New England
Climate Adaptation
PROJECT

Case Study
Barnstable, Massachusetts

PRODUCED BY:
Massachusetts Institute of Technology Science Impact Collaborative
Consensus Building Institute
National Estuarine Research Reserve System
October 2014

Acknowledgements

This Case Study was prepared by the Massachusetts Institute of Technology Science Impact Collaborative and the Consensus Building Institute, with the assistance of the Waquoit Bay National Estuarine Research Reserve and partners in the Town of Barnstable. It was produced as part of the New England Climate Adaptation Project, an effort funded by the National Estuarine Research Reserve System Science Collaborative.

Casey Stein provided guidance for the content and layout of this Case Study. The graphic design and layout were done by Takeo Kuwabara and Julie Curti from MIT. The cover photo was provided by the Town of Barnstable Growth Management Department.

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About the MIT Science Impact Collaborative

The Massachusetts Institute of Technology Science Impact Collaborative (MIT SIC) is a research group focused on developing and testing new ways of harmonizing science, politics and public policy in the management of natural resources and resolution of environmental disputes. MIT SIC's tools and approaches include collaborative adaptive management, joint fact-finding, scenario planning, collaborative decision-making and multi-stakeholder engagement, and the use of role-play simulation exercises.

MIT SIC was established in 2003 with initial support from the United States Geological Survey. Today, the research group has numerous partners and supporters, ranging from the U.S. National Estuarine Research Reserve System to the Dutch research organization TNO. By engaging in community-based action research projects, MIT SIC researchers—including doctoral students, masters students, and faculty from the MIT Department of Urban Studies and Planning—train emerging environmental professionals while simultaneously testing the latest environmental planning methods and providing assistance to communities and policy-makers who seek our help.

Visit the MIT Science Impact Collaborative website for more information: http://scienceimpact.mit.edu

About the Consensus Building Institute

The Consensus Building Institute (CBI) is a not-for-profit organization founded in 1993 by leading practitioners and theory builders in the fields of negotiation and dispute resolution. CBI's experts bring decades of experience brokering agreements and building collaboration in complex, high-stakes environments — and possess the deep understanding required to tackle negotiation and collaboration challenges in our practice areas. CBI's Founder, Managing Directors, and many of our Board members are affiliated with the Program on Negotiation at Harvard Law School and the MIT-Harvard Public Disputes Program.

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About the Waquoit Bay National Estuarine Research Reserve

The National Estuarine Research Reserve System (NERRS) is a network of 28 areas representing different biogeographic regions of the United States that are protected for long-term research, water-quality monitoring, education and coastal stewardship. The reserve system is a partnership program between the National Oceanic and Atmospheric Administration (NOAA) and the coastal states. Reserve staff work with local communities and regional groups to address natural resource management issues, such as non-point source pollution, habitat restoration and invasive species. Through integrated research and education, the reserves help communities develop strategies to deal successfully with these coastal resource issues. Through the Coastal Training Program, reserves provide adult audiences with training on estuarine issues of concern in their local communities. They offer field classes for K-12 students and support teachers through professional development programs in marine education. Reserves also provide long-term water quality monitoring as well as opportunities for both scientists and graduate students to conduct research in a "living laboratory".

The Waquoit Bay Reserve is located on the south shore of Cape Cod, Massachusetts, on the border of the towns of Falmouth and Mashpee. The Reserve's more than 2,700 acres encompass open waters, saltwater and freshwater marshes, barrier beaches, sand dunes, rivers, mixed pine and oak forests, and sand plain grasslands. The Waquoit Bay Reserve provides educational and outreach opportunities for communities throughout the Cape Cod region.

Visit the Waquoit National Estuarine Research Reserve website for more information:

http://www.waquoitbayreserve.org/

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Executive Summary

This report summarizes findings from the New England Climate Adaptation Project's (NECAP) work in Barnstable, Massachusetts, from fall 2012 through spring 2014. The project aimed to increase public awareness about climate change risks and adaptation opportunities in Barnstable and build support for local adaptation efforts. NECAP workshops engaged a diverse set of town residents to test whether role-play simulations tailored to the town's particular setting could be effective as a public education tool for learning about climate change risks, adaptation, and decision-making.

Prior to writing the simulation and running the workshops, project staff assessed the range of climate change risks facing the town and interviewed key stakeholders to determine current perceptions of these risks and the potential for adaptation. These findings were complemented by a public poll of 100 randomly selected Barnstable residents to establish baseline opinions about local climate change risk and adaptation.

Key Takeaways from the Summary Risk Assessment Include:

- Overall, Barnstable can expect temperature increases, increased precipitation, more extreme precipitation events, and rising sea levels due to climate change.
- The town is projected to experience a significant rise in extreme heat events, with the number of days reaching over 90 degrees Fahrenheit increasing by 10-fold or more by the end of the century. The town is also projected to see significantly fewer days in which the temperature falls below 32 degrees Fahrenheit by the end of the century.
- The sea level around Barnstable is expected to increase by as much as 5 to 6 feet by the end of the century.
- The number of extreme precipitation events (defined as greater than 4 inches of precipitation within 48 hours) in Barnstable is projected to rise by the end of the century from the historic 1.8 events per decade to as many as 4.1 events per decade in the high emissions scenario.
- Projections indicate that Barnstable faces increased risk of coastal flooding and storm damage from sea level rise, higher storm surge, and more extreme weather events.
- Impacts on and degradation of regional infrastructure, beaches, coastal wetlands, and other built and natural assets could threaten the economy of Barnstable, as well as human and environmental well-being in the region.

Key Takeaways from the Stakeholder Assessment Include:

- Interviews with 19 key stakeholders in Barnstable demonstrate that stakeholders hold a range of opinions about climate risk. Most interviewed stakeholders said they expect some increased risk from more frequent storms and coastal flooding. However, a few stakeholders were uncertain of the long-term effects of climate change.
- Almost every interviewed stakeholder expressed concern about the potential impacts of cli-

mate change on the town's coastal properties and low-lying areas, noting that businesses in Hyannis are particularly vulnerable to flooding.

- Several stakeholders expressed concern that climate change would impact the town's ecosystems, with consequences for valuable land assets and fisheries.
- Most stakeholders agreed that increasing stakeholder education and participation was a crucial first step to climate adaptation action, suggesting that more detailed information about climate change risks would help the town to optimize investments in climate adaptation.
- The most commonly cited barriers to climate adaptation were: disagreement about the extent of the town's risk; lack of funding; limited locally relevant research on climate risks and potential impacts; and lack of community engagement.
- Ultimately, while many stakeholders expressed strong concern about climate change risks, all but two agreed that wastewater management would remain a top priority for the town into the foreseeable future.

Key Takeaways from the Workshops

The Summary Risk Assessment and Stakeholder Assessment provided the basis upon which MIT project staff wrote a role-play simulation tailored specifically for Barnstable. In fall 2013, project staff ran eight workshops in the Town of Barnstable and surrounding communities, engaging participants in the simulation. Through the simulation, workshop participants were invited to assume roles representing the key interests of town residents in a fictional town very similar to Barnstable and to try to reach consensus on what adaptation policies to recommend to town leaders. Data was collected during workshops to allow project staff to gauge the effectiveness of the intervention. The workshops and subsequent analysis revealed six overarching themes in Barnstable:

1. **Concern about the possible local impacts of climate change.** Polled residents and workshop participants demonstrated a high preexisting level of concern and awareness about the possible local impacts of climate change. Both groups also indicated a sense of urgency for taking immediate adaptation action. Participation in the workshops did not change viewpoints in this regard, which is not surprising given the high level of concern already present.
2. **Local-level responsibility for climate change adaptation.** Prior to the workshops, the large majority of

Image 1. Barnstable; credit: Jim O'Connell

both polled residents and workshop participants expressed the belief that town government is responsible for climate adaptation and that climate adaptation should be important in the town's near-term planning. However, neither group felt particularly optimistic that Barnstable would take climate adaptation action in the next decade. Participation in the workshops led to a modest increase in both the perception of local responsibility and optimism about future near-term local action.

3. **Perceived barriers to adaptation action.** Barriers identified by participants prior to the workshops were typically political and social, rather than scientific or technical; they tended to center on divisions within the community. The nature of perceived barriers did not change after workshop participation.

4. **Use of science in decision-making.** The need to integrate scientific climate change projections into decision-making was well accepted among polled residents and workshop participants both before and after the workshops.

5. **Enriched perspective.** Individuals who participated in the role-play simulation reported experiencing an increased appreciation for learning about and accounting for others' perspectives in making planning decisions. This was evident from frequent comments on the value of engaging with different viewpoints and expressions of heightened receptiveness to different perspectives from participants after the workshop.

6. **Suggested pathways forward.** Workshop participants identified a number of pathways forward for Barnstable. The vast majority of polled residents and workshop participants saw engaging local stakeholders as important to future decision-making around climate adaptation. Additionally, workshops participants enjoyed role-playing and thought that further role-play simulations would be a useful tool for stakeholder engagement and education in their community. Finally, most workshop participants expressed the opinion that the consensus-building approach modeled in the workshops could help their community move forward with climate adaptation.

These findings provide a snapshot of the views held about climate change in Barnstable. Most strikingly, they reveal a high preexisting level of concern for climate change risks and a high preexisting sense of local responsibility for climate adaptation. They also suggest that the community is looking to the town government to take initiative on overcoming various political and social barriers to climate adaption. These research findings highlight the part that role-play simulation workshops can play in building public awareness of other community perspectives and interests. Together, the data suggests that to move forward with adaptation the Town of Barnstable may want to invest in meaningfully engaging stakeholders in adaptation decision-making, potentially through a consensus-building approach.

Introduction and Overview of NECAP

The New England Climate Adaptation Project (NECAP) recognizes that climate change poses serious threats to coastal communities, including an increased risk of intensified storms and flooding, sea level rise, saltwater intrusion into marshes and farmland, coastal erosion, and destruction of infrastructure and coastal properties. To help communities assess their vulnerability and increase their resilience to climate change, the project engaged four coastal New England municipalities in public climate adaptation workshops: Barnstable, Massachusetts; Wells, Maine; Dover, New Hampshire; and Cranston, Rhode Island. At the workshops, residents were invited to participate in role-play simulations tailored to their community. These games put residents into different roles representing various town constituencies and challenged them to reach agreement about potential adaptation policy options for a fictitious town similar to their own town. The goal was to test this hands-on approach to public education about climate adaptation and collective decision-making. The project sought to investigate current perceptions about barriers to and solutions for climate change risk management, and to test whether the widespread use of such role-play simulations can help towns move toward proactive climate adaptation.

NECAP is a collaborative research partnership between the MIT Science Impact Collaborative (MIT SIC), the Consensus Building Institute (CBI), the National Estuarine Research Reserve System (NERRS), and the four New England coastal municipalities mentioned above. NERRS has made climate change a priority and is particularly committed to working with communities to make climate change issues relevant at the local level. NERRS saw this project as a unique opportunity to gain momentum for their climate change work.

At the project outset, NERRS staff identified potential partner municipalities to serve as test sites. Partners at the Waquoit Bay National Estuarine Research Reserve in Falmouth, Massachusetts, identified the Town of Barnstable as a good match for the project given Barstable's proximity to the reserve, the town's vulnerability to climate change impacts, and the fact that the town was beginning to seriously consider planning for climate change. Additionally, as the largest town on Cape Cod, Barnstable's initiative has the potential to influence climate change adaptation throughout the region. Town leaders from the Barnstable Growth Management Department agreed the project would be valuable and committed to becoming partners in the project. Specifically, the town anticipated that participation in this research would help build the social and political will needed to move forward with collaborative adaptation planning. The partnership with the town was crucial to the achieving

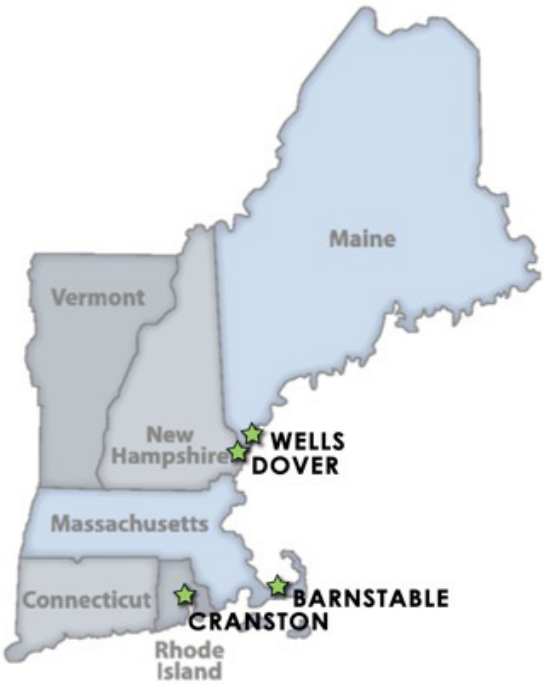

Image 2. NECAP towns; credit NECAP staff

the project's goals, providing a link through which the project's outreach and research could affect on-the-ground change and support local adaptation planning.

The project officially launched in August 2012. During the first year, technical climate change experts at the University of New Hampshire produced downscaled climate change projections specifically for Barnstable and the three other project sites. These projections provided the best possible scientific estimate of what the future climate will be like in each partner town. Projections were produced for temperature, precipitation, sea level rise, and a number of other key climate indicators such as extreme precipitation and extreme temperature events. NECAP staff worked with the technical climate change experts and municipal and NERR partners to translate these climate projections into a Summary Risk Assessment for each site. Each Summary Risk Assessment broadly explains how projected climate changes could affect the municipality, providing a broad-brush evaluation of key local risks and potential adaptation options.

The NECAP team simultaneously conducted a stakeholder assessment for each community. This involved interviewing 15 to 20 key stakeholders from each town to gather their views about climate change risks and adaptation options. Barnstable's interviewees included: town and regional government officials, local business owners, environmental organization representatives, science and engineering professionals, and property owners. During the interview process, stakeholders were shown the climate change projections for their city or town and were asked to react to these forecasts. Findings from the stakeholder interviews were then used to write a Stakeholder Assessment document, which interviewees reviewed for accuracy and completeness. The Stakeholder Assessments were shared with project partners and other officials in each town to inform their planning and public engagement strategies going forward.

Based on the Summary Risk Assessment and Stakeholder Assessment findings, MIT project staff wrote a role-play simulation tailored to each site. In Barnstable, the role-play was for the fictitious town of Shoreham, which is very similar to Barnstable in terms of population, politics, local economy, and climate change risks. The role-play was designed to model for community stakeholders a collaborative approach to local policy-making on climate change risks. The Shoreham game incorporates the downscaled scientific projections of climate change risks facing Barnstable and illustrates an array of no-regrets policy options that can help increase the town's resiliency to climate change.

Before any NECAP role-play simulation workshops were run, an independent firm conducted a randomized poll of 100 residents in each city or town via landline to establish baseline opinions about climate change risk and adaptation. This poll, conducted in May 2013, will be referred to as the "public poll" throughout this report.

Between June and December of 2013, project staff ran eight workshops in the Barnstable area and engaged more than 150 participants. Participants were surveyed at the start of each workshop to establish their baseline opinions on climate change risk and adaptation and again after the role-play and follow-up debriefing to gauge any changes in attitudes. NECAP staff conducted in-depth follow-up interviews with a subset (approximately 30 percent) of participants four to

six weeks after each workshop. The aim of these interviews was to probe more deeply into the longer-term effects of workshop participation on the views of those who took part.

The findings from this work in Barnstable are summarized in this case study. The Summary Risk Assessment, Stakeholder Assessment, public poll data, and findings from the Barnstable workshops have all been shared with town partners. NECAP staff members are currently working with local officials in Barnstable to help them build on this project and explore strategies for initiating and structuring an adaptation planning effort.

Situation Assessment

The Town of Barnstable, Massachusetts, is home to about 45,000 year-round residents. It is the largest town, both in size and population, on Cape Cod. It is also the county seat of Barnstable County, which encompasses the entirety of Cape Cod. Technically, Barnstable is a city, as it adopted a council-manager form of government in 1989, but it retains "Town of" in its official name. According to the 2010 U.S. Census, the median income for a household in Barnstable was $61,545 per annum, with 5.9 percent of families and 8.2 percent of the population below the poverty line. The racial makeup of the town is approximately 89.3 percent white, 3 percent black or African-American, 3.1 percent Latino or Hispanic, 1.2 percent Asian, and 0.6 percent Native American.

The Town of Barnstable comprises seven villages. The largest one, Hyannis, contains the town hall and central business district, including many important coastal businesses and properties. While Barnstable has a fairly diversified economy, tourism and maritime industries both play key roles. The future of these industries relies greatly on the protection of Barnstable's ecology, natural resources, beaches, and coastal infrastructure.

With 170 miles of coastline, Barnstable is highly vulnerable to climate change impacts, including sea level rise and damage associated with intensified storms. While many town officials are concerned about climate change risks, at the time this project began, Barnstable had not yet moved forward with any official efforts to assess or prepare for these risks. However, the Town of Barnstable, along with the Cape Cod Commission, the Waquoit Bay Reserve, and the Adaptation Network, have put significant work into updating the Barnstable Multi-hazard Mitigation Plan and the Regional Multi-hazard Mitigation Plan, both of which represent efforts to address the risks posed by climate change in the absence of detailed climate projections. Additionally, local environmental groups focusing on wastewater management issues have incorporated climate change risks into their work, studying the impacts of sea level rise and storm surge on the Cape's aquifer, the primary source of drinking water for the area.

The Summary Risk Assessment for Barnstable, available in full at necap.mit.edu, outlines likely future climatic conditions projected for Barnstable, in as well as the town's major risks and vulnerabilities. The risk assessment produced projections for a "better case" low emissions scenario and a "worse case" high emissions scenario across short-, medium-, and long-term time frames. These scenarios were contrasted to a historic baseline from data collected between 1980 and 2009.

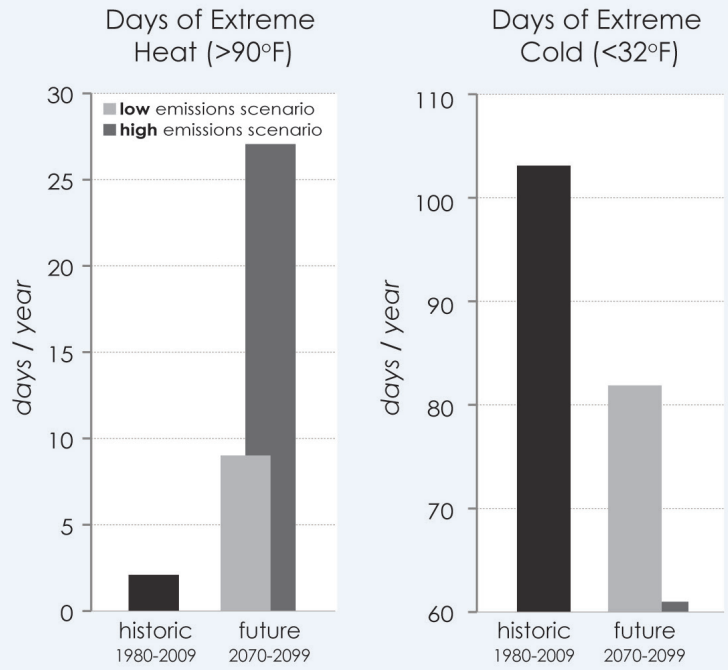

Figure 1. Temperature ranges, historic and projected

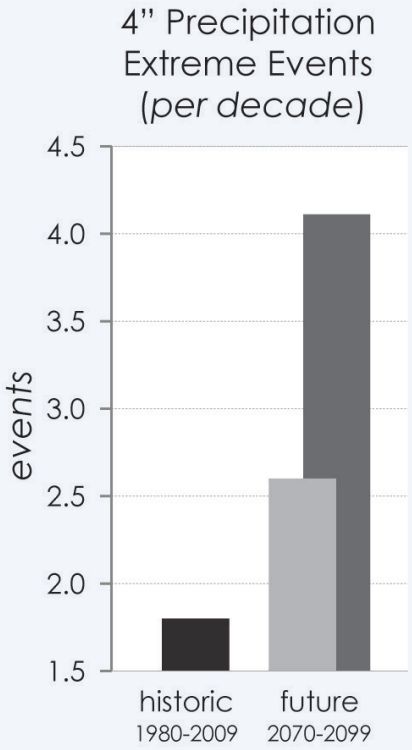

Figure 2. Predicted extreme precipitation events

The Summary Risk Assessment reports that Barnstable can expect increasing average temperatures, increasing precipitation, more frequent extreme precipitation events, and rising sea levels as a result of climate change. Long-term projections for the years 2070 through 2099 predict that average maximum temperatures in Barnstable will increase between 2.9 and 6.4 degrees Fahrenheit. Along with this increase in temperature, Barnstable can expect more extreme heat events and fewer extreme cold events. Barnstable has historically experienced an average of two extreme heat events (days in which temperatures exceed 90 degrees Fahrenheit) per year; this number could increase to 27 days annually under the high emissions, long-term scenario. Similarly, days of extreme cold (temperatures below 32 degrees Fahrenheit) are projected to decline from 103 days per year to as few as 61. Barnstable can also expect to see as much as 2.8 inches of additional precipitation annually in the long term, with wetter winters and drier summers. Not only will Barnstable see more precipitation, but projections suggest more precipitation will come in the form of extreme events, such as those in which 4 inches of precipitation fall within 48 hours. Often associated with flooding, such events have the potential to more than double from 1.8 to 4.1 events per decade under the high emissions, long-term scenario (see Figure 2). According to projections, Barnstable will also experience a significant rise in sea level under both the high- and low emissions scenario. The high emissions scenario predicts upwards of 5 to 6 feet of sea level rise in the long term, which would inundate a

significant proportion of Barnstable's coastal area (see Figure 3).

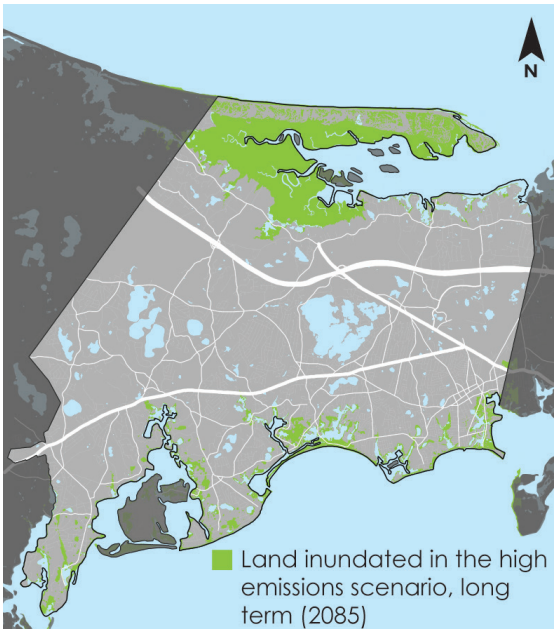

Figure 3. Sea level rise projections

Based on these projected changes in climate, Barnstable will face several serious risks. Sea level rise is expected to lead to higher storm surges that will significantly increase flooding risks along both the north and south shores. The projected increase in extreme precipitation events will further increase coastal flooding risks. Inland flooding may also occur, as a rise in sea level may raise groundwater levels and reduce the ability of rivers and streams to absorb excess water. Warmer temperatures could lead to heat waves as well as drought conditions in the drier summers, straining water supplies, electrical infrastructure, ecosystems, and human health. Ocean acidification related to climate change could threaten nearly 40 miles of important shellfish habitat. Additionally, rising sea levels could impact more than 6,000 acres of unique marine and coastal habitat. While a commonly held belief is that tourism may benefit from longer summer seasons and milder winters, this benefit would be dwarfed by potential losses due to the vulnerability of Barnstable's coastal infrastructure, beaches, and other socially and ecologically valuable land.

Stakeholder Assessment interviews conducted with 19 Barnstable residents from a variety of stakeholder groups demonstrate that stakeholders hold a range of opinions about climate risk. While some consider climate change to pose a serious risk to the entire town, others are skeptical that climate change will create new risks. Many expect some increased risk from more frequent extreme storms and coastal flooding in the next few decades, but they are more uncertain of the long-term effects of climate change. When asked about specific risks in Barnstable, almost every stakeholder expressed concern about the town's coastal properties and low-lying areas. Several also noted that Hyannis is already prone to flooding during major storms, which puts the businesses concentrated there in harm's way. Others recognized that climate change would impact the town's ecosystems with consequences ranging from a rise in pest activity to habitat shifts in protected areas such as the Sandy Neck Reserve to weakened fisheries and hatcheries.

Regarding climate adaptation strategies, most stakeholders agreed that the first step to managing climate change risks is to increase stakeholder education and participation related to climate adaptation planning. Many were concerned that constituents do not know enough about climate change risks, indicating that more information on local risks will be critical for any effective stakeholder engagement initiative. Several stakeholders saw adaptation as an extension of emergency preparedness and management. Most stakeholders have a great deal of confidence in the Barnstable emergency response team and, as a result, were less concerned about public response to small- or medium-sized storms on the Cape. However, a few people mentioned that,

if storms become more intense, the Cape would have to plan for evacuations in a way that it has not had to in the past. Finally, several stakeholders mentioned that Barnstable could reduce its vulnerability to climate change risks by changing zoning regulations for development in flood plains. These people also noted, however, that this strategy would be contentious and that the state would have to take action before the town could. Ultimately, while many stakeholders expressed strong concern about climate change risks, all but two agreed that the interconnected issues of water quality, nutrient loading, and wastewater management would remain the town's top priority for the foreseeable future. These issues have been building for years and are necessarily a priority for the region as the impacts are tangible and urgent. As an interrelated issue, climate adaptation planning will need to be integrated into this framework and addressed alongside wastewater management issues.

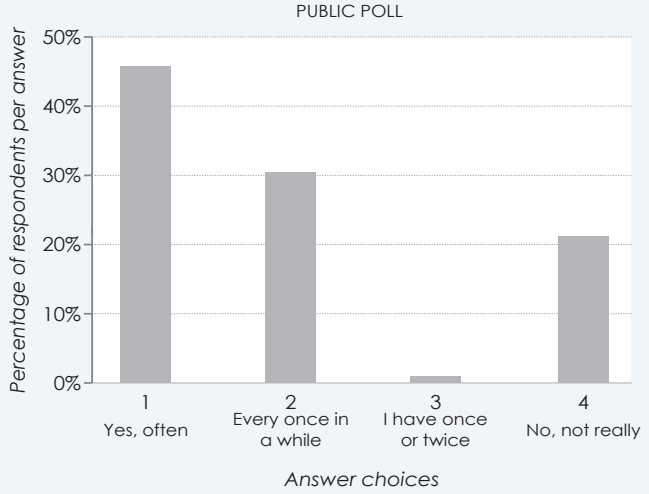

Figure 4. Frequency of climate change consideration

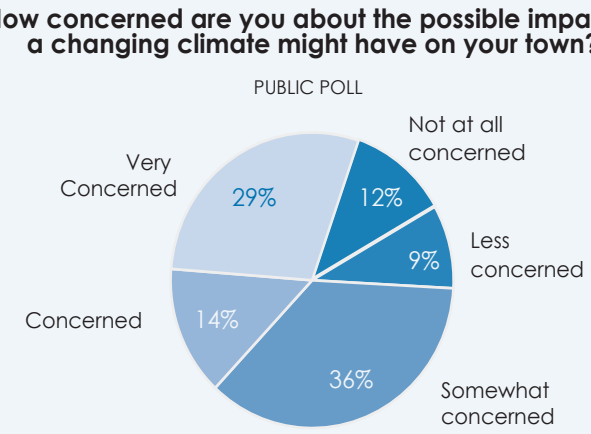

Figure 5. Level of climate change concern

The independent public poll of 100 Barnstable residents conducted prior to the project's launch provides a more comprehensive picture of residents' views about climate change risks, barriers, and solutions.[1] This poll, conducted by a professional polling firm through landline telephone calls, was generally representative of the population of Barnstable, although it had to be weighted to adjust for a skew in gender and age. Echoing the high level of concern about climate change found in the Stakeholder Assessment, 45 percent of polled residents reported "often" thinking about how climate change could affect their community; another 31 percent said that they think about how climate risks could affect their community "every once in a while" (see Figure 4). Similarly, 79 percent of respondents shared that they were "somewhat" to "very" concerned about the possible impacts a changing climate might have on their community (see Figure 5), and

1 A sample size of 100 people is commonly used for broad-brush public opinion polls and provides for a 10% margin of error, regardless of the population size.

83 percent reported believing that climate change poses a "moderate" to "very high" risk. These poll findings support the high level of concern about climate change that the 19 stakeholders indicated in their interviews.

Also in line with the Stakeholder Assessment, the climate-related concern most commonly cited first by poll respondents was increased flooding risk (36 percent), followed by more severe storms (22 percent), and ecosystem impacts (11 percent). Only 8 percent of respondents felt that there would be "no significant impacts" from climate change. Regarding who should be responsible for addressing these concerns, the most commonly first stated response was individuals (33 percent), followed by the national government (19 percent), town government (18 percent), and state government (13 percent). The high level of responsibility ascribed to individuals is consistent with the desire for public engagement found in the Stakeholder Assessment. Interestingly, while polled residents seem to expect some leadership from the government on climate change issues, there is no clear consensus on which level of government should take the lead, perhaps indicating the perceived need for a coordinated leadership effort.

Importantly, the public poll revealed a gap in confidence about the government's ability to respond success-

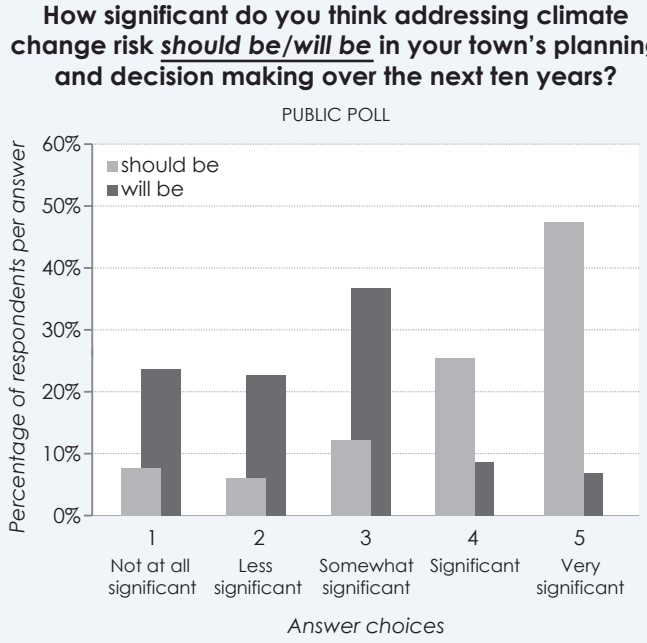

Figure 6. Confidence gap from participants' answers to two questions in the public poll.

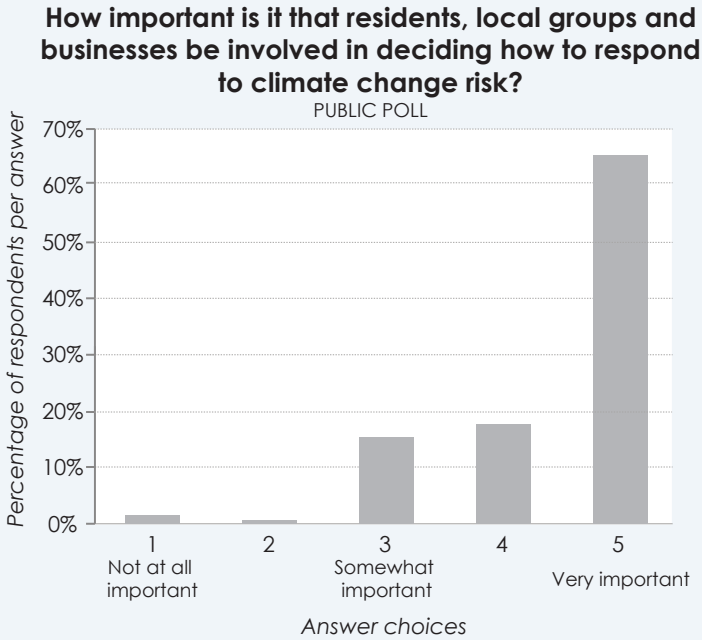

Figure 7. Perceived importance of involving local stakeholders in the decision-making by polled residents

fully to climate change risks. More than 85 percent of polled residents said they thought climate change risks should be given significant consideration in government decisions. Yet, 46 percent indicated they do not think preparing for climate change will actually be important in town decision-making in the next ten years (see Figure 6). Only 16 percent think it will be significant or very significant.

While the poll does not explain why there is a gap between what residents think local government should be doing and what they believe the government will actually do, this may be related to the finding—discussed in detail in later sections—that Barnstable workshop participants perceived the top barriers to climate adaptation action to be primarily political rather than scientific or technical in nature. Given that political barriers would encumber climate adaptation efforts by the town government, it follows that residents would also feel less confident about the town's ability to effectively respond to climate change. This confidence gap could also be related to broader reasons, such as general distrust in government's effectiveness or the complexity and uncertainty inherent in climate change risks, which make it challenging to envision what concrete steps a municipality could take in the near term.

Importantly, when asked how important it is to involve residents, local groups, and businesses in decisions about how to respond to climate risks, more than 96 percent of poll respondents said it is "somewhat important" to "very important" (see Figure 7). This high response suggests a significant opportunity to make progress on climate change issues and bridge any existing confidence gap through public engagement.

Research Methods

Workshops

Over the course of seven months, between June and December of 2013, project staff ran eight workshops throughout Cape Cod. While the initial aim was to run as many workshops as possible within the Town of Barnstable, the Barnstable team felt that it was appropriate to extend the reach of the workshops beyond the town borders since Cape Cod as a whole has a strong regional identity and faces similar climate change risks. In the end, five workshops were run in the Town of Barnstable and one each in the towns of Falmouth, Yarmouth, and Wellfleet. More than 150 people attended the workshops, with a total of 132 people fully participating—meaning they stayed for the entire workshop and completed both the before and after surveys. The number of participants at each workshop ranged from six to 36. This resulted in anywhere from one to six tables of game play at each event.

Each workshop lasted approximately two and a half hours. The first 15 minutes were designated for people to settle in. During the next 15 minutes, NECAP team members provided an all-group overview of the NECAP project and an introductory description of the Barnstable role-play simulation. Participants were then given half an hour to read their game materials. The role-play portion of the workshop ran for one hour, and the final 30 minutes were devoted to a group-wide debriefing (a discussion about participants' experience during the role-play and how they could apply the lessons learned in their own community). For the final three workshops in De-

cember, the Barnstable team increased workshop duration to three hours to allow an extra 15 minutes for the role-play simulation and an extra 15 minutes of cushion time. It had become clear that the Barnstable role-play simulation was difficult to complete in one hour given the number and complexity of issues addressed. Furthermore, the Barnstable team agreed that advertising a three-hour workshop, as opposed to one lasting two and a half hours, would not deter participants. In fact, attendance at December workshops was similar to that at previous workshops.

Image 3. Barnstable workshop; credit: NECAP staff

Role-play Simulation

The role-play simulation created for Barnstable is based on the findings of the Summary Risk Assessment and Stakeholder Assessment, reflecting the main climate threats facing the town as well as the political dynamics of Barnstable. However, to provide a safe and creative space for participants, project staff intentionally fabricated a scenario for a fictitious town called Shoreham. Similar to Barnstable, Shoreham is a 65,000-person coastal town in New England and is known as a great place to live. It has a diversified economy focused on healthcare, tourism, and professional services and boasts low unemployment, a strong working and middle class, and an educated workforce. In recent years, Shoreham residents have been startled by the number of "freak" storms that have hit their town. These storms are particularly dangerous because many businesses and homes are concentrated along the waterfront. Furthermore, the town has recently begun to confront the challenge of improving its aging infrastructure. Coastal flooding and storm surges have begun to cause significant damage to public and private property in the town.

In response, the Shoreham town manager convened a Coastal Flooding Task Force to figure out how to reduce the town's vulnerability and increase its capacity to respond to coastal flooding, particularly in light of climate change. The task force is charged with coming up with a proposal that is fiscally responsible and environmentally sound. Its six members include an assistant town manager, a town planner, the director of a local environmental group, the director of the local chamber of commerce, the president of a neighborhood association and the owner of a realty company. These roles were broadly based on the findings of the Stakeholder Assessment, although many combine the interests and perspectives of multiple real-world stakeholder groups.

At the time the role-play scenario takes place, the task force is convening for its fifth and final meeting, which will be guided by a trained facilitator. According to the scenario, in earlier meetings the task force came up with several strategies for reducing flooding risk in Shoreham. These fall into three categories: 1) flood protection infrastructure—specifically, coastal armoring, 2) flood-proofing homes and businesses, and 3) land use management. For all three categories, the specific strategies range from doing nothing to providing subsidies to adding regulations to

spur action. The challenge put to the group during the role-play simulation is for the participants to assume the roles of the task force members and come to an agreement on which specific strategies to recommend to the Town Council. The task force may modify or add contingencies to any of the strategies they are discussing. The Town Council has agreed to implement any proposal that at least five out of the six task force members support, although the Town Council would prefer a full consensus.

Each workshop participant received a set of background instructions. These included the information about Shoreham described above, a short description of each representative at the table, a chart outlining the likely benefits and costs of each strategy, a map of the town, and a brief risk assessment prepared by a local college. The risk assessment shows the potential impact of climate change on the town in terms of more frequent extreme precipitation events and sea level rise in the short-, medium-, and long-term. Additionally, each workshop participant received a set of confidential instructions specific to the role he or she was assigned to play, either one of the six task force members or the trained facilitator.

Outreach Strategy

The Barnstable team used a multifaceted outreach strategy to attract town residents to the workshops. By intent, the participants in the first two workshops were primarily people interviewed for the Stakeholder Assessment as well as town employees, Waquoit Bay Reserve staff, and other individuals connected to the project's partners. Building on their recommendations, the Barnstable team then generated an email list of potential participants for future workshops that expanded throughout the fall. Through connections established at local educational institutions, places of worship, and environmental groups, the team worked to diversify the participant base by reaching out through email, posters, and other announcements. The NECAP team also invited these groups and organizations to co-host workshops, although co-hosting proved logistically challenging. The project established a strong presence on Facebook through its project page and advertised individual workshops through Facebook events. Partners at the Waquoit Bay Reserve and the Town of Barnstable were also instrumental in the outreach strategy. The Waquoit Bay Reserve placed advertisements in local publications and announced the workshops via its email list. The Waquoit Bay Reserve also spearheaded three workshops, enabling the project to benefit from the organization's strong reputation and following in the region. Similarly, Town of Barnstable partners organized a workshop for town government employees. Finally, project staff asked each set of participants to share their workshop experiences with family, friends, and colleagues.

Data Collection and Analysis

Surveys were administered to all participants before and after each workshop. For the remainder of this document, these surveys will be referred to as the "before survey" and the "after survey," respectively. The surveys sought to measure participants' concerns about climate change risk as well as their opinions about barriers and solutions to adaptation. A total of 132 complete survey sets were collected for Barnstable. Many of the questions were included in both surveys to measure any change that might have been caused by participation in the workshops. Each workshop ended with a 20- to 30-minute debriefing. Notes from these discussions helped capture people's impressions about the workshop and about the prospect of managing the risks as-

sociated with climate change in their town. Four to six weeks after each workshop, project staff conducted in-depth interviews with about 20 percent to 30 percent of workshop participants; 38 in-depth follow-up interviews were completed for Barnstable. Interviews were scheduled via email with participants who had indicated their willingness at the workshop. All interviews were completely voluntary. These in-depth interviews provided further insight into what participants took away from the workshops.

After the final Barnstable workshop in December, MIT project staff started analyzing all the collected data. Survey results were coded for anonimity and entered into a database. Staff members looked for statistically significant shifts between the before and after survey results. They also compared workshop survey data to public poll data to determine major similarities and differences in workshop participants' views compared to the views of residents in general. Every qualitative follow-up interview was transcribed to search for key themes and takeaways. Debriefing notes were similarly organized and analyzed.

Workshop Participants

Barnstable workshop participants were comparable to residents surveyed in the public poll in many respects. There was no notable difference in the ages of the two groups except that workshop participants slightly underrepresented the 30- to 49-year-old population. The large majority of both workshop participants and polled residents were year-round residents (86 percent of workshop participants, 92 percent of polled residents). Additionally, the distribution of income levels was comparable for both groups.

However, workshop participants did differ from polled residents in several important ways. Workshop participants had a more even gender split at 48 percent female and 52 percent male, while public poll respondents were 62 percent female and 38 percent male. A larger percentage of workshop participants were relatively new to the Barnstable area compared to surveyed residents, with about 15 percent of workshop participants having lived in the town for less than three years compared to just 1 percent of public poll respondents. However, a similar percentage of workshop participants and polled residents indicated that they had lived in the area for more than 20 years (44 percent of workshop participants, 39 percent of polled residents). Workshop participants had, overall, attained higher levels of education than polled residents. For example, 58 percent of workshop participants held graduate degrees compared to 21 percent of polled residents. Additionally, this difference corresponded to a higher percentage of polled residents indicating high school as their highest level of education (43 percent of polled residents compared to 4 percent of workshop participants).

Regarding political orientation, workshop participants were more liberal than polled residents, with 50 percent of workshop participants identifying as liberal compared to just 26 percent of polled residents. Correspondingly, a lower percentage of workshop participants identified as conservative or independent compared to those polled. Workshop participants were also more environmentally oriented, with 54 percent saying they belonged to local or national environmental groups compared to just 21 percent of residents polled. A more complete chart showing demographic comparisons between the public poll and the workshop populations can be found in Figure 8. These differences in political and environmental orientation, while anticipated, are important to understanding the workshop results.

	PUBLIC POLL	WORKSHOP SURVEYS
AGE	PERCENTAGE	PERCENTAGE
29 & Under	7%	10%
30-39	9%	14%
40-49	23%	6%
50-59	26%	28%
60+	35%	41%
LENGTH OF RESIDENCE		
Less than 1 year	0%	5%
1-3 years	1%	10%
3-10 years	18%	15%
10-20 years	42%	23%
20+ years	39%	44%
Other	0%	3%
TYPE OF RESIDENCE		
Year-round	92%	86%
Summer	2%	3%
Autumn	0%	2%
Winter	0%	1%
Spring	0%	1%
I am here sporadically	3%	2%
Other	3%	5%
POLITICAL VIEWPOINT		
Conservative	22%	10%
Liberal	26%	50%
Independent	44%	35%
Other	8%	6%
ENVIRONMENTAL GROUP MEMBERSHIP		
No	79%	46%
National group	8%	23%
Local group	12%	22%
Yes, other	1%	9%
EDUCATION		
High school graduate (or equivalent)	43%	4%
Bachelor's degree	32%	33%
Graduate degree	21%	58%
Other	4%	5%

Figure 8. Demographic comparison of Barnstable public poll respondents and workshop participants

In sum, the individuals who participated in the workshops were somewhat newer to the community, more educated, more liberal, and more environmentally oriented than the general population of Barnstable polled. However, these differences do not interfere with the objectives of the project. Indeed, the people who attended the workshops are probably more likely to get involved in trying to influence action on climate or environmental issues than the average Barnstable resident. In this light, engaging this population, rather than a perfectly representative sample of Barnstable residents, could be helpful in shaping future climate adaptation action in the town.

Key Findings

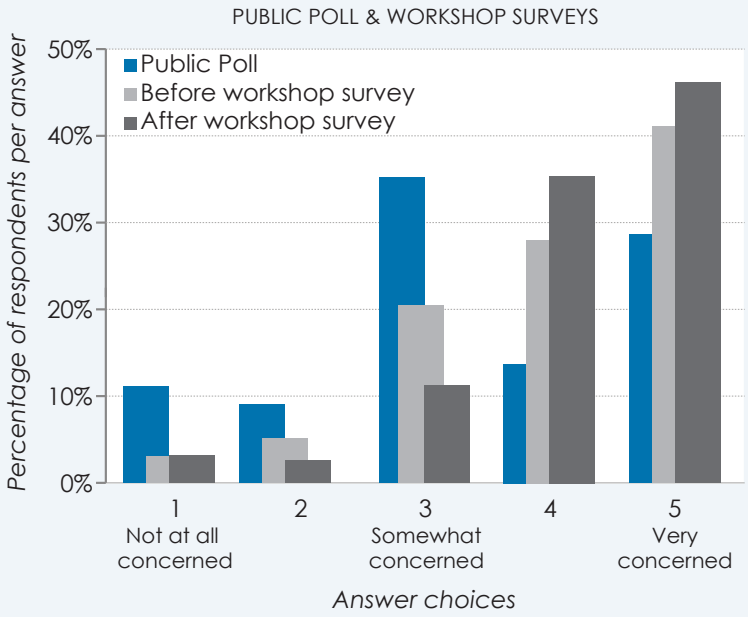

Figure 9. Comparison of levels of concern between polled residents and workshop participants

The analysis of the Barnstable data was guided by two overarching research questions. The first was, "What are the major impacts or effects of the role-play workshop on participants?" This question sought to identify the ways in which people changed their thinking as a result of participating in the workshops. The second guiding question was, "What did we learn about the attitudes of Barnstable residents regarding the management of climate change risks and the possibilities of climate adaptation?" This question sought to provide a snapshot of the level of public "readiness" and "willingness" to engage in adaptation planning. In response to these research questions, the data analysis revealed multiple key findings for Barnstable. These findings fall into six overarching categories, detailed in the sections below: concern about the possible local impacts of climate change; local-level responsibility for adaptation; barriers to action; use of science in decision-making; enriched perspective; and suggested pathways forward.

Concern About Possible Local Impacts of Climate Change

Polled residents and workshop participants demonstrated a high level of concern about and awareness of the possible local impacts of climate change. Participation in the workshops did not significantly change this concern.

In response to the question, "How concerned are you about the possible impacts a changing climate might have on your town?" 79 percent of polled Barnstable residents indicated some level of concern, with 43 percent saying they were "concerned" to "very concerned" and an

additional 36 percent saying they were "somewhat concerned." Barnstable workshop participants expressed even higher levels of concern prior to taking part in the workshop. In response to the same question on the before survey, 91 percent of workshop participants indicated some level of concern: 70 percent said they were "concerned" to "very concerned," and 21 percent said they were "somewhat concerned" about the possible impacts of climate change on their community (see Figure 9).

While these responses indicate that workshop participants had slightly higher levels of preexisting concern relative to polled residents, the large majority of both groups expressed significant concern and the discrepancy is likely due to the self-selection of workshop participants. Role-play participants' level of concern increased somewhat as a result of the workshop; however, this shift was not statistically significant, which is not surprising given the high level of prior concern. It is important to note that the level of concern about local climate change impacts among Barnstable workshop participants both before and after the workshops was the highest of all four towns studied.

Not surprisingly given the relatively high level of concern about climate change impacts, about half of Barnstable residents surveyed in the public poll also reported believing that climate change poses a significant risk to their town. In response to the question, "How 'risky' do you think climate change is?" 50 percent of polled residents said "very high" or "high." In line with their higher level of concern overall, workshop participants saw climate change as even more risky, with 80 percent saying "very high" or "high" in response to the same question (see Figure 10). This question was only posed to workshop participants in the before survey, so this finding illustrates a preexisting perception of risk and not a change due to the workshop. Ultimately, the finding that polled residents and workshop participants view climate change as highly risky, coupled with the town's high level of concern overall, suggests that there is a sense of urgency to take action on climate change adaptation in Barnstable in the near term.

In addition to this high level of concern, the data shows a high level of awareness of climate

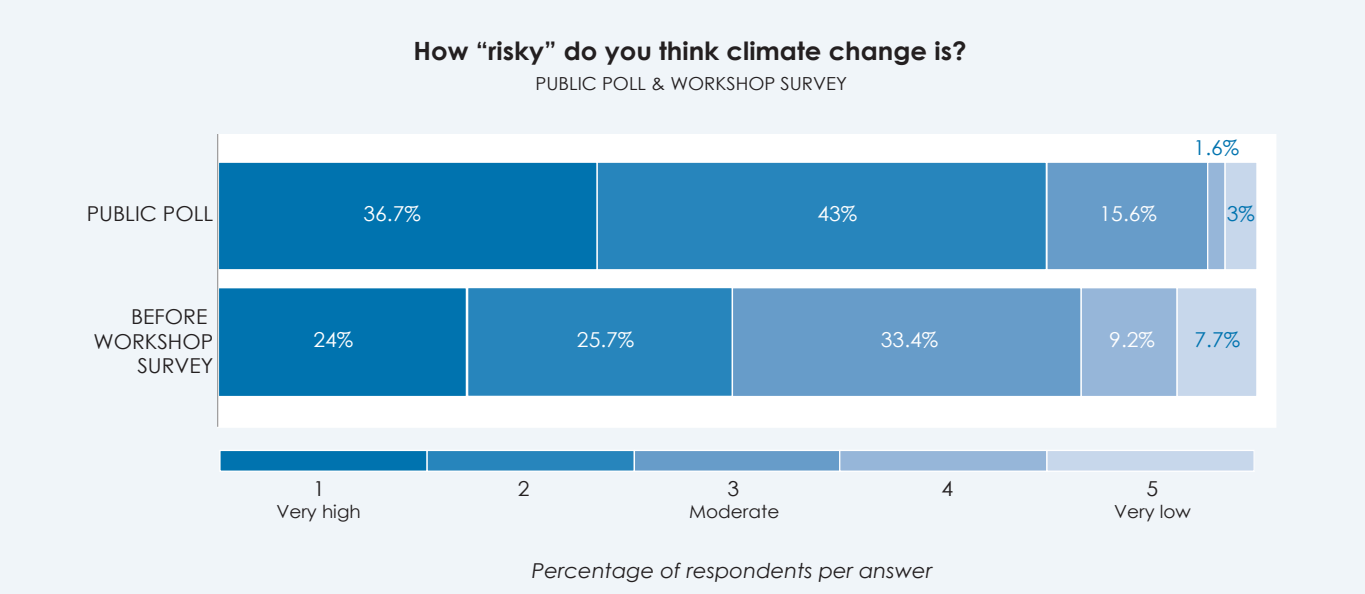

Figure 10. Comparison of perceived "riskiness" as reported by Barnstable polled residents and Barnstable workshop participants

change risks in Barnstable. When asked whether they ever think about how climate change could affect their community, 45 percent of polled residents said "yes, often" and 31 percent said "every once in a while." This indicates that Barnstable residents were already aware of the possible local impacts of climate change to the point that a large majority (76 percent) think about these issues with some regularity. In response to the same question, 65 percent of workshop participants said "yes, often" and 28 percent said "every once in a while"—indicating that the vast majority (93 percent) of workshop participants were also well aware of the possible local impacts of climate change. This question was only posed to participants before the workshop, so this finding illustrates a preexisting awareness and not a change due to the workshop. Again, the difference in the responses from each group suggests that workshop participants had slightly higher levels of awareness relative to polled residents, but a large majority of both groups were highly aware of the possible local impacts of climate change.

Image 4. Barnstable workshop; credit: NECAP staff

The follow-up interviews with workshop participants helped illuminate this point. More than half of interviewees indicated that they had a personal interest in climate change or related environmental issues before attending the workshop. People cited a wide range of personal experiences with these issues, including involvement with local environmental groups, attendance at previous programs through the Waquoit Bay Reserve, and personal research and reading. In addition, a remarkable four-fifths of interviewees said that they had had some professional experience working with climate change or other environmental issues. These experiences covered a wide range activities, from teaching and scientific research to consulting and government work. This finding might help explain why workshop participants' concern and awareness was somewhat higher than polled residents—it can be expected that a much smaller percentage of Barnstable residents as a whole have worked with these issues professionally. Taken together, these two findings from the follow-up interviews support the conclusion that the high level of prior concern and awareness explains the minimal effects of the workshops on participant concern and awareness. As one interviewee said in a typical response to the question of whether the workshop affected his level of concern: "Not really. I was very well informed when I went to the workshop, and the workshop itself didn't change my opinions much."

In sum, different data sources demonstrated a strikingly high level of preexisting concern and awareness for the possible impacts of climate change in Barnstable before the workshops. These findings have important implications for the rest of the findings in Barnstable. In light of

town participants' particularly high level of preexisting concern and awareness, it is not surprising that participation in the workshop did not significantly affect their attitudes toward local climate change risks. This finding indicates that, where levels of concern about local climate change risk are already quite high, participation in the role-play simulation may not raise levels of concern and awareness.

Local-level Responsibility for Climate Change Adaptation

Prior to the workshops, a large majority of both polled residents and workshop participants expressed a belief that town government should take action on climate change adaptation. Participation in the workshop led to a small increase in this belief.

Barnstable residents surveyed in the public poll largely reported believing that climate change risks should be an important factor in their town's planning and decision-making. In response to the question, "How significant do you think addressing climate change risk should be in your town's planning and decision-making over the next 10 years?" 73 percent of poll respondents said "significant" or "very significant." A large majority of Barnstable workshop participants similarly said climate change risks should be an important factor in their town's near-term planning and decision-making prior to participation in the workshops, with 87 percent saying it should be "significant" or "very significant." This number increased to 93 percent following the workshop (see Figure 11). This is not surprising since the vast majority of participants came into the workshops already believing that the town should plan for climate change risks. These findings indicate that there is a strong sense among Barnstable residents that the town should take responsibility for addressing climate change risks in the near future. Additionally, these findings reinforce the sense of urgency discussed above, indicating support for near-term adaptation action.

How significant do you think addressing climate change risk should be in your town's planning and decision making over the next ten years?

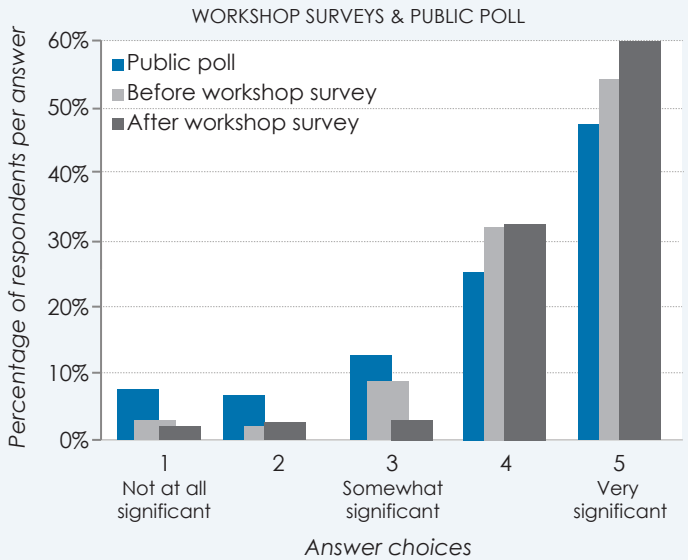

Figure 11. Comparison of polled residents' and workshops participants' perceptions regarding how important climate change adaptation should be in local planning

In a similar vein, workshop participants assigned more responsibility to the town government for climate change adaptation after the workshop. In response to the question, "If the climate is changing, who do you think should be responsible for preparing for the possible impacts this might have on your community?" 26 percent of participants selected "the city/town government" as one of their three answers prior to the workshop. After the workshop, 31 percent of participants selected this option as one of their three answers—a statistically significant increase. This suggests the workshops increased participants' perception that local government has a key role to play in preparing for climate change risks.

Follow-up interviews with workshop participants reinforced and helped explain these conclusions. Several interviewees explicitly said they feel the town government should be more involved in planning for climate change. They offered various reasons for why more government involvement is needed, often noting that the town government is better positioned to address climate change risks than other organizations or groups. For example, one interviewee commented, "We have a very large research community in Woods Hole that is very much concerned with climate change and is doing its very best to make people aware of it all the time. But I think that the town government needs to take the lead on this." Another interviewee said, "FEMA [Federal Emergency Management Agency] funds are run[ning] out and the federal government can only do so much in repairing these communities time and time again. So the towns need to start taking a portion of this pie and seeing what damage mitigation effects they can implement as quickly as possible." Such comments highlight that participants not only felt that the town government should play a key role in climate change adaptation, but also that they see a real need for the town government to take initiative on this issue.

While the large majority of both polled residents and workshop participants indicated prior to the workshops that climate adaptation should be important in Barnstable's near-term planning, neither group felt particularly optimistic that Barnstable would take climate adaptation action in the next decade. When asked, "How significant do you think climate change will actually be in your town's planning and decision-making over the next 10 years?" only about 16 percent of poll respondents and 14 percent of workshop participants before the workshop said they actually thought it would be "significant" or "very significant." When asked, "How confident are you that your town will be able to effectively respond to climate-related risks despite uncertainty about what the future climate will be like?" 44 percent of polled residents said they were "not confident"; 30 percent said they were "somewhat confident"; and only 26 percent said they were "confident" or "very confident." Similarly, in response to the same question in the before survey, 45 percent of workshop participants said they were "not confident," 43 percent said they were "somewhat confident," and only 12 percent said they were "confident" or "very confident" (Figure 12). These findings point to a gap in confidence among Barnstable residents about the local government's willingness and ability to respond effectively to climate change risks before the workshops. Interestingly, this gap was the strongest among workshop participants, who were gen-

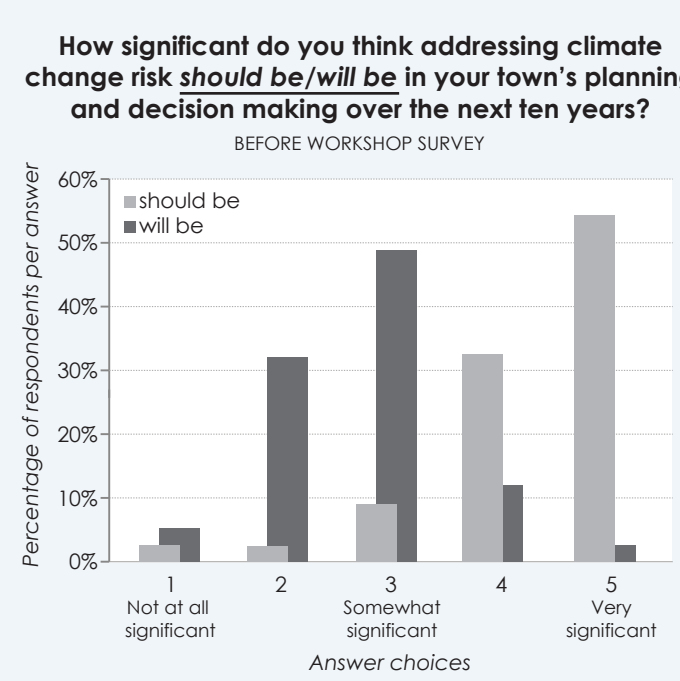

Figure 12. Confidence gap prior to the workshop

erally most concerned about climate change risks and felt most strongly that the town should act.

Workshop participants' confidence that the town government would effectively respond to climate change risks increased somewhat as a result of participation in the workshops. The percent of participants who thought that climate change would actually be "significant" to

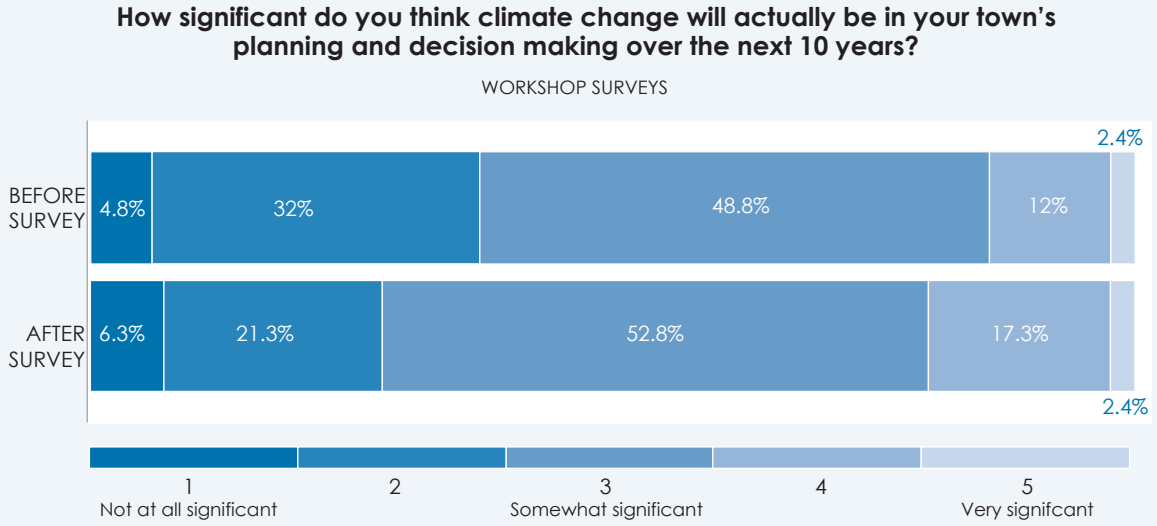

Figure 13. Workshop participants' confidence in their town's likelihood to plan for climate change

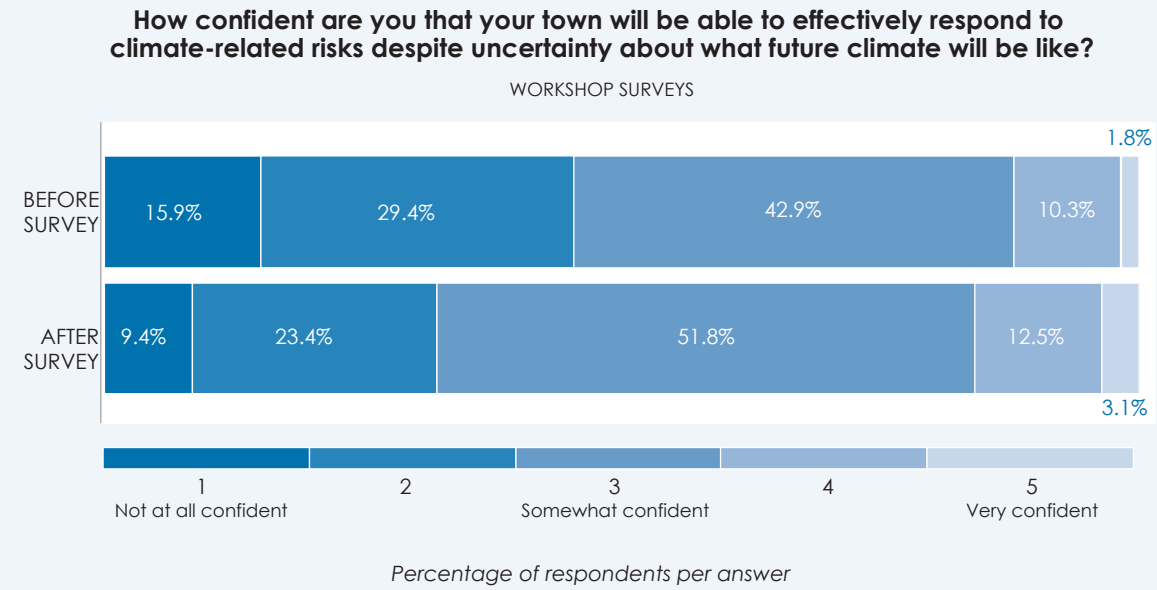

Figure 14. Workshop participants' confidence in the town's ability to respond to climate change

"very significant" in future town planning and decision-making increased from 14 percent to 20 percent (see Figure 13) after the workshops. While not statistically significant, this is a notable increase. Similarly, when the question "How confident are you that your town will be able to effectively respond to climate-related risks despite uncertainty about what the future climate will be like?" was asked again in the after survey, the percentage of people responding "somewhat confident" to "very confident" increased from 55 percent to 67 percent (see Figure 14). Although this increase was also not statistically significant in Barnstable, the results show that workshop participation led to statistically significant increases in confidence in all other towns studied under NECAP. This finding suggests that widespread participation in the workshops has the potential to increase public optimism about and confidence in the ability of local government to effectively respond to climate change risks.

While confidence in the town government was not directly addressed in the follow-up interviews, the barriers to climate adaptation identified by interviewees (and discussed in more detail in the next section) do shed some light on why there may be a confidence gap. Interviewees generally identified barriers that were political and social, rather than scientific or technical, in nature. These barriers typically involved divisions or conflicts within the community. Given that barriers of this nature would encumber any climate adaptation efforts by the town government, it follows that community members would also feel less confident about the town's ability to respond effectively to climate change. More generally, this confidence gap may also be due to the complexity and uncertainty inherent in climate change risks, which make it challenging to

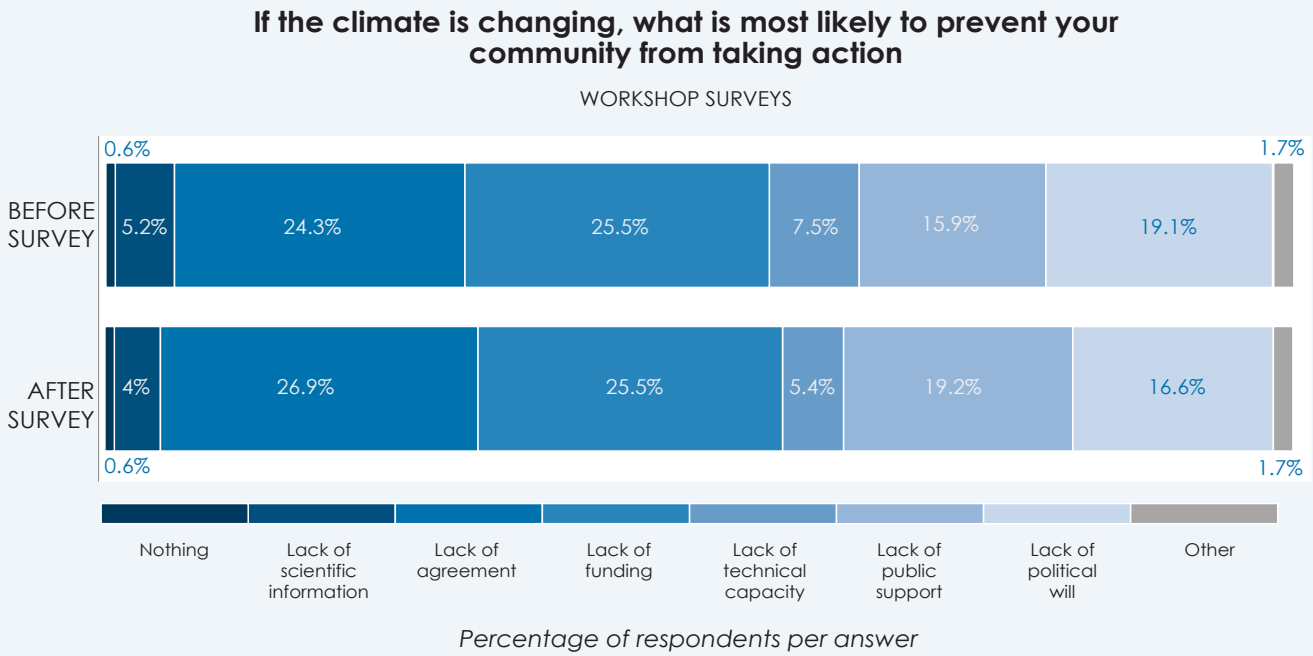

Figure 15. Workshops participants' perceived barriers to climate adaptation action

envision concrete steps that a municipality can take in the near term. It is also possible that this confidence gap is, at least to some extent, reflective of a general distrust in government's effectiveness.

Perceived Barriers to Action

As above mentioned, the barriers to adaptation were typically political and social, rather than scientific or technical in nature. The character of perceived barriers did not shift significantly as a result of workshop participation.

In response to the question "If the climate is changing, what is most likely to prevent your community from taking action?" participants' top responses were, "lack of agreement on what do to" (24 percent before, 27 percent after), "lack of funding or financial resources" (26 percent before and after), "lack of public support" (16 percent before, 19 percent after), and "lack of political will" (19 percent before, 17 percent after). In comparison, very few Barnstable residents selected "lack of scientific information" (5 percent before, 4 percent after) or "lack of technical know-how/capacity" (8 percent before, 5 percent after) as a barrier (see Figure 15).

This is further supported by the follow-up interviews, in which people identified a wide range of political and social barriers to climate adaptation. A few interviewees identified social divisions within the community, such as those between summer and year-round residents, as a barrier. One interviewee noted, "The people who come here during the summers on vacation, they might not see it [climate change] as as big of a threat because that isn't their primary dwelling." A couple interviewees also cited disagreements about how to manage beaches and coastline in light of climate change projections as a divisive issue in the community. For example, one person commented, "We are already, as a community, very conflicted about what we should do when it comes to replenishing beaches, when it comes to fortifying beaches or letting them go." A few interviewees identified more concrete concerns, such as limited funding, flood insurance encouraging continued development in vulnerable areas, and the challenging regulatory background of the broader region. These distinctly political and social barriers will present considerable challenges for town government initiatives on climate adaptation, perhaps explaining the confidence gap found in Barnstable.

Use of Science in the Decision-making Process

The need to integrate scientific climate change projections into decision-making was well accepted by the vast majority of polled residents as well as workshop participants both before and after the workshops.

In response to the question, "To what extent do you agree with the following: When making decisions today, decision-makers in my town should take into account scientific projections about what the climate might be like in 50 years," 69 percent of polled residents said they agreed or strongly agreed. Similarly, in response to the same question, 88 percent of workshop participants said before and 89 percent after the workshop that they agreed or strongly agreed. While the level of agreement is notably higher for workshop participants, both groups indicated a high level of agreement—showing a strong baseline for the acceptance of scientific climate change projections in decision-making. These results may help explain the general perception among workshop participants that barriers to adaptation in Barnstable tend to be political and social in

nature. Specifically, since the need to integrate scientific climate change projections into decision-making is well supported in Barnstable, it appears that debate surrounding this issue is not a major barrier to adaptation action.

Importantly, a few workshop participants--all of whom attended one particular workshop--adamantly denied the accuracy and applicability of the scientific climate change projections provided in the workshop. A couple of these participants agreed to give follow-up interviews. These conversations revealed that some residents do hold a more extreme "climate change skeptic" viewpoint. While the research data suggests that these views represent a small percentage of Barnstable residents, these interviews indicate that the use of scientific climate change projections in decision-making in Barnstable is not without some debate. Three interviewees specifically rejected the validity of the NECAP's climate change projections, alleging that the projections represented subjective opinions. Further inquiries provided little insight into how this barrier to action could be addressed with scientific or technical solutions—indicating the division may actually be political and social in nature. Not surprisingly, these three interviewees all had negative perspectives of the workshops, calling them "a total waste of time" and saying they felt "manipulated" and "restricted" by the role-play, which they thought was too scripted to allow a genuine discourse. Furthermore, these participants did not believe that the consensus-building approach modeled in the workshops could help their community adapt to climate change. Engaging with these viewpoints, even if they are the significant minority, will be an important challenge to bear in mind if the town moves forward with climate adaptation.

Enriched Perspective

Individuals who participated in the role-play simulation workshop experienced an increased appreciation for learning about and accounting for other perspectives in planning decisions.

Promoting a greater understanding of and appreciation for the perspectives of diverse stakeholders was a key goal of the workshops. This goal was advanced by asking participants to adopt new roles, listen and interact with a variety of other roles during the simulation, and then discuss their experiences during the debriefing period. While enriched perspective was not directly addressed in the public poll or the before and after surveys, it was a common theme in debriefing discussions and the follow-up interviews.

Broadly speaking, the notion that role-playing promotes greater understanding of and appreciation for different perspectives was a significant point of discussion in the majority of workshop debriefings. Specifically, interviewed participants commented on how the role-play helped them better understand the reasoning and context underlying different viewpoints. Participants generally found this experience to be positive and valuable, although several commented on the challenge of arguing for a viewpoint different than their own. A few people indicated that they found the adoption of an opposite viewpoint somewhat uncomfortable.

Participants who gave follow-up interviews confirmed that enriched perspective was an important takeaway from the workshops. More than half of follow-up interviewees expressed an increased understanding of and appreciation for different perspectives. While many of these comments were made in response to the question "How did it feel to adopt another role and walk in somebody else's shoes?" the notion of enriched perspective often came up multiple

times over the course of an interview. Several people expressed increased empathy for different viewpoints. For example, one interviewee said, "You really had to understand where the different types of people were coming from …. It forced you to not only acknowledge but to try to understand as well." Another commented, "You had to sit down and say, 'Maybe this guy has a point.'" Other interviewees expressed a more general appreciation for hearing a diversity of viewpoints. Comments included, "Understanding where different points of view can come into play was very enlightening."

While most participants found the role-play simulation interesting and enjoyable, there were a few interviewees who did not enjoy the role-play aspect of the workshop. The most common reasons provided were that they found adopting another viewpoint uncomfortable, restrictive, or artificial. For example, one interviewee said he disliked deliberating with people who were not representing their real-life perspectives, stating that it was difficult for him to "take seriously their thoughts and approaches to problem-solving" from such "contrived perspectives." Worth note, this particular interviewee, along with several others who found the experience uncomfortable or constraining, still saw benefit in the experience.

Image 5. Protected shorelines; credit: Town of Barnstable Growth Management Department

Finally, about a quarter of interviewed workshop participants said they felt as though the workshops were "preaching to the choir" since many participants already had professional or personal experience working in support of environmental issues. Since the greater Barnstable community appears to be more "choir-like" based on the public poll results, this was not entirely unexpected—though the Barnstable team did actively try to recruit participants with diverse backgrounds. While this observation reflects the project's recruiting challenges, it more importantly demonstrates that participants are not only open and receptive to other viewpoints, but actively want to hear and engage with them. For instance, one interviewee said, "I think it would have been better if the attendees had cut across a broader spectrum." Another encouraged project organizers to reach out to a wider audience, saying, "You've got to get outside of the group of people who are already interested." These encouraging findings suggest that the Barn-

stable community is ready to engage the full range of local stakeholders in decisions regarding climate change adaptation. Also worth note, as one project partner said, when it comes to climate change adaptation, "the choir isn't singing, so maybe they need to be preached at."

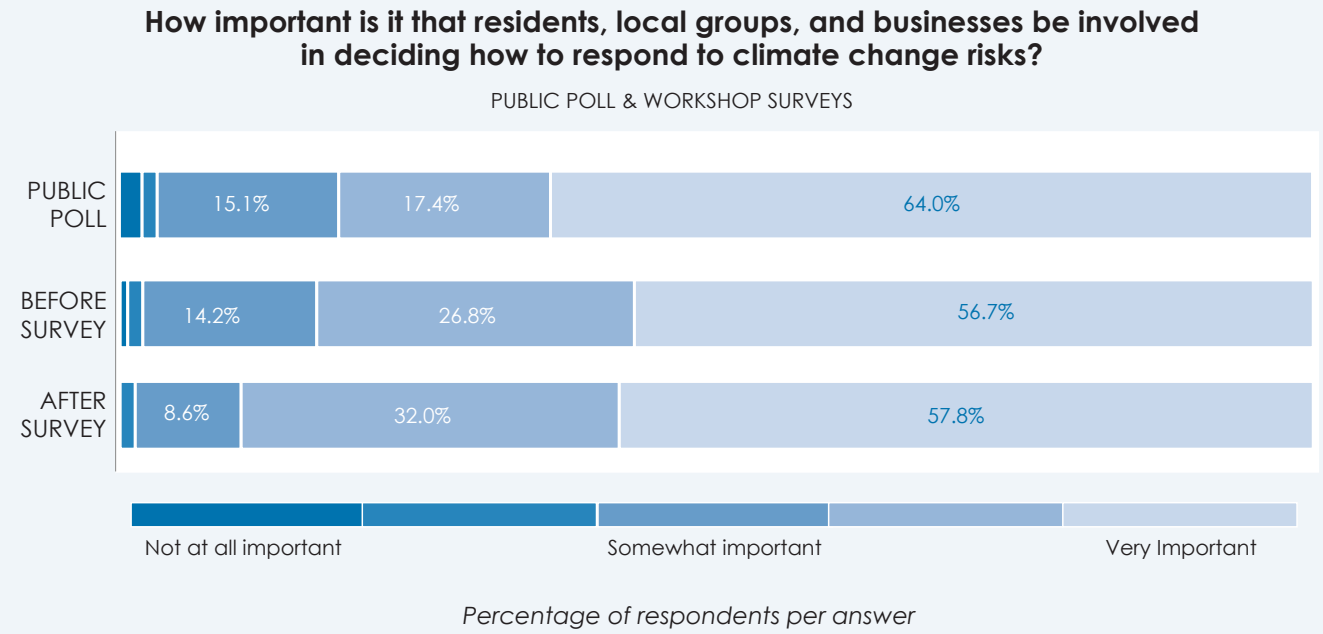

Figure 15. Perceived importance of involving local stakeholders in climate adaptation decisions

Suggested Pathways Forward

Stakeholder engagement

The vast majority of polled residents and workshop participants said they believe it is important to involve local stakeholders in decisions regarding climate change adaptation, suggesting this may be an important consideration for Barnstable as the town moves forward with climate adaptation.

In response to the question "How important is it that residents, local groups, and businesses be involved in deciding how to respond to climate change risks?" 64 percent of polled residents said "very important" and another 17 percent said "important." In other words, more than 80 percent of polled residents attributed some level of importance to engaging local stakeholders in climate adaptation action before any intervention from the workshops.

In response to the same question, workshop participants answered similarly both before and after the workshop, with 57 percent before and 58 percent after saying "very important" and 27 percent before and 32 percent after saying "important" (see Figure 15). While there was not a statistically significant shift in perceived importance of engaging local stakeholders, these numbers show that the vast majority of workshop participants believe it is important to engage local stakeholders in decisions about climate change adaptation. This finding is consistent with the

public poll finding, indicating a high level of support for local stakeholder engagement existed before any interventions from the workshops. Taken together, the poll and workshop findings suggest that the Barnstable community is ready to take collective action toward climate change adaptation and that people feel diverse stakeholders should be involved in the process.

Role-play simulations as an educational tool

Overall, workshops participants enjoyed role-playing and thought that the simulations could help their community learn about climate change adaptation. The two most common reasons interviewees gave for enjoying the role-play were that it was fun and that it was interesting to argue for an opposite viewpoint. While, as mentioned above, there were a handful of interviewees who felt the role-play was uncomfortable, restrictive, or artificial, many of these people still indicated that they found the experience interesting and valuable. For example, one interviewee commented: "I found it interesting; it wasn't enjoyable. … It took people out of their regular roles." Such comments suggest that, while not always comfortable, role-play can move people out of their everyday ways of thinking and comfort zones, providing a unique learning experience and helping people explore other ways of seeing the world.

Building off this generally positive reception to role-play, about two-thirds of follow-up interviewees responded affirmatively to the question "Do you feel that role-play simulations could help your community learn about and plan for climate change?" In a representative example, one interviewee summed up the advantages of role-play over other education strategies by saying, "It forces the communication to happen …. If we sat down there without the role-playing, some ideas are thrown out there. But when we're given that role-playing, whether you agree with it or not, it forces the subject matter to be put on the table. And it works." Such follow-up interview responses strongly suggest that role-play simulations offer a promising pathway forward for coastal communities such as Barnstable that wish to adapt to climate change. As one interviewee put it, "My thought was that if more people could do something like this it might change things." While the overwhelming support for local stakeholder engagement in Barnstable may have contributed to the perceived usefulness of role-play simulations, the method still appears to be a promising way to build the public support and open-mindedness needed to tackle complex and controversial issues such as climate change adaptation.

Consensus-building approach

In a related finding, a large majority of workshop participants said they thought a consensus-building approach modeled in the role-play simulation could help their community adapt to climate change. Many workshop participants also expressed an unprompted appreciation for the role of facilitator in this process.

In response to the post-survey question "Do you think your town should use a decision-making process like that modeled in the exercise to reach agreement about how your town should respond to possible climate impacts?" 74 percent of workshop participants answered affirmatively. Follow-up interviews showed a similar trend. In response to the question "Do you think that the consensus-building approach we modeled might help your community prepare for climate change?" almost all workshop participants interviewed after the experience agreed that the approach could help Barnstable move forward with climate adaptation. Several people noted

the unique advantages of consensus-building over other approaches. For example, one interviewee said, "I like consensus. I think that if it's majority rules all of the time sometimes the results are pretty skewed. I like the idea of working the problem through, hearing each other, and then trying to find some common ground." While a few interviewees qualified such responses by saying that they thought consensus-building would be impractical or improbable at this time, most skepticism was limited to sentiments that the consensus-building approach would be better than nothing, would not hurt, or would be worth a try. Importantly, the majority of interviewees expressed the belief that the consensus-building approach would be both beneficial and possible.

Closely related to this support for the consensus-building approach, several interviewed participants expressed an appreciation for the importance of the role of the facilitator in discussions about complex, multi-stakeholder public issues such as climate change adaptation. No questions about facilitation were asked in the workshop surveys, follow-up interviews, or public poll. Thus, comments about the importance of the facilitator or good facilitation were especially interesting because they were unprompted. About a fifth of interviewees expressed appreciation for the importance of the facilitator, showing that these participants seriously engaged with the process being modeled during the role-play simulation and overall workshop. The high level of receptiveness to and engagement with the consensus-building approach and facilitated problem-solving among workshop participants suggests there may be relatively high support for such an approach to adaptation planning in Barnstable.

Conclusion

Our research provides a striking snapshot of Barnstable as a community with a high level of concern about and awareness of local climate change risks. The workshops and interviews confirm that many Barnstable residents have a great deal of experience with and knowledge of climate change issues. The results show that, for many people, there is a sense of urgency to take climate adaptation action in Barnstable and that a large proportion of residents believe the town government should take initiative in preparing for climate change risks. These attitudes indicate that there is a strong foundation on which to take action on climate adaptation in Barnstable. While adaptation planning and implementation will not be without their challenges, it appears that the Barnstable community is surprisingly ready to move forward.

This research also demonstrates that many Barnstable residents believe the barriers to adaptation facing their community are primarily political and social in nature, rather than scientific or technical. While the workshops revealed that there might be some disagreement over the use of scientific climate change projections in decision-making, these tensions may ultimately be rooted in political differences. Encouragingly, workshop participants expressed great appreciation for learning about and accounting for other perspectives in the planning decisions. In the follow-up interviews, it became clear that many Barnstable residents are not only open to hearing different perspectives, but also want to engage actively with a wide range of viewpoints when it comes to planning for climate change. Regardless of how Barnstable moves forward with climate adaptation, it is the project's hope that these findings will spur further discourse around adaptation in the community and that a diversity of residents will be encouraged to share their perspectives.

Building on these findings, this research demonstrates several promising ways to help overcome barriers to adaptation in Barnstable. Most broadly, the results show widespread support for engaging local stakeholders in decisions about climate adaptation. Consistent with the finding of greater appreciation for different perspectives in Barnstable, this indicates that more formal stakeholder engagement would likely be very beneficial and well received in Barnstable. Additionally, given the overall positive response to the role-play simulations, the research suggests that further outreach using role-play simulations could build on the existing appreciation for different perspectives in Barnstable and help extend the benefits throughout the community. Finally, the majority of workshop participants thought that the consensus-building approach modeled in the workshop could help Barnstable move forward with climate change adaptation. Based on the follow-up interviews, it appears that many of these same workshop participants have begun to seriously consider the consensus-building approach as a possible pathway forward in Barnstable. Indeed, the existing high level of concern about climate change risks and observations of widespread openness to different perspectives in the follow-up interviews strongly suggest that a consensus-building approach could be very beneficial to any climate adaptation efforts in Barnstable.

Although the effects of participation in the role-play simulation are less prominent in Barnstable than in the other three NECAP partner communities, there was a noticeable increase in both the perception of local responsibility and optimism about future near-term local action. It may be that the workshops had a less strong influence on participant perspectives in Barnstable due to the very high level of preexisting concern and awareness about climate change risks, as well as the participant skew toward people who were already actively involved in climate change–related professions and work. This finding, particularly when contrasted with findings from the other NECAP partner municipalities, suggests that role-play simulations are likely to have the greatest influence in places where thinking about climate change risks and adaptation options is relatively undeveloped.

Adaptation planning will take time and require challenging decision-making. Barnstable has the opportunity to capitalize on the high levels of concern about climate change and on the increased recognition of local responsibility for adaptation planning generated by these workshops to increase the town's preparedness and resilience in the face of climate change risks.

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