

# Beyond Elevation: Exploring a Holistic Approach to Coastal Flood Risk Management

ASFPM Flood Science Center

Jake Thickman



---

The online version of this report and its associated resources can be found at

[no.floods.org/holistic-cfrm](http://no.floods.org/holistic-cfrm)

---

---

# Table of Contents

---

<b>Introduction</b> .....	<b>1</b>
<b>Project Overview</b> .....	<b>1</b>
<b>Terminology</b> .....	<b>2</b>
<b>Coastal Management Principles</b> .....	<b>2</b>
Increase capacity of state coastal zone management programs .....	3
Explore alternatives to structural flood risk mitigation .....	3
Implement long-term planning for flood risk .....	4
Balance flood mitigation and disaster recovery costs .....	5
Develop a holistic approach to coastal flood risk management .....	5
<b>Federal Coastal Flood Risk Management Policies and Programs</b> .....	<b>6</b>
<b>Federal Legislative Framework</b> .....	<b>6</b>
Executive Guidance .....	6
Establishment and Reform of the National Flood Insurance Program .....	8
Governance Structure .....	8
Judicial Support .....	9
Environmental Regulation .....	10
Water Infrastructure .....	11
Disaster Relief .....	11
<b>Federal Program Summaries</b> .....	<b>12</b>
<b>Federal Emergency Management Agency (FEMA)</b> .....	<b>12</b>
National Flood Insurance Program (NFIP) .....	12
Community Rating System (CRS) .....	13
FEMA Floodplain Mapping .....	14
National Dam Safety Program (NDSP) .....	15
Hazard Mitigation Assistance (HMA) .....	15
Public Assistance (PA) .....	17
Individuals and Households Program (IHP) .....	18
<b>United States Army Corps of Engineers (USACE)</b> .....	<b>18</b>
General Investigations (GI) .....	18
Flood Risk Management Program .....	19
Levee Safety Program .....	20
Technical Assistance Programs .....	20
<b>National Oceanic and Atmospheric Administration (NOAA)</b> .....	<b>21</b>
Community-based Restoration Program (CBRP) .....	21

Coastal Zone Management Act (CZMA) Programs.....	22
Endangered and Threatened Marine Species .....	23
<b>Environmental Protection Agency (EPA) .....</b>	<b>24</b>
National Environmental Policy Act (NEPA) .....	24
Clean Water Act (CWA).....	24
Clean Water State Revolving Fund (CWSRF).....	25
National Pollutant Discharge Elimination System (NPDES).....	25
<b>United States Fish and Wildlife Service (USFWS) .....</b>	<b>26</b>
Coastal Barrier Resources System (CBRS).....	26
National Coastal Wetlands Conservation Grants.....	27
Endangered Species Program .....	27
Coastal Program.....	27
<b>Natural Resources Conservation Service (NRCS).....</b>	<b>28</b>
Environmental Quality Incentives Program (EQIP).....	28
Emergency Watershed Protection Program (EWP) .....	29
Watershed Rehabilitation Program.....	29
Watershed and Flood Prevention Operations Program (WFPO) .....	30
Agricultural Conservation Easement Program (ACEP) .....	30
<b>United States Small Business Administration (SBA).....</b>	<b>31</b>
Disaster Loan Program .....	31
<b>Department of Housing and Urban Development (HUD) .....</b>	<b>32</b>
Community Development Block Grant Program (CDBG).....	32
Sustainable Communities Regional Planning Grants (SCRIP) .....	32
Home Investment Partnership Program (HOME).....	33
<b>United States Department of Transportation (DOT) .....</b>	<b>33</b>
Transportation Infrastructure Programs.....	33
<b>Bureau of Reclamation.....</b>	<b>34</b>
Dam Safety Programs .....	34
<b>Farm Service Agency (FSA).....</b>	<b>34</b>
Conservation Reserve Program (CRP).....	34
<b>State Coastal Flood Risk Management Case Studies .....</b>	<b>36</b>
Wisconsin.....	36
Florida .....	44
New York .....	53
Washington.....	61
<b>Holistic Coastal Flood Risk Management Objectives, Strategies, and Actions....</b>	<b>70</b>
Increase state coastal flood risk management capacity .....	70
Develop alternatives to structural coastal flood risk mitigation measures .....	72
Develop and enhance long-term coastal flood risk planning and adaptation.....	74
Balance investment in disaster recovery and flood risk mitigation .....	75
Adopt a more holistic approach to coastal flood risk management.....	77

---

# Introduction

---

## Project Overview

Coastal floodplains and connected ecosystems are among the most ecologically productive regions in the United States, with ecosystem services estimated at over \$20 billion (Martinez et al. 2007). Coastal regions also rank among the most densely populated areas both globally and in the United States (Duxbury & Dickinson 2007). Over a quarter of U.S. residents live in coastal counties, a number that is likely to continue to increase in coming decades (Gaddis et al. 2007). This continued development in sensitive coastal regions has resulted in a need for sound coastal management practices in order to balance the effective use of coastal resources, health of coastal ecosystems, and risk posed by factors such as coastal flooding and erosion (Bagstad et al. 2007; Temmerman et al. 2013; White et al. 2001).

These coastal management challenges will likely become more complex in the future due to changing climatic conditions, specifically rising sea levels, increased coastline erosion, and coastal storm intensification (FitzGerald et al. 2008; Hallegatte et al. 2013; IPCC 2013; Mousavi et al. 2011; Nicholls & Cazenave 2010). Coastal flood risk management policies and practices must effectively account for these changing hazards if the health of coastal communities and ecosystems is to be preserved. This need to update coastal management policies and practices in light of changing coastal hazards has been recognized by the Association of State Floodplain Managers (ASFPM) and the Coastal States Organization (CSO), which have produced number of policy guidance documents. Up to this point, however, no framework exists for implementing the progressive policies put forth. This project aims to fill this gap in knowledge through a review and synthesis of federal and state coastal management policies, identifying model policies at the federal and state level and providing guidelines for the development of a holistic approach to coastal flood risk management.

The report is organized into three main sections. The first section provides an overview of federal programs with either a direct or indirect nexus to coastal flood risk management as well as the federal policy framework under which these programs operate. Each program within the scope of the report is summarized, and individual program's responsibilities, roles, and connections to other federal agencies are identified. Federal programs are also evaluated in terms of their compatibility with the coastal flood risk management objectives of ASFPM and CSO. The second section consists of case studies of coastal flood risk management practices in Wisconsin, Florida, New York, and Washington, analyzing policies and programs across the following nine dimensions:

1. State Coastal Management Programs
2. Shoreline regulations
3. Floodplain management
4. Wetland management
5. Building codes
6. Community planning

7. Stormwater and runoff management
8. Erosion management
9. Climate adaptation initiatives

The report concludes with a set of objectives, strategies, and actions in support of a holistic, adaptive approach to floodplain management, meant to provide a framework for future coastal flood risk policy and management program development.

---

## Terminology

For the purpose of this report, key terms are defined below.

- **Resilience:** the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation (IPCC 2014)
- **Sustainability:** the capacity of a community to meet the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development 1987)
- **Adaptability:** the capacity of actors in a management system to influence the strength of resilience in that system (Walker et al. 2004)
- **Hazard:** the potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources (IPCC 2014)
- **Exposure:** the presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected (IPCC 2014)
- **Vulnerability:** the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (IPCC 2014)
- **Risk:** the potential for consequences where something of value is at stake and where the outcome is uncertain, recognizing the diversity of values. Risk is often represented as probability of occurrence of hazardous events or trends multiplied by the impacts if these events or trends occur (IPCC 2014)

---

## Coastal Management Principles

Upon review of ASFPF and CSO flood risk management policy guidance documents, including the ASFPF Foundation Holistic Coasts Report, ASFPF Coastal No Adverse Impact Handbook, ASFPF

National Flood Programs and Policies in Review, CSO Guidelines on Beach and Inlet Management, and CSO Guidelines on Coastal Resiliency Planning and Adaptation, five overarching management principles were identified. The following are recommendations espoused by both ASFPM and CSO to improve coastal flood risk management policies and practices in the United States. Descriptions of how these management principles are applied at the state level are included in the Elements of Policy Goals/Management Principles sections of each State Coastal Flood Risk Management Case Study. Specific actions that can be taken to address each of these management principles are provided in the final section of this report, Holistic Coastal Flood Risk Management Objectives, Strategies, and Actions.

## **Increase capacity of state coastal zone management programs**

An increased emphasis on state and local leadership is a critical aspect of improving coastal flood risk management. State coastal management programs are in a more advantageous position than federal agencies to provide guidance on multiple government functions essential to coastal flood risk management, including land use, building standards, and protection of coastal resources. Given this more effective coastal management toolset available to state governments, coastal management authorities at the state and local level are better equipped to address changing coastal hazards that will likely vary on a regional scale. Federal agencies can facilitate increased state capacity for coastal flood risk management by empowering effective state coastal management programs through additional technical, financial, and planning assistance. Additional, predictable funding from state, federal, or other entities should be made available to state coastal management programs in order to advance long-term community resiliency planning, coastal storm damage mitigation projects, and coordination with federal agencies. These actions would allow states to take greater ownership of local coastal flood risk management practices, making states less reliant on federal flood mitigation or disaster recovery and enabling regular updates of coastal management and hazard mitigation plans at scales relevant to local communities.

### ***Policy goals***

- Increased state capacity to provide regular updates to coastal flood risk management plans
- Increased technical assistance from federal agencies
- Improved coordination mechanisms between coastal states and federal agencies
- Development of additional consistent, long-term funding mechanisms for state coastal zone management programs

## **Explore alternatives to structural flood risk mitigation**

In light of coastal development trends, changing coastal hazards, and increased understanding of the value of coastal ecosystems, it has become necessary for U.S. coastal management policies and practices to balance human use and ecological health in coastal regions. With this in mind, the tie between coastal economies and coastal ecosystems should be integrated into planning at multiple government levels, particularly when analyzing structural means of flood risk mitigation and alternative non-structural strategies. Hazard mitigation measures should also be evaluated in terms of both sustainability and potential conflict with natural processes. Where possible, non-structural practices incorporating principles of resilience and adaptability should be used, and structural mitigation strategies should take advantage of emerging green infrastructure technologies. A literature review of disaster risk reduction studies found that the most cost-effective forms of disaster risk reduction tend to

be non-structural approaches, such as land use planning, warning systems, and household-level changes (Kelman 2013). Overall, flood risk mitigation strategies must recognize and further emphasize the link between flood damage reduction and the protection of coastal ecosystems. Restoration of natural resources will likely play a key role in forming cost-effective, long-term flood risk mitigation solutions and should be properly evaluated alongside traditional structural flood risk mitigation measures.

### *Policy goals*

- Increased use of non-structural flood risk mitigation measures
- Further inclusion of ecological services in benefit/cost analyses of flood risk mitigation projects
- Increased use of coastal natural resource restoration as a flood risk mitigation tool
- Improved regulatory and permitting process for non-structural mitigation approaches

## **Implement long-term planning for flood risk**

In order to move towards more resilient, sustainable coastal communities, coastal flood risk management policies and practices must promote long-term strategies that take into account the full range of current and potential future coastal hazards, including those risks that may emerge or be exacerbated by changing climate such as rising sea levels, changing water levels in the Great Lakes, increasing rates of erosion, and coastal storm intensification. Coastal resource protection should be integrated into such long-term planning efforts to help ensure long-term sustainable use of coastal resources and coastal ecosystem health. Additional investment in scientific expertise and data relating to coastal flood risk management will be necessary to more accurately quantify, forecast, and ultimately incorporate future flood risk into management policies and practices. An important element of this process will be collaborative federal agency investigations of significant future coastal flood events to effectively fill knowledge gaps and prevent overlap of data collection resources. Improved data on changing coastal hazards and risk should be made widely available, potentially through publicly accessible web resources, and visualization tools incorporating new data should be expanded to aid in disseminating any new information to coastal management professionals and residents of coastal communities. Uncertainty surrounding future projections of coastal hazards is likely to persist, and so agencies should make efforts to involve states and communities in flood risk mapping to communicate these uncertainties while employing measures such as the inclusion of freeboard to help account for potential unforeseen coastal flood risk. Issues relating to uncertainty in coastal flood risk management can also be addressed by shifting from a level of protection approach towards risk analysis, which is more transparent in terms incorporating uncertainty in management decisions.

### *Policy goals*

- Expanded coastal flood risk management planning horizons
- Inclusion of coastal hazards due to changing climate in flood risk maps and plans
- Expansion of information availability and visualization tools
- Increased use of freeboard in coastal flood risk management plans
- Increased use of risk analysis in coastal management decision making

## **Balance flood mitigation and disaster recovery costs**

To form resilient coastal communities in an economically sustainable fashion, those that benefit from coastal management decisions should pay a share of the cost. Federal subsidies and financial incentives in the form of flood insurance premiums and disaster relief funds should be examined to identify any conflicts with the formation of resilient coastal communities, and future coastal management policies and practices should avoid financial incentives that encourage new development or redevelopment in potentially risky coastal zones. Any such incentives currently in place should be corrected, with a key step in this process being the adjustment of flood insurance subsidies towards true costs, thereby reducing the number of properties that experience repetitive flood losses. States and communities require some degree of accountability for their coastal management decisions to avoid a scenario where communities that make less investment in flood preparedness receive greater federal assistance than those communities that have been more diligent in planning to mitigate flood risk. A mechanism for increased accountability beyond the federal level could potentially be implemented in the form of a sliding scale for disaster assistance cost-shares between federal and state agencies based on initial flood preparedness. This and other accountability mechanisms should be evaluated in order to achieve a more equitable distribution of coastal management costs and responsibilities.

### ***Policy goals***

- Increase cost-sharing between state and federal agencies for disaster recovery efforts
- Adjust flood insurance premiums in high-risk coastal areas towards true costs
- Reduce economic incentives that may encourage development in high-risk coastal areas

## **Develop a holistic approach to coastal flood risk management**

A critical focus area for future coastal flood risk management is movement towards a broad-based, holistic, and comprehensive management approach that will remove the stove-pipes found in the current flood risk management framework. This will require coordination between environmental agencies across multiple levels of government as well as vertical and horizontal alignment of federal and state coastal flood risk management policies. To form this holistic management framework future flood risk management policies and practices should seek to identify and reduce federal-state institutional barriers. Potential conflicts between flood risk mitigation and disaster recovery policies in which communities may lack sufficient incentives to reduce flood risk to acceptable levels should also be reduced. Flexibility to account for varying regional coastal flood risk management concerns will be a key aspect of this framework along with increased public outreach and education to effectively communicate changes to coastal flood risk management policies and practices.

### ***Policy goals***

- Improve coordination between state and federal coastal management agencies
- Reduce stove-pipes in current coastal flood risk management framework
- Improve vertical and horizontal alignment of federal and state coastal management policies
- Identify and reduce conflicts between national flood mitigation and disaster recovery policies

---

# Federal Coastal Flood Risk Management Policies and Programs

---

## Introduction

Knowledge of the full scope of federal programs that can influence coastal flood risk is necessary to move towards more effective, adaptive management of changing coastal hazards and ecosystems. This section of the report serves as an overview of federal programs with either a direct or indirect nexus to coastal flood risk management as well as the federal policy framework under which these programs operate. Each program within the scope of the report is summarized, and individual program's responsibilities, roles, and connections to other federal agencies are identified. Federal programs are also evaluated in terms of their compatibility with the coastal flood risk management objectives of the Association of State Floodplain Managers (ASFPM) and Coastal States Organization (CSO) for: increasing capacity of state coastal zone management programs, exploring alternatives to structural flood risk mitigation, incorporating long-term planning for flood risk into management efforts, achieving a balance between investment in flood risk mitigation and disaster recovery, and adopting a holistic approach to coastal flood risk management. The report also highlights cases in which federal programs may conflict with these management objectives. Users seeking more detail on specific federal policies and programs can find supporting documentation within ASFPM's Flood Science Center Holistic Approach to Coastal Flood Risk Management Resources webpage.

---

## Federal Legislative Framework

### Executive Guidance

Executive Order 11988: Floodplain Management, established in 1977, is one of the principal documents guiding federal floodplain management. The order requires agencies to evaluate the potential effects of actions in floodplains and to avoid any adverse impacts that may result from such actions where possible. The order directs agencies to take action to reduce flood risk, lessen flood impacts on human safety and welfare, and restore and preserve the natural and beneficial functions of floodplains. These provisions apply to the acquisition, management, and disposal of federal lands and facilities, federally undertaken, financed, or assisted construction and improvements, and federal programs and activities affecting land use within floodplains. Any new federal construction in a floodplain must comply with the National Flood Insurance Program 1% annual chance floodplain construction standards at a minimum, and structures must be elevated to meet compliance standards rather than use fill. The order also requires federal agencies to inform private parties involved in floodplain-related transactions of any hazards associated with structure locations if the federal agency guarantees, approves, regulates, or insures any aspects of the transaction.

Implementation guidelines for the order require that critical federal activities have additional protections up to the 0.2% annual chance floodplain level. Guidelines also establish an eight-step process federal agencies must adhere to when addressing the potential floodplain impacts of an action:

1. Determine whether the proposed agency action lies within the 1% annual chance floodplain.
2. Provide for public review and notice of the proposed action.
3. If the action is located in a floodplain, evaluate alternatives including relocation outside of the floodplain.
4. Determine the impacts of the proposed action.
5. If the impacts of the proposed action cannot be avoided using a practicable alternative, employ measures that minimize impacts to the floodplain as well as restore and preserve beneficial floodplain functions.
6. Reevaluate alternative actions.
7. Present findings and offer a public explanation.
8. Implement the proposed action.

Also adopted in 1977 and considered a sister order to EO 11988, Executive Order 11990: Protection of Wetlands is designed to both reduce the loss and degradation of wetlands and preserve and enhance the beneficial values of wetlands. In a similar manner to EO 11988, EO 11990 instructs federal agencies to avoid construction in wetland areas if feasible alternatives exist. Agencies must also minimize any potential damage if construction within wetlands cannot be avoided. Federal Agencies must give public notice for any proposed construction within wetlands, and any lease or sale of agency wetlands is subject to wetland preservation restrictions. Again mirroring EO 11988, EO 11990 applies to the acquisition, management, and disposal of federal lands, any construction or improvement projects which are undertaken, financed, or assisted by federal agencies, and any federal activities or programs that affect land use. Implementation guidelines require federal agencies to follow the same eight-step process as seen in EO 11988, first determining if a federal project is located within a wetland area then conducting an assessment of potential alternatives and providing opportunity for public review.

Executive Order 13690: Establishing a Federal Flood Risk Management Standard was established in 2015 but was repealed in 2017. The order as originally written serves as an amendment to EO 11988, updating federal agencies' floodplain management responsibilities. The primary purpose of the order is to establish an improved standard of resilience for any federal investment that is located in a floodplain or has an effect on floodplain functions. The order applies to the same types of federal actions as EO 11988, including construction of new facilities or substantial improvement to existing structures. Federal agencies are able to meet the new flood risk management standard in one of three ways:

1. A climate-informed science approach.
2. Additional feet of freeboard above the 1% annual chance flood elevation.
3. Planning based on the 0.2% annual chance flood event.

A climate-informed science approach must utilize best-available, actionable data and methods that integrate current and future changes in flooding based on climate science. The freeboard approach requires two feet of freeboard for non-critical structures and three feet of freeboard if a project is deemed critical. Executive Order 13690 also amends EO 11988 to emphasize the use of ecological

processes and nature-based approaches, both in the development of flood risk mitigation alternatives and as a means to increase the resilience of federal projects within floodplains.

## **Establishment and Reform of the National Flood Insurance Program**

The National Flood Insurance Act of 1968 first established the National Flood Insurance Program (NFIP) in response to the growth of economic loss and social distress associated with flood disasters. Flood disaster protective measures prior to the act had proved insufficient, and so the NFIP was created as a means for the federal government to share risk of flood losses as well as encourage preventative and protective measures against flood disasters. The 1968 act first established flood insurance purchase requirements for structures with federally backed mortgages located within high-risk flood areas and put forth elevation requirements for new and substantially improved structures in communities participating in the NFIP.

Several pieces of legislation have been introduced as reforms to the Flood Insurance Act of 1968. The Flood Insurance Protection Act of 1973 further extended flood insurance purchase requirements to properties located in high-risk flood areas that are used to secure loans. The National Flood Insurance Reform Act of 1994 was focused on mitigation, establishing mitigation insurance and creating a mitigation assistance program to reduce flood damages. The Flood Insurance Reform Act of 2004 introduced a number of measures, including provisions to reduce losses from properties that have made repetitive flood insurance claims and floodplain education requirements for insurance professionals working in high-risk flood areas.

A recent major reform to the Flood Insurance Act of 1968 was the Biggert-Waters Flood Insurance Reform Act of 2012. The act established a national floodplain mapping program and increased premiums for those properties that had been receiving subsidies, beginning a movement of flood insurance premium rates toward full actuarial risk. Following the Biggert-Waters Act there were concerns of flood insurance affordability, and the Homeowner Flood Insurance Affordability Act of 2014 was drafted in response. The Homeowner Flood Insurance Affordability Act offset parts of the Biggert-Waters Act by limiting certain flood insurance premium rate increases and restoring the practice of grandfathering NFIP policies, and also created an annual policy surcharge to improve the fiscal soundness of the NFIP.

## **Governance Structure**

Floodplain-related policies and programs are generally formulated and funded by congressional authorization and appropriations committees and subcommittees. As many as 15 standing committees in the House of Representatives and 43 standing subcommittees in the Senate have potential jurisdiction over programs related to coastal issues. Given the broad range of issues encompassed by coastal flood risk management, programs can be centered in committees with little obvious overlap. As an example, the NFIP is currently housed in the House Financial Services Committee and Senate Banking Committee, while the House Transportation and Infrastructure Committee and Senate Environment Public Works Committee have jurisdiction over the U.S. Army Corps of Engineers flood control program.

Federal agencies involved in floodplain management have acknowledged the need for collaboration in management efforts and have taken steps to further inter-agency cooperation. The Federal Interagency Floodplain Management Task Force (FIFM-TF) was established in 1975 and consists of representatives from the U.S. Army Corps of Engineers, Federal Emergency Management Agency, Department of Agriculture, Department of Commerce, Department of Defense, Department of Energy, Department of

Housing and Urban Development, Department of the Interior, Department of Transportation, Council on Environmental Quality, Environmental Protection Agency, General Services Administration, and Tennessee Valley Authority. The Task Force works to achieve the goals and pursue the strategies set forth in the Unified National Program for Floodplain Management, including formalization of a national goal-setting and monitoring system for floodplain management, reduction of risks to life, property, and natural resources of floodplains, implementation of a process to encourage positive attitudes towards floodplain management, and establishment of in-house floodplain management capability nationwide. The Task Force also publishes guidance and recommendations on federal floodplain management, although recommendations do not supersede the legislative requirements, missions, or policies of federal agencies.

A number of federal floodplain management efforts also fall under the purview of the Mitigation Framework Leadership Group (MitFLG), which works to coordinate federal agency risk mitigation efforts, integrate delivery of core mitigation capabilities, and assess the effectiveness of mitigation capabilities across the nation. Core mitigation capabilities are defined in the National Mitigation Framework and include threat and hazard identification, risk and disaster resilience assessment, planning, community resilience, public information and warning, long-term vulnerability reduction, and operational coordination. MitFLG is composed of many of the same departments and agencies as the FIFM-TF as well as representatives from state, local, tribal, and territorial governments.

While federal agencies and programs play a large role in formulating and coordinating coastal flood risk management efforts in the United States, state and local governments remain responsible for the land-use regulations and development decisions that are at the heart of sound coastal flood-risk management practices. Though disaster declarations, flood insurance, and major coastal infrastructure projects are primarily federal responsibilities, the governance structure of flood risk management in the United States is such that shared responsibility across multiple levels of government is necessary in order to effectively manage coastal flood risk.

## Judicial Support

Aspects of coastal zoning and flood risk management have ties to the idea of “takings” put forth in the Fifth Amendment to the U.S. Constitution, which requires that private property shall not be taken for public use without just compensation. Unjust takings can occur in cases in which a government entity has permanently occupied private property, denied all economically viable use of a property, or reduced private property value at a scale incompatible with landowner impacts. A taking can also occur when an exaction is involved. Takings associated with loss of economic value, as seen in *Lucas v. South Carolina Coastal Council*, are most relevant to coastal flood risk management as regulations often alter or restrict coastal land use.

Despite this definition of unjust takings, courts have frequently upheld coastal regulations if their intent is to prevent dangerous uses of coastal areas. For cases in which risk to life may occur, agencies may rely upon conservative courses of action provided they are supported by sound science and engineering. Such conservative courses of action include establishing restrictions on land-use within flood-prone areas, even if property values are substantially reduced as a result. In general, U.S. law supports preventative measures by state and local agencies that intend to ensure the safety, health, and welfare of coastal communities. In terms of future liability, the potential for government entities to be held responsible for allowing activities that cause or increase coastal flood risk often outweighs any repercussions that might result from enacting regulations that prevent future flood damages.

## Environmental Regulation

A number of major federal environmental regulations have a nexus to coastal flood risk management. A collection of such regulations are listed and summarized below and explored in further detail within agency and program descriptions.

### *Endangered Species Act (ESA)*

The Endangered Species Act of 1973 was created in response to the threats posed to wildlife, fish, and plants from continued economic growth and development within the United States. The act requires federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) or the National Oceanic and Atmospheric Administration (NOAA) to determine whether a federal action will have an adverse impact on the existence of listed endangered species or the critical habitat of such species. The act also prohibits any takings or trade of listed endangered species.

### *National Environmental Policy Act (NEPA)*

The National Environmental Policy Act, enacted in 1969, established a broad policy framework for environmental protection in the U.S. The act created the formal requirement that federal agencies consider the environmental impacts of their actions and the impacts of potential alternative actions. These impacts are presented in the form of Environmental Assessments (EAs) and Environmental Impact Statements (EISs). The act additionally established the Council on Environmental Quality within the Executive Office of the President.

### *Coastal Zone Management Act (CZMA)*

The Coastal Zone Management Act was passed by Congress in 1972 to address continued growth and development in the coastal zone. The primary goal of the act is to preserve, protect, develop, restore, and enhance coastal resources along the Gulf, East, and West coasts as well as the Great Lakes. The act established three programs to carry out this mission: the Coastal and Estuarine Land Conservation Program, the National Estuarine Research Reserve System, and the National Coastal Zone Management Program.

### *Coastal Barrier Resources Act (CBRA)*

The Coastal Barrier Resources Act of 1982 was also designed to address the impacts of coastal development, specifically development on lands that serve as coastal barriers. The goals of the act are to minimize loss of life, reduce wasteful expenditures, and protect natural resources by discouraging development in high-risk coastal areas. The act established the Coastal Barrier Resource System, which consists of coastal lands where federal development expenditures and assistance are restricted, including the purchase of flood insurance through the NFIP.

### *Clean Water Act (CWA)*

The basic structure of the Clean Water Act was initially put forth in the 1948 Federal Water Pollution Control Act and then later expanded in 1972 to form what is now known as the Clean Water Act. The 1972 act established a national framework to address water quality issues within the United States by regulating pollutant discharges into water bodies and creating water quality regulation standards for surface waters. The act also established permit requirements for the discharge of any pollutant from a point source into a navigable waterway, implemented through the National Pollutant Discharge Elimination System.

## Water Infrastructure

Water resource infrastructure at the federal level is authorized through Water Resource Development Acts (WRDA), and federal water resource projects are carried out through the United States Army Corps of Engineers (USACE). The purpose of the WRDAs is to provide for the conservation and development of water and related resources and to authorize the Secretary of the Army to construct improvement projects on rivers and harbors of the United States. USACE planning efforts are guided by the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*, commonly referred to as the Principles and Guidelines or P&G. The P&G were developed in 1983 and established national economic development as the primary objective for federal water resources planning activities.

In a recent major reform effort the 2007 WRDA called for the Secretary of the Army to revise the P&G to include planning for objectives beyond economic development. The act established a National Water Resources Planning Policy, the priorities of which include maximizing sustainable economic development, avoiding the unwise use of floodplains, and protecting and restoring the functions of natural systems. The White House Council on Environmental Quality published updated Principles, Requirements, and Guidelines (PR&G) in response to the call for reform. The new PR&G expand the scope of water resources planning to include healthy and resilient ecosystems, sustainable economic development, floodplain considerations, public safety, environmental justice, and a watershed approach. Updates also broaden the range of federal investments that the guidelines apply to. Interagency Guidelines have also been published, but specific actions addressing the expanded PR&G have yet to be implemented in federal water resources development activities.

## Disaster Relief

The Stafford Disaster Relief Act established current federal disaster relief procedures in order to address the disruption of the normal function of state governments that occurs when disaster events exceed the capacity of state emergency relief efforts. Under the act the federal government is authorized to provide assistance to states and localities following a presidential declaration of a major disaster or emergency. Declarations can be made after a state governor request following the execution of a state's emergency management plan and demonstration that supplemental federal assistance is needed, or a declaration may be made directly by the president in the event that a disaster falls under an area of primary federal responsibility. Federal aid can be provided in a variety of ways including technical, financial, and logistical assistance.

---

## Federal Program Summaries

### Federal Emergency Management Agency (FEMA)

#### National Flood Insurance Program (NFIP)

The National Flood Insurance Program was established through the National Flood Insurance Act of 1968. The NFIP is administered at the state level by the state NFIP coordinator and at the community level by the local floodplain manager. The basic function of the program is to provide flood insurance to property owners in participating communities provided that the community adopts floodplain management standards that are consistent with NFIP regulations. The NFIP floodplain management regulations center around the concept of a base flood elevation (BFE), the flood elevation reached during a flood event with a 1% annual chance of occurring. Areas that are projected to flood during the 1% annual chance flood event constitute the special flood hazard area (SFHA).

All property owners with federally backed mortgages on structures located within the SFHA are required to purchase flood insurance, and any new construction or substantial improvement (representing 50% of property value) to existing properties within the SFHA requires that the structure be elevated to a height matching the BFE. In the event of substantial damage to a property, increased cost of compliance (ICC) coverage may be available to help bring a property into compliance with any new floodplain management regulations. ICC coverage can also be used on a community level to help meet floodplain management standards when filed as a single claim as part of a FEMA mitigation grant.

Flood insurance rate maps (FIRMs) form the basis of NFIP floodplain management regulations in participating communities. These maps, overseen by a Technical Mapping Advisory Council (TMAC), determine the extent of the SFHA and also delineate other moderate and low-risk flood hazard zones. A distinction is made between structures constructed before (pre-FIRM) and after (post-FIRM) FIRM publication when setting flood insurance premiums. A structure that is newly mapped into the SFHA, whether as a result of initial FIRM publication or FIRM updates, may be eligible for initially reduced premiums. FIRMs also take into account levees that may afford flood protection to communities. Property owners are exempt from flood insurance purchase requirements if FEMA certifies that a levee provides adequate protection from the 1% annual chance flood event, as the area protected by the levee is no longer included within the SFHA. A property owner is able to request revisions to a FIRM through a letter of map amendment (LOMA), and a FIRM may also be formally altered through a letter of map revision (LOMR).

#### *Compatibility*

- The NFIP can act as a catalyst for establishing floodplain management practices within coastal communities by providing the financial incentive of federally backed flood insurance and publishing flood risk information through FIRMs.
- Successful implementation of the program relies on coordination between federal, state, and local agencies. This platform for collaboration across multiple levels of government can be leveraged to address vertical integration issues in future coastal flood risk management efforts.

- Premiums collected through the NFIP represent a step forward in addressing cost-distribution for disaster recovery and mitigation, reducing the reliance on federal disaster recovery funds and increasing responsibility of communities in managing coastal flood risk.

### *Concerns*

- While the NFIP has encouraged adoption of floodplain management practices in coastal areas, if flood insurance premiums do not represent the full risk associated with coastal flood events the NFIP can unintentionally serve as a federal subsidy to coastal development. Although movement has been made toward full-risk rates, reduced rates remain in place for many policyholders.
- FIRMs do not take into account projected future conditions due to changing coastal hazards and climate. Owners of structures not initially mapped into the SFHA lack incentives for purchase of flood insurance although there may be substantial risk over the projected lifetime of the property, especially with regard to the residual risk involved with structures located behind levees.
- The NFIP is narrowly focused on coastal flood risk in terms of base flood elevations and SFHAs, leading to potential conflicts if the program is implemented without regard to other federal and state regulations, notably with the Endangered Species Act in recent years.

### Community Rating System (CRS)

The Community Rating System, enacted in 1990 and formally codified in the National Flood Insurance Reform Act of 1994, is a program within the NFIP designed to provide incentives for communities to adopt floodplain management practices beyond the minimum requirements of the NFIP in order to reduce risk of flood and erosion damages, encourage protection of natural and beneficial floodplain functions, and reduce federal flood insurance losses. The program functions by providing credits to communities for designated floodplain management activities. Credits gained from multiple activities are pooled to give the community a ranking from 9-1, and NFIP policyholders within the community then receive insurance premium reductions based on the community rating. CRS activity categories include public information, mapping and regulation, flood damage reduction, and flood preparation. The majority of management activities communities can use to earn credits employ a non-structural flood risk management approach, including a large credit for management practices that preserve open space along coastlines and rivers.

### *Compatibility*

- The CRS program encourages state and community engagement and responsibility in the management of coastal flood risk, increasing state capacity through reduced reliance on federal minimum standards and disaster recovery programs.
- The framework of the program encourages cooperation and communication between federal, state, and community agencies involved in flood risk management, which could be leveraged for current or future environmental management programs as CRS activities may have benefits beyond reducing flood risk.
- Activities that address planning for changing climate and sea level rise are eligible for credit under the program.

## Concerns

- The narrow incentive of reduced flood insurance premiums has the potential to increase emphasis on flood insurance compliance rather than sound coastal flood risk management as a whole, as CRS participation is not incentivized through any other federal programs.
- Capacity for implementation at the community level varies by state depending on the size and resources of coastal communities, limiting potential participation where localities lack sufficient resources to complete the application process.
- While the CRS program can encourage mitigation at the community level, it may reduce incentives to mitigate individual structures or remove structures from the floodplain if high-risk structures become cross-subsidized by other policyholders.

## FEMA Floodplain Mapping

Map Mod, a flood map modernization initiative, and the Risk Mapping Assessment and Planning (Risk MAP) program represent previous FEMA efforts to improve and update flood maps across the nation. The Map Mod program took place from 2003 to 2008 and transitioned flood mapping from paper to a digital format consistent with GIS standards. The program employed a collaborative process that allowed for participation from state, regional, and local partners, taking advantage of revised data and updated technology for identifying flood hazards and establishing the Mapping Information Platform to share data.

The Risk MAP program continued the task of providing updated flood information and tools to communities, integrating data from the Map Mod program with hazard data from other federal agencies. The program took on projects in collaboration with federal, state, tribal, or local partners with the goal of filling existing gaps in data, improving public knowledge of risk, providing a coordinating platform for risk planning, increasing digital data sharing, and improving risk communication and decision making. Products of the program address areas such as project prioritization, elevation data acquisition, development of a watershed study approach, and mitigation planning support, each of which goes beyond the scope of the traditional FIRM.

National Flood Insurance Program reforms in 2014 authorized the most recent FEMA floodplain mapping initiative, the National Flood Mapping Program (NFMP). The NFMP has since recommended updates to FEMA mapping practices such as incorporating future conditions due to watershed development and increased coastal hazards as a result of storm intensification and sea-level rise.

## *Compatibility*

- The emphasis on a watershed approach to management is a step forward in reaching a more holistic coastal flood risk management framework.
- Partnerships formed at the local scale encourage buy-in and increase mapping capabilities at scales relevant to coastal flood risk management.

## Concerns

- Federal mapping efforts continue to focus on current flood hazard conditions and do not include projections of future coastal hazards and flood risk due to changing conditions.

## National Dam Safety Program (NDSP)

The National Dam Safety Program, established in the 1996 Dam Safety Act, consists of a partnership of federal agencies, states, and stakeholders whose goal is to reduce risks to life, property, and the environment that result from dam failures. The function of the federal aspect of this program is to support states in the development and maintenance of dam safety programs. Federal agencies provide support to state dam safety programs by addressing dam safety information needs, providing dam safety training, conducting dam safety research, and providing grant assistance to states. A common objective seen throughout the program is the development and enhancement of technology-based tools. Both the National Dam Safety Review Board and the Interagency Committee on Dam Safety coordinate program partnerships across agencies.

The 2016 Water Resources Development Act authorized a dam safety program similar to the USACE Levee Safety Program. The act also charged FEMA with setting up a National Dam Safety Committee to set the standards for the design, construction, operation, and maintenance in a similar manner to the corresponding levee program. While this represents an important step forward, opportunities remain to achieve full implementation of the initiative.

### *Compatibility*

- The program emphasizes increasing state capacity for ensuring safe operation of dams and serves primarily as a means of assistance to reach this goal rather than a federal replacement for state responsibilities.

### *Concerns*

- The program has a narrow focus on the safety of existing dams and so may overlook opportunities for integration with broader coastal flood risk management initiatives, such as grant assistance being used to rebuild a failed dam without consideration of future flood risk mitigation planning.

## Hazard Mitigation Assistance (HMA)

FEMA Hazard Mitigation Assistance programs, authorized through the Stafford Disaster Relief Act, are designed to reduce both long-term risk to individuals and property from natural disasters and dependence on federal disaster recovery funds. Mitigation assistance is divided between the Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation Assistance (PDM) program. FEMA also operates the Flood Mitigation Assistance (FMA) program, which is funded through flood insurance policy premiums. These HMA programs are specifically dedicated to addressing the cycle of repeated damage that can occur when property is reconstructed after a disaster without consideration of current and future risk. Recent changes to HMA program guidance have emphasized community resilience and climate change adaptation, including strategies on how best to incorporate rising sea level into benefit-cost analyses, encourage acquisition of properties along riparian barriers, and prepare for changes in future flood risk. HMA funds can be used to support a variety of eligible activities across the three programs such as property acquisition and relocation, structure elevation, floodproofing, structural and non-structural retrofitting, and building code enforcement.

The Hazard Mitigation Grant Program addresses recovery efforts after disaster declarations, providing the opportunity for mitigation measures to be employed during the reconstruction process to guard

against future disasters. Funding is made available after Presidential disaster declarations and is provided to areas identified by the state Governor. Both state and local mitigation plans must be in place to receive grant funds, which can cover up to 75% of eligible activity costs. HMGP also makes funds available through its 5 Percent Initiative, in which up to 5 percent of the total funds awarded through the program may be used for activities that struggle to meet traditional cost-effectiveness criteria such as education and outreach campaigns or hazard identification and mapping.

Pre-Disaster Mitigation grants are offered on a competitive basis and do not depend upon Presidential disaster declarations. The program assists grantees in implementing sustained pre-disaster mitigation programs through eligible activities under HMA in order to reduce long-term risk. Grants are available as planning grants, project grants, and management cost grants. Funding for the PDM program is dependent upon Congressional appropriations, and funding levels may vary between fiscal years. Similar to HMGP grants, PDM grants require a 75/25 federal/non-federal cost share, although tribal or impoverished community recipients may be eligible for up to a 90/10 cost share.

The Flood Mitigation Assistance program, authorized through the National Flood Insurance Act of 1968, has a more focused intent of reducing or eliminating claims made under the NFIP by providing assistance to state agencies, tribal governments, and local communities in implementing mitigation measures that reduce long-term risk of flood damage. Planning, project, and management cost grants are again available, and funds are distributed through an allocation formula to states based on total number of NFIP policies as well as repetitive loss properties. The Biggert-Waters Flood Insurance Reform Act of 2012 defines repetitive loss properties for FMA as properties covered by insurance under the NFIP that have incurred damage resulting in claims of 25 percent of property value on two or more occasions. Severe repetitive loss properties involve four or more separate claims each exceeding \$5,000, or two claims for which the cumulative amount exceeds the market value of the insured structure. FMA uses a 75/25 federal/non-federal cost share for eligible activities, but repetitive loss properties are eligible for a greater federal contribution if a community has a mitigation plan that address repetitive loss properties. In such cases FMA grants may cover up to 100 percent of mitigation costs for severe repetitive loss properties.

### ***Compatibility***

- HMA programs encourage and provide guidance on incorporation of future risks due to changing climate and rising sea level, consistent with the long-term scope of mitigation activities.
- Eligible activities under the HMA programs include many non-structural measures and allow for incorporation of the value of open space.
- The Pre-Disaster Mitigation program, as well as the other HMA programs, provides an opportunity for collaboration with other federal agencies such as Housing and Urban Development to further initiatives with similar goals.
- Adjustment of cost-shares for repetitive loss properties removes barriers to addressing high-risk areas and alleviates continued federal program financial burdens.

## Concerns

- Mitigation activities across the HMA programs generally focus on impacts to individual structures. This scope could be broadened to a system-wide mitigation approach to prevent future damage across coastal communities.
- Guidance for the HMA programs identifies additional benefits from riparian open spaces to be included in benefit-cost analyses, but does not do the same for coastal areas that also provide numerous ecological services to communities.

## Public Assistance (PA)

The basic function of the Public Assistance program, authorized through the Stafford Disaster Relief Act, is to provide financial assistance to states, local governments, tribal governments, and select non-profit organizations in order to assist in timely recovery from disasters when recovery efforts exceed state and local capabilities. Following a Presidential disaster declaration, FEMA designates an eligible area, specifies types of assistance to be provided, and enters into an agreement with the applicable state, territorial, or tribal government. State and federal coordinating officers then carry out disaster recovery efforts. Administrators are given significant flexibility in spending PA funds but must maintain compliance with federal environmental laws, policies, and guidelines. Grant assistance can be used for recovery activities such as debris removal and restoration of publicly owned facilities as well as hazard mitigation measures provided that cost-effectiveness requirements are met. PA can also provide mitigation assistance, commonly known as “406 mitigation” in reference to the location of the measure within the Stafford Act. Federal cost share for PA projects may be no lower than 75 percent of eligible costs and may be increased up to 90 percent if warranted.

## *Compatibility*

- The PA program involves significant coordination between federal, state, and local governments to ensure that grant projects are compatible with existing environmental regulations including EO 11988.
- PA mitigation funds provide an opportunity to leverage post-disaster recovery efforts to mitigate future coastal flood risk.

## Concerns

- Mitigation could be further emphasized within the program in order to increase state and local community capacity to recover from future disasters. Mitigation projects typically take greater effort to formulate and implement than general disaster recovery projects, and cost-effectiveness requirements can provide barriers to the use of mitigation grant funds.
- Public Assistance funds for flood recovery are still available to communities that do not participate in the NFIP, even though individuals within those communities are ineligible for assistance, reducing the incentive for a community to participate in the NFIP.
- Public Assistance funds are often spent quickly, as a performance metric for the program is how quickly funds are utilized. Because of this, opportunities to mitigate structures against future risk may be missed during rebuilding efforts.

## Individuals and Households Program (IHP)

The Individuals and Households Program falls under FEMA's broader Individual Assistance program, which operates in a similar manner to the PA program but provides assistance to individual property owners and households following disaster events instead of public entities. IHP assistance falls into two categories: housing assistance and other needs assistance. Housing assistance is provided through temporary housing, housing repair, housing replacement, and semi-permanent or permanent housing construction. If repair, replacement, or construction takes place within a Special Flood Hazard Area the applicant must comply with flood insurance purchase requirements and all local building codes related to floodplain management. Other needs assistance covers a variety of activities such as clean up, moving, and storage, and can also include the cost of a NFIP group flood insurance policy to meet requirements. FEMA covers the full cost of housing assistance under IHP, while other needs assistance is subject to a 75/25 federal/non-federal cost share.

### *Compatibility*

- The flood insurance purchase requirements within IHP help to protect federal investments and can increase participation in the NFIP following disaster events.

### *Concerns*

- Due to reliance on FIRMs, IHP fails to account for future risk due to changing climate and sea level rise, potentially leading to repetitive property losses.
- The 100% housing assistance expense coverage from FEMA may discourage consideration of future risk and mitigation efforts at the individual level, potentially reducing incentives for investment in coastal flood risk management efforts.

## **United States Army Corps of Engineers (USACE)**

### General Investigations (GI)

The USACE General Investigations program undertakes studies that are designed to help address community water resource issues in areas such as flood risk management, navigation, water supply, and recreation, including ecosystem restoration activities. These studies, initially requested through Congressional representatives, are authorized through Congressional subcommittee resolutions and are carried out in partnership with a non-federal sponsor. During a study the Corps will evaluate the feasibility of alternative plans by determining costs, benefits, and favorable or unfavorable characteristics. Following this analysis a specific course of action is then ultimately recommended to Congress, at which point Congress can authorize and fund the construction of the project. USACE also has direct authority to oversee small-scale flood risk management projects that do not require specific Congressional authorizations.

During construction USACE and the non-federal sponsor enter into a Local Cooperation Agreement (LCA) that obligates both parties to carry out the implementation, operation, and maintenance of the project in accordance with Congressional requirements. Projects are distributed among USACE district offices based on location. Upon completion USACE will periodically inspect the project but operation and maintenance become the responsibility of the non-federal entity. Non-federal sponsors are responsible

for 50 percent of the feasibility study costs, a minimum of 25 percent of the flood control costs, and 5 percent of the cost of constructed flood control works in structural projects.

### *Compatibility*

- Cooperation agreements during construction emphasize collaboration between federal and non-federal entities.

### *Concerns*

- Congressional authorization and USACE oversight during feasibility and construction may give communities the impression that flood risk management is a federal responsibility, undermining efforts to increase state capacity to deal with these issues.
- Non-structural mitigation and ecosystem restoration projects can be challenging to justify through traditional USACE benefit-cost analyses, as such methods do not incorporate the economic value of ecosystem services.
- USACE district divisions may have different needs and priorities, complicating the management structure of the program if goals do not align across other federal, state, and local administrative barriers.

## Flood Risk Management Program

The USACE Flood Risk Management Program coordinates Corps flood risk management projects internally and integrates counterpart projects of other state and federal agencies. The ultimate goal of the program is to foster collaborative flood risk mitigation planning, response, and recovery efforts across multiple levels of government, identifying and correcting misalignments between existing programs that hinder effective management efforts. The mission of the program is carried out through partnerships with multiple flood risk management stakeholders including state and local government agencies, non-governmental organizations, and private sector entities. Examples of Corps flood risk management activities include planning and construction of flood risk management projects, promotion of nonstructural flood risk reduction measures, and participation in flood disaster response efforts. The program also provides technical planning assistance for flood risk management projects to states, counties, and cities.

### *Compatibility*

- The Corps Flood Risk Management Program has a strong focus on coordination and correction of program misalignments, which helps achieve a more holistic approach to flood risk management.
- Federal partnerships with state and local entities improve state capacity to address coastal flood risk.
- The program promotes nonstructural flood risk management measures and makes technical assistance available to help states and communities implement such projects.

## *Concerns*

- The reliance on FIRMs for flood risk planning across state and local governments can reduce incentives to incorporate future coastal flood risk across USACE Flood Risk Management Program activities.

## Levee Safety Program

The 2007 Water Resources Development Act called for the formation of the USACE Levee Safety Program in response to the catastrophic events of Hurricane Katrina in 2005. The program is tasked with reducing flood risk due to levee failure by increasing public information on levee safety, developing national levee safety policies and engineering standards, and maintaining a flood damage reduction system to meet public safety needs. The program works towards these goals through risk assessment and reduction projects, levee inspections, and compilation of levees into a national levee database. Levees included in the program currently represent approximately 10 percent of all levees in the United States. The national levee database displays the location and condition of levees within the Levee Safety Program along with public data available from other federal environmental agencies, with updates as new information becomes available. Levee inspections are carried out at regular intervals to monitor levee condition, identify deficiencies, ensure sufficient maintenance, assess federal rehabilitation eligibility, and collect information for public distribution. The program partners with FEMA to support levee accreditation decisions for the NFIP and collaborates with non-federal sponsors charged with the operation and maintenance of levees once construction is completed.

## *Compatibility*

- The levee database provides a critical tool to distribute flood risk information to the public, encouraging increased responsibility of local communities in managing coastal flood risk.

## *Concerns*

- The levee database and inspection programs remain limited in terms of national scope, and a national levee safety policy or engineering standard has yet to be finalized, limiting improvements to state flood risk management capacity if levees are not included in the national program.

## Technical Assistance Programs

The broad goal of USACE technical assistance programs is to deliver services to aid communities in characterizing flood risk management challenges and exploring structural and nonstructural solutions to address those challenges. The Planning Assistance to States (PAS) program is authorized by the 1974 WRDA and provides states, communities, and non-governmental organizations with assistance in constructing comprehensive plans for conservation, utilization, and development of water resources and associated lands. These studies generally do not delve into design or project construction but instead address water resources at the planning level. The program has the flexibility to address a variety of water resource concerns including studies of water supply and demand, water quality, wetlands restoration, dam safety, flood damage reduction, and coastal zone protection. PAS studies are conducted after a local, regional, or state government requests assistance through the program, and study cost is subject to a 50/50 federal/non-federal cost share.

The Floodplain Management Services (FPMS) program, authorized by the 1960 Flood Control Act, is tasked with increasing public understanding of options for addressing flood hazards and promoting wise use and management of floodplains within the United States. The program provides technical services including development of site-specific data on flood flow, formation, timing, and natural floodplain resources. Planning guidance is available in the form of special studies, which can address multiple aspects of floodplain management including floodplain delineation, flood warning, hurricane preparedness, floodproofing, and land use changes. Program support is also available for the production of floodplain management activity guides and pamphlets for public distribution. The FPMS program fully covers all costs associated with services provided through the program.

Silver Jackets teams also fall under the umbrella of USACE technical assistance programs. Teams seek to remove programmatic stovepipes and leverage resources and information across multiple levels of government to reduce flood risk. Teams are formed at the state level, and each team has unique members depending on state need, often including state agencies involved in hazard mitigation or floodplain management as well as USACE, FEMA, and other federal partners. The program itself does not provide additional financial resources for flood risk management activities but instead seeks to aid federal agencies, states, and communities in best utilizing existing programs under available budgets by facilitating strategic risk reduction, resolving gaps and counteractive programs, improving flood risk communication, and establishing ongoing interagency relationships. Teams are currently in place or in development in all 50 states.

### ***Compatibility***

- Technical assistance programs serve a key role in increasing state capacity to manage flood risk, as programs work to help states plan and manage risk as opposed to states relying on federal projects and disaster assistance.
- The Silver Jackets program can be viewed as a model for a holistic flood risk management approach as it heavily emphasizes removal of program stovepipes and coordination of management activities across multiple agencies and levels of government.

### ***Concerns***

- Demand for technical assistance is high, and programs may not be able to meet the needs of all applicants due to funding levels.

## **National Oceanic and Atmospheric Administration (NOAA)**

### **Community-based Restoration Program (CBRP)**

NOAA's Community-based Restoration Program is authorized by the 2006 Magnuson-Stevens Fishery Conservation and Management Act. The program supports restoration of coastal habitats through financial and technical assistance for local projects and also promotes community involvement and stewardship of coastal resources. Operated through NOAA's Restoration Center, the program undertakes cooperative agreements and partnerships with coastal communities to make improvements in coastal land-use and management. These long-term partnerships are used to support community-based habitat restoration efforts over a variety of coastal areas throughout the United States. While restoration projects are primarily designed to benefit threatened fish species, habitat restoration efforts

often have ancillary benefits to coastal floodplain management through activities such as dam removal or easement purchases of coastal areas.

### *Compatibility*

- The program promotes long-term partnerships between federal, state, and local agencies through restoration projects that could be leveraged for floodplain management activities.
- Coastal habitat restoration inherently promotes nonstructural mitigation solutions and improves natural and beneficial functions of coastal floodplains.

### *Concerns*

- Floodplain management could be further integrated in the CBRP as dam removal and coastal habitat restoration may overlap with other federal and state agency activities, providing an opportunity for increased regulatory consistency across agencies.

## Coastal Zone Management Act (CZMA) Programs

The Coastal Zone Management Act of 1972 established three national programs with a nexus to coastal flood risk management: the National Coastal Zone Management Program, the Coastal and Estuarine Land Conservation Program, and the National Estuarine Research Reserve System. The National Coastal Zone Management Program, coordinated through the NOAA Office of Coastal Management, is a voluntary partnership between coastal states and the federal government in which states establish individual coastal management programs to further the goals of the CZMA. Each state program has basic requirements that must be met, but states are given flexibility to incorporate unique issues, local laws, and regulations. With the combination of federal and individual state management programs the CZM program as a whole seeks to take a comprehensive approach to coastal management issues, balancing competing uses of coastal areas as well as coordinating federal and state actions. Program guidance also makes an explicit connection to the floodplain management requirements of EO 11988.

A key aspect of the program is the federal consistency provision, which requires that federal actions within state coastal zones are consistent with state coastal management enforceable policies. The program also provides grants for coastal resource improvement and coastal zone enhancement. Resource improvement grants require a 1 to 1 match from states, while coastal zone enhancement grant funds require no match. The national program also oversees the Coastal Nonpoint Pollution Control Program, operated in partnership with the Environmental Protection Agency, which seeks to manage runoff from agriculture, forestry, urban areas, marinas, shoreline modification activities, wetlands, and vegetated treatment systems. Each state must develop a nonpoint pollution control program and ensure pollution control program implementation to participate in the national CZM program.

The Coastal and Estuarine Land Conservation Program (CELCP) aided state and local government estuarine or coastal land purchasing efforts by providing matching funds for conservation easements. To qualify for the program land purchases must have been ecologically valuable or provided other conservation value through historic features, recreational opportunities, or aesthetic features. The program was operated as a voluntary partnership between coastal states and NOAA, and states needed to develop conservation plans and priorities to participate. Plans were used for project selection

following a competitive merit review. The program was administered provided that funding was made available at the federal level.

The National Estuarine Research Reserve System (NERRS) consists of 29 coastal sites, each designed to preserve and study estuarine systems across the United States and operated as a partnership between NOAA and coastal states. State agencies, universities, and local partners are responsible for the day to day management of each site while NOAA provides national guidance and funding for the program. Reserves work to increase responsible stewardship of natural resources, supplement research on coastal management efforts, train local and state officials, and educate the public. Coastal management issues covered throughout these functions include community resilience, habitat restoration, invasive species, and nonpoint pollution.

### *Compatibility*

- The National Coastal Zone Management Program statutory framework is aimed at integrating federal, state, and local land use planning to reduce risk to coastal communities, fostering a holistic management approach in coastal areas.
- CZMA programs enable development of state capacity to manage coastal flood risk by allowing for flexibility at the state level, ensuring federal actions do not undermine state regulations, and emphasizing training and education.
- The preservation and stewardship of open space in coastal areas through the NERRS supports non-structural coastal flood risk mitigation efforts. CELCP used to serve the same function.

### *Concerns*

- While the CZMA programs emphasize the management of coastal development, many states have yet to implement policies that formally restrict development in coastal areas.

## Endangered and Threatened Marine Species

NOAA implements the Endangered Species Act through the Protected Resources program within the National Marine Fisheries Service (NMFS). NMFS is responsible for marine or anadromous species listed under the ESA including marine mammals, reptiles, fish, plants, and invertebrates. Once a marine species is listed under the ESA, the Protected Resources program requires designation of critical habitat for the species, development and implementation of a recovery plan, development of cooperative agreements with states for conservation of the species, consultation with NMFS on proposed actions that may affect the species, partnership with other nations and non-federal organizations to limit trade, and authorization of research on the species. ESA violations include any taking of the species or any impacts upon the critical habitat necessary for the species to recover, with enforcement provided by the NMFS Office of Law Enforcement.

### *Compatibility*

- The program contains procedures to incorporate effects of climate change and sea level rise into recovery plans.

- The program requires coordination and long-term partnerships among multiple government agencies across federal and state levels to ensure recovery of threatened and endangered species.

### *Concerns*

- While critical habitat designations in coastal areas provide a nexus to coastal floodplain management, maps linking critical habitat and floodplain locations are lacking, and legal issues have surfaced regarding implementation of the NFIP and ESA in coastal areas.

## **Environmental Protection Agency (EPA)**

### National Environmental Policy Act (NEPA)

The basic function of NEPA is to ensure that government agencies take environmental impacts into consideration prior to taking actions that could potentially have adverse effects. The program relies on assessments of the environmental effects of proposed actions during the decision-making process to avoid such adverse impacts. The NEPA environmental assessment process applies when federal agencies have potential alternatives available when taking actions such as financing, assisting, conducting or approving projects or regulations. While all agencies within the executive branch of the federal government are responsible for implementing NEPA, the EPA is tasked with the review of compliance documents prepared by other federal agencies. Agencies can use categorical exclusions (CE) when agency actions are not likely to have any major environmental effects, with specific actions determined and listed by each agency. If an action is likely to impact the environment the agency must conduct an environmental assessment (EA), and if impacts are then anticipated the agency must prepare an environmental impact statement (EIS). Upon review of compliance documents, EPA will then summarize its recommendations to the federal agency, and if found unsatisfactory the issue is referred to the White House Council on Environmental Quality.

### *Compatibility*

- NEPA requires federal agencies to integrate environmental values into their decision-making process through consideration of actions and alternatives. Integration across all federal agencies helps foster a holistic approach to environmental issues including coastal flood risk.

### *Concerns*

- The NEPA process can be costly and complicated, potentially discouraging innovative coastal flood risk management activities due to difficulties obtaining permits.

### Clean Water Act (CWA)

The 1972 Clean Water Act established the structure of water quality regulation in the United States, restricting discharges of pollutants into U.S. waters and establishing water quality standards for surface waters. EPA is responsible for compliance and enforcement activities associated with the CWA and has set wastewater standards for industry, water quality standards for contaminants in surface waters, and permit requirements for point source discharges into navigable waters. EPA also administers regulations relating to placement of dredged materials, fill of wetlands, estuaries, and other water bodies, and inspections of facilities at risk for oil spills. Guidance documents for the CWA have consistently supported protection for wetlands, as they provide water quality benefits to surrounding areas.

### *Compatibility*

- Protection of wetlands serves as a nexus to coastal flood risk management, as wetland preservation or restoration can also be employed as a non-structural coastal flood risk mitigation tool.

### *Concerns*

- Growth of water quality infrastructure in coastal areas in order to meet water quality standards may inadvertently increase coastal development, and any improvements in sewage control may be offset by increased stormwater runoff. Siting of infrastructure presents an opportunity to reduce future coastal flood risk when employed as part of a holistic management approach.

### Clean Water State Revolving Fund (CWSRF)

A 1987 amendment to the CWA established the Clean Water State Revolving Fund, an innovative method for financing state water quality projects. EPA funds the CWSRF at the state level with a 20% state match. States then use the fund to finance high priority water quality activities through low interest loans. Eligible recipients of assistance include local communities, non-profits, private entities, and citizen groups. As money is paid back into the fund from loans the fund is replenished and new loans are issued for additional projects, allowing funds to “revolve” at the state level. States are given flexibility in administering the program through control of loan terms and type of financial assistance provided. Focus areas of the program include municipal wastewater facilities, nonpoint pollution control, estuary protection, and green infrastructure, which is supported specifically by a Green Infrastructure Policy to promote increased funding of green infrastructure projects. Changes to the fund in 2009 also established the Green Project Reserve, which requires states to utilize a portion of appropriations for green infrastructure or other environmentally innovative activities.

### *Compatibility*

- The program is designed to give states a high degree of flexibility in providing financial assistance, encouraging growth of state management capacity and removing administrative barriers to program implementation.
- The program places an emphasis on green infrastructure, providing incentives for funding non-structural environmental management projects.

### *Concerns*

- Opportunities exist to further integrate water quality and coastal flood risk management projects, particularly with regard to implementing green infrastructure projects and siting of water quality infrastructure.

### National Pollutant Discharge Elimination System (NPDES)

The National Pollutant Discharge Elimination System is the permit system created through the CWA to regulate point sources of surface water pollution such as industrial, municipal, and agricultural facilities. These point sources are prohibited from discharging pollutants into U.S. water without a permit, which is issued through a partnership between EPA and state environmental agencies. Permits are either technology-based or water quality-based, and may be issued to individual facilities or groups of similar

pollutant-dischargers. While the primary purpose of NPDES is to address water quality issues, the program has a nexus to coastal flood risk through its stormwater management provisions. NPDES best management practices for stormwater management can also reduce flood impacts through strategies such as low-impact development, which aims to restore an urban site's ability to absorb stormwater rather than transport stormwater elsewhere.

### *Compatibility*

- A number of NPDES stormwater best management practices are aligned with natural processes and serve as effective coastal flood risk mitigation strategies, particularly in urban environments.

### *Concerns*

- If the nexus between NPDES stormwater management and coastal flood risk is not recognized programs focusing on each issue will not be able to leverage the benefits of addressing both issues simultaneously.

## **United States Fish and Wildlife Service (USFWS)**

### Coastal Barrier Resources System (CBRS)

The Coastal Barrier Resources System was established by the Coastal Barrier Resources Act of 1982 with the intention of minimizing loss of life, protecting natural resources, and reducing wasteful federal expenditures in vulnerable coastal areas. Areas within the CBRS, primarily undeveloped coastal barriers, are made ineligible for most types of federal assistance or new federal expenditures, including flood insurance under the NFIP, road construction, coastal engineering projects, and channel dredging. Flood insurance may still be available if a building was constructed prior to the CBRS designation, though such a policy cannot be renewed following substantial damage or improvement to the structure. In practice these restrictions limit federal subsidies within coastal areas by requiring non-federal entities and private developers to bear the full cost of building within high-risk coastal environments. Maps of the CBRS are currently undergoing a comprehensive modernization effort including measures for digital publication of program-area maps.

### *Compatibility*

- Restrictions through the CBRS represent a novel combination of environmental and fiscal elements, acknowledging the role of the federal government in subsidizing potentially hazardous development in coastal areas. This promotes responsible development in coastal areas as well as growth of state capacity for managing coastal flood risk.
- USFWS has worked with FEMA to incorporate the CBRS into NFIP FIRMs, an important integration of federal programs across multiple agencies.

### *Concerns*

- The CBRS will need to account for changing coastal hazards and sea-level rise to continue to prevent wasteful federal expenditures. This will likely warrant an expansion of the CBRS, and adequate funding will be required to incorporate these changes in updated and digitized maps.

- The CBRS has the potential to be further integrated into other federal programs such as the Coastal Zone Management Program. Alignment of state coastal management plans with the CBRS could improve the effectiveness of each program.

## National Coastal Wetlands Conservation Grants

The National Coastal Wetlands Conservation Grants program, authorized by the Coastal Wetlands Planning, Protection, and Restoration Act, provides matching grants to coastal states for the acquisition, restoration, management, or enhancement of coastal wetland resources. While the primary focus of the program is on the long-term conservation of coastal wetland ecosystems, an incidental nexus to coastal floodplain management exists for cases in which preserved or restored wetlands mitigate coastal flood risk. The program administers grants annually on a competitive basis and requires a minimum 25 percent non-federal match, with the majority of grants provided on a 50-50 match basis. Excise taxes on motorboat fuel and fishing equipment are used to support the program as part of the Sport Fish Restoration Account.

### *Compatibility*

- Restoration and preservation of wetlands provides a number of ecological benefits including non-structural coastal flood risk mitigation.

### *Concerns*

- The program does not currently address potential changes to coastal wetlands as a result of rising sea level, an issue that could impact a number of areas considered for grants.

## Endangered Species Program

USFWS oversees the Endangered Species Program in partnership with NOAA. The USFWS program operates in the same manner as the NOAA program, with USFWS responsible for terrestrial and freshwater animals, plants, and invertebrates. Again a nexus to floodplain management exists through critical habitat protections for listed species as preserved aquatic, riparian, and floodplain habitat often provide flood risk mitigation benefits.

### *Compatibility*

- The USFWS Endangered Species Program contains measures to account for climate change in planning for a species' recovery, including potential changes to critical habitats.

### *Concerns*

- The focus on individual species within Endangered Species Program may narrow the scale of conservation strategies and associated benefits to coastal floodplains.

## Coastal Program

The goal of the USFWS Coastal Program is to achieve voluntary conservation of coastal habitats. As a non-regulatory program, the Coastal Program provides technical and financial assistance through collaborative partnerships to benefit federal trust species. The program is currently in place in 24 priority coastal areas along all major coasts of the U.S. as well as the Caribbean. At each coastal area local staff provide assistance for habitat conservation and design efforts as well as implementation of

habitat restoration and protection projects. Projects generally involve a 1:8 ratio of federal to non-federal funding and are selected based on their relation to the program goals of improving coastal ecosystem resilience to climate change, supporting ecological integrity through science-based conservation design, facilitating the conservation and recovery of priority species, and building conservation partnerships. While the program is focused on threatened and endangered wildlife such as migratory birds and fish, the program's landscape-scale approach towards coastal habitat conservation can bring a host of other benefits including mitigation of coastal flood risk.

### *Compatibility*

- The program's broad framework built on partnerships with a variety of organizations and landscape-scale conservation efforts are consistent with a holistic approach to coastal management.
- The program acknowledges and specifically addresses changing coastal hazards due to sea level rise in conservation plans.

### *Concerns*

- The broad impacts of habitat conservation through the Coastal Program must be recognized if the program is to be further integrated into coastal flood risk management efforts.

## **Natural Resources Conservation Service (NRCS)**

### Environmental Quality Incentives Program (EQIP)

The Environmental Quality Incentives Program is the largest provider of agricultural conservation financial assistance for lands actively involved in agricultural production. The program is voluntary in nature and provides financial and technical assistance to agricultural producers for the planning and implementation of natural resource conservation practices. Assistance is also available to help agricultural producers meet federal, state, and local environmental regulations. The program targets activities on both agricultural land and non-industrial private forests and can impact floodplain management through conservation activities designed to control erosion, create buffers surrounding riparian areas, and restore wetlands, despite not having an explicit program statute or regulation that directly addresses floodplain management. The program provides technical and financial assistance through contracts, up to 10 years in length, following submission of an EQIP plan that identifies the conservation benefits of proposed practices. If the EQIP contract is approved the program will cover up to 75 percent of planning and implementation costs and up to 100 percent of income foregone to implement conservation practices.

### *Compatibility*

- EQIP supports a broad range of conservation practices that address environmental management on a holistic basis, many of which provide incidental benefits to flood risk management.

### *Concerns*

- EQIP does not specifically address adaptation to climate change due to the life-span of projects within the program.

- The floodplain management benefits of the program could be enhanced through further coordination of EQIP with other federal programs that involve wetland conservation and floodplain protection.

## Emergency Watershed Protection Program (EWP)

The Emergency Watershed Protection Program, established and funded through Congress, is an emergency response program that provides technical and financial assistance to address watershed impairments in the wake of natural disasters. Assistance provided through the program, including debris removal, erosion control, levee repair, and floodplain easement purchase, is not dependent upon federal disaster declarations. A local government must sponsor projects conducted through the EWP save for floodplain easement purchases, which can be carried out by individuals. Easements are available for properties that have been impacted in the prior year or have flooded at least two times within the previous decade, with the goal of restoring, protecting, maintaining, and enhancing floodplain functions in the purchase area. Federal funds may cover up to 75 percent of EWP project construction costs, and limited-resource areas are potentially eligible for up to 90 percent federal cost coverage. Projects are evaluated based on reduced threats to life and property and must be socially, economically, and environmentally responsible.

### *Compatibility*

- EWP offers flexible emergency response measures, and easement purchases can serve as a non-structural flood risk mitigation measure.

### *Concerns*

- Congressional funding can be inconsistent, potentially hindering long-term EWP project planning at the local level.
- Apart from easement purchases, mitigation measures could be further emphasized in EWP projects to ease federal disaster recovery burdens and increase state flood risk management capacity.

## Watershed Rehabilitation Program

The Watershed Rehabilitation Program works to rehabilitate dams that are approaching the end of their design lives, have failed to meet safety standards, or put life and property at risk. The scope of rehabilitation projects can include dam decommissioning and removal in addition to repair or strengthening of existing structures. After a potential dam rehabilitation project is identified, local sponsors can request financial assistance from the program. Projects are then selected based on potential risks to life and property upon dam failure as well as the extent of other recent rehabilitation investments. The program provides financial assistance for planning, design, and construction of complete projects once a project has been selected. Participation in the program requires local project sponsors to enter into an agreement with NRCS that defines the responsibilities of federal and nonfederal partners during the rehabilitation project. NRCS will then develop a watershed plan to identify environmental impacts, costs, benefits, and planned conservation practices.

### *Compatibility*

- Dam decommissioning and removal represent important non-structural solutions that work to restore natural flow conditions and floodplain functions.

### *Concerns*

- Although the program typically assists smaller localities with fewer resources, federal financial assistance for dam rehabilitation can undermine the responsibility of local agencies for operations and maintenance of dams after construction.
- Program funding can be inconsistent, even absent entirely in select years, potentially hindering dam safety planning efforts.

## Watershed and Flood Prevention Operations Program (WFPO)

The Watershed Program is authorized by the Watershed Protection and Flood Prevention Act, which allows for federal cooperation with states and local agencies for conservation purposes. The program works to both prevent damage from erosion and flood waters and enhance conservation and utilization of water resources. The program provides technical and financial assistance to local sponsors for the preparation and implementation of watershed project plans in support of program goals. Projects can cover a broad range of issues including flood prevention, watershed protection, public recreation, fish and wildlife conservation, agricultural water management, municipal and industrial water supply, water quality management, and watershed structure rehabilitation. Local sponsors can request watershed project plan authorization and assistance from Watershed Operations, while large projects require Congressional approval. Upon approval, technical and financial assistance is made available for project implementation activities specified in watershed project plans. Cost-share requirements are dependent upon the specific project purpose, generally involving a 50/50 federal/non-federal division of costs with certain projects such as flood prevention eligible for higher federal contributions.

### *Compatibility*

- The watershed scale of the program and broad range of activities eligible for assistance are consistent with a holistic flood risk management approach.

### *Concerns*

- The program is partially funded through annual congressional appropriations that may vary year to year, potentially hindering long-term planning and project implementation efforts.

## Agricultural Conservation Easement Program (ACEP)

The Agricultural Conservation Easement Program consolidates three past NRCS programs: the Wetlands Reserve Program, Grasslands Reserve Program, and Farm and Ranch Lands Protection Program. The program continues the mission of the three prior programs by providing technical and financial assistance to help conserve wetlands and agricultural lands and restore the natural beneficial functions of such lands. The program consists of two types of conservation easements: Agricultural Land Easements and Wetlands Reserve Easements. Agricultural easements are designed to protect the agricultural and conservation values of working lands, either by keeping land in agricultural production or preserving grassland or rangeland areas. Agricultural land is eligible for assistance that represents up

to 50 percent of the fair market value while grassland with demonstrated environmental value is eligible for assistance totaling up to 75 percent of fair market value.

ACEP wetland easements have a more direct nexus to coastal flood risk management. Private landowners can receive program assistance for both purchase and restoration of wetlands. For permanent easements, the program will pay the full value of the land and cover 75 to 100 percent of restoration costs. 30-year easements are eligible for assistance in the range of 50 to 75 percent of land value and 50 to 75 percent of restoration costs. Term easements, a commitment up to the maximum time allowed under state law, are eligible for the same level of assistance as 30-year easements. Currently farmed or converted wetlands that allow for cost-effective restoration are eligible for the program. Land is enrolled in the program through purchase agreements between NRCS and local partners, which include rights for NRCS to develop and implement restoration easement plans to enhance beneficial ecological functions.

### ***Compatibility***

- The wetlands easement program emphasizes natural and beneficial functions as well as ecological restoration, providing broad benefits including nonstructural flood risk mitigation.
- Federal investment in permanent easements incentivizes long-term planning and restoration efforts.

### ***Concerns***

- The purposes of the program may conflict in some cases as agricultural easements provide assistance to keep land in agricultural production while other easements focus on the preservation and restoration of ecological value.

## **United States Small Business Administration (SBA)**

### **Disaster Loan Program**

The Disaster Loan Program within the SBA provides loans to businesses, homeowners, private non-profit organizations, and renters following Presidential disaster declarations. Program loans can be used to repair or replace real estate, personal property, and business assets, and can also be put towards improvements that reduce future risk from similar disasters. The program limits funds for mitigation against future risk to 20 percent of the value of the total physical loss on the property. For loans related to recovery from flood damage, the applicant must have been in compliance with any flood insurance purchase requirements to receive assistance. Homeowners are eligible for up to \$200,000 for repair or replacement of a primary residence and up to \$40,000 to repair or replace damaged personal property. Businesses are eligible for up to \$2 million of assistance for physical damages or economic injury.

### ***Compatibility***

- The program provides support for future risk mitigation in the wake of disasters, potentially reducing future losses.

## *Concerns*

- The success of the program in providing assistance following flood disasters depends upon widespread purchase of flood insurance by property owners. Communities where education on or enforcement of purchase requirements is lacking are put at additional risk.

## **Department of Housing and Urban Development (HUD)**

### Community Development Block Grant Program (CDBG)

The Community Development Block Grant Program provides financial assistance to communities to address community development needs such as quality affordable housing, services for at-risk citizens, and expansion and retention of businesses. The program can also provide grants for disaster recovery assistance following presidential disaster declarations, in which the program funds emergency or temporary housing efforts for any citizens who have been displaced during a disaster. The award of CDBG funds can have a strong influence on future development within an area and thus can significantly impact community flood risk management. The program is flexible in terms of amount and type of assistance provided, which is delivered through annual grants on a formula basis to local governments and states. The formula used to determine grant amounts takes into account factors such as the extent of poverty within a community, population, overcrowding, aging housing infrastructure, and lack of population growth.

### *Compatibility*

- The flexibility and local administration of CDBG provides states and communities with opportunities to increase capacity to address future risk.

## *Concerns*

- While other types of federal assistance are prohibited in communities that have identified flood hazards but are not participating in the NFIP, CDBG awards are exempted from this requirement as they are state formula grants. This exclusion can decrease incentives for community resilience, as the award of CDBG funds can increase development in coastal areas.

### Sustainable Communities Regional Planning Grants (SCRIP)

The Sustainable Communities Regional Planning Grants Program provides financial assistance to communities to support collaborative efforts to enhance housing, economic development, and infrastructure investments. The program emphasizes partnerships across a broad range of interests including arts, health, food systems, regional planning, and education. The program is also participates in the Partnership for Sustainable Communities, a federal partnership that brings together multiple agencies to leverage and coordinate federal investments. Several policy priorities guide SCRIP investments, including job creation, sustainability, fair housing, capacity building, and interdisciplinary policy knowledge. While the program does not specifically address floodplain management, grant funds can support community development projects in areas such as stormwater management that can influence coastal flood risk.

### *Compatibility*

- The program's sustainability policy priority provides support for climate-resilient building design and siting, helping to mitigate future risk.

### *Concerns*

- The sustainability priority of the program lacks information on non-structural hazard mitigation practices, an important component of coastal flood risk resilience.

## Home Investment Partnership Program (HOME)

The Home Investment Partnership Program provides formula grants to states and local governments in order to increase housing opportunities for low-income citizens. The program is the largest of its kind in the United States, delivering approximately \$2 billion in assistance annually. Grants can be used to fund activities such as the purchase, construction, or rehabilitation of affordable housing or may be used to provide direct financial assistance to low-income citizens for rental properties. Financial assistance can take the form of grants, direct loans, loan guarantees, credit enhancements, or rental deposits, and communities are given flexibility in administering the program to meet unique needs and priorities. Similar to other HUD programs, HOME has a nexus to coastal flood risk through the development incentives associated with the award of grant funds.

### *Compatibility*

- The program emphasizes flexibility at the state and local level, encouraging growth of state capacity in managing coastal development and associated flood risk.

### *Concerns*

- Due to its status as a state formula grant program, HOME is exempted from the restriction on providing federal assistance to communities that do not comply with mandatory flood insurance purchase requirements, reducing incentives for community flood-risk resilience.

## **United States Department of Transportation (DOT)**

### Transportation Infrastructure Programs

The U.S. Department of Transportation oversees a number of transportation infrastructure improvement and recovery programs that provide technical and financial assistance to states and local governments. The Federal-aid Highway Program provides support to state highway systems through financial assistance for construction, maintenance, and operations. The Highway Bridge Program is tasked with improving the condition of highway bridges throughout the United States, providing funding for replacement, rehabilitation, and preventative maintenance. Following natural disasters, the Federal Highway Administration Emergency Relief Program provides financial assistance to repair highways, roads, and trails, coordinating with other federal agencies that provide similar services. The Transportation Infrastructure Finance and Innovation Act Program (TIFIA) provides credit financing for large transportation infrastructure projects such as highways, passenger rail, or intelligent transit systems, and the Federal Aviation Administration Airport Improvement Program supports airport planning and development through technical and financial assistance. Each of these programs has a nexus to floodplain management through the role that siting of critical transportation infrastructure

plays in coastal development. DOT has recognized this nexus in its 1979 order “Floodplain Management and Protection”, which addresses the requirements of EO 11988. The order directs infrastructure programs to avoid encroachments, minimize impacts, and restore and preserve beneficial values of floodplains when planning infrastructure projects. FEMA maps are used to determine any encroachment on floodplains in the planning process.

### *Compatibility*

- The programs coordinate with FEMA through the use of published floodplain maps and through inter-agency cooperation during disaster recovery, reducing potential program overlap.

### *Concerns*

- While DOT has published regulations regarding transportation infrastructure in floodplains, implementation of infrastructure restrictions can vary at the state level.

## **Bureau of Reclamation**

### Dam Safety Programs

The Bureau of Reclamation, which operates in western states, oversees the Safety of Dams (SOD) and Safety Evaluation of Existing Dams (SEED) programs for dams that are owned by the bureau. The focus of the SOD program is the evaluation and implementation of actions to resolve safety issues at dams managed by the Bureau. If an issue is identified the Bureau will conduct studies and take corrective action to address the problem based on potential environmental risks and liabilities. The SEED program coordinates site evaluations of existing dams to identify those that may pose a risk to public safety. If such a dam is identified, SEED will expedite analyses and take corrective actions to protect public safety and natural resources. Each of these programs is guided by the mission of the Bureau, which includes managing water resource facilities to enhance conditions for fish, wildlife, land, and cultural resources as well as protecting the public and environment through adequate maintenance and appropriate operation of dams.

### *Compatibility*

- The program recognizes the protection of natural and beneficial functions as an important component of water infrastructure management in the Bureau’s mission statement.

### *Concerns*

- As with other water infrastructure programs, the lack of national safety and hazard notification standards hinders the development of a holistic approach to flood risk management.

## **Farm Service Agency (FSA)**

### Conservation Reserve Program (CRP)

The Conservation Reserve Program, the largest private-land conservation program in the United States, is a voluntary land conservation program that enables farmers, ranchers, and agricultural producers to preserve the ecological value of environmentally sensitive privately-owned lands. The program functions through contracts with landowners that provide a yearly rental payment in exchange for the removal of

ecologically valuable land from agricultural production along with the enhancement of beneficial plant species. Contracts are 10-15 years in length, and agricultural land is eligible under a number of initiatives designed to improve water quality, prevent soil erosion, and supplement wildlife habitat. Similar to other easement programs, CRP does not address floodplain management directly, but initiatives within the program that address floodplain wetlands and highly erodible land provide opportunities to augment sound floodplain management practices.

### *Compatibility*

- Though it is limited to agricultural lands, CRP can address a wide range of activities consistent with a holistic view of environmental and flood risk management.

### *Concerns*

- The nexus to floodplain management that exists in CRP and other such programs must be recognized by program staff and managers if the substantial resources of these programs is to be leveraged to reduce flood risk.

---

# State Coastal Flood Risk Management Case Studies

---

## Introduction

This section of the report consists of case studies of coastal flood risk management practices in Wisconsin, Florida, New York, and Washington, analyzing policies and programs across the following nine dimensions:

1. State Coastal Management Programs
2. Shoreline regulations
3. Floodplain management
4. Wetland management
5. Building codes
6. Community planning
7. Stormwater and runoff management
8. Erosion management
9. Climate adaptation initiatives

The following elements of policy goals/management principles are also described for each state:

1. State Management Capacity
2. Alternatives to Structural Mitigation
3. Long-term Planning
4. Balance of Mitigation and Disaster Recovery
5. Holistic Management Approach

---

## Wisconsin

### Policies and Programs

#### Coastal Management Program

The Wisconsin Coastal Management Program, operated under the umbrella of the NOAA National Coastal Management Program, works to preserve and enhance the economic, ecological, and aesthetic resources of state Great Lakes waters. Program objectives include improving the implementation of state statutes, policies, and regulations that affect the coastal zone of Wisconsin, improving coordination of activities at multiple levels of government involved in coastal issues, strengthening the

coastal management capacity of localities, advocating for balanced use of coastal environments, and increasing public outreach and participation in the management of coastal areas. The program works towards these objectives in a variety of ways, including federal consistency reviews, grant programs, coastal initiatives, publication of guidance documents, and participation in federal coastal conservation programs.

The Wisconsin Coastal Management Program, like other state coastal management programs, works to ensure the consistent application of policies and programs at the federal and state level through a federal consistency review process. This process allows the state to have influence over federal actions in coastal areas such as the construction, funding, or permitting of projects. The Wisconsin Program also works to coordinate coastal zone activities at the state and local level, utilizing a networked approach, meeting regularly with the established Wisconsin Coastal Management Council, and leveraging the location of the program within the State Department of Administration to further management coordination efforts.

The Coastal Management Grant Program addresses six main areas of need: coastal wetland protection and habitat restoration, nonpoint source pollution control, coastal resource planning, Great Lakes education, public access to coastal areas, and community planning. Grants have supported a variety of projects throughout Wisconsin's coastal zone in past years, many of which have a nexus to coastal flood risk management through measures such as water resource revitalization, coastal habitat restoration, or implementation of green infrastructure. Land acquisition grants for at-risk coastal areas were also available through the NOAA Coastal and Estuarine Land Conservation Program (CELCP), for which the state provided matching funds.

Other Wisconsin Coastal Management Program initiatives focus on beach management, coastal natural hazards, and environmental impacts of marinas. Program beach management activities include providing education, training, and technical assistance to localities in the form of beach forecast models as well as decision support tools. Natural hazards remain a priority area for the program, with ongoing efforts to develop and implement shoreline and bluff erosion policies. Projects are coordinated across multiple state agencies through the Coastal Natural Hazards Work Group, with USACE and FEMA staff participating as federal partners. The Wisconsin Clean Marina Program encourages responsible decision-making through guidance documents, technical assistance, and educational material such as a best-practices guidebook that address both water quality concerns and issues with marina siting in undisturbed coastal environments.

## Shoreline Regulations

The Wisconsin Shoreland Protection Program, housed within the State Department of Natural Resources, works to further the maintenance of safe and healthful conditions in shoreland areas, defined as lands within 1,000 feet of a lake or pond or 300 feet from a river or stream. Along with objectives of improving water quality and protecting aquatic life, the program also seeks to address building sites, structure placement, and preservation of shore cover and natural beauty. The shoreland program pursues these objectives by publishing minimum shoreland zoning standards for all shorelands in unincorporated areas under Chapter NR 115 of the Wisconsin Administrative Code. Counties are then required to adopt these minimum standards. Shoreland rules and regulations apply to the use of shorelands in unincorporated areas and incorporated or annexed areas with select exceptions, but do not apply to state highway or bridge projects carried out by the Wisconsin Department of Transportation that affect the waters of the state.

Minimum zoning standards as part of the Wisconsin Shoreland Protection Program include provisions on minimum lot sizes, building setbacks, vegetation conservation, landscape alteration, impervious surfaces, construction height, and nonconforming structures and uses. These provisions are largely designed to protect water quality, but several aspects of zoning standards have a nexus to coastal flood risk management. A setback of 75 feet from the ordinary high-water mark is required for all buildings and structures unless an existing development pattern exists. Select exemptions to this standard exist for structures such as boathouses, utility lines, and walkways. Vegetation conservation standards require sound soil conservation practices to reduce erosion and designate a minimum 35 foot buffer zone from the ordinary high water mark in which removal of vegetation is prohibited save for select exceptions. Impervious surface standards allow up to 15% of total area as impervious surface in shorelands as a general standard, with 30% and 40% impervious surface area permitted in residential and commercial areas within designated highly developed shorelines.

## Floodplain Management

The Wisconsin Department of Natural Resources administers the state's Floodplain Management Program, the rules and regulations of which are found in Chapter NR 116 of the Wisconsin Administrative Code. Program rules provide a uniform basis of floodplain regulation throughout the state in order to protect public health, minimize public expenditures, minimize relief efforts, minimize commercial disruptions, minimize public facility damage, minimize future flood areas, discourage unwary landowner victimization, and prevent increases in regional flood levels. Municipalities are required to adopt, administer, and enforce floodplain zoning ordinances at least as restrictive as state standards in areas where substantial damage may occur within one year of data publication.

The rules and regulations of the Floodplain Management Program contain provisions that acknowledge the comprehensive nature of effective floodplain management. State floodplain management standards can be included in a variety of regulatory mechanisms such as subdivision regulations, building codes, flood insurance regulations, and stormwater management regulations. Administrative rules also allow for various methods of flood risk mitigation, including the use of easement purchases, warning systems, building codes, subdivision regulations, sewage system ordinances, and stormwater regulations. Ordinances must be updated within six months after information on changes in floodplain management statutes, rules, or case law is published or if improved data, technical information, or methods are made available. Information on areas where floodplain regulations apply is disseminated through publicly available maps, which detail areas covered during a 1% annual chance flood event. Mapping standards include a requirement that flood discharges in rapidly urbanizing areas reflect increased runoff from projected future development.

The state floodplain management program provides development standards for floodway areas, floodfringe areas, and other floodplain areas including coastal floodplain districts. Wisconsin uses a zero-rise standard for mapping floodways, meaning floodways within the state are full-conveyance floodways. In floodway areas, prohibited uses include any development that may obstruct or increase regional flood levels, structures designed for human habitation, structures not associated with open space use, and wastewater facilities. Permitted uses in floodway districts consist of open space uses with low potential for flood damage such as agriculture or recreation. Accessory structures to open space use are permitted in floodway areas provided that they do not obstruct flood flows, are firmly anchored, and have equipment elevated above regional flood levels. Public infrastructure such as utilities and roads may be permitted if adequate floodproofing measures are employed.

State regulations also limit development in floodfringe areas to projects that do not obstruct existing flood flows unless amendments are made to floodplain zoning maps and ordinances, and development may not occur in a manner that increases the regional flood height or discharge. Floodplain regulations require that residential structures located in the floodfringe be placed on fill with the lowest floor at or above the flood protection elevation, defined in Wisconsin as 2 feet above the regional (1% annual chance) flood elevation. Any basement or crawlway floor must be at or above the regional flood elevation and floodproofed to the level of the flood protection elevation, save for communities that have been granted an exception by FEMA. These development standards also apply to commercial uses in the floodfringe. Manufacturing and industrial uses must also be protected to the flood protection elevation level using either fill, floodproofing, or a combination of these measures.

Unconnected floodfringe accessory structures, including commercial or industrial parking lots, may have floors constructed below the flood protection elevation, but such structures may not be subject to flood depths greater than 2 feet or flood velocities greater than 2 feet per second in the event of a regional flood. Any public utility or transportation infrastructure in the floodfringe deemed essential to the orderly functioning of the area must also employ floodproofing measures up to the flood protection elevation and must be compatible with local floodplain development plans. Floodfringe development standards are also applied to coastal floodplain areas, with the additional requirement that no development be allowed if structures will be adversely affected by wave runup along the shoreline of Lake Superior or Lake Michigan.

Code Chapter NR 116 also addresses nonconforming uses within floodplains, containing standards for modifications or additions to buildings and the use of any building that was lawful prior to the passage of a floodplain ordinance. A nonconforming use or building must be brought into compliance if a nonconforming use is discontinued for 12 months, a modification or addition to a nonconforming building is made that exceeds 50% of the assessed value, or a nonconforming building suffers damages greater than 50% of assessed value. Within floodway areas, no modifications to a nonconforming structure may be made unless granted by a permit, and any permitted modification must be floodproofed by means other than fill to the flood protection elevation and may not increase obstruction of flood flows. Modification of nonconforming buildings in floodfringe areas also requires a permit, with the requirement that the modification be placed on fill or floodproofed in compliance with floodfringe area standards. Variances may be granted for certain cases in the floodfringe where compliance would result in unnecessary hardship. Coastal floodplain standards prohibit any repair, modification, or addition to an existing nonconforming structure that exceeds 50% of the structure's assessed value, calculated over the lifetime of the structure, unless permanent changes are made to bring the structure into compliance.

## Wetland Management

Wisconsin's Shoreland-Wetland Protection Program is administered by the state Department of Natural Resources in cities, counties, and villages. The rules and regulations of the program are found in Wisconsin Administrative Code Chapters NR 115 and NR 117, which establish minimum standards for shoreland-wetland zoning ordinances. Zoning ordinances apply to wetland areas within 1000 feet of a lake, pond, or flowage, areas within 300 feet of a river, and areas within the landward side of a river's floodplain. The program requires that zoning ordinances be adopted within 6 months of wetland inventory map publication by the Department of Natural Resources. Appeals may be made to inventory maps if there are any suspected inaccuracies, and shoreland-wetland rezoning is permitted except in

cases where proposed rezoning would have adverse impacts on shoreline protection objectives such as flood water storage capacity, shoreline protection against erosion, and wildlife habitat.

Rules and regulations require counties, cities, and villages to establish shoreland-wetland zoning districts based on Wisconsin wetland inventory maps. Permitted uses within shoreland-wetland districts include recreational activities, responsible wild crop harvest, low-impact silviculture, pasturing of livestock, agricultural crop cultivation, duck blind construction, construction of nonresidential structures compatible with wetland preservation, construction of waterfront access structures, establishment of parks and recreation areas, construction of utilities infrastructure, and construction or maintenance of transportation infrastructure. Each of these activities must be conducted without filling, flooding, draining, dredging, ditching, tiling, or excavating wetland areas. All other uses of wetland-shoreland areas are prohibited. Zoning ordinances may not prohibit repair, reconstruction, or renovation of a structure that was compliant with regulations at the effective date of the shoreland-wetland zoning ordinance or amendment; however, if a nonconforming use of a nonconforming structure is discontinued for 12 months, future use of the property and structure must come into compliance with zoning ordinances.

### Building Codes

Wisconsin construction standards, consistent with the International Building Code, are found within Administrative Code Chapter SPS 321, which provides guidance on construction in floodplains and coastal floodplains. These rules and regulations apply where dwelling construction in floodfringe areas is permitted by local zoning ordinances, regulations of the Wisconsin Department of Natural Resources, and FEMA regulations. For construction in floodplains, the lowest floor and basement floor surface of a dwelling must be at an elevation equal to or greater than the base flood elevation, although basement floors may be located at a lower depth if the basement meets certified floodproofing requirements. Enclosed spaces below the base flood elevation may also be permissible for other purposes such as storage of mobile items or stairways, but such areas must contain measures to equalize hydrostatic pressure on exterior walls.

These requirements also apply to dwellings constructed in coastal floodplains, which must additionally have the lowest portion of structural members supporting the lowest floor elevated at or above the base flood elevation. Any enclosure within a coastal floodplain located lower than the base flood elevation may not be used for human occupancy, and any non-loadbearing walls in such an enclosure must be designed to break away under wind and water stress. Foundations must also employ pilings and columns that are supported and anchored at a depth sufficient to resist the combined wind and water stress associated with the base flood elevation.

### Community Planning

Within Wisconsin, comprehensive planning is used as a means to guide the physical, social, and economic development of local governmental units. Plans can be formed at the county, city, village, and town level or at the regional level by a regional planning commission. Comprehensive plans must contain elements related to issues and opportunities, housing, transportation, utilities and community facilities, natural and cultural resources, economic development, intergovernmental cooperation, land-use, and implementation. The natural resources and land-use elements address coastal areas and floodplains most directly. The natural resources element requires that a comprehensive plan be in place to address conservation and effective management of environmentally sensitive areas such as

floodplains and wetlands. The land-use element of comprehensive plans guides future development and redevelopment of private property, listing current amount, type, intensity, and net density of uses as well as recent trends and projections for land-use 20 years into the future. The land-use planning element also requires the development of maps depicting current and future land-use, delineating natural limitations for building site development, floodplains, and wetlands among other land use types. All county, city, village, and town zoning ordinances, including shoreland, wetland, and floodplain ordinances, must be consistent with any adopted comprehensive plans.

## Stormwater and Runoff Management

Wisconsin stormwater and runoff management program regulations, found within Wisconsin Administrative Code Chapters NR 216 and NR 151 respectively, are largely focused on water quality and pollution prevention, but select elements have a potential nexus to coastal flood risk. Municipal stormwater permits through the Wisconsin Pollutant Discharge Elimination System (WPDES) require an outreach component that promotes management of shorelines, infiltration of stormwater from impervious surfaces, and environmentally sensitive land development design. WPDES permitting also requires overland flow and water infiltration management practices at construction sites. Listed best management practices for stormwater infiltration include constructed wetlands and vegetative buffers, which may also provide some measure of flood risk reduction. Runoff regulations also require implementation of best management practices designed to maintain or reduce peak discharge rates, address infiltration of runoff, and allow for protective areas surrounding lakes, rivers, or wetlands. Each of these runoff management practices has accompanying performance standards that provide an additional potential nexus to coastal flood risk management.

## Erosion Management

Erosion management is integrated into multiple state programs in Wisconsin. The runoff management program requires that erosion control practices be put in place to stabilize sediment in construction sites, though this provision is primarily focused on preventing sediment discharges that may impact water quality. Runoff performance standards additionally include measures to prevent erosion within runoff protective areas such as maintenance of vegetative cover or riprap along banks with steep slopes. The state stormwater program also has erosion management provisions, again largely geared towards water quality at construction sites but with a potential nexus to flood risk. To obtain a stormwater permit an erosion control plan must meet the same performance standards outlined in the runoff management program. Erosion control plans for storm water permits must include a description of land disturbing activities, site mapping, and documentation of best management practices to be employed, including permanent stabilization practices.

The Wisconsin Department of Natural Resources also regulates shore erosion control structures within navigable waters, the regulations of which are found in Administrative Code Chapter NR 328, but standards are only listed for inland lakes, municipal breakwaters, and structures along rivers. Coastal areas along the Great Lakes do not fall into these categories and so these state standards do not apply. Coastal counties within Wisconsin may form their own coastal erosion control measures based on need.

## Climate Adaptation Initiatives

Efforts to address the impacts of a changing climate in Wisconsin include the Wisconsin Initiative on Climate Change Impacts (WICCI) and the State of Wisconsin Hazard Mitigation Plan. The WICCI initiative

is a joint effort between the University of Wisconsin-Madison and the Wisconsin Department of Natural Resources, representing a statewide network of stakeholders and scientists. The goals of the initiative are to assess climate change impacts in Wisconsin, evaluate risks and vulnerabilities, and recommend practical adaptation strategies for implementation. The work of the initiative is carried out through 15 working groups covering areas such as adaptation, climate, water resources, and coastal communities, with oversight by a science council. The initiative provides resources such as outreach materials and a comprehensive report, Wisconsin's Changing Climate: Impacts and Adaptation. The report details past changes in Wisconsin's climate, addresses current impacts across the state, and provides plans of action for implementing adaptation measures. Reports from each working group are also available, such as the coastal community report that provides information on environmental threats, coastal community vulnerabilities, and coastal adaptation strategies.

The State of Wisconsin Hazard Mitigation Plan is a publication of the Wisconsin Silver Jackets Hazard Mitigation Team under the Wisconsin Emergency Management Program. The plan outlines the state mitigation planning process, mitigation strategy, coordination of local mitigation planning, plan maintenance process, and comprehensive state mitigation program. State mitigation goals include minimizing disruption from natural hazards, enhancing public awareness of natural hazards and disaster preparedness, encouraging hazard mitigation planning, supporting intergovernmental coordination, and improving the disaster resilience of infrastructure. The mitigation action plan described in the report details a number of actions across multiple government agencies designed to address impacts of climate change, and appendices within the plan also specifically identify climate change as an element of changing future conditions that represents a hazard to the state.

## Elements of Policy Goals/Management Principles

### State Management Capacity

- The Wisconsin Coastal Management Program's federal consistency review process provides the state with an effective means to influence federal actions in the coastal zone, alleviating potential conflicts between federal and state programs.
- The Wisconsin Initiative on Climate Change Impacts is a state-led effort to address climate change impacts and recommend practical adaptation strategies. Conducting such an effort through a network of state shareholders and scientists allows for tailored adaptation efforts and increased state management capacity for future hazards.

### Alternatives to Structural Mitigation

- The Coastal Management Grant Program, administered by the Wisconsin Coastal Management Program, provides support for projects that address implementation of green infrastructure.
- Administrative rules for floodplain management are flexible and allow alternative mitigation programs such as easement purchases to be used to meet management standards, encouraging use of a broad range of mitigation strategies.
- Shoreline protection objectives for wetland management include flood water storage capacity and shoreline erosion protection, formally acknowledging the role of wetlands in mitigating flood risk.

- Stormwater permits issued through the Wisconsin Pollutant Discharge Elimination System promote mitigation alternatives by requiring outreach related to shoreline management, stormwater infiltration, and use of environmentally sensitive land development design principles. Listed best management practices also include constructed wetlands and vegetative buffers.

### Long-term Planning

- The Wisconsin Shoreland Protection Program includes a 75 foot setback from the ordinary high-water mark as a minimum zoning standard for buildings and structures.
- Program rules for floodplain management establish minimization of future flood areas and prevention of increases in regional flood levels as goals of the program, making future risks a formal priority.
- Standards for hydraulic studies used to create floodplain maps require that flood discharges in rapidly urbanizing areas reflect increased runoff from future development projections.
- Floodplain management regulations require that residential structures in floodfringe areas have the lowest floor elevated 2 feet above the 1% annual chance flood elevation. This elevation is established throughout regulations as the flood protection elevation.
- The land-use element of comprehensive plans for communities requires identification of current trends in land-use as well as projections of land-use 20 years into the future.
- The Wisconsin Initiative on Climate Change Impacts address climate change impacts, vulnerabilities, and practical adaptation strategies within the state. The initiative includes a work group on coastal communities that details specific risks and strategies for coastal areas.
- The State of Wisconsin Hazard Mitigation Plan includes a mitigation action plan that specifies multiple actions across state agencies to address climate change impacts, which are formally identified as an element of changing future conditions that represent a hazard to the state.

### Balance of Mitigation and Disaster Recovery

- The state coastal management program provides land acquisition grants for at-risk coastal areas through the NOAA Coastal and Estuarine Land Conservation Program, reducing potential future losses and demand for disaster recovery efforts.
- For floodplain management purposes, if a developed area is downstream of a dam compliant with state standards it is zoned as though the dam is nonexistent during a regional flood event for high hazard dams, or the area is zoned assuming dam failure during a regional flood for low hazard dams. This allows mitigation measures to be put into place and addresses the residual risk of dam failure prior to a disaster event.

### Holistic Management Approach

- The Wisconsin Coastal Management Program has a specific objective to improve coordination of activities at the multiple levels of government involved in coastal issues. The Wisconsin Coastal Management Council and Coastal Natural Hazards Work Group were established to further this objective, building collaboration across multiple agencies and stakeholders into decision-making.

- Floodplain management standards can be included in a variety of regulations such as building codes, flood insurance regulations, and stormwater management regulations, allowing coastal flood issues to be addressed from multiple perspectives.
  - Community comprehensive plans must contain an element related to intergovernmental cooperation. This formally acknowledges the need for management efforts across agencies, a critical component of a holistic approach.
  - The State of Wisconsin Hazard Mitigation Plan lists supporting intergovernmental coordination as a mitigation goal, recognizing the need to mitigate hazards from multiple levels of government and across agency boundaries.
- 

## Florida

### Policies and Programs

#### Coastal Management Program

The Office of Resilience and Coastal Protection, like its counterparts in other states, was developed under the purview of the federal Coastal Zone Management Act. The program gained NOAA approval in 1981 following the passage of the Florida Coastal Management Act. The coastal program operates through the Florida Coastal Office within the state Department of Environmental Protection (DEP), which provides oversight over coastal management grants, the Coastal and Estuarine Land Conservation Program, and federal consistency reviews, among other activities. Based on the geography of Florida and the legal basis for the state program, the entirety of the state is defined as the coastal zone and falls within the authority of the state coastal management program.

As is the case with other state coastal management programs, the Office of Resilience and Coastal Protection conducts federal consistency reviews to ensure that federal actions that may affect the coastal zone are consistent with identified state enforceable policies. The intent behind this review process is to improve decision-making related to use of natural resources, vulnerability to coastal hazards, and state growth patterns, all of which have a potential nexus to coastal flood risk. Types of federal actions under review include federal agency activities, federal permitting or licensing activities, Outer Continental Shelf Activities, and federal assistance to state or local governments. Federal agency activities under the purview of federal consistency include proposals that physically alter coastal resources, plans that direct future agency actions, rulemaking that affects coastal zone use, and Outer-Continental Shelf leasing. Permitting consistency reviews are conducted as state permits such as Environmental Resource Permits or Joint Coastal Permits are processed.

In addition to federal consistency responsibilities, the Office of Resilience and Coastal Protection also oversees four types of areas of special management. Areas of Critical State Concern, recommended by the Florida Department of Economic Opportunity, are areas that would put natural resources at risk if uncontrolled development were to occur. Aquatic Preserves set aside certain state-owned submerged lands and associated coastal waters in areas that have exceptional biological, aesthetic, and scientific value, overseen by the Florida Coastal Office. The state's water management districts implement Surface Water Improvement and Management areas, primarily focused on addressing water quality

issues in critical water bodies. Beach and Inlet Management areas also exist where coastal erosion threatens natural resources.

Other Office of Resilience and Coastal Protection activities include land acquisition, a subgrant program, and outreach activities. Land acquisition by the management program is conducted through the NOAA Coastal and Estuarine Land Conservation Program, which is implemented and managed within the state through the Florida Forever Program. Land acquisition activities focus on fragile coastal upland and wetland resources including undeveloped and buffer areas. Subgrant programs include Coastal Partnership Initiative grants that provide funds to localities to support projects designed to improve community resilience, coastal resources stewardship, and access to coastal resources. The program has a number of outreach initiatives such as the Florida Assessment of Coastal Trends, a collection of indicators used to inform planning decisions, and the Performance Measurement System, a NOAA program designed to quantify the effectiveness of coastal zone management activities.

## Shoreline Regulations

The Coastal Construction Control Line Program (CCCL), which is one of three components of the state's Beach and Shore Preservation Act, protects Florida's sandy beaches and dunes from imprudent construction jeopardizing the beach/dune ecosystem. This program establishes an area of jurisdiction seaward of designated control lines in coastal areas in which specific siting and design criteria are enforced for construction activities. Construction standards seaward of the control line are typically more stringent in order to prevent beach and dune system destabilization and protect natural resource values including upland property protection during flood or storm events. The program is administered through a permit system, with CCCL permits issued based on the potential construction impacts to coastal environments, adjacent properties, and wildlife, including specific requirements for shoreline armoring activities.

Rules and requirements related to the CCCL are found in chapter 62B of the Florida Administrative Code. General prohibitions based on program standards include coastal construction without necessary permits, coastal construction projects that will result in adverse impacts with consideration of proposed mitigation plans, and construction projects that will interfere with public use of areas seaward of the high-water line, except when deemed necessary. Approval or denial of a permit application is based upon a review of the facts and circumstances on the potential impacts on the beach dune/system, adjacent properties, native salt-resistant vegetation and marine turtles, and interference with public beach access. Given this department policy, CCCL permits are approved only when a construction project is shown to have a net positive benefit on surrounding coastal systems.

Criteria for permit approval include a number of measures with a nexus to coastal flood risk. The use of green or flexible coastal infrastructure is required where practicable. Structures that may alter coastal sediment movement are prohibited unless a net benefit to coastal systems is demonstrated or mitigation of adverse coastal impacts is provided. Permits for coastal armoring are also restricted except as a last resort for certain eligible structures, and armoring is only permitted after consideration of alternatives such as dune enhancement, beach restoration, and structure relocation. Sea level rise must also be considered during the review of coastal armoring applications. Any existing structures that have caused adverse impacts due to interference with coastal sediments must be redesigned or relocated during any reconstruction projects, and such structures may also be ordered removed if threats exist to human life, health, or welfare. Coastal construction projects determined to have an adverse impact

must employ a program to monitor any impacts to coastal systems, and any unavoidable adverse impacts must be offset through a mitigation plan.

CCCL design and siting requirements also address a number of topics relevant to coastal flood risk. In order to obtain a permit for coastal construction, projects must be sited and designed in a way that minimizes adverse impacts to the coastal system. Requirements also limit the maximum level of protection provided by coastal armoring depending on structure type, extending up to a 50-year return interval storm for public safety facilities, evacuation routes, and historic sites. Coastal armoring structures must be placed as close as possible to the protected structure and are prohibited from causing any adverse impacts on adjacent property. A number of specific engineering and construction requirements for coastal areas are also listed within the administrative code, including measures to ensure that seawalls, bulkheads, revetments, and toe scour protection are designed in a manner that does not increase upland flooding due to wave run up and overtopping. If fill is used in coastal areas it must be compatible with existing beach materials in order to preserve environmental functions,, and native salt-resistant vegetation is required for any beach or dune stabilization projects

## Floodplain Management

Development in floodplain areas in Florida is managed at the local level using the standards of the National Flood Insurance Program. Community responsibilities in Florida involve recognition of flood hazards during community planning, adoption and enforcement of flood maps and flood damage prevention ordinances, and establishment of elevation standards for new and substantially improved residential and non-residential structures. Specific floodplain management practices and standards that go beyond federal and state requirements vary by locality. The State Floodplain Management Program in Florida, housed within the State Division of Emergency Management's Bureau of Mitigation, operates as the State Coordinating Agency for the NFIP, working collaboratively with counties and municipalities in Florida to help administer local floodplain management regulations.

Beyond its coordinating responsibilities, the State Floodplain Management Program recently undertook a pilot program, CRS-CAV, to encourage enrollment in FEMA's Community Rating System, which provides flood insurance premium discounts based on community implementation of additional or improved floodplain management practices. The pilot program includes seven performance measures: adoption of floodplain regulations aligned with state building codes, annual inspection of flood hazard areas and resolution of non-compliance, adoption of flood zone permit application forms, procedures, and checklists, use of FEMA's Elevation Certificate Form with verification of accuracy, outreach to propane and air conditioning companies regarding compliant installations, development of substantial improvement or damage determination procedures, and online access to digitized flood insurance rate maps and elevation certificates.

Statewide floodplain management rules and regulations are largely consistent with NFIP standards. Floodway development is only permitted if a proposed project will not increase flood levels or adversely impact structures on other properties, demonstrated through a "No Rise" certification. Wave action is considered beyond coastal V zones in areas where revised FIRMs are able to delineate the extent of wave action between 1.5 and 3.0 feet, known as the coastal A zone or CAZ. CAZs are rated lower than V zones, but construction requirements in Florida are equivalent to V zones. A number of areas in Florida also exist within the federal Coastal Barrier Resource System, where NFIP insurance is unavailable for new or substantially improved structures. Coastal floodplains also intersect with areas subject to the

Florida CCCL program. Where these areas overlap, the more restrictive code requirements and development standards apply.

In addition to statewide standards, local permits are necessary for any land-disturbing activities in flood zones including new construction, additions, substantial improvements, renovations, and substantial repairs. Mobile home placement, placement of temporary buildings, agricultural construction, transportation construction, use of fill, alteration of stream hydrology, and land subdivision also require local approval. Levee accreditation, elevation certificate requirements, restrictions on use of fill, and general elevation construction practices in flood hazard areas in Florida also remain consistent with standard NFIP practices.

## Wetland Management

Wetlands in Florida are managed through the state Environmental Resource Permit (ERP) program, part of the Department of Environmental Protection's Submerged Lands and Environmental Resources Coordination initiative. The ERP program is implemented by the DEP and state Water Management Districts. While responsibilities can also be delegated to localities, this is currently not a widespread practice. Environmental Resource Permits regulate virtually all alterations to the natural landscape that exceed permitting thresholds, covering multiple topics such as wetland impacts, erosion, and stormwater with consideration of upland area impacts. The ERP program is operated in addition to any federal program that also regulates use of U.S. waters, allowing for joint permit applications with agencies such as the USACE. If activities occur within submerged lands owned by the state, a Sovereign Submerged Lands (SSL) permit is also required. SSL permits are granted through consent by rule, letter of consent, easement, or lease, and must be issued concurrently with a required ERP. Wetlands are delineated using a specific state methodology as opposed to the federal method, although the two produce generally similar results in practice. Delineations occur on a parcel by parcel basis following a request or as part of a permit application review.

A number of ERP criteria for evaluation form the basis of wetland management in Florida. Criteria apply to construction, alteration, operation, maintenance, abandonment, or removal of projects unless exempted by statute or rule, including dredging and filling, and are based on the programmatic goal of maintaining wetland ecological functions rather than acreage. Maintenance of water quality standards within wetlands is a key aspect of ERP criteria, as doing so preserves a number of wetland functions including flood storage. Several environmental conditions for issuance must be met in order to obtain a permit. Activities may not adversely impact the value of functions provided by wetlands to fish, wildlife, and other listed species. Applicants must also provide assurances that activities are not contrary to the public interest, weighing factors including changes in flood risk, and that activities will not adversely affect the quality of receiving waters including wetlands, with additional standards for shellfish harvesting areas. Additional permit standards require that activities will not have secondary impacts to water resources or unacceptable cumulative impacts upon wetlands, the latter of which may be offset by mitigation activities.

Mitigation efforts, also based on wetland function rather than acreage, can only be employed after all practicable actions to reduce or eliminate adverse impacts of a project have been used. If deemed necessary, mitigation efforts must offset any adverse impacts to wetlands functions, determined through a state Uniform Mitigation Assessment Method, and projects may be denied permits if mitigation actions are unable to sufficiently offset these adverse impacts. A number of approaches can be used to mitigate adverse impacts, including restoration, enhancement, creation, or preservation of

wetlands, adjacent surface waters, or upland areas that function as hydrologic contributing areas. As a best practice, mitigation efforts that create, restore, enhance, or preserve similar ecological communities to those impacted are encouraged, using historically present ecological conditions as a reference where possible. Mitigation activities that occur on-site are generally preferred, but mitigation may also be employed off-site or through purchase of credits from a mitigation bank as long as sufficient adverse impacts are offset.

## Building Codes

The Florida Building Code shares many of the same fundamentals of flood resistant construction as the construction requirements of the NFIP. Building foundations must be capable of resisting flood loads, and walls and roofs must be structurally sound so as to minimize penetration by wind, rain, and debris. Lowest floors must be elevated to the level of the design flood event to prevent intrusion of floodwaters. Use of any enclosure below elevated floors is limited to parking, storage, and building access, and any such space must be constructed using flood damage resistant materials. All equipment and utilities must also be elevated or designed to withstand flood loads or otherwise be designed to be restored quickly. Several provisions of the Florida Building Code, which refers to the standards in ASCE 24: Flood Resistant Design and Construction, exceed the construction requirements of the NFIP, and communities may also enact higher standards than state requirements.

The most recent Florida Building Code contains several major updates to flood resistant construction requirements. One foot of freeboard above BFE is now required for dwellings in all flood zones. In addition to the foot of freeboard, critical facilities must be elevated or protected to a height of BFE plus two feet or the 500-year flood elevation. If an area is zoned as a coastal A zone, it is regulated in the same way as a V zone, with stemwalls permitted. Local scour and erosion hazards must also be considered in the design and construction of foundations in coastal A and V zones. Flood openings are required in all walls and breakaway walls, and an exterior door is required at the opening of any stairways enclosed by breakaway walls. Restrictions on dry floodproofing of mixed use buildings have also been updated according to ASCE commentary. The updated code also includes a modified section addressing Florida's CCCL programs requirements, which are now more closely aligned with coastal V zone requirements in an effort to minimize case-by-case determinations of which set of regulations apply as the more restrictive.

## Community Planning

Regional Planning Councils conduct planning at the regional level in Florida. Communities must also develop comprehensive plans to account for future economic, social, physical, environmental, and fiscal development. Comprehensive plans must contain a number of elements including future land-use, transportation, water quality, aquifer recharge, conservation of natural resources, open space, housing, intergovernmental coordination, and coastal management for designated coastal communities. To address concerns over sea level rise, coastal communities can also designate low lying coastal zones that experience frequent coastal flooding as adaptation action areas.

The coastal management element of a comprehensive plan must be designed to meet a number of objectives such as the maintenance and enhancement of the coastal zone environment, balance of utilization and preservation of coastal resources, limit of public expenditures that subsidize development in high-hazard areas, and protection from the effects of natural disasters. State statutes establish a number of components required of coastal management planning elements to meet these

objectives, including several with a nexus to coastal flood risk. Future land use plans must be evaluated in terms of environmental and socioeconomic impacts to coastal resources, and plans must be developed to mitigate adverse impacts. Principles for natural disaster hazard mitigation must also be developed, as well as principles for protection of existing beach and dune systems. Development and redevelopment principles of coastal management plans must also contain solutions that reduce flood risk, whether it be from high-tide events, storm surge, flash floods, stormwater runoff, or sea level rise.

## Stormwater and Runoff Management

Stormwater management practices, implemented through the state DEP and WMDs, are also under the purview of Florida's comprehensive Environmental Resource Permit program. As with other types of activities affecting Florida's landscapes and surface waters, the construction, alteration, operation, maintenance, abandonment, or removal of a stormwater management system must meet permitting criteria if permitting thresholds are exceeded, unless specifically exempted. Due to the comprehensive nature of the ERP program, stormwater management systems are evaluated in terms of adverse effects to both surface water quality and quantity, and as a general rule activities must not be harmful to water resources or inconsistent with overall objectives of the DEP or relevant Water Management District.

Water quantity performance standards for ERPs are designed to prevent adverse impacts due to changes in peak stormwater discharge rate, volume, and pollutant loading. To receive a permit, applicants must provide information to ensure that activities will not cause adverse flooding of any kind. Projects must not alter floodways, floodplains, levels of flood flows, or velocities of adjacent streams in a way that adversely impacts the off-site flood storage and conveyance capabilities of a water resource. Activities must also avoid any adverse impacts due to low flow conditions or disruption of base flow levels. Specific design and performance standards relevant to stormwater quantity are developed and published by each Water Management District. In terms of water quality, activities must comply with Florida's state water quality standards and obtain permits through the National Pollutant Discharge Elimination System where relevant.

## Erosion Management

Erosion management and sediment control are also components of Florida's Environmental Resource Permit program. Applicants must provide a plan for minimizing erosion and controlling sediment discharge as part of an ERP application. Plans are site specific, and must take into account the location, installation, and maintenance of best management practices at construction sites. Larger project permits also require development and implementation of a Stormwater Pollution Prevention Plan as part of Florida's National Pollutant Discharge Elimination System Stormwater Construction Generic Permit. Though these permit programs are generally focused on preventing stormwater pollution during construction, permit criteria also have a nexus to flood impacts.

As a rule best management practices must be used to retain sediment on-site during construction, and practices must also assure that any sediment discharges do not cause or contribute to a violation of state water quality standards. Additional erosion control efforts are required if a project may lead to adverse impacts to wetlands or cause off-site flooding. The state CCCL program additionally addresses erosion of coastal sediment through coastal construction requirements. Principles to be considered as part of an erosion and sediment control plan include consideration of landscape topography and drainage patterns, maintenance of low runoff velocities, and stabilization of areas after final grade has

been obtained. It is recommended that erosion control activities consist of both vegetative and structural measures along with other management techniques to minimize movement of sediment.

## Climate Adaptation Initiatives

Adaptation measures related to climate change, particularly with respect to sea level rise, are present in a number of state policies and programs such as the coastal construction line, adaptation action areas, and coastal management element of comprehensive planning. Apart from measures incorporated into other programs, Florida also has state level initiatives to address climate change. A 2007 executive order from the governor established the Governor's Action Team on Energy and Climate Change and required the development of Florida's Energy and Climate Action Plan. The action plan identifies a number of adaptation strategies relating to topics such as scientific data and analysis, comprehensive planning, protection of ecosystems and biodiversity, water resources management, and community protection. The action plan also outlines a planning framework with specific goals related to flood protection and strategies for implementation. In 2011, the state developed the Community Resilience Initiative, with NOAA funding provided to the Florida Department of Economic Opportunity through the Department of Environmental Protection. This 5 year Initiative ended in December 2017 and DEP is currently managing the next 4 years of NOAA grant funding, known as the Adaptation Action Initiative. The new Initiative will provide assistance to coastal communities to implement planning strategies that address long-term coastal flood risk resulting from sea level rise that were developed during the previous five years. These innovative planning strategies will be implemented in two communities annually in critical coastal areas.

A number of local and regional climate adaptation initiatives have also been developed in coastal areas throughout Florida. One major regional initiative is the Southeast Florida Regional Climate Compact, a collaborative effort among four counties in southeast Florida to coordinate mitigation and adaptation activities. The compact works to respond to state legislation related to climate adaptation and publishes planning guidance documents for use in coastal communities. One such guidance document is the Southeast Florida Regional Climate Action Plan, which outlines a framework for addressing impacts due to a changing climate, including actionable recommendations in areas such as sustainable community planning, water supply and infrastructure, natural systems, agriculture, energy, risk and emergency management, and public policy. The compact has also produced an implementation guide to accompany the climate action plan and has published regional unified sea level rise projections for planning purposes.

## **Elements of Policy Goals/Management Principles**

### State Management Capacity

- The entirety of the state of Florida falls under the formal definition of the coastal zone, providing the state coastal management program with the authority necessary to fully address coastal issues even if such issues stem from inland areas.
- The federal consistency review process gives the Office of Resilience and Coastal Protection influence over federal actions in the coastal zone. The Florida program has a broad range of enforceable policies that federal actions must be consistent with, increasing the scope of the consistency review process.

- The state coastal management program's Coastal Partner Initiative grants bolster flood risk management capacity throughout the state by funding projects to improve coastal community resilience.
- Wetland delineation for wetland management purposes is performed using a specific state methodology that differs from the federal method. The methods produce similar results, but the presence of a state method provides a precedent for changes in delineation methodology depending on state priorities.
- State Water Management Districts publish specific design and performance standards related to stormwater quantity, improving state capability to address regional stormwater issues.

### Alternatives to Structural Mitigation

- The Office of Resilience and Coastal Protection conducts land acquisitions through the Florida Forever Program and NOAA Coastal and Estuarine Land Conservation Program, with acquisitions focusing on undeveloped and buffer areas within coastal uplands and wetlands.
- The Coastal Construction Control Line Program establishes specific siting and design requirements for designated coastal areas. Permit approval for the program requires the use of green coastal infrastructure where practicable, and coastal armoring is only permitted after alternative measures have been evaluated.
- Wetland mitigation within Florida is based on ecological function as opposed to acreage, with impacts determined through a state Uniform Mitigation Assessment. Mitigation efforts that create, restore, enhance, or preserve wetland functions are encouraged.
- Erosion management guidance recommends the use of vegetative measures in coastal areas to minimize movement of sediment.

### Long-term Planning

- Sea-level rise must be considered during review of coastal armoring applications as part of Coastal Construction Control Line permit approval.
- Coastal Construction Control Line design requirements for coastal armoring projects include levels of protection for different structure types based on coastal storm return intervals, extending to 50-year return interval storms for public safety facilities, evacuation routes, and historic sites.
- Dwellings in all flood zones must be elevated one foot above the base flood elevation, and critical facilities must be elevated to two feet above the base flood elevation or to the 500-year flood elevation.
- Low lying areas in the coastal zone that experience frequent flooding can be designated as adaptation action areas. The purpose of these areas as stated in the state administrative code is to address future issues related to sea level rise.
- The development and redevelopment principles within the coastal management element of a community's comprehensive plan must address future flood risk from sources such as high-tide events and sea-level rise.

- Florida’s Energy and Climate Action Plan was formed following a 2007 executive order and contains a planning framework with specific goals related to flood protection as well as strategies for implementation.
- The state Community Resilience Initiative assists coastal communities with the development of planning strategies for future flood risk due to sea-level rise, leveraging resources from the Florida Department of Economic Opportunity, Department of Environmental Protections, and Division of Emergency Management.
- Regional climate adaptation initiatives such as the Southeast Florida Regional Climate Compact coordinate mitigation and adaptation activities. The compact has published a climate action plan, an implementation guide, and regional sea-level rise projections for planning purposes.

### Balance of Mitigation and Disaster Recovery

- As part of the Coastal Construction Control Line Program, any unavoidable adverse impacts of coastal construction projects must be offset through a mitigation plan, including a program to monitor impacts to coastal systems.
- The CRS-CAV program, a pilot program under the State Floodplain Management Program, seeks to increase enrollment in FEMA’s Community Rating System, with a number of performance measures designed to increase the effectiveness of mitigation practices.
- Areas rated as coastal A zones on FEMA flood maps have the same construction requirements as V zones within Florida, providing a higher level of protection for at-risk coastal areas.
- The coastal management element of a community’s comprehensive plan must address the limitation of public expenditures that subsidize development in high-hazard areas, acknowledging the benefits of responsible investment in coastal areas.

### Holistic Management Approach

- The Office of Resilience and Coastal Protection’s enforceable policies used for federal consistency review encompass the use of natural resources, vulnerability to coastal hazards, and state growth patterns, addressing coastal issues from multiple perspectives.
- Areas of special management within the Office of Resilience and Coastal Protection are determined in part by risk to natural resources due to uncontrolled development or rapid urbanization, with input provided from the Florida Department of Economic Opportunity.
- The Coastal Construction Control Line Program is based on the state Department of Environmental Protection policy of regulating coastal construction to prevent degradation and promote restoration of coastal ecosystems, formally addressing the connection between development and ecological function. Program permits are also evaluated on the more broad concept of net benefits to coastal systems as opposed to more narrow performance measures.
- The comprehensive nature of Florida’s Environmental Resource Permit program as well as the programs focus on ecological functions encourages applicants to consider potential project impacts from multiple perspectives, such as preserving water quality within wetlands to maintain flood storage functionality.
- Under the Environmental Resource Permit program, stormwater management systems are evaluated in terms of both water quality and quantity, with performance standards that extend

beyond pollutant loading to ensure that activities do not lead to adverse impacts on stormwater discharge rate or volume.

- Comprehensive plans for communities must contain an element related to intergovernmental coordination, and designated coastal communities must also develop a coastal management element, encouraging management of coastal issues across multiple government entities during the planning process.
- Climate adaptation measures are dispersed throughout several state programs addressing coastal issues such as the Coastal Construction Control Line, adaptation action areas, and coastal management element of comprehensive planning, building adaptation capacity into existing programs without reliance on new initiatives.

---

## New York

### Policies and Programs

#### Coastal Management Program

The New York Coastal Management Program, established in 1982, is housed within the New York Department of State's Office of Planning, Development, and Community Infrastructure. Much of the program's legislative authority is drawn from the state Waterfront Revitalization of Coastal Areas and Inland Waterways law as well as the Coastal Erosion Hazard Areas law. The program pursues goals related to coastal resources protection and development, local waterfront revitalization, coordination of major activities affecting coastal resources, public awareness of coastal issues, and federal consistency with state coastal management policies. Within New York, the Department of State administers the program and coordinates its implementation in cooperation with the state Department of Environmental Conservation as well as other state agencies.

Coastal program boundaries extend along the coast of Long Island, New York City, Hudson River estuary, both Great Lakes that border New York, and the Niagara River. Specific landward boundaries of the coastal program vary by region and locality due to initial delineation proposals from local government agencies. All barrier and coastal islands on Long Island are included within program boundaries along with areas 1,000 feet landward of the shoreline, extending further in some cases. The New York City program boundary generally extends 500 to 1,000 feet inland from the shoreline, with select areas along major tributaries also extending further. Within the Hudson River Valley the landward boundary is generally 1,000 feet but may extend up to 10,000 feet in areas that possess high aesthetic, agricultural, or recreational value. In the Great Lakes region the boundary is also generally 1,000 feet, though urbanized areas or transportation infrastructure parallel to shore limit the boundary to 500 feet or less in some cases.

Coastal management program consistency reviews require federal actions in the state coastal zone to be consistent with the enforceable policies of the state program or the policies of an approved local waterfront revitalization program. The program also contains provisions to ensure consistency of state actions in coastal areas. Of the 44 coastal management program enforceable policies in New York, seven specifically address flooding and erosion hazards. These policies touch on a number of aspects of coastal flood risk management including the siting of buildings in coastal areas to minimize risk to property and

human lives, protection of natural features that mitigate coastal flood risk, construction of erosion control structures to meet long-term needs, prevention of flood level increases due to coastal activities or development, prevention of coastal mining or dredging from interfering with natural coastal processes, use of public funds for erosion protection structures, and use of non-structural mitigation measures when possible. Additional enforceable policies address coastal development, fish and wildlife resources, public access, recreation, historic and scenic resources, agricultural lands, energy and ice management, water and air resources, and wetlands management.

## Shoreline Regulations

At the state level, aspects of New York's Environmental Conservation Law, Local Waterfront Revitalization Program, and State Environmental Quality Review permitting program influence coastal zoning and development decisions. Article 34 of the Environmental Conservation Law requires the identification of coastal erosion hazard areas and rates of recession of coastal lands. Shoreline setbacks must then be implemented at a distance that is sufficient to minimize damage from erosion. Article 36 of the Environmental Conservation Law, the state Flood Plain Management Act, also addresses coastal hazards, requiring walled and roofed buildings to be sited landward of mean high tide and prohibiting mobile homes within coastal high hazard areas, among other restrictions. Article 15, Water Resources Law, regulates the placement of coastal structures such as docks or piers and also addresses the placement of fill in coastal areas. Together these elements of the Environmental Conservation Law provide much of the legal basis for zoning decisions that can affect coastal flood risk at the municipal and local level.

Participation in the Local Waterfront Revitalization Program can also influence a local government's coastal zoning decisions. In the process of preparing and adopting a revitalization program, local governments provide a more specific implementation of the state Coastal Management Program, taking advantage of local regulatory powers such as zoning ordinances and site plan review. Upon approval of a Local Waterfront Revitalization Program, state actions must then be consistent with the local program. In this way the enforceable policies of the Coastal Management Program, including those that relate to coastal flooding and erosion, are incorporated into local zoning decisions. Elements of enforceable policies are also incorporated into environmental permitting through the State Environmental Quality Review Program, which requires state agencies and local governments to prepare an environmental impact statement for any action that may have a significant impact on the environment. If an action in a coastal area requires the preparation of an impact statement, it must also be determined that the action is consistent with any relevant coastal enforceable policies. Consistency reviews must also be applied to NYS SEQRA type 1 actions as well as unlisted actions.

## Floodplain Management

Floodplain management activities within New York are primarily conducted through the National Flood Insurance Program. Any regulations developed by the state must be at a minimum as strict as those prescribed by FEMA. Beyond the state level communities may adopt more restrictive floodplain management regulations. Within the state, local communities largely regulate development within federally designated Special Flood Hazard Areas, with state assistance provided by the New York State Department of Environmental Conservation. Local development permits govern private development within floodplains as well as development by a county, city, town, village, school district, or public improvement district, as specified in the state Environmental Conservation Law.

State standards for floodplain development permits in all designated special flood hazard areas require adequate anchorage and use of flood resistant material for all new construction and substantial improvement to existing structures. Utilities must also be designed in a manner that minimizes or eliminates risk of damage or failure during flood events. In areas where base flood elevation data exists, new construction or substantially improved residential structures must have the lowest floor at two feet above the BFE, including basements and cellars. Nonresidential structures may employ floodproofing to provide protection. Any enclosed areas below the base flood elevation must be designed to allow for the equalization of hydrostatic forces on exterior walls during a flood event. If no base flood elevation has been determined, new construction or substantially improved residential structures must be elevated above grade to the depth specified on the corresponding flood insurance rate map or two feet if no number is specified, with nonresidential structures again able to employ floodproofing measures. All state agency activities, whether directly undertaken, funded, or approved by an agency, must also be evaluated in terms of significant environmental impacts under the State Environmental Quality Review program, which includes a substantial increase in flooding as a criteria of significance. An environmental impact statement must be prepared if it is determined that an action may have a potential significant adverse impact.

All structures must be located landward of mean high tide levels within coastal high hazard areas, and all new construction or substantially improved structures must be elevated on pilings or columns so that the bottom of the lowest horizontal structural member of the lowest floor is elevated to or above the BFE. Pilings or column foundations must be adequately anchored, and fill is prohibited for use as a structural support for any new structure or substantial improvement. Space below the lowest floor may not contain obstructions to flood flows or otherwise be enclosed with non-breakaway walls. Any such space below the lowest structural floor may not be used for human habitation. New development or substantial improvement to structures must also not affect sand dunes in any way that increases potential flood damages.

## Wetland Management

The New York State Department of Environmental Conservation is also responsible for wetland management within the state. Statutory authority for wetland regulations stems from the Tidal Wetlands Act and Freshwater Wetlands Act, part of the larger state Environmental Conservation Law. Wetlands and wetland regulations are divided into either tidal or freshwater, and wetlands are further classified within each category. State wetland inventories containing information on delineated areas and classifications are made available for public use as part of the state wetland mapping program. Activities within wetland areas are regulated through a permit system.

Tidal wetlands regulations are designed to allow uses of wetlands that are compatible with the preservation, protection, and enhancement of ecological values including flood protection and storm control. Development restrictions require that all buildings and structures in excess of 100 square feet be located a minimum of 75 feet landward from tidal wetland edges, with less stringent setbacks in place for buildings located within New York City. Similar setback requirements exist for impervious surfaces exceeding 500 square feet. On-site sewage systems must have a setback of at least 100 feet, and a minimum of two feet of soil must be between the bottom of a system and the seasonal high groundwater level.

Permit standards for activities within tidal wetlands require that any proposed activity be compatible with the overall state policy of preserving and protecting tidal wetlands, and as such any activity may

not cause any undue adverse impact on the ecological value of an affected wetland area or any adjoining areas. Standards also require that any activity within tidal wetlands be compatible with public health and welfare, be reasonable and necessary, and take into account both alternative actions and the necessity of water access or dependence for the proposed action. The state also publishes compatible use guidelines for activities within wetlands based on wetland type. If any activity is presumed to be incompatible with state tidal wetland use guidelines, an applicant must overcome the presumption of incompatible use and demonstrate that the activity is compatible with the preservation, protection, and enhancement of wetland values. If a use is specifically listed as incompatible within guidelines the use is then prohibited. Permitted activities in areas adjacent to tidal wetlands must also be compatible with public health and welfare, have no undue adverse impact on wetland ecological values, and comply with use guidelines.

## Building Codes

State flood-resistant construction requirements are listed in the International Residential Code as adopted by New York State. Regulations apply to new residential buildings and structures located fully or partially within flood hazard areas as well as any substantially improved or restored structures within flood hazard areas. Construction requirements are based on the design flood elevation, which at a minimum must be the higher of either the peak elevation of a 1% annual chance flood event or the elevation of the design flood event as adopted on community flood hazard maps. Structures within flood hazard areas must generally be designed and anchored to resist the flood forces associated with the design flood elevation, and methods and practices to minimize flood damage must also be employed.

For the purposes of determining appropriate structural elevations, the lowest floor of a structure is defined as the lowest floor of any enclosed area, including basements. Within flood hazard areas not subject to high-velocity wave action, structures must have the lowest floor elevated to two feet above the base flood elevation or design flood elevation, whichever is higher. Utility systems must also be elevated to this standard. If no depth number is specified structures must be elevated not less than three feet above the highest adjacent grade. Any enclosed area below the design flood elevation must be used only for building access, parking, or storage and must contain flood openings sufficient to equalize hydrostatic forces on exterior walls.

For buildings and structures located in coastal high-hazard areas, including both V zones and Coastal A zones, the lowest floor must be elevated so that the lowest horizontal structural members are elevated to either the base flood elevation plus two feet or the design flood elevation, whichever is higher. Any walls below the design flood elevation must be designed to break away without causing damage to the elevated portion of the building, and again may be used only for parking, building access, or storage. Structures must be elevated using adequately anchored pilings or columns, with select exceptions in Coastal A zones. The use of fill for structural support and any construction of basement floors below grade are prohibited. New buildings and any substantially improved structures in coastal high-hazard areas must be located landward of the mean high tide, and any alteration of sand dunes must not result in any increased potential for flood damage in surrounding areas.

## Community Planning

Planning at the state level is guided by the State Smart Growth Public Infrastructure Policy Act, an article within the larger Environmental Conservation Law. The act outlines criteria for public infrastructure

projects that are either approved, directly undertaken, or financed by state infrastructure agencies. Among these criteria is a requirement that future public infrastructure projects mitigate future climate risk due to sea level rise, storm surge, or flood events based on available data or predictions of future extreme weather conditions. This and other criteria must be met to a practicable extent, and if deemed impracticable an agency must provide a detailed statement of justification.

The Office of Planning, Development, and Community Infrastructure within the Department of State administers several programs involved in community planning. The New York Rising Community Reconstruction Program provides recovery and resiliency planning assistance to communities affected by severe storm events, including hurricanes Sandy and Irene. The program is operated through the Governor's Office of Storm Recovery and involves collaborations between state teams and community members to develop reconstruction plans and strategies to increase physical, economic, and social resilience, often including elements related to mitigating future flood risk. State Waterfront Revitalization Programs are also involved in community redevelopment planning. These programs establish land and water use policies and identify revitalization projects at a local level to allow for sustainable use of coastal resources, including planning for coastal flood risk resilience. Local Waterfront Revitalization Programs can also be a conduit for technical assistance and grant funding to facilitate climate change adaptation through the New York State Environmental Protection Fund grant program, a permanent fund addressing a broad range of environmental and community development needs.

### Stormwater and Runoff Management

The majority of stormwater regulations in New York focus on water quality issues as part of the State Pollutant Discharge Elimination System, a state program that has been approved by the EPA as part of the National Pollutant Discharge Elimination System. The program regulates point source discharges to both groundwater and surface waters and also conducts permitting for stormwater runoff from industrial activities, municipal sewer systems in urbanized areas, and construction activities. The program is administered by the state Department of Environmental Conservation.

While water quality is the focus of stormwater programs within the state, the state stormwater design manual lists best practices that include measures to reduce overbank flooding in order to maintain pre-development peak discharge rates for two and ten-year frequency storm events following development. The design manual also addresses risks due to potential floodplain expansion following development as well as green infrastructure strategies. These green infrastructure strategies are presented as a means to meet runoff reduction standards, which require that post-development conditions replicate pre-development hydrology. Stormwater projects, like all activities undertaken, funded, or approved by state agencies, are also under the purview of the State Environmental Quality Review Act, which requires preparation of an environmental impact statement if a project is likely to cause a significant increase in flood risk.

### Erosion Management

Coastal erosion in New York is managed within designated coastal erosion hazard areas. Areas are designated as per requirements of the state Coastal Erosion Hazard Areas Act, part of the larger state Environmental Conservation Law. Regulatory programs within identified hazard areas are administered by the state Department of Environmental Conservation. Programs may also be established at a local level if minimum state standards and criteria are met. The objectives of the program, as outlined in the state administrative code, are to ensure that activities in coastal areas subject to flooding minimize or

prevent damage to property and natural features, that structures are placed at a safe distance from hazard areas to prevent premature damage to both structures and natural features, that public investment likely to encourage development within erosion hazard areas is restricted, and that publicly financed structures are only used when necessary and effective. Sections of the state administrative code also describe the erosion protection functions of natural protective features in order to guide the review of permit applications.

Coastal erosion management permits are required for any regulated activity conducted within a designated coastal erosion hazard area. Coastal erosion management permit standards require that any proposed activity be reasonable and necessary, with consideration of proposed alternatives, and that an activity will not likely lead to a measurable increase in erosion at the proposed site or other locations. Standards also require activities to prevent or minimize adverse effects to natural protective features, existing erosion protection structures, or natural resources such as fish and wildlife habitat.

Regulations within structural hazard areas allow for placement of movable structures, with construction restrictions, if a permit has been granted. Construction or placement of nonmovable structures is prohibited. Any public utility systems within structural hazard areas also require a coastal erosion management permit. Additional restrictions on regulated activities are present within natural protective feature areas, including nearshore areas, beaches, bluffs, primary dunes, and secondary dunes. Construction of erosion protection structures is allowed within such areas provided the structure meets permitting requirements and is designed to prevent or minimize damage to property and natural features in a cost-effective manner. Structures must be designed to control erosion on site for a minimum of 30 years.

## Climate Adaptation Initiatives

New York has put forth several climate adaptation measures at the state level, led primarily by the state Department of Environmental Conservation. Sea-level rise projections for threatened coastal areas are currently published within the state administrative code, a recommendation from the previously convened NYS Sea Level Rise Task Force. The projections formally establish sea-level rise levels throughout Long Island, New York City, and the Hudson River, providing information based on five risk scenarios and extending out to 2100. The Department of Environmental Conservation has also formally acknowledged its role in climate change adaptation through Commissioner's Policy 49: Climate Change and DEC Action. The policy outlines methods by which climate change considerations may be integrated into current DEC activities and programs, including making greenhouse gas reductions a primary goal, creating specific mitigation objectives for existing and future programs, incorporating adaptation strategies into programs and activities, considering climate change implications in daily department activities, and identifying specific actions to further climate change goals and objectives as part of annual planning processes. The policy goes on to establish mitigation and adaptation objectives as well as departmental responsibilities and implementation procedures.

The 2014 Community Risk and Resiliency Act (CRRRA) forms the basis for a number of climate adaptation initiatives within New York from a legislative standpoint. The previously mentioned sea-level rise projections were a product of the CRRRA, as the act amended the state Environmental Conservation Law to include a requirement that the DEC adopt science-based projections. The CRRRA also amended additional sections of the Environmental Conservation Law to require applicants for identified funding and permitting programs to demonstrate that risk due to sea-level rise, storm surge, and flooding have been considered in project design and requires the DEC to incorporate similar considerations into

facility-siting regulations. The sea-level rise, storm surge, and flood risk mitigation components of the Smart Growth Public Infrastructure Policy Act are also tied to the CRRRA. The CRRRA also directs the Department of State and Department of Conservation to develop model local laws that consider data-based future risk due to sea-level rise, storm surge, and flooding as well as guidance on the use of natural resources and natural processes to enhance community resilience to such hazards.

## Elements of Policy Goals/Management Principles

### State Management Capacity

- State management capacity is bolstered by the New York Coastal Management Program's federal consistency review process, which requires that federal activities within the state coastal zone be consistent with the program's enforceable policies. The New York program has 44 enforceable policies in total, with 7 specifically addressing flood and erosion hazards.
- Local governments can implement the state Coastal Management Program at a smaller scale through the Local Waterfront Revitalization Program, extending the influence of state program goals and enforceable policies.

### Alternatives to Structural Mitigation

- The enforceable policies of the state coastal management program address the protection of natural features that mitigate coastal flood risk and the use of non-structural mitigation measures where feasible.
- Shoreline setbacks must be established within identified coastal erosion hazard areas, and setbacks must be at a distance sufficient to minimize damage from erosion considering the rate of recession of coastal lands.
- Floodplain management regulations require that any new development or substantial improvement to structures in coastal areas not affect sand dunes in any way that might increase potential flood damages.
- Wetland management regulations require that structures be located a minimum of 75 feet landward from the edges of tidal wetlands, preserving natural flood risk mitigation functions.
- Sections of the state administrative code related to erosion management include descriptions of the erosion protection functions of natural features to guide permit applications, and permit standards require that erosion management activities prevent or minimize adverse impacts on natural protective features.
- The state stormwater management design manual includes information on green infrastructure strategies, which are presented as a means to meet runoff reduction standards and maintain pre-development hydrology for project areas.

### Long-term Planning

- The state building code requires structures not subject to wave action to have the lowest floor elevated a minimum of one foot above the base flood elevation. This rule applies to the lowest horizontal structural members of structures that are subject to wave action.

- State regulations require that erosion protection structures in coastal areas be designed to control erosion on site for a minimum of 30 years.
- Public infrastructure projects approved, undertaken, or financed by state agencies must account for and mitigate risk due to future climate risk factors such as sea-level rise, storm surge, and flood events. Mitigation efforts must be based on available data as well as projections of future conditions.
- The state has published sea-level rise projections for threatened coastal areas within the state administrative code, formally establishing risk based on five scenarios and extending to 2100.
- Commissioner’s Policy 49: Climate Change and DEC Action identifies ways that climate change considerations could be incorporated into current state programs and activities and defines departmental responsibilities and procedures for implementing the climate adaptation goals of the policy.
- The state Community Risk and Resiliency Act formally establishes a number of climate adaptation initiatives within the state, including the requirement that the state Department of Environmental Conservation adopt science-based sea-level rise projections and that applicants to funding and permitting programs demonstrate that climate risk has been incorporated into the siting of facilities.

### Balance of Mitigation and Disaster Recovery

- The enforceable policies of the state coastal management program address the siting of buildings in coastal areas to reduce risk and well as restrictions on the use of public funds for erosion protection structures.
- One of the objectives of the state erosion management program as described in the state administrative code is to restrict public investment that could encourage development within coastal erosion hazard areas. An additional objective is to use publicly financed erosion control structures only when necessary and effective.
- The New York Rising Community Reconstruction program works to develop reconstruction plans and strategies to increase coastal community resilience following severe storm events, often involving the mitigation of future flood risk.

### Holistic Management Approach

- The New York Coastal Management Program lists coordination of major activities affecting coastal resources as one of the program goals, and multiple state agencies are involved in implementing the program’s broad suite of enforceable policies.
- If an action requires preparation of an environmental impact statement as part of the State Environmental Quality Review Program it must also be consistent with the enforceable policies of the state coastal program, including policies related to coastal hazards.
- State wetland regulations are based on the preservation, protection, and enhancement of ecological values as opposed to acreage, with flood control and storm protection listed among the functions provided.

- The State Environmental Quality Review Program includes the potential for a substantial increase in flooding as a criteria of significance, which then triggers the preparation on an environmental impact statement for state agency activities.
  - State Waterfront Revitalization Programs establish land and water use policies that incorporate coastal resilience into revitalization projects and community redevelopment planning.
- 

## Washington

### Policies and Programs

#### Coastal Management Program

The Washington Coastal Management Program is operated through the Shorelands and Environmental Assistance Program, a part of the state Department of Ecology. The state coastal zone consists of all lands and waters in the 15 counties with marine shorelines, extending three nautical miles seaward. Activities outside these counties that may have an impact on coastal resources may also be considered part of the coastal zone, though most activities and development projects undertaken outside of coastal counties are presumed to have little to no impact on coastal areas. Unlike other coastal programs, Washington's coastal zone management program is not a stand-alone program. No new legislation was drafted as the foundation of the program, as the state instead relies on existing regulatory frameworks in an effort to address coastal zone issues in a more comprehensive and locally relevant manner.

The state coastal zone management program works within existing state laws and programs to address management priorities, including protecting and restoring coastal wetlands, preventing or reducing threats from coastal hazards, increasing opportunities for public access, forming partnerships to manage impacts of growth and development, and planning for the use of ocean resources. Like other coastal programs, the Washington Coastal Management Program coordinates government activities through federal consistency review, which allows local governments, tribes, and state agencies to review activities undertaken, approved, or funded by a federal agency if an activity is likely to affect coastal resources. Consistency reviews are based on identified state enforceable policies. Six state laws make up the enforceable policies within Washington: the Shoreline Management Act, the State Environmental Policy Act, the Clean Water Act, the Water Pollution Control Act, the Energy Facility Site Evaluation Council, and the Ocean Resource Management Act. This broad suite of enforceable policies reflects the program's comprehensive approach and integration within much of the existing state regulatory framework.

#### Shoreline Regulations

Coastal zoning and shoreline management programs also fall under the purview of the state Department of Ecology's Shorelands and Environmental Assistance Program. The state Shoreline Management Act forms the legislative basis for shoreline management regulations. The primary goal of the act, originally adopted in 1972, is to allow for coordinated development and use of state shorelines and coastal resources. The act applies to all shorelines within the state, including marine waters, streams and rivers with more than 20 cubic feet per second mean annual flow, lakes with an area of 20 acres or more, shorelands extending 200 feet landward from any such waters, wetlands associated with any such waters, river deltas associated with any such waters, and areas of the 100-year floodplain associated

with any such waters. The act additionally defines shorelines of statewide significance, which include the Pacific Coast and areas of Puget Sound.

The Shoreline Management Act is centered on shoreline use, environmental protection, and public access. In terms of shoreline use, the act establishes preferred uses for shoreline areas such as those that control pollution, prevent damage to the natural environment, or are dependent upon state shorelines. Such uses may include residential structures, shoreline recreation, or other “water-oriented” uses. Preferred uses are more tightly defined within shorelines of statewide significance, prioritizing the protection of statewide interests, preservation of natural character, maintenance of long-term ecological benefits, and protection of coastal resources and ecology. The environmental protection provisions of the act prioritize the protection of vegetation and wildlife in state waters against adverse effects from shoreline activities. The act requires all permitted shoreline uses to mitigate adverse environmental impacts and preserve natural character and aesthetics to the maximum practicable extent. In terms of public access, the act requires shoreline planning activities to include elements related to publicly owned area access as well as recreational elements to foster expansion of recreational opportunities.

The provisions of the Shoreline Management Act are implemented through Shoreline Master Programs. Shoreline Master Programs must be prepared within each city and county that includes a state shoreline as defined in the Shoreline Management Act. Programs are based on state laws but must also be tailored to the specific environmental and economic needs of the community, including elements related to shoreline-specific comprehensive planning, zoning ordinances, and development permitting. Once a Shoreline Master Program has been approved, towns, cities, and counties become the primary shoreline activity regulators, with the state Department of Ecology providing support through grants and technical assistance. Select permit types are also subject to state review, and any local amendment to a master program to account for changing conditions, information, or approaches must also undergo review to ensure compliance with the Shoreline Management Act and Shoreline Master Program Guidelines as published in the State Administrative Code. While communities are given flexibility in designing a master program, the program guidelines establish general provisions related to historic resources, critical areas, flood hazard reduction, public access, vegetation conservation, water quality, shoreline modifications, and shoreline uses.

## Floodplain Management

The Washington Department of Ecology serves as the lead state agency for floodplain management activities, acting as the state coordinating agency for the National Flood Insurance Program. The department also oversees state floodplain management assistance programs such as the Flood Control Assistance Account Program and the Floodplains by Design program, a public-private partnership that implements floodplain management activities at the local level. While the Department of Ecology has adopted minimum state standards for regulating development within special flood hazard areas, state legislation provides discretionary authority in county governments to form comprehensive flood control management plans, which include elements related to designation of high-risk areas, establishment of protection measures, creation of regulations on land use within floodplains, and restriction of development that may exacerbate flood damage. Floodplain management provisions for shoreline areas are also included in the Shoreline Master Program guidelines.

State floodplain management criteria for land management and use in Washington match the minimum National Flood Insurance Program standards and definitions, and the minimum regulatory area for these

regulations includes any areas subject to the base 1% annual chance flood as published on FEMA maps. Floodway areas are also subject to additional state requirements beyond NFIP minimum standards. Construction or reconstruction of residential structures is prohibited within a flood hazard area containing a designated floodway except for repairs that do not increase the ground floor area or exceed 50% of the market value of the structure. For areas without floodways, communities may require applicants to use any best available information to consider effects of development and determine that development activities will not result in a base flood increase of more than one foot.

State Shoreline Master Programs also contain provisions on flood hazard reduction. These provisions apply to any actions taken to reduce flood hazards as well as land use, development, and shoreline modifications which may increase flood hazards in coastal areas. Shoreline Master Program principles for flood hazard reduction direct communities to give preference to nonstructural flood hazard reduction measures over structural measures where feasible, base flood hazard reduction provisions on existing community comprehensive planning efforts, integrate flood hazard reduction with other efforts such as stormwater management and critical area ordinances, prevent loss of ecological functions, recognize flooding as an essential natural process, and consider relocation of structures as a flood control measure. Program standards require that development within floodplains not significantly or cumulatively increase flood hazards and restrict new development or shoreline uses that would require structural flood hazard reduction measures in the foreseeable future. In order for new structural flood hazard reduction measures to be approved, program standards require scientific and engineering analyses to demonstrate that such measures are necessary to protect existing development, that any ecological impacts can be mitigated successfully, and that shoreline vegetation is conserved. Program standards additionally require new structural flood hazard reduction measures to be located landward of any associated wetlands and vegetation conservation areas unless actions increase ecological functions.

## Wetland Management

The Washington state Shoreline Management Act and Water Pollution Control Act provide the legislative authority for wetland regulations in the state. Multiple state Department of Ecology programs as well as the environmental permitting process associated with the State Environmental Policy Act play a role in implementing state wetland regulations. The Department of Ecology also administers the state's Clean Water Act Section 401 program, which works to preserve water quality throughout waters of the U.S., including wetlands. The role of the department is generally that of application review for proposed projects that may have a potential impact to wetlands or other waters of the state. If a proposed project is likely to affect wetland resources, an applicant must go through a sequence of mitigation actions to minimize impacts, after which a determination is made regarding permit requirements and the need for any additional compensatory mitigation. The department also provides assistance to local governments in developing comprehensive plan policies and development regulations, including wetland management and conservation measures.

While the state does set certain standards and provides guidance with regard to wetland management, local governments play a key role in wetland protection and regulation. The state Growth Management Act authorizes and requires counties and municipalities to implement wetland regulations, which often take the form of a critical areas ordinance. The Department of Ecology publishes a guidance document to assist jurisdictions in creating critical area ordinances. A recent guidance update recommends the use of best available science in formulating wetland protection measures, contains information on using wetlands as stormwater management facilities, and outlines mitigation practices. Shoreline Master

Program guidance also includes information on wetland protection in critical areas. As per guidance documents, wetland regulations must be designed to achieve no net loss of wetland area and function through restriction of uses such as excavation, dumping, draining, flooding, construction, and vegetation removal. Programs must also contain sufficient buffer areas to protect and maintain wetland functions in the long term.

Local wetland regulations must also comply with state mitigation requirements, specifically mitigation sequencing. Following an avoid-buffer-compensate approach, mitigation actions are required to follow a designated order: avoid impacts, minimize impacts, rectify any impacts, reduce impacts over time, compensate for an impact, and finally monitor impacts and compensation efforts over time. As compensatory mitigation is the last available strategy in the mitigation sequence, it may only be employed if higher priority means are shown to not be feasible. Mitigation options for projects affecting wetlands within the state include wetland mitigation banking, in-lieu fee mitigation, off-site mitigation, and advance mitigation.

## Building Codes

Building codes in Washington primarily consist of nationally published codes that are then adopted by reference and amended at the state level as needed. Select codes, such as the Washington State Energy Code, are state-written and state-specific, but such codes do not involve regulations related to coastal flood-risk management. Washington, like other states, has adopted the International Building Code and the International Residential Code as the basis for regulating construction. City or county governments may amend building state building codes, but amendments must not result in a code that is less restrictive than state minimum performance standards.

Washington has adopted the flood-resistant construction provisions of the International Residential Code without amendment. These provisions apply to residential structures constructed within designated flood hazard areas, including A zones, Coastal A zones, and V zones. The code provides guidance on construction methods and practices to minimize flood damage such as establishment of a design flood elevation, lowest floor elevations, and protection of utility systems. The flood-resistant construction provisions require lowest floor elevations to be at or above the base flood elevation plus 1 foot within flood hazard areas or A zones, and any enclosed area below the design flood elevation may only be used for parking, access, or storage. Enclosed areas below the design flood elevation must also contain flood openings constructed in accordance with code criteria.

Additional requirements apply within coastal high-hazard areas, or Coastal A and V zones. New construction or substantial improvement of structures in these areas must be located landward of the mean high tide line, and any alterations of sand dunes or mangrove stands requires submission of an engineering analysis. The bottom of the lowest structural horizontal members supporting the lowest flood must be elevated to or above the base flood elevation plus 1 foot. Below grade basement floors and well as the use of fill for structural support are prohibited, and any walls below the design flood elevation must either be latticed or designed to break away under flood loads without causing additional structural damage.

## Community Planning

The state Growth Management Act primarily governs planning with regards to floodplains and coastal areas in Washington. The act was initially created to address concerns over uncoordinated and unplanned community growth as well as as a lack of formal goals representing public interest in

conservation and wise use of natural resources. The act also expresses the need for citizens, communities, local governments, and the private sector to cooperate and coordinate as part of the comprehensive land use planning process. Specific planning goals identified within the act include reduction of urban sprawl, conservation of open space, protection of the environment, and enhancement of state natural resources.

Criteria for adopting comprehensive plans and development regulations in accordance with the Growth Management Act are published within Washington's administrative code. All comprehensive plans are required to have a land use element that includes a review of drainage, flooding, and stormwater runoff in the area covered by the plan and nearby areas. Comprehensive plans may also include optional elements related to environmental conservation, protection of critical environmental areas such as wetlands, and natural hazard reduction. While these elements are optional state guidance recommends that cities and counties give strong consideration to their inclusion in planning efforts.

Regulations require city and county development plans to designate critical areas and adopt measures to protect such areas, which include both wetlands and frequently flooded areas. Protection is defined within the administrative code as preservation of natural functions and values or protection from hazards to public health and safety. Planning criteria also include requirements related to consistency and coordination both within and between jurisdictions as well as integration of planning activities with other legislation such as the state Shoreline Management Act. Regulations also require the use of best available science when developing policies and development regulations, with specific criteria published for determining what constitutes best available science, obtaining best available scientific information, and including best available science in decision-making.

## Stormwater and Runoff Management

The Washington Department of Ecology oversees stormwater and runoff management activities within the state. Permits are required for construction, industrial activities, boatyards, activities involving sand and gravel, and Department of Transportation projects. The Department of Ecology publishes a Stormwater Management Manual for Western Washington, which provides guidance on stormwater management projects within the region. The manual by itself is not a legally enforceable document, but several permit types require the use of practices listed within the manual.

The Stormwater Management Manual for Western Washington provides extensive guidance on stormwater management practices, including flow control best management practices and minimum management requirements related to preservation of natural drainage, wetlands protection, and flow control for new development or redevelopment. The guidance document as a whole is geared towards water quality issues, but several sections such as those listed above may also impact local flood risk. Guidance on best management practices for flood control includes information on maintaining a natural hydroperiod within wetlands by controlling input flows to maintain seasonal and short-term water elevation patterns. As part of minimum stormwater permit requirements, natural drainage patterns must be maintained and any discharges from project sites must occur at the natural location to the maximum extent practicable. Any adverse downstream impacts are not permitted, and outfalls require energy dissipation. Additional runoff treatment and flow control threshold requirements are in place for projects in which stormwater discharges either directly or indirectly into wetlands, and stormwater treatment and flow control facilities may not be built within natural vegetative buffers except in select cases. Minimum flow control requirements are designed to ensure that the impacts of stormwater runoff from hard surfaces and land cover conversions are minimized.

## Erosion Management

The Washington Department of Ecology also manages erosion control activities along state shorelines. The state Shoreline Master Program guidelines contain specific recommendations and standards for shoreline modifications, and guidelines encourage local governments to distinguish between shoreline modifications and shoreline uses when forming a master program. The department also provides information on green shorelines projects to property owners, covering shoreline armoring, green shoreline activity types, design considerations, and green shoreline incentive programs.

The program guidelines establish several principles for all shoreline modifications. Master programs may only allow structural shoreline modifications if such a measure is demonstrated to be necessary to protect an existing structure or use from loss or substantial damage, and all modification projects must seek to reduce any adverse impacts and minimize the number and extent of modifications. Shoreline modifications must also be appropriate for the specific shoreline type and environmental conditions in order to prevent net loss of ecological functions. Modifications with lower impacts to ecological functions are preferred, and any unavoidable impacts must be offset through mitigation, following the established state mitigation sequence. Principles also require shoreline modifications to be based on scientific and technical information where possible. When shoreline modification is necessary to control erosion, localities must plan for the enhancement of any impaired ecological functions and incorporate all feasible measures to protect both shoreline ecological functions and ecosystem wide processes.

Master program guidelines also contain provisions for specific shoreline modification projects including shoreline stabilization, beach and dune management, and habitat enhancement. Program guidance on shoreline stabilization establishes that shorelines are inherently unstable and that erosion and accretion are natural processes linked to ecological functions. Guidelines also identify a number of adverse impacts of shoreline hardening and acknowledge the potential for hard structures along shorelines to fail. Several standards for shoreline stabilization projects are also listed to minimize individual and cumulative net loss of ecological functions. To comply with standards, shoreline master programs must contain measures to consider and avoid the need for shoreline stabilization when siting new development, allow for the use of structural stabilization measures only under certain conditions, and limit the size of stabilization measures when deemed necessary.

Beach and dune management guidance directs localities to develop coastal development setbacks to prevent adverse impacts to dune systems. Per guidelines, coastal dune modification may only be permitted if projects are consistent with state and federal flood protection standards and do not result in a net loss of shoreline ecological functions or significant adverse impacts to coastal resources. Guidelines also encourage the inclusion of habitat enhancement provisions in shoreline master programs to address restoration needs and priorities, provided that enhancement projects are designed to restore the natural character and ecological functions of shorelines.

## Climate Adaptation Initiatives

Climate adaptation at the state level in Washington was formally initiated by the Washington State Agency Climate Leadership bill, first signed into law in 2009. The bill required multiple state agencies, including the state departments of ecology, agriculture, economic development, fish and wildlife, natural resources, and transportation, to develop integrated climate change response strategies. Resulting climate change response strategies must identify both barriers to action and opportunities to incorporate climate change impact projections into future planning and decision making. The end result

of the bill was the publication of a comprehensive state level strategy entitled “Preparing for a Changing Climate: Washington State’s Integrated Response Strategy”.

Washington’s integrated climate response strategy includes an overview of observed trends and future conditions projections as well as descriptions of specific issues related to oceans and coastlines. The strategy document identifies major threats posed by climate change, including sea level rise, flood damage to coastal communities, increases in coastal erosion, and loss of coastal habitat. To address these concerns, the strategy includes broad principles for response as well as more specific strategies and actions to be taken. Overarching principles include limiting new development in vulnerable areas, employing alternatives to hard shoreline armoring, accommodating rising sea levels through engineering and construction practices, managing retreat from vulnerable coastal sites, restoring and maintaining natural coastal systems, and enhancing research efforts. Five strategies expand on these principles, each with several action items to support coastal climate change response within the state.

The Shoreline Master Program Handbook also contains an appendix that addresses the incorporation of sea level rise into local programs. Handbook guidance includes regional sea level rise projections under multiple scenarios as well as a summary of potential environmental impacts in coastal areas. The handbook outlines specific actions local governments can take at multiple stages of the shoreline master program planning process to address future risk, from shoreline jurisdiction determinations through shoreline inventories, development of regulations, environment designations, shoreline modifications policies, and restoration planning. Program guidance also encourages governments to take sea level rise into account when selecting indicators to be used for net loss of ecological function determinations, which are applicable to all planning phases. The handbook appendix also lists examples of climate change preparation measures within existing shoreline master programs.

## Elements of Policy Goals/Management Principles

### State Management Capacity

- The coastal zone under the jurisdiction of the Washington Coastal Management Program includes all lands and waters in the 15 counties that have marine shorelines and has flexibility to include activities outside these counties that may impact coastal resources.
- The state coastal management program conducts federal consistency reviews to ensure that federal activities do not conflict with the enforceable policies of the program, which consist of a broad range of existing major state environmental legislation.

### Alternatives to Structural Mitigation

- The environmental protection provisions of the state Shoreline Management Act prioritize protection of native vegetation within coastal areas.
- The flood hazard reduction principles of the state Shoreline Master Program direct communities to favor nonstructural flood hazard reductions measures over structural measures where possible.
- State Shoreline Master Program standards for new structural flood hazard reduction measures require analyses to demonstrate that such measures are necessary to protect existing development and that existing shoreline vegetation is conserved.

- Wetland management provisions of Shoreline Master Programs require that programs include sufficient buffer areas surrounding coastal wetlands to protect long-term ecological functions such as flood control and stormwater management.
- Stormwater guidance includes information on maintaining a natural hydroperiod within wetlands as a best management practice in order to preserve ecological functions.
- Local Shoreline Master Programs may only allow structural shoreline modification if it is necessary to protect an existing structure or use from loss or substantial damage, and localities are required to plan for the enhancement of any impaired ecological functions. Programs must also avoid the need for shoreline stabilization measures when siting new development in coastal areas.
- Principles listed within Washington’s integrated climate response strategy include employing alternatives to hard shoreline armoring projects.

### Long-term Planning

- Flood-resistant construction provisions in the state building code require the lowest floor of structures in flood hazard areas to be elevated to the base flood elevation plus one foot. The lowest horizontal structural members must be elevated to the same level in coastal A or V zones.
- The state Growth Management Act requires the use of best available science when developing city and county comprehensive plans and development regulations. Criteria for determining what constitutes best available science, how to obtain such information, and how to use the information in decision-making is available within the state administrative code.
- The Washington State Agency Climate Leadership bill represents the state’s formal climate adaptation initiative, requiring state agencies to develop integrated climate change response strategies that identify barriers to action and opportunities to incorporate climate change impact projections into future planning. An integrated climate response strategy was also developed at the state level.
- The state Shoreline Master Program Handbook contains an appendix that provides guidance on incorporating sea-level rise into local programs, including regional sea-level rise projections under multiple scenarios and a summary of potential coastal impacts.

### Balance of Mitigation and Disaster Recovery

- The state Shoreline Management Act requires all permitted shoreline uses to mitigate adverse environmental impacts and preserve the natural character of coastal areas to the maximum practicable extent.
- State Shoreline Master Program principles for flood hazard reduction include the consideration of structure relocation as a flood control measure.
- State mitigation requirements for environmental projects include a designated sequence of mitigation steps that gives preference to avoiding or minimizing impacts over compensation.
- State guidance on beach and dune management for erosion control directs localities to develop coastal development setbacks to prevent adverse impacts to coastal dune systems and maintain current ecological functions.

- The principles of Washington’s integrated climate response strategy include managing retreat from vulnerable coastal sites, with specific strategies and recommended actions included to advance managed retreat efforts.

## Holistic Management Approach

- In an effort to address coastal issues in a comprehensive and locally relevant manner, the state coastal management program is implemented through the existing state regulatory framework, and the enforceable policies consist of major state environmental laws rather than new legislation.
- The state coastal management program lists forming partnerships to manage the impacts of growth and development in coastal areas as one of the program’s priorities.
- The state goal of the state Shoreline Management Act is to allow for coordinated development and use of state shorelines and coastal resources, formally establishing the need for cooperation in the management of coastal areas.
- Flexibility is built into shoreline management activities as towns, cities, and counties become the primary shoreline activity regulators after a Shoreline Master Program is adopted.
- The flood hazard reduction principles within state Shoreline Master Programs include integrating flood hazards reduction efforts with other efforts such as stormwater management and critical area ordinances.
- The state Growth Management Act is designed to address issues with uncoordinated and unplanned community growth, and state planning criteria require coordination within and between jurisdictions as well as integration of planning efforts with existing legislation such as the Shoreline Management Act.
- Shoreline Master Program guidance on shoreline stabilization establishes that shorelines are inherently unstable and that erosion is a natural process linked to ecological functions, encouraging compatible use within coastal areas.

---

# Holistic Coastal Flood Risk Management Objectives, Strategies, and Actions

---

## Introduction

This section of the report contains a set of objectives, strategies, and actions in support of a holistic, adaptive approach to floodplain management, meant to provide a framework for future coastal flood risk policy and management program development. These objectives, strategies, and actions are consistent with the management principles described in the Introduction section of this report.

---

## 1. Increase state coastal flood risk management capacity

1.1. **Objective** Increase and enhance federal financial and technical assistance programs

1.1.1. **Strategy** Further progress towards centralized, easily distributed risk information

1.1.1.1. **Action** Provide sufficient funding to update and digitize existing NFIP FIRMs and expand map coverage

1.1.1.2. **Action** Support and develop initiatives that provide flood risk visualization tools and data on a national level

1.1.2. **Strategy** Structure assistance programs in a manner that augments state management capacity without diminishing state responsibilities

1.1.2.1. **Action** Ensure that federal assistance programs do not infringe upon operation and maintenance responsibilities for state water resource infrastructure projects

1.1.2.2. **Action** Increase investment in flood risk planning, training, and education assistance provided to states to prevent future dependence on federal disaster recovery programs

1.1.3. **Strategy** Allow for flexibility in the use of assistance at the state level

1.1.3.1. **Action** Incorporate a broad range of management activities that qualify under flood risk assistance programs

1.1.3.2. **Action** Reduce administrative barriers to state and local use of federal financial assistance through mechanisms such as revolving funds or pass-through grant programs

- 1.2. **Objective** Improve coordination mechanisms between coastal states and federal agencies
  - 1.2.1. **Strategy** Emphasize partnerships between federal and state entities in coastal flood risk management projects
    - 1.2.1.1. **Action** Develop and enhance initiatives that assist state and local entities in taking advantage of existing federal assistance opportunities
  - 1.2.2. **Strategy** Prevent federal actions from undermining existing state regulations
    - 1.2.2.1. **Action** Include provisions in federal programs that require any federal actions taken to be consistent with current coastal flood risk management regulations at the state level

---
- 1.3. **Objective** Address funding challenges for long-term flood risk planning and mitigation
  - 1.3.1. **Strategy** Develop additional consistent, long-term funding mechanisms for state management programs involved in coastal flood risk management.
    - 1.3.1.1. **Action** Establish congressional funding mechanisms that account for timelines necessary for long-term planning and mitigation efforts
    - 1.3.1.2. **Action** Reduce inconsistencies in annual funding of risk mitigation programs that can hinder planning efforts

---
- 1.4. **Objective** Create incentives for state coastal flood risk management growth at federal level
  - 1.4.1. **Strategy** Incentivize initial establishment of flood risk management practices
    - 1.4.1.1. **Action** Encourage growth of flood risk management practices by incorporating NFIP participation as a requirement for a broad range of assistance programs in threatened areas
  - 1.4.2. **Strategy** Incentivize adoption of standards beyond NFIP minimums
    - 1.4.2.1. **Action** Reduce barriers to entry for the Community Rating System and increase assistance efforts designed to guide communities through the application process

---
- 1.5. **Objective** Develop and enhance existing state coastal flood risk management capabilities
  - 1.5.1. **Strategy** Expand areas under jurisdiction of CZM programs to encompass complete influence of land use on coastal areas

- 1.5.1.1. **Action** Ensure that formal definitions of the coastal zone incorporate upland areas as appropriate and are sufficiently flexible to address changes in land use outside existing program jurisdiction
  - 1.5.2. **Strategy** Broaden CZM enforceable policies to incorporate full spectrum of actions that can influence coastal hazards
    - 1.5.2.1. **Action** Include enforceable policies that specifically address coastal hazards as well as policies that are broad enough to encompass a variety of federal actions in coastal areas
  - 1.5.3. **Strategy** Provide mechanisms for local implementation of CZM program goals and strategies
    - 1.5.3.1. **Action** Develop and enhance state grant programs that incorporate management principles of state CZM programs into projects at the local scale
    - 1.5.3.2. **Action** Explore implementation of local programs that accept coastal management responsibilities at a smaller scale with oversight from state CZM programs
  - 1.5.4. **Strategy** Reduce reliance on federal standards and methodology
    - 1.5.4.1. **Action** Develop and enhance state-specific methodology and performance standards for actions in coastal areas
- 

## 2. Develop alternatives to structural coastal flood risk mitigation measures

- 2.1. **Objective** Reduce barriers to the implementation of non-structural coastal flood risk mitigation measures
  - 2.1.1. **Strategy** Improve permitting processes for non-structural mitigation approaches
    - 2.1.1.1. **Action** Ensure that a broad range of non-structural flood risk mitigation measures qualify as eligible activities under state and federal mitigation assistance programs
    - 2.1.1.2. **Action** Incorporate flexibility into administrative rules related to green infrastructure and non-structural flood risk mitigation strategies
    - 2.1.1.3. **Action** Incorporate metrics of natural and beneficial functions into wetland and coastal area mitigation standards and criteria
    - 2.1.1.4. **Action** Streamline the use of ecological services in traditional benefit-cost analyses when evaluating flood risk mitigation options

- 2.1.1.5. **Action** Ensure that state CZM programs include enforceable policies that address green infrastructure and non-structural flood risk mitigation
- 2.1.2. **Strategy** Develop and enhance assistance programs related to non-structural flood risk mitigation and green infrastructure
  - 2.1.2.1. **Action** Promote non-structural flood risk mitigation within assistance program guidance documents
  - 2.1.2.2. **Action** Enhance aspects of technical assistance programs that address non-structural flood risk management project implementation
  - 2.1.2.3. **Action** Increase financial support for non-structural flood risk mitigation through grant programs and the use of financial incentives within assistance programs

---
- 2.2. **Objective** Increase the use of coastal area habitat preservation and restoration as a coastal flood risk mitigation measure
  - 2.2.1. **Strategy** Formally recognize the flood risk mitigation benefits of coastal habitat preservation and restoration
    - 2.2.1.1. **Action** Allow coastal area easement purchases to qualify as a flood risk mitigation measure under technical and financial assistance programs
    - 2.2.1.2. **Action** Include the protection of coastal area natural and beneficial functions as a standard component of water resource infrastructure management
    - 2.2.1.3. **Action** Include coastal area preservation and restoration measures within published best-management practices for floodplain, stormwater, and erosion management
    - 2.2.1.4. **Action** Provide information on the protective functions of natural features within rules and regulations documents to guide permitting practices
  - 2.2.2. **Strategy** Fully leverage the numerous federal and state programs that contain coastal restoration components
    - 2.2.2.1. **Action** Provide information on non-structural flood risk mitigation practices across all programs that may influence coastal flood risk
    - 2.2.2.2. **Action** Coordinate coastal and riverine vegetation conservation activities across multiple federal and state programs

---
- 2.3. **Objective** Reduce shoreline hardening in coastal areas

- 2.3.1. **Strategy** Establish non-structural solutions and green infrastructure as a first choice for coastal flood risk mitigation
    - 2.3.1.1. **Action** Implement rules and regulations that require the use of green infrastructure where practicable, considering a built solution only after non-structural options have been evaluated
    - 2.3.1.2. **Action** Implement restrictions on the use of coastal armoring within ecologically valuable coastal areas and require sufficient mitigation efforts to offset the impacts of such projects
    - 2.3.1.3. **Action** Incorporate non-structural coastal flood risk mitigation strategies in long-term climate adaptation plans
  - 2.3.2. **Strategy** Prioritize protection of native vegetation
    - 2.3.2.1. **Action** Incorporate shoreline setbacks and additional construction and siting criteria for activities within sensitive coastal environments
    - 2.3.2.2. **Action** Restrict shoreline uses to those which depend upon close proximity to water and coastal environments using comprehensive evaluations
- 

### 3. Develop and enhance long-term coastal flood risk planning and adaptation

- 3.1. **Objective** Expand coastal flood risk management planning horizons
    - 3.1.1. **Strategy** Incentivize long-term planning efforts
      - 3.1.1.1. **Action** Incorporate long-term planning efforts into technical assistance programs with specific guidance on implementing future risk projections
      - 3.1.1.2. **Action** Enhance financial incentives for long-term flood risk planning at the state and local level through FEMA's Community Rating System and similar programs
    - 3.1.2. **Strategy** Develop sustainable funding mechanisms for long-term adaptation efforts
      - 3.1.2.1. **Action** Ensure that long-term risk planning efforts funded through congressional appropriations are consistently supported through project implementation
      - 3.1.2.2. **Action** Enhance support of activities that permanently reduce coastal flood risk such as easement purchases in highly vulnerable areas
-

- 3.2. **Objective** Integrate projected future conditions and risk factors into coastal flood risk management policies and programs
    - 3.2.1. **Strategy** Standardize future risk adaptation approaches
      - 3.2.1.1. **Action** Increase availability of future risk information through widely used planning products such as NFIP FIRMs
      - 3.2.1.2. **Action** Address future conditions and changes in flood risk in broad-reaching efforts such as permitting programs and planning criteria
      - 3.2.1.3. **Action** Develop and publish future risk projections and scenarios at state, regional, and local levels
      - 3.2.1.4. **Action** Develop procedures and guidelines for obtaining and incorporating best-available science on future conditions into coastal flood risk adaptation efforts
      - 3.2.1.5. **Action** Formally acknowledge flood risks due to changing conditions in official documentation such as hazard mitigation plans
    - 3.2.2. **Strategy** Develop and enhance state and local future coastal flood risk adaptation efforts
      - 3.2.2.1. **Action** Develop state and regional adaptation initiatives that address specific risks and contain implementation strategies for coastal areas
      - 3.2.2.2. **Action** Further incorporate freeboard and shoreline setbacks beyond federal minimums into coastal flood risk management regulations
      - 3.2.2.3. **Action** Adopt legislation related to future flood risk adaptation with formally defined departmental responsibilities and implementation procedures
- 

## 4. Balance investment in disaster recovery and flood risk mitigation

- 4.1. **Objective** Reduce reliance on disaster recovery programs to address coastal flood events
  - 4.1.1. **Strategy** Address subsidies that mask the true cost of development in high-hazard coastal areas
    - 4.1.1.1. **Action** Move NFIP rates towards full risk rates in high-hazard coastal areas
    - 4.1.1.2. **Action** Expand NFIP coverage in areas not currently within mapped floodplains where risk of flooding is still present

- 4.1.1.3. **Action** Factor the residual risk of dam structures into flood insurance purchase requirements and rates
- 4.1.2. **Strategy** Limit public infrastructure investments in high-hazard coastal areas
  - 4.1.2.1. **Action** Consider future risks due to changing conditions in coastal areas when determining infrastructure locations
  - 4.1.2.2. **Action** Consider potential future development incentives in high-hazard coastal areas that may be influenced by infrastructure investments
  - 4.1.2.3. **Action** Develop enforceable policies within state CZM programs that limit public expenditures on infrastructure in high-hazard coastal areas

---
- 4.2. **Objective** Foster proactive mitigation practices in coastal areas
  - 4.2.1. **Strategy** Incentivize mitigation that avoids repeat future flood losses in high-hazard coastal areas
    - 4.2.1.1. **Action** Implement favorable cost-share adjustments within mitigation programs for applicants that have experienced multiple previous losses
    - 4.2.1.2. **Action** Develop and enhance robust land-acquisition programs targeting high-hazard coastal areas
    - 4.2.1.3. **Action** Develop formal guidance at the state and local level related to managed retreat from vulnerable coastal areas
    - 4.2.1.4. **Action** Include structure relocation as a flood hazard reduction measure within flood risk management legislation and guidance
  - 4.2.2. **Strategy** Encourage avoided impacts over compensatory mitigation practices in coastal areas
    - 4.2.2.1. **Action** Adopt mitigation sequences that give preference to avoiding or minimizing impacts to coastal ecosystems
    - 4.2.2.2. **Action** Include formal goals related to preserving the natural character of coastal ecosystems within flood risk management legislation and program guidance
    - 4.2.2.3. **Action** Develop mitigation performance standards and criteria based on impacts to ecological functions

---

## 5. Adopt a more holistic approach to coastal flood risk management

- 5.1. **Objective** Improve coordination of flood risk management efforts at multiple levels of government
  - 5.1.1. **Strategy** Develop and enhance mechanisms for cooperation in flood risk management between local, state, and federal agencies
    - 5.1.1.1. **Action** Build collaborative management platforms into flood risk management programs through formal councils, work groups, or partnerships dedicated to coordinated management of coastal areas
    - 5.1.1.2. **Action** Include intergovernmental coordination as a formal goal within policies and programs that have a nexus to coastal flood risk management
  - 5.1.2. **Strategy** Reduce flood risk management challenges that stem from complicated administrative structures
    - 5.1.2.1. **Action** Develop dedicated assistance programs specifically designed to aid those navigating federal, state, and local flood risk management program frameworks
    - 5.1.2.2. **Action** Streamline flood risk management standards across levels of government, and align standards with criteria related to eligibility for federal assistance programs

---

- 5.2. **Objective** Leverage the flood risk management benefits of activities across programs
  - 5.2.1. **Strategy** Develop and enhance system-wide flood risk management efforts
    - 5.2.1.1. **Action** Integrate information from multiple agencies into existing coastal flood risk management products and visualizations
    - 5.2.1.2. **Action** Reduce the emphasis on flood risk mitigation for individual structures in favor of larger, watershed-scale efforts utilizing resources across agencies
  - 5.2.2. **Strategy** Encourage use of a wide variety of flood risk management activities
    - 5.2.2.1. **Action** Develop incentives for coastal flood risk mitigation that extend beyond flood insurance reductions for individuals and communities
    - 5.2.2.2. **Action** Ensure that a broad range of activities are eligible for assistance under programs designed to address coastal flood risk

5.2.2.3. **Action** Build flexibility at the local level into coastal flood risk management practices

---

5.3. **Objective** Integrate flood risk management into existing practices across a broad suite of programs

5.3.1. **Strategy** Further incorporate flood risk into land-use planning efforts

5.3.1.1. **Action** Incorporate the need for integration of flood risk considerations in land-use planning at the federal, state, and local level into statutory frameworks

5.3.1.2. **Action** Include additional elements related to coastal flood risk within community comprehensive planning efforts

5.3.1.3. **Action** Establish policies that incorporate coastal flood risk resilience into redevelopment initiatives

5.3.1.4. **Action** Build climate adaptation considerations into criteria and standards for future coastal development planning

5.3.2. **Strategy** Include flood risk considerations in environmental decision-making processes

5.3.2.1. **Action** Address potential changes in flood risk as a factor in multiple environmental permitting programs

5.3.2.2. **Action** Incorporate reduction of flood risk as an ecological value when evaluating project impacts in coastal environments

5.3.2.3. **Action** Establish a potential increase in flood levels as a criteria for review under environmental decision-making processes

5.3.3. **Strategy** Provide a legislative basis for the broad nature of coastal flood risk management

5.3.3.1. **Action** Include flood risk management measures in a broad suite of environmental regulations

5.3.3.2. **Action** Establish enforceable policies within state coastal zone management programs that address flood risk considerations across multiple agencies

5.3.3.3. **Action** Incorporate the link between coastal development and ecological functions such as flood risk reduction into environmental and land-use policies

5.3.3.4. **Action** Formally acknowledge the unstable nature of shoreline environments within legislation to encourage compatible land-use within coastal areas