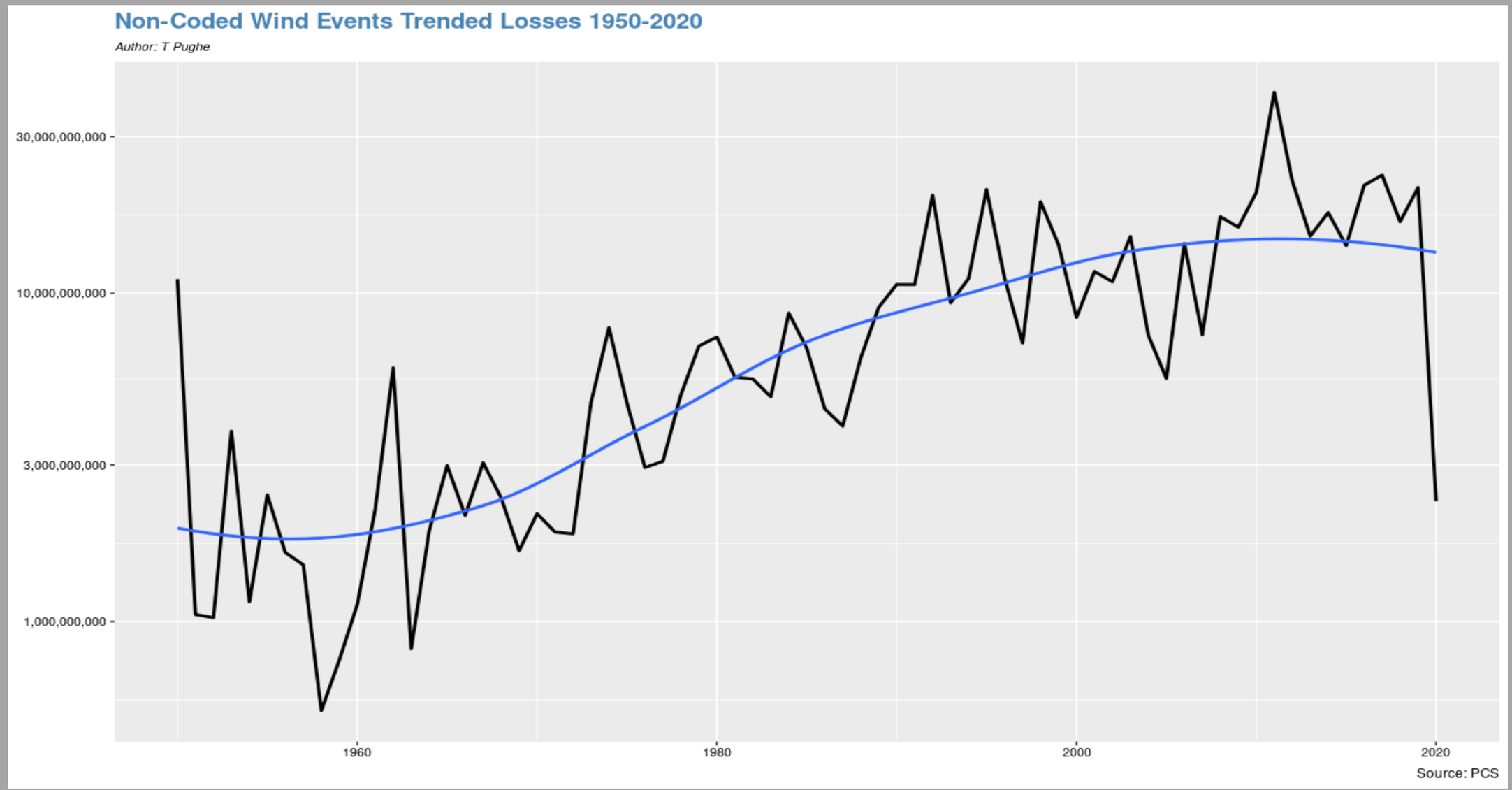
Earthquake

Labels are for large losses in the year; the sum of Loss includes other events.



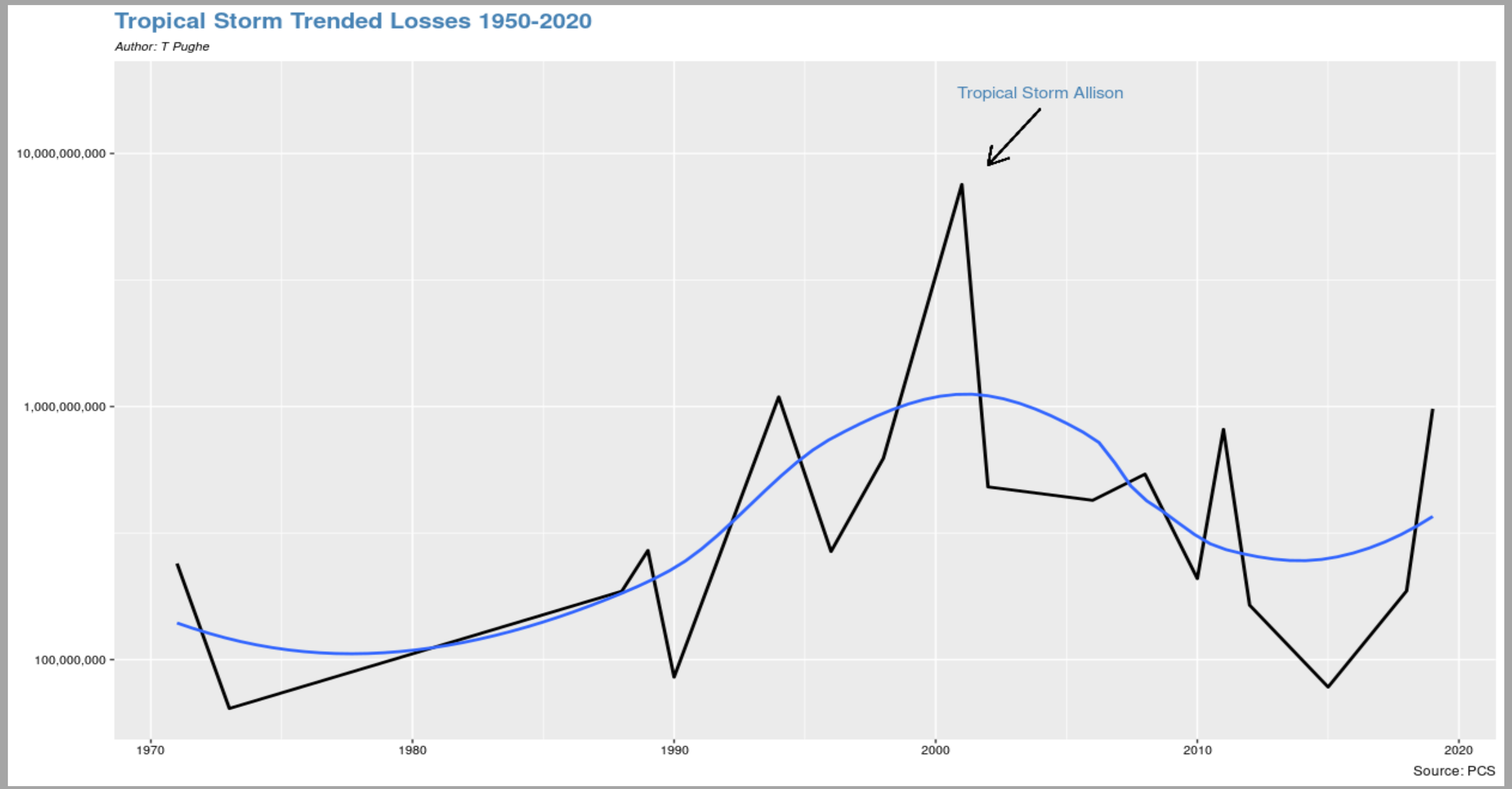
Non-Coded Wind Events

Labels are for large losses in the year; the sum of Loss includes other events. PCS coded 'Wind and Thunderstorm Events' classed as non-coded wind events throughout.



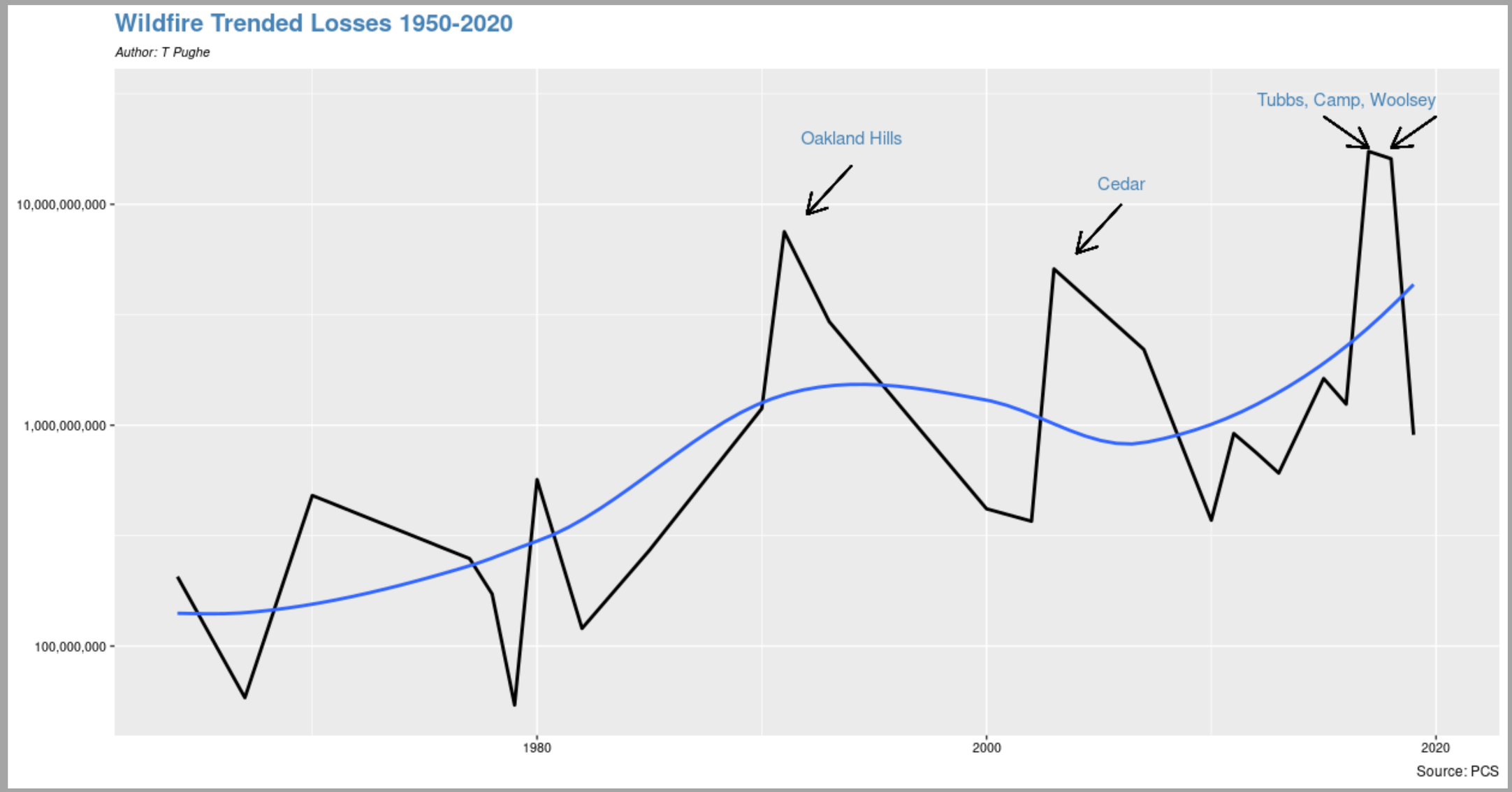
Tropical Storms

Labels are for large losses in the year; the sum of Loss includes other events.

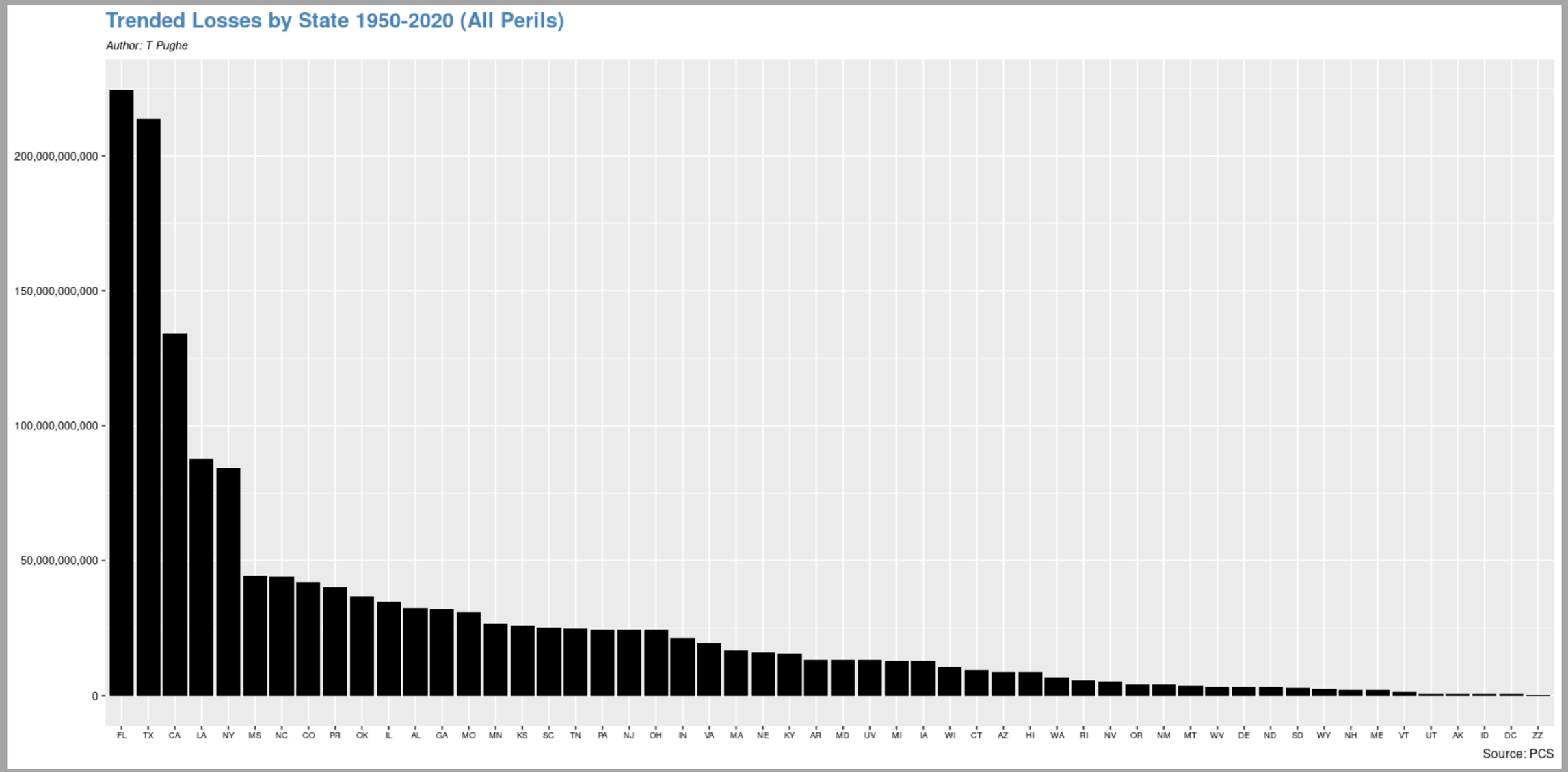


Wildfire

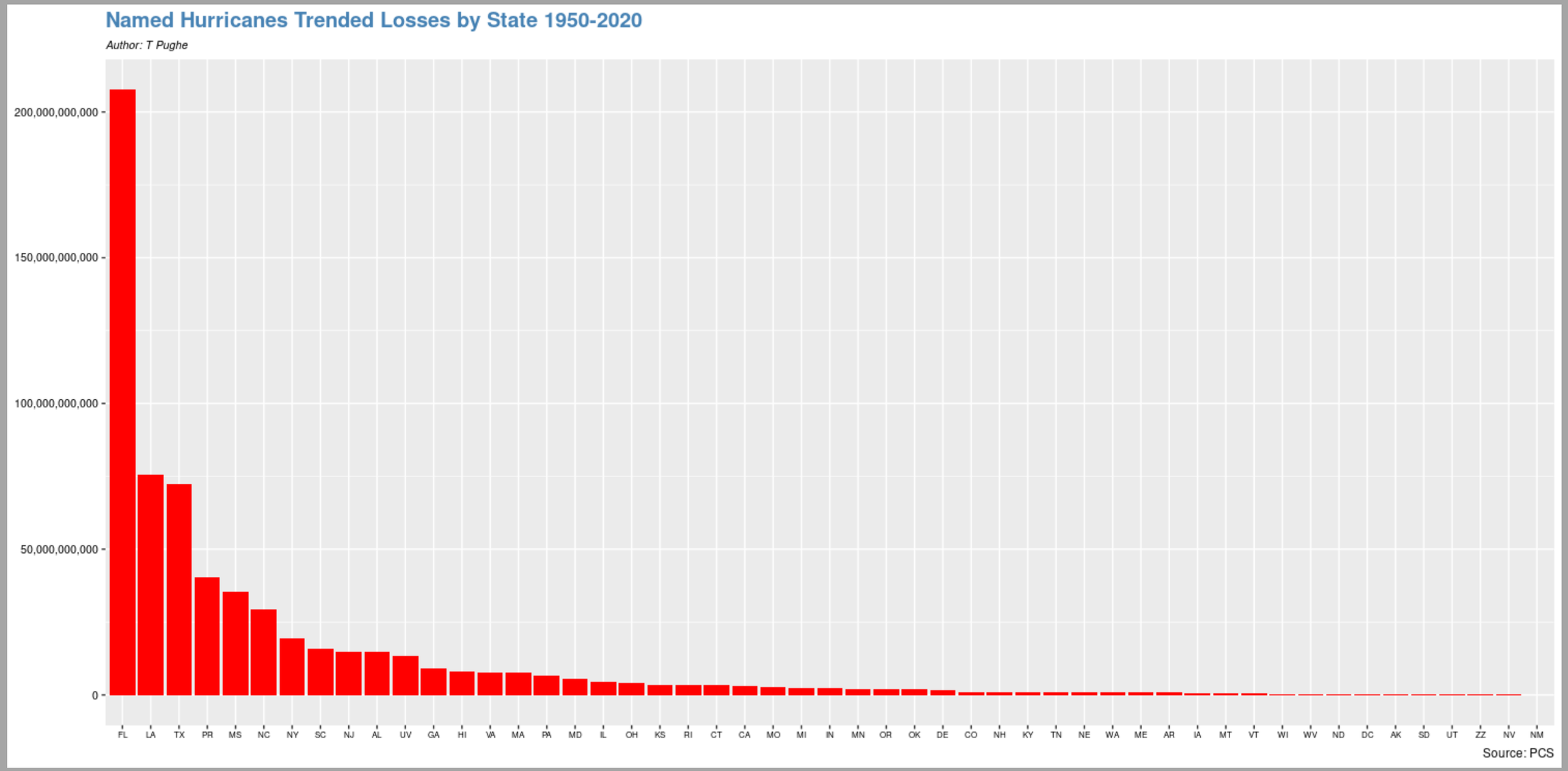
Labels are for large losses in the year; the sum of Loss includes other events.



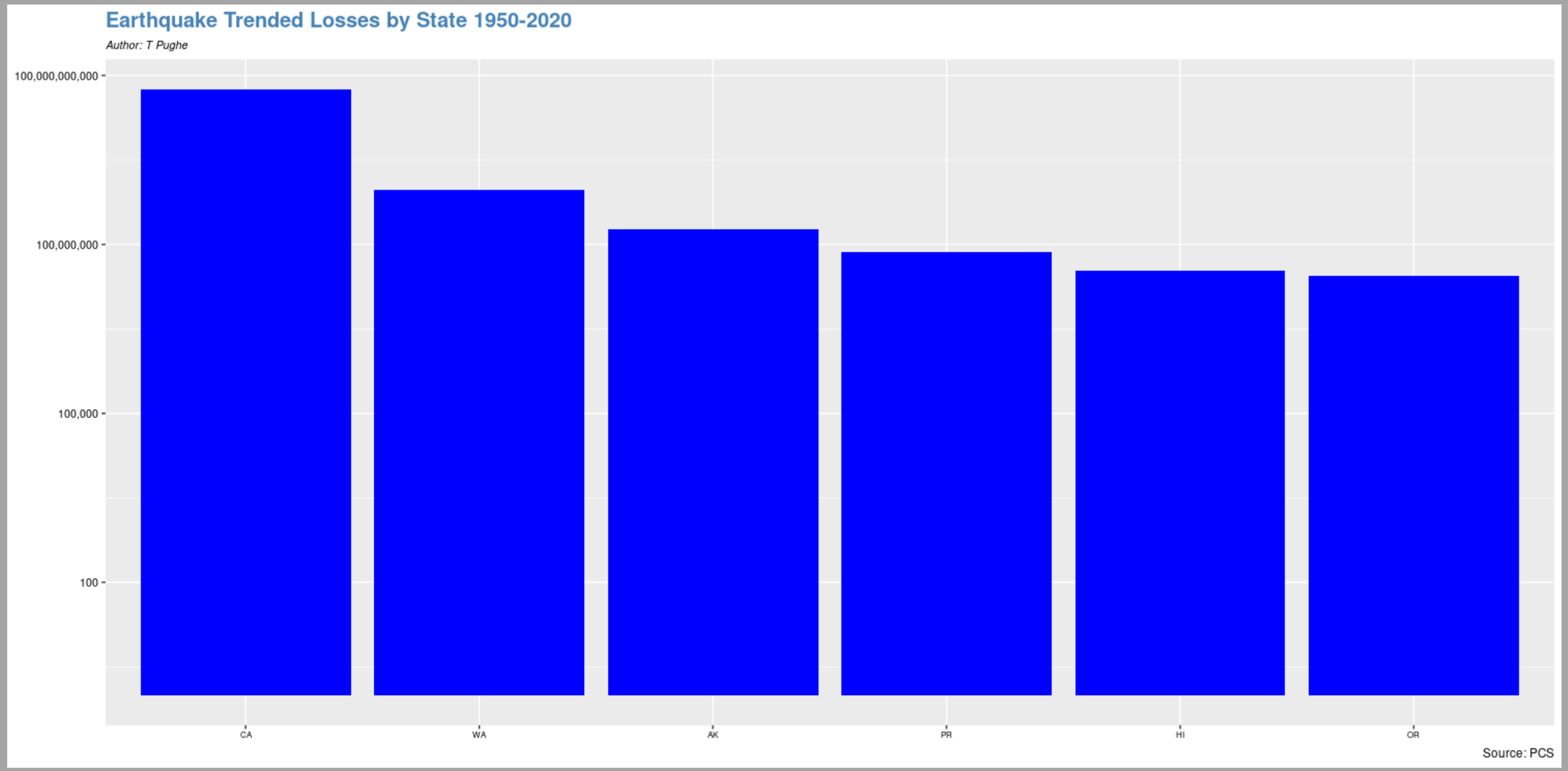
Market Losses by State



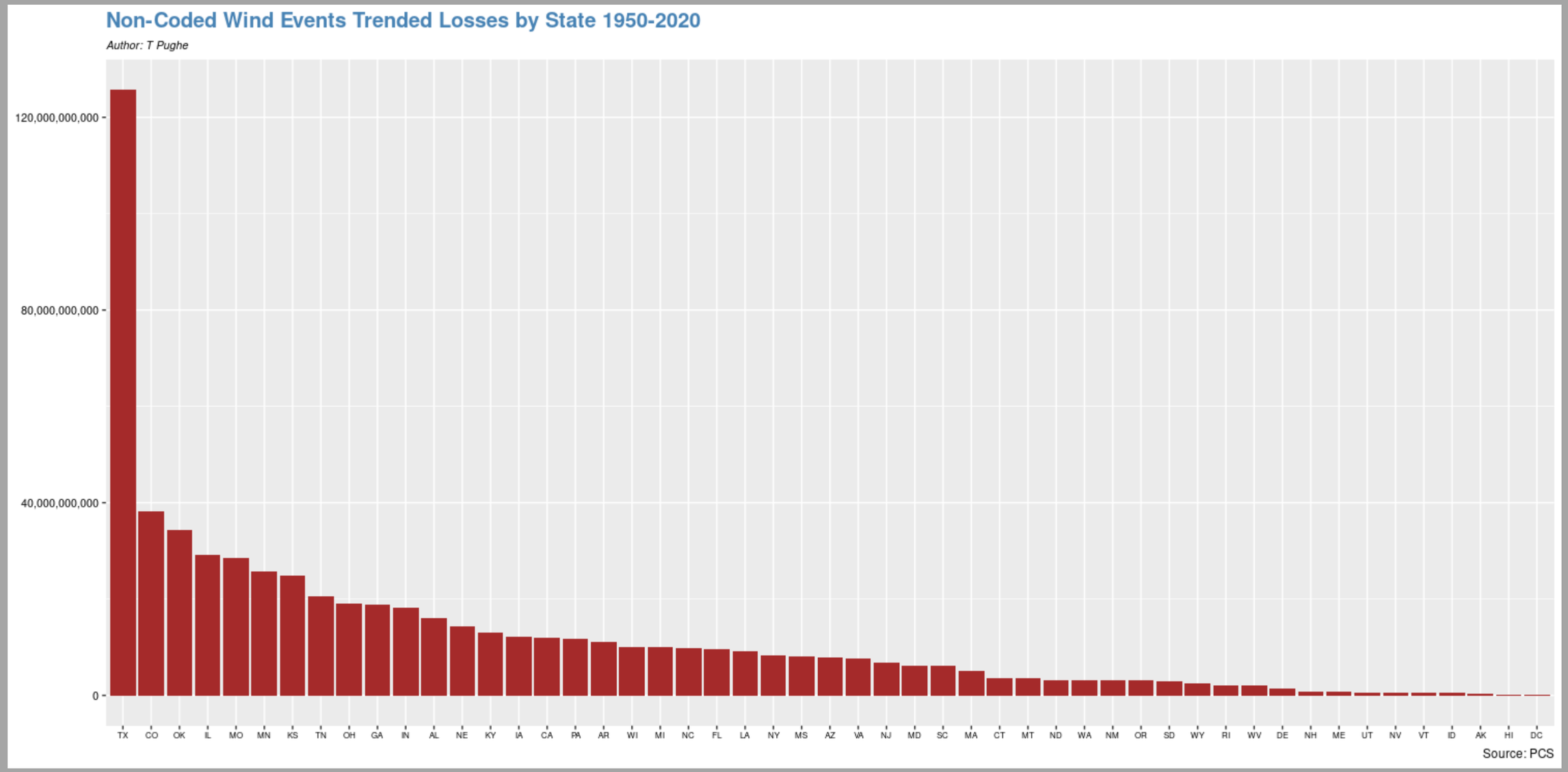
Named Hurricane Losses by State



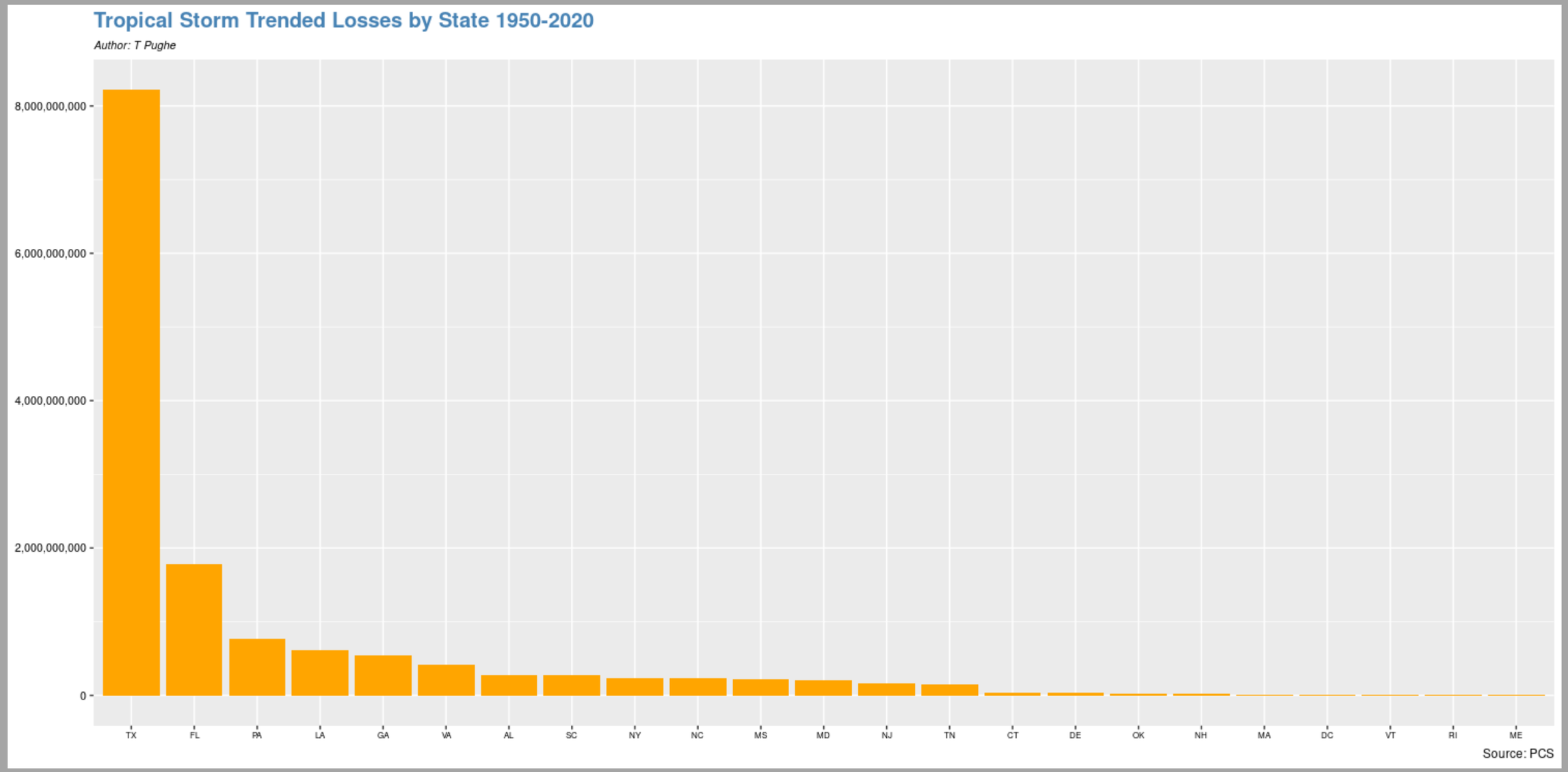
Earthquake Losses by State



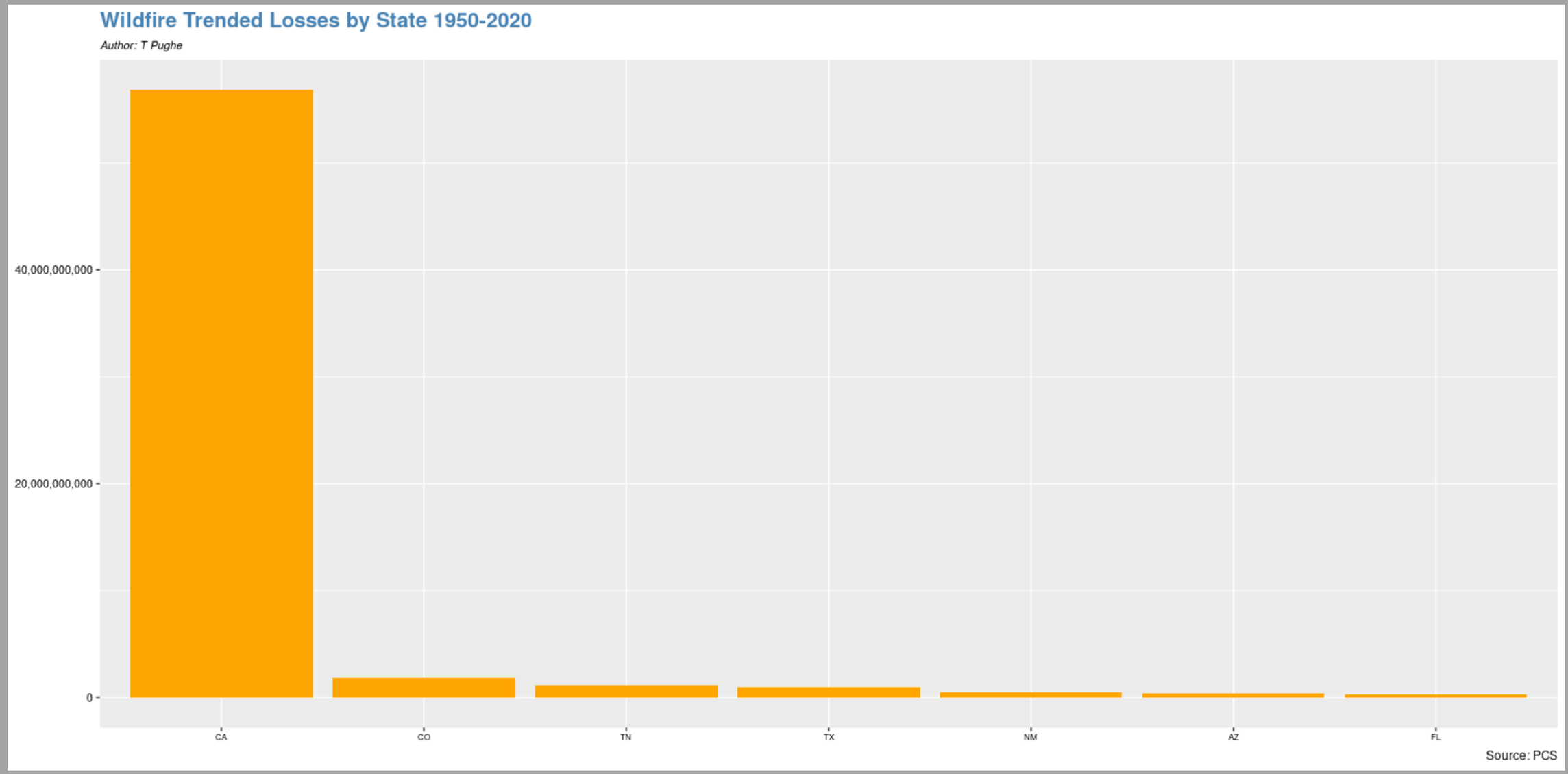
Non-Coded Wind Losses by State



Tropical Storm Losses by State



Wildfire Losses by State



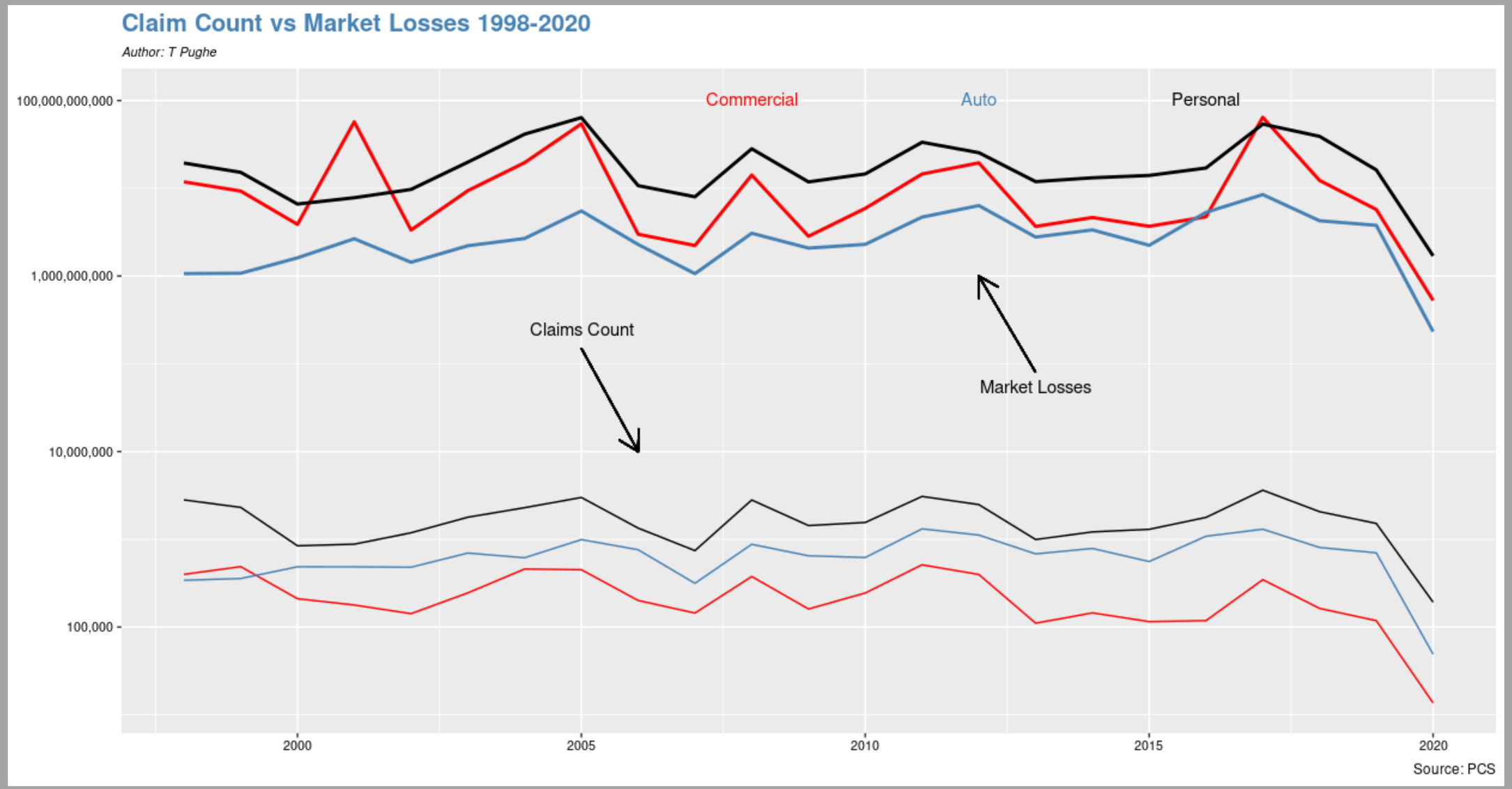
Largest Loss in any given year

Wind and Thunderstorm Events classed as non-coded wind events throughout.

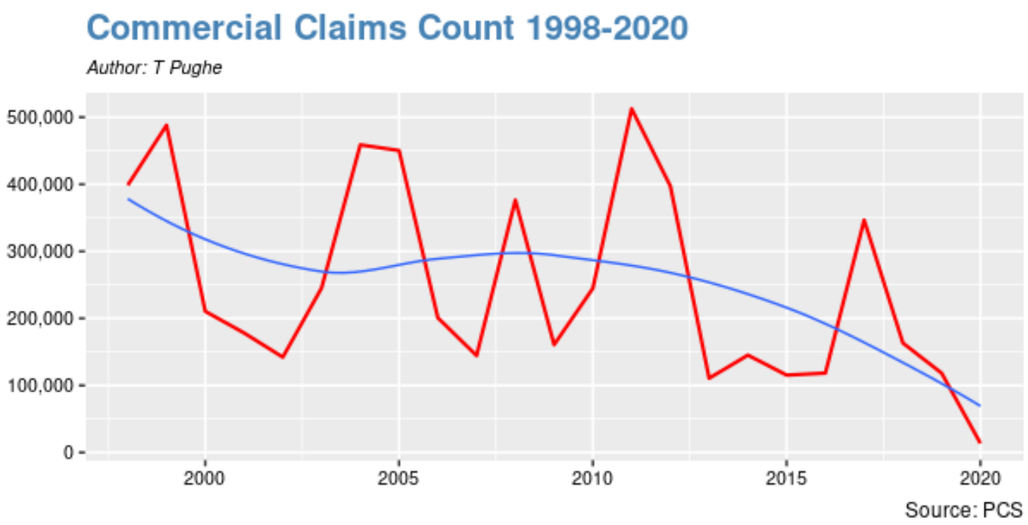
Year	Max Single Loss	Event Name
1950	9,480,518,810	Wind and Thunderstorm Event
1951	446,628,780	Wind and Thunderstorm Event
1952	286,621,161	Wind and Thunderstorm Event
1953	853,821,975	Wind and Thunderstorm Event
1954	6,004,551,919	Hurricane Hazel
1955	1,123,614,768	Hurricane Connie
1956	630,601,443	Wind and Thunderstorm Event
1957	847,438,488	Hurricane Audrey
1958	269,643,931	Hurricane Helene
1959	598,560,895	Hurricane Gracie
1960	4,384,691,501	Hurricane Donna
1961	4,059,868,338	Hurricane Carla
1962	2,815,206,885	Wind and Thunderstorm Event
1963	238,493,367	Wind and Thunderstorm Event
1964	2,977,429,612	Hurricane Cleo
1965	8,944,505,289	Hurricane Betsy
1966	1,038,199,791	Wind and Thunderstorm Event
1967	1,038,984,137	Hurricane Beulah
1968	524,589,578	Wind and Thunderstorm Event
1969	2,467,085,516	Hurricane Camille
1970	7,638,716,570	Hurricane Celia
1971	594,950,130	Earthquake
1972	1,437,980,396	Hurricane Agnes
1973	1,131,738,207	Wind and Thunderstorm Event
1974	5,272,226,654	Wind and Thunderstorm Event
1975	1,910,064,401	Hurricane Eloise
1976	461,623,099	Wind and Thunderstorm Event
1977	426,606,210	Wind and Thunderstorm Event
1978	933,629,297	Winter Storm
1979	7,411,802,448	Hurricane Frederic
1980	2,210,582,517	Fire - Other
1981	2,287,007,534	Wind and Thunderstorm Event
1982	1,845,650,563	Winter Storm
1983	6,174,299,498	Winter Storm
1984	2,318,524,252	Wind and Thunderstorm Event
1985	3,326,152,478	Hurricane Elena
1986	546,481,779	Wind and Thunderstorm Event
1987	672,729,141	Wind and Thunderstorm Event
1988	1,028,263,371	Fire - Other
1989	22,641,927,602	Hurricane Hugo
1990	3,632,584,009	Wind and Thunderstorm Event
1991	7,515,923,000	Wildland Fire Oakland Hills
1992	79,718,022,424	Hurricane Andrew
1993	8,263,102,151	Winter Storm
1994	49,856,447,074	Earthquake
1995	8,975,572,340	Hurricane Opal
1996	6,566,671,047	Hurricane Fran
1997	1,010,175,000	Wind and Thunderstorm Event
1998	9,552,775,350	Hurricane Georges
1999	6,525,293,989	Hurricane Floyd
2000	1,565,664,330	Winter Storm
2001	47,243,798,434	Fire - Other
2002	4,041,256,829	Wind and Thunderstorm Event
2003	7,834,880,344	Wind and Thunderstorm Event
2004	17,950,676,923	Hurricane Charley
2005	80,161,412,455	Hurricane Katrina
2006	3,226,717,088	Wind and Thunderstorm Event
2007	2,291,394,594	Wind and Thunderstorm Event
2008	21,674,437,904	Hurricane Ike
2009	2,088,866,410	Wind and Thunderstorm Event
2010	4,446,724,950	Wind and Thunderstorm Event
2011	11,506,444,167	Wind and Thunderstorm Event
2012	26,998,713,954	Hurricane Sandy
2013	2,530,576,702	Wind and Thunderstorm Event
2014	3,910,605,210	Wind and Thunderstorm Event
2015	2,759,554,054	Winter Storm
2016	3,784,559,658	Wind and Thunderstorm Event
2017	31,544,526,135	Hurricane Irma
2018	13,083,154,185	Hurricane Michael
2019	3,629,101,147	Wind and Thunderstorm Event
2020	851,150,153	Wind and Thunderstorm Event

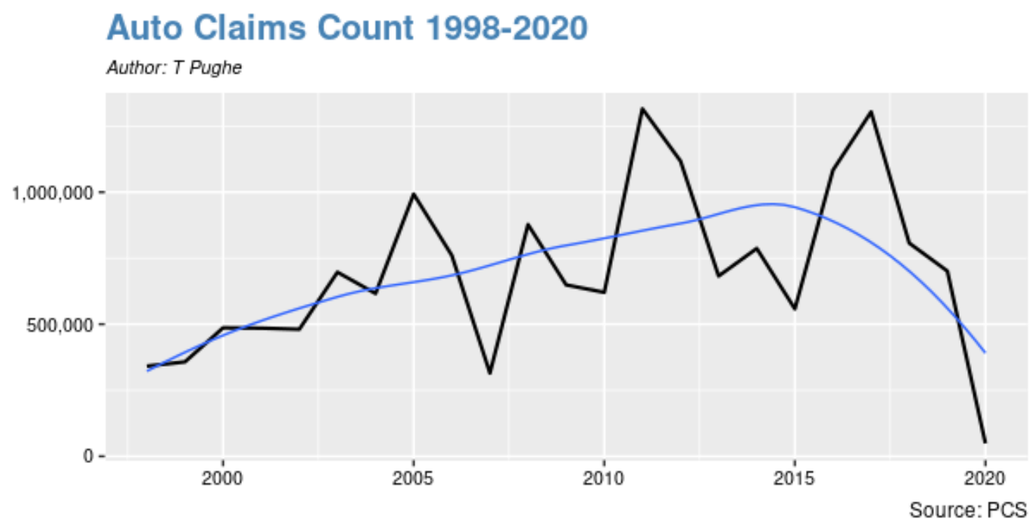
1998-2020
Breakdown by the number of claims, quantum, and line of business.

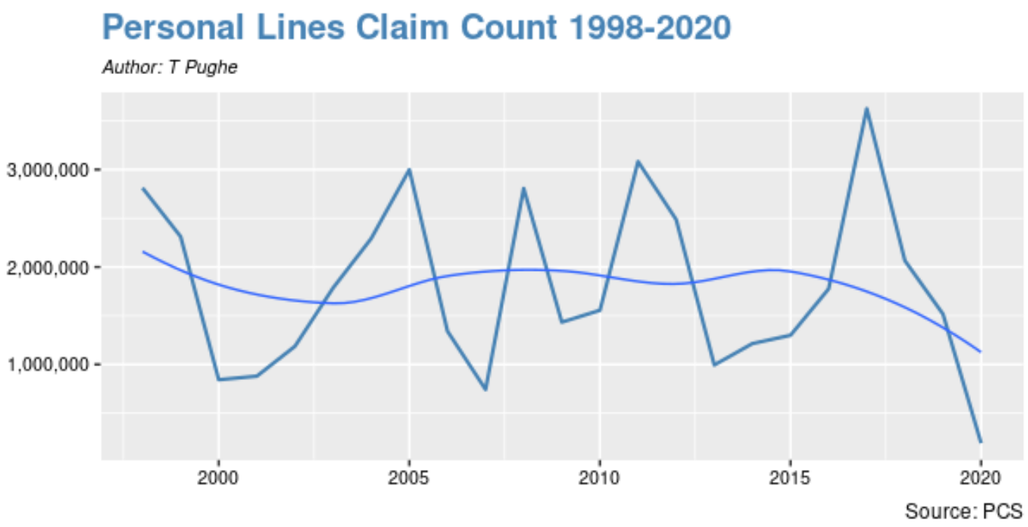
Claims Count vs. Market Losses by Line of Business

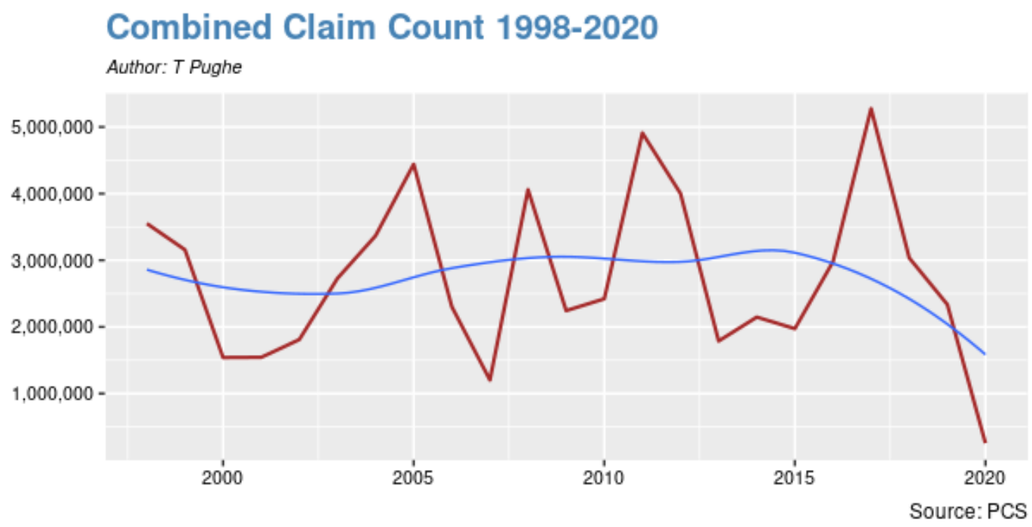


Number of Claims by Line of Business

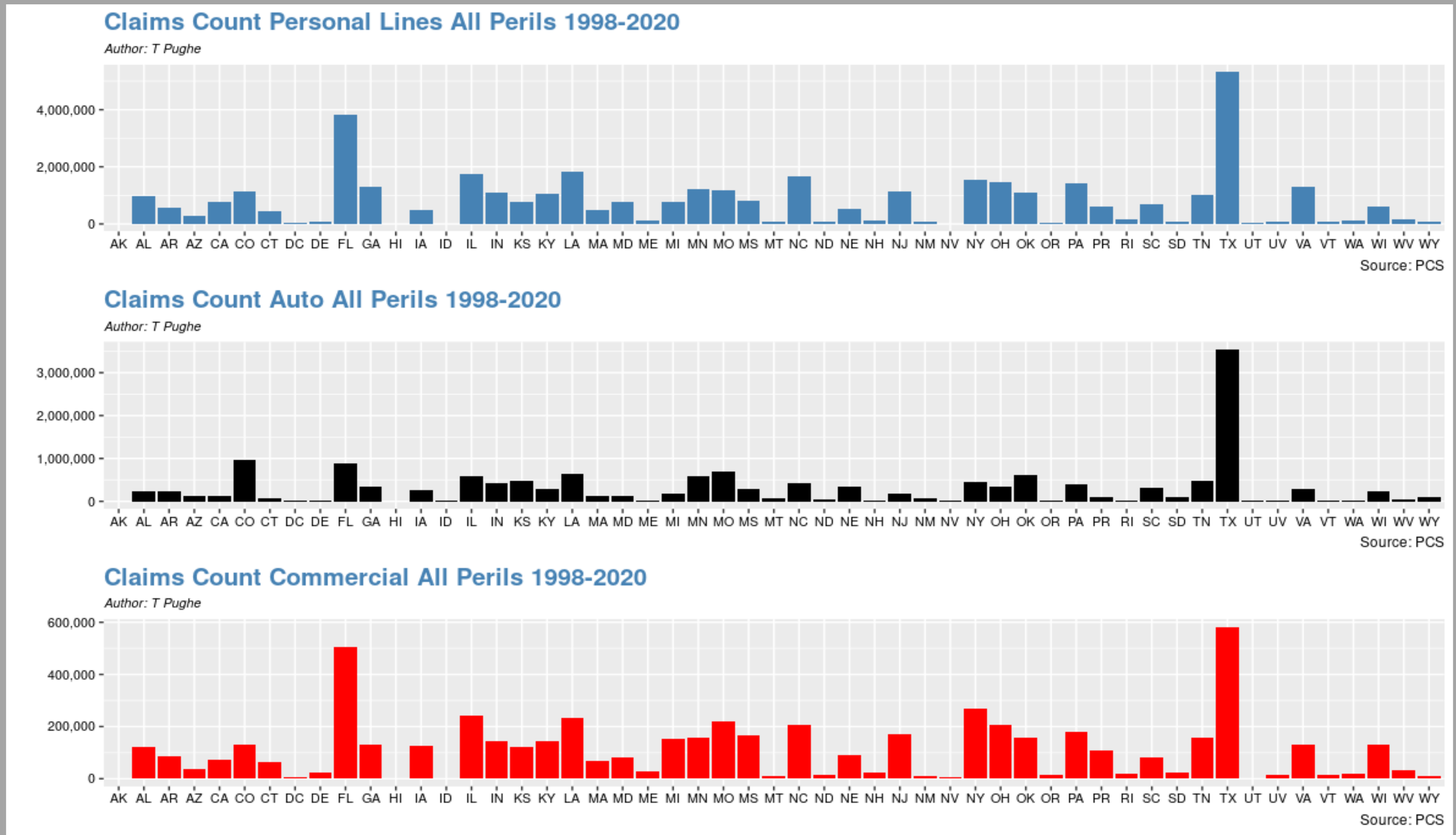




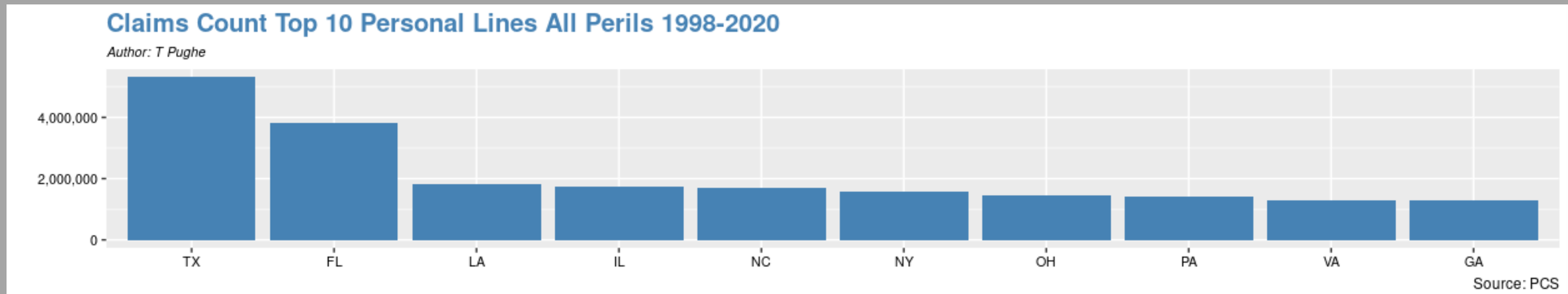


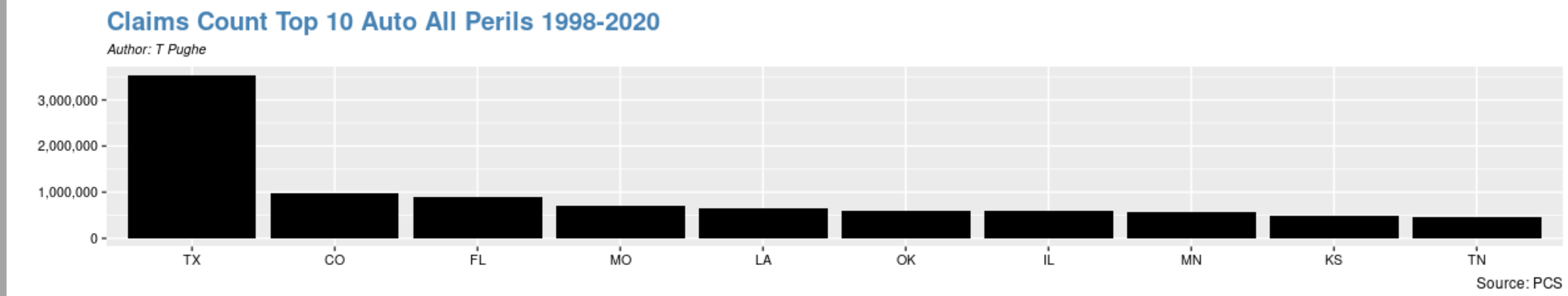


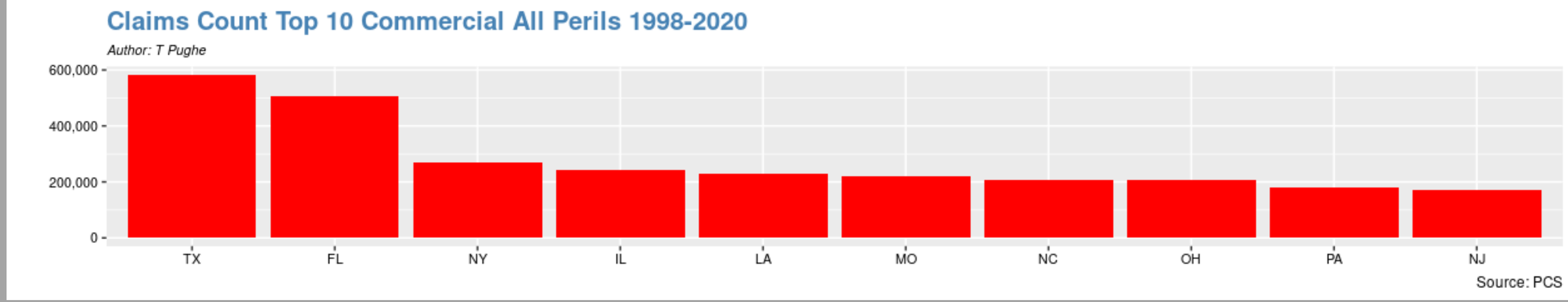
Number of Claims Split by State



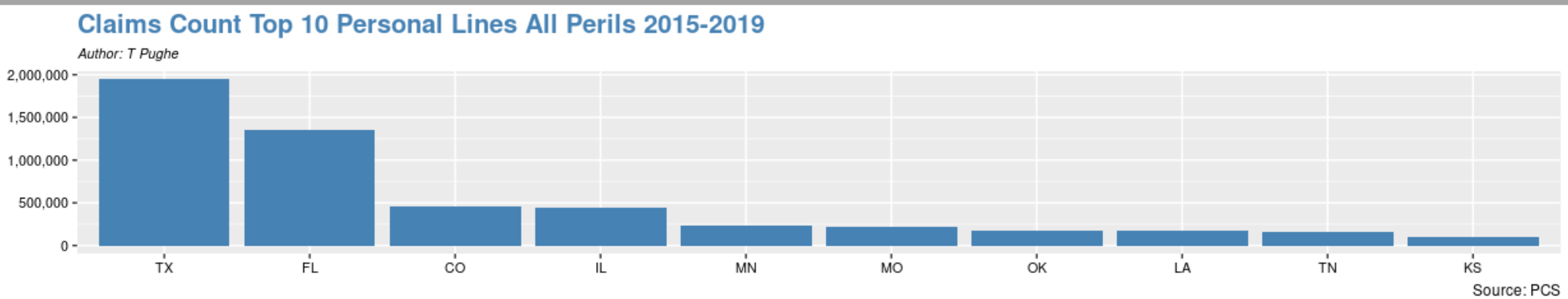
Top 10 States by Number of Claims

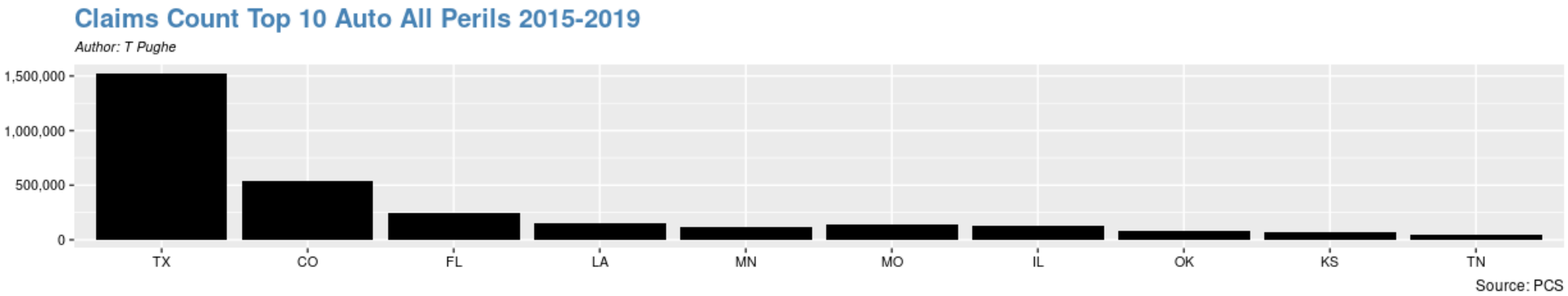


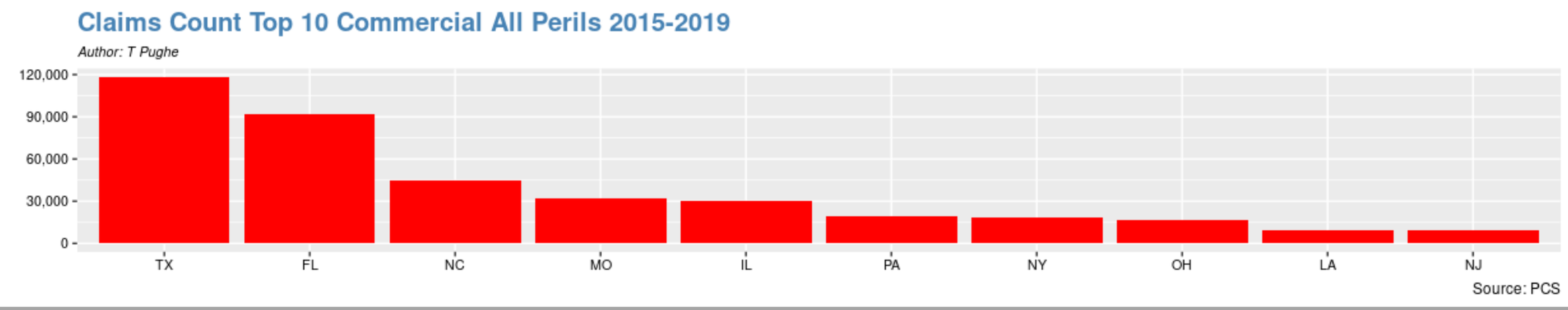




Top 10 States by Number of Claims in the last five years

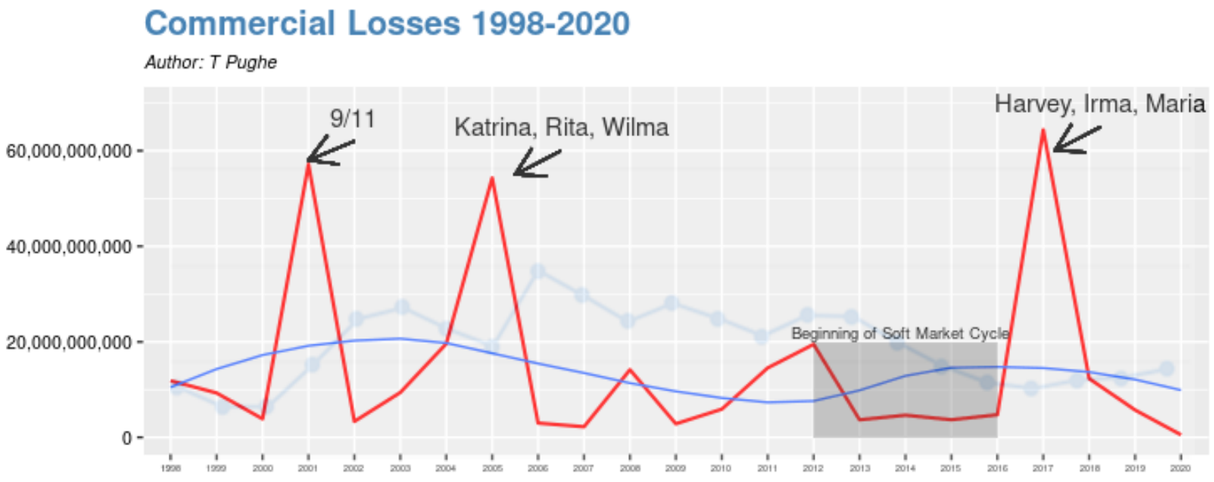


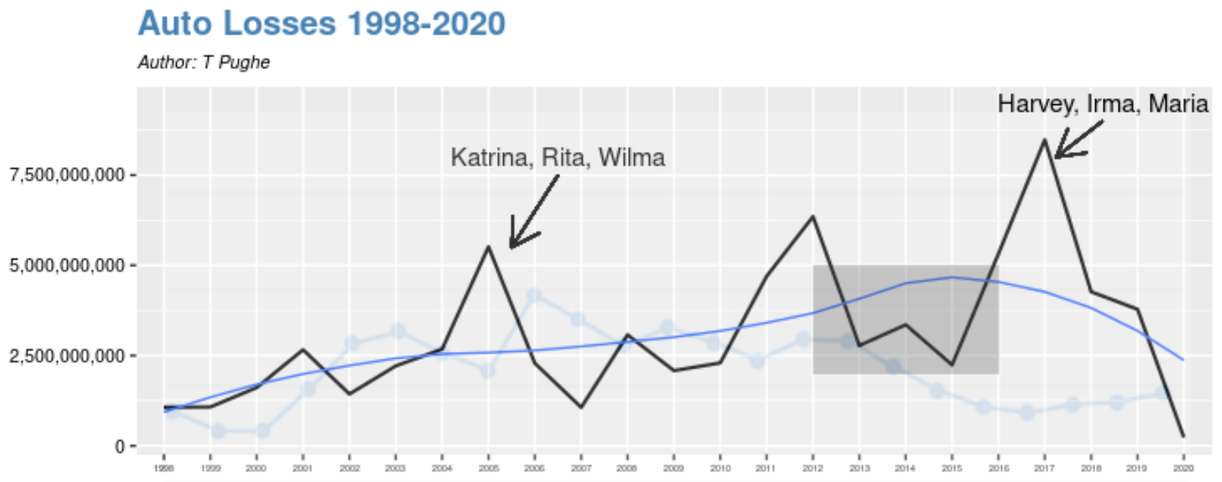


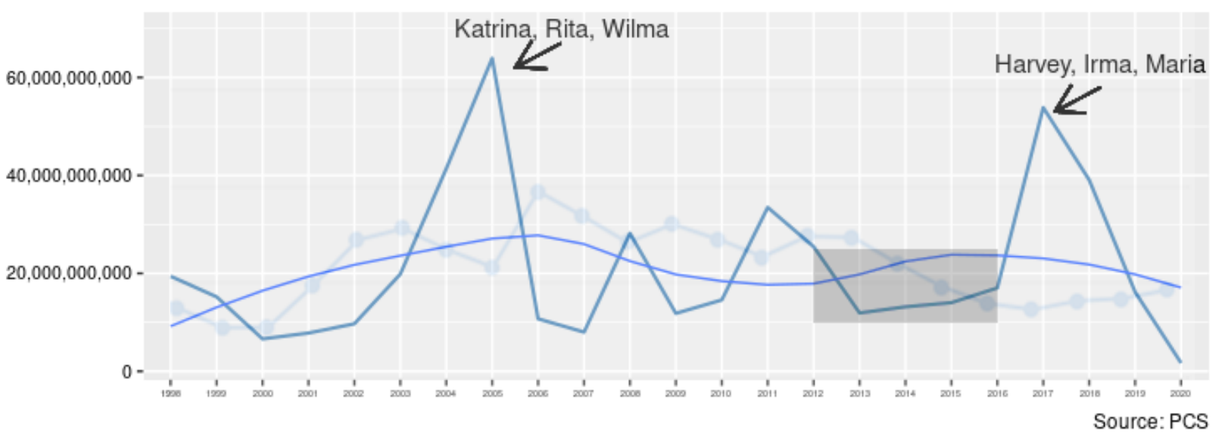


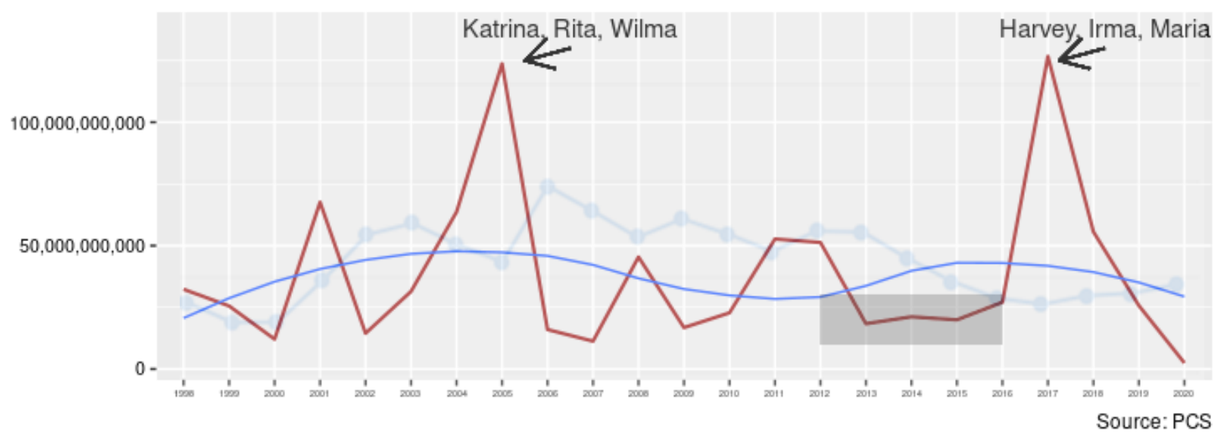
Market Losses by Year and Line of Business

The Guy Carpenter Rate Online Index (*property catastrophe*) is overlaid as a reference to market price conditions. Expect to see a delay between spike losses and ROLI because of the time it takes for rate increases to filter through. Also, note how the soft market conditions exacerbated 2017 losses. Click here for the percentage rate change year on year 1978-2018. Labels are for significant losses in the year; the sum of loss includes other events.

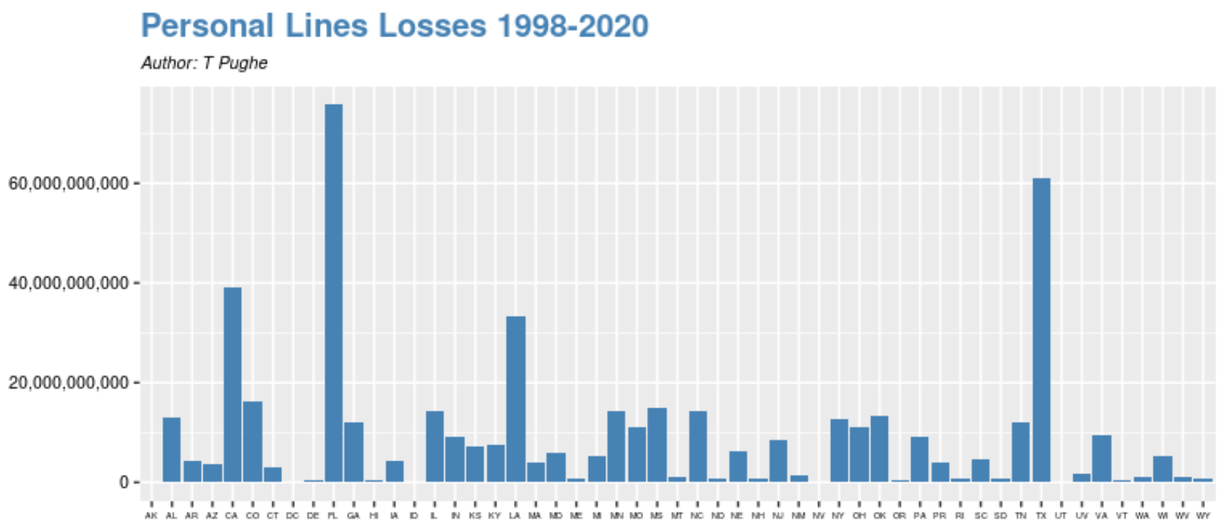


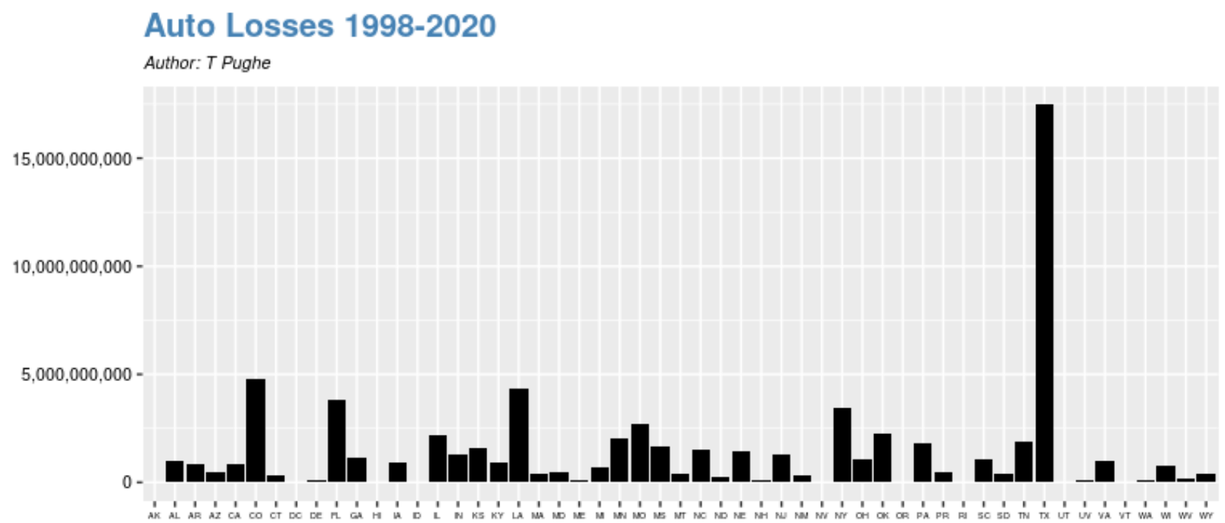


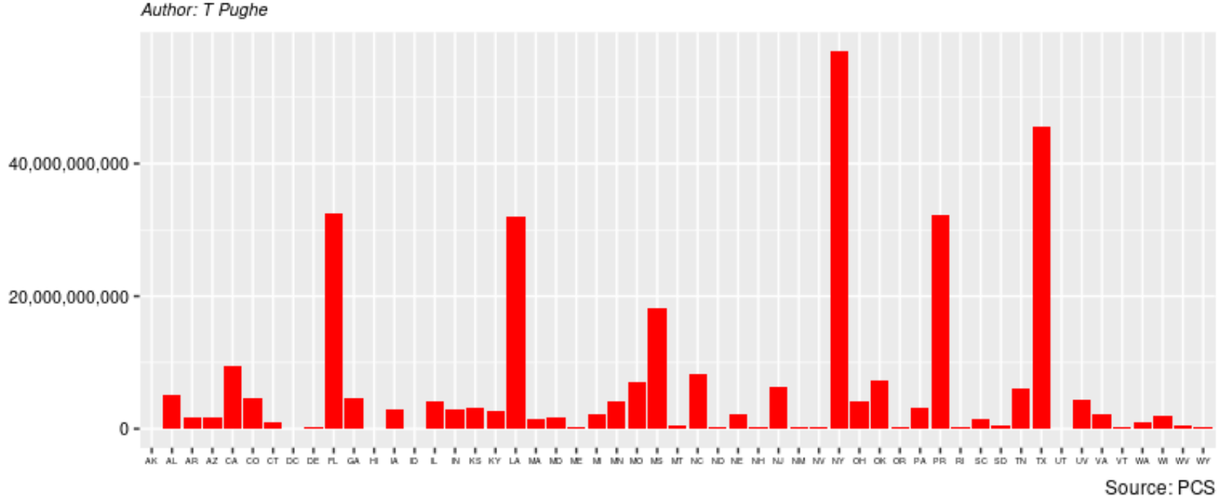


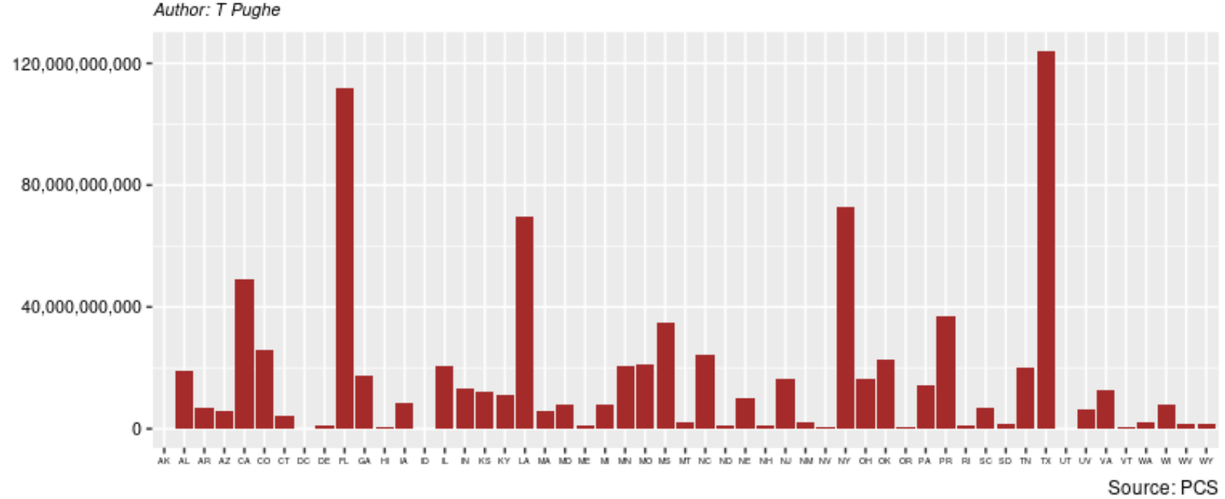


Market Losses by State and Line of Business

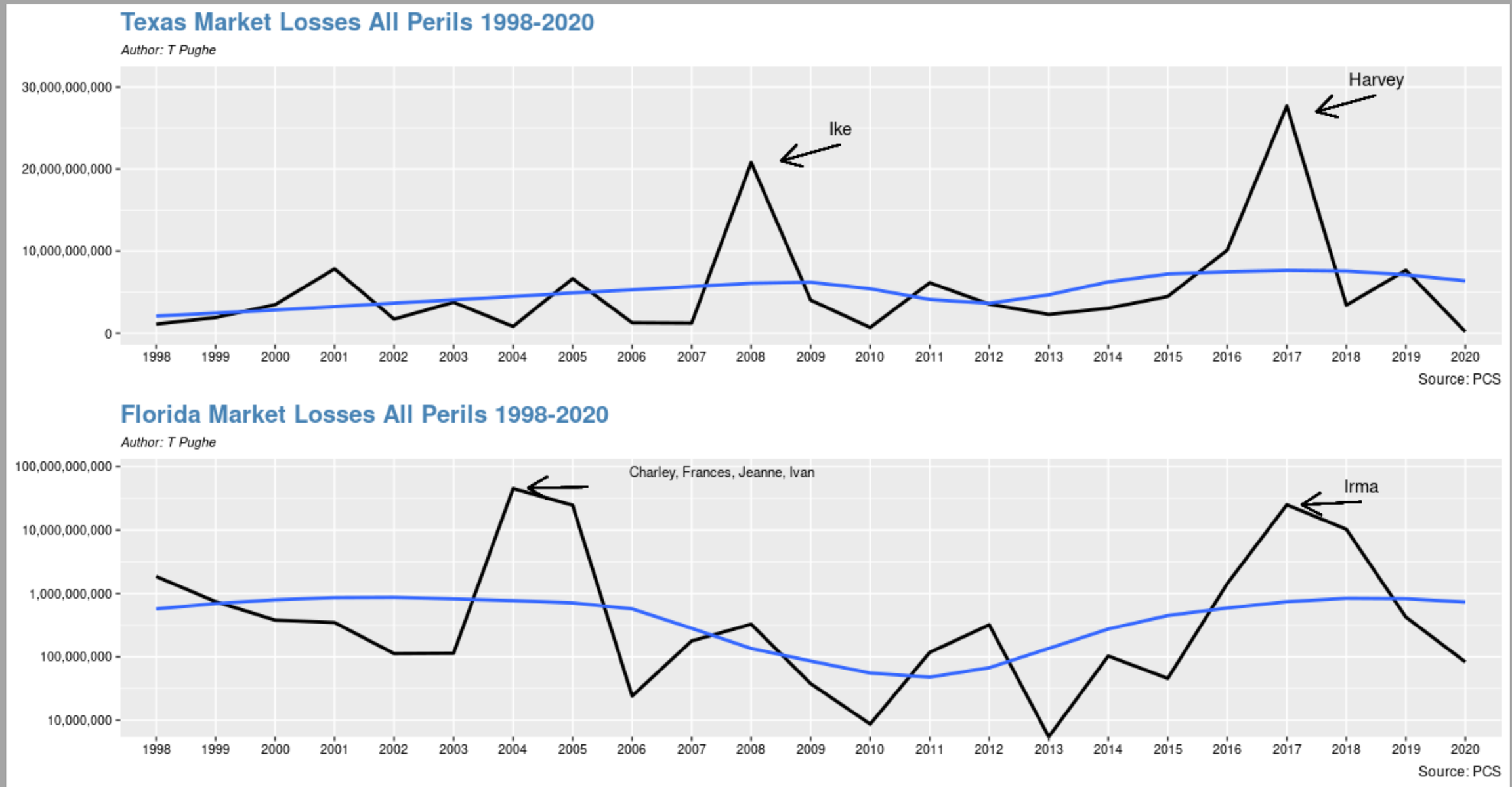






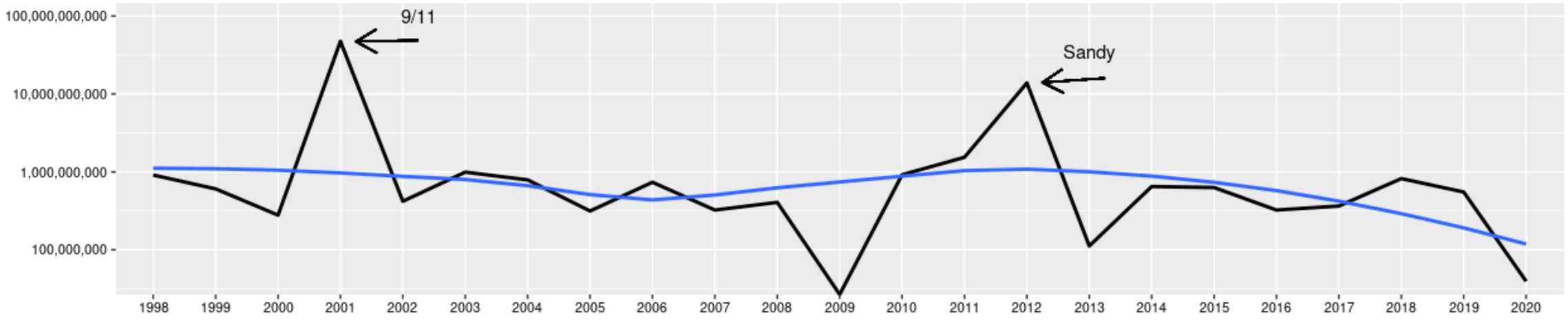


Breakdown of Market Losses by Top 10 States



New York Market Losses All Perils 1998-2020

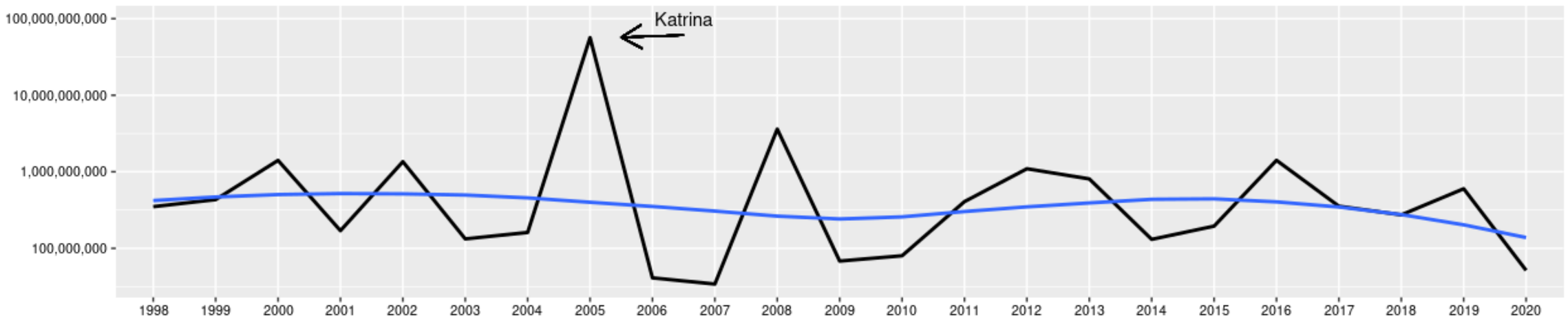
Author: T Pughe



Source: PCS

Louisiana Market Losses All Perils 1998-2020

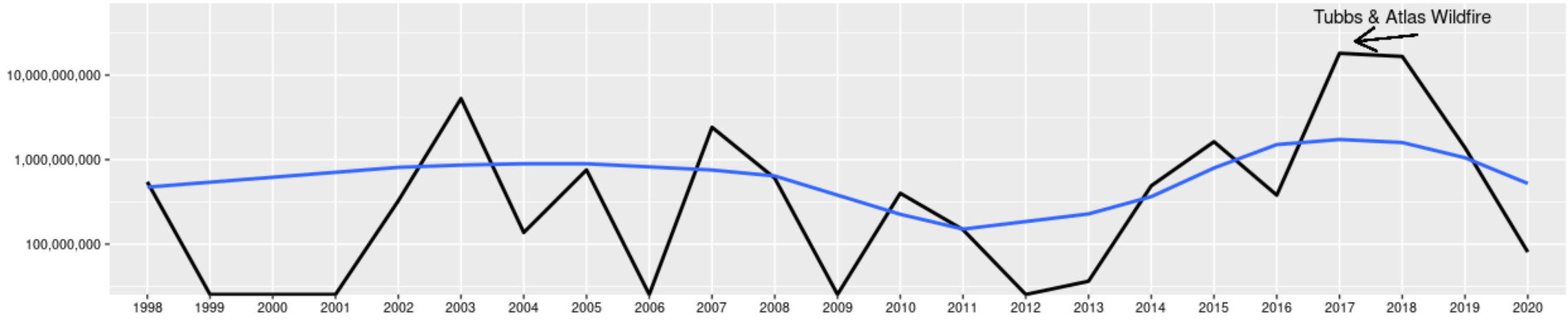
Author: T Pughe



Source: PCS

California Market Losses All Perils 1998-2020

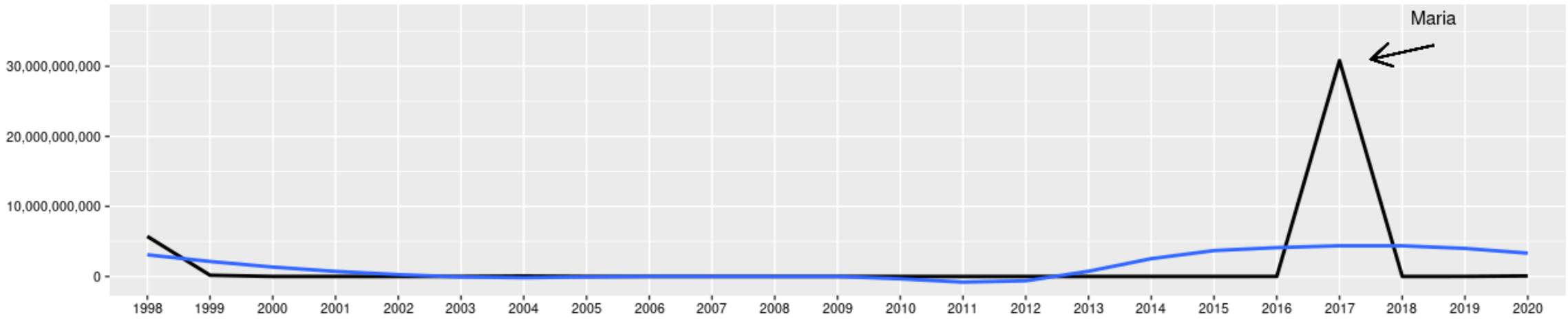
Author: T Pughe



Source: PCS

Puerto Rico Market Losses All Perils 1998-2020

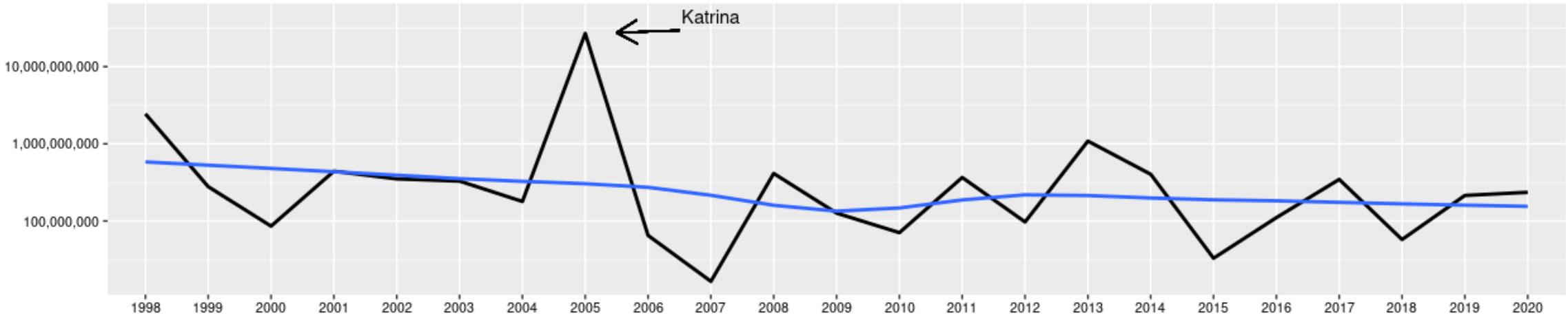
Author: T Pughe



Source: PCS

Mississippi Market Losses All Perils 1998-2020

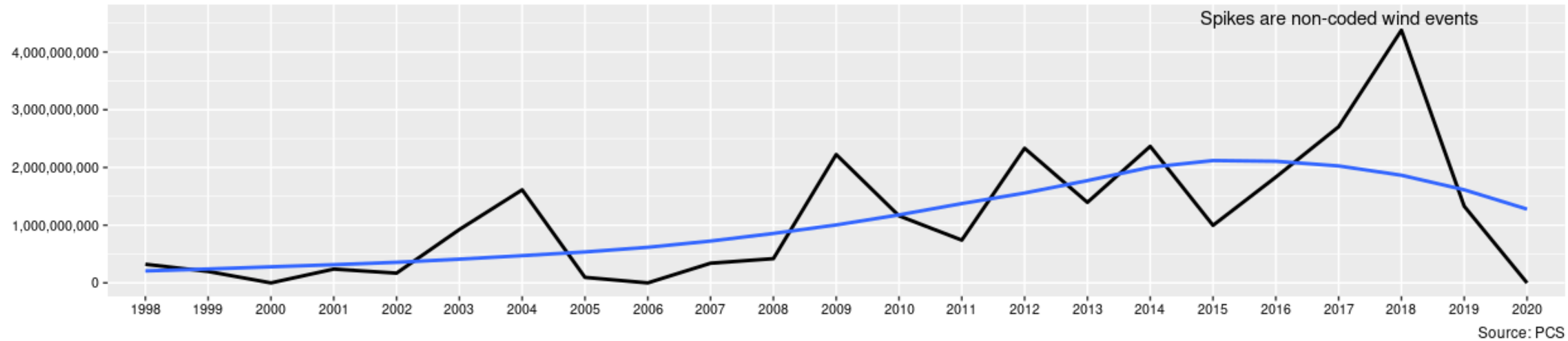
Author: T Pughe



Source: PCS

Colorado Market Losses All Perils 1998-2020

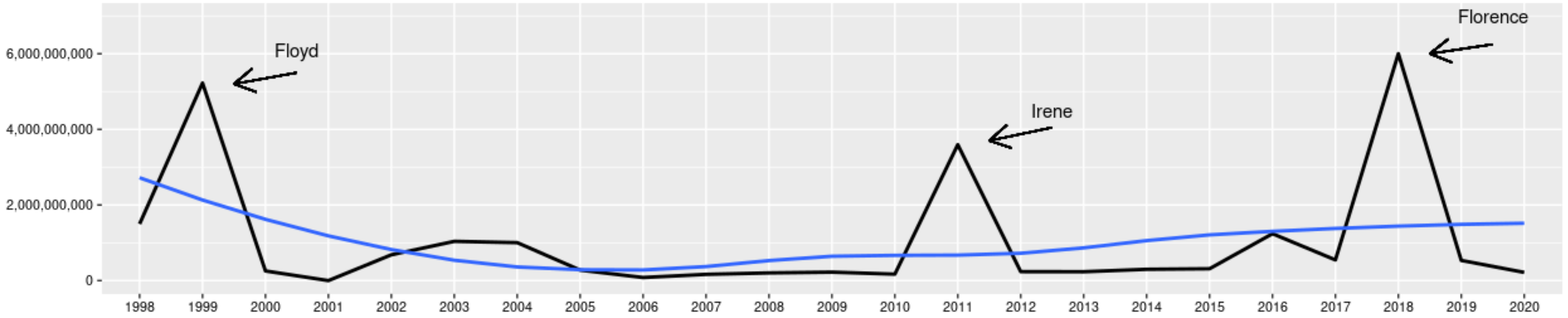
Author: T Pughe



Source: PCS

North Carolina Market Losses All Perils 1998-2020

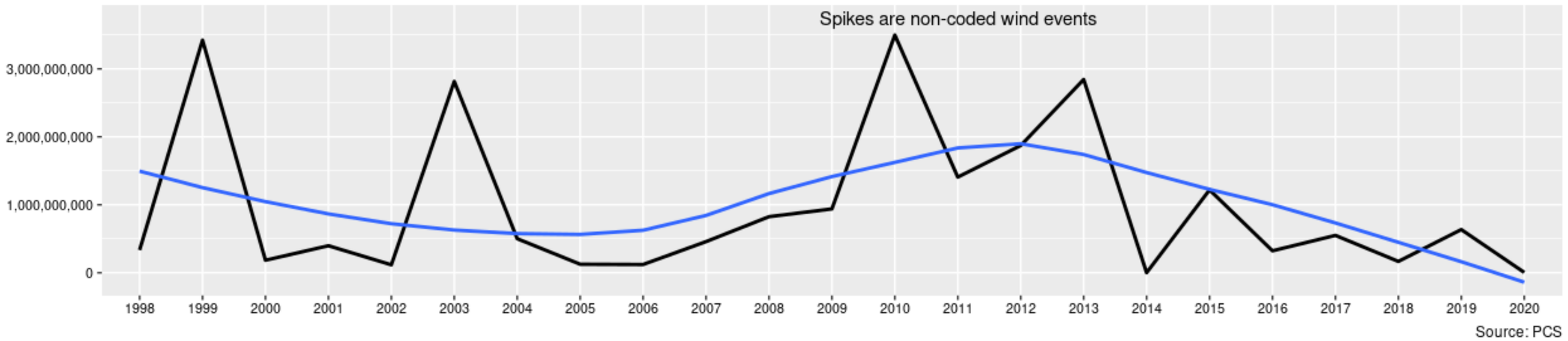
Author: T Pughe



Source: PCS

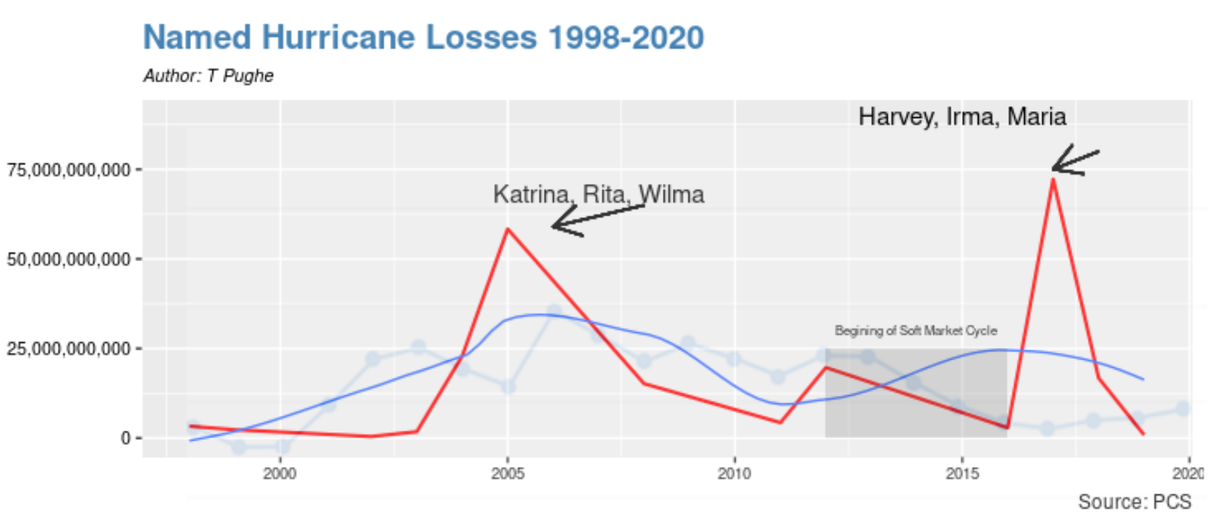
Oklahoma Market Losses All Perils 1998-2020

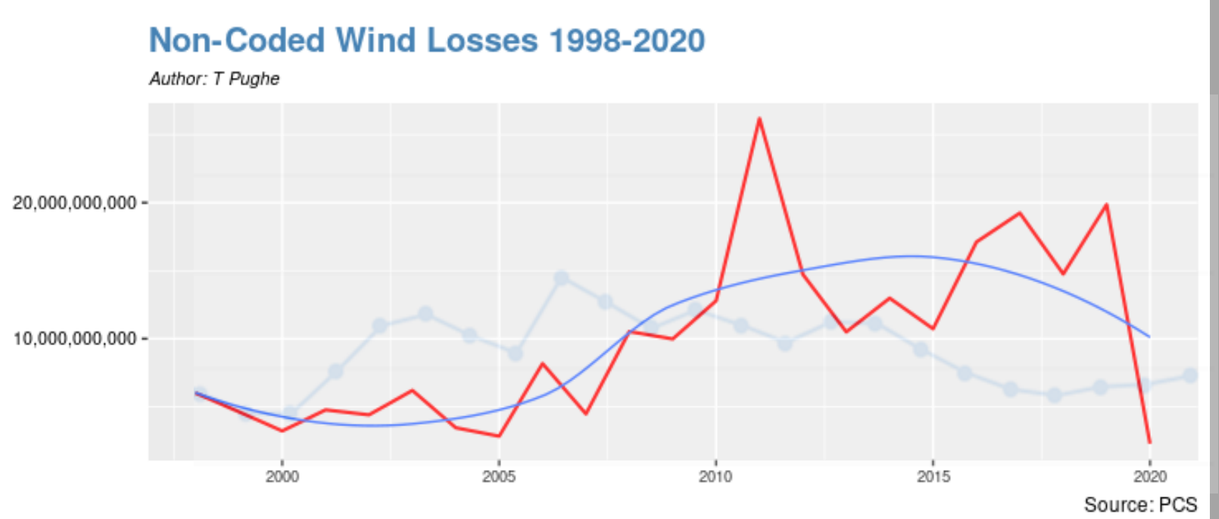
Author: T Pughe

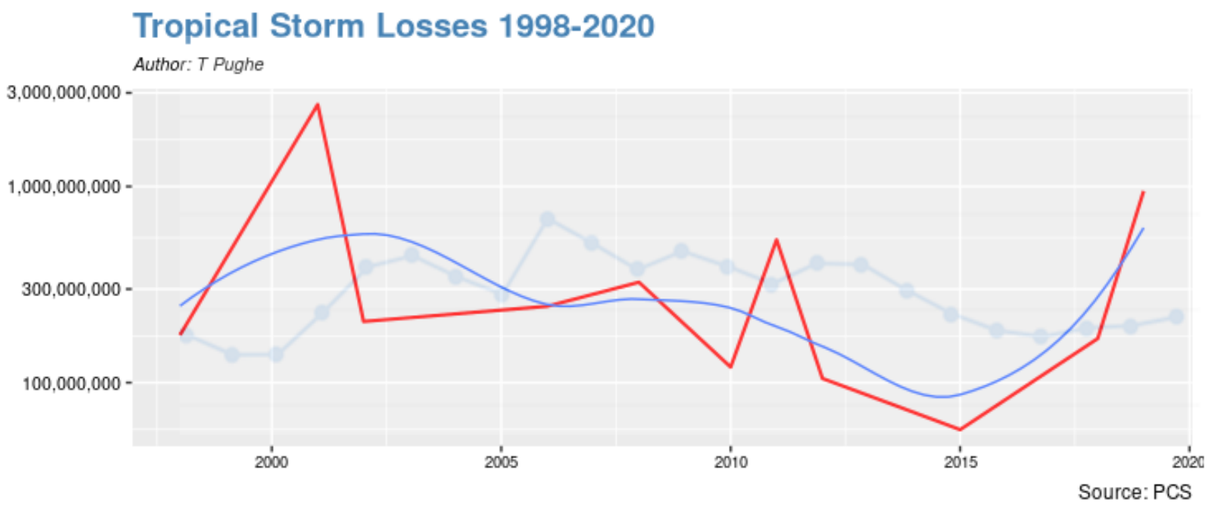


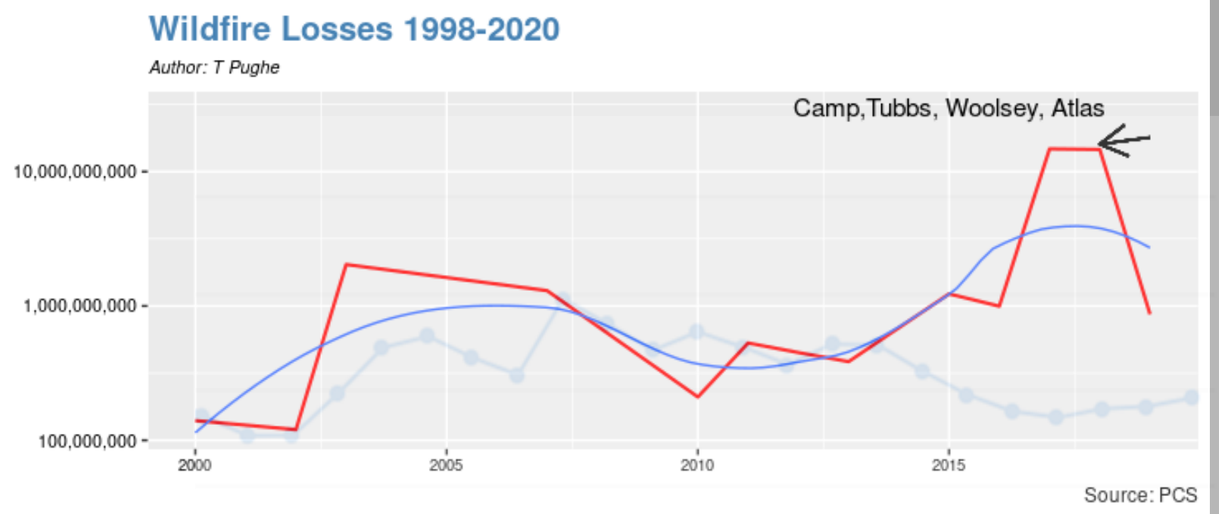
Source: PCS

Breakdown of Market Losses by Peril



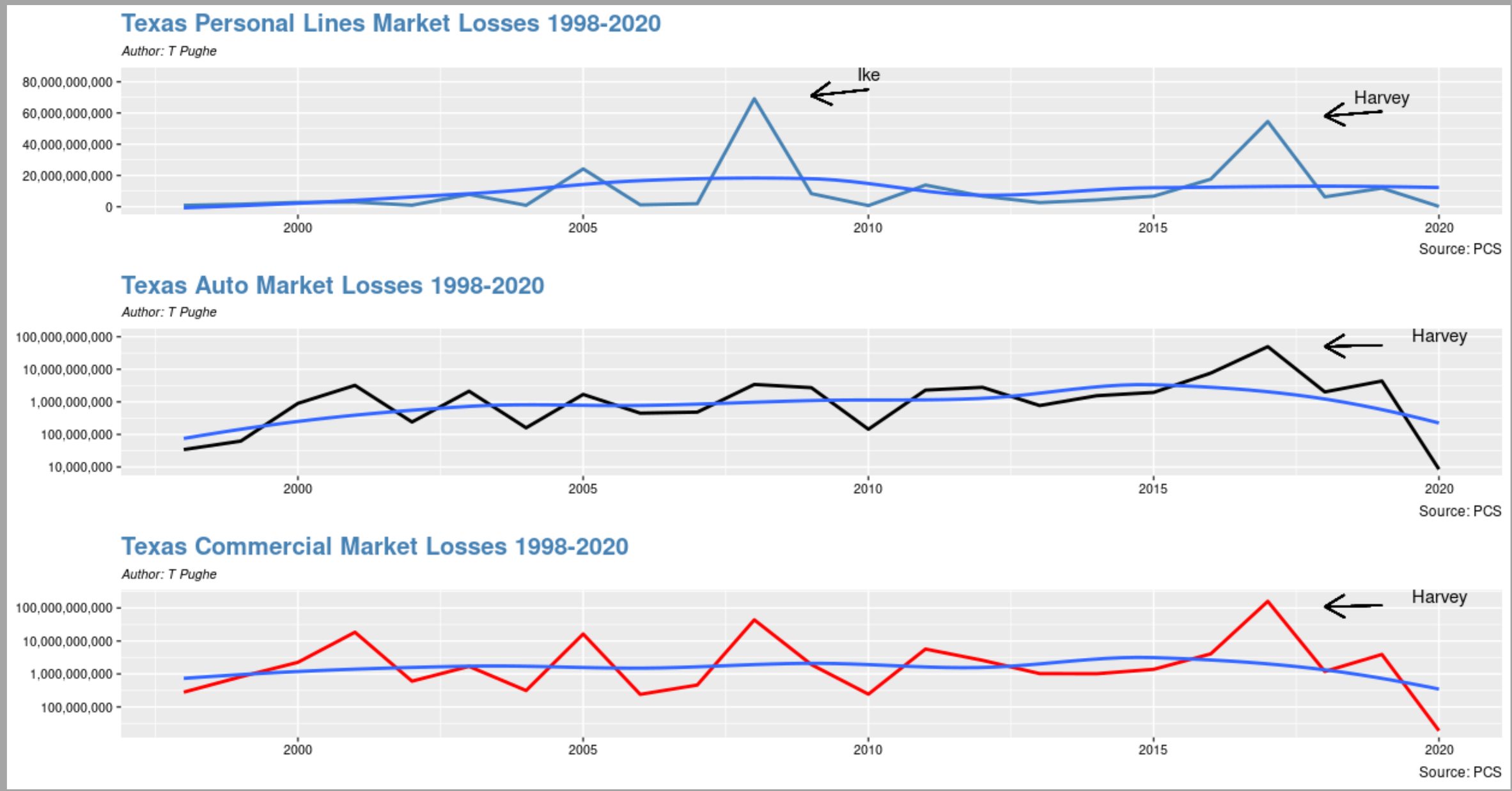




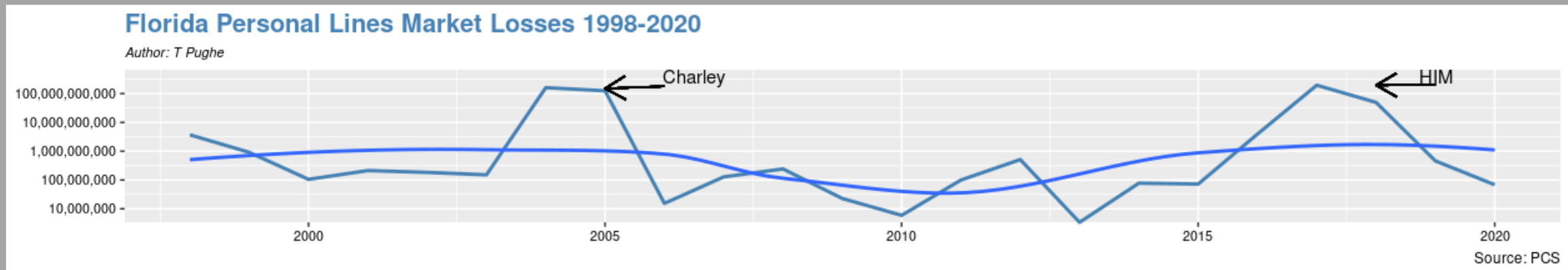


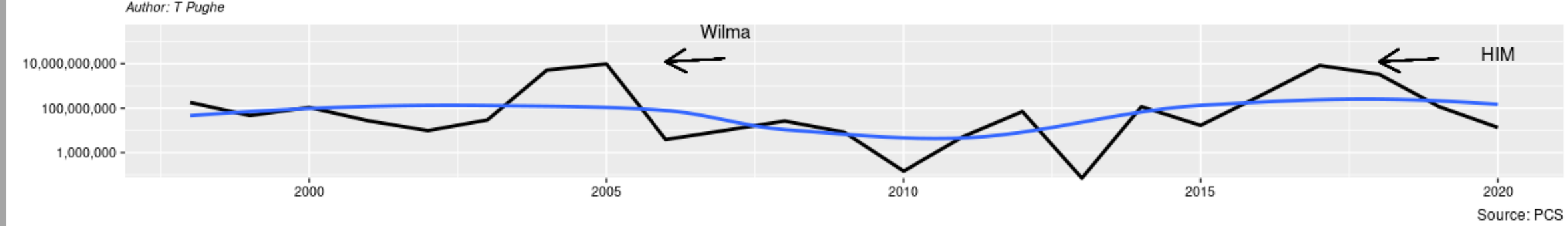
Top 5 States by Market Loss and Line of Business

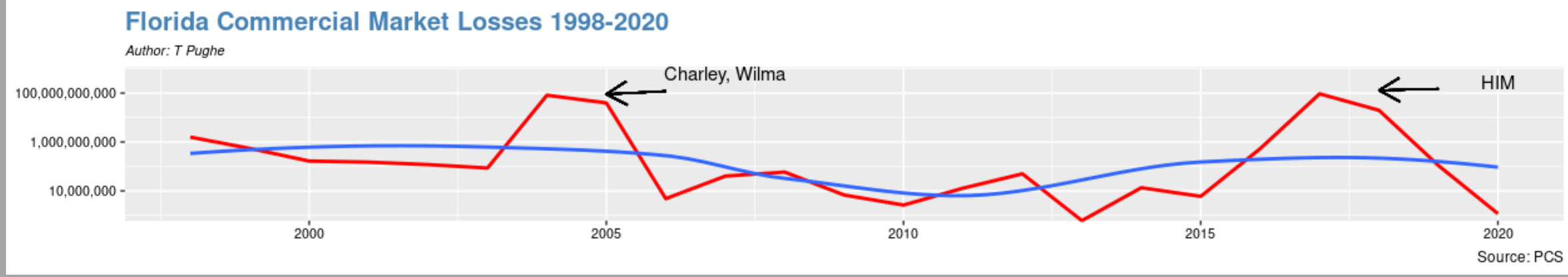
Texas



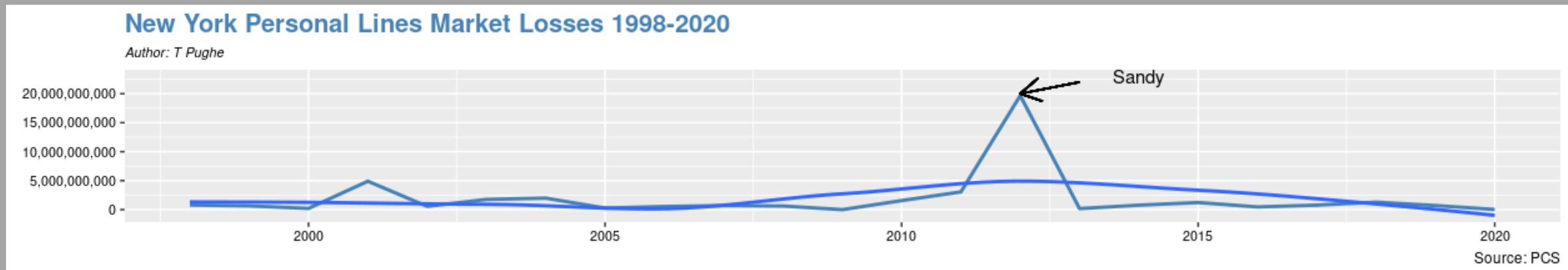
Florida

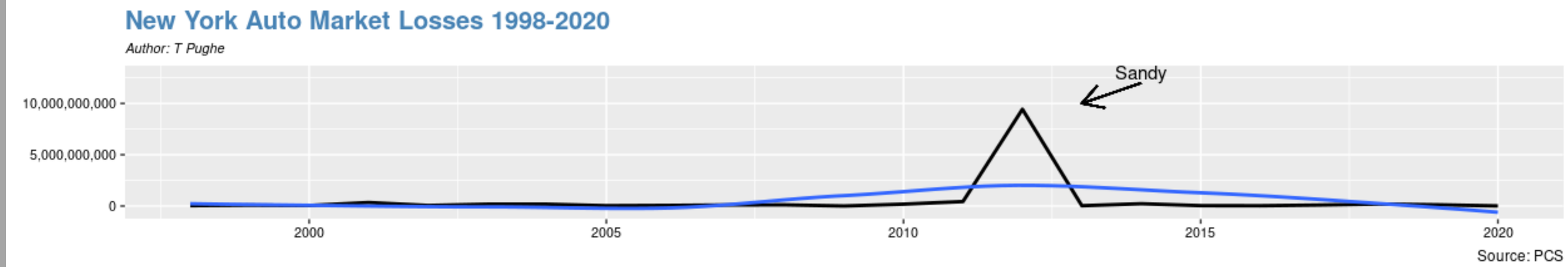

Florida Personal Lines Market Losses 1998-2020
Author: T Pughe
Charley
HIM
100,000,000,000
10,000,000,000
1,000,000,000
100,000,000
10,000,000
2000
2005
2010
2015
2020
Source: PCS

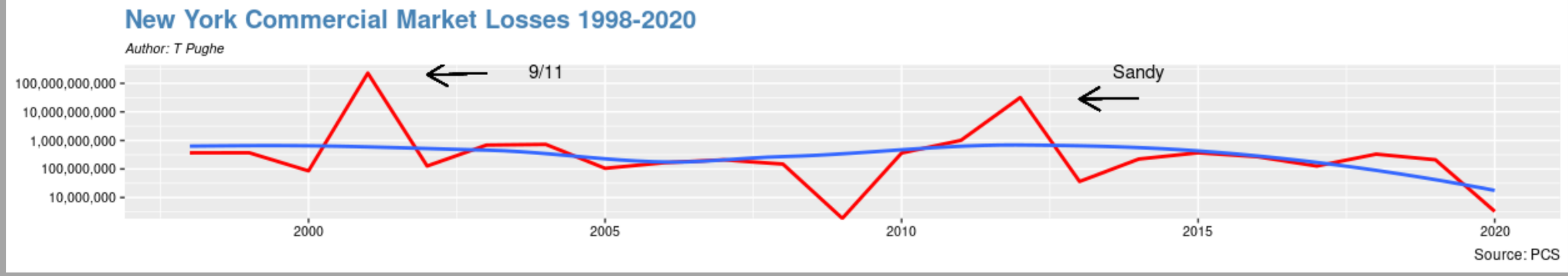

Florida Auto Market Losses 1998-2020
Author: T Pughe
Wilma
HIM
10,000,000,000
100,000,000
1,000,000
2000
2005
2010
2015
2020
Source: PCS


Florida Commercial Market Losses 1998-2020
Author: T Pughe
Charley, Wilma
HIM
100,000,000,000
1,000,000,000
10,000,000
2000
2005
2010
2015
2020
Source: PCS

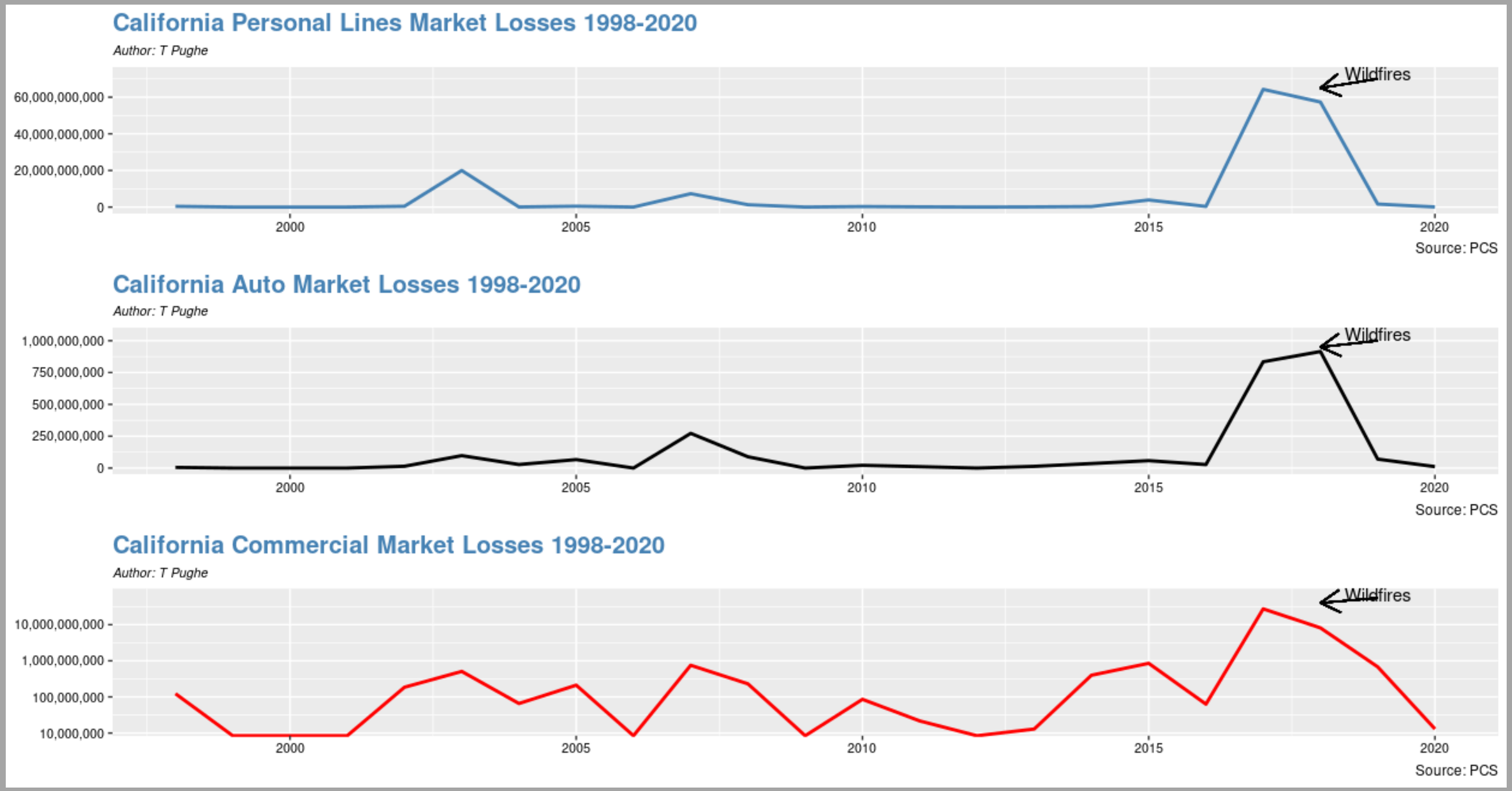
New York


New York Personal Lines Market Losses 1998-2020
Author: T Pughe
Sandy
20,000,000,000
15,000,000,000
10,000,000,000
5,000,000,000
0
2000
2005
2010
2015
2020
Source: PCS


New York Auto Market Losses 1998-2020
Author: T Pughe
Sandy
10,000,000,000
5,000,000,000
0
2000
2005
2010
2015
2020
Source: PCS


New York Commercial Market Losses 1998-2020
Author: T Pughe
9/11
Sandy
100,000,000,000
10,000,000,000
1,000,000,000
100,000,000
10,000,000
2000
2005
2010
2015
2020
Source: PCS

California


California Personal Lines Market Losses 1998-2020
Author: T Pughe
60,000,000,000
40,000,000,000
20,000,000,000
0
2000
2005
2010
2015
2020
Wildfires
Source: PCS
California Auto Market Losses 1998-2020
Author: T Pughe
1,000,000,000
750,000,000
500,000,000
250,000,000
0
2000
2005
2010
2015
2020
Wildfires
Source: PCS
California Commercial Market Losses 1998-2020
Author: T Pughe
10,000,000,000
1,000,000,000
100,000,000
10,000,000
2000
2005
2010
2015
2020
Wildfires
Source: PCS

The data

The data used in this report is publicly available and comes from PCS. It analyses the spread of both the frequency and severity of claims across the global (re)insurance market, segmented by commercial, auto, and personal lines. Original and grouped event coding is below. These have been grouped into four main categories: Hurricanes, tropical storms, non-coded wind events, and wildfire. Earthquake has been excluded from the 1998-2020 analysis because of the minimal activity. Wind and Thunderstorm Events classed as non-coded wind events throughout.

Grouped catastrophe names:

```
 [1] "Winter Storm"                        "Wind and Thunderstorm Event"          "Tropical Storm Charley"               "Hurricane Bonnie"
 [5] "Tropical Storm Frances"              "Hurricane Georges"                    "Hurricane Bret"                       "Hurricane Dennis"
 [9] "Hurricane Floyd"                     "Hurricane Irene"                      "Hurricane Lenny"                      "Wildland Fire - Cerro Gande"
[13] "Earthquake"                          "Tropical Storm Allison"               "Fire - Other"                         "Tropical Storm Gabrielle"
[17] "Wildland Fires"                      "Tropical Storm Isidore"               "Hurricane Lili"                       "Hurricane Claudette"
[21] "Utility Service Disruption"          "Hurricane Isabel"                     "Wildland Fire - Cedar"                "Wildland Fire - Old"
[25] "Hurricane Charley"                   "Hurricane Gaston"                     "Hurricane Frances"                    "Hurricane Jeanne"
[29] "Hurricane Ivan"                      "Hurricane Cindy"                      "Hurricane Katrina"                    "Hurricane Ophelia"
[33] "Hurricane Rita"                      "Hurricane Wilma"                      "Tropical Storm Ernesto"               "Workers Compensation"
[37] "Wildland Fire       -Witch"          "Hurricane Dolly"                      "Tropical Storm Fay"                   "Hurricane Gustav"
[41] "Tropical Storm Hanna"                "Hurricane Ike"                        "Tropical Storm Hermine"               "Wildland Fire Fourmile Canyon"
[45] "Tropical Storm Lee"                  "Wildland Fire Bastrop County Complex Fire" "Tropical Storm Debby"            "Wildland Fire - Waldo Canyon"
[49] "Hurricane Isaac"                     "Hurricane Sandy"                      "Wildland Fire - Black Forest"         "Riot"
[53] "Tropical Storm Bill"                 "Wildland Fire Valley Fire"            "Wildland Fire Butte Fire"             "Hurricane Hermine"
[57] "Wildland Fire Sand Fire"             "Hurricane Matthew"                    "Wildland Fire"                        "Hurricane Harvey"
[61] "Hurricane Irma"                      "Hurricane Maria"                      "Hurricane Nate"                       "Wildland Fire - Atlas Fire"
[65] "Wildland Fire - Tubbs Fire"          "Wildland Fire - Mendocino Lake Complex"  "Wildland Fire Thomas Fire"          "Wildland Fire Creek Fire"
[69] "Wildland Fire Lilac Fire"            "Tropical Storm - Subtropical Storm Alberto" "Volcanic Eruption Mt. Kilauea"  "Wildland Fire Spring Creek Fire"
[73] "Wildland Fire Carr Fire"             "Wildland Fire  - Mendocino Complex"   "Hurricane Lane"                       "Tropical Storm  - Tropical Storm Gordon"
[77] "Hurricane Florence"                  "Hurricane Michael"                    "Wildland Fire Camp Fire"              "Wildland Fire Woolsey Fire"
[81] "Hurricane Barry"                     "Hurricane Dorian"                     "Tropical Storm Imelda"                "Wildland Fire Saddle Ridge Fire"
[85] "Tropical Storm Nestor"               "Wildland Fire Kincade Fire"           "Tropical Storm Olga"
```

```
Non_Coded_Wind_data <- Trended_Losses %>%
  filter(catname == "Wind and Thunderstorm Event") %>%
  group_by(year) %>%
  summarise(trendedlosses = sum(trendedlosses, na.rm = TRUE))

Tropical_storm_data <- Trended_Losses %>%
  filter(catname %in% c("Tropical Storm Frances", "Tropical Storm Allison", "Tropical Storm Gabrielle",
                        "Tropical Storm Isidore", "Tropical Storm Ernesto", "Tropical Storm Fay",
                        "Tropical Storm Hanna", "Tropical Storm Hermine", "Tropical Storm Lee", "Tropical Storm Bill", "Tropical Storm - Subtropical Storm Alberto",
                        "Tropical Storm - Tropical Storm Gordon", "Tropical Storm Imelda", "Tropical Storm Nestor", "Tropical Storm Olga")) %>%
                        group_by(year) %>%
                        summarise(trendedlosses = sum(trendedlosses, na.rm = TRUE))

Hurricane_data <- Trended_Losses %>%
  filter(catname %in% c("Hurricane Bonnie", "Hurricane Georges", "Hurricane Bret", "Hurricane Dennis", "Hurricane Floyd", "Hurricane Irene", "Hurricane Lenny",
                        "Hurricane Lili", "Hurricane Claudette", "Hurricane Isabel", "Hurricane Charley", "Hurricane Gaston", "Hurricane Frances", "Hurricane Jeanne", "Hurricane Ivan", "Hurricane Cindy",
                        "Hurricane Katrina", "Hurricane Ophelia", "Hurricane Rita", "Hurricane Wilma", "Hurricane Dolly", "Hurricane Gustav", "Hurricane Ike",
                        "Hurricane Isaac", "Hurricane Sandy", "Hurricane Hermine", "Hurricane Matthew", "Hurricane Harvey", "Hurricane Irma", "Hurricane Maria", "Hurricane Nate",
                        "Hurricane Florence", "Hurricane Michael", "Hurricane Barry", "Hurricane Dorian")) %>%
                        group_by(year) %>%
                        summarise(trendedlosses = sum(trendedlosses, na.rm = TRUE))

Wildfire_data <- Trended_Losses %>%
  filter(catname %in% c("Wildland Fire - Cerro Gande", "Wildland Fires", "Wildland Fire - Cedar", "Wildland Fire - Old", "Wildland Fire       -Witch", "Wildland Fire Fourmile Canyon",
                        "Wildland Fire - Black Forest", "Wildland Fire Valley Fire", "Wildland Fire Butte Fire", "Wildland Fire Sand Fire", "Wildland Fire", "Wildland Fire - Atlas Fire",
                        "Wildland Fire - Tubbs Fire", "Wildland Fire - Mendocino Lake Complex", "Wildland Fire Thomas Fire", "Wildland Fire Creek Fire", "Wildland Fire Lilac Fire",
                        "Wildland Fire Spring Creek Fire", "Wildland Fire Camp Fire", "Wildland Fire Woolsey Fire", "Wildland Fire Saddle Ridge Fire", "Wildland Fire Kincade Fire")) %>%
                        group_by(year) %>%
                        summarise(trendedlosses = sum(trendedlosses, na.rm = TRUE))

Earthquake_data <- Trended_Losses %>%
  filter(catname %in% c("Earthquake")) %>%
                        group_by(year) %>%
                        summarise(trendedlosses = sum(trendedlosses, na.rm = TRUE))

Other_data <- Trended_Losses %>%
  filter(catname %in% c("Fire - Other", "Utility Service Disruption", "Workers Compensation", "Riot", "Volcanic Eruption Mt. Kilauea", "Winter Storm")) %>%
  group_by(year) %>%
  summarise(trendedlosses = sum(trendedlosses, na.rm = TRUE))
```