Neptune Flood Research Group – Issue 6
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Texas at Risk: Confronting the State's Growing Flood Insurance Gap

Executive Summary

The latest report from the Neptune Research Group explores the accelerating flood risk across Texas and the widespread underinsurance that threatens to magnify its impact. With more than 2.1 million properties projected to face flood exposure over the next 30 years, and over 200,000 expected to flood with near certainty, Texas is facing a critical insurance shortfall. Urgent action is needed to close this gap and strengthen the state's resilience.

Key Findings in Texas

- According to the First Street Foundation, of the 2.1 million properties at risk, 1.15 million face at least a 1% annual chance of flooding.
- By 2050, the Texas Water Development Board (TWDB) expects mass migration, development trends, and climate intensification to add 2.6 million more people and 740,000 new buildings into high flood risk areas.
- FEMA maps identify only 860,000 total at-risk properties, highlighting the mapping inadequacy.
- Nearly 50% of all active National Flood Insurance Program (NFIP) policies in Texas are Pre-FIRM homes (older structures more vulnerable to loss).
- Since 2005, over 52% of NFIP claims in Texas have occurred outside FEMA-designated high-risk flood zones.

The Cost of Inaction

- Texas ranks second nationally in NFIP claims, with over 150,000 claims and $11.6 billion paid over the past decade.
- Harris County accounts for nearly 50% of all NFIP payouts statewide, yet over 78% of homes remain uninsured.
- According to TWDB, the state has identified over $54.5 billion in needed flood risk reduction solutions, yet only $10.6 billion in available funding has been identified.

Texas's Widening Coverage Gap

- Only 7% of residential properties statewide have flood insurance.
- In major inland metros like Dallas, Denton, and Bexar, coverage rates remain below 1% despite repeated flood events.
- Even in FEMA-designated high-risk zones, only 28% of residential buildings have flood insurance coverage.
- Since the launch of Risk Rating 2.0 (FEMA's new property-level pricing model) in 2021, average flood insurance premiums in Texas have risen 35%, while the number of buildings covered has dropped 30%.
- As rates transition to full-risk pricing over the coming decades, affordability concerns grow, with premiums consuming an average of 4-5% of household income in some counties.

"Texas faces a clear and growing flood risk, yet millions of properties remain without adequate insurance coverage," said Matt Duffy, President of Neptune. "This report underscores the scale of the challenge and the need to improve both awareness and access to flood protection. As flood risk continues to rise due to climate change and development patterns, and with an active 2025 hurricane season on the horizon, addressing these gaps remains a critical priority for homeowners, insurers, and policymakers alike."

Texas stands at a critical juncture. The convergence of outdated flood maps, rapid development, climate change, and declining insurance coverage has created a perfect storm of risk and vulnerability. Addressing this crisis will require a coordinated effort - leveraging better data, smarter policy, public-private collaboration, and expanded private flood insurance coverage. This report aims to inform that effort and provide a roadmap for strengthening resilience in the face of growing flood threats.

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Introduction

Texas faces a uniquely high level of flood risk, driven by a combination of geography, climate, and rapid development. The state's vast, low-lying coastal and inland areas make it especially vulnerable to severe flooding events, an exposure that has been repeatedly demonstrated in recent years. Yet, federal flood insurance requirements in the U.S. only apply to those with federally backed mortgages in FEMA-designated high-risk zones, leaving millions of Texans outside this narrow mandate.

Compounding the problem, FEMA's flood maps are widely acknowledged to be outdated and inaccurate, underestimating the true scope of risk and providing a false sense of security to homeowners and builders alike.

At the same time, Texas is experiencing some of the fastest population growth in the country, with mass migration driving a surge in new home construction. Many of these homes are being built in areas that, due to poor mapping, are not flagged as high risk and therefore escape stricter building standards. This has led to a growing housing stock that is highly vulnerable to flooding. Climate change is intensifying the threat, increasing both the frequency and severity of extreme weather events, while aging infrastructure and older homes add another layer of exposure.

Despite this, flood insurance coverage in Texas is declining. FEMA's Risk Rating 2.0 has led to significant premium increases, contributing to affordability concerns and reduced policy uptake. Even among those with coverage, many remain underinsured, a gap highlighted in recent Federal Reserve research.

Meanwhile, efforts to reduce vulnerability through major infrastructure projects, such as the proposed Ike Dike, have stalled due to funding shortfalls and bureaucratic delays, leaving Texas increasingly exposed.

This report examines the evolving nature of flood risk in Texas, highlights where the true exposure lies, and outlines potential solutions to help close the insurance and protection gap.

How Exposed Is Texas to Severe Flooding?

Texas stands at the forefront of the nation's flood risk challenge. More than 5 million Texans (or 1 in 6 residents) live in high-risk areas. The risk is widespread and multifaceted, spanning both coastal and inland zones. Coastal areas are highly susceptible to storm surge and sea level rise, while inland cities increasingly face flash flooding from extreme rainfall, urbanization, and poor drainage systems.

Highly Exposed Geographic Profile

Texas combines nearly every major flooding risk factor:

- 1,200 miles of Gulf coastline, vulnerable to hurricanes and tropical storms
- Expansive low-lying coastal plains, especially around Houston, Galveston, and Corpus Christi
- Rapidly urbanizing inland cities like Dallas, Austin, and San Antonio, where heavy rainfall overwhelms stormwater systems
- Increasingly erratic weather patterns driven by climate change, intensifying the rainfall, storm frequency, and reach of flood events

Texas Municipalities with the Greatest Number of Properties at Flood Risk

Municipality	Properties at Risk (2020)	% of Total (2020)	Properties at Risk (2050)	% of Total (2050)	Change	% Change
Houston	186,481	32%	202,317	34%	+15,836	+8.5%
Corpus Christi	36,952	34%	47,248	43%	+10,296	+27.9%
San Antonio	30,587	7%	31,777	8%	+1,190	+3.9%
Port Arthur	27,723	96%	27,731	96%	+8	+0.0%
League City	27,419	70%	31,858	82%	+4,439	+16.2%
Galveston	26,651	97%	26,662	97%	+11	+0.0%
El Paso	24,306	12%	24,105	12%	-201	-0.8%
Sugar Land	22,044	66%	22,309	66%	+265	+1.2%
Dallas	21,687	7%	22,045	7%	+358	+1.7%
Fort Worth	20,648	8%	21,132	8%	+484	+2.3%

Source: First Street Foundation National Flood Risk Assessment

Historic Flood Events Underscore the Risk

Texas's vulnerability to catastrophic flooding dates back more than a century. In 1900, Galveston suffered the deadliest natural disaster in U.S. history when a major hurricane struck, killing an estimated 6,000-8,000 people. That event marked the beginning of a long history of flood devastation in the state.

- **In the last decade:** The NFIP has processed 150,000 claims and paid losses totaling more than $11.6 billion in Texas. The average claim payment was ~$94,000 over this period (more than double the average claim across the country), underscoring the severity of flood damage across the state.
    - **Hurricane Ike (2008):** Ike generated approximately 44,000 claims for the National Flood Insurance Program (NFIP), who at the time, and still today, held a near monopoly on the flood insurance market in the U.S. The NFIP made over $2.3 billion in payouts on the storm which in total caused an estimated $30 billion in damage across Texas and was blamed for 195 deaths, with impacts spanning both coastal and inland areas.
    - **Hurricane Harvey (2017):** As a result of Hurricane Harvey, the NFIP processed over 91,000 flood claims in Texas (19% of which were total losses) and paid nearly $9 billion. Harvey caused an estimated $125 billion in total property damage and 68 fatalities.
    - **Hurricane Beryl (2024):** Beryl made landfall in July 2024 and generated 2,500+ NFIP claims. Additional flooding in May brought the total to over 4,600 claims statewide. Beryl caused 44 fatalities and an estimated $6 billion in total damage.

Major Texas Flood Events – NFIP Claims and Losses

Flood Event	Claim Count	Total Paid Amount	Average Claim Payout
Hurricane Harvey (2017)	91,871	$ 9,040,370,286	$ 98,403
Hurricane Ike (2008)	44,095	$ 2,230,307,106	$ 50,580
Tropical Storm Allison (2001)	30,723	$ 1,017,381,489	$ 33,115
Tropical Storm Imelda (2019)	10,937	$ 752,448,943	$ 68,799
Hurricane Beryl (2024)	2,488	$ 57,084,236	$ 22,944

What Factors Are Impacting Risk Awareness and Trends?

Texas's flood risk is accelerating, driven by a dangerous combination of climate change, urban expansion, and aging infrastructure.

Mass Migration is Fueling a Surge in Vulnerable Homes

Texas is experiencing one of the fastest housing booms in the country, driven by mass migration. By 2050, the Texas Water Development Board (TWDB) projects 740,000 new buildings will be constructed in areas with at least a 1% annual chance of flooding. Yet, many of these homes are being built without a high-risk flood zone designation, due to FEMA's outdated maps. This disconnect places both builders and buyers at risk.

As a result, a growing portion of the housing stock is:

- Built in areas not subject to the most stringent modern flood codes
- Exempt from insurance requirements
- Increasing the overall vulnerability of the state

Aging Infrastructure Adds to the Risk

The vulnerability is not limited to new construction. Nearly 50% of all NFIP residential policies in Texas are for Pre-FIRM properties, homes built before FEMA adopted its first Flood Insurance Rate Maps. These older structures were not required to meet elevation or mitigation standards, making them especially prone to damage and increasingly costly to insure.

FEMA Mapping Errors Are Hiding the True Risk

FEMA's flood map system significantly understates actual flood risk. While FEMA identifies approximately 860,000 properties in Texas as being at high risk, research from First Street Foundation[1] estimates the true number already exceeds 1.15 million (about 9.5% of homes statewide).

This leaves hundreds of thousands of properties outside official flood zones, meaning they:

- Are less likely to be subject to stringent elevation or mitigation requirements
- Are not required by law to carry flood insurance
- Are often marketed as "low risk", despite facing substantial flood exposure

This mapping gap fosters a false sense of security, particularly in fast-growing suburban and inland areas.

Infrastructure Investment Has Not Kept Pace with Risk

Texas's exposure to catastrophic flooding has been widely acknowledged at both the state and federal levels. Following Hurricane Harvey, Congress allocated over $4.3 billion for long-term flood protection. Yet delays, fragmented planning, and administrative hurdles have kept much of that funding from reaching at-risk communities.

Despite repeated disasters and rising risk, investment in long-term resilience remains inadequate:

- Harris County, which suffered the worst impacts during Hurricane Harvey, was initially denied federal mitigation funding, prompting a federal civil rights investigation.
- In 2021, FEMA's Flood Mitigation Assistance grants totaled just $63 million for Texas, an insignificant amount compared to the $11.6 billion in NFIP payouts since 2015.

[1] First National Flood Risk Assessment

- In 2024, the Texas Water Development Board[2] released the state's first comprehensive flood plan, identifying $54.5 billion in needed projects (including implementation costs). Yet, only $10.6 billion in available funding has been identified, leaving a $44 billion gap and no dedicated state mechanism to close it.
- The state's most ambitious project, the Ike Dike, has become the perfect example of bureaucratic paralysis.

The Ike Dike: A Vision Still on Paper

The Ike Dike is a proposed 70-mile storm surge barrier designed to protect the Houston-Galveston region (including the country's largest petrochemical complex) from future hurricane damage. Initially estimated at $26 billion, updated projections now place the cost at $57 billion, making it one of the most expensive civil engineering projects in U.S. history.

Delays have already driven costs sharply upward, and without urgent action, those costs (and the risks) will only increase.

Other regions have shown the value of forward-looking mitigation. For example, New Orleans's post-Katrina storm surge barriers held firm during Hurricane Ida, preventing another catastrophe. Yet despite being one of the most disaster-prone states, Texas has failed to replicate that success.

Is Sufficient Insurance in Place to Mitigate the Financial Burden of a Catastrophe?

A significant flood insurance gap remains a huge, and growing, issue in the state of Texas:

- Only 7% of residential properties in Texas currently have flood insurance.
- Outside FEMA-designated high-risk zones (and in major inland counties like Dallas, Bexar, and Travis), penetration is often below 1%, despite repeated flood events.
- Even within FEMA-designated high-risk zones, insurance uptake is just 28%.
- In Harris County (the epicenter of repeated flooding), over 880,000 residential structures remain uninsured, accounting for 78% of the total housing stock.

Insured Households Are Significantly Underinsured

While declining flood insurance uptake is a major concern in Texas, an equally troubling issue is the underinsurance among those who do have policies. Recent research by the Federal Reserve Bank of Philadelphia[3] finds that 80% of at-risk households nationwide are underinsured, with an average annual shortfall of $7,208 per household. This underinsurance persists both inside and outside FEMA-designated Special Flood Hazard Areas.

The scale of the shortfall:

- 70% of expected annual flood losses ($17.1 billion) are uninsured nationwide.
- $15.7 billion of that is due to underinsurance among properties with known flood risk and incentives to purchase coverage.
- Nearly 9 out of 10 homes with flood risk remain underinsured nationwide.

A core contributor to this gap is the NFIP's outdated coverage limit. The program caps building coverage at $250,000 - a figure that is increasingly inadequate in Texas, where home rebuild costs often exceed that amount.

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[2] TWDB 2024 State Flood Plan

[3] Flood Underinsurance – FRB

What is Causing Such a Disconnect?

Flood Insurance Mandates Are Limited

Despite the scale of flood risk in Texas, federal flood insurance requirements in the United States remain extremely limited in scope. Under current law, property owners are only required to purchase flood insurance if two conditions are met:

1. The building is located within a FEMA-designated Special Flood Hazard Area (SFHA)
2. The building secures a federally back mortgage

This narrow mandate leaves millions of at-risk Texans with no legal requirement to carry flood insurance, even if they live in flood-prone areas. This is especially concerning given that more than 52% of NFIP claims in Texas since 2005 have occurred outside of FEMA-designated flood zones. The result is a regulatory framework that is dangerously incomplete.

Lender Enforcement is Often Inadequate

Even when flood insurance is required, weak lender enforcement of mandatory flood insurance rules[4] has allowed gaps to persist, even in high-risk FEMA zones. From 2014 to 2019, the most frequently cited violation by federal bank regulators was failure to obtain or maintain required flood insurance coverage on properties in Special Flood Hazard Areas.

This failure to uphold regulatory requirements has further widened the state's residual risk.

FEMA's Risk Rating 2.0 in Increasing Affordability Concerns

A key driver of this disconnect has been the rollout of Risk Rating 2.0 (RR2.0) in 2021, FEMA's updated pricing model designed to more accurately reflect each property's unique flood risk.

While the intent of RR2.0 is sound (bringing insurance pricing in line with actuarial reality), the short-term effect has been a dramatic drop in policy uptake.

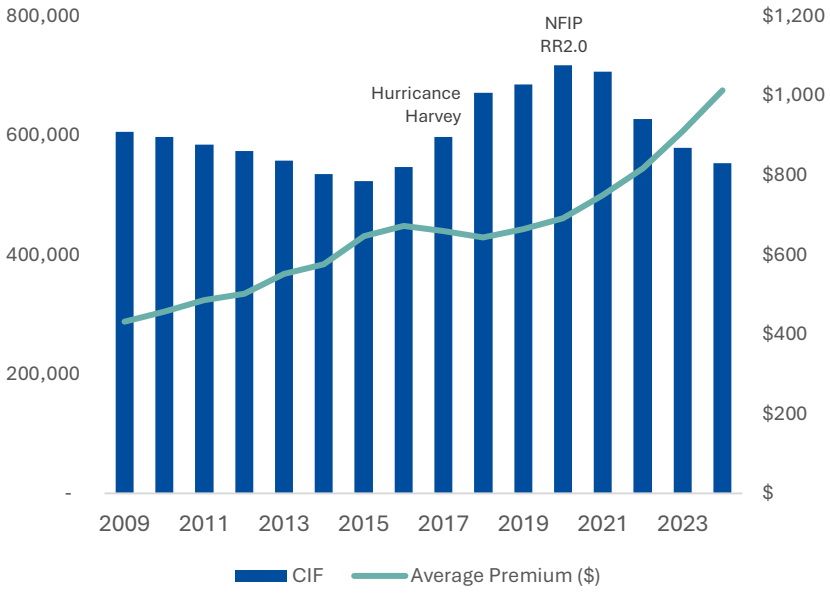
As shown in the chart below, flood insurance contracts in Texas peaked after Hurricane Harvey, driven by post-disaster awareness. Since RR2.0 launched in 2021, coverage has steadily declined:

- Average NFIP premiums in Texas have increased by 35%
- The number of buildings covered has dropped by 30% statewide
- In some counties, premiums now consume 4-8% of household income

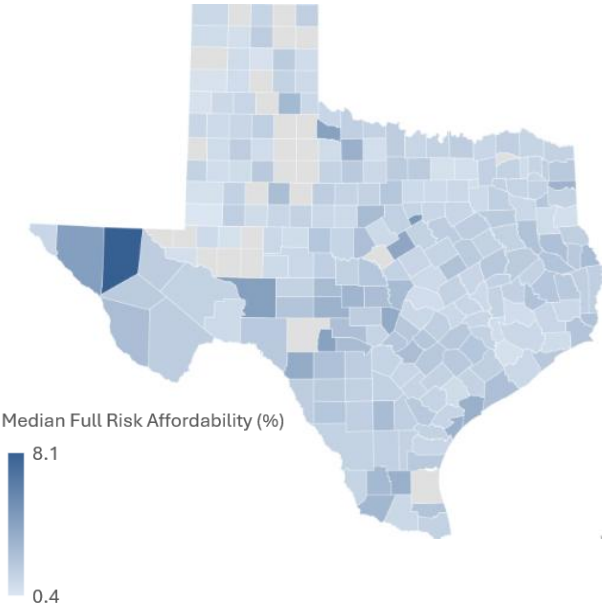
These affordability challenges have forced many homeowners (especially in low-to-moderate risk areas) to forgo coverage altogether.

[4] GAO – Mandatory Purchase Requirement

The NFIP in Texas (2009-2024)[5]
Contracts in Force Decline and Rising Premiums



NFIP – Affordability Challenges[6]
Full-Risk Premiums as a Share of Household Income



Where Does Residual Risk Remain the Highest?

As flood exposure rises, coverage declines, and mitigation funding stalls, the result is a rapidly growing pool of residual risk. Our analysis of insurance penetration, property exposure, and flood zone participation reveals where the protection gap is widest, and where intervention is most urgently needed.

Texas's Largest Urban Counties

Despite widespread flood exposure, Texas has one of the lowest residential flood insurance penetration rates in the U.S.. As of 2024, only ~7% of homes are covered, down from a high of ~10%[7] after Hurricane Harvey. Even in flood-prone urban counties with frequent claims, coverage remains alarmingly low.

[5] Open FEMA Dataset: Redacted Policies
[6] GAO – Affordability
[7] Congress.gov – Flood Insurance Gap

Most Populated Counties in Texas

County	Residential Penetration Rate	Residential Contracts in Force	Total Residential Structures
Harris	21.67%	243,737	1,124,974
Dallas	0.86%	5,127	599,172
Tarrant	0.98%	5,396	548,709
Bexar	0.91%	4,844	534,060
Travis	2.31%	6,611	286,366
Collin	0.62%	1,652	264,830
El Paso	1.20%	2,731	227,800
Denton	0.82%	1,854	224,955
Hidalgo	4.53%	9,910	218,565
Fort Bend	22.04%	48,002	217,755

Concentration of Coverage

By contrast, counties like Galveston (50.3%) and Orange (38.6%) top the penetration list, largely due to repeated storm losses. Yet, these areas represent only a small fraction of Texas's total housing stock.

Meanwhile, Harris County stands as a stark example of concentrated risk: while its 21.7% penetration rate is relatively high, over 880,000 residential structures remain uninsured, creating a significant exposure gap in one of the most flood-prone counties in the U.S.

Top Counties with the Highest NFIP Flood Insurance Penetration

County	Residential Penetration Rate	Residential Contracts in Force	Total Residential Structures
Galveston	50.26%	57,506	114,414
Orange	38.59%	12,224	31,680
Chambers	29.30%	4,102	14,000
Jefferson	27.25%	22,098	81,085
Brazoria	24.90%	31,318	125,765
Aransas	23.20%	4,368	18,829
Fort Bend	22.04%	48,002	217,755
Harris	21.67%	243,737	1,124,974
Nueces	19.65%	21,514	109,502
Calhoun	17.84%	1,792	10,043

Inland Blind Spots

Perhaps most concerning, some of the lowest insurance uptake occurs in rapidly growing inland counties, not remote or low-risk areas. In places like Dallas, Denton, and Bexar, penetration remains below 1%, despite increasing flood frequency, dense development, rising property values, and poor drainage. Following this trend, heavy rainfall, including severe flash flooding, has been seen across these areas during 2025.

Bottom Counties with the Lowest NFIP Flood Insurance Penetration (+50,000 Residential Structures)

County	Residential Penetration Rate	Residential Contracts in Force	Total Residential Structures
Collin	0.62%	1,652	264,830
Smith	0.69%	496	72,245
Denton	0.82%	1,854	224,955
McLennan	0.84%	711	84,970
Dallas	0.86%	5,127	599,172
Webb	0.87%	530	60,813
Bell	0.90%	909	101,518
Bexar	0.91%	4,844	534,060
Lubbock	0.96%	872	90,717
Ellis	0.97%	498	51,340

The SFHA Insurance Gap: High-Risk Zones, Low Coverage

Despite being located in some of Texas's highest-risk flood zones, many counties still show alarmingly low insurance uptake among residential structures in FEMA-designated Special Flood Hazard Areas (SFHAs). During hurricane Harvey, just 21% of residential properties in SFHAs were covered, leaving the majority of high-risk homes financially vulnerable.

As shown in the table below, only Galveston (60.8%) and Harris (40.8%) exceed a 40% SFHA penetration rate today. Most other high-risk counties fall far below that threshold. This discrepancy points to serious gaps in compliance with mandatory purchase requirements and reflects broader issues with affordability, enforcement, and risk communication.

Top Counties by NFIP Flood Insurance Uptake in High-Risk Zones (SFHA)

County	SFHA Residential Penetration Rate	SFHA Residential Contracts in Force	SFHA Total Residential Structures
Harris	40.82%	53,928	132,123
Galveston	60.85%	28,811	47,350
Brazoria	38.04%	11,451	30,100
Nueces	33.33%	9,586	28,763
Montgomery	15.20%	2,599	17,100
Cameron	17.86%	3,048	17,066
Travis	20.90%	2,836	13,572
Orange	24.49%	3,133	12,791
Dallas	20.51%	2,343	11,425
Bexar	15.55%	1,762	11,330

Flood Damage Is Highly Concentrated

The risk is not hypothetical and flood losses in Texas have been highly concentrated. In the past 20 years, ~50% of all NFIP payouts in the state went to Harris County alone, with Galveston, Jefferson, and Orange also receiving substantial payouts. These are the same counties where SFHA exposure is high, but insurance uptake remains insufficient relative to the scale of risk.

NFIP Flood Losses and Claims Paid by County – Last 20 Years

County	Claim Count	Total Paid Amount ($)	Percentage of Total Paid Amount
Harris	97,989	$ 7.21B	49.59%
Galveston	34,525	$ 2.22B	15.25%
Jefferson	15,574	$ 1.12B	7.74%
Orange	11,299	$ 1.03B	7.09%
Brazoria	9,417	$ 497M	3.42%
Montgomery	7,184	$ 495M	3.41%
Fort Bend	6,132	$ 438M	3.02%
Hardin	1,510	$ 173M	1.19%
Nueces	5,100	$ 166M	1.14%
Chambers	1,662	$ 126M	0.87%
Total	**224,736**	**$ 14.5B**	

What Can Be Done to Close The Gap?

Texas's flood risk is rising, but solutions are within reach. To close the protection gap and reduce vulnerability, action is needed across five fronts:

1. Invest in Major Infrastructure

Texas must prioritize long-term flood protection. This includes funding the Ike Dike, a critical project to defend the Houston-Galveston coast from future storm surge. The state should also close the $44 billion gap in its flood plan by creating a dedicated resilience fund to support high-impact mitigation projects.

2. Modernize Flood Risk Mapping

FEMA's outdated maps no longer reflect Texas's actual flood exposure, especially in fast-growing inland areas. The state should adopt forward-looking, data-driven risk models to identify vulnerable communities better and guide zoning, insurance, and development decisions.

3. Expand Access to Private Flood Insurance

The NFIP alone cannot close the protection gap. Texas should promote greater use of private flood insurance, offering higher limits, more flexible coverage, and often better pricing. Tech-driven insurers like Neptune Flood play a key role in expanding affordable, scalable options across the state.

4. Improve Affordability and Enforcement

Cost remains a major barrier to coverage. Texas should explore state-level premium assistance for low- and fixed-income homeowners and improve enforcement of existing insurance mandates, especially in high-risk zones where compliance has been weak.

5. Build Smarter for the Future

Development should not outpace resilience. The state should enforce strong flood-resilient building codes even in areas not currently mapped as high risk and provide incentives for builders to exceed minimum standards, such as tax breaks or expedited permitting.

Conclusion

Texas faces a defining challenge, one where the consequences of inaction are well-known and increasingly visible. The state remains dangerously unprotected despite repeated disasters, growing scientific consensus, and billions already spent on post-flood recovery. Millions of properties sit exposed, both outside and inside FEMA's high-risk maps.

What makes Texas's flood risk especially urgent is its pace of change. Few states are growing faster, building more rapidly, or facing more extreme weather variability. Yet flood insurance coverage is moving in the opposite direction. Instead of expanding, it is shrinking both in reach and adequacy. Even among insured households, outdated NFIP coverage limits and actuarial reforms like Risk Rating 2.0 are leaving many Texans underinsured and financially vulnerable.

But it is not too late. Texas has already taken important first steps with its statewide flood plan and growing public awareness of climate-related risk. What comes next is a combination of political will, policy design, and strategic investment. With better maps, better enforcement, a stronger role for the private market, and real infrastructure funding, the state can shift from reactive to resilient.