MAINE & NEW HAMPSHIRE COASTAL RESIDENT SURVEY (PILOT): TECHNICAL REPORT

Emma Fox, Caroline L. Noblet, Kathleen P. Bell, Abigail Kaminski, Margaret Snell, and Allyson Eslin

SCHOOL OF ECONOMICS STAFF PAPER # 623

ACKNOWLEDGEMENTS

The New England Sustainability Consortium (NEST) Safe Beaches and Shellfish Project is funded by National Science Foundation Award 11A-1330691 to Maine EPSCoR at the University of Maine. We thank NSF EPSCoR, and Maine EPSCoR for their support of this research. Further, the research team would like to acknowledge the key role stakeholders, collaborators, and colleagues played in the design and pre-testing of the 2015 Maine and New Hampshire Coastal Resident Pilot Survey. Many of our questions are a direct response to question and information needs of key stakeholders, as well as emerging research questions about beach recreation, shellfish consumption, water quality, public health risks, beach management, shellfish growing area management, and environmental change. We thank numerous coastal stakeholders, collaborating researchers on the New England Sustainability Consortium (NEST) Safe Beaches and Shellfish Project, as well as colleagues involved with similar research projects nationally, for their excellent feedback.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This report summarizes findings from the 2015 Maine and New Hampshire Pilot Coastal Resident Survey. The purpose of the pilot survey was to inform the design and administration of a summer 2015 coast-wide survey effort. The Pilot Survey investigated benefits associated with coastal water quality and focused on capturing economic and social values for this natural resource. We captured coastal residents' perceptions about water quality including benefits of water that is clear of pollution and free from contaminants, what factors detract from coastal water quality, and beliefs about who should be responsible for managing the resource.

Key findings include:

- 67.9 percent of respondents are willing to contribute, via an increase in monthly water/sewer/septic fees, to a hypothetical Coastal Water Quality Improvement Program.
    - Factors that appear to increase a citizen's willingness to contribute include: trust in science (based on responses to a series of 7 questions), and participation in coastal recreation.
    - Residents who believe they could make changes to their own behavior to improve water quality were also more likely to state a willingness to contribute.
    - Factors that decrease willingness to contribute include: higher monthly fee, a higher evaluation of home- state water quality, longer length of residency.
- A gap exists between citizen perceptions of coastal water quality and water quality data. Maine residents and New Hampshire residents evaluate Maine water quality similarly but provide differing rankings for all other states and provinces evaluated, where Mainers assigned lower water quality rankings to other states than New Hampshire respondents did.
- Public health information seeking and reporting behavior may be an issue for citizens: although beach safety information is publicly available, 70.4% of beach users do not ever seek information on beach safety; further, of respondents who reported feeling ill after eating shellfish, 80 percent did *not* report their illness.
- Citizens rank runoff and wastewater issues highest in terms of perceived negative impact on water quality. Examples of these issues are: fertilizers, chemicals, pesticides, and industrial pollution, as well as aging or failing wastewater treatment facilities and failing septic systems.
- Though most respondents believe that state residents are responsible for helping to solve coastal problems (88.3%), fewer believe it is their *personal* responsibility to help solve coastal problems (70.8%). More residents believe that their neighbors could make changes to improve coastal water quality (61.3%) than believe that they could *personally* make changes to improve coastal water quality (46.4%).

INTRODUCTION

As increases in tourism and recreational opportunities bring more coastal visitors to the Gulf of Maine, coastal water quality becomes an increasingly serious public health and environmental issue. The Maine and New Hampshire Coastal Resident Pilot survey is a part of a larger research effort through the New England Sustainability Consortium (NEST) Beaches and Shellfish Project[1] to address data gaps and provide scientific information to inform policy assessment and design. The 2015 Maine and New Hampshire Pilot Coastal Resident Survey was administered in order to pre-test the design and administration of a coast-wide survey effort. The Pilot survey focused on valuation of, perceptions of and attitudes of Maine and New Hampshire residents regarding water quality along the Gulf of Maine coast.[2]

The goals of this survey were to:

- Identify resident priorities for coastal management, resident understanding of factors contributing to poor (and good) water quality, and resident evaluation of the consequences of impaired (and improved) waters
- Classify attitudes about local and state government agencies: trust in government, effectiveness of government to address coastal issues, and responsibility toward water quality
- Assess resident willingness to pay to help improve coastal water quality
- Capture how personal characteristics of the individual—including climate change beliefs, trust in science, and other environmental behaviors—may influence their knowledge and choices about coastal water quality
- Provide insight and context to help improve alignment of management practices with resident perspectives for improved policy effectiveness

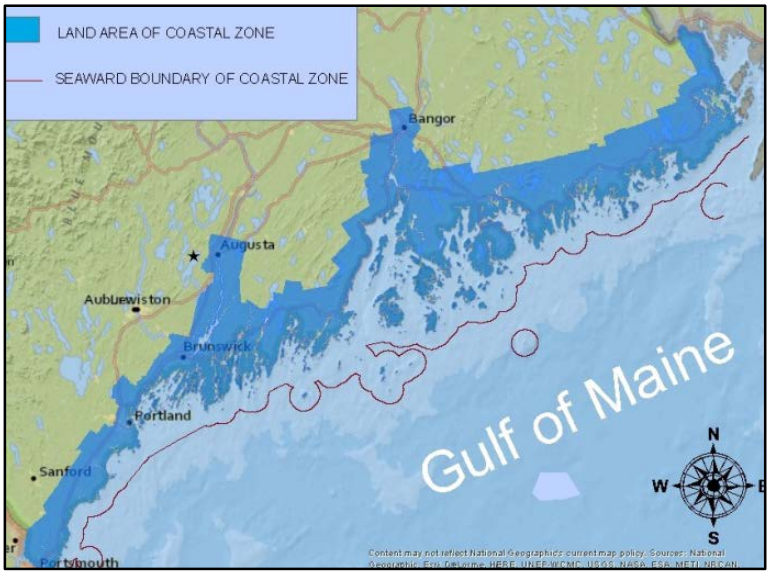
[1] The New England Sustainability Consortium (NEST) Safe Beaches and Shellfish Project is a collaboration between The University of Maine, University of New Hampshire, University of Southern Maine, University of New England, Plymouth State, and College of the Atlantic, funded by NSF-EPSCoR. You can learn more about NEST here: http://nest.maine.edu/, and here: http://www.newenglandsustainabilityconsortium.org/safe-beaches-shellfish.

[2] The survey instrument asked a variety of questions about resident attitudes about water quality, perceptions about stressors and negative impacts associated with poor quality, risky behaviors such as inadvertent exposure to harmful bacteria and pathogens by swimming after a heavy rainstorm, or active risk management through handwashing. The instrument also included questions about residents' perceptions about climate change and trust of scientists, which give insight into the effectiveness of policy or the framing of rules and regulations for beachgoers and consumers of shellfish.

SURVEY ADMINISTRATION AND METHODS

The NEST Maine and New Hampshire Pilot Coastal Resident Survey was administered in the spring of 2015. The sample area for the survey was New Hampshire and Maine's shared coast. Towns were selected for inclusion in the survey if they were defined as part of their respective state's *coastal zone*; this yielded 146 coastal towns in Maine[3] and 37 coastal towns in New Hampshire[4]. Participants received a letter by U.S. mail notifying them of their selection into the survey sample and inviting their participation. The letter included a link to the online survey.

There were two versions of the mixed-mode survey: one with a focus on beach use and the other focused on seafood consumption. Our original pilot sample of 3960 Maine residents were split, half (n=1980) received a ME Beaches version of the survey, the other half (n=1980) received the ME Shellfish version of the survey. Correspondingly, of the 2040 New Hampshire residents in the pilot sample, half (n=1020) received a NH Beaches version of the survey, the other half (n=1020) received the NH Shellfish version of the survey. A total of 6000 invitations were mailed to Maine and New Hampshire residents living on the coast, and we received 509 useable survey responses[5] (711 undeliverable) for a 10.0 percent response rate.



[3] Maine Coastal Zone Program Map: http://www.maine.gov/dacf/mcp/about/coastal_zone_map.htm
[4] New Hampshire Coastal Zone Program Map: http://des.nh.gov/organization/divisions/water/wmb/coastal/documents/nh_coastal_zone_map.pdf
[5] The number of respondents from Maine is 376 across the beach and seafood focused versions, and 133 from New Hampshire.

A) WHAT INFORMATION DID WE CAPTURE?

The survey was of mixed mode tailored design: the invitations to participate in the online survey were distributed through the mail, and we utilized Qualtrics online software as the survey instrument (Dillman, Smyth, and Christian, 2014). The survey consisted of five main sections:

Resident priorities for coastal management and water quality knowledge

- Ranking of coastal water quality
- Factors impacting water quality
- Benefits of good water quality
- Consequences from poor water quality

Beach use or shellfish consumption

- Beach activities/shellfish consumption habits
- Information seeking behavior
- Knowledge of advisories

Willingness to contribute to coastal water quality improvement

- Priorities in protecting coastal water quality
- Willingness to contribute to improvement program
- Preferences for how program funds are distributed

Personal characteristics and risk behaviors, belief in climate change, trust in scientists

- Risky behaviors
- Climate change beliefs
- Trust in science
- Perceived responsibility for coastal water quality (and effectiveness)

Demographics

- Standard demographics including years lived in home state
- Commercial or recreational harvesting license
- Participation in coastal activities within the last year

"I'm glad I took this survey. It helped me define for myself what is important to me personally and the area where I have lived most of my life."

—New Hampshire resident

B) WHO PARTICIPATED IN THE STUDY?

We begin with demographics in order to provide a more detailed description of our survey participants. The average age of our respondents was in the upper 50's, and more males than females answered the survey. Most respondents (97.8 %) answered that the address to which the survey was mailed is that of their primary residence. Respondents had lived at the residence for an average of 15.6 years, and in their home state for an average of 34 years. Thus, many of our results are from the perspective of long time, year-round residents in both Maine and New Hampshire.

Table 1. Average age and gender percentage comparison: survey participants, sample towns, and statewide

	Average Age			Percent Male Respondents		
	Participants	Sampled Towns*	Statewide	Participants	Sampled Towns*	Statewide
Maine	57.49	48.11	43.2	54.5	52.57	49
New Hampshire	56.87	44.25	41.5	66.7	51.61	49.4

Statewide and town data are from the 2010 U.S. Census. *Sampled town data is weighted.

Our survey respondents were highly educated where 89.8 percent of respondents reported that they had some college education or higher—this includes those with 1-3 years of college (or an Associate's degree), college graduates, and postgraduates. There were no statistical differences between Maine and New Hampshire residents in terms of full-time, part-time, or retired status; however, Maine had significantly more unemployed respondents than New Hampshire (p=0.001, Table 2).[6] The average income for New Hampshire respondents was significantly higher at $104,945.00 per year, compared to $85,482.50 per year in Maine (p=0.01).

Table 2. Percentage employment status by state

	Maine	New Hampshire
Employment Status	**Percent**	
Student	.9	0
Unemployed	2.7	0.0
Homemaker	1.8	.8
Employed at Home	5.9	5.8
Part-time	10.0	7.5
Retired (not working)	29.2	37.5
Full-time	49.6	48.3
N	**339**	**120**

Most of our respondents were not affiliated with environmental organizations or with religious-based community organizations (approximately 75% said no to each).[7]

[6] It should be noted that there were no respondents who identified as "unemployed" in New Hampshire.

[7] There was no statistical difference between Maine and New Hampshire for these demographic variables.

C) HOW DID WE ANALYZE OUR DATA?

We analyzed the survey response data with SAS 9.4 (**SAS** Institute Inc, 2013) for analysis. Our inferential statistics include chi-square tests of distribution differences, t-tests and analysis of variance (hereafter ANOVA). The age and gender comparison statistics using 2010 U.S. Census data[8] were calculated in Microsoft Excel. Our response rates were notably low for this pilot survey, but the data reported here are still valuable for the insight and context they provide for informing and refining our final coast-wide survey. The final coast-wide survey was launched in August 2015 with survey responses being received into December.

STUDY FINDINGS

A) COASTAL WATER QUALITY

> ***"I grew up on an island off the coast of Maine, my entire family relies on the ocean to make a living. This subject is very dear to my heart."***
>
> ***—Maine resident***

Why is water quality important?

Respondents were asked to assign rankings for different priorities for coastal managers; they were offered a scale of 1 ("should not be done") to 7 ("top priority"), where they were allowed to select more than one option as a top priority. Pollution reduction was assigned top priority by the majority of respondents: 82.0 percent of respondents assigned "reducing pollution entering coastal and ocean environments" as a top priority for managers, while 73.8 percent of respondents assigned top priority to "protection or enhancement of coastal water quality (Figure 1).

Respondents perceived that the major detractors from coastal water quality were pollution from chemicals and runoff. Fertilizers, pesticides, and other chemicals ranked highest in terms of perceived negative impact, while polluted river/stream runoff was a close second (Figure 2). The "extremely important" (7/7 on the Likert scale) outcomes associated with poor coastal water quality were environmental or public health-related" (Figure 3).

[8] An overview of the Maine 2010 Census is available in PDF format: http://www.census.gov/prod/cen2010/cph-2-21.pdf. Likewise, the New Hampshire 2010 Census overview is available in PDF format: https://www.census.gov/prod/cen2010/cph-2-31.pdf.

Figure 1. Citizen top priorities for coastal managers ranked by percentage; responses were on a Likert scale from 1 (should not be done) to 7 (top priority).

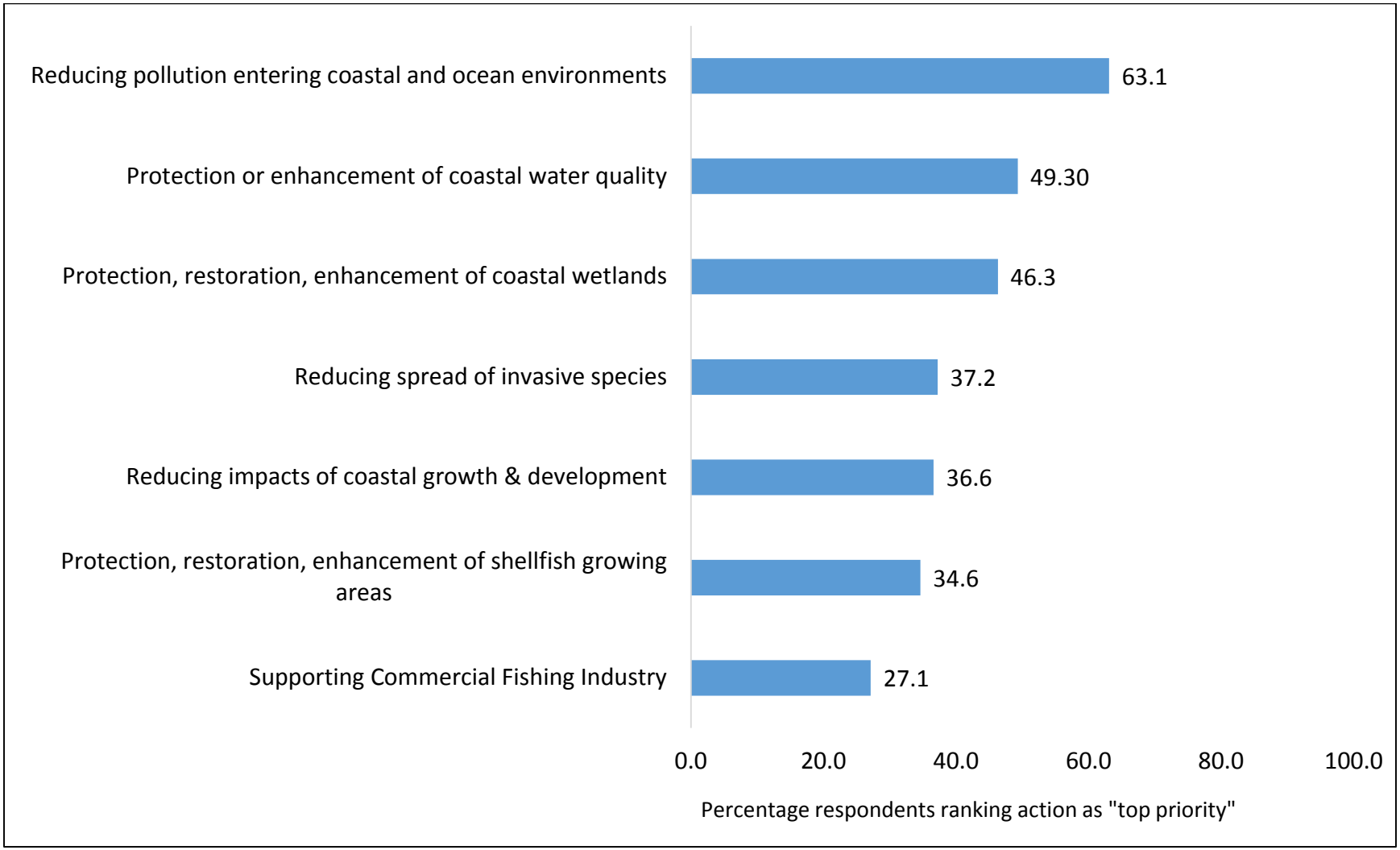


Figure 2. Resident perceptions about the severity of negative impacts associated with poor water quality by percentage agreement; responses were on a Likert scale from 1 (no negative impact) to 7 (very negative impact).

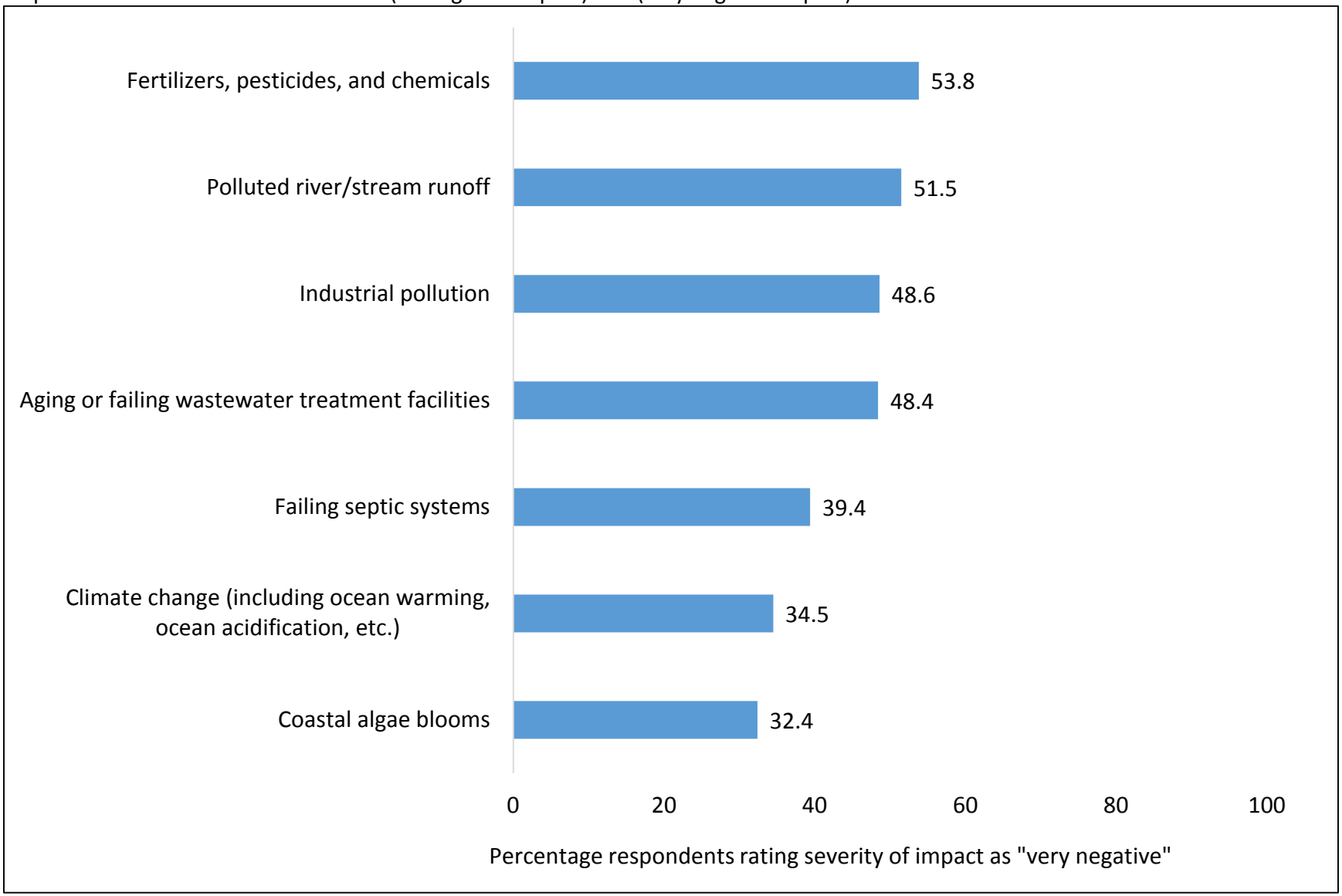
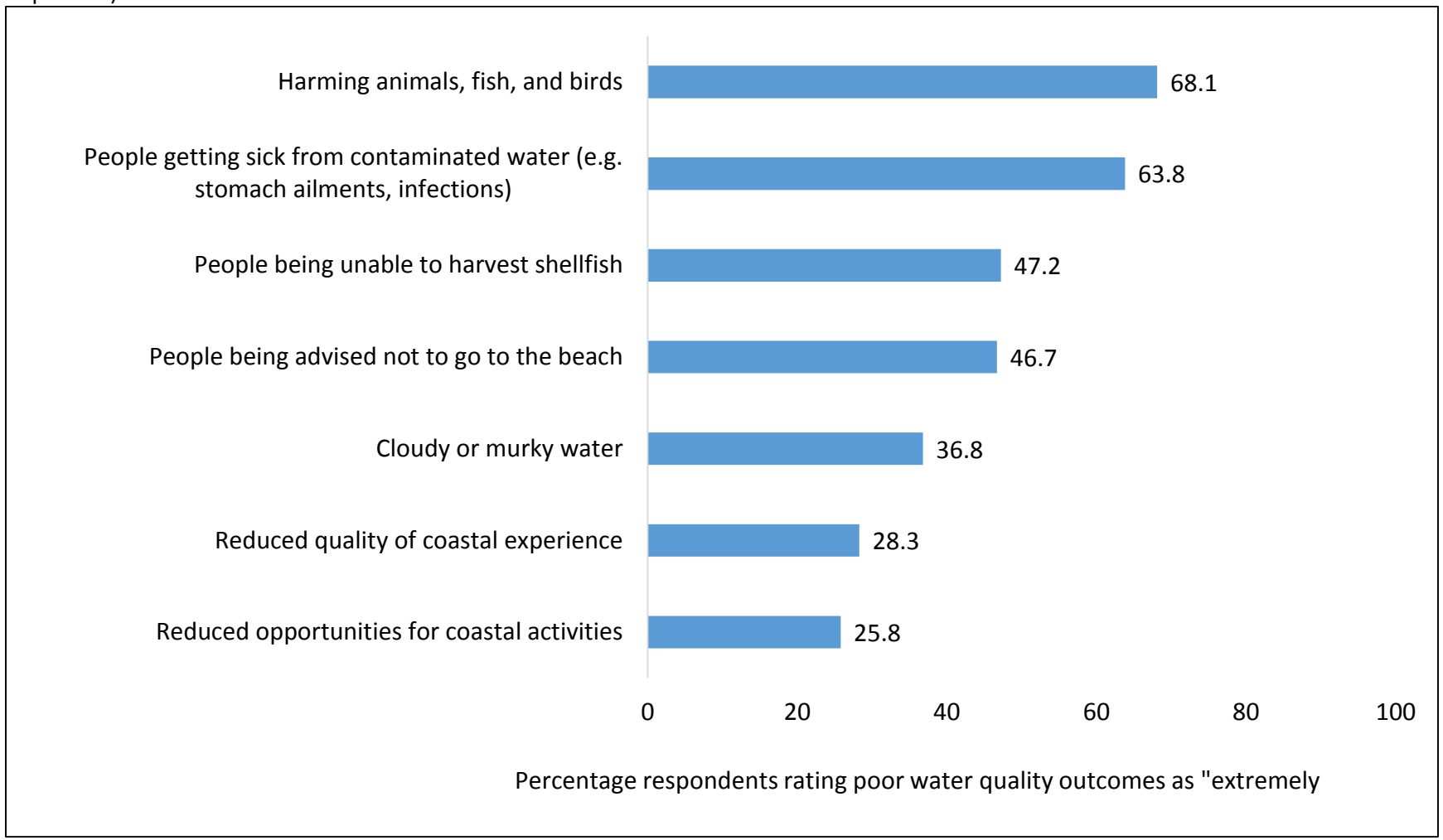


Figure 3. Outcomes related to poor water quality; respondents rated categories on a Likert scale from 1 (not important) to 7 (extremely important).



How do residents rate their own water quality?

The 2014 Natural Resource Defense Council's (NRDC) report entitled, "Testing the Waters" ranks New Hampshire 2nd in the nation in terms of coastal water quality, while Maine is rated 27th (out of 30)—a noteworthy difference for neighboring states[9]. When asked to evaluate coastal water quality in four states (Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut) and two provinces (New Brunswick and Nova Scotia) respondents ranked Nova Scotia as having the best water quality (average rating of 3.9 out of 5) with Maine and New Brunswick tied at second (m=3.8). Maine and New Hampshire residents evaluated Maine water quality similarly. However, when asked to evaluate New Hampshire, the 3 other states and 2 provinces, New Hampshire respondents consistently ranked these other regions higher than the Maine respondents. Interestingly, individuals with a strong state identity (agreement with the statement "My state is an important part of who I am") were more likely to rate their home state water quality higher. Maine residents were more likely than New Hampshire residents to identify strongly with their state (average response to "My state is an important…." statement = 5.8, NH=5.4 on a 7-point Likert scale).

This gap between data on coastal water quality and citizen perceptions of water quality provides a unique opportunity to improve understanding of how perceptions are formed, and what type of communication is most effective, given resident perceptions and measured water quality data. Further, we recognize that citizens may have differing concepts of what 'coastal water quality' is; in the 2015 coast-wide survey we will explicitly test differing definitions of coastal water quality to determine how they impact citizen evaluation of water quality, and other behaviors.

> ***"I think pesticide/herbicide use for esthetic reasons is a huge problem for water quality and public health – and a completely unnecessary practice. Many provinces in Canada have outlawed the use of pesticides and herbicides for esthetic use. I think Maine should do the same…"***
>
> ***—Maine resident***

Who is responsible for improving coastal water quality? Does how we talk about it matter?

Is coastal water quality someone else's problem? We recognize that residents may have previously developed perceptions about who should be responsible for the management and care of coastal water quality as a public natural resource, which may impact individual level and policy support decisions. We investigate whether individuals feel responsible for this resource, whether other individuals should be responsible, and finally whether state or local entities should be responsible for water quality. When asked about personal actions residents take in their house or yard that worsen their home state's coastal water quality, 71 percent answered that they did not perform actions to worsen water quality. When asked about changes residents could make in their own everyday behavior that would help to improve the quality of their state's coastal water, 53.6 percent agreed that they could make changes to their behavior to improve coastal water quality.

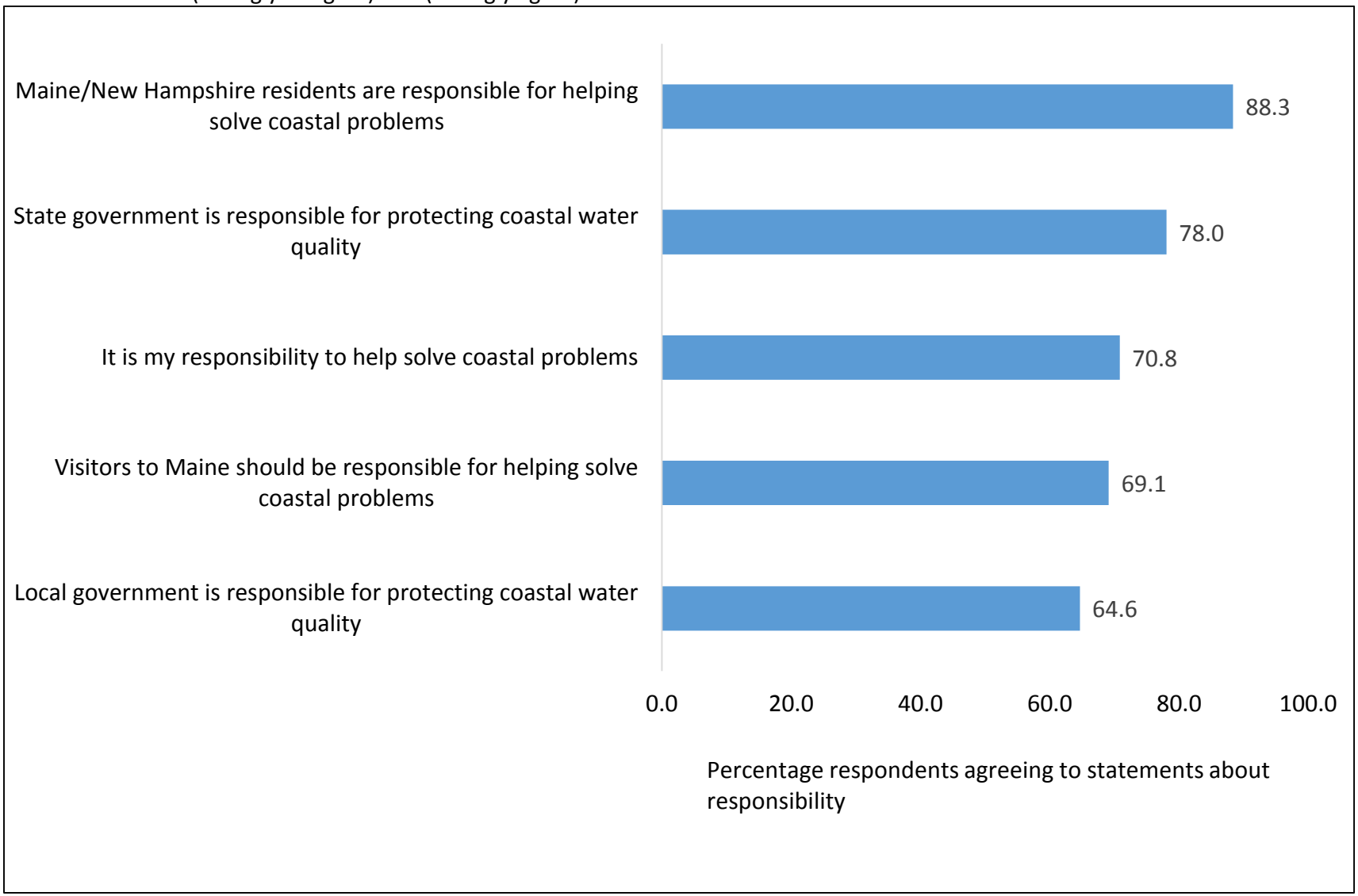
[9] Maine's low rating is due to the 19% of water samples which exceeded the national Beach Action Value (geometric average of *Enterococci* colonies per 100mL water). New Hampshire, on the other hand, had only 3% of water samples exceed the national Beach Action Value.

When asked about the possibility of their neighbors changing their behavior to improve coastal water quality, 61.3 percent of respondents agreed that their *neighbors* could make those changes. Further, 69.1 percent of respondents agreed that *visitors* to Maine and New Hampshire should be responsible for helping solve coastal issues.

> ***"People that visit or use the coastal areas should pay fees. When I utilize the coastal areas I would be willing to pay fees. That way the cost is spread amongst the users and not just the residents."***
>
> ***—New Hampshire resident***

Respondents may also be sensitive to the language used to discuss an issue, and this language may impact their feelings of responsibility. We tested two phrases associated with water quality: public health and environmental. Respondents responded to statements such as "It is my responsibility to help solve coastal (public health or environmental) problems". We find that under the public health phrasing, respondents showed lower agreement (average=4.7 out of 7) with statements that suggested personal responsibility for water quality, in comparison to responses to the same question under the environmental frame (average=5.14 out of 7). Interestingly, we also find that respondents found it "too difficult" for them to respond to coastal public health issues (average=3.4 out of 7), in comparison to environmental coastal problems (average=2.9 out of 7). Our respondents agreed that state government is responsible for protecting coastal water quality in contrast to local government (Figure 4).

Figure 4. Percentage of respondents agreeing to statements about responsibility for water quality; respondents rated categories on a Likert scale from 1 (strongly disagree) to 7 (strongly agree).



STUDY FINDINGS
B) INFORMATION, WATER QUALITY and COASTAL ACTIVITIES

Do changes in water quality affect beach visitation?
Approximately 87 percent respondents who received the survey focused on beaches said they had taken a day trip to a Maine or New Hampshire ocean beach within the last year. Residents took an average of nearly 16 day trips to Maine or New Hampshire ocean beaches. Nearly 48 percent of those who took day trips traveled to the Southern Maine Coast or the Greater Portland area, while only about 18 percent of those who took day trips visited the New Hampshire Coast. The highest reported beach activity was walking, followed by sightseeing, swimming, reading/relaxing, and eating at local restaurants.

> ***"I live on the water...and my grandchildren swim in it during the summer."***
> ***—Maine resident***

While information on water quality may be available, 70.4 percent of respondents said they do not ever seek information about the water quality at their state's coastal beaches, regardless of their initial coastal water quality ranking provided earlier in the survey. However, individuals who reported participating in beach activities which involved water contact were more likely to report information seeking behavior.

73.2 percent of beach survey respondents had never seen a beach monitoring program sign, but 40.8 percent had heard of, or seen, a coastal beach advisory in their state. The majority of respondents who do seek information about water quality at Maine and New Hampshire beaches primarily look to news and media, as well as family and friends, for information about the state of the water (Figure 4, Figure 5). Perceived information accessibility may be the issue: 42 percent of respondents said they would like to see signs at beach access points, and 30.7 percent said they would like to have coastal water quality information available on a website; importantly, information is currently provided through both of these options.

68.3 percent of beach survey respondents believed that if they entered the water during a beach advisory, they were likely to get sick. This result is consistent with literature that notes immersion activities or full-body contact in contaminated waters, especially those resulting in ingestion, such as swimming or surfing, are associated with gastrointestinal illness (Colford *et al.*, 2007, Dorevitch *et al.*, 2012, Wade *et al*., 2010). However, not a single Maine or New Hampshire participant in our study (0.0%) reported themselves or a family member feeling sick after swimming at a state coastal beach during the summer.

Figure 5. Sources from which Maine respondents seek information; answers were based on "check all that apply" responses.

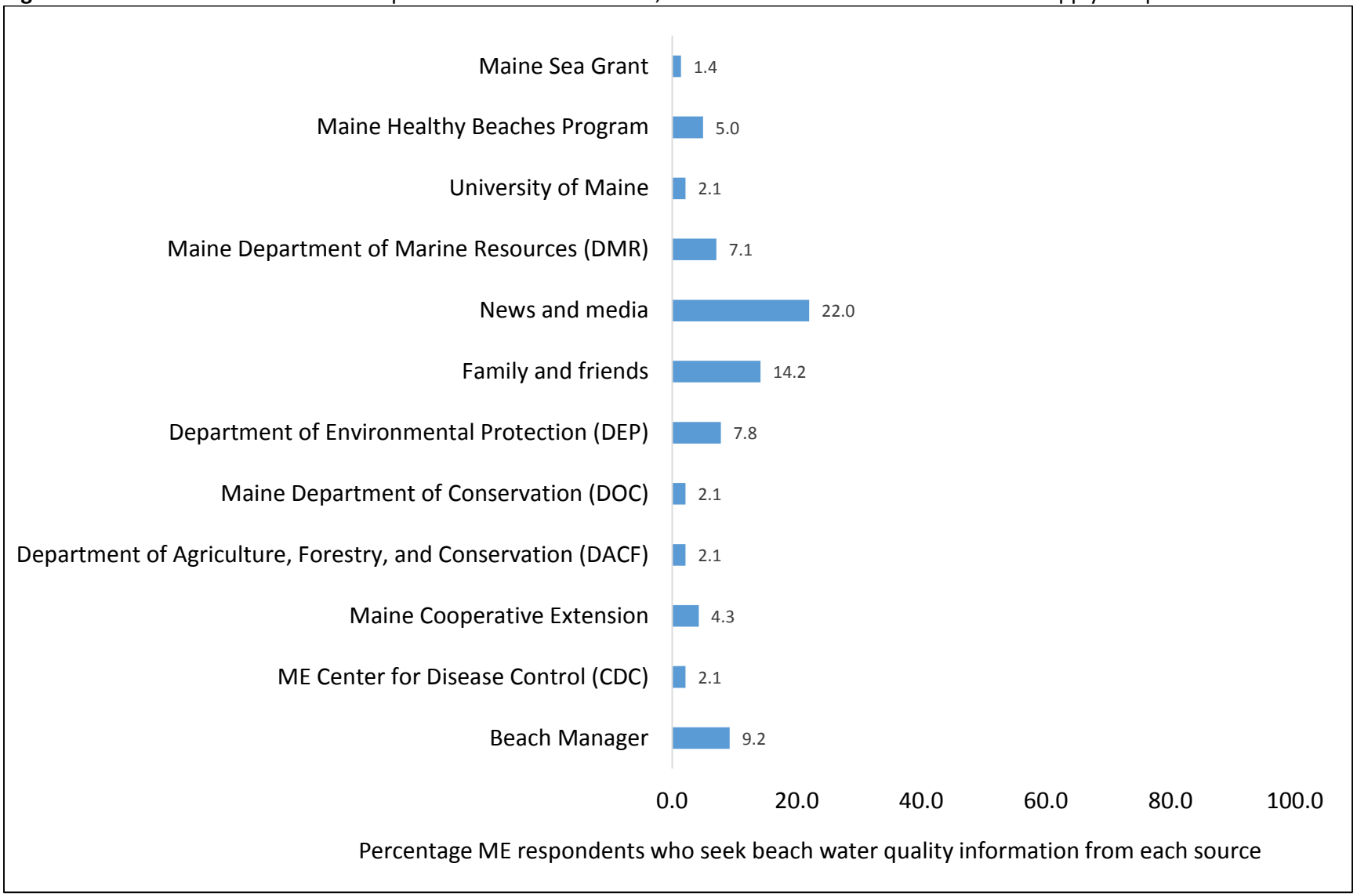
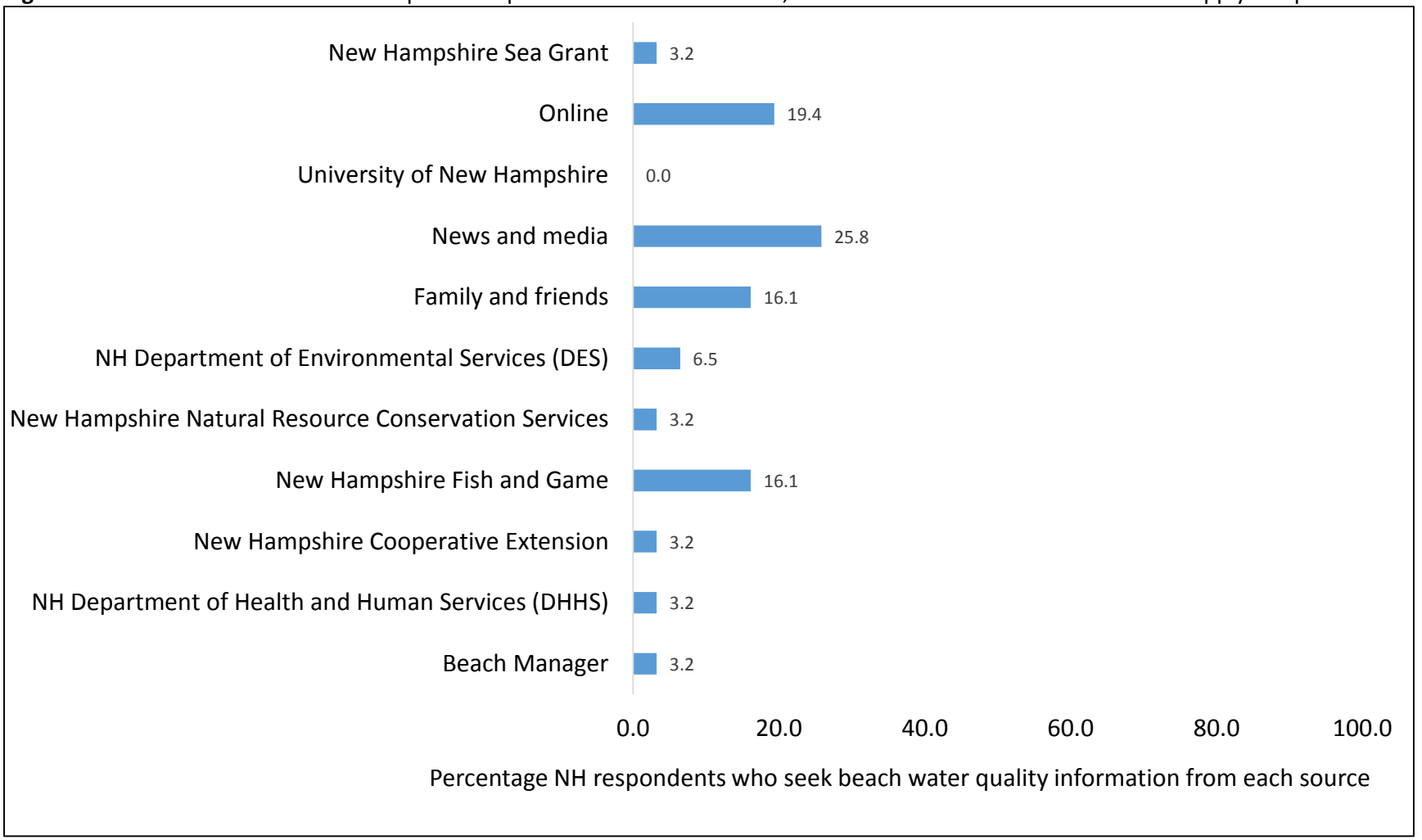


Figure 6. Sources from which New Hampshire respondents seek information; answers were based on "check all that apply" responses.



Do water quality perceptions affect shellfish consumption?
A majority of Maine and New Hampshire respondents who received the survey focused on shellfish reported consuming seafood at least once a week (64.6%). Fish was the most popular type of seafood reported, followed by scallops, shrimp, lobster, and clams, respectively. Approximately 69 percent of respondents said they typically obtain their seafood from a restaurant or grocery store.

"My livelihood depends on the ocean. I depend on a clean ocean to support myself…in the lobster industry and I depend on the ocean for my personal enjoyment, entertainment and tranquility." –Maine resident

Only 8.0 percent of respondents reported themselves or a family member feeling sick after eating shellfish. Reported symptoms associated with their shellfish-related illness were most commonly gastrointestinal: diarrhea (30.0%), stomach-ache (26.0%), nausea (20.0%), and vomiting (18.0%). The majority of these illnesses were not reported: 80.0 percent of respondents who fell ill after eating shellfish said they did not report their illness. Those who did report their illness primarily reported to a hospital. Though seafood-related illness was far more common than water-borne illness (8.0% and 0.0%, reported illness, respectively), 65.2 percent of respondents said they did not ever seek information about the safety of eating seafood.

Interestingly, only a little more than half (52.8%) of respondents believed they were likely to get sick if they consumed shellfish from an area posted as closed, while nearly 78 percent of respondents had heard of, or seen, a shellfish area closure. Most participants in Maine reported seeking information about the safety of seafood from news and media (22.8%) or family and friends (15.2%), followed by the Maine Department of Marine Resources (9.8%) and local harvesters (9.8%)[10].

[10] We do not have pilot results for this question from the New Hampshire shellfish-focused version of the survey; a coding error precluded us from collecting those responses as respondents were unable to view the question on the survey interface.

STUDY FINDINGS
C) ECONOMIC VALUATION

Contributions to improve coastal water quality?

Economic valuation questions were included in the survey in order to assess citizens' demand for water quality. The economic valuation questions utilized the contingent valuation (CV) method, where respondents were asked about their willingness to pay for a hypothetical improvement in coastal water quality. Residents were willing to pay to improve coastal water quality: 69 percent of Maine residents and 67 percent of New Hampshire residents surveyed were willing to contribute to a hypothetical Coastal Water Quality Improvement Program.

> ***"$15/month seems costly. My town won't even support a $200/year increase in property taxes for education."*** ***—New Hampshire resident***

Respondents who felt that their neighbors could change their behavior to help improve water quality (61.3%) were also significantly more likely to say "no" when asked to contribute to the Coastal Water Quality Improvement Program[11]. Respondents indicating that there were changes they could personally make to their everyday behavior were significantly more likely to be willing to contribute[12].

Residents who ranked public or environmental health as top concerns under poor water quality conditions or the most important benefits of clean coastal waters were *more willing to contribute to the Coastal Water Quality Improvement Program* than those who considered public or environmental health neither a top concern nor an important benefit[13]. Unsurprisingly, the program outcome which received the highest rating by respondents was "healthy environment for marine animals, fish, birds, and other species" (91.6%), followed by "improved beach safety (fewer advisories posted at ocean beaches" (60.3%). Again, these prioritized outcomes reflect citizen concerns about public and environmental health. Respondents also rated water quality protective actions in terms of importance, with the option to rate more than one answer choice as "most important." The actions which received the highest percentage of "important" and "very important" responses were "improving wastewater treatment" (83.8%) and "improving water quality monitoring to detect pollution levels and sources" (76.6%), followed by "better management of industrial development in upstream areas" (71.8%).

These protective actions were reflected in the budget choices citizens made. On average, respondents dedicated nearly 21 percent of the hypothetical Coastal Water Quality Improvement Program budget to "better management of industrial development," and nearly 14 percent each to "updating and maintaining septic systems" and "improving water quality monitoring to detect pollution levels and sources".

---

[11] Significance test statistics: t=4.43, p<0.0001

[12] Significance test statistics: t=-4.07, p<0.0001

[13] Significance test statistics: public health: t=-3.29, p=0.0011; environmental health: t=-4.26, p<0.0001

DISCUSSION

How can we better communicate with the public about environmental and public health risk?
Given that very few respondents (8.0%) reported shellfish-related illness, and no respondents (0.0%) reported water contact-related illness we could infer that current coastal water quality monitoring programs in Maine and New Hampshire are already doing a good job communicating the risk of exposure to contaminated water during an advisory. Another possibility is that residents may not be tracing illness back to polluted water exposure or consumption of contaminated shellfish. Thus, effective communication with residents about the public health risks associated with poor coastal water quality is a priority.

If 70.4% of respondents do not seek information about water quality before going to the beach, how are they making decisions about whether or not to enter the water? This question led us to reframe some risk behavior questions in the 2015 Maine and New Hampshire coast-wide survey in terms of popular water quality myths, such as: "high wind and waves worsen coastal water quality," "water quality is better by the mouth of a river," and "water quality is better after heavy rain." We look forward to analyzing the results and comparing with the pilot survey responses in order to help us think about how to better communicate the risks associated with polluted water.

How can we promote availability of safety information about beach and shellfish growing area advisories or closures?
Respondents indicated they would like to have access to advisory or closure information online (30.7%). Fortunately, many of these inspection and sanitation programs do provide such information on each of their websites. The EPA-funded Maine Healthy Beaches Program provides beach status updates online[14,15]. In New Hampshire, the Department of Environmental Services oversees the Beach Inspection Program and the Shellfish Program, both of which provide advisory status update information online. The Maine Department of Marine Resources provides shellfish

[14] Maine Healthy Beaches beach status page: http://www.mainecoastdata.org/public/CurrentBeachStatus.aspx
[15] Maine Healthy Beaches fact sheet: http://www.mainehealthybeaches.org/science.html#tested

pollution area inventory information for emergency flood closures (during and after rain events) and conditional area closures on their website, along with their Shellfish Sanitation Program hotline contact information[16]. Similarly, the New Hampshire Department of Environmental Services provides shellfish closure information on their website via the New Hampshire Coastal Atlas[17].

Many respondents reported that they check news/media for shellfish (22.8% in Maine[18]) and beach safety information (22.0% in Maine and 25.8% in New Hampshire), but the local newspapers do not publish a growing area status or beach advisory status report with the TV listings and sports scores. 42.0% of respondents said they would like to see beach advisory information posted at beach access points, which may indicate that they are not seeing the beach status signs already in place. We continue to partner with the Maine Healthy Beaches Program to explore different messaging and informational techniques in order to increase effectiveness of communication efforts.

"Water quality along our coastline supports many resources both human and environmental. The economy of coastal Maine requires healthy water quality." ***—Maine resident***

How might we encourage feelings of responsibility for environmental and public health?
Respondents' perceived responsibility toward coastal water quality is revealing. Recall that respondents who felt that there were personal behavioral changes they could make to improve the quality of coastal water were willing to contribute to the hypothetical Coastal Water Quality Improvement Program, while those that felt that it was up to their neighbors to change their behaviors were significantly less likely to be willing to contribute—what does this mean for coastal water quality? If coastal residents believe that water quality is always someone else's problem, how might we change that perception?

Where can we go from here?

The response patterns we observed in the pilot survey, in addition to feedback from respondents, allowed us to improve our 2015 Maine and New Hampshire coast wide survey instrument. This mail-based survey was administered between August and December of 2015. Analysis on this separate set of data will be available in March 2015.

[16] Maine DMR shellfish pollution area inventory list: http://www.maine.gov/dmr/rm/public_health/closures/closedarea.htm
[17] New Hampshire DES New Hampshire coastal atlas: http://xml2.des.state.nh.us/CoastalAtlas/Atlas.html
[18] We did not have New Hampshire resident data for this question (coding error).

REFERENCES

Colford, J.M. Jr., Wade, T.J., Schiff, K.C., Wright, C.C., Griffith, J.F., Sandhu, S.K., Burns, S., Sobsey, M./, Lovelace, G., Weisberg, S.B. (2007) Water quality indicators and the risk of illness at beaches with nonpoint sources of fecal contamination. *Epidemiology*. 18(1), 27-35

Dillman, D.A., Smyth, J.D., and Christian, L.M. (2014) *Internet, Phone, Mail, and Mixed-Mode Surveys: The Tailored Design Method*. John Wiley & Sons, Inc. Hoboken, New Jersey.

Dorevitch, S., Pratap, P., Wroblewski, M., Hryhorczuk, D.O., Li, H., Liu, L.C., Scheff, P.A. (2012) Health risks of limited-contact water recreation. *Environmental Health Perspectives.* 120(2), 192-197

Maine Department of Marine Resources. (http://www.maine.gov/dmr/rm/public_health/closures/closedarea.htm).

Maine Healthy Beaches Program. (http://www.mainehealthybeaches.org/science.html#tested).

New Hampshire Business Review. (http://www.nhbr.com/May-1-2015/Tourism-promotion-is-essential-to-our-economy/).

Natural Resource Defense Council (2014). *Testing the Waters 2014: A Guide to Water Quality at Vacation Beaches.* (http://www.nrdc.org/water/oceans/ttw/me.asp?loc=Maine). Date of access: 10/07/2015.

SAS Institute Inc. 2013.**SAS**® **9.4** Guide to Software. Updates. Cary, NC: **SAS** Institute Inc.

VisitMaine.com. (http://visitmaine.com/assets/downloads/2013_MaineFactSheet.pdf).

Wade, T.J., Sams, E., Brenner, K.P., Haugland, R., Chern, E., Beach, M., Wymer, L., Rankin, C.C., Love, D., Li, Q., Noble, R., Dufour, A.P. (2010) Rapidly measured indicators of recreational water quality and swimming-associated illness at marine beaches: a prospective cohort study. *Environmental Health*. 66(9), 1-14