Appendix C | Stakeholder Engagement

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Executive Summary

To support the development of the 2022 Massachusetts Climate Change Assessment (Climate Assessment), the Commonwealth undertook a year-long stakeholder engagement process to develop a fuller picture of how climate change will impact communities across Massachusetts.

A stakeholder engagement plan (SEP) guided the efforts to reach diverse communities across the Commonwealth with a particular focus on socially vulnerable and environmental justice (EJ) populations. The SEP laid out a framework for engaging stakeholders at key phases of the Climate Assessment such that stakeholder input would be considered and incorporated into the broader assessment process by the subject matter experts in the Climate Assessment team. A group of Community Liaisons – trusted community representatives with established networks in various regions and EJ populations – was established to serve as a bridge to share information and solicit feedback from stakeholders in three "waves" of engagement.

The goal of Wave 1 was to gather input about what climate impacts were of urgent concern to stakeholders. Four public meetings offered a forum for participants to discuss which climate impacts they felt were most significant. The project working group (PWG) then incorporated this community knowledge to develop a shortlist of 37 climate impacts to be included in the Climate Assessment.

In Wave 2, a variety of stakeholder engagement activities were used to build on the shortlist of impacts developed in Wave 1 to develop a priority ranking of climate impacts. Public meetings gathered more information on the regional impacts of climate change and cultural resources that may be impacted. Stakeholders also ranked the shortlisted climate impacts on an online survey. Wave 2 also included targeted outreach to underrepresented groups in focus groups and interviews.

Finally, Wave 3 presented the initial Climate Assessment findings to key stakeholder groups and the broader public, to determine whether the impact rankings and draft findings had accurately captured stakeholder feedback from prior engagement activities. This wave of input was used to refine the final Climate Assessment.

In addition to public outreach through the waves described above, the Climate Assessment team also worked with a Project Working Group (PWG) which included representatives from state and federal agencies, as well as non-governmental organizations. The technical assessment team also enlisted a peer review panel to provide feedback on the climate science relied upon in the Climate Assessment.

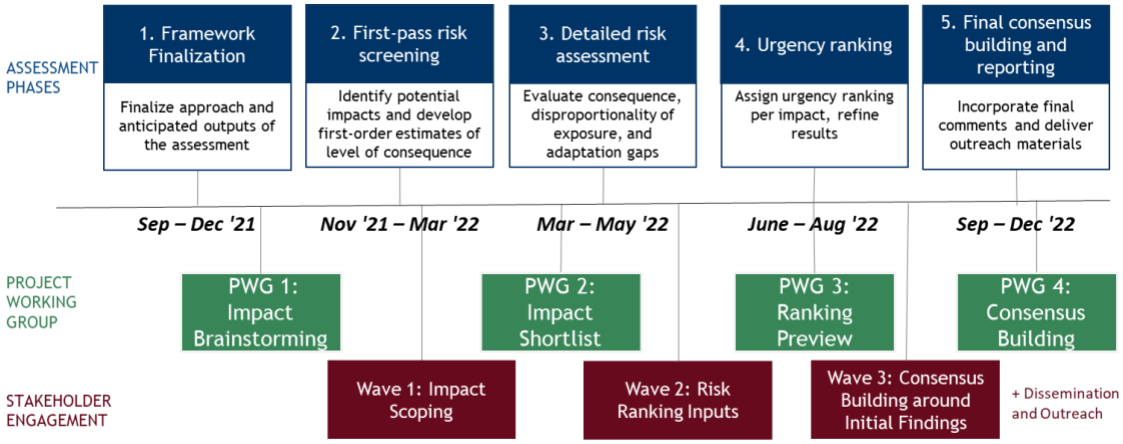
Throughout the Climate Assessment, the team documented stakeholder participation and adjusted outreach methods between waves with the goal of increasing diverse participation and reflecting feedback from stakeholder groups.

1. Overview of the Engagement Approach

The Massachusetts Climate Change Assessment (Climate Assessment) is a statewide analysis detailing how Massachusetts people, environments, and infrastructure may be affected by climate change and related hazards through the end of the century. Stakeholder engagement with the public was a key component of the Climate Assessment to develop a fuller picture of relevant climate impacts. To this end, one of the first key tasks was the development of a Stakeholder Engagement Plan (SEP) to serve as a roadmap for ensuring meaningful involvement of stakeholders across Massachusetts, prioritizing individuals from communities facing environmental and climate justice concerns or additional social vulnerabilities. Furthermore, through this engagement approach, the Climate Assessment sought to thoughtfully integrate the lived experiences of stakeholder groups, and how they connect to the risks and impacts associated with climate change.

The SEP laid out a framework for engaging the public at key phases of the technical assessment, called "waves". Each of the three waves had a specific objective and questions to address. Table C1 summarizes each wave and the key questions, outreach methods, and output that informed the next wave of engagement. Public stakeholder engagement was conducted in close coordination with the technical assessment team and the Project Management Team (PMT), which included Massachusetts Executive Office of Energy and Environmental Affairs (EEA) and Massachusetts Emergency Management Agency (MEMA). Figure C1 illustrates the connection between each stakeholder engagement wave and the phases of the technical assessment as well as interaction with the Climate Assessment Project Working Group (PWG). This is a group of partners across Massachusetts, including those internal to the state government and several external entities such as non-governmental organizations and other subject matter experts, that provided input and review throughout the technical assessment phases and have a strong interest in using the results of the assessment (see Section 5 for more information on the PWG). The intention of this process design was to have a staggered interplay between the results from subject matter experts participating in the PWG process (in the second to bottom, green row of the figure), and the input from the broader public stakeholder engagement (in the last row of the figure).

Figure C1. Project and Public Stakeholder Engagement Timeline



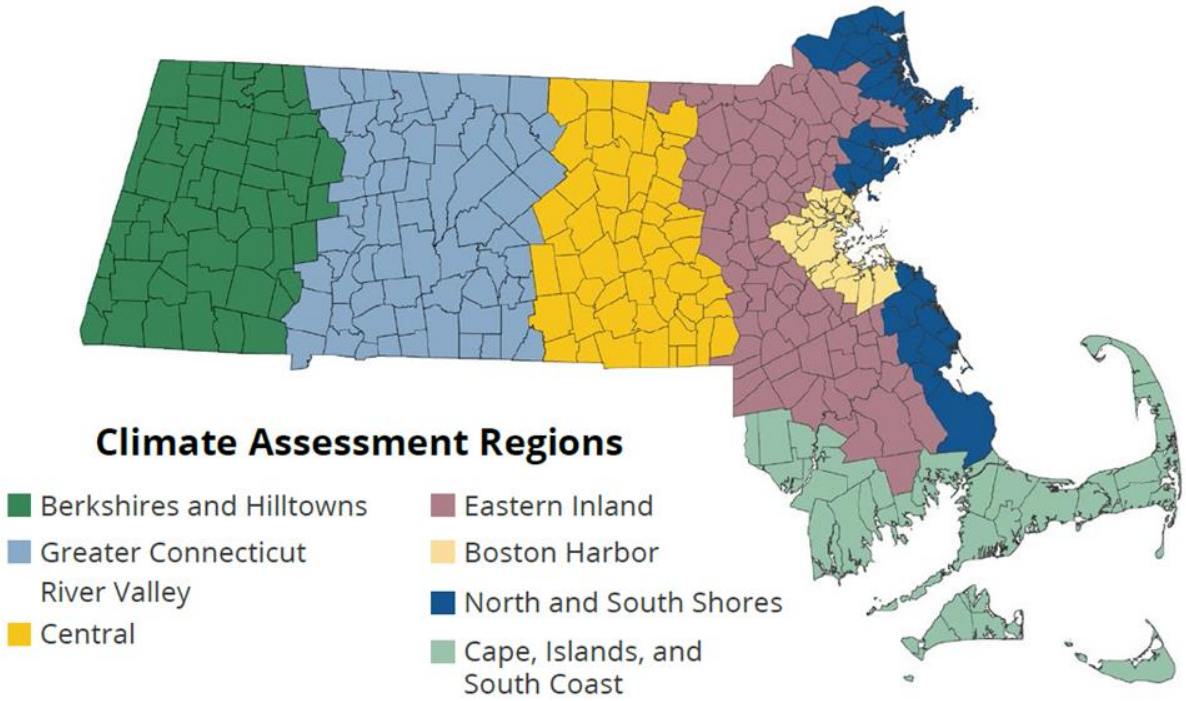
As presented in the table, in Wave 1, the Climate Assessment engagement team presented an initial list of climate impacts to stakeholders and then created a shortlist based on their feedback. Wave 2 asked stakeholders to help prioritize the shortlisted impacts identified during Wave 1 and determine who is most vulnerable to these impacts across the Commonwealth. Stakeholder input from Wave 2 was considered in the initial draft rankings of climate impacts presented in the Climate Assessment. Finally, in Wave 3 a draft of the Climate Assessment findings was presented to stakeholders for their feedback and refinement.

Table C1. Summary of Public Engagement Activities and Timeline by Wave

	Wave 1: Climate Impact List Development	**Wave 2: Climate Impact Urgency Ranking**	**Wave 3: Initial Assessment Findings and Consensus Building**
Timeline	Jan – April 2022	April – July 2022	July – November 2022
Key Questions	• Are we considering the right list of climate impacts?	• How should the impacts be prioritized? • Where do risks fall disproportionately on some populations, and how should that affect prioritization?	• Have we accurately captured stakeholder feedback on impacts and how stakeholder feedback informed prioritization?
Key Stakeholder Engagement Activities	• 4 public meetings • Community Liaison (CL) feedback and outreach	• 4 public meetings • Interviews and small group discussions with priority stakeholder groups • CL feedback and outreach • Survey	• 12 interviews with key stakeholders • 2-3 focus groups with priority stakeholder groups • CL feedback and outreach • Comment form for public review
Key Outputs from Stakeholder Engagement	• Addition of impacts considered in the analysis to reflect community knowledge	• Adjustment of model inputs prioritization based on stakeholder feedback	• Refinement of findings based on key stakeholder feedback regarding whether their input has been accurately reflected in the report findings

A key component of the Stakeholder Engagement Plan was the establishment of a group of Community Liaisons, who would represent various regions and environmental justice (EJ) populations across Massachusetts (Climate Assessment regions shown in Figure C2). Community Liaisons were selected as representatives that have established trust and networks within their communities and, thereby, could serve as a bridge to share information and solicit feedback on key stages of the Climate Assessment.

Figure C2. Map of Climate Assessment Regions



The various methods of outreach activities used throughout each wave of the engagement process – including public meetings, focus groups, one-on-one interviews, and a survey – are described in more detail in the following sections. It is important to note that elements of the Stakeholder Engagement Plan were adjusted throughout the process based on input from the Community Liaisons and lessons learned and feedback from public participants and partners.

2. Wave 1 Public Stakeholder Engagement

The overall goal of Wave 1 was to elicit stakeholder input to inform the selection of climate impacts to include in the Climate Assessment. Stakeholder input in this wave ensured the technical assessment team was considering impacts experienced by, and of concern to, communities across sectors and regions in Massachusetts. Below we present the outreach activities conducted in Wave 1, including the selection of the Community Liaisons (CLs) and stakeholders (Section 2.1), key feedback received (Section 2.2), and an overall summary of the Wave (Section 2.3).

2.1 Wave 1 Outreach Activities

As noted above, one of the first tasks undertaken was to identify a group of Community Liaisons. The Climate Assessment engagement team also worked with the PMT to identify an initial list of public stakeholders, including individual contacts and organizations across EJ populations. Input from the Community Liaisons and PMT helped design four public meetings, which comprised the key outreach activity under the first wave and are described below.

Community Liaisons

Community Liaisons were identified based on an initial list of community-based organizations (CBOs), community representatives, municipal or regional staff members, and individuals that were initially identified by the PMT and Director of Environmental Justice at the Executive Office of Energy and Environmental Affairs. The list was prioritized to ensure balanced representation geographically and demographically. Based on input from the EJ Roundtable, and the Director of EJ, the list was narrowed to approximately 15 candidates to interview. The interviews provided background on the expected role and activities, assessed engagement with key stakeholder groups, and answered questions. CBOs and community representatives serving as CLs were offered honoraria for their role to facilitate sustained engagement and reduce capacity barriers. The Community Liaisons are presented in Table C2.

Table C2. Community Liaisons Selected

Name	Affiliation	Region
Jane Winn Rosemary Wessel	Berkshire Environmental Action Team	Berkshires and Hilltowns
Gwendolyn Van Sant	Multicultural BRIDGE	Berkshires and Hilltowns
Peggy Sloan Kimberly MacPhee	Franklin Regional Council of Governments	Greater Connecticut River Valley
Melissa Provencher	Berkshire Regional Planning Agency	Berkshires and Hilltowns
Dave McMahon	Dismas House/Green Low Income Housing Coalition	Central
Melinda Vega	Neighborhood of Affordable Housing	Boston Harbor
Philip Chong Rockey Chan	Quincy Asian Resources, Inc.	Boston Harbor
Eddie Rosa	Groundwork Lawrence	Eastern Inland
Rev. Vernon K Walker	Communities Responding to Extreme Weather	Statewide
Elvis Mendez	Neighbor to Neighbor	Statewide

Initially, the CLs provided input on the Stakeholder Engagement Plan and proposed engagement activities in each wave. They also provided specific feedback and support before, during, and after each of the three waves of community engagement:

- Leading up to each engagement wave, the CLs reviewed draft approach, agendas, and materials to help the engagement team tailor the content to be relevant to local stakeholders.

- Prior to meetings, CLs publicized the meetings throughout their communities and networks, including translated versions of the invitations in Spanish, Haitian Creole, Portuguese, Chinese, and Vietnamese.
- Following each public meeting and wave, the CLs met with the engagement team to debrief the process and community input received to help refine how input was understood and integrated into the Climate Assessment.

Stakeholder Identification

An initial stakeholder list was developed prior to the start of Wave 1 with input from the PMT, including contributions from the state's Municipal Vulnerability Preparedness (MVP) Program. The Climate Assessment engagement team and CLs also provided additional contacts. The stakeholder database was continuously updated after each wave of outreach based on meeting registration and attendee information.

With information compiled in the initial stakeholder list and provided by new stakeholders during the engagement waves, key geographic and demographic information were identified for each contact (e.g., municipality, organization type, race, ethnicity). This information was used to assess stakeholder representation in the various engagement waves, based on the criteria mentioned above. These analyses were used to identify regional gaps, particularly from cities and towns with EJ populations as defined by EEA,[1] and other underrepresented population groups to target with additional outreach in future engagement activities.

Outreach Methods

In this wave, stakeholder input was gathered primarily from four public meetings held in early March 2022. Meetings were publicized via email to the stakeholder list and on social media. Community Liaisons also played an important role publicizing the meetings to their networks. The emailed invitations were translated into the five most spoken languages in Massachusetts – Spanish, Haitian Creole, Portuguese, Mandarin, and Vietnamese – and social media advertisements (Figure C3) were posted in English and Spanish.

[1] EJ populations in Massachusetts are identified here: https://www.mass.gov/info-details/environmental-justice-populations-in-massachusetts

Figure C3. Social Media Advertisement for Wave 1 in English and Spanish

Public meetings were held virtually over Zoom due to the ongoing COVID-19 pandemic. Four sessions were offered at different times from March 1 to March 9, 2022, including one evening session. Translation services were provided for all of the meetings. In addition, the meetings were recorded and posted on EEA's YouTube channel in English, Spanish, Vietnamese, Portuguese, Mandarin, Haitian Creole, and Cape Verdean Creole for those who could not attend, but still wanted to provide feedback.

The meetings included two primary components. First, the engagement team introduced the Climate Assessment, and then stakeholders provided input about climate impacts through smaller breakout discussions. The meeting began with a presentation of the following topics using inclusive language and relevant examples for a diverse non-technical audience:

- An introduction to the purpose and process of the Climate Assessment
- An overview of the five key climate hazards in Massachusetts (heat, flooding, drought, storms/extreme weather, sea level rise)
- A presentation of the preliminary list of climate impacts developed by the technical team.

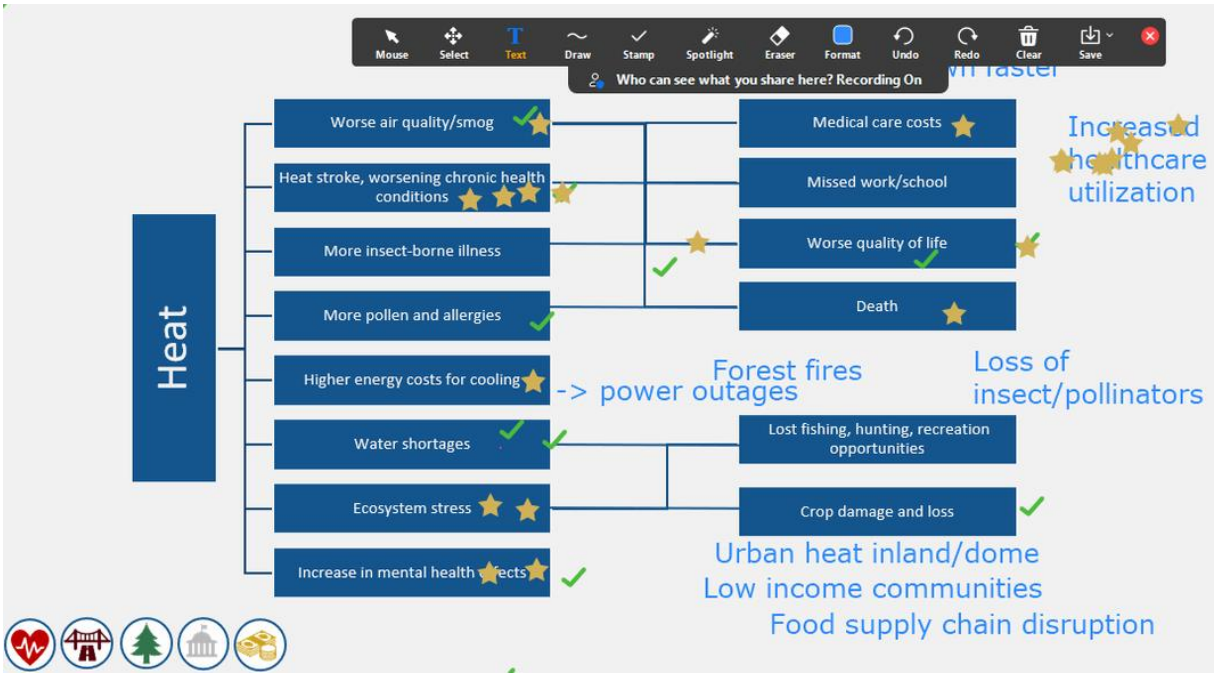
In the second half of the meetings, participants were randomly assigned into facilitated breakout rooms with directions to:

1. Review the list of climate impacts across each of the five hazards (heat, drought, flooding, storms and extreme weather, sea level rise)

2. Provide input on the following questions: (i) What impacts are missing from the list presented? (ii) What impacts are most significant and who is most impacted?

The small-group discussions enabled participants to provide feedback verbally, via the chat function, and/or using the "Annotate" feature in Zoom. For example, as shown in Figure C4, for a specific hazard (e.g., heat) participants were able to add new impacts (e.g., increased healthcare utilization) and star those impacts they felt were more significant or where populations may suffer disproportionate impacts.

Figure C4. Example of Annotate Feature Used to Identify and Impacts by Hazard



Comments made verbally, in the chat, and through annotation were saved and aggregated after the completion of Wave 1 meetings to determine, collectively, which impacts were considered most relevant to stakeholders. The summary of these results is provided below.

2.2 Wave 1 Participation and Feedback

Below is a summary of key Wave 1 participants and feedback that was integrated to the assessment and Wave 2 outreach activities.

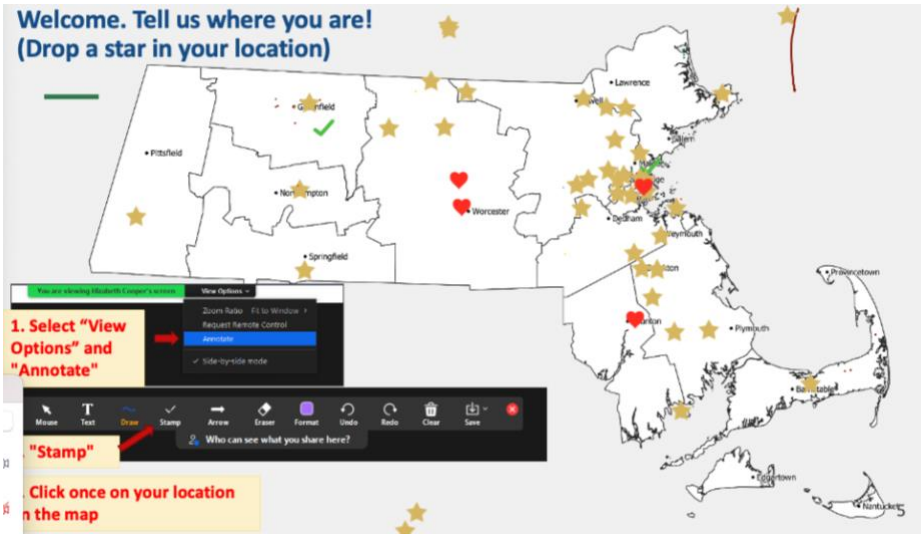
Stakeholder Participation

A total of 245 stakeholders from across Massachusetts attended the four public meetings held in March 2022. Stakeholders provided geographic and demographic information upon registration for the meetings. Overall, stakeholders from 94 towns and cities, out of 351 total towns and cities in Massachusetts, participated. Of these, 58 are designated as having EJ neighborhoods, out of 188 total towns and cities with EJ neighborhoods in Massachusetts.

At the start of each meeting, participants were asked to mark their location on a map of Massachusetts. Figure C5 below shows an example of this visual representation from the March

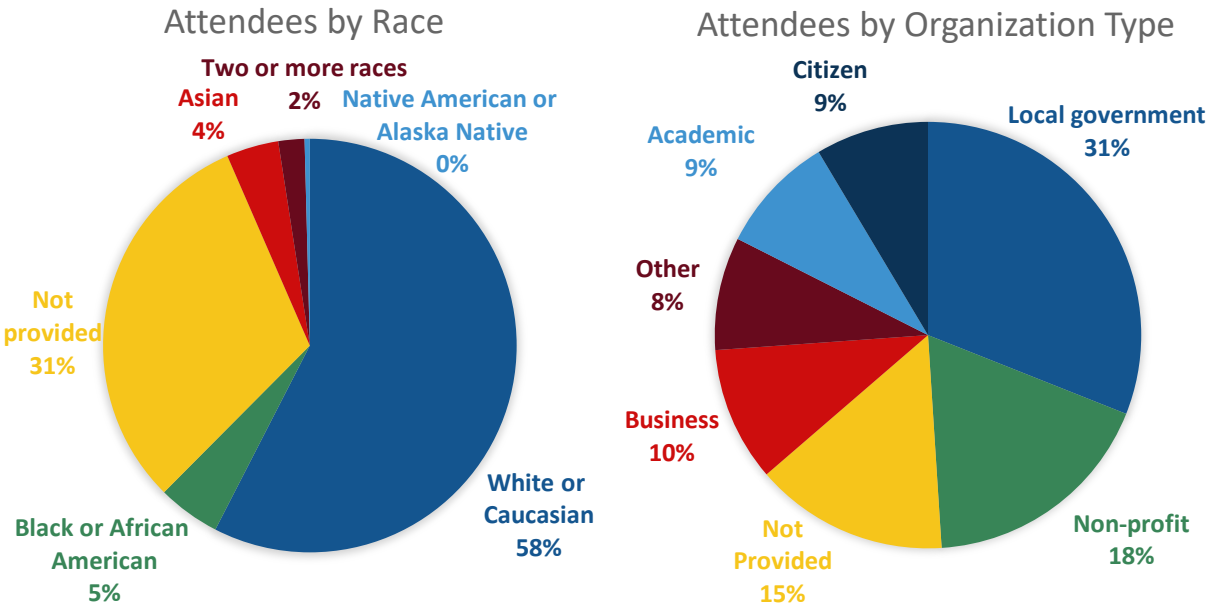
8th meeting. In general, the other meetings also had the greatest representation from the Greater Boston and the Eastern Inland Climate Assessment regions (especially Suffolk and Middlesex Counties).

Figure C5. Example Map of Stakeholder Locations from Wave 1 Meeting



Nearly 70 percent of registrants and attendees provided demographic information. Of these, 11 percent identified as a race other than White or Caucasian. Furthermore, attendees represented a variety of organization types: 31 percent from local government, 18 percent from non-profits, 10 percent from business, and 9 percent from academic institutions. Nine percent identified as private residents with no organization affiliation. Figure C6 illustrates the demographic and organizational information provided.

Figure C6. Races and Organization Types Provided by Attendees at Wave 1 Meetings



Stakeholder Feedback and Impact List Development

The stakeholder meetings in Wave 1 yielded over 2,000 unique comments related to climate impacts, which were compiled and analyzed in Excel. While stakeholder feedback was gathered in response to climate change hazards to be more intuitive for the general public, the technical and engagement teams mapped comments to the appropriate climate impact categories by sector so they could be integrated into the Climate Assessment. In addition, they were prioritized based on the number of mentions.

Overall, many attendees expressed support for impacts on the preliminary impact lists presented at the public meetings. Many comments also suggested new impacts for consideration in the Climate Assessment and provided experiential examples of areas in Massachusetts already seeing impacts. Below the key public feedback provided by Sector (Human Health, Infrastructure, Economy, Governance, and Natural Environment) and how it was considered by the technical assessment team is summarized.

Human

In the Human sector, participants expressed concern for the direct health impacts from all climate change hazards. There was a common theme of stakeholders expressing concern about extreme heat, such as an increased risk of heat stroke and growing asthma rates. Commenters often referenced the populations most vulnerable to the health impacts of climate change, including children, elderly, and outdoor workers. Power outages were considered a human health concern in the context of needing air conditioning in extreme heat events, and for the disproportionate impacts on disabled populations who rely on electronic medical devices like wheelchairs and oxygen supply. One commenter noted that: “power outages can be life or death for folks with disabilities who need AC and use electronic health aides”. Many also connected the growing human health challenges with increased stress on healthcare facilities and emergency services, which themselves can be impacted by extreme heat (power outages), flooding, and extreme weather.

Several new climate impacts were added to the list based on stakeholder feedback, including wildfires (increased risk of fire in Massachusetts as well as the air quality impacts of smoke traveling from the Western US), Lyme Disease (which was grouped with other Vector Borne Diseases), Affordable Housing, Cultural Resources, and Outdoor Winter Recreation Opportunities. Table C3 summarizes the stakeholder feedback for the human health sector and how it was incorporated in the Climate Assessment.

Table C3. Human Sector Stakeholder Feedback

Impact Considered[1]	Stakeholder Importance [2]	Included	How Included[3]	Shortlisted Impact
Air Quality (PM2.5 and Ozone)	Strong	Yes	Combined	Health Effects from Degraded Air Quality
Wildfires*	Moderate	Yes	Combined	
Indoor Air Quality	Not mentioned	Yes	Combined	
Extreme Heat and Health	Very Strong	Yes	Combined	

Impact Considered[1]	Stakeholder Importance [2]	Included	How Included[3]	Shortlisted Impact
Cognition and Learning	Not mentioned	Yes	Combined	Health and Cognitive Effects from Extreme Heat
Vector Borne Diseases and Bacterial Infections	Strong	Yes	Combined	Increase in Vector Borne Diseases
Vibrio Incidence	Not mentioned	Yes	Combined	Incidence and Bacterial Infections
Lyme Disease*	Moderate	Yes	Combined	
Aeroallergens	Moderate	Yes	Combined	Health Effects from Aeroallergens and Mold
Mold	Moderate	Yes	Combined	
Affordable Housing*	Moderate	Yes	Included directly	Reduction in the Availability of Affordably Priced Housing
Mental Health	Strong	Yes	Combined	Increase in Mental Health Stressors
Violent and Property Crime*	Strong	Yes	Combined	
Power Outages and Extreme Events	Very Strong	Yes	Included directly	Health Effects of Extreme Storms and Power Outages
Extreme Event Safety	Very Strong	Yes	Combined	Emergency Service Response Delays and Evacuation Disruptions
Emergency Response Time and Frequency	Very strong	Yes	Combined	
Evacuation Route Reliability	Strong	Yes	Combined	
Food Safety	Moderate	Yes	Combined	Reduction in Food Safety and Security
Food Security	Strong	Yes	Combined	
Cultural Resources*	Moderate	Yes	Included directly	Damage to Cultural Resources
Outdoor Recreation Opportunities	Moderate	Yes	Addressed in Economy sector	
Outdoor Winter Recreation Opportunities*	Moderate	Yes	Addressed in Economy sector	
National Security	Moderate	Partial	Partially addressed in Governance sector	

[1] *Impacts noted with an asterisk (*) were new impacts suggested by stakeholders.*

[2] *Key to Stakeholder Importance: 0 comments = Not mentioned; 1-9 comments = Moderate; 10-49 comments = Strong; 50+ comments = Very Strong. 'Not mentioned' impacts were presented by the Climate Assessment team but did not come up in discussions with stakeholders, signaling a lower importance ranking.*

[3] *"Combined" indicates that two or more considered impacts were merged into one shortlisted impact.*

Infrastructure

In the infrastructure sector, stakeholders most frequently provided comments related to Electricity Disruptions, mentioned as a potential impact from all five hazards. Most commonly, electricity-related impacts were mentioned in relation to infrastructure damage from storms and extreme weather. Other frequently mentioned impacts were those related to damaged buildings, road- and rail- based transportation infrastructure, and reduced clean water supply. With respect to the impact of drought on water supply, stakeholders noted concerns on both public water support and private wells.

Several new impacts were considered and added based on stakeholder input. For example, impact to Communication Infrastructure was added and ultimately grouped with Damage to Electric Transmission and Distribution Infrastructure, since much of our communication depends on electricity and at least some on a co-located wiring infrastructure. Electricity Supply and Demand (which stakeholders largely related to extreme heat) and Energy Production Infrastructure impacts (including reduced solar energy production in extreme heat and decreased hydro-electric power generation during droughts) were both grouped with Loss of Energy Production and Resources in the shortlist. Stakeholders also mentioned wastewater treatment plant and septic system inundation from inland and coastal flooding, which was added in each respective category of Damage to Buildings. Concern for wind damage was also reflected in the shortlisted Damage to Coastal Buildings and Ports. In addition, stakeholders also specifically noted Culverts and Bridges and Tunnels as road-related impacts, which were ultimately included in the shortlisted Damage to Roads category.

Table C4 summarizes the stakeholder feedback for the infrastructure sector and how it was incorporated in the Climate Assessment.

Table C4. Infrastructure Sector Stakeholder Feedback

Impact Considered[1]	Stakeholder Importance[2]	Included	How Included[3]	Shortlisted Impact
Electricity Transmission and Distribution Infrastructure	Very Strong	Yes	Combined	Damage to Electric Transmission and Utility Distribution Infrastructure
Communication Infrastructure*	Moderate	Yes	Combined	
Energy Infrastructure Production and Outages	Very Strong	Yes	Combined	Loss of Energy Production and Resources
Electricity Supply and Demand*	Very Strong	Yes	Combined	
Energy Production Infrastructure, Natural Gas and Solar*	Moderate	Yes	Combined	
Rainfall-Source Flooding	Strong	Yes	Combined	Damage to Inland Buildings
Fluvial (River-Source) Flooding	Strong	Yes	Combined	
WWTP and Septic System Inundation*	Very Strong	Yes	Combined	
Coastal Flooding	Very Strong	Yes	Combined	Damage to Coastal Buildings and Ports
Wind Damage*	Moderate	No	Combined	
WWTP and Septic System Inundation*	Very Strong	Yes	Combined	

Impact Considered[1]	Stakeholder Importance[2]	Included	How Included[3]	Shortlisted Impact
Roads (Repairs and Delays)	Very Strong	Yes	Combined	
Culverts*	Very Strong	Yes	Combined	
High Tide Flooding and Storm Surge on Roads (Repairs and Delays)	Very Strong	Yes	Combined	Damage to Roads and Loss of Road Service
Bridges and Tunnels*	Very Strong	Yes	Combined	
Rail (Repairs and Delays)	Very Strong	Yes	Combined	Damage to Rails and Loss of Rail/Transit Service
Subways	Very Strong	Yes	Combined	
Bridges and Tunnels	Very Strong	Yes	Combined	
Water Supply and Demand	Very Strong	Yes	Included directly	Reduction in Clean Water Supply
High-Risk Dam Overtopping	Moderate	Yes	Included directly	Increased Risk of Dam Overtopping or Failure
Contaminated Sites/ Hazardous Sites/Landfills	Strong	No	Potential area for future attention	
Subsurface Threats	Not mentioned	No	To be addressed in 2023 SHMCAP	
Air Transport	Not mentioned	No	Potential area for future attention	
Building and Envelope Integrity (qualitative)*	Moderate	No	Potential area for future attention	
Information Technology	Not mentioned	No	Potential area for future attention	

[1] *Impacts noted with an asterisk (*) were new impacts suggested by stakeholders.*

[2] *Key to Stakeholder Importance: 0 comments = Not mentioned; 1-9 comments = Moderate; 10-49 comments = Strong; 50+ comments = Very Strong. 'Not mentioned' impacts were presented by the Climate Assessment team but did not come up in discussions with stakeholders, signaling a lower importance ranking.*

[3] *"Combined" indicates that two or more considered impacts were merged into one shortlisted impact.*

Economy

Many of the stakeholder comments in the Economy sector expressed support for existing impacts that were presented during the Wave 1 meetings. Most mentioned agricultural impacts and several participants emphasized the compounding impacts of heat and drought, as well as flooding, which can have direct economic effects on local farmers as well as the larger food supply chain. Several noted that crop loss would harm farmers and residents in the Greater Connecticut River Valley, where communities tend to be more dependent on local agriculture. Stakeholders also noted Forest and Tree Products and Saltwater Intrusion of Irrigation Water Sources as impacts which were combined into the shortlisted impact Decrease in Agricultural Productivity. Strong concern was expressed for outdoor workers in extreme heat (high-risk labor), and this was added to the shortlist as Reduced Ability to Work.

Table C5 summarizes the stakeholder feedback for the economy sector and how it was incorporated in the Climate Assessment.

Table C5. Economy Sector Stakeholder Feedback

Impact Considered[1]	Stakeholder Importance[2]	Included	How Included[3]	Shortlisted Impact
Business Disruptions	Strong	Yes	Split - indirect damages in Economy, direct damages in Infrastructure	Economic Losses from Commercial Structure Damage and Business Interruptions
Field Crop Production	Very Strong	Yes	Combined	Decrease in Agricultural Productivity
Forest and Tree Products*	Moderate	Yes	Combined	
Saltwater Intrusion of Irrigation Water Sources*	Moderate	Yes	Combined	
Cranberry Production	Very Strong	Yes	Combined	
Apple Production	Very Strong	Yes	Combined	
Marine Fisheries	Strong	Yes	Combined	Decrease in Marine Fisheries and Aquaculture Productivity
Aquaculture	Moderate	Yes	Combined	
High-Risk Labor*	Strong	Yes	Included directly	Reduced Ability to Work
Recreation Opportunities and Tourism	Strong	Yes	Included directly	Damage to Tourist Attractions and Recreation Amenities
Ports and Small Harbors	Strong	Yes	Addressed in Infrastructure sector	
Dairy Production*	Moderate	No	Potential area for future attention	

[1] *Impacts noted with an asterisk (*) were new impacts suggested by stakeholders.*

[2] *Key to Stakeholder Importance: 0 comments = Not mentioned; 1-9 comments = Moderate; 10-49 comments = Strong; 50+ comments = Very Strong. 'Not mentioned' impacts were presented by the Climate Assessment team but did not come up in discussions with stakeholders, signaling a lower importance ranking.*

[3] *"Combined" indicates that two or more considered impacts were merged into one shortlisted impact.*

Governance

Relative to other sectors, Governance seemed to receive lower levels of stakeholder feedback. In general, stakeholders expressed concern for the cost and resources to respond to climate change. Specifically, stakeholders noted the need to provide access to cooling centers during extreme heat events and repair road damage after flooding or extreme events. Stakeholders also frequently commented on the costs and challenges to governments of responding to climate migration. Several stakeholders mentioned that these costs of addressing climate change present a disproportionate challenge for smaller rural governments.

Table C6 summarizes the stakeholder feedback for the Governance sector and how it was incorporated in the Climate Assessment.

Table C6. Governance Sector Stakeholder Feedback

Impact Considered[1]	Stakeholder Importance[2]	Included	How Included[3]	Shortlisted Impact
Flooding and Drainage - Risk to State Assets	Moderate	Yes	Combined state and municipal and divided by coastal and inland	Damage to Inland State and Municipal Buildings and Land
Flooding and Drainage - Risk to Municipal Assets	Strong	Yes		
Coastal Property	Very Strong	Yes		Damage to Coastal State and Municipal Buildings and Land
Inland Flooding	Very Strong	Yes		
State and Municipal Revenue Finances	Strong	Yes	Included directly	Reduction in State and Municipal Revenues
State and Municipal Adaptation Cost	Strong	Yes	Combined state and municipal and divided by coastal and inland	Increase in Demand for State and Municipal Government Services
State Risk Mitigation and Adaptation Capacity	Moderate	Yes		
Municipal Risk Mitigation and Adaptation Capacity	Strong	Yes		Increase in Need for State and Municipal Policy Review and Adaptation Coordination
Climate Migration	Strong	Yes	Included directly	Increase in Costs of Responding to Climate Migration
Federal Regulation	Not Mentioned	No	Potential area for future attention	
State Regulation	Not Mentioned	No	Incorporated in Policy Review and Adaptation Coordination	
Municipal and Tribal Regulation	Not Mentioned	No	Incorporated in Policy Review and Adaptation Coordination	

[1] *Impacts noted with an asterisk (*) were new impacts suggested by stakeholders.*

[2] *Key to Stakeholder Importance: 0 comments = Not mentioned; 1-9 comments = Moderate; 10-49 comments = Strong; 50+ comments = Very Strong. 'Not mentioned' impacts were presented by the Climate Assessment team but did not come up in discussions with stakeholders, signaling a lower importance ranking.*

[3] *"Combined" indicates that two or more considered impacts were merged into one shortlisted impact.*

Natural Environment

In the Natural Environment sector, many stakeholders expressed concern for general ecosystem stress. This was most frequently mentioned in relation to extreme heat and drought, although several people mentioned this in the context of other climate hazards or noted that the combination of climate hazards have extreme compounding impacts on our natural systems. This broad concern was largely captured in the shortlisted impact Shifting Distribution of Native and Invasive Species, which had Invasive Species added to it at the recommendation of stakeholders during these meetings.

Several other impacts were added to the list based on stakeholder suggestions, including Freshwater Quality and Harmful Algal Blooms, which were grouped with other impacts in Freshwater Ecosystem Degradation in the shortlist. Forest Health, Timber Harvesting, and Soil Health were all suggestions from stakeholders that were grouped into the shortlist under Forest Health Degradation. Riverbank Erosion was added by stakeholders and expanded to Soil Erosion by the Project Working Group to acknowledge it is an issue in many areas, not just along rivers. Marine Water Quality was another new impact added to the list based on strong stakeholder support.

Table C7 summarizes the stakeholder feedback for the natural environment sector and how it was incorporated in the Climate Assessment.

Table C7. Natural Environment Sector Stakeholder Feedback

Impact Considered[1]	Stakeholder Importance[2]	Included	How Included[3]	Shortlisted Impact
Freshwater Quality*	Strong	Yes	Combined	Freshwater Ecosystem Degradation
Harmful Algal Blooms*	Moderate	Yes	Combined	
Recreational Freshwater Fishing	Moderate	Yes	Combined	
Natural Ponds	Moderate	Yes	Combined	
Forest Health*	Strong	Yes	Combined	Forest Health Degradation
Timber Harvesting*	Strong	Yes	Combined	
Soil Health*	Moderate	Yes	Combined	
Urban Trees	Strong	Yes	Included directly	Loss of Urban Tree Cover
Riverbank Erosion*	Strong	Yes	Expanded	Soil Erosion
Distribution of Native Species	Very Strong	Yes	Combined	Shifting Distribution of Native and Invasive Species
Bird Species Ranges	Moderate	Yes	Combined	
Distribution of Invasive Species*	Strong	Yes	Combined	
Saltmarsh and Coastal Wetlands	Strong	Yes	Included directly	Coastal Wetland Degradation
Marine Water Quality*	Strong	Yes	Combined	Marine Water Ecosystem Degradation
Saltwater Recreational Fishing	Moderate	Yes	Combined	
Marine Resources	Moderate	Yes	Combined	
Coastal Erosion	Strong	Yes	Included directly	Coastal Erosion
Groundwater Recharge and Infiltration	Moderate	Yes	Moved to Infrastructure Section - Reduction in Clean Water Supply	

[1] *Impacts noted with an asterisk (*) were new impacts suggested by stakeholders.*

[2] *Key to Stakeholder Importance: 0 comments = Not mentioned; 1-9 comments = Moderate; 10-49 comments = Strong; 50+ comments = Very Strong. 'Not mentioned' impacts were presented by the Climate Assessment team but did not come up in discussions with stakeholders, signaling a lower importance ranking.*

[3] *"Combined" indicates that two or more considered impacts were merged into one shortlisted impact.*

3. Wave 2 Public Stakeholder Engagement

The objective of Wave 2 was to elicit public stakeholder input on the magnitude or consequence of the shortlist of impacts (see Figure C7) developed following Wave 1, as well as how they may burden certain groups or communities disproportionately. This input was used to help prioritize the climate impacts further. The below sections describe Wave 2 outreach activities (Section 3.1), key feedback received and how it was integrated into the Climate Assessment (Section 3.2) and a summary of Wave 2 (Section 3.3).

Figure C7. Shortlisted Impacts

Human	Infrastructure	Natural Environment	Economy	Governance
Health Effects from Degraded Air Quality	Damage to Electric Transmission and Distribution Infrastructure	Freshwater Ecosystem Degradation	Economic Losses from Damages to Places of Business	Damage to Inland State and Municipal Buildings and Land
Health and Cognitive Effects from Extreme Heat	Loss of Energy Production and Resources	Forest Health Degradation	Extreme Weather Business Interruptions	Damage to Coastal State and Municipal Buildings and Land
Increase in Vector Borne Diseases Incidence and Bacterial Infections	Damage to Inland Buildings	Loss of Urban Tree Cover	Decrease in Agricultural Productivity	Reduction in State and Municipal Revenues
Health Effects from Aeroallergens and Mold	Damage to Coastal Buildings and Ports	Soil Erosion	Decrease in Marine Fisheries and Aquaculture Productivity	Increase in State and Municipal Expenditures on Government Services
Reduction in the Availability of Affordable Housing	Damage to Roads and Loss of Road Service	Shifting Distribution of Native and Invasive Species	Reduced Ability to Work	Increase in State and Municipal Expenditures on Policy Review
Increase in Mental Health Stressors	Damage to Rails and Loss of Rail/Transit Service	Coastal Wetland Degradation	Damage to Tourist Attractions and Recreation Amenities	Increase in State and Municipal Expenditures to Provide Adaptation Coordination
Health Effects of Extreme Storms and Power Outages	Reduction in Clean Water Supply	Marine Water Ecosystem Degradation		Increase in Costs of Responding to Climate Migration
Emergency Service Response Delays and Evacuation Disruptions	Increased Risk of Dam Overtopping or Failure	Coastal Erosion		
Reduction in Food Safety and Security				
Damage to Cultural Resources				

Note: Two sets of impacts were combined after Wave 2 to form the final set of 37 shortlisted impacts. Those were Increase in State and Municipal Expenditures on Policy Review and Increase in State and Municipal Expenditures to Provide Adaptation Coordination in the Governance Sector and Economic Losses from Damages to Places of Business and Extreme Weather Business Interruptions in the Economy Sector.

3.1 Wave 2 Outreach Activities

Stakeholder engagement in Wave 2 used a layered approach to continue the outreach activities conducted in Wave 1 as well as address gaps in stakeholder outreach. To this end, outreach activities included public meetings, a survey, focus groups, and interviews. Our approach to Wave 2 was modified to reach groups that did not participate in Wave 1. To this end, we conducted interviews, supported engagement activities to assist in the completion of surveys, and conducted focus groups to reach the following groups:

- Spanish-speaking environmental justice communities;
- People with disabilities;
- Formerly incarcerated community members; and

- Tribal representatives.

Similar to Wave 1, the engagement team worked closely with the Community Liaisons (CLs) to help publicize opportunities to engage and provide feedback within their network. In some cases, CLs also provided support to their community members in helping to respond to the survey or arranging one-on-one interviews or focus groups to elicit additional input from community members. The public meetings and the written survey were also publicized via the stakeholder database and social media.

Four public meetings were held in Wave 2 in June 2022 (via Zoom) with two primary goals:

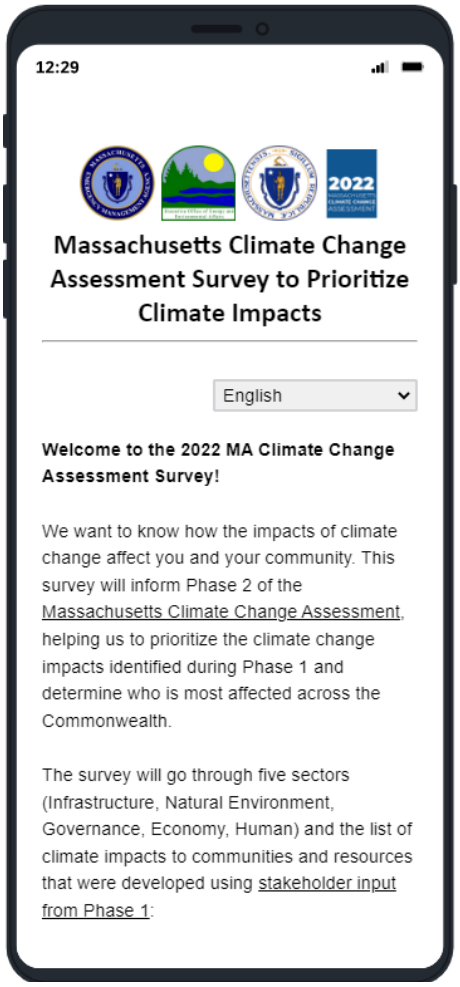
1. Refine our understanding of regional impacts.
2. Prioritize climate impacts to address, including those that fall most heavily on socially vulnerable communities.

In a similar format to Wave 1, these meetings were broken into two sections, the first being a presentation of the shortlisted impacts for the five Sectors, and the second being facilitated breakouts for stakeholder discussion and feedback. Breakout rooms were organized by region, and participants were asked to discuss the question: "What culturally important places, resources, or activities are you most concerned about being affected by climate change?".

Participants were given the opportunity to discuss the sector impacts more generally; share any personal, community, or regional concerns relating to each of the sectors; and contribute anything about the climate impacts that may not be addressed in the sector priorities. The purpose of the breakout room discussions was to start thinking about how they would prioritize the impacts by sector.

In addition to the breakout room discussions, participants were encouraged to complete the Massachusetts Climate Change Assessment Survey Prioritize Climate Impacts (the survey) (see Figure C8). As noted above, CLs also helped drive participation in the online survey by assisting and dispersing gift cards to some community members who may not otherwise have had time or capacity to respond to the survey. The survey was available in ten languages other than English: Spanish, Portuguese, Traditional Chinese, Simplified Chinese, Haitian Creole, Cape Verdean Kriolu, Russian, Arabic, Vietnamese, and Khmer.

Figure C8. Survey Welcome Page



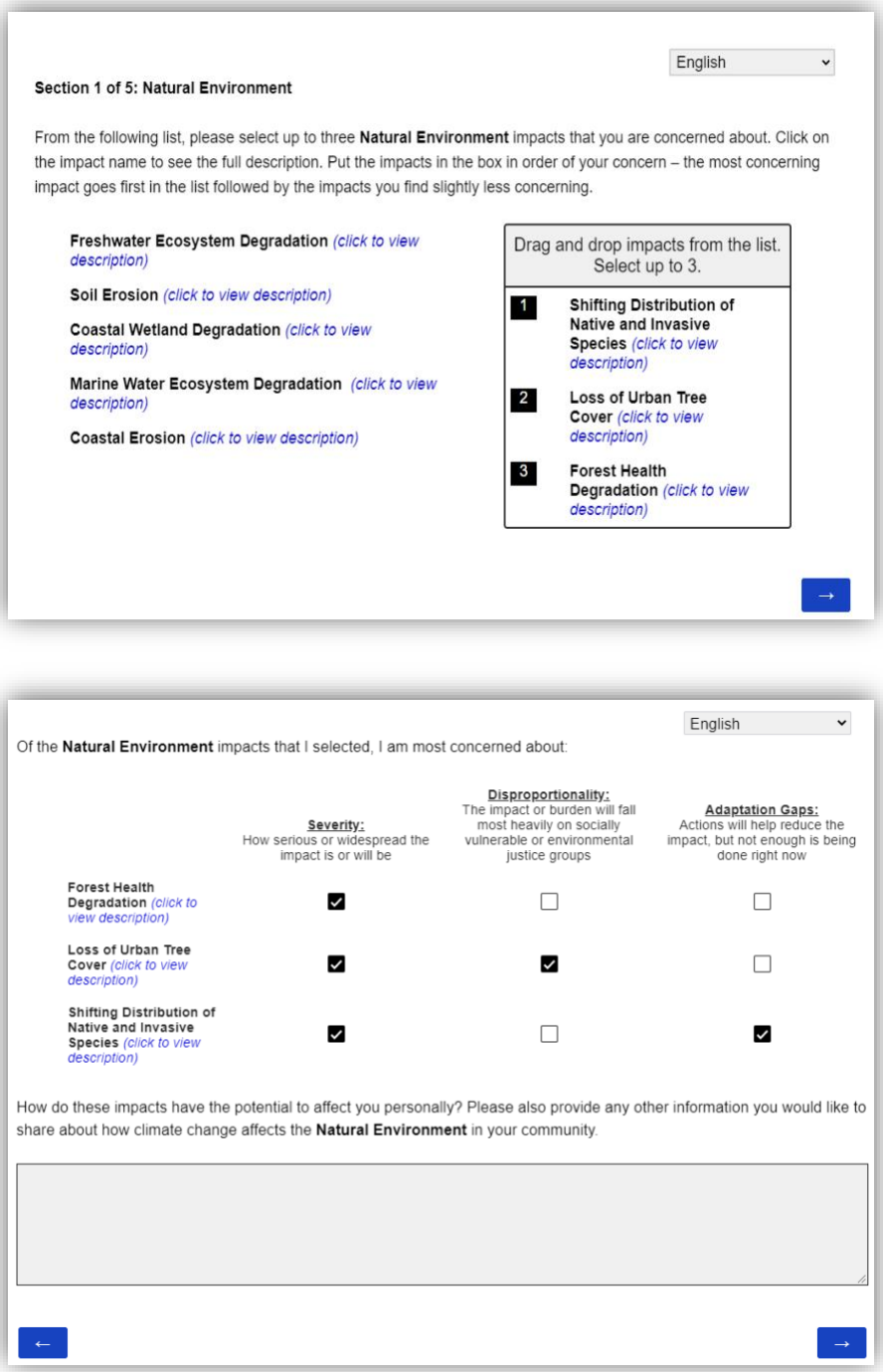
For each of the five sectors of climate impacts (Infrastructure, Natural Environment, Governance, Economy, Human), respondents were asked to select up to three impacts they found most concerning. Then, respondents could explain the reasoning behind each their selections by indicating which of the following reasons was a factor in their choice:

- **Severity**: How serious or widespread the impact is or will be
- **Disproportionality**: The impact or burden will fall most heavily on socially vulnerable or environmental justice groups
- **Adaptation Gaps**: Actions will help reduce the impact, but not enough is being done right now.

An open-ended textbox allowed respondents to provide more information about how the selected impacts have the potential to affect them and their community.

An example of the Natural Environment sector is included in Figure C9 to demonstrate the format of the survey questions.

Figure C9. Example of Survey Layout for Natural Environment Sector



Impacts for each sector were weighted according to how they were ranked by stakeholders in the survey. Impacts ranked first, or most concerning, were given 3 points, those ranked second were assigned 2 points, and those ranked third were given 1 point. The Climate Assessment team then calculated the total points earned by each impact type and used this information to create a final stakeholder ranking. The team calculated these impact rankings for all stakeholder responses across the Commonwealth, and separately for each region. The Climate

Assessment team also analyzed the reasoning provided by respondents, and considered the qualitative responses for each sector.

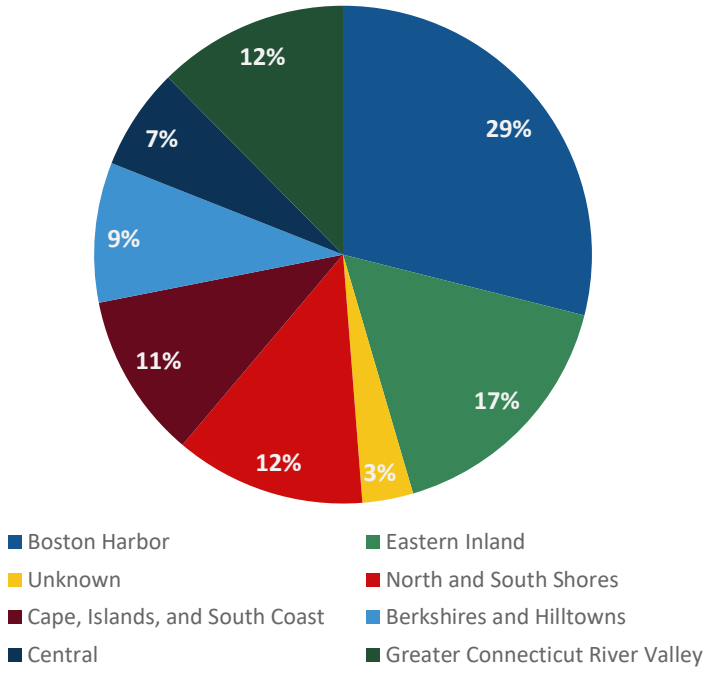
To supplement input gathered via the public meetings and surveys, the engagement team also conducted targeted outreach to groups and communities whose perspectives may have been underrepresented, by holding one-on-one interviews or small focus groups to hear their input. These conversations included content similar to what was shared in the public meetings, i.e., sharing the emerging priority climate impacts within sectors and discussing cultural resource impacts from climate change. However, these conversations afforded more flexibility to allow participants to ask questions and drive the focus of input to share what was most significant for them. In a Spanish Language focus group, for example, participants discussed the climate impacts that they had experienced or observed in their communities.

3.2 Wave 2 Participation and Feedback

Public Meeting Participation

A total of 121 stakeholders participated in the Wave 2 public meetings. Meeting attendees represented 68 towns and cities across Massachusetts, including 44 designated as having EJ populations. The breakdown of attendees by region is presented in Figure C10.

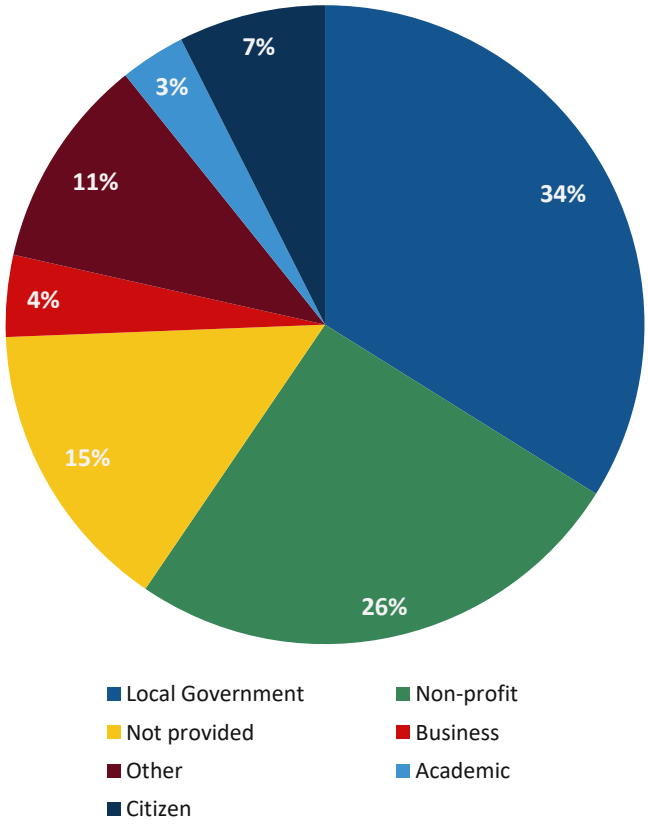
Figure C10. Regional Distribution of Wave 2 Attendees



Thirteen percent of attendees identified as non-White, and 8 percent identified as Hispanic, Latino/a/x, or Spanish. Attendees again represented a variety of organization types: 34 percent local government, 26 percent non-profit, 4 percent business, and 3 percent academic (Figure

C11). Seven percent identified as private citizens with no organization affiliation. This represents a notable increase in the proportion of non-profit representatives in Wave 2 meetings compared to Wave 1, and slight decrease in attendees from businesses or academic organizations.

Figure C11. Organization Type Representation in Wave 2 Meetings



Meeting attendees contributed a total of 247 comments verbally or via chat, 162 of which related directly to the topic of cultural resources.

Feedback on Cultural Resource Impacts from Climate Change

To frame the discussion around cultural resource impacts from climate change, in public meetings and in follow up focus groups and interviews, participants were asked: "What culturally important places, resources, or activities are you most concerned about being affected by climate change?" This prompt elicited a range of feedback on how stakeholders experience and think about climate change having an impact on cultural resources now and in the future. Table C8 provides a summary of key feedback received on different types of cultural resources.

Table C8. Feedback on Cultural Resources

Resource Type	Relevant Comments on Impacts or Loss
Tribal Cultural Resources	• Threats to spiritually significant places such as burial grounds, gravesites, and other locations due to flooding or other impacts • Akin to spiritual loss – similar to losing a member of the family • Loss of traditional ecological knowledge and ways of interacting with nature, including food autonomy
Historically significant sites, landmarks, and artifacts	• Artifacts and historical buildings may be vulnerable to flooding, higher temperatures, climate disasters, and other climate impacts
Natural places, recreation sites, and sense of home	• Natural environment and resources form an important part of cultural identity and sense of home and community (e.g., wildlife, water bodies, coastal areas) • Ability to recreate outdoors formed a significant part of their personal and cultural identity • Communities with limited access to natural/green spaces (e.g., EJ communities) are most likely to bear the costs of loss of easily accessible natural recreational spaces • Participants from immigrant communities noted that they are attuned to the effects of climate change in the countries from which their community members emigrated, which can result in mental health issues and material and logistical impacts through new waves of migration
Economic and ways of life	• Certain livelihoods (e.g., fishing and agriculture) and agrarian and rural identities are threatened • Cultural and economic phenomena such as a local food and farm-to-table economy or the lobstering industry may be impacted
Cultural hubs and community gathering opportunities	• Limited outdoor gathering spaces due to heat, flooding, insects, or other issues (e.g., parks and green spaces) • Increase in social isolation

In many cases, participants noted their concern that impacts to these cultural resources would have disproportionate effects on vulnerable populations and environmental justice communities.

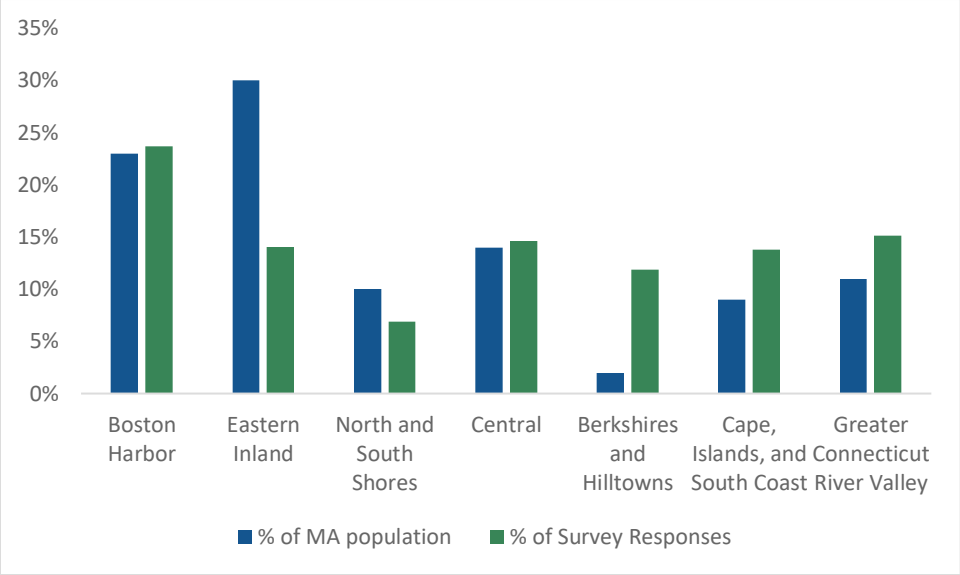
Survey

The survey gathered a total of 443 responses, with respondents representing 158 towns and cities across Massachusetts, including 90 that have EJ populations. Each region had between 25 (North and South Shores) and 86 (Boston Harbor) responses. Figure C12 shows the regional distribution of survey responses compared to the population distribution of Massachusetts and highlights a relatively low number of respondents from the Eastern Inland region and a

relatively high number of respondents from the Berkshires and Hilltowns. Note, 18 percent of respondents did not provide their location and were excluded from this population distribution analysis.

Figure C12. Regional Distribution of Stakeholder Survey Respondents

Comparison of the proportion of stakeholder survey responses (with known locations) to the proportion of Massachusetts' population by region.



Ten percent of survey respondents identified as a race other than White or Caucasian, and 7 percent reported being of Hispanic, Latino/a/x, or Spanish origin. A few respondents utilized the translated survey options—six responses were received in Spanish, one in Simplified Chinese, and one in Khmer (partially responded).

Respondents represented a diversity of organizations; most represented local government (29 percent), followed by non-profit (19 percent). Ten percent identified as residents with no organization affiliation, 8 percent represented a business, and 1 percent came from academic organizations. The remaining 33 percent chose "Other" or did not provide an affiliation.

As discussed in the methods section, stakeholder responses were weighted by ranking and summing across all respondents. The top five impacts for each sector are presented in Table C9.

Table C9. Statewide impact prioritization by sector (survey results)

Rankings averaged across survey responses. The final Climate Assessment urgency rankings used the stakeholder rankings for context but relied upon the data-driven process described in Chapter 2 to develop final urgency rankings.

Sector	Ranked Impact
Human	1 - Reduction in Food Safety and Security
	2 - Health Effects from Degraded Air Quality
	3 - Health and Cognitive Effects from Extreme Heat

Sector	Ranked Impact
	4 - Reduction in the Availability of Affordable Housing
	5 - Health Effects of Extreme Storms and Power Outages
Infrastructure	1 - Reduction in Clean Water Supply
	2 - Damage to Electric Transmission and Distribution Infrastructure
	3 - Damage to Roads and Loss of Road Service
	4 - Loss of Energy Production and Resources
	5 - Damage to Coastal Buildings and Ports
Natural Environment	1 - Freshwater Ecosystem Degradation
	2 - Forest Health Degradation
	3 - Shifting Distribution of Native and Invasive Species
	4 - Loss of Urban Tree Cover
	5 - Marine Water Ecosystem
Governance	1 - Increase in Costs of Responding to Climate Migration
	2 - Increase in State and Municipal Expenditures on Government Services
	3 - Increase in State and Municipal Expenditures to Provide Adaptation Coordination
	4 - Reduction in State and Municipal Revenues
	5 - Damage to Coastal State and Municipal Buildings and Land
Economy	1 - Decrease in Agricultural Productivity
	2 - Extreme Weather Business Interruptions
	3 - Decrease in Marine Fisheries and Aquaculture Productivity
	4 - Economic Losses from Damages to Places of Business
	5 - Reduced Ability to Work

Most of the highest-ranking impacts on the state-wide prioritization list showed very little regional variation in their stakeholder rankings. All regions ranked the Costs of Responding to Climate Migration as the #1 most concerning impact in the Governance sector. All regions ranked Reduction in Clean Water Supply (Infrastructure) and Decrease in Agricultural Productivity (Economy) as #1 or 2 within their respective sectors. Though the survey did not collect detailed reasoning behind these rankings, the survey was administered in June 2022, during one of the hottest and driest summers recorded in Massachusetts, while many cities and towns had outdoor watering bans in effect. These signals may have been front of mind for respondents while filling out the survey even though the existing literature on these impacts does not provide a strong evidence base for large projected damages. Overall, stakeholder rankings for impacts in the Infrastructure, Governance, and Economy sectors were similar across all regions, while impacts in the Natural Environment and Human Health sectors tended to have more varied regional results. For example:

- Among Infrastructure impacts, Damage to Coastal Buildings and Ports had notable regional variation with higher stakeholder rankings from the Boston Harbor, North and South Shores, and Cape, Islands, and South Coast regions compared to others.

- Damage to Roads and Loss of Road Service and Damage to Rails and Loss of Rail/Transit Service also showed variation due to Boston Harbor stakeholders ranking the Road impacts 2 points lower and Rail/Transit impacts 2 points higher than all other regions.
- Coastal Wetlands Degradation and Coastal Erosion had the greatest regional variation among impacts in the Natural Environment sector. Both were ranked very high by stakeholders in the Boston Harbor, North and South Shores, and Cape, Islands, and South Coast regions, and ranked much lower among stakeholders in the Eastern Inland, Central, Berkshires and Hilltowns, and Greater Connecticut River Valley regions.
- In the Human Health sector, Reduction in the Availability of Affordable Housing had the highest level of regional variation, ranked as the #1 most concerning Human Health impact by the Berkshires and Hilltowns and Cape, Islands and South Coast regions, but much lower by other regions across the Commonwealth.
- Health Effects of Extreme Storms and Power Outages was ranked as a more concerning impact by Eastern Inland, North and South Shores, and Cape, Islands, and South Coast stakeholders compared to other regions.
- Reduction in Food Safety and Security, which is the #1 ranked Human sector impact state-wide, was one of the most regionally consistent impacts in this sector, ranking between #1 and 3 in all regions. Health Effects from Aeroallergens and Mold and Damage to Cultural Resources were also relatively stable across all regions, ranking among least concerning impacts in all regions.

The majority of stakeholders who ranked impacts provided an explanation of their choice by selecting one or more reason: severity, disproportionality, or adaptation. Table C10 contains the average responses for impacts within each sector and shows that severity was the reason most frequently selected by respondents for all impacts across all sectors. Compared to other sectors, Human Health received the highest percentage of stakeholders concerned about disproportionality.

Table C10. Stakeholder Impact Selection Reasonings (survey results)

Stakeholder reasons for prioritizing their top climate impacts are averaged for all impacts in each sector. Stakeholders were given the option to select more than one reason per impact.

	Percent of stakeholders who selected each reason for their top-three ranked impacts.		
Sector	**Severity**	**Disproportionality**	**Adaptation Gaps**
Infrastructure	65%	37%	45%
Natural Environment	62%	25%	52%
Governance	50%	36%	42%
Economy	63%	39%	41%
Human	62%	49%	40%
All Sectors	**60%**	**37%**	**44%**

The impacts that had the highest percentage of respondents select them for each of the reasoning options are reported below:

- Severity:
  - Vector Borne Diseases Incidence and Bacterial Infections (83 percent)
  - Decrease in Marine Fisheries and Aquaculture Productivity (73 percent)
  - Freshwater Ecosystem Degradation (73 percent)
- Disproportionately:
  - Availability of Affordable Housing (79 percent)
  - Health and Cognitive Effects from Extreme Heat (67 percent)
  - Loss of Urban Tree Cover (67 percent)
- Adaptation Gaps:
  - Coastal Wetlands Degradation (60 percent)
  - Damage to Coastal Buildings and Ports (59 percent)
  - Increase in State and Municipal Expenditures to Provide Adaptation Coordination (55 percent)

In cases where the stakeholder ranking of a particular impact did not align with the technical team's assessment, the technical team dug further into possible reasons for discrepancies. In some cases, where the stakeholder input provided a strong evidence base for increasing the magnitude of consequence score, scores were adjusted after the survey. An example of this is the Food Safety and Security impact in the Human Sector. Although the climate impact literature does not include strong evidence for this impact, input from the stakeholders led to the conclusion that given the current magnitude of the issue, any exacerbation by climate change could lead to a significant consequence.

All shortlisted impacts are discussed in greater detail in Chapter 4 and Appendix A. Each impact write-up includes a direct reference to a quotation provided by a stakeholder through the survey. The example comments in each callout box were chosen to represent the common themes heard across all public stakeholder engagement activities.

Figure C13. Example Callout Box with Stakeholder Quotes

"The places I live and work on in a flood zone/plain. I could lose my home and my livelihood in the event of severe flooding."

"The heavier rains that we now experience exacerbate the problem, which leads to flooding that used to happen once in a blue moon to being a yearly threat."

- Stakeholder Survey Respondents
(See Appendix C for details)

Focus Group and Interviews

Focus groups and interviews conducted in this period included a Spanish Language focus group with community members from environmental justice communities around Boston, a focus group for people with intellectual and/or developmental disabilities in the Berkshires, and an interview with a Tribal leader.

Below are key pieces of feedback and themes that participants raised which provided additional perspective beyond what was heard in other engagement activities.

- **Climate impacts for individuals experiencing multiple vulnerability factors result in profound, compounding economic stressors.** For example, impacts are felt more strongly for people experiencing burden from low incomes, multiple low-wage jobs, time constraints in the context of rising rent and food prices, disabilities, chronic health conditions, being recent immigrants, a commitment to financially support family abroad, and the uncertainty that immigration status brings. These factors increase vulnerability to climate impacts. For example, rent and housing costs impact housing security, cost and reliability of transit impacts time availability and financial burden, and cost of electricity for cooling impacts health outcomes. Vulnerability caused by immigration status and lack of access to safety nets or social programs further compound these impacts. Such economic stressors impact both physical and mental health.
- **Disproportionate pandemic impacts.** Participants reported their community being disproportionately impacted by COVID, both directly and financially through employment loss and reduction in essential services such as public transportation. Most participants were not eligible for COVID stimulus and received little or no support from the government. These financial and health burdens leave communities with more vulnerabilities and at greater risk of exposure to, and burden from, climate impacts.
- **A lack of community engagement in emergency management planning.** Participants reported feeling unengaged, uninformed, and excluded from planning efforts. They recognize their vulnerability to extreme events but have not been engaged in the process and are not aware of plans to prepare or respond to disasters in their community. Participants report being concerned about emergency events in their community and were seeking more information on how to be prepared for extreme weather events.
- **Global climate change impacts are experienced directly.** Some participants experience not only climate impacts in Massachusetts but also those felt in their countries of origin. A flood abroad, for example, will impact communities in Boston both mentally, emotionally, and financially, as they have commitments to support family in their country of origin.

4. Wave 3 Stakeholder Engagement

The objective of Wave 3—the final Wave of stakeholder engagement—was to vet the analytic and impact ranking outputs and draft findings with key stakeholder groups to ensure that their feedback on risk priority and urgency, particularly how they relate to disproportionate burdens, is appropriately reflected in them. The Climate Assessment findings were then refined based on their input.

Wave 3 consisted of targeted outreach to key stakeholder groups, via one-on-one interviews and smaller group discussions. The key stakeholder groups targeted for additional outreach in this Wave include Tribes, areas with more limited stakeholder participation, and environmental justice communities.

In addition to targeted outreach, Wave 3 also included an opportunity for broader public input through a public comment period on the project's mass.gov site. The draft report was distributed through the stakeholder list, along with a digital survey/comment form to facilitate targeted feedback on the draft report.

Community Liaisons played an integral role in Wave 3, as they advised on targeted engagement with groups for interviews and focus groups, facilitated outreach for the public comment period, and by providing direct feedback on the draft report themselves.

4.1 Wave 3 Participation and Feedback

Focus Group and Interviews

Fourteen interviewees provided input in Wave 3 reviewed either the statewide report or their region-specific report, with particular emphasis on the draft rankings. In structured conversation, they were asked, "Are we missing anything about priority impacts in this sector? Is there anything we need to know about these impacts to help set priorities and action steps?"

Feedback from these conversations helped shed light on additional dimensions of the impacts described, pointed to areas where content in the report needed to be clarified, and in some cases highlighted concerns with and suggested reprioritizations of impact rankings. When interviewees suggested different prioritizations, they were asked to share more about why they thought the priorities should be adjusted. This gave the technical team an opportunity to review the inputs into rankings and consider adjustments. Additionally, as was true throughout the process, interviewees made many comments reflecting the interconnected nature of climate impacts, which complicates their categorization into sectors. These comments in some cases helped refine the impact summaries, where these interconnections can be explained. Many interviewee comments also stressed that adaptation plans following this assessment should center the needs of socially vulnerable and environmental justice groups facing the greatest threats from climate impacts, and work to redress inequalities in investment, access to public resources, and economic opportunity.

Public Comment Form

The Climate Assessment team received 28 responses to the request for public comment (including two letters from local CBOs). Respondents included representatives from municipalities, CBOs and NGOs, regional planning authorities, and residents of the Commonwealth. Key themes of the public comments included:

- **Interaction of Magnitude of Consequence scores and Disproportionality scores.** Commenters asked why impacts with the highest magnitude scores ranked below those with lower magnitude scores. They recognized that disproportionality was the technical reasoning but questioned whether this methodology was appropriate. Some noted that impacts of this magnitude are likely to have disproportionate effects due to adaptive capacity, and suggested adaptive capacity play a role in future assessments. Others noted perhaps magnitude should be weighted higher than the other two components in the urgency score. The Climate Assessment team responded to this comment by

describing the relative importance of each component in more detail in Appendix B of the report.

- **Definition of Disproportionality metric.** Some commenters offered suggestions for expanding the analysis of disproportionality in the Climate Assessment. Suggestions included incorporating additional categories of socially vulnerable populations (e.g., people with disabilities, elderly populations), considering cumulative impacts, and incorporating adaptive capacity, particularly for high magnitude impacts. This Climate Assessment aligns with EEA's environmental justice population definition, but the comments raised here are helpful for future assessments and for the state EJ Council that is currently reviewing EJ definitions for EEA.
- **Specific feedback on rankings.** Some commenters felt specific impacts should have higher disproportionality scores (e.g., Decrease in Agricultural Productivity and Damages to Cultural Resources) and others thought impacts such as Damage to Roads and Damage to Coastal Infrastructure should have higher magnitude scores. Much of this discussion centered around connections between impacts (e.g., road damages also affect economy and health outcomes). The Climate Assessment team reviewed existing scores for these impacts and expanded the discussion of the approach for accounting for interactions between sectors.
- **Additional adaptation plans to consider in Adaptation Gap analysis**. Commenters provided specific plans that the Climate Assessment team then incorporated in the analysis. There were also questions regarding the relative importance of early-phase studies and plans to closing the gap versus the ability of on-the-ground action to close the gap. The Climate Assessment team added a discussion of this distinction in Chapter 2 of the report.
- **Simplify Executive Summary**. Commenters emphasized the importance of the executive summary and asked for simplification wherever possible. The Climate Assessment team reviewed language in the Executive Summary and simplified where possible.

The Climate Assessment team revised discussion in the report in response to these comments and noted instances where the comments provided important points for consideration in future climate assessments.

5. Project Working Group Engagement

The Climate Assessment team also worked with the Project Working Group (PWG), a group of representatives from state and federal agencies, as well as several community-based organizations and non-governmental organizations. The role of the PWG was to first review the framework for this Climate Assessment and then provide feedback throughout the process and review draft materials. Table C11 provides more details on when and how the PWG was engaged throughout the Climate Assessment.

Table C11. Summary of PWG Engagement Activities and Timeline

	PWG 1: Climate Impact Brainstorming	**PWG 2: Climate Impact Shortlist Development**	**PWG 3: Climate Impact Ranking Preview**	**PWG 4: Consensus Building**
Timeline	*Nov-Dec 2021*	*April 2022*	*Aug-Sept 2022*	*Oct-Dec 2022*
Key Task	• Brainstorm the impacts of climate change in Massachusetts	• Narrow the set of impacts down to the most critical impacts to be studied further in the Climate Assessment	• Provide feedback on early drafts of impact rankings and summary write up (i.e., the text of Chapter 4 of the statewide report and Appendix B).	• Review draft Climate Assessment
Key Activities	• 5 meetings (1 per sector)	• 5 meetings (1 per sector) • Survey	• 1 Workshop, with breakout rooms by sector	• Report review
Key Outputs	• Additions and subtractions from Climate Assessment team's initial impact list	• Looked at preliminary consequence results from technical team and public stakeholder input and recommended shortlisted impacts • In the survey, rate impacts by importance. Results are used to finalize shortlist and begin to inform urgency ranking.	• Review urgency rankings and component scores by sector, provide feedback on specific component scores • Reviewed impact write ups and provided feedback on rankings, analysis, and sources	• PWG members provided multiple rounds of comments on the draft report, prior to and during the public review period

The PWG was organized into five sector working groups, aligning with the five sectors examined in the Climate Assessment. Table C12 lists the organizations and agencies represented in the PWG. Approximately 150 people participated in PWG activities across the organizations and agencies listed below.

Table C12. Organizations and Agencies Represented in the PWG

State Agency Reviewers and Contributors

Board of Underwater Archaeological Resources (BUAR)	Division of Ecological Restoration (DER)	Massachusetts Bay Transportation Authority (MBTA)
Bureau of Environmental Health (BEH)	Division of Fisheries & Wildlife (MassWildlife)	Massachusetts Clean Energy Center (MassCEC)
Department of Conservation & Recreation (DCR)	Division of Marine Fisheries (DMF)	Massachusetts Department of Agricultural Resources (MDAR)
Department of Energy Resources (DOER)	Executive Office for Administration & Finance (A&F)	Massachusetts Department of Environmental Protection (MassDEP)
Department of Housing & Community Development (DHCD)	Executive Office of Energy & Environmental Affairs (EEA)	Massachusetts Emergency Management Agency (MEMA)
Department of Labor Standards (DLS)	Executive Office of Education (EOE)	Massachusetts Office of Travel and Tourism (MOTT)
Department of Public Health (DPH)	Executive Office of Health & Human Services (HHS)	Office of Coastal Zone Management (CZM)
Department of Public Utilities (DPU)	Executive Office of Housing & Economic Development (EOHED)	Office of Preparedness & Emergency Management (OPEM)
Department of Transportation (DOT)	Executive Office of Public Safety & Security (EOPSS)	Secretary of the Commonwealth (SEC)
Division of Capital Asset Management & Maintenance (DCAMM)	Executive Office of Technology Services and Security (EOTSS)	

Additional Reviewers and Contributors

Blackstone Watershed Collaborative	Massachusetts Association of Community Development Corporations (MACDC)	National Oceanic and Atmospheric Administration (NOAA)
Boston Harbor Now	Massachusetts Bays National Estuary Partnership (MassBays)	National Weather Service (NWS) Boston
Boston Library Consortium (BLC)	Massachusetts Food Systems Collaborative	Northeast Climate Adaptation Science Center (NE CASC)
Central Massachusetts Regional Planning Council (CMRPC)	Massachusetts Lobstermen's Association (MLA)	Pioneer Valley Planning Council (PVPC)
Conservation Law Foundation (CLF)	Massachusetts Municipal Association (MMA)	Stone Living Lab
Eversource	Massachusetts Port Authority (Massport)	The Nature Conservancy (TNC)
Federal Emergency Management Agency (FEMA)	Massachusetts Water Resources Authority (MWRA)	U.S. Department of Agriculture (USDA)
Franklin Regional Council of Governments (FRCOG)	Mattapan Food & Fitness Coalition (MFFC)	U.S. Environmental Protection Agency (EPA)
Harvard Forest	Metropolitan Area Planning Council (MAPC)	U.S. Fish & Wildlife Service (FWS)
Healthcare Without Harm	Mystic River Watershed Association (MyRWA)	Urban Harbors Institute (UHI)
Mass Audubon	National Grid	

6. Peer Review of Climate Science

The Climate Assessment team also worked with an external peer review panel of climate scientists, with expertise in forecasts of temperature, precipitation, sea level rise, and coastal and inland storm incidence specific to Massachusetts. The panel included members affiliated with Massachusetts Institute of Technology; University of Massachusetts at Amherst, Cornell University, Salem State University, and the National Oceanic and Atmospheric Administration. The panel reviewed the proposed application of climate inputs for impact assessment, and considered alternative sources of climate data, including the updated United Nations Intergovernmental Panel on Climate Change (IPCC) Global Climate Models (GCMs – the latest versions are part of a model ensemble referred to as CMIP6). The panel acknowledged and agreed with EEA and the Project Team, however, that until a well-accepted bias-corrected and downscaled product is available for these newer projections, the adoption of CMIP6 results (rather than the CMIP5 projections the Climate Assessment is based on) would be premature. The overall conclusion of the panel, in consultation with EEA and the Project Team, is that the Climate Assessment is using the best available climate science as inputs. Additional details on the scope of the peer review and the specifics of the climate science basis for the Climate Assessment are provided in Appendix B of this report.

7. Lessons Learned

Stakeholder engagement – a key component of the Climate Assessment – was an iterative process that incorporated lessons learned between waves. Overall, the PWG, public stakeholders, and CLs provided positive and invaluable feedback regarding the engagement process. This feedback, as well as feedback from the engagement team, was used to develop a list of general "lessons learned" building on what was effective in this process, and to support future stakeholder engagement efforts, with the goal of reaching more diverse groups of stakeholders in the Commonwealth and elsewhere.

- Consider the audience. Develop communication methods to be accessible to stakeholders with varying background knowledge on the topic. Present materials using non-jargony and non-technical terms.
- Provide engagement options. Provide multiple options for stakeholder engagement, i.e., public meetings, smaller focus groups, interviews, surveys. It is also important to keep in mind potential stakeholder commitments (work, family) when scheduling public meetings. Conduct multiple engagement activities at different times so that stakeholders can participate repeatedly throughout the project.
- Work through community connections. Connect with community-based organizations or leaders that have established trust with key stakeholder groups. Similarly, look to align engagement outreach with regularly scheduled meetings such as regional planning council meetings or other community meetings.
- Consider incentives for participation. Compensating community liaisons and stakeholders for their time is important and may increase their ability to participate. Also consider using gift cards to increase survey or focus group participation.
- Consider standardizing and streamlining the approach across agencies. Different agencies across Massachusetts are conducting outreach related to different programs, permits, or policies to many of the same stakeholder groups. Developing and applying a standard approach and language for outreach and communication would make outreach more efficient given CBO and community partners' limited resources.
- Feedback loop. Provide feedback and information to organizations supporting outreach along the way so that they know if their outreach is working (e.g., number of stakeholders from a specific region or community) and can adjust accordingly.