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The Connecticut Seafood Survey

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THE CONNECTICUT SEAFOOD SURVEY: ASSESSING SEAFOOD CONSUMPTION, KNOWLEDGE, BEHAVIORS AND PREFERENCES OF CONNECTICUT RESIDENTS

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TABLE OF CONTENTS

- A. Introduction and Background.....4
- B. Methodological Approach
 - a. Demographics.....7
 - b. Limitations.....9
- C. Findings
 - a. Knowledge.....10
 - b. Behavior.....11
 - c. Preferences.....14
- D. Summary17
- E. Related Work.....20
- F. References.....20

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INTRODUCTION AND BACKGROUND

Humans are increasingly interested in consuming seafood, and the world's ocean can only provide a limited share of the global supply. Over the last 50 years, the average annual growth in seafood production exceeded that of all other types of terrestrial animal production (FAO 2018). Further, seafood production reached an all-time high of 171 million metric tons in 2016, with farmed seafood (aquaculture) representing nearly half of the total of all seafood produced. With capture fisheries production nearly static, aquaculture has been rapidly expanding to meet the needs of a growing population.

According to FAO (2018), global aquaculture production included 80 million metric tons of fish, mollusks, crustaceans and other aquatic animals, and 30.1 million metric tons of aquatic plants (mostly seaweeds). Asia, and China in particular, dominate global aquaculture production and also account for the majority of the growth in the aquaculture sector. Aquaculture production in the United States lags far behind, ranking 16th in global aquaculture production and expansion is challenged by a complex permitting process and competition for space, especially in public waterways. Catfish, trout, tilapia, carp, striped bass, yellow perch, crawfish and prawns are the leading U.S. products grown in fresh water. Mollusks such as oysters, clams and mussels constitute the majority of marine aquaculture production in the U.S., with shrimp, salmon and seaweeds comprising the remainder (NMFS 2018).

While the average per capita seafood consumption is rising globally, domestic seafood consumption has varied little over the past decade and remains lower (16.0 pounds/year) than the global average (42.8 pounds/year) (NMFS 2018). Few Americans consume the two seafood servings per week recommended in the 2015-2020 Dietary Guidelines for Americans (USDA ERS 2016). Furthermore, recent research indicates that American children are eating far less seafood than recommended, as well (Bernstein 2019). Even so, the U.S. imported more than 90% of the seafood consumed in 2017, more than at any point in its history (NMFS



2018). To keep pace with the current demand for seafood, the United States would need to expand aquaculture production exponentially.

Locally, Connecticut seafood production is diverse and growing. In recent years marine aquaculture production has surpassed wild seafood harvest, with 50 businesses generating nearly \$30 million in farm-gate revenue in 2016 (Connecticut Department of Agriculture, Bureau of Aquaculture). Fifteen percent of the state's coastal waters, approximately 50,000 acres, are designated for aquaculture. The industry continues to expand with innovative cultivation methods, and with new species such as kelp. While public and private research and development efforts are supporting this important U.S. food production sector in Connecticut and across the nation, challenges remain. However, for sustainable aquaculture to expand along Connecticut's densely populated shoreline, it is important that residents understand the current seafood landscape, and that regulatory agencies, community leaders, outreach professionals and others understand the interests and concerns of residents in order to engage the public about aquaculture development.

Previous key studies of Connecticut seafood consumers identified consumption rates (Balcom et al. 1999; U.S. EPA 2013), as well as preferences for ecolabeled seafood (Roheim et al. 2005).

This report includes primary findings from a survey of Connecticut residents about their seafood related consumption, knowledge, behaviors and preferences. The purpose of the study was to collect data to inform the development of public engagement programs on Connecticut aquaculture and seafood products. Further, the study generated new data useful to seafood industries and policymakers.

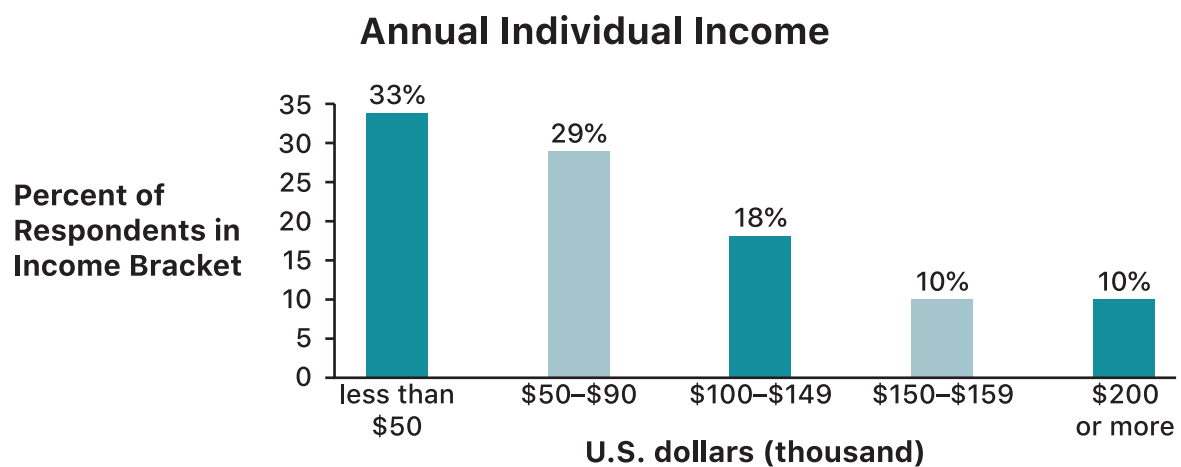
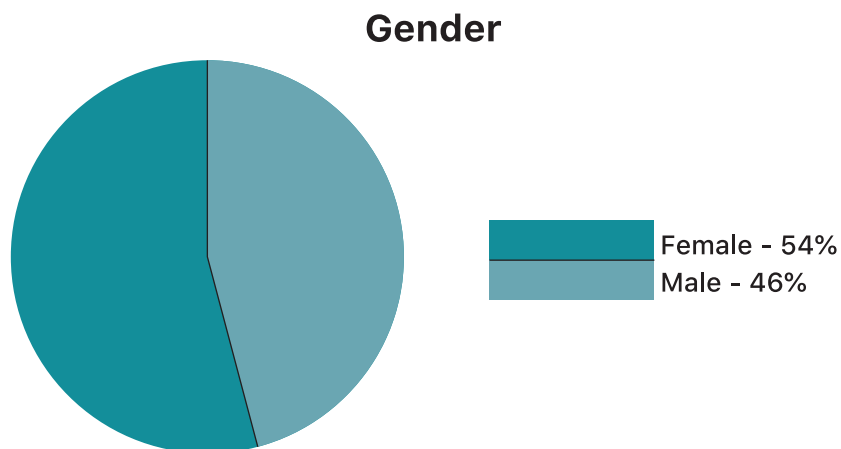
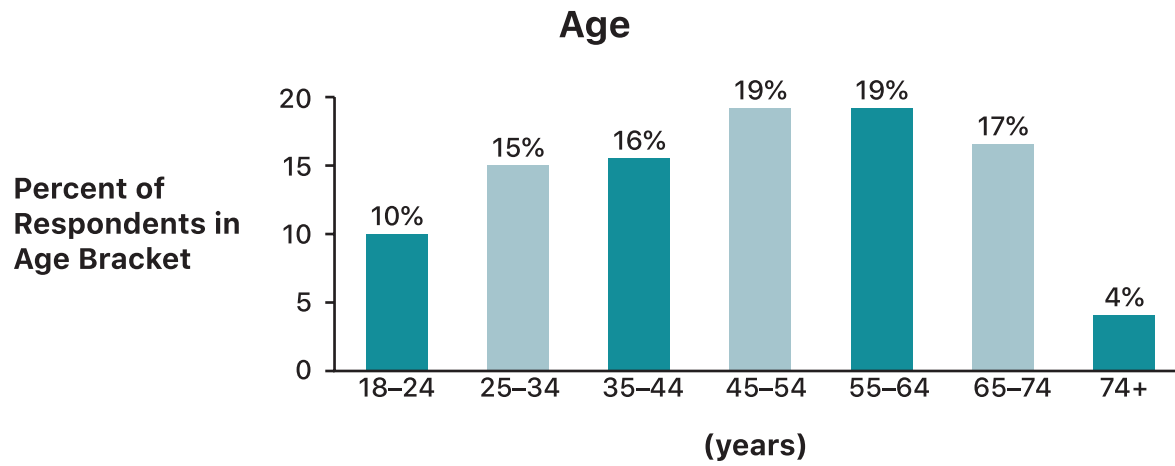


METHODOLOGICAL APPROACH

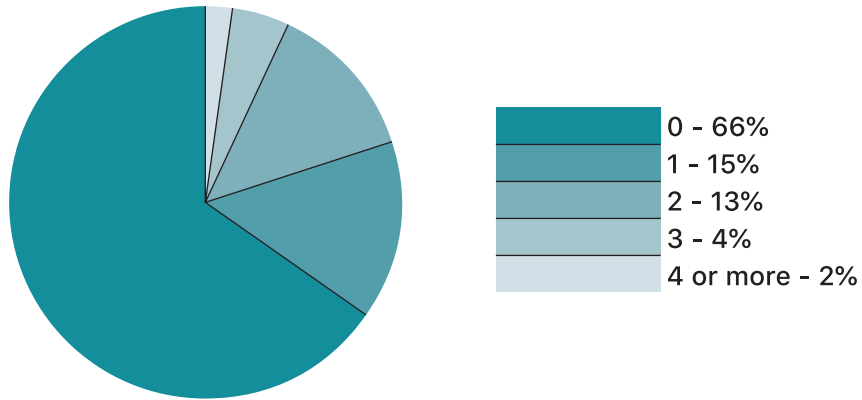
A survey intended for Connecticut adult residents (18 years and older) was developed and implemented using Qualtrics® data collection software. The survey was reviewed for subject matter validity and a robust pilot study was completed to confirm the survey was operational and yielding data in accordance with our research-related expectations. The survey was administered online through the University of Connecticut site license and was approved by the University of Connecticut Institutional Review Board (XI 7-067). Survey participants were recruited from established Qualtrics® survey participant panels.

A total of 1,756 adults participated in the study. A non-probability quota sampling approach allowed the sample to closely mirror the distribution of Connecticut residents based on age, gender and income. These calculations relied on the most recent census data (2010). Sampling occurred over an eight-week period in the Fall of 2017 to the Winter of 2018. Upon collection, data were exported into SPSS (Statistical Package for Social Scientists) for analysis. Descriptive, correlational and significant difference tests were used. Probabilities of 0.05 or less were considered significant. Additionally, categorical data relationships were analyzed using chi-squared tests.

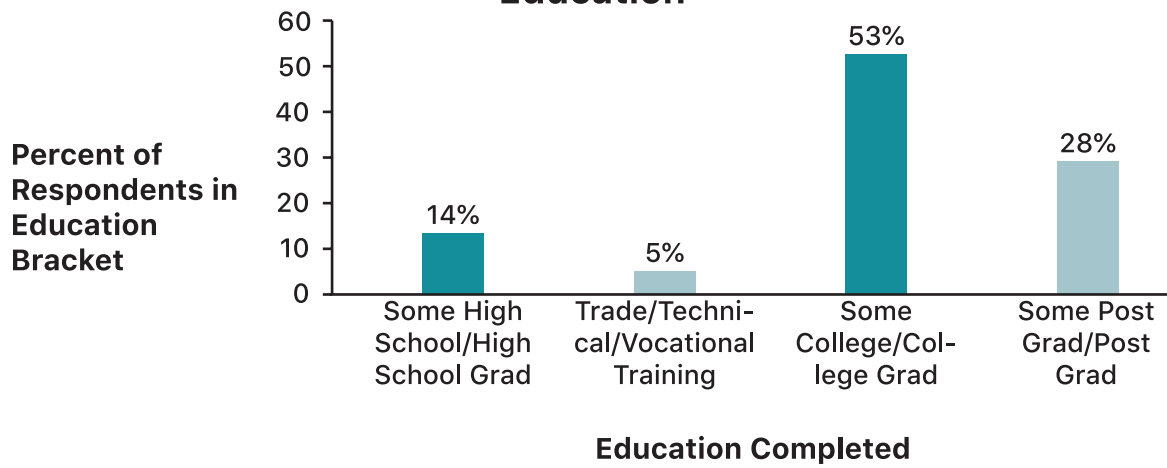
SURVEY PARTICIPANT DEMOGRAPHICS (N=1,756)



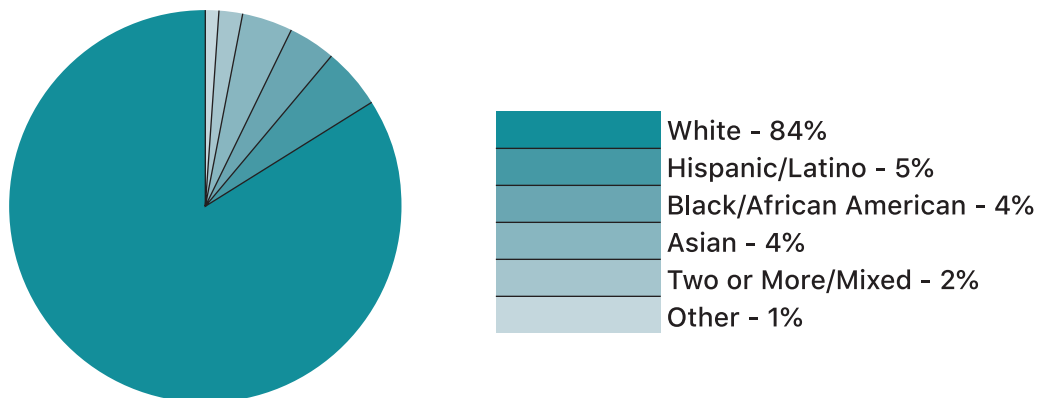
Number of Children



Education



Race/Ethnicity





SAMPLE LIMITATIONS

There are a number of items to note related to the demographic attributes of the data collected. First, 99% of respondents reported having completed some or all of high school and more than 50% completed some college or were college graduates. This is important because they may have been exposed to more information about seafood production and consumption (Stanovich and Cunningham, 1993). The nation's median household income from 2013–2017 was \$57,652 with Connecticut ranked 6th highest in the nation at \$73,781 (U.S. Census Bureau 2018). One-half of respondents (51%) reported having individual annual incomes in excess of \$75,000. This is important, as individuals with higher incomes may be more able to afford seafood than those with lower incomes. Fresh seafood is typically, though not always, more expensive than other meats such as poultry, beef and pork and prices for all of these products are predicted to rise (Linehan et al. 2013). Lastly, the survey over-sampled individuals who reported themselves to be white (not Hispanic or Latino) at 84% and under-sampled those who reported themselves to be Hispanic or Latino at only 5%. According to the most recent U.S. Census, Connecticut's population is 67% white and 16% Hispanic or Latino. This is important because the views of an important and growing segment of our population may not have been captured.



FINDINGS

KNOWLEDGE FINDINGS

Overview:

Participants related knowledge that they should consume seafood on a regular basis, two to three servings per week, but our findings that follow show that few actually do. Few participants knew that more than 90% of the seafood consumed in the U.S. is imported from other countries, or that equal amounts of seafood consumed come from farm-raised and wild-caught sources. Also, many participants were unaware of the fact that the U.S. FDA (2017) recommends that pregnant and nursing mothers, youth and women of childbearing age should eat fish lower in mercury. These findings represent an educational opportunity to engage the public in learning about how and where seafood is produced, and the health benefits and potential risks associated with seafood consumption.

Key Findings:

- More than half of participants knew that the United States government recommends 2-3 servings of seafood per week.
- Six percent (6%) of participants knew that more than 90% of the seafood consumed in the United States is imported from other countries.
- Thirteen percent (13%) of participants knew that globally, equal amounts of seafood are wild caught and farm raised.

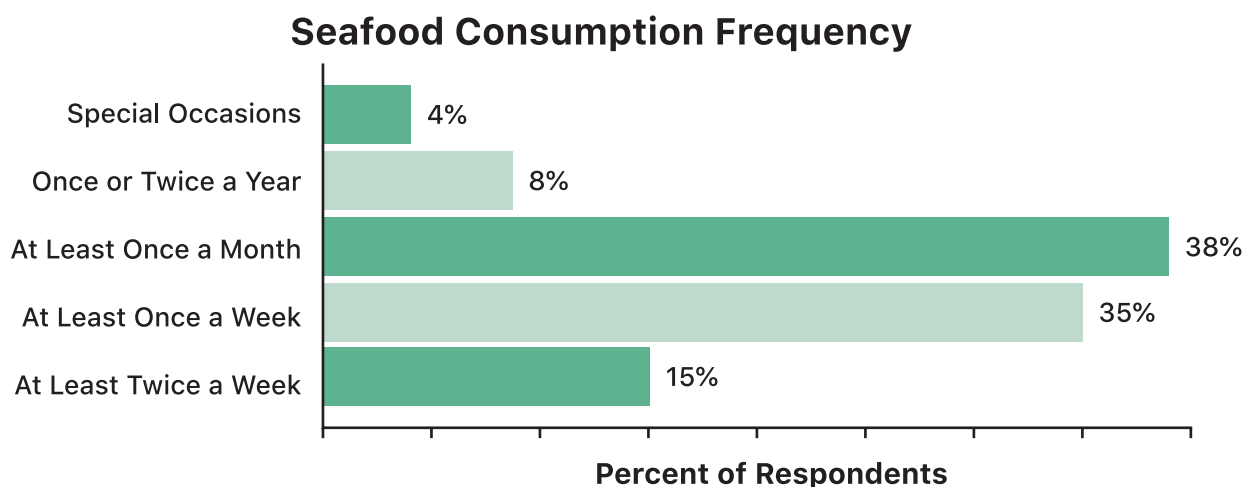
SEAFOOD CONSUMPTION BEHAVIOR

Overview:

In a national survey, Hicks et al. (2006) reported that 88% of Americans eat seafood. In Connecticut, ninety-one percent (91%) of respondents to this survey reported that they eat seafood. However, while the United States Department of Agriculture (USDA) recommends two servings of seafood per week, only 50% of respondents reported eating seafood at least once a week, and only 15% meet the USDA target. Additional relational tests indicated that the frequency of seafood consumption increases with increased age, income and level of education. Consumption frequency was slightly lower among individuals who reported themselves to be white (not Hispanic or Latino) than all other reported races. These data indicate that there is an opportunity to engage the public in ways that may lead to a change in consumption behavior. Outreach programs could potentially benefit youth and adults, as well as individuals from diverse ethnic groups.

In addition to being asked about their general seafood consumption patterns, participants were asked about their consumption of Connecticut farm-raised shellfish (e.g. oysters, clams, mussels and scallops) and seaweed.

The following charts represent the results of seafood consumption behavior (n=1,756)

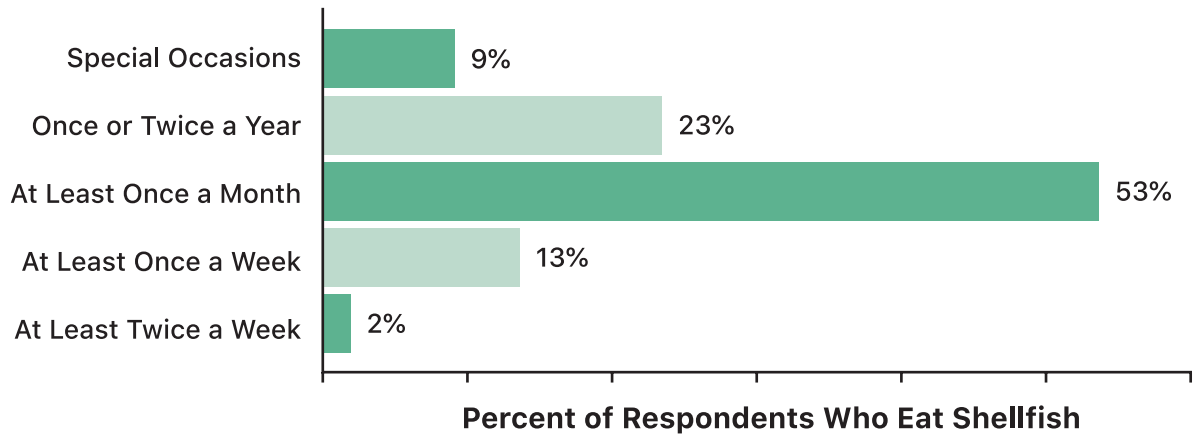


Key Findings:

- 91% of Connecticut survey respondents stated that they eat seafood (this study) as compared to 88% nationally (Hicks et al. 2006), but only 15% meet the USDA target for seafood consumption.



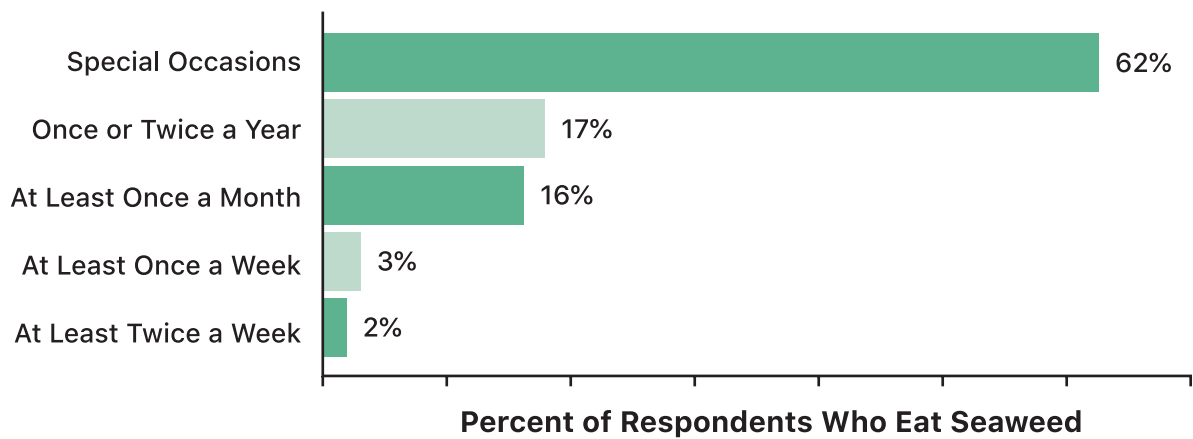
Shellfish Consumption Frequency



Key Findings:

- Seventy nine percent (79%) of Connecticut survey respondents stated that they eat shellfish.
- Sixty eight percent (68%) of consumers eat shellfish at least once a month.
- Thirteen percent (13%) harvest their own shellfish for personal consumption.

Seaweed Consumption Frequency



Key Findings:

- Thirty four percent (34%) of Connecticut survey respondents stated that they eat seaweed.
- Twenty one percent (21%) of consumers eat seaweed at least once a month.
- Two percent (2%) harvest their own seaweed for personal consumption.

FACTORS MOTIVATING SEAFOOD CONSUMPTION BEHAVIOR

Overview:

The top factors reported as “moderately important” to “extremely important” when purchasing seafood were flavor, freshness and safety. Other important considerations included: water quality where the seafood was harvested, previous consumption or familiarity with the seafood product and country of origin of the seafood product. Areas of least importance include familiarity with the farmer and the type of packaging. However, even though of lesser importance than the other choices, nearly 50% of respondents indicated that all of these factors were “moderately important” to “extremely important.”

The following charts represent the results of seafood consumption behavior (n=1,641)

Motivating Factors	Not important	Slightly important	Moderately important	Extremely important
Freshness	Less than 1%	3%	14%	83%
Flavor/taste	Less than 1%	2%	17%	80%
Knowing if it is safe to eat	1%	5%	16%	78%
Price/cost	2%	11%	44%	43%
The water quality of the place where it was harvested	8%	18%	32%	42%
Knowing how to prepare/cook it	6%	18%	44%	32%
Country of origin	10%	24%	35%	30%
If you have eaten the seafood product before	9%	23%	41%	27%
If it is wild caught or farm raised	16%	25%	32%	27%
If it is sustainably produced (not subject to overfishing)	15%	28%	35%	23%
Nutritional information	10%	25%	46%	20%
Familiarity with brand/label	13%	27%	41%	19%
Type of packaging	15%	36%	35%	14%
Familiarity with farm or farmer	26%	29%	31%	14%

This question was only asked of participants who indicated they eat seafood or purchase seafood for members of their household even though they don't eat it.

Key Findings:

- Freshness, flavor and safety were reported to be the most important factors motivating seafood purchases, and more than 90% of respondents ranked these factors as “extremely important” or “moderately important.”
- Fifty percent (50%) of respondents would be more willing to consume local seafood products if they were sold with recipes and cooking instructions.



RATES OF CONFIDENCE IN SEAFOOD SOURCE LOCATIONS

Overview:

The majority of consumers expressed “moderate confidence” or “extreme confidence” in seafood harvested locally in Connecticut (91%), as well as in the New England region (94%), as compared to elsewhere in the United States, while fewer (23%) expressed confidence in products produced in foreign countries. The top three reasons selected by respondents who prefer Connecticut seafood were: 1) It’s fresher, 2) It’s easily available, and 3) It supports local fishermen and the economy. Safety, quality, and sustainability – the focus of many seafood certification programs – were the lowest ranked reasons for preferring local seafood. The top three reasons selected by respondents without a preference for Connecticut seafood were: 1) It’s not safe to eat, 2) It’s lower quality, 3) Products I prefer are not available.

In Connecticut, very little seafood is marketed directly to consumers, though that is beginning to change (David Carey, Connecticut Department of Agriculture, Bureau of Aquaculture, personal communication). Given that “supporting local fishermen and the economy” was one of the top three reasons indicated by those respondents who stated a preference for Connecticut seafood, a local seafood marketing campaign appears to be an opportunity.

The following table and charts represent the results for seafood preferences (n=1,641)

Seafood Source	Not confident	Slightly confident	Moderately confident	Extremely confident
Foreign countries	34%	42%	21%	2%
United States	1%	11%	59%	29%
New England	1%	5%	36%	58%
Connecticut	2%	8%	40%	51%

*This question was only asked of participants who indicated they eat seafood or purchase seafood for members of their household even though they don’t eat it.

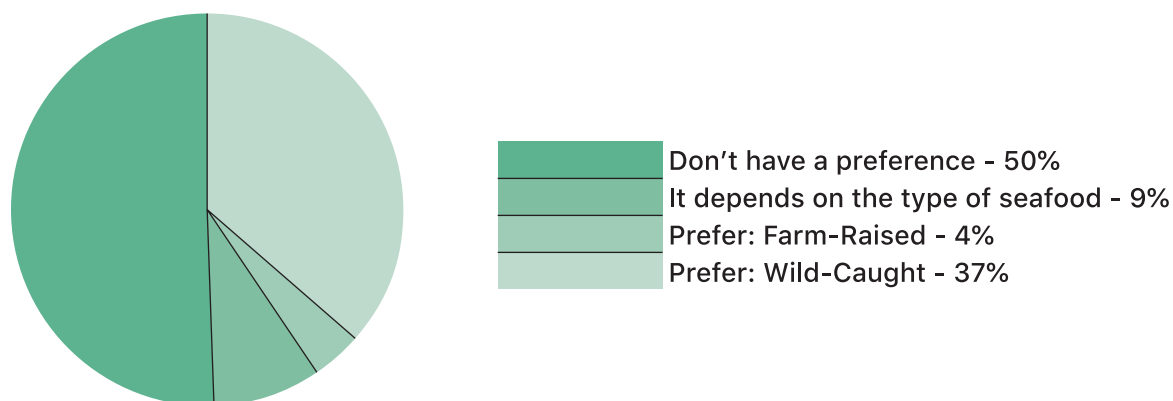
Key Findings:

- Supporting local seafood producers and the economy is important to many survey respondents.
- Respondents reported significantly higher confidence in domestic seafood products.

PREFERENCES FOR WILD-CAUGHT OR FARM-RAISED SEAFOOD

Overview:

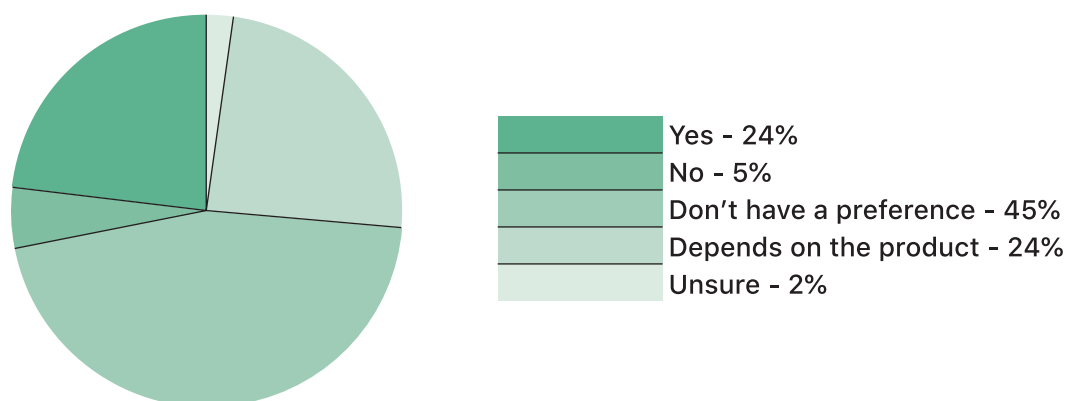
On average, less than 4% of residents stated a preference for farm-raised seafood, while 37% stated a preference for wild-caught seafood. Older, wealthier respondents and those with advanced levels of education preferred wild-caught seafood as compared to younger, less wealthy respondents and those with fewer years of completed education. However, a large proportion of respondents were undecided or said their preference depended upon the type of seafood. This suggests an opportunity to engage seafood consumers in learning more about the types of seafood available and different production methods, while improving our understanding of their concerns and preferences.



PREFERENCES FOR CONNECTICUT SEAFOOD

Overview:

Only about one-quarter of respondents had a stated preference for Connecticut seafood. The majority indicated that they did not have any preference or that it depended on the product. The majority of respondents prefer to purchase their seafood from a local seafood market, grocery store or restaurant. Those purchasing from a farmers market, food delivery service or directly from the producer tended to be wealthier and have completed a higher level of education. This finding may support educational efforts that target consumers of a certain age bracket or income and education level regarding local seafood products and availability at local markets.



Key Findings:

- More information about specific products purchased by consumers is necessary to draw conclusions on preferences for wild-caught vs. farm-raised seafood, and for local seafood products.

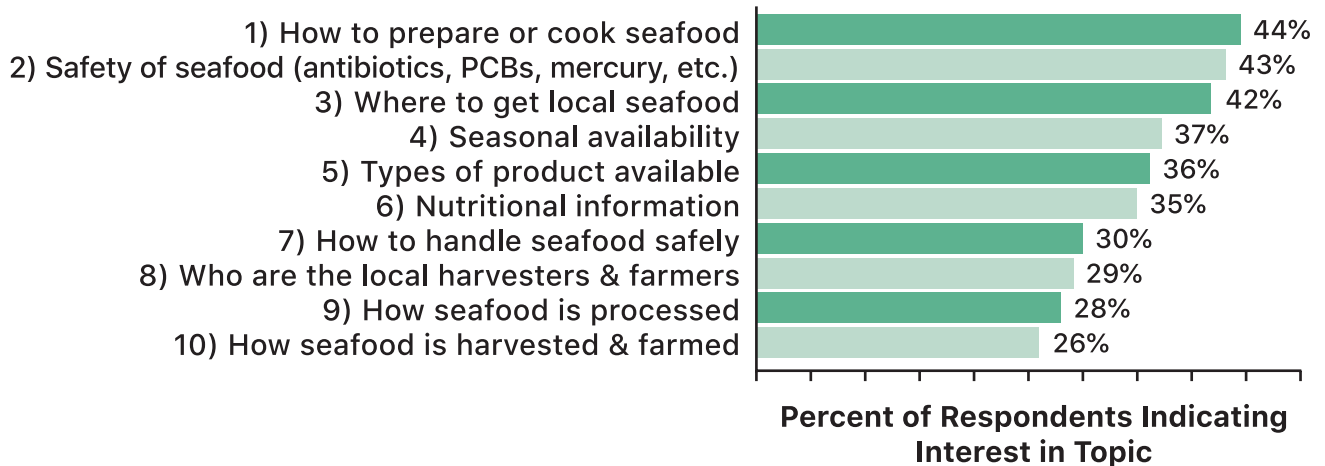
INFORMATION AND COMMUNICATION PREFERENCES

Overview:

The top three areas of interest are: 1) how to prepare/cook seafood (44%), 2) safety of seafood (43%), and 3) where to get local seafood (42%). The majority of respondents prefer to get seafood information from the Internet, although some prefer access via printed educational materials, television, social media, email, festivals and public events. When asked who they would prefer to get that information from, the majority identified public health officials, seafood industry, researchers and scientists, seafood retailers, environmental advocacy groups and healthcare providers. In general, friends and family, extension agents and aquarium, zoo or museum staff were ranked lowest as desired sources of information. This is important because among the public these organizations may not be the first that come to mind for information related to seafood risks and benefits. These organizations may seek opportunities to share seafood-related information with public health officials, industry leaders and scientists and researchers.

The following table represents the results for information and communication preferences (n=1,756)

The Top 10 Seafood Topics of Interest



Key Findings:

- Consumers want more information on seafood and prefer to get that information from public health officials.
- Survey respondents stated the Internet as an important source for seafood information.





WILLINGNESS TO PAY

Overview:

A complementary study assessed consumer willingness to pay for Connecticut farm-raised aquaculture products including raw oysters and clams and raw kelp and processed kelp noodles. Survey respondents were randomly placed into three groups: control, treatment 1 and treatment 2. The control group was not given any other information about the product except for the location (state or country) it was harvested from. The treatment groups were given either information about nutritional benefits of seafood, seafood safety, and environmental benefits of aquaculture (treatment 1) or economic benefits of Connecticut aquaculture (treatment 2). Then the respondents participated in a discrete choice experiment which allowed us to assess their willingness to pay a premium, and if so, how much of a premium compared to product grown in other locations. The key results are highlighted below. To read the full report, see the "Related Work" section for the reference.

Key Findings:

- Respondents are willing to pay a premium for Connecticut farm-raised products including raw oysters, clams and kelp.
- Respondents are willing to pay more for Connecticut farm-raised oysters (1 dozen on the half shell) than the same product from Maine, Washington or Louisiana.
- Respondents are willing to pay more for Connecticut farm-raised clams (1 dozen on the half shell) than the same product from Rhode Island, Virginia or Florida.
- Respondents are willing to pay more for Connecticut farm-raised kelp (1 pound of either raw kelp or processed kelp noodles) than the same product from Maine, Korea, or China.
- Providing information on the nutritional benefits, seafood safety, and environmental benefits or economic benefits of Connecticut aquaculture may further increase the price premium that the respondents were willing to pay, but that depends on the product purchased.



SUMMARY

The results of this survey complement and update previous findings regarding consumer knowledge, behaviors, preferences and consumption patterns of Connecticut seafood (Balcom et al. 1999, Roheim et al. 2004, U.S. EPA 2013). The study finds that the majority (91%) of respondents consume seafood but raises questions about the degree of consumer knowledge about the availability and variety of local seafood products, as well as their familiarity with the manner in which Connecticut seafood is captured or grown. Further, it highlights the need to better understand their motivations for purchasing either wild-caught or farm-raised seafood.

While the United States Department of Agriculture recommends two servings of seafood a week, half of the respondents reported eating seafood at least once a week, and only 15% meet the target set by the federal government. While many residents are eating seafood, they are not doing so as often as they should. Further research is needed to investigate why consumption frequency is lower than government recommendations. However, promotion of seafood by public health officials may be key to increasing seafood consumption rates in Connecticut.

When asked why respondents prefer seafood from Connecticut, the top three reasons were: 1) it's fresher, 2) it's easily available, 3) it supports local fishermen and the economy. Additionally, 50% reported that they would be more likely to purchase Connecticut products if they came with recipes and instructions on preparation. Seafood



producers, marketing councils and food service professionals may consider strategies that couple the branding of and promotion of local seafood companies with unique packaging and instructional materials.

The top reasons why respondents don't prefer Connecticut seafood: 1) it's not safe to eat, 2) it's lower quality, 3) products I prefer are not available. Policymakers should be aware that many people perceive Long Island Sound (LIS) water quality to be poor. Policy makers can provide information that describes the high-quality seafood standards set and share what producers do to meet/exceed these standards. Further, they can share information on water quality improvement initiatives, water quality criteria and how LIS measures up. Educators can help disseminate information that underpins this message throughout the state and region.

In general, the ratio of those who eat seafood at home more often vs. those who eat seafood outside the home (e.g., in restaurants) more often was approximately 1 to 1. However, the youngest respondents ate seafood outside of the home more frequently. Seafood producers seeking to gain new or expanded markets can consider marketing product locally, especially in restaurants to capture the younger demographic.

"How to prepare or cook seafood" was the number one seafood topic of interest. This may suggest that this is a hurdle to increasing consumption rates, though it may offer an opportunity for restaurateurs to educate customers on how to properly prepare seafood.

Older, wealthier individuals were more likely to eat seafood, and also preferentially choose wild-caught seafood over farm-raised. The majority of consumers prefer Connecticut seafood over seafood from other locations. Interestingly, the majority claim to prefer wild-caught seafood while others state that they do not have a preference or that their attitude depends upon the product. The fact is that the majority of seafood produced in the state is farm-raised, not wild-caught. That said, what can be found in the supermarket or at seafood establishments may not well represent the variety of seafood produced in the state. Outreach and education professionals may consider exploring the motivations driving consumer purchases for different types of seafood products. They may also consider working with the seafood industry to better communicate seafood production practices and address consumer interests or concerns with respect to those.

The vast majority (61%) of individuals who reported not eating seafood stated that they don't like the taste, texture or smell. Direct education is not likely to change this. Alternatively, educators and outreach professionals can focus on encouraging people to try different foods. Additionally, helping people learn how to prepare these foods for themselves may also increase consumption frequency rates.

Three-quarters (75%) of non-seafood consumers reported that they did not purchase seafood for other members of their household. This is important because it could be an opportunity to engage



individuals, especially parents, about seafood health benefits, even when caregivers aren't eating the recommended amounts. There is also a potential to reach youth in the classroom, and teachers may consider integrating messages about the health benefits of seafood consumption. This may help inform their current and future consumption patterns and purchasing decisions.

Consumers are willing to pay a premium for local aquaculture products, including farm-raised shellfish and seaweed, but the results indicate that there is confusion about the types of seafood products, their availability throughout the year, and the practices involved in farming or capturing them. There is opportunity to expand outreach on these topics.

Shellfish, including oysters, clams, scallops and mussels, are the most important farm-raised seafood products in Connecticut, and kelp farming is slowly gaining traction. Recreational shellfishing is also important to the local economy, and to the thousands of individuals and families that participate in that activity. Thirteen percent (13%) of survey respondents have harvested their own shellfish, and 2% of respondents reported harvesting their own seaweed from Connecticut waters. Of those who have not, the majority responded that they did not know about the activity, where to go or the rules. Education and outreach officials may consider exploring the connection between recreational seafood harvest and seafood consumption. They can also promote seafood harvesting as an activity that supports physical activity and healthy nutrition. Public officials can focus on sharing information about easily accessible harvest areas, and demonstrate how to properly gather, store and consume these items.

While 79% of respondents reported that they eat shellfish, it is not known if they consumed product from Connecticut or if it was wild-caught or farm-raised. The majority of respondents ate shellfish at least once a month, and state that they would pay a premium if the product was from Connecticut. The fact is that all shellfish commercially harvested in Connecticut are farm-raised, but consumers may not be aware of this. Food service professionals including chefs may consider featuring Connecticut shellfish more regularly on their menus and use the opportunity to educate their patrons about shellfish farming practices and products. Shellfish farmers may consider new direct marketing venues where they may have the opportunity to sell their product at considerably higher prices.

Farm-raised kelp is a new aquaculture product for Connecticut and markets are being explored. The results indicate that 34% of respondents eat some form of seaweed, though for the majority it was consumed on special occasions only. Of those who did not eat seaweed, 23% stated they would be willing to try it. Helping chefs to better access locally produced seaweed and to overcome barriers related to seasonality, processing and storage are essential to offering local seaweed products statewide.

Conclusions:

The results of this survey improve our general understanding of seafood consumption knowledge, behaviors and preferences among Connecticut residents. The information presented here may be important to community leaders, state and federal regulators as they consider how seafood production fits among the other water-dependent uses of our coastal waters. Also, the information may be valuable to public health officials and outreach and education professionals, as they work to improve youth and adult knowledge about the benefits and risks of seafood consumption. Finally, the information may be helpful to food service and aquaculture industries.



RELATED WORK

A complementary study on consumer willingness to pay for Connecticut aquaculture products was also conducted. Results of this study are reported in a separate document, contact the authors:

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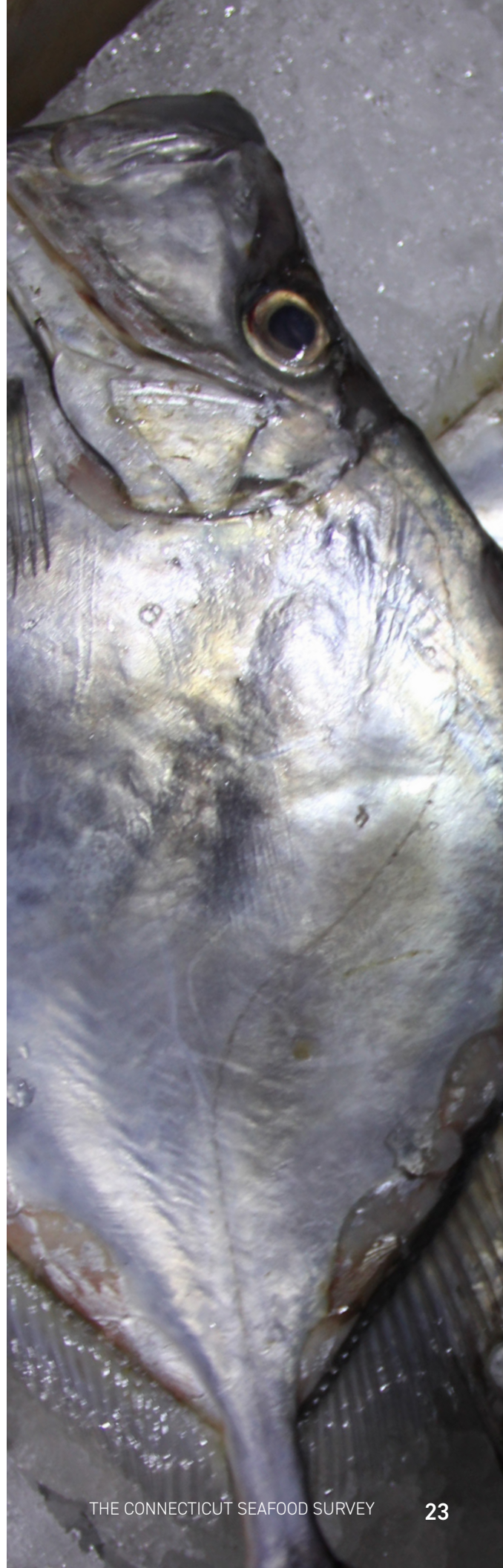
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