

The Federal Emergency Management Agency's Community Rating System;
Evaluating its functionality as a robust climate change adaptation strategy

by

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ABSTRACT

Climate impacts are increasing in frequency and severity. As a result there is growing demand in communities around the world for immediately actionable and scalable climate change adaptation solutions. Unfortunately, there are few examples of active, and successful, adaptation projects at the present time. One promising option in the United States is the extension and modification of existing programs such as the Community Rating System (CRS), a federal flood management program. Supplementing FEMA's National Flood Insurance Program (NFIP), the CRS incentivizes communities to adopt advanced flood management practices in order to reduce community vulnerability. Informed by a review of pertinent literature, interviews, and public document analysis, this study examines whether the CRS can be used as a legitimate adaptation tool today, and in the future. Analysis suggests that the CRS, as currently structured, does not satisfy adaptation's central definitions and goals. However, the program is capable of being used to broadly build community adaptive capacity. With some modifications (increased incorporation of climate science projections and greater attention to vulnerable populations), the CRS should successfully function as adaptation solution, and is a promising tool to grow large-scale climate resilience.

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INTRODUCTION

Climate impacts are increasing in frequency and severity, demanding climate change adaptation solutions. Manifested in droughts, heat waves, wild fires, cyclones, and floods, the International Panel on Climate Change's (IPCC 2014) describes climate change as "widespread, unequivocal and consequential across the planet for both people and nature". With this consensus among scientists around the world that climate change "has changed global weather patterns, temperatures, water cycles, and sea levels" (IPCC 2013) there is growing agreement that climate change adaptation must be pursued as a tool to address climate change, as much as mitigation activities seeking to reduce greenhouse gas (GHG) emissions, starting now. Adaptation is defined as the process of altering human or natural systems in response to actual or expected climate impacts, in order to simultaneously reduce vulnerability and increase resiliency (IPCC 2014; Moser and Boykoff 2013).

One of the greatest climate threats to the United States is increased flooding. In the last thirty years, flood damages have accounted for more than 80% of federally declared disaster losses, and cost an average of \$10 billion annually. These damages and costs stress the need to identify and implement adaptation strategies today (Ceres 2010). Domestic flood events are attributed to a combination of heavy rainfall, sea level rise (SLR), strong El Nino events, atmospheric river events, and levee and dam failures. Moreover flood vulnerability and losses are expected to increase in response to more extreme weather events combined with coastal floodplain expansion--due to SLR (NAS 2010; AECOM 2012).

The clear need to improve management of flood risks and costs coincides with two important regulatory and political events. First, the country's primary source of flood insurance, the U.S. Federal Emergency Management Agency (FEMA)'s National Flood Insurance Program (NFIP), is \$24 billion in debt proving to be a financially insolvent and unstable program. Second, the Federal Government, under the Obama Administration, is taking its first meaningful steps towards addressing climate change and its impacts in announcing two climate change policies: The President's Climate Action Plan (June 2013) and Executive Order—Preparing the United States for the Impacts of Climate Change (November 2013). These policies suggest that the

federal government is primed to move and adopt adaptation strategies to reduce flood vulnerabilities and costs.

Two primary types of adaptation programs exist across the climate change adaptation landscape; “extensions of past practices and [the creation of] novel strategies for addressing uncertainty and change” (NAS 2010). Adaptation efforts can be further categorized and defined based on their action scales (from individual, to private companies, to government decisions at the local, national or international level), whether they are planned or autonomous, and anticipatory or reactive (Adger et al. 2005). Creation of new programs or “novel strategies”, also known as transformative adaptation, promise fundamental change through the introduction of new technologies or paradigm and policy shifts that align with adaptation’s values of promoting “sustainable development [and]... poverty reduction” (IPCC 2014; Moser and Boykoff 2013). The second type of adaptation efforts, the use of existing programs or policies, is also known as “mainstreaming adaptation” or the “incremental integration of climate change into ongoing governance structures” and activities (Ekstrom and Moser 2013). Through this second adaptation type, climate change and its impacts can be incorporated into a wide range of programs or sectors, including some with no overt focus on climate change (Stein and Shaw 2013). This piggybacking approach, so to speak, can be achieved with minimal costs (NAS 2010), especially compared to the alternative of creating new programs.

Feasibility of adaptation strategies, however, has been seriously challenged for both adaptation types due to a lack of political will, public support, and access to financial and technical resources. Of the two, though, the financial and support requirements for mainstreaming adaptation are fewer making it the more common (Ekstrom and Moser 2013) and a more immediately viable option. One program with potential to be mainstreamed as adaptation in the United States is the Federal Government’s Community Rating System (CRS), a complementary program to the National Flood Insurance Program (NFIP). Highly regarded for encouraging robust community flood management practices, this program has been lauded by The Nature Conservancy as “the best first step a community can take to improv[e] its resilience” (TNC 2013). The CRS program additionally has strong institutional underpinnings (is supported

at local, state, regional, and federal levels), spans the entire country, and—if able to achieve adaptation’s central requirement and goals—could be used for easily actionable and scalable adaptation.

Using three forms of analysis, this paper explores the questions of to what extent CRS helps increase community resilience, builds adaptive capacity, and is an effective adaptation tool for today, or for the future. Analysis includes: 1) Interviews with 28 CRS administrators to hear their personal accounts of if, and to what extent, climate change drives or factors into the program’s goals and implementation. 2) A review and comparison of the 2007 and 2013 coordinator’s manual to assess what percent of CRS activities can be categorized as adaptation, and whether there has been an increase in the promotion of activities that are most suited to deal with the increased risks from climate change, And 3) A literature review to assess whether participation in CRS is consistent with adaptation’s widely accepted definitions and goals. This analysis comes at a critical time when climate change can no longer be dismissed and when the U.S. is in need of cost-effective, easily actionable, and scalable adaptation solutions (Moser 2013). If CRS can be used to mainstream adaptation, it will represent a “low-hanging fruit” adaptation solution for the Obama Administration.

BACKGROUND & CONTEXT

COMMUNITY RATING SYSTEM

Program Description

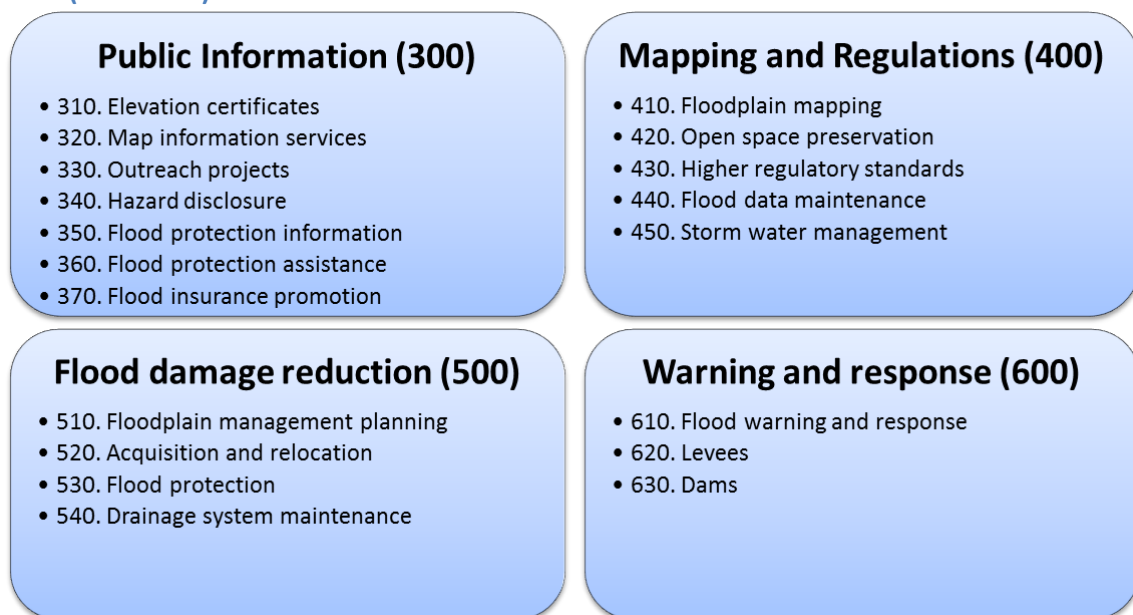
In 1990, the Community Rating System (CRS) was established to supplement the nation’s primary flood insurance program, the National Flood Insurance Program (NFIP), and to fulfill three main goals: “1) Reduce and avoid flood damage to insurable property, 2) Strengthen and support insurance aspects of the NFIP, and 3) Foster comprehensive floodplain management” (FEMA 2013). Administered by FEMA’s insurance and mitigation arm, FIMA or the Federal Insurance and Mitigation Administration, CRS is a voluntary program that offers reduced insurance premiums to fully compliant NFIP communities who adopt flood hazard mitigation activities that exceed the minimum standards required by NFIP (FEMA 2011). Possible insurance premium reductions are available at two discount levels; the larger for properties located

within Special Flood Hazard Areas (SFHAs) and more limited reductions for properties in non-SFHA zones. Potential insurance premium reductions range from 5% to 45% and are determined based on a community’s CRS ranking. CRS communities are ranked on a 10-point scale that reflects the extent of their adoption of CRS activities, with Class 1 communities receiving the greatest premium rate reductions, and Class 10, or nonparticipating, communities paying standard flood insurance rates.

CRS Activities

CRS is composed of 19 activities and 95 sub-activities (Webinar, Wesley Shaw). The 19 activities fall into four broad categories (see Figure 1) and offer a variety of “structural and non-structural” flood management options (FEMA 2011). These activities range from basic non-technical actions, such as ensuring that flood rate maps and flood hazard information is easily accessible to the public, to more technically challenging actions, such as floodplain management planning and maintenance of drainage systems.

Figure 1--CRS is composed of 19 activities that fall into four Series: Public Information (300 Series), Mapping and Regulations (400 Series), Flood damage reduction (500 Series), and Warning and response (600 Series)



Today the CRS program includes more than 1,250 communities, found in all fifty states (see Figure 2, below), and is growing by approximately 35 new communities each year (FIMA). Of

these communities, however, 55.8% are known as introductory communities (Class 8 or 9), 43.3% are intermediate communities (Class 5-7), and only 0.9% are advanced communities (Class 1-4) (FEMA 2012). As such there is considerable opportunity for communities to participate in additional activities and increase their class rating.

NATIONAL FLOOD INSURANCE PROGRAM

Program Description

Created in 1968 to fill the flood insurance void left by risk adverse private insurers (NYT 2012.b), the National Flood Insurance Program (NFIP) has provided flood insurance to more than 5.7 million home and business owners, in flood prone regions, across America. The program, managed by the Federal Emergency Management Agency (FEMA), operates on a conditional basis, where it provides home and business owners with insurance coverage *as long as* their community complies with federally established floodplain management requirements by adopting floodplain management ordinances. Floodprone properties have considerable reason to participate in the program; first to protect their property and second, because flood insurance is required for federally backed mortgages (Sea Grant 2013).

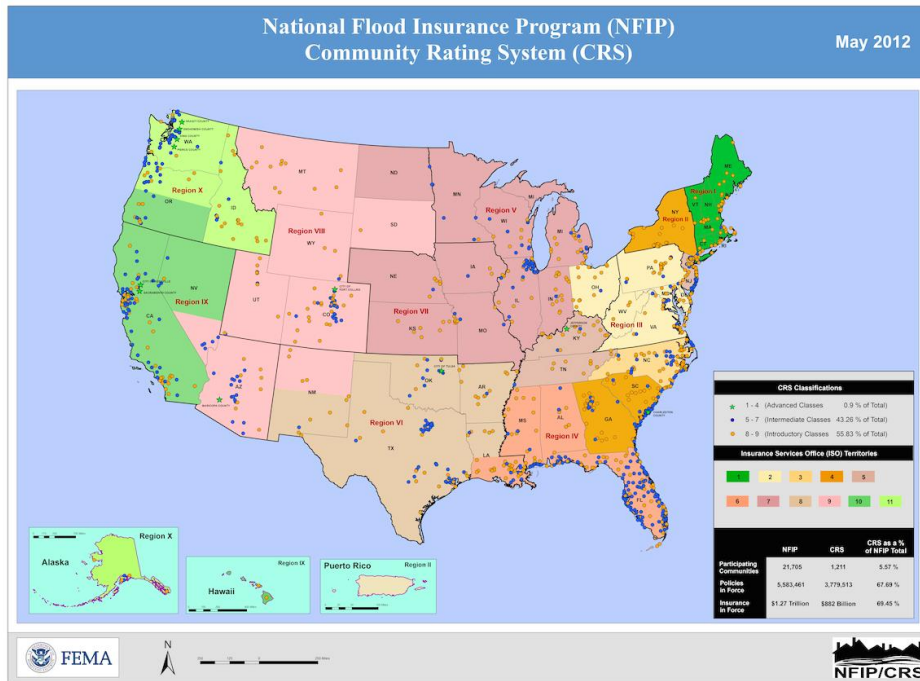
A Model of Financial Instability

The program, though, is not without its faults and has been extensively criticized for providing subsidized insurance premiums to buildings in dangerous flood zones, for using outdated floodplain maps and corresponding flood insurance rate maps (FIRMs), for lax policy enforcement, and for being fiscally unstable (NYT 2012.a). Today, the NFIP is \$24 billion in debt as a result of Hurricanes Katrina, Sandy, and other unexpectedly high flood losses, and is prime for reform.

When created in 1968, NFIP used subsidized insurance rates to encourage existing non-compliant buildings to participate in the program. Since then, many properties have benefitted from pre-FIRM and post-FIRM grandfather clauses, and have paid premiums considerably below actuarial rates. Because of these grandfather clauses, it is estimated that millions of property owners pay only 40% of their policy's true cost (NYT 2012.a). In North Carolina alone there are almost 18,000 properties in flood prone regions benefitting from the pre-FIRM and

post-FIRM grandfather clauses, and paying highly subsidized insurance premium rates (ArcGIS). To exacerbate the situation, the cost of subsidized insurance premiums falls to American tax payers who bear the financial burden of a program that pays 30% of all claims to repetitive loss properties, representing only 1.4% of the NFIP total (Blue Ribbon).

Figure 2-- Map of FEMA CRS communities: CRS communities are found in all 50 states and in both coastal and riverine floodprone areas. Florida, California, and North Carolina (in order) are home to the greatest number of CRS communities



The prevalence of government subsidized NFIP policies, coupled with the inherent risk of insuring flood prone areas, and an increase in severe recent flood events has drawn attention to the fact that the program is a fiscal time bomb with an unsustainable financing scheme. Annually, NFIP collects about \$3.5 billion in premiums, but in four of the last eight years, insurance claims have exceeded premiums leaving NFIP so deeply in debt that FEMA officials acknowledge “they will never be able to fully repay the \$18 billion [post-Hurricane Katrina] Treasury-financed loan that bailed the program out” (NYT 2012). What makes matters worse is that by simply repaying the Treasury Department interest on the debt (ranging from \$90 million to \$750 million a year), FEMA and NFIP are unable to build financial reserves for future disasters. Rightfully so, federal officials are concerned and in 2012, passed the Biggert-Waters

Flood Insurance Reform Act, to reduce the program's financial liability and to more accurately reflect true flood risks.

BIGGERT-WATERS 2012

Overview

On July 1, 2012 the U.S. Congress passed the Biggert-Waters Flood Insurance Reform Act (BW-12), extending NFIP's authorization for the next five years, with the goal of making the program more fiscally stable. The Reform Act's main modifications are to NFIP flood insurance and flood mapping policy, and the creation of a disaster reserve fund. To date, most attention to BW-12 has focused on Sections 205 and 207 which remove subsidies to subsidized policyholders; targeting high-risk and non-primary residency groups and by removing grandfather clauses. The modifications are taking effect on a tiered timeline--the first premium increase was scheduled to begin on January 1, 2013, followed by increases in October 2013, with most scheduled for 2014. Varying based on flood zones, some property owners may see as much as a 200% premium increase (Sea Grant 2013).

Beginning on January 1, 2013 subsidies were to be removed from non-primary residences in Special Flood Hazard Areas (SFHA). On this date, premiums increased by 25% and can continue to increase by 25% annually until the property owner provides an elevation certificate, demonstrating compliance with FIRM requirements. Starting on October 1, 2013 subsidies were scheduled to be removed from repetitive loss properties, from businesses in SFHAs, and from properties with flood claims exceeding the fair market value. For properties in these three categories, premiums will increase by 25% annually until the policyholder obtains and presents an elevation certificate. Premium increases were expected for a variety of other property types at unspecified dates.

Status

Since its passage, BW-12 generated considerable political controversy. In early 2014, two bills were proposed in the U.S. Senate to reverse or neuter the insurance reform legislation. On March 21st, the Senate's efforts succeeded when President Obama signed the Homeowner Flood Insurance Affordability Act of 2014 into law, thereby repealing BW-12 (FEMA 2014). The

White House's newly signed act prohibits increases in flood insurance that would reflect current flood risks and prohibits the removal of insurance subsidies; thereby gutting BW-12's more important reforms and halting progress towards stabilizing the country's primary source of flood insurance. It is reasonable to presume, then, that BW-12's proposed reforms are merely on hold. As long as NFIP is underwater, to the tune of \$24 billion or more, it is inevitable that similar reform legislation will be on the political horizon to salvage NFIP, and more accurately value flood risks.

CRS, IS IT ADAPTATION?

While CRS has been publicly marketed and promoted as a program to help achieve NFIP's insurance objectives and to reduce flood losses, it also holds the promise of achieving a secondary objective—of mitigating risks that NFIP faces due to climate change. Although not obvious from FEMA's public facing materials, the claim that CRS can be considered climate adaptation is supported, at a surface level, by the structure of its review process, by its longstanding recognition and consideration of relevant climate impacts, and by its ability to increase levels of community resilience and adaptive capacity to increasing sea level rise, higher storm surges, and extreme rain events.

ANALYSIS

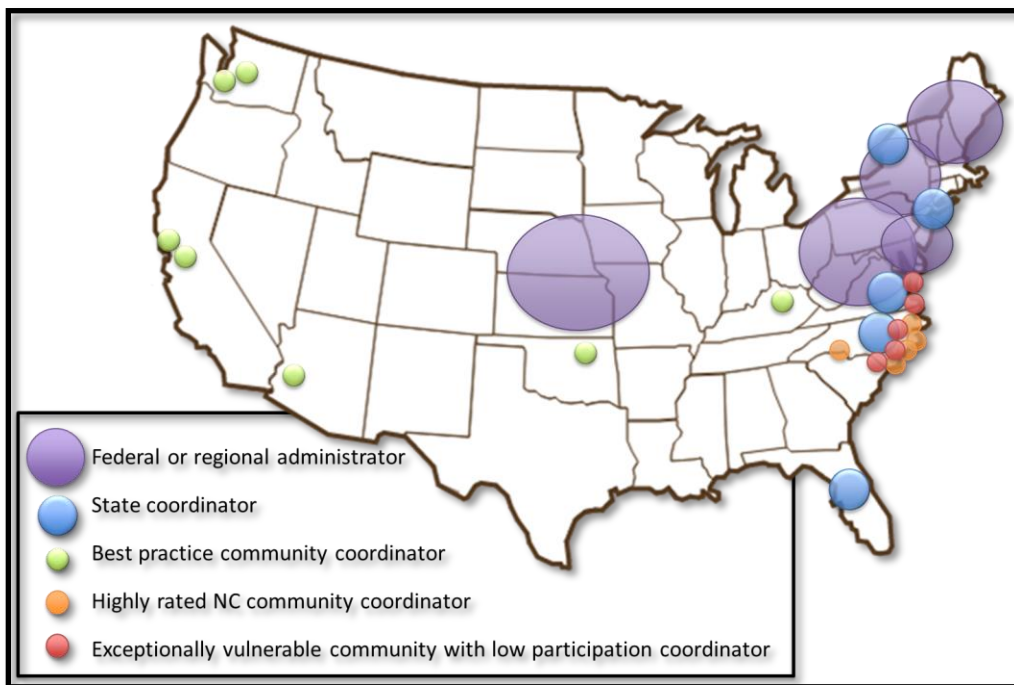
To further inform the posed research questions as to whether CRS is being used as a robust climate adaptation tool, three forms of analysis were conducted: 1) Interviews with 28 CRS administrators to hear their personal accounts of if, and to what extent, climate change drives or factors into the program's goals and implementation, 2) A review and comparison of the 2007 and 2013 coordinator's manual to assess what percent of CRS activities can be classified as adaptation, and whether there has been an increase in adaptation-functioned activities from 2007 to 2013, and 3) A literature review to assess whether participation in CRS is consistent with adaptation's widely accepted definitions and goals.

INTERVIEWS

Purpose and Methods

Between December 2013 and February 2014, 28 interviews were conducted with CRS policy makers and practitioners at all levels of U.S. government—from program management at FEMA’s headquarters in DC, to regional, state, and community coordinators. Interviews were conducted to inform the questions of 1) Whether the CRS can be considered a climate change adaptation strategy?, and 2) What motivates communities to participate in the program, and what can be done to encourage higher rates of future participation (see Appendix B for a complete list of interview questions and the Internal Review Board (IRB) interview protocol).

Figure 3-- Geographic distribution of CRS administrators (at the federal, FEMA regional, state, and community level) were selected as interviewees. They were distributed across the country representing coastal and riverine floodprone areas. Interviewees were concentrated in North Carolina and the east coast



To represent the range of experiences and viewpoints, potential interviewees were selected to fall into one of five interview types: 1) Federal or regional administrator, 2) State coordinator, 3) Best practice community coordinator, 4) Highly rated North Carolina community, and 5) Exceptionally vulnerable communities that do not participate in the CRS program, or participate at an introductory level. Figure 3, above, shows the distribution of interviewees. North Carolina

and east coast states were identified as focus areas on the basis of three factors. First, that the coastline from Cape Hatteras, NC to Boston, MA is believed to be a sea-level-rise hotspot (Sallenger et al. 2012). Second, that this area includes states recently impacted by Hurricane Sandy. Third, with 81 CRS communities, North Carolina ranks third in the country in terms of CRS participation (following Florida and California). Additionally North Carolina's floodplain and coastal hazard management planning efforts have recently been influenced by a combination of unique political and social factors. Non-focus area interviewees, mostly represent advanced communities (Class 1-4), also referred to here as best practice communities. These include communities from California, Washington state, Arizona, Oklahoma, and Kentucky.

Interviews consisted of between 10 and 15 questions, depending on interview type and lasted between 12 and 40 minutes each. Because not all questions were posed to all 28 interviewees, some questions have fewer (26 or 27) responses.

Interview questions were designed to be neutral and to not "prime", or direct, respondents to certain answers (see Appendix B). However, interviewees were made aware that the purpose of the interviews was to inform the question of whether the CRS program has been influenced by climate change and if the program is be considered adaptation (the term adaptation was not present in the IRB request letter but was mentioned in interview introductions). In this way, interviewees may have been "primed" to speak on the topic of climate change and adaptation more than they would have absent the prime. Two of the last questions posed during the interviews directly asked interviewees how frequently climate change is discussed in their line of work and whether it's considered a serious issue. These questions are considered direct prompts for interviewees to speak to climate change.

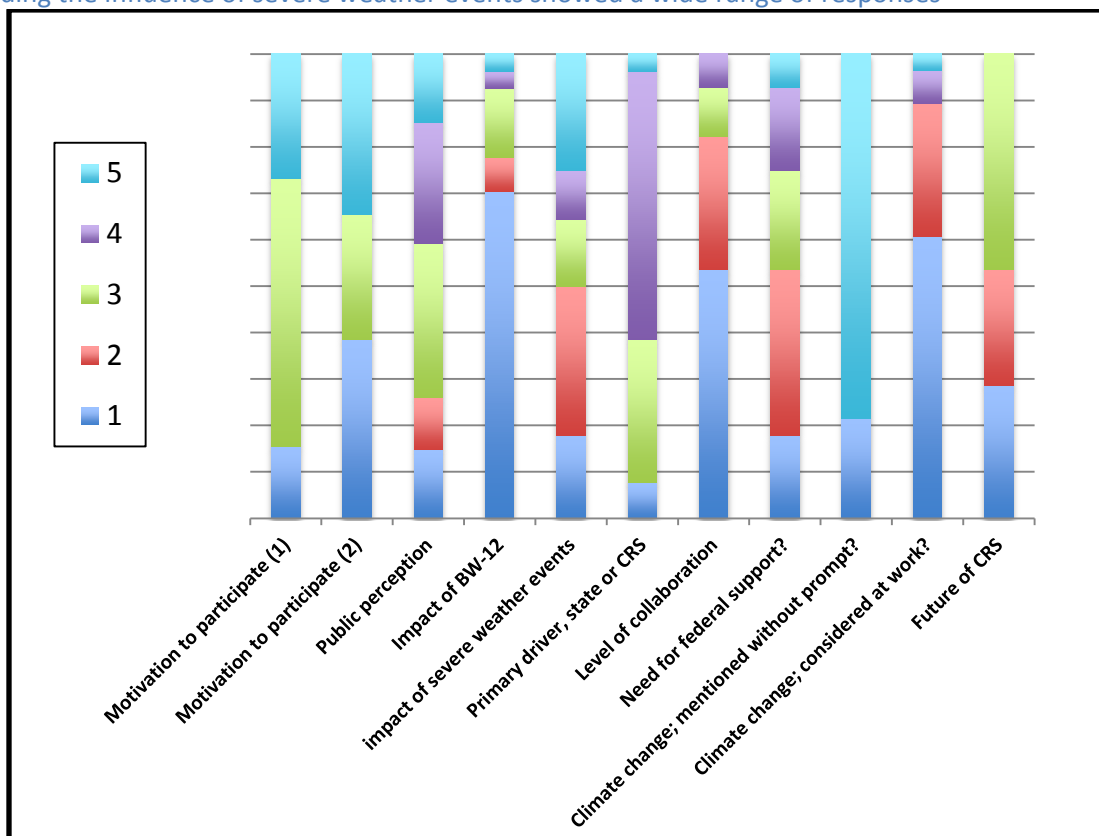
Another possible prime was made with the question "What is the public's perception of the program? Is it a program that they're proud of, or does it serve a more administrative function of providing insurance rate reductions?" This question could have primed respondents to respond affirmatively that the program is a source of pride. However, it does not appear that either prime had a strong influence on responses. Climate change was mentioned (pre-prompt) in only 20% of the interviews despite the fact that interviewees had been informed twice that

climate change was the focus of the interview. Similarly, in the case of the community pride question, only 15% of respondents reported community pride as a motivating factor?

Interview Analysis

Eleven data points were derived from the interviews, and range in topics from what motivates communities to participate in the CRS program to whether climate change is treated as a concern in their line of work. Considerable differences in opinions and experiences were expressed. Much of this variation can be attributed to the interview identity. For instance, it is expected that administrators at the federal or FEMA regional levels are more familiar with federal climate policies than administrators from introductory CRS communities. As a whole, the 28 interviews provide a qualitative narrative of how CRS administrators associate the CRS program with climate change adaptation.

Figure 4-- Interview responses were converted to a numerical point scale to compare where coordinators show consensus in responses. For example, almost 80% of respondents reported increased interest in the program since the passage of the Biggert-Waters 2012 legislation. In contrast, question 5 regarding the influence of severe weather events showed a wide range of responses



Interview responses were categorized on a five-point scale for each of the eleven questions. Categorization was used to identify trends, consensus or divergences, in responses. Figure 4 (above) shows that some consensus was seen in six of the eleven questions; consensus is defined as when 50% or more respondents provided similarly categorizable answers. Questions where consensus was seen include: Question 1- (Motivation to participate), Question 4-(Impact of BW-12 on interest in the program), Question 6- (Whether state, county, or CRS guidance was the primarily driver for a community's flood management activities), Question 7- (Degree of collaboration with other communities), Question 9- (How frequently is climate change and its impacts are discussed?), and Question 10- (To what extent, climate change is taken seriously).

Data Point Responses

Participation motivations

Motivation to participate in the CRS program ranges from interest in reducing a community's flood vulnerabilities, to saving costs by reducing flood insurance rates, to political motivations such as representing constituent interests and to improve the community's public image. All respondents stated more than one reason for participation, demonstrating widespread perception that the program helps communities achieve multiple goals. Communities' primary participation motivation was to reduce insurance costs (15 responses), followed by ability to reduce flood vulnerabilities (7 responses), and third political motivations (4 responses). Secondary motivations ranked political motivations first (10 responses), followed by reduction of flood vulnerabilities (9 responses), and cost reduction as third (7 responses). In all, cost reduction was the most common response where 22 of 26 interviewees listed it as one of their two motivations. Flood reduction and political motivations also proved to be significant drivers, with approximately equal influence (16 and 14 responses respectively). A good example of a community with many reasons for joining the program is Tulsa Oklahoma; one of the first-to-join and highest rated CRS communities (Class 2) in the country. Its political motivations sprang from the fact that in the 1970s and 1980s Oklahoma experienced more federally declared disasters (including severe storms, tornadoes, and flooding), and related damages, than any other state. The state's high level of vulnerability and exposure spurred Tulsa to "join the

program in the interest of protecting our citizens and to stop the cycle of flood, rebuild, flood, rebuild” (Interview, Bill Robison City of Tulsa CRS Coordinator).

As a flood management program that financially rewards participating communities with insurance rate reductions, flood vulnerability and reduced insurance costs were expected to be the strongest drivers. However it appears that participation in the program is also politically valuable. A common response was that participation in the federal program and its associated guidance ultimately gives community floodplain managers and administrators a mandate and authority in developing their flood and coastal management practices than they would have in the absence of the CRS guidance. The increased flexibility and authority was attributed to federal backing which helps prevent pushback to changes from constituents, helps communities uphold standards, and “reduce backsliding”.

Community perception—is participation a source of pride or a means to insurance rate reductions? The vast majority, or 20 of 27 interviewees, conveyed that participation in CRS is not a source of pride for their community. In most of these cases (13 out of 28 interviews), respondents reported that the public was ‘mostly unaware’ or ‘ignorant’ of the program. This point was surprising given that education and outreach are two of the most commonly used CRS activities. It is possible that the public education materials do not make mention of the CRS program? On the other end of the spectrum, seven respondents reported that the program provides a real source of pride for their communities. This response came from all five-interview types (federal to local administrators), and pride in the community was most often connected to competition between communities and when communities were presented with recognition placks. Of the seven best practice communities, who are the highest rated and thus expected to express the most pride, only one community (Sacramento, CA) reported a sense of pride.

Increased program interest since the passage of Biggert-Waters 2012

Interviewees responded with consensus to the question of whether communities have seen increased interest in CRS since the passage of the Biggert-Waters 2012, almost 80% of responded affirmatively that interest has increased. Interviewees stressed that as flood

insurance premiums are expected to move to full actuarial rates—Biggert-Water’s central reform to NFIP—the public, real estate agents, banks, and local politicians are desperate for fixes. In the case of Florida, where almost 40% of the nation’s NFIP policies are located, some policies are slated to cost as much as \$68,000, and as a Florida Floodplain manager warned, “could shut the state down”. Motivated by Biggert-Waters, states like Florida are turning greater attention to the CRS program—even hiring additional staff-- as a way to reduce expected costs. For some non-participating CRS communities, like Virginia Beach, the expected cost of BW-12 is great enough for them to reevaluate their status, and begin the application process. According to a FEMA regional coordinator, this surge of interest in CRS is because it’s considered the only “carrot” or proactive action communities can take to temper Biggert-Water’s expected financial blow.

Of the six interviewees who did not experience increased interest or who were unsure, five represent North Carolina communities. This may be because some of these administrators serve tourist and vacation- property communities who are less active or aware of the implications of BW-12. Interestingly, the same five North Carolina administrators were also some of the least interested in, or able, to speak to the question of how, or if, the CRS program might be impacted by federal climate change and adaptation policy. This leads to the possible conclusion that this group—representing both wealthy and poor communities-- is less influenced by external pressures (such as discussion of federal policy and regulations) than interviewees from other states. This bias is important in these research results because almost one third, or nine of the 28 interviewees, were from North Carolina communities.

Has program interest increased in response to severe weather events?

Interviewees were asked one of three questions based on their represented region: 1) Has increased interest be seen since a local exceptionally severe event?, 2) Since Hurricane Sandy?, or 3) Since Hurricane Katrina? Since interviewees from California, Arizona, or Washington State were less likely to have been influenced by Hurricanes Katrina or Sandy, they were asked about local storms and weather events instead. Half of all respondents reported that yes, they had noticed increased interest in the CRS program following especially severe storms. Notably, five

of these, or almost 20% of total respondents reported that severe storms had motivated their community to enhance their flood management efforts. Of all interviewees, regional FEMA coordinators were the most likely to respond affirmatively, that they had seen increased interest, and acted on it; specifically from FEMA regions located in the northeast.

The other half of interviewees responded either that severe weather was not connected to increased interest, that they were unsure, or that while there had been an increased number of severe storms, they do not think CRS would serve as an appropriate solution.

Primary driver of flood management activities

Interviewees were asked what percentage of their floodplain management activities could be attributed to the CRS program, versus state regulations, to get a sense of the extent that CRS shapes community floodplain management programs. Almost two thirds of respondents said that state and local regulations are the primary driver, and that only 5-10% of their flood management activities were directly attributed to the CRS program. The most commonly attributed activities were outreach, education, and reporting. Based on responses from the second question about community pride, though, it's unclear how effective outreach and education efforts are since most respondents reported that the public was mostly unaware of the program. The 16 responses that state regulations are the primary driver included six of the seven CRS best practice communities. The other third of respondents reported that CRS and state/ local planning equally motivate their flood management activities, and emphasized CRS's value in providing flood management guidance and reinforcing floodplain managers' authority.

Prominent in these discussions was the topic of uniform minimum credits (UMC), or the number of federal CRS points that communities are automatically eligible for based on meeting state flood management ordinances and requirements. For instance, communities from states with robust flood management regulations like California, New Jersey, and Washington are able to enter the program with automatically between 500 and 720 points, varying based on state and type of flood risk—riverine or coastal. States with less robust flood requirements on the other hand, like Virginia, will only enter the program with 120 points. Variations in UMCs show that some states have advantages over others when it comes to joining the CRS program. On

the other hand, it is also communities who are eligible for fewer UMCs who attribute CRS as a greater driver than in communities who are eligible for more UMC points. Interviewees from states like Washington and Virginia, for instance, with minimal floodplain management requirements, were the only respondents to describe CRS as their flood management programs' main driver. So it seems that the federal program motivates adaptation behaviors when state programs are non-existent.

Collaboration and exchange of best practices

All but two of the respondents reported they that share best practices with neighboring communities via a mix of users groups, floodplain managers groups, and FEMA offered conferences, webinars, and trainings. The majority engage with other communities using two or more of the above mentioned coordination tools. Interviews suggest that communities are especially likely to share best practices if they share watersheds (California communities) or are part of the same county. Towns within Dare County, North Carolina, for instance, employ a strong collaborative network; Kill Devil Hills, Kitty Hawk, and Nags Head (towns of Dare County) all described the collaborative environment. Exceptional forms of coordination are present in states like North Carolina, where the NC Association of Floodplain Managers established a mentoring program for introductory communities (Interview, Bill Tingle, Charlotte-Mecklenburg Floodplain Administrator).

A common theme in responses to this question was mention of newly formed CRS user groups. CRS user groups came up in 9 of 28 interviews, and represent a concerted push FEMA is making to encourage, and increase, coordination and collaboration between local communities.

Need for increased federal support

Respondents are eager to see one of two types of assistance: first, grant money to help with programmatic administration costs, e.g. funds for staff budgets or to develop record-keeping systems (Interview, Virginia Beach Administrator); and second, changes to the application process to make it easier for small and resource strapped communities to join.

Presently, the program is structured to favor communities with large populations and large numbers of NFIP policies because aggregate NFIP rate reductions increase with more NFIP policies (FEMA 2011). For small communities with few NFIP policies, like many northeast towns, the financial calculus of balancing administrative costs with potential financial benefits to the community has historically swung toward not joining the program. In the case of Virginia Beach, even though the community is home to 573 repetitive loss properties, officials are still evaluating whether CRS participation would be cost effective given that participation would require Virginia Beach to hire additional staff and develop a new record-keeping system (Interview, Virginia Beach Administrator). Now that this economic calculus is changing, due to Biggert-Waters and the prospect of severe insurance increases, more communities will join but will require initial funding and resources to do so. Initial administrative requirements to join the program are large requiring staff resources and time. Once a community has joined the program, technical and administrative requirements increase progressively as communities advance in class with large threshold requirements for communities to advance to classes 6, 4, and 1. The fact that advancing in class requires considerable staff, technical, and financial resources from communities explains why most CRS communities rank as either intermediate (Class 5-7) or introductory classes (8-9); 43.3% and 55.8% respectively (FEMA 2012).

The extensive nature of CRS administrative requirements are highlighted by the experience of two Washington communities where more than 2000 hours of staff time were required to prepare pre-audit documentation (Interview, Snohomish County, Class 4) followed by a lengthy audit that lasted two weeks (Interview, Pierce County, Class 2). Time, staff, and resource requirements are thus considerable and prove to be prohibitively high for communities such as Tyrrell and Pender Counties, in North Carolina, who have not joined the program, even though they are in full compliance with NFIP requirements. Moreover, these considerable requirements coincide with the fact that states and communities are seriously constrained by shrinking budgets to the point that some are forced to make cuts to critical functions, like reducing staff size.

It is therefore understandable that most recommendations for federal assistance were to remove certain administrative barriers and to simplify the application process; perhaps by creating a two-tiered application system where entrance requirements are commensurate with a community's size and number of NFIP policies. Additional recommendations came in the form of increased funds for hazard mitigation, public education, and funds for property buy-outs in repetitive loss areas.

On the other side of the spectrum, a quarter of respondents emphasized that FEMA has recently taken important steps to facilitate the application process and the administration experience. Tim Murphy, an administrator to the Flood Control District of Maricopa County, Arizona, shared that "CRS has recently become more hands on and is offering more tools and resources, thereby making the program more user friendly" (Interview, Tim Murphy). This effort seems to have manifested in the wide adoption of user groups, described above. From the vantage point of FEMA leadership, the need for robust entry and advancement requirements is understandable. Recognition and insurance rate reductions are achieved when communities *go above and beyond* the NFIP requirements, and the program loses much of its value if it were to become another form of government handout.

Climate change, mentioned without prompt?

Even though interviewees were primed twice that a central focus of the interviews concerned climate change and adaptation, climate change or sea level rise were only mentioned pre-prompt in 6 of 28 interviews, or twenty percent of all interviews. In the six instances when climate change was mentioned, it was in context to climate change plans or to comment on the fact that climate change isn't adequately factored into local planning efforts. In the vast majority of interviews, though, climate change wasn't mentioned until interviewees were directly asked 'if climate change is discussed in their place of employment and is relevant to their line of work'. This seems to align with the mindset of many floodplain managers who communicated that although CRS and floodplain management can be used for adaptation in the future, much of today's floodplain management is focused on meeting flood management

ordinance compliance requirements that reflect existing risks (Interview, Ken Vafier, Planning and Zoning Supervisor, New Hanover County).

Is Climate Change discussed at work and is it taken seriously?

Even though climate change was not raised, pre-prompt, in most interviews, sixty percent of interviewees reported that climate change is relevant and discussed in their line of work, and almost ninety percent believe climate change to be a serious issue posing real threats to their community. Three respondents reported that climate change is neither discussed at work nor relevant to their work, or did not comment on whether climate change is a serious issue. One reoccurring theme was that acknowledging the seriousness of climate change does not directly correspond with a willingness, or ability, to act. In at least three interviews, administrators recognized climate change as a real and serious threat but described a type of paralysis in not knowing how, or wanting to, factor climate change into planning because of scientific uncertainty and emotional distancing.

Future of the CRS program; might climate change and adaptation policies influence the future of the CRS?

Responses to the question of whether climate change and adaptation policies (similar to those recently issued by the White House) might shape the CRS program in the future are divided into three categories: 1) Interviewee held an informed position, 2) Interviewee could conjecture about CRS's future, and 3) Interviewee had no opinion and had given no thought to the program's future. The eight interviewees who fell into the first category were unanimous that climate change would be more aggressively factored into future coordinator manuals and that a more realistic approach to climate change would be made in the 2016 manual (Interview, Berry Williams, CRS consultant). Additionally, there was agreement that the program will continue to grow in size and importance resulting from more frequent and severe climate impacts (Interview, New York Floodplain Administrator). Not surprisingly, seven of the eight respondents who could speak confidently on topic of CRS's future were program administrators at the federal, regional, or state level. Presumably, these individuals have greater access and more frequent discussions about the program's political drivers and future.

COORDINATOR MANUALS' REVIEW & COMPARISON

CRS Coordinator Manuals serve as the comprehensive guidance documents on how the CRS program should be administered and reflects the program's evolving drivers and priorities. As such, to ascertain to what extent the program is adaptation and which of the 19 CRS activities can be considered adaptation, or are future-looking, a review of the 2007 and 2013 manuals was conducted. Composed of two steps; first reviewing how frequently climate change and adaptation themed terms were used in the manuals, and second, comparing the point allocation for CRS activities, and whether there was an increase or decrease of points allocated to activities that help reduce stresses associated with climate change.

To inform the 2013 manual revision, in 2011 FIMA and the CRS Task Force released "A Strategic Plan for the Community Rating System"—a document heavily focused on the increasingly severe climate change impacts and recommending increased attention to flood loss reduction and to mitigation activities including increased freeboard standards and greater preservation of open space (FIMA). To this point, the Strategic Plan opened with a quote from then NOAA Administrator, Jane Lubchenco: "Climate change is real. It is here, and it is happening now, in our backyards and around the globe.", seemingly presenting a clear position that action was needed to address mounting climate impacts. Because of this effort, I expected to see a marked increase in adaptation activities and point allocation from 2007 to 2013.

Climate Change and Adaptation Themed Terms

Based on widely accepted adaptation definitions and goals, nine climate change and adaptation themed words or phrases were selected as search terms, to evaluate how prevalent adaptation references were in the two manuals. The terms include: Climate change, Sea level rise, Adaptation, Forward looking or Future looking, No adverse impact, 500-floodplain, Resilience or Resilient, Anthropogenic, and Manmade (Moser and Boykoff 2013; Adger et al. 2005).

A review of the 2007 manual was first conducted to establish a baseline for comparison to the 2013 manual. Overall, the review and manual comparison found that use of adaptation-themed words was extremely rare in both 2007 and 2013 manuals. For instance (see Figure 5, below), the 2007 manual mentions only two of the seven terms (Future conditions and 500-year flood),

and the 2013 manual mentions six of the nine terms (Climate change, Sea level rise, Forward looking, No adverse impact planning, 500-year flood, and Manmade). Neither plan ever includes the terms adaptation, anthropogenic, resilient or their derivatives. Moreover, the frequency at which the terms that *are* used is rare in both editions. In the 2007 manual, only three activities, and one class advancement requirement in the 2007 manual, reference any of the adaptation-themed terms. Of these four instances, only the class advancement requirement (to advance to a Class 4 community) is mandatory. In the case of Activities 410, 430, and 530 (Floodplain mapping, Higher Regulatory Standards, and Flood Protection respectively), communities can participate in, and earn points, for these activities without considering future conditions or 500-year floodplains, but will earn extra points if future conditions are considered.

Albeit few, there is increased use of adaptation-themed-terms in the 2013 manual. Most notably, here, adaptation terms are referenced relevant to seven activities (Activities 320, 340, 410, 450, 430, 440, and 510)—four more than in the 2007 manual. Additionally, adaptation terms are present in two Class advancement requirements; to Class 1 and Class 4. These requirements state that advancing communities must protect critical facilities located within 500-year floodplains, factor SLR into flood elevation requirements, and avoid maladaptive actions through “no adverse impact planning”. The most common adaptation themed term in the 2013 manual is ‘sea level rise’, and appears relevant to four activities and one class advancement requirement. This is notable given that sea level rise was not mentioned in the 2007 manual.

Point Distribution to CRS Activities

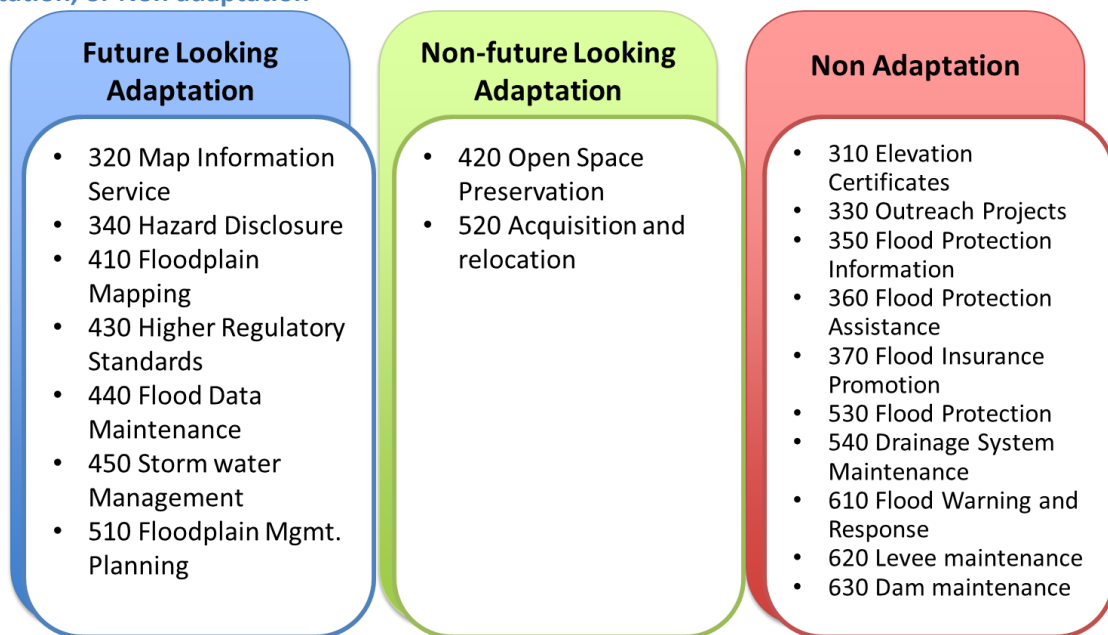
Each CRS activity is associated with a point value that represents the maximum points that a community can earn for adopting that measure. Between 2007 and 2013, there was an overall reduction of 2,546 points where 14,850 were available through the 2007 manual and 12,304 points are available through the 2013 manual, and where all activities experienced a change in their possible point allotments. A comparison of the point distribution is therefore important to gauge if point reassignments were made in favor of activities that help reduce climate vulnerabilities.

Figure 5--Comparison of climate/ adaptation terms (2007 and 2013 Coordinator Manuals)

2007	Activities				
Forward looking/ Future conditions	410. Inclusion of future hydrological conditions				
500- year flood/ 500-floodplain	Class 4. Ensure that critical facilities are outside 500-year flood-zones	430. Regulations must be enforced to 500-year floodplain	530. More points are available to higher floodplain standards		
Terms not mentioned: Climate Change, Sea Level Rise, Adaptation, "No adverse impact", Resilience/ Resilient, Anthropogenic, Manmade					
2013	Activities				
Climate Change	320. Must provide information re future flood risks due to CC and SLR	340. Disclosure to prospective buyers re potential flooding due to CC and SLR	510. Flood Hazard assessment that considers CC or SLR	Class 4 Prereq: Must demonstrate program will minimize harm from future flooding	
Sea Level Rise	320. Must provide information re future flood risks due to CC and SLR	340. Disclosure to prospective buyers re potential flooding due to CC and SLR	410. Regulatory map based on future hydrology and SLR	510. Flood Hazard assessment considers CC or SLR	Class 1 Prereq: Use regulatory flood elevations in V and A Zones reflecting SLR
Forward looking/ Future conditions	410. Regulatory map based on future hydrology, including SLR	450. Storm water management includes future peak flows	510. Flood management plan considers future flooding conditions		
"No adverse impact planning"	Class 1 Prereq: Property owners must not negatively impact another				
500- year flood/ 500-floodplain	410. Flood maps show 500-year flood elevations and impacts	430. Construct critical facilities outside of 500-year floodplain	440. Show 500-year floodplain elevations and boundaries	Class 1 Prereq: Critical facilities protected to 500-year flood level	
Manmade	Recognition that floodplains change from natural and manmade changes				
Terms not mentioned: Adaptation, Anthropogenic, and Resilience/ Resilient					

Some of the most significant changes are the introduction of a new activity, 370--Flood Insurance Promotion as well as serious revisions to activities 620 and 630 to improve levee and dam maintenance and safety. The largest point increase was made to Activity 420-- Open space preservation, which gained 1120 possible points; more than doubling previously allotted points. Other increases, albeit of a lesser magnitude are seen in Activities 510, 540, and 610; Floodplain Management Planning, Drainage System Maintenance, and Flood Warning and Response respectively. More common though, was for activities to lose points. The most considerable of these (lost 30% of points or more) are seen in Activities 520, 530, and 410; Acquisition and relocation, Flood protection, and Floodplain mapping respectively. These represent serious point reductions where Activities 520 and 530 lost almost 60% of their points and where Floodplain mapping lost 40% of its points. As can be seen in Figure 5 (above), Activity 410. (Floodplain mapping) is one of the seven activities where adaptation-themed terms are present.

Figure 6—The 19 CRS activities categorized as either Future-looking adaptation, Non-future looking adaptation, or Non adaptation

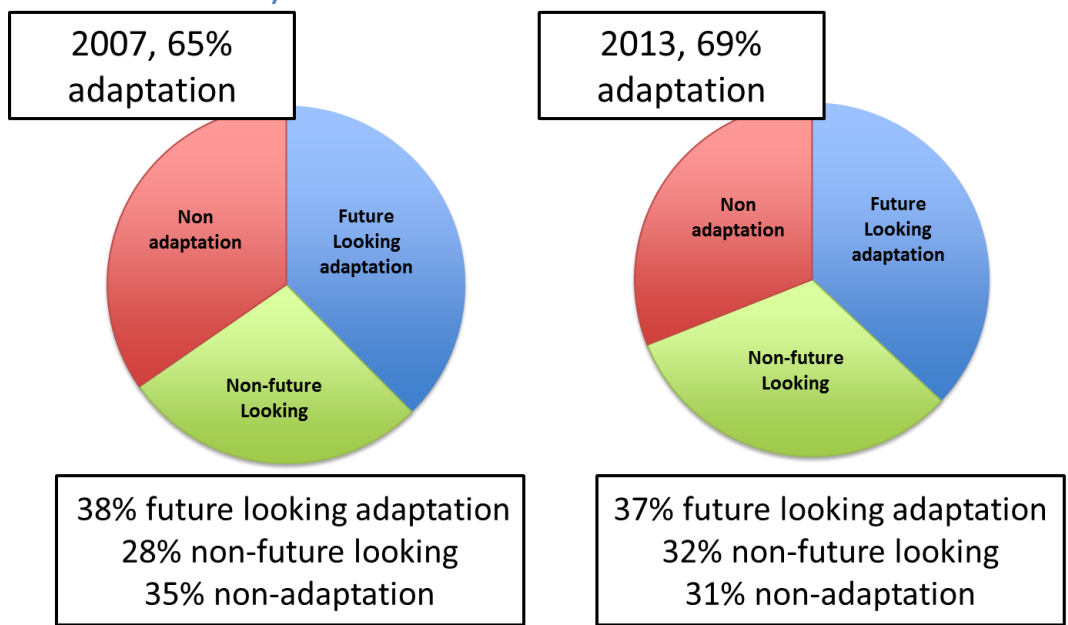


In broader terms, though, what does the point reallocation mean for the program’s adaptation functionality? Here it’s necessary to clarify that activities with adaptation functions are not limited to activities associated with climate change and adaptation themed terms (see previous section). For instance, Activities 520 (Acquisition and relocation) and 420 (Open Space

Preservation) are widely recognized as adaptation actions. Acquisition and relocation falls into one of three broad adaptation categories of retreat and resettlement (Macintosh 2012). Open space preservation helps reduce the sensitivity of a system and increases resilience, considered two of adaptation’s most critical functions (Adger 2004). Furthermore, all 19 activities can help communities increase their adaptive capacity, a form of soft adaptation.

Definitional distinctions of this sort begin to complicate comparisons between the 2007 and 2013 manuals. For this reason, the 19 activities were categorized into three groups: 1) Future-looking adaptation (with references to climate or adaptation themed terms), 2) Non-future looking adaptation (widely accepted as adaptation even though no climate or adaptation themed terms are present in its description), and 3) Non adaptation. Activities that are neither commonly accepted as adaption (per Georgetown Climate Center and National Academy of Sciences) nor contain climate-adaptation themed terms in their descriptions are classified as non-adaptation. Figure 6, above, shows that most activities fall into the “Future looking adaptation” and “Non adaptation” categories. As seen in Figure 7, below, there is very little difference between 2007 and 2013 in using this classification system.

Figure 7--Comparison of point distribution to adaptation and non adaptation activities (2007 and 2013 Coordinator Manuals)



Activities listed in the “Non adaptation” category are those that only fulfill adaptive capacity functions, like Activities 330, 350, and 370 (Outreach Projects, Flood Protection Information, and Flood Insurance Promotion respectively), rather than fulfilling clear adaptation functions. In total, nine, or slightly less than half the activities fall into the two adaptation categories. Interestingly, after point distributions were normalized based on the overall point reduction, the percentage of CRS activities with adaptation functions is almost identical between 2007 and 2013. From Figure 7, above, we can see that 38% of all CRS activities in 2007 are considered “forward-looking” actions and then drops slightly to 37% in 2013. In terms of “non-future-looking activities” (Acquisition and Relocation and Open Space Preservation), the percentage of allocated points increased moderately from 28% in 2007 to 32% in 2013. Combined, “future-looking” and “non-future-looking” adaptation activities account for 65% and 69% of all possible points, in 2007 and 2013—demonstrating no meaningful change in point allocation.

Analysis Conclusions and Discussion

Results from the review and point comparison are surprising given that considerable attention was dedicated to climate change, and associated risks, during this past manual review process. The overall shortage of adaptation and climate themed references also suggests a missed opportunity for the government conducted climate focused research to inform the CRS programmatic decisions. On the other hand, all 19 CRS Activities can help communities increase their adaptive capacity, and in a climate where many local officials are reticent to engage in adaptation because of scientific uncertainty and budget shortages, participation in the CRS may be one of the most important actions they can take towards increasing their resiliency.

LITERATURE REVIEW

A combination of primary research, journal articles, technical reports, and planning manuals were reviewed in a non-systematic manner to form a contextual foundation for evaluating this paper’s central question, “Is CRS adaptation”? Using common and widely accepted adaptation definitions and goals (see Appendix 1). The literature review evaluated to what extent the CRS program satisfies adaptation’s definitional requirements and whether the program meets adaptation’s primary and secondary goals? Primary and secondary goals were determined by

how frequently they appear in prominent adaptation literature, and range in topics from whether the program is just and equitable, prevents maladaptation, pursues co-benefits, etc.

Adaptation Definitions

Whether adaptation actions must be based on scientific projections or attribute climate change to anthropogenic causes is debated in adaptation literature. Some advocating that adaptation isn't adaptation without recognition of human attribution of climatic change (Moser and Boykoff 2013). Opposing academics believe that "adaptation" can be adaptation even if it's reactive and autonomous, e.g. actions that are neither planned, intentional, and are a continuation of "what we've always done" as long as central adaptation goals (increasing resilience and reducing vulnerability to climate change) are met (e.g. Moser and Boykoff 2013). Adger (2005) provides a middle perspective writing that adaptation is "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities." This strays from Moser and Boykoff's definition in two notable ways, by removing the necessity that adaptation responds to anthropogenic or future-looking climate impacts, and expands the definition to allow for autonomous adaptation, as well as planned. Adger's expanded definition allows programs like the CRS—non-intentional adaptation with minimal future focus—to in function, be classified as adaptation.

This position is reinforced by The National Academies of Science (NAS) and Sea Grant in their respective reports (NAS 2010) and (Sea Grant 2013). These reports stress that even when coastal hazard mitigation and floodplain management plans do not incorporate future climate projections, by virtue of being plans, these efforts increase capacity and reduce community vulnerability, at least in the short-term (NAS 2010). To this point, it can easily be argued that whether an activity achieves adaptation's goals is more critical than whether an action falls within the confines of a definition.

Another approach to determine if CRS's actions are adaptation in practice, if not by name, is to compare how well CRS activities align with the tools and toolsets outlined by the Georgetown Climate Center's Adaptation Tool Kit; a guidance manual currently used by state and local

governments. The Georgetown Climate Adaptation Tool Kit describes four main toolsets to promote and implement adaptation: 1) Planning tools, 2) Regulatory tools, 3) Spending tools, and 4) Tax and market-based tools. Interestingly all four toolset types are available through CRS's 19 activities, the most considerable of which are floodplain regulations (Regulatory), acquisition and buyouts (Spending), and financial incentives (Tax and Market-Based).

Adaptation Goals

Adaptation actions can be as much defined by their ability to achieve climate risk management goals as if they satisfy the above definitions; most critical of which is whether actions reduce vulnerability and increase resiliency. Other adaptation goal requirements gleaned from literature reviewed address the questions of: 1) Is the action equitable, just, and fair?, 2) Does the action achieve multiple benefits?, 3) Does it encourage adaptive capacity through outreach and education, 4) Does it reduce and mitigate maladaptive tendencies, and 5) Are actions identified and updated through an iterative planning and management process?

Adaptation Goal: actions should be fair, equitable, and just

Much of the adaptation literature stresses that adaptation actions should achieve multiple goals, such as the pursuit of social equality or anti-poverty measures (Heltburg et al. 2008, 89). The goal of ensuring fair outcomes is particularly important as it recognizes that less privileged communities and individuals are often the most vulnerable, lack adaptive capacity, and thus are most in need of planning and adaptation assistance (Moser and Boykoff 2013). Often they are least responsible for the additional risks of climate change as well because poorer people tend to emit less carbon over their lifetimes. In regards to this criteria, the CRS program fares poorly. The program neither prioritizes communities based on vulnerability or provides targeted resources or assistance to communities with the greatest needs. To the contrary, a community's ability to participate in the CRS program is restricted by whether that community possesses adequate wealth and resources. This point was reiterated during interviews with multiple comments to the effect that participation requires considerable staff time and technical resources, and that these requirements present real burdens to community administrators.

North Carolina's Tyrrell County exemplifies this point. Tyrrell County is considered one of North Carolina's most disadvantaged counties with more than twenty percent of its population living below the poverty line. With more than 90% of the county located in a 100-Year floodplain, Tyrrell is also one of North Carolina's most vulnerable counties to flooding hazards (Interview, Tyrrell County administrator). Moreover, Tyrrell has the highest percentage of subsidized policies (41% of the county's NFIP policies are subsidized) in the state and will be severely challenged to afford increased policy premiums and building requirements mandated through the Biggert-Waters legislation. For these reasons, Tyrrell County is an ideal candidate to join the CRS program, increase its adaptive capacity, and receive insurance rate reductions. The county, however, will not be joining the program; not because of NFIP non-compliance, but because it lacks the required resources (Interview, Tyrrell County administrator).

Adaptation Goal: actions should fulfill multiple social benefits

Communities' decisions to engage in adaptation will differ from one to another, and are rarely singularly motivated by climate change (Moser and Boykoff 2013). Some communities are motivated by their high level of vulnerability while others view adaptation as a means to advance local "goals and priorities, such as sustainability and economic development" (Carmin and Dodman 2013). CRS, as a program that supports and guides community coastal hazard mitigation and floodplain management efforts, does succeed as a program able to advance multiple priorities. What's more is that it is a program that communities are inclined to join for multiple reasons. As seen in the interviews, communities are motivated to join the program for a combination of financial, vulnerability reduction, and political reasons.

Adaptation Goal: actions should encourage adaptive capacity via outreach and education

Education and public engagement are recognized as two strong tools to build a community's adaptive capacity (Moser and Boykoff 2013, 3-7). To CRS's credit outreach and education activities are a prominent part of the program and factor into five of the nineteen activities: 320. Map Information Service, 330 (Outreach Projects), 340 (Hazard Disclosure), 350 (Flood Protection Information), and 370 (Flood Insurance Promotion). Interviewees, also repeatedly attributed their communities' outreach and education efforts to the CRS program. At the same time, CRS generated education and outreach efforts do not appear terribly effective, given that

many administrators reported that only a small amount of their community knows of the program's existence, even when receiving insurance premium reductions.

Adaptation Goal: planning and implementation process should be iterative

The CRS program adheres well to ideal adaptation planning and review processes where planning is conducted in an iterative and continuous manner-- where actions are refined over time, in response to new information and threats (Macintosh 2012). Using decision making frameworks like Susanne Moser's, the National Academy of Sciences, or Georgetown Climate Center's multi-step process, adaptation planners are guided to first identify problems and objectives, study the problem, evaluate potential solutions, make and implement decisions, monitor implementation, and reassess in a continuous process. Although not labeled adaptation, the CRS program undergoes a review and evaluation process similar to Georgetown Climate Center's process, described above. In fact, every three to five years, the CRS program undergoes a periodic review, when the CRS Task Force conducts a thorough assessment; evaluating whether the program is meeting its goals and offering corresponding recommendations. Reviews can last as long as two years and are made public, and actionable, with the issuance of an updated edition of the Coordinators Manual—the principal document to explain the program and provide administration guidance. The most recent program review was completed in 2011, producing the 2013 manual, with the next program update expected in 2016.

An advantage of CRS's, contributing to this, is that the program can draw on program records and Flood Insurance Rate Maps, which help establish a baseline for comparison for more than 20 years. Conversely, however, the program does not have a successful history of basing its requirements and updates from scientific research or evolving determinations of success (Carmin and Dodman 2013). This first issue could be easily resolved if program administrators were better able to incorporate available climate science data and projections into the program and future Coordinator Manual revisions.

Adaptation Goal: actions should avoid and mitigate maladaptation

According to Barnett and O’Neill editorial on maladaptation, maladaptation occurs when any action “increase[s] the [future] vulnerability of other groups or sectors”, and more generally speaks to social or environmental negative externalities caused by adaptation efforts (Barnett and O’Neill 2009, 211). Barnett and O’Neill continue to list the five most common forms of maladaptation as actions that: 1) Increase GHG emissions, 2) Disproportionately burden the most vulnerable, 3) Have high opportunity costs, 4) Reduce incentives to adapt, and 5) Establish path dependency and foreclose future adaptation options. The question then is, does CRS produce, avoid, or reduce these types of maladaptation?

Supplementing the NFIP program, CRS cannot be evaluated on its own, but should be considered in relation to NFIP and the recent insurance reform act, Biggert-Waters. As a starting point then it should be stated that NFIP is a widely acknowledged example of maladaptation, in that it encourages development in floodplains, provides property owners with a sense of false safety, and thereby increases community vulnerability (NAS 2010). In terms of Barnett and O’Neill’s maladaptation pathways, the program produces three of five maladaptation outcomes: 1) High opportunity costs, 2) Reduces incentives to adapt, and 3) Establishes path dependency). Since 1968, the program has provided floodprone property owners with subsidized insurance policies and false price/ risk signals. Consequently, insurance policy holders lack incentives to modify their behaviors and have been path dependent for the last 45 years.

Positively, CRS and Biggert-Waters, both provide options for tempering and alleviating NFIP caused externalities. On its own, CRS produces none of the five forms of maladaptation and helps lessen NFIP’s maladaptive impacts by providing communities with financial incentives to adopt aggressive standards to prevent future losses; thereby mitigating the path dependency. While less clear-cut, the controversial flood reform act, Biggert Waters 2012, also takes steps to reverse some of NFIP most maladaptive components. Like the CRS program, Biggert Waters also will help communities break path dependencies and will push communities to adapt by providing them with price signals that more accurately reflect the true cost of insurance and

climate change. Biggert Waters, though, is not without faults and produces types of maladaptation of its own. For instance, the main reason that Biggert-Waters is such a contested piece of legislation is because the scheduled insurance increases are considerable and will force some property owners to pay up to five times their current rates. This type of rate increase will place large financial burdens on some vulnerable populations and will present high opportunity costs to property owners who cannot afford the revised rates. Barnett and O’Neill, however, provide Biggert Waters with a loophole with their definition of high opportunity cost being “if [an action’s] economic, social, or environmental costs are high *relative* to alternatives”, with emphasis on the phrase “relative to alternatives”. Yes, Biggert Waters will burden some property owners with high costs but the bill was passed in response to the absence of financially stable and viable alternatives. In summary, Biggert Waters contributes to maladaptive behavior by imposing financial impacts on vulnerable groups, but deserves more attention for the significant ways it will reduce NFIP’s longstanding and pervasive maladaptive influences.

DISCUSSION

This report’s analysis yields no clear signal as to whether CRS should be considered adaptation or not. Instead, the three forms of analysis came to similarly ambiguous conclusions—that the program meets certain adaptation definitions, goals, and requirements but not enough to confidently label the program as a strong tool for adaptation. For instance, interviews with program administrators showed that the vast majority do not perceive CRS as a tool for adaptation. Less than 50% of interviewees reported that their CRS efforts were influenced by climate change or increasingly severe weather patterns. Additionally, 70% of respondents could not speak to the program’s future and whether federal climate change policies might influence the CRS program.

The coordinator manual review showed minimal change in adaptation-themed-terms between the 2007 and 2013 manuals. Although the updated 2013 manual provides some positive changes relative to climate change adaptation— in that considerably more points are being dedicated to open space preservation and to floodplain management planning—these point

increases do not constitute meaningful change towards adaptation, given that the point allocation overall to adaptation activities remains consistent between 2007 and 2013.

The literature review also shows that CRS is able to satisfactorily meet approximately half of the identified adaptation definitions and goals that are espoused in adaptation literature. By definition, CRS meets Adger (2005) definition “any adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities” but fails to incorporate scientific projections of climatic change, or acknowledge that climate change is anthropogenically caused.

The fact that climate projections are only minimally incorporated into the program’s guidance is surprising given FEMA’s long history of researching climate impacts relevant to its programs. Beginning in 1991, the federal government has initiated at least five reports to study possible climate impacts to FEMA’s flood management programs. Initiated by Congress in 1991, the first such report, “Projected Impact of Relative Sea Level Rise on the National flood Insurance Program”, in a forward looking move, conducted an initial review of how NFIP would be impacted by 1 and 3 feet sea-level-rise (SLR) increases by 2100 (FEMA 2011). Concerned by high levels of scientific uncertainty and unclear timelines, the 1991 report recommended the CRS program to encourage adaptation measures, such as increased freeboard standards and construction setbacks (FEMA 2011). A second report, “Evaluation of Erosion Hazards”, completed by the Heinz Center in 2000 and under contract to FEMA, predicted that more than a quarter of coastal homes would be impacted by SLR and erosion by 2060 (AECOM 2013). Subsequent reports released in 2011 and 2013, projected special flood hazard areas (SFHA) to grow 40-45% by 2100 and that, consequently, climate change should factor as a larger driver for NFIP and CRS programs (AECOM 2013).

CRS successfully satisfies only two of five adaptation goals. It successfully serves multiple goals and avoids or reduces maladaptation. It could be argued it moderately satisfies two additional goals, outreach and education and iterative planning and review process. However, per the Tyrrell County example, CRS does not ensure the goal of equitable and fair outcomes.

What these conclusions draw attention to is the confusion generated from multiple adaptation definitions. If, for instance, the program was evaluated based on one, instead of three, adaptation definitions, it would be easier to conclude with CRS is adaptation or not. To complicate the evaluation further, it is likely that CRS would more appropriately be considered a tool to build adaptive capacity, a subset of adaptation, than to achieve adaptation itself. Adaptive capacity versus adaptation allows for a “system to accommodate or cope with climate change impacts with minimal disruption”, and generally “improv[es] societal flexibility” using education, information technology, finance structures, etc. (Glick 2011; Patt 2013). As stated in the Coordinator Manual Review section, (See page 29) all 19 CRS activities can be used by communities to increase their adaptive capacity.

Despite this, a lack of clarity persists on whether the CRS should be considered robust adaptation or not. In a landscape, however, where climate change actions are few and where public officials are reticent to initiate adaptation efforts due to scientific uncertainty and limited budgets, programs that achieve *some* adaptation functions, like CRS, are preferable to no action.

STATE of ADAPTATION & SCIENTIFIC UNCERTAINTY

State of Adaptation Planning and Implementation—A Nascent Field

After decades of attention and academic research, adaptation is still in a nascent phase (Carmin and Dodman 2013; Moser and Boykoff 2013). Across the U.S., today’s adaptation efforts are concentrated in the research and planning phases of adaptation with few examples of adaptation progressing from research to implementation (Moser and Boykoff 2013; EcoAdapt 2013). This is the case even in affluent and progressive communities that could be considered adaptation’s first actors. For example, Julia Ekstrom and Susanne Moser’s review of adaptation progress and barriers in five California Bay Area communities shows limits and barriers to adaptation action even with strong state mandates for climate change action (Ekstrom and Moser 2013). For the most part, the lack of adaptation implementation can be explained by the fact that adaptation has ranked low as a national priority, and that it requires considerable financial, political, and public support. Because of this, much adaptation in the U.S. has been

performed on an ad hoc basis instead of adhering to adaptation definitions and process guidelines.

Scientific Uncertainty

For local planning efforts, scientific uncertainty is a powerful barrier to adoption of adaptation efforts. Among state and local governments there is a “widespread recognition that climate science cannot provide certainty about future conditions”, especially on a micro-scales (Carmin and Dodman 2013). Scientific uncertainty, though, does not need to be a non-starter (Dessai et al. 2009). Against the backdrop of scientific unknowns, it is more important for communities to take a more incremental, flexible, and non-path dependent approaches. Alternatively, these approaches are known as win-win strategies, these efforts will benefit communities, even if a community isn’t negatively impacted in the near term. Because adaptation is in an early stage coupled with local-scale scientific uncertainty, there are recommendations that the easiest and most prudent form of adaptation to implement today are low-cost strategies with win-win outcomes, such as those used to build adaptive capacity (NAS 2010).

STRENGTHS of the CRS

In context of the above-mentioned serious challenges to adaptation, CRS becomes an appealing option if able to fulfill its soft-adaptation functions. This point is reinforced by the fact that CRS provides compelling incentives to communities, is able to avoid standard barriers that adaptation faces, and through correct framing can avoid psychological distancing commonly associated with climate change and adaptation.

The Right Incentives

In the article, “Weathering Climate Change: some simple rules to guide adaptation decision”, Frankhauser et al. posits that offering proper incentives is one of three requirements (along with “Timely recognition of the need to adapt” and “Capacity to adapt”) for successful adaptation (Frankhauser et al. 1998). An incentive-based program, the CRS program is able to offer communities powerful financial incentives, especially when framed as the only program able to temper the Biggert-Waters scheduled insurance rate increases.

Avoids and Overcomes Standard Barriers

In addition to scientific uncertainty and the lack of adaptation best practices and success stories, standard adaptation barriers include: 1) Institutional and governance issues, 2) Attitudes, values, and motivations, and 3) Resource and funding issues (Ekstrom and Moser 2013). These barriers emerge due to the challenges of working collaboratively across organizations, lack of interest in changing behaviors, and because of resource shortages. Established in 1990, CRS is underpinned by a strong cross-government organizational structure, and is growing. Additionally, as an existing program with a large and committed group of participating communities, CRS should be able to avoid attitudes and values challenges. In essence, CRS is well positioned to enable better climate change adaptation because of its strong networks and institutional roots.

Mitigates Psychological Distancing to Climate Change and Adaptation

Climate change is often associated with psychological distancing “in that people...perceive it is most likely to impact geographically and temporally distant people and places (Spence and Pidgeon 2010). Even more, the magnitude of potential climate impacts coupled with high degrees of uncertainty makes it understandable why psychological distancing becomes the default for planners and administrators, especially in the absence of simple and promising solutions. This type of paralysis to act was described in the interviews and is a considerable obstacle to advance adaptation efforts. CRS has the advantage that it is highly regarded and is widely used. Moreover the program is framed to address familiar, severe, and near-term threats such as “storm surge” and “inundation of low-lying areas” instead of psychological distancing terms such as “climate change”, “sea-level-rise”, and “climate-change adaptation”. The fact that CRS is a floodplain management program that undergoes incremental revisions mitigates psychological distancing and paralysis that is often associated with climate change planning.

RECOMMENDATIONS & CONCLUSION

There are few easily actionable domestic adaptation options at a time when the need for adaptation is growing. Through three easily achievable recommendations, the program’s adaptation functionality can be significantly enhanced. First, incorporate climate science and

projections into future guidance materials. Second, prioritize and make resources available to the most vulnerable populations. Third, increase point values allocated to important adaptation activities that specifically provide protection from SLR, increased storm surge, and heavy rain events.

RECOMMENDATIONS

Incorporate Climate Science and Projections into Future Guidance Materials

To remedy this problem, revisions for the upcoming 2016 Coordinator's Manual of the coordinator manual need to stress climate impacts and corresponding actions. Such revisions could easily be informed by FEMA's "2011 Strategic Plan Evaluation: Climate Change and the Community Rating System" and the Federal Government's extensive research on climate change and impacts to FEMA and its programs. This recommendation aligns with, and could be supported by, the creation of issue focused working groups, as proposed in the White House Climate Action Plan and Executive Order.

Prioritize and Make Resources Available to the Most Vulnerable Populations

The area where the CRS is most in conflict with adaptation's goals is that it fails to meet the goal of producing equitable and fair outcomes. To remedy this point of conflict, and ensure that the CRS produces equitable and fair outcomes, the program could adopt the two most common recommendations from interviews with program administrators. First, simplify application processes and requirements for interested communities. Second, provide grants and financial assistance to help cover administrative needs. As outlined by interview respondents (see page 22), the CRS application process could be redesigned in two tiers, with one tier focused on the needs and constraints of the most vulnerable communities.

In terms of grants for vulnerable communities, FEMA and the Federal Government already manage a host of grant making programs (Emergency Management Performance Grants, Hazard Mitigation Assistance Grants, Hazard Mitigation Technical Assistance Program, and the Pre-Disaster Mitigation Program) that could be expanded and awarded to potential CRS communities in need of technical and financial assistance. All federal grant programs, in fact, must comply with federal authorities that protect and affirm the needs of underserved groups;

including Executive **Order 12898** of 1994, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, **Executive Order 12898** of 1994, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, and **Title VI of the Civil Rights Act (1964)**, which prohibits discrimination on the basis of race, color, and nationality. Establishing grant options for low-income or disadvantaged CRS communities would both increase compliance with the abovementioned authorities and build a pathway for CRS to achieve equitable and fair outcomes.

Increase Point Values Allocated to Important Adaptation Activities

While the revised 2013 CRS Coordinator’s Manual includes point increases to some adaptation activities, like the preservation of open space (Activity 420), it also reduces point values to two important adaptation activities—Activities 430 (Higher Regulatory Standards) and 520 (Acquisition and Relocation). These activities are considered two of the program’s most valuable, where communities like the City of Tulsa (OK) and Charlotte-Mecklenburg (NC) have purchased and relocated as many as 1,000 repetitive-loss homes outside 100-year floodplains. Additionally, freeboard standards—requirements to elevate properties an identified height above flood levels, a sub-activity to Activity 430 (Higher Regulatory Standards), which is considered one of the best ways to reduce vulnerability and protect properties against flood loss, also suffers from reduced point allocation (Sea Grant 2012). It is not clear why these two activities’ point allocations were reduced from 2007 to 2013, but returning their point values to 2007 levels would improve the program’s overall functionality as adaptation. It is thus recommended that point values, for these activities, should be increased in the 2016 Coordinator Manual revision.

CONCLUSION

The CRS program spans the country geographically and possesses robust institutional networks that are growing. It encourages communities to take actions that reduce their risks to flooding. CRS is a promising tool for easily actionable and scalable adaptation. However, the program requires some small modifications to be a robust adaptation tool. Federal administrators still need to incorporate climate change science and impacts into the program’s guidance. They also need to prioritize resources for vulnerable, low-income communities, and increase the number

of points allocated to activities that are most helpful for decreasing the vulnerability of communities to sea level rise and increased risks of flooding from extreme rain and storm surges. If these recommendations are met, then the program represents an important piece of the Obama Administration's commitment to addressing climate change and building widespread climate resilience.

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APPENDIX A—ADAPTATION DEFINITIONS AND GOALS, PER ADAPTATION LITERATURE

PRIMARY DEFINITION and GOALS					
An adjustment to a natural or human system responding to actual or expected climate impacts	Reduce vulnerability	Increase resilience and flexibility of systems	Avoid maladaptation	Produce synergies and co-benefits	
Adger et al. 2005	Burch et al. 2013; Moser and Boykoff 2013	Burch et al. 2013; Moser and Boykoff 2013; Frankhauser 1998	Moser and Boykoff 2013	Carmin and Dodman 2013; Yohe and Strzepek; Cheong et al.; Shroeder and Okereke	
SECONDARY DEFINITION and GOALS					
Acknowledge anthropogenic contributions	Iterative process	Emphasize communications and engagement	Work in partnerships	Focus on highest rated risks	Must be sustainable
Moser and Boykoff 2013		Moser and Boykoff 2013	Moser and Boykoff 2013	Moser and Boykoff 2013	Moser and Boykoff 2013
				Ensure Fair Outcomes	Limits costs
					Carmin and Dodman 2013

APPENDIX B—IRB PROTOCOL AND INTERVIEW QUESTIONS**A. Investigator and Project Information**

Project Title: _FEMA's National Flood Insurance Program & Community Rating System:
Two unlikely and promising tools for climate change adaptation in North Carolina

Investigator: Kristina Ronneberg_____

Status: [] Faculty [x] Graduate Student [] Other: _____

Department/School: Nicholas School of the Environment_____

E-mail: _kcr14@duke.edu_____ Phone: _510-333-4707_____

Faculty Advisor for Graduate Students and Post-Doctoral Researchers:

Dr. Nicole Heller_____

E-mail: _nicole.heller@duke.edu_____ Phone: _____

Source of Funding: _N/A_____

(If research is externally funded, submit a copy of the application or the award.)

Proposal/Grant Number for Federally-Funded Research: _N/A_____

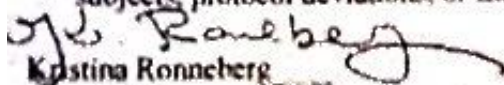
Research Site: _Duke University_____


B. Assurances
(Original signatures are required)

Investigator(s) Assurance:

I affirm the following:

1. The research will not be initiated until written approval is secured from the IRB. (Note: Approval will not be provided unless certification to conduct research with human subjects is current for the investigator(s), and if the investigator is a student, the advisor's certification is also current.)
2. I will conduct this study as described in the approved protocol. If any changes are anticipated, I will contact the IRB staff prior to implementing the changes. I will contact the IRB staff immediately if any of the following events occur: unanticipated problems involving risks to subjects, protocol deviations, or findings during the study that would affect the risks or benefits.


Kristina Ronneberg
Investigator



January 10, 2014
Date

Faculty Advisor Assurance (Required for Graduate Student or Post-Doctoral Research):

I affirm that I have reviewed and approved the research plan of the student(s). I assume responsibility for (1) ensuring that student researchers are aware of their responsibilities as investigators, and (2) that the IRB will be immediately informed in the event of unanticipated problems involving risks to subjects, protocol deviations, or findings during the study that would affect the risks or benefits of participation.



Advisor



Date

For IRB use only

APPROVAL: _____ Date _____
IRB Member or Human Subjects Program Director

C. Category of Research Activity

Categories of Eligible Research Activity:

Please select the exemption category that applies to your protocol. If the protocol includes any research activity with human subjects not specifically exempted under one or more of the exemption criteria, IRB review is required and the *Request for Protocol Approval* form must be used (<http://www.ors.duke.edu/forms/request-protocol-approval>).

The categories are listed in the order most often used by researchers in the social and behavioral sciences. Sponsors may want you to identify the federal number for the category used to exempt your research so the numbers are supplied at the end of each category.

___ (1) Research conducted in established or commonly accepted educational settings, involving *normal educational practices*, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.



X (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), *survey procedures*, *interview procedures*, *observation of public behavior*, **unless** the information is obtained and recorded in such a manner that the human subjects can be identified, directly or through identifiers linked to the subjects; **and** any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

___ (3) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, or observation of public behavior that is not exempt under item (2) above; **if** the human subjects are *elected or appointed public officials or candidates for public office*; **or** federal statute(s) require without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.

___ (4) Research involving the study of existing data, documents, records, pathological specimens, or diagnostic specimens is exempt **if** these sources are publicly available, **or** if the information is recorded by the investigator in such a manner that the subjects cannot be identified directly, or through identifiers linked to the subjects. *The secondary analysis of pre-existing data requires the use of a separate form. Please go to <http://ors.duke.edu/Research-with-Human-Subjects/forms>.*

___ (5) Research and demonstration projects which are conducted by or subject to the approval of Department or Agency heads, and which are designed to study, evaluate, or otherwise examine methods and procedures of *public benefit or service programs*. (For example, a study of identifiable welfare data.)

D. Research Description

1. Research Design

1.1. Purpose of study: The purpose of this research is two-fold, to answer the questions: 1) Can the Community Rating System (a program that supplements the National Flood Insurance Program by incentivizing more rigorous flood management practices) be considered a climate change adaptation strategy?, and 2) What motivates communities to participate in the program, and what can be done to encourage additional and advanced participation in the Community Rating System Program (CRS).

- Relevant background is that the Community Rating System is an underutilized and inadequately managed program given its potential benefits—to reduce flood hazard risks to participating communities.

1.2. Subjects will participate in one of five types of interviews; all interviews should last approximately 30 minutes. Most interviews will be conducted via phone but when possible, certain interviews may be conducted in person. All interviews will be conducted with government employees/ administrators-- from federal to local levels. At the beginning of each call I will request permission to record the conversation, using audio-recording function built into Microsoft Word. The five types of interviews are:

- **First:** Interviews with federal CRS managers, e.g. FEMA employees/ administrators in Washington, D.C. The purpose of these interviews (estimate 2-3) is to learn more about the program, how it's administered, what the program considers successful communities, to what extent the program considers climate change adaptation and sea-level-rise and how the program may evolve given recent White House policy mandates (the June 2013 Climate Change Action Plan and the November 2013 Climate Change Adaptation Executive Order)
- **Second:** Interviews with state coordinators; state coordinators will be selected from one of two types of states. 1- From states with high levels of participation-- Florida (216 communities), California (83 communities), and North Carolina (81 communities), and 2- From states with low levels of CRS participation, even though their vulnerability to flooding and sea-level-rise is above the national average— Massachusetts (21 communities) and Virginia (13 communities). The purpose of these interviews is to learn what factors influence the levels of state participation.
- **Third:** Interviews with CRS best practice communities; across the United States there are more than CRS 1200 communities. Of these, only four are considered advanced (to be considered advanced, communities must rank in the top three CRS classes, out of ten possible classes). Beyond advanced communities, only seven communities are in Class Four; the most advanced of moderate communities. The purpose of interviewing these eleven communities (four advanced and seven advanced moderate) is to learn about these communities' motivations, to what extent the public has been involved, whether climate change and sea-level-rise are factored into CRS planning and for Class Four communities, what could motivate them to become advanced communities.

- **Fourth:** Interviews with county commissioners from North Carolina's highest ranked CRS communities. These communities include: The City of Charlotte (Class Five) & Kill Devil Hills, Nags Head, Kitty Hawk, Topsail Beach, and Mecklenburg (All Class Six). The purpose of these interviews will be to learn what motivated these communities to participate in the program at their level.
- **Fifth:** Interviews with county commissioners from North Carolina communities that are exceptionally vulnerable to flood hazards and sea-level-rise **and** do not participate in the CRS program, or participate at an introductory level. These communities include: Beaufort County, Tyrrell County, and Hyde County. The purpose of these interviews is to learn why they currently are not optimally utilizing the CRS program, whether sea-level-rise projections would influence their participation level, and whether they are interested in assistance to join or increase their participation in the program. As part of my project I plan to make policy recommendations relevant to these three communities.

1.3. Interview Questions: See Attachment 1 for interview questions, p. 5-7

1.4. Interview Schedule: See Attachment 2 for interview schedule, p. 8

1.5. Collection of identifiable data: Aside from names and contact information (phone numbers and email addresses), no personal identifiable information will be collected. Aside from rare circumstances where specific consent is obtained in written form, no personal identifiable data will be included in the final report. The rare event when I would include personal identification information (Interviewee's name and title) would accompany direct quotes.

- Within the report I will make generalizations about how interview responses differ from state to state, or between U.S. regions, but in broad enough terms so that descriptions cannot be connected associated to specific individuals.
- All personal identification information will be destroyed at the study's conclusion.

2. Subject Selection

2.1. All potential subjects will be government employees/ officials, at the federal, state, or local level.

2.2. Prospective interviewees will be identified and selected via the following methods:

- Internet search for FEMA CRS managers and for state CRS coordinators; contact information is publicly available (listed on government websites)
- Emails and phone calls to state Insurance Services Offices (ISOs) to provide names and contact information for State Coordinators; also publically available online
- Referrals from other FEMA or CRS coordinator/ administrator if provided

2.3. Recruitment: Targeted emails and phone calls serve as this project's recruitment.

2.4. Recruitment materials: The informed consent letter (see attachment 3) also serves as the recruitment letter. Regardless of whether a potential interviewee was initially contacted via email or phone call, that individual will receive the recruitment/ informed consent email (attachment 3) before the interview will be scheduled.

3. Informed Consent

Informed consent will be obtained through the recruitment email. The joint informed consent/ recruitment letter, Attachment three (p, 9), will be sent to every prospective interviewee, before an interview is conducted, even if initial contact was made over the phone.

Attachment 1- Draft Interview Questions—a supplement to Section 1

While interviews will include a series of pre-developed questions (similar to questions below), interviews will be *organic* and will progress as the conversation directs. All interviews concern the topics of 1) the National Flood Insurance Program, 2) The Community Rating System Program, 3) The Biggert Waters 2012 Flood Insurance Reform Act legislation, and the Obama Administration’s recent climate policies—The Climate Change Action Plan and the Climate Change Adaptation Executive Order.

1. Interview questions for federal administrators:

- What is your role in administering the CRS program?
- What are the goals of the CRS program?
 - What effects have President Obama’s recent [climate change action plan](#) (June 2013) and [executive order](#) (Nov 2013) had on the program and its goals?
- Can you describe how the program is administered and the administration hierarchy? For instance, how FEMA employees interact with states, counties, etc.?
- What constitutes a successful CRS community?
- Do you, or how do you, encourage more communities to join?
- How hands-on is FEMA in the management of the program and interacting with participating communities?
- Do you expect many changes in the wake of BW-12?
 - To what extent was the CRS program considered during the passage of BW-12?
- Is CRS considered adaptive in any way?
 - What could be done to CRS to improve its ability to function as a climate change adaptation tool?
- How is CRS funded?
- Exactly what resources are provided to communities?
- I’m interested in learning about CRS best practices, can you tell me a little about what motivates communities and whether any factors serve as indicators for a communities success in the program?
 - Can you recommend specific communities that I should connect with?
 - If yes, can you please provide me with their contact information or put us in touch?

2. Interview Questions for State Coordinators

- When did your state join the CRS program?
- How did you learn about the program?
- What were your motivations in joining?
- What flood concerns did your community face?
- What resources and assistance, if any, was provided to your state from the federal government?
- What resources and assistance, if any, have you made available to counties across your state?

- Do you have plans for increasing participation?
 - If yes, what is your strategy for encouraging communities to join or increase their participation levels?
- Do you expect the Biggert Waters legislation to influence the degree of your state's participation?
- What about increasingly severe weather patterns?
- Are there certain types of support or resources, provided by the federal government, which could facilitate or improve your state's participation?

3. Interview Questions for CRS Best Practices Communities

- When did you join the CRS program?
- How did you learn about the program?
- What were your motivations in joining?
- What flood concerns did your community face?
- To what extent has the community been engaged/ active?
- Has your community done much to increase its level of participation since joining?
- What are your plans for increasing participation?
- Do you expect the Biggert Waters legislation to influence the degree of your community's participation?
- How about increasingly severe weather patterns?
 - Has your region recently experienced more severe weather patterns?
 - Have you seen a higher degree of interest from citizens?
- Are there certain types of support or resources that would have made participation in the program easier?

4. Interview Questions for Highest Rated North Carolina CRS Communities

- When did you join the CRS program?
- How did you learn about the program?
- What were your motivations in joining?
- What flood concerns did your community face?
- To what extent has the community been engaged/ active?
- Has your community done much to increase its level of participation since joining?
- What are your plans for increasing participation?
- Do you expect the Biggert Waters legislation to influence the degree of your community's participation?
- How about increasingly severe weather patterns?
 - Has your region recently experienced more severe weather patterns?
 - Have you seen a higher degree of interest from citizens?
- Are there certain types of support or resources that would have made participation in the program easier?

5. Interview Questions for North Carolina Communities selected based on their high level of environmental vulnerabilities and their low participation levels in the CRS program

- Do you know about the CRS program?
 - If yes
 - What are the main reasons why your community doesn't participate in CRS? Could it be best described as lack of capacity and resources, or lack of interest?
 - If no, I'll describe the program, its benefits, and how its relevant to the community
- What about the program do you find appealing or unappealing?
- Does the passage of the 2012 Biggert Waters legislation, and the fact that many of your communities NFIP policy premiums are expected to increase, influence your community's interest in the program?
- Would additional resources from the state or federal level increase your likelihood of participation?
- Would you be interested in learning about easy ways to (join the program or increase your participation)?

Appendix 2- Interview Schedule, a supplement to Section 1

Interviews will commence once IRB exemption status has been granted and will take place in three to four following weeks.

Ideally, interviews will be carried out sequentially beginning with Type 1 interviews and ending in Type 5 interviews. However, it is likely that certain individuals will be more difficult to contact than others and therefore some interviews may be out of the sequential order. The purpose of conducting the interviews sequentially— beginning with high level program administrators (responsible for oversight of the entire program) and ending with local government officials—is to fully understand the program at a macro level before drilling down to more micro issues, at the community and local government level.

I hope to have all interviews completed by February 10th, 2014, but this is not a hard deadline.

Appendix 3—Recruitment telephone script, *a supplement to Section 2*

Hello, my name is Kristina Ronneberg and I'm a graduate student at Duke University's Nicholas School of the Environment. I am calling because as I am interested in the U.S. Federal Emergency Management Agency's (FEMA) Community Rating System (CRS) program. Currently, I am researching CRS programs and what motivates community participation and whether recent weather patterns and national policy will influence state and community participation levels in the program. I would like to schedule an interview, lasting approximately 30 minutes, to discuss your experience with the CRS program. I will be happy to provide you with more information if you are interested in learning more. Would that be okay?

Appendix 4—Informed Consent email/ script, a supplement to Section 3

Subject: Informed Consent regarding interview to inform Masters Research on the FEMA Community Rating System program

Dear (x),

My name is Kristina Ronneberg and I'm a graduate student at Duke University's Nicholas School of the Environment. As part of my graduate research I am interested in the U.S. Federal Emergency Management Agency's (FEMA) Community Rating System (CRS) program—a program that incentivizes community-based flood hazard mitigation planning. Particularly, I am researching what motivates community participation and whether recent weather patterns and national policy (Biggert-Waters 2012 and the Obama Administration's Climate Action Plan) will influence state and community participation levels in the program.

I am writing to request an interview, lasting approximately 30 minutes, to discuss your experience with the CRS program. During the interview I will inquire into your (state/communities) motivations to participate in CRS. Interview responses will help provide background and ground level insights into the program, and will help inform my research findings and recommendations.

Although I collect your names, titles, and contact information, I will not include this information in my final report without your explicit, written permission. If it is likely that I will request to use your name in my report, I will ask for your permission, via email, before the interview. To ensure I maintain an accurate record of our conversation, the interviews will be audio-recorded. Interview transcripts will be seen only by my advisor, Dr. Nicole Heller, and myself.

The report will be complete in late April, at which point it will be accessible for viewing by Duke University faculty and students at [this website](#). At this time, I will make a copy of the final report available to you.

Participation in the interview is voluntary, and I would greatly appreciate your assistance and 30 minutes of your time. Thank you for your consideration and I look forward to hearing back from you. ***In your response please let me know if you are or are not willing to participate in an interview.*** Should you have any questions about the research or related matters, please feel free to contact me at kristina.ronneberg@duke.edu or at 510-333-4707. You can also contact my advisor, Dr. Nicole Heller, or the Duke University Institutional Review Board (IRB). My advisor, Dr. Nicole Heller can be contacted at nicole.heller@duke.edu. The Duke University's Institutional Review Board can be contacted at 919-684-3030 or ors-info@duke.edu.

Best regards,

Kristina Ronneberg

Appendix 5—Written Request, a supplement to Appendix 3

Subject: RE: Informed Consent regarding interview to inform Masters Research on the FEMA Community Rating System program

Dear (x),

Thank you for agreeing to participate in my research. I am looking forward to our interview.

As you know, my research topic focuses on the U.S. Federal Emergency Management Agency's (FEMA) Community Rating System (CRS) program—a program that incentivizes community-based flood hazard mitigation planning.

At this time I am writing to request your permission to use identifiable information about you, specifically your name, position, and organizational affiliation. I will use this information in my final research report; for example, if attributing quotes to you.

If you do not want your identifiable information to be used in my research that is fine. You can still participate in the interview without giving me permission to use your identifiable information. Whatever you decide is okay.

Again, thank you for your consideration and I look forward to hearing back from you. ***In your response please let me know if you give me permission to include your name, position, and organizational affiliation in my research.***

Should you have any questions about the research or related matters, please feel free to contact me at kristina.ronneberg@duke.edu or at 510-333-4707. You can also contact my advisor, Dr. Nicole Heller, or the Duke University Institutional Review Board (IRB). My advisor, Dr. Nicole Heller can be contacted at nicole.heller@duke.edu. The Duke University's Institutional Review Board can be contacted at 919-684-3030 or ors-info@duke.edu.

Best regards,

Kristina Ronneberg