

4. VULNERABILITY TO HURRICANE WINDS

Methods

Hurricanes pose a multi-faceted threat to coastal communities including storm surges, rainfall and flooding, tornadoes, and destructive winds. The last of these, tropical storm and hurricane force winds, can affect areas far afield from the storm's center. While coastal areas currently plan for hurricane impacts, interior counties may be less aware of the potential destruction of high winds. In these areas, it will be high winds, not storm surge, that cause a majority of damage during hurricane events.

Tropical storm and hurricane wind hazard zones were created for the state of Florida using historical wind speed information from the Extended Best Track (EBT) dataset for storms occurring between 1988 and 2012.²³ This dataset provides satellite-based estimates on the maximum radial extent of wind within each of four quadrants around the hurricane eye. These wind speeds and associated distances form the basis from which polygonal representations of each hurricane path are created. The extent of tropical storm strength winds (those greater than 34 kt) in the vicinity of Florida for 1998's Hurricane Georges is shown as an example (Figure 5A). A polygon is made using each set of four points (Figure 5B). Those individual polygons are dissolved into a single polygon (Figure 5C). Finally, the polygon is smoothed to more accurately approximate the storm's circular shape (Figure 5D).

EBT is not available for storms occurring between 1952 and 1987. Instead, an idealized buffer is created around each segment of the storm's track. The buffer has a greater distance for stronger wind speeds at the storm's center. All of the resulting wind zone representations are combined into a single hurricane wind hazard layer, and the number of hurricane zone overlaps were counted and associated with each unique overlapping polygon. This sum of hurricane or tropical storm events was then divided by the number of years in the record to determine the annual frequency of occurrence for each census tract in the state (Figure 6). Tropical storm wind risk is defined using an equal interval classification scheme applied to all historical storms where low risk is < 25% historical frequency of tropical storm winds, medium risk is between 25%-50% historical frequency, high risk is between 50%-75% historical frequency, and extreme risk is > 75% historical frequency. Because the frequency of hurricane winds is much lower than that of tropical storm force winds hurricane wind risk was classified using a manual

²³ The "extended" best track file was created by supplementing the North American Hurricane Database (HURDAT) with additional storm parameters determined by NHC. The additional parameters include the following:

1. Maximum radial extent of 34, 50 and 64 kt wind in four quadrants
2. Radius of maximum wind
3. Eye diameter if available
4. Pressure and radius of the outer closed isobar. More information at http://rammb.cira.colostate.edu/research/tropical_cyclones/tc_extended_best_track_dataset/index.asp

method where low risk is < 5% historical frequency of hurricane winds, medium risk is between 5%-10% historical frequency, high risk is between 10%-15% historical frequency, and extreme risk is > 15% historical frequency.

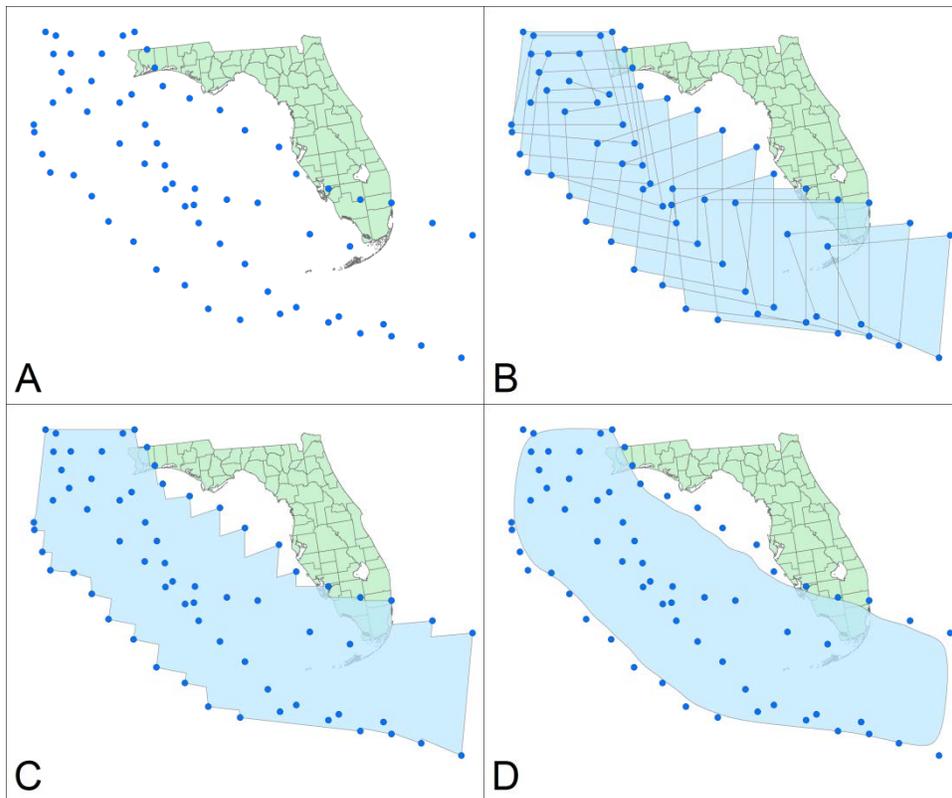


Figure 5: Process of creating historical hurricane wind zones.

State Summary

An analysis based on historical tropical storm and hurricane force winds shows a medium to high risk for tropical storm force winds for the majority of the state, with the highest risk to the east (Figure 6). Counties most affected include Miami-Dade, Palm Beach, and Orange Counties, each with more than 1 million residents in the high risk category (Table 14). While no counties in the state have tracts included in the extreme risk category (

Table 13), only a small portion of the state (5%) is at low risk to tropical storm force winds. Florida's hurricane force wind hazard risk tells a much different story, with the highest areas of risk along the southeastern coast and in the panhandle (Figure 7). Nearly 15% of the state is at high risk to hurricane force winds (Table 15), accounting for almost 3 million people (Table 16).

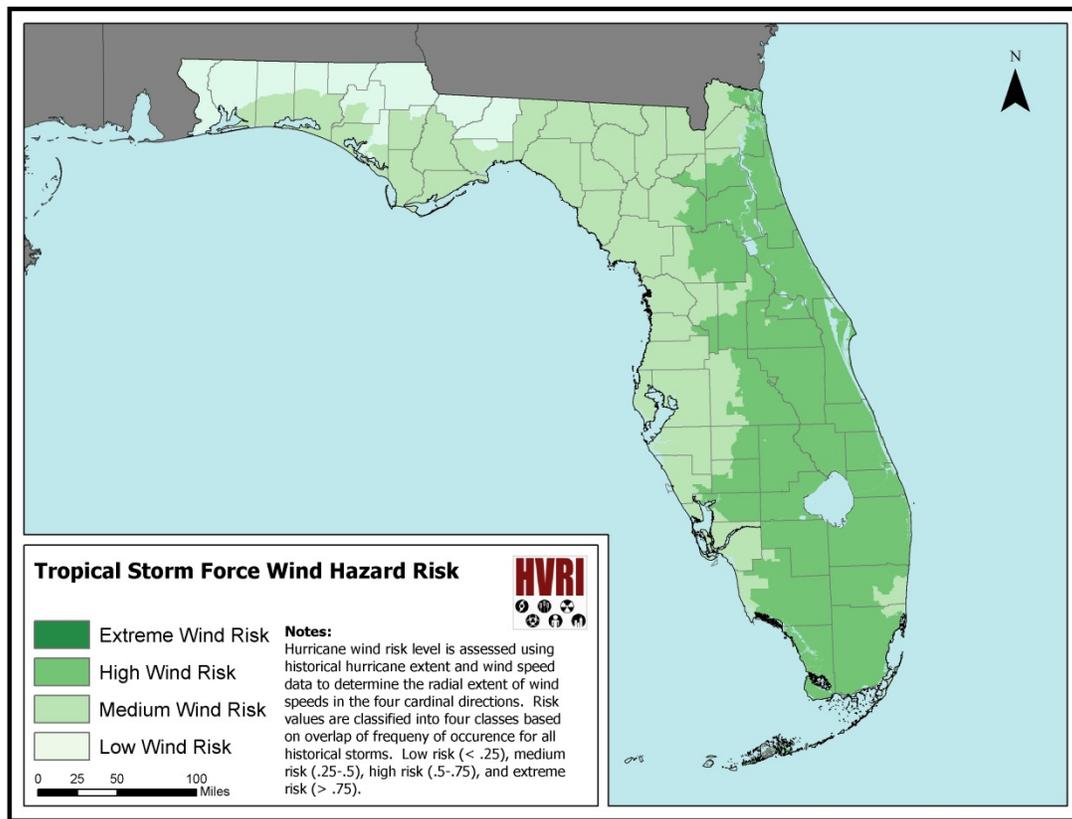


Figure 6: Tropical storm force wind hazard risk in Florida.

Table 13: Census tract summary for tropical storm force wind hazard risk.

County Name	Tropical Storm Wind Hazard Risk					County Name	Tropical Storm Wind Hazard Risk				
	Extreme (75%)	High (50%-75%)	Medium (25%-50%)	Low (<25%)	Out		Extreme (75%)	High (50%-75%)	Medium (25%-50%)	Low (<25%)	Out
Alachua	-	5.36%	94.64%	-	-	Lee	-	-	100.00%	-	-
Baker	-	-	100.00%	-	-	Leon	-	-	-	100.00%	-
Bay	-	-	54.55%	45.45%	-	Levy	-	-	100.00%	-	-
Bradford	-	25.00%	75.00%	-	-	Liberty	-	-	100.00%	-	-
Brevard	-	100.00%	-	-	-	Madison	-	-	100.00%	-	-
Broward	-	40.72%	59.28%	-	-	Manatee	-	-	100.00%	-	-
Calhoun	-	-	66.67%	33.33%	-	Marion	-	69.84%	30.16%	-	-
Charlotte	-	66.67%	33.33%	-	-	Martin	-	100.00%	-	-	-
Citrus	-	-	100.00%	-	-	Miami-Dade	-	74.76%	25.24%	-	-
Clay	-	50.00%	50.00%	-	-	Monroe	-	77.42%	22.58%	-	-
Collier	-	5.41%	94.59%	-	-	Nassau	-	58.33%	41.67%	-	-
Columbia	-	-	100.00%	-	-	Okaloosa	-	-	80.49%	19.51%	-
DeSoto	-	55.56%	44.44%	-	-	Okeechobee	-	100.00%	-	-	-
Dixie	-	-	100.00%	-	-	Orange	-	95.17%	4.83%	-	-
Duval	-	49.13%	50.87%	-	-	Osceola	-	100.00%	-	-	-
Escambia	-	-	1.41%	98.59%	-	Palm Beach	-	100.00%	-	-	-
Flagler	-	100.00%	-	-	-	Pasco	-	-	100.00%	-	-
Franklin	-	-	100.00%	-	-	Pinellas	-	-	100.00%	-	-
Gadsden	-	-	-	100.00%	-	Polk	-	38.31%	61.69%	-	-
Gilchrist	-	-	100.00%	-	-	Putnam	-	100.00%	-	-	-
Glades	-	100.00%	-	-	-	Santa Rosa	-	-	20.00%	80.00%	-
Gulf	-	-	100.00%	-	-	Sarasota	-	1.06%	98.94%	-	-
Hamilton	-	-	100.00%	-	-	Seminole	-	100.00%	-	-	-
Hardee	-	33.33%	66.67%	-	-	St. Johns	-	100.00%	-	-	-
Hendry	-	100.00%	-	-	-	St. Lucie	-	100.00%	-	-	-
Hernando	-	2.22%	97.78%	-	-	Sumter	-	10.53%	89.47%	-	-
Highlands	-	96.30%	3.70%	-	-	Suwannee	-	-	100.00%	-	-
Hillsborough	-	-	100.00%	-	-	Taylor	-	-	100.00%	-	-
Holmes	-	-	-	100.00%	-	Union	-	-	100.00%	-	-
Indian River	-	100.00%	-	-	-	Volusia	-	100.00%	-	-	-
Jackson	-	-	-	100.00%	-	Wakulla	-	-	75.00%	25.00%	-
Jefferson	-	-	100.00%	-	-	Walton	-	-	63.64%	36.36%	-
Lafayette	-	-	100.00%	-	-	Washington	-	-	14.29%	85.71%	-
Lake	-	41.07%	58.93%	-	-	State Total	-	46.38%	48.35%	5.27%	-

Table 14: Census tract population summary for tropical storm force wind hazard risk.

County Name	Tropical Storm Wind Hazard Risk					County Name	Tropical Storm Wind Hazard Risk				
	Extreme (75%)	High (50%-75%)	Medium (25%-50%)	Low (<25%)	Out		Extreme (75%)	High (50%-75%)	Medium (25%-50%)	Low (<25%)	Out
Alachua	-	10,116	237,220	-	-	Lee	-	-	618,754	-	-
Baker	-	-	27,115	-	-	Leon	-	-	-	275,487	-
Bay	-	-	72,458	96,394	-	Levy	-	-	40,801	-	-
Bradford	-	7,635	20,885	-	-	Liberty	-	-	8,365	-	-
Brevard	-	543,369	-	-	-	Madison	-	-	19,224	-	-
Broward	-	726,001	1,022,065	-	-	Manatee	-	-	322,833	-	-
Calhoun	-	-	12,192	2,433	-	Marion	-	210,256	121,042	-	-
Charlotte	-	104,699	55,279	-	-	Martin	-	146,318	-	-	-
Citrus	-	-	141,236	-	-	Miami-Dade	-	1,855,502	637,625	-	-
Clay	-	98,146	92,719	-	-	Monroe	-	54,882	18,208	-	-
Collier	-	37,825	283,695	-	-	Nassau	-	40,204	33,110	-	-
Columbia	-	-	67,531	-	-	Okaloosa	-	-	126,855	53,967	-
DeSoto	-	17,692	17,170	-	-	Okeechobee	-	39,996	-	-	-
Dixie	-	-	16,422	-	-	Orange	-	1,096,602	49,354	-	-
Duval	-	465,581	398,682	-	-	Osceola	-	268,685	-	-	-
Escambia	-	-	2,136	295,483	-	Palm Beach	-	1,319,462	-	-	-
Flagler	-	95,696	-	-	-	Pasco	-	-	464,697	-	-
Franklin	-	-	11,549	-	-	Pinellas	-	-	916,542	-	-
Gadsden	-	-	-	46,389	-	Polk	-	253,613	348,482	-	-
Gilchrist	-	-	16,939	-	-	Putnam	-	74,364	-	-	-
Glades	-	12,884	-	-	-	Santa Rosa	-	-	41,114	110,258	-
Gulf	-	-	15,863	-	-	Sarasota	-	33,041	346,407	-	-
Hamilton	-	-	14,799	-	-	Seminole	-	422,718	-	-	-
Hardee	-	7,973	19,758	-	-	St. Johns	-	190,039	-	-	-
Hendry	-	39,140	-	-	-	St. Lucie	-	277,789	-	-	-
Hernando	-	4,785	167,993	-	-	Sumter	-	5,601	81,422	-	-
Highlands	-	95,985	2,801	-	-	Suwannee	-	-	41,551	-	-
Hillsborough	-	-	1,229,226	-	-	Taylor	-	-	22,570	-	-
Holmes	-	-	-	19,927	-	Union	-	-	15,535	-	-
Indian River	-	138,028	-	-	-	Volusia	-	494,593	-	-	-
Jackson	-	-	-	49,746	-	Wakulla	-	-	21,909	8,867	-
Jefferson	-	-	14,761	-	-	Walton	-	-	34,262	20,781	-
Lafayette	-	-	8,870	-	-	Washington	-	-	6,615	18,281	-
Lake	-	161,026	136,026	-	-	State Total	-	9,350,246	8,442,667	998,013	-

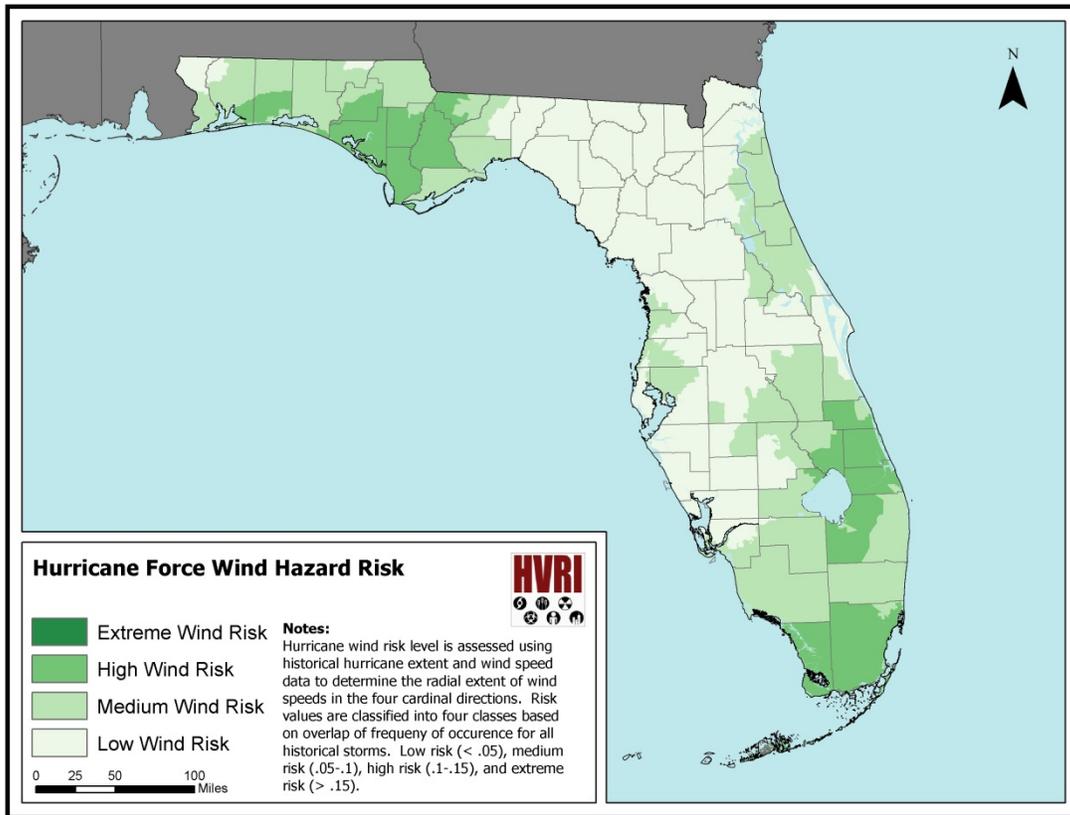


Figure 7: Hurricane force wind hazard risk in Florida.

Table 15: Census tract summary for hurricane force wind hazard risk.

County Name	Hurricane Wind Hazard Risk					County Name	Hurricane Wind Hazard Risk				
	Extreme (>15%)	High (10%-15%)	Medium (5%-10%)	Low (<5%)	Out		Extreme (>15%)	High (10%-15%)	Medium (5%-10%)	Low (<5%)	Out
Alachua	-	-	-	100.00%	-	Lee	-	-	38.32%	61.68%	-
Baker	-	-	-	100.00%	-	Leon	-	-	36.76%	63.24%	-
Bay	-	97.73%	2.27%	-	-	Lewy	-	-	-	100.00%	-
Bradford	-	-	-	100.00%	-	Liberty	-	100.00%	-	-	-
Brevard	-	-	14.16%	85.84%	-	Madison	-	-	-	100.00%	-
Broward	-	-	100.00%	-	-	Manatee	-	-	-	100.00%	-
Calhoun	-	66.67%	33.33%	-	-	Marion	-	-	-	100.00%	-
Charlotte	-	-	-	100.00%	-	Martin	-	94.12%	5.88%	-	-
Citrus	-	-	7.14%	92.86%	-	Miami-Dade	-	80.15%	19.85%	-	-
Clay	-	-	3.33%	96.67%	-	Monroe	3.23%	96.77%	-	-	-
Collier	-	-	100.00%	-	-	Nassau	-	-	-	100.00%	-
Columbia	-	-	-	100.00%	-	Okaloosa	-	12.20%	87.80%	-	-
DeSoto	-	-	-	100.00%	-	Okeechobee	-	90.91%	9.09%	-	-
Dixie	-	-	-	100.00%	-	Orange	-	-	0.48%	99.52%	-
Duval	-	-	21.97%	78.03%	-	Osceola	-	-	31.71%	68.29%	-
Escambia	-	4.23%	91.55%	4.23%	-	Palm Beach	-	1.49%	98.51%	-	-
Flagler	-	-	100.00%	-	-	Pasco	-	-	55.22%	44.78%	-
Franklin	-	25.00%	75.00%	-	-	Pinellas	-	-	5.31%	94.69%	-
Gadsden	-	33.33%	66.67%	-	-	Polk	-	-	8.44%	91.56%	-
Gilchrist	-	-	-	100.00%	-	Putnam	-	-	47.06%	52.94%	-
Glades	-	25.00%	75.00%	-	-	Santa Rosa	-	28.00%	68.00%	4.00%	-
Gulf	-	100.00%	-	-	-	Sarasota	-	-	-	100.00%	-
Hamilton	-	-	-	100.00%	-	Seminole	-	-	5.81%	94.19%	-
Hardee	-	-	33.33%	66.67%	-	St. Johns	-	-	100.00%	-	-
Hendry	-	-	66.67%	33.33%	-	St. Lucie	-	100.00%	-	-	-
Hernando	-	-	20.00%	80.00%	-	Sumter	-	-	-	100.00%	-
Highlands	-	-	40.74%	59.26%	-	Suwannee	-	-	-	100.00%	-
Hillsborough	-	-	66.67%	33.33%	-	Taylor	-	-	-	100.00%	-
Holmes	-	-	75.00%	25.00%	-	Union	-	-	-	100.00%	-
Indian River	-	66.67%	33.33%	-	-	Volusia	-	-	87.72%	12.28%	-
Jackson	-	-	100.00%	-	-	Wakulla	-	-	100.00%	-	-
Jefferson	-	-	-	100.00%	-	Walton	-	9.09%	90.91%	-	-
Lafayette	-	-	-	100.00%	-	Washington	-	42.86%	57.14%	-	-
Lake	-	-	8.93%	91.07%	-	State Total	0.02%	14.97%	40.88%	44.13%	-

Table 16: Census tract population summary for hurricane force wind hazard risk.

County Name	Hurricane Wind Hazard Risk					County Name	Hurricane Wind Hazard Risk				
	Extreme (>15%)	High (10%-15%)	Medium (5%-10%)	Low (<5%)	Out		Extreme (>15%)	High (10%-15%)	Medium (5%-10%)	Low (<5%)	Out
Alachua	-	-	-	247,336	-	Lee	-	-	211,964	406,790	-
Baker	-	-	-	27,115	-	Leon	-	-	110,076	165,411	-
Bay	-	168,852	-	-	-	Lewy	-	-	-	40,801	-
Bradford	-	-	-	28,520	-	Liberty	-	8,365	-	-	-
Brevard	-	-	106,372	436,997	-	Madison	-	-	-	19,224	-
Broward	-	-	1,748,066	-	-	Manatee	-	-	-	322,833	-
Calhoun	-	12,192	2,433	-	-	Marion	-	-	-	331,298	-
Charlotte	-	-	-	159,978	-	Martin	-	141,056	5,262	-	-
Citrus	-	-	9,747	131,489	-	Miami-Dade	-	1,947,436	545,691	-	-
Clay	-	-	3,251	187,614	-	Monroe	20	73,070	-	-	-
Collier	-	-	321,520	-	-	Nassau	-	-	-	73,314	-
Columbia	-	-	-	67,531	-	Okaloosa	-	21,449	159,373	-	-
DeSoto	-	-	-	34,862	-	Okeechobee	-	37,175	2,821	-	-
Dixie	-	-	-	16,422	-	Orange	-	-	2,916	1,143,040	-
Duval	-	-	222,006	642,257	-	Osceola	-	-	69,975	198,710	-
Escambia	-	10,743	272,651	14,225	-	Palm Beach	-	25,086	1,294,376	-	-
Flagler	-	-	95,696	-	-	Pasco	-	-	268,850	195,847	-
Franklin	-	1,690	9,859	-	-	Pinellas	-	-	59,286	857,256	-
Gadsden	-	15,973	30,416	-	-	Polk	-	-	38,483	563,612	-
Gilchrist	-	-	-	16,939	-	Putnam	-	-	35,528	38,836	-
Glades	-	2,266	10,618	-	-	Santa Rosa	-	40,818	106,273	4,281	-
Gulf	-	15,863	-	-	-	Sarasota	-	-	-	379,448	-
Hamilton	-	-	-	14,799	-	Seminole	-	-	41,396	381,322	-
Hardee	-	-	7,973	19,758	-	St. Johns	-	-	190,039	-	-
Hendry	-	-	27,698	11,442	-	St. Lucie	-	277,789	-	-	-
Hernando	-	-	32,131	140,647	-	Sumter	-	-	-	87,023	-
Highlands	-	-	42,346	56,440	-	Suwannee	-	-	-	41,551	-
Hillsborough	-	-	805,817	423,409	-	Taylor	-	-	-	22,570	-
Holmes	-	-	15,977	3,950	-	Union	-	-	-	15,535	-
Indian River	-	84,231	53,797	-	-	Volusia	-	-	440,158	54,435	-
Jackson	-	-	49,746	-	-	Wakulla	-	-	30,776	-	-
Jefferson	-	-	-	14,761	-	Walton	-	2,506	52,537	-	-
Lafayette	-	-	-	8,870	-	Washington	-	-	13,058	11,838	-
Lake	-	-	27,409	269,643	-	State Total	20	2,899,618	7,573,147	8,318,141	-

Analyzing Tropical Cyclone Wind Hazards in Combination with SoVI and MedVI

About Bivariate Classifications

Here, we keep the exposure constant by using the same hazard threat surface but use different vulnerability perspectives (social and medical) in bivariate representations to create an easily understood depiction of not only increased threat but also a limited ability to adequately prepare for and respond to these threats. In doing so, we are able to quickly identify three specific geographic areas of interest:

1. Areas where the hazard itself should be the focus of planning and mitigation,
2. Areas where understanding the underlying socioeconomics and demographics would prove to be the most advantageous input point to create positive change, and
3. Areas where a combination of classic hazard mitigation techniques and social mitigation practices should be utilized in order to maximize optimal outcomes.

The following maps utilize a three by three bivariate representation in which one can easily identify areas of limited to elevated SoVI in relation to areas with low to extreme hazard classifications. Places identified in item number one in the preceding list are shaded in the blue colors and can be understood as locations where hazard

susceptibility is higher than SoVI or MedVI. Areas identified in item number two above, indicating where socioeconomics and demographics play an important role, are shaded in the pink/red colors and can be conceived as locations where SoVI or MedVI are greater than physical hazard threats. Places identified in item number three above are shaded either in gray-tones or in a dark burgundy color and can be understood as areas that have equal vulnerability and hazard classification scores.

Integrating Hurricane Wind Hazard Risk with SoVI and MedVI

With regards to tropical storm force wind risk, much of the panhandle has low social vulnerability and low hazard risk, while areas along the Kissimmee River and the southeastern coast exhibit the highest combination of social vulnerability and hazard vulnerability (Figure 8). Counties with more than 100,000 people displaying high tropical storm force wind hazard risk and high social vulnerability include Broward, Miami-Dade, Orange, Osceola, Palm Beach, and Polk Counties, comprising 489 of the 573 census tracts in that category (

Table 17). When comparing social vulnerability to the risk of hurricane force winds, the coast of Miami-Dade county stands out as having high social vulnerability as well as high hazard vulnerability (Figure 9). Conversely, the panhandle of Florida presents an area of high hazard risk and low social vulnerability. Most of the population at high risk for hurricane force winds are in 267 tracts in Miami-Dade County, totaling nearly 1.4 million people (Table 18). Additionally, Broward and Miami-Dade Counties each contained more than 500,000 people at medium risk.

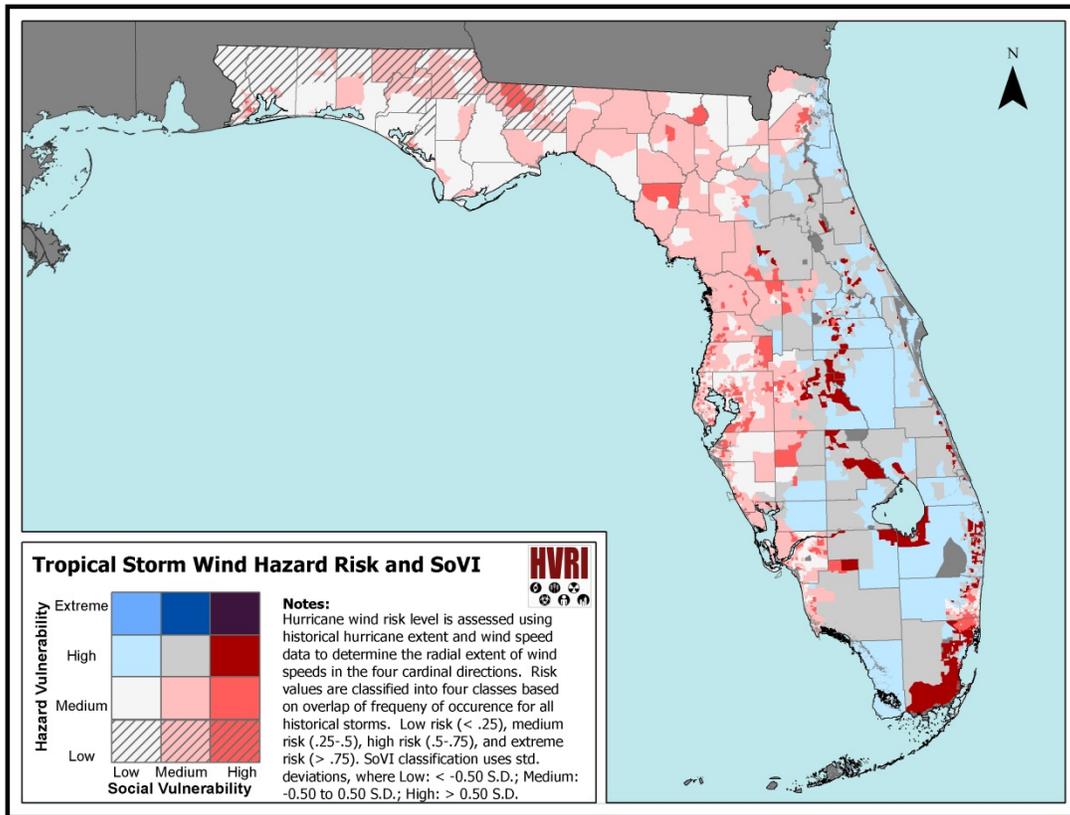


Figure 8: Bivariate representation of SoVI and tropical storm force wind hazard risk in Florida

Table 17: Tract and population summary for counties with high SoVI and medium or greater tropical storm force wind hazard risk.

County Name	Number of Tracts	Total Population of Tracts	County Name	Number of Tracts	Total Population of Tracts	County Name	Number of Tracts	Total Population of Tracts
High Tropical Storm Force Wind Hazard Risk								
Brevard	6	20,847	Broward	37	171,243	Charlotte	4	14,263
Clay	1	5,311	Collier	1	4,657	Duval	1	4,046
Flagler	3	15,884	Hendry	3	21,846	Highlands	8	35,116
Indian River	5	14,670	Marion	8	41,502	Martin	2	4,091
Miami-Dade	269	1,406,413	Okeechobee	3	10,116	Orange	42	209,995
Osceola	14	103,651	Palm Beach	104	378,320	Polk	23	112,273
Putnam	3	10,480	Seminole	7	25,901	St. Johns	1	4,155
St. Lucie	10	37,115	Volusia	18	83,236		-	-
State Total	573	2,735,131		-	-		-	-
Medium Tropical Storm Force Wind Hazard Risk								
Alachua	4	19,406	Bay	2	5,186	Broward	74	378,305
Charlotte	1	3,642	Citrus	5	23,598	Collier	14	72,025
Columbia	1	2,872	DeSoto	3	13,900	Dixie	1	7,331
Duval	36	146,380	Hamilton	1	1,760	Hardee	2	10,630
Hernando	15	62,301	Hillsborough	73	279,785	Lake	9	40,805
Lee	32	100,752	Manatee	19	84,453	Marion	7	60,714
Miami-Dade	90	494,208	Orange	8	42,353	Pasco	28	87,242
Pinellas	37	132,662	Polk	29	107,187	Sarasota	13	46,430
Sumter	6	52,106	Suwannee	1	7,016		-	-
State Total	511	2,283,049		-	-		-	-

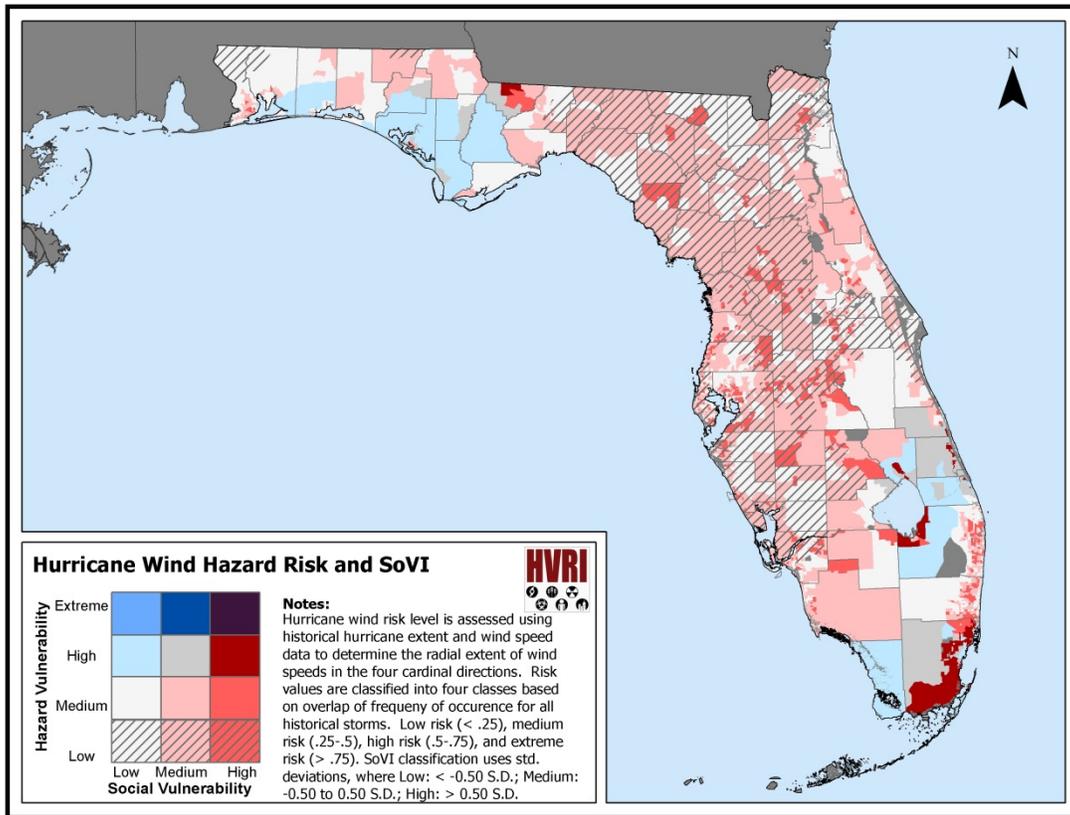


Figure 9: Bivariate representation of SoVI and hurricane force wind hazard risk in Florida.

Table 18: Tract and population summary for counties with high SoVI and medium or greater hurricane force wind hazard risk.

County Name	Number of Tracts	Total Population of Tracts	County Name	Number of Tracts	Total Population of Tracts	County Name	Number of Tracts	Total Population of Tracts
High Hurricane Force Wind Hazard Risk								
Bay	3	8,846	Gadsden	1	5,540	Indian River	3	5,566
Martin	2	4,091	Miami-Dade	267	1,398,628	Okeechobee	3	10,116
Palm Beach	4	15,858	St. Lucie	10	37,115			
State Total	293	1,485,760		-	-		-	-
Medium Hurricane Force Wind Hazard Risk								
Brevard	1	5,430	Broward	111	549,548	Collier	15	76,682
Escambia	12	39,923	Flagler	3	15,884	Gadsden	4	19,493
Hendry	2	14,316	Hernando	1	4,029	Highlands	6	27,137
Hillsborough	52	203,144	Indian River	2	9,104	Lee	8	19,380
Miami-Dade	92	501,993	Osceola	1	4,355	Palm Beach	100	362,462
Pasco	11	38,187	Polk	2	5,069	Putnam	1	3,342
Santa Rosa	1	6,115	St. Johns	1	4,155	Volusia	17	79,273
State Total	443	1,989,021		-	-		-	-

As shown in Figure 10, medical vulnerability is highest in the northern and central portions of the state, with the highest combination of medical vulnerability and tropical storm force wind hazard risk from the center of the peninsula eastward toward the Atlantic Ocean. Counties with the highest populations in the high tropical storm force wind hazard risk coupled with high medical vulnerability include Marion, Osceola, Polk, St. Lucie, and Volusia Counties, each with more than 200,000 people at high hazard risk (Table 19). Low medical vulnerability coupled with high hazard risk is most present in south Florida, although there are some tracts where medical vulnerability is high. When comparing medical vulnerability to hurricane force wind hazard risk, areas most at risk still include north and central Florida, but with the higher risks present in the panhandle (Figure 11). St. Lucie and Bay Counties have the most people at high risk, totaling more than 400,000 people across 75 tracts. An additional 438 tracts across 30 counties represent 1.9 million people at medium risk and high medical vulnerability (Table 20).

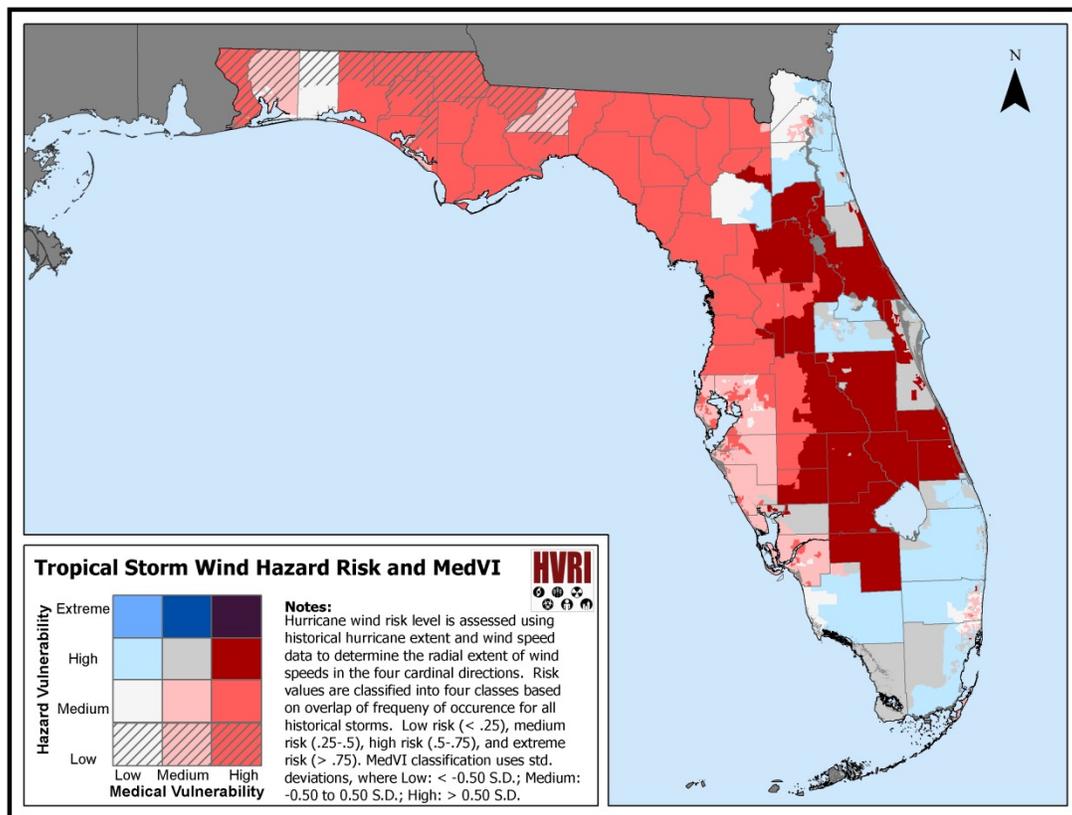


Figure 10: Bivariate representation of MedVI and tropical storm force wind hazard risk in Florida.

Table 19: Tract and population summary for counties with high MedVI and medium or greater tropical storm force wind hazard risk.

County Name	Number of Tracts	Total Population of Tracts	County Name	Number of Tracts	Total Population of Tracts	County Name	Number of Tracts	Total Population of Tracts
High Tropical Storm Force Wind Hazard Risk								
Bradford	1	7,635	Brevard	27	158,238	Broward	1	8,694
Charlotte	7	32,234	DeSoto	5	17,692	Flagler	6	24,521
Glades	3	12,884	Hardee	2	7,973	Hendry	6	39,140
Hernando	1	4,785	Highlands	25	95,984	Indian River	29	138,028
Lake	23	161,026	Marion	43	210,256	Miami-Dade	4	12,514
Okeechobee	11	39,996	Osceola	39	264,577	Polk	58	253,610
Putnam	17	74,364	St. Johns	2	7,673	St. Lucie	43	277,789
Sumter	2	5,601	Volusia	113	494,593		-	-
State Total	468	2,349,807		-	-		-	-
Medium Tropical Storm Force Wind Hazard Risk								
Baker	3	20,431	Bay	20	65,546	Bradford	3	20,885
Broward	3	18,422	Calhoun	2	12,192	Citrus	27	141,236
Columbia	12	67,531	DeSoto	4	17,170	Dixie	3	16,422
Duval	10	34,821	Escambia	1	2,136	Franklin	4	11,549
Gilchrist	5	16,939	Gulf	3	15,863	Hamilton	3	14,799
Hardee	4	19,758	Hernando	43	167,993	Highlands	1	2,801
Hillsborough	85	307,926	Jefferson	3	14,761	Lafayette	2	8,870
Lake	33	136,026	Lee	32	136,588	Levy	9	40,801
Liberty	2	8,365	Madison	5	19,224	Manatee	17	73,525
Marion	19	121,042	Pasco	131	458,710	Pinellas	68	272,992
Polk	95	348,482	Sarasota	16	63,596	Sumter	16	81,422
Suwannee	7	41,551	Taylor	4	22,570	Union	3	15,535
Wakulla	3	21,909	Walton	7	34,262	Washington	1	6,615
State Total	709	2,901,266		-	-		-	-

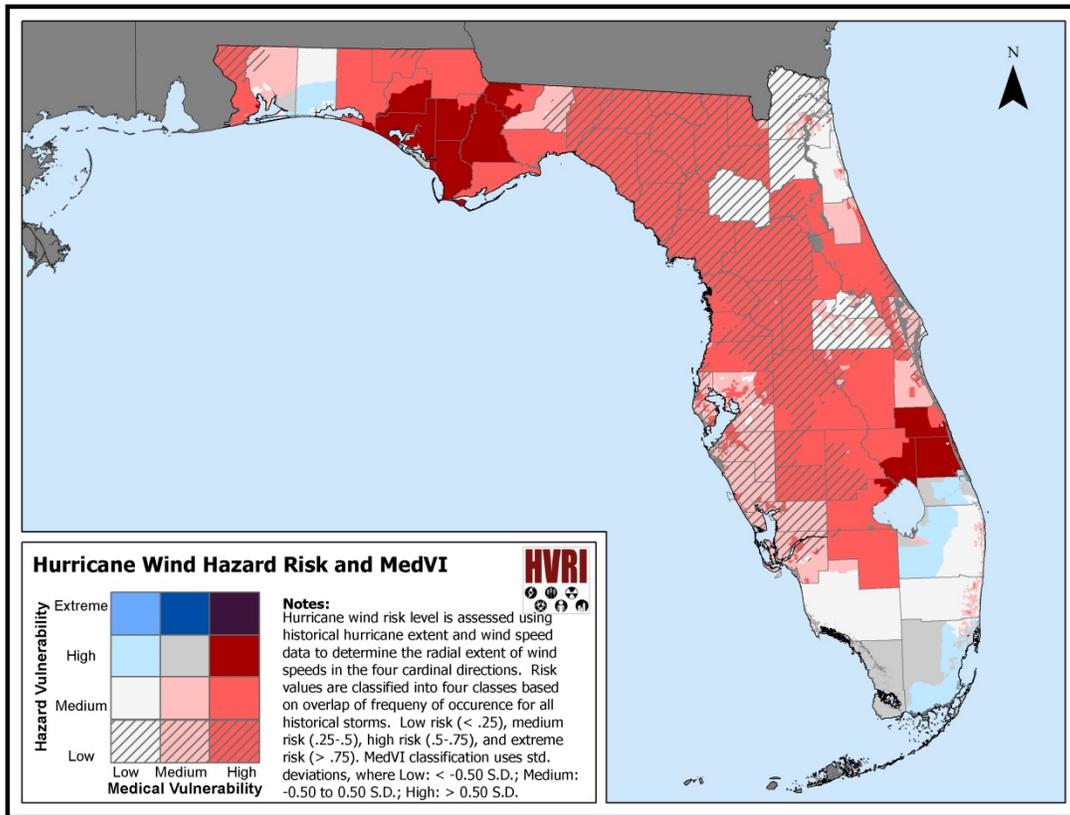


Figure 11: Bivariate representation of MedVI and hurricane force wind hazard risk in Florida.

Table 20: Tract and population summary for counties with high MedVI and medium or greater hurricane force wind hazard risk.

County Name	Number of Tracts	Total Population of Tracts	County Name	Number of Tracts	Total Population of Tracts	County Name	Number of Tracts	Total Population of Tracts
High Hurricane Force Wind Hazard Risk								
Bay	32	127,796	Calhoun	2	12,192	Escambia	3	10,743
Franklin	1	1,690	Gadsden	3	15,973	Glades	1	2,266
Gulf	3	15,863	Indian River	19	84,231	Liberty	2	8,365
Miami-Dade	4	12,514	Okeechobee	10	37,175	St. Lucie	43	277,789
Walton	1	2,506	Washington	3	13,058			
State Total	127	622,161		-	-		-	-
Medium Hurricane Force Wind Hazard Risk								
Brevard	2	17,274	Broward	4	27,116	Calhoun	1	2,433
Citrus	2	9,747	Escambia	64	269,428	Flagler	6	24,521
Franklin	3	9,859	Gadsden	6	30,416	Glades	2	10,618
Hardee	2	7,973	Hendry	4	27,698	Hernando	8	32,131
Highlands	11	42,346	Hillsborough	65	231,817	Holmes	3	15,977
Indian River	10	53,797	Jackson	11	49,746	Lake	5	27,409
Lee	4	26,611	Okeechobee	1	2,821	Osceola	12	69,799
Pasco	71	262,863	Pinellas	1	4,322	Polk	13	38,483
Putnam	8	35,528	St. Johns	2	7,673	Volusia	99	440,158
Wakulla	4	30,776	Walton	10	52,537	Washington	4	11,838
State Total	438	1,873,715		-	-		-	-