



Nature-Based Mitigation Goals and Actions in Local Mitigation Plans

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Introduction

Recently, increased emphasis has been placed on non-structural and nature-based strategies as cost-effective alternatives for hazard mitigation that also help achieve conservation goals like maintaining biodiversity. Nature-based strategies (also called natural infrastructure or green infrastructure) are actions that use the conservation or restoration of nature, such as ecosystems like wetlands and floodplains, or green infrastructure projects, like rain gardens, to address hazards. Nature-based hazard mitigation strategies can help minimize the negative impacts of disasters while also provide environmental and social co-benefits, such as increasing habitat and biodiversity, and creating recreational spaces for communities.

Coastal wetlands, for example, are one of the natural features that provide valuable protection from natural hazards. According to one study, existing wetlands prevented \$625 million in property damage in areas affected by Hurricane Sandy.¹ The study showed a “correlation between wetland cover and avoided property damages: the greater the extent of the wetland, the more protection it provides. Even relatively degraded wetlands in highly urban areas like New York City provided hundreds of millions of dollars in flood protection.”

Nature-based mitigation strategies can also be more cost-effective than traditional “gray” solutions in many contexts, achieving the same hazard mitigation benefits while requiring lower upfront (capital) and ongoing (operation and maintenance and repair) costs.² For example, installing living shorelines in the South Atlantic was estimated to cost, on average, \$361/linear foot, which is approximately a third of the estimated cost to install concrete bulkheads.³ Similarly, investment in natural infrastructure up-front can save communities money down the road. For example, according to one study, for every \$1 spent on wetland and reef restoration in the Gulf of Mexico, communities have saved up to \$7 in “flood-reduction benefits.”⁴ Natural infrastructure may also require fewer post-disaster repairs. For example, after Hurricane Matthew (2016), a study found living shorelines reduced erosion just as effectively as bulkheads, but required no repairs post-disaster, while $\frac{3}{4}$ of the bulkheads required repairs.⁵

¹ Beck et al., *Coastal Wetlands and Flood Damage Reduction: Using Risk Industry-based Models to Assess Natural Defenses in the Northeastern USA*, Lloyd’s Tercentenary Research Foundation, London (2016) <https://conservationgateway.org//ConservationPractices/Marine/crr/library/Documents/CoastalWetlandsandFloodDamageReductionReport.pdf>.

² Environmental and Energy Study Institute, *Fact Sheet: Nature as Resilient Infrastructure – An Overview of Nature-Based Solutions* (Oct. 16, 2019), available at <https://www.eesi.org/papers/view/fact-sheet-nature-as-resilient-infrastructure-an-overview-of-nature-based-solutions>. Glick, P., E. Powell, S. Schlesinger, J. Ritter, B.A. Stein, and A. Fuller. *The Protective Value of Nature: A Review of the Effectiveness of Natural Infrastructure for Hazard Risk Reduction*. (2020) Washington, DC: National Wildlife Federation, available at <https://www.nwf.org/-/media/Documents/PDFs/NWF-Reports/2020/The-Protective-Value-of-Nature.ashx?la=en&hash=A75F59611475502BEE58723F8B3C58423417E579>

³ Anne N. Connor, *Why you want oysters and a salt marsh between you and a hurricane*, Vox (June 3, 2019), available at <https://www.vox.com/2019/6/3/18262182/hurricane-season-2019-storm-protection>

⁴ NOAA Office for Coastal Management, Fast Facts – Natural Infrastructure, at <https://coast.noaa.gov/states/fast-facts/natural-infrastructure.html>

⁵ Smith et al., *Living shorelines enhanced the resilience of saltmarshes to Hurricane Matthew*, *Ecological Applications*, 28(4), (2016), available at <https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/eap.1722?sid=nlm%3Apubmed>

Much of the needed investment in identifying and implementing nature-based projects for hazard mitigation may be accomplished by leveraging and integrating existing institutions and programs. FEMA's Hazard Mitigation Assistance (HMA) grants can be one potential funding opportunity to pay for the restoration and protection of critical natural infrastructure and to improve outcomes and reduce costs from the next disaster.⁶ These grants provide funding for hazard mitigation planning as well as for cost-effective hazard mitigation activities. FEMA's new Building Resilient Infrastructure and Communities (BRIC) program, for example, made \$500 million dollars available to states, U.S territories, Indian tribal governments, and local communities for *pre-disaster* mitigation activities in 2020.⁷ The FY2020 program priorities included incentivizing projects that incorporate nature-based solutions.⁸

Although nature-based methods are eligible for FEMA funding to mitigate almost any hazard identified by state and local plans, relatively few of these projects have been funded through FEMA hazard mitigation grant programs so far.⁹ Funded mitigation activities, including nature-based projects, must be done in accordance with priorities set out in state, tribal, or local hazard

⁶ In its recent resources, FEMA has placed some emphasis on nature-based hazard mitigation, identifying natural systems protection actions for reducing risk to natural hazards and disasters in resources for planners and communities. See FEMA, *Mitigation Ideas - A Resource for Reducing Risk to Natural Hazards* (2013), available at https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf and FEMA, *Building Community Resilience with Nature-Based Solutions- A Guide for Local Communities* (2020), available at https://www.fema.gov/sites/default/files/2020-08/fema_riskmap_nature-based-solutions-guide_2020.pdf. In 2015, FEMA announced the eligibility of a suite of new activities, including floodplain and stream restoration, for its hazard mitigation funding. FEMA, *Floodplain and Stream Restoration Fact Sheet* (2015), available at https://www.epa.gov/sites/production/files/2016-04/documents/fema_floodplain_stream_restoration_fact_sheet-sept_2015.pdf FEMA has also made a series of changes to its Benefit-Cost Analysis Toolkit and supporting policies, most recently in 2020, to allow "for easier inclusion of nature-based solutions into risk-based mitigation projects." All projects funded by FEMA Hazard Mitigation Assistance grants must pass a benefit cost analysis using FEMA software. FEMA, *Ecosystem Service Benefits in Benefit-Cost Analysis for FEMA's Mitigation Programs Policy* FEMA Policy FP-108-024-02 available at https://www.fema.gov/sites/default/files/2020-09/fema_ecosystem-service-benefits_policy_september-2020.pdf (last visited March 31, 2021)

⁷ FEMA's BRIC grant program was created as part of Disaster Recovery Reform Act of 2018 and replaces the Pre-Disaster Mitigation program. The BRIC program is funded by a six percent set-aside from federal post-disaster grant expenditures. The 2020 [FEMA Mitigation Action Portfolio](https://www.fema.gov/sites/default/files/2020-08/fema_mitigation-action-portfolio-support-document_08-01-2020_0.pdf) highlights a wide range of innovative hazard mitigation projects that are possible to fund under the new BRIC program.

https://www.fema.gov/sites/default/files/2020-08/fema_mitigation-action-portfolio-support-document_08-01-2020_0.pdf On May 4, 2021, the Biden administration doubled the amount of funding available for the BRIC program. See <https://www.whitehouse.gov/briefing-room/statements-releases/2021/05/24/fact-sheet-biden-administration-invests-1-billion-to-protect-communities-families-and-businesses-before-disaster-strikes/>

⁸ FEMA, *Building Resilient Infrastructure and Communities Notice of Funding Opportunity (NOFO) FY 2020*, (2020), available at https://www.fema.gov/sites/default/files/2020-08/fema_fy20-bric-notice-of-funding-opportunity_federal-register_August-2020.pdf

⁹ Although there may be relatively few FEMA-funded grants for projects that are primarily nature-based, there are some examples of these kinds of projects. Examples of some nature-based projects that were funded primarily or in part by FEMA grants can be found on the Naturally Resilient Communities website. <http://nrcsolutions.org/>. We also have prepared two case studies of FEMA-funded nature-based projects (See <https://www.eli.org/land-biodiversity/hazard-mitigation-planning>). There are likely a greater number of FEMA grant funded projects that have nature-based components.

mitigation plans. Many state plans identify nature-based goals that set hazard mitigation objectives for the state and actions and include hazard mitigation actions, such as the conservation and restoration of wetlands and floodplains and green infrastructure, that prioritize the risk reduction benefits of natural infrastructure.¹⁰ Local hazard mitigation plans are more directly tied to local needs and goals and thus may provide an important opportunity for communities to integrate conservation and restoration goals.

Local hazard mitigation plans aim to minimize risk and future losses from hazards. The local plan must include documentation of the planning process used to develop the plan, a risk assessment section that includes a description of the hazards that can affect the jurisdiction and the jurisdiction's vulnerability to those hazards, a mitigation strategy that includes a description of the jurisdiction's mitigation goals and the range of specific actions and projects being considered to address the identified hazards, and a description of a plan maintenance process (plans must be updated every five years).¹¹ The planning process must include an opportunity for the public to comment on the plan during the drafting stage and an opportunity for other stakeholders (neighboring communities, local and regional hazard mitigation agencies, agencies that regulate development, businesses, academic, other private and non-profit interests) to be involved in the process.¹²

We reviewed 103 local plans from across the country to better understand to what extent they are incorporating nature-based actions. We aimed to identify the range of practice as well as model examples that could be used by other local planners to further incorporate and implement nature-based solutions.

Study Methodology

We examined local (county- and municipal-level) hazard mitigation plans from 11 states (Alabama, California, Florida, Iowa, Louisiana, Minnesota, Mississippi, Texas, Virginia, Washington and Wisconsin) to better understand how local plans are incorporating nature-based mitigation actions (See Figure 1).¹³ We selected study locations to reflect geographic diversity and a range of potential hazards (e.g., flood, fire, coastal storms, etc.). We specifically included local plans from states whose state hazard mitigation plan included nature-based goals or actions.¹⁴ In total, we reviewed 103 plans. Plan were generally county-level plans, but many integrated actions from the municipalities within.¹⁵ We also reviewed several regional plans (Mississippi Emergency Management Agency (MEMA) District 9 Regional Hazard Mitigation

¹⁰ ELI examined 50 state hazard mitigation plans to identify examples of how states are including natural infrastructure or natural resource protection or restoration as mitigation goals and actions. See our report at <https://www.eli.org/land-biodiversity/hazard-mitigation-planning>.

¹¹ 44 CFR 201.6(c)

¹² 44 CFR 201.6(b)

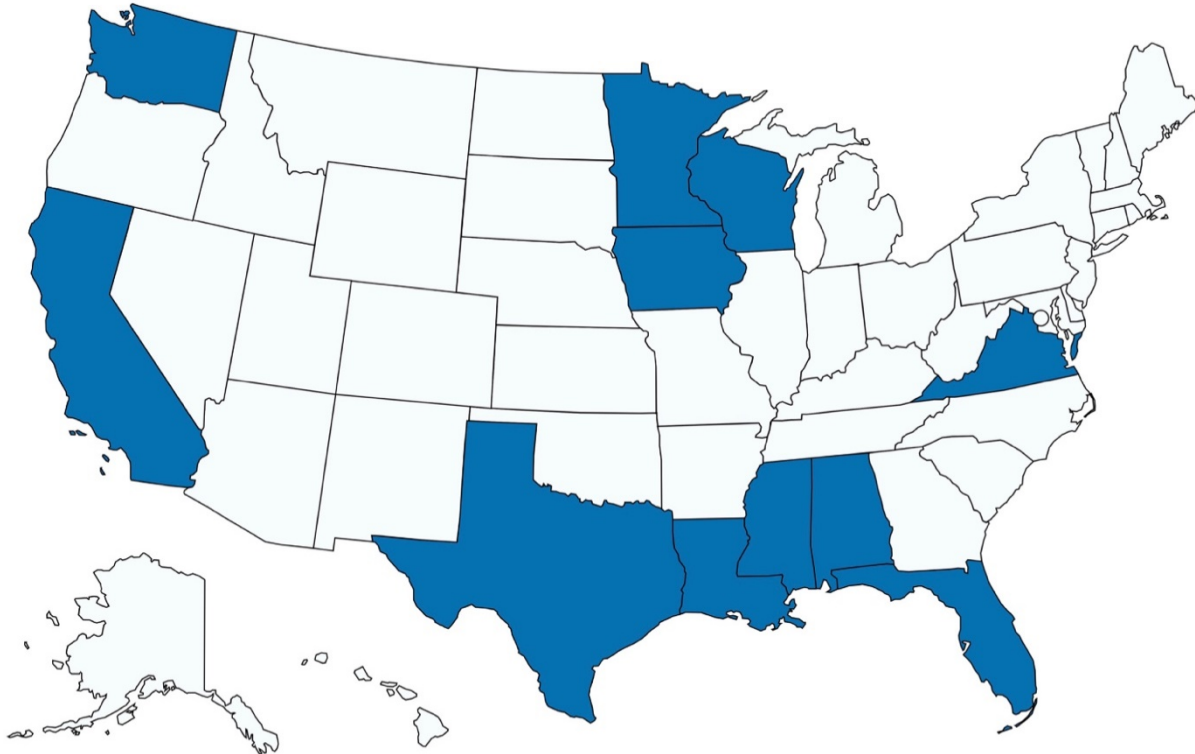
¹³ We have posted a spreadsheet with links to all of the plans reviewed on our webpage at <https://www.eli.org/land-biodiversity/hazard-mitigation-planning>.

¹⁴ ELI examined 50 state hazard mitigation plans to identify examples of how states are including natural infrastructure or natural resource protection or restoration as mitigation goals and actions. See our report at <https://www.eli.org/land-biodiversity/hazard-mitigation-planning>.

¹⁵ Multi-jurisdictional plans may be accepted by FEMA as long as each jurisdiction has participated in the process and has officially adopted the plan. 44 CFR 201.6(a)

Plan, Guadalupe River Authority Plan (Texas), Hampton Roads Hazard Mitigation Plan (Virginia), Middle Peninsula Region Hazard Mitigation (Virginia)). Therefore, our review covered many more than 103 jurisdictions.

Figure 1: Map of States Represented by Local Plans Reviewed for the Study



Hazard mitigation plans were generally sourced from local government websites (e.g., county webpages).

A keyword search was used as an initial screening of all of the sections of the local hazard mitigation plans with the goal of identifying all the nature-based actions each local plan mentioned. Keywords included: wetland, natur- (e.g., natural and nature-based); green (e.g., green infrastructure); conserv- (e.g., conserve, conservation); preserv- (e.g., preserve, preservation); restor- (e.g., restore, restoration); stream; and living shore. Following the keyword search, the mitigation strategy section of the plan was more closely reviewed to ensure all relevant mentions, actions and details were included.

We documented actions that were explicitly related to the environment, natural infrastructure, or nature-based solutions. Some plans included explanatory text for their actions, providing an opportunity for planners to be more specific in the approaches or tactics to be employed for that action. Many plans, on the other hand, only included the title or a brief description of their

actions, making it difficult to interpret what the action might entail. We therefore took a conservative view of relevant actions to include in our analysis. We included only actions that explicitly discussed natural infrastructure or nature-based strategies (e.g., habitat conservation or restoration projects, green infrastructure projects, protection policies, etc.). We did not include the following types of actions:

- references to buyouts or acquisitions that just focused on the purchase of structures (unless they explicitly talked about converting the land to open or green space),
- stormwater projects (e.g., detention ponds or construction/clearing of drainage structures or creation of drainage management plans) that did not mention habitat restoration,
- drought-tolerant landscaping plans or ordinances (or vegetation management for drought that did not mention habitat conservation or restoration),
- beach re-nourishment (that did not talk about dune restoration),
- erosion control plans/programs (or projects) that didn't mention habitat,
- tree management, when focused only on pruning, and
- fire vegetation management (that did not mention habitat conservation or restoration).

We included actions where it was reasonable to interpret the action as primarily (or in large part) a nature-based activity. It is possible that in practice some of the actions or programs focus on other non-nature-based programmatic components to varying degrees. It is also possible that we screened out some actions that are in practice relevant nature-based strategies.

The documented actions were sorted into categories to better understand the range of strategies included in state plans across the country. The categories identified included:

- **Conservation/Preservation/Management:** Conservation/Preservation/Management actions are those that explicitly focus on protection or management of ecosystems or natural resources (e.g., protect wetlands, maintain creek banks, ecosystem preservation).
- **Restoration:** Restoration actions are those focused on restoration of natural habitats, usually wetlands, streambanks, floodplains, beaches, etc. These actions include dam removals, dune restoration, and restoration of native vegetation.
- **Green Infrastructure:** These actions call on the use of green infrastructure projects to address stormwater management.¹⁶ Green infrastructure is generally implemented at the parcel-level scale and is primarily conducted in urban areas. Many of the actions identified in this study broadly mention promoting or investing in green infrastructure projects, others describe more specific green infrastructure projects such as bioswales, rain gardens, or green roofs.

¹⁶ Green infrastructure refers to a way to collect and clean rainwater where it falls. Using plants and soil, green infrastructure projects reduce the amount of rainwater entering 'gray' water infrastructure (e.g., storm sewers, pipes). This can help reduce flooding. Green infrastructure projects can also help to clean and conserve water and provide recreational and other benefits to the community.

- **Land Use:** Land Use actions seek to address risks to communities through land use, including acquiring properties and converting to open space, planning and zoning guidelines or policy, and managing development in hazard-prone areas.
- **Funding and Programmatic:** Funding and Programmatic actions seek to create or expand preservation, restoration, or green infrastructure programs; develop or enhance funding programs; or develop implementation plans related to nature-based strategies.
- **Policy and Law:** Policy and Law actions call upon different agencies to develop and implement policies and regulations that would encourage or facilitate conservation and/or nature-based mitigation actions. These include promulgating wetland regulations, ensuring enforcement of policies, and integrating protection policies into existing plans.
- **Technical and Information:** Technical and Information actions include those related to studies, modeling, and development of tools (e.g., decision support tools). Sometimes these actions are related to better understanding risk and other times they include actions to identify future projects that will address identified risk.
- **Education and Awareness:** Education and Awareness actions include those focused on development of guidance, conducting community outreach, and creating technical bulletins and training programs aimed at enhancing understanding of ecosystem services and non-structural mitigation measures.
- **Agency Coordination:** Agency Coordination actions encourage or promote coordination among local agencies or state and local agencies.
- **Partnerships:** Partnership actions encourage partnerships with non-profits, utilities, or other organizations to conduct mitigation strategies.

See attached Appendix for a table of all relevant actions.

Findings

Overall, plans varied widely in the extent to which they incorporated nature-based mitigation actions. Sixty-three of the 103 plans that we reviewed include some sort of nature-based mitigation actions (See attached Appendix). In total, we found 342 nature-based actions in the plans. About one-quarter of the plans had 5 or more actions. Eight plans had more than ten relevant actions. However, some plans (King and Snohomish Counties, Washington) had single actions that listed several types of relevant strategies. So, the number of actions per plan may not indicate the extent to which the plan contemplated nature-based strategies.

We found the most actions fell into the Restoration (128) and Conservation/ Preservation/ Management (72) categories (Table 1). These actions were also distributed across the greatest number of plans. Forty-nine plans had one or more Restoration actions, and 37 plans had one or more Conservation/ Preservation/ Management actions. Other types of actions (e.g., Land Use,

Funding and Programmatic, Policy and Law) were also distributed across a number of plans.

Table 1: Mitigation Actions in Reviewed Plans by Action Category

Action Category	Number of Actions*	Number of Plans
Agency Coordination	5	4
Conservation/ Preservation/ Management	72	37
Education and Awareness	17	14
Funding and Programmatic	39	25
Green Infrastructure	41	15
Land Use	34	20
Partnerships	14	6
Policy and Law	23	17
Restoration	128	49
Technical and Information	22	14

*49 actions were included in more than one category.

The following section elaborates on the different types of nature-based actions that were included in the plans.

Agency Coordination

Agency coordination actions encourage or promote coordination among local agencies or state and local agencies. For example, the Cameron County, TX plan includes an action focused on agency coordination to promote restoration: “Work with General Land Office to develop a living coastline constructed from natural materials derived from regional materials such as rock and seagrass.”¹⁷

Another example comes from the Terrebonne Parish, LA plan: “Participate in existing programs at the state and federal levels oriented to environmental enhancement and conservation.”¹⁸

Conservation/Preservation/Management

Conservation/preservation/management actions explicitly focus on implementing protection or management of ecosystems or natural resources (e.g., protect wetlands, maintain creek banks, ecosystem preservation).

Often, plans broadly discuss preserving existing wetlands, floodplains, and/or streams to prevent degradation and an increased risk from hazards. For example, Buchanan County, Iowa includes the following action: “Protection of wetland and other natural areas existing along waterways.”¹⁹

¹⁷ The County of Cameron, Hazard Mitigation Action Plan Update 2021, p 180 (2021) available at <https://www.cameroncounty.us/wp-content/uploads/2021/02/2021-Cameron-County-HMP-s.pdf>.

¹⁸ Terrebonne Parish, Louisiana Hazard Mitigation Plan Update 2020, p. 115 (2020) available at <http://www.tpcg.org/files/flooding/Terrebonne-HMPU-2020-Ver2.pdf>

¹⁹ 2017 Updated Multi-Jurisdictional Hazard Mitigation Plan for Buchanan County, Iowa, p. 96 (2017) available at http://www.inrcog.org/pdf/Buchanan_Co_2017_MJ-HMP.pdf.

Some plans included an action that specifies a mechanism for the conservation action. For example, Harrison County, MS (MEMA District 9 Regional Hazard Mitigation Plan) included the following action: “Encourage acquisition or donation of conservation easements and properties in environmentally sensitive areas.”²⁰ Some plans specifically mentioned species protection. The Grant County, WI plan included an action to “Work with DNR and County to protect local trout streams from erosion and pollution (Town of Castle Rock).”²¹

Education and Awareness

Education and awareness actions include those focused on development of guidance, conducting community outreach, and creating technical bulletins and training programs aimed at enhancing understanding of ecosystem services and non-structural mitigation measures.

For example, one of Wabasha County, MN plan’s actions is to “[p]rovide information to property owners on ways to reduce local flood damage to properties, such as grading and landscaping, and green infrastructure.”²² Another example comes from Polk County, WI: “Continue to expand educational efforts and partnerships regarding alternatives to mitigate stormwater and flash flooding run-off, such as agricultural soil health best practices, erosion controls, rain gardens, natural vegetation buffers, permeable pavement, shoreland practices, and forest management in areas with steep slopes.”²³

Funding and Programmatic

Funding and programmatic actions seek to create or expand preservation, restoration, or green infrastructure programs; develop or enhance funding programs; or develop implementation plans related to nature-based strategies.

Some examples of actions that focus on program development include “[d]evelop and implement a shoreline protection program,”²⁴ from Brazoria County, TX, and “[e]ncourage development of acquisition and management strategies to preserve open space for flood mitigation, fish habitat, and water quality in the floodplain,”²⁵ from Jefferson County, WA.

²⁰ MEMA District 9, Section 9, Regional Hazard Mitigation Action Plan, p 9:73 (2017) available at <http://co.harrison.ms.us/downloads/departmental%20downloads/code%20admin%20flood/flood%20information/mitigation/09%20-%20Mitigation%20Action%20Plan.pdf>.

²¹ Grant County Hazard Mitigation Plan, p. 153 (2018) available at

<http://grantcountylandrecords.com/GrantCountyMultiHazardMitigationPlanDraft2018.pdf>

²² Wabasha County Geospatial Analysis Center, Multi-Hazard Mitigation Plan, p 117 (2017) available at https://scse.d.umn.edu/sites/scse.d.umn.edu/files/mhmp_wabasha_2017.pdf.

²³ West Central Wisconsin Regional Planning Commission, 2017-2022 Natural Hazards Mitigation Plan, Polk County, Wisconsin, p 194 (2017) available at <https://www.co.polk.wi.us/vertical/Sites/%7BA1D2EAAA-7A29-46D6-BF1A-12B71F23A6E1%7D/uploads/PlanPolkCountyNaturalHazardsMitigation.pdf>.

²⁴ Brazoria County Hazard Mitigation Plan, p. 261 (2017) available at https://www.h-gac.com/getmedia/66a0f5b6-8273-4192-a00e-62c241fb157e/Brazoria%20County%20HMAP%209_19_18.pdf

²⁵ Department of Emergency Management, Jefferson County, 2016 City of Port Townsend All Hazard Mitigation Plan, p 36 (2016) available at <https://www.co.jefferson.wa.us/DocumentCenter/View/3318/2016-Hazard-Mitigation-Plan?bidId=>.

Other Funding and Programmatic actions focus more specifically on the funding of projects or programs. Some actions mention funding but do not identify funding sources, such as the plan from Terrebonne Parish, LA: “Pursue approvals and funding for coastal restoration projects such as sediment diversions to reduce land subsidence in coastal areas.”²⁶ Other actions provide at least broad areas for potential funding, like the Washburn County, WI plan: “Identify sites where environmental restoration work can benefit flood mitigation efforts.”²⁷

Green Infrastructure

Green Infrastructure actions call on the use of green infrastructure projects to address stormwater management. Many of these actions broadly mention promoting or investing in green infrastructure projects, others described more specific green infrastructure projects such as bioswales, rain gardens, or green roofs.

For example, the Hampton Roads Plan in Virginia (Portsmouth) broadly mentions green infrastructure: “Implement green infrastructure for flood and stormwater abatement.”²⁸ Orleans Parish, Louisiana included an action to make sure green infrastructure actions are maintained: “Green Infrastructure maintenance manual - Create a comprehensive green infrastructure maintenance manual for Orleans Parish that details procedures such as who is the party responsible for maintenance, what are the steps and needed equipment and materials to maintain the green infrastructure, how these efforts can be sustainably funded over time, and how maintenance will be properly inspected and enforced.”²⁹

Land Use

Land use actions seek to address risks to communities through land use, including acquiring properties and converting to open space, planning and zoning guidelines or policy, and managing developments in hazard-prone areas.

Many local plans include actions focused on acquiring properties and converting them to open space. For example, the Fayette County, IA plan includes an action to address flooding: “Acquire flood prone properties and convert to open space/green space, or pursue easements when acquisition is not possible.”³⁰ Other Land Use actions include: “Consider expansion of the

²⁶ Terrebonne Parish Consolidated Government, Hazard Mitigation Plan Update 2020, p 111 (2020) available at <http://www.tpcg.org/files/flooding/Terrebonne-HMPU-2020-Ver2.pdf>.

²⁷ Washburn County, Wisconsin, Hazard Mitigation Plan, July 2020, p 109 (2020) available at <https://www.co.washburn.wi.us/images/custom/departments/emerg-mgt/washburn-co-hazmit-plan-update-final-2014v7.pdf>.

²⁸ Hampton Roads, Hazard Mitigation Plan, p 353 (2017) available at <https://www.hrpdcva.gov/uploads/docs/2017%20Hampton%20Roads%20Hazard%20Mitigation%20Plan%20Update%20FINAL.pdf>.

²⁹ Hazard Mitigation Plan City of New Orleans, p. 216 (2020), available at <https://ready.nola.gov/NOLAReady/media/Assets/Hazard%20Mitigation%20Plan/2020-City-of-New-Orleans-Multi-Jurisdictional-Hazard-Mitigation-Plan-Draft-20210108.pdf>.

³⁰ Fayette County, Iowa Multi-Jurisdiction (MJ-14) Multi-Hazard Mitigation Plan, p 50 (2018) available at https://uerpc.org/uploads/PDF_File_57832624.pdf.

County’s properties that are designated natural and beneficial areas,” from the Santa Rosa County, FL plan,³¹ and “Limit or Restrict Development in Floodplain Areas,” from the Whatcom County, WA plan.³²

Partnerships

Partnership actions encourage partnerships with non-profits, utilities, or other organizations to conduct mitigation strategies.

Most of these actions focus on collaboration with specific partners, rather than prioritizing general collaboration. For example, the Fayette County, IA plan includes an action to:

“Work with Flood Mitigation Professionals in the implementation of agricultural conservation practices, water control basins, on-road water control structures, wetlands and riparian buffers, restoration and protection of stream ecosystems, conservation easements, and urban green streetscape practices.”

Another example comes from the Harrison County, MS HMP: “Partner with the Land Trust for the Coastal Mississippi Plain to preserve open space.”

Policy and Law

Policy and Law actions call upon different agencies to develop and implement policies and regulations that encourage or facilitate conservation and/or nature-based mitigation actions. These include promulgating wetland regulations, ensuring enforcement of policies, and integrating protection policies into existing plans.

The Harrison County, MS plan (MEMA District 9 Regional Hazard Mitigation Plan), for example, includes an action to develop wetlands regulations: “Develop local, city, and county wetlands regulations that provide the ‘intent’ of the regulations for flood storage.”³³ Another example comes from the Barron County, WI plan, which discusses regulation enforcement: “Continue to enforce County floodplain regulations to: discourage future floodplain development and the storage of hazardous materials in floodplains; require dry land access for new structures; limit development in dam shadows; and maintain natural flood storage areas.”³⁴ Another example comes from Jefferson Parish, LA: “Update Stormwater Management Regulations (ex. Compensatory storage for new construction, drainage study with new development, program for

³¹ 2016 - 2020 Local Mitigation Strategy Plan, Section 9 p. 17 (2016) available at <https://www.santarosa.fl.gov/DocumentCenter/View/128/2016---2020-Local-Mitigation-Strategy-Plan-PDF>.

³² Whatcom County Natural Hazards Mitigation Plan, p. 3-23 (2016) available at <https://www.whatcomcounty.us/DocumentCenter/View/39313/Whatcom-County-Natural-Hazard-Mitigation-Plan?bidId=>.

³³ MEMA District 9, Section 9, Regional Hazard Mitigation Action Plan, p 9:66 (2017) available at <http://co.harrison.ms.us/downloads/departamental%20downloads/code%20admin%20flood/flood%20information/mitigation/09%20-%20Mitigation%20Action%20Plan.pdf>.

³⁴ Multi-Hazard Mitigation Plan Barron County, Wisconsin 2017-2022, p. 229 (2017) available at http://www.wcwrpc.org/Documents/BarronCo_HMP_Plan_2017%20Update_DRAFT.pdf.

rain garden/green infrastructure incentives, permeable surface requirements, sewer backup/overflow protection program).”³⁵

Restoration

Restoration actions focus on restoration of natural habitats, usually wetlands, streambanks, floodplains, beaches, etc. These actions include dam removals, dune restoration, and restoration of native vegetation.

Many local plans have an action focused on restoration. Some of these actions are broad: “support marsh restoration efforts,”³⁶ (Harrison County, MS) and “restore wetlands or create new wetlands” (Hennepin County, MN).³⁷ Others specify locations for restoration: “Enhance existing wetland south of Fletcher Avenue,”³⁸ and at various other locations (Hillsborough County, FL), and “The Biloxi Marsh Living Shoreline Project. The Biloxi Marshes consists of approximately 49,000 hectares of brackish and salt marshes, which provide important storm buffer for New Orleans as well as key habitat and ecosystem services. The marshes have been greatly impacted by shoreline erosion from wind-driven waves.”³⁹ (Orleans Parish, LA). Others provide the reason for restoration: “. . . protect their natural functions and prevent any negative impacts from development”⁴⁰ (St. Croix County, WI), “Dredge Jackson Marsh to restore wetlands and help reduce flooding”⁴¹ (Hancock County, MS).

Technical and Information

Technical and Information actions include those related to studies, modeling and development of tools (e.g., decision support tools). Sometimes these actions are related to better understanding risk and other times they include actions to identify future projects that will address identified risk.

³⁵ Jefferson Parish, 2020 Multijurisdictional Hazard Mitigation Plan Update, p 293 (2020) available at https://jefferson-parish-government.azureedge.net/documents/departments/floodplain-management---hazard-mitigation/hazard-mitigation-plan/2020HazardMitigationPlan_Complete-2020-06-19.pdf.

³⁶ MEMA District 9, Section 9, Regional Hazard Mitigation Action Plan, p 9:116 (2017) available at <http://co.harrison.ms.us/downloads/departments%20downloads/code%20admin%20flood/flood%20information/mitigation/09%20-%20Mitigation%20Action%20Plan.pdf>.

³⁷ Hennepin Emergency Management, 2018 Hennepin County All-Jurisdiction Hazard Mitigation Plan, Volume 3: Community and Mitigation Strategies(R), p 332 (2018) available at <https://www.hennepin.us/-/media/hennepinus/residents/emergencies/hazard-mitigation-vol-3.pdf?la=en&hash=A4BD7F7B103B85F8EDED4BF0E995C4A82CD28869>.

³⁸ County of Hillsborough, Hillsborough County Multi-jurisdictional Local Mitigation Strategy (2020); Appendix D. Available at <https://www.hillsboroughcounty.org/library/hillsborough/media-center/documents/lms/plans/lms-april-2020-appendices-only.pdf>

³⁹ Hazard Mitigation Plan City of New Orleans, p. 216 (2020), available at <https://ready.nola.gov/NOLAReady/media/Assets/Hazard%20Mitigation%20Plan/2020-City-of-New-Orleans-Multi-Jurisdictional-Hazard-Mitigation-Plan-Draft-20210108.pdf>.

⁴⁰ St. Croix County, Wisconsin, All Hazard Mitigation Plan 2013-2018, p 241 (2013) available at <https://www.sccwi.gov/DocumentCenter/View/385/Completed-2013-2018-All-Hazard-Mitigation-Plan-PDF>.

⁴¹ MEMA District 9, Section 9, Regional Hazard Mitigation Action Plan, p 9:54 (2017) available at https://memad9hmp.weebly.com/uploads/7/7/6/5/77658414/d9_section_09_mitigation_action_plan.pdf.

For example, the McLeod County, MN plan focuses on identifying projects: “Work with the Buffalo Creek Watershed District to identify three potential stormwater retention ponds and/or wetland restorations. . . .”⁴² Another example comes from the Jackson County, MS (MEMA District 9 Regional Hazard Mitigation Plan): “Conduct a study of the effects of sea level rise and develop mitigation strategies to minimize those effects.”⁴³ Actions like these provide more information to local communities and agencies so natural infrastructure actions can be implemented in the future.

Conclusion

Many local hazard mitigation plans include at least one nature-based mitigation goal or action. Our review provides a snapshot of the range of practice across local hazard mitigation plans across the country and identifies some example language that could be used by local governments in future plan updates. Based on our review, we identified these conclusions:

Opportunities for Integrating Nature-Based Mitigation Actions

More than half of the local plans we reviewed have integrated nature-based action to some degree, but there are still opportunities to improve, including more systematic inclusion of specific and targeted nature-based hazard mitigation actions and realistic prioritization and implementation of nature-based strategies

Identifying and integrating nature-based hazard mitigation actions in mitigation plans is an important first step toward advancing and expanding the use of these techniques to address risk associated with natural hazards. Funding, implementing, and monitoring these projects are important next steps. More demonstration projects are needed to show the multiple benefits of nature-based projects. Such “case studies” of nature-based projects that have been successfully funded by FEMA could help to demonstrate to other applicants that such projects are possible and can result in multiple benefits.

Including Detailed or Location-Specific Actions

There is some tension over the degree of specificity plans should use when detailing their proposed actions.⁴⁴ On one hand, greater detail may facilitate the process of getting grant

⁴² McLeod County Emergency Management, the McLeod County Hazard Mitigation Plan Task Force & the Mid-Minnesota Development Commission, McLeod County Hazard Mitigation Plan 2015-2020, p 238 (2015) available at <https://greenstep.pca.state.mn.us/sites/default/files/29.1HutchinsonActionFile.pdf>.

⁴³ MEMA District 9, Annex D, Jackson County, Regional Hazard Mitigation Plan, p 151 (2017) available at <https://www.co.jackson.ms.us/DocumentCenter/View/703/Hazard-Mitigation-Plan-PDF>.

⁴⁴ In California, for example, local mitigation plans include only broad descriptions of potential mitigation actions that are not yet fully flushed out projects due to the possibility of triggering a California Environmental Quality Act (CEQA) environmental review on the plan. The CEQA review can occur during the adoption process of a final local hazard mitigation plan if the local jurisdiction governing board feels there is anything “actionable” in the plan, specifically mitigation actions. A CEQA review could hold up the LHMP approval. Personal communication with California Governor's Office of Emergency Services.

funding for projects that closely match the action in question, and signals that more thought and preparation has gone into the development of the idea. On the other hand, more general actions provide some flexibility to take advantage of project opportunities as they arise (especially for state plans). The majority of the local plans did not include any geographically specific actions. However, we did identify a few plans that included some actions for specific projects.

Partnerships Are Key

Partnerships are key to achieving a local government's mitigation goals and in advancing nature-based approaches. There are many ways for partners to be involved in the planning process, and in the identification and implementation of mitigation actions. These experts can:

- participate on hazard planning teams to inform plan development;⁴⁵
- educate the public about the co-benefits and effectiveness of nature-based projects;
- engage community stakeholders to garner plan support and ensure community wants and needs are included in the plan;
- provide data and expertise about natural infrastructure project opportunities;
- help to plan, design, and implement nature-based projects; and
- take on the maintenance, management, and monitoring responsibilities of nature-based projects.

Next Steps for Local Governments

To improve integration of nature-based actions into plans, local planners can:

- Identify and include natural resource protection and restoration experts as key members of the planning team (such experts could include state or local agency staff, NGOs, watershed groups, academics, etc.). As a first step, local planners may wish to draw from the programs already identified in the capabilities section of the hazard mitigation plan to identify potential partners that would be valuable members of the planning team.
- Consider including mitigation plan goals that not only focus on how to protect the environment from natural hazards but also reflect the local government's priority and commitment to use nature-based strategies to mitigate risk.
- Consider integrating both broad and specific actions into plans. Broad actions communicate a general commitment to pursuing nature-based projects and may more easily allow for the pursuit of funding when opportunities arise. More specific actions can give some weight to a given project that has been developed to address a specific risk or vulnerability. Identifying partners in these actions would also be useful.
- Invest in monitoring and assessment of nature-based hazard mitigation projects. Performance data will help planners communicate the success and value of nature-based projects to the public. Monitoring data can help convince local stakeholders that nature-

⁴⁵ FEMA, *Building Community Resilience with Nature-Based Solutions- A Guide for Local Communities* (2020), available at https://www.fema.gov/sites/default/files/2020-08/fema_riskmap_nature-based-solutions-guide_2020.pdf.

based strategies will work in their specific case and offer numerical evidence that nature-based projects have positive environmental and mitigation effects. Monitoring data can also help planners design more effective nature-based hazard mitigation strategies in the future.

The companion spreadsheet for this report could serve as a resource for reviewing examples of actions from other local plans.⁴⁶ The action categories that we suggest here (Agency Coordination, Education and Awareness, Funding and Programmatic etc.) could be used as a guide for formulating, organizing, and reviewing actions. This frame might help local governments identify gaps in the types of actions they have and/or spur new ideas.

⁴⁶ We have posted a spreadsheet with links to all of the plans reviewed on our webpage at <https://www.eli.org/land-biodiversity/hazard-mitigation-planning>.

Appendix: All Relevant Actions Categorized

State	Regional Plan	County	Action	Action Category
Alabama		Mobile County	4.1.1: Increase open space acquisitions through the FEMA HMA Grant Programs and other flood plain acquisition efforts.	Conservation/ Preservation/ Management
Alabama		Mobile County	4.4.1: Restore and protect wetlands to enhance storm water drainage.	Restoration Conservation/ Preservation/ Management
Alabama		Mobile County	1.1.1: Maintain up-to-date comprehensive plans for all jurisdictions. Each plan should address natural hazards exposure and include long-term disaster resistance measures. The vulnerability and environmental suitability of lands for future development should be clearly addressed. Local plans should assess the vulnerability of designated hazard areas and encourage open space planning to create amenities for recreation and conservation of fragile resources.	Funding and Programmatic
Alabama		Mobile County	4.3.3: Develop an urban forestry management plan to ensure a progressive urban forestry program aimed at increasing forestry canopy, increased safety and planting hurricane resistant tree species.	Funding and Programmatic
Alabama		Mobile County	4.4.2: Develop a coastal renourishment program.	Funding and Programmatic
Alabama		Mobile County	2.2.1: Pursue grant funds to acquire and demolish flood prone or substantially damaged structures and replace with permanent open space.	Funding and Programmatic
Alabama		Mobile County	1.4.3: Require delineation of flood plain fringe, floodways, and wetlands on all plans submitted with a permit for development within a flood plain.	Policy and Law
Alabama		Mobile County	1.5.1: Examine regulatory options and feasibility of requiring open space areas for recreation, landscaping, and drainage control.	Policy and Law
Alabama		Mobile County	4.2.1 Keep builders and developers informed of Federal wetlands permitting requirements of the Corps of Engineers.	Policy and Law
California		Kern County	Caliente Creek Habitat Mitigation Project	Restoration
California		Kern County	Cuddy Creek Restoration Project	Restoration
California		Madera County	Woody Debris Removal	Restoration
California		Madera County	Erosion Repair and Restoration Projects	Restoration
California		Tulare County	Develop plans and action items for vegetation management that provides fire damage mitigation and protection of open space values. Plans should address protection of natural resource financial values, establishment of fire resilient natural resources, protection of watershed qualities, and protection of endangered species habitats. Actions should consider prescribed burning, fuel breaks, and vegetation thinning and removal	Funding and Programmatic

California		Tulare County	Incorporate native species habitat needs as part of long-term fire protection and fire restoration plans.	Funding and Programmatic
California		Tulare County	Continue to require buffer areas between development projects and significant watercourses, riparian vegetation, wetlands, and other sensitive habitats and natural communities. These buffers should be sufficient to assure the continued existence of the waterways and riparian habitat in their natural state.	Policy and Law
California		Tuolumne	Seek funding sources for and initiate watershed improvement projects for the County	Funding and Programmatic
Florida		Franklin County	Project 21: Protect and improve functioning of wetlands and waterways by eliminating and educating residents on living shorelines	Education and Awareness
Florida		Gulf County	Action 2: County wide beach nourishment and dune restoration with an emphasis on the Stump Hole and St. Joseph Peninsula areas. (pg 79)	Restoration
Florida		Hillsborough County	Shoreline acquisition [area recently developed] Also, include LaMP in Mango.	Conservation/ Preservation/ Management
Florida		Hillsborough County	Project 109.4: Acquire/improve 90 acres for wildlife habitat. Contains three disturbed wetlands. Create shallow foraging pond for Ibis, and passive recreational/educational area. (pg 16)	Restoration
Florida		Hillsborough County	Project 112.1: Develop stormwater wetland system in the portion of property used for agriculture and integrate it with the adjacent natural systems. Design system to provide stormwater treatment for flows equivalent to one inch from the S. (pg 20)	Green Infrastructure
Florida		Hillsborough County	Project 112.8: Construct culvert for wildlife underpass on two roadways near Balm-Boyette Scrub.	Land Use
Florida		Hillsborough County	Project 106.4: Regrading and replanting streambank. Support invasive species removal and agricultural BMPs. (pg 12)	Restoration
Florida		Hillsborough County	Project 106.6: Replace invasive shoreline vegetation with native plants. (pg 12)	Restoration
Florida		Hillsborough County	Project 106.7: Use ditch blocks to restore wetland hydroperiod for group of existing wetlands. (pg 12)	Restoration
Florida		Hillsborough County	Project 106.8: Enhance existing wetland south of Fletcher Avenue. (pg 12)	Restoration
Florida		Hillsborough County	Project 106.9: Enhance existing wetland at USF golf course. (pg 12)	Restoration
Florida		Hillsborough County	Project 107: Enhance existing wetland south of Bruce B. Downs Boulevard.	Restoration
Florida		Hillsborough County	Project 107.1: Enhance existing wetland east of 56th Street.	Restoration
Florida		Hillsborough County	Project 107.6: Divert flow to borrow pit to create 15 acre pond. Also, create 2-5 acre marsh	Restoration
Florida		Hillsborough County	Project 108: Install ditch blocks and excavate to increase existing wetland hydroperiod. (pg 14)	Restoration
Florida		Hillsborough County	Project 108.6: Create large marsh and divert flow to existing pond.	Restoration

Florida		Hillsborough County	Project 108.7: Regrade and replant streambank. Invasive species and agricultural BMP effort. (pg 15)	Restoration
Florida		Hillsborough County	Project 108.9: Purchase 5 parcels and create 13.5 acre detention pond and wetlands. (pg 15)	Restoration
Florida		Hillsborough County	Project 109.1: Create large marsh in-line or off-line.	Restoration
Florida		Hillsborough County	Project 109.3: Regrading and replanting streambank. Support invasive species removal and agricultural BMPs. (pg 16)	Restoration
Florida		Hillsborough County	Project 109.6: Remove nuisance vegetation and plant native understory to reduce erosion and improve wildlife habitat. (pg 16)	Restoration
Florida		Hillsborough County	Project 110: Expand existing 30 acre wetland to create 60 acre stormwater treatment area and culvert replacement.	Restoration
Florida		Hillsborough County	Project 110.3: Replant west shoreline with aquatic plants to aid in shifting the trophic structure of the lake from a phytoplankton dominated system to an emergent/submerged aquatic plant dominated system (pg 17)	Restoration
Florida		Hillsborough County	Project 110.4: Regrade existing channel north of Floral Drive to Lakewood/Iris Avenue and restore/create wetland riparian habitat along the channel. (pg 17)	Restoration
Florida		Hillsborough County	Restore 1,100 acres [acquired former pasture] to provide habitat based on soils and historic aerals. Restore to pine flatwoods and hardwood hammocks. (pg 19)	Restoration
Florida		Hillsborough County	Restore approx. 50 acres of wet pasture to herbaceous wetlands. (pg 19)	Restoration
Florida		Hillsborough County	Restore hydroperiod of impacted 40 acre wetland. (pg 20)	Restoration
Florida		Hillsborough County	Sun City Heritage Park Exotic Species Removal - Invasive species removal and native planting.	Restoration
Florida		Hillsborough County	Stormwater Improvements - Invasive species removal and native planting.	Green Infrastructure
Florida		Hillsborough County	Ruskin Inlet / March Branch Exotic Species Removal - Invasive species removal and native planting.	Restoration
Florida		Hillsborough County	Ruskin Commongood Exotic Species Removal - Invasive species removal and native planting.	Restoration
Florida		Hillsborough County	Domino Road Boat Ramp Exotic Species Removal - Invasive species removal and native planting.	Restoration
Florida		Hillsborough County	Wildcat Creek Park Stormwater Improvements - Invasive species removal and native planting.	Restoration
Florida		Hillsborough County	Beaudette Park Stormwater Improvements - Invasive species removal and native planting.	Restoration
Florida		Hillsborough County	Mango - MGA C - Invasive species removal and native planting.	Restoration
Florida		Hillsborough County	Project 113.2: Expand canal to increase size of redfish nursery.	Restoration

Florida		Lee County	Billy Creek Restoration – Fort Myers (pg 144)	Restoration
Florida		Lee County	Citywide Lake Rehabilitation – Fort Myers	Restoration
Florida		Lee County	Dredging and Restoration of the Sanibel Slough System - Sanibel	Restoration
Florida		Lee County	Living Shoreline Projects – Sanibel (pg 144)	Restoration
Florida		Lee County	Captiva Island Beach Restoration Project – Lee County (pg 146)	Restoration
Florida		Lee County	Gasparilla Island Beach Restoration Project – Lee County (pg 146)	Restoration
Florida		Lee County	Caloosahatchee Shoreline – Fort Myers (pg 144)	Restoration
Florida		Pasco County	Project 74: Acquire properties adjacent to river and Celtic Dr to establish a canoe/kayak launch site with riverfront park (pg 6)	Conservation/ Preservation/ Management
Florida		Pasco County	Project 78: Purchase Mickler property located along the Gulf of Mexico to protect wildlife and enhance floodplain (pg 7)	Conservation/ Preservation/ Management
Florida		Pasco County	Project 79: Purchase Boger Coastal property because it is located in a coastal high hazard area and it will protect wildlife and floodplains. (pg 7)	Conservation/ Preservation/ Management
Florida		Pasco County	Project 80: Purchase Castriota property located in a Critical Linkage to protect wildlife and floodplains (pg 7)	Conservation/ Preservation/ Management
Florida		Pasco County	Project 227: Acquire a parcel of 158 acres of wetlands along the Anclote River. This will serve as a buffer north of the Anclote River as increased floodplain (pg 15)	Conservation/ Preservation/ Management
Florida		Pasco County	Project 188: Restore original drainage patterns in the City and Regional Area in the Dade Oaks Community to allow for a new pond system function naturally and eliminate need of stormwater pumps and flooding (pg 12)	Restoration
Florida		Santa Rosa County	Action 30. Consider acquisition of natural areas for parks or open space. (pg 379)	Conservation/ Preservation/ Management
Florida		Santa Rosa County	Action 41: Encourage designation, protection and maintenance of wetlands as identified in the Comprehensive Plan and Land Development Code. (pg 383)	Conservation/ Preservation/ Management
Florida		Santa Rosa County	Action 40: Consider expansion of the County's properties that are designated natural and beneficial areas. (pg 383)	Land Use
Florida		Santa Rosa County	Action 24: Maintain and enforce designation of Coastal Barrier Resources Act (CBRA) property. (pg 376)	Policy and Law
Florida		Sarasota County	Purchase lots along the Myakkahatchee Creek	Conservation/ Preservation/ Management
Florida		Sarasota County	Coastal Land Acquisition Program - Purchase properties and preserve for open space	Land Use
Florida		Wakulla County	Project 2: Crawfordville Area stormwater study & mitigation (ph. 2) Acquisition of land & project implementation to address Crawfordville Area storm water issues	Technical and Information Conservation/ Preservation/ Management

Florida		Wakulla County	Project 26: Acquisition of severe repetitive loss properties for open space Acquisition of properties & demolition of structures on SRL list for permanent open space	Land Use
Florida		Wakulla County	Project 3: Drainage in Panacea Areas west of 98 in Panacea are prone to freshwater flooding. Cross drains and/or storage areas need to be identified and implemented to mitigate the impacts of flooding. Solution must not make the areas more vulnerable to storm surge. Study, acquisition of land, & implementation of storm water detention projects	Technical and Information
Florida		Wakulla County	Project 5: Wakulla Gardens subdivision storm water mitigation Study, acquisition of land, & implementation of storm water detention projects	Technical and Information
Florida		Wakulla County	Project 9: Magnolia Gardens & Griner's Addition subdivision storm water mitigation Study, acquisition of land, & implementation of storm water detention projects	Technical and Information
Florida		Walton County	Action: Promote the natural functions of wetlands and require that an impact on wetlands due to development be appropriately addressed or mitigated in kind. (pg 164)	Education and Awareness Policy and Law
Iowa		Allamakee County	Participate in watershed/waterway planning and initiatives	Funding and Programmatic
Iowa		Allamakee County	Stormwater management as needed, including infiltration, retention basins, bioswale, rain garden, & siltation removal projects (Harper's Ferry, Waukon)	Green Infrastructure
Iowa		Bremer	Participate in and cooperate with other jurisdictions in improving watersheds, including Watershed Management Authorities and Drainage Districts	Agency Coordination
Iowa		Bremer	Mitigate erosion along waterways and ditches through vegetation management	Restoration
Iowa		Bremer	Purchase additional parkland in order to increase greenspace and reducing surface flow	Conservation/ Preservation/ Management
Iowa		Buchanan County	Expand easement programs on agricultural land along rivers and streams	Conservation/ Preservation/ Management
Iowa		Buchanan County	Protection of wetland and other natural areas existing along waterways	Conservation/ Preservation/ Management
Iowa		Buchanan County	Follow watershed monitoring requirements set forth by the Iowa Department of Natural Resources	Policy and Law
Iowa		Buchanan County	Encourage the use of buffer strips (Aurora, Fairbanks, Rowley)	Land Use
Iowa		Buchanan County	Maintenance of watershed management behind fire department – reseeded to control flood waters (Brandon)	Conservation/ Preservation/ Management
Iowa		Buchanan County	Strategically place Filter Strips and other Sedimentation and Erosion Control Measures in areas to reduce the amount of foreign materials entering water bodies (Quasqueton)	Restoration

Iowa		Chickasaw County	Marketing, promoting, and encouragement of the use of buffer zones and filter strips along streams, lakes, and rivers	Education and Awareness
Iowa		Chickasaw County	Identify locations and development of wetlands/detention ponds	Technical and Information Restoration
Iowa		Chickasaw County	Encourage the use of buffer and filter strips (Fredericksburg)	Land Use
Iowa		Fayette County	Acquire flood prone properties and convert to open space/green space, or pursue easements when acquisition is not possible	Land Use
Iowa		Fayette County	Participate in Turkey River Watershed Management Authority planning, and other waterway planning / initiatives	Funding and Programmatic
Iowa		Fayette County	Support stormwater management practices (i.e. drainage, infiltration, retention basins, bioswale, raingardens, and siltation removal projects)	Green Infrastructure
Iowa		Fayette County	Consider opportunities for implementing community project ideas listed in Figure 6.G.1 of the TRWMA Flood Reduction Plan: 1) Pond/wetland/small lake, 2) Raingarden/empty lot project, 3) Rain barrel program, 4) Permeable pavers, 5) Rainscaped park revitalization, 6) School stormwater runoff program, 7) Green roofs, 8) Native turf/native grasses, 9) Bio - swales, 10) Lawn nutrient reduction, 11) Policy/ordinance, 12) Business rainscape incentive/Blvd. projects, 13) Tree planting (edible/other) (Arlington, Clement, Elgin, Fayette, Hawkeye, Maynard, St. Lucas, Wadena, Waucoma, West Union,)	Green Infrastructure
Iowa		Fayette County	Support planning and initiatives of the newly established Upper Wapsi and Maquoketa River Watershed Management Authorities	Funding and Programmatic
Iowa		Fayette County	Include and incorporate watershed practices identified and modeled by the Turkey River Watershed Management Authority's (TRWMA) Watershed Resiliency Plan	Conservation/ Preservation/ Management
Iowa		Fayette County	Consider land acquisition or easements along properties north of Hwy 150 bridge and on Little Volga River to provide space for stormwater structures, natural buffers or open space areas to help mitigate against flooding (Maynard)	Conservation/ Preservation/ Management
Iowa		Fayette County	Acquire flood prone properties and convert to open space/green space, or pursue easements when acquisition is not possible (Waucoma)	Land Use
Iowa		Fayette County	Identify and acquire flood prone properties and convert to open space/green space (Clemont)	Land Use
Iowa		Fayette County	Coordinate with landowners along Turkey River (e.g. Pleasant Valley Sports Club) to plan native buffer / riparian plantings along river to reduce impacts from flooding (Clemont)	Partnerships Restoration
Iowa		Fayette County	Install native turf or perennial plantings near culverts to help trap sediment and reduce maintenance (Hawkeye)	Conservation/ Preservation/ Management

Iowa		Fayette County	Work with Flood Mitigation Professionals in the implementation of agricultural conservation practices, water control basins, on-road water control structures, wetlands and riparian buffers, restoration and protection of stream ecosystems, conservation easements, and urban green streetscape practices	Partnerships Conservation/ Preservation/ Management Restoration
Iowa		Dubuque	Restore the Bee Branch Creek with open channel from the 24th St. neighborhood to E. 16th St. retention basin, including the acquisition of approximately 70 homes and businesses.	Restoration
Louisiana		Iberia Parish	Action I14: Protect the lower planning area of the Parish from coastal erosion by creating marsh and shore protection at Weeks Bay. (pg 168)	Restoration
Louisiana		Iberia Parish	Action I15: This project is designed to re-create brackish marsh habitat in open water areas of the interior marsh primarily caused by hurricane damage. (pg 168)	Restoration
Louisiana		Iberia Parish	Action I16: Vermilion Bay Shoreline Restoration (pg 168)	Restoration
Louisiana		Jefferson Parish	P-6: Increase Open Space Areas (pg 287) o City of Gretna o City of Harahan o City of Kenner o City of Westwego o Town of Grand Isle o Town of Jean Lafitte	Conservation/ Preservation/ Management
Louisiana		Jefferson Parish	NRP-1: Increase coastal protection (pg 291)	Conservation/ Preservation/ Management
Louisiana		Jefferson Parish	FP-2: Update Stormwater Management Regulations (ex. compensatory storage for new construction, drainage study with new development, program for rain garden/green infrastructure incentives, permeable surface requirements, sewer backup/overflow protection program) (pg 289) o City of Gretna o City of Harahan o City of Kenner o City of Westwego o Town of Grand Isle o Town of Jean Lafitte	Policy and Law Green Infrastructure
Louisiana		Jefferson Parish	NRP-2: Build back marsh (pg 292)	Restoration
Louisiana		Jefferson Parish	NRP-2: Revitalize wetlands to protect City from surge (pg 303) (City of Gretna)	Restoration
Louisiana		Jefferson Parish	NRP-1: Use debris (fallen trees) after a strong hurricane for coastal restoration (like Christmas tree project) (Town of Grand Isle) (pg 341)	Restoration
Louisiana		Jefferson Parish	NRP-3: Natural Shoreline/ Dune Restoration (Town of Grand Isle) (pg 342)	Restoration
Louisiana		Orleans Parish	Improve drainage infrastructure through measures in high flood risk areas including, but not limited to, the upgrade and improvement of culvert design and construction, retention and detention areas. Improve drainage infrastructure through measures including the upgrade and improvement of canals	Green Infrastructure

			and drainage pipes, installation of retention and detention areas including green infrastructure.	
Louisiana		Orleans Parish	Continue implementing funded drainage improvement projects, including post-construction maintenance and monitoring. These projects will reduce pressure on the existing piping system. The benefits of these projects will include beautification, improved recreational areas, flood mitigation, and social cohesion. Drainage improvement projects could include St. Roch Streetscape Improvements, Mirabeau Water Park, Mac 35/Hall/Youth Study Center, Pontilly Project green infrastructure interventions, and Hagan Lafitte drainage upgrades.	Green Infrastructure
Louisiana		Orleans Parish	Install rain gardens and stormwater runoff filtration and water retention systems along streets to reduce subsidence and flooding.	Green Infrastructure
Louisiana		Orleans Parish	Promote greater use of pervious concrete	Green Infrastructure
Louisiana		Orleans Parish	Engage with regional and statewide efforts for the protection of coastal wetlands – including coordination regarding wetlands policy.	Agency Coordination Conservation/ Preservation/ Management
Louisiana		Orleans Parish	The Golden Triangle Marsh Creation Project	Restoration
Louisiana		Orleans Parish	The Biloxi Marsh Living Shoreline Project. The Biloxi Marshes consists of approximately 49,000 hectares of brackish and salt marshes, which provide important storm buffer for New Orleans as well as key habitat and ecosystem services. The marshes have been greatly impacted by shoreline erosion from wind-driven waves.	Restoration
Louisiana		Orleans Parish	Coordinate with State and Federal partners to implement the NO East Landbridge restoration project	Restoration
Louisiana		Orleans Parish	Educate the public about stormwater management - Educate the public about their role in keeping drains and culverts clear. Distribute information on lot-scale mitigation strategies like GI; promoting the work of partner NGOs that have programs to assist homeowners with implementing these activities	Education and Awareness Green Infrastructure
Louisiana		Orleans Parish	Pursue an acquisition/buy-out program wherein property owners could elect to move out of a high-risk area to a lower risk area. Pursue an acquisition/buy-out program wherein property owners could elect to move out of a high-risk area to a lower risk area. Acquired properties would be rezoned as open space and maintained by Parks and Parkways as passive recreational areas.	Land Use
Louisiana		Orleans Parish	N Claiborne GI - Implement recommended green infrastructure improvements along the North Claiborne corridor that could include tree planting, bioswales, stormwater parks, and pervious pavement on public and private property	Green Infrastructure
Louisiana		Orleans Parish	2043-47 Felicity GI - Implement recommended green infrastructure improvements along 2043- 47 Felicity Street.	Green Infrastructure
Louisiana		Orleans Parish	Lafitte Blue Way - Implement recommended green infrastructure improvements along the Lafitte Greenway	Green Infrastructure

Louisiana		Orleans Parish	Integrate design solutions into community stormwater behaviors (e.g., designate parking areas in neutral grounds to avoid damage to trees and underground infrastructure) - Implement citywide urban design standards intended to guide the community's response to stormwater management. Ensure the design guidelines and solutions consider the location of utilities and green infrastructure to prevent accidental and unintended damage to City facilities and improve safety and mobility.	Green Infrastructure
Louisiana		Orleans Parish	Sankofa Wetlands Enhancement - Develop a nature trail and wetland park on 40 acres of space in the Lower Ninth Ward to help with stormwater management and reduction of land subsidence. Utilize this project as an educational opportunity for youth in the area.	Green Infrastructure
Louisiana		Orleans Parish	NO East Landbridge Restoration: Advocate for NRDA funding - Advocate for NRDA Funding of the NOE Land Bridge Project at State and Federal Levels.	Restoration
Louisiana		Orleans Parish	Bayou Bienvenue/Central Wetlands Restoration - Advocate for Funding of the restoration of Bayou Bienvenue at State and Federal Levels.	Restoration
Louisiana		Orleans Parish	Scale-up tree planting to the neighborhood level, opt-out approach, contiguous planting grids - Promote tree clustering strategy, which will allow plantings to have a more impactful scale. It is a proven strategy that produces numerous environmental benefits, which has been implemented in numerous major cities, including Atlanta. Explore an opt-out planting strategy where the community preselects streets for plantings; property owners can "opt-out" of the project if they desire.	Land Use
Louisiana		Orleans Parish	Leverage Resilience work to create workforce development opportunities - Work with the WIB and JOB1 to build out a strategy for workforce development in the field of resiliency. Leverage local resilience and mitigation efforts as opportunities to train the local workforce in 'green' jobs, such as sustainable construction, green infrastructure, adaptive reuse of demolition materials, energy and carbon capture and storage, and water quality technicians. Make sure all angles of workforce development are being addressed.	Green Infrastructure
Louisiana		Orleans Parish	Scale-up lot-scale green infrastructure, stormwater management, etc. through trainings, funding	Green Infrastructure
Louisiana		Orleans Parish	Increase water literacy curriculum development, teacher training, the goal of all students receiving 1 hour/year of qualified instruction - Work with Orleans Parish School Board and other charter schools in the Parish to develop a curriculum for water ecology, rain gardens, best management practices for stormwater management (catch basin debris collection, etc.)	Education and Awareness Green Infrastructure

Louisiana		Orleans Parish	Louisiana Watershed Initiative - City engagement in Region 6 and Region 8 planning and policy - Continue coordination with Regional Planning Commission (RPC) and other parishes in Region 6 and Region 8 to implement the planning and policy development for watershed management in the region. Evaluation of flood risks and identification of projects in the region to minimize the flood risk in accordance with Louisiana Water Initiative launched by the State of Louisiana in 2018 based on the following principles: 1) Using scientific tools and data; 2) Enabling transparent, objective decision-making; 3) Maximizing the natural function of floodplains; 4) Establishing regional, watershed-based management of flood risk.	Funding and Programmatic
Louisiana		Orleans Parish	Reforestation community outreach plan - Develop a public outreach and education plan to involve residents, businesses, and public officials to promote an equitable and healthy tree canopy. This public outreach program will facilitate the ongoing city's reforestation initiative to restore and expand the urban forest to a 50 percent tree canopy coverage by 2030 as specified in the city master plan—link reforestation to complete streets elements like desirable walking conditions and traffic calming	Funding and Programmatic
Louisiana		Orleans Parish	Green Infrastructure maintenance manual - Create a comprehensive green infrastructure maintenance manual for Orleans Parish that details procedures such as who is the party responsible for maintenance, what are the steps and needed equipment and materials to maintain the green infrastructure, how these efforts can be sustainably funded over time, and how maintenance will be properly inspected and enforced.	Green Infrastructure
Louisiana		Orleans Parish	Develop a Comprehensive Reforestation Plan - Conduct a Tree Canopy Study to understand gaps in the existing tree canopy inventory. Identify and allocate city budget to plant trees in order to address the identified gaps in the tree canopy network.	Funding and Programmatic
Louisiana		Orleans Parish	Complete study on the economic impact of Green Infrastructure investments and implement policy recommendations	Technical and Information Green Infrastructure
Louisiana		Orleans Parish	List the permitting process for tree planting and some types of concrete removal as Green Infrastructure rather than a Construction project	Policy and Law Green Infrastructure
Louisiana		Orleans Parish	Create a citywide data platform for all green infrastructure projects	Technical and Information Green Infrastructure
Louisiana		Plaquemines Parish	Restore marshland. (pg 74)	Restoration
Louisiana		Plaquemines Parish	Create man-made and natural barriers to coastal erosion. (pg 75)	Restoration
Louisiana		Plaquemines Parish	Participate in existing programs at the state and federal levels oriented to environmental enhancement and conservation.	Funding and Programmatic

Louisiana		Tammany Parish	STP30: The West St. Tammany Shoreline Protection project is a 24,773 linear foot project. The goal of this project is the restoration of 15,677 feet of shoreline and the protection of 9106 feet shoreline. (pg 179)	Restoration Conservation/ Preservation/ Management
Louisiana		Tammany Parish	STP31: Guste Island Marsh Creation project is a 685 acre marsh creation project. The goal of this project is the restoration of 651 acres of marsh as well as the nourishment of 34 acres of stressed marsh land. (pg 179)	Restoration
Louisiana		Tammany Parish	STP32: The Bayou Cane Marsh Creation project is a 4,117 acre marsh creation project. The goal of this project is the restoration of 850 acres of low salinity marsh as well as the nourishment of 3,293 acres of stressed marsh land (pg 179)	Restoration
Louisiana		Tammany Parish	STP33: The Faciane Canal Marsh Creation project is a 2,853 acre marsh creation project. The goal of this project is the restoration of 1,997 acres of low salinity marsh as well as the nourishment of 630 acres of stressed marsh land. (pg 179)	Restoration
Louisiana		Tammany Parish	STP34: The Bayou Lacombe Marsh Creation project is a 3,114 acre marsh creation project. The goal of this project is the restoration of 623 acres of low salinity marsh as well as the nourishment of 2,336 acres of stressed marsh land (pg 180)	Restoration
Louisiana		Tammany Parish	STP35: The Fritchie North Marsh Creation project is a 4,395 acre marsh creation. The goal of this project is the restoration of 2,417 acres of marsh as well as the nourishment of 1,997 acres of stressed marsh land. (pg 180)	Restoration
Louisiana		Terrebonne Parish	Action 4.2.1: Participate in existing programs at the state and federal levels oriented to environmental enhancement and conservation (pg 126)	Agency Coordination
Louisiana		Terrebonne Parish	Action 1.5.1: Pursue approvals and funding for coastal restoration projects such as sediment diversions to reduce land subsidence in coastal areas (pg 122)	Funding and Programmatic Restoration
Louisiana		Terrebonne Parish	Action 4.2.6: Research partners and low tech or low cost alternatives for marsh, coastal or shoreline protection or restoration programs to reduce harm from all hazards.	Technical and Information
Louisiana		Vermilion Parish	Action V33: Shoreline protection through rock breakwaters of approximately 21,000 feet of Schooner Bayou Canal bankline from Highway 82 to North Prong, to benefit preservation of shoreline integrity and reduction of wetland degradation (pg 120)	Conservation/ Preservation/ Management
Louisiana		Vermilion Parish	Action V37: Protect existing healthy marsh from extended periods of high salinity or high water levels; restore degraded marsh to benefit bird species in wetlands (pg 121)	Conservation/ Preservation/ Management Restoration
Louisiana		Vermilion Parish	Action V38: Prevent further wetland loss through reduction of bank erosion and subsequent tidal scour of shoreline marshes as well as to enhance the biodiversity of the project area with the creation of Oyster Reefs. Phase II will complete construction of remaining 2,855 linear feet. (pg 121)	Conservation/ Preservation/ Management Restoration

Louisiana		Vermilion Parish	Action V43: Prevent further wetland loss through reduction of bank erosion and subsequent tidal scour of shoreline marshes as well as to enhance the biodiversity of the project area with the creation of Oyster Reefs. Phase I and II will complete the construction of the remaining 4,190 linear feet of oyster reef/shoreline protection designed in Phase I. (pg 122)	Conservation/ Preservation/ Management Restoration
Louisiana		Vermilion Parish	Action V11: Marshland project implementation to mitigate against coastal land loss. (pg 116)	Restoration
Minnesota		Carver County	Work to reduce the impacts of sedimentation and erosion to County / City drainage systems of streams, creeks, and culverts to mitigate over-the-road flooding. (Carver County, Carver, Chanhassen, Chaska, Cologne, Hamburg, Mayer, New Germany, Norwood Young America, Victoria, Waconia, Watertown)	Restoration
Minnesota		Carver County	Work with the City of Watertown to evaluate dam removal on the Crow River at Rick Johnson Park in order to reduce hazard and risk created by dam. Remove dam if feasible. (Carver County, City of Watertown)	Technical and Information
Minnesota		Carver County	Improve Carver Creek near the City of Carver to provide relief and overflow in large rain events and reduce stress on adjacent Co. Rd. 40, particularly in locations where Carver Creek is threatening road banks. (Carver County, City of Carver)	Restoration
Minnesota		Carver County	Provide information & technical assistance to property owners to help mitigate against localized flooding during high-rain events. (i.e., landscaping / green infrastructure applications). (Carver County, Carver, Chanhassen, Chaska, Cologne, Hamburg, Mayer, New Germany, Norwood Young America, Victoria, Waconia, Watertown)	Education and Awareness
Minnesota		Carver County	Work to restore and preserve natural systems impacted by wind/water erosion (i.e., wetland restoration). (Carver County, Carver, Chanhassen, Chaska, Cologne, Hamburg, Mayer, New Germany, Norwood Young America, Victoria, Waconia, Watertown)	Conservation/ Preservation/ Management Restoration
Minnesota		Carver County	Improve the stabilization of hillsides or banks to reduce impacts to roads, natural resources, and recreation areas from erosion and slope failure. (Carver County, Carver, Chanhassen, Chaska, Cologne, Hamburg, Mayer, New Germany, Norwood Young America, Victoria, Waconia, Watertown)	Land Use
Minnesota		Carver County	Promote/provide assistance to landowners in the application of practices that help to mitigate against erosion (i.e., installation of shelter belts, erosion control measures for lake shore and stream bank stabilization).	Education and Awareness
Minnesota		Filmore County	Implement flood infrastructure improvements through effective measures identified in the SWCD One Plan. Measure may include installing grassed waterways, redesigned bridges, appropriately sized culverts and ditches, retention structures, storm water systems, tiling, upload storage, natural	Restoration

			plantings, ponds, wetlands, diversion channels, buffers, no-till technologies, and landslide prevention measures	
Minnesota		Goodhue County	Turn all property along River Road into green space to prevent loss of life and property in flooding if dam failed	Conservation/ Preservation/ Management
Minnesota		Goodhue County	Plant a "living fence" along roadways	Land Use
Minnesota		Goodhue County	Eliminate invasive species such as buckthorn, wild parsnip, and oriental bittersweet	Restoration
Minnesota		Hennepin County	Install rain gardens to slow runoff and improve water quality (City of Crystal, New Hope)	Green Infrastructure
Minnesota		Hennepin County	Review and update policies that discourage growth in flood-prone areas (Dayton, Independence, Maple Plain, Minnetonka Beach, Minnetrista, Orono, Plymouth, Spring Park, St. Bonifacius)	Policy and Law
Minnesota		Hennepin County	Work with the local water sheds to continue to protect our lakes and streams for future water quality (Loretto, Maple Plain, Medina, Minnetonka Beach, Minnetrista, Orono, Spring Park, St. Bonifacius)	Conservation/ Preservation/ Management
Minnesota		Hennepin County	Provide incentives to public and private stakeholders to implement green infrastructure projects by providing grants (Minnehaha Creek Watershed District)	Funding and Programmatic Green Infrastructure
Minnesota		Hennepin County	Protect the tree canopy with work on updating the Urban Forestry Policy and funding the Forestry Preservation Coordinator Position (Minneapolis)	Land Use
Minnesota		Hennepin County	Use natural environmental features as wind buffers in site design (Minneapolis)	Land Use
Minnesota		Hennepin County	Reduce Urban Heat Island Effect by 1. Increasing tree plantings around buildings to shade parking lots and along public rights-of-way. 2. Encouraging installation of green roofs, which provide shade and remove heat from the roof surface and surrounding air. (Minneapolis)	Land Use Green Infrastructure
Minnesota		Hennepin County	Ensure defensible fire-fighting space is afforded adjacent to wild land and open space areas in new developments, as resources are available (Plymouth)	Land Use
Minnesota		Hennepin County	Wetlands and Ponds- Foster ongoing relationships with watershed and conservation districts to maintain healthy wetlands and ponds on or adjacent to our campuses (Hopkins Public Schools)	Partnerships Conservation/ Preservation/ Management
Minnesota		Hennepin County	Maintain wetland and natural resource inventories (Plymouth)	Technical and Information
Minnesota		Hennepin County	Restore wetlands or create new wetlands (Bassett Creek Watershed District)	Restoration
Minnesota		Hennepin County	Stabilize banks and improve habitat along Plymouth Creek in Plymouth with bank stabilization techniques including vegetation, sloping and grading, rock veins, stone toe, root wads, and rip rap (Bassett Creek Watershed District)	Restoration
Minnesota		Hennepin County	Evaluate wetlands throughout watershed (Bassett Creek Watershed District)	Technical and Information
Minnesota		Hennepin County	Prioritize and plan for wetland restoration projects (Bassett Creek Watershed District)	Technical and Information

Minnesota		Hennepin County	Work with a wide range of stakeholders to improve shoreline stabilization on Minnehaha Creek and repair streambank erosion (Minnehaha Creek Watershed District)	Partnerships Restoration
Minnesota		Hennepin County	Work with local municipalities to develop model ordinances to promote conservation development (Minnehaha Creek Watershed District)	Policy and Law
Minnesota		Hennepin County	Work with stakeholders to implement climate adaptation planning into their decision framework for new development and redevelopment (Minnehaha Creek Watershed District)	Partnerships Funding and Programmatic
Minnesota		Hennepin County	Conduct a cultural, historical and natural resources assessment of Hennepin County.	Technical and Information
Minnesota		Mcleod County	2.A.10. Retention Ponds. Work with the Buffalo Creek Watershed District to identify three potential stormwater retention ponds and/or wetland restorations. Secure conservation funding to implement.	Partnerships Technical and Information
Minnesota		Olmsted County	Flooding: identify and implement habitat restoration projects along the Zumbro River that will help reduce flooding by providing temporary storage within the river corridor (County, City of Byron, Oronoco)	Funding and Programmatic Restoration
Minnesota		Olmsted County	Work with private landowners (farmers) to obtain easements for water storage on their property to help reduce prolonged flood duration in cropland areas. (County, City of Byron, Pine Island)	Partnerships Conservation/ Preservation/ Management
Minnesota		Olmsted County	Encourage use of vegetation (i.e., tree planting) in communities to help reduce impacts of extreme heat temperatures. (County, City of Byron, Chatfield, Eyota, Oronoco, Stewartville)	Land use
Minnesota		Olmsted County	Update land use plans and floodplain zoning ordinances to identify and enforce where development should not occur. (County, Chatfield, Dover, Eyota, Oronoco, Pine Island, Stewartville)	Policy and Law
Minnesota		Olmsted County	Identify public properties that experience flood damage and work to implement measures to reduce or eliminate future flood damages as appropriate (i.e., homeowner education on landscaping, green infrastructure, or property acquisition & relocation) (County, Chatfield, Dover, Eyota, Oronoco, Pine Island, Stewartville)	Technical and Information Green Infrastructure
Minnesota		Olmsted County	Continue to update and implement existing plans (i.e., South Zumbro CIP) to help reduce long-term vulnerability of flooding and erosion to key waterways. (County, City of Byron, Stewartville)	Funding and Programmatic
Minnesota		Olmsted County	Examine the use of Low Impact Development (LID) techniques in road and development projects to more effectively manage stormwater runoff during heavy rain events. (County, City of Byron, Dover, Pine Island, Stewartville)	Green Infrastructure
Minnesota		Olmsted County	Develop educational materials and promote shoreland buffer vegetation Best Management Practices, and monitoring.	Education and Awareness
Minnesota		Olmsted County	Develop a model ordinance for use in every community in the county that will minimize disturbance and avoid the development of certain	Policy and Law

			areas that are unstable due to soils and/or geologic formation.	
Minnesota		Olmsted County	Regulate zoning and building permit applications to ensure new construction does not occur in flood-prone areas. (Eyota)	Policy and Law
Minnesota		Ramsey County	Work to restore and preserve natural systems impacted by wind/water erosion (i.e., wetland restoration).	Conservation/ Preservation/ Management Restoration
Minnesota		Ramsey County	Reduce the effects of extreme heat temperatures through measures such as installation of permeable paving, greenways, white roofs and tree plantings.	Green Infrastructure
Minnesota		Ramsey County	Provide information & technical assistance to property owners to help mitigate against localized flooding during high-rain events (i.e., landscaping / green infrastructure applications). (Ramsey County, Arden Hills, Falcon Heights, Gem Lake, Lauderdale, Little Canada, Maplewood, Mounds View, New Brighton, North Oaks, North St. Paul, Roseville, St. Anthony, Shoreview, Vadnais Heights, White Bear Lake)	Education and Awareness Green Infrastructure
Minnesota		Scott County	Acquire easements and prepare property to increase stormwater storage capacity in the Upper Watershed (Spring Lake TWP) to protect agricultural property and downstream communities. This storage would reduce peak flows on Spring and Prior Lakes (Prior Lake, Scott County)	Conservation/ Preservation/ Management
Minnesota		Scott County	Prevent or eliminate invasive species from our waterways, trees, and environment	Restoration
Minnesota		Scott County	Identify resources to combat the Emerald Ash Borer.	Funding and Programmatic
Minnesota		Scott County	Obtain grant funding to study for Markley Lake and O'Dowd Lake outlet improvements.	Funding and Programmatic
Minnesota		Scott County	Prevent or eliminate invasive species from our waterways, trees, and environment	Restoration
Minnesota		Wabasha County	Identify and implement projects to reduce risk to structures or infrastructure from erosion and landslides (i.e., installing buffer strips, preserving mature vegetation, decreasing slope angles, stabilizing with riprap or other means of slope anchoring.)	Conservation/ Preservation/ Management
Minnesota		Wabasha County	Provide information to property owners on ways to reduce local flood damage to properties, such as grading and landscaping, and green infrastructure.	Education and Awareness Green Infrastructure
Minnesota		Wabasha County	Evaluate and implement the planting of windbreaks to serve as a "living snow fence" to help prevent blowing and drifting snow onto key transportation routes.	Land Use
Minnesota		Wabasha County	Evaluate the locations and numbers of stream monitoring stations throughout the County, and coordinate and/or purchase additional monitoring equipment if necessary.	Technical and Information
Minnesota		Washington County	Remove levee to restore floodplain	Restoration
Mississippi	MEMA District 9	Hancock County	NRP-2: Develop and implement a plan in an effort to protect and maintain the natural marshes and other barriers. (pg 143) (City of Waveland)	Funding and Programmatic

Mississippi	MEMA District 9	Hancock County	NRP-3: Support marsh re-nourishment and restoration by participating with coastal states to protect wetlands and marshes as protective barriers from storms. Actions may minimize storm surge. (pg 115)	Partnerships Conservation/ Preservation/ Management
Mississippi	MEMA District 9	Hancock County	NRP-4: Restore barrier islands. (pg 115)	Restoration
Mississippi	MEMA District 9	Hancock County	NRP-3: Dredge Jackson Marsh to restore wetlands and help reduce flooding. (pg 144) (City of Waveland)	Restoration
Mississippi	MEMA District 9	Harrison County	NRP-3: Encourage acquisition or donation of conservation easements and properties in environmentally sensitive areas (pg 150)	Conservation/ Preservation/ Management
Mississippi	MEMA District 9	Harrison County	NRP-2: Preserve and protect trees and vegetation on uninhabited properties to improve natural stormwater management and flood control processes. (pg 205) (City of Pass Christian)	Conservation/ Preservation/ Management
Mississippi	MEMA District 9	Harrison County	P-4: Partner with the Land Trust for the Coastal Mississippi Plain to preserve open space. (City of Gulfport) (pg 183)	Partnerships Conservation/ Preservation/ Management
Mississippi	MEMA District 9	Harrison County	NRP-3: Work with the Harrison County Sand Beach Authority to continue dune propagation in areas along the beach where the seawall is below 10 foot in elevation. (pg 205) (City of Pass Christian)	Partnerships Restoration
Mississippi	MEMA District 9	Harrison County	P-9: Develop local, city, and county wetlands regulations that provide the "intent" of the regulations for flood storage (available for CRS credit). (pg 143)	Policy and Law
Mississippi	MEMA District 9	Harrison County	NRP-4: Encourage dune propagation in areas where the seawall is below 10 feet (NGVD). (pg 150)	Restoration
Mississippi	MEMA District 9	Harrison County	NRP-2: Support marsh restoration efforts. (pg 194) (City of Gulfport)	Restoration
Mississippi	MEMA District 9	Harrison County	NRP-3: Support the restoration of the barrier islands. (pg 194) (City of Gulfport)	Restoration
Mississippi	MEMA District 9	Jackson County	Action NRP-2: Acquisition of natural wetlands for City of Gautier land conservation. 32-acre parcel north of Singing River Mall to be used as Town Green). (pg 160) (City of Gautier)	Conservation/ Preservation/ Management
Mississippi	MEMA District 9	Jackson County	Action NRP-3: Land acquisition for City of Gautier City Park Community Center-Phase 1. Improvements to City Park along Mary Walker Bayou. (pg 160) (City of Gautier)	Conservation/ Preservation/ Management
Mississippi	MEMA District 9	Jackson County	NRP 1: Preserve trees and vegetation on uninhabited properties to improve stormwater management/flood control. (pg 178) (City of Ocean Springs)	Conservation/ Preservation/ Management
Mississippi	MEMA District 9	Jackson County	NRP 2: Preserve natural/wetlands and riparian areas through acquisition or conservation easements. (pg 179) (City of Ocean Springs)	Conservation/ Preservation/ Management
Mississippi	MEMA District 9	Jackson County	Action P-7: Continue implementation of open space preservation. (pg 187) (City of Pascagoula)	Conservation/ Preservation/ Management

Mississippi	MEMA District 9	Jackson County	NRP 3: Extend sand beach additional 100 feet to the east and stabilize with plantings (pg 179) (City of Ocean Springs)	Restoration
Mississippi	MEMA District 9	Jackson County	NRP 4: Request that Jackson County continue dune propagation in areas along East Beach and Front Beach. (pg 179) (City of Ocean Springs)	Restoration
Mississippi	MEMA District 9	Jackson County	Action P-9: Conduct a study of the effects of sea level rise and develop mitigation strategies to minimize those effects. (City of Gautier)	Technical and Information
Texas	Guadalupe River Basin	Comal County	Action 2: Adopt and implement a “green infrastructure” program for parks, nature preserves and greenbelts throughout the city. (pg 174) (Bulverde)	Funding and Programmatic Green Infrastructure
Texas	Guadalupe River Basin	Comal County	Action 1: Remediate repetitive losses along the Guadalupe River by acquiring flood damaged structures and converting acquired land to open (green) space. (pg 188) (New Braunfels)	Land Use
Texas	Guadalupe River Basin	Comal County	Action 8: Remediate repetitive losses along the Guadalupe River by acquiring flood damaged structures and converting acquired land to open (green) space. (pg 160)	Land Use
Texas	Guadalupe River Basin	Guadalupe River Authority	Action 36: Acquire, conserve and utilize easements to prevent development of known hazard areas. (pg 277)	Conservation/ Preservation/ Management
Texas	Guadalupe River Basin	Hays County	Action 20: Land Conservation for Aquifer Recharge (pg 551) (City of San Marcos)	Conservation/ Preservation/ Management
Texas	Guadalupe River Basin	Hays County	Action 18: Enhancement on existing Parks program item that placed riparian zone signs in areas where park land vegetation is left natural. Action would map the points of the sign placement using GIS. (pg 393) (City of Kyle)	Funding and Programmatic
Texas	Guadalupe River Basin	Hays County	Action 29: For improved drainage and public recreation, this project also called a Riparian Corridor Land Assembly will be a project that interconnects greenways into a trail system that connects across Kyle. (pg 397) (City of Kyle)	Land Use
Texas	Guadalupe River Basin	Hays County	Action 28: Selection of a municipal park where all or a portion of the site may be restored to a natural grassland or woodland. (pg 397) (City of Kyle)	Restoration
Texas	Guadalupe River Basin	Victoria County	Action 9: Implement a stream restoration/channelization program to ensure adequate drainage/diversion of storm water, throughout various county low water crossings, streambeds, creek sheds, tributaries, and riverine areas. (pg 148)	Restoration
Texas	Guadalupe River Basin	Victoria County	Action 9: Implement a stream restoration/channelization program to ensure adequate drainage/diversion of storm water, throughout various county low water crossings, streambeds, creek sheds, tributaries, and riverine areas. (pg 178) (City of Victoria)	Restoration
Texas		Aransas County	Action: Purchase Gordon Stanley Pond (pg 210) (City of Rockport)	Conservation/ Preservation/ Management
Texas		Aransas County	Action: Create a countywide wetlands preservation plan (pg 174)	Funding and Programmatic

Texas		Aransas County	Action: St. Charles Bay Shoreline/Lamar Beach Road (and shell ridge road)(and Newcomb's point) - the creation of new habitat will provide erosion protection improvements (pg 179) (pg 190) (pg 191)	Restoration
Texas		Aransas County	Action: Little Bay Hydraulic Restoration - remove sediment from the bay and use it for nourishment and habitat restoration projects. The project will protect habitat from coastal erosion and improve the ecotourism economy (pg 212) (City of Rockport)	Restoration
Texas		Brazoria County	Action P10: Preserve natural lands and green space to reduce the impacts of natural hazards. Up to 35,000 acres of land tracts could be purchased from willing sellers for their natural ecosystem services. Including floodwater storage, groundwater recharge, erosion control, drought mitigation, and wildfire damage reduction. The land will be converted to parks, wildlife management areas, community forests, and/or other public open spaces. (pg 255) In Partnership with The Trust for Public Land and voluntary partnering jurisdictions.	Conservation/ Preservation/ Management
Texas		Brazoria County	Action B5: Acquisition of seaward property and re-establish stabilizing vegetation. (pg 261) (Surfside Beach)	Conservation/ Preservation/ Management
Texas		Brazoria County	Action N12: Secure and develop Park land on and surrounding Lake Tenneco (pg 310)	Conservation/ Preservation/ Management
Texas		Brazoria County	Action N13: Acquire available three tracts of land adjacent to and near Brazos River County Park, develop and improve Park facilities and access (pg 311)	Conservation/ Preservation/ Management
Texas		Brazoria County	Action B4: Develop and implement a shoreline protection program. (pg 261) (Surfside Beach)	Funding and Programmatic
Texas		Brazoria County	Action N3: Implement dune and beach restoration to protect county beach areas between Surfside Beach and San Luis Pass (pg 306)	Restoration
Texas		Brazoria County	Action N16: Create a feeder beach for Follett's Island to slow the current erosion rate and protect wetlands in southeast Brazoria County. (pg 312)	Restoration
Texas		Cameron County	Action 6: Work with General Land Office to develop and implement a dune restoration plan to protect roads and minimize washouts from flooding and tidal surge (pg 135)	Agency Coordination Funding and Programmatic
Texas		Cameron County	Action 10: Work with General Land Office to develop a living coastline constructed from natural materials derived from regional materials such as rock and seagrass (pg 139)	Agency Coordination Restoration
Texas		Chambers County	Action B2: Hydroaxing the entire length of Hackberry Gully and Cotton Bayou from South of I-10 to Cotton Lake. Clearing out invasive species as well as other vegetation that are currently restricting the flow of storm water. Phases 1 and 2 have been completed, the requested funds will complete phases 3 through 6, completing the project. The requested funds will also pay for acquisition of permanent easements on both sides of the complete length of the project area. (pg 104)	Conservation/ Preservation/ Management

Texas		Galveston County	JB 2006-1: Implement beach and dune restoration program (pg 306) (Jamaica Beach) (City staff and council)	Restoration
Texas		Harris County	Action NAS28 (City of Nassau Bay) – Develop a Shoreline Management Plan (pg 451)	Funding and Programmatic
Texas		Harris County	Action KTY12 (City of Katy) — Provide incentives to private industry and contractors, for using permeable driveways and surfaces to reduce runoff and promote groundwater recharge. (pg 346)	Green Infrastructure
Texas		Harris County	Action PAS8 (City of Pasadena) — Flood control and drainage improvements. • Improve drainage easements by expanding the slopes, banks and drainage structures. • Expand and protect current bayou environment associated with riverine flood to mitigate city’s threat from flooding. • Construction of floodwalls, detention and retention basins, spillways and other related structures. • Hydrological routing • Right of Way Flood Mitigation • Projects Golden Acres Wastewater Treatment Plant Elimination (pg 475)	Restoration
Texas		Jefferson County	Action 6: Restore sand dunes to protect inland resources during storm surge events. (pg 397)	Restoration
Texas		Matagorda County	Action 7: Plant dune vegetation seaward and strengthen dunes. The County will work with Commissioner’s Court, Beach Dune Committee and Emergency Management for specific sections of the beach. (pg 29) (Emergency Management)	Restoration
Texas		Montgomery County	Action E-5: Improvements to two water channels within the city. Anders Branch and Town Creek. Physical improvements to both waterways. (pg 185) (City of Montgomery)	Restoration
Texas		Nueces County	Action 26: This action is to create a plan to preserve the unique ecosystems encompassing Hazel Bazemore Park by restoring the park’s natural resources through the mitigation and protection of its habitat while concurrently providing public access and ecotourism opportunities for park patrons. The objectives of the proposed project are to implement an environmentally engineered plan by executing erosion control techniques, constructing riverbank stabilization, remediation of native vegetation, providing public access through timber walkways and nature overlooks; and protecting and preserving the habitat through interpretive signage educating the public. (pg 372)	Funding and Programmatic
Texas		Nueces County	Action 23: This project is to restore, enhance and expand an existing wetland in the Corpus Christi Beach area by excavating an upland area and creating a hydrologic connection between the wetlands and Corpus Christi Bay. The connection will create a mix of tidal and fresh water and increase the environment available to aquatic species. Educational and informational signs will inform the public about the environment and the ecological value of wetlands and create public awareness to further promote the conservation and protection of the area. (pg 374)	Restoration

Texas		Wharton County	Action 4: Acquire, reuse and preserve open spaces adjacent to flood prone areas. (pg 31) (City of Wharton, City Public Works Department)	Conservation/ Preservation/ Management
Texas		Wharton County	Action 9: Design and construct flood-use stream restoration/ channelization projects. Flood protection for existing structures and also encouragement for the development of new structures. (pg 32) (City of Wharton, Planning Department)	Restoration
Virginia	Hampton Roads	Hampton	Hampton Mitigation Action 6: Adopt and implement holistic watershed plan. May include Climate Resilient Mitigation Activities (CRMA).	Funding and Programmatic
Virginia	Hampton Roads	Isle of Wight	Isle of Wight County Mitigation Action 4, p 7:172: Implement four-phase strategy to guide development in areas most vulnerable to sea level rise: 1) Create, adopt and distribute zoning maps identifying coastal and shoreline areas most vulnerable to sea level rise; 2) Identify and protect valued ecosystem features through zoning, subdivision regulations or other existing regulatory tools (e.g., shoreline setbacks, living shorelines, beach nourishment, erosion control); 3) Adopt policies that encourage development investment outside of the most vulnerable areas (e.g., tax incentives, fee waivers, County/State/Federal funds for roads, redevelopment or economic development, relocation assistance/planning); and 4) Begin to armor existing development where relocation is not feasible (e.g., elevation of new bridges, structural flood protection, tide gates).	Land Use Policy and Law
Virginia	Hampton Roads	James City	James City County Mitigation Action 2: Mitigate flooding problems identified in the flood studies performed for Powhatan Creek watershed. Measures may include, but are not limited to improvements to road crossings by increasing flow capacity, or installing over-topping protection. This action may include Climate Resilient Mitigation Activities (CRMA).	Restoration
Virginia	Hampton Roads	Newport News	Newport News Mitigation Action 4: Enhance and stabilize shorelines and roadway embankments along Chesapeake Avenue, and reduce the impact and risk of flooding to private and public properties. This action may include Climate Resilient Mitigation Activities (CRMA).	Restoration
Virginia	Hampton Roads	Newport News	Newport News Mitigation Action 9: Drainage improvements on Chelsea Place, to include increased flow through the drainage outfall from the apartments and diversion of some of the flow from Edgemoor Drive to a new outfall. This action may include Climate Resilient Mitigation Activities (CRMA).	Restoration
Virginia	Hampton Roads	Newport News	Newport News Mitigation Action 15, p 7:47: Hampton Avenue Channel Improvements & Constructed Wetlands Project.	Restoration
Virginia	Hampton Roads	Newport News	Newport News Mitigation Action 16, p 7:48: Salters Creek Stream Restoration Project.	Restoration

Virginia	Hampton Roads	Norfolk	Norfolk Mitigation Action 2, p 7:95: Maintain and protect the City's beaches and shorelines using natural shoreline protection measures...multiple activities are covered under this effort, including living shorelines, and dune planting and stabilization and environmental permitting.	Conservation/ Preservation/ Management Restoration
Virginia	Hampton Roads	Norfolk	Norfolk Mitigation Action 6: Continue to implement capital improvements that improve stormwater management and control flooding, especially for undersized and out-of-date drainage systems and patterns. This action may include Climate Resilient Mitigation Activities (CRMA).	Green Infrastructure
Virginia	Hampton Roads	Norfolk	Norfolk Mitigation Action 14: Identify and implement resilient strategies throughout the city to provide better watershed, neighborhood and parcel specific flood protection and mitigation. This action may include Climate Resilient Mitigation Activities (CRMA) and Mitigation Reconstruction projects	Restoration
Virginia	Hampton Roads	Poquoson	Poquoson Mitigation Action 11, p 7:59: Protect flood-prone natural resources as a buffer against sea level rise, including, but not limited to: 1) Protect in perpetuity the 69 acres of natural land at the end of Poquoson Avenue donated to the City; 2) Provide additional access points for the City's Blueway system, a series of canoe and kayak water trails in and around the City and Plum Tree Island; and, 3) Provide opportunities for retail and residential development on land that is less prone to flooding and sea level rise, such as the Big Woods area.	Conservation/ Preservation/ Management Land Use
Virginia	Hampton Roads	Portsmouth	Portsmouth Mitigation Action 14, p 7:121: Implement green infrastructure for flood and stormwater abatement.	Green Infrastructure
Virginia	Hampton Roads	Southampton County	Southampton County Mitigation Action 13, p 7:222: Enact tree preservation or landscape ordinance for new construction.	Policy and Law
Virginia	Hampton Roads	Southampton County	Southampton County Mitigation Action 18: Implement drainage plan for Newsoms area. The plan was created through a DHCD grant, but is not currently funded. Seek additional funding sources. Through the use of green infrastructure, this action may include Climate Resilient Mitigation Activities (CRMA).	Green Infrastructure
Virginia	Hampton Roads	Suffolk	Suffolk Mitigation Action 4: Continue to implement capital improvements that improve stormwater management and control flooding, especially for undersized and out-of-date drainage systems and patterns. This action may include Climate Resilient Mitigation Activities (CRMA).	Green Infrastructure

Virginia	Hampton Roads	Town of Boykins	Town of Boykins Mitigation Action 5, p 7:232: Acquire floodprone structures and convert land to open space. Other mitigation measures may include elevation, retrofit, mitigation reconstruction projects, or relocation of floodprone structures. Town of Branchville Mitigation Action 6, Town of Courtland Mitigation Action 5. Town of Ivor Mitigation Action 4, p 7:248 Town of Newsoms Mitigation Action 5, p 7:253	Land Use
Virginia	Hampton Roads	Virginia Beach	Virginia Beach Mitigation Action 15, p 7:149: Acquire open space in strategic locations that can provide multiobjective management benefits. Objectives may include but are not limited to: flood control, water quality, public access to waterways, preserving or creating tree canopy, and preserving unique ecological and cultural heritage sites. This action may include Climate Resilient Mitigation Activities (CRMA). Chesapeake Mitigation Action 15.	Conservation/ Preservation/ Management
Virginia	Hampton Roads	York County	York County Mitigation Action 7, p 7:89: Continue support of the Newport News Department of Public Utilities (Waterworks) forest management program to mitigate wildfire hazards and promote the health of forests within the reservoir watersheds.	Partnerships
Virginia	Middle Peninsula Region (Essex, Middlesex, Mathews, Gloucester, King & Queen, and King William Counties)	Essex County, Gloucester County, King William County, Mathews County, and 5. Middlesex County.	When elevating or flood proofing is not feasible for existing buildings threatened by flooding, land purchase and conversion to non-residential recreation/conservation land uses should be pursued by the locality using FEMA Grant Funds.	Land Use
Washington		Clallam County	Encourage native vegetation on shorelines and formation of dunes (Tribe)	Restoration
Washington		Clallam County	Encourage residents and landowners to leave natural erosion barriers, such as driftwood logs on the shore, in place to reduce shoreline erosion.	Education and Awareness
Washington		Clallam County	Implement vegetation and other natural resource management practices to reduce landslides and coastal erosion	Conservation/ Preservation/ Management
Washington		Jefferson County	Encourage development of acquisition and management strategies to preserve open space for flood mitigation, fish habitat, and water quality in the floodplain (City of Port Townsend, Jefferson County, Jefferson County Land Trust, and the Salmon Recovery Office)	Funding and Programmatic
Washington		Jefferson County	Use technical knowledge of natural ecosystems and events to link natural resource management and land use organizations to mitigation activities and technical assistance.	Technical and Information

Washington		King	<p>Protect and Restore Natural Floodplain Functions The natural functions of floodplains include storing floodwater and lowering flood heights and velocities, all of which reduces flood risk. Natural coastlines attenuate waves distribute sediment and large wood on beaches, and allow coastal erosion, all of which reduce coastal wave energy on properties in the floodplain. King County has a robust focus on protecting and restoring natural floodplain functions, but progress still needs to be made to accelerate progress and connect restoration projects to flood risk reduction projects. Additionally, upland forested areas provide a source of natural functions that reduces fast runoff, manages sediment flow, and protects water quality. These upland areas should be considered vital parts of natural floodplain functions.</p> <p>Implementation Plan/Actions</p> <ol style="list-style-type: none"> 1. Proactively acquire floodprone properties to utilize for future restoration projects. 2. Complete restoration projects that reconnect rivers to their floodplains, remove bank armoring, create side channels, reconnect oxbows, and encourage natural features such as beaver dams and large wood in channels for increased flood storage and fish habitat. These projects will create places for flood storage, which will reduce downstream flood heights and provide habitat for endangered species. 3. Restore coastal shorelines by removing bulkheads wherever possible, creating pocket estuary habitats, and allowing erosion to nourish beaches. Softening shorelines and creating estuaries will result in reduced wave energy and fewer negative coastal flooding impacts. 4. Incorporate beaver habitat in restoration projects to provide flood storage and keep instream water cooler. 5. Continue enforcing regulations that stop negative impacts on habitat and encourage net ecological benefit. Shoreline management, critical area, and floodplain management regulations that adhere to FEMA’s Biological Opinion are among the regulations that seek to improve natural floodplain functions. 	Conservation/ Preservation/ Management Restoration Policy and Law
Washington		King	<p>Manage Flood Protection Facilities Implementation Plan/Actions The following are strategies supported by the King County Flood Hazard Management Plan that should continue:</p> <ol style="list-style-type: none"> 1. Where possible, King County should remove flood protection facilities and allow rivers to reconnect to their floodplains. 3. Utilize bioengineering in repairs, enhancements, or temporary measures. Bioengineering incorporates live plants and large wood in an effort to reduce flood velocities while protecting aspects of flood protection facilities. 	Restoration

Washington		Mason County	Work with other stakeholders, such as the Skokomish Watershed Action Team (SWAT) to develop watershed restoration projects that will enhance/restore stream and wetland buffers and increase the flood storage capacity	Partnerships Restoration
Washington		Snohomish County	<p>CW-26 Preserve and restore floodplain and watershed ecosystem functions and service - Functioning ecosystems provide flood risk reducing co-benefits. Such benefits can include storing water, reducing damaging flows, containing debris, recharging aquifers, and removing pollutants.</p> <ol style="list-style-type: none"> 1. Continue compliance with the Shoreline Master Plan and Growth Management Act Programs. 2. Implement salmon recovery plans and Sustainable Lands Strategy (SLS) (e.g., watershed-based hydrologic management plan as identified in SLS). These plans include the following measures that preserve and restore hydrologic ecosystem services: <ol style="list-style-type: none"> a. Support forestry and farming resource area uses through tax and other incentives. b. Exempt forestry and farming activities from nuisance complaints to allow for full provisioning of ecosystem services. c. Preserve and protect open space and agricultural land. d. Restrict urban growth to non-flood prone areas unless expansion facilitates habitat restoration or open space acquisition e. Discourage new development and increased densities, both public and private, within riparian areas, channel migration zones, and marine shorelines wherever feasible. f. Decommission and treat select roads. g. Restore forested land cover. h. Restore natural hydrological and biological function to the floodplain and along shorelines. 3. Promote enhanced native vegetation along shorelines. 4. Implement storm water management to prevent land use-caused increases in flood levels and restore floodplain function. Methods may include the following: <ol style="list-style-type: none"> a. Monitor all stormwater and pumping station sites. b. Retrofit and repair stormwater conveyance infrastructure to restore floodplain function and maintain ecosystem services. c. Develop regional stormwater management plan. d. Continue to improve and upgrade stormwater facilities. e. Replace existing failed drainage system with adequately sized culvert at 22510 Cherry Valley Road. f. Construct bridges to replace undersized culverts at Mann Rd (MP 1.53) and Mt. Loop (MP 13.620029) to reduce flood risk. 	Conservation/ Preservation/ Management Restoration Land Use

Washington		Snohomish County	Promote strategies that accommodate flooding with minimal consequences within flood prone areas where risks are not life threatening. 3. Exploit ecosystem services/benefits of open spaces, parkways, and forested lands to reduce water velocity, control debris, and hold water.	Conservation/ Preservation/ Management
Washington		Snohomish County	Consider flood control structure maintenance that restores and maintains hydrologic ecosystems services of flood plains where feasible. 1. Reestablish and maintain healthy riparian areas and, where possible, consider setbacks and the use of bioengineering techniques where it is not feasible to decommission existing flood control structures. 2. Prohibit new dikes, levees, floodgates, pump stations, culverts, dams, water diversions, and other alterations in the floodplain unless it has been demonstrated that no feasible alternative exists. 3. Consider a policy promoting the spreading of flood flows over developed land where flood risks can be accommodated. This would be a preferred alternative to the construction of ever higher and higher levees. This strategy would be appropriate where there are climate-change-predicted increases in the occurrences of more frequency, lower depth, and low-velocity events.	Conservation/ Preservation/ Management Land Use
Washington		Whatcom County	Protect and Restore Natural Flood Mitigation Features (Whatcom County, City of Bellingham, City of Blain, Whatcom County Flood Control Zone District)	Conservation/ Preservation/ Management Restoration
Washington		Whatcom County	Preserve Floodplains as Open Space (Whatcom County, City of Blain, City of Bellingham, City of Everson, City of Ferndale, Whatcom County Flood Control Zone District, City of Lynden, City of Nooksack, City of Sumas)	Conservation/ Preservation/ Management
Washington		Whatcom County	Limit or Restrict Development in Floodplain Areas (Whatcom County, City of Bellingham, City of Blaine, City of Everson, City of Ferndale, Whatcom County Flood Control Zone District, City of Lynden, City of Nooksack, City of Sumas,	Land Use
Washington		Whatcom County	Adopt Polices to Reduce Storm Water Runoff (City of Blaine)	Policy and Law
Washington		Whatcom County	Prevent Development in Hazard Areas (City of Bellingham, City of Everson, City of Ferndale, City of Lynden, City of Nooksack, City of Sumas, Whatcom County)	Land Use
Washington		Whatcom County	Manage Development in High-Risk Areas (City of Bellingham, City of Blaine, City of Everson, City of Nooksack, City of Sumas, Whatcom County)	Land Use
Wisconsin		Barron County	Continue to monitor, study, and address stormwater and flash flooding hotspots in the County as identified in the flood assessment risk and vulnerability assessment of the hazard mitigation plan. Potential projects include, but are not limited to creation/expansion of flood/stormwater storage areas, the installation or re-sizing of culverts, the creation or improvement of drainageways, and the protection of natural drainage and retention areas.	Conservation/ Preservation/ Management

Wisconsin		Barron County	Continue to enforce County floodplain regulations to: discourage future floodplain development and the storage of hazardous materials in floodplains; require dry land access for new structures; limit development in dam shadows; and maintain natural flood storage areas.	Policy and Law
Wisconsin		Barron County	Continue to expand public educational efforts and partnerships regarding alternatives to mitigate stormwater and flash flooding run-off, such as agricultural soil health best practices, erosion controls, rain gardens, natural vegetation buffers, permeable pavement, shoreland practices, and forest management in areas with steep slopes. Partner with municipalities, lake groups, farmer-led councils, and other interested parties to promote related best practices.	Education and Awareness
Wisconsin		Barron County	Continue to maintain and implement the Barron County 15-Year Comprehensive Forest Land Use Plan and the Barron County Land and Water Resources Conservation Plan to include best management practices to reduce risks related to wildfire, drought, invasive species, and plant diseases.	Funding and Programmatic
Wisconsin		Bayfield County	Restrict or limit development in areas with sensitive coastal wetlands	Land use
Wisconsin		Bayfield County	PROMOTE NATURAL Methods TO CONTROL EROSION	Funding and Programmatic
Wisconsin		Bayfield County	Discourage land uses that negatively impacts the quality and quantity of coastal waters and/or wetlands	Land Use
Wisconsin		Bayfield County	Continue to protect the Lake Superior shoreline within Red Cliff Tribal boundaries with “protected” status.	Conservation/ Preservation/ Management
Wisconsin		Bayfield County	PROTECT RESOURCES Land Slumping - Old US 2 near Fish Creek – prevention of slumping banks.	Conservation/ Preservation/ Management
Wisconsin		Bayfield County	Village of Mason – Evaluate impact of erosion on the White River through the Village.	Technical and Information
Wisconsin		Douglas County	Promote acquisition of flood prone areas for open space protection, fish and wildlife habitat and preservation of water quality	Conservation/ Preservation/ Management
Wisconsin		Eau Claire County	Continue to monitor, study, and address stormwater and flash flooding hotspots in the County as identified in the flood assessment of the hazard mitigation plan. Potential projects include, but are not limited to: creation/expansion of flood/stormwater storage areas, the installation or re-sizing of culverts, the creation or improvement of drainageways, and the protection of natural drainage and retention areas.	Technical and Information Conservation/ Preservation/ Management
Wisconsin		Eau Claire County	Continue to educate the public and elected officials of flood risks, flood insurance, and alternatives to mitigate stormwater runoff (e.g., soil health, erosion controls, rain gardens, low-impact development). Especially target those municipalities with the greatest assessed improvements in or near floodplain areas.	Education and Awareness

Wisconsin		Eau Claire County	Continue to maintain and exercise the City's Flood Emergency Action Plan. Protect the function of and restore sensitive natural resources such as streams floodplains, wetlands, shorelines, and riverbanks through regulation, plan review, and/or City investment. Work with Wisconsin DNR to protect the banks and floodplain of the Chippewa and Eau Claire Rivers, as well as Sherman, Lowes, and Otter Creeks by enforcing its current floodplain regulations, using natural stream edge protection techniques, and by acquiring additional land for public open space. (City of Eau Claire)	Conservation/ Preservation/ Management
Wisconsin		Grant County	Explore utilizing natural systems such as bioswales to retain stormwater with new development (Village of Mount Hope)	Green Infrastructure
Wisconsin		Grant County	Continue to enforce stormwater ordinance and pursue stormwater system upgrades through natural systems. (City of Platteville)	Green Infrastructure
Wisconsin		Grant County	Work with DNR and County to protect local trout streams from erosion and pollution. (Town of Castle Rock)	Conservation/ Preservation/ Management
Wisconsin		Grant County	Work with UW – Extension to educate landowners on erosion and riparian conservation. (Town of Potosi)	Education and Awareness
Wisconsin		Pepin County	Monitor and enforce shoreland zoning ordinance in an effort to protect surface water quality.	Policy and Law
Wisconsin		Polk County	Continue to expand educational efforts and partnerships regarding alternatives to mitigate stormwater and flash flooding run-off, such agricultural soil health best practices, erosion controls, rain gardens, natural vegetation buffers, permeable pavement, shoreland practices, and forest management in areas with steep slopes.	Education and Awareness Green Infrastructure
Wisconsin		Polk County	Continue working with lake groups and other partners to implement the County's Aquatic Invasive Species Strategic Plan, enforce the transport ordinance, and complete the AIS rapid response plan.	Partnerships
Wisconsin		Polk County	Work with the St. Croix-Red Cedar Cooperative Weed Management Area (SC-RC CWMA) to identify and promote actions that can be undertaken in Polk County based on the recommendations in the SC-RC CWMA Strategic Management Plan for terrestrial plant and animal species of highest concern.	Partnerships Funding and Programmatic
Wisconsin		Polk County	Using various methods, prioritize target areas, treatment, and management efforts for terrestrial invasive species in Polk County.	Restoration
Wisconsin		Polk County	Continue to maintain and implement the Polk County 15-Year Comprehensive Forest Land Use Plan to include best management practices to reduce risks related to wildfire, invasive species, and plant diseases.	Funding and Programmatic
Wisconsin		Polk County	Undertake an educational initiative regarding the cutting and movement of firewood, which can spread invasives and diseases/fungus such as Emerald Ash Borer, Gypsy Moth, and Oak Wilt.	Education and Awareness

Wisconsin		Polk County	Identify some basic strategies that can be taken by cities, villages, and towns to combat the spread of invasive species. Educate elected officials and the public to identify those invasive species of greatest concern and the potential economic and resource impacts of these species.	Funding and Programmatic
Wisconsin		St. Croix County	Continue to monitor, study, and address stormwater and flash flooding hotspots in the County as identified in the flood assessment of the hazard mitigation plan. Potential projects include, but are not limited to: creation/expansion of flood/stormwater storage areas, the installation or re-sizing of culverts, the creation or improvement of drainageways, and the protection of natural drainage and retention areas.	Conservation/ Preservation/ Management Restoration
Wisconsin		St. Croix County	Continue to enforce County and local floodplain regulations to: discourage future floodplain development and the storage of hazardous materials in floodplains; require dry land access for new structures; limit development in dam shadows; and maintain natural flood storage areas.	Policy and Law
Wisconsin		St. Croix County	Continue to educate the public and elected officials of flood risks, flood insurance, and alternatives to mitigate stormwater runoff (e.g., soil health, erosion controls, rain gardens, low-impact development). Especially target those municipalities with the greatest assessed improvements in or near floodplain areas.	Education and Awareness
Wisconsin		Washburn County	Identify sites where environmental restoration work can benefit flood mitigation efforts.	Funding and Programmatic Restoration
Wisconsin		Washburn County	Create rain gardens up stream of existing storm sewers	Green Infrastructure
Wisconsin		Washburn County	*Encourage the development of acquisition and management strategies to preserve open space for flood mitigation (e.g., buy out, elevation, flood-proofing).	Land Use
Wisconsin		La Crosse County	Continue to monitor and enforce N.R. 116 Floodplain, Shore Land - Wetland Regulations and any changes to it.	Policy and Law
Wisconsin		La Crosse County	Utilize modeling, including EVAAL to identify priority areas for conservation and mitigation practices and projects	Technical and Information
Wisconsin		La Crosse County	Develop a landowner/farmer outreach program which will increase the number of practices that will retain water	Funding and Programmatic
Wisconsin		La Crosse County	Conduct a feasibility study on green infrastructure and implementation (City of La Crosse)	Technical and Information
Wisconsin		La Crosse County	Encourage the planting of trees in the City (City of La Crosse)	Funding and Programmatic
Wisconsin		La Crosse County	Plan and implement constructed wetlands (City of La Crosse)	Restoration



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