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National Flood Insurance Program: The Current Rating Structure and Risk Rating 2.0

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SUMMARY

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National Flood Insurance Program: The Current Rating Structure and Risk Rating 2.0

The National Flood Insurance Program (NFIP) is the primary source of flood insurance coverage for residential properties in the United States, with more than five million policies in over 22,000 communities in 56 states and jurisdictions. FEMA is planning to introduce the biggest change to the way the NFIP calculates flood insurance premiums, known as Risk Rating 2.0, since the inception of the NFIP in 1968. The new premium rates are scheduled to go into effect on October 1, 2021, for all NFIP policies across the country.

Risk Rating 2.0 will continue the overall policy of phasing out NFIP subsidies, which began with the Biggert-Waters Flood Insurance Reform Act of 2012 and continued with the Homeowner Flood Insurance Affordability Act of 2014. Under the change, premiums for individual properties will be tied to their actual flood risk. Because the limitations on annual premium increases are set in statute, Risk Rating 2.0 will not be able to increase rates faster than the existing limit for primary residences of 5%-18% per year.

According to FEMA, Risk Rating 2.0 will:

- reflect an individual property's risk,
- reflect more types of flood risk in rates,
- use the latest actuarial practices to set risk-based rates,
- provide rates that are easier to understand for agents and policyholders, and
- reduce complexity for agents to generate a flood insurance quote.

The NFIP's current rating structure follows general insurance practices in effect at the time that the NFIP was established and has not fundamentally changed since the 1970s. The current NFIP rating structure uses several basic characteristics to classify properties based on flood risks. Structures are evaluated by their flood zone on a Flood Insurance Rate Map (FIRM), occupancy type, and the elevation of the structure. FEMA uses a nationwide rating system that combines flood zones across many geographic areas, and calculates expected losses for groups of structures that are similar in flood risk and key structural aspects, assigning the same rate to all policies in a group.

According to FEMA, flood zones will no longer be used in calculating a property's flood insurance premium following the introduction of Risk Rating 2.0. Instead, the premium will be calculated based on the specific features of an individual property, including structural variables such as the foundation type of the structure, the height of the lowest floor of the structure relative to base flood elevation, and the replacement cost value of the structure. The current rating system includes two sources of flood risk: the 1%-annual-chance fluvial (river) flood and the 1%-annual-chance coastal flood. As proposed, Risk Rating 2.0 will incorporate a broader range of flood frequencies and sources than the current system, as well as geographical variables such as the distance to water, the type and size of nearest bodies of water, and the elevation of the property relative to the flooding source.

According to FEMA, although flood zones on a FIRM will not be used to calculate a property's flood insurance premium, flood zones will still be used for floodplain management purposes, and the boundary of the Special Flood Hazard Area will still be required for the mandatory purchase requirement.

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Introduction

The National Flood Insurance Program (NFIP) is the primary source of flood insurance coverage for residential properties in the United States, with more than five million policies in over 22,000 communities in 56 states and jurisdictions. The program collects about $4.6 billion in annual revenue from policyholders' premiums, fees and surcharges and provides over $1.3 trillion in coverage.[1] The NFIP was established by the National Flood Insurance Act of 1968.[2] The general purpose of the NFIP is both to offer primary flood insurance to properties with significant flood risk, and to reduce flood risk through the adoption of floodplain management standards. A longer-term objective of the NFIP is to reduce federal expenditure on disaster assistance after floods.[3]

The Federal Emergency Management Agency (FEMA), which administers the NFIP, is planning to introduce Risk Rating 2.0, which represents the biggest change to the way the NFIP calculates flood insurance premiums since its inception.[4] The new rates are scheduled to go into effect on October 1, 2021, for all NFIP policies.[5]

The price of insurance is generally based on three components: (1) the average annual loss, which is the expected loss per year; (2) the risk, which depends on the variability or uncertainty in loss estimates; and (3) expenses. These rating factors are used to calculate the premium that is sufficient to cover expected losses.[6] The methodologies used to estimate these components, particularly the average annual loss and the risk, have changed over the decades that the NFIP has been in operation. This report will outline how the NFIP currently rates risks and sets premiums to cover losses, and how these are expected to change with the introduction of Risk Rating 2.0.

The NFIP's Current Rating Structure

How the NFIP Currently Determines Flood Insurance Premiums

The NFIP's current rating structure follows general insurance practices in effect at the time that the NFIP was established and has not fundamentally changed since the 1970s.[7] The current NFIP rating structure uses several basic characteristics to classify properties based on flood risks. Structures are evaluated by their specific flood zone[8] on a Flood Insurance Rate Map (FIRM),

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[1] FEMA, *Watermark, FY2019, Third Quarter*, https://www.fema.gov/media-library-data/1571176580547-ef8862488673f492cda24f37fe7f0189/FIMAWatermarkFY1Q3FINAL4.pdf, and email correspondence from FEMA Congressional Affairs staff, August 5, 2019.

[2] Title XIII of P.L. 90-448, as amended, 42 U.S.C. §4001 et seq.

[3] The NFIP is discussed in more detail in CRS Report R44593, *Introduction to the National Flood Insurance Program (NFIP)*, by Diane P. Horn and Baird Webel.

[4] See FEMA, *NFIP Transformation and Risk Rating 2.0*, at https://www.fema.gov/nfiptransformation.

[5] FEMA, *FEMA Defers the Implementation of Risk Rating 2.0*, November 7, 2019, https://www.fema.gov/news-release/2019/11/07/fema-defers-implementation-risk-rating-20.

[6] American Academy of Actuaries, *Uses of Catastrophe Model Output*, Washington, DC, July 2018, pp. 11-16, https://www.actuary.org/sites/default/files/files/publications/Catastrophe_Modeling_Monograph_07.25.2018.pdf.

[7] FEMA, *NFIP Transformation and Risk Rating 2.0*, at https://www.fema.gov/nfiptransformation.

[8] Flood zones are geographic areas that FEMA has defined according to levels of flood risk and are depicted on a community's Flood Insurance Rate Map (FIRM). NFIP flood zones can be divided into three main categories: low to moderate risk areas (zones B, C, and X zones), high risk areas (A zones), and high risk coastal areas (V zones). For a more detailed explanation of flood zones, see CRS Report R44593, *Introduction to the National Flood Insurance Program (NFIP)*, by Diane P. Horn and Baird Webel.

occupancy type,[9] and the elevation of the structure relative to the Base Flood Elevation (BFE). [10] In addition, the premium structure includes estimates for the expenses of the NFIP, including servicing of policies.

FEMA uses a nationwide rating system that combines flood zones across many geographic areas. Individual policies do not necessarily reflect topographical features that affect flood risk. FEMA calculates expected losses for groups of structures that are similar in flood risk and key structural aspects, and assigns the same rate to all policies in a group. For example, two properties that are rated as the same NFIP risk (e.g., both are one-story, single-family dwellings[11] with no basement, in the same flood zone, and elevated the same number of feet above the BFE), are charged the same rate per $100 of insurance, although they may be located in different states with differing flood histories or rest on different topography, such as a shallow floodplain as opposed to a steep river valley.[12] In addition, two properties in the same flood zone are charged the same rate, regardless of their location within the zone.

Risk Modeling

FEMA's current efforts to model risk consider only the potential for coastal storm surge and fluvial (river) flooding. The NFIP expresses flood risk in terms of the expected economic loss due to inundation and the probability of that loss. Information about the flood hazard is determined through NFIP flood studies, the vulnerability of the structure being insured, and the performance of certain flood protection measures.[13] This is incorporated into a flood risk assessment, which yields an estimate of the average annual loss. The insurance rate is determined from this loss after adjusting for expenses, deductibles, underinsurance (because not all structures are insured to their full value), and other factors.[14]

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[9] The NFIP occupancy types are single family, 2-4 family, other residential, non-residential business, or other non-residential. For further detail, see FEMA, *Flood Insurance Manual, 3. How to Write*, pp. 3-9 to 3-11, revised October 2019, at https://www.fema.gov/media-library-data/1569523558680-8c1d47a539c8e21b3b8f80cf7b108fae/3_how_to_write_oct2019.pdf.

[10] The Base Flood Elevation (BFE) is the water-surface elevation of the base flood, which is the 1%-annual-chance flood, commonly called the 100-year flood. The probability is 1% that rising water will reach BFE height in any given year.

[11] The NFIP defines a single-family dwelling as either a residential single-family building in which the total floor area devoted to non-residential uses is less than 50% of the building's total flood area, or a single-family residential unit within a 2-4 family building, other-residential building, business, or non-residential building, in which commercial uses within the unit are limited to less than 50% of the unit's total floor area. See https://www.fema.gov/national-flood-insurance-program/definitions#S.

[12] U.S. Government Accountability Office, *Flood Insurance: FEMA's Rate-Setting Process Warrants Attention*, GAO-09-12, October 2008, p. 23, https://www.gao.gov/assets/290/283035.pdf.

[13] The NFIP describes the performance of levees and other flood control structures by comparing the properties of these measures to design and operation standards. In FEMA's terminology, an accredited levee is one that FEMA has shown on a FIRM as providing flood risk reduction from at least the 1%-annual-chance flood. A levee cannot be accredited until the certification process is complete. Certification is the process that deals with the design and physical condition of the levee. Certification consists of documentation, signed and sealed by a registered professional engineer, that the levee meets the requirements of 44 C.F.R 65.10; in other words, that the levee meets federal design, construction, maintenance, and operational standards to adequately reduce the risk of flooding from a 1%-annual-chance flood. If a levee meets these standards, it is considered to provide protection from the 1%-annual-chance flood as well as floods with lesser velocities, water surface elevations, and discharge rates. Non-accredited levee systems are levee systems that do not meet all the requirements along the entire length of the levee system. See FEMA, *Analysis and Mapping Procedures for Non-Accredited Levees—New Approach*, https://www.fema.gov/media-library/assets/documents/33587.

[14] National Research Council, *Tying Flood Insurance to Flood Risk for Low-Lying Structures in the Floodplain*, Washington, DC, 2015, pp. 1-4, https://www.nap.edu/catalog/21720/tying-flood-insurance-to-flood-risk-for-low-lying-

In inland areas, NFIP flood studies focus on a river's watershed, the topography along the river and adjacent floodplain where structures are located, and the hydraulic characteristics of the river and floodplain.[15] In coastal areas, the studies also assess the effects of storm surge and wave action. Models of relevant physical processes are coupled with statistical models of weather events to compute flood depths and velocities, and their likelihood of occurring. The model prediction results are summarized in reports and portrayed on FIRMs which show water surface elevations, floodplain boundaries, and flood zones.

An area of specific focus on the FIRM is the Special Flood Hazard Area (SFHA).[16] Properties in an SFHA are subject to the mandatory purchase requirement, which requires owners of properties in the mapped SFHA, in a community that participates or has participated in the NFIP, to purchase flood insurance as a condition of receiving a federally backed mortgage.[17] Within the SFHA, there are two broad flood zones, the A zone[18] and the V zone.[19] V zones are distinguished from A zones in that V zones are subject to wave action (i.e., coastal flooding).

Geographical and Structural Variables

To calculate the premium, the current rating system considers the flood zone, the building occupancy type, the foundation type, the number of floors, the presence or not of a basement, whether the property is entitled to a subsidy, whether or not the property is a primary residence, prior claims, and the structure's elevation relative to the BFE. The amount of coverage and the deductible will also affect the premium.

Premium Subsidies and Cross-Subsidies

Except for certain subsidies, flood insurance rates in the NFIP are directed to be "based on consideration of the risk involved and accepted actuarial principles,"[20] meaning that the rate is reflective of the true flood risk to the property. FEMA determines full-risk rates[21] by estimating the probability of a given level of flooding, damage estimates based on that level of flooding, and accepted actuarial principles.[22] However, Congress has directed FEMA *not* to charge actuarial rates for certain categories of properties and to offer subsidies[23] or cross-subsidies to certain

structures-in-the-floodplain.

[15] Ibid., p. 15.

[16] A Special Flood Hazard Area (SFHA) is defined by FEMA as an area with a 1% or greater risk of flooding every year.

[17] For further information on the mandatory purchase requirement, see CRS Report R44593, *Introduction to the National Flood Insurance Program (NFIP)*, by Diane P. Horn and Baird Webel.

[18] FEMA defines the A Zone as areas subject to inundation by the 1%-annual-chance flood. Zone A is in the SFHA. See FEMA, *Zone A*, https://www.fema.gov/zone.

[19] FEMA defines the V zone as areas along coasts subject to inundation by the 1%-annual-chance flood with additional hazards associated with storm-induced waves. FEMA, *Zone V*, https://www.fema.gov/zone-v.

[20] 42 U.S.C. §4014(a)(1).

[21] FEMA defines full-risk rates as those charged to a group of policies that generate premiums sufficient to pay the group's anticipated losses and expenses. See U.S. Government Accountability Office, *National Flood Insurance Program: Continued Progress Needed to Fully Address Prior GAO Recommendations on Rate-Setting Methods*, GAO-16-59, March 2016, p. 8, http://www.gao.gov/assets/680/675855.pdf.

[22] For a brief explanation of accepted actuarial principles, see National Research Council of the National Academies, *Affordability of National Flood Insurance Program Premiums: Report 1*, 2015, pp. 36-38, at http://www.nap.edu/catalog/21709/affordability-of-national-flood-insurance-program-premiums-report-1.

[23] FEMA defines subsidized rates as those charged for a group of policies that results in aggregate premiums

classes of properties in order to achieve the program's objectives so that that owners of certain existing properties in flood zones are able to afford flood insurance. There are three main categories of properties which pay less than full risk-based rates:

1. Those built or substantially improved[24] before FEMA published the first post-1974 flood insurance rate map (FIRM);
2. Most properties newly mapped into a SFHA on or after April 1, 2015, if the applicant gets flood insurance coverage within a year of the mapping; and
3. Those that had flood insurance on the property that complied with a prior FIRM, but the property was remapped into a different rate class (a practice known as "grandfathering").

Pre-FIRM Subsidy

Pre-FIRM properties are those which were built or substantially improved before December 31, 1974, or before FEMA published the first FIRM for their community, whichever was later.[25] By statute, premium rates charged on structures built before they were first mapped into a flood zone that have not been substantially improved, known as pre-FIRM structures, are allowed to have lower premiums than what would be expected to cover predicted claims. The availability of this pre-FIRM subsidy was intended to allow preexisting floodplain properties to contribute in some measure to pre-funding their recovery from a flood disaster instead of relying solely on federal disaster assistance. In essence, flood insurance could distribute some of the financial burden among those protected by flood insurance and the public. As of September 2018, approximately 13% of NFIP policies received a pre-FIRM subsidy.[26] Historically, the total number of pre-FIRM policies is relatively stable, but the percentage of those policies by comparison to the total policy base has decreased.[27]

Newly Mapped Subsidy

The Homeowner Flood Insurance Affordability Act of 2014 (HFIAA)[28] established a new subsidy[29] for properties that are newly mapped into a SFHA on or after April 1, 2015, if the applicant obtains coverage that is effective within 12 months of the map revision date. Certain properties may be excluded based on their loss history.[30] The rate for eligible newly mapped

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insufficient to pay for anticipated losses and expenses. See https://www.fema.gov/national-flood-insurance-program/definitions#S.

[24] 44 C.F.R §59.1 defines "substantial improvement" as any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which exceeds 50% of the market value of the structure before the start of construction of the improvement. For additional discussion of substantial improvement, see FEMA, *Substantial Improvement*, at https://www.fema.gov/floodplain-management-old/substantial-improvement.

[25] 42 U.S.C. §4015(c).

[26] Email correspondence from FEMA Congressional Affairs staff, June 13, 2019.

[27] For an historical prospective on the percentages of subsidized policies in the NFIP, see GAO, *Flood Insurance: More Information Needed on Subsidized Properties*, GAO-13-607, July 2013, p. 7, at http://www.gao.gov/assets/660/655734.pdf.

[28] Section 8(a) of P.L. 113-89, 128 Stat. 1023.

[29] Section 6 of P.L. 113-89, 128 Stat.1028, as codified at 42 U.S.C. §4015(i).

[30] For properties which are excluded from, or ineligible for, the newly mapped subsidy, see FEMA, *Flood Insurance Manual, 3. How to Write,* pp. 3-40 to 3-48, revised October 2019, at https://www.fema.gov/media-library-data/1569523558680-8c1d47a539c8e21b3b8f80cf7b108fae/3_how_to_write_oct2019.pdf.

properties is equal to the Preferred Risk Policy (PRP)[31] rate, but with a higher Federal Policy Fee,[32] for the first 12 months following the map revision. After the first year, the newly mapped rate begins to transition to a full-risk rate, with annual increases to newly mapped policy premiums calculated using a multiplier that varies by the year of the map change. As a result of the increases to the multiplier, premiums for newly-mapped policies are increasing 15% per year.[33] As of September 2018, about 4% of NFIP policies receive a newly mapped subsidy.[34]

Grandfathering

FEMA allows owners of properties that were built in compliance with the FIRM which was in effect at the time of construction to maintain their old flood insurance rate class if their property is remapped into a new flood rate class. This practice is colloquially referred to as grandfathering, and is separate and distinct from the pre-FIRM subsidy.[35] A property can be grandfathered due to a change in its flood zone or a change in its BFE.

Zone grandfathering is the most common form of grandfathering. An example of zone grandfathering would be a property that is initially mapped into a flood zone and is built to the proper building code and standards, and is later remapped to a higher-risk flood zone. If the policyholder has maintained continuous insurance coverage under the NFIP, the owner of this property can pay the flood insurance premium based on the prior mapped zone.

Elevation grandfathering occurs when a new FIRM increases the BFE, but the property itself does not change flood zones. For example, a property that was initially mapped as being four feet above BFE but is now, under the revised FIRM, only one foot above BFE, would still be allowed to pay the premium associated with a property four feet above BFE.[36]

FEMA does not consider the practice of grandfathering to be a subsidy for the NFIP, per se, because grandfathered properties are within a class of policies that are not subsidized for the class as a whole; instead, the discount provided to an individual policyholder is cross-subsidized by other policyholders in the NFIP. Thus, while grandfathering does intentionally allow policyholders to pay premiums that are less than their actuarial rate, the discount is offset by others in the same rate class as the grandfathered policyholder. As of September 2018, about 9% of NFIP policies were grandfathered.[37]

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[31] A Preferred Risk Policy is a Standard Flood Insurance Policy that offers low-cost coverage to owners and tenants of eligible buildings located in moderate- and low-risk flood zones in NFIP communities. See FEMA, *Flood Insurance Manual, 3. How to Write,* pp. 3-34 to 3-40, revised October 2019, at https://www.fema.gov/media-library-data/1569523558680-8c1d47a539c8e21b3b8f80cf7b108fae/3_how_to_write_oct2019.pdf.

[32] The Federal Policy Fee for a newly mapped property is $50, where the FPF for PRP is $25. See FEMA, *Flood Insurance Manual, Rate Tables*, revised October 2019, p.3-40, https://www.fema.gov/media-library-data/1569523612531-8c1d47a539c8e21b3b8f80cf7b108fae/app-j_rate_tables_oct2019.pdf.

[33] FEMA, *April 1, 2019 and January 1, 2020 Program Ch*anges, W-18021a, https://nfipservices.floodsmart.gov/sites/default/files/w-18021a.pdf.

[34] Email correspondence from FEMA Congressional Affairs staff, June 13, 2019.

[35] For a full description, see FEMA, *NFIP Grandfathering Rules for Agents*, March 2015, at https://www.fema.gov/media-library-data/1488482596393-dcc52e6c120c9327dcd75f1c08e802e4/GrandfatheringForAgents_03_2016.pdf.

[36] National Academies of Sciences, *Affordability of National Flood Insurance Program Premiums: Part 1*, 2015, p. 43, at http://www.nap.edu/catalog/21709/affordability-of-national-flood-insurance-program-premiums-report-1.

[37] Email correspondence from FEMA Congressional Affairs staff, June 13, 2019.

Premium, Fees, and Surcharges

In addition to the building and contents premium, NFIP policyholders pay a number of fees and surcharges mandated by law.

Paid by All Policyholders

- The **Federal Policy Fee (FPF)** was authorized by Congress in 1990 and helps pay for the administrative expenses of the program, including floodplain mapping and some of the insurance operations.[38] The amount of the Federal Policy Fee is set by FEMA and can increase or decrease year to year. Since October 2017, the FPF has been $50 for Standard Flood Insurance Policies (SFIPs), $25 for Preferred Risk Policies (PRPs), and $25 for contents-only policies.
- A **reserve fund assessment** was authorized by Congress in the Biggert-Waters Flood Insurance Reform Act of 2012 (BW-12)[39] to establish and maintain a reserve fund to cover future claim and debt expenses, especially those from catastrophic disasters.[40] Since April 2016, FEMA has charged every NFIP policy a reserve fund assessment equal to 15% of the premium.
- All NFIP policies are also assessed a surcharge following the passage of HFIAA. The amount of the **HFIAA surcharge** is dependent on the type of property being insured. For primary residences, the charge is $25; for all other properties, the charge is $250.[41]

Paid by Most Policyholders

- The NFIP requires most policyholders to purchase **Increased Cost of Compliance (ICC) coverage**. This is in effect a separate insurance policy to offset the expense of complying with more rigorous building code standards when local ordinances require them to do so. The ICC policy has a separate rate premium structure, and provides an amount up to $30,000 in payments for certain eligible expenses.[42] Congress has capped the amount that can be paid for ICC coverage at $75.[43] ICC coverage is not required on condominium units and content-only policies.

Paid by Some Policyholders

- In April 2019, FEMA began charging a **Severe Repetitive Loss premium**[44] equivalent to 5% of the premium on all severe repetitive loss properties.

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[38] 42 U.S.C. §4014(a)(1)(B)(iii).

[39] Title II of P.L. 112-141.

[40] Section 100212 of P.L. 112-141, 126 Stat. 992, as codified at 42 U.S.C. §4017a.

[41] For a description of how the surcharge is applied to different policy types, see FEMA, *The HFIAA Surcharge Fact Sheet*, April 2015, https://www.fema.gov/media-library/assets/documents/105569.

[42] For additional information on ICC coverage, see FEMA, *Increased Cost of Compliance Coverage*, https://www.fema.gov/increased-cost-compliance-coverage.

[43] 42 U.S.C. §4011(b).

[44] Severe repetitive loss properties are those that have incurred four or more claim payments exceeding $5,000 each, with a cumulative amount of such payments over $20,000; or at least two claims with a cumulative total exceeding the

- If a community is on probation[45] from the NFIP, all policyholders in that community will be charged a **probation surcharge** of $50 for a full one-year period, even if the community brings its program into compliance and is removed from probation.

Proposed Rating Structure Under Risk Rating 2.0

How the NFIP Will Determine Flood Insurance Premiums

As proposed, NFIP premiums calculated under Risk Rating 2.0 will reflect an individual property's flood risk, in contrast to the current rating system in which properties with the same NFIP flood risk are charged the same rates. This will involve the use of a larger range of variables than in the current rating system, both in terms of modeling the flood risk and also in assessing the risk to each property.

Risk Modeling

The current rating system includes only two sources of flood risk: the 1%-annual-chance fluvial flood and the 1%-annual-chance coastal flood.[46] In contrast, Risk Rating 2.0 is designed to incorporate a broader range of flood frequencies and sources, including pluvial flooding (flooding due to heavy rainfall), flooding due to tsunami, and coastal erosion outside the V zone. Risk Rating 2.0 is expected to use a multi-model approach to support the development of the new rates, with data from multiple sources including existing NFIP map data, NFIP policy and claims data, United States Geological Survey (USGS) 3-D elevation data,[47] National Oceanographic and Atmospheric Administration (NOAA) SLOSH[48] storm surge data, and U.S. Army Corps of Engineers data sets.

According to FEMA, Risk Rating 2.0 will also use three commercial catastrophe models to estimate future loss potential. The use of catastrophe models to estimate potential losses caused by events such as hurricane wind, storm surge, inland flooding, tornadoes, earthquakes, and

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value of the property. See 42 U.S.C. §4014(h) and 44 C.F.R. §79.2(h).

This premium is calculated as 5% of the annual subtotal premium, which includes the building and contents premiums and the reserve fund assessment. See David I. Maurstad, *April 1, 2019, and January 1, 2020, Program Changes*, FEMA, Federal Insurance and Mitigation Administration, Memorandum for Write Your Own Principal Coordinators and the National Flood Insurance Program Servicing Agent, W-18021a.

[45] A community can be placed on probation by FEMA if it is found that it is failing to adequately enforce the floodplain management standards it has adopted. As established by regulations, probation can result in a fee of $50 being charged to all policyholders in the community while the community is given time to rectify FEMA's concerns regarding their implementation of the floodplain management standards. Ultimately, if the community does not correct its cited deficiencies after given time periods described in regulations, the community will be suspended from the NFIP by FEMA. For additional details on probation, see 44 C.F.R. §59.24(b) and (c), and FEMA, *Probation*, https://www.fema.gov/probation.

[46] FEMA defines the 1%-annual-chance flood as a flood that has a 1% chance of being equaled or exceeded in any given year. See FEMA, *Insurance Professionals and Lenders: Frequently Asked Questions*, https://www.fema.gov/insurance-professionals-lenders-frequently-asked-questions.

[47] See United States Geological Survey, *3D Elevation Program*, https://www.usgs.gov/core-science-systems/ngp/3dep.

[48] NOAA's Sea, Lake, and Overhead Surges from Hurricane (SLOSH) model is a numerical model developed by the National Weather Service to estimate storm surge heights resulting from historical, hypothetical, or predicted hurricanes. See National Hurricane Center, *Sea, Lake, and Overhead Surges from Hurricane (SLOSH)*, https://www.nhc.noaa.gov/surge/slosh.php.

wildfires has become a standard risk management practice in the insurance industry.[49] Catastrophe models were initially developed to address the shortcomings inherent in using historical data to project potential losses from infrequent, severe events that impacted many properties that were not geographically diverse.[50] While each peril model reflects factors specific to the peril being modeled, catastrophe models generally have similar components, including modules simulating (1) the probability of the particular catastrophe occurring; (2) the intensity of the catastrophe; (3) the damage to structures; and (4) the allocation of the amount of the loss among those responsible for payment.

The first stage of catastrophe modeling is to generate a stochastic event set, which is a database of simulated events. Each event is characterized by a probability of occurrence (event rate) and geographic area affected. Thousands of possible event scenarios are simulated, based on realistic parameters and historical data, to model probabilistically what could happen in the future. The hazard component of catastrophe models quantifies the severity of each event in a geographical area, once the event has occurred. An event footprint is generated, which is a spatial representation of hazard intensity from a specific event. For example, a model could calculate the peak wind speeds at each location affected by hurricane winds. Property vulnerability is modeled using mean damage ratios (MDRs), which are losses expressed as a percent of value, for a given hazard level (e.g., hurricane wind speed) and location. MDRs give the average percentages of damage that are expected for a structure with the characteristics input into the model. Finally, a financial or insurance module quantifies the financial consequences of each event from various financial perspectives. The policy terms such as deductibles, limits, and reinsurance are applied to the damage from each insured property from the vulnerability model to calculate the allocation of the loss amount.[51]

In the first stage of Risk Rating 2.0 modeling, FEMA is to conduct probabilistic flood risk analyses, in which structures are assigned specific annualized probabilities of being impacted by flood, and to validate these results with NFIP historical data. The next step is to compare the results of this analysis with the output of commercial catastrophe models. Finally, FEMA is to generate average annual loss values for certain geographies, focusing particularly on leveed areas and complex flooding hazards.

Geographic and Structural Variables

Geographical variables to be used in Risk Rating 2.0 are to include the distance to water and the type of water (e.g., river, stream, coast), the elevation of the property relative to the flooding source, and the stream order,[52] which is a measure of the relative size of streams and rivers. The structural variables which have been identified by FEMA for use in Risk Rating 2.0 include the foundation type of the structure, the height of the lowest floor of the structure relative to BFE, and the replacement cost value of the structure.

[49] American Academy of Actuaries, *Uses of Catastrophe Model Output*, Washington, DC, July 2018, p. 3, https://www.actuary.org/sites/default/files/files/publications/Catastrophe_Modeling_Monograph_07.25.2018.pdf.

[50] Ibid.

[51] Ibid., pp. 9-10.

[52] Perennial streams without tributaries are referred to as first-order streams. If two streams of equal order merge, the resulting stream is given a number that is one higher. The Mississippi River is a tenth order river and the Amazon River is a twelfth order river.

Replacement Cost Value

In the current NFIP rating system, rates are based on the amount of insurance purchased for a structure[53] rather than the replacement cost of that structure. For most actuarially-rated structures, the NFIP classifies the first $60,000 of building coverage for single-family residences ($175,000 for businesses) and $25,000 of contents coverage as the basic limit. It charges higher rates for coverage below this amount, because losses are more likely to occur in this range. Rates for additional coverage above the basic limit are lower. The basic and additional rates are weighted to account for the average tendency to buy less insurance than the replacement value. For example, a post-FIRM single-family property in Zone A with no basement would currently pay a basic rate of 1.1% per $100 coverage on the first $60,000 and an additional rate of 0.3% per $100 of coverage over $60,000.[54]

The two-tiered rating structure was used by the NFIP for two reasons. First, it ensured that the premium collected is sufficient to cover the typical claim, even if a policy is under-insured; according to FEMA, most NFIP claims are below $60,000.[55] By charging a high rate for coverage up to $60,000, a policyholder's premium is likely to be sufficient to cover a typical claim. Secondly, it encouraged policyholders to insure their structure fully. By charging a low additional rate, policyholders are encouraged not just to insure a typical claim, but to insure against the unlikely but possible higher claim.

For much of the NFIP's existence, the two-tiered rating structure operated with minimal inequity. However, as the range of replacement values widened, particularly through the 2000s, the potential for inequity caused by rating based on coverage instead of structure value grew. Two groups are most subject to inequity. First, structures whose value is closer to the $60,000 basic limit pay more than they would if their rate was based on their structure value because their entire rate is mainly comprised of the higher basic rate. Second, structures whose value is above $250,000 pay less than they would if their rate was based on structure value, because their rate is based on an average structure value that is much less than their actual structure value. In addition, high-valued structures can produce much higher claims than lower valued structure with the same intensity of damage.[56]

If replacement cost value were to be used in setting NFIP premium rates, it is anticipated that those structures with higher replacement costs than current local or national averages would begin paying more for their NFIP coverage than those structures that are below the average, which would pay less. How much more, or how much less, is undetermined.

Mitigation Credits in Risk Rating 2.0

Risk Rating 2.0 is to initially provide credits for three mitigation actions:

1. installing flood openings according to the criteria in 44 C.F.R. §60.3;

[53] The maximum coverage offered by the NFIP for single-family dwellings (which also includes single-family residential units within a 2-4 family building) is $100,000 for contents and $250,000 for buildings coverage. The maximum available coverage limit for other residential buildings is $500,000 for building coverage and $100,000 for contents coverage, and the maximum coverage limit for non-residential business buildings is $500,000 for building coverage and $500,000 for contents coverage.

[54] FEMA, *Flood Insurance Manual, Rate Tables*, Revised October 2019, p. J-6, https://www.fema.gov/media-library-data/1569523612531-8c1d47a539c8e21b3b8f80cf7b108fae/app-j_rate_tables_oct2019.pdf.

[55] Email correspondence from FEMA Congressional Affairs staff, July 19, 2017.

[56] Ibid.

2. elevating onto posts, piles, and piers; and
3. elevating machinery and equipment above the lowest floor.[57]

FEMA has not yet given any information on how these credits will be applied to individual property premiums. Currently the only mitigation activity for which the NFIP gives premium credit is elevating a structure, so Risk Rating 2.0 could encourage individual policyholders to do more to mitigate the flood risk for their property.

Risk Rating 2.0 and Flood Zones

Flood zones are to no longer be used in calculating a property's flood insurance premium following the introduction of Risk Rating 2.0; instead, the premium are to be calculated based on the specific features of an individual property. However, as proposed, flood zones will still be needed for floodplain management purposes; for example, all new construction and substantial improvements to buildings in Zone V must be elevated on pilings, posts, piers, or columns.[58] The boundary of the SFHA will still be required for the mandatory purchase requirement. The FIRM map appeal[59] process will still exist, but once Risk Rating 2.0 begins, map appeals are not to have any effect on the premium that a policyholder pays.

Although FEMA has not yet given any details of how grandfathered properties will be affected by Risk Rating 2.0, other than to say that "all properties will be on a glide path to actuarial rates,"[60] the implication of the fact that flood zones will no longer be used to set premiums appears to indicate that zone grandfathering, at least, will no longer be relevant.

Maximum Premium Increases under Current Statute

FEMA has statutory authority to set premium rates.[61] The limitations on annual premium increases are also set in statute,[62] and Risk Rating 2.0 will not be able to increase rates annually beyond these caps. HFIAA set maximum rate increases for primary residences at 5-18% per year. HFIAA permits individual property increases of up to 18%, but limits the rate class[63] increases to 15% per year.[64] In other words, the *average* annual premium rate increase for primary residences within a single risk classification rate may not be increased by more than 15% a year, while the *individual* premium rate increase for any individual policy may not be increased by more than 18% each year.[65] Other categories of properties are required to have their premium increased by

[57] FEMA, *NFIP Transformation and Risk Rating 2.0*, at https://www.fema.gov/nfiptransformation.

[58] 44 C.F.R. §60.3(e)(4).

[59] See FEMA, *Appeals and Protests*, https://www.fema.gov/media-library-data/20130726-1627-20490-1536/r6_appeals_protests_supporting_data.pdf.

[60] CRS briefing from FEMA staff, May 8, 2019.

[61] 42 U.S.C. §4015(a).

[62] 42 U.S.C. §4015(e).

[63] A single rate class (or risk classification) is a group of properties with the same flood risk classification; for example, pre-FIRM properties or properties with the newly mapped subsidy.

[64] The chargeable risk premium rate for any property may not be increased by more than 18% per year (except in certain circumstances, which are listed); see 42 U.S.C. §4015(e)(1). The chargeable risk premium may not be increased by an amount that would result in the average of such rate increases for properties within the risk classification exceeding 15% of the average of the risk premium rate for properties within the risk classification; see 42 U.S.C. §4015(e)(3).

[65] For example, the average annual premium increase for pre-FIRM primary residences cannot be more than 15%, but

25% per year until they reach full risk-based rates: this includes non-primary residences, non-residential properties, business properties, properties with severe repetitive loss, properties with substantial cumulative damage,[66] and properties with substantial damage[67] or substantial improvement after July 6, 2012.

However, FEMA does not consider everything that policyholders pay to the NFIP to be part of the premium and therefore subject to these caps. When premium rates are calculated for compliance with the statutory caps, FEMA only includes the building and contents coverage, the Increased Cost of Compliance coverage, and the reserve fund assessment. Other fees and surcharges are not considered part of the premium and therefore are not subject to the premium cap limitations, including the Federal Policy Fee, the HFIAA surcharge and, if relevant, the 5% Severe Repetitive Loss premium and/or probation surcharge.[68]

Table 1 shows the effects of a maximum statutory increase on the national average premium for a Standard Flood Insurance Policy (SFIP) which pays the full $75 for Increased Cost of Compliance (ICC) coverage. According to FEMA, the national average premium for an SFIP is $700.[69] The reserve fund assessment for this policy would be $105 and the ICC premium would be $75, for a total premium of $880. For an SFIP primary residence, the maximum 18% increase would be calculated on this premium of $880, leading to an increase of $158.40 and a new premium of $1038.40. However, an SFIP primary residence would also pay an FPF of $50 and a HFIAA surcharge of $25, so the total amount due to the NFIP after an 18% increase would be $1113.40.

An SFIP for a non-primary residence would be subject to a 25% increase on the initial premium of $880, leading to an increase of $220 and a new premium of $1100. Costs for such a policy for a non-primary residence would also include an FPF of $50 and a HFIAA surcharge of $250, so the total amount due to the NFIP after a 25% increase would be $1,400.

Table 1. Maximum Increases on an Average NFIP Premium

Based on a Standard Flood Insurance Premium and $75 Increased Cost of Compliance Coverage Premium

Premium, Fee, or Surcharge	Primary Residence	Non-Primary Residence
National Average Premium for Standard Flood Insurance Policy (SFIP)	$700	$700
Reserve Fund Assessment (15% of premium)	$105	$105
Maximum Increased Cost of Compliance Coverage (ICC) Premium	$75	$75

an individual pre-FIRM primary residence could have an increase of up to 18% due to particular characteristics of the structure.

[66] A property with substantial cumulative damage is any property that has incurred flood-related damage in which the cumulative amounts of payments under the NFIP equaled or exceeded the fair market value of such property. See 42 U.S.C. §4014(a)(2)(C).

[67] 44 C.F.R §59.1 defines "substantial damage" as damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50% of the market value of the structure before the damage occurred. For additional discussion of substantial damage, see FEMA Fact Sheet, *NFIP "Substantial Damage"—What Does It Mean?* at https://www.fema.gov/news-release/2017/09/14/fact-sheet-nfip-substantial-damage-what-does-it-mean.

[68] See David I. Maurstad, *April 1, 2019, and January 1, 2020, Program Changes*, FEMA, Federal Insurance and Mitigation Administration, Memorandum for Write Your Own Principal Coordinators and the National Flood Insurance Program Servicing Agent, W-18021a, Washington, DC, October 1, 2018, pp. 1-2, https://nfipservices.floodsmart.gov/sites/default/files/w-18021a.pdf.

[69] Email correspondence from FEMA Congressional Affairs staff, November 2, 2018.

Premium, Fee, or Surcharge	Primary Residence	Non-Primary Residence
Premium Subject to 18% Cap	**$880**	**$880**
Federal Policy Fee (FPF) for SFIP	$50	$50
HFIAA Surcharge	$25	$250
Total Due to NFIP before Increase	**$955**	**$1,180**
18% Increase on Premium of $880	$158.40	
Total Premium after 18% Increase	$1,038.40	
Total Due to NFIP after 18% Increase (includes FPF, HFIAA)	**$1,113.40**	
25% Increase on Premium of $880		$220
Total Premium after 25% Increase		$1100
Total Due to NFIP after 25% Increase (includes FPF, HFIAA)		**$1,400**

Source: Calculated by Congressional Research Service. National average NFIP premium provided by FEMA Congressional Affairs staff, November 2, 2018.

Risk Rating 2.0 and NFIP Cross-Subsidies

The current three categories of properties which pay less than the full risk-based rate (pre-FIRM, newly-mapped, and grandfathered) are determined by the date when the structure was built relative to the date of adoption of the FIRM, rather than the flood risk or the ability of the policyholder to pay. As proposed, the new rating system will not eliminate the three categories, nor the process of phasing out subsidies which began with BW-12, but rate changes will not necessarily be uniform within each category. Premiums for individual properties will be tied to their actual flood risk rather than the flood zone, but the rate at which the subsidies will be phased out will continue to be constrained by law.

In general, Risk Rating 2.0 is expected to lead to the reduction of cross-subsidies between NFIP policyholders, and the eventual elimination of premium subsidies and cross-subsidies once all properties are paying the full risk-based rate. However, certain non-insurance activities of the NFIP are funded by cross-subsidies from NFIP policyholders' premiums. For example, through a program called the Community Rating System (CRS), FEMA encourages communities to improve upon the minimum floodplain management standards that are required to participate in the NFIP. [70] Policyholders in communities which participate in the CRS can get discounts of 5% to 45% on their flood insurance premiums. These discounts are determined by the activities carried out by the community to reduce flood and erosion risk and adopt measures to protect natural and beneficial floodplain functions.[71] The National Research Council estimated that the CRS program provided an average 11.4% discount on SFIP premiums across the NFIP.[72] The CRS discount is cross-subsidized into the NFIP program, such that the discount for one community ends up being offset by increased premium rates in all communities across the NFIP.

[70] 42 U.S.C. §4022(b)(1).

[71] See FEMA, *NFIP Community Rating Coordinator's Manual 2017*, at https://www.fema.gov/media-library-data/1493905477815-d794671adeed5beab6a6304d8ba0b207/633300_2017_CRS_Coordinators_Manual_508.pdf.

[72] For additional details, see National Research Council of the National Academies, *Affordability of National Flood Insurance Program Premiums: Report 1*, 2015, pp. 44 and 114, at http://www.nap.edu/catalog/21709/affordability-of-national-flood-insurance-program-premiums-report-1.

An average 11.4% discount for CRS communities is cross-subsidized and shared across NFIP communities through a cost (or load) increase of 13.4% to overall premiums.[73] It is not yet clear how Risk Rating 2.0 will affect the CRS cross-subsidy.

In addition, as much as 42% of the funding for flood mapping and floodplain management is collected from NFIP policyholders in the form of the FPF.[74] About 66% of the resources from the FPF are allocated to flood mapping, with floodplain management receiving about 19% of the overall income from the FPF.[75] Again, it is not yet clear how Risk Rating 2.0 might affect funding for floodplain management and flood risk mapping.

Concluding Observations

FEMA believes that the more transparent and accurate flood insurance pricing in Risk Rating 2.0 will lead to better risk communication and an increase in flood insurance take-up rate. However, Risk Rating 2.0 is not designed to increase or decrease revenue for the NFIP.[76] According to FEMA, Risk Rating 2.0 will not be allowed to create a shortfall relative to the amount of premium income under the current rating system. If the new rates lead to a shortfall, the rating plan will be revised.[77]

FEMA is carrying out an actuarial analysis and cannot give any information at the time of writing about the number or percentage of properties which will see their premiums change under Risk Rating 2.0.[78] However, certain types of properties may be more likely to be affected, either positively or negatively. These may include zone-grandfathered properties, properties which are currently on the border of flood zones, properties currently outside the SFHA at risk of pluvial flooding, and properties with above-average or below-average replacement cost values. For example, the use of distance to water, rather than flood zone, may mean that premiums for properties at the landward boundary of an SFHA could go down, while premiums for a property at the water boundary could go up.[79]

Concerns about premium increases in the past have focused on certain subsidized properties, but under Risk Rating 2.0 all types of properties may be subject to higher rates of increase than at present. For example, as of April 1, 2019, the premium for pre-FIRM properties increased by 7.3% and the premium for newly mapped properties increased by 15%. Premiums for post-FIRM

[73] A more recent average CRS premium discount is not available; however, according to FEMA it changes very little from year to year. Email correspondence from FEMA Congressional Affairs staff, June 15, 2017.

[74] For example, in FY2017, Congress appropriated $175.5 million for flood hazard mapping and risk analysis and FEMA received $1.95 million from the FPF, with approximately $128.7 million used for flood hazard mapping.

[75] Email correspondence from FEMA Congressional Affairs staff, December 6, 2016.

[76] Christopher Flavelle, "Climate Advocates Cheer Trump Policy Shift on Flood Insurance," *Bloomberg*, March 18, 2019, https://www.bloomberg.com/news/articles/2019-03-18/climate-advocates-cheer-trump-policy-shift-on-flood-insurance.

[77] CRS briefing from FEMA staff, May 8, 2019.

[78] FEMA, *NFIP Transformation and Risk Rating 2.0*, at https://www.fema.gov/nfiptransformation.

[79] For example, imagine a hypothetical V zone which starts at the ocean front and extends to two miles inland, with the boundary between the A zone and the V zone at the two-mile mark. A property that is 1.95 miles inland which was initially in the V zone should see its premium go down, whereas a property that is 2.05 miles inland, and originally in the A zone, should see its premium go up.

V zone properties increased by 6%, post-FIRM A zones increased by 4%, and X zone[80] properties increased by 1%.[81] These properties could face higher premiums under Risk Rating 2.0.

Risk Rating 2.0 is may lead to premium increases for some NFIP policyholders, which could raise questions of affordability. When the Biggert-Waters Flood Insurance Reform Act of 2012 (BW-12) went into effect, constituents from multiple communities expressed concerns about the elimination of lower rate classes, arguing that it created a financial burden on policyholders, risked depressing home values, and could lead to a reduction in the number of NFIP policies purchased.[82] Similar concerns may be expressed with Risk Rating 2.0. Although risk-based price signals could give policyholders a clearer understanding of their true flood risk, charging actuarially sound premiums may mean that insurance for some properties is considered unaffordable, or that premiums increase at a rate which may be considered to be politically unacceptable.

FEMA does not currently have the authority to implement an affordability program, nor does FEMA's current rate structure provide the funding required to support an affordability program. However, affordability provisions are included in the three bills which have been introduced in the 116th Congress for long-term reauthorization of the NFIP: the National Flood Insurance Program Reauthorization Act of 2019 (H.R. 3167), and the National Flood Insurance Program Reauthorization and Reform Act of 2019 (S. 2187) and its companion bill in the House, H.R. 3872. As Congress considers a long-term reauthorization of the NFIP, a central question may be who should bear the costs of floodplain occupancy in the future and how to address the concerns of constituents facing increases in flood insurance premiums.

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[80] FEMA defines the X zone as the area between the limits of the base flood and the 0.2% annual chance (or 500-year) flood. The X zone is an area of moderate flood hazard. See FEMA, "Flood Zones," https://www.fema.gov/flood-zones.

[81] See David I. Maurstad, *April 1, 2019, and January 1, 2020, Program Changes*, FEMA, Federal Insurance and Mitigation Administration, Memorandum for Write Your Own Principal Coordinators and the National Flood Insurance Program Servicing Agent, W-18021a, Washington, DC, October 1, 2018, pp. 2-3, https://nfipservices.floodsmart.gov/sites/default/files/w-18021a.pdf.

[82] National Research Council of the National Academies, *Affordability of National Flood Insurance Program Premiums: Report 1*, 2015, p. 2, at http://www.nap.edu/catalog/21709/affordability-of-national-flood-insurance-program-premiums-report-1.

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