Coastal Flood Resilience Project

WHITE PAPER

A Proposed Strategy to Better Communicate Flood Risk to Coastal Property Owners
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The Coastal Flood Resilience Project is a network of organizations working for stronger programs to prepare the United States for more severe coastal storms and rising sea level along the U.S. coast.

This white paper describes the flood risks that coastal storms and rising seas pose to coastal property and proposes that the federal government work with state and local governments and the private sector to significantly improve communication of these risks to owners of coastal property. Better communication of coastal flood risks is helpful to current property owners and buyers, useful in building public support for coastal flood response measures, and valuable in improving the stability of the coastal property financial system.

I. Introduction: Communicating Flood Risk to Coastal Property Owners

Millions of people owning homes and businesses along the U.S. coast face flood risks from storms. A warming climate is making coastal storms more intense, driving higher storm surges farther inland while also driving an accelerating rate of sea level rise. The combination of more severe storms and rising seas is resulting in higher flood levels in places along the coast that traditionally flood and an expansion of the land area that is at risk of flooding.

Higher flood levels across larger coastal areas will generate expanded property damages, raise the costs to governments for both flood mitigation and response, and drive up the cost of living on the coast by increasing insurance rates and driving new flood and storm standards (e.g., compliance with updated building codes, elevating homes). Although the monetary costs of flooding can be devastating, flood impacts also bring human suffering in the form of stress, mental anguish, loss of life, and community disruption.

Despite the significant impacts that coastal flooding has for millions of people along the coast, governments have made limited efforts to warn property owners of the risks that they face.

Although 19 of the 23 coastal states have adopted laws requiring disclosure of varying degrees of information about flood risk at the time of sale of a property, most state laws are weak.

The Federal Emergency Management Agency (FEMA) publishes maps of areas at risk of flooding but the maps are often inaccurate or out of date. FEMA also provides general information about flood risk in the National Risk Assessment but without offering information about specific properties.

Property specific flood risk assessments are available from private companies but the assessments have limitations and are typically available only at a cost.

Given the growing significance of coastal flood risk and the lack of widely available, high quality property flood risk assessments, the federal government should work with state and local governments and non-governmental organizations to develop and implement a strategy to more effectively communicate flood risk to coastal property owners.

The key elements of a strategy for better coastal flood risk management communication are:

1. **Strengthen State Flood Disclosure Laws:** State laws providing for disclosure of flood risks at time of sale or lease of property need to be strengthened as they play a key role in supporting the integrity of property transactions and complement risk communication accomplished by other means.

2. **Improve Federal Coastal Flood Risk Data:** Existing federal data on coastal flood risks should be improved, including updates to FEMA flood risk maps and addition of assessments of future coastal storm risks to sea level rise projections.

3. **Establish a National Coastal Property Flood Risk Database:** FEMA should establish a public, online database providing nationally consistent data that addresses specific information on current and future flood risk for coastal property.

4. **Provide Notification of Flood Risk to Owners of Property in High-Risk Coastal Areas:** FEMA should identify properties at high risk of coastal flooding and provide periodic, written notice of risks and risk mitigation opportunities directly to property owners.

5. **Reports to Congress on Changing Coastal Flood Risks and Needed Response Actions:** FEMA, in cooperation with other federal agencies, should provide periodic reports to Congress describing changes in coastal flood risk and recommending measures to improve coastal flood risk communication.

This white paper addresses the following key topics:

- An overview of flood risk for coastal property owners from more severe storms and rising sea levels;
- An evaluation of existing coastal flood risk assessments and mechanisms for communicating flood risk to property owners;
- An analysis of the benefits of improved coastal flood risk communication; and
- A description of proposed goals and key elements of a strategy to improve flood risk information for coastal properties and to better communicate this information to property owners.

II. Storm and Sea Level Rise Risks to Coastal Communities

Climate change poses a significant risk to coastal communities through the impacts of more severe storms bringing temporary flooding and widespread damage. As sea levels rise, storm impact areas will expand, and coastal areas will increasingly see permanent inundation unrelated to storms. These storms and rising seas bring flood waters to homes and businesses, but also threaten coastal ecosystems (e.g., beaches and wetlands) and major, critical infrastructure assets that provide essential services such as transportation, energy, and water. The multiple dimensions of these coastal impacts will gradually reduce property values, increase insurance costs, undermine the financial health of property owners and communities, and diminish the capacity to recover from major storm events.

Coastal Storms: Coastal storms and hurricanes are a major risk to life and property and major storms can deliver storm surges of over fifteen feet and wind speeds of over 100 miles per hour. A warming climate is causing an increase in the number of the strongest storms, which bring higher winds, more extensive coastal flooding, higher storm surges, and increased rainfall. Research indicates that the travel speed of intense storms is slowing down and storms are thus lingering and raining on a given place for longer, generating more damages and more flooding. Even as storms move more slowly, they intensify more rapidly, making their landfall harder to predict and more likely to result in major damage and loss of life.

The National Oceanic and Atmospheric Administration (NOAA) reports that disasters with impacts of over a billion dollars have increased since 1980. Of all these billion-dollar events, including wildfire, droughts, and floods, coastal hurricanes were the single biggest contributor to damages, accounting for 54 percent of all costs for a total cost of over $1.3 trillion. Hurricanes were also the single largest cause of deaths, accounting for over 40 percent of all deaths (i.e., 6,890 total deaths from 1980 to 2022, about 160 per year).

Sea Level Rise: NOAA recently issued new estimates of future sea level rise, concluding that sea level along the U.S. coasts is likely to rise as much over the next 30 years (i.e., about 1.3 feet by 2050 in the “Intermediate” scenario) as it has over the last 100 years. Sea level rise averaging as

high as 1.7 feet around the coastline is possible over this period and could reach as high as 2.2 feet in some places (e.g., the Western Gulf of Mexico).

By the year 2100, NOAA projects that sea level rise along the U.S. coasts will average about 4 feet in the "Intermediate" scenario, while an average increase of over 7.2 feet is possible. Sea level rise in some regions could be higher. By 2150, NOAA forecasts average sea level rise of over 7 feet in the "Intermediate" scenario and the possibility of average increases as high as 12.8 feet, with increases in the Western Gulf of Mexico of 14.7 feet.

Future Impacts of More Severe Storms and Rising Seas: More severe storms and rising seas will bring economic, environmental, and social disruption to coastal communities on an unprecedented scale. In the short term, coastal communities can expect more "sunny day flooding" during high tides and larger surges and greater flooding during storms. In the longer term, all or parts of hundreds of coastal communities will face far more extensive flood damages than they currently experience. As sea levels rise, sunny day flooding will increase and gradually lead to permanent inundation. The combination of more severe storms and rising seas is projected to result in potential losses of coastal property running into trillions of dollars.

These loss estimates, however, are based on the existing population along the coast, and are likely to rise further as new development of homes and supporting infrastructure occurs in risky coastal places in response to population increases. Today, the coastal counties along the U.S. coasts are home to over 100 million Americans. The population living right along the coast (i.e., the Low Elevation Coastal Zone or LECZ including places at elevations of 33 feet and lower) is expected to double by 2060 to about 44 million people.

Finally, it is important to note that many low-income and disadvantaged communities are among those in harm's way. Recent research has found that these communities are less likely than wealthier communities to benefit from disaster relief. They also often lack the resources to respond to these risks.

III. Assessment of Existing Coastal Flood Risk Communication

Today, the risks of storm flooding and sea level rise inundation are communicated to coastal property owners through a diverse set of risk assessments and information tools. These assessments and tools are managed by federal and state governments and the private sector in a largely uncoordinated way and without the framework of an overall goal and strategy. Each of the assessments and tools has some strengths as well as weaknesses but, taken together they do a poor job of communicating flood risk to coastal residents.

Description of Coastal Flood Risk Assessments and Communication Tools

The key coastal flood risk assessments and tools are:

- FEMA flood insurance maps;
- FEMA's National Risk Index;
- NOAA assessment of current and future coastal storm risks;
- Federal interagency assessments of sea level rise;
- State laws requiring flood risk disclosure at time of property sale or lease;
- Private flood risk assessment and communication tools (e.g., First Street's "Flood Factor").

Each of these assessments and tools is described briefly below along with issues or challenges associated with its use.

1. **FEMA Flood Insurance Maps:** One of the most widely recognized sources of flood risk information is the flood maps produced by FEMA to support the National Flood Insurance Program (NFIP). Their primary purpose is to identify Special Flood Hazard Areas (SFHAs). Structures located in SFHAs are to comply with local floodplain management regulations and homes in these areas are required to have NFIP insurance in order to be guaranteed by a federal mortgage guarantee institution such as Fannie Mae and Freddie Mac.

   The SFHAs are mapped to include areas that "will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year." The 1-percent annual chance flood is also referred to as the base flood or 100-year flood. The flood maps also show the area of a 500-year flood, having a .2 percent chance of flooding each year.

   FEMA flood maps also include a range of zones that provide more information about flood risks, including for five zones running from low to higher risk. For example, maps indicate V Zones that are high risk coastal areas that have a 26% chance of flooding over the life of a 30-year mortgage.

   Although the flood insurance maps provide helpful flood risk information and are widely available, they also have some significant issues. A 2021 report from the Government Accountability Office found that maps "didn't reflect the best available climate science or include information on current flood hazards (e.g., heavy rainfall that overwhelms existing storm drainage systems)".

   Some key issues with SFHA maps, including issues described in the *2023 Annual Report* of FEMA's Technical Mapping Advisory Committee (TMAC) and are outlined below.

- **Out of Date:** SFHA maps are updated to reflect the changes in flood risks that occur over time (i.e., the time between original map and updated map) but this process of updating maps is time consuming, expensive, and often controversial. As a result, many maps are outdated and will not be updated for some time. In 2016, the Department of Homeland Security Inspector General found that "only 42% of the total flood map miles in FEMA's inventory were updated and valid".

- **Inaccurate:** The flood zone boundaries mark the outer edges of the one chance in 100 flood risk area but recent studies of flood damages identify damages in places outside of mapped flood zones. In addition, FEMA practice is to map areas with 50 percent accuracy.

- **Historical But Not Future Risk:** Floodplain maps are based on historical flood risk data and do not reflect future changes in conditions such as rising sea level or more severe storms.

Flood Impacts Outside of Mapped Floodplains

A new report from First Street evaluated property losses due to Hurricane Debbie and concluded:

"78% of the properties affected by the hurricane were located outside of FEMA's designated Flood Zone. The storm resulted in a staggering $12.3 billion in damages, with $9.7 billion occurring outside of FEMA's Flood Zone. These findings underscore the necessity for a reevaluation of flood risk assessments and preparedness strategies in vulnerable areas."

As a result of these problems, floodplain maps under-represent the true extent of the 100-year floodplain and under-represent the actual flood risk.

2. **FEMA's National Risk Index:** FEMA manages a risk information tool called the National Risk Index. This online resource offers a national map that allows a user to identify a county or census track and see an overall risk score between 0 and 100 based on estimated current risk from some eighteen different natural hazards. The Index is freely accessible and offers users the confidence that assessments reflect the federal government's best estimates.

   One of the 18 natural hazards is "Hurricanes," and each county/census track has a hurricane risk score. For example, Broward County, Florida has a "Very High" hurricane risk, a hurricane risk score of 100 percent, and a projected storm frequency of 0.3 events per year. Information concerning expected annual losses, social vulnerability, and community resilience is also provided. For example, in the case of expected annual loss, the costs of losses are associated with specific natural hazards (e.g., the expected annual loss due to hurricanes in St. Luci County Florida is $188 million).

A key issue with the National Risk Index, however, is that it evaluates relative risk from historical data and does not account for future risk from a changing climate or other factors (e.g., population growth and development). So, local risk scores do not reflect projected increments of increasing hurricane intensity over time due to changing storm characteristics or higher storm surges due to rising sea level. Other issues with the National Risk Index are:

- The Index is overflowing with data and it can be difficult to draw conclusions;
- Risk data is not available at a property address specific level; and
- The Index is a passive tool and does not provide warning to owners that a property is sited in a risky location.

Trump Administration Termination of FEMA Future Risk Index

In 2024, FEMA released a "Future Risk Index" complementing the National Risk Index and offering county-by-county information on projected annual losses this century from threats including coastal flooding, hurricanes, wildfires, extreme heat, and drought. Each county was also given an overall risk rating, which ranked how vulnerable its particular population is to climate shocks. In early 2025, the Trump Administration terminated the Index but the tool is still available as a result of a collaboration between The Guardian newspaper and Fulton Ring, a software and data company.

3. **Assessments of Future Coastal Storm Risks:** As the National Risk Index demonstrates, a critical weakness of current efforts to communicate flood risk to coastal residents is the lack of user-friendly information concerning risk of current and future coastal storm surge flooding at different parts of the coastline.

   Fortunately, NOAA has developed estimates of the expected changes in coastal storm severity in future decades. After years of sometimes conflicting research, there is growing agreement on the question of future storm characteristics. After a review of research on possible changes to storm characteristics over time, NOAA published in May 2023 the following general conclusions:

   > "Based on a survey of existing studies, with regards to future North Atlantic, Caribbean Sea, and Gulf of Mexico tropical storm and hurricane activity, a 2˚C (4˚F) global warming scenario would be expected to lead to the following:
   >
   > - Storm inundation levels during hurricane surge events will increase due to sea level rise, anticipated to rise by about 2 to 3 ft (0.4 to 0.8 meters) by 2100. [NOTE: Sea level rise is projected to be greater in some places, e.g., 4.3 feet by 2100 under the intermediate scenario at Hampton Roads, Va.] This sea level rise will contribute toward significantly more coastal destruction and increased economic damage.
   >
   > - Rainfall rates within tropical storms and hurricanes are projected to increase by about 15%.

- Numbers of Atlantic hurricanes reaching Category 4 or 5 intensity are projected to increase about 10% but with large uncertainty and with some studies projecting a decrease."

NOAA has also developed maps showing the frequency of return of hurricanes with wind speeds below and above 96 knots along the Atlantic and Gulf of Mexico coasts. Although the maps provide no data on future changes in frequency, they do provide a general sense of where hurricanes of all categories have been most frequent and where the most severe storms (i.e., winds greater than 96 knots) have occurred.

This information about current and future storm risk location, frequency, and intensity is helpful to an experienced researcher but difficult for a property owner to access, assemble, and evaluate. A user-friendly presentation of the existing data would be a major step forward for coastal flood risk communication.

4. **Federal Interagency Assessments of Sea Level Rise:** The existing federal interagency effort to develop cross-agency assessments of sea level rise along the coast is one of the strongest elements of the current coastal flood risk communication effort.

   The Interagency Sea Level Task Force includes over half a dozen federal agencies and academic partners. It produces a periodic sea level rise scenarios report that describes future sea level rise under several scenarios for specific coastal locations and over time periods out to the year 2150. It also produces online tools to support decision-makers, an *Application Guide* to support use of the sea level rise scenarios, and a cross-agency website providing background information about sea level rise. All this information is verified as accurate by multiple federal agencies and is easy to access for free.

   Although there is much to commend in the existing assessment and communication of sea level rise risks, several aspects of this work could be improved. The existing reports and tools are designed for decision-makers rather than individual property owners. With an investment of time and effort, a non-scientist can gain a good understanding of sea level rise risks at a specific location, but many people are not able to devote the time to this work and would benefit from having a more user-friendly expression of risk (e.g., risk to a given site, by a given year, on a scale of 1-10). In addition, the information is passive in the sense that property owners need to go and find it on the internet and there is no capacity to affirmatively warn specific property owners in high risk areas of the risk they face.

   Finally, understanding sea level rise risk (permanent inundation occurring everywhere along the coast) without integrating coastal storm risk (temporary flooding occurring incidentally at specific places) means that property owners lack a full perspective of coastal flood risk. Better integration of sea level rise and storm flood assessments would be a major benefit to coastal property owners and other decision-makers.

5. **State Laws Requiring Flood Risk Disclosure at Time of Property Sale or Lease:** Some 19 of the 23 coastal (i.e., saltwater not Great Lakes) states have adopted laws requiring disclosure of varying degrees of information about flood risk at the time of sale of a property. These laws respond to the reality that many properties for sale have flood histories. A recent report found that 6.6 percent of homes in states surveyed that were sold in 2021 had previously been flooded.

   State disclosure laws are important because purchase of a home is the single biggest investment most people make and the existence of flood risk can reduce home value. These statutes build on and extend common law requirements for real estate transactions. In addition, state disclosure laws can address the information gap created by FEMA's decision not to release to the public its data on past flood damages to properties.

   Unfortunately, the majority of the existing coastal state disclosure laws have significant weaknesses. A national assessment of these state laws by the nonprofit Natural Resources Defense Council (NRDC) rated seven coastal state laws as "Best", six as "Adequate", and six as "Inadequate". The criteria for each grade are:

   Grade A (Best): Seven coastal state laws require disclosure of:
   - whether the property is in a designated floodplain,
   - whether there have been any flood damages to structures on the property;
   - whether there is any requirement to carry flood insurance; and
   - the cost of flood insurance or an elevation certificate.

   Grade C (Adequate): Six coastal state laws require only disclosure of whether the property is in a designated floodplain and whether there have been any flood damages to structures on the property but fail to require disclosure of whether flood insurance is mandatory.

   Grade D (Inadequate): Six coastal states require only the disclosure of whether the property is—before point of sale—in a designated floodplain and fail to require disclosure of any flood damages to structures on the property or disclosure of any requirement to carry flood insurance.

   FEMA Model State Requirements for Flood Risk Disclosure During Real Estate Transactions

   FEMA has published a report outlining a set of ten key elements of flood risk disclosure during real estate transactions. The report identifies states with the strongest flood risk disclosure requirements and provides a sample selection of their laws and disclosure forms that could be adopted by other states looking to implement or strengthen their real estate disclosure requirements

Importantly, only the states of Hawaii and New Jersey provide for disclosure of future risk from rising sea levels.
Hawaii was the first state in the U.S. to pass a law requiring explicit sea level rise disclosures in a real estate transaction. The statute requires sellers to disclose whether the property lies within the Sea Level Rise Exposure Area (i.e., the area of shoreline that could be impacted by 3.2 feet of sea level rise). To identify a property's location relative to a sea level rise exposure area, sellers are required to consult the Hawai'i Sea Level Rise Viewer.

New Jersey's recently updated disclosure law now requires purchasers to be warned about the impacts of sea level rise. As of March 2024, every seller of real property must disclose specific flood risk information via a property condition disclosure statement before the purchaser becomes obligated under any property purchase contract. The disclosure statement section on flood risk contains the following warning:

> "Flood risks in New Jersey are growing due to the effects of climate change. Coastal and inland areas may experience significant flooding now and in the near future, including in places that were not previously known to flood. For example, by 2050, it is likely that sea-level rise will meet or exceed 2.1 feet above 2000 levels, placing over 40,000 New Jersey properties at risk of permanent coastal flooding.... To learn more about these impacts, including the flood risk to your property, visit flooddisclosure.nj.gov."

The New Jersey disclosure statement also warns buyers of the following:

> "Also note that properties in coastal and riverine areas may be subject to increased risk of flooding over time due to projected sea level rise and increased extreme storms caused by climate change which may not be reflected in current flood insurance rate maps."

Including sea level rise disclosure within state statutory flood risk disclosure laws is important because disclosure of this key form of flood risk is not likely to be found by courts to be required by underlying common law. A recent *George Washington Law Review* article {cite Scata/Vogle after publication} concluded:

> "Besides the statutory mandates of Hawaii and New Jersey, sellers are likely not required to disclose the potential impacts of sea level rise. Based on the analysis of the aforementioned states, the common law is insufficient to require disclosure."

In summary, some of the issues with the state flood risk disclosure laws are:

- Four coastal states have no disclosure laws and only seven coastal states have laws rated by NRDC as "Best";
- Only two states provide for disclosure of future flood risk and risk from rising sea level, such as flood inundation and rising groundwater levels;
- Disclosure only occurs at time of sale, or in some cases lease, of a property and this lack of a periodic, affirmative notice of risk means that some property owners could be unaware of flood risk for long periods;
- The timing of the actual disclosure of flood risk sometimes occurs very late in the sales process (e.g., just prior to closing) and thus has a limited influence on the purchase decision;
- Because of the range of disclosure requirements in state laws it is difficult to compare flood risk at properties in different states; and
- State disclosure statements generally lack a user-friendly format that allows a buyer to understand risk of a given property relative to other properties (e.g., a 1-10 flood risk score).

6. **Private Flood Risk Assessment and Communication Tools:** Several private, non-governmental entities have drawn on national mapping and related databases to develop online tools providing assessments of flood risk, including in coastal areas. For example, First Street has developed the "Flood Factor" tool that provides a flood risk score on a 1-10 scale for specific property address in an online format. The risk assessment firm Corelogic also offers a flood risk assessment service.

   The Flood Factor tool has several strong points:

   - It provides a flood risk assessment in a user-friendly format (i.e., 1-10 score);
   - The score represents risks from both storm flooding and rising seas;
   - The score recognizes changing risks in the future and is presented as an evolving risk over a thirty-year period; and
   - The risk information is now widely accessible as it is provided as a service on real estate sale listing sites, including Zillow and Redfin.

   At the same time, there are several drawbacks to Flood Factor:

   - Much of the assessment information beyond the overall flood risk score is behind a paywall which limits access for many people, including lower income property owners;
   - Although the methodology used to make the assessments is provided online, the methodology is not verified as accurate and reliable by the federal government posing something of a "use at your own risk" conundrum for property owners (e.g., does flood risk information on a property sales website understate risk);
   - Assessments of competing, private sector risk models have demonstrated that different models produce "startlingly different outcomes"; and

- The limitation of projected future flood risks to thirty years means that property owners may miss important increases in flood risk (e.g., sea level rise) occurring beyond this period when they or their family still own the property.

CoreLogic is a private company offering risk assessment services to a wide range of private and public sector decision-makers. In the case of coastal storms, CoreLogic offers a "Hurricane Risk Report" including a "storm surge risk score" based on historical risk information. The company also produces general reports, such as a report on the 2024 hurricane season. Unfortunately, CoreLogic charges for place specific risk assessments and the assessments lack an endorsement from the federal government.

Finally, it is important to keep in mind that although each of the current coastal flood risk assessments and tools has strengths and weaknesses, the most significant fault of the current coastal flood risk communication system is that each element has developed independently and there is a lack of focus on clearly defined goals and a lack of effective coordination among the various parties to address weaknesses and highlight and develop strengths. No agency or leadership group is responsible for managing and improving communication of coastal flood risk.

IV. Benefits of More Effective Flood Risk Communication

Property owners, communities, and state and federal governments would all derive important benefits from more effective communication of coastal flood risks.

Benefits to Property Owners

Some of the key benefits that coastal property owners will get from better understanding of their flood risks are described below.

1. **Allow Property Buyers to be Fully Aware of Flood Risks:** The purchase of a home is often the largest financial investment a person makes and the decision to make a purchase for a given price can have long-term financial consequences.

   In coastal areas, buying a home without understanding its flood risk, both past and future, can result in unexpected flood damages and repair costs. Repair costs can range from minor to the total rebuilding of a home or structure.

NRDC Report Finds High Costs Due to Purchase of Flood Risk Homes

A NRDC-commissioned report found that "home buyers who unwittingly purchase a flood-prone home are likely to incur tens of thousands of dollars in flood-related damages. By denying home buyers information about past flooding, people cannot make informed decisions about one of their biggest financial investments—their home."

With awareness of potential flood related costs and access to reliable flood risk information about a property, especially prior to a property purchase, people will be able to participate in the coastal housing market with the confidence that they are not putting their financial health at risk.

2. **Better Informed Insurance Purchases:** Homeowners located in Special Flood Hazard Areas (SFHAs) are required to purchase flood insurance from the NFIP so that their mortgage can be guaranteed by federal home financing institutions such as Fannie Mae and Freddie Mac. But, many homeowners still face a decision to buy or not to buy NFIP insurance including:

    - People who recognize that they may still face flood risks even though they are located outside the SFHA;
    - People inside the SFHA who pay off their mortgages and no longer face a requirement to purchase NFIP insurance; and
    - People who are able to purchase a coastal property with cash and do not need a mortgage.

    In addition, because of the $250,000 coverage limit on NFIP policies, some people with higher value properties may consider buying flood insurance on the private market to supplement NFIP coverage. Because of the high value of many coastal properties, many homeowners who have only NFIP coverage are significantly underinsured.

    Each of these insurance decisions can have huge financial implications for a property owner. The annual cost of NFIP insurance under new Risk Rating 2.0 guidelines is generally increasing for coastal properties and is likely to continue to rise as flood risks grow. These premium cost increases are causing some property owners not required to have flood insurance to go without flood insurance. While the annual cost of insurance can be difficult to fit into an annual budget, the financial consequences of experiencing flood damage without insurance can be devastating.

3. **Savings from Property Specific Flood Mitigation:** An improved program of coastal flood risk communication will likely include better information about the cost-effective measures that individual homeowners can take to reduce flood risks on their property. For example, property-specific risk mitigation measures range from relocation of electrical services to elevation of some or all of a structure. These measures might be promoted in the context of both insurance transactions and more general flood risk information. Mitigation investments may lower annual NFIP premiums and may minimize damage costs, including avoiding catastrophic losses well above the $250,000 NFIP coverage limit.

4. **Avoid Emotional Trauma and Death:** Flood damages can be emotionally taxing and major damages, such as those associated with coastal storms, can lead to years of emotional trauma. In a more existential sense, a decision to avoid buying or staying in a

coastal home with significant flood risk can reduce the risk of death. NOAA reports that over 7,000 deaths resulted from hurricanes since 1980.

Benefits to Communities

Improving coastal flood risk communication will also have benefits for communities and local governments.

1. **Support Local Flood Management Decision-making:** Coastal communities face difficult decisions in managing development in risky coastal areas. Some flood management options involve major investment of local funds in structural protection projects or in zoning changes to discourage new development in flood risk areas. These complex decisions are more likely to be effective at reducing risk when the public is well informed about present and future flood risk at their property and to the community more generally.

   Some communities are working through the Community Rating System to implement a menu of flood reductions measures. Each measure contributes to a small reduction in the premium that local property owners pay for NFIP insurance. But, these measures involve staff time and other costs and a community is more likely to engage this work if the public recognizes the flood risks and supports the investments. By implementing these measures, communities reduce NFIP premiums but also reduce risks and future damages to both private and public assets.

   In addition, some local governments have been reluctant to implement flood risk reduction measures that involve eminent domain based on a concern for the cost of litigation opposing these actions. A key factor in judicial review of eminent domain cases is whether the property owner had an “investment backed expectation” that the property was safe (i.e., the owner invested in a property and was not advised of a flood risk). A more comprehensive effort to improve flood risk communication will generally support future local government decisions related to eminent domain and help defeat claims of “investment backed expectation”.

2. **Reduce Local Infrastructure Damage Costs**: Infrastructure and other assets owned by local governments and related public entities or utilities are at risk of damage from both coastal storms and gradually rising sea level. In the case of major disasters, communities may receive disaster relief funds to repair or replace buildings, roads, and supporting infrastructure. But damage from small storms and from gradual sea level rise can result in incremental but significant deterioration of assets. This damage can be minimized with timely investment in flood mitigation measures and these investments are more likely to be supported by the public when people are well informed about flood risk and the benefits of community wide flood mitigation.

3. **Improve Property Tax Stability:** Municipal governments rely on local property taxes to sustain annual costs of services ranging from schools to police, to roads, and libraries. Even small declines in property tax revenues can result in significant impacts to service levels. In coastal communities, high value properties right along the coast often pay a significant percentage of property taxes.

   But relying on revenues from these high value properties is a risky game. On one hand, promoting high value development right along the coast can generate significant tax income and support expanded local government services in the short term. On the other hand, inevitable damage or loss of these properties to storm surge flooding or rising sea levels can result in significant declines in annual revenues, driving up taxes on other property owners significantly or forcing major service cuts.

   Instability in local property tax revenues is a problem for several reasons:

   - Local governments are faced with difficult decisions about whether to increase taxes or cut services, sometimes including services to the neediest residents;
   - Owners of local property not damaged by a flood can see dramatic tax increases and these owners may be least able to afford higher taxes; and
   - Instability in local property taxes can undermine bond credit ratings, raising the cost of financing of investments in flood recovery, future flood mitigation, and diverse other public services.

   Municipalities can minimize property tax instability with timely investments in projects and policies that minimize storm flood damage and impacts of rising sea levels. These investments, however, compete among a wide range of other potential local investments and are more likely to survive this competition if the people in the community have a clear understanding of the flood risk that the community faces.

4. **Sustain Municipal Bonding Capacity**: Local governments rely on issuance of bonds to finance a wide range of public infrastructure to provide essential services and enhance local amenities. These bonds are commonly tax free for investors and municipalities work to keep the bond interest rates low by maintaining high credit ratings that are based on confidence of the ability of the local government to make the annual bond payments.

   In judging local capacity to repay bonds, bond rating agencies are moving toward considering both exposure to climate risks and vulnerability to climate driven damages. Local governments can do little to reduce flood risk exposure but can make investments to reduce flood vulnerability. Municipalities with sound flood management programs are likely to sustain good credit ratings and avoid the major damages that would undermine their ability to make bond payments. Building public understanding of local

flood risks is likely to result in wider public support for the investment in flood risk reduction that will help sustain strong bond ratings.

Benefits to State and Federal Governments

Last but not least, states and the federal government will benefit from a more effective effort to improve understanding of coastal flood risks.

1. **Disaster Relief Savings:** States and the federal government make significant investments in relief of disasters after they occur and in preparing for future disasters. Although better public recognition of coastal flood risks can be expected to drive demand for increased investments in flood prevention, these investments are likely to be more than offset by reduced costs of disaster relief.

   FEMA reports that every dollar spent on natural hazard mitigation grants resulted in $6 in savings and that the savings ratio in the case of hurricane storm surge was even greater at $7. The National Institute of Building Sciences estimates that basic flood mitigation practices, such as building one foot above the 100-year flood elevation, are cost effective, adding only $90 million of construction cost per year for new construction, while saving $550 million, a 6-to-1 benefit-cost ratio.

2. **Improved Macroeconomic Stability:** Disaster prevention and relief spending consumes large parts of state and federal budgets but disasters also generate additional financial costs for state and federal governments and the public.

   A critical source of macroeconomic instability is exposure of private residential mortgage-backed securities to home loans that will be driven to default as a result of flooding from coastal storms and rising sea level. Residential mortgaged backed securities have tight profit margins and a small number of defaults above the predicted rate can cause the security to fail to provide the promised returns to investors. Today, most of these securities do not reflect current coastal flood risk or the increased vulnerability that will come from more severe storms and rising sea level.

   A related consideration is that federal mortgage guarantee institutions like Fannie Mae and Freddie Mac hold significant portfolios of residential mortgages. Growing flood risks to these properties will increase the rate of default on the mortgages. Last year, the Congressional Budget Office found that federally backed mortgages covered properties that were likely to sustain about $190 billion in flood damage over 30 years. The *New York Times* has reported that, despite some recent efforts to evaluate potential losses, to date, Fannie Mae and Freddie Mac have not set guidelines to minimize flood risk losses to the mortgages they guarantee.

Finally, the rise in flood insurance premiums, combined with the rise in property insurance premiums, is adding to the annual overhead costs of many homeowners. Even in the absence of a major flood event with its resulting costs, some less wealthy homeowners will find that the steady increase in annual insurance costs driven by rising coastal flood risks will force them to sell.

As more of these homes come on the market the value will decline and these homes may become unmarketable in some areas. Homes that do not sell are at risk of mortgage default posing risks to the broader economy at a level comparable with the 2008 housing financial crisis.

Senate Budget Committee Hearing Statement

In his opening statement at a 2023 hearing of the Senate Budget Committee on the economic risks that climate change poses for coastal communities, Chair Senator Sheldon Whitehouse commented:

"As we saw in 2008, trouble in the mortgage market can cascade out into the broader economy. Freddie Mac has made similar warnings, so let me close by quoting their former chief economist here today on the damage that climate change is likely to inflict as coastal property values get hit: "the economic losses and social disruption … are likely to be greater in total than those experienced in the housing crisis and Great Recession" a sobering warning."

3. **Increased Social Equity:** Although coastal storms and sea level rise pose a threat to rich and poor alike, people with fewer resources are likely to be less able to recover from the financial impacts of flooding and more likely to experience trauma following major flood events. People with limited resources face the prospect of rebuilding on a scale that does not match what was lost and being in the rebuilding process longer. In addition, recent studies have found that government disaster relief is more likely to go to wealthy and white people.

   Although direct action to correct inequitable allocation of disaster relief is an obvious means of addressing the problem, it is also the case that more comprehensive and effective efforts to reduce vulnerability to coastal flooding would allow for the more equitable allocation of available funds. Improved flood risk communication would support the programs and projects that would reduce flood vulnerability.

4. **Increased Social Harmony:** Public appreciation of coastal flood risk will drive greater success in minimizing flood impacts, both fiscal and social, thereby increasing social and civic harmony. Although social harmony is difficult to monetize, a country bombarded with one devastating disaster after another is likely to be more stressed and less happy than a country where disasters are less frequent and less severe. Funds that would have been diverted to meet the mounting costs of disasters are available to provide other social goods that further increase social harmony. These social benefits are not limited to coastal areas and apply to the country as a whole.

V. Proposed Strategy to Strengthen Communication of Flood Risk to Coastal Property Owners

Given the significant benefits of strengthening communication of coastal flood risks and the weaknesses of existing flood risk assessments and tools, the federal government should develop and implement a strategy to more effectively communicate flood risk to coastal property owners.

As a first step, the federal government should charge an interagency team made up of federal agencies, led by FEMA, NOAA, and USGS, with developing and implementing a coastal flood risk communication strategy. The interagency team should prepare a strategy document describing overall goals and key elements and should also provide for coordination among federal agencies, states, and non-governmental organizations on a continuing basis.

The interagency team should consider the following goals for a coastal flood risk communication strategy:

- Strengthen property owner understanding of current and future coastal flood risks to foster improved decision-making and reduce loss of life and property in coastal areas;
- Improve implementation of flood risk mitigation measures by property owners and communities;
- Reduce federal, state, and local government disaster response costs;
- Reduce property losses and minimize costs of federal flood insurance and property insurance in coastal areas;
- Encourage public support for federal, state and local investments in plans and projects to mitigate current and future damages from coastal storms and rising seas; and
- Minimize the risk of severe property losses and mortgage defaults that would undermine the financial stability of local governments or larger economy.

The key elements of a strategy for better coastal flood risk management communication are:

- Strengthen State Flood Disclosure Laws;
- Improve Federal Coastal Flood Risk Data;
- Establish a National Coastal Property Flood Risk Database;
- Provide Notification of Flood Risk to Owners of Property in High-Risk Coastal Areas; and
- Report to Congress on Changing Coastal Flood Risks and Needed Response Actions.

Taken together, these strategy elements strengthen coastal flood risk communication and help deliver the benefits of better public understanding of flood risk described in the previous section of this white paper. At the same time, these actions are generally low cost for states and the federal government in terms of funding and staff, do not engage intractable controversies, and do not require enactment of federal legislation.

Each of these five strategy elements is described below.

1. **Strengthen State Flood Disclosure Laws:** The existing state laws providing for flood risk disclosure at time of sale or lease of property provide a useful but limited service of flood risk communication. As an interim measure pending development of a broader, national strategy, the federal government and non-governmental organizations should encourage coastal states to adopt or improve these laws as quickly as possible.

   Several key improvements are needed:

   - The four coastal states without flood risk disclosure laws (i.e., Alabama, Georgia, Massachusetts, and Virginia) should adopt such laws;
   - The existing laws in the twelve states with flood disclosure laws lacking key elements should be upgraded (e.g., amended as needed to meet criteria to be rated "Best" under the NRDC rating methodology); and
   - All coastal state disclosure laws should be amended to address the flood risks posed by rising sea levels, following the models of laws now in place in Hawaii and New Jersey.

   In addition to simply encouraging state adoption of these laws, the federal government should consider providing incentives for state action including:

   - Amending FEMA's Community Rating System to provide credits to coastal communities that participate in the System when the state adopts or strengthens a flood risk disclosure law thus improving the System score for the community and reducing the premiums that homeowners in that community pay for federal flood insurance;
   - Considering state requirements for coastal flood risk disclosure at time of sale as a positive factor in acceptance of mortgage by the federal loan guarantee institutions Fannie Mae and Freddie Mac;
   - Reducing the state share of disaster relief funding for states adopting strong flood risk disclosure laws; and
   - Reducing the state share of funding for pre-disaster mitigation grants and grants for coastal storm plan implementation from the Army Corps of Engineers for states adopting strong coastal flood risk disclosure laws.

2. **Improve Federal Coastal Flood Risk Data:** As a key first step in developing a federal strategy for improved coastal flood risk management, the federal government should take steps to strengthen several types of coastal flood risk data.

A. **Improve FEMA Flood Maps**: FEMA should draw on the recommendations of the Technical Mapping Advisory Committee to expand current efforts to upgrade flood risk maps used in the NFIP. Work in this area should include:

- Update maps to reflect current flood risks;
- Upgrade accuracy of maps from the current 50 percent probability of accuracy standard to the 95 percent standard;
- Improve accuracy of maps (i.e., evaluate mapped areas in light of evidence that flood risk areas are not included on maps);
- Add information concerning sea level rise risks to maps for information purposes; and
- Add information concerning the frequency and severity of coastal storm surge flooding for informational purposes.

Nonprofit Organization Letter Recommending Flood Map Improvements

A group of nonprofit organizations wrote to FEMA calling for full implementation of the recommendations of the Technical Mapping Advisory Committee, including updating of maps and recognition that changing environmental conditions due to climate change will make some places more vulnerable to flooding in the future than they have been in the recent past.

Updating maps is costly and the administration should request, and Congress should provide, sufficient funds to both update existing maps and expand mapping to places that are not yet mapped.

B. **Present Storm Surge Risk Data:** The federal government should expand efforts to use existing information on the frequency and severity of storms generating damaging flood surges at specific places along the coast and expand efforts to predict changes in frequency and severity over the decades ahead. This data should inform presentation of storm risk information on FEMA flood maps and in the proposed Coastal Property Flood Risk Database (see recommendation #3 below).

Coastal Flood Resilience Project White Paper on Improving Assessment of Future Coastal Storm and Hurricane Risks

The CFRP published a white paper in July of 2024 recommending that the federal government take steps to strengthen assessments of the current and future flood risks from tropical storms and hurricanes at places along the Atlantic and Gulf of Mexico coasts of the United States.

C. **Expand Mission of Interagency Sea Level Task Force to Include Storm Surge Risk:** The federal government should expand the mission of the existing Interagency Sea Level Task Force to include risks of coastal storm flooding associated with the frequency and severity of both historical and projected future coastal storms and hurricanes. By addressing risks from both sea level rise and storm surge risk as part of a coordinated effort, the federal government will provide coastal residents with a more useful resource to understand present and future flood risks.

As part of this effort, the Task Force should develop a research agenda for improving prediction of the severity and frequency of coastal storms over the coming decades. More information about the need to improve research and data on coastal storm prediction is available in a Coastal Flood Resilience Project white paper.

3. **Establish a National Coastal Property Flood Risk Database:** FEMA should establish a public, online database providing nationally consistent, address-specific information on current and future flood risk for coastal property. The database should include risk information for each property located in a coastal county as defined by NOAA but excluding inland coastal counties (i.e., Great Lakes counties not subject to sea level rise).

   Each address-specific property record in the database should include:

   - whether the property is in a designated FEMA floodplain;
   - whether there have been any flood damages to structures on the property;
   - whether there is any requirement to carry flood insurance;
   - the cost of flood insurance or an elevation certificate;
   - the existing and projected risk from storm surge in 2050; and
   - the existing and projected risk of flooding from rising sea levels in the years 2050 and 2100.

   Each property record should include a user-friendly, numerical, flood risk score along with supporting information and data. To the extent practicable, each property record should provide a community level flood risk assessment designed to inform readers of current and likely future flood risks beyond the specific property, including flood risks to infrastructure assets (e.g., power, water, sewer, emergency services).

   By investing in the coastal flood risk database, the federal government will assure that the public will have free access to flood risk data that is reliable. But rather than rely on the public to find this information among the many online information sources, federal agencies should develop and implement a communications plan to use diverse social media, public service announcements, and related tools to alert people in coastal areas to the availability of flood risk information.

   In addition, FEMA should amend the Community Rating System to provide credits to participating communities that implement measures to educate the community on how to use the database, providing supplemental credits for outreach dedicated to disadvantaged populations.

   Finally, FEMA, in cooperation with federal home mortgage guarantee institutions, should provide information from the flood risk database to homeowners in saltwater coastal counties at part of the mortgage guarantee financial transaction.
4. **Provide Notification of Flood Risk to Owners of Property in High-Risk Coastal Areas:** FEMA should identify properties at high risk of coastal flooding and provide address-

specific, periodic (e.g., every five years), written notice of flood risks and risk mitigation opportunities directly to property owners in a user-friendly format. FEMA should draw on the coastal property flood risk database in developing notice formats.

In defining properties as "high-risk", FEMA should include coastal properties that meet any of the following criteria:

- the property has sustained damages in excess of 50 percent of total value;
- the property is defined by FEMA as a "repetitive loss property" (i.e., a NFIP-insured structure that has had at least 2 paid flood losses of more than $1,000 each in any 10-year period since 1978); or
- the property has a numerical flood risk score of 9 or 10 in the Coastal Property Flood Risk Database.

To the extent practicable, the risk notifications should describe actions that property owners should consider to mitigate flood damages including low-cost property improvements with potential to reduce damages, nature-based resilience techniques, and relocation to higher ground.

5. **Reports to Congress on Changing Coastal Flood Risks and Needed Response Actions:** The interagency team leading development and implementation of a flood risk communication strategy (chaired by FEMA and NOAA), in cooperation with other appropriate federal agencies, should provide periodic reports to Congress describing changes in coastal flood risk and recommending measures to improve coastal flood risk communication.

   Reports to Congress should include:

   - an overall assessment of recent coastal flood damages and losses, including estimated damages and federal, state and local disaster relief costs;
   - an assessment of the relative contributions of storm flooding, hurricanes, and rising sea level to coastal flood damages;
   - summary of data from the Coastal Property Flood Risk Database;
   - summary of data from the notification of property owners of coastal flood risks; and
   - recommendations for policy or program changes that federal agencies, Congress, state governments, and local governments should consider to reduce flood risk damages and encourage implementation of risk reductions measures at the property and community level.

The *Coastal Flood Resilience Project* is a coalition of organizations working for stronger programs to prepare for coastal storm flooding and rising sea level in the United States. The

views expressed in this white paper are those of the supporters listed below and do not represent the views or endorsements of their organizations.

Supporters of this white paper include:

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- Stephen Eisenman; Anthropocene Alliance
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- Jason Scorse; Middlebury Center for the Blue Economy
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