Massachusetts State Hazard Mitigation and Climate Adaptation Plan

Chapter 7: Hazard Mitigation and Climate Adaptation Strategy

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Acronyms and Abbreviations

A&F	Executive Office of Administration and Finance
BBRS	Board of Building Regulations and Standards
CIP	Capital Improvement Program
CY	Calendar Year
CZM	Office of Coastal Zone Management
DCAMM	Division of Capital Asset Management and Maintenance
DCR	Department of Conservation and Recreation
DEP	Department of Environmental Protection
DER	Division of Ecological Restoration
DHCD	Department of Housing and
DLS	Department of Labor Standards
DOER	Department of Energy Resources
DPH	Department of Public Health
DPU	Department of Public Utilities
EOEEA	Executive Office of Energy and Environmental Affairs
EMPG	Emergency Management Performance Grant
EOPSS	Executive Office of Public Safety and Security
EOTSS	Executive Office of Technology Services and Security
FEMA	Federal Emergency Management Agency
FMA	Flood Mitigation Assistance
FY	Fiscal Year
GIS	Geographic Information System
HRD	Human Resources Division
LHAs	Local Housing Authorities
MassDOT	Massachusetts Department of Transportation
MassWildlife	Division of Fisheries and Wildlife
MEMA	Massachusetts Emergency Management Agency
MOTT	Massachusetts Office of Travel and Tourism
MPRO	Massachusetts Permit Regulatory Office
MWRA	Massachusetts Water Resources Authority
NBS	Nature-Based Solutions
NGO	Nongovernmental Organization
NRCS	Natural Resources Conservation Service
OPSI	Office of Public Safety and Inspection
PA	Public Assistance
PDM	Pre-Disaster Mitigation
PMT	Project Management Team
RL	Repetitive Loss
RGGI	Regional Greenhouse Gas Initiative
RMAAT	Resilient MA Action Team
SHMCAP	State Hazard Mitigation and Climate Adaptation Plan
SHMP	State Hazard Mitigation Plan
SRL	Severe Repetitive Loss
THIRA	Threat and Hazard Identification and Risk Assessment
U.S. EPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
WURP	Water Utility Resilience Program

7. Hazard Mitigation and Climate Adaptation Strategy

This hazard mitigation and climate adaptation strategy is a culmination of the previous work in the planning process, including significant stakeholder engagement, as well as specific findings from the risk and vulnerability assessments and the state capability and adaptive capacity analysis.

The plan's mission statement and goals represent the vision of the Commonwealth of Massachusetts for a future in which vulnerabilities from natural hazards and climate change are reduced or eliminated through specific hazard mitigation and climate adaptation actions. They also reflect the needs identified in the risk and vulnerability assessments and the state capability and adaptive capacity analysis. For instance, an obstacle identified in the capability and adaptive capacity analysis related directly to the challenge of institutionalizing hazard and climate resilience within state agencies that will require more clear emphasis, direction, and operational

SHMCAP Mission Statement

Reduce the statewide loss of life, and protect natural resources, property, infrastructure, public health, and the economy from natural hazards and climate change through the development of a comprehensive and integrated hazard mitigation and climate adaptation program.

commitments from each Cabinet Secretary. Institutional change often encounters cultural resistance, and will likely need to be incremental, and sustained over the long term. This need is directly reflected in the first goal statement, which emphasizes enhancing resiliency by integrating programs and building institutional capacity.

7.1 Mission Statement

The mission statement developed with stakeholder input outlines an ambitious vision for mitigating risk and adapting to climate change across the Commonwealth:

Reduce the statewide loss of life, and protect natural resources, property, infrastructure, public health and the economy from natural hazards and climate change impacts through the development of a comprehensive and integrated hazard mitigation and climate adaptation program.

7.2 Goals

Five goals were developed to provide a framework to implement the vision of the Commonwealth for mitigating risk and adapting to climate change. The bold text in the following goal statements are the key ideas that are essential for addressing the vulnerabilities identified in the risk assessment.

1. Enhance the Commonwealth's resiliency to natural hazards and climate change by **integrating programs and building institutional capacity**.

2. Reduce the impacts of natural hazards and climate change with forward-looking **policies, plans, and regulations**.

3. Understand our **vulnerabilities and risks** and develop immediate and long-term risk reduction strategies for current and future conditions using the best available science.

4. Increase the resilience of State and local government, people, natural systems, the built environment, and the economy by investing in **performance-based solutions**.

5. Support implementation of this plan through increased **education, awareness, and incentives** for action for state agencies, local governments, private industry, non-profits, and the general public.

The process of developing the goal statements, including an analysis of the change in priorities, is fully outlined in *Chapter 9: Planning Process* and in Appendix D.

Although not specifically referenced in the goal statements, the need to address repetitive loss (RL) and severe repetitive loss (SRL) properties, as identified by the Federal Emergency

Management Agency (FEMA), is recognized by the Commonwealth in our specific actions and in our funding prioritization criteria for Hazard Mitigation Assistance (HMA) grants.

7.3 Importance of Nature-Based Solutions in Hazard Mitigation and Climate Adaption

Nature-based solutions (NBS) are defined as:

> *The conservation, enhancement, and restoration of nature to reduce emissions, adaptation, and enhance resiliency. These types of solutions use natural systems, mimic natural processes, or work in tandem with traditional engineering approaches to address natural hazards like flooding, erosion, drought, and heat islands.*

Examples of NBS include restoring wetlands and floodplains to reduce flooding, planting trees to reduce the heat island effect, and conserving and managing agricultural soils to sequester carbon. NBS projects like open space conservation have been shown to reduce storm surge damages in hurricanes, provide habitat services, support a restoration economy, improve water quality, and improve housing values.

Nature-based solutions offer numerous co-benefits, including minimizing costs, improving water quality, and enhancing quality of life. Listed below are some co-benefits that should be taken into account when considering the cost and benefits of NBS:

- Flooding: Floodplains provide flood protection and reduce infrastructure damage.
- Public Health: Managing stormwater from precipitation events and reducing retention ponds reduces the creation of mosquito habitat and vector-borne illnesses.
- Air Quality and Public Health: Trees reduce the urban heat island effect, reducing smog creation and resulting asthma occurrences, as well as reducing nitrogen dioxide and particulate matter.
- Water Quality: Streamside vegetation filters pollutants, reduces erosion, and reduces velocity in high flow events.
- Water Quantity: Forests and wetlands store water during high flow events, improve water quality, and recharge groundwater.
- Recreation: Clean, flowing waters support recreation, including boating, fishing, and swimming; while open space provides areas for hiking and biking.
- Quality of Life: Open space and street trees create a more enjoyable outdoor environment, benefiting community connection, health, and the economy in downtowns and commercial areas. Green spaces have also been shown to reduce stress and help with healing.

- Property Value: An increase in natural features can increase property values and the tax base; for example, healthy, mature trees add an average of 10 to 30 percent to a property's value.
- Carbon Sequestration: Massachusetts has carbon-rich natural resources—forests, wetlands, salt marshes, and soils—that, if protected and restored, can retain carbon stocks and enhance the natural cycles to absorb carbon. Massachusetts forests currently absorb more than 15 percent of the carbon generated in Massachusetts every year.
- Energy Usage and Carbon Emissions: Trees planted in urban environments can reduce heating and cooling needs in buildings and lead to more efficient use of energy resources, therefore helping to reduce carbon emissions.

These co-benefits should also be considered in decision-making. When making funding and policy decisions, NBS should receive strong consideration over "hard" infrastructure solutions, where feasible. *Executive Order 569 Establishing an Integrated Climate Change Strategy for the Commonwealth* calls for Secretariats to employ NBS (Section 3.1):

> *(v) policies and strategies for ensuring that adaptation and resiliency efforts complement efforts to reduce greenhouse gas emissions and contribute towards the Commonwealth meeting the statewide emission limits established pursuant to the GWSA;*
>
> *(vi) strategies that conserve and sustainably employ the natural resources of the Commonwealth to enhance climate adaptation, build resilience and mitigate climate change;*

The prioritization framework used to rank the action items (as outlined in Appendix D) includes nature-based approaches specifically designed to conserve and/or employ natural resources as the highest-priority ranking.

In addition, for the implementation of certain State grant or State-administered grant programs, emphasis may be placed on projects that outline a nature-based solution, such as the Executive Office of Energy and Environmental Affairs' (EOEEA's) Municipal Vulnerability Preparedness (MVP) Action Grants, FEMA's HMA grants, the Office of Coastal Zone Management's (CZM) Coastal Resiliency Grants, and others.

7.4 Hazard Mitigation and Climate Adaptation Actions

Identifying hazard mitigation and climate adaptation actions for this plan began when the planning process was initiated. Each opportunity for stakeholder involvement provided a chance for stakeholders to recommend their ideas for how the State could address risks and vulnerabilities from natural hazards and climate change. For the purposes of this plan, hazard mitigation was defined as:

> *The effort to reduce loss of life and property by **lessening the impact of disasters**. In order for mitigation to be effective we need to take action now—before the next disaster—to reduce human and financial consequences later (analyzing risk, reducing risk, and insuring against risk).*

Climate adaptation was defined as:

> *Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. (IPCC, 2007)*

Resilience was defined as:

> *The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions.*

This plan defines a hazard mitigation or climate adaptation action as a specific **action, project, activity, or process** taken to reduce or eliminate long-term risk to people, property, and natural systems from climate change and/or natural hazards and their impacts. This section provides an initial list of actions developed by the Executive Offices and agencies of the Commonwealth as part of the planning process. These were developed through a comprehensive stakeholder engagement process with final review and development by the Commonwealth's state agencies, Executive Office Climate Change Coordinators, and Cabinet Secretaries. The actions are also informed by the Massachusetts Emergency Management Agency's (MEMA's) review and working knowledge of the actions and strategies identified in local hazard mitigation plans. In addition, the actions from the 2013 State Hazard Mitigation Plan (SHMP) were reviewed at the start of the planning process. See Appendix D for a complete review and summary of the status of these actions.

Many agency actions relate directly to the vulnerabilities identified in the state agency vulnerability assessment reports that were completed as a part of this plan (see Chapter 9 for additional details). Eight Executive Offices and 21 state agencies contributed actions for inclusion in the plan.

The state capability and adaptive capacity analysis led to recommendations for mitigating risk by identifying challenges and opportunities at the state and local level. These conclusions were shared by the Project Management Team (PMT) with stakeholders when developing action ideas.

Actions

A hazard mitigation or climate adaptation action is a specific **action, project, activity, or process** taken to reduce or eliminate long-term risk to people, property, and natural systems from climate change and/or natural hazards and their impacts.

Typically, hazard mitigation actions may be developed to mitigate risk identified by a specific hazard. As detailed in

Chapter 3: Introduction to Risk Assessment, a categorization of traditional natural hazards in the context of climate change was used to demonstrate the connections between traditional natural hazard analysis and climate change projections. All actions considered in the plan address at least one of the primary climate change interactions, and associated climate change impacts identified in *Chapter 4: Risk Assessment*. This directly connects the hazard mitigation and climate adaptation strategy to the risk assessment conducted for the plan. The range of actions is broad, and covers topics such as protecting assets, developing additional studies, supporting local governments, and meeting the needs of vulnerable populations. Below are several examples of actions identified by state agencies to mitigate risks identified in the state capability and adaptive capacity analysis:

- The Department of Public Health (DPH) developed an action titled *State Employee Education on Climate Change and Hazards*.
- The Department of Conservation and Recreation (DCR) developed an action to Understand DCR Asset Vulnerability. One of the financial recommendations is to "develop specific procedures to encourage and maximize the use of the FEMA's Public Assistance (PA) 406 Mitigation program funding following future Presidentially Declared Disasters. PA 406 is a historically underused source of discretionary funding for building resilience into the repair, replacement, or restoration of publicly owned facilities damaged by a hazard event."
- MEMA has an action titled *Enhance the effectiveness of 406 funding by working to further integrate mitigation into the FEMA Public Assistance Program*. This action was also included in the 2013 SHMP, and progress was made by MEMA's mitigation and recovery units working collaboratively to identify areas where 406 funding could be leveraged to maximize tax dollars.

Every challenge identified in the state capability and adaptive capacity analysis does not have a representative action; however, many do, as shown above.

All of the actions are designed to achieve goals established by the Commonwealth for mitigating risk and adapting to climate change. Table 7-1 outlines the comprehensive range of actions by goal. Many actions address more than one goal.

Table 7-1: Number of Actions for Each Goal Statement

Total Number of Actions	Goal 1: Integrating Programs and Building Institutional Capacity	Goal 2: Policies, Plans, and Regulations	Goal 3: Vulnerabilities and Risks	Goal 4: Performance-Based Solutions	Goal 5: Education, Awareness, and Incentives
108	**68**	**69**	**82**	**56**	**39**

The State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) actions are maintained in an "action tracker" spreadsheet that can be sorted in multiple ways, and viewed and maintained by the State. Table 7-2 identifies the columns listed in the action tracker spreadsheet. The actions are also included in tables in Appendix D.

Table 7-2: Action Tracker Sheet Column Descriptions

Columns	Descriptions
Global Actions	Represent actions that have cross-cutting impacts on risk reduction across the administration.
Completion Time Frame	These time frame categories are a guide to implementation of this action plan: • Less than 3 years • 3 to 5 years • Greater than 5 years
Action Title	This is a short sentence describing the action. It typically includes an action word (engage, perform, develop) to facilitate measurable outcomes.
Action Description	Brief description about why the action is relevant and what problem it addresses. It may also include how it complements other actions or an agency mission.
Executive Office	Organizing by Executive Office facilitates leadership by the Climate Change Coordinators.
Lead Agency	The responsible state agency.
Partner(s)	State agencies, programs, or nonprofit organizations that may participate in the action.
Agency Priority Score	State agencies self-assigned a priority score for their actions relative to their other identified agency actions using a tool developed by the PMT.
Possible Funding Source(s)	Any pre-identified or anticipated funding source options. Sources may include combinations of the below: • State Funding – Operating Budget • State Funding – Capital Budget • Federal Funding • Departmental Revenue or Other Sources
SHMCAP Goal(s)	Each action is connected to one or more plan goal statements.
Primary Climate Change Interaction(s)	This identifies the primary climate interactions and associated impacts that an action is proposed to address (these categories are used in the climate change and natural hazard taxonomy that has been developed for the plan). All appropriate boxes are checked.

The following sections present an initial list of actions identified during the development of this plan. Section 7.4.1 includes "global" actions that are intended to reduce risk across State government and the Commonwealth. The global actions are organized by the following completion time frame categories: less than 3 years, 3 to 5 years, and greater than 5 years. Actions within each completion time frame category are presented by Executive Office in alphabetical order, followed by Lead Agency in each Executive Office in alphabetical order. Section 7.4.2 includes the specific actions of the Executive Office and Lead Agency, which are organized in the same manner as the global actions. Detail from the action tracker spreadsheet is provided for each action.

Actions were prioritized by each agency using a prioritization tool developed by the consultant team and PMT using agreed-on metrics. The prioritization tool (Appendix D) allowed agencies to rank actions against other agency-specific actions based on 21 different factors. Prioritization criteria included considerations of cost-effectiveness, ability to meet multiple goals, environmental soundness, avoided losses, and technical feasibility, in addition to many other factors the PMT agreed were important in evaluating and prioritizing actions to be included in the SHMCAP. In total, the prioritization system included 21 different parameters under three categories: Relevancy, Resiliency, and Cost & Time. Scores from the tool resulted in rankings of Very High, High, Medium, or Low Priority (Appendix D). Importantly, priority scores have not been evaluated collectively across Secretariats; these scores simply reflect a within-agency, initial evaluation.

7.4.1 Global Actions

Completion Time Frame	EOTSS: Migrate CommVault to the cloud.	
Less than 3 years	**Action Description:**	Migrate CommVault system to the cloud, removing the need to maintain and protect on premise servers for this system.
	Executive Office:	Executive Office of Technology Services and Security
	Lead Agency:	Executive Office of Technology Services and Security (EOTSS)
	Partner(s):	
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	2, 3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake

Completion Time Frame	EOTSS: Migrate critical operational systems to the cloud (MITC); move critical communications infrastructure to Markley.	
Less than 3 years	**Action Description:**	Migrate Commonwealth servers to cloud hosting to the fullest extent possible (handful of exceptions.) Move critical communications infrastructure to Markley (secure, local location). These migrations away from on premise hosting to cloud hosting reduce the risk of disruption due to sea level rise and extreme weather events.
	Executive Office:	Executive Office of Technology Services and Security
	Lead Agency:	Executive Office of Technology Services and Security (EOTSS)
	Partner(s):	Administration-wide
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	2, 3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake
Completion Time Frame	**EOTSS: Migrate email to the cloud.**	
Less than 3 years	**Action Description:**	Migrate legacy Microsoft Exchange systems to cloud-based Office 365 services.
	Executive Office:	Executive Office of Technology Services and Security
	Lead Agency:	Executive Office of Technology Services and Security (EOTSS)
	Partner(s):	Administration-wide
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	2, 3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake
Completion Time Frame	**A&F: Budgeting, coordinating administrative functions, and planning.**	
3-5 years	**Action Description:**	Incorporate climate change vulnerability, resiliency, and adaptation standards into budgeting, coordination, and capital planning.
	Executive Office:	Executive Office of Administration and Finance
	Lead Agency:	Executive Office of Administration and Finance (A&F)
	Partner(s):	Administration-wide
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	1
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	HRD: Incorporate hazard and climate change vulnerability into personnel and workplace policies, training, and guidance as appropriate.	
3-5 years	**Action Description:**	Executive Branch employees are subject to policies and guidance from HRD regarding weather and other hazard-related emergencies, workplace rules, and other information. HRD will evaluate current policies and guidance and will consider updates and other training opportunities about personnel readiness, workplace climate change vulnerabilities, hazard mitigation, and climate adaptation techniques, etc.
	Executive Office:	Executive Office of Administration and Finance
	Lead Agency:	Human Resources Division (HRD)
	Partner(s):	Administration-wide
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake
Completion Time Frame	**DPU: Power system planning that incorporates climate change risk.**	
3-5 years	**Action Description:**	Assess how power system planning may incorporate existing climate models to assess risk and deploy cost-effective infrastructure to reduce outages, repair, and replacement. Utilities could also identify key data gaps for system planning and identify that to DPU/EOEEA to coordinate with ongoing research.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Public Utilities (DPU)
	Partner(s):	DOER
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	EOEEA: Create and deploy a SHMCAP project database.	
3-5 years	**Action Description:**	The primary system for monitoring and evaluating plan implementation is through the SHMCAP Action Tracker, a customized tracking spreadsheet tool for reporting progress status updates on individual actions. The Action Tracker will be deployed as a consistent approach for updating and reporting in real-time and will be actively maintained on a restricted, password-protected file sharing site to be established by EOEEA. It will serve as the primary mechanism for the status updates on each action and will establish metrics to measure effectiveness.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Executive Office of Energy and Environmental Affairs (EOEEA)
	Partner(s):	MEMA
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	1, 2
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake
Completion Time Frame	**EOEEA: In consultation with DCAMM, MassDOT, and EOHED develop climate change design standards.**	
3-5 years	**Action Description:**	EOEEA will work with Climate Change Coordinators and agency staff across Secretariats to review and update design standards using Massachusetts climate change projections that will support best management and construction practices for new and improved agency structures, roads, parkways, parking lots, housing, and other facilities.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Executive Office of Energy and Environmental Affairs (EOEEA)
	Partner(s):	DCAMM, A&F, EOHED
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Operational and Capital Budget
	SHMCAP Goal(s):	1, 2, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	EOEEA: Maintain and enhance climate change projections and specific climate change data sets to support different groups of end users.	
3-5 years	**Action Description:**	EOEEA has partnered with the Northeast Climate Adaptation Science Center at University of Massachusetts Amherst to obtain climate change projections for temperature, precipitation, sea level rise, and inland hydrology through the end of the century. Now these datasets needs to be maintained, updated, and enhanced through additional studies, stakeholder engagement to determine key data needs, and ongoing incorporation of advancements in the field of climate change science. Updated climate change data will be maintained and made available to the public on the resilient MA website.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Executive Office of Energy and Environmental Affairs (EOEEA)
	Partner(s):	Northeast Climate Adaption Science Center
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	1, 2
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**OPSI: Review the state building code to assess feasibility of incorporating hazard mitigation and resilience.**	
3-5 years	**Action Description:**	OPSI will review the state building code to assess feasibility of incorporating hazard mitigation and resilience into standards.
	Executive Office:	Executive Office of Housing and Economic Development
	Lead Agency:	Office of Public Safety and Inspections (OPSI)
	Partner(s):	BBRS
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	1, 2
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake

Completion Time Frame	EOTSS: Migrate HRCMS/MMARS to the cloud.	
3-5 years	**Action Description:**	Migrate the EOTSS Human Resources Compensation Management System and Massachusetts Management Accounting and Reporting System to the cloud, removing the need to maintain and protect on premise servers for these systems.
	Executive Office:	Executive Office of Technology Services and Security
	Lead Agency:	Executive Office of Technology Services and Security (EOTSS)
	Partner(s):	Comptroller, A&F, HRD
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	2, 3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake
Completion Time Frame	**DCAMM: Incorporate hazard and climate change vulnerability into capital planning, master planning, and facilities management functions.**	
Greater than 5 years	**Action Description:**	DCAMM will incorporate climate change vulnerability, resilience, and adaptation standards into capital planning for new projects; refer to agency climate change vulnerability assessments in master planning exercises; and integrate climate change vulnerability assessments into a facilities management system.
	Executive Office:	Executive Office of Administration and Finance
	Lead Agency:	Division of Capital Asset Management and Maintenance (DCAMM)
	Partner(s):	EOHHS
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	2, 3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake

Completion Time Frame	EOEEA: Review, evaluate, and implement revisions as needed to environmental and energy policies, regulations, and plans.	
Greater than 5 years	**Action Description:**	Review, evaluate, conduct outreach with stakeholders, and implement revisions that may be needed to key state environmental and energy policies, regulations and plans maintained by EOEEA and its agencies. This action has cross-cutting impact on risk reduction across the administration.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Executive Office of Energy and Environmental Affairs (EOEEA)
	Partner(s):	A&F
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	1, 3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**EOEEA: Utilize available climate change projections and risk assessment data to assess vulnerabilities of all EOEEA properties. Support efforts across the administration to assess facilities held by other Executive Offices.**	
Greater than 5 years	**Action Description:**	Climate projection information and information on site specific vulnerabilities, agency adaptive capacity, populations served, and other information will be utilized to assess climate change vulnerability at all of EOEEA's land holdings, facilities, parkways, fisheries, dams, and other properties. This vulnerability assessment would result in scores and information for each asset, as well as a system of GIS layers depicting exposure and sensitivity and final vulnerability scores to help EOEEA to understand the risks present at each site.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Executive Office of Energy and Environmental Affairs (EOEEA)
	Partner(s):	All EOEEA agencies, DCAMM
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital and Operating Budget
	SHMCAP Goal(s):	2, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	EOPSS: Incorporate climate change resilience into business continuity planning for state government.	
Greater than 5 years	**Action Description:**	EOPSS will work with A&F and EOTSS to update business continuity planning and to incorporate climate change hazards into plans and procedures across state government. This action has cross-cutting impact on risk reduction across the administration.
	Executive Office:	Executive Office of Public Safety and Security
	Lead Agency:	Executive Office of Public Safety and Security (EOPSS)
	Partner(s):	A&F, EOTSS, MEMA
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	1, 2
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**MEMA: Update the State Hazard Mitigation and Climate Adaptation Plan and submit for FEMA review and approval every 5 years.**	
Greater than 5 years	**Action Description:**	The Commonwealth expanded its commitment to the mitigation program by continually updating the plan and by incorporating climate adaptation into the 2018 update. Incorporating climate change into the plan, creates a more practical and useful tool for the Commonwealth. The updated plan is referred to as the 2018 State Hazard Mitigation and Climate Adaptation Plan (SHMCAP). A project management team was formed and a contractor was hired to assist. This action has cross-cutting impact on risk reduction across the administration.
	Executive Office:	Executive Office of Public Safety and Security
	Lead Agency:	Massachusetts Emergency Management Agency (MEMA)
	Partner(s):	EOEEA and RMAAT
	Agency Priority Score:	Very High
	Possible Funding Source(s):	Federal Funding - FEMA HMA Grants
	SHMCAP Goal(s):	1, 2, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake

Completion Time Frame	MassDOT: Expand and improve the Boston Harbor Flood Risk Model to create the Massachusetts Coastal Flood Risk Model.	
Greater than 5 years	**Action Description:**	Create improved sea level rise and storm surge scenarios for the present tidal epoch, 2030, 2050, 2070/2100; create northern and southern model grids; consider future shoreline changes; correct CZM/MassGIS shoreline mapping; assess the storm surge vulnerability of the coastal transportation network; and make data available to state agencies, coastal communities, and other interested stakeholders.
	Executive Office:	Massachusetts Department of Transportation
	Lead Agency:	Massachusetts Department of Transportation (MassDOT)
	Partner(s):	EOEEA, Coastal Zone Management (CZM), University of Massachusetts Boston
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	1, 2, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

7.4.2 Executive Office and Agency Specific Actions

Completion Time Frame	DCR: Track and assess asset vulnerability by adding climate change/resiliency categories as part of the Asset Management Modernization Project.	
Less than 3 years	**Action Description:**	DCR has been working with DCAMM to create a comprehensive database of property information. To date, vulnerabilities to climate change and natural hazards have not been incorporated into the data. DCR will work to include climate change vulnerabilities and resiliency actions this for a more robust understanding of DCR properties and their vulnerabilities.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Conservation and Recreation (DCR)
	Partner(s):	DCAMM
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	1, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	DCR: Update the State Forest Action Plan to enhance climate change mitigation and adaptation strategies.	
Less than 3 years	**Action Description:**	Update State Forest Action Plan to incorporate strategies to deal with future conditions presented by a warming planet. These concepts will be incorporated into the 2020 update of the Plan.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Conservation and Recreation (DCR)
	Partner(s):	MassWildlife
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	1, 2, 3
	Primary Climate Change Interaction(s):	Precipitation Changes, Rising Temperatures
Completion Time Frame	**DEP: Vulnerability assessment of hazardous waste sites.**	
Less than 3 years	**Action Description:**	Conduct a vulnerability assessment of thousands of waste sites in state. Prioritize high concern based on water resources and indoor protections. Pilot studies of at risk sites for adaptations/mitigation measures. Provide assessment results to MVP Planning.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Environmental Protection (DEP)
	Partner(s):	OTA
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake

Completion Time Frame	DER: Update and share a dam removal decision support tool that directly incorporates new climate change projections, climate adaptation benefits and helps municipalities and others prioritize dams for removal.	
Less than 3 years	**Action Description:**	Municipalities, federal, state, and local agencies and non-profit organizations want to remove outdated dams to reduce risk, improve public safety, and restore habitat. With more than 3,000 dams and limited resources, it is important to select the projects that will yield the greatest environmental and risk reduction benefits. DER has developed and published a web-based tool that evaluates dams for removal based on the expected ecological benefit. DER will update and publish the web-based tool to include risk reduction and climate adaptation benefits.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Ecological Restoration (DER)
	Partner(s):	Office of Dam Safety; MassGIS. Users of the tools will include municipalities, NGOs, state agencies, and others.
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	1, 2, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Rising Temperatures, Extreme Weather
Completion Time Frame	**EOEEA: Develop and implement a communications strategy to build state agency, municipal and public awareness of climate change resiliency issues and adaptation strategies.**	
Less than 3 years	**Action Description:**	Working with MEMA, EOPSS and other Climate Change Coordinators, EOEEA will develop a communications strategy for the purpose of keeping state agency staff, municipal staff and volunteers, and residents informed of the risks, vulnerabilities and solutions as the impacts of climate change continue. EOEEA will use assets such as state parks to offer educational opportunities for residents across the Commonwealth and the resilient MA Climate Change Clearinghouse.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Executive Office of Energy and Environmental Affairs (EOEEA)
	Partner(s):	MEMA, EOPSS, Climate Change Coordinators
	Agency Priority Score:	Low
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	EOEEA: Reassess and develop a climate change resiliency framework and criteria for all EOEEA agency land acquisition and grant funding for land acquisition to support natural resource conservation, wildlife, human health and public safety.	
Less than 3 years	**Action Description:**	While EOEEA has incorporated resiliency criteria into its land acquisition grant programs and agencies address it in their agency prioritization schemes, the overall natural land protection program should be reviewed, assessed and reprioritized to ensure protection of multiple resiliency goals including protecting critical ecosystem services, ensuring connectivity of wildlife, protecting climate-sensitive areas, avoiding repeat loss of infrastructure and property, increasing human health and safety, and preserving habitats of climate-sensitive species.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Executive Office of Energy and Environmental Affairs (EOEEA)
	Partner(s):	All EOEEA agencies will be involved. Support from NGO's may be sought.
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital and Operating Budget
	SHMCAP Goal(s):	1, 3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	DPH: Provide support and direct care to vulnerable populations susceptible to climate change impacts.	
Less than 3 years	**Action Description:**	Provide data with a social determinants framework to inform the Municipal Vulnerability Preparedness (MVP) Program and DPH preparedness plans. Identify adaptation and resiliency strategies that address health and racial equity. Strengthen the Environmental Public Health Tracking network and the Climate and Health Program in the DPH. Using DPH's current cross-state databases, perform data collection and needs assessment for particularly vulnerable populations (such as the homeless, the elderly, and people with mental illness or substance use disorders) and develop and implement adaptation and resiliency plans for these vulnerable populations. • Provide data with a social determinants framework to inform the Municipal Vulnerability Preparedness (MVP) Program and DPH preparedness plans. • Identify adaptation and resiliency strategies that address health and racial equity. • Strengthen the Environmental Public Health Tracking network and the Climate and Health Program in the DPH. • Using DPH's current cross-state databases, perform data collection and needs assessment for particularly vulnerable populations (such as the homeless, the elderly, and people with mental illness or substance use disorders) and develop and implement adaptation and resiliency plans for these vulnerable populations.
	Executive Office:	Executive Office of Health and Human Services
	Lead Agency:	Department of Public Health (DPH)
	Partner(s):	EOEEA
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake

Completion Time Frame	EOHED: Incorporate climate change resilience/adaptation standards into grant programs including MassWorks.	
Less than 3 years	**Action Description:**	EOHED will incorporate climate change resilience and adaptation criteria into major grant programs to enhance vulnerability of resulting assets to climate hazards and risks, to increase the resilience of the MA economy to climate risks, and to assist local governments in making local infrastructure more resilient. EOHED will begin with MassWorks program and use results to model best practices for other programs.
	Executive Office:	Executive Office of Housing and Economic Development
	Lead Agency:	Executive Office of Housing and Economic Development (EOHED)
	Partner(s):	EOEEA
	Agency Priority Score:	Very High
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	1, 2, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake
Completion Time Frame	**DLS: Review and consider updates to MASSsafetyWorks! resources given increased expectations of extreme weather events.**	
Less than 3 years	**Action Description:**	DLS provides informational safety flyers for employers and employees with suggestions on how to improve workplace safety. DLS will review these to evaluate whether they should be updated in light of expectations of increased severity and frequency of extreme weather events.
	Executive Office:	Executive Office of Labor
	Lead Agency:	Department of Labor Standards (DLS)
	Partner(s):	
	Agency Priority Score:	Low
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	1, 3, 5
	Primary Climate Change Interaction(s):	Rising Temperatures, Extreme Weather

Completion Time Frame	MEMA: Apply for available federal HMA funding to implement and update the completed and approved multi-jurisdictional and local hazard mitigation plans.	
Less than 3 years	**Action Description:**	Progress made / continual. At present, there are 78 plans in development. From 2013-2017 the SHMT received 36 applications for planning grants to develop and / or update local hazard mitigation plans. Beginning with PDM 16, the Commonwealth began managing the PDM planning applications so that funding could be provided to more communities. The Mitigation Unit developed a strengthened internal process to better track local plan statuses in order to notify communities so that they can update their plans without a lapse.
	Executive Office:	Executive Office of Public Safety and Security
	Lead Agency:	Massachusetts Emergency Management Agency (MEMA)
	Partner(s):	RMAAT Agencies
	Agency Priority Score:	High
	Possible Funding Source(s):	Federal - State Management Cost, FEMA Emergency Management Performance Grant
	SHMCAP Goal(s):	1, 2, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake
Completion Time Frame	**MEMA: Create an Earthquake Risk Reduction Program.**	
Less than 3 years	**Action Description:**	This project will develop a multi-jurisdictional/multi-disciplinary working group that will be convened and led by a facilitator hired by the Commonwealth utilizing NEHRP Direct State Assistance funding. Working group members will represent a wide variety of disciplines, levels of government, and sectors. The primary goals of this diverse group will be to establish a robust earthquake mitigation program for the Commonwealth that will develop and implement strategies to increase earthquake awareness, preparedness and education, and mitigate earthquake-related risks.
	Executive Office:	Executive Office of Public Safety and Security
	Lead Agency:	Massachusetts Emergency Management Agency (MEMA)
	Partner(s):	USGS, FEMA, Northeast Stated Emergency Consortium (NESEC), Weston Observatory, State Building Code Officials, Structural Engineers, Academic Partners
	Agency Priority Score:	Medium
	Possible Funding Source(s):	Federal - Earthquake Hazards Reduction State Assistance Program
	SHMCAP Goal(s):	1, 3
	Primary Climate Change Interaction(s):	Earthquake

Completion Time Frame	MEMA: Hire a Disaster Survivor Assistance Planner.	
Less than 3 years	**Action Description:**	New and Ongoing. Develop and formalize plans, processes, and procedures for the direct and indirect delivery of services to citizens affected by man-made and natural disasters in the Commonwealth. To develop these, the Planner will convene one or more project management teams comprised of various local, state, and federal agencies, not-for-profit organization, and private sector partners.
	Executive Office:	Executive Office of Public Safety and Security
	Lead Agency:	Massachusetts Emergency Management Agency (MEMA)
	Partner(s):	
	Agency Priority Score:	Medium
	Possible Funding Source(s):	Federal - FEMA Emergency Management Performance Grant
	SHMCAP Goal(s):	1, 2
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**MEMA: Plan and host hazard mitigation grant workshops for state agencies and local governments after natural disasters, especially immediately following Presidential Disaster Declarations.**	
Less than 3 years	**Action Description:**	MEMA conducts multiple grant briefings following declared disasters and upon release of PDM / FMA Notice of Funding Opportunities. In addition to the in-person briefings, MEMA has acquired webinar capability to provide increased opportunities for participation. MEMA also regularly speaks at various municipal meetings about the importance of mitigation.
	Executive Office:	Executive Office of Public Safety and Security
	Lead Agency:	Massachusetts Emergency Management Agency (MEMA)
	Partner(s):	FEMA and Communities
	Agency Priority Score:	High
	Possible Funding Source(s):	Federal - State Management Cost, FEMA Emergency Management Performance Grant
	SHMCAP Goal(s):	1, 2, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake

Completion Time Frame	MEMA: Prepare hazard mitigation best practices and case studies.	
Less than 3 years	**Action Description:**	The Mitigation Unit regularly shares best practices during grant briefings and through the widely distributed "MEMA Reports".
	Executive Office:	Executive Office of Public Safety and Security
	Lead Agency:	Massachusetts Emergency Management Agency (MEMA)
	Partner(s):	DCR, EOEEA, CZM, DER
	Agency Priority Score:	Medium
	Possible Funding Source(s):	Federal - FEMA HMA Grant
	SHMCAP Goal(s):	1, 2, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**MassDOT: Incorporate climate resiliency into capital planning activities.**	
Less than 3 years	**Action Description:**	Establish awareness and training to incorporate climate change impacts into project design, and Operations and Maintenance. Impacts of current state and federal regulation impacts, policy, standard operating procedures, design guides will be assessed.
	Executive Office:	Massachusetts Department of Transportation
	Lead Agency:	Massachusetts Department of Transportation (MassDOT)
	Partner(s):	Highway Division staff, Consultants
	Agency Priority Score:	Very High
	Possible Funding Source(s):	State Funding - Capital and Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	DCR: Incorporate climate vulnerability in all planning efforts.	
3-5 years	**Action Description:**	As a large statewide agency, DCR has numerous plans which require periodic updates. This action item assures that impacts from climate change and natural hazards are considered in all planning efforts agency-wide.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Conservation and Recreation (DCR)
	Partner(s):	MassWildlife, DER, CZM
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	1, 2, 3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**DCR: Upgrade and strengthen control systems for both the New Charles River and Amelia Earhart dams.**	
3-5 years	**Action Description:**	DCR oversees the New Charles River and Amelia Earhart dams, which address the Charles River and Mystic River, respectively. Together, these dams provide critical flood control functions in a heavily populated, trafficked, and economically significant portion of the Commonwealth. DCR will review its capital maintenance and modernization plans with respect to these dams and will incorporate relevant flood, tidal, and other hazard mitigation considerations to make them more resilient to flooding and severe weather events.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Conservation and Recreation (DCR)
	Partner(s):	Army Corps
	Agency Priority Score:	Very High
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	1, 2, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Extreme Weather

Completion Time Frame	DEP: Promulgate wetlands regulations to establish performance standards for work in land subject to coastal storm flowage.	
3-5 years	**Action Description:**	Promulgate wetlands regulations to establish performance standards for work in Land Subject to Coastal Zone Flowage. DEP Wetlands Protection Program is working to propose draft regulations that will establish performance standards for work in Land Subject to Coastal Zone Flowage. This resource area is critical for reducing coastal impacts from Storm event. DEP intends to align any proposed standards with FEMA mapping and the state building code for these areas.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Environmental Protection (DEP)
	Partner(s):	
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**DEP: Update precipitation data used by wetlands program.**	
3-5 years	**Action Description:**	Update Precipitation projections (models) used by the wetlands program to condition work in wetland resource areas and design stormwater controls.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Environmental Protection (DEP)
	Partner(s):	University of Massachusetts at Boston and Amherst, Cornell University, MassDOT
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	DEP: Develop a Statewide River Hydraulic Model.	
3-5 years	**Action Description:**	This project will gather the paper printouts, microfiche, older software, and modern LIDAR to create a Statewide River Hydraulic Model. The Statewide Model will facilitate future updates to FEMA maps, including providing the ability to project the effects of higher hydrology on flooding elevations as well as project the river elevations during droughts. This project will allow for projection of future river elevations for both high and low flows and aid in estimating the effects of projects on river flooding.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Environmental Protection (DEP)
	Partner(s):	USGS New England Division. MassDOT, Northeast Climate Adaptation Science Center, EOEEA
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Operating Budget, Federal - USGS cooperative funding
	SHMCAP Goal(s):	3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**DEP: Develop Future Extreme River Flow Projections.**	
3-5 years	**Action Description:**	This project will develop streamflows predicted for the Year 2100 using a downscaled Global Circulation Model (GCM) with standardized Representative Concentration Pathways (RCP) from Coupled Model Intercomparison Project Phase 5 (CMIP5). The future streamflows will be added to the web-based USGS StreamStats Methods to make them widely available. This project will allow new and rebuilt roadway crossings to be designed using future expected streamflows which will eliminate uncertainty in the methods that convert precipitation to streamflow. Ultimately, the project will increase the resilience of new or rebuilt roadway crossings to convey river flow, aquatic organisms, and roadway automobile traffic.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Environmental Protection (DEP)
	Partner(s):	USGS New England Division. MassDOT, Northeast Climate Adaptation Science Center
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Operating Budget, Federal - USGS cooperative funding
	SHMCAP Goal(s):	3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	DEP: Improve Mapping to Enhance Resilience and Emergency Preparedness of Water Utilities.	
3-5 years	**Action Description:**	DEP's Water Utility Resilience Program (WURP) and Geographic Information Systems (GIS) Program initiated a collaborative effort in 2016 to develop a uniform approach in creating and tracking maps of public water systems and publicly owned treatment works. The project improves internal access to water utility critical infrastructure information, aids in identifying system vulnerabilities and local climate change planning, improves emergency preparedness and response capabilities, and develops consistently formatted, statewide water utility infrastructure maps for multiple uses. To date the project has developed detailed GIS maps for 89 water utilities in over 50 communities as well as general service area maps. Ongoing project implementation will create GIS mapping to improve system resiliency for additional water utilities. The project further aims to establish secure access to critical infrastructure information by DEP staff and collaborating agencies to enhance emergency response and recovery efforts.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Environmental Protection (DEP)
	Partner(s):	DPH, Water utilities/DPWs, Local municipal emergency managers
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	1, 2, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**DEP: Regional water quality monitoring initiative.**	
3-5 years	**Action Description:**	DEP is participating in a regional surface water quality monitoring initiative with the other New England states, EPA Regional offices, and tribes in the Northeast, Mid-Atlantic and Southeast. This effort monitors freshwater streams to detect climate-related changes related to temporal trends in biological, thermal, hydrologic, habitat and water chemistry data, and to gather information on response and recovery of organisms to extreme weather events.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Environmental Protection (DEP)
	Partner(s):	MassWildlife, DER, CZM
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	DER: Develop a prioritization and implementation strategy for barrier removal on cold water streams most impacted by warming temperatures to allow climate adaptation and habitat restoration.	
3-5 years	**Action Description:**	DER will work with federal, state, and local organizations and property owners to identify, prioritize, design, permit, and guide the removal of dams and replacement of culverts for the benefit of cold water habitat, public safety, and municipal infrastructure resilience. Removing barriers results in-stream temperatures decreasing and connectivity increasing for sensitive species in cold water streams, while also improving the safety of roadways, infrastructure and residents living in close proximity to dams and culverts.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Ecological Restoration (DER)
	Partner(s):	Municipalities; Office of Dam Safety; state and federal regulatory agencies; EOEEA; NOAA; U.S. Fish and Wildlife Service; NGOs
	Agency Priority Score:	Very High
	Possible Funding Source(s):	Federal - NOAA, U.S. Fish and Wildlife Service, Natural Resources Conservation Service, the National Fish and Wildlife Foundation, and others
	SHMCAP Goal(s):	1, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Rising Temperatures, Extreme Weather
Completion Time Frame	**DER: Develop an implementation plan to complete priority water quality restoration projects for climate adaptation and habitat restoration.**	
3-5 years	**Action Description:**	DER will work with partners to identify, prioritize, plan and complete projects that improve water quality and increase community resilience to water quality impacts stemming from climate change. Projects may include green infrastructure stormwater treatments; enhancing local and regional capacity for data collection, analysis, and leading restoration projects; restoration of riparian buffer functions and values; and support to communities developing ordinances and stormwater utilities.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Ecological Restoration (DER)
	Partner(s):	DEP, CZM
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	1, 2, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Rising Temperatures

Completion Time Frame	DER: Develop an implementation plan to reprioritize and accelerate tidal wetland restoration for climate adaptation and habitat restoration.	
3-5 years	**Action Description:**	DER will work with towns and private property owners as well as federal, state, and local organizations to identify, design, permit, and guide the construction of salt marsh restoration projects that benefit public safety, build resilience to extreme weather and sea level rise, and restore coastal habitat. Coastal wetlands provide benefits to people and communities such as flood reduction, protection from coastal storms, water quality improvement, and recreation.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Ecological Restoration (DER)
	Partner(s):	Municipalities; state and federal regulatory agencies; EOEEA; NOAA; U.S. Fish and Wildlife Service; NRCS, NGOs
	Agency Priority Score:	High
	Possible Funding Source(s):	Federal - NOAA, U.S. Fish and Wildlife Service, Natural Resources Conservation Service, the National Fish and Wildlife Foundation, and many others. EOEEA's Dam and Seawall Repair or Removal Program, MVP action grants, or other sources fund projects within municipalities.
	SHMCAP Goal(s):	1, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**DER: In support of EOEEA's efforts on MVP, build the capacity of regional organizations to implement climate adaptation and habitat restoration at the local level.**	
3-5 years	**Action Description:**	DER will partner with and support up to five regional organizations that help municipalities identify, develop, and implement projects that provide climate change adaptation and improved public safety for communities and habitat restoration benefits for fish and wildlife. DER will facilitate regional solutions at the watershed, river corridor, or coastline scale, which may cross municipal boundaries.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Ecological Restoration (DER)
	Partner(s):	NGOs
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital and Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	MassWildlife: Evaluation of climate change impacts on common species.	
3-5 years	**Action Description:**	MassWildlife is largely funded through the purchase of fishing and hunting licenses. Common species (e.g., yellow perch, pumpkinseed, chain pickerel, wild turkey, deer, bear,) provide recreational opportunities to the broadest number of anglers and hunters and yet little work has focused on understanding how these species will respond to climate change in Massachusetts. Climate change is likely to shift habitats that support common species as well as angler and hunter behavior. Understanding the direct and indirect effects of climate change on common species and angler/hunter behavior will allow the Division to foresee how management strategies may need adjustment to provide recreational opportunities to Commonwealth citizens into the future.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Fisheries and Wildlife (MassWildlife)
	Partner(s):	
	Agency Priority Score:	Low
	Possible Funding Source(s):	Departmental Revenue or Other Sources
	SHMCAP Goal(s):	3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**MassWildlife: Updates to BioMap2.**	
3-5 years	**Action Description:**	In 2010, the MassWildlife's Natural Heritage and Endangered Species Program completed a rigorous analysis of the status and location of rare species and natural communities in collaboration with The Nature Conservancy. The resulting document, BioMap2, identified areas where conservation efforts should be focused in order to protect plant and wildlife biodiversity in Massachusetts. For example, the document has been used to identify where land acquisition is likely to benefit the protection of rare species. Since completion of the document newer and finer-scaled climate change predictions have become available. Incorporation of the newer predictions as well as more recent species and habitat data can help the Division prioritize and tailor effective management actions.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Fisheries and Wildlife (MassWildlife)
	Partner(s):	NGOs
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	MassWildlife: Work with MassDOT to incorporate habitat and cold water fisheries considerations into MassDOT climate vulnerability assessments, adaptation projects, and community planning tools.	
3-5 years	**Action Description:**	Ongoing efforts by MassDOT (e.g. Deerfield River Watershed Climate Change Vulnerability Assessment Pilot Project) are identifying road stream/wetland crossings that are vulnerable to climate change, storm damage and flooding. Information from this assessment will be incorporated into an existing GIS-based project planning tool used by MassDOT staff and shared with municipalities and regional planning authorities. Building on the existing "Linking Landscapes" MassWildlife/MassDOT partnership—a nationally recognized model for State Wildlife/Transportation Agency coordination, the proposed project will: • Expand the pilot MassDOT Road Infrastructure Vulnerability Assessment statewide. Identify the important habitat areas that would benefit from improved stream and wetland crossing structures and that intersect with the most vulnerable road infrastructure (e.g. Rare Species key sites, Cold Water Fisheries priority areas, Natural Communities). • Conduct a comprehensive assessment that builds on existing models to (SHEDS-ICE) to map stream reaches in Massachusetts that are likely to remain cold water refugia under different climate scenarios and timescales (2030-2100). • Incorporate project results into an existing GIS-based project planning tool used by MassDOT staff and shared with municipalities and regional planning authorities. In addition to identifying vulnerable road infrastructure that intersect habitat features of statewide and regional significance the planning tool will make specific project design recommendations, and highlight available technical assistance and funding opportunities.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Fisheries and Wildlife (MassWildlife)
	Partner(s):	MassDOT
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	1, 2
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	MassWildlife: Evaluation of shifts in habitats and species distributions.	
3-5 years	**Action Description:**	Species habitats and distributions are expected to shift with changing environmental conditions, resulting in changes to the function and structure of ecosystems. The Division of Fisheries and Wildlife will need to understand the rate and extent of changes to ecosystems over different timescales in order to effectively manage resources. The Division is already considering these shifts in management decisions. For instance, emphasis has fallen away from purchasing areas that will likely be lost to sea level rise (e.g., salt marshes). However, comprehensive spatially-explicit analysis (where, how) of impacts to ecosystems and vulnerable species and habitats has not been completed.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Fisheries and Wildlife (MassWildlife)
	Partner(s):	
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Capital and Operating Budget and Departmental Revenue
	SHMCAP Goal(s):	3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**MassWildlife: In partnership with CZM, improve management of beach nourishment projects and other shoreline protection strategies and incorporate habitat considerations into coastal storm disaster response habitat and infrastructure on barrier beaches.**	
3-5 years	**Action Description:**	The proposed project will strengthen technical expertise in management of beach nourishment projects and other strategies (e.g. dune revegetation) to simultaneously enhance wildlife habitat and protect shoreline infrastructure, ensuring key habitat considerations are made in coastal storm disaster response.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Fisheries and Wildlife (MassWildlife)
	Partner(s):	USFWS
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	MassWildlife: Study impact of climate change on fish hatcheries held by MassWildlife.	
3-5 years	**Action Description:**	The Division owns and manages five fish hatcheries, Bitzer Hatchery (Montague), Sunderland Hatchery (Sunderland), McLaughlin Hatchery (Belchertown), Roger Reed Hatchery (Palmer), and Sandwich Hatchery (Sandwich). All hatcheries breed and raise trout that are stocked in lakes and streams statewide. Sea level rise, extreme weather, heat and changes in precipitation may all affect these resources and a study will be conducted to assess vulnerabilities and impacts and to determine next steps.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Fisheries and Wildlife (MassWildlife)
	Partner(s):	
	Agency Priority Score:	Low
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	4
	Primary Climate Change Interaction(s):	Sea Level Rise

Completion Time Frame	EOEEA: Update and maintain the resilientMA.org climate change clearinghouse site to include a Vulnerability Assessment Wizard for MVP communities, a clearinghouse to grant programs to fund MVP actions, and a dynamic version of the SHMCAP.	
3-5 years	**Action Description:**	Key updates to the existing website include: • Development of a Climate Change Vulnerability Assessment Wizard or tool to help cities and towns assess, track and address vulnerability. This tool would also allow users to spatially view the key vulnerabilities identified across the state and priority actions. • Creation of a municipal portal for MVP communities to store data, submit reports, and save resources. • A dynamic version of the state plan for interactive reading, searching, and resourcing. • A clearinghouse of State grant opportunities to help MVP recipients address priority climate change actions identified in their planning process. • Continually updated climate change projections and data, and ongoing curation of the repository of climate change literature, plans, and other documents.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Executive Office of Energy and Environmental Affairs (EOEEA)
	Partner(s):	All EOEEA agencies will be involved. Support from NGO's may be sought.
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital and Operating Budget, also Alternative Compliance Payment
	SHMCAP Goal(s):	1, 3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	EOEEA: Incorporate information on climate change risk and vulnerability from the SHMCAP and subsequent studies into all capital budget planning.	
3-5 years	**Action Description:**	Ensure all funding requests are consistent with vulnerability and risk assessments completed through the SHMCAP and subsequent studies so that future investments are resilient, do not increase exposure to climate change impacts, do not jeopardize life and safety, and seek to increase the resiliency of EOEEA's holdings.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Executive Office of Energy and Environmental Affairs (EOEEA)
	Partner(s):	A&F
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	1, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**DPH: Update and expand DPH and DPH provider/vendor Emergency Operations Plans (EOPs) and Continuity of Operations Plans (COOPs) to address climate impacts.**	
3-5 years	**Action Description:**	Include all-hazards regional trainings for providers/vendors. These trainings cover, at a minimum, substance use, prevention, and treatment services including naloxone management; building communications redundancies for crisis intervention services; and health access, promotion, and prevention services for long-term resiliency.
	Executive Office:	Executive Office of Health and Human Services
	Lead Agency:	Department of Public Health (DPH)
	Partner(s):	
	Agency Priority Score:	Very High
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake

Completion Time Frame	MOTT: Research and assess and potential effects of climate change on Commonwealth travel and tourism industry and assets.	
3-5 years	**Action Description:**	MOTT will Research and assess and potential effects of climate change on Commonwealth travel and tourism industry and assets.
	Executive Office:	Executive Office of Housing and Economic Development
	Lead Agency:	Massachusetts Office of Travel and Tourism (MOTT)
	Partner(s):	DCR
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Operating Budget and Trust Funding
	SHMCAP Goal(s):	2
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake
Completion Time Frame	**OPSI: Voluntary resilience audits for private property.**	
3-5 years	**Action Description:**	Program with voluntary (or incentivized) resilience audits that consider private property is exposure to hazards (natural and climate change) and make mitigation/adaptation recommendations.
	Executive Office:	Executive Office of Housing and Economic Development
	Lead Agency:	Office of Public Safety and Inspections (OPSI)
	Partner(s):	Electric utilities
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	3, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	EOPSS: Create a statewide Threat and Hazard Identification and Risk Assessment (THIRA). In conjunction with the development of the THIRA conduct a statewide capabilities gap assessment.	
3-5 years	**Action Description:**	The THIRA was updated in December 2017 and is in the process of its annual update and revision. The THIRA is a foundational document for Homeland Security Planning and Preparedness. To the maximum extent the Commonwealths THIRA is integrated with the Risk Assessment in this plan.
	Executive Office:	Executive Office of Public Safety and Security
	Lead Agency:	Executive Office of Public Safety and Security (EOPSS)
	Partner(s):	Administration-wide and Federal partners
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State - Operating Budget, Federal - Grant
	SHMCAP Goal(s):	3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake
Completion Time Frame	**MEMA: Perform a statewide risk analysis for all hazards to include in future updates to this state hazard mitigation plan and other related plans. Address data deficiencies and improve analysis, when available, by partnering with federal, state, local, and other subject matter experts.**	
3-5 years	**Action Description:**	A SHMCAP risk assessment was conducted in 2018. The Municipal Vulnerability Program (MVP) program was developed through the Executive Office of Energy and Environmental Affairs to assist local communities with creating resiliency plans.
	Executive Office:	Executive Office of Public Safety and Security
	Lead Agency:	Massachusetts Emergency Management Agency (MEMA)
	Partner(s):	EOEEA and RMAAT
	Agency Priority Score:	Very High
	Possible Funding Source(s):	State Funding - Capital Budget, Federal - FEMA HMA Grants
	SHMCAP Goal(s):	3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	MEMA: Build out a mechanism to incorporate new data and recommendations from the FEMA-approved regional and local mitigation plans into the SHMCAP, ArcGIS online and/or Climate Clearinghouse, especially locations of critical facilities and assessments of vulnerability and estimates of potential losses by jurisdiction.	
3-5 years	**Action Description:**	Progress made / continual. The Office of Coastal Zone Management (CZM) created an accurate GIS layer for critical facilities for all Massachusetts coastal communities.
	Executive Office:	Executive Office of Public Safety and Security
	Lead Agency:	Massachusetts Emergency Management Agency (MEMA)
	Partner(s):	EOEEA, CZM, DCR, Towns
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Capital Budget, Federal - FEMA HMA Grant, FEMA Emergency Management Performance Grant
	SHMCAP Goal(s):	1, 2, 3, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**MEMA: Improved Local Comprehensive Emergency Management Plan (CEMP) Program.**	
3-5 years	**Action Description:**	Roll out and train local officials on the improved CEMP Program; CEMP Template, online document storage, and a mapping tool. The new mapping tool which will ingest the data from local communities using ArcGIS Online. This gives communities the ability to map critical infrastructure, hazardous facilities and routes, and points of interest, and provides a wider range of customization and mapping capabilities.
	Executive Office:	Executive Office of Public Safety and Security
	Lead Agency:	Massachusetts Emergency Management Agency (MEMA)
	Partner(s):	
	Agency Priority Score:	Medium
	Possible Funding Source(s):	Federal - FEMA HMA Grant, FEMA Emergency Management Performance Grant
	SHMCAP Goal(s):	1, 2
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	MEMA: Partner with stakeholders in Massachusetts to develop and implement regional and local multi-hazard mitigation plans by providing training and technical assistance.	
3-5 years	**Action Description:**	The SHMT works with local officials and regional planning agencies to provide technical assistance and funding for local hazard mitigation plans. In addition MEMA hosted a G318 Training for many local communities.
	Executive Office:	Executive Office of Public Safety and Security
	Lead Agency:	Massachusetts Emergency Management Agency (MEMA)
	Partner(s):	FEMA, EOEEA, MVP Program Staff, NGOs
	Agency Priority Score:	Medium
	Possible Funding Source(s):	Federal - FEMA HMA Grant, FEMA Emergency Management Performance Grant
	SHMCAP Goal(s):	1, 2, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake
Completion Time Frame	**MassDOT: Pilot Deerfield Watershed Stream Crossing Resilience Project.**	
3-5 years	**Action Description:**	This project will produce GIS layers and a web viewer ranking the vulnerability of culverts and wildlife to climate change. The final report will document the methods used in the project. Next steps will include an evaluation of how to transfer the methods to the remaining watersheds in Massachusetts.
	Executive Office:	Massachusetts Department of Transportation
	Lead Agency:	Massachusetts Department of Transportation (MassDOT)
	Partner(s):	Staff and Consultants
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital and Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	MassDOT: Incremental Development of Resiliency-Oriented Design Guidelines.	
3-5 years	**Action Description:**	MassDOT will work towards incrementally updating design standards across all Divisions for projects including roads, bridges, tunnels, and support facilities using the Massachusetts climate change projections.
	Executive Office:	Massachusetts Department of Transportation
	Lead Agency:	Massachusetts Department of Transportation (MassDOT)
	Partner(s):	Internal Staff, Consultants, State partners, Federal partners, AASHTO, TRB
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital and Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**MassDOT: State-wide Transportation Asset Vulnerability Assessment (inland flooding).**	
3-5 years	**Action Description:**	The study aims to provide a better understanding of which MassDOT's assets (infrastructure) are most likely to be at risk due to future inland flooding by utilizing the latest climate model results, suitable hydrologic and hydraulic tools, geospatial analysis and scenario planning methods. The potential impact of extreme heat on transportation assets and operations is also investigated qualitatively. The study has delivered a prototype methodology for mapping out future climate-related inland flood plains at U8 watershed level and for assessing assets' vulnerability to extreme flood events. The study will eventually generate a prioritized list of assets for resilience actions.
	Executive Office:	Massachusetts Department of Transportation
	Lead Agency:	Massachusetts Department of Transportation (MassDOT)
	Partner(s):	Highway Division
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital and Operating Budget
	SHMCAP Goal(s):	2, 3, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Rising Temperatures, Extreme Weather

Completion Time Frame	EOE: Review and recommend standards for the safety and health of students in the Commonwealth informed by climate science.	
Greater than 5 years	**Action Description:**	EOE will work with DESE and EEC to review existing agency regulations and policies related to resiliency issues to gain a better understanding of how these regulations support licensed providers and public schools in resiliency planning. EOE will also work with DCAMM (with support from EOEEA and MEMA) to understand how resiliency planning related to public higher education facilities might be used to inform resiliency planning for licensed providers and public schools.
	Executive Office:	Executive Office of Education
	Lead Agency:	Executive Office of Education (EOE)
	Partner(s):	DESE, EEC, MSBA, DCAMM, EOEEA, MEMA
	Agency Priority Score:	Low
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	1, 3, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake
Completion Time Frame	**DCR: Develop strategy to implement priority DCR infrastructure projects in its Coastal Inventory.**	
Greater than 5 years	**Action Description:**	The 2014 Coastal Infrastructure Inventory and Assessment Report covered 1,462 hard and soft structures located in 62 coastal communities. DCR proposes to develop implementation strategies for prioritized projects identified in the report.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Conservation and Recreation (DCR)
	Partner(s):	A&F
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Capital Budget, Federal - grant funding if available
	SHMCAP Goal(s):	2, 4
	Primary Climate Change Interaction(s):	Sea Level Rise, Extreme Weather

Completion Time Frame	DCR: Revise current review procedures for DCR-managed dams and other flood control structures to incorporate climate change data.	
Greater than 5 years	**Action Description:**	The Office of Dam Safety works with dam owners across the state to manage their dams safely. The Office will incorporate data on climate change into standards used to review dam management plans, and will conduct outreach to private dam owners about potential risks related to climate change and extreme weather events.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Conservation and Recreation (DCR)
	Partner(s):	DER
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital Budget, Federal - grant funding if available
	SHMCAP Goal(s):	2, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Extreme Weather
Completion Time Frame	**DCR: Work in strong coordination with EOEEA to monitor coastal shoreline sediment migration.**	
Greater than 5 years	**Action Description:**	As offshore storms increase in both magnitude and frequency, migration of sediment becomes a critical challenge in managing the Commonwealth's beaches and shores. DCR will continue to monitor sediment migration in order to understand and deal with the complexities of this natural phenomenon in a publicly and environmentally beneficial manner.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Conservation and Recreation (DCR)
	Partner(s):	EOEEA and CZM
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	2, 3
	Primary Climate Change Interaction(s):	Sea Level Rise, Extreme Weather

Completion Time Frame	DOER: Build energy resiliency.	
Greater than 5 years	**Action Description:**	Continue to prioritize investments in clean energy resiliency infrastructure projects at state, municipal, and critical private facilities.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Energy Resources (DOER)
	Partner(s):	DCAMM, Municipalities, Universities
	Agency Priority Score:	High
	Possible Funding Source(s):	Regional Greenhouse Gas Initiative, Alternative Compliance Payment
	SHMCAP Goal(s):	3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**DEP: Enhance the Water Utility Resilience Program (WURP).**	
Greater than 5 years	**Action Description:**	WURP supports the efforts of public drinking water and wastewater utilities in building or enhancing resilience to and recovery from severe weather events, including those caused or affected by climate change. Enhancing this program will provide additional technical assistance through DEP's regional offices for water utilities to improve asset management, address system vulnerabilities and support more outreach and provide educational materials and events for this sector.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Environmental Protection (DEP)
	Partner(s):	Water utilities, EPA, MWWA, MEMA
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	DEP: Implement Updated Stream crossing culvert replacement guidance.	
Greater than 5 years	**Action Description:**	DEP has an updated stream crossing / culvert replacement guidance to protect wildlife habitat and reduce flooding impacts. The agency will continuing to partner with the Department of Fish and Game, the Division of Ecological Restoration and others to secure funding for culvert replacement projects that will improve the resiliency of new structures, protect habitat and reduce flood damage.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Environmental Protection (DEP)
	Partner(s):	Coastal Zone Management, Department of Fish and Game, Division of Ecological Restoration, NOAA, U.S. Fish and Wildlife Service, American Rivers, and other conservation partners
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital and Operating Budget
	SHMCAP Goal(s):	3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**DEP: Resiliency Grants for Water Infrastructure.**	
Greater than 5 years	**Action Description:**	Resiliency grants for public water systems and wastewater systems to make system improvements that will increase capacity to withstand the effects of climate change and recover after severe events. Projects could include flood protection measures, elevation to avoid sea level rise or more severe precipitation events, securing backup power for critical services, anticipating rising temperatures, and replacing fragile aging infrastructure that is increasingly vulnerable because of climate changes. These grants would be designed to support resiliency projects that are not being regularly supported by other financial incentive programs while being consistent with and complementing them.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Environmental Protection (DEP)
	Partner(s):	
	Agency Priority Score:	Low
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	1, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake

Completion Time Frame	DEP: Demand strategies educational campaign.	
Greater than 5 years	**Action Description:**	DEP is piloting an education and outreach campaign aimed at reducing non-agricultural outdoor water use (e.g. lawn watering) in the Parker River and Ipswich River Watersheds, two of the state's most stressed basins. Work will be informed by municipal scale piloting by the Division of Ecological Restoration. DEP is also piloting demand management strategies in the Ipswich and Parker watersheds. Information gained may be useful in designing statewide conservation outreach and drought response strategies.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Environmental Protection (DEP)
	Partner(s):	
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**DPU: Facilitate a program for sharing resources between municipalities for tree maintenance.**	
Greater than 5 years	**Action Description:**	Investigate, encourage or facilitate a program for towns, regions and utilities to work together and share information and equipment to reduce potentially hazardous trees/limbs.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Public Utilities (DPU)
	Partner(s):	Municipalities, Electric distribution companies, Community organizations
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Extreme Weather

Completion Time Frame	DPU: Review storm preparedness best practices from other regional distribution systems.	
Greater than 5 years	**Action Description:**	Review distribution system adaptation methods adopted in areas which have historically been subject to the types of hazards which may increase in Massachusetts (e.g. precast distribution poles near the coast, such as those used in Florida).
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Public Utilities (DPU)
	Partner(s):	Public utility commission and distribution companies in areas reviewed
	Agency Priority Score:	High
	Possible Funding Source(s):	Departmental Revenue or Other Sources
	SHMCAP Goal(s):	1, 2, 3, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**DPU: Regional power grid planning and incorporation of climate change data.**	
Greater than 5 years	**Action Description:**	Through implementation of the grid modernization docket microgrids have been identified as an area of continued research and development. Utilities could assess climate data and prioritize regional power grid improvements that will provide benefits of reduced outages, and lower long-term maintenance costs.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Department of Public Utilities (DPU)
	Partner(s):	Municipalities, Electric Distribution Companies, Community Organizations, Neighboring States, ISO-NE
	Agency Priority Score:	Medium
	Possible Funding Source(s):	Ongoing regulatory structure
	SHMCAP Goal(s):	1, 2, 3, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	DER: Develop an implementation plan to build municipal capacity to replace undersized, deteriorated culverts with larger, safer structures that are resilient to extreme storms and provide passage for fish and wildlife.	
Greater than 5 years	**Action Description:**	DER will provide training, tools, technical assistance, and incentive grants for municipalities to replace undersized culverts with larger, safer structures that are resilient to extreme storms, reduce roadway flooding and infrastructure damage, and provide passage for fish and wildlife.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Ecological Restoration (DER)
	Partner(s):	Municipalities; state and federal regulatory agencies; EOEEA; NOAA; U.S. Fish and Wildlife Service; National Fish and Wildlife Foundation; The Nature Conservancy; American Rivers
	Agency Priority Score:	Very High
	Possible Funding Source(s):	Federal - NOAA, U.S. Fish and Wildlife Service, Natural Resources Conservation Service, the National Fish and Wildlife Foundation, and many others. MVP grant program.
	SHMCAP Goal(s):	1, 2, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Rising Temperatures, Extreme Weather
Completion Time Frame	**DER: Develop an implementation strategy and updated prioritization scheme to work with federal, state, and local partners and non-profit organizations to remove unwanted state-owned dams to reduce risk, increase resilience to extreme weather and climate change, and restore aquatic habitat.**	
Greater than 5 years	**Action Description:**	DER will work with state agencies to identify, prioritize, design, permit, and guide the construction of dam removal projects that benefit public safety, build resilience to extreme weather, and restore riverine habitat.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Ecological Restoration (DER)
	Partner(s):	Office of Dam Safety at DCR; EOEEA, DFG, DCR, state and federal regulatory agencies; NOAA; U.S. Fish and Wildlife Service; NGOs
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	1, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Rising Temperatures, Extreme Weather, Earthquake

Completion Time Frame	DER: Develop an implementation strategy for retired cranberry bog restoration for climate adaptation and habitat restoration by working with landowners, federal, state, and local partners and non-profit partners for climate resiliency, habitat quality, flood and water quality protection, and wildlife.	
Greater than 5 years	**Action Description:**	DER will work with landowners, federal, state, and local partners and non-profit organizations to restore retired cranberry bogs to natural wetlands, increasing habitat resilience for fish and wildlife as well as resilience to drought, improved water quality, and flood storage for communities.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Ecological Restoration (DER)
	Partner(s):	
	Agency Priority Score:	Medium
	Possible Funding Source(s):	Federal - NOAA, U.S. Fish and Wildlife Service, Natural Resources Conservation Service, the National Fish and Wildlife Foundation, and many others
	SHMCAP Goal(s):	1, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**DER: Restore streamflow to flow-stressed rivers to increase resiliency for aquatic ecosystems and for water supplies.**	
Greater than 5 years	**Action Description:**	DER works to restore natural streamflow (the amount of water that flows through streams and rivers) in Massachusetts. DER works with partners to collect streamflow data and manages restoration projects aimed at restoring natural flow. Streamflow restoration projects increase community resilience to drought and improve aquatic habitats.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Ecological Restoration (DER)
	Partner(s):	Municipalities; watershed organizations; water suppliers; DEP; EOEEA; DCR; federal agencies; and others
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	1, 2, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Rising Temperatures

Completion Time Frame	MassWildlife: Identification of areas with high native aquatic biodiversity to help prioritize aquatic adaptation actions as the climate changes.	
Greater than 5 years	**Action Description:**	The Division of Fisheries and Wildlife is responsible for the conservation of freshwater fishes and wildlife throughout Massachusetts. Efforts (i.e. BioMap2) have been made to rigorously analyze and map rare species and natural community data in terrestrial ecosystems. These efforts identified lands critical for protecting and maintaining wildlife and plant biodiversity in Massachusetts. However, similar efforts have not been completed for the river and streams providing habitat to aquatic species (e.g., fishes, freshwater mussels) managed by MassWildlife. Identification of water bodies with high native aquatic biodiversity would provide critical information necessary for effective management and conservation of aquatic species in the state.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Fisheries and Wildlife (MassWildlife)
	Partner(s):	
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Capital and Operating Budget
	SHMCAP Goal(s):	3
	Primary Climate Change Interaction(s):	Precipitation Changes, Rising Temperatures, Extreme Weather

Completion Time Frame	MassWildlife: Identification of cold water climate refugia and transitional waters for protections of CFRs.	
Greater than 5 years	**Action Description:**	Coldwater streams are among the most vulnerable habitats to climate change. Changes in precipitation and air temperatures will alter hydrology to the detriment of many cold water streams. Some cold water streams are expected to diminish in size, permanently transition to warmer habitats, and/or go dry. However, certain watershed characteristics can buffer climate change impacts. Coldwater streams in deep canyons, poleward-facing slopes, thick canopy cover, groundwater-fed areas, and areas with fewer anthropogenic impacts, are more likely to persist as conditions change. Such areas may act as cold water refugia, providing long-term habitat to ecologically and economically important species such as brook trout (Salvelinus fontinalis). The efficacy of conservation strategies to protect cold water streams and the cold water-adapted species that rely on them will depend largely on understanding the potential persistence and transition of habitats. We build on existing models (SHEDS-ICE) to map stream reaches in Massachusetts that are likely to remain cold water refugia, or transition to cool- or warm water habitats, under different climate scenarios and timescales (2030-2100). Although existing mapping tools incorporate some watershed characteristics (e.g., aspect, impervious surfaces), none directly include flow management, including lake-level management and groundwater inputs, the effects of which have been shown to shape fish assemblages in Massachusetts streams. Management decisions that benefit directly from this research include prioritization of dam removal, instream flow protection, riparian vegetation management and location and timing of trout stocking.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Fisheries and Wildlife (MassWildlife)
	Partner(s):	University of Massachusetts Amherst, Northeast Climate Adaptation Science Center, US Geological Survey, Division of Ecological Restoration
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	3
	Primary Climate Change Interaction(s):	Precipitation Changes, Rising Temperatures, Extreme Weather

Completion Time Frame	MassWildlife: Dam removals at the Merrill Ponds Wildlife Management Area.	
Greater than 5 years	**Action Description:**	MassWildlife owns two dams in the Merrill Ponds Wildlife Management Area (WMA), Welsh Pond Dam and Putnam Pond Dam, that have undersized outlet structures that are prone to clogging with debris. Work is needed to remove two additional dams and rehabilitate a third dam that provides significant recreational benefits. Each project will continue to improve the resiliency of the agency's resources by improving the hydraulic capacity of the roadway stream crossings, reducing solar heating of Singletary Brook.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Fisheries and Wildlife (MassWildlife)
	Partner(s):	DER
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	4
	Primary Climate Change Interaction(s):	Precipitation Changes, Extreme Weather, Earthquake

Completion Time Frame	MassWildlife: Great Marsh Pilot Ditch Remediation Project.	
Greater than 5 years	**Action Description:**	At more than 10,000 acres, Great Marsh is the largest and most ecologically significant Salt Marsh in New England. In addition to providing habitat for a great diversity of fish and bird species, the Great Marsh supports a large population of Salt Marsh Sparrows a species threatened with global extinction due to rising seas. Among its many ecosystem services the marsh buffers land and infrastructure against waves, storm surges, and coastal erosion. Although salt marshes are at great risk of being destroyed by sea level rise, pilot studies are demonstrating that, with human intervention, salt marshes can accrete material and increase in elevation, increasing the ability to adapt to sea level change. Because of the significance of the marsh, cost-effective experimental pilot projects are warranted to assess the feasibility of larger-scale interventions in the future. Marsh ditching during the past century has led to partial drying and lowering of the marsh bed. In cooperation with The Trustees of Reservations (TTOR), researchers at University of New Hampshire, and other partners, we propose to fill select ditches on MassWildlife and TTOR properties with organic material and measure the effects on marsh elevation and rates of sediment trapping. Preliminary indications are that this technique may prevent further subsidence, reduce the rate of marsh loss, and possibly even gradually elevate the marsh bed through sediment trapping. The ditch remediation pilot is only the first step. Through this project we will build a coalition of partners committed to additional adaptive management, including the possibility of experimenting with thin layer deposition—another technique that is more difficult to implement and permit, but also holds the promise of gradually raising the marsh elevation, while preserving marsh grasses and other marsh life. Planning for this second phase would occur during the 5 year implementation timeline for the project.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Fisheries and Wildlife (MassWildlife)
	Partner(s):	NGOs
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures

Completion Time Frame	MassWildlife: Mapping and control of invasive plant species.	
Greater than 5 years	**Action Description:**	Climate change is expected to increase the spread of non-native invasive species by increasing growth rates and providing weather-related disturbances that favor the life cycles of these species. Invasive plants are one of the greatest threats to the integrity of natural communities by decreasing the survival of many native species. As a result, the Division engages in efforts to identify the most problematic species and to manage them when and where possible. Comprehensive identification and mapping of the extent of invasive plants has not been completed on Division-owned and managed lands statewide. This information is necessary to determine the habitat quality and restoration potential of lands, as well as treatment methods for controlling or eradicating invasive species. Additionally monitoring helps with early detection and eradication efforts to control for newly introduced invaders who may be able to spread north under climate change. Once invasive plants are mapped, treatment options for eradication or control can be determined and implemented. Because of the robust nature of most invasive species, treatment to eradicate or significantly control any one existing population can take 5-8 years.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Division of Fisheries and Wildlife (MassWildlife)
	Partner(s):	DER
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	2, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	EOEEA: Accelerate implementation of priority actions identified through the Municipal Vulnerability Preparedness (MVP) program, increase municipal participation in planning program, conduct program review and revise planning and action grant program as needed.	
Greater than 5 years	**Action Description:**	The MVP program has now moved from its pilot stage into full implementation with the establishment of the MVP Action Grant and 156 communities enrolled in the planning process. Deployment of action grant funds will accelerate to begin implementation of priority actions, particularly those actions with multiple benefits, transferability, and nature-based solutions. EOEEA will strive to continue the high rate of enrollment so that at the end of the next four years close to 100% of the state's municipalities are MVP designated. Additionally, program review of year 1 of action and planning grants will support a more robust program going forward and help to improve and revise the MVP framework. Establishment of metrics and ongoing review will allow EOEEA to monitor program performance over time.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Executive Office of Energy and Environmental Affairs (EOEEA)
	Partner(s):	MEMA, NGOs
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	1, 2, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**EOEEA: Review habitat management, land stewardship, coastal zone management, agricultural and invasive species programs and policies to develop strategies that promote coordination among agencies and support climate change adaptation and mitigation goals.**	
Greater than 5 years	**Action Description:**	EOEEA will facilitate multi-agency review of habitat management, forest stewardship, agricultural best practices and invasive species programs and policies to recommend updates that reflect climate change data and projections and address opportunities to increase resilience while also reducing GHG emissions or increasing carbon sequestration.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Executive Office of Energy and Environmental Affairs (EOEEA)
	Partner(s):	All EOEEA Agencies
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	1, 3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	EOEEA: Based on results of vulnerability assessment for EOEEA properties and vulnerability assessments from other agencies, use climate change projections to develop stormwater management actions and projects.	
Greater than 5 years	**Action Description:**	EOEEA properties held by agencies including DCR and MassWildlife such as parkways, parking lots, and other facilities may have opportunities for decreased stormwater runoff through the use of green techniques or traditional methods. Similarly, protected green space held by agencies may be able to buffer neighboring infrastructure held by others. EOEEA will work with its agencies to examine areas with the highest potential for best practice stormwater management projects, and develop a plan to implement these management actions.
	Executive Office:	Executive Office of Energy and Environmental Affairs
	Lead Agency:	Executive Office of Energy and Environmental Affairs (EOEEA)
	Partner(s):	NGOs, MWRA, Cities and towns
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Capital, Federal - Grant
	SHMCAP Goal(s):	2, 4
	Primary Climate Change Interaction(s):	Precipitation Changes
Completion Time Frame	**DPH: Strengthen DPH health care systems and services to prepare for climate impacts.**	
Greater than 5 years	**Action Description:**	Includes direct health care services and licensing of healthcare facilities and professionals. Train health care professionals on responding to climate impacts. Incorporate plans to address anticipated increases in patient and client volumes, changing health demands, and delivery of critical life-saving support during climate events.
	Executive Office:	Executive Office of Health and Human Services
	Lead Agency:	Department of Public Health (DPH)
	Partner(s):	Health Care Systems, Providers
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake

Completion Time Frame	DPH: Strengthen environmental health programs to respond to climate-related impacts.	
Greater than 5 years	**Action Description:**	These programs respond to impacts on the food supply, water/air quality, recreational water quality, housing/sanitation, indoor air quality, exposure to toxins in various media, and radiation hazards. Support other state agencies and communities to conduct health impact assessments on climate.
	Executive Office:	Executive Office of Health and Human Services
	Lead Agency:	Department of Public Health (DPH)
	Partner(s):	
	Agency Priority Score:	Very High
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake
Completion Time Frame	**DHCD: Facilitate and coordinate development of guidelines and best practices for climate change adaptation and resilience for state-aided housing development.**	
Greater than 5 years	**Action Description:**	Facilitate and coordinate development of guidelines and best practices for climate change adaptation and resilience for state-funded housing development, including state-aided public housing and affordable housing funded by quasi-public agencies.
	Executive Office:	Executive Office of Housing and Economic Development
	Lead Agency:	Department of Housing and Community Development (DHCD)
	Partner(s):	LHA, Quasi-public authorities
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital and Operating Budget
	SHMCAP Goal(s):	5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Extreme Weather

Completion Time Frame	MPRO: Review Chapter 40A and existing regulatory framework to evaluate incorporation of feasibility and practicality of climate change hazard mitigation measures.	
Greater than 5 years	**Action Description:**	MPRO will review Chapter 40A + Subdivision control law and regulatory framework, including standards and possible mitigation measures such as street widths (less impervious surfaces), low impact development, and natural storm water sinks/systems.
	Executive Office:	Executive Office of Housing and Economic Development
	Lead Agency:	Massachusetts Permit Regulatory Office (MPRO)
	Partner(s):	
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Operating Budget
	SHMCAP Goal(s):	2, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**MEMA: Encourage state granting agencies in the Commonwealth, such as the Massachusetts Department of Housing and Community Development's review of Community Development Block Grants, to work together with MEMA to assist in providing the Non-federal cost share in Disaster Recovery and Hazard Mitigation Grants to maximize the federal funding available to the Commonwealth and its communities.**	
Greater than 5 years	**Action Description:**	FEMA grants are typically 75% federal funding and require a 25% non-federal cost share. State funding such as Department of Housing and Community Development Community Development Block Grant (CDBG), CDBG-DR, MassWorks, Municipal Vulnerability Program, etc., can works in conjunction with FEMA funding recovery and mitigation projects in the Commonwealth. One project under this program was funded in conjunction with HMGP funding resulting in $0 out of pocket for a small community.
	Executive Office:	Executive Office of Public Safety and Security
	Lead Agency:	Massachusetts Emergency Management Agency (MEMA)
	Partner(s):	DHCD, EOEEA, DCR, EOHED, Others
	Agency Priority Score:	High
	Possible Funding Source(s):	State - Operating Budget, Federal - State Management Cost, FEMA Emergency Management Performance Grant
	SHMCAP Goal(s):	1, 2, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	MEMA: Enhance the effectiveness of 406 funding by working to further integrate mitigation into the FEMA Public Assistance Program.	
Greater than 5 years	**Action Description:**	Progress made. The mitigation and recovery units work collaboratively to identify areas where 406 funding can be leveraged to maximize disaster recovery funding to build back better and more resilient infrastructure. This includes working on an interagency recovery group after a disaster to maximize efficiencies and reduce duplication for communities.
	Executive Office:	Executive Office of Public Safety and Security
	Lead Agency:	Massachusetts Emergency Management Agency (MEMA)
	Partner(s):	FEMA , DCR, CZM, DEP, EOEEA
	Agency Priority Score:	High
	Possible Funding Source(s):	Federal - State Management Cost, FEMA Emergency Management Performance Grant
	SHMCAP Goal(s):	1, 2, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**MEMA: Work with communities to implement cost-effective, environmentally sound, and feasible mitigation projects to severe repetitive loss properties.**	
Greater than 5 years	**Action Description:**	Progress continues; both repetitive and severe repetitive loss properties are lifted up for FMA grants each year, as well as whenever HMGP funds are available. Partners shall continue to seek other methods of funding for flood mitigation, including the use of the HUD programs, and preliminary consideration of potential new state lead partnerships to assist communities in the management of these activities. Seek to advance funding for all eligible project types that reduce risk with a particular focus on nature base solutions. In addition, the Flood Hazard Management Program will continue to assist in focusing on mitigation or SRL and RL Structures through direct property mitigation or community flood risk reduction projects. FEMA's database showed 220 SRL properties in Massachusetts. This activity must continue until all severe repetitive loss properties in the state have been acquired, relocated or mitigated. Project selection criteria will always favor properties that are designated SRL or RL.
	Executive Office:	Executive Office of Public Safety and Security
	Lead Agency:	Massachusetts Emergency Management Agency (MEMA)
	Partner(s):	Communities as Sub-grantees
	Agency Priority Score:	High
	Possible Funding Source(s):	Federal - FEMA HMA Grant Management Cost, FEMA Emergency Management Performance Grant
	SHMCAP Goal(s):	3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Extreme Weather

Completion Time Frame	EOTSS: Migrate Beacon, Meditech and FamilyNet to the cloud.	
Greater than 5 years	**Action Description:**	Migrate critical systems for the Department of Transitional Assistance (Beacon) and the Executive Office of Health and Human Services (Meditech and FamilyNet) to the cloud, removing the need to maintain and protect on premise servers for these systems.
	Executive Office:	Executive Office of Technology Services and Security
	Lead Agency:	Executive Office of Technology Services and Security (EOTSS)
	Partner(s):	EOHHS
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	2, 3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake
Completion Time Frame	**EOTSS: For Registry of Motor Vehicle systems that must remain on-premises (not cloud), evaluate migration options or relocations to third party on premises.**	
Greater than 5 years	**Action Description:**	Work with Registry to evaluate and plan relocating servers to a 3rd party location.
	Executive Office:	Executive Office of Technology Services and Security
	Lead Agency:	Executive Office of Technology Services and Security (EOTSS)
	Partner(s):	
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	2, 3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake

Completion Time Frame	EOTSS: Re-platform MA21 and MMIS to enable cloud migration.	
Greater than 5 years	**Action Description:**	Before they can be migrated to the cloud, the Executive Office of Health and Human Services' critical systems MMIS (Medicaid Management Information System) and MA21 (MassHealth's eligibility system) will need to be re-platformed. This will facilitate their future migration to the cloud, removing the need to maintain and protect on premise servers for these systems.
	Executive Office:	Executive Office of Technology Services and Security
	Lead Agency:	Executive Office of Technology Services and Security (EOTSS)
	Partner(s):	
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital Budget
	SHMCAP Goal(s):	2, 3
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake
Completion Time Frame	**MBTA: Incorporate climate resiliency into capital planning activities.**	
Greater than 5 years	**Action Description:**	The MBTA's Strategic Plan and Focus 40 goals explicitly address climate resiliency as a key priority for the MBTA. The overarching capital planning program will continue incorporating climate resiliency as a factor in project-level decision-making. All ongoing and new capital projects will mandate consideration of current and future extreme weather and incremental climate change related risks into design and construction of each project.
	Executive Office:	Massachusetts Department of Transportation
	Lead Agency:	Massachusetts Bay Transit Authority (MBTA)
	Partner(s):	MassDOT
	Agency Priority Score:	Very High
	Possible Funding Source(s):	State Funding - Capital Budget, Federal Funding - FTA Grants
	SHMCAP Goal(s):	1, 2, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	MBTA: Complete system-wide vulnerability assessment.	
Greater than 5 years	**Action Description:**	Continue assessing vulnerability of MBTA systems, operations, and assets. Blue Line vulnerability assessment has been completed. Drill-down assessments of critical assets on Blue Line in-progress. Piecemeal approach will continue in FY 2019 with assessments of Red Line, Power and Communications Systems, and portions of Commuter Rail. Additional assessments and resiliency measures will occur from FY2020-onward.
	Executive Office:	Massachusetts Department of Transportation
	Lead Agency:	Massachusetts Bay Transit Authority (MBTA)
	Partner(s):	Consultant support
	Agency Priority Score:	Very High
	Possible Funding Source(s):	State Funding - Capital Budget, Federal Funding - FTA Grants
	SHMCAP Goal(s):	1, 2, 3, 4, 5
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather, Earthquake
Completion Time Frame	**MassDOT: Utilize the Boston Harbor Flood Risk Model and data from the vulnerability assessments to identify current and future high risk areas and strengthen emergency management with local, state and federal agencies.**	
Greater than 5 years	**Action Description:**	MassDOT and the Federal Highway Administration co-funded a pilot project to assess the vulnerabilities of the Central Artery tunnel system in Boston to coastal storm surge for present day, 2030, and 2070. This project created the Boston Harbor Flood Risk Model (BH-FRM) and includes the effects of nor'easters, hurricanes and sea level rise. The goal of the action is encourage the use of BH-FRM data by state and local entities and begin to inform resiliency related projects.
	Executive Office:	Massachusetts Department of Transportation
	Lead Agency:	Massachusetts Department of Transportation (MassDOT)
	Partner(s):	FHWA, Cities of Boston and Cambridge and Stakeholders
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital and Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	MassDOT: Assess the feasibility of recommendations from the Commission on the Future of Transportation in the Commonwealth.	
Greater than 5 years	**Action Description:**	With Executive Order 579: Establishing the Commission on the Future of Transportation in Commonwealth, Governor Baker wanted to investigate 5 areas of interest one of which is Climate and Resiliency. This topic area includes greenhouse gas emission reduction, and what investments will be needed to make transportation infrastructure more resilient for the 2020-2040 timeframe. The Commission's report and recommendations are due to the Governor by December 1, 2018.
	Executive Office:	Massachusetts Department of Transportation
	Lead Agency:	Massachusetts Department of Transportation (MassDOT)
	Partner(s):	EOEEA
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital and Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**MassDOT: Capture and document institutional knowledge on vulnerabilities from staff using the Mapping Our Vulnerable Infrastructure Tool (MOVIT).**	
Greater than 5 years	**Action Description:**	MOVIT Tool that contains data obtained from the institutional knowledge of maintenance engineers (and anyone else with pertinent knowledge) and data from the vulnerability assessments. This initiative will provide vulnerable asset data collected from districts to be used for project review and prioritization. This information will be stored in MOVIT or other databases as developed.
	Executive Office:	Massachusetts Department of Transportation
	Lead Agency:	Massachusetts Department of Transportation (MassDOT)
	Partner(s):	Highway Division
	Agency Priority Score:	Medium
	Possible Funding Source(s):	State Funding - Capital and Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	MassDOT: Coordinate with state and federal agencies to evaluate environmental regulation and permitting processes to address current roadblocks in climate change.	
Greater than 5 years	**Action Description:**	Establish a regulatory working group to explore the expansion of Surface Transportation Uniform Relocation Assistance Act regarding exemptions and minor modifications.
	Executive Office:	Massachusetts Department of Transportation
	Lead Agency:	Massachusetts Department of Transportation (MassDOT)
	Partner(s):	Regulatory Agencies
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital and Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**MassDOT: Develop climate change adaptation design guidance and provide resources and training for project managers and design teams on bridge and culvert design interaction with emerging fluvial geomorphology practices.**	
Greater than 5 years	**Action Description:**	MassDOT is developing a fluvial geomorphology based "Rivers & Roads" training program that will be initially offered to staff, including environmental analysts, project managers, bridge and hydraulic engineers, and construction and maintenance personnel. The training will eventually be offered to local government and the private consulting and construction sectors. The program will include three tiers that will increase in complexity.
	Executive Office:	Massachusetts Department of Transportation
	Lead Agency:	Massachusetts Department of Transportation (MassDOT)
	Partner(s):	Highway Division staff, Consultants
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital and Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Rising Temperatures, Extreme Weather

Completion Time Frame	MassDOT: Incorporate climate change adaptation into the MassDOT Highway Division Transportation Asset Management Plan and coordinate Asset Management across divisions and partner agencies.	
Greater than 5 years	**Action Description:**	Conduct an asset management pilot project on the vulnerability of culvert and bridge assets. This information will be stored in MAPIT and will give an alert to proponent to coordinate with Hydraulics, Bridge, and Environmental departments.
	Executive Office:	Massachusetts Department of Transportation
	Lead Agency:	Massachusetts Department Transportation (MassDOT)
	Partner(s):	Federal Highway Administration
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital and Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**MassDOT: Incorporate resiliency review items into the Early Environmental Coordination Checklist.**	
Greater than 5 years	**Action Description:**	Revise the Environmental Early Coordination Checklist to include resiliency review items.
	Executive Office:	Massachusetts Department of Transportation
	Lead Agency:	Massachusetts Department Transportation (MassDOT)
	Partner(s):	Highway and Bridge Design, Consultants
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital and Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

Completion Time Frame	MassDOT: Leverage permit granting authority and ability to influence M.G.L. Section 61 findings and mitigation.	
Greater than 5 years	**Action Description:**	Developers are required to evaluate a project's impacts on transportation through a Transportation Impact Analysis and to include mitigation, as necessary, in the form of highway, transit, pedestrian and bicycle accommodations. After the project is build, the proponent must submit a monitoring report. Example: ENCORE BOSTON HARBOR provided $7.5 million to improve the transit system and ensure multimodal accommodations are effective in mitigating new trip generation. Planning is working on getting MassBike, Walk Boston and developers at the same time to evaluate performance and identify ways to enhance the transit system.
	Executive Office:	Massachusetts Department of Transportation
	Lead Agency:	Massachusetts Department Transportation (MassDOT)
	Partner(s):	Highway Division
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital and Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather
Completion Time Frame	**MassDOT: Require a holistic evaluation of all vulnerability, environmental, transportation and social data sets in the earliest project planning phases.**	
Greater than 5 years	**Action Description:**	Understanding a broad range of constraints and sensitive resources early in project planning ensures resilient infrastructure and helps avoid permitting issues later in the project development process. This initiative will also reduce the need to retrofit infrastructure for adaptation measures post-construction. MassDOT will vet and compile data sources including vulnerability data and leverage project planning tools such as MassDOT Project Intake Tool or MAPIT. MAPIT is a web-based GIS and project development tool that brings together transportation, safety, environmental, and vulnerability data to help arrive at the most context sensitive design.
	Executive Office:	Massachusetts Department of Transportation
	Lead Agency:	Massachusetts Department Transportation (MassDOT)
	Partner(s):	Massachusetts Department of Transportation Planning, Consultant support
	Agency Priority Score:	High
	Possible Funding Source(s):	State Funding - Capital and Operating Budget
	SHMCAP Goal(s):	1, 2, 3, 4
	Primary Climate Change Interaction(s):	Precipitation Changes, Sea Level Rise, Rising Temperatures, Extreme Weather

7.5 Strategy Development

This hazard mitigation and climate adaptation strategy was developed using the risk-based information provided in Chapter 4 to identify a wide range of vulnerabilities to natural hazards and climate change, and develop strategies to address these challenges. The strategy is also based on the capability and adaptive capacity analysis provided in *Chapter 6: State Capability and Adaptive Capacity Analysis*, which identifies strengths and opportunities to reduce risk through existing government authorities, policies, programs, staffing, and funding. The actions included in the plan were developed by participation from each Executive Office of the Commonwealth and a subset of state agencies most directly impacted by these risks. Finally, an action prioritization tool was developed by the PMT and applied by Executive Offices and state agencies to consistently evaluate and prioritize their final list of actions. This strategy serves as an initial plan for reducing losses associated with vulnerabilities identified in the risk assessment and a blueprint for development of data, tools, policies, and programs to advance hazard mitigation and climate adaptation efforts in the future.

The five primary steps outlined in FEMA's *State Mitigation Planning Key Topics Bulletin: Mitigation Strategy* were followed in the development of this strategy (modified to include reference to climate adaptation).

1. Validating hazard mitigation and climate adaptation goals;
2. Reviewing, evaluating, and updating existing hazard mitigation and climate adaptation actions;
3. Identifying any new hazard mitigation and climate adaptation actions;
4. Prioritizing all hazard mitigation and climate adaptation actions; and
5. Identifying current and appropriate funding sources.

7.5.1 Stakeholder Engagement

This strategy was developed through an extensive stakeholder engagement process that is more fully described in Chapter 9. The stakeholder outreach and engagement process served the purpose of providing input on goals and identification of hazard mitigation and climate adaptation actions. Stakeholders included representatives from the following:

- State agencies
- Regional planning agencies
- Local government
- Nongovernment/private-sector organizations, including those representing critical infrastructure, engineering, social welfare, and economic development

- Environmental and natural resources organizations
- Public health departments and organizations

Two workshop series were held for the specific purpose of developing this strategy. The first workshop series was held in three locations in January 2018: Springfield, Framingham, and Middleborough. These workshops had the primary purpose of developing goal statements for this strategy. The second workshop series was held in April 2018 in Boston, Hopkinton, and Lanesborough to gather ideas for actions to achieve the vision of the goal statements previously developed. Additional actions were collected via the Action Proposal Worksheet. Ultimately, several hundred Action Proposal Worksheets were completed by state agencies and stakeholders across the Commonwealth. These suggested actions were considered by the relevant agencies and executive offices, and developed into a list of initial actions for implementation of the SHMCAP.

7.5.2 National Mitigation Framework

The National Mitigation Framework is one of five FEMA frameworks that comprise the National Preparedness System. All of the frameworks emphasize a whole community approach, which the PMT adopted for this planning process. This approach assumes that everyone in a community (including state agencies, nonprofit organizations, businesses, local governments, and interested citizens) can contribute to and benefit from mitigation planning efforts. The National Mitigation Framework focuses on building resiliency and creating a culture of preparedness. The PMT emphasized this throughout the planning process, and specifically added the need for improving institutional capacity to address climate change and natural hazards in the first goal statement.

The core capabilities in the National Mitigation Framework were adhered to throughout the planning process, and therefore contributed to the development of the actions the State intends to implement over the next 5 years. These capabilities are:

- **Threats and Hazards Identification.** Develop and/or gather required data in a timely and accurate manner to effectively identify threats and hazards.
- **Risk and Disaster Resilience Assessment.** Perform credible risk assessments using scientifically valid and widely used risk assessment techniques.
- **Planning.** Incorporate the findings from the assessment of risk and disaster resilience into planning processes.
- **Community Resilience.** Recognize the interdependent nature of the economy, health, and social services, housing infrastructure, and natural and cultural resources within a community.

- **Public Information and Warning.** Communicate priorities and actions identified through risk analysis and plans to stakeholders and those expected to take action to reduce risk.
- **Long-Term Vulnerability Reduction.** Develop plans and recognize that a prepared individual or family is the foundation of a resilient community.
- **Operational Coordination.** Capitalize on opportunities for mitigation actions following disasters and incidents.

7.5.3 Integration of Climate Adaptation

This plan meets FEMA requirements for a state-level hazard mitigation plan and also satisfies a key requirement of Executive Order 569 to develop a state climate adaptation plan. Integrating climate adaptation into the hazard mitigation plan update process provided an opportunity to implement a systematic approach to more fully assess the risk of natural hazards that are projected to increase in both frequency and intensity, as well as introduce new hazards in the next 50 years; and to identify adaptation strategies to reduce risk and increase resilience. Integrating hazard mitigation and climate adaptation was a strategic decision based on current science. The Climate Risk Management journal article *"Integrating climate change into hazard mitigation planning: Opportunities and examples in practice"* offers a detailed look at the benefits of this practice, and identifies opportunities for embedding climate change into hazard mitigation planning (Climate Risk Management, 2017). All of the opportunities identified in this article were used to develop this SHMCAP, including the use of climate-related stakeholders and studies in all parts of the planning process; evaluating how climate change impacts each hazard identified and assessed in the plan; and factoring climate change into the probability of future hazards. Goals for the plan were developed with climate change in mind, and climate change was part of the criteria included in the action prioritization process for this plan. As a result of this integration process, this plan uses the best available science and projections for climate change, describes the interactions of climate change and natural hazards, and then identifies adaptation strategies to reduce risk and increase resilience. As described in Section 7.4, all adaptation strategies or actions identified in the plan address at least one of four climate change interactions.

7.6 Conclusion

The result of the hazard mitigation and climate adaptation strategy is a mission statement and goal statements that represent the vision of the Commonwealth of Massachusetts for addressing vulnerabilities from climate change and natural hazards. In addition, 108 well-developed initial actions are included in this plan to reduce or eliminate long-term risk from climate change and/or natural hazards and their impacts. These actions reflect input from public and private stakeholders across the state, and extensive contributions from the Executive Offices and agencies of the Commonwealth. These actions will be further refined, assessed, and implemented

as appropriate through the ongoing SHMCAP implementation process, outlined in *Chapter 8: Plan Implementation and Maintenance*. In addition, further actions and strategies will be identified with stakeholders going forward. These actions will build the capacity of the Commonwealth to withstand future climate conditions and natural hazards.