The Southern Midcoast Maine Social Resilience Project

Briefing Book
January 26, 2022

This Briefing Book (BB) provides exercise participants with all the necessary tools for their roles in the exercise.

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Credits

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- Bowdoin College
- Maine Sea Grant
- The Island Institute
- The Maine Coastal Program
- The Nature Conservancy

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- Blue Sky Planning Solutions
- Bowdoin College
- Casco Bay Estuary Partnership
- Kennebec Estuary Land Trust
- Maine Sea Grant and University of Maine Cooperative Extension
- The Nature Conservancy
- The Wells National Estuarine Research Reserve

The Advisory Committee for their thoughtful input:
- Allison Hepler, Woolwich Selectboard
- Anne Fuchs, Maine Emergency Management Agency- Director of Mitigation, Planning, and Recovery
- Grainne Shaw, Sagadahoc County Emergency Management Agency- Deputy Director
- Jared Woolston, City of Brunswick- Planner
- Mary Turner, Good Shepherd Food Bank
- Mary Ann Nahf, Harpswell Conservation Commission
- Nathan Robbins, Maine Dept. of Environmental Protection- Climate & Adaptation Program
- Patricia Pinto, AARP Maine- Volunteer State President
- Celeste Stimpson, American Red Cross- Disaster Program Manager, Coastal Maine

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Exercise Overview

Exercise Name	The Southern Midcoast Maine Social Resilience Project
Exercise Date	January 26, 2022
Scope	This is a scenario planning exercise, planned for 4 hours via Zoom.
Competencies	Planning, Response, and Recovery
Objectives	For exercise participants to learn about each other, to identify opportunities for new partnerships, and to become more effective and efficient at supporting the region's residents most at risk to the impacts of storm events.
Threat or Hazard	Extreme weather events that periodically occur along the coast of Maine are expected to occur more and more frequently as a result of climate change. There are community members and groups who, due to economic and/or social circumstances, will be at greater risk and have less resources to respond to and recover from storm impacts. Through this exercise, we will explore opportunities for new partnerships and cooperation to prepare, respond, and recover from storms in a way that more effectively supports these southern midcoast residents.
Scenario	A late fall storm coincident with astronomical high tide causes severe flooding, road damage, wind damage, and extended loss of electricity.
Sponsor	This exercise is being implemented through a partnership of the following organizations with support of a Coastal Communities Grant from the Maine Coastal Program and a ShoreUp grant from the Island Institute: Bowdoin College, Kennebec Estuary Land Trust, Maine Sea Grant, Wells National Estuarine Research Reserve, Casco Bay Estuary Partnership, and The Nature Conservancy.
Participating Jurisdictions/ Organizations	State, regional, and local representatives from emergency management, social services, municipalities, and conservation organizations in the eight communities: Harpswell, Brunswick, West Bath, Bath, Phippsburg, Georgetown, Arrowsic, and Woolwich.
Point of Contact	Ruth Indrick, Kennebec Estuary Land Trust; rindrick@kennebecestuary.org; 207-442-8400

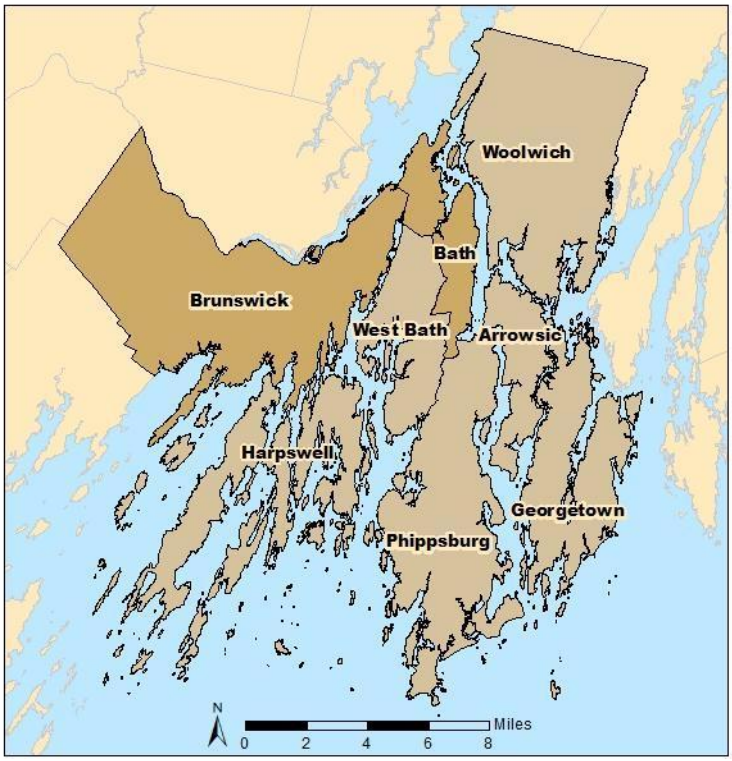
General Information

The Social Resilience Project:

Better connected communities are more able to respond to impacts from natural disasters and serve those community members who, due to economic and/or social circumstances, will be at greater risk from those events. The network of connections between individuals, organizations and services is social resilience. This project was designed to promote new connections and partnerships between four sectors in the Southern Midcoast Maine Region involved with preparation, response and recovery relative to extreme events.

The Region:

The region covered by this exercise includes Arrowsic, Phippsburg, Georgetown, West Bath, Bath, Brunswick, Harpswell and Woolwich. This is a region in which coastal communities are linked along peninsulas and islands and reliant upon service center communities to the north. The ability of an individual community in this region to respond to and recover from extreme weather events can be directly impacted by actions taken by its neighboring communities.



The Sectors:

The sectors taking part in this exercise include municipal, conservation, emergency management, and social services. The choice of these sectors was based on preliminary work done by the Project Planning Team through focus group meetings with each sector. Through those meetings, it became obvious that while each sector had established systems to address the components of hazard events relevant to their specific sector, there was a lack of connection and coordination between the sectors. This exercise was developed to provide an opportunity for conversation between the sectors in the hopes that new partnerships and coordination opportunities will be identified to strengthen social resilience within the region.

What is Social Vulnerability?

Social Vulnerability relates to the circumstances of a person or community that affect their capacity to anticipate, confront, repair, and recover from the effects of a disaster. Some examples of factors that might affect a person's social vulnerability include socioeconomic status, household composition, minority status, and vehicle access.

Socially Vulnerable Populations include those who have specific circumstances, such as, but not limited to, poverty, minority status, people without vehicles, people with disabilities, older adults, and people with limited English proficiency that may increase their vulnerability in the event of an emergency. We will be using the term Socially Vulnerable Populations to refer to these groups and individuals for the remainder of the Briefing Book.

Below is the list of Socially Vulnerable Populations we will be considering in this exercise. For more information on Social Vulnerability and why populations with these characteristics may have more difficulty preparing for, responding to and recovering from disasters, refer to Appendix D: What is Social Vulnerability (p.21).

Households below poverty	Households with one or more members with a disability
Individuals who are unemployed	Households with a single parent and children under 18
Individuals who are employed in a natural resource occupation	BIPOC (Black, Indigenous, People of Color)
Individuals who are self-employed	Individuals who speak English less than well
Low income households	Individuals living in mobile homes
Individual who has not completed a high school education	Crowding - more people than rooms
Individuals 65 or over	Households without a vehicle
Individuals 65 or over and living alone	LGBTQ (lesbian, gay, bisexual, transgender, queer/questioning)
Individuals under 18	New Mainers (refugees, asylum seekers, asylees, secondary migrants)

Table 1. Socially Vulnerable Populations to be considered in the exercise.

The Exercise

Exercise Goals:

The goals of this exercise are twofold. First, to assess the current level of social resilience in the region and second, to improve it by increasing the connections within and between communities and four specific sectors that are involved in preparing for, responding to, and recovering from storm events and/or supporting residents of the Southern Midcoast Region who, due to social and/or economic circumstances, are less likely to have the connections and resources needed to recover from severe storm events.

Exercise Objectives

Table 2 lists the exercise objectives and the outcomes that will be used to measure overall success of the exercise.

Exercise Objectives	Measure of success
Learn about each other	Participants leave with greater understanding of what each organization does during an extreme event.
Identify opportunities for increased coordination between sectors	Participants have identified new partnership opportunities as well as opportunities for strengthening existing partnerships and improving communications.
Increase awareness of the needs of Socially Vulnerable Populations - those community members whose circumstances put them at greater risk from the impacts of a storm event and increase difficulty in recovering from those impacts.	Participants are more effective at supporting Socially Vulnerable Populations.

Table 2. Exercise Objectives

Roles and Responsibilities of Those Taking Part in the Exercise

Participants:

Participants are the individuals who have been invited to take part in the exercise; a full list of registered participants can be found in Appendix B. They will work in small groups, guided by a facilitator with the support of a note taker and timekeeper. These groups will work through the events of the storm scenario on the day of the exercise. Participants will be asked to answer questions and take part in the

conversation from the perspective of the organization they are representing. Tabletop exercises are not passive events. This exercise has been designed to provide an opportunity for all to take part. The success of the exercise depends upon all participants taking an active role in the conversation. It has been designed to offer a variety of ways for participants to provide their input.

Participants will be asked to:

1) be cooperative — remembering that everyone wants to find solutions for emergencies, and the best time to do that is while the "emergency" doesn't exist!

2) go with the flow and embrace the objectives of the scenario at hand.

3) recognize that all perspectives are equally valued and important to the success of the project. The Project Planning Team made the conscious choice to bring these four sectors together because of the way their work might intersect, support each other and support populations most negatively impacted by an extreme event in the region.

4) recognize that different sectors bring different strengths to the table and may play stronger roles in some parts of the scenario than others.

5) stay engaged and try to accept the limits of the chosen scenario.

Facilitators:

Facilitators provide situation updates, structure the discussion, ensure all participants are able to contribute their ideas, and guide the pace and flow of the exercise. They also provide additional information or resolve any questions as required. Facilitators provide for full engagement of all group members. They will draw out solutions from the group and ask questions to encourage deeper thinking about potential issues that may be encountered. There will be one facilitator for each break out room during the event and a facilitator that guides the event overall.

Observers:

Observers may be interested parties, may have extensive knowledge on topics relevant to the exercise, or have otherwise indicated an interest in the project. In this exercise, the Observers will passively take part to follow the proceedings; they will not take part in the actual conversations during the scenario itself but will be invited to provide input during the Final Reflection.

Notetakers:

Notetakers are assigned to observe and document the conversation during the exercise. Their primary role is to document the discussions in each breakout room and during the Final Reflection. There will be one Notetaker for each breakout room. There will also be a Notetaker for the event overall. These notes will be used in the development of the After Action Report.

Evaluators:

Evaluators play an essential role in documenting the outcomes of the tabletop exercise, highlighting both positive actions taken during the scenario and areas for improvement. The Evaluators will not be taking part in the exercise; they will watch the Zoom recordings after the event. They will observe the exercise recordings and note communication gaps and other issues in accordance with the evaluation criteria established for the exercise.

Exercise Structure

Due to the COVID19 pandemic, this event will be held in a virtual format. All parties involved in the exercise will gather via computer using Zoom. The day will be spent in large group format and in breakout groups of 5-7 participants to allow each participant time and space to take part in the discussions. (See Appendix A: Exercise Schedule p. 17).

This will be a multimedia, facilitated exercise employing a "Story Map" to move through the different elements of the day. The exercise includes the following 4 sections:

- Context setting: A Storm is Coming
- Module 1: Immediately After the Storm
- Module 2: Six Months After the Storm
- Final Reflection

> **A story map** is a web map that has been thoughtfully created, given context, and provided with supporting information so it becomes a stand-alone resource. It integrates maps, legends, text, photos, and video and provides functionality, such as swipe, pop-ups, and time sliders, that helps users explore this content. It is a fully functioning information product. *Retrieved 12/20/21 from:* esri.com/about/newsroom/arcuser/what-can-you-do-with-a-story-map

Each section will begin with a multimedia update through the story map that summarizes key events occurring within that time period. The facilitators will walk their respective breakout groups through each section. The participants will review the situation and engage in group discussions following a list of questions for each section about the storm's impact on Socially Vulnerable Populations and needs and opportunities to partner and support them. We are engaging four sectors (see list below) to work through this exercise together. Participants will be strategically placed in groups allowing them to work with individuals from different sectors at different points of the exercise. The sectors are as follows:

- Social Services
- Municipal
- Conservation
- Emergency Management

After the modules, there will be a report out during which key themes from each break out group will be shared with the entire group.

The exercise will close with a Final Reflection. During this period, Participants and Observers will have the opportunity to identify what they felt worked, what didn't, and their overall impressions immediately following the exercise.

A post-exercise survey will be sent out following the event to gather more specifics from the Participants. It will be used in overall evaluation of the exercise.

Exercise Guidelines

- This exercise will be held in an environment that will allow for open, frank discussion. Diverse, even opposing viewpoints, are expected.
- Participants are expected to respond to the scenario from the point of view of the organization each is representing using their knowledge of its mission, capabilities and programs.
- This exercise is an opportunity to discuss, present and think through multiple options and possible solutions. Options and solutions offered by Participants during the exercise are not binding on the Participants' organizations.
- Identification of issues is not as valuable as suggestions and recommendations for actions that could improve support for Socially Vulnerable Populations and new partnership opportunities between sectors and communities. Problem-solving efforts should be the focus.
- The assumption is that the exercise scenario is plausible and events occur as they are presented. All Participants will receive information at the same time.

Exercise Evaluation

Evaluation of the exercise is based on the exercise objectives. There are several evaluation elements built into this project. A pre-exercise survey was completed by Participants during their registration process; the final segment on the day of the exercise will include a brief survey as part of the 'Final Reflection' during which Participants will be able to share immediate responses regarding their experience during the exercise; a post-exercise survey will be sent to Participants and Observers after the exercise. And finally, Evaluators will watch the recordings of the event to identify specific elements related to the exercise's overall objectives. All of this information will be used to evaluate the overall success of the exercise and will be used as a key element of the After Action Report. There will be a follow up meeting to share the After Action Report with all who took part in the exercise.

The Exercise Scenario

Context: A Storm is Coming

Entire group

November 28, 2022

A storm is predicted to hit tomorrow. It will hit during a high astronomical tide period in November (11.8'). A storm out in the Atlantic has intensified quickly and will bring 3.9' of storm surge during the high tide. This will result in an historic 15.7' storm tide. SE winds are predicted at 45mph with gusts of up to 70 mph. The storm is coming from the SE, piling water into the upper reaches of Casco Bay. The predicted near shore waves of 12-14 feet will lead to destructive wave action including major erosion and flooding. This level of flooding is expected to severely impact transportation networks throughout the region through flooding, culvert washouts, tree limbs and other debris. It is expected that the storm will cause power outages throughout the region. The current temperature is above freezing.

Key Issues

- The storm will hit at a highest astronomical tide which will lead to extreme flooding.
- Severe flooding, strong winds and debris are expected to impact roads.
- Extensive power outages are expected.
- The temperature is above freezing.

Module 1: Immediately after the Storm

Break out groups

November 29, 2022

The storm has passed, and the tide has receded. Temperatures have dropped and it is now below freezing. Strong NW winds (30mph with gusts up to 50mph) on the backside of the storm hit for a 12 hr period and slowly decrease in intensity. The number of power outages increases during this period. Strong winds delay power outage restoration efforts. Roads are washed out; businesses and schools are closed; emergency shelters will not open until a few days after the storm has passed. Debris is blocking roads and impacting transportation; homes and businesses have been damaged.

Key Issues

- The storm has passed and the storm tide has receded.
- Strong winds cause additional power outages and delay restoration efforts.
- Schools and businesses are closed.
- Temperatures drop below freezing.
- Debris impacts roadways.
- Buildings, both public and private, have been damaged.

Break-out Group Composition

The small discussion groups will be composed of representatives from two to three municipalities located near each other mixed with representatives from conservation, social service, and/or emergency management that do work within those municipalities.

Questions

Based on the information provided, participate in the discussion concerning the issues raised in the starting scenario.

The following questions are provided to guide the discussion:
(questions may be slightly altered on the day of the event)

1. What Socially Vulnerable Populations, if any, are you/is your organization concerned about at this point?
    a. Refer back to Table 1. Socially Vulnerable Populations to be Considered for this Exercise (p.7)
2. Relative to those Socially Vulnerable Populations, what actions, if any, are you/is your organization taking to **respond** to the immediate impacts of the storm? What actions, if any, are you/is your organization taking to help them **recover** from the storm?
3. What organizations do you/does your organization work with or partner with in response and recovery?

Response: the response phase occurs in the immediate aftermath of a disaster. During the response phase, business and other operations do not function normally. Personal safety and wellbeing in an emergency and the duration of the response phase depend on the level of preparedness.

Recovery: during the recovery period, restoration efforts occur concurrently with regular operations and activities.
The recovery period from a disaster can be prolonged.

Preparedness: this phase includes planning, training, and educational activities for events that cannot be mitigated.

Retrieved 12/20/21 from:
https://training.fema.gov/emiweb/downloads/is111_unit%204.pdf

4. Based on conversations today, are there any gaps between the needs of Socially Vulnerable Populations and support being provided? And are there any additional actions that might be useful to fill those gaps?

Module 2: 6 months after the storm

Break out groups

May 13, 2023

Power has been restored throughout the region. Roads and culverts have been repaired. Schools are open and shelters have been closed. There are still visible areas of blowdowns throughout the towns. Most substantial damage to homes and public buildings throughout the region has been repaired. Many homeowners are waiting for insurance payments. A small percentage of local businesses have closed. Self-employed individuals lost revenue. There are still affected Socially Vulnerable Populations.

Key Issues

- Power has been restored and roads are repaired.
- Debris is still being removed.
- Repairs to public and private facilities and homes are underway.

Breakout Group Composition

The small discussion groups will be composed of representatives from two to three municipalities located near each other mixed with representatives from conservation, social service, and/or emergency management that do work within those municipalities

Questions

Based on the information provided, participate in the discussion concerning the issues raised in Module 2.

The following questions are provided to guide the discussion:
(questions may be slightly altered on the day of the event)

1. What Socially Vulnerable Populations, if any, are you/is your organization concerned about at this point?

    a. For the participants: Refer back to Table 1. Socially Vulnerable Populations to be Considered for this Exercise (p.7)

2. Relative to those Socially Vulnerable Populations, what actions, if any, are you/is your organization taking to support **recovery** from the previous storm? What actions, if any, are you/is your organization taking to **prepare** your community for a similar storm in the future?

3. What organizations do you/does your organization work with or partner with in recovery and preparation?

4. Based on conversations today, are there any gaps between the needs of Socially Vulnerable Populations and support being provided? And are there any additional actions that might be useful to fill those gaps?

Final Reflection and Wrap Up

The group will reconvene to share feedback about the exercise. Before the group discussion, a quick questionnaire will be launched. It will be sent to Participants and Observers via a link provided through the zoom meeting. The group will be given 3-5 minutes to complete the questionnaire. Responses to this questionnaire will be anonymous. The goal is to capture Participants' and Observers' immediate reactions to the event. The questionnaire will include these questions:

- Can you highlight a particular takeaway?
- Do you think that the scenario was realistic?
- What do you think worked well during the exercise?
- What do you think did not work well?
- What are your overall impressions of the scenario exercise?

A more in-depth survey will be sent to Participants and Observers one week from the event.

Following the questionnaire, the Lead Facilitator will guide the entire group in a conversation about the following questions:

- Did you learn anything new about the capacity of the region to support vulnerable populations during natural disasters?
- Did you identify any gaps in the region's capacity to support vulnerable populations?
- Are you leaving with any ideas for new partnerships?

Post Event

Post Event Survey:

1 week following the exercise, Participants and Observers will receive a survey from Eileen Johnson via email. This survey is an essential element of the overall evaluation of the exercise and the Project Planning Team appreciates your time for its completion.

After Action Report:

Within 5 months of the exercise, participants and observers will receive a copy of the After Action Report. This report will detail lessons learned from the exercise, will include recommendations based on those lessons and results from the exercise evaluation.

Final Zoom Meeting:

After release of the After Action Report, a final zoom meeting will be held to discuss the report and its recommendations.

Appendix A: Exercise Schedule

(version 1/5/2022)

January 26, 2022

Approximate Time	Activity
8:15	Zoom walk through for those needing it
8:25	All Participants signed in to Zoom
8:30	Exercise begins, Welcome, Introductions
8:40	Context: A Storm is Coming
8:55	Module 1: Immediately After the Storm
	Break (15 minutes)
10:25	Module 2: Six Months After the Storm
11:45	Final Reflections
12: 15	Wrap Up, Next Steps
12:30	Close

Appendix B: Exercise Participants

(version 1/5/2022)

Conservation Sector

Becky Kolak	Kennebec Estuary Land Trust
Kathy Gravino	Georgetown Conservation Commission
Jeremy Gabrielson	Maine Coast Heritage Trust
Ben Martens	Maine Coast Fisherman's Association
Josephine Ewing	Arrowsic Conservation Commission
Matt Craig	Casco Bay Estuary Partnership
John Zittel	Bath Climate Action Commission
Ellen Winchester	Phippsburg Conservation Commission
Lee Cataldo	Brunswick Topsham Land Trust
Jennifer Zagariello	Harpswell Conservation Commission
Julia McLeod	Harpswell Heritage Land Trust

Emergency Management Sector

Samuel Roy	Maine Emergency Management Agency
Brian Carlton	Towns of Arrowsic & Woolwich, Emergency Management
William Guindon	American Red Cross of Northern New England
Lawrence Renaud	Bath Fire & Rescue Department
Sarah Bennett	Sagadahoc County Emergency Management Agency
Art Howe	Harpswell Dept. of Safety and Emergency Services
Heather Dumais	Maine Emergency Management Agency
Chelsea Robbins	Cumberland County Emergency Management Agency

Municipal Sector

Amanda Campbell	Town of Georgetown
Lee Leiner	City of Bath, Public Works
Walter Briggs	Arrowsic Selectboard
Rich Donaldson	Georgetown Selectboard
Gordon Carrolton	Phippsburg Road Committee
Kristine Poland	Town of West Bath
Benjamin Averill	City of Bath, Planning & Development
Emily Thompson	West Bath School
Phillip J. Potenziano	Brunswick School Department
Matt Panfil	Town of Brunswick, Planning & Development

Social Services Sector

Nikki Williams	211 Maine
Stacy Frizzle-Edgerton	People Plus
Kimberly Gates	Bath Area Food Bank
Claire Berkowitz	Midcoast Maine Community Action
Victoria Abbott	Spectrum Generations
Maria Hinteregger	United Way of MidCoast Maine
Roger Bogart	Age Friendly Georgetown
Karin Sadtler	Age Friendly Communities of the Lower Kennebec
Debora Keller	Bath Housing
Odette Zouri	Mid Coast New Mainers Group
Jodie Singer	Bath Area YMCA
Karen Parker	Midcoast Hunger Prevention Program
Rota Knott	Tedford Housing
Jay McCreight	Harpswell Aging at Home
John A. Hodge	Brunswick Housing Authority
Carol Kalajainen	Mid Coast New Mainers Group
Anita Ruff	Oasis Free Clinic
Lynne Holland	UMaine Cooperative Extension

Appendix C: Project Leadership

Project Planning Team

Ruth Indrick, Kennebec Estuary Land Trust
Eileen Johnson, Bowdoin College
Victoria Boundy, Casco Bay Estuary Partnership
Kristen Grant, Maine Sea Grant
Annie Cox, Wells National Estuarine Research Reserve
Jeremy Bell, The Nature Conservancy
Elizabeth Hertz, Blue Sky Planning Solutions

Advisory Committee

Allison Hepler, Woolwich Selectboard
Anne Fuchs, Maine Emergency Management Agency- Director of Mitigation, Planning, and Recovery
Grainne Shaw, Sagadahoc County Emergency Management Agency- Deputy Director
Jared Woolston, City of Brunswick- Planner
Mary Turner, Good Shepherd Food Bank
Mary Ann Nahf, Harpswell Conservation Commission
Nathan Robbins, Maine Dept. of Environmental Protection- Climate & Adaptation Program
Patricia Pinto, AARP Maine- Volunteer State President
Celeste Stimpson, American Red Cross- Disaster Program Manager, Coastal Maine

Appendix D: What Is Social Vulnerability?

What is Social Vulnerability?

Jeremy Bell, The Nature Conservancy, Eileen Johnson, Bowdoin College, Elizabeth Hertz, Blue Sky Planning Solutions

Social Vulnerability relates to the circumstances of a person or community that affect their capacity to anticipate, confront, repair, and recover from the effects of a disaster. Some examples of factors that might affect a person's social vulnerability include socioeconomic status, household composition, minority status, and vehicle access.

Socially Vulnerable Populations include those who have specific circumstances, such as, but not limited to, poverty, minority status, people without vehicles, people with disabilities, older adults, and people with limited English proficiency which may increase their vulnerability in the event of an emergency.

What is Community Resilience?

Community Resilience refers to a community's capacity to anticipate, confront, repair and recover from a disaster. Community resilience reflects a community's capacity to "bounce forward" after an event. While events such as hurricanes may reduce a community's resilience, strengthening social infrastructure (the number and types of organizations that help vulnerable populations) or investing in physical infrastructural improvements can increase community resilience. A key tenet of community resilience is engaging all members of the public throughout all stages of the planning for, responding to and/or recovering from events such as a coastal storm. Resilient communities intentionally develop personal and collective capacity to sustain and renew the community, and to develop new trajectories for the communities' future.

For socially vulnerable populations, resilience is a factor of individuals AND whole communities. In other words, an individual may be somewhat resilient but the condition and level of cohesion of their community may make them less resilient or not resilient at all.

Why is Understanding Social Vulnerability Important?

In the field of disaster management, risk is often defined as the interplay between a physical hazard and the difference between the vulnerability to that hazard and the resources available to address the effects of the hazard (Flanagan, 2011). Until very recently, disaster management has focused almost solely on the vulnerability of physical infrastructure with little to no consideration of how to address social vulnerability. Studies have shown that social vulnerability is inversely related to a population's ability to recover from a disaster. The higher the level of social vulnerability, the more difficult recovery becomes. Without understanding social vulnerability and incorporating it into disaster management including preparation for, responding

to and recovery from disasters, we place the status of physical assets and infrastructure above that of the people in our communities. Providing a focus on attending to the needs of the most vulnerable members of our communities also helps us to better understand the historic inequities in disaster management and to begin to work towards addressing these inequities.

Climate change has increased the frequency and severity of extreme weather events in Maine. Ensuring that our communities can bounce 'forward' to become more secure and less vulnerable after extreme events requires that we understand the factors that drive their vulnerability in the first place.

What is the Maine Social Vulnerability Index?

The Maine Social Vulnerability Index (MSVI) was developed to help identify where vulnerable populations are located and what factors drive those vulnerabilities. Until the development of the MSVI, work being done in Maine on identifying vulnerabilities to projected impacts of climate change had focused almost entirely on impacts to physical infrastructure like roads, bridges and buildings. Little had been done to assess 'social vulnerability'. The MSVI located on the Maine Coastal Risk Explorer (https://maps.coastalresilience.org/maine/#) is based on 17 socioeconomic and demographic indicators taken from US Census data. The MSVI is a customized version of a social vulnerability index developed for the US Centers for Disease Control following Hurricane Sandy. The MSVI calculates the percentage of the population within each census block group for each indicator. The Maine Coastal Risk Explorer provides a visualization of the information, shows the details for each census block group, and provides the relative level of vulnerability for each census block group within the coastal zone. The Maine Social Vulnerability Index supports communities in decision making that improves the resiliency of the whole community by addressing the needs of the underserved. We note that 'vulnerability' is often the result of the societal systems in place that create inequities in climate risk to people.

The MSVI is a tool that can be used to help inform planning processes, allocation of resources, and policy and program development by bringing the elements of social vulnerability into the calculus. It provides detail at the census block group level as well as providing a way to assess social vulnerability between census block groups and across larger regions of Maine. As a resource, the MSVI is intended to complement local level knowledge of a community's vulnerabilities.

Recovery from disasters and extreme events has historically meant a return to the conditions in place prior to the event. Recovery should be used as an opportunity to increase social and community resilience; we need to develop specific strategies including resources to support efforts that reduce vulnerabilities and increase resilience. Integrating the use of the MSVI with local knowledge provides a mechanism to bring social and community resilience into the discussions that until now have focused primarily on the resilience of physical infrastructure.

The following table provides more detailed information on categories included in the Social Vulnerability Index as well as additional categories not currently included, but that have been identified by area organizations that support the needs of vulnerable populations:

SVI Variable	Explanation
Below Poverty	Individuals experiencing poverty are less likely to have the income or assets to prepare for disasters due to limitations in purchasing supplies in advance or recover from a disaster or buying services or materials in the aftermath of an event. Individuals who are below poverty may be less likely to have stable employment which can be disrupted during storm events. Additionally, the value of homes may represent a larger proportion of overall total assets, and any loss or damage can potentially be more expensive to replace, particularly in regards to household or renter's insurance.[1]
Unemployed	Individuals who are unemployed do not benefit from employee benefit plans that can provide income and health cost assistance if individuals experience injury from a hazard[2]
Employed in a Natural Resource occupation	Rural residents may experience greater social vulnerability due to lower incomes and greater dependence on natural resources (extraction) economies. When storm events disrupt the ability to fish or farm for example, this has a direct impact on residents whose livelihood depends upon these resources.[3]
Self-Employed	Individuals who are self-employed do not benefit from employee benefit plans that can provide income and health cost assistance if individuals experience injury from a hazard[4]
Income	Higher income individuals experience losses due to hazards but these losses may be buffered by ability to have insurance policies, unearned income from investments and stable employment. It may be more difficult for lower income workers to relocate or travel to a new job. Individuals with lower incomes may be more likely to have difficulty evacuating, need shelters or temporary housing and stay there longer[5] Lower income residents are less likely to receive funding through FEMA for housing repair or housing assistance

[1] Barry E. Flanagan et al., "A Social Vulnerability Index for Disaster Management," *Journal of Homeland Security and Emergency Management* 8, no. 1 (2011); B. H. Morrow, "Identifying and Mapping Community Vulnerability," *Disasters* 23, no. 1 (1999)..Susan L. Cutter et al., "Social Vulnerability to Environmental Hazards," *Social Science Quarterly* 84, no. 2 (2003).
[2] Flanagan et al., "A Social Vulnerability Index for Disaster Management."
[3] Cutter et al., "Social Vulnerability to Environmental Hazards."
[4] Flanagan et al., "A Social Vulnerability Index for Disaster Management."
[5] Ibid.; Morrow, "Identifying and Mapping Community Vulnerability."

	programs[6] Wealth allows communities to recover from hazards through insurance, social safety nets and entitlement programs[7]
No High School Diploma alt Educational Attainment	Individuals with higher education are more likely to have information and act upon information on hazards from preparation to recovery. Higher education levels may lead to better employment opportunities during post-event and potentially a greater capacity in dealing with governmental entities in gaining access to assistance programs[8]
Aged 65 or over	Many older or disabled individuals have special needs that require assistance from others. Older individuals may lack physical and economic resources to respond to an event and may recover more slowly due to any health-related impacts[9]
Aged 65 or older and living alone	Individuals living alone may not have nearby family or neighbors who would look in on an older individual as these individuals may be coping with the impact of the hazard and caring for others might be beyond their abilities[10]
Aged 18 or younger	Children lack the necessary resources and knowledge to cope with disaster situations. As parents are responsible for children, the risks faced by children are not incorporated into planning exercises, as a result, the direct impact of hazards on children may not be as understood and planned for. It may be useful to have advance information on the number of children who may need special services in a shelter. After Hurricane Andrew, there was a recognition of the specific needs for children at disaster-assistance centers due to an awareness of the lack of resources for children during the event at evacuation centers[11]
Civilian with a disability	This term is used in the US Census. Similar to older residents, residents with a physical, sensory or cognitive challenge may have special needs that require assistance of others. [12]
Single parent household	Households with one parent may be more vulnerable during a disaster as all daily caretaking falls to one parent. In addition, single parent households may have a lower socioeconomic status. In looking at impacts of Hurricane Andrew, one factor attributed to higher than expected preparation rates was that warnings being broadcast over a weekend when people were not at work and had

[6] Rebecca Hersher, "Why Fema Aid Is Unavailable to Many Who Need It the Most _ Maine Public.," (2021).
[7] Ibid.
[8] Flanagan et al., "A Social Vulnerability Index for Disaster Management."; Morrow, "Identifying and Mapping Community Vulnerability."
[9] Flanagan et al., "A Social Vulnerability Index for Disaster Management."; Morrow, "Identifying and Mapping Community Vulnerability."
[10] Flanagan et al., "A Social Vulnerability Index for Disaster Management."
[11] Ibid.; Morrow, "Identifying and Mapping Community Vulnerability."
[12] Flanagan et al., "A Social Vulnerability Index for Disaster Management."

	more time to secure supplies. Having an adult who can be available to get supplies and afterwards meet with representatives of agencies to access support may increase overall resilience, which is challenged when adults are less able to attend to these needs de to child care needs[13]
Minority/BIPOC	BiPOC (Black, Indigenous, People of Color). The impacts of structural racism particularly real estate discrimination coupled with social and economic marginalization may place individuals in these demographic groups at greater risk during all phases of a disaster[14]. A study of the aftermath of Hurricane Harvey stated that individuals in block groups with a larger percentage of minorities were less likely to receive FEMA IHP grants[15 T] The term minority is used as in the SVI as it reflects the description provided in the way that the US CDC calculated the Social Vulnerability Index which incorporates all that the Maine Social Vulnerability Index is based upon. We have maintained this term for the sake of consistency with the CDC SVI but acknowledge the term BIPOC as a more respectful term in the context of population vulnerabilities.
Speaks English Less Than Well	For individuals with limited disaster proficiency, disaster communication is difficult, and availability of translators may be scarce. Immigrant populations are more likely to rely on relatives and closer friends for information[16]
Multi-Unit Structures	Individuals living in high-rise apartments are vulnerable due to risks associated with exiting stairwells or having a larger number of people exiting in the street which can affect orderly evacuation[17]
Mobile homes	Mobile homes are often not designed to withstand severe weather or flooding, and often do not have basements. They are often in areas not as accessible to public transit and in some cases may be clustered, increasing overall vulnerability due to having a higher number of individuals who may be at risk in one area. Based upon a study of Hurricane Andrew, mobile homes were 21 times more likely to be destroyed than a conventional home and in one area, all but 9 of the 6600 mobile homes were destroyed. However, effective evacuation resulted in only a few deaths.[18] In the wake of Hurricane Irene, the Vermont Department of Housing and Community Development, mobile home parks were subject to higher levels of

[13] Ibid.; Morrow, "Identifying and Mapping Community Vulnerability."
[14] Flanagan et al., "A Social Vulnerability Index for Disaster Management."
[15] Stephen B. Billings, Emily A. Gallagher, and Lowell Ricketts, "Let the Rich Be Flooded: The Distribution of Financial Aid and Distress after Hurricane Harvey," (SSRN, 2021).
[16] Flanagan et al., "A Social Vulnerability Index for Disaster Management."
[17] Ibid.
[18] Ibid.; Morrow, "Identifying and Mapping Community Vulnerability."

	risk due to a combination of location on flood plains and impacts from Hurricane Irene[19]
Crowding/Group Quarters	Household units with a larger number of people within the household may make evacuations during an emergency difficult. Group quarters such as dormitories, nursing homes or long-term care facilities may be more vulnerable due to specific needs of the individuals, potential understaffing and the challenges of relocating and residents that may require specialized vehicles[20]
No Vehicle	For individuals without access to cars, transportation may be more difficult when evacuation becomes necessary[21]
The following categories are not currently included in the Maine Social Vulnerability Index. We have included them as a result of our conversations with area organizations' work on Diversity, Equity and Inclusion initiatives. We acknowledge the importance of planning with these populations in addressing social vulnerabilities who are not included in current census categories.	
New Mainers	Newer residents to Maine who came to the state as refugees, asylum seekers, or secondary migrants. To a certain extent, New Mainers may be associated with the SVI categories of BIPOC (Minorities) and Speaks English Less than Well.
LGBTQ	Lesbian, Gay, Bisexual, Transgender, Queer.
Uninsured/ Underinsured	Residents who lack any or adequate health coverage

[19] Vermont Department of Housing and Community Development, "Report on the Viability and Disaster Resilience of Mobile Home Ownership and Parks," (Vermont Deparment of Housing and Community Development, 2013).
[20] Flanagan et al., "A Social Vulnerability Index for Disaster Management."
[21] Ibid.

Appendix E: Resources for More Reading

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Morrow, B. H. "Identifying and Mapping Community Vulnerability." *Disasters* 23, no. 1 (Mar 1999): 1-18.

New Jersey Department of Environmental Protection. Whole-Community Coastal Climate Resilience Planning. NJDEP | Climate Change | Trainings | About Whole-Community Coastal Climate Resilience Planning Training

Vermont Department of Housing and Community Development. "Report on the Viability and Disaster Resilience of Mobile Home Ownership and Parks." Vermont Department of Housing and Community Development, 2013.

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