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# THE MASSACHUSETTS SHELLFISH INITIATIVE

Initial Scoping and Survey Results of Coastal Massachusetts Shellfish Groups

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Photo Credit Lauren Owen

## Introduction

Massachusetts is home to some of the most productive shellfish growing areas in the country. Thousands of recreational shellfish permits are issued each year by coastal municipalities and over 3,000 commercial shellfish permit holders make their living harvesting and growing shellfish in Massachusetts coastal waters. With annual state landings valued at more than \$40M, wild harvest opportunities and the growing aquaculture sector represent a high point in the state's marine economy. Of perhaps the same importance, shellfish provide invaluable ecosystem services and are a major component of many of the on-going local, state, and national efforts to maintain and improve water quality and restore ecosystem health in our coastal waters. The Massachusetts Shellfish Initiative (MSI) aims to expand the state's shellfisheries as informed by stakeholder priorities, and the growing economic need to sustain the shellfish industry in the Commonwealth.

The National Shellfish Initiative was established by the National Oceanic and Atmospheric Administration (NOAA) in June 2011 to "increase the populations of bivalve shellfish in our nation's coastal waters-including oysters, clams, and mussels-through commercial production and conservation activities." The outline and goal of the National Shellfish Initiative looks to address the seafood trade deficit through enhancing the economic, environmental, and social benefits of shellfish by:

- Improving marine planning and permitting
- Conducting and supporting environmental research on shellfish populations
- Supporting restoration and farming techniques
- Prioritizing coordinated and innovative financing for conservation, commercial and research activities

The National Shellfish Initiative has since spawned the development of multiple regional shellfish initiatives including Hawaii, Alaska, Washington, Oregon, California, Mississippi, Gulf of Mexico, Maryland, Connecticut, Maine, Rhode Island, and the Massachusetts Shellfish Initiative (MSI).

Interest in and development of all aspects of shellfish have been on the rise in recent years and a comprehensive statewide plan in support of NOAA's national plan is needed to ensure the continued responsible growth of Massachusetts shellfish communities.

The Cape Cod Commercial Fishermen's Alliance (CCCFA), The Massachusetts Aquaculture Association (MAA) and The Nature Conservancy (TNC) are working together to initiate conversations to begin developing such a plan. The MSI is intended to be a collaborative process that improves communication among shellfish harvesters (wild, aquaculture, and recreational), state and town agencies, NGOs and environmental organizations, and scientific and research organizations and can be a tool to responsibly expand shellfish resources in Massachusetts.

The outlined discussions and the initial scoping survey results herein have identified interests, concerns and potential avenues for expanding shellfish resources and improving management within the state of Massachusetts under a proposed Massachusetts Shellfish Initiative. These results represent a starting point for gathering input from stakeholders to create a strong foundation and framework for informing next steps for the initiative. The MSI is the first time a shellfish plan for the state is being driven from the ground up.



## Scope and Summary of Survey

The MSI survey was designed by the Cape Cod Commercial Fisherman's Alliance (CCCFA), Massachusetts Aquaculture Association (MAA), The Nature Conservancy (TNC) and The University of Massachusetts Boston (UMB) to gain initial input from a variety of stakeholders involved with shellfish activities and industries across the state of Massachusetts.

The survey was designed to address key areas of concern that were identified in working with industry groups, local and state managers, and various owners of farms throughout the state that included representation from:

- The United States Army Corps of Engineers (USACE)
- Barnstable County Cooperative Extension (BCCE)
- The Department of Energy and Environmental Affairs at the State House (EEA)
- The Mashpee Wampanoag Tribe
- Massachusetts Department of Agricultural Resources (MDAR)
- Massachusetts Division of Marine Fisheries (DMF)
- Massachusetts Office of Coastal Zone Management (CZM)
- Massachusetts Oyster Project (MOP)
- MIT Sea Grant
- Northeastern Massachusetts Aquaculture Center
- Salem State University
- Southeastern Massachusetts Aquaculture Center
- Wellfleet SPAT
- Woods Hole Oceanographic Institute (WHOI)
- Woods Hole Sea Grant

To begin the scoping process for the MSI and synthesize results of stakeholder engagement the survey was distributed at seven statewide listening sessions in: Wellfleet, Harwich, Duxbury, New Bedford, Manchester, Martha's Vineyard and Nantucket. In addition to several in

person meetings, an online version of the survey was distributed through various online communications and engagement with local associations.

To further inform the public about the survey, there were also articles published in the Cape Cod Times, Harwich Bulletin and other agency websites that provided insight and more information about the initiative and distributed the survey link to people not in attendance at the meetings.

The survey was comprised of 9 sections, some of which were developed for specific stakeholder groups to answer. In Section 1 of the survey, respondents were asked to self-identify with their stakeholder group and to answer other general demographic questions. Sections 2 and 3 addressed business questions pertaining specifically to aquaculture and wild harvesters, respectively. Sections 4 through 8 were designed to be taken by all stakeholders, excluding the “general public”. Section 9 was specifically for the general public. These sections addressed shellfish industry topics dealing with municipal issues, public health, environmental issues and future needs in the industry.

To further understand the needs of stakeholders within the shellfish industry, we aggregated survey responses by the respondent’s shellfish activity (aquaculture, wild commercial harvest, or recreational harvest) and determined with a Fisher’s Exact Test if answers were similarly associated across categories.

The results of the MSI survey offered insight to several areas of need that were common amongst all or a large majority of respondents across stakeholder groups. Common agreement among the different stakeholder groups ( $p > 0.05$ ) based on the survey can be summarized as such:

- Cooperation between permitting and regulatory agencies, as well as between municipalities, should be improved
- The opening of more available acreage as it relates to shellfish activates
- Resources for Division of Marine Fisheries related to water quality monitoring should be increased
- Additional field monitoring related to shellfish disease, harmful algal blooms, and human health risks is needed
- More training required for operating in the shellfish industry

- Public monies should be used to help sustain shellfisheries in MA
- Shellfisheries should be expanded in MA with a focus on allowing new areas for aquaculture in formerly nutrient impaired waters
- Standards for shellfish as a tool to mitigate nitrogen need to be developed
- Funding should be increased for shellfish propagation and hatcheries
- Educational resources/opportunities about fisheries science and factors affecting them should be increased in Massachusetts

While common support exists for many overarching issues within the Massachusetts' shellfish community, how to go about addressing those issues frequently differed by stakeholder group ( $p < 0.05$ ) in:

- The streamlining of the current shellfish permitting process
- Current timeliness of the permitting structure in issuing permits
- The use of “home rule” as an effective way to manage and promote the growth of the MA shellfish industry
- The role of DMF in providing additional templates and standards for towns to manage shellfish resources
- The use of shellfish propagation as a tool to optimize harvests
- The negative impact of shellfish disease on their businesses in the last ten years
- The effect of harmful algal blooms on their businesses in the last ten years
- The use of diversifying shellfish species as a tool to increase business resilience to disease
- The financial hardship involved in meeting current post harvest icing regulation
- Eelgrass regulations as it relates to shell activities
- The use of trainings/resources designed to help diversity business with in adding other shellfish species
- Participation in future MSI discussions to help develop the MSI

## Key Trends from Coastal Listening Sessions

In addition to the in-person distribution of surveys at the various sponsored stakeholder meetings, listening sessions were held across the state for various stakeholders and shellfish user- in addition of the MSI survey questions, to further:

- Develop mechanism to gain a better understanding of the current industry needs around shellfish
- Foster discussion with local stakeholders to gather feedback from the people across various shellfish industries and communities
- Evaluate the current state of industry/economics
- Evaluate the potential for the MSI
- Identify important goals and next steps of the initiative

Compared to other shellfish initiatives, Massachusetts is essentially starting from the ground- up working with members of the shellfish community to foster the development of its initiative. Each meeting gathered about 15-25 people and lasted about 2 hours. The goal of the listening sessions was to generate a baseline assessment with input from all user groups to, identify common and differentiating concerns and, goals from each group to address the needs across the industry.

Some over-arching concerns from each of the meetings included:

- The need for more public outreach and education with both the shellfishing community and the general public about complex scientific issues
- Water quality
- The lengthy process of government regulation
- Perception between various stakeholder groups about other groups
- The need for enhanced communication between legislative groups
- The need for an increase in academic research, but with greater access to the results
- Greater transparency and open communication between the state, commercial and recreational shellfishermen, and researchers

- Increase research relying on shellfishermen's knowledge
- Where to learn more about current eelgrass regulations and where to find them
- Understanding of regulatory process (regarding individual harvesters, commercial, etc.).
- Outreach/ education needed for vibrio, harmful algal blooms, and shellfish disease to prevent public misconception/panic
- The lumping of propagation and restoration together
- Worry about the expansion of the industry with people coming in who do not have the educational background to operate on the same level of existing investors
- Sharing water with new growers
- Citing and granting leases
- The competition of space between moorings and aquaculture grants
- Mitigating short and long-term closures
- Reclassification of areas (prioritizing opening up areas that are permanently closed)
- The reason behind the increase in demand for acreage in recent years: is the increased prompted from increased demand for production or increased acreage?

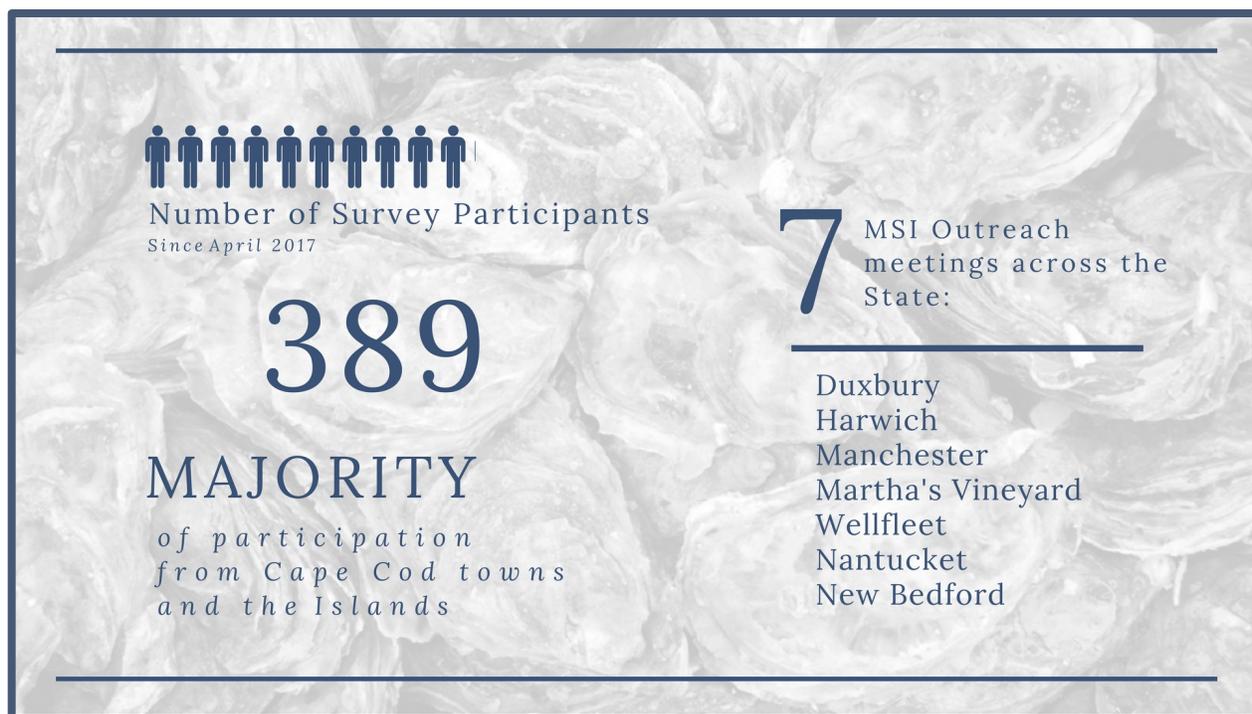


## Demographics of Survey Participants

(Summary of Section 1 Survey Results)

In Section 1 of the survey, respondents were asked to supply some general demographic data (with no individual identifiers collected, per University of Massachusetts Boston IRB Exempt Review Protocol #2017066). These demographic questions are listed below.

1. Which meeting are you attending?
2. What shellfish user group do you most identify with?
3. Which region best describes your primary shellfish activity location or area of interest within the state of Massachusetts?

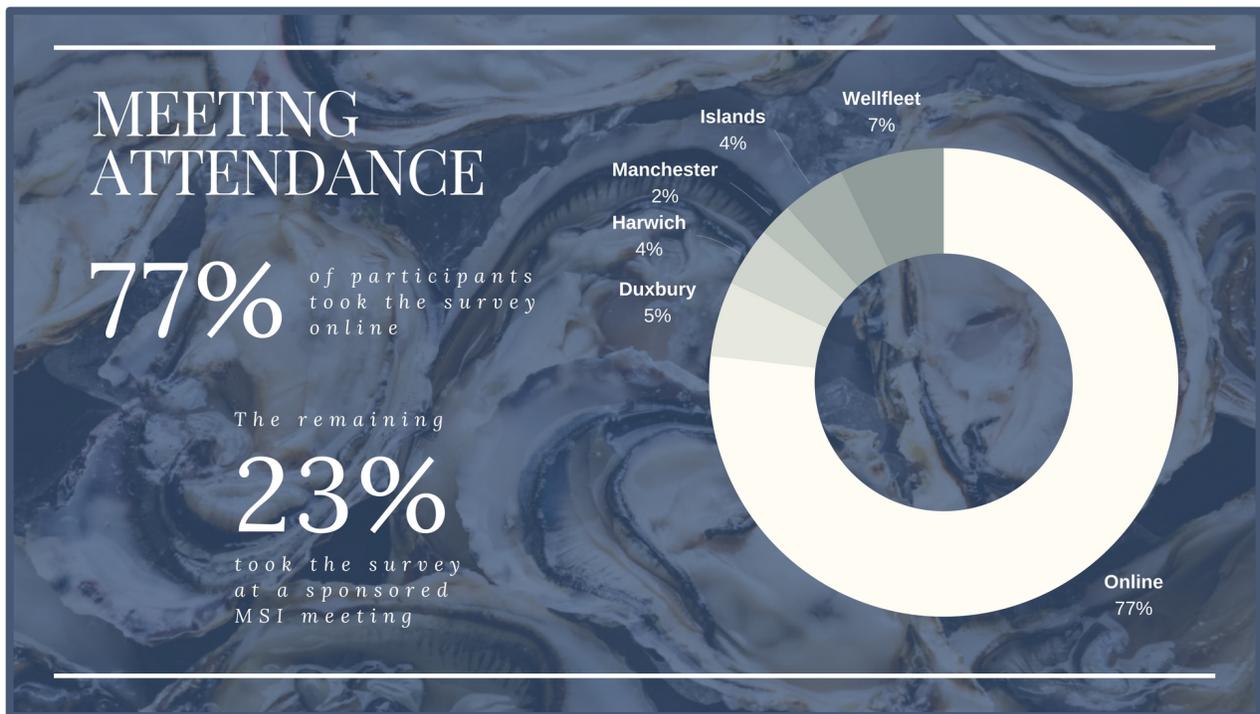


**Figure 1.**

Of the 389 respondents to the initial scoping survey over the course of four months, the majority of respondents identified their primary shellfish activity and/or area of interest within Cape Cod (52%) and the Islands (21%), followed by South Shore Towns (11%), North Shore Towns (8%), South Coast Towns (5%), and 3% choosing not to respond (Figure 1).

The responses were heavily skewed toward Cape Cod, which should be considered when looking at the data and additional outreach is needed north of Boston (Figure 1). In addition to the responses skewed toward Cape Cod, a majority of the total participants to the initial scoping survey were from online responses. With 77% of total participants taking the survey online rather than attending one of the seven sponsored stakeholder meetings, while the remaining 23% took the survey at a sponsored MSI meeting (Figure 2).

Percentages of the total data are shown or the number of people who gave a particular answer to each answer as a proportion of the number of total people who answered the question. Approximately 77% percent of the survey respondents which is 289 of the 389 participants surveyed took the survey online.



**Figure 2.**

Though people who identified with every major stakeholder group took surveys, there were more responses by recreational harvesters (29%) than any other group (Figure 3). Responses from all groups showed similar representation with aquaculture (19%) and the general public (16%) coming in a close second and third, followed by other (14%) which, includes entertainment/retail, state and town officials, and wholesale

dealers. Closing out the groups were restoration/advocacy/non-profit respondents (12%) and wild commercial harvesters (10%) (Figure 3).

More than half of participants indicated their involvement in their identified shellfish activity to be greater than 10 years (56%) with an additional 15% identifying being involved in the industry for 6-10 years, 20% involved for at least 5 years, and <5% of participants newly identified with the industry.



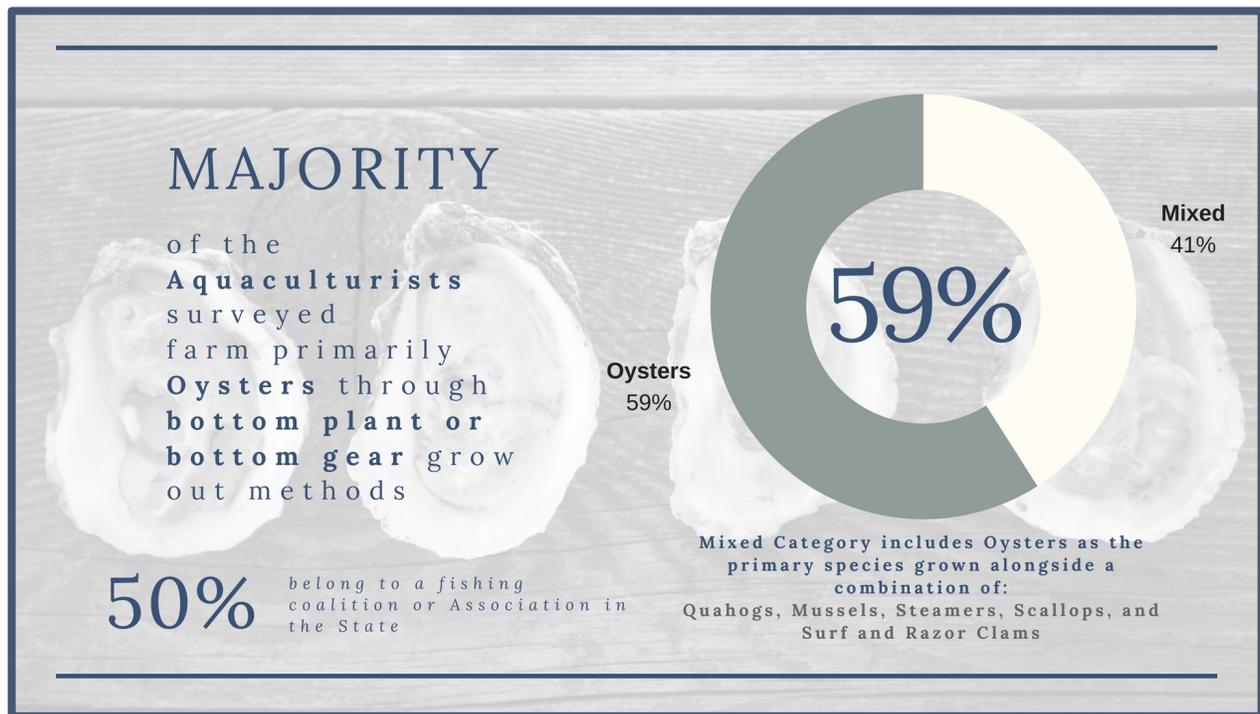
Figure 3.

## Business – Aquaculture

(Summary of Section 2 Survey Results)

In Section 2, stakeholders that self-identified as being involved in the aquaculture industry (75/389 respondents) were asked to respond to specific questions pertaining to their business involvement within the aquaculture industry. The responses to those questions are listed below.

The aquaculture business section results indicate support for expansion of shellfish resources in Massachusetts with 81% in support of expanding shellfish resources in some capacity. Greater than 50% of participants in this section belong to a fishing coalition or association in the state of Massachusetts. A majority of the participants identified as being in the industry for more than 6 years, had a high interest in oyster aquaculture, and support the current size regulations and access to shellfish (i.e., times allowed to shellfish) (Figure 4).



**Figure 4.**

Areas of disagreement among respondents in this section was largely between access to shellfish infrastructure, with most of the respondents split between adequacy of access to both on water and onshore

infrastructure. With greater than 70% of respondents feeling they lacked access to resources. A few reasons listed were crowded landings, lack of access to a working waterfront, lack of access to ice and lack of storage.

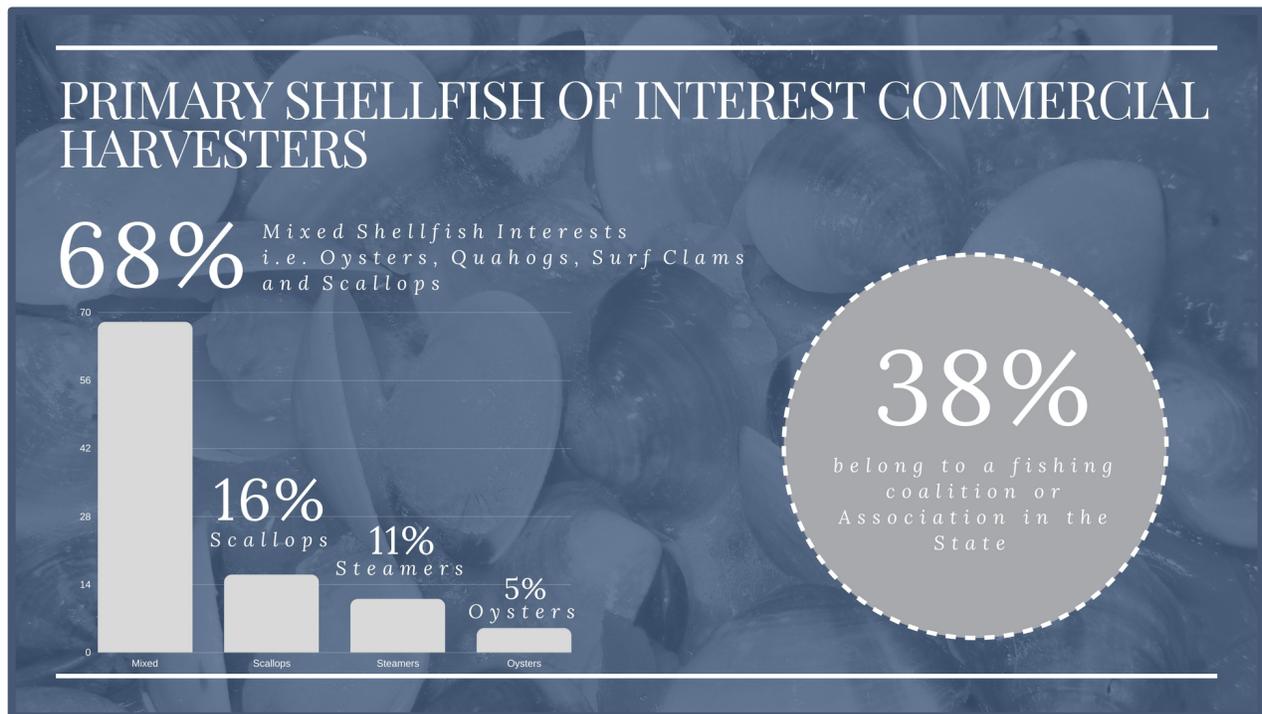
Most respondents (57%) to this section had some form of ownership (either as a primary or secondary owner) over their primary shellfish activity (aquaculture) and more than half responded their involvement in the aquaculture industry was their primary source of income. Forty-five percent of participants were permitted to use 1-5 acres for their aquaculture business, with 60% of respondents using more than 30% of their grant at any given time. A majority of respondents (60%) believe that the current regulations on their primary shellfish of interest (oysters) are appropriate with 63% believing that the current resources available for enforcement of shellfish regulations are adequate.

## Business - Wild Commercial Harvester

(Summary of Section 3 Survey Results)

In Section 3, stakeholders that self-identified as wild harvesters (37/389 respondents) were asked to respond to specific questions pertaining to their business involvement in the shellfish industry. The responses to those questions are listed below, however, the small number of participants from the commercial industry should be considered when looking at the data.

The majority of wild harvesters that responded to this section had ownership over their shellfish activity (73%). Primarily wild harvesters surveyed had more diverse shellfish interest than aquaculturists with 68% of survey participants having mixed shellfish interests i.e., oysters, quahogs, surf clams and scallops. Participants in the survey were split in whether income generated from shellfish was primary (49%) or secondary (43%).



**Figure 5.**

Almost half of participants that identified as wild harvesters (46%) believe that there is an adequate diversity of shellfish products in the state and that the access to their shellfish of interest is appropriate (54%). Based on

responses from the majority of wild harvesters surveyed most have access to both onshore and on water infrastructure to maintain or grow their business (65%). Wild harvesters were split between support for bringing new shellfish products to market with slightly more believing that there is not enough adequate support for bringing new products to market.

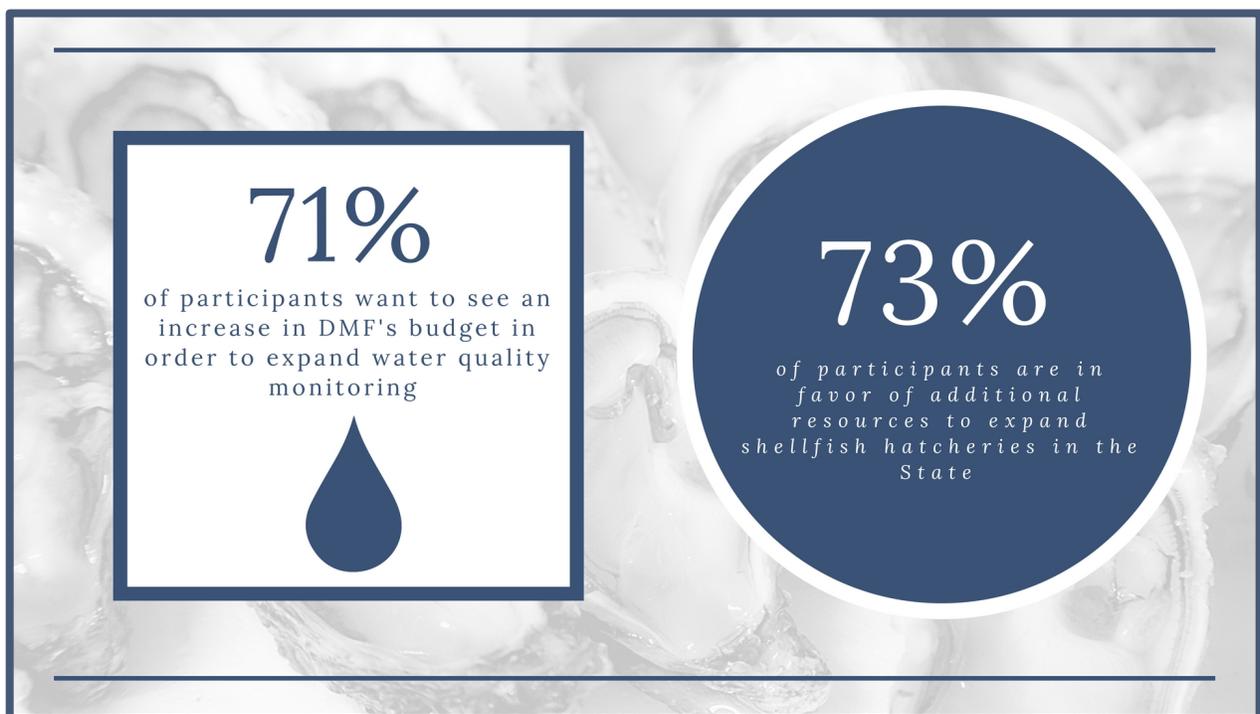
One hundred percent of those surveyed believe that shellfish resources should be expanded in MA across the industry, with only 27% in support of expansion limited to wild harvest and restoration.

## Municipal Involvement

(Summary of Section 4 Survey Results)

In Section 4, all stakeholders that self-identified as anything other than general public (327/389 respondents) were asked to respond to specific questions pertaining to municipal involvement in the shellfish industry. The responses to those questions are listed below.

Respondents in this section generally supported increasing collaboration between permitting institutions with 61% believing that there needs to be increased collaboration across regulatory groups. The majority of participants that responded “yes” believe that an initiative like the MSI will help achieve this goal. In addition, the survey participants listed better communication between agencies as a method to increase collaboration and empower local authorities.



**Figure 6.**

Responses were varied if the permitting process should be more streamlined and if the permitting structure issues permits in a timely manner. Thirty-three percent of those surveyed believe that the permitting process needs to be more straightforward, and of that 33% almost 60%

believe that the state level permitting needs to be more streamlined. The majority of survey participants (71%) want to see an increase in the Department of Marine Fisheries budget in order to expand water quality testing to reclassify closed areas. With over half of the participants (53%) seeking to utilize more acreage for their shellfish activity if more were open and the majority of participants (73%) are in favor of adding additional resources for the expansion of shellfish hatcheries in the state.

In addition to the expansion of hatcheries, the majority of survey participants (62%) believe that their town's shellfish propagation program is important to optimizing their harvest, and more resources should be devoted to their expansion.

## Public Health and Shellfish Disease

(Summary of Section 5 Survey Results)

In Section 5, all stakeholders that self-identified as anything other than general public (327/389 respondents) were asked to respond to specific questions pertaining to public health and shellfish-borne disease in the shellfish industry. The responses to those questions are listed below.

Surprisingly only 29% of respondents in this section had been impacted by shellfish disease in the last ten years, however over half (52%) of participants chose not to respond to this question. Similarly, only 29% responded that their business had been subject to foodborne illness related closure with 41% of participants choosing not to answer this question. Participants seemed to respond to algal bloom issues more so than disease issues with 42% responding that their business/shellfish activity had been subject to harmful algal bloom closure in the last ten years, with only 17% choosing not to respond compared to 52% and 41%.

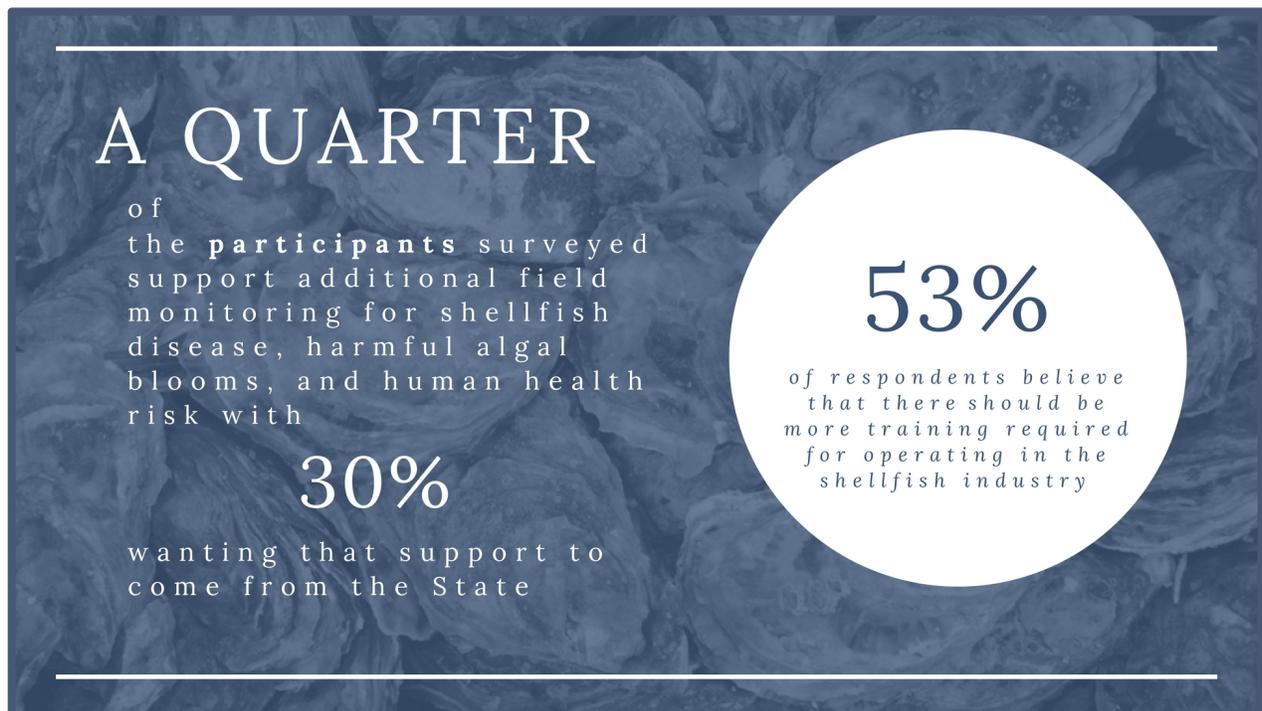


Figure 7.

Over half of participants support additional training requirements for new shellfishermen (53%), and strongly support additional water quality monitoring for agents of disease (75%). Respondents had mixed responses regarding the time allowed to cool shellfish after they have been removed from the water with 47% believing that this was not applicable to their shellfish activity. Similarly, participants did not think diversifying shellfish harvests was applicable to them (36%).

## Environmental Restoration

(Summary of Section 6 Survey Results)

In Section 6, all stakeholders that self-identified as anything other than general public (327/389 respondents) were asked to respond to specific questions pertaining to environmental issues in the shellfish industry. The responses to those questions are listed below.

Respondents in this section strongly supported (66%) increasing remediation using shellfish if it means opening new acreage for commercial and recreational fishing. Half of participants are willing to become citizen scientists and help in environmental monitoring activities on their grant, acreage, or area of interests.

Participants were split if the state should revisit eelgrass as it relates to shellfish with 30% asking for the state to be more stringent, 30% unsure about the question and 10% believing the state should be less stringent. Over half (53%) of respondents believe that the state should be investigating and implementing actions for addressing ocean acidification.

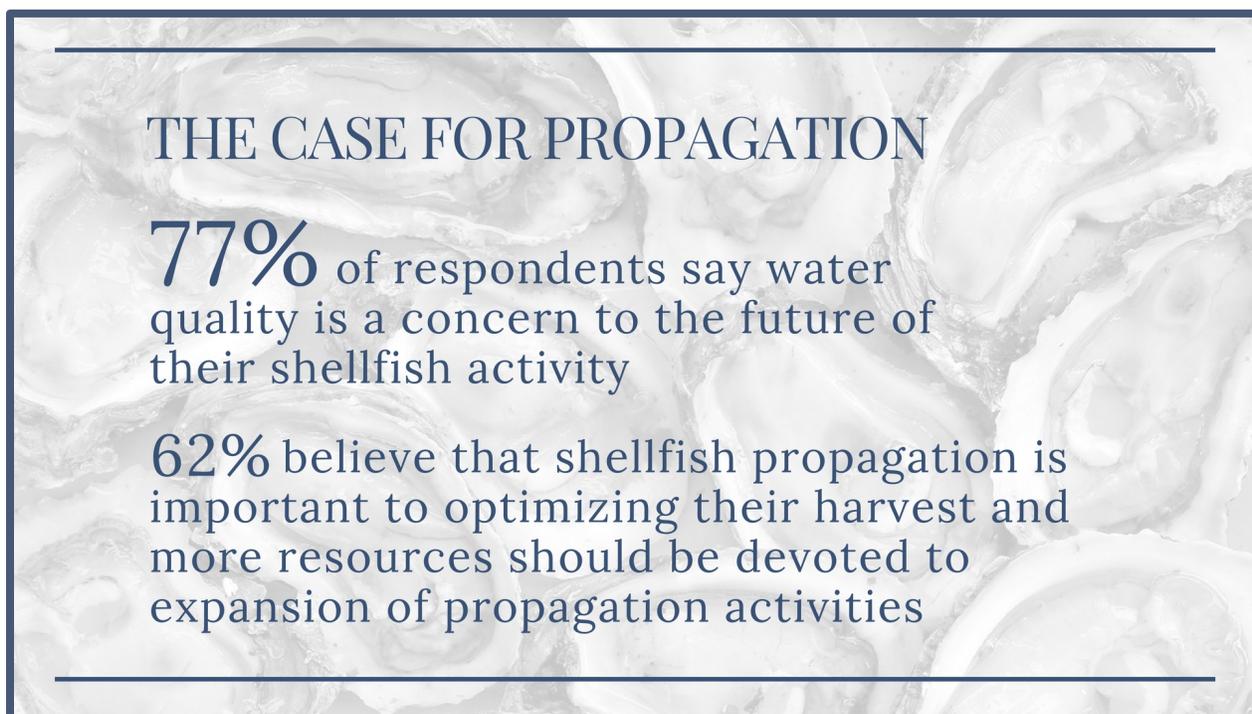


Figure 8.

Seventy-five percent of respondents want to see more resources dedicated to water quality monitoring to allow for more areas to be open to shellfish activities, with a majority of respondents (77%) concerned about water quality impacts to the future of their shellfish related activity. More than half of respondents (65%) believe that shellfish can help clean nutrient impaired waters and almost half (43%) would be willing to allow new areas for aquaculture in formerly nutrient impaired waters.

Respondents generally did not have marine entanglement issues with their shellfish activity, but those that did were willing to work with conservationists to decrease the risk of entanglement.

## Education

(Summary of Section 7 Survey Results)

In Section 7, all stakeholders that self-identified as anything other than general public (327/389 respondents) were asked to respond to specific questions pertaining to education in and about the shellfish industry. The responses to those questions are listed below.

42% of respondents in this section wanted more training resources designed to help diversify their business with other shellfish species and over 50% of respondents are willing to participate in future MSI discussions.

A little more than half of the respondents are in support of a mentorship program for new shellfishermen, and of those in favor, 66% of respondents are willing to participate in the program.

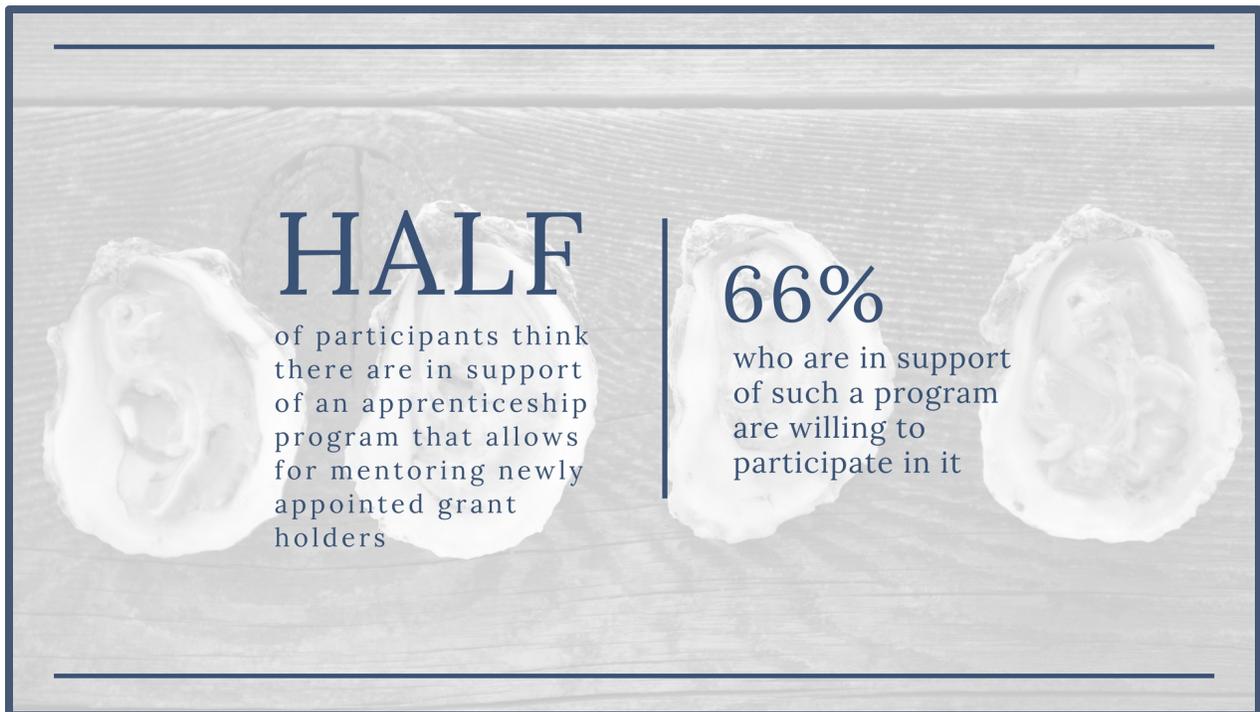


Figure 9.

## Future Needs Assessment

(Summary of Section 8 Survey Results)

In Section 8, all stakeholders that self-identified as anything other than general public (327/389 respondents) were asked to respond to specific questions pertaining to their future needs in the shellfish industry. The responses to those questions are listed below. Half of respondents (50%) in this section believed that a Massachusetts Shellfish Initiative could help add credibility to shellfish industry projects with the majority of those respondents.



**Figure 10.**

Respondents identified better communications between stakeholders as a top priority to provide a framework for increasing shellfish production in Massachusetts. Additionally, respondents listed several critical challenges:

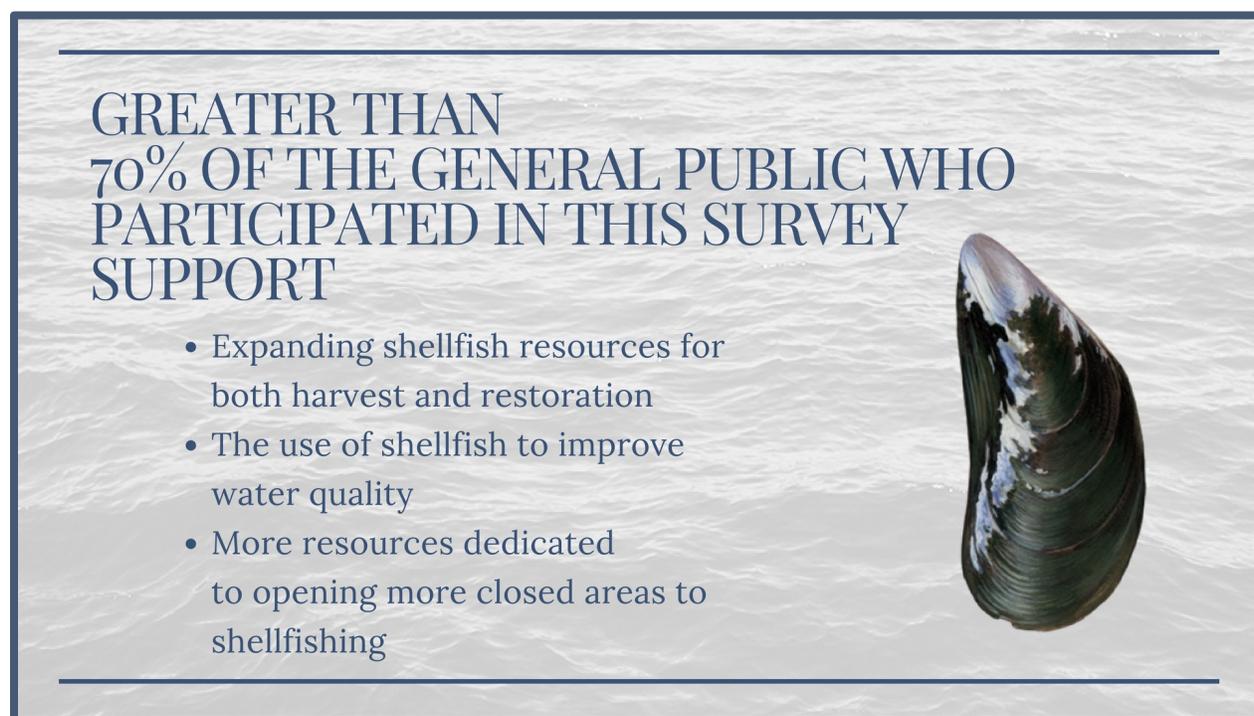
- Access to dependable seed/funding for infrastructure
- Algal blooms
- Area and rainfall closures
- Water quality and nitrogen levels

- Closing of previously opened areas
- Eelgrass decline
- Lack of space/funding to address the influx of demand for shellfish grant space
- Getting started
- Genetic dilution of stock
- Introduction of shellfish disease
- Lack of management
- Lack of comprehensive knowledge

## General Public Input

In Section 9, members of the general public (62/389), respondents that did not identify as another type of stakeholder, were asked to respond to specific questions pertaining to the shellfish industry:

1. *Do you eat shellfish?*
2. *Do you feel safe eating shellfish from Massachusetts?*
3. *Should shellfish be used to improve water quality?*
4. *Do you support expanding shellfish resources in MA?*



**Figure 11.**

Of the 62 respondents who identified as part of the general public 77% feel safe consuming shellfish from Massachusetts. A majority of respondents' support both using shellfish for water remediation and habitat restoration (74%) and expanding water quality projects across the state (71%). None of the respondents were opposed to the expansion of shellfisheries in Massachusetts.

Respondents did however differ in their responses on whether state funds should be used to sustain or bolster the commercial shellfishery. The majority of respondents (73%) support the state contributing money and resources to sustaining and growing the commercial shellfish industry but disagree on how the money should be spent. Only 43% of respondents are in support of a state funded marketing campaign for Massachusetts grown shellfish and the majority (77%) would like to see more resources dedicated to water quality management.

## Appendix I

(Glossary of Key Terms)

**Aquaculture** - "the manipulation of marine or freshwater organisms and/or their environment before eventual release, harvest, or capture; the controlled cultivation and harvest of aquatic animals and plants" (USDA National Aquaculture Development Plan, 1983). On the popular level, however, aquaculture is sometimes referred to as "farming."

**Long term Transplants** - the transfer of seed shellfish only by municipalities from growing areas classified as Prohibited to growing areas classified as Approved or Conditionally Approved to reduce pathogens. Transplants require one or more spawning seasons and a minimum of 6 months of natural depuration before harvest. Areas used as a source of shellfish for transplants must have acceptably low levels of poisonous or deleterious substances as defined by the NSSP and any other contaminants of concern to MA DPH. Testing must demonstrate that the shellfish are free of shellfish diseases prior to transplanting.

**Mitigation** - propagation done as compensation for alterations resulting in losses or damage to existing shellfish resources or habitat.

**Planting** - any type of human induced or assisted method of increasing or creating shellfish resources regardless of the purpose.

**Propagation** - any planting activity conducted by municipalities or the state to increase the supply of shellfish available to the public fisheries.

**Research Project** - any planting activity designed for hypothesis testing, experimentation, scientific research or education permitted annually by Marine Fisheries. These permits include a monitoring and reporting component.

**Restoration** - propagation to recreate a shellfish resource that is historically known to have occurred in a water body but no longer exists as a naturally sustaining population. This term generally includes any propagation effort done for ecosystem service benefits.

**Seed** - The NSSP defines seed as shell stock (shellfish), which is less than market size.

**Short term Relays** - the transfer of any sized shellfish by municipalities from growing areas classified as Restricted or Conditionally Restricted to growing areas classified as Approved or Conditionally Approved to reduce pathogens. Shellfish may be harvested after 90 days and usually one spawning season. Shellfish are typically relocated (relayed) in late spring and opened to harvest in the fall. Areas used as a source of Massachusetts shellfish for relays must have a current sanitary survey and shellfish must meet NSSP and MA DPH guidelines for suitability (Division of Marine Fisheries Shellfish Planting Guidelines Updated March 2015 Page 6). Testing must demonstrate that the shellfish are free of shellfish diseases prior to relaying.

## Appendix II (Survey)

# Massachusetts Shellfish Initiative Survey

You are receiving this survey as a means to better understand the needs of stakeholders in setting goals for a Massachusetts Shellfish Initiative. This survey is being administered in conjunction with the University of Massachusetts Boston. This research has been declared exempt by Institutional Review Board approval under IRB #2017066.

Participation in this survey will take approximately 20 minutes, is entirely voluntary, and all information will be kept *completely confidential and no personal identifiers* will be collected or reported in future publications. You are free to withdraw from the study at any time, or you may choose not to answer any specific questions.

The Primary Investigators for this research and their contact information are listed below. For more information, questions, or concerns, please feel free to notify them.

Sean McNally, sean.mcnally001@umb.edu

By checking the box below, you certify that you understand the above statement and consent to complete this survey.

**I give my consent**

## Section 1: General Background

1. Which meeting are you attending?
  - a. Boston
  - b. Duxbury
  - c. Harwich
  - d. Manchester
  - e. Martha's Vineyard
  - f. Wellfleet
  - g. I did not attend an in-person meeting (am taking online)
  
2. What shellfish user group do you most identify with?
  - a. Aquaculture
  - b. Wild Commercial Harvester
  - c. Restoration
  - d. Town Official
  - e. State Official
  - f. Recreational harvester
  - g. Wholesale dealer
  - h. Advocacy/Non-profit
  - i. Entertainment/Retail
  - j. General Public
  - k. Other
  
3. Is the sector you identified with the only user group you identify with?
  - a. Yes
  - b. No

4. If no, which of the following is your secondary association?

- a. Aquaculture
- b. Wild commercial harvester
- c. Restoration
- d. Town Official
- e. State official
- f. Recreational harvester
- g. Wholesale dealer
- h. Advocacy/Non-profit
- i. Entertainment/Retail
- j. General public
- k. Other

5. Which region best describes your primary shellfish activity location or area of interest within the state of Massachusetts?

- a. North Shore Towns
- b. South Shore Towns (i.e. Duxbury, Kingston, Plymouth)
- c. Cape Cod Towns
- d. Islands
- e. South Coast Towns (i.e. New Bedford, Fairhaven, Wareham)
- f. Other

6. How long have you been involved with your primary shellfish user group, as identified in question 2?

- a. 0-1 year
- b. 1-5 years
- c. 6-10 years
- d. > 10 years

7. How long have you been involved with your secondary shellfish user group, as

identified in question 4?

- a. 0-1 year
- b. 1-5 years
- c. 6-10 years
- d. >10 years
- e. Not applicable

**STOP! If you did not select a or b in questions 2 or 4, please skip to the Municipal Involvement section (pg. 45).**

## Section 2: Business- Aquaculture

**Please complete this section if you identified as Option “a- Aquaculture” in Questions 2 or 4.**

8. What are your shellfish of interest? Select all that apply.

- a. Oysters
- b. Quahogs
- c. Surf clams
- d. Steamers
- e. Razor clams
- f. Scallops
- g. Mussels
- h. Other

9. If you selected “Other” in Question 8, please identify your other shellfish of interest:

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10. How would you describe your participation in the shellfish industry?

- a. Primary source of income
- b. Supplemental Income

11. Do you have complete business ownership of the shellfish user group you most identify with?

- a. Yes, I am the business owner
- b. Yes, I am co-owner
- c. No, I am an employee

d. Other

12. Do you feel that there is currently adequate support for bringing new shellfish products (i.e. new species) to market?

- a. Yes
- b. No
- c. Unsure

13. How much acreage are you currently granted and/or permitted to use?

- a. < 1 acre
- b. 1- 5 acres
- c. 6-10 acres
- d. > 10 acres
- e. Not applicable

14. How much of your grant are you using currently?

- a. <10%
- b. 10 - 30%
- c. 30-75%
- d. > 75%
- e. Not applicable

15. What is your primary growout method?

- a. Bottom-gear
- b. Floating-gear
- c. Bottom plant
- d. Long line
- e. Other
- f. Not applicable

16. Do you have access to adequate onshore infrastructure to sustain and/or expand

your business?

- a. Yes
- b. No
- c. Not applicable

17. If you answered “No” in Question 16, how could it be improved?

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18. Do you have access to adequate on-water infrastructure to sustain and expand your business?

- a. Yes
- b. No
- c. Not applicable

19. If you answered “No” in Question 18, how could it be improved?

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20. Do you support expanding shellfish resources in MA?

- a. Yes, across the board
- b. No
- c. Aquaculture Only
- d. Wild Harvest Only
- e. Restoration Only
- f. Aquaculture and Wild Harvest
- g. Wild harvest and Restoration
- h. Aquaculture and Restoration

21. Do you support growth of the industry through (select all that apply):

- a. Expansion of existing aquaculture operations
- b. Addition of more/new aquaculture operations
- c. Increased harvest by existing wild harvesters
- d. Addition of more/new wild harvesters
- e. Other, not listed above

22. If you selected option "e-Other, not listed above" in Question 21, please explain:

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23. Do you currently belong to a fishing coalition or association in the state of Massachusetts?

- a. Yes
- b. No
- c. Not applicable

24. Do you feel that your current regulations (i.e. minimum sizes) on your primary shellfish of interest are appropriate?

- a. Yes, they are appropriate
- b. No, they are too restrictive
- c. No, they are not restrictive enough
- d. Not applicable

25. Do you feel that the current resources available for enforcement of shellfish regulations are adequate?

- a. Yes, adequate
- b. No, not adequate

26. Do you feel that your access to your shellfish of interest (amount of open area and duration of openings) is appropriate?

- a. Yes
- b. No, it is too much
- c. No, it is not enough
- d. No, for a reason not listed above
- e. Not applicable

27. If you answered “d-No, for a reason not listed” in Question 26, please briefly explain:

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***Continue to the Municipal Involvement Section on pg. 45.***

### **Section 3: Business- Wild Harvester**

**Please complete this section if you identified as Option “b- Wild Commercial Harvester” in Questions 2 or 4.**

8. What are your shellfish of interest? Select all that apply.

- a. Oysters
- b. Quahogs
- c. Surf clams
- d. Steamers
- e. Razor clams
- f. Scallops
- g. Mussels
- h. Other

9. If you selected “Other” in Question 8, please identify your other shellfish of interest:

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10. How would you describe your participation in the shellfish industry?

- a. Primary source of income
- b. Supplemental Income

11. Do you have complete business ownership of the shellfish user group you most identify with?

- a. Yes, I am the business owner
- b. Yes, I am co-owner
- c. No, I am an employee
- d. Other

12. Do you feel that there is currently a good diversity of shellfish products (i.e. shellfish flesh, non-traditional species of shellfish, shells, etc.) in the Massachusetts Market?

- a. Yes
- b. No
- c. Unsure

13. Do you feel that there is currently adequate support for bringing new shellfish products (i.e. new species) to market?

- a. Yes
- b. No
- c. Unsure

14. Do you feel that your town's shellfish propagation program (i.e. planting shellfish for public harvest) is important to optimizing your harvest?

- a. Yes and it should be expanded
- b. Yes and it is adequate
- c. No
- d. Not applicable

15. Do you have access to adequate onshore infrastructure to sustain and/or expand your business?

- a. Yes
- b. No
- c. Not applicable

16. If you answered "No" in Question 15, how could it be improved?

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17. Do you have access to adequate on-water infrastructure to sustain and expand your business?

- a. Yes
- b. No
- c. Not applicable

18. If you answered "No" in Question 17, how could it be improved?

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\_\_\_\_\_ 19. Do you support expanding shellfish resources in MA?

- a. Yes, across the board
- b. No
- c. Aquaculture Only
- d. Wild Harvest Only
- e. Restoration Only
- f. Aquaculture and wild harvest
- g. Wild harvest and restoration
- h. Aquaculture and restoration

20. Do you support growth of the industry through (select all that apply):

- a. Expansion of existing aquaculture operations
- b. Addition of more/new aquaculture operations
- c. Increased harvest by existing wild harvesters
- d. Addition of more/new wild harvesters
- e. Other, not listed above

21. If you selected option “e-Other, not listed above” in Question 20, please explain:

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22. Do you currently belong to an industry coalition or association in the state of Massachusetts?

- a. Yes
- b. No
- c. Not applicable

23. Do you feel that your current regulations (i.e. daily harvest limits and/or minimum sizes) on your primary shellfish of interest are appropriate?

- a. Yes, they are appropriate

- b. No, they are too restrictive
- c. No, they are not restrictive enough
- d. Not applicable

24. Do you feel that the current resources available for enforcement of shellfish regulations are adequate?

- a. Yes, adequate
- b. No, not adequate

25. Do you feel that your access to your shellfish of interest (amount of open area and duration of openings) is appropriate?

- a. Yes
- b. No, it is too much
- c. No, it is not enough
- d. No, for a reason not listed above
- e. Not applicable

26. If you answered “d-No, for a reason not listed” in Question 25, please briefly explain:

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**Continue to the Municipal Involvement Section on pg. 45.**

## **Section 4: Municipal Involvement**

**If you selected options c-k in Section 1, Question 2, please answer questions starting here. If you selected a-b in Section 1, Questions 2 or 4 and completed your respective business section, please start answering question here.**

28. Do you feel that the shellfish permitting process (aquaculture and restoration) should be more streamlined?

- a. Yes, aquaculture should be more streamlined
- b. Yes, restoration should be more streamlined
- c. Yes, restoration and aquaculture should be more streamlined
- d. No, the restoration and aquaculture permitting process is fine
- e. Unsure
- f. Not applicable

29. If you selected "Yes" in Question 28, please select all of the levels of permitting that you believe need to be more streamlined (select all that apply):

- a. Federal
- b. State
- c. Municipal
- d. Other

30. Do you feel that the current permitting structure is issuing permits in a timely manner?

- a. Yes
- b. No
- c. Unsure
- d. Not applicable

31. If you selected "No" in Question 30, how could the permitting structure be improved?

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32. Do you feel that there needs to be increased collaboration across regulatory groups working with shellfish?

- a. Yes
- b. No
- c. Unsure

33. If you responded "Yes" in Question 32, how can collaboration be increased?

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34. Would you support adding additional shellfish hatcheries in Massachusetts?

- a. Yes
- b. No
- c. Unsure
- d. Not applicable

35. If more open acreage was available in your town, would you seek to utilize the area to expand your shellfish activity?

- a. Yes
- b. No
- c. Unsure
- d. Not applicable

36. Should the Division of Marine Fisheries' budget be increased in order to expand their ability to evaluate water quality and reclassify areas?

- a. Yes
- b. No
- c. Unsure
- d. Not applicable

37. The current municipal permitting system ("home rule") is an effective way to manage and promote the growth of the MA shellfish industry. Do you agree or disagree with this statement?

- a. Agree
- b. Disagree
- c. Not familiar with 'home rule' structure
- d. Unsure
- e. Not applicable

38. The Division of Marine Fisheries should provide additional templates and standards for towns to manage their shellfish resources. Do you agree or disagree with this statement?

- a. Agree
- b. Disagree- DMF should not provide this
- c. Disagree- What is provided is adequate
- d. Unsure
- e. Not applicable

39. Do you feel that your town's shellfish propagation program (i.e. planting shellfish for public harvest) is important to optimizing your harvest?

- a. Yes and it should be expanded
- b. Yes and it is adequate
- c. No
- d. Not applicable

40. Do you feel that there is currently a good diversity of shellfish products (i.e. shellfish flesh, non-traditional species of shellfish, shells, etc.) in the Massachusetts Market?

- a. Yes
- b. No
- c. Unsure

## **Section 5: Public Health/Disease**

**All respondents continue through section 5, 6, 7, and 8.**

41. Has shellfish disease negatively impacted your business or shellfish activity in the last ten years?

- a. Yes
- b. No
- c. Not applicable

42. Has your business been subject to a foodborne illness-related closure in the last ten years?

- a. Yes
- b. No
- c. Not applicable

43. Has your business or shellfish activity been subject to Harmful Algal Bloom closure in the last ten years?

- a. Yes
- b. No
- c. Not applicable

44. Would you support additional field monitoring for shellfish diseases, harmful algal blooms (HAB), and human health risks (vibrio, etc.)? Select all that apply.

- a. Yes, state funded
- b. Yes, town funded
- c. Yes, industry funded
- d. Yes, all of the above
- e. No
- f. Unsure at this time

45. Do you feel that diversifying your shellfish harvest (i.e. harvesting/growing/otherwise using multiple species of shellfish) could increase your business's resilience to disease?

- a. Yes
- b. No
- c. Unsure
- d. Not applicable

46. Is the current time allowed to get shellfish cool following harvest a financial hardship?

- a. Yes
- b. No
- c. Not Applicable

47. Do you feel that there needs to be more training required for operating in the

shellfish industry (people that grow, harvest, handle and store shellfish)?

- a. Yes
- b. No
- c. Unsure
- d. Dependent on the type of training requirement

## Section 6: Environmental/Restoration

48. Would you support adding areas of shellfish for remediation (i.e. for nutrient mitigation) if it meant opening more acreage for the commercial shellfishing industry?

- a. Yes
- b. No
- c. Depends on the type/ area of remediation
- d. Unsure
- e. Not applicable

49. Would you be willing to become a citizen scientist and help in the environmental monitoring activities of your land grant, harvesting acreage, and/or area of interest?

- a. Yes
- b. No
- c. Unsure
- d. Not applicable

50. Should the state revisit regulations regarding eelgrass as it relates to shellfishing?

- a. Yes, more stringent
- b. Yes, less stringent
- c. No
- d. Unsure
- e. Not applicable

51. Should the state of Massachusetts be investigating and implementing actions for addressing ocean acidification's effects on shellfish (as a result of runoff and climate change)?

- a. Yes, the state should lead
- b. Yes, the industry should lead
- c. No
- d. Unfamiliar with Ocean Acidification
- e. Unsure
- f. Not applicable

52. Do you feel that shellfish can help to clean nutrient impaired waters?

- a. Yes
- b. No
- c. Sometimes
- d. Unsure

53. Would you be willing to allow new areas for aquaculture in formerly nutrient impaired waters?

- a. Yes
- b. No
- c. In some cases
- d. Unsure
- e. Not applicable

54. Should the state of MA develop standards for shellfish being used to mitigate nitrogen?

- a. Yes, the state should lead
- b. Yes, the industry should lead
- c. No
- d. Unsure
- e. Not applicable

55. Should more resources be dedicated to improving water quality to allow for more areas to open to shellfishing (aquaculture, wild harvest, and/or recreational harvest)?

- a. Yes
- b. No
- c. Unsure
- d. Not applicable

56. Are entanglements (ie. of whales, seals, turtles) an issue for your shellfish-related activity?

- a. Yes
- b. No
- c. Unsure
- d. Not Applicable

57. If you answered “Yes” to Question 56, would you be willing to collaborate with conservation stakeholders to further minimize this risk?

- a. Yes
- b. No
- c. Unsure

58. Is water quality a concern to the future of your shellfish of interest?

- a. Yes
- b. No
- c. Unsure
- d. Not applicable

## **Section 7: Education**

59. Are you interested in trainings or resources designed to help you diversify your business with other shellfish species?

- a. Yes
- b. No
- c. Unsure

60. Are you willing to participate in future MSI discussions to help guide the development of the MSI?

- a. Yes
- b. No
- c. Unsure

61. Do you think there is a need for an apprenticeship program that allows for permitted users to mentor prospective or newly appointed grantholders and/or harvesters?

- a. Yes
- b. No
- c. Unsure

62. If you selected “Yes” in Question 61, would you be willing to participate in the program?

- a. Yes
- b. No

## **Section 8: Future Needs Assessment**

63. What are some of the most critical challenges to your shellfish activity of interest?

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64. What is your vision for the future of shellfish activities in the state of Massachusetts in the next ten years?

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65. Do you agree that MSI can provide additional credibility to the existing and future shellfish industry, to earn funding or community support?

- a. Yes
- b. No
- c. Unsure

