

# Analysis of Damage Caused by Hurricane Harvey and Recommendation for Resource Allocation

## Table of Contents

[Background and Scope](#)

[Visualizations](#)

[Analysis](#)

[Conclusions and Recommendations](#)

## Background and Scope

In 2017, Hurricane Harvey became one of the costliest hurricanes on record, causing approximately \$125 billion in damage. Most of the damage was caused from flooding with some areas receiving over 40 inches (102 cm) of rain.

Hurricanes are large weather events with a specific definition – a rotating low-pressure weather system with sustained winds of 74+ mph (119 km/h). Harvey became a hurricane August 24th, made landfall on the 25th, and was downgraded to a tropical storm on August 26th. Harvey related events were reported beginning August 17th and ended September 3rd as the system moved north and east across the United States. Flooding, thunderstorms, hail, and tornadoes were just a few of the weather events related to Harvey.

In the aftermath of a large-scale weather event, we saw a temporary surge in the number of claims received by insurance companies. This project aims to help the insurance company decide where to send the contractors in the aftermath of Hurricane Harvey. Below is a table generated by a predictive model to estimate the damage caused by Hurricane Harvey. My analysis will be majorly based on this data.

## Import the Data

```
filename = "StormEvents_2017_finalProject.csv";
Events = importfile(filename);
month = ["January", "February", "March", "April", "May", "June", "July", "August", "September", "October"];
Events.Month = reordercats(Events.Month, month);
Events.Property_Cost(ismissing(Events.Property_Cost)) = 0;
Events.Crop_Cost(ismissing(Events.Crop_Cost)) = 0;
Events = Events(Events.Begin_Date_Time >= '2017-08-17 00:00:00' & Events.Begin_Date_Time < '2017-09-04 00:00:00');
```

Events = 2248x24 table

	EpisodeID	Event_ID	State	Year	Month	Event_Type	CZ_Name
1	119542	726661	IOWA	2017	August	Tornado	STORY
2	119542	726659	IOWA	2017	August	Tornado	BOONE
3	119542	726660	IOWA	2017	August	Tornado	STORY

	EpisodeID	Event_ID	State	Year	Month	Event_Type	CZ_Name
4	119542	717362	IOWA	2017	August	Heavy Rain	AUDUBON
5	119542	717363	IOWA	2017	August	Heavy Rain	POLK
6	119542	717364	IOWA	2017	August	Thunderstorm Wind	POWESHIEK
7	120232	720731	VIRGINIA	2017	August	Heavy Rain	NORFOLK (C)
8	120232	720732	VIRGINIA	2017	August	Heavy Rain	NORTHAMPTON
9	120232	720735	VIRGINIA	2017	August	Heavy Rain	NORTHAMPTON
10	120232	720737	VIRGINIA	2017	August	Heavy Rain	PORTSMOUTH...
11	120232	720739	VIRGINIA	2017	August	Heavy Rain	PRINCE GEO...
12	120232	720740	VIRGINIA	2017	August	Heavy Rain	PRINCE GEO...
13	120232	720741	VIRGINIA	2017	August	Heavy Rain	PRINCE GEO...
14	120232	720744	VIRGINIA	2017	August	Heavy Rain	SUFFOLK (C)
15	120232	720746	VIRGINIA	2017	August	Heavy Rain	SURRY
16	120233	720839	MARYLAND	2017	August	Heavy Rain	WORCESTER
17	120233	720850	MARYLAND	2017	August	Heavy Rain	WORCESTER
18	120231	720338	VIRGINIA	2017	August	Thunderstorm Wind	DINWIDDIE
19	120231	720339	VIRGINIA	2017	August	Thunderstorm Wind	ISLE OF WI...
20	120232	720526	VIRGINIA	2017	August	Heavy Rain	ACCOMACK
21	120232	720527	VIRGINIA	2017	August	Heavy Rain	ACCOMACK
22	120232	720528	VIRGINIA	2017	August	Heavy Rain	ACCOMACK
23	120232	720530	VIRGINIA	2017	August	Heavy Rain	ACCOMACK
24	120231	720335	VIRGINIA	2017	August	Thunderstorm Wind	DINWIDDIE
25	120231	720337	VIRGINIA	2017	August	Thunderstorm Wind	DINWIDDIE
26	120232	720534	VIRGINIA	2017	August	Heavy Rain	CHESAPEAKE...
27	120232	720541	VIRGINIA	2017	August	Heavy Rain	CHESTERFIELD
28	120232	720549	VIRGINIA	2017	August	Heavy Rain	HAMPTON (C)
29	120232	720550	VIRGINIA	2017	August	Heavy Rain	HOPEWELL (C)
30	120232	720555	VIRGINIA	2017	August	Heavy Rain	ISLE OF WI...
31	120232	720561	VIRGINIA	2017	August	Heavy Rain	JAMES CITY
32	120232	720565	VIRGINIA	2017	August	Heavy Rain	JAMES CITY
33	120232	720570	VIRGINIA	2017	August	Heavy Rain	MATHEWS
34	120232	720728	VIRGINIA	2017	August	Heavy Rain	NEWPORT NE...
35	120232	720729	VIRGINIA	2017	August	Heavy Rain	NEWPORT NE...
36	120232	720730	VIRGINIA	2017	August	Heavy Rain	NORFOLK (C)

	EpisodeID	Event_ID	State	Year	Month	Event_Type	CZ_Name
37	120232	720748	VIRGINIA	2017	August	Heavy Rain	SUSSEX
38	120232	720750	VIRGINIA	2017	August	Heavy Rain	VIRGINIA B...
39	120232	720752	VIRGINIA	2017	August	Heavy Rain	VIRGINIA B...
40	120232	720754	VIRGINIA	2017	August	Heavy Rain	VIRGINIA B...
41	120232	720810	VIRGINIA	2017	August	Heavy Rain	VIRGINIA B...
42	120232	720820	VIRGINIA	2017	August	Heavy Rain	YORK
43	120238	720480	PUERTO R...	2017	August	Flash Flood	MAYAGUEZ
44	120238	720485	PUERTO R...	2017	August	Flash Flood	PATILLAS
45	120238	720490	PUERTO R...	2017	August	Flood	MAYAGUEZ
46	120056	719507	IOWA	2017	August	Hail	O'BRIEN
47	119960	718989	PUERTO R...	2017	August	Flood	SAN JUAN
48	119960	718991	PUERTO R...	2017	August	Flash Flood	PATILLAS
49	120238	720407	PUERTO R...	2017	August	Flash Flood	AGUADA
50	120238	720414	PUERTO R...	2017	August	Flash Flood	MAYAGUEZ
51	120238	720472	PUERTO R...	2017	August	Flash Flood	PATILLAS
52	120238	720474	PUERTO R...	2017	August	Flash Flood	PATILLAS
53	120238	720475	PUERTO R...	2017	August	Flood	MAYAGUEZ
54	120238	720476	PUERTO R...	2017	August	Flash Flood	MAYAGUEZ
55	120238	720478	PUERTO R...	2017	August	Flash Flood	MAYAGUEZ
56	120196	720201	SOUTH DA...	2017	August	Flash Flood	MINNEHAHA
57	120196	720202	SOUTH DA...	2017	August	Flash Flood	LINCOLN
58	120196	720203	SOUTH DA...	2017	August	Flash Flood	LINCOLN
59	120197	720205	NEBRASKA	2017	August	Flash Flood	DIXON
60	120056	722574	IOWA	2017	August	Tornado	OSCEOLA
61	120055	719415	MINNESOTA	2017	August	Hail	LINCOLN
62	120055	719416	MINNESOTA	2017	August	Hail	LYON
63	120055	719417	MINNESOTA	2017	August	Hail	COTTONWOOD
64	120055	719418	MINNESOTA	2017	August	Hail	MURRAY
65	120055	719419	MINNESOTA	2017	August	Hail	NOBLES
66	120055	719420	MINNESOTA	2017	August	Hail	NOBLES
67	120055	719422	MINNESOTA	2017	August	Hail	NOBLES
68	120055	719427	MINNESOTA	2017	August	Tornado	NOBLES
69	120056	719506	IOWA	2017	August	Hail	O'BRIEN

	EpisodeID	Event_ID	State	Year	Month	Event_Type	CZ_Name
70	119960	718940	PUERTO R...	2017	August	Flash Flood	RIO GRANDE
71	119960	718941	PUERTO R...	2017	August	Flash Flood	RIO GRANDE
72	119960	718943	PUERTO R...	2017	August	Flash Flood	LUQUILLO
73	119960	718944	PUERTO R...	2017	August	Flash Flood	LUQUILLO
74	119960	719005	PUERTO R...	2017	August	Heavy Rain	GUAYAMA
75	119960	719011	PUERTO R...	2017	August	Flash Flood	NAGUABO
76	120238	720401	PUERTO R...	2017	August	Flood	MAYAGUEZ
77	120056	719508	IOWA	2017	August	Hail	O'BRIEN
78	120056	719509	IOWA	2017	August	Hail	O'BRIEN
79	120056	719510	IOWA	2017	August	Hail	O'BRIEN
80	120056	719511	IOWA	2017	August	Hail	O'BRIEN
81	120056	719513	IOWA	2017	August	Hail	CHEROKEE
82	119960	718939	PUERTO R...	2017	August	Flash Flood	CEIBA
83	120056	719515	IOWA	2017	August	Tornado	CHEROKEE
84	120056	719524	IOWA	2017	August	Thunderstorm Wind	OSCEOLA
85	120151	719884	NEBRASKA	2017	August	Hail	DIXON
86	120055	720197	MINNESOTA	2017	August	Thunderstorm Wind	LYON
87	120055	720198	MINNESOTA	2017	August	Thunderstorm Wind	LYON
88	120055	720199	MINNESOTA	2017	August	Thunderstorm Wind	MURRAY
89	120195	720200	SOUTH DA...	2017	August	Hail	UNION
90	120238	720492	PUERTO R...	2017	August	Flash Flood	MAYAGUEZ
91	120238	720493	PUERTO R...	2017	August	Flash Flood	SAN LORENZO
92	120238	720495	PUERTO R...	2017	August	Flood	MAYAGUEZ
93	120280	720689	KANSAS	2017	August	Hail	RAWLINS
94	120280	720690	KANSAS	2017	August	Hail	RAWLINS
95	120279	720694	NEBRASKA	2017	August	Hail	DUNDY
96	120279	720682	NEBRASKA	2017	August	Hail	HITCHCOCK
97	120279	720683	NEBRASKA	2017	August	Hail	HITCHCOCK
98	120279	720684	NEBRASKA	2017	August	Hail	DUNDY
99	120279	720685	NEBRASKA	2017	August	Hail	DUNDY
100	120279	720687	NEBRASKA	2017	August	Hail	DUNDY

⋮

## Two States Most Impacted by Harvey

Identifying the most impacted states is the first step for the exploration. By looking for states that endured the most significant total property cost, which included both property cost and crop cost, several states manifested themselves, such as Texas, Puerto Rico, Florida.

However, it is important to gather data from multiple sources and learn about the event. Context can often help us determine if the results are reasonable, especially when our estimation for the costs was primarily based on predictive modeling. By searching for existing information, seven states had been seen to be heavily impacted - Arkansas, Kentucky, Louisiana, Mississippi, North Carolina, Tennessee, and Texas.

Combining the two sources of information, the most two states most impacted by Harvey should be Texas and Louisiana.

```
A = groupsummary(Events, "State", 'sum', 'Property_Cost');  
A = sortrows(A, 'sum_Property_Cost', 'descend')
```

A = 57×3 table

	State	GroupCount	sum_Property_Cost
1	TEXAS	275	7.7427e+10
2	LOUISIANA	86	75277000
3	NORTH CARO...	59	12338500
4	WASHINGTON	5	4000000
5	FLORIDA	68	2237000
6	MINNESOTA	24	1375000
7	NEBRASKA	62	1054000
8	MISSISSIPPI	39	915000
9	NEW YORK	116	641000
10	TENNESSEE	46	504000
11	PENNSYLVANIA	203	491630
12	KENTUCKY	21	435000
13	CALIFORNIA	82	329000
14	IOWA	68	321000
15	INDIANA	6	300000
16	NORTH DAKOTA	17	141000
17	OHIO	48	112500
18	IDAHO	11	111000
19	MASSACHUSE...	17	92700
20	VERMONT	9	67000
21	ARKANSAS	53	61000
22	SOUTH CARO...	42	54000

	State	GroupCount	sum_Property_Cost
23	MISSOURI	78	49000
24	MICHIGAN	5	45000
25	GEORGIA	34	36000
26	ARIZONA	12	26000
27	VIRGINIA	64	23000
28	WEST VIRGI...	9	20100
29	SOUTH DAKOTA	105	12000
30	HAWAII	34	10000
31	LAKE SUPER...	1	10000
32	ALABAMA	16	5000
33	NEVADA	13	5000
34	OKLAHOMA	34	2000
35	NEW MEXICO	15	800
36	AMERICAN S...	1	0
37	ATLANTIC N...	62	0
38	ATLANTIC S...	32	0
39	COLORADO	7	0
40	DELAWARE	4	0
41	DISTRICT O...	4	0
42	E PACIFIC	1	0
43	GULF OF ME...	64	0
44	ILLINOIS	30	0
45	KANSAS	64	0
46	LAKE ERIE	5	0
47	LAKE MICH...	5	0
48	LAKE ONTARIO	1	0
49	MAINE	3	0
50	MARYLAND	64	0
51	MONTANA	22	0
52	NEW HAMPSH...	21	0
53	NEW JERSEY	27	0
54	OREGON	13	0
55	PUERTO RICO	33	0

	State	GroupCount	sum_Property_Cost
56	UTAH	2	0
57	WISCONSIN	6	0

## Table of Events for Two Most Impacted States

Below is a table containing only events from the two states identified above.

```
MostImpacted = Events(Events.State == "TEXAS" | Events.State == "LOUISIANA",:)
```

MostImpacted = 361x24 table

	EpisodeID	Event_ID	State	Year	Month	Event_Type	CZ_Name
1	119753	723472	TEXAS	2017	August	Tropical Storm	MONTGOMERY
2	119753	723473	TEXAS	2017	August	Tropical Storm	FORT BEND
3	119753	723449	TEXAS	2017	August	Tropical Storm	GALVESTON
4	119753	723474	TEXAS	2017	August	Tropical Storm	SAN JACINTO
5	119753	723475	TEXAS	2017	August	Tropical Storm	WALKER
6	119753	723648	TEXAS	2017	August	Tropical Storm	POLK
7	120011	719146	TEXAS	2017	August	Flash Flood	EL PASO
8	120012	719147	TEXAS	2017	August	Thunderstorm Wind	EL PASO
9	120012	719148	TEXAS	2017	August	Flash Flood	EL PASO
10	119746	719493	TEXAS	2017	August	Flash Flood	HARDIN
11	119746	719496	TEXAS	2017	August	Flash Flood	JASPER
12	119746	719497	TEXAS	2017	August	Flash Flood	NEWTON
13	119753	720340	TEXAS	2017	August	Flash Flood	FORT BEND
14	119826	718436	TEXAS	2017	August	Thunderstorm Wind	MIDLAND
15	117836	708282	TEXAS	2017	August	Thunderstorm Wind	BRISCOE
16	119746	719740	TEXAS	2017	August	Thunderstorm Wind	JASPER
17	119746	720010	TEXAS	2017	August	Flood	ORANGE
18	119753	720464	TEXAS	2017	August	Flash Flood	MONTGOMERY
19	119853	718515	TEXAS	2017	August	Thunderstorm Wind	ECTOR
20	119746	719342	TEXAS	2017	August	Flash Flood	JEFFERSON
21	119753	720344	TEXAS	2017	August	Flash Flood	GALVESTON
22	117887	708470	LOUISIANA	2017	August	Heat	CADDO
23	117887	708471	LOUISIANA	2017	August	Heat	BOSSIER
24	117887	708472	LOUISIANA	2017	August	Heat	DE SOTO
25	117887	708473	LOUISIANA	2017	August	Heat	RED RIVER

	EpisodeID	Event_ID	State	Year	Month	Event_Type	CZ_Name
26	118032	709519	TEXAS	2017	August	Thunderstorm Wind	SWISHER
27	118916	714375	LOUISIANA	2017	August	Tropical Storm	SABINE
28	118330	711050	TEXAS	2017	August	Flash Flood	ANGELINA
29	118330	711054	TEXAS	2017	August	Flash Flood	ANGELINA
30	118330	711059	TEXAS	2017	August	Flash Flood	ANGELINA
31	118330	711060	TEXAS	2017	August	Flash Flood	ANGELINA
32	119753	721087	TEXAS	2017	August	Flash Flood	SAN JACINTO
33	119753	720859	TEXAS	2017	August	Flash Flood	GALVESTON
34	117887	708474	LOUISIANA	2017	August	Heat	BIENVILLE
35	117887	708475	LOUISIANA	2017	August	Heat	WEBSTER
36	117887	708477	LOUISIANA	2017	August	Heat	CLAIBORNE
37	117887	708478	LOUISIANA	2017	August	Heat	LINCOLN
38	117887	708479	LOUISIANA	2017	August	Heat	JACKSON
39	118032	709521	TEXAS	2017	August	Thunderstorm Wind	LUBBOCK
40	118916	714376	LOUISIANA	2017	August	Tropical Storm	NATCHITOC...
41	118916	714377	LOUISIANA	2017	August	Tropical Storm	UNION
42	118330	711063	TEXAS	2017	August	Flash Flood	ANGELINA
43	118032	709520	TEXAS	2017	August	Flash Flood	SWISHER
44	118032	709525	TEXAS	2017	August	Thunderstorm Wind	HOCKLEY
45	120132	719823	TEXAS	2017	August	Thunderstorm Wind	CLAY
46	119753	720465	TEXAS	2017	August	Flash Flood	GALVESTON
47	117887	708480	LOUISIANA	2017	August	Heat	UNION
48	117887	708481	LOUISIANA	2017	August	Heat	OUACHITA
49	117887	708482	LOUISIANA	2017	August	Heat	CALDWELL
50	117887	708483	LOUISIANA	2017	August	Heat	WINN
51	117887	708484	LOUISIANA	2017	August	Heat	LA SALLE
52	120318	720930	TEXAS	2017	August	Tropical Storm	KENEDY
53	118032	709522	TEXAS	2017	August	Flash Flood	HOCKLEY
54	118032	709523	TEXAS	2017	August	Thunderstorm Wind	LYNN
55	118032	711899	TEXAS	2017	August	Heavy Rain	HOCKLEY
56	118330	711072	TEXAS	2017	August	Flash Flood	SABINE
57	118330	711078	TEXAS	2017	August	Flash Flood	SAN AUGUS...
58	118330	711079	TEXAS	2017	August	Flash Flood	SABINE



	EpisodeID	Event_ID	State	Year	Month	Event_Type	CZ_Name
59	118330	711081	TEXAS	2017	August	Flash Flood	SABINE
60	118330	711083	TEXAS	2017	August	Flash Flood	ANGELINA
61	118330	711089	TEXAS	2017	August	Flash Flood	ANGELINA
62	118330	711090	TEXAS	2017	August	Flash Flood	ANGELINA
63	118330	711092	TEXAS	2017	August	Flash Flood	SABINE
64	118330	711405	TEXAS	2017	August	Flash Flood	SABINE
65	118330	711407	TEXAS	2017	August	Flash Flood	SABINE
66	118330	711408	TEXAS	2017	August	Flash Flood	SABINE
67	118330	711409	TEXAS	2017	August	Flash Flood	SABINE
68	118330	711412	TEXAS	2017	August	Flash Flood	ANGELINA
69	119556	717411	TEXAS	2017	August	Hail	SHERMAN
70	119753	720858	TEXAS	2017	August	Flash Flood	HARRIS
71	119753	720860	TEXAS	2017	August	Flash Flood	HARRIS
72	117887	708485	LOUISIANA	2017	August	Heat	GRANT
73	117887	708486	LOUISIANA	2017	August	Heat	NATCHITOC...
74	117887	708487	LOUISIANA	2017	August	Heat	SABINE
75	117891	708498	TEXAS	2017	August	Heat	CASS
76	118330	711413	TEXAS	2017	August	Flash Flood	SHELBY
77	118330	711414	TEXAS	2017	August	Flash Flood	SHELBY
78	118330	711415	TEXAS	2017	August	Flash Flood	SABINE
79	118386	711416	LOUISIANA	2017	August	Flash Flood	SABINE
80	118386	711417	LOUISIANA	2017	August	Flash Flood	SABINE
81	118386	711418	LOUISIANA	2017	August	Flash Flood	SABINE
82	118386	711419	LOUISIANA	2017	August	Flash Flood	RED RIVER
83	118386	711420	LOUISIANA	2017	August	Flash Flood	SABINE
84	118386	711421	LOUISIANA	2017	August	Flash Flood	RED RIVER
85	118386	711422	LOUISIANA	2017	August	Flash Flood	SABINE
86	118386	711423	LOUISIANA	2017	August	Flash Flood	NATCHITOC...
87	118386	711424	LOUISIANA	2017	August	Flash Flood	NATCHITOC...
88	119556	717412	TEXAS	2017	August	Hail	HUTCHINSON
89	119556	717413	TEXAS	2017	August	Thunderstorm Wind	RANDALL
90	119565	717436	TEXAS	2017	August	Thunderstorm Wind	HARTLEY
91	119753	721098	TEXAS	2017	August	Flash Flood	AUSTIN

	EpisodeID	Event_ID	State	Year	Month	Event_Type	CZ_Name
92	117891	708499	TEXAS	2017	August	Heat	MARION
93	117891	708500	TEXAS	2017	August	Heat	HARRISON
94	117891	708501	TEXAS	2017	August	Heat	GREGG
95	117891	708503	TEXAS	2017	August	Heat	RUSK
96	118386	711425	LOUISIANA	2017	August	Flash Flood	SABINE
97	118386	711426	LOUISIANA	2017	August	Flash Flood	SABINE
98	118386	711427	LOUISIANA	2017	August	Flash Flood	NATCHITOC...
99	118386	711428	LOUISIANA	2017	August	Flash Flood	NATCHITOC...
100	118386	711429	LOUISIANA	2017	August	Flash Flood	SABINE

⋮

## Visualizations

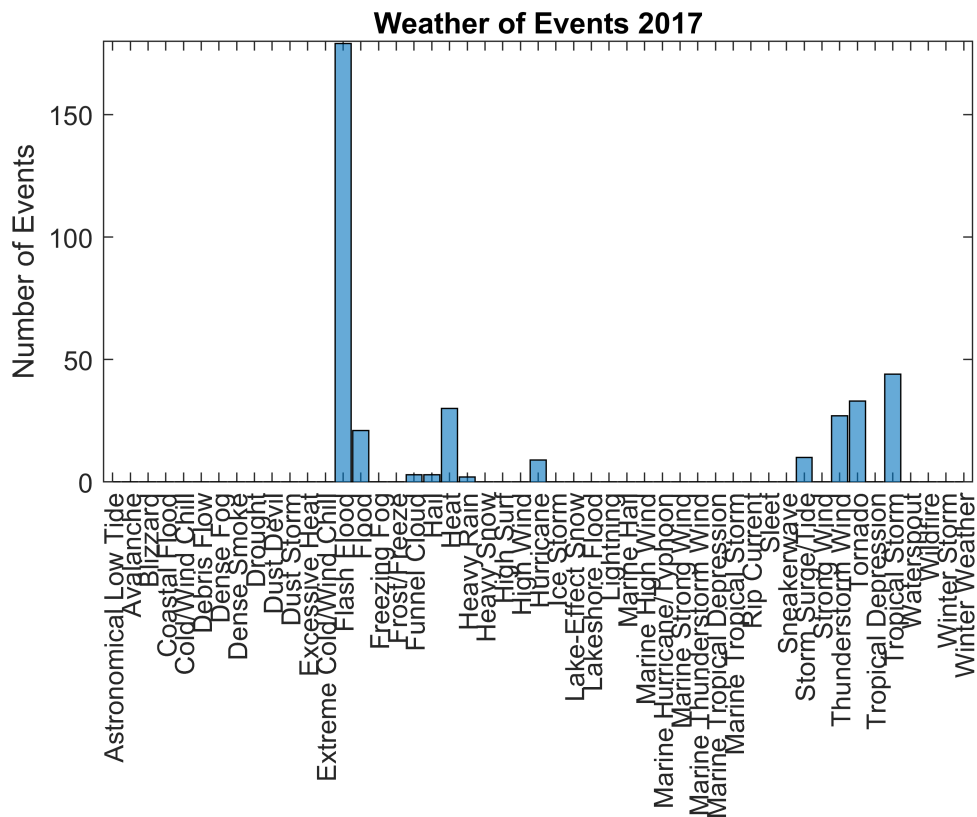
### Figure of Event Types

As shown below, the three most frequent event types are hail, thunderstorm wind, and flash flood.

```

histogram (MostImpacted.Event_Type)
title('Weather of Events 2017')
ylabel('Number of Events')

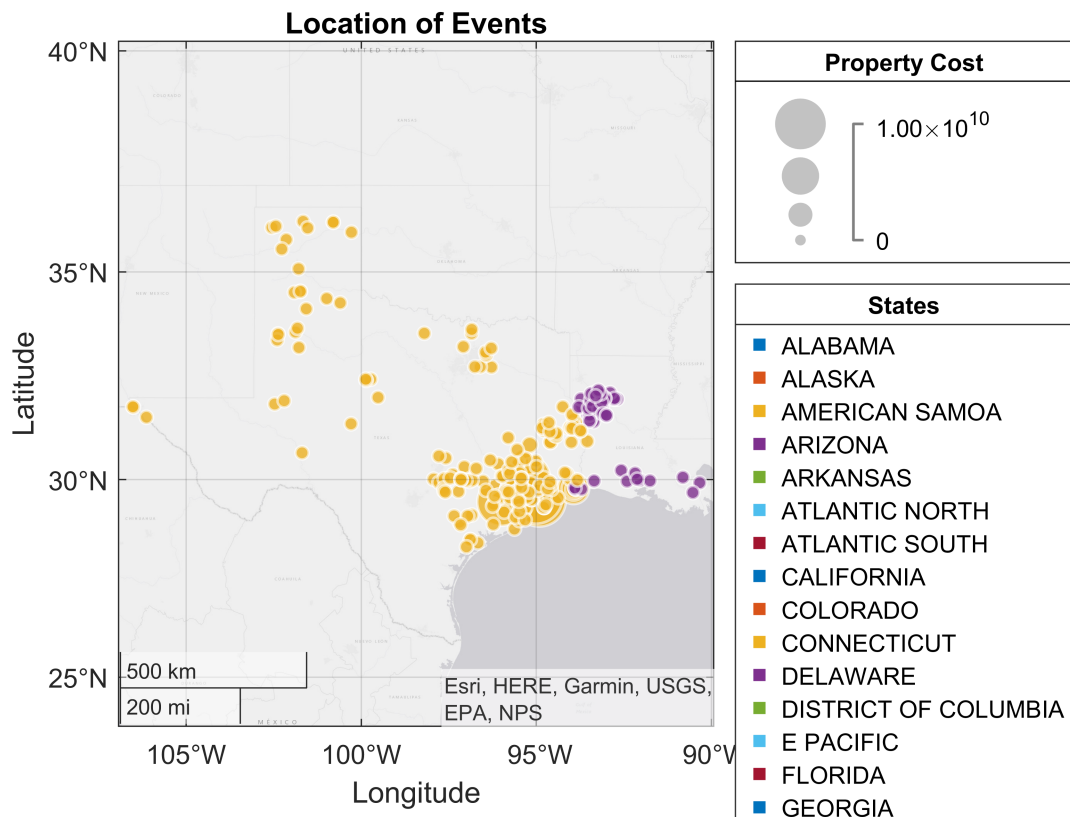
```



## Figure of Event Locations

The following figure shows the location of events in the two states.

```
geobubble(MostImpacted.Begin_Lat,MostImpacted.Begin_Lon,MostImpacted.Property_Cost,MostImpacted
legend show
title('Location of Events')
```



## Analysis

### Three Counties with Most Events in Texas

In Texas, the three counties that had most events were Harris, Galveston, and Fort Bend.

```
State1 = MostImpacted(MostImpacted.State == "TEXAS",:);
B = groupsummary(State1,"CZ_Name");
B = sortrows(B,'GroupCount','descend')
```

B = 95×2 table

	CZ_Name	GroupCount
1	HARRIS	21
2	GALVESTON	17
3	FORT BEND	13
4	ANGELINA	12
5	BRAZORIA	12
6	SABINE	12
7	BASTROP	9

	CZ_Name	GroupCount
8	CHAMBERS	8
9	CALDWELL	7
10	MONTGOMERY	6
11	CALHOUN	5
12	JEFFERSON	5
13	MATAGORDA	5
14	WHARTON	5
15	FAYETTE	4
16	LIBERTY	4
17	WALKER	4
18	WALLER	4
19	AUSTIN	3
20	EL PASO	3
21	GRIMES	3
22	HOCKLEY	3
23	JACKSON	3
24	ORANGE	3
25	REFUGIO	3
26	SAN AUGUS...	3
27	SAN JACINTO	3
28	SHELBY	3
29	SWISHER	3
30	TAYLOR	3
31	VICTORIA	3
32	ARANSAS	2
33	BRAZOS	2
34	COLLIN	2
35	DALLAS	2
36	DE WITT	2
37	GONZALES	2
38	GRAYSON	2
39	HAYS	2
40	JASPER	2

	CZ_Name	GroupCount
41	LEE	2
42	LUBBOCK	2
43	MADISON	2
44	NACOGDOCHES	2
45	NUECES	2
46	OCHILTREE	2
47	POLK	2
48	SAN PATRI...	2
49	WASHINGTON	2
50	WILLIAMSON	2
51	BEE	1
52	BEXAR	1
53	BOWIE	1
54	BRISCOE	1
55	BURLESON	1
56	CASS	1
57	CLAY	1
58	COLEMAN	1
59	COLORADO	1
60	COMAL	1
61	CROCKETT	1
62	DALLAM	1
63	DENTON	1
64	ECTOR	1
65	GOLIAD	1
66	GREGG	1
67	GUADALUPE	1
68	HALE	1
69	HARDIN	1
70	HARRISON	1
71	HARTLEY	1
72	HEMPHILL	1
73	HUNT	1

	CZ_Name	GroupCount
74	HUTCHINSON	1
75	JIM WELLS	1
76	KARNES	1
77	KAUFMAN	1
78	KENEDY	1
79	KLEBERG	1
80	LAVACA	1
81	LIVE OAK	1
82	LYNN	1
83	MARION	1
84	MIDLAND	1
85	MOORE	1
86	MOTLEY	1
87	NEWTON	1
88	OLDHAM	1
89	PANOLA	1
90	RANDALL	1
91	RUSK	1
92	SHERMAN	1
93	TOM GREEN	1
94	TYLER	1
95	WILSON	1

## Three Counties with Most Events in Louisiana

In Louisiana, the three counties that had most events were Natchitoches, Sabine, Red River.

```
State2 = MostImpacted(MostImpacted.State == "LOUISIANA",:);
C = groupsummary(State2,"CZ_Name");
C = sortrows(C, 'GroupCount', 'descend')
```

C = 30x2 table

	CZ_Name	GroupCount
1	NATCHITOC...	21
2	SABINE	15
3	RED RIVER	9

	CZ_Name	GroupCount
4	WINN	6
5	CAMERON	4
6	VERMILION	4
7	DE SOTO	3
8	UNION	2
9	ACADIA	1
10	BEAUREGARD	1
11	BIENVILLE	1
12	BOSSIER	1
13	CADDO	1
14	CALCASIEU	1
15	CALDWELL	1
16	CLAIBORNE	1
17	EAST CAME...	1
18	GRANT	1
19	IBERIA	1
20	JACKSON	1
21	LA SALLE	1
22	LAFAYETTE	1
23	LAFOURCHE	1
24	LINCOLN	1
25	OUACHITA	1
26	ST. CHARLES	1
27	ST. JAMES	1
28	ST. MARY	1
29	WEBSTER	1
30	WEST CAME...	1

### Three Counties with Highest Property Cost in Texas

In Texas, the three counties with highest property cost were Galveston, Fort Bend, and Montgomery. The costs were estimated to be about \$20 billion, \$16 billion, and \$14 billion, respectively.

```
D = groupsummary(State1,"CZ_Name","sum","Property_Cost");
D = sortrows(D,'sum_Property_Cost','descend')
```

```
D = 95x3 table
```



	CZ_Name	GroupCount	sum_Property_Cost
1	GALVESTON	17	2.0000e+10
2	FORT BEND	13	1.6004e+10
3	MONTGOMERY	6	1.4000e+10
4	HARRIS	21	1.0001e+10
5	JEFFERSON	5	3.0000e+09
6	BRAZORIA	12	2.0008e+09
7	ARANSAS	2	1.9500e+09
8	ORANGE	3	1.5000e+09
9	NUECES	2	1.3000e+09
10	WALKER	4	1.2000e+09
11	LIBERTY	4	1.0000e+09
12	SAN JACINTO	3	700000000
13	HARDIN	1	600000000
14	POLK	2	600000000
15	SAN PATRI...	2	502000000
16	MATAGORDA	5	500500000
17	JACKSON	3	500200000
18	REFUGIO	3	500020000
19	WALLER	4	350700000
20	CALHOUN	5	281010000
21	WHARTON	5	200350000
22	VICTORIA	3	160000000
23	WASHINGTON	2	150000000
24	JASPER	2	85005000
25	MADISON	2	80000000
26	TYLER	1	60000000
27	FAYETTE	4	50000000
28	GRIMES	3	50000000
29	NEWTON	1	45000000
30	BURLESON	1	20000000
31	BRAZOS	2	15000000
32	CALDWELL	7	12850000
33	DE WITT	2	3100000

	CZ_Name	GroupCount	sum_Property_Cost
34	BASTROP	9	1500000
35	CHAMBERS	8	1000000
36	COMAL	1	1000000
37	GOLIAD	1	1000000
38	LEE	2	350000
39	AUSTIN	3	100000
40	BEXAR	1	100000
41	GONZALES	2	100000
42	HAYS	2	100000
43	LAVACA	1	100000
44	GUADALUPE	1	50000
45	HOCKLEY	3	42000
46	BEE	1	10000
47	BRISCOE	1	10000
48	KLEBERG	1	10000
49	LIVE OAK	1	10000
50	ECTOR	1	8000
51	JIM WELLS	1	1000
52	LUBBOCK	2	500
53	ANGELINA	12	0
54	BOWIE	1	0
55	CASS	1	0
56	CLAY	1	0
57	COLEMAN	1	0
58	COLLIN	2	0
59	COLORADO	1	0
60	CROCKETT	1	0
61	DALLAM	1	0
62	DALLAS	2	0
63	DENTON	1	0
64	EL PASO	3	0
65	GRAYSON	2	0
66	GREGG	1	0

	CZ_Name	GroupCount	sum_Property_Cost
67	HALE	1	0
68	HARRISON	1	0
69	HARTLEY	1	0
70	HEMPHILL	1	0
71	HUNT	1	0
72	HUTCHINSON	1	0
73	KARNES	1	0
74	KAUFMAN	1	0
75	KENEDY	1	0
76	LYNN	1	0
77	MARION	1	0
78	MIDLAND	1	0
79	MOORE	1	0
80	MOTLEY	1	0
81	NACOGDOCHES	2	0
82	OCHILTREE	2	0
83	OLDHAM	1	0
84	PANOLA	1	0
85	RANDALL	1	0
86	RUSK	1	0
87	SABINE	12	0
88	SAN AUGUS...	3	0
89	SHELBY	3	0
90	SHERMAN	1	0
91	SWISHER	3	0
92	TAYLOR	3	0
93	TOM GREEN	1	0
94	WILLIAMSON	2	0
95	WILSON	1	0

### Three Counties with Highest Property Cost in Louisiana

In Louisiana, the three counties with highest property cost were Calcasieu, Beauregard, and Acadia. The costs were estimated to be about \$60 million, \$15 million, and \$0.2 million, respectively.

```
E = groupsummary(State2, "CZ_Name", "sum", "Property_Cost");
```

```
E = sortrows(E, 'sum_Property_Cost', 'descend')
```

```
E = 30x3 table
```

	CZ_Name	GroupCount	sum_Property_Cost
1	CALCASIEU	1	60000000
2	BEAUREGARD	1	15000000
3	ACADIA	1	200000
4	CAMERON	4	72000
5	VERMILION	4	5000
6	BIENVILLE	1	0
7	BOSSIER	1	0
8	CADDO	1	0
9	CALDWELL	1	0
10	CLAIBORNE	1	0
11	DE SOTO	3	0
12	EAST CAME...	1	0
13	GRANT	1	0
14	IBERIA	1	0
15	JACKSON	1	0
16	LA SALLE	1	0
17	LAFAYETTE	1	0
18	LAFOURCHE	1	0
19	LINCOLN	1	0
20	NATCHITOC...	21	0
21	OUACHITA	1	0
22	RED RIVER	9	0
23	SABINE	15	0
24	ST. CHARLES	1	0
25	ST. JAMES	1	0
26	ST. MARY	1	0
27	UNION	2	0
28	WEBSTER	1	0
29	WEST CAME...	1	0
30	WINN	6	0

## Conclusions and Recommendations

In summary, the major contributing factor to property damage was the floods, as well as winds. Hence, it is reasonable to expect the damage to be higher in coastal areas, and that was supported by our analysis. Thus, it is wise to allocate more resources to coastal areas.

Also, as revealed by statistics, claims adjusters would need more assistance in Texas and Louisiana, especially in the counties identified above. However, it should be noted that counties in Texas showed much higher absolute property cost than counties in Louisiana.

Additional work is necessary to determine further details needed for a comprehensive plan, such as the specific types of property being damaged.