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THESIS

**CANCELLING THE FLOOD: INCREASING FEMA
COMMUNITY RATING SYSTEM PARTICIPATION
IN FLOOD-PRONE COMMUNITIES**

by

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September 2023

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**CANCELLING THE FLOOD: INCREASING FEMA COMMUNITY RATING
SYSTEM PARTICIPATION IN FLOOD-PRONE COMMUNITIES**

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ABSTRACT

Flooding is the most frequent severe weather threat and the costliest natural disaster facing the nation. The Community Rating System (CRS) rewards flood-prone communities for improving floodplain management, enhancing preparedness, and mitigating flood risk. This thesis employs appreciative inquiry (AI) to study CRS success in the three most flood-prone states—Florida, Texas, and Louisiana—as well as local initiatives of coastal and fluvial communities to enhance community resiliency. These states share comprehensive floodplain management planning across all four CRS series, with effective public outreach, open space preservation, enforcement of regulations, and an integrated mitigation program. Sea Bright, NJ succeeded largely because of Superstorm Sandy upgrades that most coastal flood communities could replicate. Wilkes-Barre, PA has benefited from substantial flood mitigation projects, including reducing repetitive loss properties, which return on investment (ROI) validates. This thesis determines that planning with ROI, expanded training, and repetitive loss analysis reduces flood risk. Due to the heightened frequency and cost of flooding-related disasters, the nation must utilize CRS to meet two competing Congressional goals: National Flood Insurance Program (NFIP) fiscal solvency and affordability of flood insurance. CRS bridges this gap by providing discounts in those communities that reduce the overall risk to the federal treasury, a win-win for all.

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LIST OF ACRONYMS AND ABBREVIATIONS

AI	appreciative inquiry
BFE	base flood elevation (the elevation of surface water resulting from a flood that has a one percent chance of equaling or exceeding in any given year; sometimes referred to as the 100-year flood elevation)
BW	Biggert-Waters Flood Insurance Reform Act of 2012
CFM	Certified Floodplain Manager
CRS	Community Rating System
DHS	Department of Homeland Security
FDIC	Federal Deposit Insurance Corporation
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	flood insurance study
GAO	Governmental Accountability Office
HFIAA	Homeowner Flood Insurance Affordability Act of 2014
HMPG	Hazard Mitigation Grant Program
HUD	Department of Housing and Urban Development
ISO	Insurance Service Office
NFIA	National Flood Insurance Act
NFIP	National Flood Insurance Program
NFIP-RE	National Flood Insurance Program Reauthorization Act of 2019
NPG	National Preparedness Goal
PKEMRA	Post-Katrina Emergency Management Reform Act
PPD 8	Presidential Policy Direction Eight
RL	repetitive loss
ROI	return on investment
RR 2.0	Risk Rating 2.0

SFHA	Special Flood Hazard Area (the SFHA is comprised of high hazard zones) Zones A and V
SRL	severe repetitive loss
SWOT	strengths, weaknesses, opportunities, and threats
THIRA	Threat and Hazard Identification and Risk Assessment
USACE	U.S. Army Corp of Engineers
100-year flood	a flood that statistically has a one percent chance of occurring in any given year; alternatively referred to as the base flood event
500-year flood	a flood that has a 0.2 percent chance of occurring in any given year

EXECUTIVE SUMMARY

According to the Federal Emergency Management Agency (FEMA), “Flooding is the most frequent severe weather threat and the costliest natural disaster facing the nation.”¹ In 1968, Congress created the National Flood Insurance Program (NFIP) to provide flood insurance protection to homeowners.² Three decades later, Congress amended it to include the Community Rating System (CRS) that rewards flood-prone communities for efforts to improve floodplain management, enhance community preparedness, and mitigate flood risk.³ CRS monetized the preparedness activities of communities before flooding, resulting in reduced flood damages and insurance claims, thereby saving the federal treasury taxpayer dollars. Participating communities receive NFIP discounts of up to 45 percent for their residents.⁴ Congress created the CRS to help meet the two competing goals of the NFIP: financial solvency of the program and affordable flood insurance premiums.

This thesis explores methods for FEMA to increase Community Rating System participation in flood-prone communities. It employs appreciative inquiry as part of a comparative analysis of CRS success in the three most flood-prone states—Florida, Texas, and Louisiana. Since most of the CRS initiatives focus on the local level, this thesis examines the critical successes and essential failures of populous coastal and fluvial communities, too.

¹ Federal Emergency Management Agency, *Flooding – Our Nation’s Most Frequent and Costly Natural Disaster* (Washington, DC: Federal Emergency Management Agency, March 2010).

² Congress recognized that it could not be both profitable for private insurance companies and affordable for homeowners without financial support and commitment from the federal government. Federal Emergency Management Agency, *Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials*, FEMA 480, Washington, DC: Federal Emergency Management Agency, 2005, 2–3, https://www.fema.gov/sites/default/files/documents/fema-480_floodplain-management-study-guide_local-officials.pdf.

³ Federal Emergency Management Agency, *Floodplain Management Requirements*, 2–4.

⁴ Diane P. Horn, *Introduction to the National Flood Insurance Program*, CRS Report R44593 (Washington, DC: Congressional Research Service, January 6, 2023), 19.

This research provides the findings of the comparative analysis including state promotion of the CRS program, the consequential impact of repetitive loss properties on NFIP's solvency, and the unrealized opportunities to earn significant CRS credits for reducing such properties across the nation. By using the appreciative inquiry (AI) framework, this thesis identifies effective and unique mitigation opportunities to build resiliency into flood-prone communities, including advanced design solutions, along with grant funding solutions. By studying the CRS success of the three most flood-prone states and selected communities, this research provides roadmaps and blueprints for other communities to enhance and sustain their community resiliency, thereby providing flood insurance premium reductions for homeowners and improved financial solvency for the NFIP.

The three most flood-prone states share comprehensive floodplain management planning across all four CRS series, helping them attain CRS success. Executing a plan of public outreach, open space preservation, and an effective mitigation program leads to CRS success and reduced flood insurance premiums for homeowners.⁵ Further, within the three most flood-prone states, urban centers have significantly greater participation, especially those with recent natural disasters, such as Houston and Austin.⁶ Reviewing the state-by-state performance reveals a trend—performance varies significantly by community and depends more on local factors than broader state performance. State success in the CRS program depends on its promotion to communities. Further, developing a comprehensive floodplain management plan must account for the context. For example, Louisiana not only faces hurricanes from the Gulf, but also the confluence of two-thirds of the nation's stormwater runoff.⁷

⁵ “Federal Emergency Management Agency, National Flood Insurance Program Community Rating System Newsletter,” Federal Emergency Management Agency, February 2023), 4.

⁶ Federal Emergency Management Agency, *Texas: Top 50 National Flood Insurance Program (NFIP) Policy Count Communities and Community Rating System (CRS) Participation* (Washington, DC: Federal Emergency Management Agency, October 1, 2021), https://crsresources.org/files/100/maps/states/texas_crs_map_october_2021.pdf.

⁷ *Promoting Mitigation: FEMA and the State of Louisiana Press Release* (Washington, DC: Federal Emergency Management Agency, February 11, 2011), 1.

Sea Bright, NJ succeeded largely because of Superstorm Sandy upgrades that most coastal flood communities could replicate.⁸ The One NYC plan provides a great foundation for CRS success since it covers all facets of life in New York City. Wilkes-Barre and Scranton, Pennsylvania are similar fluvial communities, having attained Fire Insurance Service Office (ISO) scores of two, which is outstanding.⁹ Even though Scranton has fewer floodplain properties, its success with Fire ISO signals leadership commitment to emergency preparedness. Successful CRS communities have a commitment to the foundation of CRS—Floodplain Management Planning, Community Outreach, Mitigation Planning—focusing on repetitive and severe repetitive loss properties and unique challenges to the specific community.¹⁰

A surprising finding of this research is the substantial flood risk of repetitive loss properties and their crucial role in the overall success of the CRS program. According to FEMA, “NFIP actuaries have reported that repetitive loss is the single most important factor that affects the stability of the National Flood Insurance Fund.”¹¹ Additionally, NFIP expects the costs of these properties to grow in the future. As FEMA notes, although only 1.3 percent of insured properties qualify as repetitive loss (RL) or severe repetitive loss (SRL), those properties may well account for 15 to 20 percent of future NFIP losses in the future.¹² Since RL and SRL pose exponentially greater financial risk to FEMA, reducing the number of these high hazard properties eliminates repeated flood claims and

⁸ Sea Bright, *CRS Activity 510: Progress Report on Implementation of Credited Plan*, (Sea Bright, NJ: 2019), 2–6.

⁹ “Community Rating System Factsheet,” Federal Emergency Management Agency, 2017, 1.

¹⁰ Katherine H. Norris, “Inequity in Action: A Quantitative Analysis of the Implementation of State Hazard Mitigation Plans,” (master’s thesis, Naval Postgraduate School, March 2023), 25, <http://hdl.handle.net/10945/72063>.

¹¹ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System: Coordinator’s Manual*. FIA -15 /2017 (Washington, DC: Federal Emergency Management Agency, 2017), 110–6. https://www.fema.gov/sites/default/files/documents/fema_community-rating-system_coordinators-manual_2017.pdf.

¹² Federal Emergency Management Agency, 500–3.

improves the NFIP’s solvency.¹³ Hence, FEMA awards the most CRS points for activities that collectively reduce RL and SRL risk.¹⁴

The Community Rating System (CRS) bridges the gap between fiscal solvency and citizen flood protection by encouraging local governments to execute proven floodplain management practices that reduce the risk to the federal government, which it rebates to homeowners through policy discounts. CRS rewards communities with policy discounts for additional floodplain management activities that reduce the overall risk to the federal treasury, a win-win for all.

For the CRS program to be effective and efficient, the federal, state, and local levels must have a strong partnership. It begins with leadership and a commitment to enhance and sustain the core capabilities of the National Preparedness Goal.¹⁵ This effort starts with a comprehensive floodplain management plan developed with community stakeholders and partners, and then incorporates this plan into a longer-term state mitigation plan with community resiliency as the cornerstone.

RECOMMENDATIONS

1. Public Official Training

For lasting impact, all partners and stakeholders must have a basic understanding of the serious threat of flooding to the nation, the basic principles of the NFIP, and the value of the CRS. Based on the comparative analysis and findings, this thesis advances the following short-term, medium-term, and long-term training options for any community leader to be more effective and efficient in floodplain management and CRS success.¹⁶

¹³ Laura Lightbody and Brian Watts, “Repeatedly Flooded Properties Will Continue to Cost Taxpayers Billions of Dollars,” Pew, October 1, 2020, <https://www.pewtrusts.org/en/research-and-analysis/articles/2020/10/01/repeatedly-flooded-properties-will-continue-to-cost-taxpayers-billions-of-dollars>

¹⁴ Federal Emergency Management Agency, *Coordinator’s Manual*, 110–6.

¹⁵ William L. Painter, *The Department of Homeland Security: A Primer*. CRS Report No. R47446 (Washington, DC: Congressional Research Service, March 21, 2023), 1

¹⁶ Federal Emergency Management Agency. *The Importance of Floodplain Management for Elected Officials* (Washington, DC: Federal Emergency Management Agency, 2023)

2. Planning for CRS Communities

For communities participating in the CRS program, using a return on investment (ROI) template, found in Appendix C, would provide a roadmap to effectively improve their CRS ratings. This Alternative CRS Strategy organizes projects by ROI rather than activity, providing a roadmap to quickly focus on easy-to-achieve projects. By using the current CRS community achievement levels, communities could reorganize each element by high ROI (points earned with limited effort required), medium ROI (moderate effort required), low ROI (significant effort required), and de minimis ROI (exhaustive effort required).¹⁷

4. THIRA Planning for Communities with Repetitive Loss Properties

Finally, for NFIP participating communities that have either RL or SRL properties, those communities should integrate the required NFIP Repetitive Loss Analysis plan into the required NPG Threat and Hazard Identification and Risk Assessment (THIRA).¹⁸ Both federal programs separately require this assessment of flood risk so the ROI of working in partnership improves the chances of increasing mitigation grant funding.

5. Future Research

How can other states replicate Florida's CRS program success? Florida's overall CRS participation rates and the number of advanced communities far exceed the rest of the nation. What can be duplicated from the success of Miami, Houston, and New Orleans, in cities like Hoboken, New York, Philadelphia, and others? Lessons learned from these communities can become best practices for others to implement.

¹⁷ Michael-Kerjan Erwann, Ajita Atreyna and Jeffrey Czajkowski, *Learning over Time from FEMA's Community Rating System (CRS) and Its Link to Flood Resilience Measurement* (Philadelphia: The Wharton School, University of Pennsylvania, 2016), 21.

¹⁸ Department of Homeland Security, Federal Emergency Management Agency, *Local Mitigation Planning Policy Guide*, FP 206-21-0002 (Washington, DC: Department of Homeland Security, Federal Emergency Management Agency, April 19, 2023), 17.

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I. INTRODUCTION

A. PROBLEM STATEMENT

According to the Federal Emergency Management Agency (FEMA), “Flooding is the most frequent severe weather threat and the costliest natural disaster facing the nation.”¹ In fact, “ninety percent of all natural disasters in the U.S. involve flooding.”² The FEMA Floodplain Management Desk Reference provides a great comparison of homeowner risk: “During a 30-year mortgage, it may have a 26 percent chance of being hit by the 100-year flood, but the odds are 96 percent (nearly guaranteed) that it will be hit by a 10-year flood. Compare those odds to the only 1–2 percent chance that the house will catch fire during the same 30-year mortgage.”³ Thus, floods are not only the most devastating but also the most likely risk to homeowners.

In this context, recognizing the harmful financial consequences such natural disasters have on homeowners and financial institutions, Congress has undertaken several legislative initiatives to support a national flood insurance program. Congress realized that private insurance companies consistently sacrificed profits across most of the United States. Because of this, Congress pledged that the U.S. Treasury would guarantee flood losses not covered by premiums collected.

First, to provide flood insurance protection to homeowners, Congress passed the National Flood Insurance Act (NFIA) of 1968, creating the National Flood Insurance Program (NFIP).⁴ Congress wanted an alternative to continued funding of numerous

¹“Flooding—Our Nation’s Most Frequent and Costly Natural Disaster,” Federal Emergency Management Agency, 2010, <https://www.fbiic.gov/public/2010/mar/FloodingHistoryandCausesFS.PDF>

² “Course Summary: IS-322 Flood Mitigation Basics for Mitigation Staff,” Federal Emergency Management Agency, accessed March 6, 2021, <https://emilms.fema.gov/IS322/FM01summary.html>.

³ Federal Emergency Management Agency, *Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials*, FEMA 480 (Washington, DC: Federal Emergency Management Agency, 2005), 3–5. https://www.fema.gov/sites/default/files/documents/fema-480_floodplain-management-study-guide_local-officials.pdf.

⁴ Congress recognized that it could not be both profitable for private insurance companies and affordable for homeowners without financial support and commitment from the federal government. Federal Emergency Management Agency, *Floodplain Management Requirements*, 2–3.

structural flood control projects that were inordinately expensive. According to the Congressional Research Service, Congress believes that a combination of federally backed flood insurance and prudent land development at the local level can help prevent and mitigate flood losses.⁵ According to FEMA, “The NFIP is based on a mutual agreement between the Federal Government and the community. Federally backed flood insurance is made available in those communities that agree to regulate development in their mapped floodplains.”⁶ The partnership between the national and local governments is the linchpin of the NFIP’s success.

The Congressional Research Service elaborates on the goals of the NFIP:

The NFIP essentially has two interrelated policy purposes that can be summarized as follows:

1. to provide access to primary flood insurance, thereby allowing for the transfer of some of the financial risk of property owners to the federal government, and
2. to mitigate and reduce the nation’s comprehensive flood risk through development.⁷

Second, Congress amended the NFIP in 1973 following the devastating effects of Hurricane Agnes. Purchasing flood insurance is mandatory for homes in the floodplain with Federal Deposit Insurance Corporation (FDIC) mortgages. These legislative changes dramatically increased the number of flood-prone properties covered by flood insurance, reducing the financial risk to federally-backed financial institutions.⁸ Communities benefit from the NFIP, which prevents over \$1 billion of flooding damage per year.⁹ The NFIP demonstrates that a voluntary comprehensive floodplain management partnership between the federal government and communities can avoid flood losses and make communities more resilient, even when meeting only the minimum requirements of the NFIP.

⁵ Diane P. Horn, *Introduction to the National Flood Insurance Program*, CRS Report No. R44593 (Washington, DC: Congressional Research Service, January 6, 2023), 2.

⁶ Federal Emergency Management Agency, *Floodplain Management Requirements*, 2–6.

⁷ Horn, *Introduction to the National Flood Insurance Program*, 2.

⁸ Federal Emergency Management Agency, *Floodplain Management Requirements*, 2–4.

⁹ Federal Emergency Management Agency, 5–4.

Third, Congress realized that communities meeting the minimum floodplain management criteria under the NFIP would dramatically reduce losses. Therefore, to recognize and reward flood-prone communities for volunteer actions taken to improve floodplain management, enhance community preparedness, and mitigate flood risk, Congress passed the National Flood Insurance Reform Act of 1994.¹⁰ Among other things, the Act created the Community Rating System (CRS), a program that awards points under four broad activities further detailed in 19 specific floodplain management functions.¹¹ The credit-earning activities performed by communities before flooding have resulted in reduced flood insurance damages and claims, thereby saving the federal treasury taxpayer dollars. The CRS program employs incentives like safe driver discounts for car insurance and the very successful fire Insurance Service Office (ISO) rating program for fire insurance. The CRS program rewards prudent and sweeping activities by a community when planning, preparing, responding, and mitigating potential flooding threats. The communities making these efforts receive NFIP discounts of up to 45 percent for their residents.¹² The CRS motivates and prods communities to enhance their all-hazards preparedness, emphasizing the most common hazard, flooding.¹³ In this way, Congress pays to prevent floods by incentivizing private and community investment.

Nevertheless, despite the success of this voluntary program in numerous communities, the CRS discounts are unavailable to 31 percent of all NFIP flood insurance policyholders because their communities do not participate in the CRS program.¹⁴ Our nation is more resilient when communities implement CRS principles thereby improving floodplain management; resulting in reduced flood damage along with lower insurance

¹⁰ Federal Emergency Management Agency, *Floodplain Management Requirements*, 2–4.

¹¹ Essentially for every five hundred (500) points a community earns performing CRS recognized activities, homeowners in the community receive a five (5) percent discount on their NFIP policy premium. Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System: Coordinator's Manual*, FIA-15/2017 (Washington, DC: Federal Emergency Management Agency, 2017), 110–6, https://www.fema.gov/sites/default/files/documents/fema_community-rating-system_coordinators-manual_2017.pdf.

¹² Horn, *Introduction to the National Flood Insurance Program*, 19.

¹³ Horn, 19.

¹⁴ Horn, 19.

cost. In this context, Congress passed the Homeowner Flood Insurance Affordability Act (HFIAA) of 2014, which stipulates the fair treatment of policyholders, making flood insurance more affordable for homeowners.¹⁵ Increased community participation in the CRS program would result in a more resilient nation and would further promote the intent of Congress under the HFIAA to make flood insurance more affordable. Even New York City, which suffered severe impacts from Super Storm Sandy and has been a role model in all-hazard preparedness, has not been able to successfully join the CRS program. My research establishes how FEMA can increase CRS participation in flood-prone communities such as New York City.

B. RESEARCH QUESTION

How can FEMA increase Community Rating System participation in flood-prone communities?

C. LITERATURE REVIEW

This literature review presents the scholarly literature on the CRS in flood-prone communities and research why NFIP communities fail to join the CRS recognition program.¹⁶ It traces how the country's flood risk management has evolved over the past 50 years to manage economic, safety, and societal risk effectively and explores why more participating CRS communities do not progress from the introductory (8–9) to the intermediate (5–7) or advanced stages (1–4), nor improve upon the efficacy and efficiency of comprehensive floodplain management.¹⁷ The literature review demonstrates the need

¹⁵Homeowner Flood Insurance Affordability Act of 2014, Pub. L. No. 113–89, 128 Stat. 1020–1036, (2014), <https://www.congress.gov/113/plaws/publ89/PLAW-113publ89.pdf>.

¹⁶Of the 22,000 communities that participate in the NFIP only 1,444 communities have voluntarily joined the CRS program, a mere 5.57 percent of all communities. Federal Insurance and Mitigation Administration, “Community Rating System: Fact Sheet,” Federal Emergency Management Agency, 2017, http://www.fbfl.us/DocumentCenter/View/17848/NFIP_CRS_Fact_Sheet_2017_508OK?bidId=.

¹⁷The 1,520 CRS communities are comprised of: Introductory Classes (8-9), which make up 44.01 percent, Intermediate Classes (5-7), which make up 54.34 percent, and Advanced Classes (1-4), which make up a mere 1.64 percent. “Community Rating System Eligible,” Federal Emergency Management Agency, April 1, 2022, <https://www.fema.gov/floodplain-management/community-rating-system#forms>.

for broader research on the barriers to greater acceptance of CRS in more flood-prone communities.

1. CRS Management of Flooding Risk

Annually in the United States, over eighty people lose their lives to flooding, and flooding causes over \$8 billion in property damage.¹⁸ The United States General Accountability Office (GAO) has a list of 34 high-risk programs, including the NFIP, that threaten the financial stability of the federal treasury.¹⁹ Thus, according to the literature, from a public safety perspective and an economic necessity, sustaining our economy, preserving our cultural and natural resources, and ensuring the future viability of communities require a better approach to floodplain management.

To understand the significance of the CRS program, one must first understand how the program operates. FEMA facilitates communities voluntarily joining the CRS program by encouraging preparedness programs that go above and beyond the basic rules to be in compliance with the NFIP. Promoting homeowner risk awareness along with flood insurance promotion, mitigating flooding impacts, encouraging preparedness planning, and fostering an all-inclusive approach to floodplain leadership activities are the foundation of the CRS program.²⁰ The FEMA Flood Smart website directs homeowners to a “How Can I Pay Less for My Flood Insurance” section. It lists four expensive actions that would reduce flood insurance premiums but explains how encouraging community enrollment in the CRS program provides an immediate discount with no effort required by the

¹⁸ “Hydrologic Information Center–Flood Loss Data,” National Weather Service, accessed July 10, 2018, <https://www.nws.noaa.gov/hic/>.

¹⁹ J. Christopher Mihm, *High-Risk Series: Progress on Many High-Risk Areas, While Substantial Efforts Needed on Others*, GAO 17–317, (Washington, DC: Government Accountability Office, 2017), 2, <https://www.gao.gov/products/gao-17-317>.

²⁰ Erwann Michel-Kerjan, Ajita Atreyna, and Jeffery Czajkowski, “Learning over Time from FEMA’s Community Rating System (CRS) and Its Link to Flood Resilience Measurement,” (working paper, The Wharton School, University of Pennsylvania, 2016), 4, <https://riskcenter.wharton.upenn.edu/wp-content/uploads/2020/03/WP201611-Learning-Over-Time-CRS.pdf>

homeowner.²¹ More CRS opportunities above and beyond the minimum allow citizens to benefit from better floodplain management activities and reduce NFIP premiums.

In this connection, FEMA proposed and developed a strategic plan for CRS with the following goals:

1. Validate all CRS credits.
2. Reduce repeated dangerous floods.
3. Incentivize communities for continuous improvement of floodplain management programs.
4. Institute proper protocols and level of resources to implement the CRS Strategic Plan.
5. Implement a knowledge management plan for the CRS.²²

CRS has sought to combat the risk of and improve the awareness of flooding. Its core strategy is to encourage the government at the local level to implement flood management requirements beyond those of the NFIP. CRS has attempted to improve the actionability of these improvements with an array of goals.²³ By achieving each goal, as Jingyuan Li and Craig Landry explain, the community amasses points, resulting in lower premiums for flood insurance.²⁴ As structured, communities can decrease their risk and premiums by following the CRS system.

The CRS program, unlike government programs, seeks to monetize the rewards at a local level. Abdul-Akeem Sadiq and Douglas Noonan, scholars at the Wharton School of Business Risk Center, note that the program allocates incentives at the local level despite its direction from the federal level, unlike other environmental policies.²⁵ As such, Kevin Starbuck's thesis asserts that there are core moral hazards that arise from flood insurance

²¹ "How can I Pay Less for My Flood Insurance," FEMA National Flood Insurance Program, accessed June 10, 2019, <https://www.floodsmart.gov/costs/how-can-i-pay-less-for-my-flood-insurance>.

²² Federal Emergency Management Agency, *A Strategic Plan for the Community Rating System: Fiscal Years 2008–2013* (Washington, DC: Federal Emergency Management Agency, 2008), 8, https://crsresources.org/files/other/CRS_Strategic_Plan_2008-2013.pdf.

²³ Horn, *Introduction to the National Flood Insurance Program*, 2.

²⁴ Jingyuan Li and Craig E. Landry, "Flood Risk, Local Hazard Mitigation, and the Community Rating System of the National Flood Insurance Program," *Land Economics*, 94, no. 2 (May 2018): 194.

²⁵ Abdul-Akeem Sadiq, and Douglas Noonan, "Local Capacity and Resilience to Flooding: Community Responsiveness to the Community Rating System Program Incentives," *Natural Hazards* 78 (2015): 1426. <https://doi.org/10.1007/s11069-015-1776-9>.

because no one individual takes full responsibility for risks.²⁶ CRS attempts to combat this issue, as Li and Landry highlight: “The use of incentives at the household level to motivate provisions of risk-reducing public goods by local governments is novel, addressing issues of moral hazard and coordination of mitigation activities at appropriate levels of government and scales of investment.”²⁷ In her thesis, Sandra Keefe points out the need for significant changes in the NFIP while acknowledging the success and value of the CRS program, as it benefits the federal government, the local government, and homeowners.²⁸

So, what is CRS, and how can all components work together by applying an all-hazards approach to preparedness, protection, response, recovery, and mitigation to enhance unified floodplain management? Communities can reduce their flood insurance premiums by up to 45 percent by voluntarily doing more than the NFIP mandates.²⁹ According to FEMA, communities undertaking floodplain management activities in four categories (series) accomplish this objective:

1. 300 Series—Public information
2. 400 Series—Mapping and regulations
3. 500 Series—Flood damage reduction
4. 600 Series—Flood preparedness³⁰

These four broad categories are further split into functions and specific activities in the detailed FEMA’s 641-page CRS Coordinator’s Manual.³¹ This large set of floodplain management information may keep some community leaders—who have many other responsibilities and time commitments—from actively pursuing the CRS program. FEMA refers to the mayor or county manager as the CEO and requires this individual to verify

²⁶ Kevin T. Starbuck, “Moral Hazard: How the National Flood Insurance Program Is Limiting Risk Reduction” (master’s thesis, Naval Postgraduate School, December 2016), 5. <http://hdl.handle.net/10945/51620>.

²⁷ Li and Landry, “Flood Risk, Local Hazard Mitigation,” 194.

²⁸ Sandra A., Keefe, “The Perfect Storm: Changing National Policies to Reduce Flooding Impacts and Costs” (master’s thesis, Naval Postgraduate School, 2011), 46. <http://hdl.handle.net/10945/10627>.

²⁹ Federal Emergency Management Agency, *Floodplain Management Requirements*, 9–22.

³⁰ Federal Emergency Management Agency, 9–23.

³¹ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 110–6.

that the community faithfully follows all flood regulations and activities for which the community earns CRS credit.³² Eri Furusawa's Columbia University thesis recommends a potential improvement to CRS that eliminates unnecessary, time-consuming administrative requirements and reallocates those resources to implement core CRS initiatives.³³ To drive further adoption of the CRS program, FEMA may need to restructure the program to reduce the administrative burden.

2. Joining the Introductory Stage (8-9) Is Challenging and Requires Commitment

Most communities within the CRS program are in the Introductory Stage (Classes 8–9). For the largest subset of communities not yet in the program, many communities have received accolades from other partners for initiating comprehensive floodplain management activities. However, the community does not receive CRS credit, and the respective decrease in premiums. With more coastline than any other U.S. city, New York City cannot enter the Introductory Stage of CRS, despite its 51,861 properties in the Special Flood Hazard Area (SFHA).³⁴ One New York is a comprehensive plan that investigates aspects of life in New York City and ways to improve through four broad visions. Vision 4 outlines robust, all-hazards emergency preparedness activities that would likely help qualify New York City for the CRS program.³⁵ Many communities fail to seek CRS credit for facilities they provide via parks and recreation. Open-space preservation areas such as soccer fields, baseball fields, and the natural regions may provide enough CRS points to

³² Federal Emergency Management Agency, 210–9.

³³ Eri Furusawa, “Subsidizing the Resilience Commons: A Study on the Community Rating System and CRS Research” (master’s thesis, Columbia University, 2018), 55, <https://doi.org/10.7916/D82J7V96>.

³⁴ Federal Emergency Management Agency, “New York: Top 50 National Flood Insurance Program (NFIP) Policy Count Communities and Community Rating System (CRS) Participation,” (Washington, DC: Federal Emergency Management Agency, October 1, 2021), https://crsresources.org/files/100/maps/states/new_york_crs_map_october_2021.pdf.

³⁵ City of New York, Mayor’s Office of Sustainability, *One New York: The Plan for a Strong and Just City* (New York: City of New York, 2015), <http://www.nyc.gov/html/onenyc/downloads/pdf/publications/OneNYC.pdf>.

reach the entry-level requirements of a Class 9 community.³⁶ New York City could conceivably enter the program today and begin reducing premiums immediately.

In this context, just like in New York City, many small and large communities may already meet most of the CRS Class 9 requirements. The communities opt not to participate because either they do not realize current and past activities may qualify for CRS credit or because the administrative burden outweighs the savings in premiums.

For the communities making up the largest portion of CRS programs, deciding where to start is the most complex and challenging decision. According to Sadiq et al., “CRS communities tend to invest in low hanging fruit” or projects with a high return on investment (ROI) when trying to earn CRS credit.³⁷ FEMA has validated this by reporting that greater than 95 percent of all CRS communities receive credit for activities for function “310 (elevation certificates), 430 (higher regulatory standards), and 440 (flood data maintenance).”³⁸ Most successful communities start with the most accessible activities before proceeding to more complex areas.

Since communities must make the best use of limited taxpayer funds, thinking about return on investment (ROI) helps local leaders determine whether the CRS activities are a prudent use of scarce resources. ROI equals the amount of income, or in this case, insurance savings for a community divided by the required capital expenditures. Horngreen, Datar, and Foster highlight ROI as an accepted method of measuring a project’s success as it (i) effectively weighs both the savings earned and the investment required and (ii) creates an effective metric to compare one project with all other available opportunities.³⁹ ROI validates that CRS makes good business sense for a community.

³⁶ “Small Communities in the CRS Factsheet,” Federal Emergency Management Agency, 2018, 2.

³⁷ Abdul-Akeem Sadiq et al., “A Review of the Federal Emergency Management Agency’s Community Rating System Program,” *Natural Hazards Review*, 21 no. 1 (October 2019) 17, [https://doi.org/10.1061/\(ASCE\)NH.1527-6996.0000320](https://doi.org/10.1061/(ASCE)NH.1527-6996.0000320)

³⁸ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 110–6.

³⁹ Charles T. Horngreen, Srikant M. Datar, and George Foster, *Cost Accounting: A Managerial Emphasis*, 12th ed. (Upper Saddle River, NJ: Prentice Hall, 2005), 793.

The Wharton School of Business finds that “Overall, the annual retention rate is found to be 99 percent.”⁴⁰ Research has shown that advancing from the CRS Introductory Stage to the Intermediate Stage proves difficult for most communities, and less than five percent of communities advance yearly.⁴¹ The limited improvement in ratings suggests that communities cannot or will not voluntarily progress in the CRS stage.

3. Advancing to the Intermediate Stage (5–7) Requires More Resources, Time, and Funding

For local governments that successfully enter introductory stages, progressing to more advanced stages becomes more complex. Hence, the credits earned to move up to the Intermediate Phase validate long-term changes in properties in the floodplain.

The most effective way to reduce repetitive flood losses is a comprehensive mitigation plan to elevate or remove these properties from the SFHA. In addition, floodplain activities undertaken under mitigation will earn substantial CRS points to advance to the Intermediate Phase. In his thesis, West compares the mitigation buyout programs in Waterloo, IA, and Cedar Falls, IA, determining that Cedar Falls’ well-planned and executed program provides a dramatically higher value in CRS points.⁴² Lucia validates through his research that each \$1 spent by the Federal Treasury saves \$4 on a go-forward basis, highlighting the excellent ROI and CRS value.⁴³ Significant CRS credits reward the removal of repetitive flood loss properties from the SFHA. Still, creating more open space for community recreational use and substantial additional open space earns CRS credits. Cedar Falls had notable mitigation activities, but Waterloo had limited success, and this lacuna directly affects its NFIP CRS status. Today, Cedar Falls is a CRS Class 5 and benefits from a 25 percent discount for SFHA homeowners, whereas Waterloo

⁴⁰ Erwann, Atreyna and Czajkowski, *Learning over Time*, 19.

⁴¹ Erwann, Atreyna and Czajkowski, 18.

⁴² Tracy L. West, “Flood Mitigation and Response: Comparing the Great Midwest Floods of 2003 and 2008” (master’s thesis, Naval Postgraduate School, 2010), 62, <http://hdl.handle.net/10945/4962>.

⁴³ Bill Lucia, “More Evidence Pre-Disaster Hazard Mitigation Investments Can Pay Off,” Route Fifty, October 20, 2018, <https://www.route-fifty.com/infrastructure/2018/10/utility-transportation-mitigation-study/152416/>.

does not participate in the program.⁴⁴ Cedar Falls demonstrates that comprehensive floodplain management has excellent benefits to the federal government, the local government, and homeowners. But it also illustrates that attaining an Intermediate Phase recognition requires more resources, time, and funding.

4. Attaining Advanced (1–4) Recognition Requires a Long-term Strategy

Although attaining advanced stages can be perceived as onerous, the benefits are longstanding and positive. Reaching this stage requires taking precursor and consistent steps. Comprehensive floodplain management strategies must be in place for almost all eighty-one activities (prerequisites) and have few deficiencies.⁴⁵ Since less than one percent of communities attain this recognition, research in this area is scarce and specific to an individual community’s unique requirements and topography. For example, achieving Class 4 recognition requires the community to meet stringent processes for the written plan, execution, and update of its Hazard Mitigation Plan.⁴⁶ Any patterns recognized among the Advanced communities cannot be generalized because of today’s limited data.

5. Evolution of the National Flood Insurance Program

The country’s plan to address flood risk has evolved in recent history, and experts and scholars continue to analyze historical steps and future projections. In 1995, President Clinton presented “A Unified National Program for Floodplain Management” to Congress that said, “At its best, floodplain management focuses simultaneously on the present, near future, and long-term viability of the floodplain as an integral part of the human

⁴⁴ National Flood Insurance Program, *Flood Insurance Manual* (Washington, DC: Federal Emergency Management Agency, 2021), 3–8, <https://www.fema.gov/flood-insurance/work-with-nfip/manuals/current>.

⁴⁵ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 210–4 thru 201–8.

⁴⁶ Federal Emergency Management Agency, *Mitigation Planning and the Community Rating System Key Topics Bulletin* (Washington, DC: Federal Emergency Management Agency, 2018), 6–9, https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-planning-and-the-community-rating-system-key-topics-bulletin_10-1-2018.pdf.

community, the watershed, the shoreline, or the coastal system.”⁴⁷ The Wharton Risk Center elucidates that, “residential flood insurance claims in class 9 (entry level) and class 8 communities are 13.5 percent lower than in non-participating communities.”⁴⁸ The average NFIP policy premium discount to a homeowner in a CRS community is about 15 percent.⁴⁹ CRS saves the federal government and property owners money by promoting comprehensive floodplain management.

Risk Rating 2.0 (RR 2.0) is the most significant change in the NFIP in five decades. To improve the economic feasibility of the NFIP, FEMA has recently approved and adopted “Risk Rating 2.0, premiums for an individual property will be based on that property’s specific flood risk, as opposed to being placed in a general risk category based on flood zones.”⁵⁰ RR 2.0 takes many factors into account such as, “the specific features of the property, including variables such as foundation type of the structure, the height of the lowest floor of the structure relative to based flood elevation, and the replacement cost value (RCV) of the structure.”⁵¹ The new rating formula will increase premiums as “all properties will be on a glide path to actuarial rates.”⁵² Since most property owners will see an annual 18 percent increase in their NFIP premiums for the next few years, citizens will likely encourage their community leaders to join the CRS program out of economic necessity.

Due to the higher premiums that property owners will have to pay, joining the CRS program will become more urgent. By joining CRS or increasing its score, a community

⁴⁷ William J. Clinton, *A Unified National Program for Floodplain Management* (Washington, DC: White House, 1995), 8.

⁴⁸ Erwann, Atreyna and Czajkowski, *Learning over Time*, 21.

⁴⁹ Thomas L. Hayes, and D. Andrew Neal, *National Flood Insurance Program: Actuarial Rate Review: In Support of the October 1, 2011, Rate and Rule Change* (Washington, DC: Federal Emergency Management Agency, 2011), 17, <https://www.fema.gov/flood-insurance/work-with-nfip/actuarial-rate-review>.

⁵⁰ Diane P. Horn, *Options for Making the National Flood Insurance Program More Affordable*, CRS Report No. R47000 (Washington, DC: Congressional Research Service, 2021), 7.

⁵¹ Horn, 7.

⁵² Diane P. Horn, *National Flood Insurance Program: The Current Rating Structure and Risk Rating 2.0*, CRS Report No. R45999 (Washington, DC: Congressional Research Service, 2021), 10–11.

could gain a CRS rating and the accompanying discounts for residents.⁵³ Joining CRS has more benefits as “FEMA has confirmed that discounts to policyholders in communities that participate in the CRS will continue, with the discount uniformly applied to all policies in the community regardless of whether the structure is inside or outside the SFHA.”⁵⁴ Under RR 2.0, all policyholders within CRS communities will receive the discount, not just those in the high-risk Special Flood Hazard Area (SFHA), which rewards them for the first time.

The literature supports a comprehensive floodplain management program as essential in making flood insurance affordable and the nation resilient to the most significant natural hazard: flooding. Congress has communicated that the Department of Homeland Security must focus on NFIP more for the economic security of the nation and the public health and safety of citizens.⁵⁵ Research evidence demonstrates that increased CRS participation leads to widespread benefits but increasing CRS participation in flood-prone communities requires more research. As the study reveals, many communities have opted not to participate in the program despite the benefits.

The thesis explores the lessons learned from successful and unsuccessful CRS communities to drive further adoption. A consolidation of successful strategies—including but not limited to creating an easy-to-follow strategic blueprint, prioritizing high ROI projects, and creating a whole community approach with buy-in from a diverse cross-section of crucial constituents—would make the CRS program more attainable for communities. By improving the ease of implementation, FEMA can drive CRS adoption, improving community resilience, and decreasing premiums.

D. RESEARCH DESIGN

This study identifies how to increase voluntary community participation in the Community Rating System, reducing flood insurance premiums and improving community

⁵³ Horn, 29.

⁵⁴ Horn, 13.

⁵⁵ Diane P. Horn, *National Flood Insurance Program: Selected Issues and Legislation in the 115th Congress*, CRS Report No. R45099 (Washington, DC: Congressional Research Service, 2018), 4.

resilience. To this end, this thesis conducts a comparative analysis—a policy analysis and a case study—as a qualitative research method.

In this context, the literature review explores how more flood-prone communities can understand the diverse parts of the Community Rating System to improve their comprehensive floodplain management. It also analyzes how they can diligently complete CRS activities to qualify for discounts while enhancing community resilience. This research examines how communities enter the introductory phase (8–9) of CRS, improve their CRS recognition level to intermediate (5–7), and finally, how a tiny group attains the advanced level (1–4). I use each CRS activity to complete a strengths, weaknesses, opportunities, and threats (SWOT) analysis of how FEMA and the communities reach a common goal of enhanced comprehensive floodplain management.⁵⁶

In addition, this thesis examines non-financial factors that may affect a community's interest in the CRS program, such as being recognized for excellence in a national program and the positive publicity generated. Likewise, I research the activities of other community departments, following an all-hazards approach under the Department of Homeland Security Core Capabilities in compliance with Presidential Policy Directive 8.⁵⁷ The research also looked at scholarly books such as *The Ostrich Paradox: Why We Underprepare for Disasters* which considers problems like, “We fail to evacuate when advised. We rebuild in flood zones. We don’t wear helmets. We fail to purchase insurance. We would rather avoid the risk of ‘crying wolf’ than sound the alarm.”⁵⁸ This investigation allowed for a greater breadth of research material than just focusing on the financial benefits and implications of the activities in the four CRS categories and explores perceived barriers.

⁵⁶ William G. Nickels, James M. McHugh, and Susan M. McHugh, *Understanding Business* (New York: McGraw-Hill, 2010), 182–183.

⁵⁷ “President Obama’s Presidential Policy Directive/PPD-8 “is aimed at strengthening the security and resilience of the United States through systematic preparation for the threats that pose the greatest risk to the nation, including acts of terrorism, cyber attacks, pandemics, and catastrophic natural disasters.” Barack Obama, *Presidential Policy Directive/PPD-8: National Preparedness*, Department of Homeland Security Presidential Directives (Washington, DC: Department of Homeland Security, 2011), <https://www.dhs.gov/presidential-policy-directive-8-national-preparedness>.

⁵⁸ Robert Meyer and Howard Kunreuther, *The Ostrich Paradox: Why We Underprepare for Disasters* (Philadelphia: Wharton Digital Press, 2018), <https://wdp.wharton.upenn.edu/book/ostrich-paradox/>.

I first analyze the NFIP CRS, as well as the four general categories of CRS that organize activities; then, I scrutinize how CRS relates to each of the DHS Core Capabilities (prevention, protection, mitigation, response, and recovery) and examine the successes and failures of the CRS in some of the most flood-prone states. These categories help establish benchmarks to enhance comprehensive floodplain management and CRS success. I mine information and data from academic and practitioner research to enhance floodplain management and improve community resilience.

The 1,444 current CRS communities provide statistical data on their floodplain management program and CRS through their community website to improve measurability, as required by CRS activity (350 Flood Protection Information).⁵⁹ Planners can use the reliable statistical information on each community's website to help develop hypotheses on which CRS activities other communities can adopt and identify barriers to specific activities.

A significant number of scholarly reports for federal partners on the NFIP and CRS are available from the Government Accountability Office, the Congressional Research Service, the Congressional Budget Office, and the DHS's FEMA with CRS Resources and Flood Smart. Furthermore, professional organizations such as the National League of Cities, the U.S. Conference of Mayors, the International Association of Emergency Managers, and the Association of State Floodplain Managers have conducted significant investigative analyses on comprehensive floodplain management for their members. In my research, I used the Homeland Security Digital Library and the Dudley Knox Library and searched several scholarly electronic databases for CRS information, including *ABI/Inform*, *Scopus*, *Political Science Complete*, *CQ Researcher*, and *Google Scholar*.

To better understand why some communities more successfully manage risk and join the CRS program, this thesis explores the measures taken by different communities across the country. On a state level, I compared the critical actions taken by the three most flood-prone states—Florida, Texas, and Louisiana. Since the local level controls much of

⁵⁹ Federal Emergency Management Agency, National Flood Insurance Program Community Rating System, 350–1.

flood management, I highlight the critical successes and note the essential failures of populous coastal and fluvial communities. Through these comparisons, I hope to identify the critical factors for success, as defined as the advancement through the CRS program in flood-prone communities.

In my comparative analysis, I use the Business Canvas Model (BCM) with a Mission (or Problem) to organize research materials to formulate a strategic plan to increase flood-prone community participation in CRS. Osterwalder and Pigneur describe nine building blocks of a business model. They write, “a business model describes the rationale of how an organization creates and delivers and captures value.”⁶⁰ The Business Canvas Model can measure mission achievement, not just profitability.⁶¹ Likewise, the Mission Model Canvas provides a research framework to ensure that all “key partners, key activities, key resources value propositions, buy-in and support, deployment, beneficiaries, mission budget, and mission achievement” receive consideration at each research step.⁶² Mission achievement is a measure of success, just as CRS scores are credible testaments of success. As Bui states, “Your study should address a research problem and question that you want answered because they are important to you, and you have been unable to find meaningful and validated solutions.”⁶³ The Mission Model Canvas provides an excellent model, acceptable to partners in the federal government, local communities, and homeowners. Helping communities improve the CRS participation will meet the goals with an objective measure of success, leading to tangible program enhancement.

⁶⁰ Alexander Osterwalder, and Yves Pigneur, *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers* (Hoboken, NJ: John Wiley & Sons. 2010), 14.

⁶¹ Steve Blank, “The Mission Model Canvas – An Adapted Business Model Canvas for Mission Driven Organizations,” *Steve Blank* (blog), February 23, 2016, <https://steveblank.com/2016/02/23/the-mission-model-canvas-an-adapted-business-model-canvas-for-mission-driven-organizations/>.

⁶² Blank, “The Mission Model Canvas.”

⁶³ Yvonne N. Bui, *How to Write a Master’s Thesis*, 2nd ed. (Thousand Oaks, California: Sage Publications, 2014), 22.

II. STUDY OF THE NATIONAL FLOOD INSURANCE PROGRAM

This chapter explains the history of the National Flood Insurance Program (NFIP) and its evolution through legislation since it is the foundation for the Community Ratings Systems (CRS). Over the past century, the United States government has adopted legislation to manage risk for flooding disasters. To accurately assess the country's management of this risk requires understanding of current laws and their evolution in response to more frequent flooding, which prompted the creation of the CRS. The National Flood Insurance Act enacted in 1968 remains the key piece of legislation, but Congress has passed laws and presidential executive orders have built on it. Laws include: NFIA; Flood Disaster Insurance Reform Act of 1973; National Flood Insurance Reform Act of 1994; Homeland Security Act of 2002; Post Katrina Reform Act of 2006; Biggert-Waters Flood Insurance Reform Act of 2012; Disaster Recovery Reform Act of 2018; and National Flood Insurance Program Reauthorization Act of 2019; executive orders include 11988, 12127, and 12148.

This chapter explores the initial act and its subsequent changes, most of which responded to major events. Finally, the chapter highlights the future of national flood insurance—the National Flood Insurance Program Risk Rating 2.0. Despite legislative successes, flood insurance premiums will continue rising because competing goals remain; the financial solvency of the program conflicts with achieving low insurance rates.

A. FLOOD INSURANCE ACT OF 1968

In 1968, Congress created a nationalized program to offer communities flood insurance that private institutions would not provide because of the inordinate cost. The NFIA directly addressed (i) the rising economic burden of flooding on a national level as floods became more frequent, (ii) the limited success of previous measures put in place to prevent and insure the community, (iii) the effective perceived economic value of pooling the risk of a broader community, and (iv) the hope that if an effective plan were implemented, flooding risk would diminish and insuring such policies in the public market

would become economically feasible.⁶⁴ Through addressing the above concerns, Congress made the first step in mandating the management of flooding risk at the national level.

According to FEMA, the NFIA created four primary outcomes in risk management. Through the first and most impactful, subsidized premiums, the law effectively transferred the risk of flooding from the public market to the federal government. Second, planned government intervention after large flooding events provided guaranteed aid to flood-prone communities. Third, the law aimed to deter the continued development of flood-prone areas. Fourth, new building requirements would lessen the cost of insuring homes in communities with flooding risk exposure over the long term. The Federal Insurance Administration was to administer NFIA under the Department of Housing and Urban Development (HUD).⁶⁵ NFIA aimed to reduce overall costs by mitigating flooding impacts through many new approaches to comprehensive floodplain management.

Key themes of the initial law remain despite recent amendments. The most impactful—are (i) the government precedent of subsidizing flood insurance premiums, (ii) the federal moral imperative to support communities following a major flood disaster, and (iii) the ongoing desire of the federal government to make flood insurance profitable enough for the public market to absorb it.⁶⁶ Future programs updated regulation, such as development and flood insurance purchase requirements for homes that had a federally backed mortgage in a floodplain. By requiring homes in floodplains to buy insurance, it reduced risk of mortgage default after a flood.

B. FLOOD DISASTER INSURANCE REFORM ACT OF 1973

Despite implementing the NFIA, public adoption did not grow considerably. For example, FEMA noted that in 1972 the total participants in the program across the entire United States was approximately 100,000 out of 2,000,000 properties at risk of flooding.⁶⁷ As such, the majority, or 95 percent, of at-risk properties did not participate in the program

⁶⁴ National Flood Insurance Act of 1968, 42 U.S.C. § 4001 (1968).

⁶⁵ Federal Emergency Management Agency, *Floodplain Management Requirements*, 2–3.

⁶⁶ Horn, *Introduction to the National Flood Insurance Program*, 1.

⁶⁷ Federal Emergency Management Agency, *Floodplain Management Requirements*, 2–4.

and owners did not pay into the premium pool that provided coverage for the entire community. Simply put, the NFIA fell far short of the goal of mortgaged property owners voluntarily buying flood insurance to mitigate the financial risk to both individual citizens and the federal treasury.

Several major weather events, most notably Hurricane Agnes, highlighted the economic losses from insufficient premium buy-ins. FEMA reports that in June of 1972, Hurricane Agnes severely damaged communities.⁶⁸ Additionally, partly due to the limited participation in NFIA, the federal aid for Agnes-affected properties was the highest on record up to that point.⁶⁹ Improved participation in the program would have lowered the costs of aid while also providing additional income to the federal government from low and moderate risk property owners who are not required to buy flood insurance..

To address this imbalance of participation and assure a sustainable program, Congress created a new act, the Flood Disaster Protection Act of 1973. The new regulation (i) mandated that all properties within a flood prone community purchase flood insurance to qualify for government aid, (ii) banned federal aid for the development or purchase of any new properties within flood-prone communities not participating in the program, and, most importantly, (iii) required property owners in flood-hazard areas with federal backed mortgages to purchase flood insurance.⁷⁰

The 1973 Act increased participation by flood-prone property owners and improved protections for the banks that provided mortgages for these property owners, making the program more sustainable. Regarding participation, FEMA noted that the law resulted in an almost immediate 1,900 percent increase in total properties with flood insurance—from slightly less than one hundred thousand in 1972 to approximately two million in 1979.⁷¹ By widening the pool of participants, Congress took a first necessary step in improving the solvency of flood insurance and diminishing the exposure of single expensive catastrophic

⁶⁸ “Thousands Flee to Higher Ground as Raging River Breaches Dike,” *Times Leader*, June 23, 1972, 1.

⁶⁹ Federal Emergency Management Agency, *Floodplain Management Requirements*, 2-4.

⁷⁰ Flood Disaster Protection Act of 1973. Pub. L. No. 93-234

⁷¹ Federal Emergency Management Agency, *Floodplain Management Requirements*, 2-4.

event. Second, when focusing on protection of the banks, mandating the purchase of flood insurance limited the risk that a bank mortgage would have a recovery value below its outstanding principal. As such, as the U.S. district court affirmed in Callahan, “it is well established that lenders, not borrowers, are [the] intended beneficiaries of NFIA.”⁷² Therefore, it is important to understand the relationship between banking regulations and flooding regulations; and that both are very closely inter-related. By requiring homeowners with mortgages in high-risk flood areas to buy insurance reduces the risk of default, thereby protecting the banks investment. Protecting bank mortgage capital investment portfolios from losses due to large scale mortgage defaults in an area impacted by substantial flood losses remains a heightened national security issue today, as highlighted by the implications of the Great Recession of 2008.⁷³ In this connection, ensuring bank liquidity continues to be a key driver of flooding regulation, as highlighted by the United States House Committee on Financial Services holding regulatory authority over the National Flood Insurance Program, not FEMA.⁷⁴ The strong banking connection to the Homeland Security National Preparedness Goal responsibilities, require a different partnership across diverse disciplines to enhance and sustain our nation’s resiliency.

C. EXECUTIVE ORDERS 11988, 12127, 12148

Throughout the late 1970s, a series of executive orders (11988, 12127, 12148) increased the community interest and legal requirements of flood insurance in the United States. Like the Flood Disaster Reform Act of 1973, these executive orders responded to a series of natural and technical disasters the Three Mile Accident.

President Jimmy Carter signed Executive Order 11988 on May 24, 1977, which gave extensive guidance on comprehensive floodplain management as well mandating what federal agencies are required to implement.

⁷² Callahan v Country Wide Home Loans, Inc., 20 Fla. L. Weekly Fed. D. 227, 2006 U.S. Dist. LEXIS 51217 (N.D. Fla. 2006)

⁷³ Suzanne McGee, *Chasing Goldman Sachs*, (New York: Crown Business, 2010), 170.

⁷⁴ William O. Jenkins, *National Flood Insurance Program: New Processes Aided Katrina Claims Handling, but FEMA’s Oversight Should be Improved*, GAO 07–169 (Washington, DC: Government Accountability Office, 2006), 47.

Each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for (1) acquiring, managing and disposing of Federal lands, and facilities; (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating and licensing activities.⁷⁵

Executive Order 11988 became the standard for most floodplain management minimum requirements and the foundation for the Community Rating System, making it far reaching in its effects.

Immediately following the Three Mile Accident on March 28, 1979, President Jimmy Carter signed two executive orders that, while not flood-risk related, significantly changed how the nation addressed domestic emergencies.⁷⁶ The first, Executive Order 12127, was signed on March 31st and created the Federal Emergency Management Agency (FEMA).⁷⁷ The second, Executive Order 12148, was signed on July 20th and “designated FEMA as the lead agency for both civil defense and emergency management.”⁷⁸ This change also resulted in the NFIP moving from HUD to FEMA, to be more responsive in an emergency. Years later, FEMA would become part of the newly created Department of Homeland Security.

Combined with the 1973 Act, the three executive orders completed the federal government’s plan to protect flood-prone communities. As such, no amendments were required throughout the 1980s.

⁷⁵ Exec. Order No. 11988, 3 C.F.R. 1977.

⁷⁶ The Three Mile Accident was a serious nuclear reactor malfunction disaster in Harrisburg, PA which changed the emergency management paradigm and resulted in the creation of FEMA a few days after the accident. “EPA History: Three Mile Island,” United States Environmental Protection Agency, June 6, 2023, <https://www.epa.gov/history/epa-history-three-mile-island>.

⁷⁷ Exec. Order No. 12127, 3 C.F.R. 1979.

⁷⁸ Exec. Order No. 12148, 3 C.F.R. 1979.

D. NATIONAL FLOOD INSURANCE REFORM ACT OF 1994

The NFIA remained unchanged over two decades, so in 1994 some modifications of the rules and regulations that created the groundbreaking flood risk reduction program known as the Community Rating System. By the mid-1990s, Congress had identified key issues with the current management of flood insurance risk in the United States—most notably a lack of lender compliance and community incentives.⁷⁹ As an example when banks provided mortgages, they did not properly require mortgagees, “to purchase flood insurance as a condition of a federally backed mortgage.”⁸⁰ These changes increased the pain to banks to ensure lender compliance with the mandatory flood insurance purchase to protect bank-provided mortgages. As such, Congress created the National Flood Insurance Reform Act of 1994 to mitigate those problems. It provided further regulation to remove loopholes and create incremental opportunities to improve how the nation protected flood-prone communities. However, the 1994 Act created CRS, which Chapter III discusses in greater detail.⁸¹ Congress created the Community Rating System to help meet the two goals of the NFIP: financial solvency of the program and affordable flood insurance premiums.

E. HOMELAND SECURITY ACT OF 2002

Following the devastating attacks on September 11th, President George W. Bush created the Department of Homeland Security (DHS) to synchronize various emergency functions throughout the nation to effectively interact with each other through one entity. The DHS became responsible for “(i) border and transportation security, (ii) emergency preparedness and response, (iii) coping with the threat of weapons of mass destruction and (iv) intelligence gathering and analysis designed to create an integrated intelligence

⁷⁹ Federal Emergency Management Agency, *Laws and Regulations: Governing the National Flood Insurance Program* (Washington, DC: Federal Emergency Management Agency, 2020), <https://www.fema.gov/flood-insurance/rules-legislation/laws>.

⁸⁰ Diane P. Horn, *National Flood Insurance Program: The Current Rating Structure and Risk Rating 2.0*. CRS Report No. R45999, (Washington, DC: Congressional Research Service, 2022), 3.

⁸¹ Federal Emergency Management Agency, *Floodplain Management Requirements*, 2–4.

picture.”⁸² By this mandate (ii), DHS would manage the prevention, protection, mitigation, response, and recovery of natural disasters, including severe flooding events. Now a new federal department would be responsible for FEMA and its most expensive program, the National Flood Insurance Program.

Furthermore, the Act resulted in the “transfer of functions, personnel, assets, and liabilities of the Federal Emergency Management Agency, including the functions of the Director of the Federal Emergency Management Agency relating thereto, to the Secretary of Homeland Security.”⁸³ As such, beginning in 2002, FEMA became a part of the much larger DHS and with that, DHS would regulate the NFIP.

Through consolidation, Congress articulated coordination through one agency as the most effective approach to managing disasters, whether human caused, technological, or natural. Through a unified approach, the country could more effectively prepare and address emergencies. NFIP is a significant program that touches 222,000 communities representing five million policies worth approximately \$1.3 trillion in coverage.⁸⁴ As such, this addition represented a significant increase in the responsibilities of DHS.

F. POST-KATRINA EMERGENCY REFORM ACT OF 2006

After the failure of all levels of government (local, state, and federal) during Hurricane Katrina, Congress acted swiftly to redirect emergency preparedness activities. The creation of DHS aimed to improve the coordination of emergency responders; therefore, reducing the time to respond, increase the effectiveness of such responses and enhance the resiliency of the nation. However, Hurricane Katrina exposed deficiencies in the new DHS structure for such responses, which were focused primarily on terrorist attacks, not natural disasters.⁸⁵ Tabletop exercises in 2004 where the newly formed DHS ran a simulation of a hurricane in New Orleans, known as Hurricane Pam, highlighted the

⁸² Nadav Morag, *Comparative Homeland Security: Global Lessons*, 2nd ed. (Hoboken, NJ: John Wiley & Sons, 2018), 4.

⁸³ Homeland Security Act of 2002, Pub. L. No. 107-296, November 25, 2002, 8.

⁸⁴ William L. Painter, *Selected Homeland Security Issues in the 116th Congress*, CRS Report No. R45701 (Washington, DC: Congressional Research Service, 2019), 21.

⁸⁵ Painter, *Selected Homeland Security Issues in the 116th Congress*, 1.

lack of preparation. Following the exercise, DHS noted key deficits and additional resources needed, such as the lack of boats for evacuations however, no one ever addressed those weaknesses.⁸⁶

The report of United States Senate Committee of Homeland Security and Government Affairs discovered four overarching failures during Hurricane Katrina:

1. Long-term warnings went unheeded and government officials neglected their duties to prepare for a forewarned catastrophe;
2. Government officials took insufficient actions or made poor decisions in the days immediately before and after landfall;
3. Systems on which officials relied on to support their response efforts failed; and
4. Government officials at all levels failed to provide effective leadership.⁸⁷

Despite the simulation, DHS was unprepared for the disaster. Damage from the disaster was so significant that the amount of national flood insurance claims paid from Hurricane Katrina (\$16.2 billion) were more than the combined claims from all the flood disasters since the formation of FEMA in 1979 (\$9.5 billion).⁸⁸ The failures of all levels of government during Hurricane Katrina required Congress to look at national preparedness in a new paradigm.

Congress created the Post-Katrina Emergency Reform Act of 2006 to address the shortfalls exposed by Hurricane Katrina. The act emphasized the DHS focus on all hazards and provided FEMA with the requirement to create the national preparedness goal (NPG).⁸⁹ The NPG enhanced FEMA's flood preparedness programs by focusing on five mission areas including prevention, protection, response, recovery, mitigation. The act also

⁸⁶ Christopher Cooper and Robert Block, *Disaster: Hurricane Katrina and the Failure of Homeland Security*, (New York: Henry Holt and Company, 2006), 14.

⁸⁷ United States Senate Committee on Homeland Security and Government Affairs, *Hurricane Katrina: A Nation Still Unprepared*, Special Report of the United States Senate Committee on Homeland Security and Government Affairs (Washington, DC, Congress, 2006), 2.

⁸⁸ Rawle O. King, *National Flood Insurance: Background, Challenges, and Financial Status*, CRS Report No. R40650 (Washington, DC: Congressional Research Service, 2011), 5.

⁸⁹ Painter, *Selected Homeland Security Issues in the 116th Congress*. 16.

created thirty-two core capabilities to protect against identified threats to the country's resiliency, which appear in greater detail in Chapter IV.⁹⁰ By focusing on flooding disasters, Congress underscored the value of the agency within DHS and the ongoing importance of federal emergency responses to severe flooding.

G. THE BIGGERT-WATERS FLOOD INSURANCE REFORM ACT OF 2012 AND SUBSEQUENT REVERSAL

To control the cost of future flooding disasters, Congress passed Biggert-Waters to require homeowners to pay the actuarial flood risk rate for flood insurance, a significant increase in premiums for many who lived in high flood risk areas. This was a strategy to enhance the financial solvency of the NFIP by increasing revenue through premium increases. To transfer the fiscal responsibility of flooding from the federal government to property owners and lenders, the House of the Financial Service Committee led efforts to improve floodplain management with the Biggert-Waters Flood Insurance Reform Act of 2012 on July 6, 2012.⁹¹ It aimed to increase premiums slowly on annual basis to an actuarially sound rate. Doing so significantly increased premiums for insurance policy holders within high-risk flood areas.⁹² Additionally, new homes or homes with 50 percent or greater damage not constructed to actuarially sound standards, such as including freeboard, would face punitively high premiums.⁹³ Additionally, the law raised the penalty on banks providing loans for uninsured properties from \$350 to \$2,000 for each loan not in compliance.⁹⁴ These changes in the law strengthened flood regulations that reduced risk, but many property owners who faced new restrictions on their property use and development did not welcome some of these new restrictions on building in the floodplain because of the substantial cost to comply, which in many cases exceeded the value of the

⁹⁰ Department of Homeland Security, *National Preparedness Goal*, 2nd ed. (Washington, DC: Department of Homeland Security, 2015), 3.

⁹¹ Daniel Garcia-Diaz, *Overview of GAO's Past Work on the National Flood Insurance Program*, GAO 14-297R (Washington, DC: Government Accountability Office, 2014), 1.

⁹² Diane P. Horn, *Introduction to the National Flood Insurance Program*, CRS Report R44593 (Washington, DC: Congressional Research Service, January 6, 2023), 17.

⁹³ Garcia-Diaz, *Overview of GAO's Past Work on the National Flood Insurance Program*, 19

⁹⁴ Garcia-Diaz, 24.

property. Many voiced their concerns to Congress, and then modified BW-12 to accommodate the concerns of many voters.

The Natural Conservancy explains Sandy’s impact on New Jersey as, “The storm inflicted \$37 billion in damage to New Jersey—more than half of the \$70 billion impact to the East Coast—and was the most destructive and costliest hurricane ever recorded in our state.”⁹⁵ Shortly after the law’s enactment on October 22, 2012, Superstorm Sandy devastated the Greater New York City Metropolitan Area as well as four coastal counties of New Jersey (Cape May, Atlantic, Ocean, and Monmouth). The two primarily affected communities had differing issues. For New York City, the loss of critical infrastructure, primarily subways, tunnels and public works, had crippling effects on the city’s ability to conduct daily life.⁹⁶ For coastal New Jersey, the new development restrictions made it difficult for property owners to rebuild.⁹⁷ Superstorm Sandy highlighted the weaknesses and gaps that the 2012 Act created, primarily because it created an immediate, rather than sliding scale, premium increases for reconstructed homes.⁹⁸ Congress realized the pattern of flood insurance rate increases under BW-12 was not affordable and sustainable, and might actually cause more homeowners to drop their flood insurance coverage; thereby effectively reducing the money received by the U.S. Treasury. In this way, Congress reversed course because homeowners objected to the high costs of premiums, which ultimately perpetuated the cycle of the government covering flood losses, rather than the private market.

As a corrective measure, in March 2014, President Barrack Obama signed the Homeowner Flood Insurance Affordability Act of 2014. The 2014 Act reversed many of the provisions of the Biggert-Waters Flood Insurance Reform Act of 2012 (BW-12) that

⁹⁵ “Lessons from Hurricane Sandy,” Nature Conservancy, September 27, 2022, <https://www.nature.org/en-us/about-us/where-we-work/united-states/new-jersey/stories-in-new-jersey/sandy-one-year-later/>.

⁹⁶ Wouter Botzen, Howard Kunreuther, Erwann O. Michel-Kerjan, *Understanding Individual Flood Risk Perceptions and Flood Insurance Choices to Build More Resilient Communities: A Survey of New York City Residents*, (Philadelphia: The Wharton School, University of Pennsylvania, 2013), 2.

⁹⁷ Diane C. Bates, *Superstorm Sandy: The Inevitable Destruction and Reconstruction of the Jersey Shore*, (New Brunswick, NJ: Rutgers University Press, 2016), 24.

⁹⁸ Garcia-Diaz, Overview of GAO’s Past Work on the National Flood Insurance Program, 18.

had harmed homeowners. However, the penalties on banks remained in place.⁹⁹ The law basically reduced the premiums increases enacted under BW-12, suspended many new regulations temporarily and required FEMA contractors reviewing flood insurance claims to treat policy owners more fairly.

Due to significant public backlash about the increased cost of premiums under BW-12, as well as the expensive requirements to rebuild in some instances, Congress modified many of the provisions of BW-12 and the focus on affordability. Neither the 2012 Act nor the 2014 Act had lasting effects on the U.S. approach to flooding risk, since they counteracted each other. Although much of it no longer applies since the 2014 reversal, the outcome of Biggert-Waters Flood Insurance Reform Act of 2012 demonstrated the need to create flooding legislation that effectively manages the flood risk for the whole community. Legislation without a comprehensive plan for insurance affordability cannot effectively overhaul of the Flood Insurance Act of 1968, without the support from homeowners, who are also voters who are upset about substantial premium increases. Since homeowners would not accept being required to buy higher insurance unless there was an added value and would convey their dissatisfaction to their members of Congress.

H. DISASTER RECOVERY REFORM ACT OF 2018

Another piece of legislation that altered flood risk management was the Disaster Recovery Reform Act of 2018. Unlike prior legislation, one major event did not primarily drive its passage. Instead, the Disaster Recovery Reform Act intended to give FEMA further authority to manage all-hazards (natural, human-caused, and technological). The act enhanced funding for public and individual assistance and grant funding for all hazard mitigation. The act created a new program to assist local officials with building code enforcement to ensure properties comply with the NFIP regulations and national building

⁹⁹ Richard Sykes, *Disaster Policy & Politics: Emergency Management and Homeland Security*, 3rd ed. (Los Angeles: Sage Publications Ltd., 2020), 33.

code standards.¹⁰⁰ In this context, the act decreased the nation’s flooding risk by providing further mitigation opportunities and additional incentives.

I. NATIONAL FLOOD INSURANCE PROGRAM REAUTHORIZATION ACT OF 2019

The NFIP is only authorized by Congressional Extensions, so no significant changes in the NFIP have happened. In 2019, Congress proposed another law—the National Flood Insurance Program Reauthorization Act of 2019. The Act was not passed and instead Congress extended the current law—the Flood Insurance Act of 1968. Rather than passing a new law, Congress has extended the current law twenty-five times, with its next scheduled expiration date of September 30, 2023.¹⁰¹ Until Congress reforms the NFIP, many of the same challenges will exist, however there might be increased opportunities for floodplain resiliency when the program is re-authorized.

However, the draft law accentuates key trends in ongoing flood insurance management. If enacted, the law would formally reauthorize the Flood Insurance Program and create drastic improvements including (i) increased accountability for adjusters, (ii) extend the number of property owners who are required to purchase insurance, and (iii) the creation of a community rating system regional coordinator to directly assist communities wanting to join the CRS program.¹⁰² The proposed law would increase the functionality of CRS, the focus of this research.

J. NATIONAL FLOOD INSURANCE PROGRAM–RISK RATING 2.0

Since the inception of the NFIP in 1968, communities received flood maps to determine the cost of flood insurance based on the general risk of a neighborhood, known as Risk Rating 1.0. Technology such as GPS provided an exact risk rating for each

¹⁰⁰ Diane P. Horn, *The Disaster Recovery Reform Act of 2018 (DRRA) Implementation Update Tables for Select Provisions*, CRS Report R46774 (Washington, DC: Congressional Research Service, April 27, 2021), 16.

¹⁰¹ Horn, *The Disaster Recovery Reform Act of 2018*, 31–32.

¹⁰² Diane P. Horn, *Selected Issues for the National Flood Insurance Program (NFIP) Reauthorization and Reform*, CRS Insights IN11050 (Washington, DC: Congressional Research Service, October 5, 2020), 1.

individual home including specific characteristics in the calculation. Hence, all factors affecting the potential flood risk calculation could provide a more accurate rating, but in most instances increasing the premiums, known as Risk Rating 2.0. On October 1, 2021, FEMA introduced “Risk Rating 2.0, which represents the biggest change to how the NFIP calculates flood insurance premiums since its inception.”¹⁰³ Risk Rating 2.0 was fully adopted and implemented in April of 2022. This change from the general risk rating of a neighborhood with a Flood Insurance Rate Map (FIRM), would now rate each individual property based on multiple variables of each specific factors under Risk Rating 2.0. The Congressional Research Service explained some new considerations that are used to calculate new premiums, “Geographical variables used in Risk Rating 2.0 include the distance to water and the type of water (e.g., river, lake, or coast), the drainage area of the river, whether or not the structure is on a barrier island or behind a levee, and the elevation of the structure relative to the flooding source. The structural variables used by FEMA 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.”¹⁰⁴

According to the Congressional Research Service, “Risk Rating 2.0 is projected to lead to premium increases for 77 percent of NFIP policyholders.”¹⁰⁵ This result is in direct conflict with the intent of Congress to keep flood insurance premiums affordable.

The Congressional Research Service warns,

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 politically unacceptable.¹⁰⁶

Since Congress has limited flood insurance premiums to 18 percent annual increases, communities may have additional incentives to join CRS, as it would help lessen increased

¹⁰³ Diane P. Horn, *National Flood Insurance Program: The Current Rating Structure and Risk Rating 2.0*. CRS Report No. R45999, (Washington, DC: Congressional Research Service, April 4, 2022), 1.

¹⁰⁴ Horn, *National Flood Insurance Program*, 9.

¹⁰⁵ Horn, 16.

¹⁰⁶ Horn, 16–17.

flood policies cost to homeowners. After the adoption of Risk Rating 2.0, implementing measures to lower flood risk and attain the related CRS premium discounts has become economically and politically required.

Risk Rating 2.0 continues to assess the risk of coastal and fluvial (river) flooding which has been mapped by FEMA, however pluvial was difficult to map due to unpredictability—but new technology may lead to a better understanding of this risk. Significant rain events, neither the flooding of any significant body of water nor design deficiencies in the storm water conveyance systems cause pluvial flooding.¹⁰⁷ Since Risk Rating 1.0 did not consider pluvial flooding, new technologies now allow for calculating its risk under Risk Rating 2.0, increasing the number of homeowners needing, “to purchase flood insurance as a condition of receiving a federally backed mortgage.”¹⁰⁸ It appears in Chapter VI, as it relates to a new hazard in New York City.

Risk Rating 2.0 changes premiums in two ways—(i) it increases them at a steady rate (a maximum of 18 percent per year) to reach actuarially sound levels and (ii) it extends CRS discounts for the entire community when CRS initiatives have been met.¹⁰⁹ Chapter III covers available CRS discounts in detail.

K. CONCLUSION

Due to the heightened frequency and cost of flooding-related disasters, the nation must meet two competing goals with the CRS: fiscal solvency and affordable rates for flood-prone communities. The Community Rating System (CRS) bridges this gap by encouraging local governments to execute proven floodplain management practices that reduce the risk to the federal government, and the federal government shares some of that benefit with homeowners in the form of policy discounts.

Today, in combination with recent regulation, the NFIA offers the sale of flood insurance to all property owners (Flood Insurance Act of 1968) who purchased flood

¹⁰⁷ Horn, 7.

¹⁰⁸ Horn, 3.

¹⁰⁹ Horn, 11–13.

insurance (Flood Disaster Insurance Reform Act of 1973) at an actuarially sound rate (Risk Rating 2.0 replaced Biggert-Waters), with discounts available for mitigation activities (Flood Insurance Reform Act of 1994 and Risk Rating 2.0). The federal government through the DHS (Homeland Security Act of 2002) guarantees the effective management of flood disasters through the National Preparedness Goal (Post-Katrina Emergency Reform Act of 2006 and the Disaster Recovery Reform Act of 2018).

The history of flood regulation demonstrates a clear end goal—to create a sustainable flood management strategy for the community that is safe and financially sound. One strategy to align these goals is to provide incentives, or premium discounts, to premiums charged through the Community Rating System.

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III. NATIONAL FLOOD INSURANCE PROGRAM–COMMUNITY RATING SYSTEM

This chapter outlines the requirements for communities to join the Community Rating System, gain discounts, and decrease flooding risk. Additionally, the chapter discusses which activities within the program are the most attainable and provide the greatest value to both local communities and the federal government. The chapter concludes that the CRS program is complex and nuanced, which may explain its low adoption, and suggests that using a return-on-investment framework might increase community participation, thereby offsetting increasing flood insurance premiums. It presents floodplain management, the Community Rating System and its series from Public Information and Promotion, Mapping and Regulation, to Flood Damage Reduction Activities, and Acquisition and Relocation.

A. INTRODUCTION

According to the General Accountability Office (GAO), “FEMA is tasked with two competing goals—keeping flood insurance affordable and keeping the program fiscally solvent.”¹¹⁰ Through the study of the history of NFIP and its subsequent amendments, Congress intends to delicately balance (i) keeping the insurance cost to citizens in flood prone communities low and (ii) limiting the financial burden to the federal government. Congress can partially achieve these goals by encouraging more citizens to purchase flood insurance. As noted by the GAO, the more policies purchased, including properties in medium and low risk areas, the greater the revenue to the federal treasury to pay for expected flood claims.¹¹¹ Although additional flood insurance premiums improve the financial viability of NFIP, if insurance premiums are too expensive, citizens will not buy into the program. The CRS program would accomplish these goals, if communities understood the program and adopted it for reasons outlined here.

¹¹⁰ Gene L. Dodaro, *High Risk Area: National Flood Insurance Program*, GAO 21–119SP (Washington, DC: Government Accountability Office, October 14, 2020), 2.

¹¹¹ Dodaro, 2.

The adoption of CRS program achieves financial viability of the NFIP while maintaining affordable premiums. The program provides premium discounts for mitigating activities that reduce risk to the federal government. In exchange, FEMA rewards communities with CRS points that result in policy discounts.¹¹² CRS operates much like automobile insurance, which offers premium discounts for safer driving that decreases the insurance carrier's risk.

CRS improves the viability of NFIP by (i) diminishing the risk incurred by the government, as proactive measures diminish the magnitude of flood damage, and (ii) increasing the premiums earned by the program, since lower premiums increase citizen buy-in. CRS is based upon preparedness activities that are organized into four overarching series that are discussed throughout this chapter.¹¹³ At its core, each series focuses on community efforts that lower flooding risk but require community investments from a human and financial capital perspective.

B. NFIP MINIMUM REQUIREMENTS: FLOODPLAIN MANAGEMENT

FEMA defines floodplain management as “a decision-making process that aims to achieve the wise use of the nation’s floodplains.”¹¹⁴ Through effective floodplain management, FEMA can ensure that land properly developed within a high flood risk community poses less risk from a safety and economic perspective. FEMA further illustrates floodplain management as a three-legged stool that balances the equally important goals of “hazard identification or knowing the risk, mitigation or managing the

¹¹² Diane P. Horn, *Introduction to the National Flood Insurance Program*, CRS Report No. R44593 (Washington, DC: Congressional Research Service, June 30, 2022), 29.

¹¹³ FEMA organizes the Community Rating System into four series: 300 Public Information Series, 400 Mapping and Regulations Series, 500 Flood Damage Reduction Series, and 600 Warning and Response Series. Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 110–6.

¹¹⁴ Federal Emergency Management Agency, *Floodplain Management Requirements: As Study Guide and Desk Reference for Local Officials*, FEMA 480 (Washington, DC: Federal Emergency Management Agency, 2005), 1–29, https://www.fema.gov/sites/default/files/documents/fema-480_floodplain_management_study_guide_local_officials.pdf.

risk, and flood insurance or insuring the risk.”¹¹⁵ This comprehensive floodplain management framework enables FEMA to be a strategic partner with communities and homeowners.

Communities must complete a series of steps to sign up for CRS before receiving its benefits. Since property owners could not buy flood insurance prior to a community’s participation in the NFIP, most flood-prone communities participate in the program today.¹¹⁶ Minimum NFIP requirements target limiting the damage of moderate and severe flooding for individuals, properties, and communities. Examples of these requirements include (i) a local ordinance that complies with the national flood insurance building and code regulations, (ii) a defined flood emergency response plan, (iii) current hazard mitigation plan, etc.¹¹⁷ In summary, if a community completes the minimum requirements listed above, it is now eligible to reap the benefits of the CRS program. The community may earn credits through CRS for undertaking additional activities that reduce flood risk, which in turn increase policy discounts to homeowners. As such, the CRS program rewards those communities that go above and beyond the minimum NFIP requirements to prepare their community for the most common natural disaster—flooding.

C. COMMUNITY RATING SYSTEM

CRS is a scorecard of the monetary value associated with decreasing flooding risk in frequency and severity, thus providing FEMA with a metric for rewarding strong or positive efforts. By implementing more than the minimum requirements, these activities reduce the risk of flooding and benefit all—homeowners, local communities, and the federal government.¹¹⁸ As discussed in Chapter I, each class level advancement provides additional discounts. Through voluntary participation in the program, a community can

¹¹⁵ Federal Emergency Management Agency, *Managing Floodplain Development through the NFIP*, Course E273 Instructors Guide (Emmitsburg, Maryland: Federal Emergency Management Agency, 08/2021), IG 795.

¹¹⁶ Federal Emergency Management Agency, *Floodplain Management Requirements*, 5–4.

¹¹⁷ Federal Emergency Management Agency, 10–2.

¹¹⁸ Federal Emergency Management Agency, *Community Rating System Overview and Participation: Fact Sheet* (Washington, DC: Federal Emergency Management Agency, June 30, 2021), 1.

significantly reduce the flood insurance premiums for all homeowners within its municipality.

FEMA has classified the CRS program's floodplain management activities by four series organized into nineteen functions containing one hundred and one elements.¹¹⁹ These elements provide local leaders with the building blocks to reduce flooding risk for their citizens. Communities receive an updated scorecard based on the number of elements completed.¹²⁰ See Appendix B, CRS by Activity, for further illustration.

Joining and implementing CRS is a detailed process that requires commitment from managers. When communities decide to join the CRS program, they must demonstrate to FEMA that they meet and/or exceed the minimum requirements of floodplain management and would like to begin the process of validating the CRS activities.¹²¹ Communities can improve their rating class by implementing activities in any of the four general series as outlined in the CRS Coordinator's Manual. The CRS Coordinator's Manual clearly defines each of the series including functions and elements classification, directions for implementation, definitions and standards for success and total points earned.¹²² Because of the complexity of each element, adoption requires buy-in from internal and external stakeholders.

¹¹⁹ FEMA organizes the Community Rating System into nineteen functions: Functional Areas: 310 Elevation Certificates, 320 Map Information Service, 330 Outreach Projects, 340 Hazard Disclosure, 350 Flood Protection Information, 360 Flood Protection Assistance, 370 Flood Insurance Promotion; 410 Flood Hazard Mapping, 420 Open Space Preservation, 430 Higher Regulatory Standards, 440 Flood Data Maintenance, 450 Stormwater Management; 510 Floodplain Management Planning, 520 Acquisition and Relocation, 530 Flood Protection, 540 Drainage System Maintenance; 610 Flood Warning and Response, 620 Levees, and 630 Dams. Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 110–6.

¹²⁰ Federal Emergency Management Agency, *Master List of Community Rating System (CRS) Activities and Elements* (Washington, DC: Federal Emergency Management Agency, 2021), https://crsresources.org/files/2021-addendum/master_list_of_elements-2017_manual_2021_addendum.pdf

¹²¹ Federal Management Agency, *National Flood Insurance Program Community Rating System: Coordinator's Manual*, FIA -15 /2017 (Washington, DC: Federal Emergency Management Agency, 2017), 110–8, https://www.fema.gov/sites/default/files/documents/fema_community-rating-system_coordinators-manual_2017.pdf.

¹²² Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 300–1.

The community participation rate for the CRS program has room to grow. The Congressional Research Service notes that, as of 2021, only 7 percent of eligible communities participated in the program, which represented 70 percent of all moderate and high-risk properties.¹²³ Due to the strong benefits of CRS participation, more communities should appreciate the opportunity to decrease premiums and improve resiliency. Fortunately, a material event occurred on April 1, 2022, that made the incentives for joining significantly more valuable. As of that date, the federal government began the process of increasing flood insurance premiums charged to their actuarially sound rate. Premiums will increase every year by eighteen percent until reaching that level.¹²⁴ As the adoption and implementation of CRS activities decrease premiums, CRS participation is an effective tool for communities to offset these increasing premiums.

FEMA notes that each numerical decrease in CRS class results in a five percent discount for flood insurance premiums for properties within the community.¹²⁵ For example, if a community that was previously rated as a 10 were to improve to a 7, then all properties within the community would benefit from a fifteen percent discount on their flood insurance premiums. This decrease would offset the ongoing increases to reach the actuarially sound rate, thereby meeting the goals of FEMA for NFIP: a sustainable NFIP program and affordable insurance rates for consumers in high-flood risk areas.

Although under this scenario the NFIP earns less revenue to cover future losses from claims, the decrease in flood insurance claims paid by the federal government more than offset the reduced premiums paid by the homeowners within the community. As noted by Michel-Kerjan, “a 100-point increase in CRS class reduces claims by slightly less than 2.5 percent.”¹²⁶ The 2.5 percent decrease in monetary claims compares very favorably to

¹²³ Diane P. Horn, *Introduction to the National Flood Insurance Program*, CRS Report No. R44593 (Washington, DC: Congressional Research Service, June 30, 2022), 20.

¹²⁴ Diane P. Horn, *National Flood Insurance Program Risk Rating 2.0: Frequently Asked Questions*, CRS Report No. IN11777 (Washington, DC: Congressional Research Service, April 4, 2022), 2.

¹²⁵ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 2.

¹²⁶ Erwann Michael-Kerjan, Ajita Atreyna, and Jeffrey Czajkowski, *Learning over Time from FEMA's Community Rating System (CRS) and Its Link to Flood Resilience Measurement* (Philadelphia, PA: The Wharton School, University of Pennsylvania, 2016), 21.

the 1.0 percent premium discount earned for completing the corresponding activities.¹²⁷ In summary, the federal government is reducing its overall loss from flooding risk for the communities participating in CRS by 1.5 percent for each adopted activity. Therefore, to reach its goal of increasing the financial viability of NFIP, the federal government is highly incentivized to support communities' participation in CRS.

Aside from premium discounts, CRS participation provides communities with other benefits including (i) a benchmark to easily compare their community's floodplain management vs. others across the nation, (ii) the ability to better understand the flood risk of their community, and (iii) clear guidelines that improve and sustain public health and safety.¹²⁸ In summary, these benefits help provide a roadmap to make a community more resilient against floods.

This chapter provides a roadmap for communities to maximize the benefits CRS, including which functions that are the most practical areas to focus on first; thereby quickly earning CRS points, with commensurate flood insurance premium discounts for homeowners. As outlined in Chapter I, an unbiased way to measure the value of each activity within CRS is by measuring its ROI, or its return on investment.¹²⁹ This measure, helps communities and FEMA efficiently determine which activities have the greatest impact, pinpointing the highest value activities by tracking the communities' adoption rate and the respective CRS discount applied for each function. For a complete overview of each of the one hundred and one elements and its respective ROI classification, see Appendix C.

Due to the extensive nature of the CRS program, the remainder of this chapter focuses on the composition of each of the four series, including its overarching goal, its functional areas and an example of the elements contained within a selected function. By

¹²⁷ Federal Management Agency, *National Flood Insurance Program Community Rating System*, 110–3.

¹²⁸ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 4.

¹²⁹ Charles T. Horngreen, Srikant M. Datar, and George Foster, *Cost Accounting: A Managerial Emphasis*, 12th ed. (Upper Saddle River, NJ: Prentice Hall, 2005), 793.

reviewing the composition and goals of each series, a strong appreciation of the objectives, adoption rates, and benefits of CRS can be gained.

1. Public Information (300)

The overarching goal of the Public Information series is to encourage activities that will inform the homeowner of risks and hazards, insurance options, and preparedness plans. According to FEMA, “floodplain residents, property owners, insurance agents, real estate agents, or other segments of the local populace” create and use these activities.¹³⁰ The elements within this series focus on local leadership that results in further community understanding of the flooding risks, possible mitigating activities, and CRS points’ value. Because Public Information is the foundation of any emergency management capability and the building block for the three other CRS series, Public Information is the first series covered by CRS.

Public Information contains seven function areas, as outlined in Table 1. Each of the seven functions under Public Information has specific elements (with thirty-two elements in total) that, upon completion, result in CRS points. Public Information Series offers 1,091 points.¹³¹ As such, if a community only meets half of the 300 series points, it will earn 545 points or enough points to earn a CRS class rating of 9 and a corresponding five percent reduction in premiums for all homeowners who purchase an NFIP policy.¹³²

All seven of these functions are soft mitigation activities. The elements within each function do not require a large monetary capital outlay or construction projects. Through completing the functions in Table 1, local leaders provide homeowners with information to understand and reduce their risk. As such, the elements provide local leaders with a low-cost way to raise public awareness and increase resiliency.

¹³⁰ Federal Emergency Management Agency, National Flood Insurance Program Community Rating System, 300–1.

¹³¹ Federal Emergency Management Agency, 110–6.

¹³² Federal Emergency Management Agency, 2.

Table 1. Public Information (300)¹³³

Public Information (300)		1,091 Points Available
310	Elevation Certificates	116
320	Map Information Service	90
330	Outreach Projects	350
340	Hazard Disclosure	80
350	Flood Protection Information	125
360	Flood Protection Assistance	110
370	Flood Insurance Promotion	220

Since the financial capital outlay of these functions is low and the return on investment is high, the majority of the functions have strong adoption rates, as outlined in Appendix C. Excluding function 370 Flood Insurance Promotion, the functions within Public Information have an average adoption rate of eighty one percent; however, Flood Insurance Promotion has an adoption rate of four percent, twenty times worse than the average of the other functions.¹³⁴ Maybe, this abysmal performance calls for investigation to determine reasons for the low acceptance, whether knowledge of the program or some other barrier.

In 2017, the Congressional Research Services estimated that the adoption rate (or properties covered by flood insurance) for homes in the floodplain was only sixty one percent, even though homes with mortgages must purchase flood insurance.¹³⁵ Flood Insurance Promotion is a possible answer to this issue. The function area contains seven elements, as outlined in Table 2, that would encourage increased homeowner purchases of flood insurance. The elements include activities such as hosting flood insurance meetings, issuing brochures, and implementing a coverage improvement plan.

¹³³Adapted from Federal Emergency Management Agency, 110–6.

¹³⁴ Federal Emergency Management Agency, 110–6.

¹³⁵ Horn, *National Flood Insurance Program Risk Rating 2.0*, 12.

Table 2. Flood Insurance Promotion (370) ¹³⁶

Flood Insurance Promotion (370)		220 Points Available
372-a	Flood Insurance Coverage Assessment	15
372-b	Coverage Improvement Plan	30
372-c	Coverage Improvement Plan Implementation	60
372-d	Technical Assistance	35
372-e	Flood Insurance Brochures	25
372-f	Flood Insurance Meeting	40
372-g	State-required Continuing Education (SCE)	15

The function area 370 requires the buy-in of certain stakeholders including flood insurance professionals and property owners. The Grand Forks, North Dakota Flood of 1997, which was caused by the rapid melting of excess snowfall, highlighted the difficulty of gaining property owner buy-in of flood insurance. Despite FEMA spending \$300,000 educating the public on the need for flood insurance, only seventy-three more property owners bought flood insurance, at an average cost of four thousand dollars per property. When the flood disaster occurred later that year, only ten percent of properties had insurance.¹³⁷ As the federally led marketing efforts had moderate success, FEMA concluded the local level should promote marketing, as outlined within Flood Insurance Promotion.

Despite the heightened focus, twenty years later, local marketing efforts have not significantly improved flood insurance participation. The high balance of low and moderate risk homeowners, who are not legally required to purchase flood insurance but encouraged to purchase it after understanding the risk. With less flood insurance take-up, federal losses are higher, along with personal financial hardship after natural disasters. In 2017, Hurricane Harvey resulted in significant flood damage in Texas; however, many

¹³⁶ Adapted from Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 370–1.

¹³⁷ Patrick L. Abbott, *Natural Disasters*, 5th ed. (New York, McGraw-Hill, 2006), 390.

affected homeowners, or eighty percent, did not have flood insurance.¹³⁸ This gap left the majority of the homeowners within the community unprepared. As noted by FEMA, “many people are not aware that flood insurance is available, and many of those who are aware do not see a need to insure their property.”¹³⁹ Therefore, local communities must improve their abilities to inform and explain the risks of flooding and the benefits of purchasing flood insurance.

Due to (i) the low adoption rate of Flood Insurance Promotion and (ii) education for homeowners needed at the local level, CRS concluded that the incentives for this function area needed enhancement. Therefore, in 2021, CRS doubled the number of points available under this function area from 110 to 220 and expanded the number of elements from four to seven.¹⁴⁰ The addition of points available and elements highlights FEMA’s focus on expanding flood insurance take-up, by providing local leaders with a stronger incentive to promote flood insurance.

Public Information remains an effective and low-cost approach for communities to improve their resiliency to flooding risk. Despite the high adoption rate of the overall series, CRS needs further improvement, particularly in Flood Insurance Promotion. As adoption of the series increases, community buy-in will grow and the overall financial risk to NFIP will decrease.

2. Mapping and Regulations (400)

The Mapping and Regulations function sets out to encourage communities to expand on the core preparedness activities required to join NFIP. These enhanced capabilities include items such as building code requirements, storm surge regulation, and the protection of open space.¹⁴¹ At its core, Mapping and Regulations focuses on

¹³⁸ Heather Long, “Where Harvey is Hitting Hardest, 80 Percent Lack Flood Insurance,” *Washington Post*, August 29, 2017, 1, <https://www.washingtonpost.com/news/wonk/wp/2017/08/29/where-harvey-is-hitting-hardest-four-out-of-five-homeowners-lack-flood-insurance/>.

¹³⁹ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 370–2.

¹⁴⁰ Federal Emergency Management Agency, A-34.

¹⁴¹ Federal Emergency Management Agency, 400–1.

improving the resiliency of new development by promoting sound flood risk reduction activities before any building construction is approved. The series achieves this goal by (i) providing the public with knowledge of hazard locations and (ii) creating stricter regulations on newly constructed buildings. It may seem simple, but if homeowners know the hazard location through mapping and new construction had stricter building requirements, they would be in a better position to make informed decisions. Properties within the community would be inherently less risky; overall profitability of NFIP would improve, and the public safety of the community would increase.

Mapping and Regulations contains five function areas as outlined in Table 3. Each of the five functions under Mapping and Regulations further break down into thirty-eight elements, which offer a total of 5,841 points.¹⁴² In its entirety, the elements within Mapping and Regulations help reduce flood risk through planning activities that deter flooding thereby improving the community's resiliency.

Table 3. Mapping and Regulations (400)¹⁴³

Mapping and Regulations (400)		5,841 Points Available
410	Flood Hazard Mapping	802
420	Open Space Preservation	2,020
430	Higher Regulatory Standards	2,042
440	Flood Data Maintenance	222
450	Stormwater Management	755

Communities and FEMA agree that this series has the highest ROI or return on investment because money spent on prevention saves on the size of ultimate payouts from flood damage. For this reason, Mapping and Regulations has the highest points available of any series in CRS. This series has one hundred and fifty percent more points available than the average of the other three series.¹⁴⁴ The high number of CRS points available

¹⁴² Federal Emergency Management Agency, 110–6.

¹⁴³ Adapted from Federal Emergency Management Agency, 110–6.

¹⁴⁴ Federal Emergency Management Agency, 110–6.

highlights the ability of the series to significantly decrease the likelihood of property damage. From a community perspective, the Series has the highest adoption rate, with an average of 85 percent across all functions.¹⁴⁵ Additionally, for communities within CRS, almost the majority (49 percent) of rating improvement comes from points earned from Series 400.¹⁴⁶ Communities' high adoption rate of Series 400, despite having higher capital outlay requirements than Series 300, highlights local leaders' and communities' appreciation of Series 400's impact on resiliency. The increased value of the 400 Series to communities is the focus on self-directed, community-based actions, including enhancing local building codes and floodplain management activities, with limited capital investment—but have the greatest potential to earn CRS points.

The simplest way to appreciate the value and success of Series 400 is to review function area Higher Regulatory Standard. Every community within CRS proactively completes activities in Series 430, with 100 percent participation rate.¹⁴⁷ Additionally, function area Higher Regulatory Standards (2,042 points available) has more points available than the entirety of Series 300 and Series 600.¹⁴⁸ The high points available relate to the function's ability to significantly reduce flooding risk. The function area contains sixteen elements, as outlined in Table 4. Due to the extensive nature of the function area, this chapter explores two of the elements—Freeboard and Regulation Administration.

¹⁴⁵ Federal Emergency Management Agency, 110–6.

¹⁴⁶ Michael-Kerjan, Atreyna, and Czajkowski, *Learning over Time*, 25.

¹⁴⁷ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 110–6.

¹⁴⁸ Federal Emergency Management Agency, 110–6.

Table 4. Higher Regulatory Standards (430)¹⁴⁹

Higher Regulatory Standards (430)		2,042 Points Available
432-a	Development Limitations	1,330
432-b	Freeboard	500
432-c	Foundation Protection	80
432-d	Cumulative Substantial Improvements	90
432-e	Lower Substantial Improvements	20
432-f	Protection of Critical Facilities	80
432-g	Enclosure Limits	240
432-h	Building Code	100
432-i	Local Drainage Protection	120
432-j	Manufactured Home Park	15
432-k	Coastal A Zone Regulations	500
432-l	Special Hazards Regulations	100
432-m	Tsunami Hazard Regulations	50
432-n	Coastal Erosion Regulations	370
432-o	Other Higher Standards	100
432-p	Regulation Administration	67

Element 432-b, Freeboard, relates to the height required for new construction or substantial improvements. Freeboard constitutes the extra elevation, or the supplement to the Base Flood Elevation that accommodates additional potential flooding from items such as storm surges, climate change, and design errors.¹⁵⁰ FEMA training reminds floodplain students that freeboard is “considered one of the most cost-effective ways to reduce flood damage, freeboard means increasing the elevation of a structure above the Base Flood Elevation.”¹⁵¹ Communities with building regulations that require all new construction and substantial improvements to have three feet of freeboard immediately receive 500 points.¹⁵² As previously discussed, 500 CRS points results in an automatic reduction of five percent for all insurance premiums within the community. Therefore, the new discount

¹⁴⁹Adapted from Federal Emergency Management Agency, 430–1.

¹⁵⁰ Federal Emergency Management Agency, 120–5.

¹⁵¹ Federal Emergency Management Agency, *Managing Floodplain Development through the NFIP Student Manual*, E 273 (Washington, DC: Federal Emergency Management Agency, 2021), SM-402.

¹⁵² Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 430–13.

applies to all buildings within the community, regardless of whether their individual property is three feet above Base Flood Elevation. Because communities can quickly appreciate the goals of freeboard regulation (a significant decrease in likelihood of flooding) and the inherent economic benefits to the whole community (a five percent reduction in premium), local leaders have a significant incentive to enact 432-b.

Element 432-p provides credit for communities that currently have employees who have completed FEMA E273 and E278. Training E273 covers the National Flood Insurance program and management of floodplain development, which is a four-day class. Training E278 provides an understanding of CRS and is also a four-day class.¹⁵³ Communities earn premiums by having employees complete the training as (i) a direct premium discount and (ii) better prepares the community for comprehensive floodplain management. FEMA recognizes a municipal planning and emergency management staff that is well trained can find ways to improve resiliency, reduce risk and effectively implement the regulations in the community. Having local CRS advocates who explain the less transparent elements and their economic benefits can facilitate communities adopting all elements, regardless of the series.

As observed with elements 432-b and 432-p, creating elements easy to implement with clear economic benefits is one of the easiest ways to drive adoption. Many of the activities within Mapping and Regulations have simple roadmaps that make them easy for local governments to navigate, resulting in the series having a 100 percent adoption rate.¹⁵⁴

3. Flood Damage Reduction (500)

The main objective of Flood Damage Reduction is to decrease the flood claims due to flooding risk on current properties within the community. The series achieves this goal by implementing activities to decrease the ongoing flooding risk of existing buildings such as restructuring, elevating and physically moving structures as well as effective

¹⁵³ Federal Emergency Management Agency, 430–55.

¹⁵⁴ Federal Emergency Management Agency, 110–6.

planning.¹⁵⁵ By implementing the activities described, previously high flood risk areas within the community can reduce that threat. Although Flood Damage Reduction is not the building block for other CRS Series (such as Series 300) or the CRS Series with the highest points and community adoption (such as Series 400), Series 500 is important because it significantly decreases the total risk to NFIP by removing high risk properties from the high hazard area—completely eliminating the risk.

Flood Damage Reduction contains four function areas as outlined in Table 5. Each of the four functions under Flood Damage Reduction are further categorized into fifteen elements which offer a total of 5,042 points.¹⁵⁶ The elements within this series improve the durability of current structures within the community.

Table 5. Flood Damage Reduction Activities (500)¹⁵⁷

Flood Damage Reduction Activities (500)		5,042 Points Available
510	Floodplain Management Planning	622
520	Acquisition and Relocation	2,250
530	Flood Protection	1,600
540	Drainage System Maintenance	570

Land management activities, acquisition and relocation can significantly improve the risk profile of the community, as highlighted by the Series having the second largest amount of CRS points available.¹⁵⁸ However, Flood Damage Reduction elements include significant mitigation projects which take a substantial amount of time, momentous capital investment, and professional expertise for design, approval, and construction. As such, these activities have lower adoption by communities.¹⁵⁹ As an example a community might create a plan to buyout and remove a number of high-risk properties in a neighborhood, but this process takes a great

¹⁵⁵ Federal Emergency Management Agency, 500–1.

¹⁵⁶ Federal Emergency Management Agency, 500–2.

¹⁵⁷ Adapted from Federal Emergency Management Agency, 110–6.

¹⁵⁸ Federal Emergency Management Agency, 500–2.

¹⁵⁹ Federal Emergency Management Agency, 110–6.

deal of time and agreement from residents to sell their homes. Once all the residents agree to the buyout terms, these homes must be demolished and then these multiple adjacent parcels must be combined into a new park, never to be built on again. However, once executed, fewer properties in the community would have a high risk of flooding, thus benefiting the NFIP.

An effective way to understand the inherent value of these activities is to review function area Acquisition and Relocation. The function area contains five elements, as outlined in Table 6.¹⁶⁰ Although the adoption for this function is only twenty-eight percent, CRS encourages participation for this function through a significant number of points available and a very high cap for each category.¹⁶¹ This function has a higher number of points available than any other function area within the CRS program.¹⁶² The 500 Series has the greatest potential to substantially reduce flood losses, but these activities require long term planning, significant coordination with other agencies, and usually take a number of years to execute. These more involved activities are, therefore, more difficult to achieve. The federal government has a strong incentive to fund these mitigation strategies, since they reduce losses, and a community with repetitive loss and severe repetitive loss properties needs to prioritize mitigation activities.

Table 6. Acquisition and Relocation (520)¹⁶³

E4r		2,250 Points Available
522-a	Building, Acquired and Relocated	no limit up to 2,250
522-b	Buildings on the Repetitive Loss List	no limit up to 2,250
522-c	Severe Repetitive Loss Properties	no limit up to 2,250
522-d	Critical Facilities	no limit up to 2,250
522-e	Buildings Located in the V Zone or Coastal A	no limit up to 2,250

¹⁶⁰ Federal Emergency Management Agency, 500–2.

¹⁶¹ Federal Emergency Management Agency, 110–6.

¹⁶² Federal Emergency Management Agency, 520–1.

¹⁶³ Adapted from Federal Emergency Management Agency, 520–1.

The high costs to insure, support, and protect homeowners who reside in Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties naturally disincentivize their sales and repair.¹⁶⁴ According to FEMA, “NFIP actuaries have reported that repetitive loss is the single most important factor that affects the stability of the National Flood Insurance Fund.”¹⁶⁵ Additionally, NFIP expects the costs of these properties to grow in the future. As FEMA notes, although only 1.3 percent of insured properties qualify as RL or SRL, those properties may well account for 15 to 20 percent of future NFIP losses in the future.¹⁶⁶ Since RL and SRL are exponentially greater financial risk to FEMA, a strategy that reduces the number these high hazard properties helps reduce repeated flood claims for the same structure and improves the solvency of the NFIP.

The current high impact that RL and SRL properties have on the viability of NFIP strongly affect the macro (community) and micro (single property). On a macro level, CRS noted that since the establishment of NFIP, flood insurance claims for RL and SRL homes have accounted for “\$17.0 billion or approximately 30 percent of claims paid...reducing the number of RL and SRL properties, through mitigation or relocation, could reduce claims and improve the NFIP’s financial position.”¹⁶⁷ After assessing the ongoing costs to insure RL and SRL properties, the CRS Program concludes that, considering the high frequency and cost of insuring these homes, buying out the properties is the most financially viable decision for the federal government.

On a micro level, PEW reaches the same conclusions. PEW noted in its research the example of a home in Mississippi. Over the course of thirty-two years, the home experienced damages from flooding thirty-four times, resulting in claims that accounted for \$663,000 or

¹⁶⁴ FEMA defines Repetitive Loss Properties (RL) as, “Properties that have had two or more claims of more than \$1,000 paid by the NFIP within any 10-year period since 1978.” and Severe Repetitive Loss (SRL) as, “Properties that have four or more claims of more than \$5,000 or two to three claims that cumulatively exceed the building’s value.” Federal Emergency Management Agency, 500–3.

¹⁶⁵ Federal Emergency Management Agency, 500–3.

¹⁶⁶ Federal Emergency Management Agency, 500–3.

¹⁶⁷ William L. Painter, *Selected Homeland Security Issues in the 116th Congress*, CRS Report No. R45701 (Washington, DC: Congressional Research Service, November 26, 2019), 24.

approximately 10.5x the value of the home.¹⁶⁸ By purchasing and deeding the land for preservation, NFIP would have saved 950 percent or \$594,000.

The federal government wants to provide communities with a high incentive to remove these properties from the NFIP and willingly fund the partial or full cost of the project, depending on the flooding risk severity of the property. The federal government provides this incentive in two ways—(i) CRS points that result in a significant discount in premiums and (ii) FEMA grants to cover the majority of the costs to implement the plan. Elements 522-b and 522-c focus on creation of and execution of a plan for structures that are repetitive and severe repetitive losses.¹⁶⁹ The elements provide CRS points for the purchase and demolition of RL and SRL properties. The community earns CRS points based on the percentage of RL and SRL properties that it (i) acquires, (ii) demolishes, and (iii) deeds and restricts the land from future development.¹⁷⁰ For example, if a community effectively removes 50 percent of the RL and SRL properties within its community, then they are rewarded 1,175 points, which affords a ten percent discount in premiums for all properties within the community. In addition to the points earned for the creation and execution of these plans, FEMA will provide a grant to cover 90 percent and 100 percent of the cost to implement 522.b and 522.c, respectively.¹⁷¹ As FEMA covers the majority of the costs, the burden to the community primarily relates to outreach, planning and execution of the removal of RL and SRL properties.

Although FEMA continues to refine these elements, the headwinds of (i) climate change and (ii) continued development in at risk properties have offset these gains. For example, over the course of two decades, FEMA removed 57,000 at risk properties using this strategy; however, despite these efforts, the total number of RL properties increased by

¹⁶⁸ Laura Lightbody and Brian Watts, “Repeatedly Flooded Properties Cost Billions,” Pew, October 1, 2020, 1, <https://www.pewtrusts.org/en/research-and-analysis/articles/2020/10/01/repeatedly-flooded-properties-will-continue-to-cost-taxpayers-billions-of-dollars>.

¹⁶⁹ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 520–1.

¹⁷⁰ Federal Emergency Management Agency, 520–5.

¹⁷¹ Diane P. Horn, *The National Flood Insurance Program: Selected Issues and Legislation in the 116th Congress*, CRS Report No. R46095 (Washington, DC: Congressional Research Service, December 2, 2019), 34.

64,101.¹⁷² As observed by elements 522-b and 522-c, the highest value functions for NFIP do not align with the functions with the highest adoption by at risk communities. As climate change increases the frequency and severity of flooding damage, it will become imperative for CRS to find effective avenues to encourage communities to adopt elements that will mitigate the flooding risk from RL and SRL properties.

4. Warning and Response (600)

Warning and Response aims to find effective ways to increase the time available for citizens of the community to take prudent and necessary actions to safely evacuate from an impending flooding disaster.¹⁷³ By lengthening evacuation time, the program should limit the potential loss of life and property. Unlike the other series, Warning and Response primarily focuses on improving the life and safety of at-risk communities. In this context, premium reductions compared to claim reductions do not apply.

Warning and Response contains three function areas, as outlined in Table 7. Each three function under Warning and Response has specific elements (with sixteen elements in total) that, upon completion, result in 790 CRS points.¹⁷⁴ Each of the three key function areas within warning and response focus on activities to save lives through better warning and accreditation for flood control structures such as dams and levees.

Table 7. Warning and Response (600)¹⁷⁵

Warning and Response (600)		790 Points Available
610	Flood Warning and Response	395
620	Levees	235
630	Dams	160

¹⁷² Alicia-Puente Cackley. *National Flood Insurance Program: Fiscal Exposure Persists Despite Property Acquisitions*, GAO 20–508 (Washington, DC: Government Accountability Office, June 2020), 25.

¹⁷³ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 600–1.

¹⁷⁴ Federal Emergency Management Agency, 110–6.

¹⁷⁵ Adapted from Federal Emergency Management Agency, 110–6.

As levees and dams involve only a portion of the total number of CRS participating communities, function area Flood Warning and Response has the greatest impact on at-risk communities. Despite its (i) low capital requirements (similar to functions in Series 300) and (ii) ability to ensure the safety of the community, only one in five of at-risk communities participate in the function.¹⁷⁶ If more communities participate in Flood Warning and Response, residents would have more time to evacuate during flooding events, and, most importantly, reduce the loss of life.

As outlined in Table 8, Flood Warning and Response contains six elements which result in 395 available CRS points.¹⁷⁷ The function area provides the public as much notice as possible about the flooding threat, including providing accurate and timely warning so that community members may make informed decisions for themselves as well as their families.

Table 8. Flood Warning and Response (610)¹⁷⁸

Flood Warning and Response (610)		395 Points Available
612-a	Flood Threat Recognition System	75
612-b	Emergency Warning Dissemination	75
612-c	Flood Response Operations Plan	115
612-d	Critical Facilities Planning	75
612-e	Storm Ready Community	25
612-f	Tsunami Ready Community	30

The elements of Flood Warning and Response prepare communities for the nation's most deadly natural disaster: flash flooding. FEMA notes that “flash flooding is the number one weather-related killer in the U.S.”¹⁷⁹ Flash flooding occurs with little warning in a period of up to six hours from the storm.¹⁸⁰ As severe weather issues become a more prevalent threat

¹⁷⁶ Federal Emergency Management Agency, 110–6.

¹⁷⁷ Federal Emergency Management Agency, 610–1.

¹⁷⁸ Federal Emergency Management Agency, 610–1.

¹⁷⁹ Federal Emergency Management Agency, *Flooding- Our Nation's Most Frequent and Costly Natural Disaster* (Washington, DC: Federal Emergency Management Agency, 2010), 2.

¹⁸⁰ Federal Emergency Management Agency, 2.

to communities, quickly warning citizens about the threat of a natural disaster will become imperative.

When combined, the elements 612-b and 612-e can ensure that urgent flood-related messages promptly reach the community. Element 612-e Storm Ready Community confirms the municipality's ability to receive weather updates, while element 612-b Emergency Warning Dissemination validates that those municipalities can then effectively share those updates with its citizens.¹⁸¹ The effectiveness of the function area requires buy-in from key stakeholders including first responders, meteorologists, and leaders in publicly and privately owned infrastructure.

In summary, like the conclusions reached for Flood Damage Reduction, as climate change intensifies present challenges, the adoption rate of Flood Warning and Response must increase. Communities have an ethical and moral obligation to give ample warning to citizens about pending catastrophic disaster events, even without considering the CRS point value.

Table 9. CRS Series Summary¹⁸²

CRS Series Summary			
#	Series	Adoption Rate	Key Takeaways
300	Public Information	81 percent (excluding Flood Insurance Promotion at 61 percent)	Limited monetary requirements that increase community resiliency
400	Mapping and Regulations	85 percent	Lowest monetary requirements, resulting in highest adoption rate
500	Flood Damage Reduction	28 percent	Most impactful program in CRS as it relates to improving solvency of the NFIP because it removes repetitive loss properties
600	Warning and Response	25 percent	Lowest adoption rate but program with most initiatives that ensure life and safety

¹⁸¹ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 610–11, 621.

¹⁸² Adapted from Federal Emergency Management Agency, 110–6.

D. CONCLUSION

CRS is complex to navigate due to the nuances and length of the point system. Since four series made up of 19 functions and 101 elements, practitioners need a roadmap that validates the activities and maximizes the return for their resources. This chapter provided an overview of each series, as well as an example how to accomplish of a selected element in that series. Table 9 gives a high-level summary of the successful adoption of these series in the aggregate while Appendix C provides supplemental information on how to develop a strategic plan to improve CRS ratings. Additionally, as certain points are significantly easier to achieve, communities may pursue low or de minimis ROI projects when high ROI projects may be easily attainable or are already eligible for points. The wide variance in adoption rates by function, 85 percent for Mapping and Regulations vs. 25 percent for Flood Warning and Response and 61 percent for Flood Insurance promotion suggests the need for better communication about the benefits of the program, particularly for those functions with the highest possible payback.

As outlined in Appendix C CRS by ROI, Alternative Strategy, by reclassifying projects by ROI rather than activity, communities could quickly focus on easy to achieve projects. By using the current CRS community achievement levels, communities could reorganize each element by high ROI (points earned with limited effort required), medium ROI (moderate effort required), low ROI (significant effort required), and de minimis ROI (exhaustive effort required).

By easily identifying high ROI projects, communities could quickly advance in CRS ratings. As outlined, high ROI projects include elevation certificates (310), higher regulatory standards (430) and flood data maintenance (440). These three functions represent 4,270 points, with an average attainment of 423 points by 95 percent of the communities.¹⁸³ A community could easily earn a five percent discount in its premium by quickly focusing on the easy to reach projects.

¹⁸³ Federal Emergency Management Agency, 110–6.

As highlighted through the review of each CRS activity, different key stakeholders must effectively implement each element (such as local government employees for 432 and local meteorologists for 612). To effectively implement a strong, comprehensive CRS program that includes medium and low ROI projects, the community would need buy-in from all specialties. By focusing on quick wins, easy to implement, measurable activities, the community could validate the value of participating in the program before beginning work on more complex elements.

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IV. DEPARTMENT OF HOMELAND SECURITY MISSION AREAS AND CRS

This chapter investigates the synergies of DHS core capabilities and CRS functions to provide a guide for the emergency management practitioners to create partnerships with community stakeholders and capitalize on any prospective leverage. Correlating NFIP CRS elements and functions with the DHS mission areas and core capabilities would likely improve partnerships across all levels of government to sustain and enhance the National Preparedness Goal (NPG).

This effort should reduce duplication of effort and support economies of scale to maximize points earned for CRS activities. This chapter outlines examples in each mission area to increase partnership between municipal officials, community stakeholders, homeowners, and emergency preparedness leaders; recognizing that some mission areas are much more closely related to comprehensive floodplain management than other hazards and threats.

To this end, the chapter discusses the Department of Homeland Security's use of the NPG outlined in the Post Katrina Emergency Management Recovery Act (PKEMRA). This framework guides all hazards preparedness and correlates with opportunities to enhance and sustain the NFIP CRS program.¹⁸⁴ This chapter examines each of the five mission areas and their integration with thirty-two core capabilities to enhance community flood risk reduction, thereby earning CRS credit. This chapter demonstrates the nearly perfect correspondence between the NPG and the CRS program and that the most effective strategy for a community includes monetizing the benefits of collaborating and combining the efforts of both programs. An extension of this chapter, Appendix D provides a crosswalk of NFIP CRS activities with DHS mission areas and core capabilities.

¹⁸⁴ William L. Painter, *Selected Homeland Security Issues in the 116th Congress*, CRS Report No. R45701 (Washington, DC: Congressional Research Service, November 26, 2019), 16.

A. NATIONAL PREPAREDNESS GOAL AND CRS

The NPG was intended to be the keystone for communities for all hazards preparedness. NPG aims to create “a secure and resilient Nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk.”¹⁸⁵ Communities that receive Department of Homeland Security preparedness grants are encouraged to undertake activities that support the NPG by developing supporting preparedness and building resiliency.¹⁸⁶ In fact, the FEMA Fiscal Year 2023 Preparedness Grants Manual states, “Resilience is the desired outcome, defined in the Goal as the ‘ability to adapt to changing conditions and withstand and rapidly recover from emergencies.’”¹⁸⁷ Just as CRS has nineteen functions, the NPG has thirty-two core capabilities.¹⁸⁸ In this way, both programs are foundational to the emergency response cycle.

B. MISSION AREAS AND CRS

Like the organization of activities in CRS by series, the National Preparedness Goal (NPG) splits into five mission areas comprising the thirty-two core capabilities.¹⁸⁹ DHS notes that core capabilities directly address identified threats to the Nation’s resiliency and safety.¹⁹⁰ To outline this structure, here are definitions key to the NPG.

Mission Areas:

- **Prevention:** The capabilities necessary to avoid, prevent, or stop a threatened or actual act of terrorism. Within the context of national

¹⁸⁵ Department of Homeland Security, *National Preparedness Goal*, (Washington, DC: Department of Homeland Security, 2015), 1.

¹⁸⁶ William L. Painter, *The Department of Homeland Security: A Primer*, CRS Report No. R47446 (Washington, DC: Congressional Research Service, March 21, 2023), 1.

¹⁸⁷ Federal Emergency Management Agency, *Fiscal Year 2023 Preparedness Grant Manual*, FEMA 207–22-0001 Version 4 (Washington, DC: Federal Emergency Management Agency, 2023), 6.

¹⁸⁸ Department of Homeland Security, “Core Capabilities: Distinct Critical Elements Necessary to Achieve the National Preparedness Goal;” Department of Homeland Security, *National Preparedness Goal*, A-1.

¹⁸⁹ Department of Homeland Security, 3.

¹⁹⁰ Department of Homeland Security, 4.

preparedness, the term ‘prevention’ refers to preventing imminent threats.

- Protection: The capabilities necessary to secure the homeland against acts of terrorism and manmade or natural disasters.
- Mitigation: The capabilities necessary to reduce loss of life and property by lessening the effect of disasters.
- Response: The capabilities necessary to save lives, protect property and the environment, and meet basic human needs after an incident has occurred.
- Recovery: The capabilities necessary to assist communities affected by an incident to recover effectively.¹⁹¹

As discussed in Chapter III, FEMA organized CRS activities around four general series of concentration that support comprehensive floodplain management to reduce risk by exceeding minimum standards.¹⁹² The DHS NPG focuses on all-hazards and although CRS activities do not follow the same organization, they set out to achieve the same outcome.¹⁹³ Emergency preparedness doctrines share the same principles, even though many users may not grasp the alignment, thereby limiting the ability to capitalize upon potential collaboration with other emergency management professionals and resources. Hence, the benefit of providing a roadmap for community partners to work in partnership and with a common goal of enhanced floodplain preparedness.

The first step in this process capitalizes on tools and programs already in place. DHS created the Comprehensive Preparedness Guide (CPG 101) to provide communities detailed guidance and instruction for assessing their capabilities and gaps.¹⁹⁴ CPG 201 is supplemented by CPG 201 known as the Threat and Hazard Identification and Risk Assessment (THIRA) and Stakeholder Preparedness Review (SPR) Guide which, “includes standardized language to describe threat and hazard impacts and capability

¹⁹¹ Department of Homeland Security, *Readiness: Training Identification and Preparedness Planning Participant Guide*, MGT-418 (Washington, DC: Department of Homeland Security, 2016), 2–26.

¹⁹² Federal Emergency Management Agency, National Flood Insurance Program Community Rating System, 110–6.

¹⁹³ Department of Homeland Security, National Preparedness Goal, 3.

¹⁹⁴ Christopher P. Currie, National Preparedness: Additional Actions Needed to Address Gaps in the Nation’s Emergency Management Capabilities, GAO 20–297(Washington, DC: Government Accountability Office, 2020), 5.

targets.”¹⁹⁵ Collectively CPG 101 and 201 provide a basis for emergency preparedness professionals to determine the capability gaps of the community, thereby sustaining and enhancing the resiliency of the community.¹⁹⁶

Before looking at the specific core capabilities of each mission area, all share three common elements.

1. Planning
2. Public Information and Warning
3. Operational Coordination¹⁹⁷

These cross-cutting capabilities encompass all mission areas and easily integrate into almost any CRS activity to attain points. Therefore, incorporating each capability into any corresponding CRS activity has a great opportunity to earn CRS points thereby improving a community’s CRS classification with corresponding insurance premium discounts.

Hence, numerous opportunities allow communities to earn CRS credits in each core capability in all five mission areas. As an example, planning in each mission area may parallel different CRS elements and corresponding points. This chapter provides some examples in each area, as supplemented by an Excel crosswalk in the Appendix, to reduce the confusion to emergency management practitioners and increase community participation in the CRS program.

1. Prevention

DHS defines prevention as the grouping of capabilities that enable the nation to “avoid, prevent, or stop a threatened or actual act of terrorism.”¹⁹⁸ The core capabilities

¹⁹⁵ Department of Homeland Security, *Threat and Hazard Identification and Risk Assessment (THIRA) and Stakeholder Preparedness (SPR) Review*, (Washington, DC: Department of Homeland Security, 2015), 3.

¹⁹⁶ Government Accountability Office, 10

¹⁹⁷ Department of Homeland Security, 3.

¹⁹⁸ Department of Homeland Security, 5.

included within prevention focus exclusively on impending acts of terrorisms and subsequent terrorist events.¹⁹⁹

Table 10. Mission Area: Prevention (Core Capabilities)²⁰⁰

Mission Area: Prevention (Core Capabilities)
Planning
Public Information and Warning
Operational Coordination
Intelligence and Information Sharing
Interdiction and Disruption
Screening, Search and Detection
Forensics and Attribution

As prevention entirely focuses on anti-terrorism initiatives from imminent threats, CRS elements have limited overlap with this core capability for the DHS. Minor examples, such as the protection of levees and other flood infrastructure are adjacent but align more closely with other DHS core capabilities. Although prevention activities constitute an important part of an all-hazards, whole community approach to preparedness; prevention offers limited opportunities for CRS points other than as part of the planning team in our mission areas for CRS elements.

2. Protection

DHS defines protection as the grouping of measures to ensure the safety of the nation in the face of terrorist attacks as well as natural disasters. The core capabilities within protection represent initiatives that are strongly aligned with CRS, including critical infrastructure protection and transportation security.²⁰¹

¹⁹⁹ Department of Homeland Security, 5.

²⁰⁰ Adapted from Department of Homeland Security, 3.

²⁰¹ Department of Homeland Security, 8.

Table 11. Mission Area: Protection (Core Capabilities) ²⁰²

Mission Area: Protection (Core Capabilities)
Planning
Public Information and Warning
Operational Coordination
Intelligence and Information Sharing
Interdiction and Disruption
Screening, Search and Detection
Access Control and Identity Verification
Cybersecurity
Physical Protective Measures
Risk Management for Protection Programs and Activities
Supply Chain Integrity and Security

When comparing the core capabilities within the protection mission area, the core capability of risk management for protection programs and activities perfectly aligns with CRS element 512.a floodplain management planning.²⁰³ Therefore, activities already being undertaken by local emergency management leaders in the protection mission area, would qualify for CRS point credit. Since these actions are occurring anyway, it just makes sense to seek CRS point credit.

Floodplain management planning requirements can provide a framework to help assess the risk and activities that potentially would reduce the impacts in a community and its most important facilities. To understand the core capability, correctly assessing the threat, vulnerability, and exposure of critical facilities is vitally important.²⁰⁴ Floodplain management planning contributes to understanding the threat of flooding on the community by weighing the vulnerability or likelihood of flooding (such as 10-year, 50-year, 100-year, and 500-year risk profile) and the exposure to flooding, or the total value

²⁰² Adapted from Department of Homeland Security, 3.

²⁰³ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 510–1.

²⁰⁴ Federal Emergency Management Agency, “Mission Area-Protection: Core Capability-Risk Management for Protection Systems and Activities Factsheet,” Department of Homeland Security, February 3, 2021.

subject to loss.²⁰⁵ Ganguly, Bhatia, and Flynn note that approximately three fourths of presidential disaster declarations relate to flooding and subsequent related events. Furthermore, flooding threatens critical infrastructure because the related force of impact, water, and related sediment can result in severe damage to property.²⁰⁶ CRS element 512.a floodplain management planning entails creating a multi-step outline, including “assess the hazard,” “assess the problem” and “review possible activities.”²⁰⁷

3. Mitigation

DHS defines mitigation as the steps taken to diminish the life and property damage incurred from disasters. The focus of the mission area is to improve the resiliency of the nation, including “individuals, the private and nonprofit sectors, communities, critical infrastructure, and the Nation.”²⁰⁸ Through increased resiliency, the Nation can benefit from diminished losses in the face of all-hazards—natural, human caused and technological— disasters.²⁰⁹

Table 12. Mission Area: Mitigation (Core Capabilities) ²¹⁰

Mission Area: Mitigation (Core Capabilities)
Planning
Public Information and Warning
Operational Coordination
Community Resilience
Long-term Vulnerability Reduction
Risk and Disaster Resilience Assessment
Threats and Hazards Identification

²⁰⁵ Auroop Ratan Ganguly, Udit Bhatia, and Stephen E. Flynn, *Critical Infrastructure Resilience: Policy and Engineering Principles* (New York, NY: Routledge, 2018), 20.

²⁰⁶ Ganguly, Bhatia, and Flynn, 51.

²⁰⁷ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 510–1.

²⁰⁸ Department of Homeland Security, *National Preparedness Goal*, 10.

²⁰⁹ Department of Homeland Security, 10.

²¹⁰ Adapted from Department of Homeland Security, 3.

Mitigation is the mission area that provides the greatest opportunity to reduce flood risk as well as corresponding potential for the most CRS points. DHS notes that the improving mitigation capabilities will increase in priority over time and states that “given the trend of increasing impacts from extreme events and catastrophic incidents, hazard mitigation stands as a critical linchpin to reduce or eliminate the long-term risks to life, property, and well-being.”²¹¹ According to DHS, mitigation focuses on implementing change “at the local level.”²¹² This concordance directly aligns with CRS goals, which seek to drive flood mitigating activities at the community or local level. Furthermore, of the five DHS mission areas, mitigation represents the largest portion of CRS elements, and the largest potential activity to attain substantial CRS points. Hence, it is best opportunity to earn the most CRS points and reduce the flood risk to a community.

According to FEMA, “a successful planning effort includes active participation and buy-in from community leaders, stakeholders and the public.”²¹³ Stakeholders should be from all sectors: planning and zoning, public utilities, government agencies, emergency management and citizens.²¹⁴ Further when FEMA elevates a proposed local or state hazard mitigation plan for compliance, it must validate that the plan has considered NFIP repetitive loss structures. In fact, “Element B2-c. Does the plan address NFIP-insured structures within each jurisdiction that have been repetitively damaged by floods?”²¹⁵ Hence, some activities already undertaken by emergency management professional may also qualify for CRS credit.

For example, DHS core capability community resilience includes the goals of (i) increasing the number of communities with the Nation that have a plan to address disaster risk at the local level and enabling those communities to diminish disaster related risk at

²¹¹ Department of Homeland Security, 10–11.

²¹² Department of Homeland Security, 11.

²¹³ Department of Homeland Security, Federal Emergency Management Agency, *Local Mitigation Planning Policy Guide*, FP 206–21-0002 (Washington, DC: Department of Homeland Security, Federal Emergency Management Agency, 2023), 17.

²¹⁴ Department of Homeland Security, Federal Emergency Management Agency, 17.

²¹⁵ Department of Homeland Security, Federal Emergency Management Agency, *Local Mitigation Planning Policy Guide*, 52.

the local level.²¹⁶ This core capability fully captures all of the elements within function 520 acquisition and relocation, including “522.a buildings acquired or relocated, 522.b buildings on the repetitive loss list, 522.c severe repetitive loss properties, 522.d critical facilities, and 522.e buildings located in the V Zone or coastal A Zone.”²¹⁷ As Hubbard notes, the key goal in the mitigation of risk is to diminish the total impact in some way, either through a decrease in likelihood or in total cost.²¹⁸ The purchase or relocation of repetitive or severe loss properties significantly lowers the total risk.

The GAO created the Disaster Resilience Framework (DRF) to provide “three broad overlapping principles and as series of questions that those who provide oversight or management of federal efforts can consider when analyzing opportunities to enhance their contribution to national disaster resilience.”²¹⁹ These three DRF principles of information, integration, and incentives compliment the four CRS series of public information, mapping and regulation, flood damage reduction, as well as warning and response; and can easily be adopted across the whole community.²²⁰

4. Response

DHS defines response as the capabilities required to protect human life, property, and critical infrastructure quickly and effectively after an emergency or disaster. Like the mitigation mission area, local responders handle the initial response until exhausting resources, thereafter state and federal partners step in to supplement local efforts.²²¹

²¹⁶ Federal Emergency Management Agency, “Mission Area-Response.”

²¹⁷ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 520–1.

²¹⁸ Douglas W. Hubbard, *The Failure of Risk Management: Why It's Broken and How to Fix It*, (Hoboken, NJ: John Wiley & Sons, 2009), 26.

²¹⁹ Christopher Currie, *Disaster Resilience Framework: Principles for Analyzing Federal Efforts to Facilitate and Promote Disaster Resilience*, GAO 20–100 (Washington, DC: Government Accountability Office, October 2019), 1.

²²⁰ Currie, *Disaster Resilience Framework*, 4.

²²¹ Department of Homeland Security, *National Preparedness Goal*, 12.

Table 13. Mission Area: Response (Core Capabilities) ²²²

Mission Area: Response (Core Capabilities)
Planning
Public Information and Warning
Operational Coordination
Infrastructure Systems
Critical Transportation
Environmental Response / Health and Safety
Fatality Management Service
Fire Management Suppression
Logistics and Supply Chain Management
Mass Care Services
Mass Search and Rescue Operations
On-scene Security Protection and Law Enforcement
Operational Communications
Public Health, Healthcare, and Emergency Medical Services
Situational Assessment

The core capability of infrastructure features the ability to shield, stabilize and reboot critical infrastructure within the community after a disaster.²²³ This core capability echoes the majority of the CRS elements within CRS function 610 flood warning and response, including CRS elements “612.a flood threat recognition system, 612.b emergency warning dissemination, 612.c flood response operations, and 612.d critical facilities planning.”²²⁴ For example, through 612.d critical facilities planning, the community ensures that these facilities receive timely warnings of flood-related emergencies, which ensure the protection of critical infrastructure.

²²²Adapted from Department of Homeland Security, 3.

²²³ Department of Homeland Security, Federal Emergency Management Agency, “Mission Area-Response.”

²²⁴ Federal Emergency Management Agency, National Flood Insurance Program Community Rating System, 610–1.

5. Recovery

DHS defines recovery as martialing the “capabilities necessary to assist communities affected by an incident to recover effectively.”²²⁵ DHS explains that recoveries should result in a community emerging from a disaster (i) at the same or better position as prior to the event and (ii) better prepared for future incidents by implementing new plans to address similar disasters in the future.

Table 14. Mission Area: Recovery (Core Capabilities) ²²⁶

Mission Area: Recovery (Core Capabilities)
Planning
Public Information and Warning
Operational Coordination
Infrastructure Systems
Economic Recovery
Health and Social Services
Housing
Natural and Cultural Resources

Efforts outlined by DHS within the recovery mission area directly correspond with CRS, including “pre-incident preparedness, increasing resilience, collaborative, inclusive planning and developing capacity to manage disaster recovery effectively.”²²⁷ During a recovery from a flooding disaster, a community will have the support of flood victims to make changes to reduce the impact of future events; such as physical improvements, strengthening flood code regulations, and implementing CRS activities to make the community more resilient.

A significant number of core capabilities within recovery overlap with CRS elements. For example, ongoing planning and development, the core capability of natural

²²⁵ Department of Homeland Security, Mission Area – Recovery.”

²²⁶ Adapted from Department of Homeland Security, 3.

²²⁷ Department of Homeland Security, 17.

and cultural resources includes the preservation and restoration of natural resources.²²⁸ This core capability mirrors the majority of the CRS elements within CRS function 420 open space preservation, including CRS elements “422.a open space preservation, 422.b deed restrictions, 422.c natural functions open space, 422.e coastal erosion open space and 422.h natural shoreline protection.”²²⁹ For example, through 422.c natural functions, open space focuses on the protection of parcels “preserved in or restored to their natural state.”²³⁰ Through the preservation and restoration of natural functions, the element parallels the core capability’s goals.

C. SUMMARY

As illustrated throughout the chapter, the well-established mission areas of DHS contain the CRS activities. A full reclassification is unnecessary and would cause undue complexity for current communities within the CRS program. In contrast, a crosswalk would facilitate greater buy-in and understanding among emergency managers who understand NPG, not CRS. Appendix D outlines a crosswalk template of the synergies of NFIP CRS elements with the DHS Core Capabilities, as a roadmap to success in CRS by effectively engaging the core capabilities as charged by NPG.

Chapter V reviews how the three most flood-prone states in the nation approach CRS, Texas, Florida, and Louisiana, and how four specific communities approach CRS.

²²⁸ Department of Homeland Security, Federal Emergency Management Agency, “Mission Area-Recovery: Core Capability-Natural and Cultural Resources Factsheet,” Department of Homeland Security, Federal Emergency Management Agency, 2021).

²²⁹ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 420–1

²³⁰ Federal Emergency Management Agency, 420–1.

V. CRS SUCCESS BY STATES

CRS success varies significantly by state, and states have a significant impact on how CRS operates at a community level. This chapter analyzes activities affecting outcomes from a state level. It scrutinizes how CRS relates to each of the DHS Core Capabilities (prevention, protection, mitigation, response, and recovery) and examines success and failures of CRS programs in some of the most flood-prone states. These core capabilities will help establish benchmarks to enhance comprehensive floodplain management as well as CRS success.

First, the chapter compares which factors drive strong state participation in the nation's three most flood prone states—Florida, Texas, and Louisiana. After identifying trends at this scale, it examines the participation of flood-prone communities within states possessing key factors required for CRS success. In addition, this chapter compares how some communities implement CRS activities and how these activities closely correlate with mission areas and core capabilities as prescribed by the National Preparedness Goal.

A. FLORIDA

Florida is susceptible to hurricanes in its' eastern coastal communities from the Atlantic Ocean, as well the western coastal counties from the Gulf of Mexico, making Florida the most flood-prone state in the United States.²³¹ It holds 1,743,170 of the 5,000,000 flood insurance policies in the nation, representing 35 percent of all policies.²³² Due to the magnitude of its flooding, Florida is one of the most important states to analyze.

Florida has the highest participation rate in CRS program within the nation. When reviewing all communities participating in NFIP in the state, 244 of the 468 participate in

²³¹ Jarrod Heil, "10 U.S. States Where Hurricanes Hit Most Often," Universal Property & Casualty Company, Fort Lauderdale, FL, <https://universalproperty.com/united-states-where-hurricanes-hit-most/>

²³² Alicia Puente Cackley, *National Flood Insurance Program: FEMA Can Improve Community Oversight and Data Sharing*, GAO 20–396 (Washington, DC: Government Accountability Office, May 2020), 5.

the CRS program, representing 52 percent of all communities.²³³ Of the state’s 50 most flood-prone communities, all participate in CRS, representing the only state to have universal coverage of the most vulnerable areas.²³⁴

Table 15. Florida CRS Participation for Top 50 Communities²³⁵

Florida CRS Participation for Top 50 Communities		
Stage	# of Participants	Participation Rate
Intermediate / Advanced	49	98 percent
Introductory	1	2 percent
Not Participating	0	0 percent
Total	50	100 percent

Table 15 demonstrates the CRS participation in Florida validated by all of the top 50 most flood-prone communities participating in CRS. Further, better than any other state with 98 percent of the most flood-prone communities attaining either Intermediate or Advanced Class recognition. See Appendix A.1 for more specific details on Florida communities CRS participation rates as well as the number of high-risk flood properties in these communities.

Figure 1 provides a visual depiction of the high CRS participation rate throughout Florida, including coastal and inland communities. Further, this map shows how narrow Florida is from west to east, demonstrating some hurricanes can potentially impact both coasts. It is important to note that in Florida there is CRS success in both coastal and inland counties.

²³³ Federal Emergency Management Agency, “Florida: Top 50 National Flood Insurance Program (NFIP) Policy Count Communities and Community Rating System (CRS) Participation,” Federal Emergency Management Agency, October 1, 2021, https://crsresources.org/files/100/maps/states/florida_crs_map_october_2021.pdf.

²³⁴ Federal Emergency Management Agency, “Florida: Top 50 National Flood Insurance Program (NFIP) Policy Count Communities and Community Rating System (CRS) Participation,” Federal Emergency Management Agency, October 1, 2021, https://crsresources.org/files/100/maps/states/florida_crs_map_october_2021.pdf. Florida map

²³⁵ Adapted from Federal Emergency Management Agency, “Florida: Top 50 National Flood Insurance Program.”

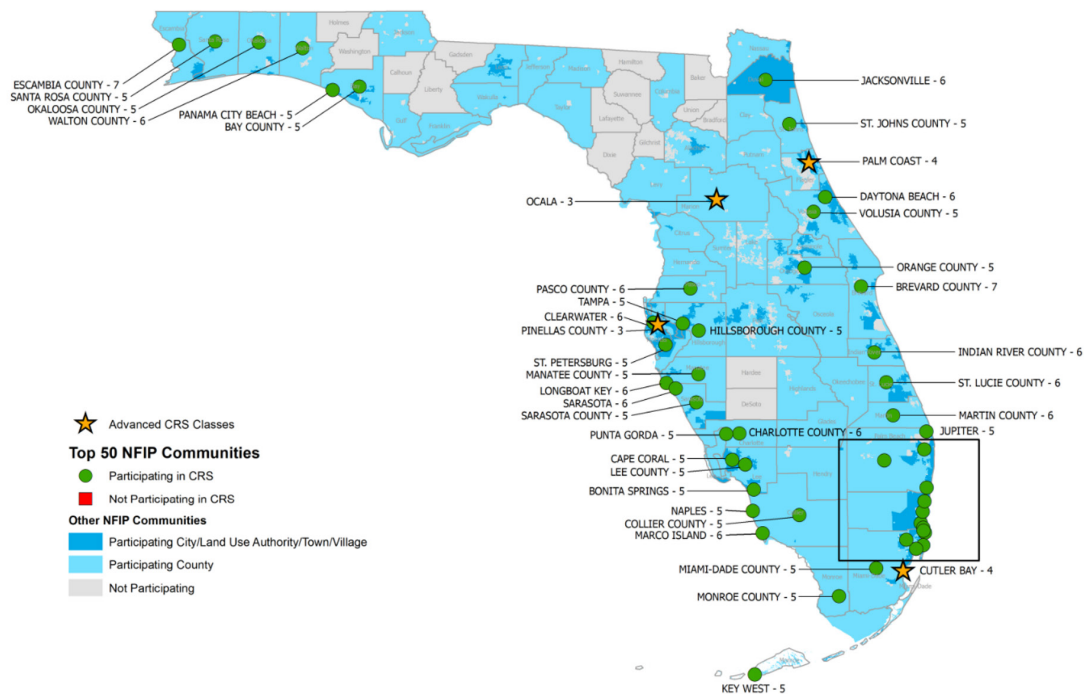


Figure 1. Top 50 NFIP Communities in Florida Overlaid with CRS Participants²³⁶

To help understand CRS, this section examines how Florida communities plan and execute a successful CRS program. The most successful community in Florida is Cutler Bay, which represents the only advanced stage community within the state.²³⁷ Due to the state's significant concentration of CRS participants, other communities' benefit from the local knowledge of implementation and best practices. According to FEMA, "Effective April 1, 2023, the Town of Cutler Bay will become again the first municipality in Broward, Miami-Dade and Monroe Counties to reach Class 3 status, having previously been rated at a CRS Class 4."²³⁸ More important than FEMA's recognition of CRS success, "successful improvement to CRS class 3 will save policyholders on average of \$338 per flood

²³⁶ Source: Federal Emergency Management Agency, "Florida: Top 50 National Flood Insurance Program."

²³⁷ Federal Emergency Management Agency, "Florida Top 50 National Flood Insurance Program."

²³⁸ Gibson, Rod. "Cutler Bay Achieves CRS Class 3 Community, Saving Residents 35% on Flood Insurance" Town of Cutler Bay, April 25, 2023, 1, <https://www.cutlerbay-fl.gov/community/page/cutler-bay-achieves-crs-class-3-community-saving-residents-35-flood-insurance>.

insurance policy, and a total savings for the Town of \$2,378,138.”²³⁹ Therefore, the residents consider all these CRS activities worthwhile because they reduce their flood risk profile and provide them a huge discount on their flood insurance premium.

Cutler Bay attained the Advanced Stage of CRS in just twelve years through:

The Town’s floodplain management activities that contributed to its CRS Class 3 rating, including the adoption of the Watershed Master Plan, regular inspections and cleaning of the Town’s drainage system, preserving Special Flood Hazard Areas as open space, and conducting general outreach and educational projects.²⁴⁰

Its CRS plan provides a roadmap to success as Table 16 demonstrates the synergies between these activities and DHS Core Capabilities.

Table 16. Successful CRS Activities for Cutler Bay, Florida

CRS activity	Points Available	Mission Area	Core Capability
452c. Watershed Master Plan	315	All	Planning
542a. Channel Debris Removal	200	Protection	Physical Protective Measures
422a. Preserved Open Space	1,450	Recovery	Natural and Cultural Resources
332a. Outreach Projects	200	All	Public Information and Warning

Table 16 points out that the Cutler Bay’s CRS success activities can be directly correlated to core capabilities that are executed on a continuous basis by emergency management professionals; as well as the work done by community planners and environmental advocates to improve the community’s resiliency. The cornerstone of this success starts with the Watershed Master Plan, which provides a roadmap on objectives for

²³⁹ Gibson, 1.

²⁴⁰ Gibson, 2.

the entire community. In fact, this is the exact intention of the National Preparedness Goal of the whole community working together to enhance and sustain resiliency.²⁴¹

Conversely, also in Florida is Escambia County, which has substantial floodplain management weaknesses, but also an opportunity for CRS success. Despite Escambia County's small size, it has a negative effect on the financial solvency of the NFIP. Notably, Escambia County accounts for only 1.5 percent of the state population but approximately 16.7 percent of the state's NFIP claims.²⁴² Escambia County is currently a CRS Class 7 but could greatly reduce flood risk by improving its CRS score and associated NFIP premium discount for homeowners.²⁴³ Even though Escambia County has only ten percent of the population of Miami-Dade County, Escambia County contains double the number of repetitive and severe repetitive loss properties as Miami-Dade.²⁴⁴ Hence, little Escambia County severe flood loss risk is double Miami-Dade, even though Miami-Dade has ten times the number of properties.

As discussed in Chapter III, according to FEMA, "NFIP actuaries have reported that repetitive loss is the single most important factor that affects the stability of the National Flood Insurance Fund."²⁴⁵ Additionally, NFIP expects the costs of these properties to grow in the future. As FEMA notes, although only 1.3 percent of insured properties qualify as RL or SRL, those properties may well account for 15 to 20 percent of future NFIP claims.²⁴⁶ Since RL and SRL represent an exponentially larger fiscal risk to

²⁴¹ Department of Homeland Security, *National Preparedness Goal*, (Washington, DC: Department of Homeland Security, 2nd ed. September 2015), 1.

²⁴² Marilyn Montgomery, Howard Kunreuther, *Pricing Storm Surge Risks in Florida: Implications for Determining Flood Insurance Premiums and Evaluating Mitigation Measures* (Philadelphia, PA: The Wharton School, University of Pennsylvania, 2017), 3.

²⁴³ Federal Emergency Management Agency, "Florida Top 50 National Flood Insurance Program (NFIP) Policy Count Communities and Community Rating System (CRS) Participation."

²⁴⁴ "Flood Lessons from Escambia County," Flood Defenders, March 25, 2021, <https://www.flooddefenders.org/news/flood-lessons-from-escambia-county>.

²⁴⁵ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 500–3.

²⁴⁶ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 500–3.

FEMA, a strategy that reduces the number of these high hazard properties thereby lowering the repeated flood claims for the same structure and improves the solvency of the NFIP.

Therefore, Escambia County would be a strong candidate for enhanced mitigation planning. FEMA encourages communities to reduce RL and SRL losses by funding the Hazard Mitigation Grant Program; FEMA funds RL projects at 90 percent federal and 10 percent local and SRL at 100 percent federal with no local match required.²⁴⁷ As Norris pointed out in her thesis, for a community to qualify for these grant funds, the community must have developed in partnership with the state; an all-hazards mitigation plans, including RL and SRL.²⁴⁸ Table 17 outlines how Escambia County could initially earn CRS credits, by developing a floodplain management plan that includes a RL and SRL analysis of high flood risk properties. Then, using that enhanced plan in collaboration with state and FEMA, it could receive grant funds to remove these RL and SRL properties, thereby earning substantially more CRS credit and reducing the nation's flood risk profile as well as its own.

²⁴⁷ Federal Emergency Management Agency, "Flood Insurance and Mitigation Administration Fact Sheet." Federal Emergency Management Agency, 2018, 3.

²⁴⁸ Katherine H. Norris, "Inequity in Action: A Quantitative Analysis of the Implementation of State Hazard Mitigation Plans," (master's thesis, Naval Postgraduate School, March 2023), 25.
<http://hdl.handle.net/10945/72063>.

Table 17. Potential CRS Implementation Activities for Escambia County, Florida

CRS activity	Points Available	Mission Area	Core Capability
512a. Floodplain Management Planning	382	Mitigation	Threats and Hazards Identification
512b. Repetitive Loss Analysis	140	Mitigation	Threats and Hazards Identification
522b. Acquisition and Relocation of Buildings on the Repetitive Loss List	2,250	Mitigation	Community Resiliency
522c. Acquisition and Relocation of Severe Repetitive Loss Properties	2,250	Mitigation	Community Resiliency

Table 17 demonstrates the potential for Escambia County to work in cooperation with community stakeholders and partners to develop a comprehensive plan to reduce repetitive loss properties, while earning CRS credit, as well as supporting emergency management professionals and local community planning experts in their local mitigation planning efforts. In addition, this plan would provide a strategy to fund these mitigation projects with federal grant funds. By working together, the community leaders and citizens all benefit with a more resilient county.

B. TEXAS

Texas is the second most flood-prone state in the United States, due to its geographic size, significant Gulf Coast shoreline as well as minimally regulated past development. It holds 754,028 of the 5,000,000 flood insurance policies in the nation, representing 15 percent of all policies.²⁴⁹ Texas has done well reducing flood risk in its major urban communities which have seen many devastating floods in the past few years, by significant community outreach and education. The flood risk reduction has been accomplished by showing community members their flood risk and promoting the wise purchase of flood insurance to mitigate the risk to homeowners. The NFIP is part of

²⁴⁹ Government Accountability Office, *National Flood Insurance Program*, 5.

FEMA’s Mitigation Division and is considered a very sound and prudent mitigation strategy for homeowners.

When reviewing all communities participating in NFIP in the state, 66 of the 1,260 participate in the CRS program, representing only 5 percent of all communities. On a more granular scale, of the 50 most flood-prone communities, only 44 percent participate in CRS.²⁵⁰ As demonstrated in the map below, the two largest counties (Harris and Dallas Counties) participate in CRS, but most of the 254 counties in Texas do not. See Table 18 and Figure 2 and CRS participation in the state. See Appendix 5.b for more specific details on Texas communities’ CRS participation rates as well as the number of high-risk flood properties in these communities.

Table 18. Texas CRS Participation for Top 50 Communities²⁵¹

Stage	# of Participants	Participation Rate
Intermediate / Advanced	17	34 percent
Introductory	5	10 percent
Not Participating	28	56 percent
Total	50	100 percent

Table 18 demonstrates that more than half of the top 50 flood-prone communities in Texas do not participate in CRS. As well as only one third have been able to attain either Intermediate or Advance CRS Class recognition. Further, Table 18 points out the great opportunity to encourage the 254 Texas counties to join the CRS program, even if just in the Introductory Phase.

²⁵⁰ Federal Emergency Management Agency, “Texas: Top 50 National Flood Insurance Program (NFIP) Policy Count Communities and Community Rating System (CRS) Participation,” Federal Emergency Management Agency, October 1, 2021, https://crsresources.org/files/100/maps/states/texas_crs_map_october_2021.pdf.

²⁵¹ Adapted from Federal Emergency Management Agency, “Texas: Top 50 National Flood Insurance Program.”

score of 4, which is significantly better than the average rating for communities participating in NFIP in Texas.²⁵³ Houston success can be tied directly to, “dedicated significant time to implementing the city’s CRS Plan for Public Information and insurance promotion; spreading messages to homeowner associations; and using Houston’s ‘Super Neighborhoods’ as examples. Flood insurance policies have significantly increased over the past five years.”²⁵⁴ Houston has capitalized on greater community participation with stakeholders and diverse emergency preparedness leaders to improve its CRS score with activities that align with DHS Core Capabilities Table 19 demonstrates that to have an exceptional CRS score requires a whole community approach and robust public engagement plan by qualified professionals.

Table 19. Successful CRS Activities for Houston, Texas

CRS activity	Points Available	Mission Area	Core Capability
332.a Outreach Projects	200	All	Public Information and Warning
372.a-g Flood Insurance Promotion	220	Mitigation	Risk and Disaster Resilient Assessment

Table 19 demonstrates that community outreach by floodplain management professionals in collaboration with emergency management leaders can be complimentary to both disciplines and improve the preparedness of residents and save lives in flooding events.

C. LOUISIANA

The final comparison by state is Louisiana. Louisiana is not only very susceptible to Gulf Coast hurricanes but also funnels two-thirds of the nation’s storm water runoff to the Ocean, thereby making Louisiana subject to the two biggest flood threats (coastal and

²⁵³ National Flood Insurance Program Community Rating System Newsletter,” Federal Emergency Management Agency, March 2023, 4.

²⁵⁴ Federal Emergency Management Agency, 4.

fluvial). It is the third most flood-prone state with 318 communities participating in NFIP.²⁵⁵ Louisiana's success in the program is stronger than Texas but not in line with Florida.

When reviewing all communities participating in NFIP in the state, 41 of the 318 participate in the CRS program, representing 13 percent of all communities. Of the state's 50 most flood-prone communities, 58 percent are enrolled in CRS.²⁵⁶ See Figure 3 and Table 20 outlining CRS participation in the state. Figure 3 shows a pattern of interior, rather than coastal community participation in CRS. See Appendix A.3 for more specific details on Louisiana communities CRS participation rates as well as the number of high-risk flood properties in these communities.

Table 20. Louisiana CRS Participation for Top 50 Communities²⁵⁷

Stage	# of Participants	Participation Rate
Intermediate / Advanced	5	10 percent
Introductory	24	48 percent
Not Participating	21	42 percent
Total	50	100 percent

Table 20 points out that even for the limited Louisiana communities that participate in the CRS program, almost half are in the introductory stage. Only ten percent have attained either Intermediate or Advanced CRS Class recognition. It is important when considering the impacts of Table 20, that many Louisiana officials have personally experienced flooding events; therefore, their life experience might provide an extra incentive to join the CRS program and be a community advocate. Figure 3 shows a CRS participation map of Louisiana.

²⁵⁵ "Louisiana Top 50 National Flood Insurance Program (NFIP) Policy Count Communities and Community Rating System (CRS) Participation," Federal Emergency Management Agency, October 1, 2021, https://crsresources.org/files/100/maps/states/louisiana_crs_map_october_2021.pdf.

²⁵⁶ Federal Emergency Management Agency.

²⁵⁷ Adapted from Federal Emergency Management Agency.

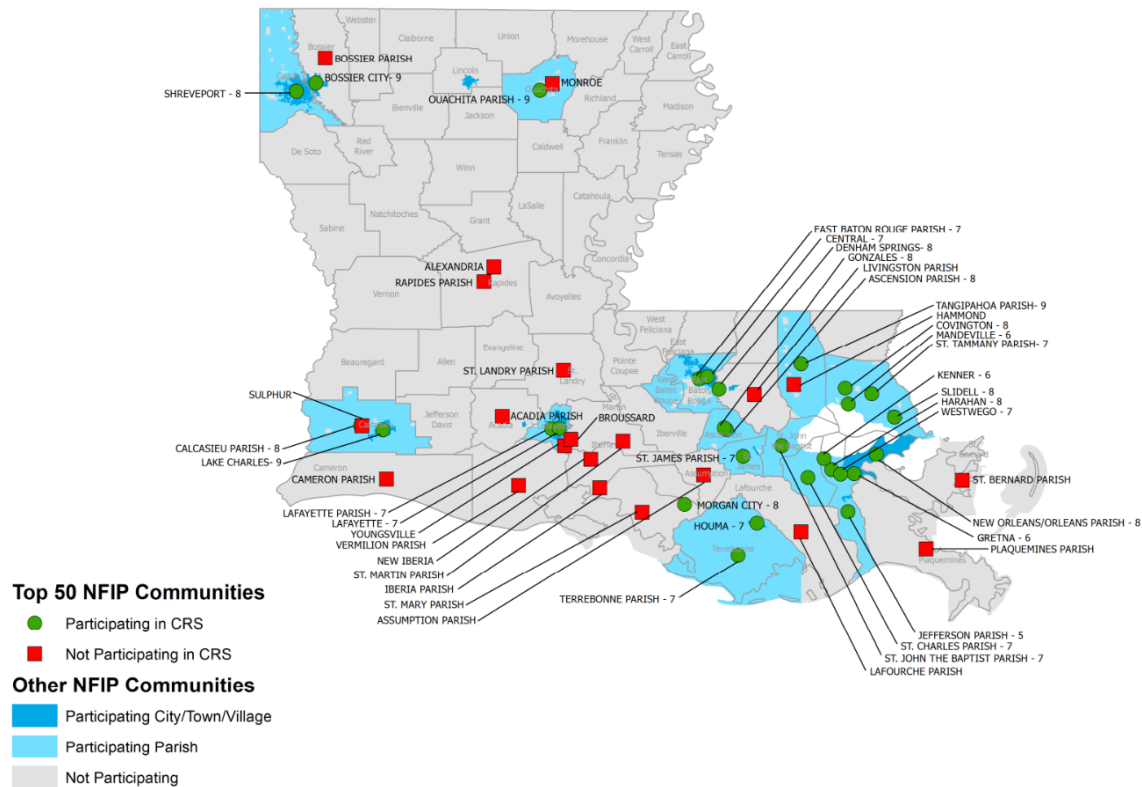


Figure 3. Top 50 NFIP Communities in Louisiana Overlaid with CRS Participants²⁵⁸

Figure 3 points out with red squares, several very high flood-risk communities who do not participate in the CRS program despite being severely impacted by Hurricane Katrina in 2005. This is an opportunity for FEMA outreach to local floodplain managers and emergency management coordinators. Further, Figure 3 reinforces the flood risk importance on the Gulf Coast communities.

Although Louisiana has not had success in CRS like Florida, it has a wonderful opportunity to address its biggest floodplain management challenge of RL and SRL properties. Since sixty-six percent of the nation's waterways eventually flow into Louisiana, the state suffers not only coastal storms but also vast majority of the stormwater

²⁵⁸ Source: Federal Emergency Management Agency.

runoff of the nation.²⁵⁹ Louisiana must have a multi-faceted approach to flooding, which can be exacerbated by both Mississippi River flooding at the same time as another Hurricane Katrina. See Figure 4, which shows Mississippi and the Atchafalaya River Basin.



Figure 4. Mississippi and the Atchafalaya River Basin²⁶⁰

Figure 4 demonstrates that the vast majority of the nation's river (fluvial) systems all converge in the Mississippi/Atchafalaya River Basin. Hence, Louisiana must not only contend with hurricanes from the Gulf, but also the confluence of two-thirds of the nation's stormwater runoff. Figure 4 also points out the fact that Louisiana's flooding is impacted

²⁵⁹ "Promoting Mitigation: FEMA and the State of Louisiana Press Release," Federal Emergency Management Agency, February 11, 2011. 1.

²⁶⁰Source: "Mississippi/Atchafalaya River Basin," United States Environmental Protection Agency, <https://www.epa.gov/ms-htf/mississippiatchafalaya-river-basin-marb>.

by upstream states who share some limited moral responsibility to help Louisiana mitigate flooding by constructing flood control dams in their respective states.

DHS explains the biggest expense to the National Flood Insurance Program is repetitive loss properties, thereby requiring all local hazard mitigation plans to consider repetitive loss properties in any local mitigation plan.

As part of the National Repetitive Loss Strategy, FEMA has ranked all repetitive loss structures. The top 10,000 repetitive loss structures nationwide have received repetitive flood to the extent that floods claim equal or exceed the value of these structures or, as is the case for most of Louisiana's structures, have experienced four or more losses in the last 10 years.²⁶¹

The federal NFIP and Louisiana state homeowners would improve their resiliency through an improved Acquisition and Relocation Program to address RL and SRL properties. A justification for this increased focus on RL and SRL properties in Louisiana is that thirty percent of repetitive loss properties are in the state: primarily concentrated in Jefferson and Orleans Parishes.²⁶² In order to improve the financial solvency of the NFIP, a well thought out RL and SRL strategy is very important. Table 21 demonstrates how Louisiana could potentially implement CRS activities, as well as how these activities would relate to DHS Mission Areas and Core Capabilities.

²⁶¹ Federal Emergency Management Agency, "Promoting Mitigation," 1.

²⁶² Federal Emergency Management Agency, 1.

Table 21. Potential CRS Implementation Activities for Louisiana

CRS Activity	Points Available	Mission Area	Core Capability
512a. Floodplain Management Planning	382	Mitigation	Threats and Hazards Identification
512b. Repetitive Loss Analysis	140	Mitigation	Threats and Hazards Identification
522b. Acquisition and Relocation of Buildings on the Repetitive Loss List	2,250	Mitigation	Community Resiliency
522c. Acquisition and Relocation of Severe Repetitive Loss Properties	2,250	Mitigation	Community Resiliency

Table 21 demonstrates how these activities would also support the National Preparedness Goal (NPG) and the resiliency of the nation. At a minimum this table demonstrates that meeting as a whole community for floodplain management planning also helps state and local emergency management officials complete an accurate assessment of the threats, hazards, and capabilities of the community. The only way to address RL and SRL properties is to first identify the threat and hazard.

Louisiana CRS participation exceeded that of Texas but still lags significantly when compared to Florida. Like Texas and Florida, the state maintained great success in most of its urban centers. FEMA noted that small communities face significantly different challenges when joining CRS than their urban peers, including fewer employees, smaller revenue dollars to reallocate, and a likely limitation of internal knowledge.²⁶³ As such, these limitations make it harder for smaller and less affluent communities in Louisiana to join CRS, given the administrative burden required to initially join the program.

The CRS program reduces flood losses and is particularly important to these three states and the federal treasury. According to Eddings, “Overall, Texas ranks first amongst states in property damages due to flood-related events from 1980–2020, accounting for 24.8 percent of the total. Florida ranks second with 19.1 percent and Louisiana ranks third

²⁶³ “Small Communities in the CRS Factsheet,” Federal Emergency Management Agency, 2018, 1.

with 18.7 percent.”²⁶⁴ Since these three states have more NFIP policies in place, than the remaining forty-seven states; CRS activities undertaken to reduce the flood risk of Florida, Texas, and Louisiana improve the financial solvency of the NFIP.

D. CONCLUSION

After comparing the most flood-prone states, Texas and Florida, participation is significantly different despite the states having above average economic resources. Better understanding the variation in participation level and the significantly more rapid advancement in CRS program stages requires further research. When looking at these three states, some common activities that have helped communities attain CRS success include comprehensive floodplain management planning across all four CRS series. By executing a plan that includes public outreach, open space preservation, and an effective mitigation program will lead to CRS success and reduced flood insurance premiums for homeowners. Conversely, as demonstrated by Escambia County, FL and the state of Louisiana, by not developing a RL and SRL analysis plan, a community does not have an important blueprint to reduce flood risk or earn CRS credit.

Within the three most flood-prone states, urban centers appear to have significantly more participation, especially for urban centers with natural disasters in recent history, such as Houston and New Orleans. Reviewing the state-by-state performance reveals a trend—performance varies significantly by community and depends more on local factors than broader state performance. The overriding principle is that for a state to be successful in the CRS program, the state must take the lead and encourage community participation. This starts with a comprehensive floodplain management plan that is developed with community stakeholders and partners, and then incorporate this plan into a longer-term state mitigation plan with community resiliency as the cornerstone.

²⁶⁴ Ryan David Eddings, “Factors Affecting Community Rating System Participation in the National Flood Insurance Program: A Case Study of Texas” (PhD diss., Portland State University, 2023), 1.

VI. CRS SUCCESS BY COMMUNITIES

This chapter analyzes activities affecting outcomes from a community level. It scrutinizes how CRS relates to each of the DHS Core Capabilities (prevention, protection, mitigation, response, and recovery) and examines success and failures of CRS in some of the most flood-prone communities. These core capabilities will help establish benchmarks to enhance comprehensive floodplain management as well as CRS program success. This chapter discusses which key drivers differentiate community participation, particularly for those close to one another, including the coastal and fluvial.

A. COASTAL COMMUNITIES

FEMA defines coastal communities, also known as communities designated in flood maps as Zone V, as “the special flood hazard area subject to coastal high hazard flooding.”²⁶⁵ Coastal flooding is the natural disaster caused primarily by weather-related events, such as superstorms and hurricanes, as well as tides impacted by moon phases, both of which result in storm surges, higher tides and wind-related damages.²⁶⁶ This section examines activities taken and documented by one coastal community and CRS credit that possibly could be earned by another community for activities already being executed, just not recognized under a CRS series, function or elements.

Across the water from Sea Bright, N.J., New York, N.Y. stands as one of the nation’s largest economic centers and one of the world’s largest coastal cities. The Wharton Center for Risk Management notes that New York is a key city to analyze as it (i) holds a significant coastal population with over 10 million residents, (ii) continues its expansion and construction into flood hazard areas with the value of its properties within the floodplain doubling over the course of the past three decades, and (iii) has experienced recent weather events that can be studied.²⁶⁷ Additionally, New York is a unique city as,

²⁶⁵ Federal Emergency Management Agency, *Floodplain Management Requirements*, D-11.

²⁶⁶ Federal Emergency Management Agency, I-9, 10.

²⁶⁷ Wouter Botzen, Howard Kunreuther, and Erwann O. Micheal-Kerjan, *Understanding Individual Flood Risk Perceptions*, 4.

unlike its peers in Florida (Miami), Texas (Dallas, Houston and Austin), and Louisiana (New Orleans), New York does not participate in the CRS program.²⁶⁸ As shown in Appendix A.5 New York, the city is the largest holder of NFIP policies within the state with 51,861 properties purchasing NFIP policies. Despite its large scale, New York is one of the state's 1,469 NFIP communities that does not participate in the CRS program.²⁶⁹ Emergency management professionals in New York City have a mind set to improve preparedness and increase resiliency, and with expanded flood risk threats; there is an opportunity to capitalize on the success of other large cities in flood risk reduction.

²⁶⁸ Erwann O. Micheal-Kerjan, Howard Kunreuther, and Jeffery Czajkowski, *Strengthening Resilience: NFIP Community Rating System (CRS) Analysis of New York State* (Philadelphia, PA: The Wharton School, University of Pennsylvania, 2013), 4.

²⁶⁹ “New York: Top 50 National Flood Insurance Program (NFIP) Policy Count Communities and Community Rating System (CRS) Participation,” Federal Emergency Management Agency, October 1, 2021, https://crsresources.org/files/100/maps/states/new_york_crs_map_october_2021.pdf.

1. Seabright, NJ

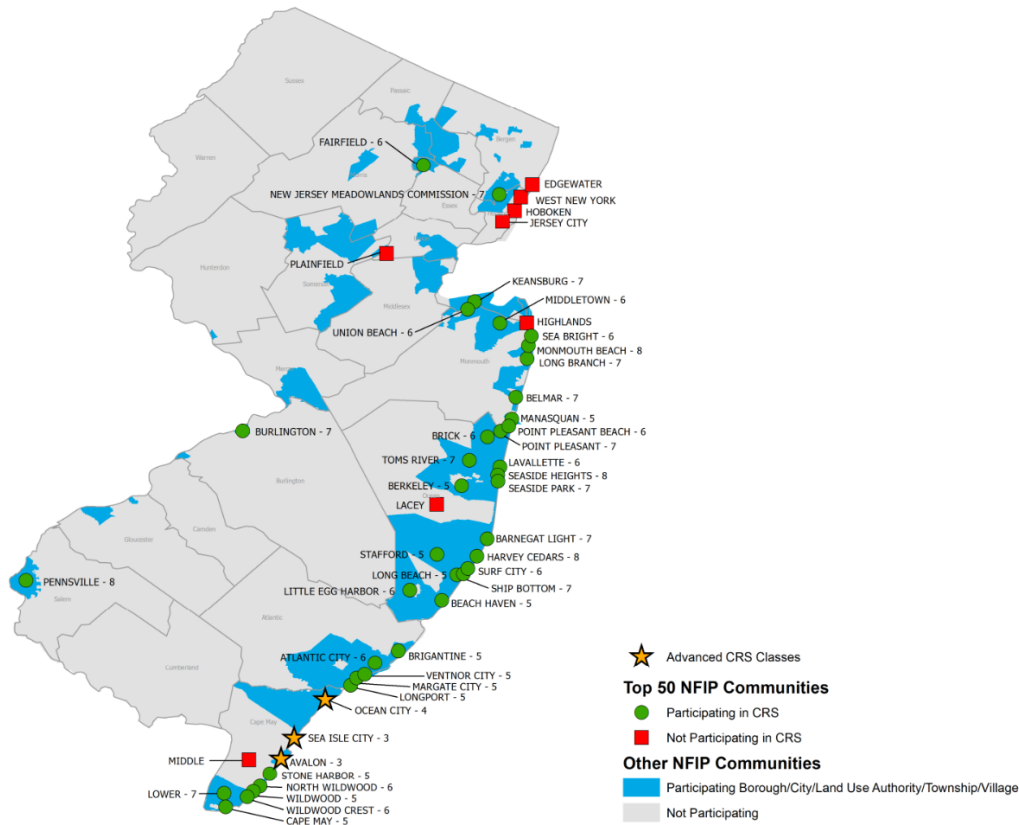


Figure 5. New Jersey CRS Participation Map²⁷⁰

Figure 5 demonstrates heavy CRS participation by New Jersey coastal communities, with a notable gap in the inland (fluvial) counties. The aftermath of Superstorm Sandy encouraged many communities to include resiliency when rebuilding, thereby earning CRS credit. Post Superstorm Sandy many coastal mitigation projects provided substantial CRS points.

Sea Bright, N.J, is a town within Monmouth County. Bates notes that this county has significant risk of coastal flooding because it is one of the most populous communities

²⁷⁰ Source: “New Jersey: Top 50 National Flood Insurance Program (NFIP) Policy Count Communities and Community Rating System (CRS) Participation,” Federal Emergency Management Agency, October 1, 2021, https://crsresources.org/files/100/maps/states/new_jersey_crs_map_october_2021.pdf.

in the nation with a non-urban watershed. For example, during Superstorm Sandy, it experienced the most significant impact.²⁷¹ Many residents of Sea Bright commute to work daily by ferryboat across the ocean to lower Manhattan. As shown in Appendix A.4 New Jersey, Sea Bright is a coastal community along the Jersey Shore with 1,089 properties holding NFIP policies. Despite its small size, the community is a member of CRS and currently holds an Intermediate Rating of 6.²⁷² Although Sea Bright is a smaller community with limited staff, community leaders realize after surviving the impact of Superstorm Sandy that activities that make the community more flood resilient are a sound and prudent investment of time and limited resources.

Sea Bright has developed an implementation plan for CRS with specific deliverables and timelines shared with the community. As an example of its ongoing plan, Sea Bright shared the October 2019 progress report on CRS Activity 510, with the whole community. Through CRS Activity 510, implementing a credited plan, Sea Bright outlined its

(i) bulkhead construction, (ii) seawall construction, (iii) elevated homes, (iv) floodproofing of its downtown, (v) coastal dune construction, (vi) underground electrical utilities, (vii) stormwater drainage improvement, (viii) enforced building codes, (ix) flood and hazard mitigation planning, (x) flood and hazard mitigation education, awareness and research, (xi) elevating roadways above sea level, (xii) wind event preparation, (xiii) dredging and (xvi) marina strengthening.²⁷³

These comprehensive plans outline goals under the CRS definition, with the targets to “organize, involve the public, set goals, review possible actions, draft action plans, adopt the plan, and implement, evaluate and revise.”²⁷⁴ Sea Bright’s success could be a strong roadmap for effectively following the CRS 10-step process.

²⁷¹ Diane C. Bates, *Superstorm Sandy: The Inevitable Destruction and Reconstruction of the Jersey Shore* (New Brunswick, NJ: Rutgers University Press, 2016), 23.

²⁷² Federal Emergency Management Agency, “New Jersey: Top 50 National Flood Insurance Program.”

²⁷³ Sea Bright, *CRS Activity 510: Progress Report on Implementation of Credited Plan* (Sea Bright, NJ: October 10, 2019), 2–6.

²⁷⁴ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 510–1.

As part of its comprehensive plan, the community also has an aggressive beach replenishment initiative with ongoing timelines. The community has further invested in the ongoing installation and rebuilding of dunes.²⁷⁵ The Army Corps of Engineers defines beach replenishment, also known as beach nourishment, as

the adding of sediment onto or directly adjacent to an eroding beach. This ‘soft structural’ response allows sand to shift and move with waves and currents. Dune restoration is commonly carried out during a beach nourishment project as well. A wide, nourished beach system absorbs wave energy, protects upland areas from flooding and mitigates erosion.²⁷⁶

Beach nourishment, as shown in Figure 6, is a proven method of limiting the risk of severe coastal flooding damage, which also enhances beach recreation activities and promotes tourism as an economic driver. Beach nourishment is considered a soft mitigation measure, since its effectiveness is reduced after each hurricane impacts on the shore. Beach nourishment has an additional benefit of helping maintain the natural habitat for many different animal and plant species.

²⁷⁵ Sea Bright, *CRS Activity 510*, 3.

²⁷⁶ “Beach Nourishment,” Institute for Water Resources, accessed September 21, 2021, <https://www.iwr.usace.army.mil/Missions/Coasts/Tales-of-the-Coast/Corps-and-the-Coast/Shore-Protection/Beach-Nourishment/>.



Figure 6. Atlantic City, New Jersey Beach Nourishment²⁷⁷

When reviewing the results of Superstorm Sandy, communities that had nourished their beaches prior to the weather event were significantly less likely to suffer damage than those that had not. As outlined by Bennington and Farmer, approximately sixty-five percent of structures behind non-nourished beaches experienced damage while only thirty-five percent of structures behind nourished beaches did. Looking further at the data of the properties damaged behind non-nourished beaches, the majority, or fifty-five percent experienced major damage or complete destruction; however, of the structures damaged behind nourished beaches, only thirty-eight percent suffered either one.²⁷⁸ Most importantly Sea Bright recognized that a dam or levee would not be an effective mitigation

²⁷⁷ Source: Thomas D. McGroarty. “Atlantic City, New Jersey Beach Nourishment,” Picture taken February 15, 2021.

²⁷⁸ J. Bret Bennington and E. Christa Farmer, *Learning from the Impacts of Superstorm Sandy* (San Diego, CA: Elsevier, 2015), 65.

plan, and as such beach nourishment was the most cost effective program, thereby validating that floodplain management must be a local plan that takes into account unique characteristics and special needs of the municipality.

A small town with relatively high average property values can quickly learn and adapt to evolving CRS policies, enabling it to advance through CRS ratings. Sea Bright's advancement in CRS Function 510, which only 64 percent of CRS communities successfully complete, highlights the abilities of communities like it.²⁷⁹ Sea Bright and similar communities can serve as a roadmap for other communities' involvement as the CRS scorecard is adopted on a broader scale. See Appendix A.4 for more specific details on New Jersey communities CRS participation rates as well as the number of high-risk flood properties in these communities.

Table 22 demonstrates how a well-developed comprehensive floodplain management plan can be the catalyst for CRS success.

Table 22. Successful CRS Activities for Sea Bright, New Jersey

CRS activity	Points Available	Mission Area	Core Capability
332a. Outreach Projects	200	All	Public Information and Warning
432b. Freeboard	500	Recovery	Housing
512a. Floodplain Management Planning	382	All	Planning
442e. Coastal Erosion Open Space	750	Recovery	Natural and Cultural Resources

Table 22 explains some of the unique CRS success in Sea Bright following an all-hazards approach to planning. In addition, beach nourishment mitigates future hurricane impacts, while earning substantial coastal erosion CRS credits. Further, Coastal Erosion Open Space CRS credits complement Mission Area Recovery under Core Capability of

²⁷⁹ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 110–6.

Natural and Cultural Resources, along with showing the value of integrating diverse partners and disciplines.

2. New York, NY

New York City has more coastline than any other United States city, but it does not participate in the CRS program. New York City is not unique in this regard, as most New York State communities do not participate. However, New York City has over 50,000 high risk flood properties that would greatly benefit from the City joining the CRS program. Further, New York City has traditionally been impacted by coastal and fluvial flooding, but now has seen a dramatic increase in pluvial flooding as well.

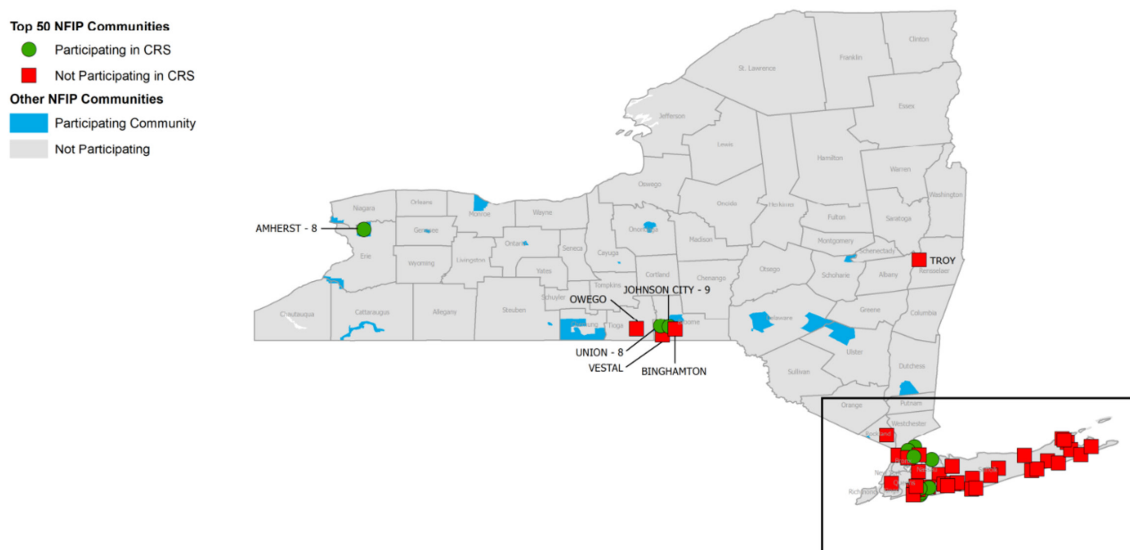


Figure 7. New York State CRS Participation Map²⁸⁰

Figure 7 shows the limited CRS success in the entire state of New York. Further almost all the coastal flooding area of New York state are seen in red, as not participating in the CRS program. See Appendix A for more specific details on New York communities

²⁸⁰ Source: Federal Emergency Management Agency, “New York: Top 50 National Flood Insurance Program.”

CRS participation rates as well as the number of high-risk flood properties in these communities.

Despite its lack of participation in the CRS program, New York City has a comprehensive plan to address all facets of life across the metropolitan area with its “One NYC 2050 (A Vibrant Democracy, An Inclusive Economy, Thriving Neighborhoods, Healthy Lives, Equity and Excellence in Education, A Livable Climate, Efficient Mobility and Modern Infrastructure)” policy.²⁸¹ The plan has nine volumes, each of which focuses on a core threat to the city. Volume 7 focuses specifically on “a livable climate” which includes the risk of flooding.

Regarding flooding, the plan addresses several initiatives outlined in CRS, including

expanding flood awareness and educating the population (CRS Function 330 Outreach), implementing retrofit strategies for existing buildings (CRS Function 530 Flood Protection), mitigating risk to infrastructure (CRS Function 610 Flood Warning and Response), increasing flood insurance adoption (CRS Function 370 Flood Insurance Promotion), and improving stormwater management (CRS Function 450 Stormwater Management).²⁸²

All these activities would provide New York City with some initial CRS points for what is already taking place, by simply documenting these activities following the CRS guidelines. Table 23 provides examples of how New York City could earn CRS points for current activities.

²⁸¹ ONENYC, “Is a Strategy to Secure Our City’s Future Against the Challenges of Today and Tomorrow,” New York: Office of the Mayor, 1.

²⁸² ONENYC, “A Livable Climate,” New York: Office of the Mayor, 24.

Table 23. Potential CRS Implementation Activities for New York City

CRS activity	Points Available	Mission Area	Core Capability
332a. Outreach Projects	200	All	Public Information and Warning
372a-g. Flood Insurance Promotion	220	Mitigation	Risk and Disaster Resilient Assessment
452a. Stormwater Management Regulations	380	Recovery	Natural and Cultural Resources
532b. Flood Protection Improvement	1,600	Mitigation	Community Resilience
612c. Flood Response Operations	115	Response	Operational Coordination

Table 23 proposes some potential CRS activities that New York City is already engaged in, and probably qualify for CRS points. If New York City could even document 25 percent of the CRS activities in Table 23, the community would earn a CRS score of 9, with a corresponding five percent discount to all flood insurance policy holders in the City. Table 23 visualizes the activities that are already completed by a wide cross section of City agencies and departments, but simply may have not been documented for submission to FEMA for CRS credit.

New York City is already completing major projects that would qualify for CRS credit, including its beach replenishment on the Rockaway Peninsula, a new levee in Staten Island, and over one billion dollars' worth of resiliency projects for Staten Island and Queens. Besides receiving federal funding for the above projects, the city is also considering pursuing health preparedness projects that could qualify for CDC funding under the new CDC program—Building Resilience Against Climate Effects (BRACE).²⁸³ Therefore, many of the CDC funded hospital resiliency projects in Manhattan would qualify for credit for making critical facilities more resilient to flooding, such as the impacts that occurred during Superstorm Sandy.

²⁸³ “Building Resilience against Climate Effects,” Center for Disease Control and Prevention, April, 2022, 1.



Figure 8. Lourdes Hospital Flooding Mitigation in Binghamton, NY²⁸⁴

Figure 8 is a graphic example of Protection of Critical Infrastructure to earn CRS credits, while improving the resiliency of a hospital. Lourdes Hospital was subject to flooding from the Susquehanna River, so a unique approach to mitigation was developed and constructed. In between the hospital and the river was a large surface parking lot. A large concrete parking garage was constructed as a barrier to the river flooding the hospital. The excess land between the new parking garage and the river was returned to its natural condition as an open space park, qualifying for additional CRS credit. This mitigation project brought together diverse federal partners such as the United States Army Corp of Engineers, FEMA, National Parks Service and even the Department of Health and Human Services. This hospital mitigation project is a model for the New York City Hospital Resiliency Project and for other communities to protect critical infrastructure with innovation, initiative, and ingenuity.

Unlike Sea Bright, which has the exclusive threat of flooding, New York focuses on other key issues including crime, terrorism, and fire. Although the community's

²⁸⁴ Source: "The Lourdes Hospital Flood Save: A Decade Later," Flood Break, accessed September 19, 2021, <https://floodbreak.com/lourdes-hospital-flood-save/>.

resources are significantly greater than that of Sea Bright, most of them address other issues. However, New York City has clear reasons to join the CRS program including (i) New York City's "One New York Policy" (ii) the effective participation of other major urban centers with significant flood risk (Houston, Dallas, Miami, and New Orleans) and (iii) its ongoing and rising risk of flooding from a coastal, fluvial, and now the serious impacts from pluvial flooding.

In addition to both coastal and fluvial (river) flooding it has as expanding pluvial flood threat that is exacerbated by the large number of basement apartments. With a population of over ten million citizens, New York has the additional flood hazard of basement flooding, not from a waterway but rather is pluvial.²⁸⁵ FEMA defines pluvial flooding as heavy rainfall over a short duration of time that overwhelms the conveyance systems, such as stormwater run-off pipes and catch basins, causing urban street and basement flooding.²⁸⁶ Pluvial flooding has become a true threat to the city and the safety of its citizens. On September 1, 2021, New York City experienced its most severe pluvial flooding to date from Hurricane Ida that resulted in 11 deaths in basement living units.²⁸⁷ The CDC notes in its Climate Health and Intervention Assessment that half of all flooding deaths result from drowning and is considering key strategies to address this risk in New York City.²⁸⁸ The increased threat from pluvial flooding will be hard to mitigate due to the complex street drainage systems and numerous basement apartments; a better approach might be to focus on the 600 CRS series. The 600 series has the lowest participation rate among communities, but these Warning and Response Series—functions and elements might have the most impact in saving lives and earning CRS credit.

²⁸⁵ Botzen, Kunreuther and Michael-Kerjan, *Understanding Individual Flood Risk Perceptions*, 6.

²⁸⁶ Diane P. Horn, *National Flood Insurance Program: The Current Rating Structure and Risk Rating 2.0*. CRS Report No. R45999 (Washington, DC: Congressional Research Center, April 4, 2022), 7.

²⁸⁷ Mihir Zaveri, Matthew Haag, Adam Playford and Nate Schweber, "The Storm's Toll Highlighted New York City's Shadow World of Basement Apartments," *New York Times*, September 2, 2021, 1, <https://www.nytimes.com/2021/09/02/nyregion/nyc-basement-apartments-flooding.html#:~:text=But%20after%20Wednesday's%20record%2Dshattering,Ida%20made%20landfall%20on%20Sunday.>

²⁸⁸ "Climate and Health Intervention Assessment," Center for Disease Control and Prevention, 2022, 19.

It is imperative to save lives that a different approach will need to be developed to reduce the pluvial threat to basement dwellers in New York City. Today, New York City has approximately 100,000 basement apartments in which its residents reside.²⁸⁹ Due to the increasing risk of pluvial flooding, the city must formulate an action plan to address the potential loss of life and property. A year after the Hurricane Ida tragedy, *Bloomberg News* noted that the city has not yet adequately addressed the risk of basement flooding and potential loss of life. Until a comprehensive pluvial flood response plan is in place, New York's short-term solution is to improve response times to street flooding and to expedite the maintenance of the conveyance systems problem areas.²⁹⁰ Since Risk Rating 2.0 incorporates (fluvial, coastal and now pluvial) flooding impacts, and all three plague New York City; the triple threat might motivate New York City to incorporate all of its vast floodplain management plans into earning CRS credits, by joining the CRS program.

B. FLUVIAL COMMUNITIES

FEMA defines fluvial communities, also known as communities designated in flood maps as Zone A, as “the special flood hazard map area (except coastal V Zones) shown on a community’s Flood Insurance Rate Map.”²⁹¹ Fluvial flooding affects channeled waterways, including streams, creeks, and rivers, due to overbanking or receiving excess water from the catchment area.²⁹² Just as 2/3 of the nation’s stormwater catchment flows to Louisiana, every river (fluvial) flood risk must consider the catchment area; thereby the value of a Watershed Master Plan becomes an important CRS planning tool to quantify the risk and develop plans to mitigate runoff.

When comparing fluvial communities, this research attempts to identify the root cause of the variability in participation in small communities. Analyzing two adjacent communities with similar risk and economic profiles, one of which has the highest CRS

²⁸⁹ Amy Yee, “In NYC’s Basement Apartments Deadly Flood Risk Remain,” *Bloomberg News*, September 1, 2022, <https://www.bloomberg.com/news/articles/2022-09-01/in-new-york-city-s-basement-apartments-flood-dangers-remain-a-year-after-ida>

²⁹⁰ Yee, *Bloomberg News*.

²⁹¹ Federal Emergency Management Agency, *Floodplain Management Requirements*, D-11.

²⁹² Federal Emergency Management Agency, I-6, 7.

rating in the state and one of which does not participate in the CRS program can help identify key factors. This research evaluates the two adjacent cities within Pennsylvania—Wilkes-Barre and Scranton.

Pennsylvania has limited participation in the CRS program. When reviewing all communities participating in NFIP in the state, 29 of the 2,468 participated in the CRS program, representing only one percent of all communities. Of the state’s 50 most flood-prone communities, 32 percent are enrolled in CRS (not including Philadelphia or Scranton).²⁹³ See Appendix A for more specific details on Pennsylvania communities CRS participation rates as well as the number of high-risk flood properties in these communities.

Table 24. Pennsylvania CRS Participation for Top 50 Communities²⁹⁴

Stage	# of Participants	Participation Rate
Intermediate / Advanced	0	0 percent
Introductory	16	32 percent
Not Participating	34	68 percent
Total	50	100 percent

Table 24 illustrates that over two-thirds of the top fifty flood-prone communities in Pennsylvania have not joined the CRS program. In addition, not one community in Pennsylvania has been able to attain either the Advanced or Intermediate Stage of the CRS program. This table graphically displays the need for greater education of community officials to encourage their communities to become more resilient and join the CRS program.

²⁹³ “Pennsylvania: Top 50 National Flood Insurance Program (NFIP) Policy Count Communities and Community Rating System (CRS) Participation,” Federal Emergency Management Agency, October 1, 2021, https://crsresources.org/files/100/maps/states/pennsylvania_crs_map_october_2021.pdf.

²⁹⁴ Adapted from Federal Emergency Management Agency.

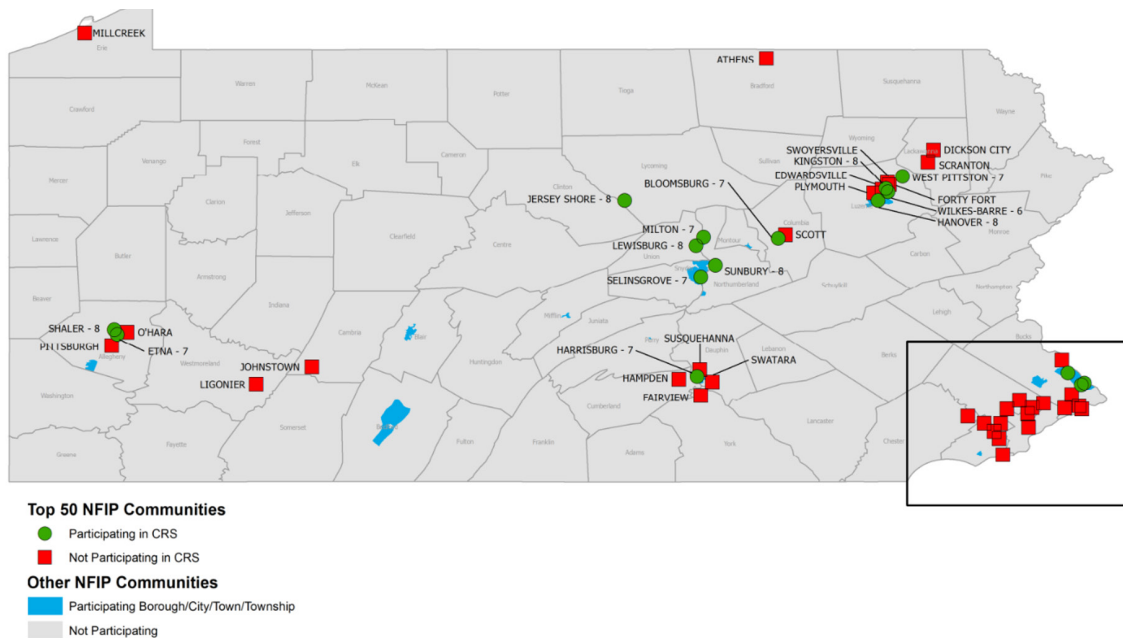


Figure 9. Pennsylvania CRS Participation Map²⁹⁵

Figure 9 shows that the greatest success in Pennsylvania is along the Susquehanna River. Further, Philadelphia and the other urban communities in southeast Pennsylvania have very limited CRS participation despite being exposed to flooding from the Schuylkill River. Even Johnstown, which is home to the United States National Parks Service National Flood Museum, does not participate in the CRS program.²⁹⁶

1. Wilkes-Barre, PA

Wilkes-Barre, PA is a city within Northeast Pennsylvania and is the third largest policy holder of NFIP policies within the state with 1,409. The community's uniqueness from a flood risk mitigation perspective is holding the highest CRS rating in the state, with a Class 6 score. The community's score is significantly better than the most flood-prone communities—Philadelphia (not participating) and Kingston (9). Additionally, the community has been more effective at adopting the program's elements than smaller, more

²⁹⁵ Source: Federal Emergency Management Agency, "Pennsylvania: Top 50 National Flood Insurance Program."

²⁹⁶ "The Dam is Becoming Dangerous and May Possibly Go!" National Park Service, July 21, 2023, <https://www.nps.gov/jofl/index.htm>.

economically sound communities along the Main Line in suburban Philadelphia, including Radnor (not participating) and New Hope (not participating).²⁹⁷ Although flooding is the number one hazard in the state, the leadership in many communities have not made it a priority.

Wilkes-Barre has experienced a series of flooding issues over the past half century. Beginning in 1972, Hurricane Agnes devastated Northeastern Pennsylvania with the most severe damage in Wilkes-Barre.²⁹⁸ The U.S. Army Corps of Engineers noted that the excess rainfall resulted in a crest elevation of forty-one feet high, which overbanked the Susquehanna River thirty-seven-foot-high levee, resulting in \$2.8 billion of damages.²⁹⁹ In 1996, another flood with a differing root cause affected Wilkes-Barre. Due to excess snowfall and subsequent melt, the Susquehanna River experienced crest elevation of thirty-four feet.³⁰⁰ These events motivated leaders at the local, state, and federal level to secure the funding for the largest flood protection project ever constructed in Pennsylvania.

Figure 10 provides an overview of the main components of the levee system including reinforced concrete walls, earthen levee, and stormwater pumping stations. The effectiveness of the levee is based on interdependency of the different component systems. Stormwater pumping stations pump interior stormwater (dry side of levee) conveyance runoff into the river at greater velocity than normal; to prevent pluvial flooding behind the levee.

²⁹⁷ Federal Emergency Management Agency, “Pennsylvania: Top 50 National Flood Insurance Program.”

²⁹⁸ “Thousands Flee to Higher Ground as Raging River Breaches Dike” *Times Leader*, June 23, 1972, 1.

²⁹⁹ “Wyoming Valley Levee Raising,” Army Corps of Engineers, March 1, 2018, 1.

³⁰⁰ “Historic Flood Crest on Susquehanna River at Wilkes-Barre,” National Weather Service, October 30, 2020, 2.



Figure 10. Wyoming Valley Levee System³⁰¹

At that time all realized that the Wyoming Valley Levee Raising Project would have a cost/benefit ratio of 14.0 (\$200 million/ \$2.8 billion), well exceeding the FEMA benefit/cost ratio standard of 1.0. Benefit / Cost Ratio is the metric used by FEMA to gauge the viability of mitigation projects. The Army Corps of Engineers noted that in 1996 and in direct response to the recurring floods, the federal government, under the guidance of President Bill Clinton, provided \$200 million in grant funding to raise the levee from thirty-seven feet to forty-four feet. In subsequent years, the levee height was validated by Tropical Storm Lee in 2011. The excess rainfall resulted in the Susquehanna River cresting at over forty-two feet, which was approximately two feet higher than the crest of Hurricane Agnes.³⁰² The 2011 crest would have resulted in damages exceeding that of Hurricane Agnes had the levee not been raised in 1996.

Due to the community's multiple experiences with floodplain management, the community is more committed than others to adopt new strategies. Additionally, as the community can validate first-hand the ROI of such projects, the community is also more willing than others to implement such practices. These small communities have limited budget resources to focus on federal initiatives that are difficult to manage and adopt because they have few

³⁰¹ Source: Thomas D. McGroarty, "Wyoming Valley Levee Project," Wilkes-Barre, PA, picture taken April 2, 2022.

³⁰² Army Corps of Engineers, "Wyoming Valley Levee Raising," 1.

implementable options. Wilkes-Barre, which had the great misfortune of past fluvial flooding, has decided that flood risk mitigation to be a key issue. Other communities within the state will be able to adopt the program over time as (i) CRS knowledge becomes more prevalent, (ii) communities gain further incentives to participate in the program through increased premiums to actuarially sound rates and (iii) the steady adoption of programs which takes time, particularly for communities with limited resources to quickly respond to administrative changes.

Table 25 demonstrates that large mitigation projects not only improve community resiliency, they also can provide substantial CRS points. In addition, outreach projects can benefit a diverse population and help meet the cross-cutting NPG of Public Information and Warning. Further, that a community can improve one whole CRS class by modifying planning and zoning regulations to require two feet of freeboard in all new construction. Figure 11 is an example of a unique way to increase the freeboard capacity at a bridge crossing a waterway.

Table 25. Successful CRS Activities for Wilkes-Barre, Pennsylvania

CRS activity	Points Available	Mission Area	Core Capability
332a. Outreach Projects	200	All	Public Information and Warning
432b. Freeboard	500	Recovery	Housing
512a. Floodplain Management Planning	382	All	Planning
532b. Flood Protection Improvement	1,600	Mitigation	Community Resilience



Figure 11. Solomon Creek Bridge³⁰³

Figure 11 displays uniquely designed and constructed bridges that cross Solomon Creek in Wilkes-Barre. On the left the bridge is in the flooding configuration, where the bridge parapets rotate ninety degrees and interlock—forming a solid flood wall. This allows for additional flood water to stay within the channel walls—while topping the bridge travel deck. This increase in floodwater capacity above the minimum requirement is known as freeboard. On the right is the bridge in normal vehicle transportation mode, its normal state 99.9 percent of the time. The flood configuration can become operational in less than one hour, which happens about once every five years. Figure 11 also points out the value of working with our community partners such as transportation planners, well before a transportation project over a fluvial water source is designed and constructed. Further, these bridges were awarded substantial CRS credit under Capital Improvement Programs, even though they were funded by United States Department of Transportation, not FEMA: validating the benefit of a whole community approach under the NPG.

2. Scranton, PA

Scranton shares similar fluvial risk with Wilkes-Barre and other key demographic trends. Scranton has 383 NFIP policies but is not currently participating in the CRS program. Although Scranton has not participated in the CRS program, the community has advanced in other disaster mitigations. As of June 2022, the community achieved a Fire

³⁰³ Source: “Solomon Creek Bridges,” Wilkes-Barre, PA, picture taken September 1, 2021; Thomas D. McGroarty, “Vehicle Traffic,” Wilkes-Barre, PA, picture taken April 1, 2022.

ISO Score of Class 2, which is identified as an outstanding level of fire protection and preparedness.³⁰⁴ Scranton focuses its attention first on enhancing fire preparedness because flooding risk is not as top of mind for the community. It suffered less damage in the floods of 1972, 1996 and 2011 and has fewer properties with NFIP policies (1,409 in Wilkes-Barre vs. 383 in Scranton). Because Scranton City leaders have shown a commitment to public safety and emergency preparedness, they may be great candidates to join CRS and apply lessons learned from their neighbor-Wilkes-Barre.

As FEMA notes in the Community Ratings Fact Sheet, communities that have adopted the Fire ISO and those in the process may be natural collaborators for CRS.³⁰⁵ Over time, after meeting other preparedness goals, small communities can reallocate their key resources to address other disasters. FEMA's strategy is to encourage communities that have improved their Fire ISO score to join CRS because the programs share similarities and the same FEMA contractor, Verisk, review them both. Therefore, if Verisk visited a community to evaluate the efficiency and efficacy of the fire service, it might be a great time to evaluate for CRS.

Scranton has begun the process of adopting CRS after successfully attaining a very impressive Fire ISO rating, based on sound fire prevention, fire suppression and fire leadership milestones. Scranton has sent three emergency leaders to the FEMA Emergency Management Institute to complete the Floodplain Management Course for Local Officials. This first step provides the training and background for these officials to develop a comprehensive floodplain management plan for the city, along with planning activities for CRS credit. In 2024, Scranton intends to apply to the CRS program and is now drafting a comprehensive floodplain management plan to earn CRS credit and an action plan that will examine a ROI Strategy for its time and effort. It is important to note that to earn one CRS class, a community must earn five hundred points. Scranton's first step provides an initial 382 points (CRS Element 512a. Floodplain Management Training), providing a great start.

³⁰⁴ Jeff Horvatz, "City's Upgraded Fire Protection Classification Could Prompt Lower Insurance Premiums," Scranton Times Tribune, June 22, 2022, 1.

³⁰⁵ "Community Rating System Factsheet," Federal Emergency Management Agency, June 2017, 1.

Table 26 points out potential CRS points require limited effort, following their successful Fire ISO campaign, beginning with Floodplain Management Planning.

Table 26. Potential CRS Implementation Activities for Scranton, Pennsylvania

CRS activity	Points Available	Mission Area	Core Capability
332a. Outreach Projects	200	All	Public Information and Warning
432b. Freeboard	500	Recovery	Housing
512a. Floodplain Management Planning	382	All	Planning

Table 26 demonstrates the value of outreach and planning for both floodplain management and enhancing capabilities as part of the NPG. Since Scranton has updated its zoning ordinance to include freeboard, it has enough points to earn CRS Class 9 recognition. As shown below, Scranton has developed some unique mitigation projects to pluvial flooding that other communities may learn from as well.



Figure 12. Scranton Stormwater Street Vaults³⁰⁶

Figure 12 provides a visual of the top street access panel for underground stormwater retention vaults. Stormwater retention vaults are constructed under the roadway to retain stormwater runoff and release it after the storm impacts have subsided; like a traditional retention pond found at the site of a new big box store. Underground stormwater retention vaults can be constructed in the public roadway rights-of-way when there is no land available for a traditional retention pond. Further, this approach can be used to mitigate pluvial flooding neighborhoods determined to be at a higher risk in the planning process.

³⁰⁶ Source: Thomas D. McGroarty, “Scranton Stormwater Street Vaults,” Scranton, PA, picture taken April 2, 2022.

C. CONCLUSION

Sea Bright's success is mainly because of Superstorm Sandy impacts and is replicable across the ocean in New York City, both coastal flood communities. The One NYC plan provides a great foundation for CRS success, since it covers all facets of life in New York City. Wilkes-Barre and Scranton are similar, having Fire ISO scores of two, which is outstanding. Even though Scranton has fewer floodplain properties, its success with Fire ISO is a good indicator of leadership commitment to emergency preparedness. Successful CRS communities have a commitment to the foundation of CRS—Floodplain Management Planning, Community Outreach, Mitigation Planning that focuses on RL and SRL, and unique challenges to the specific community.

As Sadiq and Noonan summarize, the CRS program aimed to incentivize local communities to decrease their risk of flooding and specifies community-level policy.³⁰⁷ Comparing communities with similar flooding risk exposure in the same geographic region can help identify the key factors that drive an NFIP community's decision to join and advance through CRS. The Congressional Budget Office notes that coastal communities account for approximately seventy-five percent of all NFIP policies.³⁰⁸ Since three fourths of all flooding risk is along the coast, planning needs to incorporate special effects including those of high tide, storm surge, velocity of wave action as well as the effective hydrostatic (stationary) but hydrodynamic (moving) water on properties in the floodplain.

Finally, for CRS to be effective and efficient, the federal, state, and local levels must have a strong partnership. Partnership begins with leadership and a commitment to enhance and sustain the core capabilities of the National Preparedness Goal. CRS rewards communities with policy discounts for additional floodplain management activities that reduce the overall risk to the federal treasury, a win-win for all.

³⁰⁷ Abdul-Akeem Sadiq, and Douglas Noonan, "Local Capacity and Resilience to Flooding: Community Responsiveness to the Community Rating System Program Incentives," *Natural Hazards* 78 (2015) 1414, <https://doi.org/10.1007/s11069-015-1776-9>.

³⁰⁸ Keith Hall, *Preliminary Results from CBO Analysis of the National Flood Insurance Program* (Washington, DC: Congressional Budget Office, April 19, 2017), 5.

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VII. CONCLUSIONS

This thesis explored, “How can FEMA increase Community Rating System participation in flood-prone communities?” To accomplish this as part of a comparative analysis, appreciative inquiry (AI) was used to study the CRS success of the three most flood-prone states—Florida, Texas, and Louisiana. Since most of the CRS initiatives are focused on the local level, an examination of the critical successes and essential failures of populous coastal and fluvial communities is investigated as well.

This chapter provides the findings of the comparative analysis to include diverse ways states promote the CRS program, the consequential impact that repetitive loss properties have on the solvency of the NFIP, as well the great opportunities to earn significant CRS credit points for mitigating the repetitive loss challenge across the nation. By using the AI framework, this thesis has discovered very effective and unique mitigation opportunities to build important resiliency into flood-prone communities, including advanced design solutions, along inimitable diverse grant funding resolutions. By studying the CRS success of both the three most flood-prone states as well as selected communities; this research provides roadmaps and blueprints for other potential communities to enhance and sustain their community resiliency, thereby providing reduced flood insurance premium reductions for homeowners and improved financial solvency of the NFIP for the nation.

A. COMPARATIVE ANALYSIS

Before looking at specific states and communities on a micro level, a nationwide macro comparison of success percentages of each of the nineteen functions provides a baseline to begin analytical deliberation. As discussed initially in Chapter III, the level of community CRS success varies greatly by function. Essentially some functions are easier or less costly to implement, therefore they are often the leadoff focus of communities attempting to join CRS. As discussed in Chapters IV, V, and VI; states and communities organize their floodplain management plans with specific objectives and measure their achievement. Table 27 provides a quick snapshot of the success rates of current CRS

communities for each specific function, thereby providing public officials a benchmark to design next steps and to strategize budget priorities.

Barrett and Fry explain, “AI squarely focuses on generating dynamics that will shift organizations from average to exceptional.”³⁰⁹ The authors relate that all organizations have normal functions that they do well at, and with some capacity building techniques that communities can use to exceed future expectations.³¹⁰ In relationship to flooding, most communities do well at meeting the minimum requirements of the NFIP; but great communities have been able to join the introductory stage of CRS program, whereas the exceptional communities have attained intermediate or even advanced CRS scores. The writers describe capacity building, “the process of elaborating and expanding on a system’s strengths—usually closely tied to cooperative acts—in order to move that system from good to great, from doing well to always winning, from constantly correcting forever innovating, and so on.”³¹¹

AI is organized around four stages (Discovery, Dream, Design, and Destiny) requiring teamwork, task-lists, thought, dialogue, and attentive listening.³¹² The authors summarize AI, “from Discovery that surfaces the core factors for past success, to Dream that reveals the most shared images of a preferred future state, to Design where participants self-organize into cross-functional teams to create specific, actionable change targets or aspirations, to Destiny where these same groups self-organize and commit to actions, pilots, and projects that will move the organization towards realization of their preferred future.”³¹³ Discovery focuses on history, past triumphs, consequential metrics, and potentials new avenues to rethink the approach.³¹⁴

³⁰⁹ Frank J. Barrett and Ronald E. Fry, *Appreciative Inquiry: A Positive Approach to Building Cooperative Capacity* (Chagrin Falls, OH: Taos Institute Publications, 2008), 19.

³¹⁰ Barrett and Fry, 19.

³¹¹ Barrett and Fry, 19-20.

³¹² Barrett and Fry, 54-55.

³¹³ Barrett and Fry, 71.

³¹⁴ Barrett and Fry, 56.

As part of AI Discovery, not all nineteen CRS functions are as easy to attain as others, and the metrics vary greatly. All communities in the CRS program have some type of success with Higher Regulatory Standards (430), therefore any community considering joining the CRS program would benefit from 430 activities as a starting point. Levees (620) which are expensive long term capital investment projects, not surprisingly because of difficulty have the worst CRS success percentage. However, Flood Insurance Promotion (370), which requires no capital investment; but substantial public outreach, has a very low four percent success rate. 370 functions are opportunities for community leadership to dream, design, and use Appendix C as a roadmap to destiny.

Instead of arranging the nineteen functions under their respective four series, the functions are listed sequentially based on success percentages. This table provides community leaders with a summary of the best metrics to dream and helps design cooperative capacity for CRS program success. Table 27 demonstrates the success rate nation-wide of each of the nineteen CRS functions for communities in the CRS program. The table further divides the nineteen functions by ROI (High, Medium, Low and De Minimis).

Table 27. CRS Functions Organized by Success Rates

ROI	Function	Description	Success Rate Percentage
High ROI	430	Higher Regulatory Standards	100
	310	Elevation Certificates	96
	440	Flood Data Maintenance	95
Medium ROI	330	Outreach Projects	93
	420	Open Space Preservation	89
	350	Flood Information Services	87
	450	Storm Water Management	87
	320	Map Information Services	85
Low ROI	340	Hazard Disclosure	84
	510	Floodplain Management	64
	410	Flood Hazard Mapping	55
De Minimis ROI	540	Drainage System Maintenance	43
	360	Flood Protection Assistance	41
	630	Dams	35
	520	Acquisition and Relocation	28
	610	Flood Warning and Response	20
	530	Flood Protection	13
	370	Flood Insurance Promotion	4
	620	Levees	0.5

A strengths, weaknesses, opportunities, and threats (SWOT) analysis of the three most flood-prone states and some specific communities is helpful when examining best practices, opportunities to replicate innovative processes, and learning from comparable communities is beneficial when enhancing and improving capacity building. The strengths discussed can be used as a blueprint for capacity building (Discover, Dream, Design and Destiny), as well the weakness examples can be refined to build capacity as well. Appendix C refines the nineteen functions down to the one-hundred-one specific elements to provides a roadmap that can be used by any community considering joining CRS, as well as evaluating some of the comparative examples.

The previous chapters reveal that the most successful community in Florida is Cutler Bay, which represents the only advanced stage community within the state.³¹⁵ According to FEMA, “Effective April 1, 2023, the Town of Cutler Bay will become again the first municipality in Broward, Miami-Dade and Monroe Counties to reach Class 3 status, having previously been rated at a CRS Class 4.”³¹⁶ More important than FEMA’s recognition of CRS success, “successful improvement to CRS class 3 will save policyholders on average of \$338 per flood insurance policy, and a total savings for the Town of \$2,378,138.”³¹⁷ Therefore, the residents consider all these CRS activities worthwhile because they reduce their flood risk profile and provide them a huge discount on their flood insurance premium.

Cutler Bay attained the Advanced Stage of CRS in just twelve years through:

The Town’s floodplain management activities that contributed to its CRS Class 3 rating, including the adoption of the Watershed Master Plan, regular inspections and cleaning of the Town’s drainage system, preserving Special Flood Hazard Areas as open space, and conducting general outreach and educational projects.³¹⁸

Conversely, Escambia County, Florida has substantial floodplain planning management weaknesses and has negative effect on the financial solvency of the NFIP. Notably, Escambia County accounts for only 1.5 percent of the state population but approximately 16.7 percent of the state’s NFIP claims.³¹⁹ Even though Escambia County has only ten percent of the population of Miami-Dade County, Escambia County contains double the number of repetitive loss (RL) and severe repetitive loss (SRL) properties as Miami-Dade.³²⁰ Hence, little Escambia County severe flood loss risk is double Miami-Dade, even though Miami-Dade has ten times the number of properties. Escambia County

³¹⁵ Federal Emergency Management Agency, “Florida: Top 50 National Flood Insurance Program.”

³¹⁶ Gibson, “Cutler Bay Achieves CRS Class 3 Community.”

³¹⁷ Gibson.

³¹⁸ Gibson.

³¹⁹ Marilyn Montgomery, Howard Kunreuther, “Pricing Storm Surge Risks in Florida: Implications for Determining Flood Insurance Premiums and Evaluating Mitigation Measures,” *Risk Analysis* 38, no. 11 (June 2018), 3, <https://doi.org/10.1111/risa.13127>.

³²⁰ Federal Emergency Management Agency, “Florida Top 50 National Flood Insurance Program.”

is an example of the serious floodplain management gap with repetitive loss properties; but this inconsistency is not unique to Escambia County and is a challenge to many other communities across the nation as well.

Cutler Bay with a well thought out Watershed Master Plan has incorporated the discovery, dream, design, and destiny into their comprehensive floodplain management allowing them to be one of the top CRS communities in the nation. Escambia County has discovered that their significant RL and SRL properties are an impediment to CRS success, and now must dream, design, and consider their destiny to address this significant flood risk. Escambia County would greatly benefit from developing a long-term repetitive loss analysis strategy, not only for CRS points; but to make the community more resilient.

Houston recently improved its CRS score of 4, which is significantly better than the average rating for communities participating in NFIP in Texas.³²¹ Houston success can be tied directly to, “dedicated significant time to implementing the city’s CRS Plan for Public Information and insurance promotion; spreading messages to homeowner associations; and using Houston’s ‘Super Neighborhoods’ as examples. Flood insurance policies have significantly increased over the past five years.”³²² It is important to note that Houston’s success came not from large capital infrastructure investments, but by significant community outreach to explain the flood risk and encourage flood insurance purchase in the whole community, not only the high-risk areas.

DHS explains the biggest expense to the National Flood Insurance Program is repetitive loss properties, thereby requiring all local hazard mitigation plans to consider repetitive loss properties in any local mitigation plan. The federal NFIP and Louisiana state homeowners would improve their resiliency through an improved Acquisition and Relocation Program since thirty percent of nation’s repetitive loss properties are in Louisiana.³²³ To improve the financial solvency of the NFIP, a well thought out RL and

³²¹ Federal Emergency Management Agency, “National Flood Insurance Program Community Rating System Newsletter.”

³²² Federal Emergency Management Agency, 4.

³²³ Federal Emergency Management Agency, “Promoting Mitigation,” 1.

SRL strategy concentrated in Jefferson and Orleans Parishes is essential. Louisiana, with almost one third of the repetitive loss properties, needs to make this a priority.

After researching CRS success from a state level perspective, it is important to look at what works in local communities. Each community is unique and CRS success requires that the whole community work together on solutions to reduce flood risk and enhance community resiliency. Therefore, it is helpful to compare some of the successful approaches taken by different communities that include unique designs and innovative funding approaches.

In Sea Bright, NJ, the community has an aggressive beach replenishment initiative with ongoing timelines. The community has further invested in the ongoing installation and rebuilding of dunes.³²⁴ The Army Corps of Engineers defines beach replenishment, also known as beach nourishment, as

the adding of sediment onto or directly adjacent to an eroding beach. This “soft structural” response allows sand to shift and move with waves and currents. Dune restoration is commonly carried out during a beach nourishment project as well. A wide, nourished beach system absorbs wave energy, protects upland areas from flooding and mitigates erosion.³²⁵

Beach nourishment is a proven method of limiting the risk of severe coastal flooding damage, which also enhances beach recreation activities and promotes tourism as an economic driver. Beach nourishment is considered a soft mitigation measure, since its effectiveness is reduced after each hurricane impacts on the shore. Beach nourishment has an additional benefit of helping maintain the natural habitat for many different animal and plant species. Therefore, beach nourishment projects are not only funded by FEMA but also the U.S. Army Corp of Engineers as well as the Department of Commerce.

Binghamton, NY provides a graphic example of how Protection of Critical Infrastructure can earn CRS credits, while improving the resiliency of a hospital.³²⁶

³²⁴ Sea Bright, *CRS Activity 510*.

³²⁵ Institute for Water Resources, “Beach Nourishment.”

³²⁶ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System: Coordinator’s Manual*, 530–2.

Lourdes Hospital was subject to flooding from the Susquehanna River, so a unique approach to mitigation was developed and constructed. In between the hospital and the river was a large surface parking lot. A large concrete parking garage was constructed as a barrier to the river flooding the hospital. The excess land between the new parking garage and the river was returned to its natural condition as an open space park, qualifying for additional CRS credit. This mitigation project brought together diverse federal partners such as the United States Army Corp of Engineers, FEMA, National Parks Service and even the Department of Health and Human Services. This hospital mitigation project is a model for the New York City Hospital Resiliency Project and for other communities to protect critical infrastructure with innovation, initiative, and ingenuity.

Wilkes-Barre, PA constructed four unique bridges over Solomon Creek that can be converted quickly to a flood configuration thereby creating additional freeboard for the flood channel. During flooding events, the bridge parapets rotate ninety degrees and interlock, forming a solid flood wall. This allows for additional flood water to stay within the channel walls while topping the bridge travel deck. During normal operations the bridge is in standard vehicle transportation mode. This unique design was not funded by FEMA but rather the Department of Transportation, which only required a five percent local match as opposed to traditional FEMA mitigation projects at twenty-five percent. This project shows the value of working with community partners such as transportation planners, well before a transportation project over a fluvial water source is designed and constructed. Further, these projects received substantial CRS credit under Leverage (projects not funded by FEMA).³²⁷

Scranton, PA had an urban neighborhood that had no surface land available for the construction of area to retain stormwater runoff and therefore designed a distinctive solution to temporally hold the overflow. In collaboration with local partners, Scranton used underground right-of-way in the street to construct storm water vaults to hold stormwater during a rain event and release it after the storm impacts have subsided; like a

³²⁷ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System: Coordinator's Manual*, 410–4.

traditional retention pond found at the site of a new big box store. This approach can be used to mitigate pluvial flooding neighborhoods determined to be at a higher risk in the planning process. Further, this innovative approach qualifies for CRS credit under Drainage System Maintenance.³²⁸

Each of these communities' approach to CRS can be compared to capacity building, first by inquiring or discovering what are strengths and weaknesses in floodplain management. Thinking or dreaming about potential solutions to weaknesses. Then designing the necessary infrastructure to enhance resiliency. Finally, creating a blueprint and financial plan to realize the dream.

In summary, using AI examples of CRS success on a macro and micro level has provided a blueprint for communities to follow to accomplish CRS success. The lessons discovered by the three most flood-prone states offer new opportunities for other communities to replicate. Further, some of the examples of unique mitigation projects undertaken by diverse communities suggest other innovative and imaginative strategies to mitigate flood risk, in their own municipalities.

B. SUMMARY OF DATA AND FINDINGS

The following findings emerge from this research on the CRS. First and foremost, that biggest flood risk is repetitive loss and severe repetitive loss properties across the nations. On a micro level it can be just one property, or on a macro level it can be defined across a whole community or even an entire state. The three most flood-prone states have many of the same hazards, but also some unique challenges based on geography. CRS participation is based on local leadership commitment to enhancing community resiliency. There is limited if any success in communities leveraging CRS activities with the NPG core capabilities.

The first—and most significant—finding of this research on the NFIP CRS program is the substantial flood risk of repetitive loss properties, and why it is crucial to

³²⁸ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System: Coordinator's Manual*, 540–1.

address for the overall success of the CRS program.³²⁹ According to FEMA, “NFIP actuaries have reported that repetitive loss is the single most important factor that affects the stability of the National Flood Insurance Fund.”³³⁰ Additionally, NFIP expects the costs of these properties to grow in the future. As FEMA notes, although only 1.3 percent of insured properties qualify as RL or SRL, those properties may well account for 15 to 20 percent of future NFIP losses in the future.³³¹ Since RL and SRL are exponentially greater financial risk to FEMA, a strategy that reduces the number these high hazard properties helps reduce repeated flood claims for the same structure and improves the solvency of the NFIP.

Second finding: the current high impact that RL and SRL properties have on the viability of NFIP strongly affects the macro (community) and micro (single property). On a macro level, CRS noted that since the establishment of NFIP, flood insurance claims for RL and SRL homes have accounted for “\$17.0 billion or approximately 30 percent of claims paid...reducing the number of RL and SRL properties, through mitigation or relocation, could reduce claims and improve the NFIP’s financial position.”³³² After assessing the ongoing costs to ensure RL and SRL properties, the CRS Program concludes that, considering the high frequency and cost of insuring these homes, buying out the properties is the most financially viable decision for the federal government.

Third finding: on a micro level, PEW reaches the same conclusions. PEW noted in its research the example of a home in Mississippi. Over the course of thirty-two years, the home experienced damages from flooding thirty-four times, resulting in claims that accounted for \$663,000 or approximately 10.5x the value of the home.³³³ By purchasing and deeding the land for preservation, NFIP would have saved 950 percent or \$594,000.

³²⁹ Federal Emergency Management Agency, 500–3.

³³⁰ Federal Emergency Management Agency, 500–3.

³³¹ Federal Emergency Management Agency, 500–3.

³³² William L. Painter, *Selected Homeland Security Issues in the 116th Congress*, CRS Report No. R45701 (Washington, DC: Congressional Research Service, November 26, 2019), 24.

³³³ Laura Lightbody and Brian Watts, “Repeatedly Flooded Properties Cost Billions,” Pew, October 1, 2020, 1.

Hence, FEMA provides a 100 percent federal grant to communities, to acquire and relocate families to a more resilient location. However, the community must first discover these properties and then dream, design, and achieve destiny.

Fourth finding: Florida is susceptible to hurricanes in its eastern coastal communities from the Atlantic Ocean, as well the western coastal counties from the Gulf of Mexico, making Florida the most flood-prone state in the United States.³³⁴ It holds 1,743,170 of the 5,000,000 flood insurance policies in the nation, representing 35 percent of all policies.³³⁵ Florida has highest participation rate in CRS programs within the nation. When reviewing all communities participating in NFIP in the state, 244 of the 468 participate in the CRS program, representing 52 percent of all communities.³³⁶ Of the state's 50 most flood-prone communities, all participate in CRS, representing the only state to have universal coverage of the most vulnerable areas.³³⁷ Further, Florida has the most flood-prone communities having attained either Intermediate or Advanced CRS recognition.³³⁸

Fifth finding: Texas is the second most flood-prone state in the United States, due to its geographic size, significant Gulf Coast shoreline, and minimally regulated past development. It holds 754,028 of the 5,000,000 flood insurance policies in the nation, representing 15 percent of all policies.³³⁹ Texas has had significantly more CRS success in the fluvial counties than its coastal counties, including the urban communities of Dallas,

³³⁴ Jarrod Heil, "10 U.S. States Where Hurricanes Hit Most Often," Universal Property and Casualty Company, accessed August 5, 2023, <https://universalproperty.com/united-states-where-hurricanes-hit-most/>.

³³⁵ Alicia Puente Cackley, *National Flood Insurance Program: FEMA Can Improve Community Oversight and Data Sharing*, GAO 20–396 (Washington, DC: Government Accountability Office, 2020), 5.

³³⁶ Federal Emergency Management Agency, "Florida: Top 50 National Flood Insurance Program."

³³⁷ Federal Emergency Management Agency.

³³⁸ Federal Emergency Management Agency.

³³⁹ Puente Cackley, *National Flood Insurance Program*, 5.

Houston and Austin.³⁴⁰ Notably, the Houston community has the most insurance policies out of any flood-prone community in the United States.³⁴¹

Sixth finding: Louisiana is not only very susceptible to Gulf Coast hurricanes but also funnels two-thirds of the nation's storm water runoff to the Ocean, thereby making Louisiana subject to the two biggest flood threats (coastal and fluvial). It is the third most flood-prone state with 318 communities participating in NFIP.³⁴² When reviewing all communities participating in NFIP in the state, 41 of the 318 participate in the CRS program, representing 13 percent of all communities. Of the state's 50 most flood-prone communities, 42 percent are not enrolled in CRS.³⁴³ Further, only 10 percent of the enrolled communities in Louisiana have attained Intermediate CRS recognition.³⁴⁴ Despite Louisiana's significant flood risk, it has a very low CRS participation rate which could be greatly enhanced by comprehensive floodplain management planning, including increased community participation, especially in flood insurance promotion. Even if action is taken immediately, over the short run many RL and SRL will flood; therefore, buying flood insurance is a short-term goal that will help family's financial resiliency, while long-term plans are discovered, dreamed about, designed, and result in destiny.

Finally, this research was unable to find any significant CRS success by communities using the NPG mission areas and core capabilities as the basis of their floodplain planning activities. However, the research did find two mission areas where there is significant opportunity to create whole community collaboration.

1. Mission Area: Mitigation—Core Capabilities: Community Resilience, Long-term Vulnerability Reduction, Risk and Disaster Resilience Assessment, and Threats and Hazard Identification.
2. Mission Area: Recovery—Infrastructure Systems, Housing.

³⁴⁰ Federal Emergency Management Agency, "Texas: Top 50 National Flood Insurance Program."

³⁴¹ Federal Emergency Management Agency.

³⁴² Federal Emergency Management Agency, "Louisiana Top 50 National Flood Insurance Program."

³⁴³ Federal Emergency Management Agency.

³⁴⁴ Federal Emergency Management Agency.

Appendix D provides a crosswalk of DHS Mission Area—Core Capabilities with NFIP-CRS activities, as point to begin the discovery process of opportunities to engage the whole community.

C. RECOMMENDATIONS

This thesis research has shown several opportunities to improve CRS participation in flood-prone communities. Each of these recommendations can be looked at as a phase of the AI. If these recommendations are used as a guide along with the appropriate Appendix references the result will be enhanced community resiliency and CRS program success.

1. Public Official Training

For any recommendations to have any lasting impact, all partners and stakeholders must have a basic understanding of the serious threat flooding is to the nation, the basic principles of the NFIP and value of the CRS. Based on the comparative analysis and findings, this thesis advances the following short term, medium term, and long-term training options for any community leader to be more effective and efficient in floodplain management and CRS success. All three levels of training begin the process of capacity building and support the first building block of AI—Discovery.

- **Short Term:** Complete the new FEMA 1.5-hour course, “The Importance of Floodplain Management for Elected Officials.” This course is designed for anyone who has community leadership responsibilities but has a limited understanding of floodplain management. The training covers the nation’s flood risk, an overview of how the NFIP works, responsibilities of federal, state, and local officials; the CRS program, as well as value of purchasing flood insurance for citizens.³⁴⁵
- **Medium Term:** Complete the free online training offered by FEMA related to CRS and NPG in Appendix E. The two primary NFIP courses:

³⁴⁵ Federal Emergency Management Agency, *The Importance of Floodplain Management for Elected Officials* (Washington, DC: Federal Emergency Management Agency, August 2023).

“How to Read a Flood Insurance Rate Map” and “How to Use a Flood Insurance Study” can be completed in only 2.5 and 1.6 hours respectfully. Further, the National Preparedness Goal course is just 2 hours. These courses will help any community leader have an excellent foundation on comprehensive floodplain management as well as community resiliency. Annex E, also provides more free online advanced supplemental trainings for future consideration through the FEMA Independent Study Program.³⁴⁶

- **Long Term:** Encourage floodplain management staff to improve their professional development by applying to FEMA’s Emergency Management Institute to complete in residence course E273: “Managing Floodplain Development thru the NFIP”; and in a subsequent year attend E 278 “NFIP/ Community Rating System” course. This training and education plan will help community officials acquire the knowledge and expertise to promote comprehensive floodplain management, improve community resiliency, and attain success in the CRS program.

2. Planning for Non-CRS Participating Communities

Any NFIP participating community that has not joined the CRS program should initially focus on just three of the nineteen functions to be able to attain CRS success. A community would be well on its way to realization by focusing first just on these three high ROI projects including elevation certificates (310), higher regulatory standards (430) and flood data maintenance (440); all with very limited capital outlay. These three functions represent 4,270 points, with an average attainment of 423 points for 95 percent of the communities.³⁴⁷ A community could easily earn a five percent discount for any homeowners NFIP premium by quickly focusing on these easy to reach projects. Simply

³⁴⁶ “DHS FEMA Independent Study Program,” Federal Emergency Management Agency, June 30, 2022, <https://training.fema.gov/IS/>.

³⁴⁷ Federal Emergency Management Agency, *National Flood Insurance Program Community Rating System*, 110–6.

put these are the easiest to implement and have very limited costs, other than professional staff time. For non-CRS participating communities implementing this new strategy learned in Discovery is the initial step in the Dream phase by executing the high ROI functions to join the CRS program.

3. Planning for CRS Participating Communities

For communities that have joined the CRS program, using the ROI template found in Appendix C would provide a roadmap to effectively improve their communities' CRS ratings. This Alternative CRS Strategy organizes projects by ROI rather than activity, providing a roadmap to quickly focus on easy to achieve projects. By using the current CRS community achievement levels, communities could reorganize each element by high ROI (points earned with limited effort required), medium ROI (moderate effort required), low ROI (significant effort required), and de minimis ROI (exhaustive effort required). This new initiative should be incorporated into the community's all-hazards preparedness plans and be updated on an annual basis as CRS success is achieved. Communities already participating in CRS understand the Dream and are now focusing on explicit and precise objectives for the Design phase. During the Design phase, the information in the ROI spreadsheet is optimized to help the community reach the Destiny phase in the future.

4. Planning for Recipients of DHS Preparedness Grants

All communities within the NFIP that receive Federal National Preparedness grant funds would benefit from leveraging complimentary activities and monetizing limited funds. Appendix D outlines a crosswalk template of the synergies of NFIP CRS elements with the DHS Core Capabilities, as a roadmap to success in CRS by effectively engaging the core capabilities as charged by NPG. Since this is such a new avenue of approach, most of the activities will be in the Discovery phase.

5. THIRA Planning for Communities with Repetitive Loss Properties

Finally, for NFIP participating communities that have either repetitive loss (RL) or severe repetitive loss (SRL) properties, those communities should integrate the required NFIP Repetitive Loss Analysis plan into the required NPG Threat and Hazard

Identification and Risk Assessment (THIRA). As both federal programs separately require this assessment of flood risk, the ROI of working in partnership and improving mitigation grant funding opportunities is high. If a community implements this recommendation, public officials will be able to advance through the AI phases quickly. Discovering the locations of the RL and SRL properties will be on a list provided annually to the community. Dreaming on how to pay for it will be simple, since FEMA pays 100 percent of all SRL properties, mitigated by the community. Design simply requires all the key partners and stakeholders to work in partnership to execute the new repetitive loss analysis plan. Finally, enhanced community resiliency is evidenced in the next THIRA—validating Destiny.

D. FUTURE RESEARCH

This research on the CRS program demonstrates the need for additional scholarly study on how to improve CRS participation in flood-prone communities. However, this thesis can be a building block to expanded CRS research in the areas outlined below.

How can Florida's CRS program success be replicated by other states? Florida's overall participation CRS rates as well the number of advanced communities that far exceed the rest of the nation. When compared to its peers both from a likelihood of flooding (Louisiana and Texas) and economic power (New York), Florida far exceeds its contemporaries. Further diligence on Florida's success could provide a roadmap for other states to follow.

Based on inconsistent CRS program participation in many large flood-prone communities, what can be duplicated from the success of Miami, Houston, and New Orleans, in cities like Hoboken, New York, Philadelphia, and others? Lessons learned from these communities can be best practices for others to implement.

Creating a comparison for communities that have had strong success achieving a low Fire ISO Score, but a high CRS classification would help understand barriers to improving a community's resiliency. As those communities that have improved their Fire ISO Score have community leadership that promotes enhancing public safety. This

exercise could be a collaborative effort of FEMA's National Fire Academy and Emergency Management Institute, which are both co-located in Emmitsburg, Maryland.

An examination of how federal Homeland Security grants provided to state and local governments under the National Preparedness Goal may complement CRS activities when executing NPG core capabilities. Through further alignment of the strategies, the community would be able to create synergies in all-hazards preparedness and community resiliency.

With increased frequency of natural disasters, and loss of life, further study is needed on why the CRS series Warning and Response has the lowest success rate, at less than twenty percent. Warning and Response CRS functions promote effective ways to increase the time available for citizens of the community to take prudent and necessary actions to safety evacuate from an impending flooding disaster. Further research is required for not only flood risk but all-hazards.

E. FINAL THOUGHTS

Communities have an ethical and moral obligation to give ample warning to citizens about pending catastrophic disaster events, even without considering the CRS point value. It is the obligation of public safety leaders and professionals to always make life safety the number one priority, with timely and accurate evacuation messages. Following Hurricane Katrina, the National Preparedness Goal (NPG) was promulgated to require all-hazards preparedness across all levels of government, within each specific emergency support function, along with redundant and sustainable emergency communications.

Simply put, the NPG aims to create “a secure and resilient Nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk.”³⁴⁸ The NPG focuses on sustaining and enhancing capabilities, just as Barrett and Frye explain that

³⁴⁸ Department of Homeland Security, *National Preparedness Goal*, (Washington, DC: Department of Homeland Security, 2015), 1.

capacity building is what makes organizations exceptional. Therefore, a community trying to incorporate the NPG in its' CRS program can benefit from the four Ds of AI.

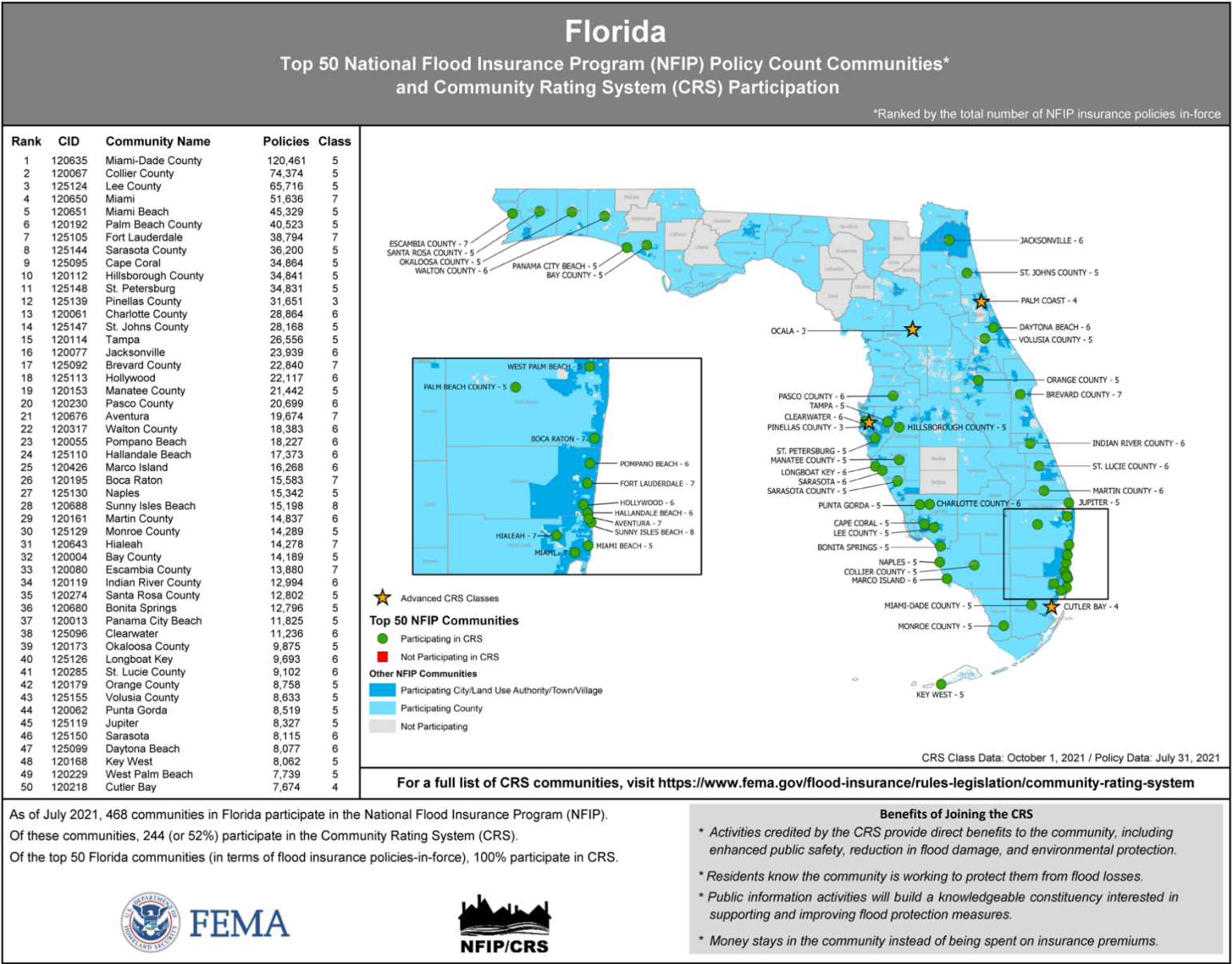
Hubbard explained that one system failing causing another to collapse is known as a cascade failure that can be visualized by a domino effect.³⁴⁹ In order to earn CRS credits under Flood Warning and Response, a community must not only demonstrate one means of effectively and efficiently communicating the urgent risk to residents, it must have redundant systems that operate independently of each other to prevent cascade failures.³⁵⁰ In light of recent events in Hawaii, it might be the opportune time for all communities to look at their emergency alerting systems, their redundancies, as well susceptibility to cascading failures—and rethink their all hazards risk management communication policies and procedures.

³⁴⁹ Douglas W. Hubbard, *The Failure of Risk Management: Why It's Broken and How to Fix It*, (Hoboken, NJ: John Wiley & Sons, 2009), 49.

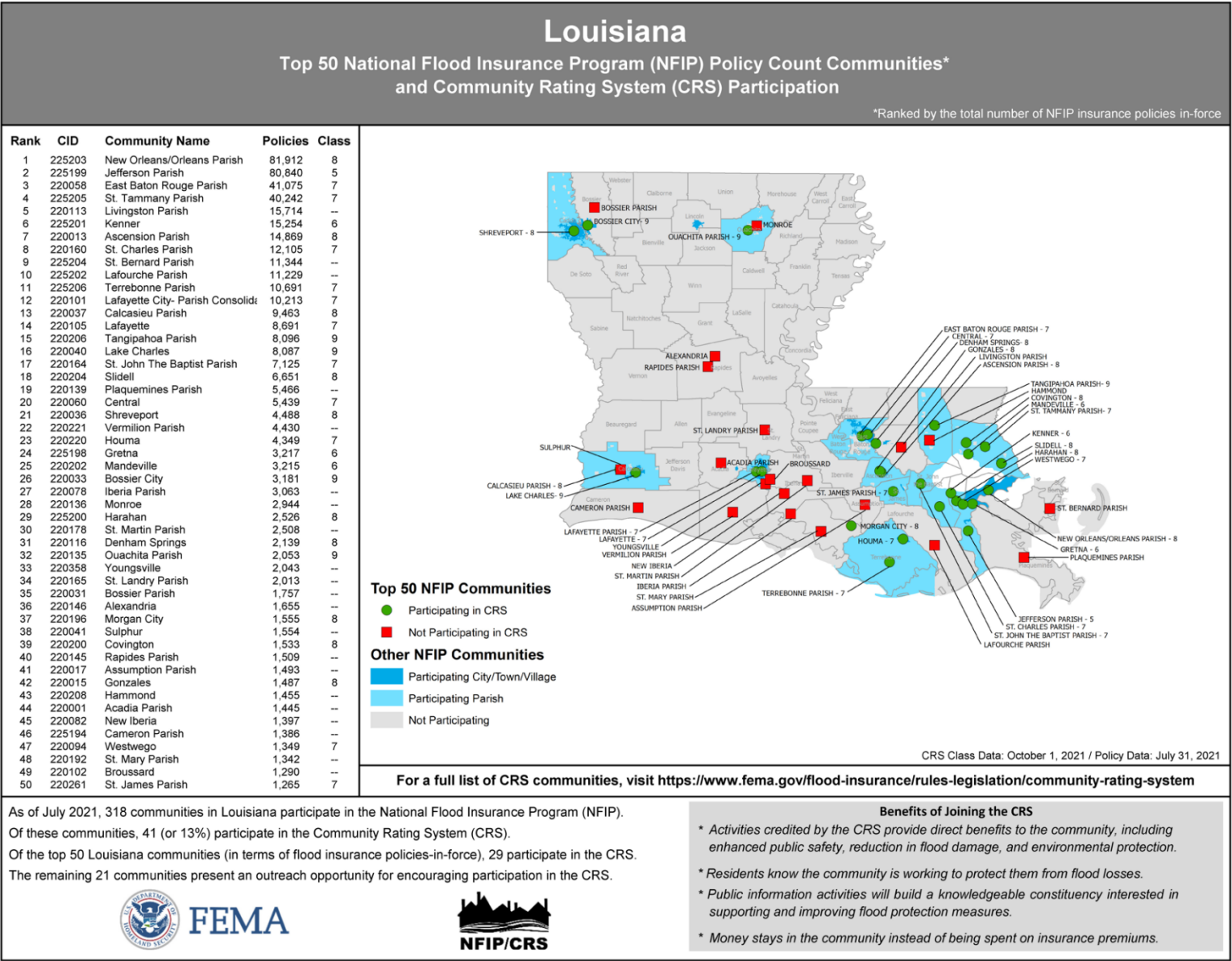
³⁵⁰ Federal Emergency Management Agency, National Flood Insurance Program Community Rating System, 610–12.

APPENDIX A. CRS STATE PARTICIPATION RATE DATA AND MAP

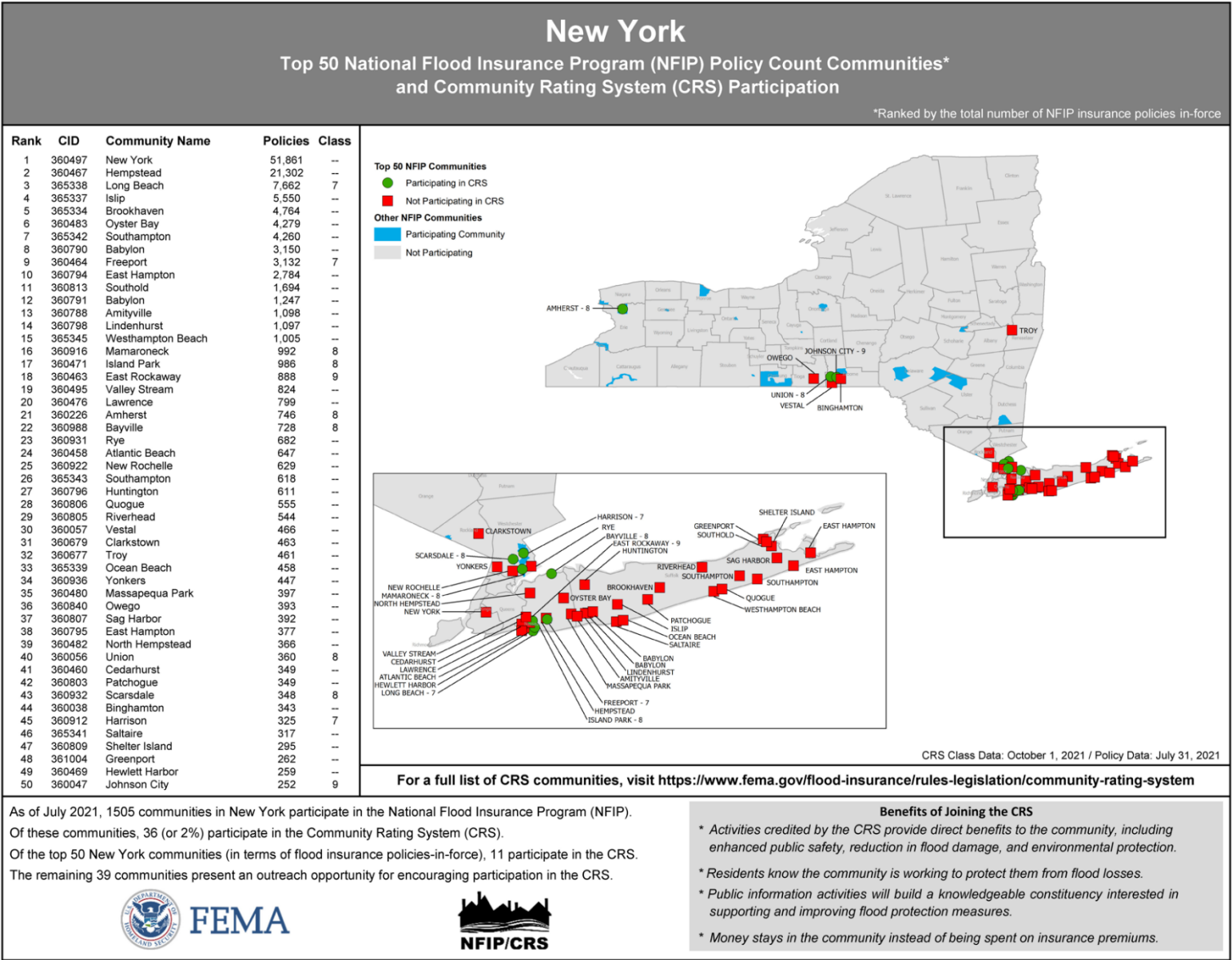
A. FLORIDA



C. LOUISIANA



E. NEW YORK



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APPENDIX B. CRS MASTER LIST OF CRS ELEMENTS 2017 AND 2021



Master List of Community Rating System (CRS) Activities and Elements

300 Series: Public Information Activities			Max	Page*	400 Series: Mapping and Regulations			Max	Page*
310 (Elevation Certificates)					410 (Floodplain Mapping)				
a	CCMP	Construction certificate management procedures	38	A-29	a	NS	New study	350	410-8
b	ECPO	Elevation Certificate on post-FIRM buildings	48	310-13	b	LEV	Leverage	N/A	410-14
c	ECPR	Elevation Certificate on pre-FIRM buildings	30	310-15	c	SR	State review	60	410-16
320 (Map Information Service)					d	HSS	Higher study standards	200	410-18
a	MI1	Providing insurance information from FIRM	30	320-8	e	FWS	Floodway standard	140	410-21
b	MI2	LiMWA/floodway info/CBRS area	20	320-10	f	MAPSH	Special hazards mapping	100	410-24
c	MI3	Other flood problems not shown on FIRM	20	320-11	420 (Open Space Preservation)				
d	MI4	Flood depth data	20	320-11	a	OSP	Preserved open space	1,450	420-3
e	MI5	Special flood-related hazards	20	320-13	b	DR	Deed restriction	50	420-12
f	MI6	Historical/repetitive flood information	20	320-14	c	NFOS	Natural functions open space	350	420-14
g	MI7	Natural floodplain functions	20	320-15	d	SHOS	Special hazards open space	150	420-19
330 (Outreach Projects)					e	CEOS	Coastal erosion open space	750	420-20
a	OP	Outreach projects	200	330-6	f	OSI	Open space incentives	250	420-21
b	FRP	Flood response preparations	50	330-9	g	LZ	Low density zoning	600	420-28
c	PPI	Program for Public Information bonus	N/A	330-14	h	NSP	Natural shoreline protection	120	420-30
d	STK	Stakeholder bonus	50	330-20	430 (Higher Regulatory Standards)				
340 (Hazard Disclosure)					a	DL	Development limitations	1,330	430-6
a	DFH	Real estate agent disclosure of SFHA	35	340-3	b	FRB	Freeboard	500	430-11
b	ODR	Other disclosure requirements	25	340-5	c	FDN	Foundation protection	80	430-16
c	REB	Real estate brochure	12	340-7	d	CSI	Cumulative substantial improvements	90	430-18
d	DOH	Disclosure of other hazards	8	340-10	e	LSI	Lower substantial improvements	20	430-19
350 (Flood Protection Information)					f	PCF	Protection of critical facilities	80	430-21
a	LIB	Library	10	350-3	g	ENL	Enclosure limits	240	430-23
b	LPD	Locally pertinent documents in the library	10	350-5	h	BC	Building code	100	430-26
c	WEB	Website	105	350-7	i	LDP	Local drainage protection	120	430-30
360 (Flood Protection Assistance)					j	MHP	Manufactured home park	15	430-31
a	PPA	Property protection advice	40	360-4	k	CAZ	Coastal A Zone regulations	500	430-32
b	PPV	Advice after a site visit	45	360-6	l	SHR	Special hazards regulations	100	430-38
c	FAA	Financial assistance advice	15	360-7	m	TSR	Tsunami hazard regulations	50	430-46
d	TNG	Training	10	360-10	n	CER	Coastal erosion regulations	370	430-48
370 (Flood Insurance Promotion)					o	OHS	Other higher standards	100	430-52
a	FIA	Flood insurance assessment	15	370-3	p	RA	Regulations administration	67	430-55
b	CP	Coverage plan	15	370-6					
c	CPI	Plan implementation	60	370-9					
d	TA	Technical assistance	20	370-12					
e	FIB	Flood insurance brochures	25	A-37					
f	FIM	Flood insurance meeting	40	A-38					
g	SCE	State-required continuing education	15	A-39					

* "A" pages refer to the 2021 Addendum to the 2017 CRS Coordinator's Manual



Master List of Community Rating System (CRS) Activities and Elements

<u>400 Series: Mapping and Regulations</u>			<u>Max</u>	<u>Page</u>	<u>600 Series: Warning and Response</u>			<u>Max</u>	<u>Page</u>
440 (Flood Data Maintenance)					610 (Flood Warning and Response)				
a	AMD	Additional map data	160	440-3	a	FTR	Flood threat recognition system	75	610-8
b	FM	FIRM maintenance	15	440-8	b	EWD	Emergency warning dissemination	75	610-11
c	BMM	Benchmark maintenance	27	440-9	c	FRO	Flood response operations plan	115	610-15
d	EDM	Erosion data maintenance	20	440-13	d	CFP	Critical facilities planning	75	610-19
450 (Stormwater Management)					e	SRC	StormReady community	25	610-21
a	SMR	Stormwater management regulations	380	450-4	f	TRC	TsunamiReady community	30	610-22
b	WMP	Watershed master plan	315	450-14	620 (Levees)				
c	ESC	Erosion and sedimentation control	40	450-19	a	LM	Levee maintenance	95	620-7
d	WQ	Water quality regulations	20	450-20	b	LFR	Levee failure threat recognition	30	620-10
500 Series: Flood Damage Reduction Activities					c	LFW	Levee failure warning	50	620-12
510 (Floodplain Management Planning)					d	LFO	Levee failure response operations	30	620-14
a	FPM	Floodplain management planning	382	510-4	e	LCF	Levee failure critical facilities	30	620-17
b	RLAA	Repetitive loss area analysis	140	510-29	630 (Dams)				
c	NFP	Natural floodplain functions plan	100	510-35^	a	SDS	State dam safety program	45	630-5
d	SDP	Substantial damage management plan	140	A-54	b	DFR	Dam failure threat recognition	30	630-6^
520 (Acquisition and Relocation)					c	DFW	Dam failure warning	35	630-8
All	All	Acquisition and relocation of buildings	2,250	520-4	d	DFO	Dam failure response operations	30	630-11^
530 (Flood Protection)					e	DCF	Dam failure critical facilities	20	630-12
	PB(R)	Retrofitted buildings	1,600	530-2					
	PB(S)	Structural flood control & drainage projects	1,000	530-2					
540 (Drainage System Maintenance)									
a	CDR	Channel debris removal	200	540-5					
b	PSM	Problem site maintenance	50	540-11					
c	CIP	Capital improvements program	70	540-13					
d	SDR	Stream dumping regulations	30	540-16					
e	SBM	Storage basin maintenance	120	540-18					

* "A" pages refer to the 2021 Addendum to the 2017 CRS Coordinator's Manual

^ Also see 2021 Addendum page A-64

APPENDIX C. CRS RETURN ON INVESTMENT SPREADSHEET

Credit Points Awarded for CRS Activities

Sorted by Return on Investment ("ROI")

May 20, 2023

High ROI Projects

Projects that require limited effort to receive points.

	Elevation Certificates ("EC")	Func. Abrv.	Points Available	Average Earned	Success Rate
312. a	Maintaining EC	EC	38		
312. b	Maintaining EC Post FIRM building	ECPO	48		
312.c	Maintaining EC Pre- FIRM building	ECPR	30		
Total Elevation Certificates ("EC")			116	38	96%

	Higher Regulatory Standard	Func. Abrv.	Points Available	Average Earned	Success Rate
432. a	Development limitations	DL	1,330		
432. b	Freeboard	FRB	500		
432.c	Foundation protection	FDN	80		
432.d	Cumulative substantial improvement	CSI	90		
432.e	Lower substantial improvement	LSI	20		
432.f	Protection of critical facilities	PCF	80		
432.g	Enclosure limits	ENL	390		
432.h	Building code	BC	100		
432.i	Local drainage protection	LDP	120		
432.j	Manufactured home parks	MHP	15		
432.k	Coastal A Zones	CAZ	500		
432.l	Special flood - related hazard regulations	SHR	100		
432.m	Tsunami hazard regulations	TSR	50		
432.n	Coastal erosion hazard regulations	CER	370		
432.o	Other higher standards	OHS	100		
432.p.	Regulations administration	RA	67		
Higher Regulatory Standard			3,912	270	100%

	Flood Data Maintenance	Func. Abrv.	Points Available	Average Earned	Success Rate
442.a	Additional map data	AMD	160		
442.b	FIRM maintenance	FM	15		
442.c	Benchmark Maintenance	BMM	27		
442.d	Erosion data maintenance	EDM	20		
Flood Data Maintenance			222	115	95%

Credit Points Awarded for CRS Activities
Sorted by Return on Investment ("ROI")

Medium ROI Projects

Projects that require moderate effort to receive points.

		Func. Abrv.	Points Available	Average Earned	Success Rate
Map Information Services					
322.a	Providing insurance information from FIRM	MI1	30		
322.b	LiMWA/flooding info./ CBRs area	MI2	20		
322.c	Other flood problems not shown on FIRM	MI3	20		
322.d	Flood depth data	MI4	20		
322.e	Speical flood-related hazards	M15	20		
322.f	Historical / repetitive flood information	M16	20		
322.g	Natural floodplain functions	M17	20		
Map Information Services			150	73	85%

		Func. Abrv.	Points Available	Average Earned	Success Rate
Outreach Projects					
332. a	Outreach projects	OP	200		
332.b	Flood response preparations	FRP	50		
332.c	Program for Public Information bonus	PPI	80		
332.d	Stakeholder delivery bonus	STK	50		
Outreach Projects			total may not exceed 350	350	87
				87	93%

		Func. Abrv.	Points Available	Average Earned	Success Rate
Flood Protection Information					
352.a	Flood protection library	LIB	10		
352.b	Locally pertinent documents in library	LPD	10		
352.c	Flood protection website (including PPI)	WEB	105		
Flood Protection Information			125	38	87%

		Func. Abrv.	Points Available	Average Earned	Success Rate
Open Space Preservation Activities					
422.a	Open space preservation	OSP	1,450		
422.b	Deed restrictions	DR	50		
422.c	Natural functions open space	NFOS	350		
422.d	Special flood related hazards	SHOS	150		
422.e	Coastal erosion open space	CEOS	750		
422.f	Open space incentives	OSI	250		
422.g	Low density zoning	LZ	600		
422.h	Natural shoreline protection	NSP	120		
Open Space Preservation Activities			2,870	509	89%

		Func. Abrv.	Points Available	Average Earned	Success Rate
Storm Water Management					
452.a	Stormwater management regulations	SMR	380		
452.b	Watershed master plan	WMP	315		
452.c	Erosion and sediment control regulations	ESC	40		
452.d	Water quality regulations	WQ	20		
Storm Water Management			755	132	87%

Credit Points Awarded for CRS Activities
Sorted by Return on Investment ("ROI")

Low ROI Projects					
Projects that require significant effort to receive points.					
	Hazard Disclosure	Func. Abrv.	Points Available	Average Earned	Success Rate
342.a	Disclosure of flood risk	DFH	35		
342.b	Other disclosure requirements	ODR	25		
342.c	Real estate brochure	REB	12		
342.d	Disclosure of other hazards	DOH	8		
Hazard Disclosure			80	14	84%
	Floodplain Management Planning	Func. Abrv.	Points Available	Average Earned	Success Rate
512.a	Floodplain management planning	FMP	382		
512.b	Repetitive loss area analysis	RLAA	140		
512.c	Natural floodplain function plan	NFP	100		
512.d	Substantially Damaged Properties Plan	SBP	140		NEW
Floodplain Management Planning			762	175	64%
	Flood Hazard Mapping	Func. Abrv.	Points Available	Average Earned	Success Rate
412.a	New study	NS	350		
412.b	Leverage (scored as a ratio of NS non federal \$)	LEV	No limit		
412.c	State review	SR	60		
412.d	Higher study standards	HSS	200		
412.e	More restrictive floodway standard	FWS	140		
412.f	Mapping special flood related hazard areas	MASPH	100		
Flood Hazard Mapping			850	60	55%

Credit Points Awarded for CRS Activities
Sorted by Return on Investment ("ROI")

De Minimis ROI Projects

Projects that require exhaustive effort to receive points.

Flood Protection Assistance		Func. Abrv.	Points Available	Average Earned	Success Rate
362.a	Property protection advice (including PPI)	PPA	40		
362.b	Protective advice provided after a site visit PPI)	PPV	45		
362.c	Financial assistance advice (including PPI)	FAA	15		
362.d	Advisor training	TNG	10		
Flood Protection Assistance			110	55	41%

Flood Insurance Promotion		Func. Abrv.	Points Available	Average Earned	Success Rate
372. a	Flood insurance coverage assessment	FIA	15		
372.b	Coverage improvement plan	CP	30		
372.c	Implementation of coverage improvement plan	CPI	60		
372.d	Technical assistance	TA	35		
372.e	Flood Insurance Brochure	FIB	25		NEW
372.f	Flood Insurance Meeting	FIM	40		NEW
372.g	State Required Continuing Education	SCE	15		NEW
Flood Insurance Promotion			220	39	4%

Acquisition and Relocation		Func. Abrv.	Points Available	Average Earned	Success Rate
522. a	Buildings acquired and relocated (SFHA ratio)	bAR	No limit		
522.b	Buildings on the repetitive loss list (SFHA ratio)	bRC	No limit		
522.c	Severe repetitive loss properties (SFHA ratio)	bSRL	No limit		
522.d	Critical facilities (SFHA ratio)	bCF	No limit		
522.e	Building located in the V zone or Coastal A(ratio)	bVZ	No limit		
Acquisition and Relocation			2,250	195	28%

Flood Protection		Func. Abrv.	Points Available	Average Earned	Success Rate
532.a	Flood protection project technique used (ratio)	TU_	No limit		
532.b	Flood protection improvement (ratio)	FPI	No limit		
532.c	Protected buildings (ratio & technique)	PB	No limit		
Flood Protection			1,600	73	13%

Drainage System Maintenance		Func. Abrv.	Points Available	Average Earned	Success Rate
542.a	Channel debris removal	CDR	200		
542.b	Problem site maintenance	RSM	50		
542.c	Capital improvement program	CIP	70		
542.d	Stream dumping regulation	SDR	30		
542.e	Storage basin maintenance	SBM	120		
Drainage System Maintenance			470	218	43%

Credit Points Awarded for CRS Activities
Sorted by Return on Investment ("ROI")

De Minimis ROI Projects

Projects that require exhaustive effort to receive points.

		Func. Abrv.	Points Available	Average Earned	Success Rate
	Flood Warning and Response				
612.a	Flood threat recognition system	FTR	75		
612.b	Emergency warning dissemination	EWD	75		
612.c	Flood response operations	FRO	115		
612.d	Critical facilities planning	CFP	75		
612.e	Storm ready	SRC	25		
612.f	Tsunami ready	TRC	30		
Flood Warning and Response			395	254	20%

		Func. Abrv.	Points Available	Average Earned	Success Rate
	Levees				
622.a	Levee maintenance, not recognized on FIRM	LM	95		
622.b	Levee failure threat recognition system	LFR	30		
622.c	Levee failure warning	LFW	50		
622.d	Levee failure response plan	LFO	30		
622.e	Levee failure critical facilities planning	LCF	30		
Levees			235	157	0.5%

		Func. Abrv.	Points Available	Average Earned	Success Rate
	Dams				
632.a	State dam safety	SDS	45		
632.b	Dam failure threat recognition system	DFR	30		
632.c	Dam failure warning	DFW	35		
632.d	Dam failure response operations	DFO	30		
632.e	Dam failure critical facilities planning	DCF	20		
Dams			160	35	35%

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APPENDIX D. CRS AND NATIONAL PREPAREDNESS GOAL SPREADSHEET

National Preparedness Goal		CRS Activities		
Core Capabilities	Mission Area(s)	Code	Elements	Points Available ¹
Intelligence and Information Sharing	Prevention / Protection		N/A	
Interdiction and Disruption	Prevention / Protection		N/A	
Screening, Search, and Detection	Prevention / Protection		N/A	
Forensics and Attribution	Prevention		N/A	
Access Control and Identity Verification	Protection			
Cybersecurity	Protection			
Physical Protective Measures	Protection			
Risk Management and Protection Programs and Activities	Protection	512a	Floodplain Management	382
Supply Chain Integrity and Security	Protection			
Community Resilience	Mitigation	522a-e	Acquisition and Relocation	2,250
Long-Term Vulnerability Reduction	Mitigation	432a-q	Higher Regulatory Standard	3,932
Risk and Disaster Resilience Assessment	Mitigation	412a-f	Flood Hazard Mapping	850
Threats and Hazards Identification	Mitigation	342a-d	Hazard Disclosure	80
Infrastructure Systems	Response / Recovery	612a-f	Flood Warning and Response	395
Critical Transportation	Response	452a-d	Storm Water Management	755
Environmental Response / Health and Safety	Response			
Fatality Management	Response			
Fire Management and Suppression	Response			
Logistics and Supply Chain Management	Response			
Mass Care Services	Response			
Mass Search and Rescue Operations	Response	632 a-e	Dams	160
On-Scene Security, Protection, and Law Enforcement	Response			
Operational Communications	Response			
Public Health, Healthcare, and EMS	Response			
Situational Assessment	Response			
Economic Recovery	Recovery			
Health and Social Services	Recovery			
Housing	Recovery			
Natural and Cultural Resources	Recovery	512.c	Natural Floodplain Function Plan	100
		422a-h	Open Space Preservation	2,870
Planning	All (X5) Mission Areas	512.a	Floodplain Management Planning	382
Public Information and Warning	All (X5) Mission Areas	612.a-f	Flood Warning and Response	395
Operational Coordination	All (X5) Mission Areas	622 a-e	Levees	235
Total CRS Points Available through National Preparedness Goal				12,786

(1) 500 points equate to a 5% discount in insurance policy premiums

<u>Mission Area</u>	<u>US DHS Capability (PPD - 8) National Preparedness Goal</u>	Comprehensive Floodplain Management	CRS	Function
Prevention / Protection	Intelligence and Information Sharing Interdiction and Disruption Screening, Search, and Detection			
Prevention	Forensics and Attribution			
Protection	Access Control and Identity Verification Cybersecurity Physical Protective Measures Risk Management and Protection Programs and Activities Supply Chain Integrity and Security			
Mitigation	Community Resilience Long-Term Vulnerability Reduction Risk and Disaster Resilience Assessment Threats and Hazards Identification			
Response / Recovery	Infrastructure Systems			
Response	Critical Transportation Environmental Response / Health and Safety Fatality Management Fire Management and Suppression Logistics and Supply Chain Management Mass Care Services Mass Search and Rescue Operations On-Scene Security, Protection, and Law Enforcement Operational Communications Public Health, Healthcare, and EMS Situational Assessment			
Recovery	Economic Recovery Health and Social Services Housing Natural and Cultural Resources			
All (X5) Mission Areas	Planning Public Information and Warning Operational Coordination			

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