



ENJOYING SOFT SHELL CLAMS, JULEK CHAWARSKI

Citizen science is real-world data collection that relies on everyday people to help answer research questions. Citizen science can be more engaging and often more affordable than research conducted solely by professional scientists. By crowd-sourcing information about the world around us, citizen science can greatly expand the amount of data available to answer important research questions. A bonus is that citizen scientists often enrich their own knowledge and enjoyment of the environment in the process!

Typically, citizen science projects study wildlife in its natural habitat. In contrast, the Eat Like a Fish citizen science project studied wildlife in a human habitat: the markets, kitchens, and tables that form the final links of the supply chains that connect ocean to plate. The project formulation rested on a basic principle: no one is better suited to investigate the contents and characteristics of New England seafood counters than New England seafood eaters themselves. By putting data collection tools in the hands of everyday seafood shoppers, the project was able to penetrate New England's retail marketplace far more broadly than it ever could have with a small team of professional researchers on a limited budget. Even more importantly, the quality of the data obtained was unmatched in its realism, due to the breadth of perspectives that citizen scientists brought with them to the project.

The Eat Like a Fish project targeted three sets of research questions:

At the Market

- How readily available are New England wild seafood species in the New England retail marketplace?
- How does availability of local seafood vary by species?
- How does availability of local seafood species vary by market type, state, and distance from the coast?
- How diverse are offerings of local seafood, and how does diversity vary by market type, state, and distance from the coast?
- What factors do consumers weigh when selecting seafood?
- What can we learn from the shopping experiences of consumers who go looking for diverse local seafood?

In the Kitchen

- What can we learn from the experiences of consumers about cooking with diverse local seafood?
- How comfortable are New England seafood eaters with cooking a diverse array of local species?
- How do local species vary in their culinary practicality?
- What insights do these experiences provide for the diversification of local seafood diets?

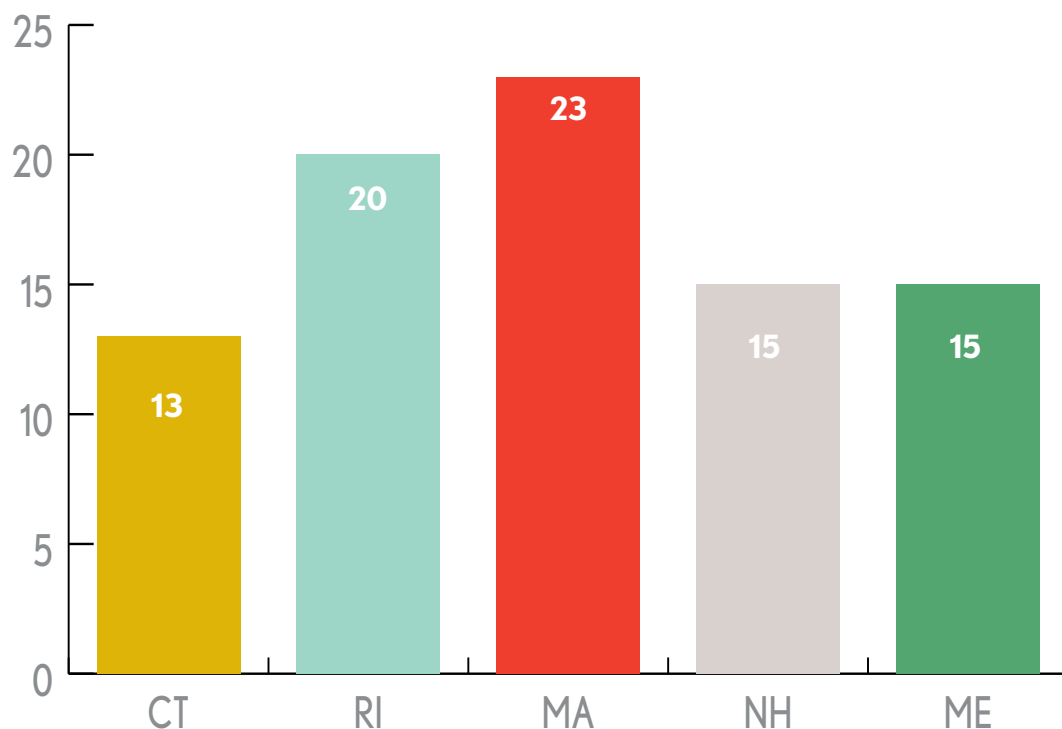
On the Table

- What can we learn from the experiences of consumers about eating diverse local seafood?
- How do local species vary in their gastronomic likability?
- What insights do these experiences provide for the diversification of local seafood diets?

To answer these questions, Eating with the Ecosystem enrolled 86 citizen scientists across the five coastal New England states (Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine), and together they embarked on a 26-week quest to locate, buy, cook, and eat local seafood. Once a week between May and November 2017, each participant received a randomly assigned list of four local species. Participants then searched for these species at up to three markets each. If they found one or more species, they took one home and prepared it for dinner. When they were done, they used an online form to submit information, impressions, stories, and even photographs to the project team for compilation. This set of methods, which is discussed in detail in the following section, not only produced a rich combination of quantitative and qualitative information about local seafood in its journey from the market to the kitchen to the table. It also produced a corps of 86 local seafood lovers with a unique first-hand understanding of the latent potential of New England's seafood market to incorporate a much larger diversity of local catches than it currently does—each of whom now has a fervent commitment to helping this potential become realized.

**FIGURE 1.
PARTICIPATION BY
STATE**

Numbers of citizen scientists residing in each state. Citizen scientists resided in all five New England coastal states (Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine). A total of 86 individuals participated consistently for the majority of the project.



86 CITIZEN SCIENTISTS

Recruitment of citizen scientists took place in April 2017 through Eating with the Ecosystem’s social media, e-newsletter, and partner networks and organizations. Interested individuals applied to participate in the project via a Survey Monkey form that solicited information about their eligibility and interest. The project team led six in-person trainings in locations throughout New England and two webinar-based trainings to familiarize potential participants with the research protocols. Participants numbered 92 at the outset of the project, but decreased to 86 within the first month due to competing life commitments. In the end, 86 dedicated citizen scientists participated for the majority of the project. This high retention rate can be attributed in part to the research team’s use of social engagement tools, including an Eat Like a Fish Facebook group, a weekly blog post and e-newsletter containing a roundup of photos and stories from the previous week, and an Eat Like a Fish refrigerator magnet and set of 52 species profile cards that were given to participants who attended in-person trainings.

Participants represented a wide variety of career paths. For example, they included a children’s book illustrator from Rhode Island, a student from Maine, a carpenter from Connecticut, a physician from New Hampshire, and an ice-cream production manager from Massachusetts. Despite the project team’s efforts to recruit a representative spectrum of demographic groups, over three quarters of participants were female. Additionally, participants tended to be young professionals, many with college or postgraduate degrees. Due to the prevalence of certain groups, we recognize that the citizen scientists involved in this project do not necessarily provide an accurate representation of New England seafood consumers at large. In part, this is due to the nature of the project: citizen scientists signed up for a project that asked them to eat local seafood once a week for six months. Therefore, participants were self-selected seafood lovers with a certain amount of disposable time and income. Although these citizen scientists may not represent the average New England consumer, they do represent consumers who care about locally caught seafood and are excited to eat a diversity of local species. As such, they represent an important group of interest for seafood marketing: the “early adopters.”

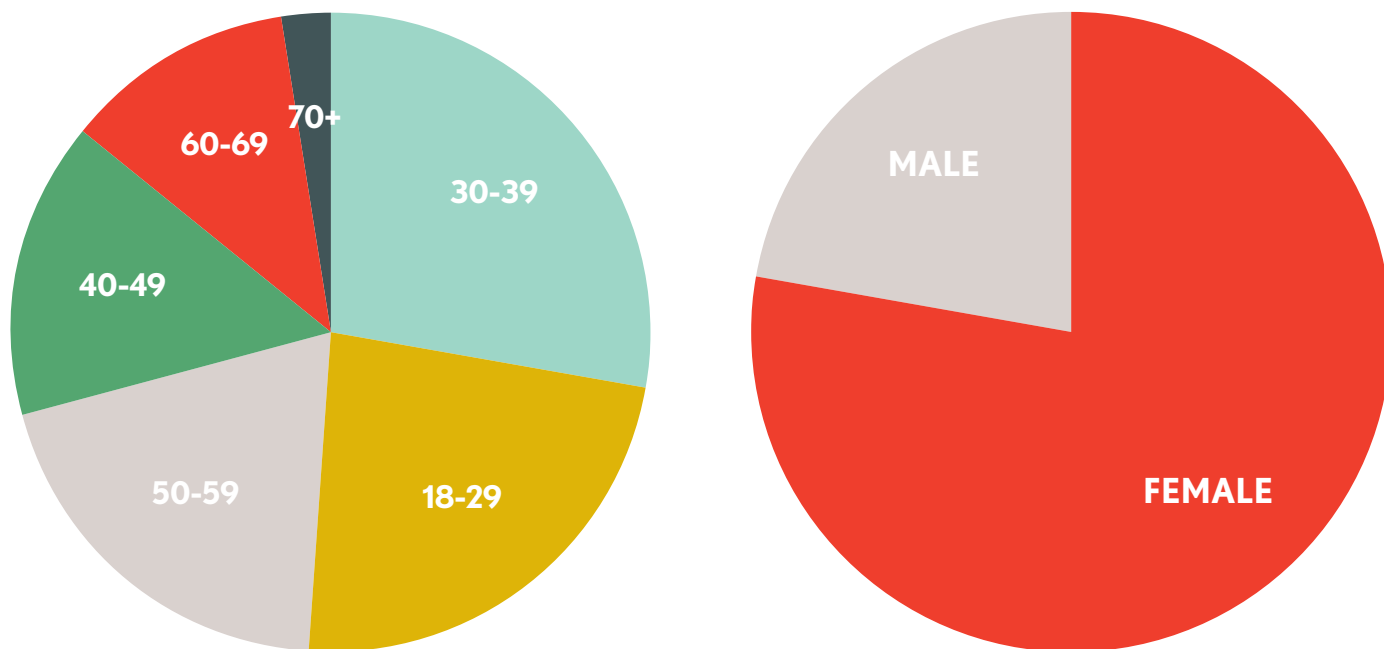


FIGURE 2. GENDER & AGE OF PARTICIPANTS

Breakdown of citizen science participants by age (left) and gender (right).

52 LOCAL SEAFOOD SPECIES

Although there are probably hundreds of species of edible marine life in New England waters, the research team selected 52 species (or in some cases, groups of closely related species) as a focus for this project. These species, which can be seen in Figure 6, are all relatively common in the Mid-Atlantic Bight, Georges Bank, and/or the Gulf of Maine. All three water bodies border New England coastlines and form most of the territory where New England-based fishing vessels harvest their catch. The species chosen ran a wide gamut: offshore, inshore, and coastal species; shellfish, finfish, and crustaceans. They ranged from well-known New England favorites such as cod, lobster, and scallops to lesser-known local species such as scup, sea robin, whiting, and skate. The research team also included a few species that have traditionally been more common in the Mid-Atlantic but are thought to be moving northwards with climate change. The team selected each species for the potential story it might tell about the ways that marine ecosystems, local fishing fleets, and the regional marketplace interact.

26 WEEKLY ASSIGNMENTS

Every week, each citizen scientist received an assignment consisting of four species, known as the Fish List. Weekly species assignments were unique to each individual and were randomly selected from the master list of 52 species using a random number generator feature in Excel. For example, on any given week, one participant might receive an assignment including scup, swordfish, mussels, and Jonah crab, while another might receive an assignment of quahogs, black sea bass, cunner, and bluefish. The next week, both assignments might be completely different. After receiving their Fish Lists, participants were tasked with venturing into the New England seafood marketplace to search for their species at one or more retail markets of their choosing. At the market, participants were instructed to verify the origin of any Fish List species they found to make sure they were landed in New England. This is because some species, such as cod, swordfish, tuna, pollock, and several others, may be caught in New England as well as in other regions or countries. Participants were also instructed to seek out only wild seafood, and not to count or purchase farmed seafood. This is because of the project's focus on comparing the species mix of New England's wild marine ecosystems with the mix of species in its marketplace. Verification of origin and harvest type was accomplished by reading labels and consulting with fishmongers.

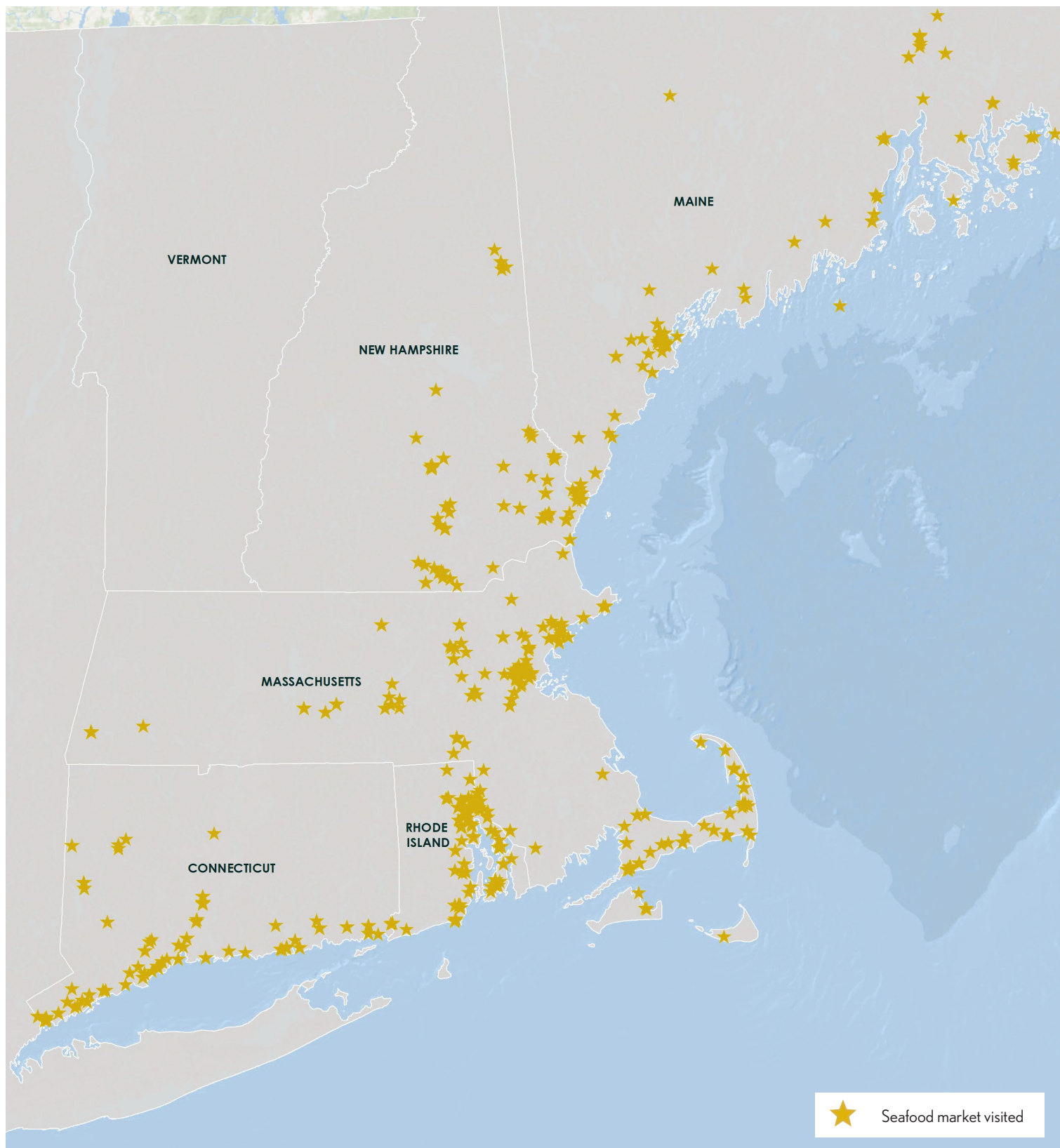


FIGURE 3. MAP OF MARKET LOCATIONS

Locations of the 394 individual markets visited by citizen scientists.

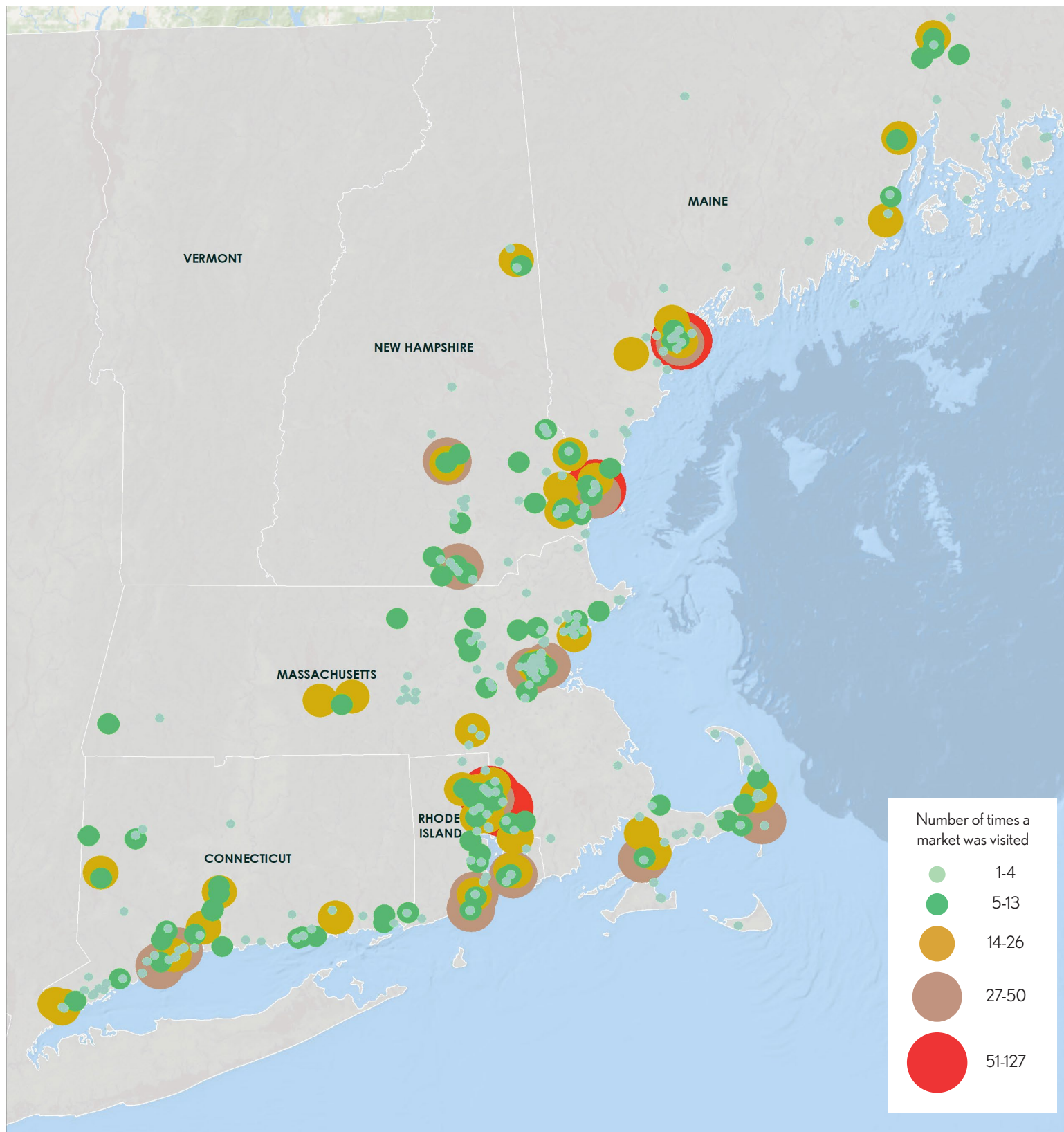
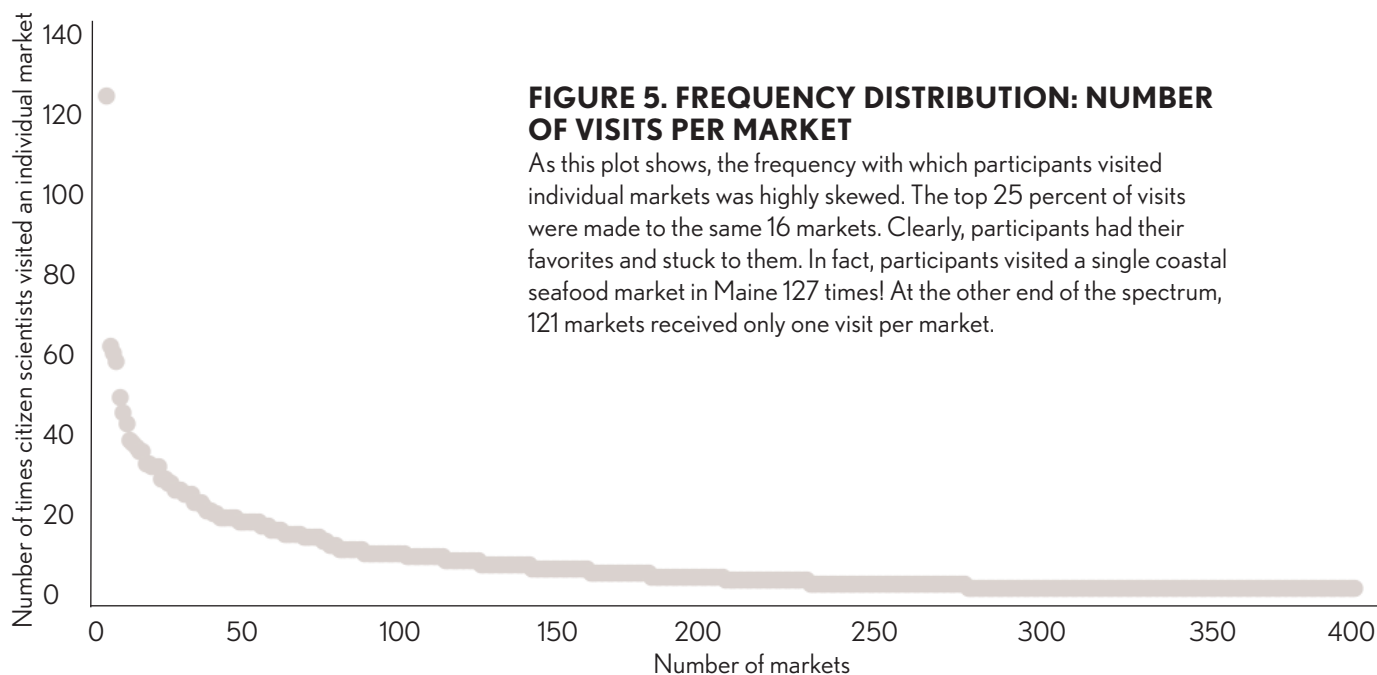


FIGURE 4. MAP OF MARKET VISIT FREQUENCY

Some markets were visited more frequently than others. In this map, the size and color of each bubble indicate the number of times each market was visited by citizen scientists during the 26-week study.



11,780 MARKET DATA POINTS

Through their market visits, which they cataloged weekly through a Survey Monkey-based “Fish Diary” (see page 15), citizen scientists produced 11,780 data points on the presence or absence of the 52 local focus species in the marketplace. The research team analyzed this data in several ways. First, the team calculated an index called the Market Availability Index (MAI), which is defined as the percentage of times a species was found, out of the number of times it was looked for. MAI scores were compared by market type (supermarket, seafood market, specialty market, and locavore market), by state, and by distance from the coast. Second, the team utilized a well-known diversity index from ecology, the Shannon-Wiener index, to compare how diversity of local species differed by market type, state, and distance from the coast. Third, the team performed a logistic regression analysis to determine the relative effect of four factors—species, market type, state, and distance from coast—on the likelihood that a species would be present at any particular market. Finally, the team used qualitative content analysis to extract meaningful themes about the shopping experience from participants’ Fish Diary entries. This data is summarized in the At the Market section on pages 17-29.

1,048 SEAFOOD DINNERS

For most citizen scientists, the best part of the role was taking their Fish List species home and eating them. In the course of the project, citizen scientists purchased, prepared, and ate 1,048 seafood meals and recorded their reactions to preparing and consuming each one in their weekly Fish Diary. The research team aggregated these responses and calculated species-specific scores of culinary practicality and gastronomic likability. The team also used qualitative content analysis to extract meaningful themes related to cooking and eating a diverse range of local species. Results related to cooking and eating Fish List species are summarized in the In the Kitchen section on pages 31-35 and the On the Table section on pages 37-41 of this report.

TAKEAWAY

The participation of 86 citizen scientists in the Eat Like a Fish project resulted in a rich and geographically diverse data set on the availability and diversity of 52 local seafood species in the marketplace, as well as real-life reactions to the experience of cooking and eating these species. This study is unique in its “real-world” setting and structure and its continued engagement of seafood lovers for an intensive six-month project.

FISH DIARY QUESTIONS

The Fish Diary was constructed in Survey Monkey, using features that allowed customization of each individual's navigation of the form based on his or her own experience. Responses were downloaded into a spreadsheet for analysis.

- What were the four species on your Fish List this week?
- What market(s) did you visit while searching for your seafood?
- Which of your four species were available at each of the markets that you visited?
- Did you purchase, prepare, and consume a species from your Fish List?
- Which species did you purchase?
- If more than one species was available, rank the following factors on a scale from 1-5, in terms of how much it influenced your choice of species: flavor, texture, freshness, prior familiarity, perceived ease of preparation, affordability, source-traceability, eco-labeling, environmental concerns, health and safety concerns, and nutritional benefit.
- What was the advertised price for the seafood you bought?
- What was the product form of the seafood you bought (e.g., filleted, whole, smoked, picked)?
- When you took the seafood home, did you require any tips or advice before preparing it?
- If so, where did you obtain advice on preparation?
- What cooking method did you use to prepare it?
- On a scale of 1-5, how would you characterize the level of difficulty involved in preparing your seafood?
- On a scale of 1-5, how much did you enjoy eating your seafood?
- How would you describe the texture of your seafood?
- How would you describe the flavor of your seafood?
- Fish Story: It's story time! What would you tell a friend about your fish eating experience? What did you learn? What surprised you? This is your chance to provide insights not captured in the questionnaire. Tell your tale!
- Upload a photo to commemorate your fish-eating experience!