

ISSUE BRIEF

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The National Flood Insurance Program in Pennsylvania

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FLOOD RISK IN PENNSYLVANIA

Pennsylvania has many regions of high flood risk, primarily located along the state's rivers and streams and their tributaries, such as in central Pennsylvania along the Susquehanna River; in Southwest Pennsylvania along the Allegheny, Monongahela, and Youghiogheny Rivers; and in the East along the Delaware and Schuylkill Rivers. In addition, floods can occur in lower elevation areas—even far from rivers and streams—as the result of heavy rainfall. This risk of rainfall related flooding is getting worse in the northeast of the United States as the planet warms. Extreme precipitation in Pennsylvania has increased substantially over time, increasing the risks of rainfall-related (pluvial) flooding.¹

Most recently in September 2021, remnants of Hurricane Ida spurred historic flooding across the Philadelphia region. Torrential rainfall caused the Schuylkill River to reach its highest level in over 100 years. The river overflowed its banks, flooding riverside neighborhoods and submerging a portion of the Vine Street Expressway. Around the region, emergency personnel conducted hundreds of water rescues. The costs associated with the widespread property and infrastructure damage continue to rise.

Pennsylvania has experienced other severe floods in the past decade. For example, flooding from Tropical Storm Lee in 2011 displaced thousands of people in central Pennsylvania and cost residents hundreds of millions of dollars in property damage.² The NFIP distributed roughly \$402 million (2020 USD) to Pennsylvania households in claims payments that year alone, and since 2000, the program has paid out \$1.227 billion (2020 USD) in the state.

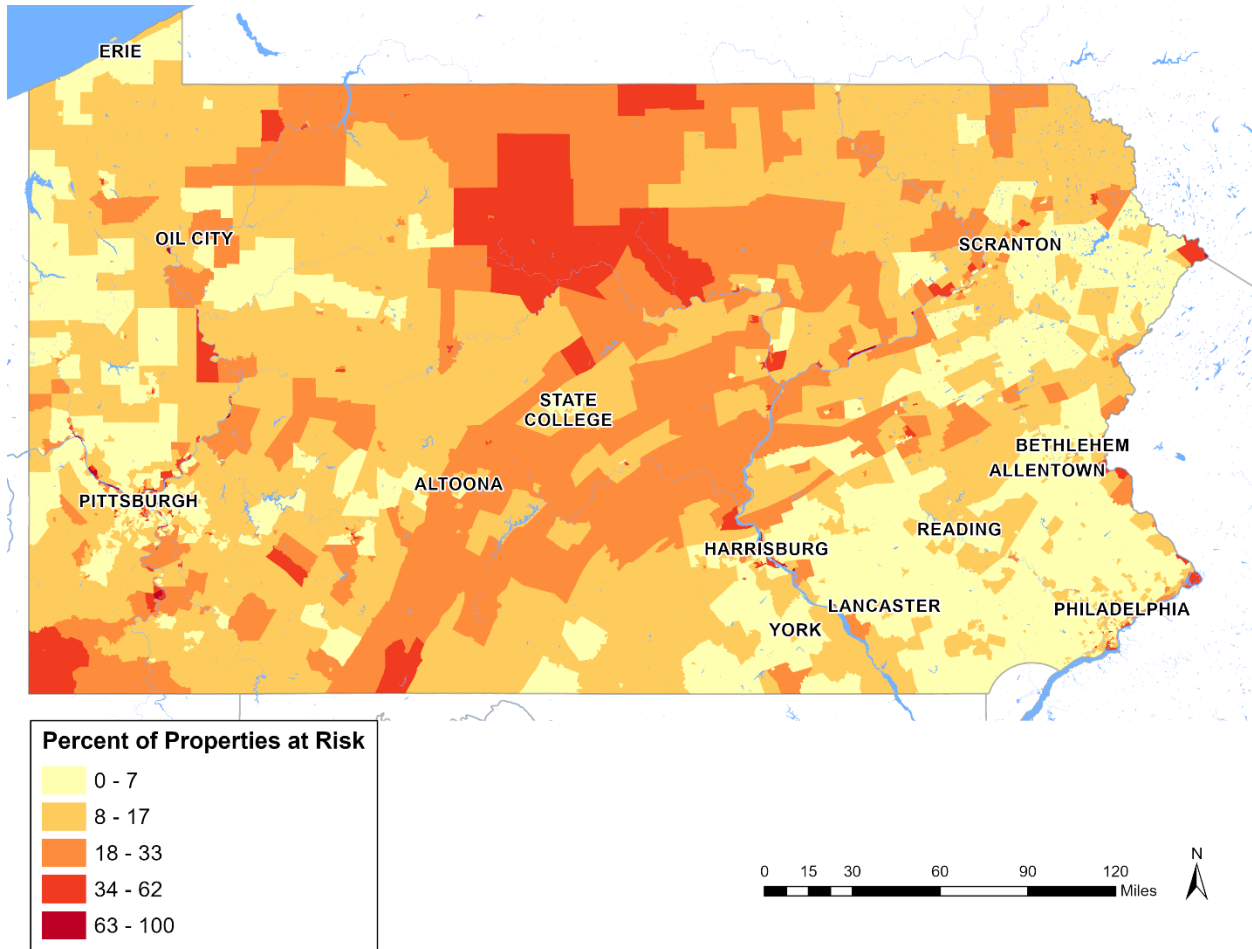
KEY FINDINGS

- NFIP policies in Pennsylvania are concentrated in urban areas along major rivers.
- The risk of rainfall-related flooding is getting worse, and many properties at risk of flood damage remain uninsured.
- The number of Pennsylvania NFIP policies-in-force was increasing until 2012, when it hit a maximum (at 69,716 policies) and has since declined. Private sector flood policies have likely increased.
- Under the NFIP's new methodology—Risk Rating 2.0—most Pennsylvania households in the NFIP will see minimal changes in premiums.

¹ "Climate Change in PA," Pennsylvania Department of Environmental Protection. Accessed November 2021. <https://gis.dep.pa.gov/ClimateChange/index.html>

² "4th Anniversary of the Flooding from Tropical Storm Lee," National Weather Service. Accessed May 2021. <https://www.weather.gov/ctp/TSLeeFlooding>

According to the First Street Foundation, a non-profit research group quantifying flood risk in the United States, 9.9% of properties in Pennsylvania are currently at substantial risk for flooding (1% annual risk), and this number will increase to 10.3% by 2050 due to climate change.³ Figure I displays the current percentage of properties with at least a 1% annual chance of flooding (100-year floodplain) by census tract for the state.



Note: Data is courtesy of the First Street Foundation Flood Model, which covers flood risk due to rainfall (pluvial), riverine flooding (fluvial), tidal flooding, and coastal surge. Census tract boundaries are from the 2010 US Census.

Figure I: Properties at Substantial Risk of Flooding in Pennsylvania, by Census Tract

Flood Insurance

Flood insurance is typically excluded from standard homeowners policies. To have financial protection against the property damage floods can cause, homeowners need to purchase a separate flood insurance policy. The overwhelming majority of flood insurance is provided through the federal National Flood Insurance Program (NFIP). There is, though, a

³ “The First National Flood Risk Assessment Defining America’s Growing Risk,” First Street Foundation. Accessed September 7, 2021. https://assets.firststreet.org/uploads/2020/06/first_street_foundation_first_national_flood_risk_assessment.pdf

small and growing market for private flood insurance: the Pennsylvania Insurance Department currently lists 26 licensed private flood insurers in the state.⁴

The NFIP, established in 1968, is housed within the Federal Emergency Management Agency (FEMA). The program was created as a partnership between the federal government and local communities to reduce flood risk. When communities join the NFIP, they must implement specific regulations within the 100-year floodplain—also referred to as the Special Flood Hazard Area (SFHA)—to reduce the risk of flood-related damage. In return, residents of the community become eligible to purchase flood insurance through the program.⁵ As of February, 2021, 2,484 of Pennsylvania’s 2,527 municipalities participated in the NFIP.⁶

At the program’s inception, few communities joined the NFIP and few residents chose to insure when their community did participate. To increase take-up rates, Congress mandated that federally-regulated lenders or issuers of federally-backed mortgages require flood insurance on all loans secured by property in the SFHA. This helped steadily increase the purchase of flood insurance. A challenge, however, is that the SFHA does not capture all flood risk, and many households and small businesses at risk of flood damage remain uninsured.

Notably, the SFHA designation often does not include stormwater flooding from heavy rainfall events when far from rivers and streams, which is an increasing problem not just in Pennsylvania, but in many communities around the country. In addition, more severe flood events can and do occur and these often extend outside the SFHA. Since 1975, 37% of claims paid out by the NFIP have come from outside of the SFHA. FEMA flood maps also show broad flood zones, which were historically used in premium-setting and in floodplain regulations. These include the A and V zones, which make up the SFHA. The V zone is a narrow strip along the coast subject to waves, and the A zone makes up the rest of the 100-year floodplain area. Outside the SFHA is the X zone. These broad zones, however, fail to accurately capture flood risk at a property level and using them for pricing flood insurance has created many cross-subsidies.

As of the fall of 2021, FEMA has implemented a new approach to pricing, referred to as Risk Rating 2.0. By drawing on advances in risk modeling capacity and improved datasets, Risk Rating 2.0 will modernize the methods used to price premiums, which have not been updated in decades. Updated premiums will better reflect all sources of flood risk for individual properties and undo a regressive cross-subsidy that currently exists in NFIP pricing between low- and high-valued homes.⁷

NFIP PURCHASES IN PENNSYLVANIA

As of December 31, 2020, there were 47,638 NFIP policies-in-force across Pennsylvania. Of these policies, the large majority at 85% (40,505), were residential. NFIP policies in Pennsylvania tend to be concentrated around major rivers. Figure 2 shows the estimated take-up rates for all NFIP policies in Pennsylvania by census tract. This estimated take-up rate was calculated by dividing the number of policies in a given tract by the number of structures in that area using US

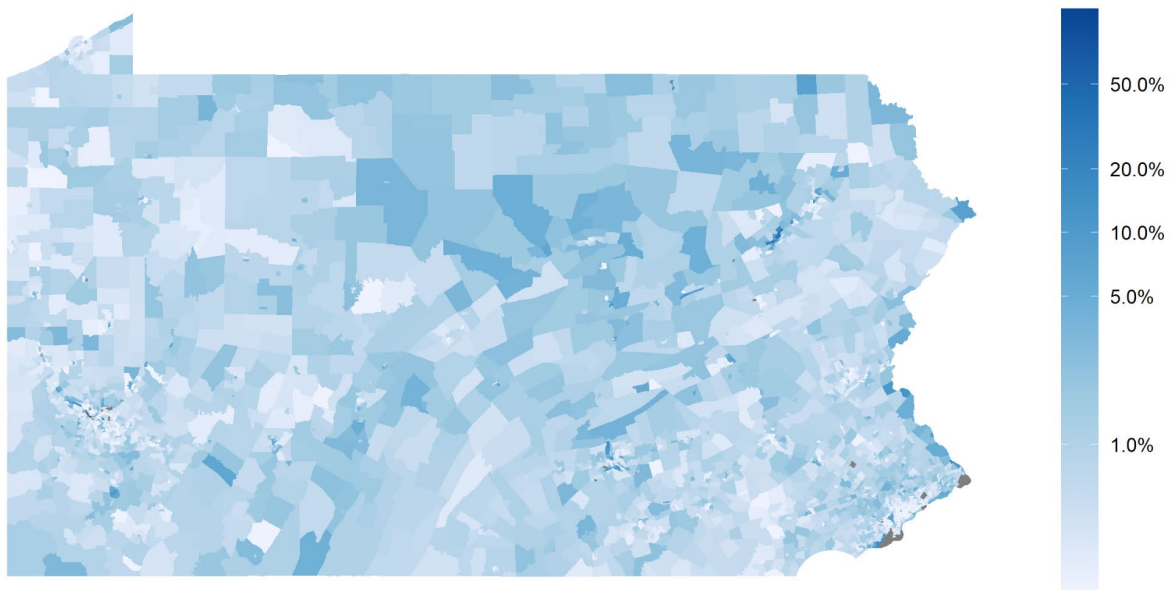
⁴ “Licensed Insurance Companies,” Pennsylvania Insurance Department. Accessed July 14, 2021. <https://www.insurance.pa.gov/Coverage/Pages/Licensed-Insurance-Companies.aspx>

⁵ A residential property owner can purchase up to \$250,000 of coverage for their building and up to \$100,000 of coverage for its contents. Renters can purchase a contents-only policy. Non-residential property owners, such as commercial and municipal properties, can purchase up to \$500,000 of coverage each for the structure and its contents.

⁶ “Community Status Book,” Federal Emergency Management Agency. Accessed May 20, 2021. <https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book>

⁷ “Risk Rating 2.0: Equity in Action,” Federal Emergency Management Agency. Accessed May 20, 2021. <https://www.fema.gov/flood-insurance/work-with-nfip/risk-rating>

Census data (as such, it is not adjusted for the number of properties at high risk of floods).⁸ Unsurprisingly, take-up rates are higher in areas of known higher flood risk.



Note: As of December 31, 2020. Data from OpenFEMA and the US Census. Census tracts shaded gray did not have any structures.

Figure 2: Estimated Take-Up Rates for Flood Insurance in Pennsylvania by Census Tract

The number of NFIP policies-in-force was increasing in Pennsylvania until about 2012, when it hit a maximum (at 69,716 policies) and has declined ever since.⁹ This is shown in Figure 3, which displays the number of NFIP policies in the state at the end of each calendar year from 2009 to 2020. The increase around 2012 could be attributable to Tropical Storm Lee; greater awareness of flood risk, as well as federal requirements that recipients of federal disaster aid purchase flood insurance, could have led to a bump in NFIP purchases.

Some of the decrease in policies in more recent years is offset by an increase in the number of private flood insurance policies. As of February 2019, the number of private flood insurance policies in the state had risen to 8,950, from 5,200 the year before.¹⁰ While more recent data on the count of private policies is not available, this number is likely even higher today, reflecting increased awareness in the state and a larger number of insurers licensed to sell flood coverage.

⁸ Public data from OpenFEMA is the source for all NFIP statistics in this report.

⁹ The number of policies-in-force was calculated by summing the number of NFIP policies with an expiration date after December 31 and a date effective prior to December 31.

¹⁰ “More Pennsylvanians Getting Private Market Flood Insurance Policies to Protect Homes and Property,” Pennsylvania Pressroom. February 26, 2019. <https://www.media.pa.gov/Pages/Insurance-Details.aspx?newsid=373>

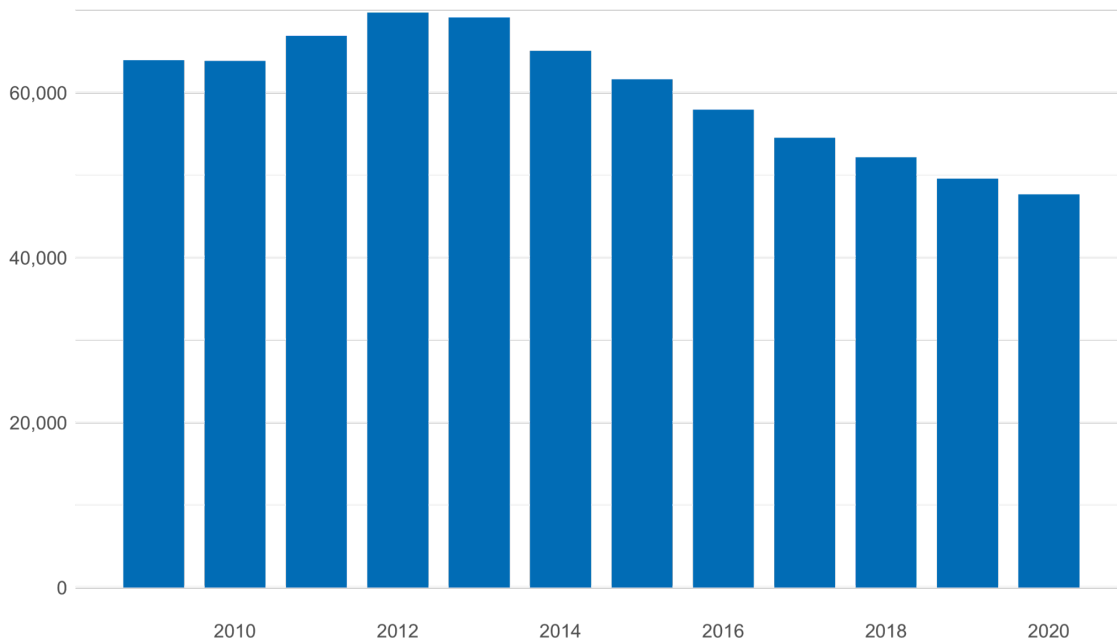


Figure 3: NFIP Policies-in-Force in Pennsylvania as of December 31, 2009 – 2020

As expected, the largest number of NFIP policies are purchased by residents in the SFHA, where the insurance is required for those with a mortgage (see Figure 4). There are also a substantial number of policies in the X zone receiving a lower insurance price under the NFIP’s Preferred Risk Policy (PRP), which offers lower-cost flood insurance to policyholders with a favorable loss history. There are also policies in the X zone that are not PRP.

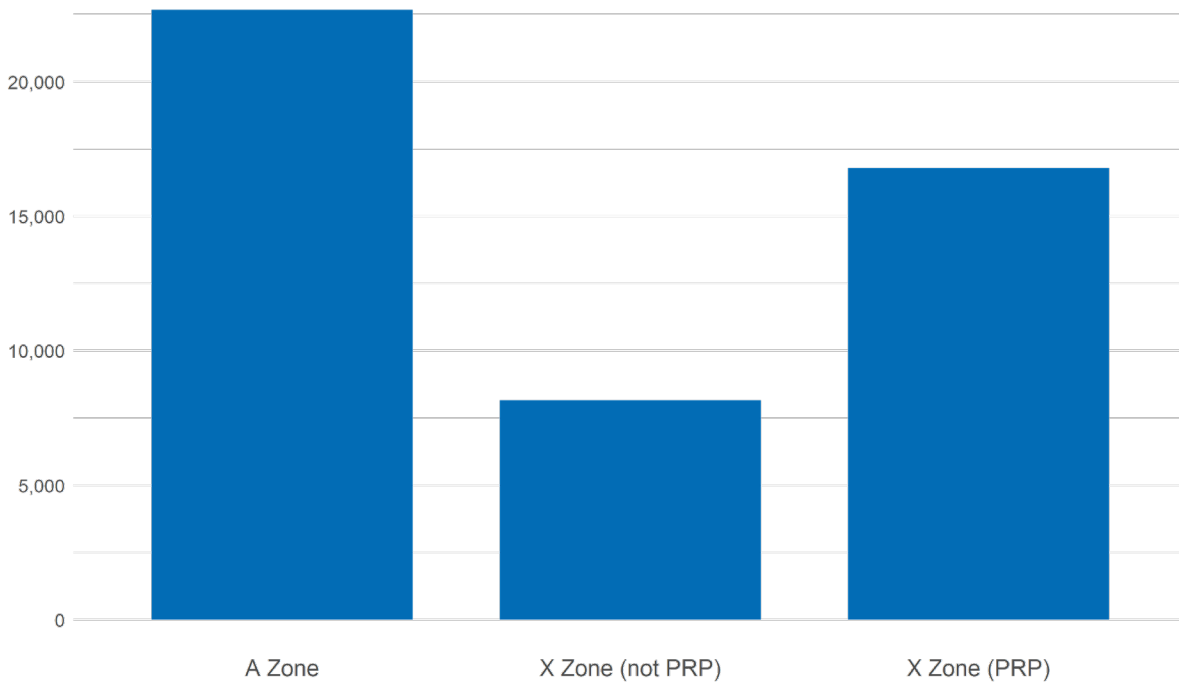


Figure 4: NFIP Policies-in-Force in Pennsylvania by Flood Zone as of December 31, 2020

THE CURRENT COST OF FLOOD INSURANCE IN PENNSYLVANIA

Until October 2021, NFIP policies in Pennsylvania were subject to the historical pricing methodology, in which premiums varied primarily by risk zone. Figure 4 displays the average premium by flood zone of NFIP policies-in-force on December 31, 2020. A zones, which hold the plurality of Pennsylvania policies, had an average premium of \$2,074.

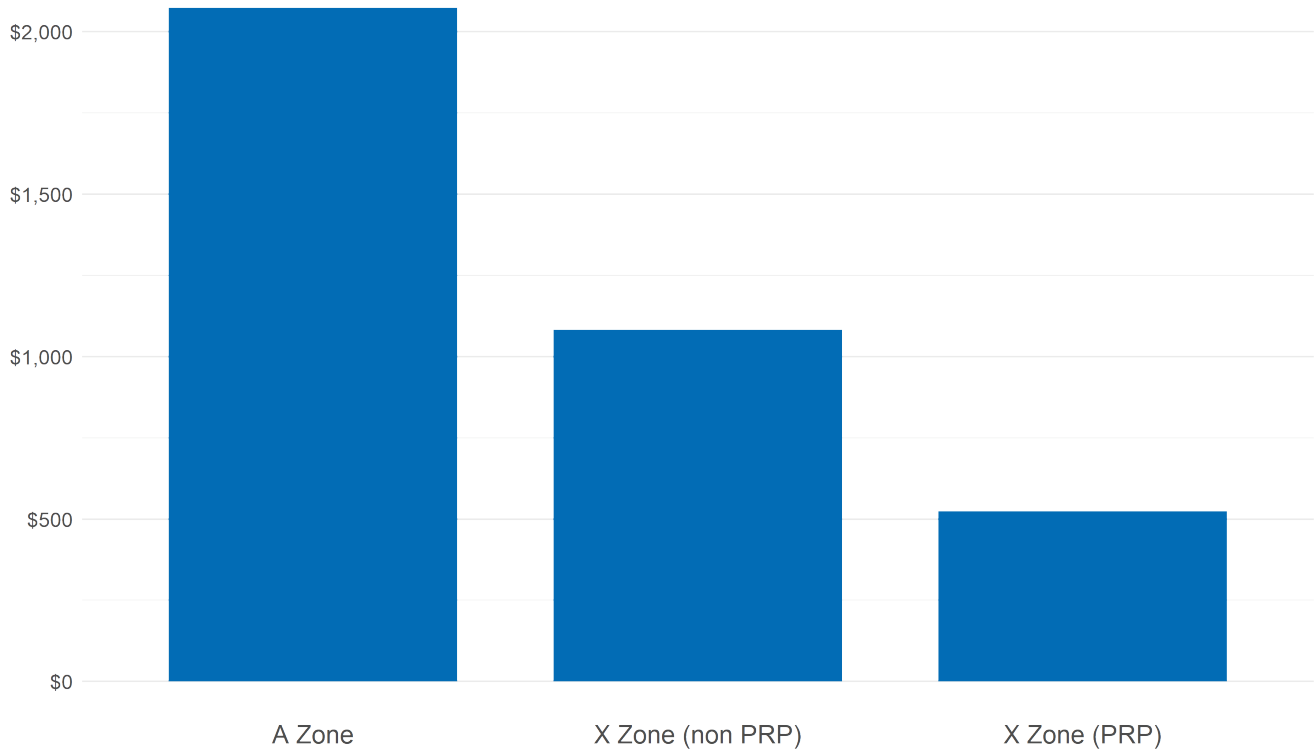
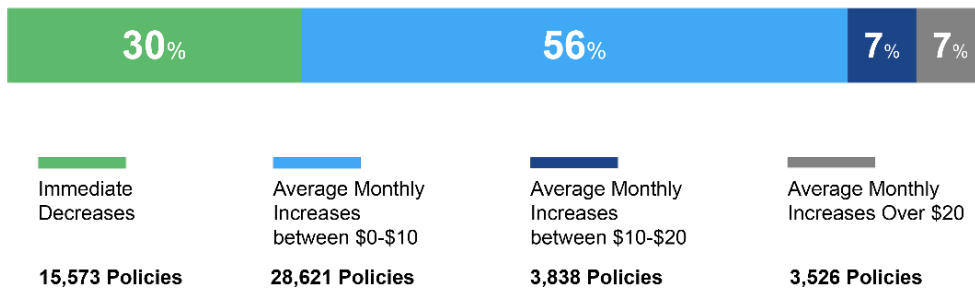


Figure 4: Mean NFIP Premium in Pennsylvania by Flood Zone
for Policies-in-Force on December 31, 2020

After the rollout of Risk Ratio 2.0, pricing in the state will change. Note that with Risk Rating 2.0 pricing, there will not be large price jumps between flood zones anymore, but a more gradual gradient that better reflects the flood risk. Risk Rating 2.0 will be adopted in two phases. Phase I will begin on October 1, 2021, at which point all new policies will be subject to the new rating methodology. In addition, current policyholders with policies eligible for renewal will be able to take advantage of immediate decreases in premiums. Phase II will start on April 1, 2022, and all renewing policies will be subject to the new methodology, with price increases phased in at the Congressionally mandated cap of 18% per year.¹¹

FEMA has released information on the average premium changes expected across households in Pennsylvania under Risk Rating 2.0. As summarized in Figure 5, the majority of households in the NFIP—56%—will pay \$0 to \$10 more per month in premiums under Risk Rating 2.0.

¹¹ For data and information specific to NFIP's Risk Rating 2.0 transformation in Pennsylvania, please refer to the [Pennsylvania State Profile](#).



Source: "Pennsylvania - Risk Rating 2.0," Federal Emergency Management Agency, March 2021. https://www.fema.gov/sites/default/files/documents/fema_pennsylvania-state-profile_03-2021.pdf

Figure 5: Changes to NFIP Premiums in Pennsylvania under Risk Rating 2.0

NFIP CLAIMS PAID IN PENNSYLVANIA

From 1975 to 2020, Pennsylvania policyholders had cumulatively received just under \$1.8 billion (2020 USD) in total payments on 74,721 claims. Of these, 13.7% were for non-residential properties. The three years with the largest paid claims—1996, 2004, and 2011—account for more than half of this total (\$915.7 million, 2020 USD). Figure 6 shows total paid claims by year. The spikes seen in 1996 and 2004 are due heavy snow and rain fall during a winter storm and to Hurricane Ivan.¹² As noted earlier, the spike seen in 2011 is due to Tropical Storm Lee.

Annual claim totals have been steadily increasing since the spike in 2011. The recently available full year data from 2020 indicates that Pennsylvania policyholders received roughly \$60 million (2020 USD) from the NFIP. This trend is likely to continue as the frequency and severity of heavy rainfall events leads to more coastal and pluvial flooding.¹³

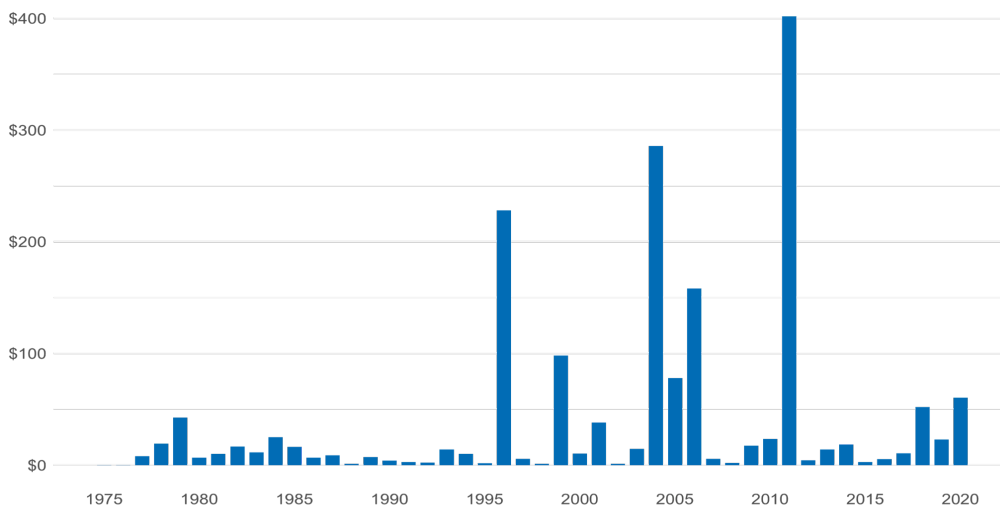


Figure 6: NFIP Claims Paid Out in Pennsylvania
millions of 2020 USD, 1975 - 2020

¹² U.S. Department of Commerce. [Service Assessment: Blizzard of '96](#).

¹³ Kousky, C. and N. R. Netusil (2021). [The Coming Storm: How U.S. Cities Are Managing Stormwater from Increasingly Extreme Rainfall Events](#). Wharton Risk Center Issue Brief, October.

Figure 7 displays a “heat map” of paid claims made from 1975 through 2020. NFIP claims in Pennsylvania are concentrated in urban areas along major rivers—the Schuylkill, Delaware, Allegheny, Ohio, and Susquehanna. Unsurprisingly, the five counties with the highest number of policies-in-force are also the five counties that have made the most NFIP claims from 1975 through 2020. Across this timespan, the average NFIP claim was \$23,774 (2020 USD).

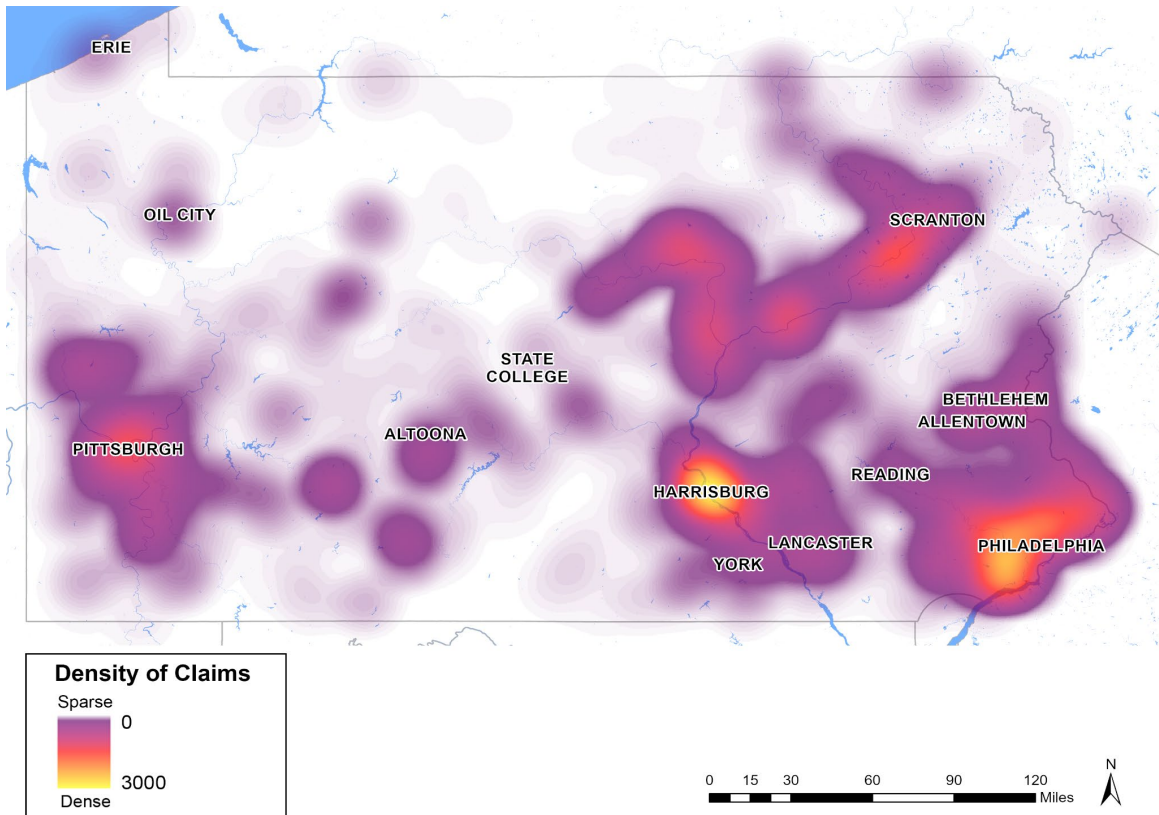


Figure 7: NFIP Claims Paid Out in Pennsylvania, 1975 - 2020

THE FUTURE OF FLOOD INSURANCE IN PENNSYLVANIA

Insurance is critical for financial resilience in the aftermath of floods. Many households have insufficient savings, can be locked out of access to credit, and are unlikely to receive federal assistance—which leaves insurance as a necessary source for funds to cover the rebuilding and repair costs of a flood. As heavy rainfall events escalate in the coming years from climate change, it will be essential that the state support broader take-up of flood insurance. For equitable recoveries, this will include a focus on policy approaches to help lower-income households afford the premiums.

Additional resources:

[Financing Flood Losses: A Discussion of the National Flood Insurance Program](#) (2018)

[Improving the Post-Flood Financial Resilience of Lower-Income Households through Insurance](#) (2021)

[Perspectives on Flood Insurance Demand Outside the 100-Year Floodplain](#) (2020)

[The Coming Storm: How U.S. Cities Are Managing Stormwater from Increasingly Extreme Rainfall Events](#) (2021)

[Flood Risk Management in the United States: Building flood resilience in a changing climate](#) (2020)

[The Emerging Private Residential Flood Insurance Market in the United States](#) (2018)