

THE NATIONAL FLOOD INSURANCE PROGRAM: A PRIMER¹

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The National Flood Insurance Program (NFIP) is a federal program providing flood insurance to residents of participating communities. Created in 1968, communities can voluntarily join the program, adopting baseline floodplain management regulations, and then all residents—homeowners, renters, and businesses—are eligible to purchase a flood insurance policy. The program, now housed in the Federal Emergency Management Agency (FEMA), also maps flood risks, helps educate residents about flooding, and supports flood risk reduction through grants, outreach, and incentives.

The Wharton Risk Management and Decision Processes Center, established in 1985, is a research center affiliated with the Wharton School at the University of Pennsylvania. The Center is recognized worldwide as a leader in risk-related research and policy analysis and serves as a bridge between scholars at Penn and organizations and decision-makers in the public and private sectors. Our primer series provides an introduction to topics in risk and resilience.

OVERVIEW OF THE NFIP

The National Flood Insurance Program (NFIP) was created over fifty years ago, partially in response to a lack of private market flood coverage.² Floods can present challenges for private insurance due to adverse selection, correlated losses, and the possibility of very extreme events. Today, standard homeowners insurance policies typically exclude flood damages. To be protected against flood-related losses, a separate flood policy is usually required.³ While there has always been a robust private market for commercial flood coverage, there is also

¹ We are grateful for financial support from the Travelers–Wharton Partnership for Risk Management and the National Science Foundation (grant number 2133256). We thank Erin St. Peter for research assistance.

² For more on the history of the program, see: National Research Council (2015). *Affordability of National Flood Insurance Premiums: Report 1*. Washington, DC, National Academies Press.

³ For more details on the program, see: Kousky, C. (2018). "Financing Flood Losses: A Discussion of the National Flood Insurance Program." *Risk Management and Insurance Review* 21(1): 11-32.

now a developing private market for residential coverage, although approximately 90% or more of residential flood policies are still purchased through the NFIP.⁴

The NFIP is currently housed in the Federal Emergency Management Agency (FEMA). Pricing for flood insurance is set by the program and the program holds all the risk. Private insurance companies issue and service policies in exchange for a fee. Referred to as Write-Your-Own (WYO) firms, this arrangement was established in 1983. Today, 60 insurers participate in the WYO program and approximately 88% of NFIP policyholders apply for NFIP policies via this program.⁶

Homeowners can purchase up to \$250,000 of building coverage. Homeowners and renters can both purchase contents coverage up to \$100,000. Businesses and public buildings can purchase both building and contents coverage up to \$500,000. As of early 2022, there were over 5 million policies-in-force nationwide.

FLOODPLAIN MAPPING

FEMA maps flood risk on Flood Insurance Rate Maps (FIRMs). FIRMs depict various flood zones. The Special Flood Hazard Area (SFHA) refers to the area with a 1% annual chance or greater of flooding. It is also commonly referred to as the 100-year floodplain. FIRMs divide the SFHA into two zones: “A” zones and “V” zones. A zones, subject to rising waters but no or limited wave velocity, represent the majority of SFHA policies; V-zones, a thin strip along some coastlines, represent areas exposed to wave velocity, such as storm surge hazards. Many FIRMs also show the estimated height of flood waters for a 1% annual flood, referred to as the base flood elevation (BFE). Outside of the SFHA is the X zone, which includes the 500-year floodplain (2% annual chance of flooding) and other areas of minimal flood hazard. Figure 1 shows a sample FIRM from Ocean County in New Jersey.

FIRMs are a regulatory tool of the NFIP. The SFHA is the area where flood insurance is mandatory for those with a federally-backed mortgage loan or a loan from a federally backed lender. This is referred to as the mandatory purchase requirement and was adopted early in the program’s history to increase purchase of flood insurance.⁷ The SFHA is also the area in which participating communities must adopt certain building codes (discussed further in the next section). Until 2021, the FIRMs were also used for pricing flood insurance. The new approach to pricing is discussed below.

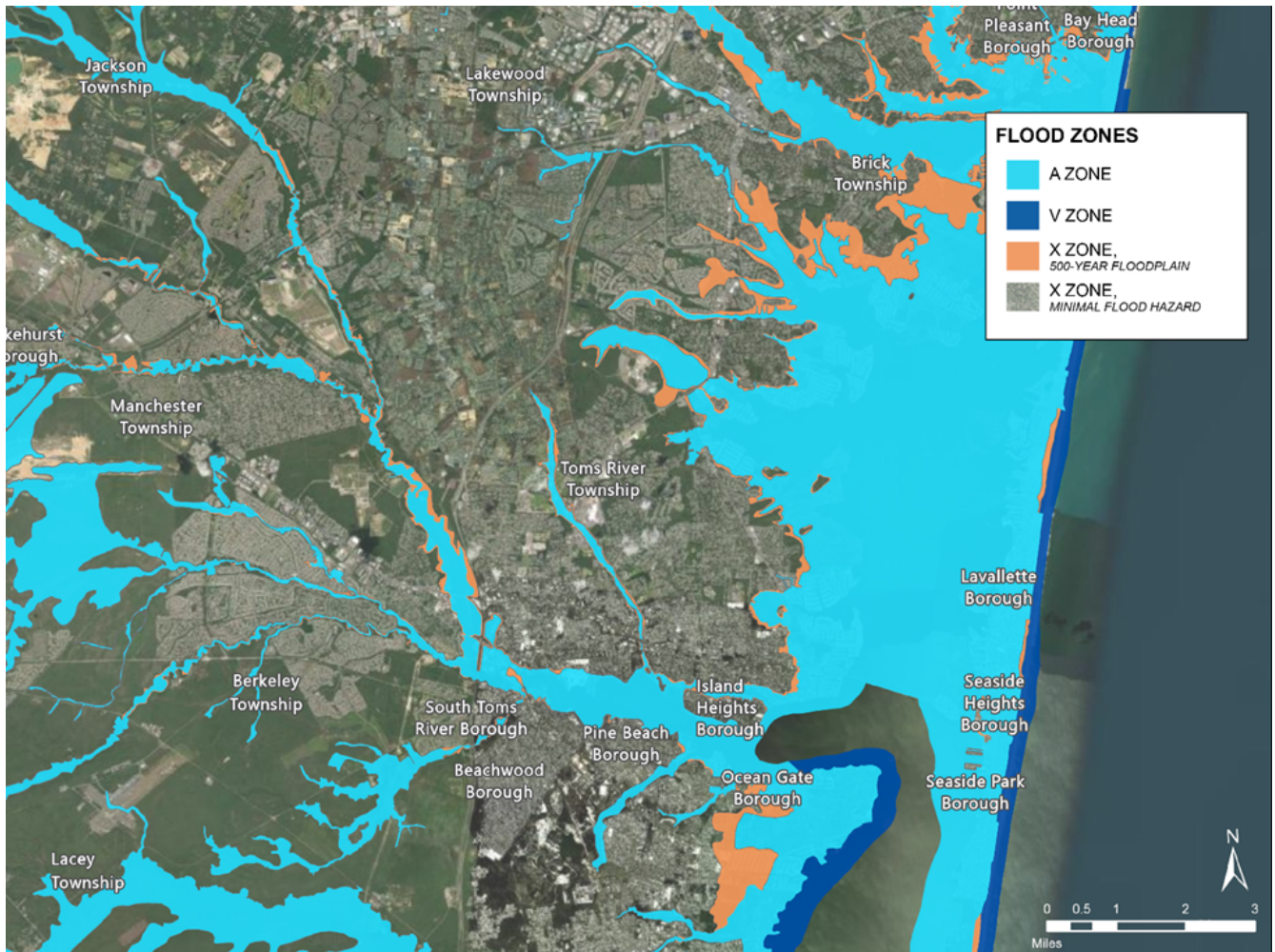
⁴ See: Kousky, C., B. Lingle, H. Kunreuther and L. Shabman (2018). *The Emerging Private Residential Flood Insurance Market in the United States*. Philadelphia, PA, Wharton Risk Management and Decision Processes Center, University of Pennsylvania. July.

⁵ In 2019, the fee paid to WYO companies for general expenses was 30% of the written premium. For more detail on WYO compensation, see: FEMA (2019). *National Flood Insurance Program (NFIP): Revisions to Methodology for Payments To Write Your Own (WYO) Companies*. Federal Register, Vol. 84, No. 130, July 8, 2019, Proposed Rules. Page 32371. <https://www.federalregister.gov/documents/2019/07/08/2019-14343/national-flood-insurance-program-nfip-revisions-to-methodology-for-payments-to-write-your-own-wyo>

⁶ Insurance Information Institute. *Facts + Statistics: Flood insurance: The National Flood Insurance Program*. <https://www.iii.org/fact-statistic/facts-statistics-flood-insurance>

⁷ For more on the mandatory purchase requirement, see: Shabman, L., C. Kousky, and B. Lingle (2019). *The Mandatory Purchase Requirement: Origins and Effectiveness in Achieving NFIP Goals*. Philadelphia, PA, Wharton Risk Management and Decision Processes Center. September.

FIGURE 1: FLOOD ZONES IN OCEAN COUNTY, NEW JERSEY



Note: A zone areas and V zone areas are both classified as SFHA.

Source: Map created using data from FEMA's National Flood Hazard Layer displayed over Maxar satellite imagery.

To capture the changing nature of flood risk, FEMA is required to assess the need to update a community's FIRM at least once every five years. Reasons for updating maps are varied. Examples include advances in technological capacity to measure risk, changing land use patterns that affect the spatial extent of flood events, rising sea levels (observed, not projected), and land subsidence. In 1997, FEMA established the Flood Map Modernization Program to improve and digitize flood hazard mapping. Despite progress achieved through this initiative, FEMA has faced criticism for failing to update maps frequently enough, neglecting to include forward-looking flood risk measures like climate change projections, and failing to capture pluvial (rainfall) flood risk in SFHA designations.

In response to such criticism, FEMA has cited a lack of sufficient funding for mapping activities and delays caused by community challenges to the new maps. Because new maps can increase the number of households subject to the mandatory purchase requirement and/or show that individuals are now in higher risk categories associated with higher flood insurance premiums, the new maps often face appeals from communities.⁸

⁸ For more on delays with issuing new maps, see: Wilson, M. T. and C. Kousky (2019). "The Long Road to Adoption: How Long Does it Take to Adopt Updated County-Level Flood Insurance Rate Maps?" Risk, Hazards, & Crisis in Public Policy 10(4):403-421.

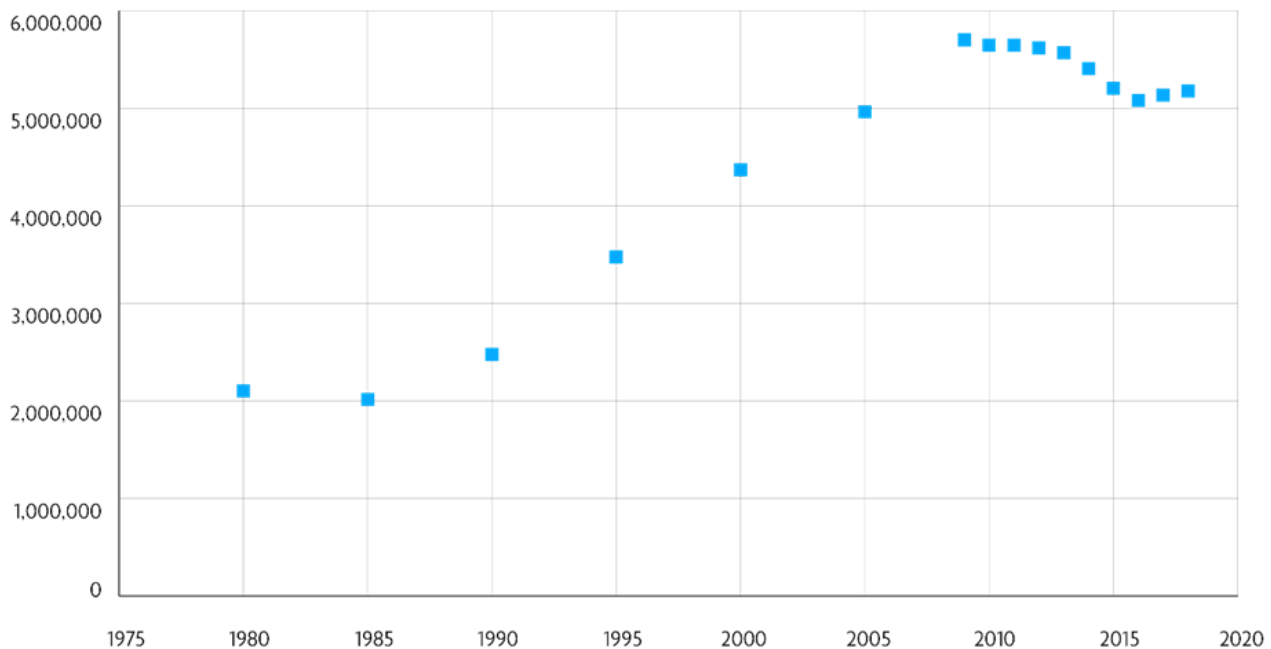
FLOODPLAIN REGULATIONS

In order to participate in the NFIP, communities must adopt minimum floodplain management regulations in the SFHA, which include the following: (1) the community must require all new development in SFHAs to obtain a permit, (2) new development in floodways (the central portion of a floodplain that carries deep and/or high-velocity flows) must not be permitted if it increases flood heights, and (3) all new construction, or substantially improved or damaged properties in SFHAs, must be elevated such that the lowest floor is at or above the BFE, which is the estimated height of floodwaters in a 100-year flood (nonresidential structures can also use certain building materials to be dry flood-proofed). V zones have additional construction requirements that prohibit enclosed areas below the lowest floor from being used as living space and require homes to be elevated above the BFE on posts, piles, piers, or column foundations. The community also must base all regulations on the most up-to-date FIRM. Some communities may elect to have floodplain building codes that exceed these minimum requirements.

PARTICIPATION IN THE NFIP

Early in the program's history, very few people purchased flood insurance. The mandatory purchase requirement, adopted in the Flood Disaster Protection Act of 1973, helped steadily increase purchase of flood policies as shown in Figure 2. As of February 2022, there were over five million active NFIP policies nationwide with about \$1.3 trillion in building and contents coverage.⁹

FIGURE 2: YEAR-END COUNT OF NFIP POLICIES-IN-FORCE



Source: Data from OpenFEMA and the Insurance Information Institute

⁹ Horn, D. and B. Webel (2021). Introduction to the National Flood Insurance Program (NFIP). Congressional Research Service. R44593, December 9. <https://crsreports.congress.gov/R44593>.

The NFIP is largely serving the residential market: as of August 31, 2021, 69% of policies covered single-family homes.¹⁰ Take-up rates in the SFHA vary substantially across the United States. Nationwide, the average take-up rate for residential properties in the SFHA is around 30%, but it is much higher in coastal areas of the south and east. Indeed, the program is heavily concentrated geographically with only 3% of counties accounting for 75% of residential policies.¹¹ The state of Florida has the largest share of policies at 27% with Texas coming in second at 17%.¹²

However, there are many counties around the country where a majority of policies-in-force are outside the SFHA. These communities are likely to have experienced recent or repeated flooding (for example, in 2017, when Hurricane Harvey flooded more than 31,000 homes in Harris County, Texas, but only 32% of them were in the SFHA); have active and continuing local outreach programs that educate the community about flood risk and availability and affordability of flood insurance (for example, Pinellas County, Florida, where a Real Estate Flood Disclosure training program has developed tools to help agents discuss flood risk and flood insurance with their clients); or may have residents with higher levels of disposable income willing to invest in flood coverage.¹³

NFIP PRICING

Historically, the NFIP set premiums based on the flood zones shown on the FIRMs and a limited set of property characteristics.¹⁴ As part of the historical approach to rate-setting, there were certain policyholders that received discounted premiums. One group is referred to as pre-FIRM. These were discounts for properties built before a community's first FIRM was completed. Legislation passed in 2012 and in 2014 began to phase out pre-FIRM premium reductions. Another group of policyholders (referred to as "grandfathered") are able to keep lower premiums even when new FIRMs map them into higher risk categories.

The NFIP is now undertaking a major overhaul of rate-setting, referred to as Risk Rating 2.0. Launched in the fall of 2021, Risk Rating 2.0 replaced the zone-based rating system with more individualized measures of property risk. It modernizes premium-setting practices, which had not been updated in the more than fifty years since the program's founding, harnessing advanced catastrophe modeling and improved datasets.¹⁵ Premiums no longer vary by zone, but reflect a more comprehensive analysis of flood risk for each property. Risk Rating 2.0 eliminates artificial "price cliffs" in the old pricing system that would appear at flood zone boundaries. It also undoes a regressive cross-subsidy, which, by failing to account for home value in setting premiums, charged higher-valued homes too little and lower-valued homes too much.

¹⁰ Insurance Information Institute. Facts + Statistics: Flood insurance: The National Flood Insurance Program. <https://www.iii.org/fact-statistic/facts-statistics-flood-insurance>

¹¹ Kousky, C. and B. Lingle (2018). The 3 Maps that Explain Residential Flood Insurance Purchases. BRINK, September 13.

¹² Source: Authors' analysis of 2018 OpenFEMA policies dataset.

¹³ For an in-depth look into the topic of voluntary flood insurance purchases outside the SFHA, see: Kousky, C., L. Shabman, Z. Linder-Baptie, and E. St. Peter (2020). Perspectives on Flood Insurance Demand Outside the 100-year Floodplain. Wharton Risk Center Issue Brief. May.

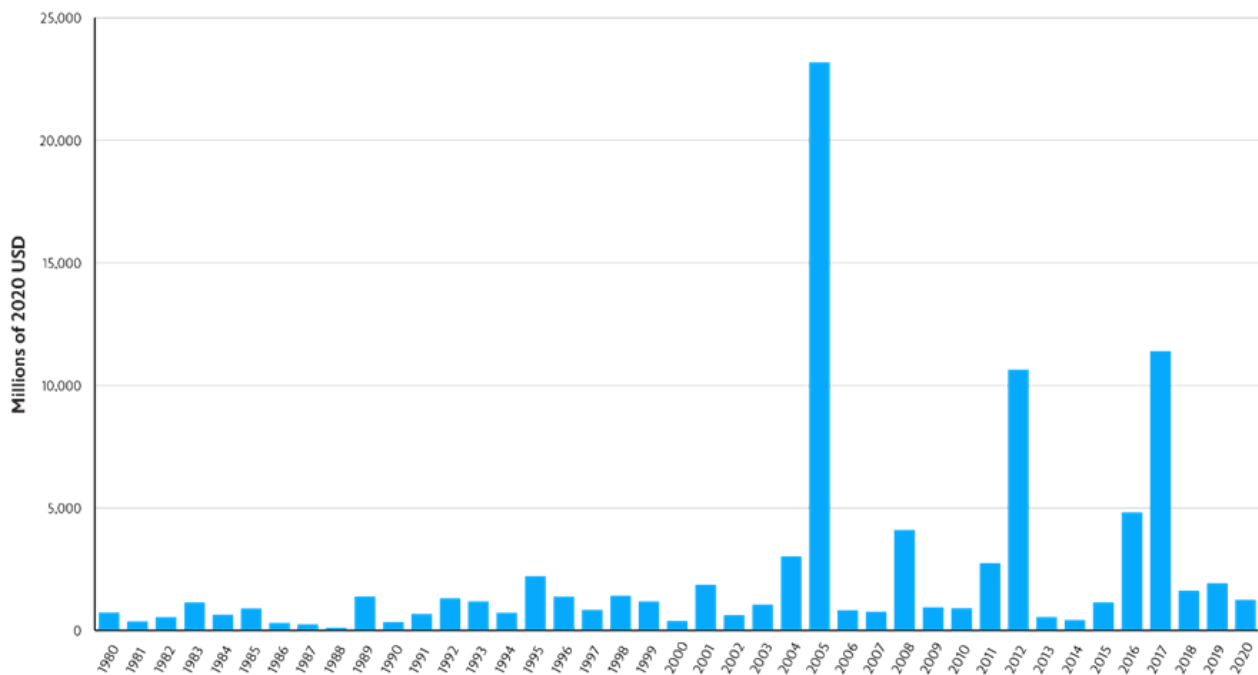
¹⁴ For more information, see: Kousky, C., B. Lingle, and L. Shabman (2017). "The Pricing of Flood Insurance." *Journal of Extreme Events*. 4(2): 1750001.

¹⁵ For more information on Risk Rating 2.0, see: Horn, D. (2019). National Flood Insurance Program: The Current Rating Structure and Risk Rating 2.0. Congressional Research Service. <https://crsreports.congress.gov/product/pdf/R/R45999> and FEMA (2022).

CLAIMS

Typically, natural disaster losses tend to be “spiky” and can be characterized as having periods of low loss activity followed by the occasional catastrophic loss year. As illustrated in Figure 3, claims paid by the NFIP follows this pattern. Hurricane Katrina and the other storms of the 2005 season, Hurricane Sandy (2012), and Hurricanes Harvey, Irma, and Maria in 2017 are primarily responsible for the high-loss years in NFIP history. Flood losses, though, appear to be growing. The number of claims and the average inflation-adjusted amount per claim have both increased over time.¹⁶

FIGURE 3: INFLATION-ADJUSTED NFIP CLAIMS, BY YEAR (IN MILLIONS OF 2020 USD)



Source: Data from OpenFEMA

Some properties have been flooded frequently and there are special classifications and programs relating to these properties. Repetitive loss properties are classified as insurable structures having two or more NFIP claims above \$1,000 inside any ten-year period since 1978. Severe repetitive loss (SRL) properties represent buildings with either four or more claims greater than \$5,000 each or two or more claims where the combined building components of the claims exceed the property value. (In either case, the claims must have occurred within ten years of one another.) FEMA offers some funding assistance for SRL properties to take mitigation action.¹⁷

¹⁶For more information on claims activity, see: Bradt, J. and C. Kousky (2020). Flood Insurance in the US: Lessons from FEMA’s Recent Data Release (Part I). Wharton Risk Management and Decision Processes Center, University of Pennsylvania. January 14. <https://riskcenter.wharton.upenn.edu/lab-notes/lessonsfromfemadatapart1/>

¹⁷FEMA. Guidance For Severe Repetitive Loss Properties https://www.fema.gov/pdf/nfip/manual201205/content/20_srl.pdf Accessed April 13, 2022.

THE COMMUNITY RATING SYSTEM¹⁸

The Community Rating System (CRS) is a voluntary program established in 1990 whereby communities elect to take on various outreach and mitigation activities in exchange for community-wide premium reductions. The system awards a rating from 9 to 1, with 1 being the highest ranking. Each new level in the program brings further premium discounts for residents, ranging from 5 to 45%. CRS activities include: emergency preparedness; maintaining consistent FEMA elevation certificates; protecting open space in the floodplain; and a range of outreach efforts. Outreach can be local community messaging campaigns regarding flood hazards, flood protection, and flood insurance. As of 2021, over 1,500 communities were participating in the CRS. While the program largely benefits flood insurance policyholders by offering a discount on premiums, the actions taken by participating communities can increase flood risk awareness and lower the costs floods impose.¹⁹

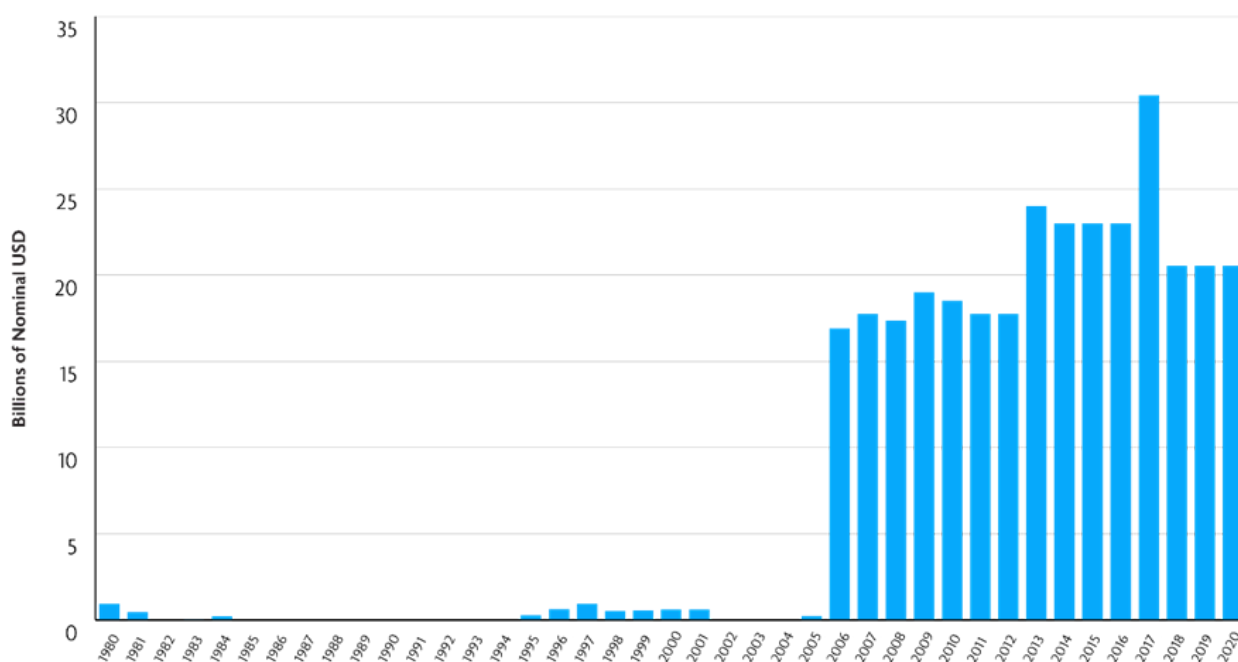
NFIP FUNDING SOURCES

Funding for the NFIP comes primarily from policy premiums and fees, as well as annual appropriations for certain administrative activities like flood mapping. To help smooth expenses associated with large loss years, the NFIP borrows from the U.S. Treasury. This borrowing authority was an intentional component of the NFIP's design, as the program was not created with the financial structure to withstand losses from catastrophic loss years. The limit on NFIP borrowing from the Treasury, in nominal terms, was \$250 million upon inception and has been adjusted upward numerous times, reaching its current level of \$30.425 billion in 2013. Hurricane Katrina in 2005 sunk the program into massive debt. Losses from Hurricanes Ike, Sandy, Harvey and other flood events have further exacerbated this financial position. Congress appropriated funds in the early 1980s to pay down NFIP debt, and in 2017, canceled \$16 billion of the outstanding debt. The NFIP is still in debt \$20.5 billion to the U.S. Treasury (see Figure 4). Both FEMA and the U.S. Government Accountability Office acknowledge the NFIP will not be able to repay this debt.

¹⁸ For more information about the CRS, see: FEMA. Community Rating System. <https://www.fema.gov/fact-sheet/community-rating-system>. Accessed April 13, 2022.

¹⁹ Sadiq, A. A., J. Tyler, D. S. Noonan, R. K. Norton, S. E. Cunniff, and J. Czajkowski (2020). "Review of the federal emergency management agency's community rating system program." *Natural Hazards Review*, 21(1), 03119001. Table 4, Theme 3. <https://ascelibrary.org/doi/10.1061/%28ASCE%29NH.1527-6996.0000320>

FIGURE 4: YEAR-END CUMULATIVE NFIP DEBT TO TREASURY



Source: Congressional Research Service²⁰

Steps have been taken to improve the financial position of the NFIP. Legislation in 2012 required FEMA to establish a reserve fund that would maintain at least 1% of total annual potential loss exposure.²¹ To fund this reserve, a Reserve Fund Assessment totaling 15% of the NFIP policy premium is charged to each policy.²² A surcharge mandated by legislation in 2014 and a surcharge for severe repetitive loss policies adopted in 2019 also contribute to the reserve fund. The surcharge is \$25 for primary residences and \$250 for all other property types. The SRL surcharge is an additional 5% of the premium. The 2012 and 2014 laws also permitted the NFIP to purchase reinsurance and insurance linked securities (such as catastrophe bonds) from private capital markets. This was a substantial change in policy for the NFIP—prior to 2016, it had no substantial engagement with reinsurance markets. Reinsurance acts as an insurance policy for the insurer, structured to pay out in catastrophic loss years. The NFIP now purchases reinsurance from private investors and capital markets, thus transferring some of the public risk exposure to the private sector. In 2017, the NFIP made its first large reinsurance purchase, securing \$1.042 billion in reinsurance coverage and recovered the entire amount after Hurricane Harvey. Three catastrophe bonds were also issued in 2018, 2019, and 2020 to transfer roughly \$1.2 billion in NFIP financial risk to private capital markets. These recent risk transfers and statements made by FEMA suggest that reinsurance will continue to play a large role in NFIP financing.²³

²⁰ Horn, D. (2021). National Flood Insurance Program Borrowing Authority. Congressional Research Service. <https://fas.org/sgp/crs/homesec/IN10784.pdf>

²¹ Total annual loss exposure was measured using policies-in-force from the prior fiscal year.

²² The Reserve Fund Assessment has increased over time. At its establishment in 2013, it charged 5% on all standard policies.

²³ The NFIP Reinsurance Program notes that “FEMA is committed to growing the NFIP Reinsurance Program to protect against future flood losses.” See <https://www.fema.gov/flood-insurance/work-with-nfip/reinsurance> for more information.

CONCLUSION: ONGOING CHALLENGES FOR THE NFIP

The NFIP is an important program nationwide, providing policyholders with financial resilience in the face of flood risk that is escalating in many locations. But the program faces several challenges. The NFIP is in an unsustainable fiscal position, despite rating overhauls, which will require Congress to forgive its accumulated debt. At the same time, flood insurance policies can be unaffordable for some at-risk residents who most need the financial protection of insurance. Many scholars and observers have suggested means-tested assistance to help lower-income families with the cost of flood insurance, but Congress has failed to adopt such a program.²⁴ Finally, the program will also need to address growing flood risk in many locations from climate change. Currently, the NFIP fails to sufficiently communicate future flood risk, does not adequately address ever-increasing rainfall-related flooding, flood maps are backward looking and often out-of-date, and has not updated its development regulations to account for this growing risk.

²⁴ See: (1) An Affordability Framework for the National Flood Insurance Program. Department of Homeland Security, Federal Emergency Management Agency. April 17, 2018. Washington, DC. (2) Dixon, L., N. Clancy, B. M. Miller, S. Hoegberg, M. Lewis, M., B. Bender, et al. The Cost and Affordability of Flood Insurance in New York City: Economic Impacts of Rising Premiums and Policy Options for One- to Four-Family Homes. RAND Corporation. 2017. Santa Monica, CA. (3) Affordability of National Flood Insurance Premiums: Report 1. National Research Council. National Academies Press. March 2015. Washington, DC.

NFIP TERMS & DEFINITIONS²⁵

- **FIRM:** FEMA acronym for Flood Insurance Rate Map, the official community map used by FEMA to delineate flood risk zones.
- **Pre-FIRM:** A structure for which initial construction or substantial improvements took place on or prior to December 31, 1974 or before the effective date of the first FIRM that maps the flood risk of the property.
- **SFHA/100-year floodplain:** A designated area on the FIRM with a 1-in-100 (1%) modeled chance of being flooded in any given year from riverine or coastal floods. This is the area of a FIRM where floodplain regulations are enforced and where the mandatory purchase of flood insurance applies.
- **500-year floodplain:** A designated area that has a 1-in-500 (2%) modeled chance of being flooded in any given year.
- **CRS:** FEMA acronym for Community Rating System, which is a voluntary FEMA program that encourages communities to complete a variety of mitigation and outreach activities to receive a discount on policy premiums for residents.
- **Grandfathering:** Generally meaning to be exempt from a new rule based on previous circumstances. Under the NFIP, grandfathering refers to when policyholders are able to keep lower premiums even when new FIRMs map them into higher risk categories.
- **WYO Program:** The Write-Your-Own program, an ongoing collaborative effort between FEMA and the insurance industry, allowing private insurance carriers to issue and service NFIP policies.
- **Severe Repetitive Loss Building/Property:** Refers to any property that is covered by flood insurance and has flood damage with four separate claims that have a sum value exceeding \$20,000 or two separate claims that have a sum value exceeding the fair market value of the insured property.

WHERE CAN I FIND DATA ON THE NFIP?

Researchers interested in exploring data specific to the NFIP can use the following datasets and rating manuals:

Policies and Claims Datasets: OpenFEMA publishes policy-level data on the most recent 10 years of policies in claims in two separate datasets found here: <https://www.fema.gov/about/openfema/datasets#nfip>

Historical Rate Manuals: FEMA publishes each rating manual from 2005 onward. Until 2022, rate manuals provided information on how to calculate premiums, rating methodology, and relevant definitions. In the newer manuals, rate tables used to calculate premiums may be found in Appendix J. <https://www.fema.gov/flood-insurance/work-with-nfip/manuals>

Participating Communities in the CRS: The current list of communities eligible for participation in the CRS, as well as their current class and discount level can be found via <https://www.fema.gov/flood-insurance/rules-legislation/community-rating-system>

²⁵ To see more detailed definitions of these and other terms, visit FEMA's glossary: <https://www.fema.gov/about/glossary>