



MEMORANDUM

DATE: February 5, 2024
TO: David Durden, General Manager
FROM: James Murphy, Chief Actuary | Vice President, Enterprise Analytics
RE: 2024 Funding – 100-Year Probable Maximum Loss and Reinsurance

The Association is required by statute to maintain total available loss funding in an amount not less than the Association's probable maximum loss (PML) for a catastrophe year with a one-in-100-year probability. In support of this, the TWIA Board of Directors has asked the Actuarial & Underwriting Committee for its recommendations in determining the 100-year PML for the 2024 hurricane season. To assist the Committee, I have prepared the following resolution template and information and attached reference exhibits to accompany a presentation by TWIA's catastrophe modeler, Aon. The attached exhibits include a timeline for the PML determination process, statutory and regulatory requirements, and an analysis of recent TWIA growth originally presented to the Board of Directors at its December 2023 meeting.

Template for Committee Recommendations for the 2024 Hurricane Season

1. The Committee recommends to average the results from the catastrophe models presented as a reference point for making the Board's determination of the 100-year PML using the following weighting: AIR ___% RMS ___% IF ___% RQE ___%.
2. The Committee recommends that the model results based on [near] [long] term assumptions are preferable.
3. The Committee recommends that the words, "total available loss funding" in statute contemplate [inclusion] [exclusion] of loss adjustment expenses in determining the probable maximum loss for the Association for a catastrophe year with a probability of one in one hundred.
4. The Committee recommends based on the foregoing and the information presented that for catastrophe year 2024 the one in one hundred probable maximum loss amount is \$___ billion.

For reference, the resolutions regarding the 100-year PML and reinsurance passed by the TWIA Board at its January 19, 2023 meeting assigned 100% weight to the RMS model based on long-term frequency assumptions and including loss adjustment expenses. The resulting PML was \$4.508 billion.



Additional Reference Information

Texas Administrative Code Rule §5.4160 requires the Association to discuss determining its one-in-100-year probable maximum loss for the year at the Association's first regular board meeting each year. Following the discussion at this meeting, the Association must determine its one in-100-year probable maximum loss for the year and disclose it to the Commissioner not later than April 1. The Association must disclose its method for determining its one-in-100-year probable maximum loss at the same time. The determination and information must be disclosed each year, regardless of whether the Association requests a reinsurance assessment.

Neither the statute nor TDI's rule guidance specify how the Association must determine its one-in-100-year probable maximum loss. However, the rule describes the information that must be included regarding the methodology used to determine the one-in-100-year probable maximum loss. This information has been provided in the attached summary. The rule can be found in its entirety online at the following link: [Rule §5.4160](#).

In 2019, the Texas Legislature enacted statutory changes that require the Association to assess its member insurers to pay for any reinsurance it purchases in excess of the Association's 1:100 statutory minimum funding level. Member assessments to pay for this excess reinsurance are distinct from member assessments to pay losses and would not affect the Association's ability to assess member companies for excess losses incurred.

Sec. 2210.453(f) of the Texas Insurance Code prohibits the Association from purchasing reinsurance from an insurer or broker involved in the execution of a catastrophe model on which the Association relies in determining the probable maximum loss applicable for the period covered by the reinsurance. TWIA's reinsurance broker, Gallagher Re, has not been involved in the execution of any of the catastrophe models to be relied on by the Board in determining the 100-year probable maximum loss.

JM

Exhibit 1 - Annual Timetable

Timing	Action
<p>At the Association's first regular board meeting (February)</p>	<p>The association must discuss with the Board its methodology for determining its one-in-100-year probable maximum loss for the calendar year.</p> <p>The association must determine its one-in-100-year probable maximum loss for the calendar year</p> <p>In discussing its methodology, the Association must provide the information described in §5.4160(d) and make that information available to its members and the public.</p>
<p>After the first regular board meeting but not later than April 1</p>	<p>The Association must disclose to the Commissioner its one-in-100-year probable maximum loss for the calendar year and the Association's method for determining that probable maximum loss.</p>
<p>No later than the second regular board meeting (May)</p>	<p>If the Association elects to purchase coverage for reinsurance or alternative risk transfer mechanisms in excess of the one-in-100-year probable maximum loss, then the Association must also obtain a quote for coverage that provides funding equal to the one in 100-year probable maximum loss.</p> <p>The Association must provide each of the following to its board and make this information available to its members and the public:</p> <ul style="list-style-type: none"> (1) the reinsurance or alternative risk transfer mechanism premium quote for coverage that provides funding equal to the one in 100-year probable maximum loss. (2) the total deposit premiums for all reinsurance or alternative risk transfer mechanism coverage for the year. <p>If, at the time of the second regular board meeting of the calendar year, deposit premiums described above are not known, then the Association must provide its best estimate of those premiums to the board and make the estimate available to its members.</p>
<p>Following disclosure to the Commissioner of the one-in-100-year probable maximum loss</p>	<p>The department (TDI) will post one-in- 100-year probable maximum loss for the calendar year and the Association's method for determining that probable maximum loss on its website.</p>

As soon as the Association knows the deposit premiums (June)	As soon as the Association knows the deposit premiums described in subsection (g) of this section, the Association must provide them to the board and make them available to its members.
Within a reasonable time after it knows its total reinsurance costs for that calendar year	If the Association must assess its members under Insurance Code §2210.453(d)(1) then the Association must request the Commissioner's approval within a reasonable time after it knows its total reinsurance costs for that calendar year.
By the later of either: (A) 120 days after the date the Association receives the [member premium data that TDI provides under §5.4162(f) for that year; or (B) December 1 of that year.	The Association must issue the assessment.
Within 30 days of receipt of notice of assessment.	Each member must remit to the Association payment in full of its assessed amount of any assessment levied by the Association within 30 days of receipt of notice of assessment.

Exhibit 2

**Sec. 2210.453. FUNDING LEVELS; REINSURANCE AND ALTERNATIVE RISK FINANCING MECHANISMS;
REINSURANCE FROM CERTAIN INSURER OR BROKER PROHIBITED.**

- (a) The Association may purchase reinsurance or use alternative risk financing mechanisms or both as necessary.
- (b) The Association shall maintain total available loss funding in an amount not less than the probable maximum loss for the Association for a catastrophe year with a probability of one in 100. If necessary, the required funding level shall be achieved through the purchase of reinsurance or the use of alternative financing mechanisms, or both, to operate in addition to or in concert with the trust fund, public securities, financial instruments, and assessments authorized by this chapter.
- (c) The attachment point for reinsurance purchased under this section may not be less than the aggregate amount of all funding available to the Association under Subchapter B-1.
- (d) The cost of the reinsurance purchased or alternative financing mechanisms used under this section in excess of the minimum funding level required by Subsection (b) shall be paid by assessments as provided by this subsection. The Association, with the approval of the commissioner, shall notify each member of the Association of the amount of the member's assessment under this subsection. The proportion of the cost to each insurer under this subsection shall be determined in the manner used to determine each insurer's participation in the Association for the year under Section 2210.052.
- (e) A member of the Association may not recoup an assessment paid under Subsection (d) through a premium surcharge or tax credit.
- (f) The association may not purchase reinsurance under this section from an insurer or broker involved in the execution of a catastrophe model on which the association relies in:
 - (1) determining the probable maximum loss applicable for the period covered by the reinsurance; or
 - (2) adopting rates under Section 2210.355.

Exhibit 3

Information Required to be Disclosed to the Commissioner pursuant to §5.4160(d)

In disclosing its method for determining its one-in-100-year probable maximum loss, the association must include:

- (1) the hurricane model or models it relied on, including the model vendors, the model names, and the versions of each model;
- (2) the in-force date and the total amount of direct exposures in force for the policy data used as the input for each hurricane model the association relied on;
- (3) all user-selected hurricane model input assumptions used with each hurricane model the association relied on;
- (4) the one-in-100-year probable maximum loss model output produced by each hurricane model the association relied on;
- (5) if the association relied on more than one hurricane model, the methodology the association used to blend or average the hurricane model outputs, including all weighting factors used; and
- (6) any adjustments the association or another party made to the one-in-100-year probable maximum loss model outputs or the blended or averaged output, including any adjustments to include loss adjustment expenses.



MEMORANDUM

DATE: November 21, 2023

TO: David Durden
General Manager

FROM: James C. Murphy, FCAS, MAAA
Chief Actuary | Vice President, Enterprise Analytics

RE: Analysis of TWIA Growth

TWIA has been growing rapidly since 2021, with the policies in-force and direct liability having increased 27% and 57%, respectively, over the last two years. This growth has been driven both by insolvencies and the general constriction of the private market on the coast.

To better understand the growth and its impact on the Association, and prompted by questions raised by multiple Board members, I have prepared some additional exhibits to supplement the standard policy count and exposure exhibits included in each Board meeting's materials.

Following the Statistical and Quarterly Liability reports in this section, please find the following:

- A comparison of new vs. renewing business by policy and property characteristics, identifying fundamental differences between policies issued in the last twelve months and those that were insured by TWIA prior to that time;
- Several exhibits showing the geographic distribution of growth over the last year, both at a county and ZIP code level; and
- A high-level analysis of the impact of the growth on TWIA's funding, specifically the leveraged impact on reinsurance.

JM

Texas Windstorm Insurance Association
Statistical Report
As of September 30, 2023



County	<u>Policies In-Force</u>		<u>PIF Growth</u>		<u>Exposure In-Force</u>		<u>Exposure Growth</u>		<u>YTD Written Premium</u>		<u>Premium Growth</u>	
	9/30/22	9/30/23	Actual	Percentage	9/30/22	9/30/23	Actual	Percentage	9/30/22	9/30/23	Actual	Percentage
Aransas	6,833	7,593	760	11.10%	2,559,850,452	3,258,299,800	\$698,449,348	27.30%	15,996,212	21,126,926	\$5,130,714	32.10%
Brazoria	37,192	43,695	6,503	17.50%	12,067,270,887	16,030,880,200	\$3,963,609,313	32.80%	64,401,256	84,228,731	\$19,827,475	30.80%
Calhoun	4,186	4,454	268	6.40%	1,219,038,062	1,408,460,400	\$189,422,338	15.50%	7,720,784	8,971,136	\$1,250,352	16.20%
Cameron	9,995	10,694	699	7.00%	3,347,450,272	4,329,607,700	\$982,157,428	29.30%	17,458,483	25,613,507	\$8,155,024	46.70%
Chambers	5,252	6,398	1,146	21.80%	1,964,051,657	2,653,303,400	\$689,251,743	35.10%	10,025,429	13,165,340	\$3,139,911	31.30%
Galveston	69,814	76,687	6,873	9.80%	25,935,986,204	31,724,081,700	\$5,788,095,496	22.30%	146,556,412	176,838,733	\$30,282,321	20.70%
Harris	3,831	4,262	431	11.30%	1,345,861,000	1,714,052,000	\$368,191,000	27.40%	5,462,280	7,077,412	\$1,615,132	29.60%
Jefferson	27,806	30,277	2,471	8.90%	7,324,845,116	9,260,880,700	\$1,936,035,584	26.40%	45,262,495	57,077,185	\$11,814,690	26.10%
Kenedy	24	35	11	45.80%	6,819,741	6,955,300	\$135,559	2.00%	53,518	34,946	-\$18,572	-34.70%
Kleberg	820	903	83	10.10%	208,718,453	291,802,200	\$83,083,747	39.80%	1,301,095	2,279,445	\$978,350	75.20%
Matagorda	4,908	5,276	368	7.50%	1,363,794,629	1,636,561,900	\$272,767,271	20.00%	7,745,709	9,520,007	\$1,774,298	22.90%
Nueces	40,637	43,735	3,098	7.60%	13,097,317,231	16,619,975,600	\$3,522,658,369	26.90%	74,287,382	95,942,636	\$21,655,254	29.20%
Refugio	371	426	55	14.80%	106,490,828	127,317,700	\$20,826,872	19.60%	746,584	892,337	\$145,753	19.50%
San Patricio	7,200	8,075	875	12.20%	2,175,192,349	2,719,080,100	\$543,887,751	25.00%	12,580,535	15,767,557	\$3,187,022	25.30%
Willacy	350	378	28	8.00%	99,331,821	126,426,300	\$27,094,479	27.30%	733,970	903,302	\$169,332	23.10%
Total	219,219	242,888	23,669	10.80%	72,822,018,702	91,907,685,000	\$19,085,666,298	26.20%	410,332,144	519,439,200	\$109,107,056	26.60%

Texas Windstorm Insurance Association
 Quarterly Liability Report
 As of September 30, 2023



Class of Business	Policies Written		Risks Written		Premium Written		Liability at End of Quarter		In-Force at End of Quarter	
	During Qtr	YTD	During Qtr	YTD	During Qtr	YTD	Direct	Indirect	Policies	Risks
Aransas										
Commercial	149	404	322	1,021	1,515,499	5,426,680	547,679,000	15,561,555	432	1,031
Manufactured Home	60	180	60	180	104,957	304,272	12,888,200	0	193	193
Residential	2,720	6,012	2,720	6,012	7,145,017	15,395,974	2,697,732,600	233,294,740	6,968	6,968
Total	2,929	6,596	3,102	7,213	8,765,473	21,126,926	3,258,299,800	248,856,295	7,593	8,192
Brazoria										
Commercial	323	710	518	1,305	2,542,526	7,321,900	720,977,500	23,768,899	809	1,448
Manufactured Home	76	218	76	218	152,696	443,358	19,888,600	0	258	258
Residential	16,424	36,224	16,424	36,224	36,096,738	76,463,473	15,290,014,100	2,080,428,640	42,628	42,628
SUM:	16,823	37,152	17,018	37,747	38,791,960	84,228,731	16,030,880,200	2,104,197,539	43,695	44,334
Calhoun										
Commercial	87	186	161	369	510,429	1,588,729	157,714,000	4,527,340	207	442
Manufactured Home	25	63	25	63	41,392	104,362	5,011,100	0	75	75
Residential	1,532	3,549	1,532	3,549	3,223,478	7,278,045	1,245,735,300	108,768,860	4,172	4,172
SUM:	1,644	3,798	1,718	3,981	3,775,299	8,971,136	1,408,460,400	113,296,200	4,454	4,689
Cameron										
Commercial	294	731	623	1,997	3,641,717	12,792,056	1,878,591,000	25,165,890	825	2,247
Manufactured Home	27	63	27	63	31,749	72,092	3,246,700	0	70	70
Residential	3,497	8,347	3,497	8,347	5,559,250	12,749,359	2,447,770,000	233,381,400	9,799	9,799
SUM:	3,818	9,141	4,147	10,407	9,232,716	25,613,507	4,329,607,700	258,547,290	10,694	12,116

Texas Windstorm Insurance Association
Quarterly Liability Report
As of September 30, 2023



Class of Business	Policies Written		Risks Written		Premium Written		Liability at End of Quarter		In-Force at End of Quarter	
	During Qtr	YTD	During Qtr	YTD	During Qtr	YTD	Direct	Indirect	Policies	Risks
Chambers										
Commercial	61	108	79	148	442,923	926,107	94,482,000	2,337,465	122	189
Manufactured Home	25	56	25	56	40,747	104,044	5,076,800	0	68	68
Residential	2,426	5,344	2,426	5,344	5,714,063	12,135,189	2,553,744,600	354,247,960	6,208	6,208
SUM:	2,512	5,508	2,530	5,548	6,197,733	13,165,340	2,653,303,400	356,585,425	6,398	6,465
Galveston										
Commercial	819	1,959	1,538	3,772	12,018,782	31,816,333	3,612,112,000	87,962,390	2,226	4,439
Manufactured Home	78	212	78	212	128,239	351,479	16,644,400	0	255	255
Residential	25,102	62,540	25,102	62,540	59,534,112	144,670,921	28,095,325,300	3,306,219,540	74,206	74,206
SUM:	25,999	64,711	26,718	66,524	71,681,133	176,838,733	31,724,081,700	3,394,181,930	76,687	78,900
Harris										
Commercial	31	76	79	292	650,460	1,814,057	219,958,000	6,436,620	84	257
Manufactured Home	4	5	4	5	6,472	6,996	267,000	0	5	5
Residential	1,322	3,476	1,322	3,476	1,992,937	5,256,359	1,493,827,000	200,757,540	4,173	4,173
SUM:	1,357	3,557	1,405	3,773	2,649,869	7,077,412	1,714,052,000	207,194,160	4,262	4,435
Jefferson										
Commercial	354	764	713	1,409	4,526,592	8,646,713	926,779,800	27,165,619	851	1,662
Manufactured Home	23	63	23	63	43,849	119,708	5,131,400	0	65	65
Residential	11,198	25,452	11,198	25,452	22,436,067	48,310,764	8,328,969,500	1,093,772,500	29,361	29,361
SUM:	11,575	26,279	11,934	26,924	27,006,508	57,077,185	9,260,880,700	1,120,938,119	30,277	31,088

Texas Windstorm Insurance Association
 Quarterly Liability Report
 As of September 30, 2023



Class of Business	Policies Written		Risks Written		Premium Written		Liability at End of Quarter		In-Force at End of Quarter	
	During Qtr	YTD	During Qtr	YTD	During Qtr	YTD	Direct	Indirect	Policies	Risks
Kenedy										
Commercial	0	1	0	5	0	-13,960	0	0	0	0
Manufactured Home	0	0	0	0	0	0	0	0	0	0
Residential	19	34	19	34	29,429	48,906	6,955,300	40,800	35	35
SUM:	19	35	19	39	29,429	34,946	6,955,300	40,800	35	35
Kleberg										
Commercial	18	45	27	96	97,933	1,010,842	65,157,000	2,166,450	55	110
Manufactured Home	1	3	1	3	3,013	6,799	259,500	0	3	3
Residential	327	727	327	727	600,164	1,261,804	226,385,700	24,626,440	845	845
SUM:	346	775	355	826	701,110	2,279,445	291,802,200	26,792,890	903	958
Matagorda										
Commercial	59	146	85	368	448,587	1,468,441	141,959,000	1,931,145	178	387
Manufactured Home	11	33	11	33	22,892	66,609	2,846,000	0	36	36
Residential	1,724	4,312	1,724	4,312	3,319,305	7,984,957	1,491,756,900	156,168,100	5,062	5,062
SUM:	1,794	4,491	1,820	4,713	3,790,784	9,520,007	1,636,561,900	158,099,245	5,276	5,485
Nueces										
Commercial	778	2,000	1,681	4,465	9,781,838	26,963,773	3,573,832,300	97,211,415	2,302	5,252
Manufactured Home	21	40	21	40	33,451	68,288	2,993,200	0	48	48
Residential	13,992	35,187	13,992	35,187	28,445,752	68,910,575	13,043,150,100	1,477,196,060	41,385	41,385
SUM:	14,791	37,227	15,694	39,692	38,261,041	95,942,636	16,619,975,600	1,574,407,475	43,735	46,685

Texas Windstorm Insurance Association
 Quarterly Liability Report
 As of September 30, 2023



Class of Business	Policies Written		Risks Written		Premium Written		Liability at End of Quarter		In-Force at End of Quarter	
	During Qtr	YTD	During Qtr	YTD	During Qtr	YTD	Direct	Indirect	Policies	Risks
Refugio										
Commercial	17	30	30	48	176,057	235,174	20,729,000	177,900	31	52
Manufactured Home	5	20	5	20	9,406	40,869	1,742,700	0	22	22
Residential	138	341	138	341	279,016	616,294	104,846,000	10,961,560	373	373
SUM:	160	391	173	409	464,479	892,337	127,317,700	11,139,460	426	447
San Patricio										
Commercial	96	250	157	448	755,373	2,218,378	221,293,500	5,846,170	278	497
Manufactured Home	19	52	19	52	32,243	93,580	4,014,600	0	56	56
Residential	2,957	6,703	2,957	6,703	6,447,582	13,455,599	2,493,772,000	310,676,680	7,741	7,741
SUM:	3,072	7,005	3,133	7,203	7,235,198	15,767,557	2,719,080,100	316,522,850	8,075	8,294
Willacy										
Commercial	11	27	16	53	74,674	242,637	26,440,000	99,900	32	73
Manufactured Home	3	11	3	11	7,865	19,443	742,100	0	10	10
Residential	128	291	128	291	305,283	641,222	99,244,200	6,818,740	336	336
SUM:	142	329	147	355	387,822	903,302	126,426,300	6,918,640	378	419
Total All Counties										
Commercial	3,097	7,437	6,029	15,796	37,183,390	102,457,860	12,207,704,100	300,358,758	8,432	18,086
Manufactured Home	378	1,019	378	1,019	658,971	1,801,899	80,752,300	0	1,164	1,164
Residential	83,506	198,539	83,506	198,539	181,128,193	415,179,441	79,619,228,600	9,597,359,560	233,292	233,292
SUM:	86,981	206,995	89,913	215,354	218,970,554	519,439,200	91,907,685,000	9,897,718,318	242,888	252,542

Texas Windstorm Insurance Association
Analysis of Growth
Distribution of New Business vs Renewals
 by Policy and Property Characteristics
 Policies In-Force as of 9/30/2023

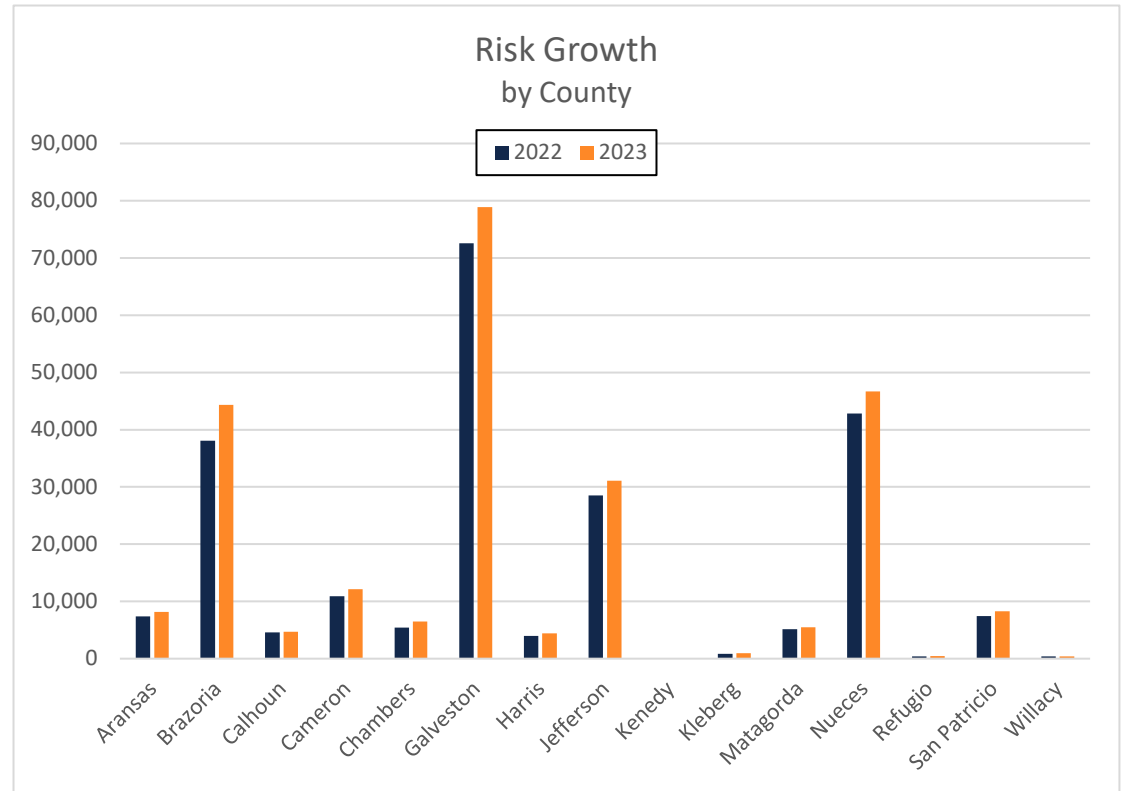


Occupancy, construction type, roof year, and building code were also examined but did not show significant differences

Texas Windstorm Insurance Association
Analysis of Growth
Risks In-Force
 by County
 as of September 30, 2022-2023



County	Risks In-Force *		Growth	%
	2022	2023		
Aransas	7,380	8,192	812	11.0%
Brazoria	38,057	44,334	6,277	16.5%
Calhoun	4,593	4,689	96	2.1%
Cameron	10,908	12,116	1,208	11.1%
Chambers	5,442	6,465	1,023	18.8%
Galveston	72,588	78,900	6,312	8.7%
Harris	3,998	4,435	437	10.9%
Jefferson	28,522	31,088	2,566	9.0%
Kenedy	33	35	2	6.1%
Kleberg	866	958	92	10.6%
Matagorda	5,124	5,485	361	7.0%
Nueces	42,803	46,685	3,882	9.1%
Refugio	412	447	35	8.5%
San Patricio	7,426	8,294	868	11.7%
Willacy	394	419	25	6.3%
Total	228,546	252,542	23,996	10.5%

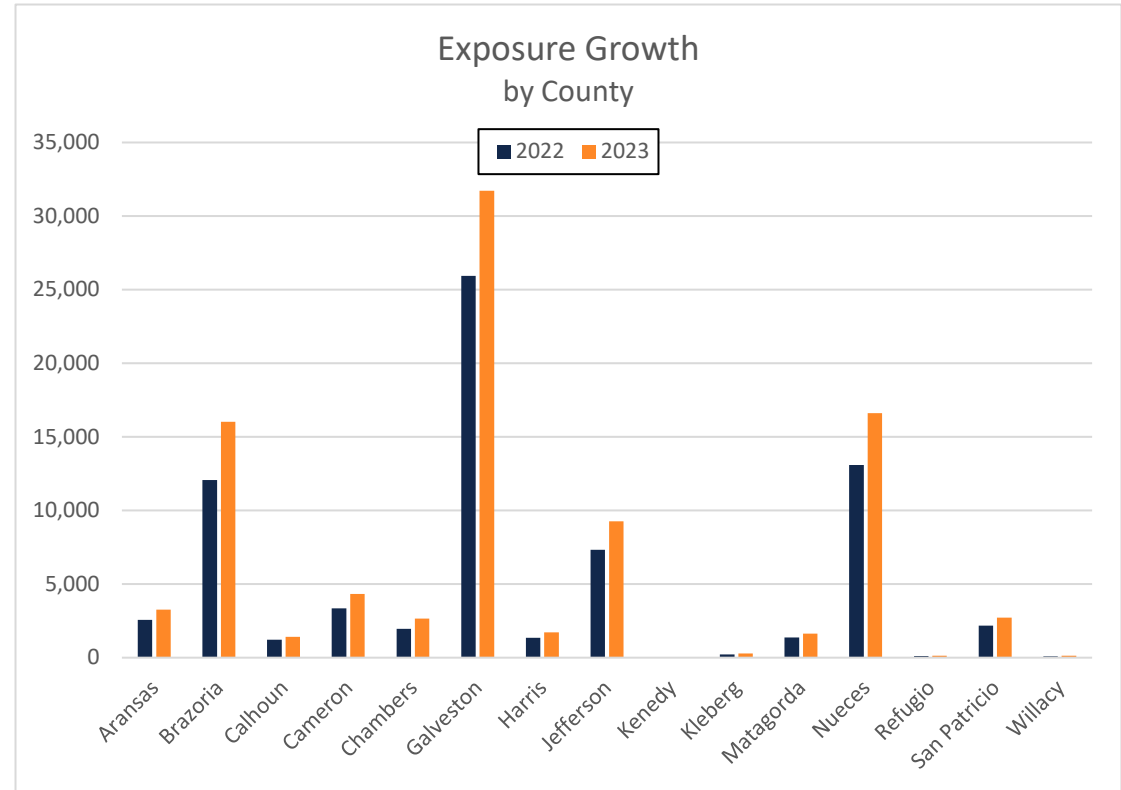


* Risks in-force count each location separately on multi-location policies

Texas Windstorm Insurance Association
Analysis of Growth
Exposures In-Force
 by County
 as of September 30, 2022-2023



County	Direct Liability In-Force (\$M) *			
	2022	2023	Growth	%
Aransas	2,561	3,258.3	697.3	27.2%
Brazoria	12,068	16,030.9	3,962.8	32.8%
Calhoun	1,219	1,408.5	189.4	15.5%
Cameron	3,347	4,329.6	982.2	29.3%
Chambers	1,964	2,653.3	689.3	35.1%
Galveston	25,936	31,724.1	5,788.3	22.3%
Harris	1,346	1,714.1	368.2	27.4%
Jefferson	7,325	9,260.9	1,936.0	26.4%
Kenedy	7	7.0	0.1	2.0%
Kleberg	209	291.8	83.1	39.8%
Matagorda	1,363	1,636.6	273.4	20.1%
Nueces	13,097	16,620.0	3,522.7	26.9%
Refugio	106	127.3	20.8	19.6%
San Patricio	2,174	2,719.1	545.1	25.1%
Willacy	99	126.4	27.1	27.3%
Total	72,822.0	91,907.7	19,085.7	26.2%



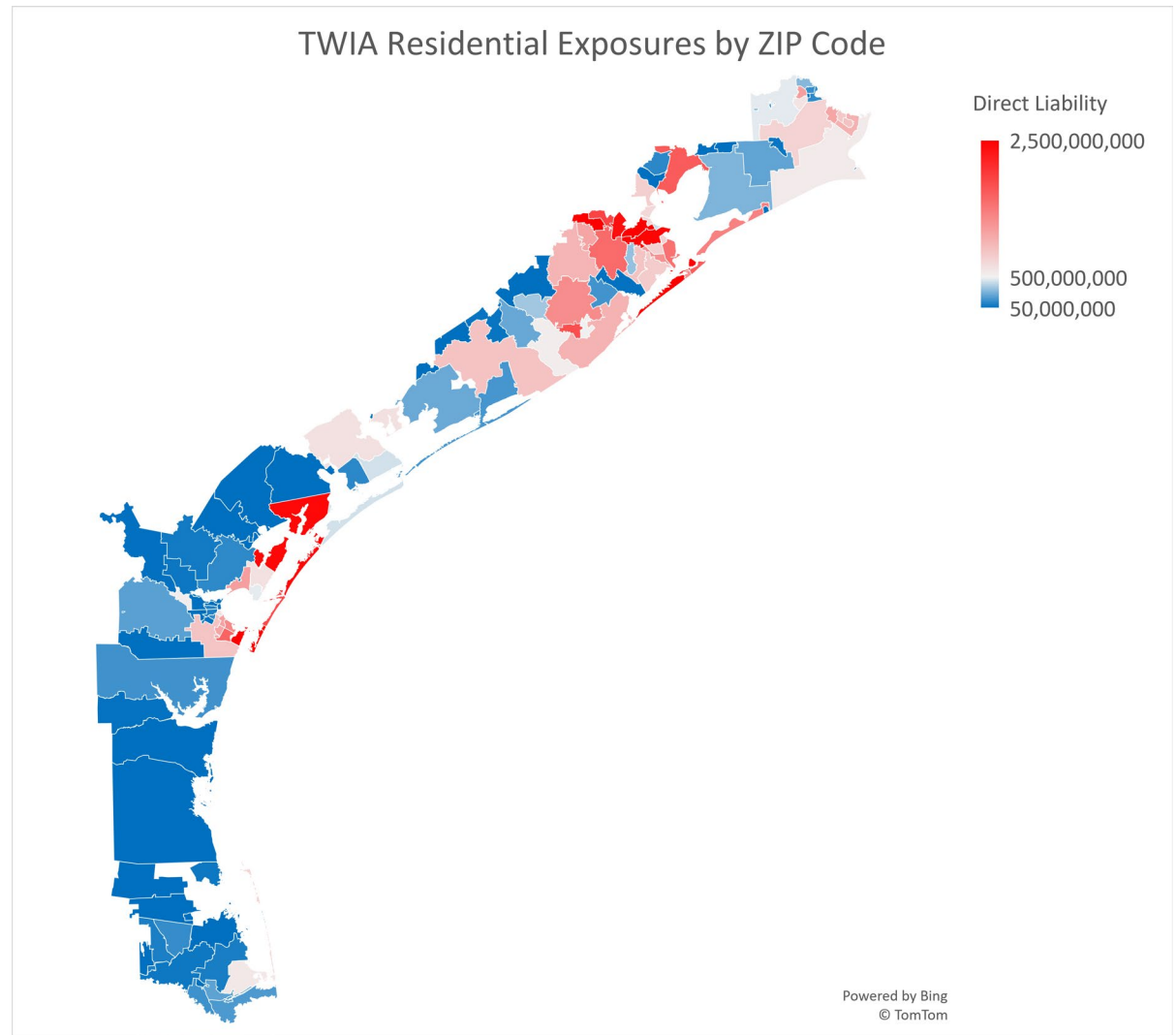
* Direct liability includes structure and contents coverage and excludes business interruption coverage

Texas Windstorm Insurance Association
Analysis of Growth
Residential Exposures In-Force
 by ZIP Code
 as of September 30, 2023



Top 25 ZIP codes

ZIP Code	Description	Direct Liability
77573	League City	7,793,503,100
77554	Galveston	4,009,348,100
77584	Pearland	3,544,878,800
78418	Corpus Christi	2,970,859,900
77539	Dickinson	2,458,540,400
78382	Rockport	2,431,019,200
77546	Friendswood	2,373,145,900
77581	Pearland	1,941,248,500
78373	Port Aransas	1,876,624,600
77566	Lake Jackson	1,843,949,100
77523	Baytown	1,737,996,900
77550	Galveston	1,731,875,500
78414	Corpus Christi	1,675,676,300
77511	Alvin	1,612,203,700
77590	Texas City	1,560,541,600
77650	Port Bolivar	1,423,685,400
78412	Corpus Christi	1,355,360,300
77515	Angleton	1,331,437,200
77551	Galveston	1,321,981,400
77568	La Marque	1,288,192,000
77706	Beaumont	1,189,940,600
78374	Portland	1,187,375,900
78411	Corpus Christi	1,159,942,900
77578	Manvel	1,136,077,900
77627	Nederland	1,126,361,900

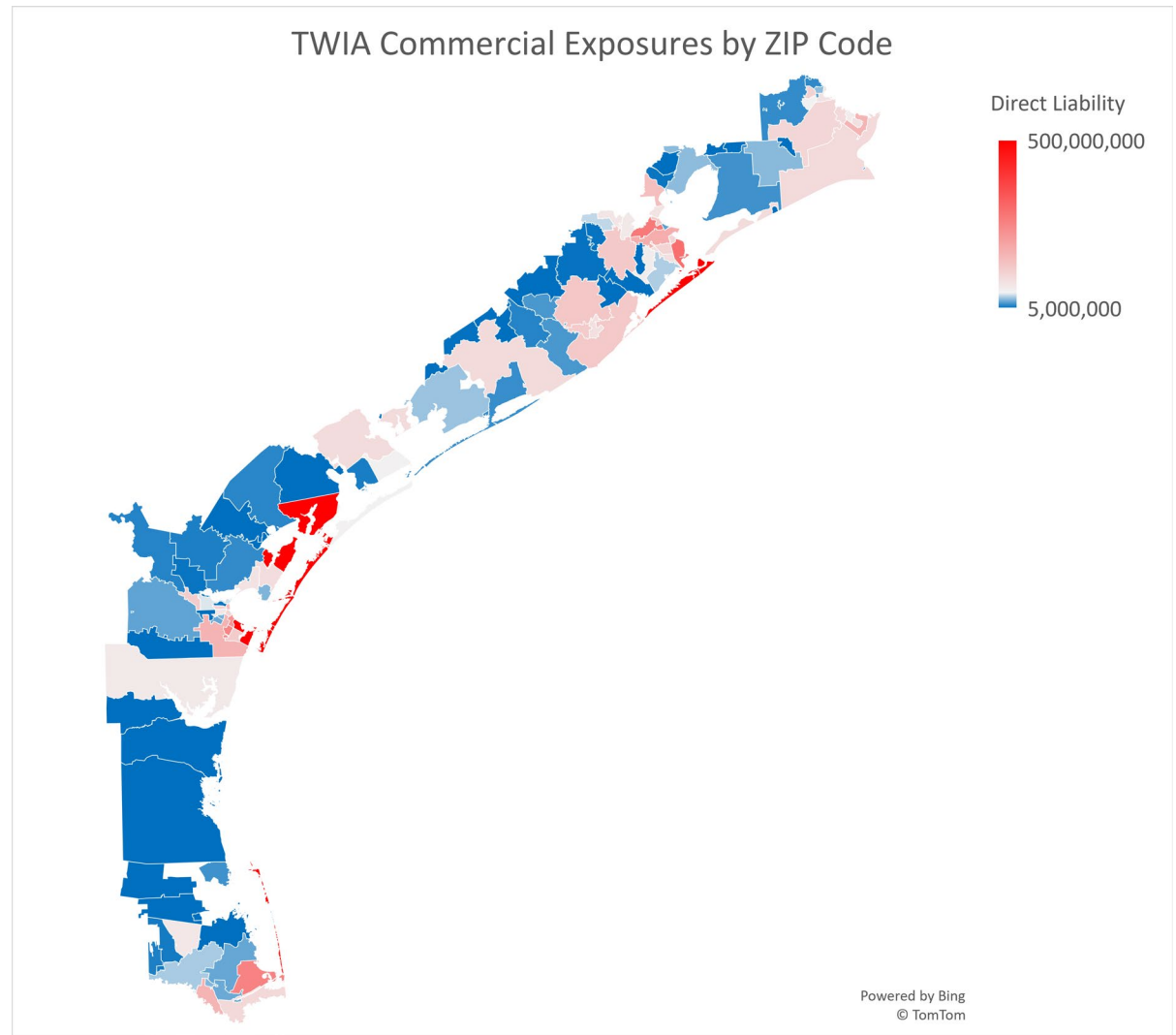


Texas Windstorm Insurance Association
Analysis of Growth
Commercial Exposures In-Force
 by ZIP Code
 as of September 30, 2023



Top 25 ZIP codes

ZIP Code	Description	Direct Liability
78597	South Padre Island	1,024,015,000
77550	Galveston	960,566,000
78373	Port Aransas	948,475,800
77554	Galveston	667,699,000
78418	Corpus Christi	629,593,000
77551	Galveston	576,025,000
78412	Corpus Christi	524,456,000
78382	Rockport	501,172,000
77590	Texas City	293,377,000
77573	League City	272,820,000
78578	Port Isabel	257,005,000
78413	Corpus Christi	249,972,000
78411	Corpus Christi	220,674,000
77539	Dickinson	176,229,000
78415	Corpus Christi	164,931,500
78520	Brownsville	163,976,000
77642	Port Arthur	163,258,000
78401	Corpus Christi	149,691,000
77571	La Porte	144,095,000
77515	Angleton	130,789,000
77541	Freeport	126,065,000
77511	Alvin	123,897,000
77565	Kemah	123,602,000
78414	Corpus Christi	121,416,000
77566	Lake Jackson	120,996,000



Texas Windstorm Insurance Association

Analysis of Growth

Residential Exposures In-Force

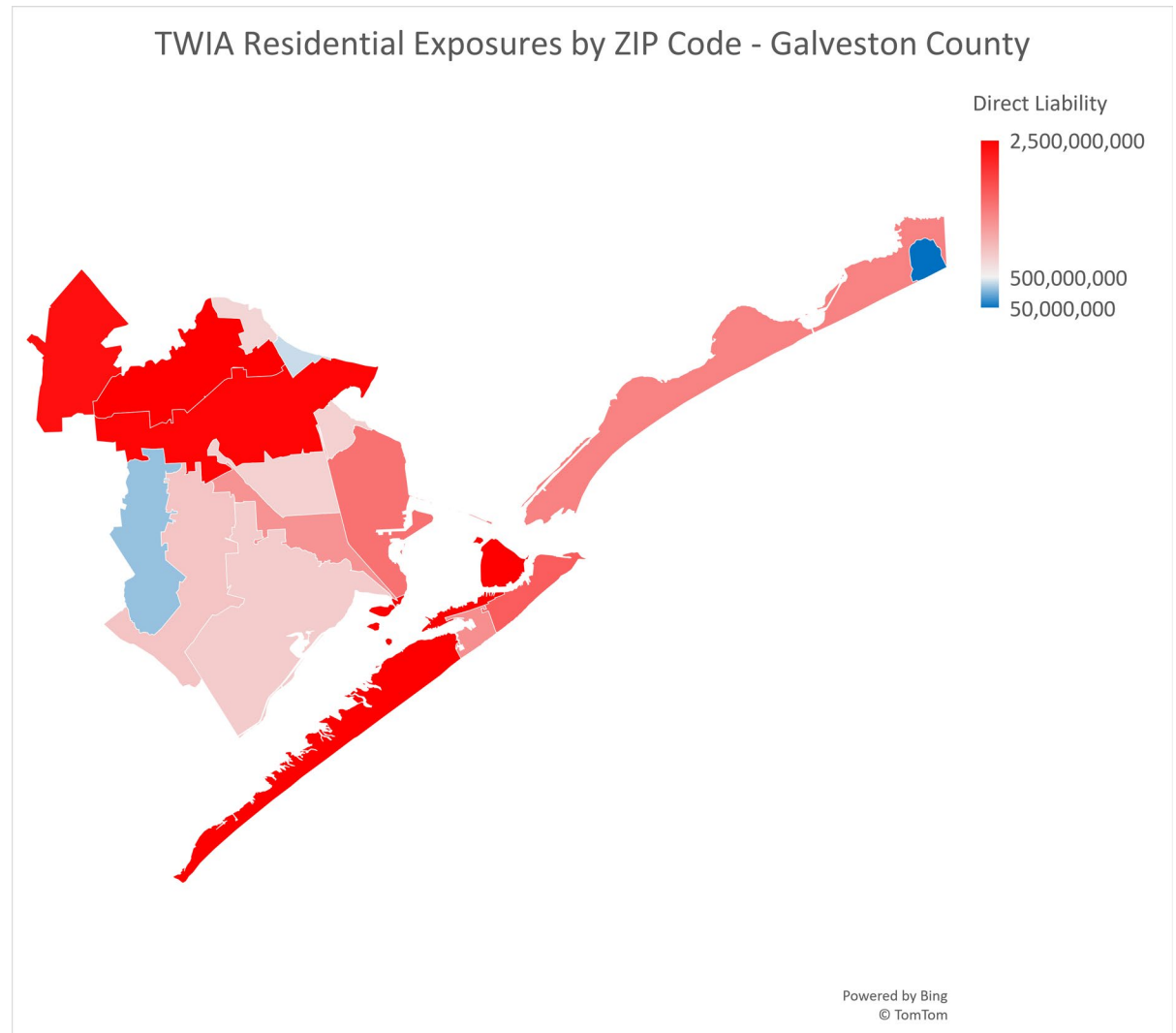
by ZIP Code - Galveston County

as of September 30, 2023



Galveston County

ZIP Code	Description	Direct Liability
77573	League City	7,793,503,100
77554	Galveston	4,009,348,100
77539	Dickinson	2,458,540,400
77546	Friendswood	2,373,145,900
77550	Galveston	1,731,875,500
77590	Texas City	1,560,541,600
77650	Port Bolivar	1,423,685,400
77551	Galveston	1,321,981,400
77568	La Marque	1,288,192,000
77510	Santa Fe	876,628,500
77563	Hitchcock	817,507,100
77591	Texas City	771,477,400
77565	Kemah	727,373,900
77518	Bacliff	424,647,900
77517	Santa Fe	329,734,300
77617	Gilchrist	126,190,600
77623	High Island	16,579,000
77553	Galveston	5,757,400



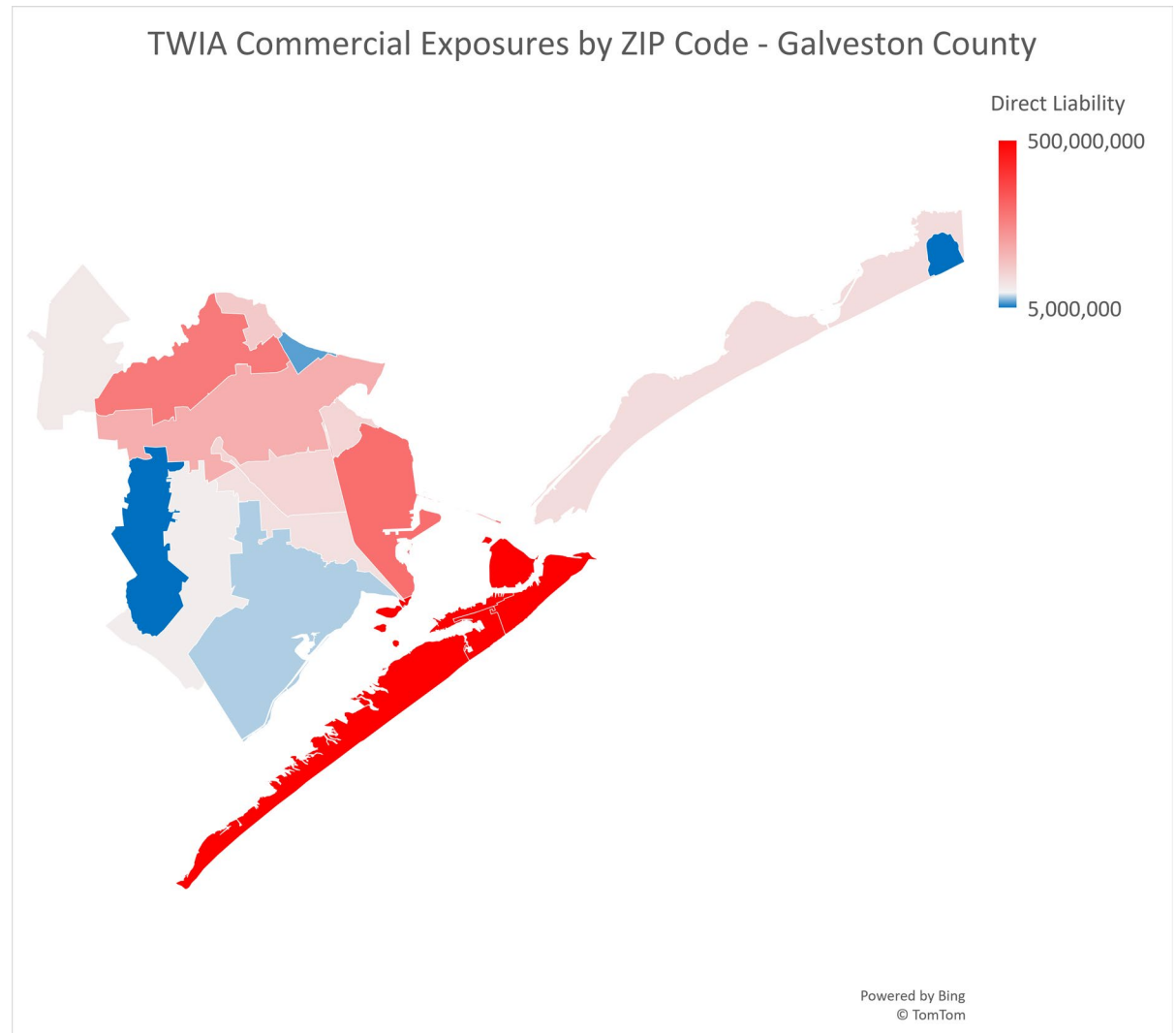
**Texas Windstorm Insurance Association
Analysis of Growth
Commercial Exposures In-Force**



as of September 30, 2023

Galveston County

ZIP Code	Description	Direct Liability
77550	Galveston	960,566,000
77554	Galveston	667,699,000
77551	Galveston	576,025,000
77590	Texas City	293,377,000
77573	League City	272,820,000
77539	Dickinson	176,229,000
77565	Kemah	123,602,000
77591	Texas City	104,120,000
77650	Port Bolivar	90,165,000
77568	La Marque	84,142,000
77553	Galveston	73,033,000
77546	Friendswood	67,180,000
77510	Santa Fe	58,903,000
77563	Hitchcock	37,591,000
77518	Bacliff	21,607,000
77617	Gilchrist	14,049,000
77517	Santa Fe	4,801,000
77623	High Island	3,620,000



Texas Windstorm Insurance Association

Analysis of Growth

Residential Exposures In-Force

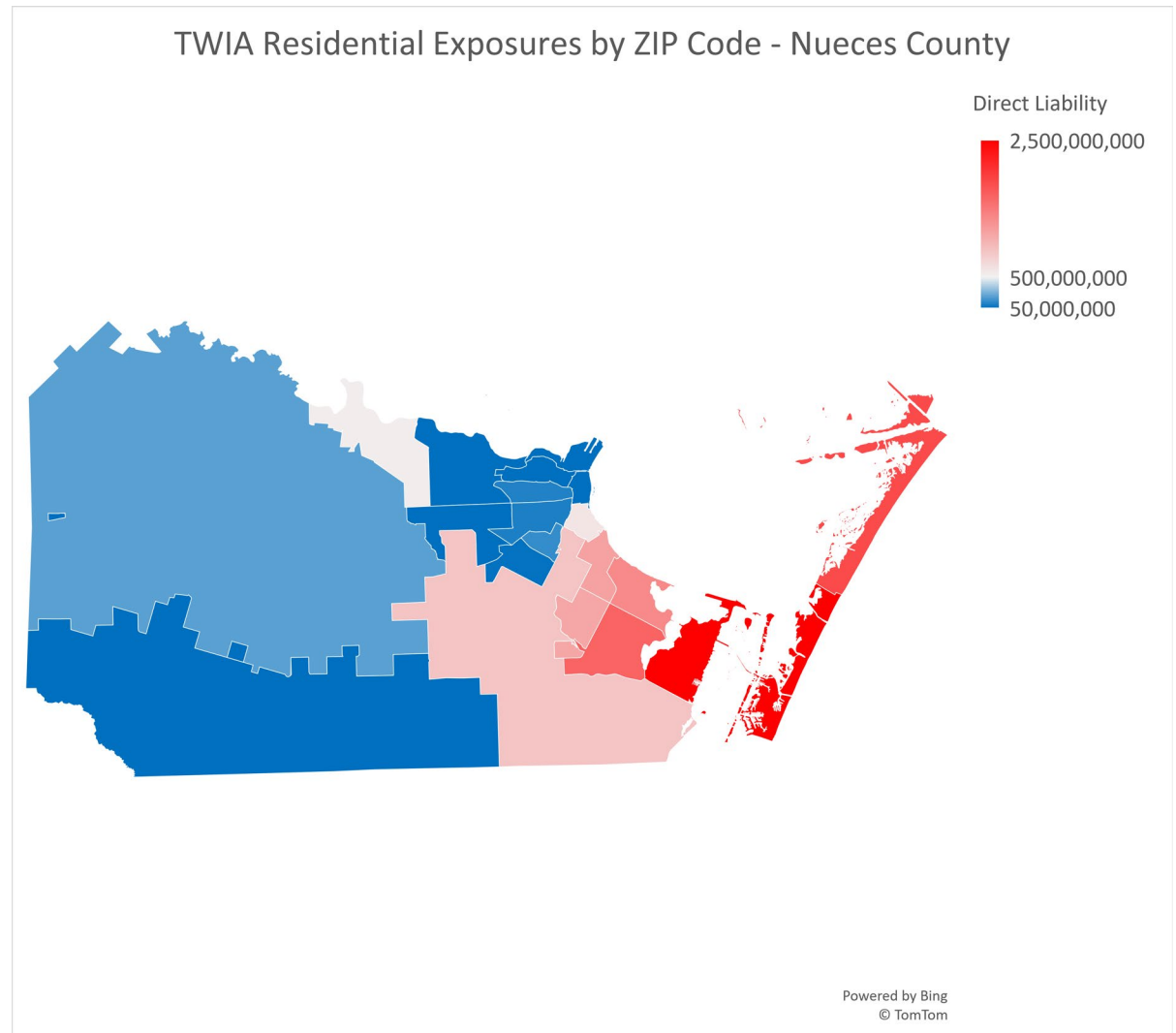
by ZIP Code - Nueces County

as of September 30, 2023



Nueces County

ZIP Code	Description	Direct Liability
78418	Corpus Christi	2,970,859,900
78373	Port Aransas	1,876,624,600
78414	Corpus Christi	1,675,676,300
78412	Corpus Christi	1,355,360,300
78411	Corpus Christi	1,159,942,900
78413	Corpus Christi	1,115,697,300
78415	Corpus Christi	878,516,100
78404	Corpus Christi	603,360,700
78410	Corpus Christi	542,576,300
78380	Robstown	218,079,900
78416	Corpus Christi	148,743,600
78408	Corpus Christi	112,350,000
78405	Corpus Christi	103,684,000
78417	Corpus Christi	57,975,200
78343	Bishop	35,284,700
78402	Corpus Christi	34,063,400
78409	Corpus Christi	28,311,000
78401	Corpus Christi	22,130,000
78407	Corpus Christi	22,118,400
78330	Agua Dulce	4,648,700
78406	Corpus Christi	2,694,300
78469	Corpus Christi	132,000



Texas Windstorm Insurance Association

Analysis of Growth

Commercial Exposures In-Force

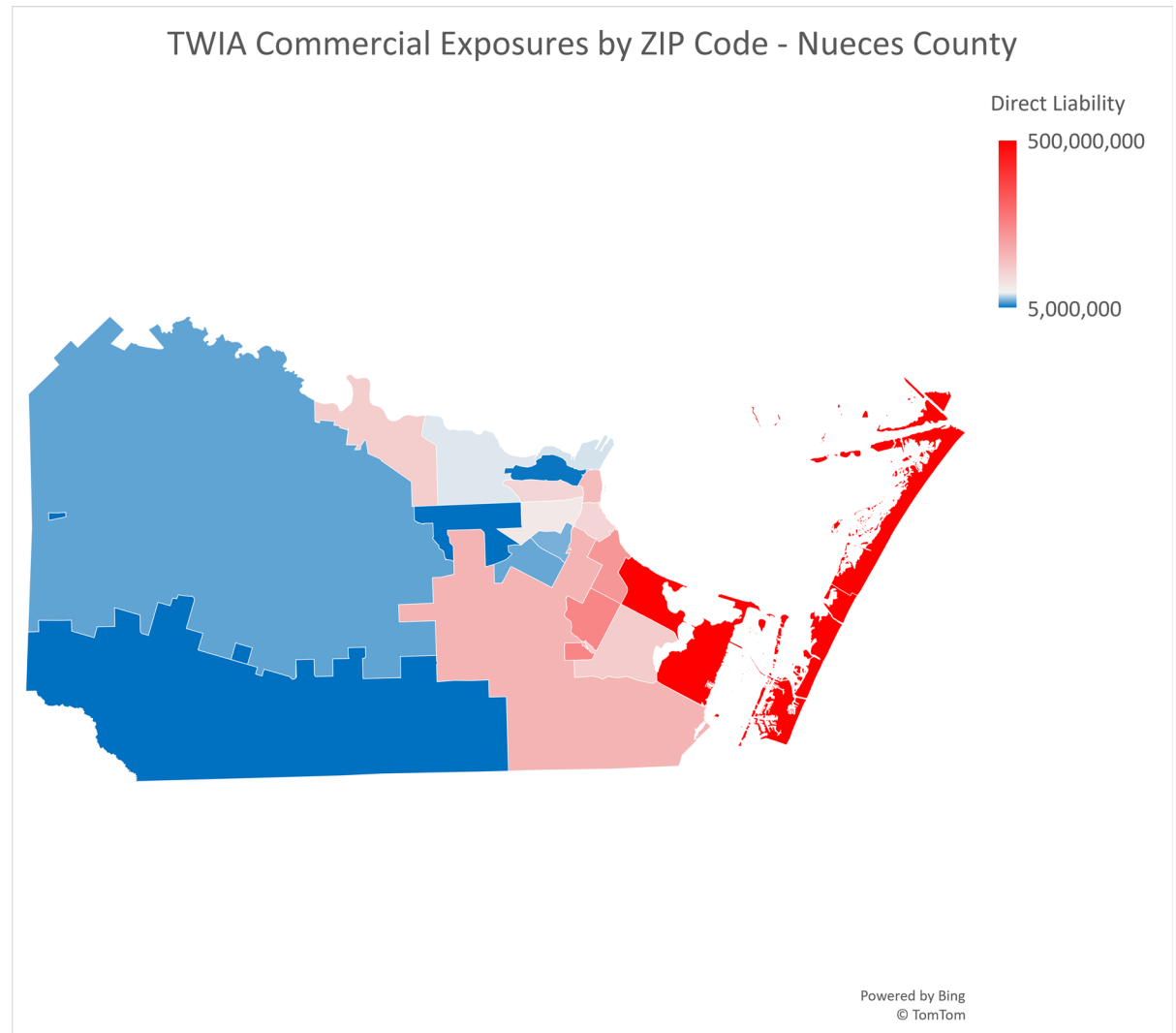
by ZIP Code - Nueces County

as of September 30, 2023



Nueces County

ZIP Code	Description	Direct Liability
78373	Port Aransas	948,475,800
78418	Corpus Christi	629,593,000
78412	Corpus Christi	524,456,000
78413	Corpus Christi	249,972,000
78411	Corpus Christi	220,674,000
78415	Corpus Christi	164,931,500
78401	Corpus Christi	149,691,000
78414	Corpus Christi	121,416,000
78410	Corpus Christi	117,867,000
78404	Corpus Christi	106,413,000
78408	Corpus Christi	104,563,000
78405	Corpus Christi	68,732,000
78409	Corpus Christi	46,287,000
78402	Corpus Christi	44,477,000
78416	Corpus Christi	27,262,000
78417	Corpus Christi	24,158,000
78380	Robstown	22,892,000
78407	Corpus Christi	6,949,000
78343	Bishop	4,906,000
78406	Corpus Christi	3,633,000
78469	Corpus Christi	858,000
78330	Agua Dulce	50,000

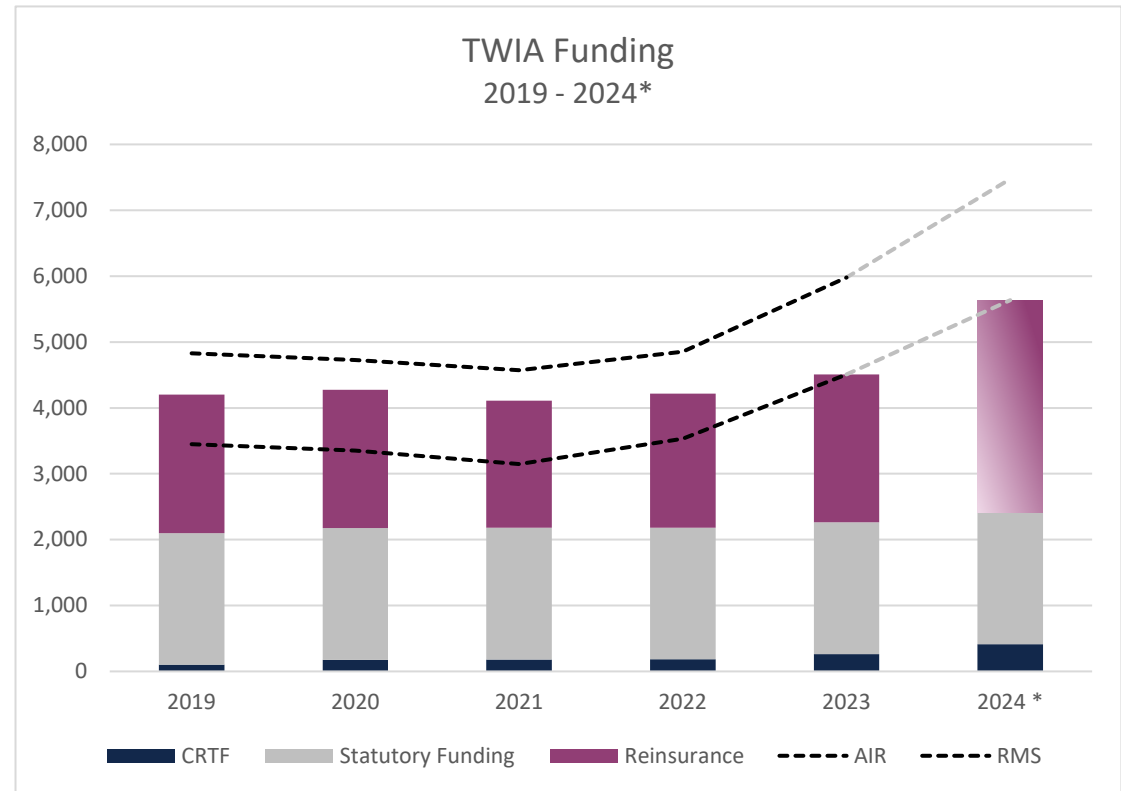


**Texas Windstorm Insurance Association
Analysis of Growth
Impact on Funding
2019 - 2024**



Catastrophe Year	Available CRTF Balance Amount	Change
2019	100	
2020	177	77
2021	179	2
2022	183	4
2023	265	82
* 2024	415	150

Catastrophe Year	Total Funding Amount	Change	Change in Reinsurance
2019	4,200		
2020	4,277	77	0
2021	4,109	-168	-170
2022	4,219	110	106
2023	4,508	289	207
* 2024	5,635	1,127	977



* 2024 funding is projected for illustrative purposes only; actual amounts have not yet been determined
 Projections based on estimated CRTF balance and assume 25% growth in modeled and selected 100-Year Probable Maximum Loss (PML)
 AIR and RMS PMLs shown based on long-term frequency and include 15% provision for loss adjustment expense (LAE)

AON

Texas Windstorm Insurance Association

Actuarial & Underwriting
Committee Meeting

February 2024



Contents

Texas Windstorm Insurance Association

1

Exposure Change

2

**Modeled Loss
Change**

3

**Defining the 100 Yr.
PML**

4

Model Change Detail

1

Exposure Change



Exposure Change

Year-Over-Year Exposure Summary

County	2023 Exposure	2022 Exposure	% Change Exposure
Jefferson	10,613,790,979	8,491,425,848	25.0%
Chambers	3,128,169,285	2,321,785,586	34.7%
Harris	1,951,456,880	1,549,856,289	25.9%
Galveston	36,025,818,900	29,307,918,350	22.9%
Brazoria	18,958,894,064	14,149,674,000	34.0%
Matagorda	1,837,690,070	1,531,677,501	20.0%
Calhoun	1,546,937,500	1,344,452,901	15.1%
Refugio	141,503,260	116,687,821	21.3%
Aransas	3,555,670,025	2,809,312,335	26.6%
San Patricio	3,123,907,240	2,497,199,720	25.1%
Nueces	18,688,712,340	14,875,727,997	25.6%
Kleberg	330,279,230	236,906,030	39.4%
Kenedy	6,832,100	7,313,323	-6.6%
Willacy	136,089,650	109,451,634	24.3%
Cameron	4,734,377,985	3,516,100,296	34.6%
Total	104,780,129,508	82,865,489,629	26.4%

By line of business breakout available in appendix

2

Modeled Loss Change

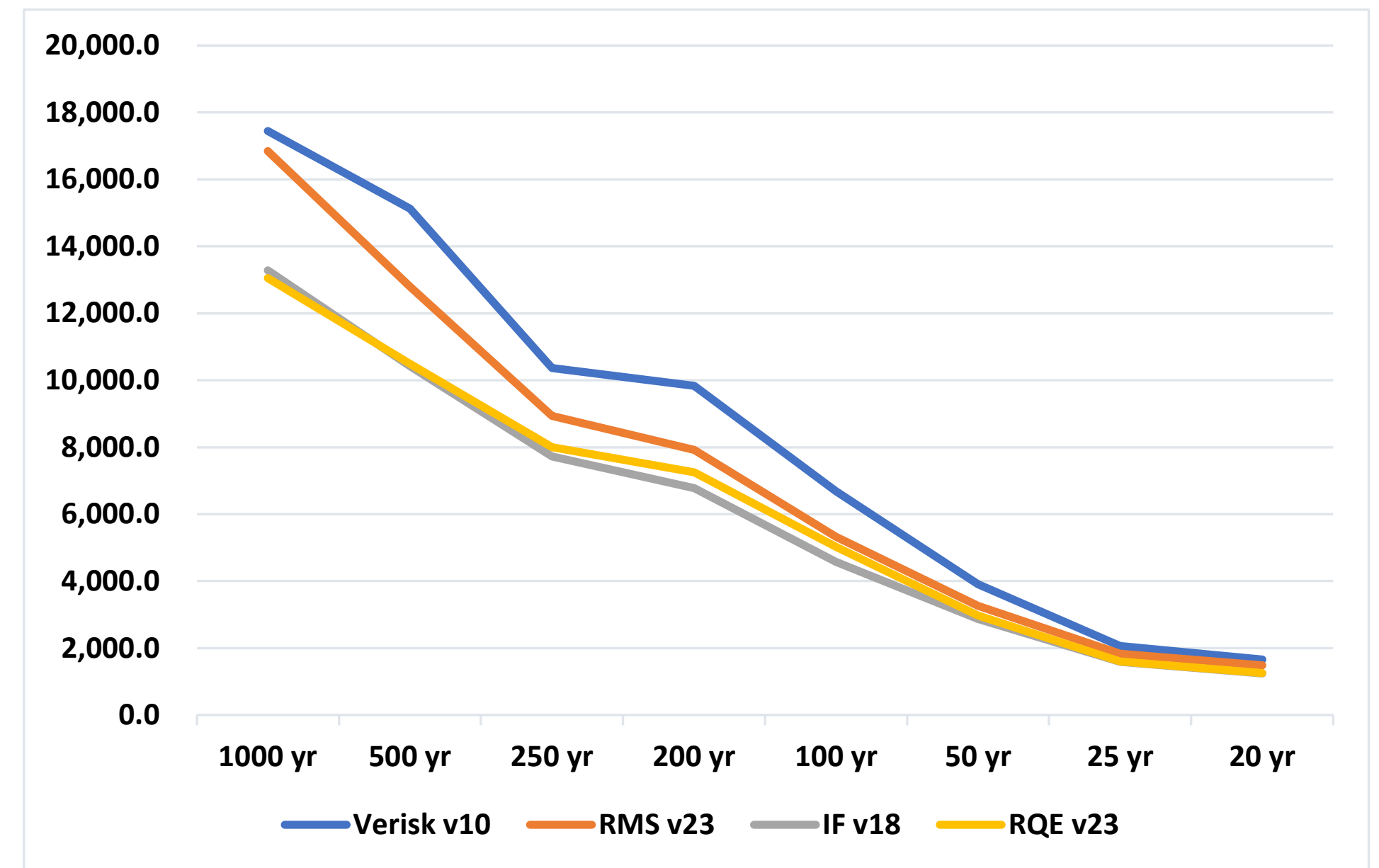


Multi-Model Comparison – All Perils

Combined Hurricane (Long-Term) & Severe Conv. Storm AEP Gross Losses (excl. LAE)

AEP - All Perils (Long-Term/Standard)

Return Period	Verisk v10	RMS v23	IF v18	RQE v23
1000 yr	17,441.8	16,843.2	13,285.2	13,046.4
500 yr	15,122.9	12,801.0	10,425.9	10,491.2
250 yr	10,366.1	8,940.2	7,719.6	7,998.5
200 yr	9,828.4	7,924.6	6,776.4	7,247.6
100 yr	6,690.1	5,331.0	4,580.8	5,023.4
50 yr	3,910.1	3,257.2	2,872.7	2,972.4
25 yr	2,062.4	1,830.4	1,584.1	1,601.0
20 yr	1,656.5	1,480.8	1,246.2	1,257.9
Annual avg	360.0	313.8	259.5	265.3
Std dev	1,362.7	1,259.2	1,073.4	1,026.6



US \$ in Millions

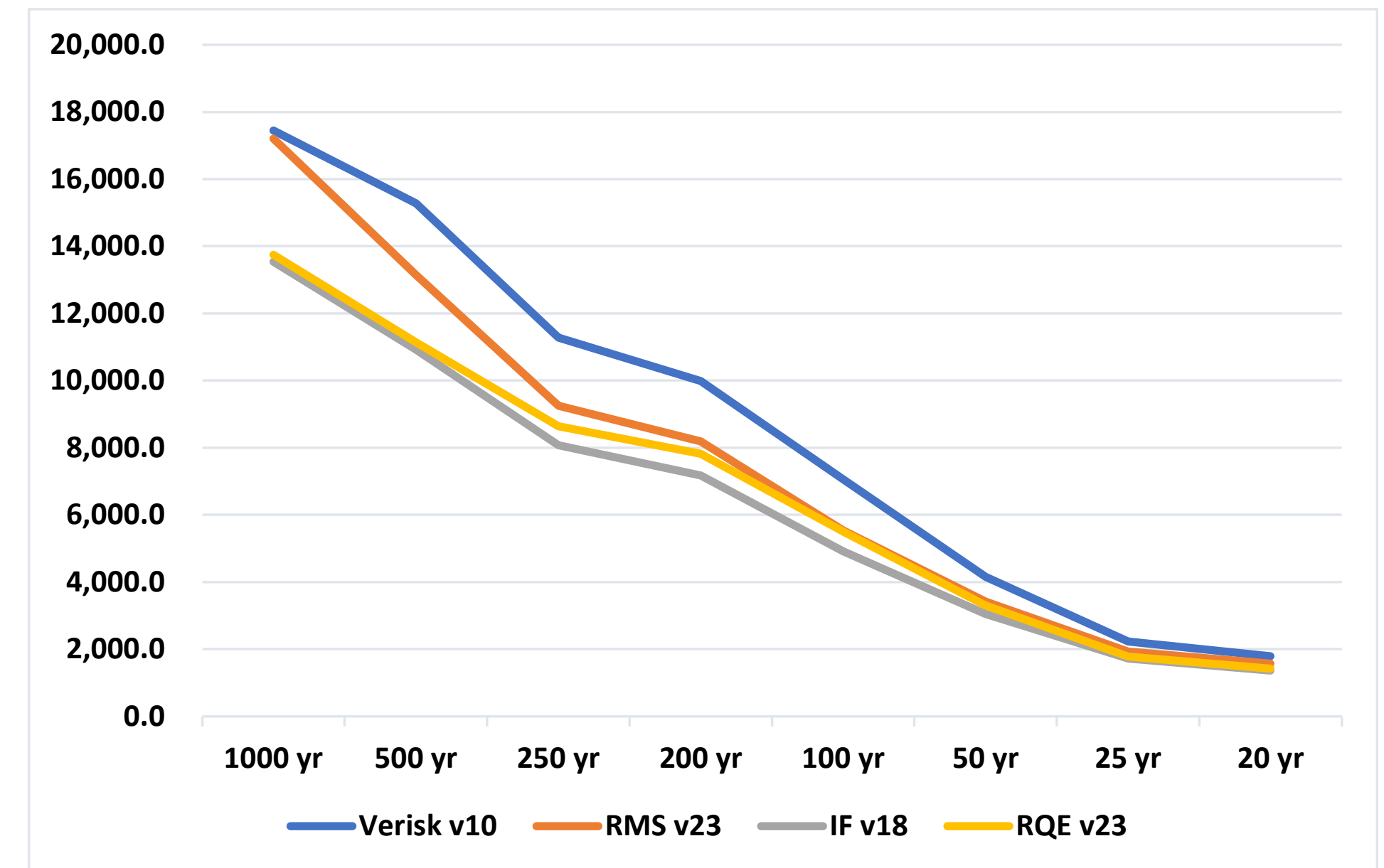
Including Demand Surge, Excluding Storm Surge

Multi-Model Comparison – All Perils

Combined Hurricane (Near-Term) & Severe Conv. Storm AEP Gross Losses (excl. LAE)

AEP - All Perils (Near-Term/Warm Sea Surface Temperature)

Return Period	Verisk v10	RMS v23	IF v18	RQE v23
1000 yr	17,441.8	17,201.3	13,534.9	13,749.2
500 yr	15,283.6	13,149.9	10,922.5	11,137.0
250 yr	11,276.8	9,243.0	8,077.3	8,641.0
200 yr	9,985.0	8,191.1	7,176.5	7,819.1
100 yr	7,061.9	5,534.9	4,916.4	5,497.2
50 yr	4,148.8	3,408.9	3,043.7	3,300.8
25 yr	2,221.5	1,932.1	1,721.2	1,777.0
20 yr	1,784.9	1,572.6	1,360.9	1,422.2
Annual avg	382.5	333.8	279.3	295.8
Std dev	1,413.9	1,293.6	1,120.7	1,104.2



US \$ in Millions

Including Demand Surge, Excluding Storm Surge

Modeled Loss Change

Verisk Touchstone v9 & v10 AEP Gross Losses (excl. LAE)

AEP - All Perils (Warm Sea Surface Temperature)

Return Period	Verisk v10 11/30/2023	Verisk v10 11/30/2022	Verisk v9 11/30/2022	Overall Change	Exposure Change	Model Change
1000 yr	17,441.8	13,850.9	13,905.9	25.4%	25.9%	(0.4%)
500 yr	15,283.6	12,234.0	12,293.9	24.3%	24.9%	(0.5%)
250 yr	11,276.8	8,822.9	8,859.2	27.3%	27.8%	(0.4%)
200 yr	9,985.0	7,933.2	7,966.8	25.3%	25.9%	(0.4%)
100 yr	7,061.9	5,579.8	5,615.0	25.8%	26.6%	(0.6%)
50 yr	4,148.8	3,260.5	3,248.2	27.7%	27.2%	0.4%
25 yr	2,221.5	1,691.0	1,691.4	31.3%	31.4%	(0.0%)
20 yr	1,784.9	1,369.7	1,377.5	29.6%	30.3%	(0.6%)
Annual avg	382.5	296.9	290.1	31.8%	28.8%	2.3%
Std dev	1,413.9	1,118.9	1,123.2	25.9%	26.4%	(0.4%)

US \$ in Millions

Including Demand Surge, Excluding Storm Surge

No model change impacting Hurricane or Severe Convective Storm models in Verisk Touchstone v10

- **Enhancements in geocoding** account for modest differences in loss year-over-year

Verisk exposure change modeled loss **tracks closely** with TWIA portfolio exposure change across all counties and lines of business

Overall change yields a **25.8% increase** in the key 100 yr. PML

Modeled Loss Change

RMS RiskLink v21 & v23 AEP Gross Losses (excl. LAE)

AEP - All Perils (Near-Term)

Return Period	RMS v23 11/30/2023	RMS v23 11/30/2022	RMS v21 11/30/2022	Overall Change	Exposure Change	Model Change
1000 yr	17,201.3	14,191.9	12,813.7	34.2%	21.2%	10.8%
500 yr	13,149.9	10,851.8	9,480.5	38.7%	21.2%	14.5%
250 yr	9,243.0	7,641.9	6,519.2	41.8%	21.0%	17.2%
200 yr	8,191.1	6,748.5	5,786.2	41.6%	21.4%	16.6%
100 yr	5,534.9	4,541.9	3,944.4	40.3%	21.9%	15.1%
50 yr	3,408.9	2,800.3	2,447.7	39.3%	21.7%	14.4%
25 yr	1,932.1	1,577.4	1,376.8	40.3%	22.5%	14.6%
20 yr	1,572.6	1,281.4	1,118.7	40.6%	22.7%	14.5%
Annual avg	333.8	274.4	241.1	38.5%	21.6%	13.8%
Std dev	1,293.6	1,064.0	958.1	35.0%	21.6%	11.1%

US \$ in Millions

Including Demand Surge, Excluding Storm Surge

Model change driven principally by vulnerability updates driving change in TWIA portfolio, **tracks closely with RMS guidance**

- Residential Mean Damage Ratio (MDR) shows increased divergence in loss from RMS v22 to v23 for peak gust events >100 mph

Exposure change PMLs are **slightly below portfolio exposure change**, due to portfolio growth by line of business and relative damageability in residential lines for key geographic areas

Overall change yields a **40.3% increase** in the key 100 yr. PML

Modeled Loss Change

Impact Forecasting v15 & v18 AEP Gross Losses (excl. LAE)

AEP - All Perils (Near-Term)

Return Period	IF v18 11/30/2023	IF v18 11/30/2022	IF v15 11/30/2022	Overall Change	Exposure Change	Model Change
1000 yr	13,534.9	11,298.5	9,605.2	40.9%	19.8%	17.6%
500 yr	10,922.5	8,940.7	8,250.0	32.4%	22.2%	8.4%
250 yr	8,077.3	6,605.7	6,599.3	22.4%	22.3%	0.1%
200 yr	7,176.5	5,818.2	5,899.1	21.7%	23.3%	(1.4%)
100 yr	4,916.4	3,980.3	4,318.7	13.8%	23.5%	(7.8%)
50 yr	3,043.7	2,461.5	2,808.7	8.4%	23.7%	(12.4%)
25 yr	1,721.2	1,384.8	1,683.8	2.2%	24.3%	(17.8%)
20 yr	1,360.9	1,097.9	1,345.4	1.2%	24.0%	(18.4%)
Annual avg	279.3	226.1	263.1	6.2%	23.6%	(14.1%)
Std dev	1,120.7	915.0	866.5	29.3%	22.5%	5.6%

US \$ in Millions

Including Demand Surge, Excluding Storm Surge

Model change driven by recalibration of both hazard and vulnerability, yielding marginally higher losses at the top of the curve and lower losses at the bottom

- Inclusion of **HURDAT2** data and **13b claims data** drives hazard and vulnerability updates

Exposure change PMLs are **slightly below portfolio exposure change**, due to aforementioned combination of hazard and vulnerability changes

Overall change yields a **13.8% increase** in the key 100 yr. PML, with exposure change being offset by model change

Modeled Loss Change

CoreLogic RQE v21 & v23 AEP Gross Losses (excl. LAE)

AEP - All Perils (Near-Term)

Return Period	RQE v23 11/30/2023	RQE v23 11/30/2022	RQE v21 11/30/2022	Overall Change	Exposure Change	Model Change
1000 yr	13,749.2	10,207.0	10,261.4	34.0%	34.7%	(0.5%)
500 yr	11,137.0	8,503.9	8,259.8	34.8%	31.0%	3.0%
250 yr	8,641.0	6,532.8	6,404.6	34.9%	32.3%	2.0%
200 yr	7,819.1	5,867.0	5,843.2	33.8%	33.3%	0.4%
100 yr	5,497.2	4,110.8	4,084.0	34.6%	33.7%	0.7%
50 yr	3,300.8	2,439.3	2,458.9	34.2%	35.3%	(0.8%)
25 yr	1,777.0	1,283.7	1,279.5	38.9%	38.4%	0.3%
20 yr	1,422.2	1,022.4	1,001.5	42.0%	39.1%	2.1%
Annual avg	295.8	218.0	215.7	37.1%	35.7%	1.1%
Std dev	1,104.2	821.3	817.9	35.0%	34.4%	0.4%

US \$ in Millions

Including Demand Surge, Excluding Storm Surge

Model change impact is relatively flat for prior year data, due to limited impact from frequency adjustments and historical event data enhancements

Exposure change PMLs are **slightly above portfolio exposure change**, driven by growth in commercial lines losses and higher damageability in certain residential construction types

- Data mapping classification changes on residential exposures having frame with brick veneer constructions yields increased damageability

Overall change yields a **34.6% increase** in the key 100 yr. PML

3

Defining the 100 Yr. PML



Discussion of the 100 Yr. PML Threshold

Multi-Model - Near-Term/WarmSST

All Perils (Near-Term/Warm Sea Surface Temperature)

Model	Weight	100yr PML - OEP	100yr PML - AEP	AEP/OEP Ratio
AIR v10	50%	6,812.2	7,061.9	1.037
RMS v23	50%	5,332.0	5,534.9	1.038
IF v18	0%	4,679.9	4,916.4	1.051
RQE v23	0%	5,255.8	5,497.2	1.046
Blend	100%	6,072.1	6,298.4	1.037
Blend w/ LAE	100%	6,982.9	7,243.2	

All Perils (Near-Term/Warm Sea Surface Temperature)

Model	Weight	100yr PML - OEP	100yr PML - AEP	AEP/OEP Ratio
AIR v10	25%	6,812.2	7,061.9	1.037
RMS v23	25%	5,332.0	5,534.9	1.038
IF v18	25%	4,679.9	4,916.4	1.051
RQE v23	25%	5,255.8	5,497.2	1.046
Blend	100%	5,520.0	5,752.6	1.043
Blend w/ LAE	100%	6,347.9	6,615.5	

US \$ in Millions

Including Demand Surge, Excluding Storm Surge

Multi-Model - Long-Term/Std

All Perils (Long-Term/Standard)

Model	Weight	100yr PML - OEP	100yr PML - AEP	AEP/OEP Ratio
AIR v10	50%	6,306.7	6,690.1	1.061
RMS v23	50%	5,148.4	5,331.0	1.035
IF v18	0%	4,328.8	4,580.8	1.058
RQE v23	0%	4,784.0	5,023.4	1.050
Blend	100%	5,727.5	6,010.5	1.048
Blend w/ LAE	100%	6,586.7	6,912.1	

All Perils (Long-Term/Standard)

Model	Weight	100yr PML - OEP	100yr PML - AEP	AEP/OEP Ratio
AIR v10	25%	6,306.7	6,690.1	1.061
RMS v23	25%	5,148.4	5,331.0	1.035
IF v18	25%	4,328.8	4,580.8	1.058
RQE v23	25%	4,784.0	5,023.4	1.050
Blend	100%	5,142.0	5,406.3	1.051
Blend w/ LAE	100%	5,913.3	6,217.3	

US \$ in Millions

Including Demand Surge, Excluding Storm Surge

100 Yr. PML Limit Comparison Year-Over-Year

	2023 Placement	2024 Placement	\$ Difference	% Difference
100 Yr Selected PML*	3,920.3	5,331.0	1,410.8	36.0%
100 Yr Selected PML w/ 15% LAE	4,508.0	6,130.7	1,622.7	36.0%
Retention	2,280.0	2,440.0	160.0	7.0%
Limit Required	2,228.0	3,690.7	1,462.7	65.7%

**2023 selected PML based on RMS v21 Long-Term AEP All Perils; 2024 assumes same settings in v23*

US \$ in Millions

Retention adjustment will offset increased limit purchase needs

100 Yr PML selection assumes static LAE pick and no adjustment for growth projections or inflation adjustment

Managing Tail Risk Tolerance

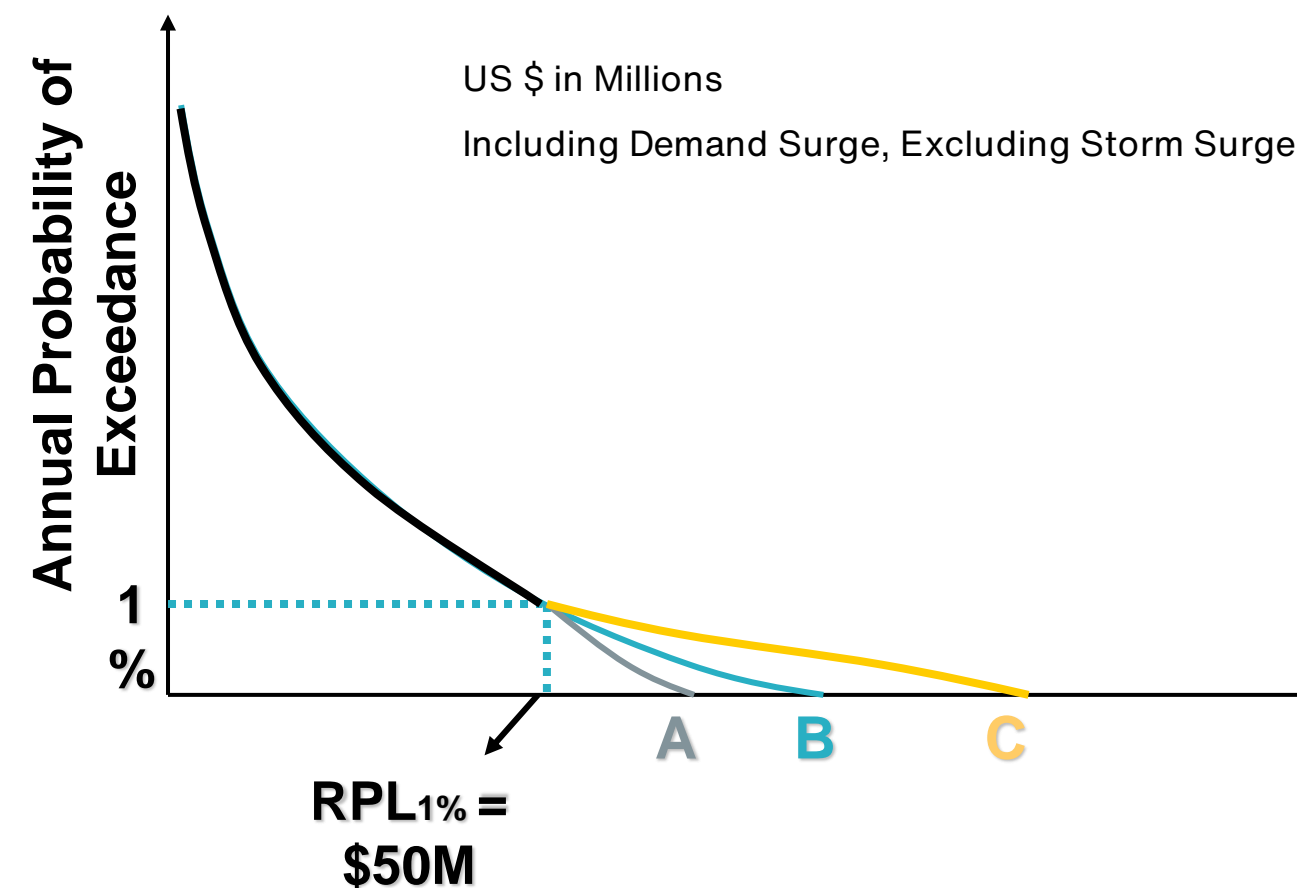
What is TVaR and how can it inform your coverage decisions?

Tail Value at Risk (TVaR)

- Average value of loss given that a loss at least as large as the selected EP return period loss has occurred
- Measures not only the probability of exceeding a certain loss level, but also the average severity of losses in the tail of the distribution
- Example: AIR 100 yr return period loss equals \$7,061.9m
 - TVaR is \$11,612.1m (TVaR will always be greater or equal to return period loss)
- Interpretation
 - PML: There is a 1% annual probability of a loss exceeding \$7,061.9m
 - TVaR: Given that at least a \$7,061.9m loss occurs, the average severity will be \$11,612.1m

AEP - All Perils (Near-Term/Warm Sea Surface Temperature)

Return Period	Verisk Touchstone v10			RMS RiskLink v23		
	TVaR	VaR	TVaR Ratio	TVaR	VaR	TVaR Ratio
1000 yr	20,472.3	17,441.8	1.17	22,991.4	17,201.3	1.34
500 yr	18,427.1	15,283.6	1.21	18,969.8	13,149.9	1.44
250 yr	15,800.1	11,276.8	1.40	14,947.0	9,243.0	1.62
200 yr	14,700.9	9,985.0	1.47	13,695.4	8,191.1	1.67
100 yr	11,612.1	7,061.9	1.64	10,177.4	5,534.9	1.84
50 yr	8,534.9	4,148.8	2.06	7,239.2	3,408.9	2.12
25 yr	5,775.8	2,221.5	2.60	4,886.8	1,932.1	2.53
20 yr	5,019.4	1,784.9	2.81	4,257.8	1,572.6	2.71
Annual avg	382.5	382.5	1.00	333.8	333.8	1.00
Std dev	1,413.9	1,413.9	1.00	1,293.6	1,293.6	1.00



Higher TVaR ratio in RMS indicates greater severity deviation from the aggregate 100 yr, although AIR has higher overall modeled losses

Historical Perspective

OEP - Hurricane Only (Near-Term/Warm Sea Surface Temperature)

Return Period	Verisk v10	RMS v23	IF v18	RQE v23
1000 yr	17,439.0	16,890.9	13,292.0	13,304.6
500 yr	14,905.3	12,865.0	10,562.6	10,835.0
250 yr	10,328.2	8,970.3	7,812.9	8,279.6
200 yr	9,734.9	7,938.3	6,907.7	7,487.2
100 yr	6,812.2	5,332.0	4,679.9	5,255.8
50 yr	3,892.1	3,243.9	2,883.5	3,111.0
25 yr	1,993.4	1,818.1	1,612.7	1,639.4
20 yr	1,608.7	1,474.1	1,263.6	1,297.0
Annual avg	351.3	314.2	258.5	275.3
Std dev	1,412.1	1,293.3	1,120.2	1,102.4

US \$ in Millions

Including Demand Surge, Excluding Storm Surge

Variability in both loss magnitude and share indicates a need for more insightful view of historical experience and catastrophe models

- Trended TWIA losses indicate that the Cat program could be significantly (Harvey) to completely (Ike) impacted if events similar to those in the historical catalog were to occur again
- TWIA market share of total PCS event loss carries significant variation, indicating potential for outsized impact on the program
- Trended PCS losses shown using CAS Collins & Lowe methodology through Jan. 2024
 - Trended TWIA losses excl. LAE calculated using market share from orig. PCS events
- PCS Industry losses cited below exclude flood and auto loss
- Recast loss shows high degree of model variability and extreme event potential if a storm similar to the 1900 Galveston hurricane were to occur again

Named Storm	Orig Incurred Loss & ALAE	Trended Incurred excl. 15% LAE	TWIA % Share excl. 15% LAE	Orig. PCS	Trended PCS	Recast Event	Verisk v10 Gross Loss	RMS v23 Gross Loss
				Res+Comm Loss	Res + Comm Loss			
Hurricane Bret	6.5	17.9	20%	28.0	90.7			
Hurricane Claudette	16.9	37.3	17%	85.0	221.3			
Hurricane Rita	161.9	290.8	3%	5,411.2	11,436.2			
Hurricane Dolly	327.2	539.5	55%	502.5	974.6			
Hurricane Ike	2,443.9	3,949.8	17%	12,024.5	22,862.9	Hurricane Harvey	2,224.5	1,311.0
Tropical Storm Hermine	6.0	9.5	5%	110.0	203.8	Hurricane Ike	1,401.3	1,012.5
Hurricane Harvey	1,535.8	1,868.1	8%	16,108.2	23,050.4	Hurricane Rita	562.0	409.4
Hurricane Hanna	12.0	12.7	3%	295.2	366.6	Hurricane Alicia	878.4	742.0
Hurricane Laura	21.9	23.8	0%	10,976.4	14,030.1	Hurricane Carla	1,666.3	1,116.3
Hurricane Delta	22.0	23.8	1%	1,671.9	2,132.2	1900 Galveston Hurricane	9,100.3	5,767.6

*Losses shown US \$ in Millions

4

Model Change Detail



RMS v23 North Atlantic Hurricane Model

Scope of Update



Key Takeaways

Release: June 2023

Key Updates - Vulnerability

- Recalibrated RES and COM curves
 - RES: recalibrated year-built differentiation, updated number of stories differentiation particularly for Multi-Family Dwellings, updated ATC 42 (Condo) vulnerability
 - COM: biggest update since v11 with updates across year-buils, heights, occupancy classes
 - New year-built band (2021+)
- Updated credits/penalties for roof age secondary modifier

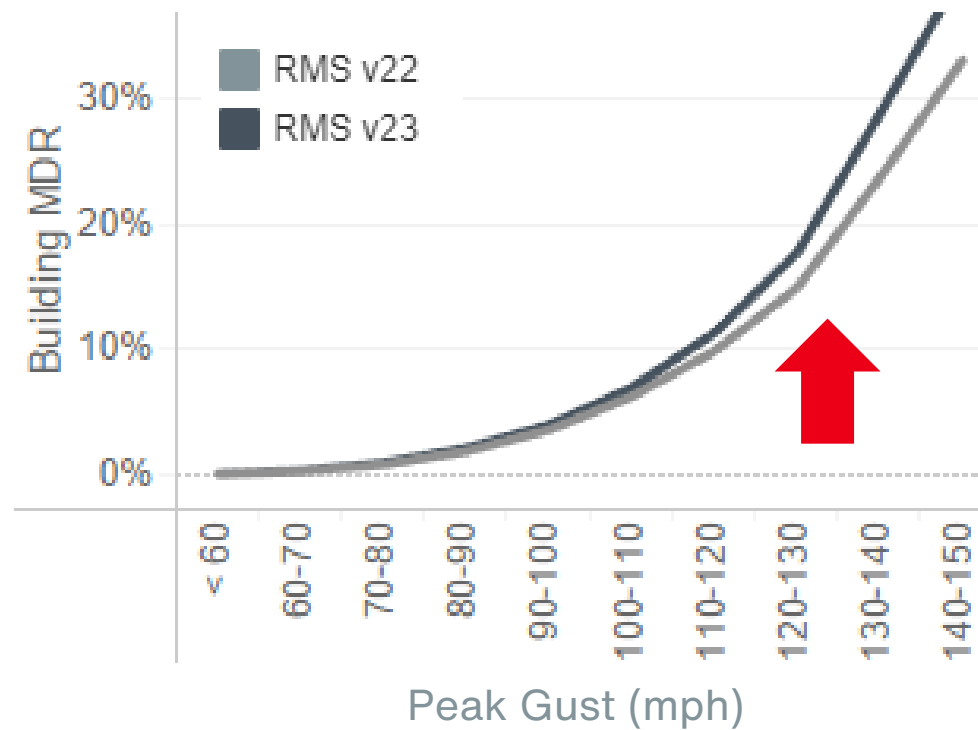
Key Updates - Hazard

- Updated Long-Term Rates
- Updated Medium-Term Rates
- New historical events (Dorian 2019, Sally 2020, Zeta 2020, Laura 2020, Delta 2020)

Texas Vulnerability Change Examples

Example Building Vulnerability Curve

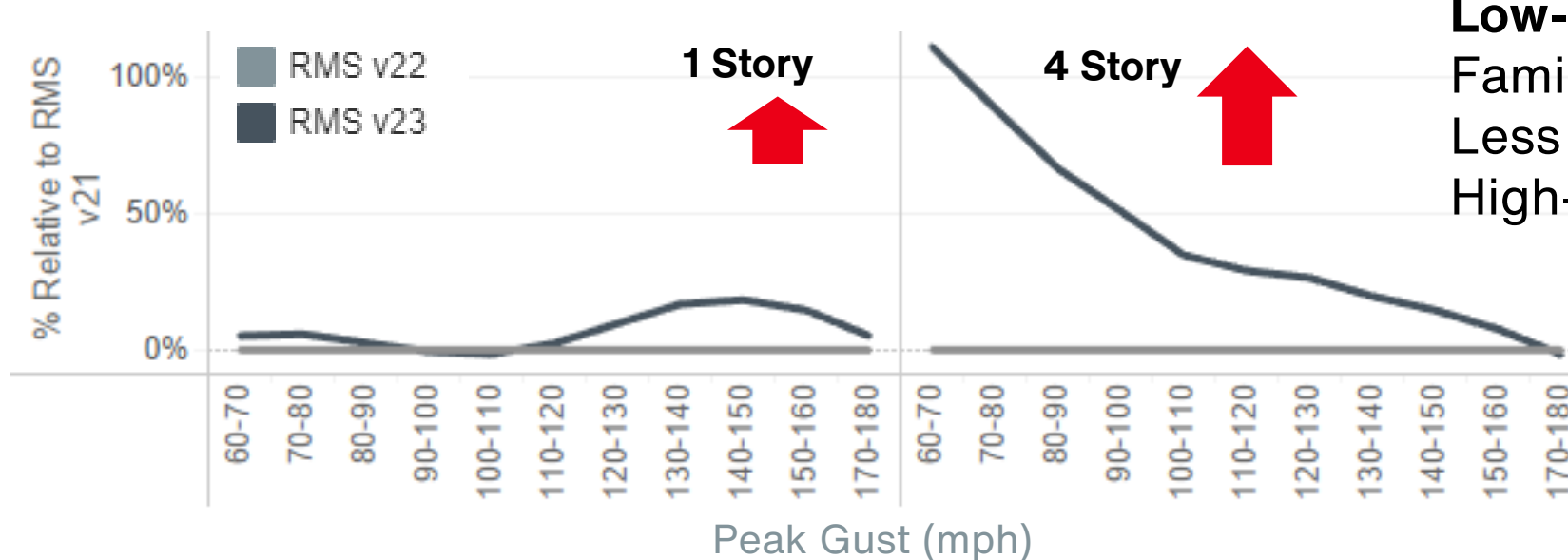
Single Family, Wood, 1985, 1 story (Houston, TX)



Texas shows increases from signals of rainfall infiltration

Example Building Vulnerability Curve Relativity by Height

Multi-Family, Masonry, 1985 (Houston, TX)



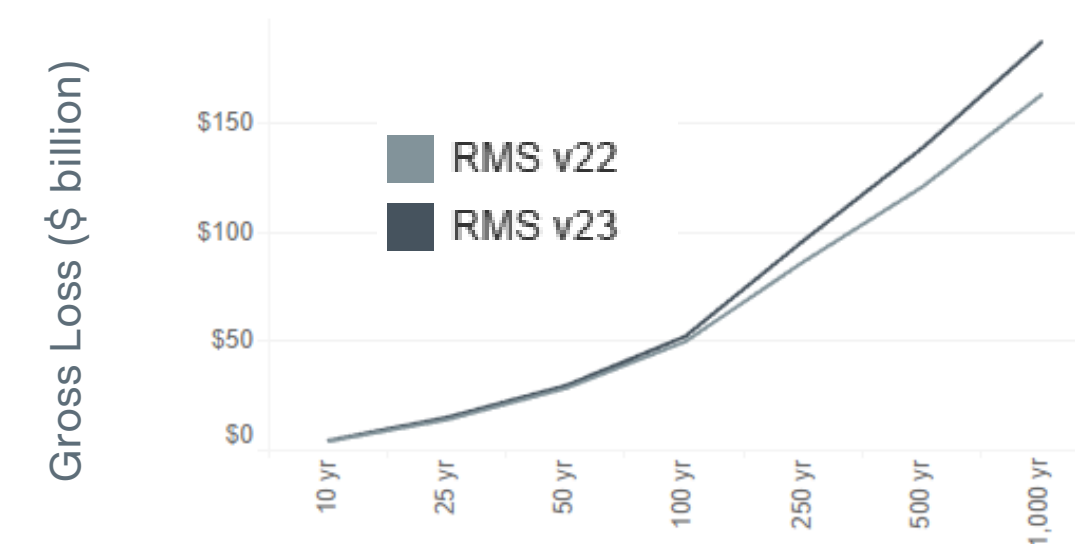
Low-Rise Multi-Family Increases Less than Mid- or High-Rise

The primary driver of model change is a significant vulnerability recalibration across both residential and commercial lines, and TWIA loss generally follows guidance

Texas Industry Model Change Projections

Texas Residential OEP Summary

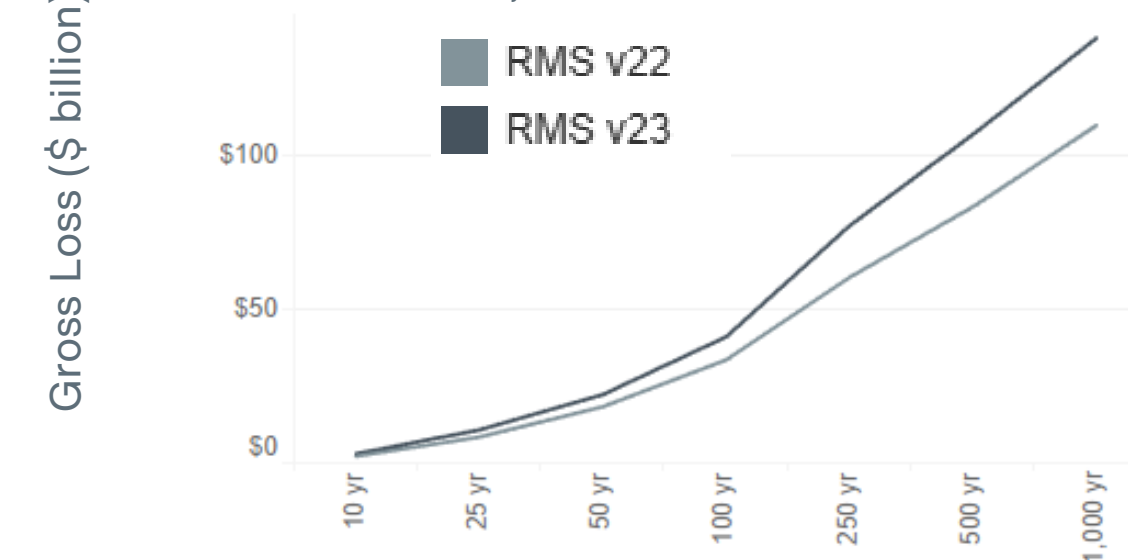
Aon 2023 IED, Near-Term Rates



	Aon 2023 IED	RMS Guidance Based on 2021 RMS IED
AAL	+8%	+2 to +10%
100-year	+5%	+2 to +10%
250-year	+11%	+10 to +20%

Texas Commercial OEP Summary

Aon 2023 IED, Near-Term Rates



	Aon 2023 IED	RMS Guidance Based on 2021 RMS IED
AAL	+27%	+10 to +20%
100-year	+22%	+10 to +20%
250-year	+28%	+10 to +20%

Impact Forecasting Country-wide Hurricane Model v3

Scope of Update

Key Updates

Brand-new US-wide model that builds on model approved by FL commission in 2023, leveraging more up-to-date data results in a more robust model that has been peer-reviewed by Aon's Model Evaluation team

Utilizes HURDAT2 (1900 - 2020) data from HURDAT (1850 - 2013)

Upgrade to intensity model to use more recent scientific research

Introduction of outlier treatment in regression models to **reduce influence of extreme values**

Update to friction model to account for local roughness and directional changes in terrain roughness

Recalibration of vulnerability model based on **~13B of claims** across **18 historical events**

Reassessment of vulnerability relativities across different states

Update to near-term view incorporating conservative climate trend according to the latest research from Columbia University

Shares track set with Atlantic Tropical Cyclone – Wind (FCHLPM) Model Version 2.0 (certified for rate filling in Florida)

Using a more robust peer-reviewed view of shape and windspeed model to generate a full footprint of stochastic storms - Willoughby's parametrization model replaces regression model imitating Shapiro's numerical model

CoreLogic RQE v23 North Atlantic Hurricane Model

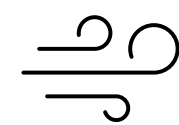
Scope of Update (U.S.)

The CoreLogic update involves both hazard and vulnerability components, leading to minor industry change



Key Takeaways

- **Release:** August 2023
- **Key Updates - Hazard**
 - Regenerated the stochastic hurricane database for consistency with HURDAT2 (1900-2021) as of April 2022, impacting rates and storm parameters as well as historical events
 - Updated long-term and near-term event rates
- **Key Updates - Vulnerability**
 - Updated default year of construction based on 2020 Census
 - Updated defaults for selecting secondary modifiers including roof age, roof condition
- **Model change guidance based on CoreLogic IED**
 - Residential Lines: Less than -5%
 - Commercial Lines: Less than +5%



Wind Hazard

- Updated Long-Term Rates (1900-2021)
- Updated Near-Term Rates (Atlantic Multidecadal Variability catalog)
- Updated distribution of storm parameters, including Rmax, forward speed, and filling rate
- Updated historical events:
 - Events from 1966-1970, due to HURDAT2 reanalysis
 - Matthew 2016
 - 2020 events were already present in the historical event set of RQE v21, but the footprints have been updated in RQE v23 to account for HURDAT2 updates
- New historical events:
 - Ida 2021 and Nicholas 2021
 - Ian 2022 and Nicole 2022 (not yet considered in frequencies)

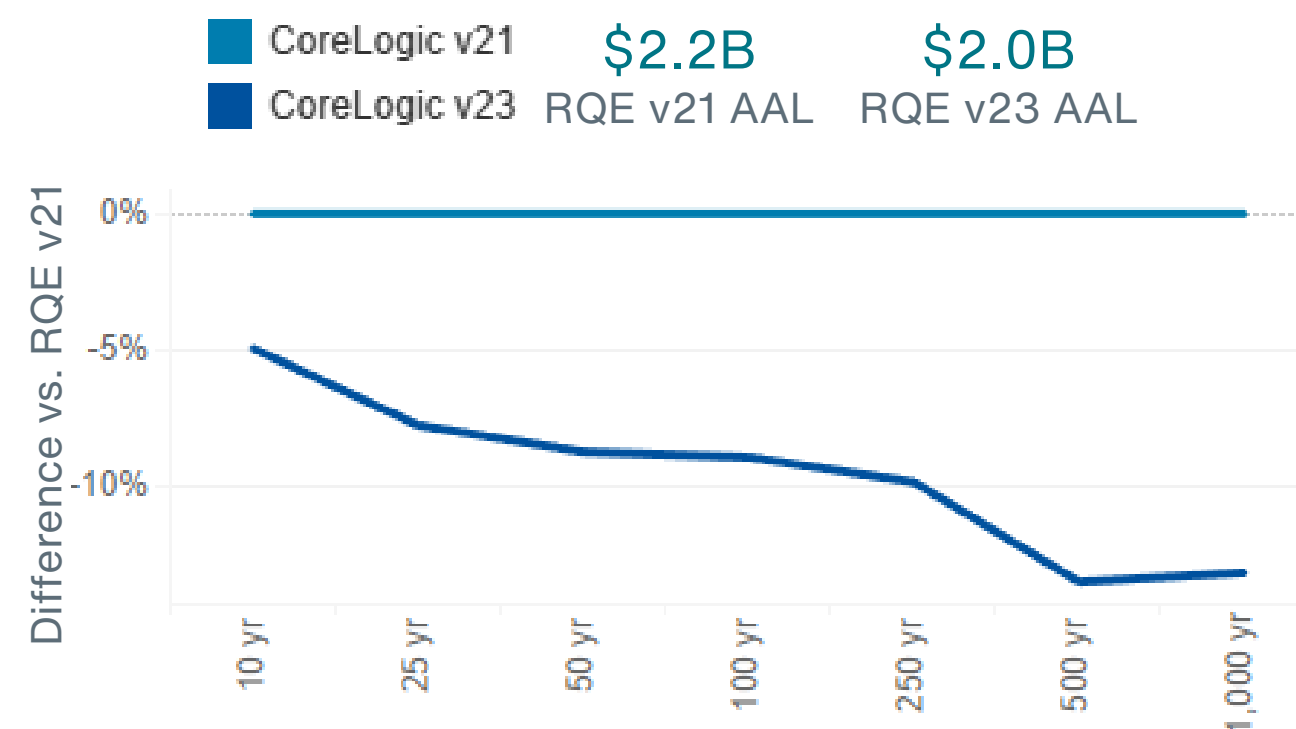


Vulnerability

- Updated default year of construction based on 2020 Census
- Updated defaults for selected secondary characteristics (roof age, roof condition, manufactured home exterior wall conditions, shutter/screen in the wind-borne debris region of North Carolina)
- Updated assignments of ZIP Codes to the Wind-Borne Debris Region

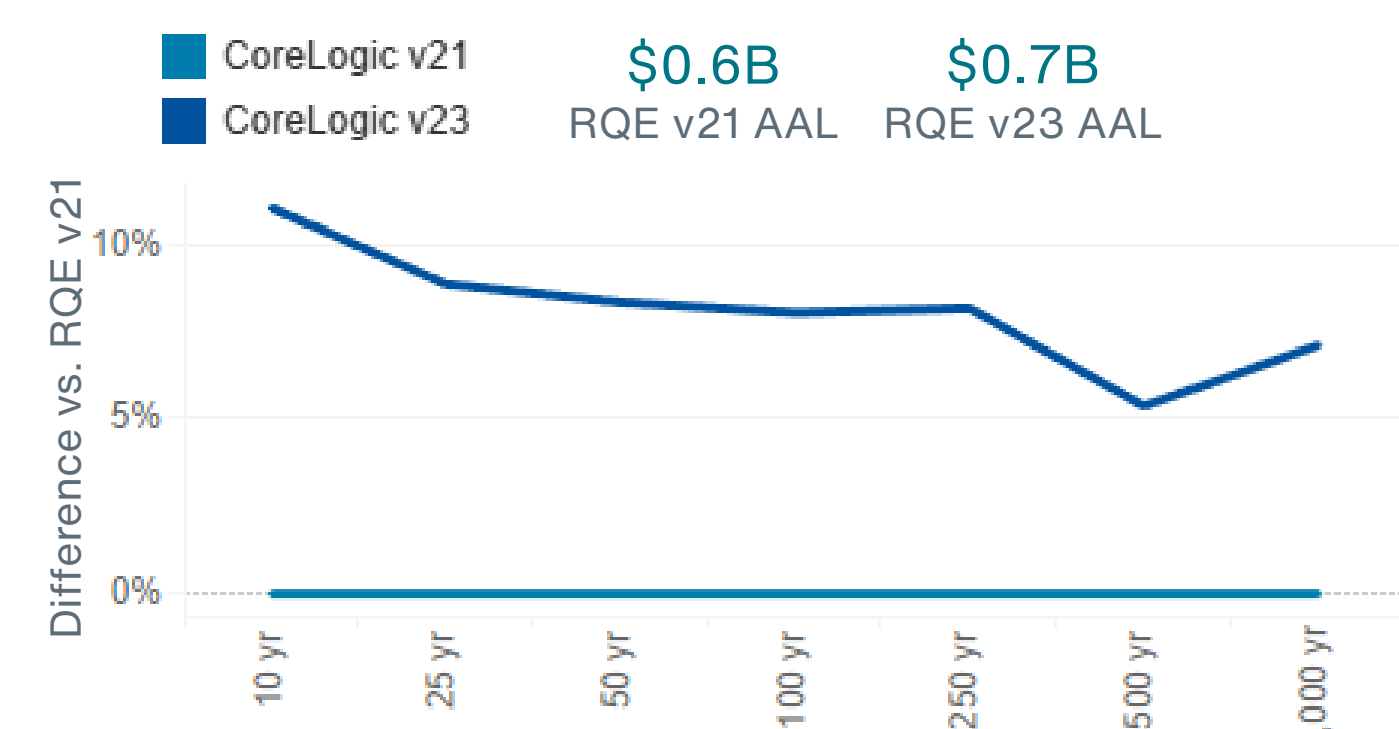
Texas Residential Loss Change

Aon 2023 IED, Near-Term Rates



Texas Commercial Loss Change

Aon 2023 IED, Near-Term Rates



Appendix

Reference Items

Multi-Model Comparison – Hurricane

Hurricane (Near-Term) AEP Gross Losses (excl. LAE)

AEP - Hurricane Only (Near-Term/Warm Sea Surface Temperature)

Return Period	Verisk v10	RMS v23	IF Beta 3	RQE v23
1000 yr	17,439.0	17,252.2	13,521.6	13,713.5
500 yr	15,281.0	13,201.4	10,891.3	11,122.7
250 yr	11,193.4	9,299.9	8,050.8	8,608.0
200 yr	9,981.8	8,243.2	7,156.9	7,797.9
100 yr	7,041.9	5,575.7	4,896.8	5,483.6
50 yr	4,108.9	3,438.4	3,023.1	3,278.5
25 yr	2,168.1	1,943.2	1,701.9	1,742.6
20 yr	1,752.9	1,577.8	1,335.4	1,388.8
Annual avg	351.3	314.2	258.5	275.3
Std dev	1,412.1	1,293.3	1,120.2	1,102.4

US \$ in Millions

Including Demand Surge, Excluding Storm Surge

Multi-Model Comparison – Hurricane

Hurricane (Long-Term) AEP Gross Losses (excl. LAE)

AEP - Hurricane Only (Long-Term/Standard)

Return Period	Verisk v10	RMS v23	IF Beta 3	RQE v23
1000 yr	17,439.0	16,894.0	13,259.0	13,001.2
500 yr	15,095.1	12,855.4	10,397.3	10,478.9
250 yr	10,336.1	8,998.0	7,690.7	7,962.7
200 yr	9,811.9	7,978.0	6,757.1	7,218.9
100 yr	6,607.8	5,372.1	4,560.5	5,007.5
50 yr	3,892.1	3,286.2	2,857.0	2,947.3
25 yr	2,034.8	1,840.4	1,562.3	1,567.9
20 yr	1,632.1	1,484.9	1,222.2	1,223.7
Annual avg	328.8	294.2	238.6	244.9
Std dev	1,360.8	1,258.9	1,072.9	1,024.8

US \$ in Millions

Including Demand Surge, Excluding Storm Surge

Multi-Model Comparison – Severe Convective Storm

Severe Convective Storm AEP Gross Losses (excl. LAE)

AEP - Severe Conv. Storm

Return Period	Verisk v10	RMS v23	IF Beta 3	RQE v23
1000 yr	878.1	234.5	343.8	795.9
500 yr	629.1	194.1	241.2	591.4
250 yr	491.6	159.6	171.0	395.7
200 yr	442.3	149.1	149.7	351.1
100 yr	329.9	118.7	102.6	228.9
50 yr	236.9	92.2	79.0	143.3
25 yr	146.4	68.7	62.6	85.9
20 yr	122.8	61.6	57.9	72.7
Annual avg	31.2	19.6	20.9	20.4
Std dev	72.3	26.5	31.3	62.7

US \$ in Millions

Including Demand Surge (where available)

Exposure Change by Line of Business

Year-Over-Year Exposure Summary

TWIA Provided Site Limit Control Totals

Exposures as of 11/30/2023

County	Commercial	Mobile Home	Residential	Total
Galveston	3,751,782,560	16,528,600	32,257,507,740	36,025,818,900
Nueces	3,830,431,080	3,287,200	14,854,994,060	18,688,712,340
Brazoria	878,166,104	20,289,000	18,060,438,960	18,958,894,064
Jefferson	1,018,539,599	4,988,200	9,590,263,180	10,613,790,979
Cameron	1,848,470,805	3,218,700	2,882,688,480	4,734,377,985
Aransas	536,224,205	13,007,700	3,006,438,120	3,555,670,025
San Patricio	250,472,880	4,104,600	2,869,329,760	3,123,907,240
Chambers	96,386,545	5,137,800	3,026,644,940	3,128,169,285
Harris	229,713,500	267,000	1,721,476,380	1,951,456,880
Matagorda	154,472,330	3,076,800	1,680,140,940	1,837,690,070
Calhoun	165,658,840	5,428,100	1,375,850,560	1,546,937,500
Kleberg	70,659,590	259,500	259,360,140	330,279,230
Refugio	21,459,900	1,722,700	118,320,660	141,503,260
Willacy	25,499,030	742,100	109,848,520	136,089,650
Kenedy	-	-	6,832,100	6,832,100
Total	12,877,936,968	82,058,000	91,820,134,540	104,780,129,508

Exposures as of 11/30/2022

County	Commercial	Mobile Home	Residential	Total
Galveston	3,140,710,659	14,430,568	26,152,777,123	29,307,918,350
Nueces	2,453,933,896	2,149,100	12,419,645,002	14,875,727,997
Brazoria	460,867,981	13,882,389	13,674,923,630	14,149,674,000
Jefferson	498,049,575	4,143,950	7,989,232,323	8,491,425,848
Cameron	1,232,168,354	2,695,600	2,281,236,342	3,516,100,296
Aransas	334,111,773	10,181,130	2,465,019,432	2,809,312,335
San Patricio	133,727,579	3,971,912	2,359,500,229	2,497,199,720
Chambers	66,074,529	4,000,243	2,251,710,814	2,321,785,586
Harris	123,247,176	192,000	1,426,417,113	1,549,856,289
Matagorda	103,140,131	1,919,807	1,426,617,563	1,531,677,501
Calhoun	131,887,632	4,434,394	1,208,130,875	1,344,452,901
Kleberg	22,736,963	-	214,024,567	236,761,530
Refugio	18,576,730	1,556,800	96,554,291	116,687,821
Willacy	19,550,150	326,045	89,575,439	109,451,634
Kenedy	694,441	144,500	6,618,882	7,457,823
Total	8,739,477,568	64,028,438	74,061,983,623	82,865,489,629

Exposures % Change

County	Commercial	Mobile Home	Residential	Total
Galveston	19.5%	14.5%	23.3%	22.9%
Nueces	56.1%	53.0%	19.6%	25.6%
Brazoria	90.5%	46.1%	32.1%	34.0%
Jefferson	104.5%	20.4%	20.0%	25.0%
Cameron	50.0%	19.4%	26.4%	34.6%
Aransas	60.5%	27.8%	22.0%	26.6%
San Patricio	87.3%	3.3%	21.6%	25.1%
Chambers	45.9%	28.4%	34.4%	34.7%
Harris	86.4%	39.1%	20.7%	25.9%
Matagorda	49.8%	60.3%	17.8%	20.0%
Calhoun	25.6%	22.4%	13.9%	15.1%
Kleberg	210.8%	N/A	21.2%	39.5%
Refugio	15.5%	10.7%	22.5%	21.3%
Willacy	30.4%	127.6%	22.6%	24.3%
Kenedy	-100.0%	-100.0%	3.2%	-8.4%
Total	47.4%	28.2%	24.0%	26.4%