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## Taco Tuesday Anyone? Understanding student demand and knowledge of local seafood.

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## Taco Tuesday Anyone? Understanding student demand and knowledge of local seafood.

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## 1. INTRODUCTION

Whether it is Maine lobster, Boston clam chowder, or Rhode Island quahogs, coastal New England is analogous to seafood. The nearly 200 lighthouses that direct fishing boats safely into harbor are perhaps as iconic within American maritime heritage as the seafood caught (D'Entremont 2018, GSA 2018). Groundfishing (for bottom-dwelling fish including cod, haddock, redfish and flounder) was America's first colonial industry and has contributed both culturally and economically to New England for more than 400 years (NOAA 2017). For instance, the National Oceanic and Atmospheric Administration (NOAA) valued the 2016 landings for all species combined in the New England region at 597,030,396 pounds and \$1,329,191,225 (NOAA 2018). When compared to the nation as a whole, New England harvested 6.2% of the total weight in landings and 24.7% of the overall economic value (ibid). The comparison disparity between weight and value results from the high value of the lobster and scallop fisheries, which are two of the most valuable fisheries in the country. In 2018, the lobster fishery in Maine was worth \$484 million, and in 2017, the port of New Bedford was the highest valued port in the country with \$389 million in landings, the majority of which were scallops (NMFS 2018). Within the New England region, Maine has the highest value of landings at \$635,809,318 in 2018, followed by Massachusetts (\$551,077,333) and Rhode Island (\$94,046,673) (ibid).

Despite the economic potential of the region, the Gulf of Maine that serves New England fisheries has been facing severe challenges, such as the unprecedented low cod stocks, (NOAA 2017) while adapting to a new regulatory framework of assigned species allocations (CEI 2015). There are various factors that have historically contributed to the decline in once abundant fisheries. Advances in fishing gear and location technology increased catch efficiencies (Johnson and Sutinen 2009). As catch per unit effort (CPUE) rose, so have sea surface temperatures. The Gulf of Maine's water temperatures have increased faster than 99% of the global ocean (Pershing et al. 2015). The warming ecosystem has led to lower recruitment and increased metabolic costs and mortality of the Atlantic cod stock in the region (ibid). Akin to cod, the lobster fishery of southern New England is facing collapse as a result of warming waters, ecosystem changes, and absence of harvester-driven conservation efforts to protect juvenile and large lobsters as well as reproductive female lobsters (Bris et al. 2018).

Intertwined with the ecological constraints, socio-economic factors contribute additional risk to the viability of the fishing industry. For instance, fishing continues to be a high risk, low-paying career (Brown et al. 2017). The Bureau of Labor Statistics reported the farming, fishing and forestry category as having the highest proportion of fatal work injuries among civilian workers in 2016 with 24.9 fatalities per 100,000 full-time equivalent workers (BLS 2016). BLS also found the mean hourly wage and annual 2017 wage for the farming, fishing and forestry category were \$15.00/hour and \$31,190/year, respectively; for reference within the same year, the mean and annual wage for all occupations were \$24.34/hour and \$50,620/year, respectively (BLS 2017).

NOAA integrates poverty into determination of social vulnerability indices for coastal communities. Many northern New England towns and cities experience social vulnerability with regard to lower income, fewer resources, fewer affordable housing options, and gentrification pressures (NOAA nd). Related to gentrification and working waterfronts, the loss of seafood industry infrastructure, such as commercial ice-making and deep-freeze storage capacity along northern New England's coastline, impacts the availability for seafood's constant cold chain requirements, thereby contributing to economic viability challenges (CEI 2015). Domestic fishing viability is further impeded by import competition from countries that may have weaker environmental and labor regulations (Brown et al. 2017).

As these challenges limit the economic livelihood of small business fishermen in the Gulf of Maine, opportunities are emerging in other parts of the food system that could provide an alternative market for local seafood. Such opportunities are connected to increased consumer interest and demand for various alternatives to conventionally produced food. Consumers are purchasing products that encompass attributes of local and regional farm viability, environmental sustainability, food safety and ethical welfare for food workers and livestock (Low et al. 2015; Torres, Barry, & Pirog 2015; Greene 2013; Honeyman et al. 2006). This trend is not limited to green grocers, natural food aisles, or direct marketing, such as farmer's markets and community supported agriculture (CSA) farms. Colleges are responding to changing student demand of alternatively produced and sourced food. One study conducted by Farm to Institution New England (FINE) found more than 95% of colleges surveyed (105 of 209 campuses in the region) purchased local food for their dining services (FINE 2017); in addition, colleges spent on average 21% of their annual food budget on local food (ibid).

While this new consumer demand invigorates land-based food production, it has yet to carry over into seafood (Brown et al. 2017). Despite outreach efforts to promote regional seafood species that are abundant and can sustain higher catch efficiencies, consumer preference for such underutilized species is largely unknown (Witkin et al. 2015). Looking specifically at colleges, only 16% of New England universities and colleges identified locally-harvested seafood within their top products based on value; while 18% found it difficult to source seafood locally and 15% are not interested in sourcing local seafood (FINE 2017). And yet, community organizations have been partnering with colleges in New England to help dining halls increase local seafood purchasing. For example, the foodservice management company Sodexo operates the dining services at 11 college campuses in the state of Maine and has been partnered with the Gulf of Maine Research Institute (GMRI), a local nonprofit, on shifting to more local seafood. GMRI has an ecolabel, the *Gulf of Maine Responsibly Harvested*<sup>®</sup> program, for regional seafood that is traceable to the Gulf of Maine and that meets criteria around responsible harvest.

For its 11 campuses in Maine, Sodexo has committed to shift to 100% of its fresh white fish being *Gulf of Maine Responsibly Harvested*<sup>®</sup> program by 2020. Part of Sodexo's goal is also to focus on sourcing underutilized species from the region. These are species that are not as

traditionally well-known, but are very similar to the fish New England consumers are more accustomed to. These species, like Atlantic pollock, Acadian redfish, or cape shark, are called underutilized because fishermen do not catch even half of the quotas they are responsibly allowed to land for these species, due to lack of market demand. As of 2018, which was three years into working on this goal, Sodexo had successfully sourced 82% *Gulf of Maine Responsibly Harvested*<sup>®</sup> white fish across the state, with a focus on underutilized species. Sodexo's staff want to build demand for these species in the near-term so that fishermen have opportunities to catch the range of species available to them. Sodexo staff also have the goal of educating students about the range of local fish available from the Gulf of Maine, creating longer-term demand for these species. Yet Sodexo is constrained by how much seafood students will eat on its campuses, and whether students absorb the messaging about the company's commitment to regional seafood. Dining hall staff try to gather anecdotal feedback from students, but they do not have good data about student preferences around seafood to inform how/when they serve seafood and communications about their local seafood goals.

Given these unknowns, we focused this study on college students, their seafood consumption, species preferences, and eco-label knowledge. A team of stakeholders from the Gulf of Maine Research Institute (GMRI), University of Southern Maine (USM) faculty, and Sodexo developed the research questions while undergraduate students conducted the research as part of USM civic engagement commitment to the community. One important goal for learning this information is to identify opportunities for additional offering and labeling of regionally-produced Gulf of Maine seafood within New England college dining.

## **2. METHODS**

The purpose of this research was to understand college student preferences of seafood as well as their knowledge of seafood eco-labeling and potential barriers to consumption. This study was conducted at the University of Southern Maine on the Portland and Gorham campuses in the 2017/2018 academic school year. The research was embedded into the course Food and Environment (FSP 210) as a community-engaged service learning project.

### **2.1. Study Area and Participants**

The University of Southern Maine (USM) is a public comprehensive university with part of the University of Maine System. USM is located in the heart of metro-Portland with three campuses in Portland, Gorham, and Lewiston, Maine. There were nearly 8,000 enrolled students in the 2017/18 academic year when this study was conducted (USM 2017). USM student community is culturally, economically and geographically diverse, representing 44 states and 21 countries (ibid). The average age of the USM student body is 27 with 77% commuter (USM nd). More than 85%

of full-time students receive financial aid averaging approximately \$14,000 per year (ibid). There are 100 areas of study among undergraduate and graduate education with the average class size is 25 given a 14:1 student to faculty ratio (USM 2017).

The target sample population were students at the Portland and Gorham, Maine campuses. The large commuter student population is useful for this type of study. Off-campus students likely utilize home kitchens and make their own food purchasing decisions. Gathering data from this diverse student body allowed us to obtain a broad sense of student seafood preferences and labeling knowledge.

## **2.2. Surveys and Data Collection**

Survey development, pilot testing, and data collection were integrated into two independent class projects of an undergraduate course Food and the Environment (FSP 210) at the University of Southern Maine (USM). Before research was conducted, students of the course completed human subjects training while the research project and related surveys were evaluated and approved by the Office of Research Integrity and Outreach, the institutional review board at USM. Survey data were collected during two semesters, fall of 2017 and spring of 2018, which represent the first and second parts of the study respectively. Participants were recruited to participate in the study in various ways. For Part 1, surveys were either administered to an entire class or to individual students. For Part 2, data were collected only in the campus dining halls. Paper copies of the surveys were administered to those willing to participate in the study; although there was no financial compensation for completing the survey, Part 2 participants received a small bag of red fish candy. A consent form was signed by all participants. There were 227 students who participated in Part 1, and 320 students in Part 2. The Part 2 sample size included 108 participants for lunch (response rate of 47% lunch customers) and 212 participants for dinner (response rate of 49% dinner customers).

The survey for Part 1 consisted of 14 questions, focusing on current seafood consumption, overall protein preferences, food eco-labeling, deterrence of purchasing local seafood, country of origin, environmental issues and dietary choices, and demographic characteristics of race, education, income and race/ethnicity. The Part 2 survey had 9 questions, concentrating on whitefish consumption and preferred preparation, seafood tasting for future café purchase, recommended seafood offering, reasons for choosing to consume tested special seafood entrée, seafood eco-labeling and educational signage, and recommendations for outreach to dining customers. Both surveys were completed in less than 10 minutes on average. Draft versions of the survey were pre-tested in focus groups consisting of more than 100 students as well as community partners at the Gulf of Maine Research Institute and Sodexo and fellow faculty at USM. Both surveys are included in the supplemental materials.

### 3. RESULTS

Results from both surveys (Parts 1 and 2) are summarized below. Data collected in the fall of 2017 aimed at answering questions concerning seafood consumption frequency, species selection, challenges, and multi-commodity food eco-labeling. The second part of the study completed in spring 2018 concentrated on seafood served within college dining and outreach associated with these new seafood offerings.

#### 3.1. Consumption Preferences, Barriers, and Demographics

For Part 1 (Fall 2017) participants, most incorporate seafood into their regular diet. On average, 15% eat seafood, such as fish or shellfish, a few times per week, while 43% eat seafood a few times per month and 29% a few times per year (N=220). The minority (remaining 12%) are those who never consume seafood. This seafood is primarily enjoyed at home (58%), followed by restaurants (37%) or the campus dining hall (5%). For the seafood prepared at home, it is largely purchased at grocery stores (73%), followed by fish markets (18%), fisherman (6%) and wholesale clubs (3%). Overall, participants showed strong preference for the top three most consumed species in the United States: salmon, shrimp and tuna, as shown in Figure 1 (Kearns 2018). More than 50% of those surveyed indicated each of these three species for seafood that they typically consume. Next in order were species such as lobster, haddock, clams, mussels and cod, commonly consumed in New England. The least popular represent a group of underutilized species found in the Gulf of Maine, such as pollock, redfish and dogfish. Sourcing seafood from the Gulf of Maine was an important factor for most of our participants with only 21% that indicated local sourcing was not an important factor in their seafood choices (N=218). Despite strong support for Gulf of Maine local seafood, cost was the top barrier for 44% of our participants (N=227). Additional impediments to consuming local seafood centered on lack of knowledge either about seafood preparation (as indicated by 24% of our sample), or the seafood's sustainability (20%).

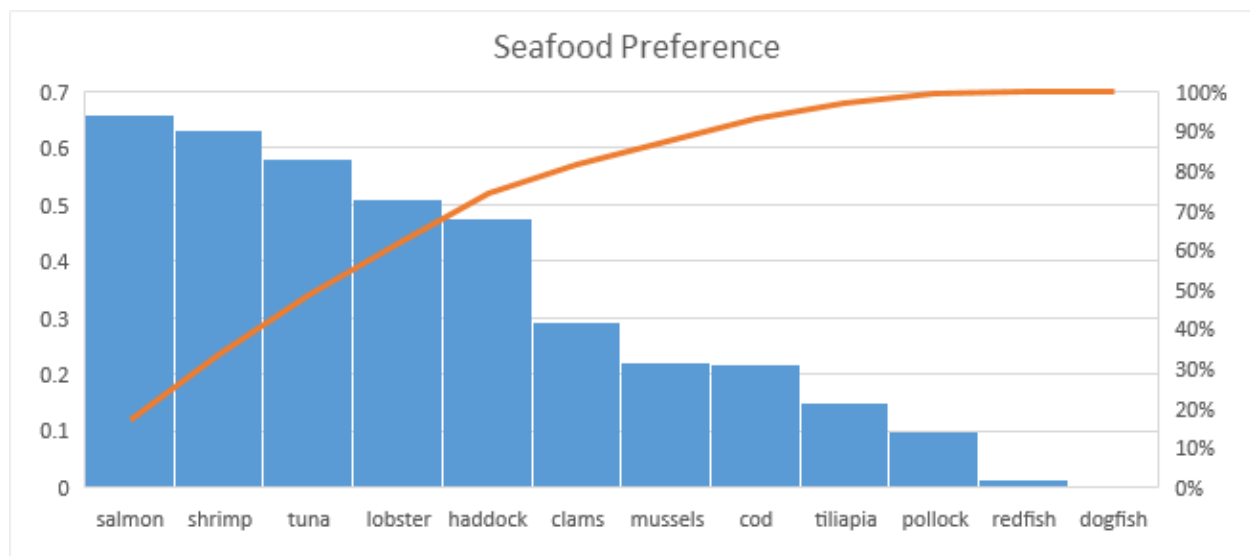


Figure 1 Species of Seafood Typically Consumed by Participants

Participants in Part 1 matched the overall student body demographics of the university. Our sample was 59.6% female, 38.7% male and 1.8% other, closely identical to 57% female for the fall 2017 undergraduate population (USM nd). Study participants were predominately white (82.4%) following the entire undergraduate student body at 18% minority (ibid). Likewise, our sample was undergraduate students (86.2%), whereas the general student population is 78% undergraduate. Finally, our participants' household income was relatively spread across the ranges provided in the survey instrument.

### 3.2. Food Labeling

Given that one-fifth of Part 1 participants were deterred by unknown sustainability sourcing of seafood, it was not surprising that the majority of participants did not recognize either of the two seafood eco-labels, as shown in Figure 2. Only 10% of our 227 participants identified with the international blue label of the Marine Stewardship Council (MSC). This label represents well-managed, independently certified sustainable fisheries around the globe (MSC nd). Nearly one quarter recognized the regional seafood label, *Gulf of Maine Responsibly Harvested*. Established by the Gulf of Maine Research Institute, this label highlights externally-reviewed fish stocks verified to meet sustainability criteria (GMRI nd). These seafood eco-labels did not perform as well compared with the other labels associated with either a state-based product (62% recognition for "Get real. get Maine!") or an organically-produced product (81% recognition for certified USDA Organic). However, the recognition of the seafood labels is in line with other market research. Through a recent consumer survey (n=4,155), the MSC found that 23% of consumers in North America recognize their label (MSC 2019). They also found that while 70% of consumers



are interested in seeing ecolabels on seafood, only 24% of consumers report noticing ecolabels when they shop, pointing to an opportunity for building better awareness (ibid).

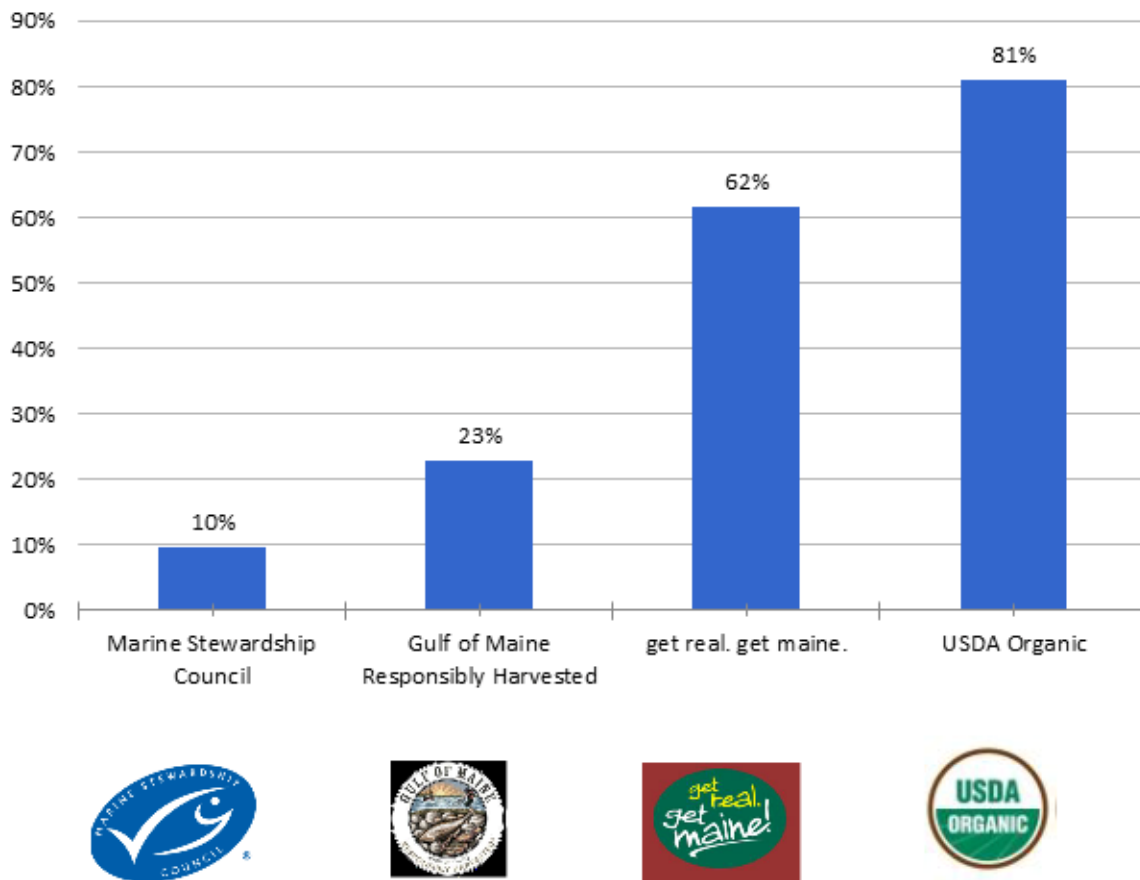


Figure 2 Positive Recognition of Food Eco-Labels

Finally, with regards to food labels, most participants (75%) indicated uncertainty of the country of origin for their seafood (N=218). Only 3% indicated that they always knew the country sources for the seafood they consumed.

### 3.3. Collegiate Café and Whitefish

White fish seafood, such as haddock, pollock, cod, redfish, hake and dogfish, are consumed by 67% of Part 2 (Spring 2018) participants. For this group, no single preparation method was singled out. For example, 29% enjoyed white fish baked, followed by 22% fried, 21% soup/chowder, 16% raw (sushi), and 12% made-to-order (freshly prepared when ordered by customer). Our sample would like to see white fish offered frequently: 43% asked for serving white fish a few times per week, 39% a few times per month, followed by 11% never and 7% a few times per semester.

Within the spring study, we tested a new entrée made of pollock, an underutilized white fish from the Gulf of Maine that has the *Gulf of Maine Responsibly Harvested*<sup>®</sup> eco-label designation. This entrée was served during lunch as a la carte, shown in Figure 3, and during dinner as part of the dormitory all-you-can-eat buffet. This new entrée was not popular for either of the meal shifts, with only 5% of those surveyed at lunch and 17% of those surveyed at dinner ordering the pollock tacos. For both lunch and dinner patrons, their top reasons for choosing the fish tacos focused on preference for seafood and eating healthfully, followed by the desire to eat locally and sustainably. Only a minority of lunch and dinner customers chose the tacos because they considered this entrée their best option among other main dishes. For the remaining participants, their top reason for *not* choosing the fish tacos was because they did not see this entrée being offered – 45% reported this as the top reason at lunch, and 26% at dinner. Secondary reasons included not liking seafood or preferring other options for that meal. The choice factors are summarized in Table 1.



Figure 3 Korean BBQ Taco Test Entrée with Outreach Small Signage and Sticker

	Reasoning to purchase Korean BBQ Grilled Pollock Tacos					
	Purchased Fish Tacos	Like Seafood	Eat Healthy	Eat Locally	Eat Sustainably	Best Available Option
Lunch (N=108)	4.6%	29.4%	35.3%	23.5%	5.9%	5.9%
Dinner (N=212)	17.5%	28.6%	23.0%	17.5%	16.7%	14.3%

	Reasoning to not purchase Korean BBQ Grilled Pollock Tacos					
	Did Not Purchase	Don't Like Any Seafood	Don't Like This Seafood	Don't Like Preparation	Didn't See Taco Entrée	Prefer Other Entrée
Lunch (N=108)	95.4%	16.7%	7.3%	3.1%	44.8%	19.8%
Dinner (N=212)	82.5%	22.9%	10.1%	13.4%	25.7%	24.0%

Table 1 Consumer Choices for Korean BBQ Taco Test Entrée

### 3.4. Outreach and Marketing

While testing the new fish entrée in Spring 2018 (Part 2), several key pieces of outreach regarding the sustainability and sourcing of *Gulf of Maine Responsibly Harvested*<sup>®</sup> white fish were located throughout both cafeterias. For the lunch location, there were 4 posters around the serving lines; while at dinner, there were 8 posters in the larger dormitory cafeteria. In addition to the posters, smaller signage was located alongside the grill stations serving the tacos. Finally, stickers showing the *Gulf of Maine Responsibly Harvested*<sup>®</sup> eco-label were affixed to wax paper lining each order of tacos, as shown in Figure 3. Overall, 34% of participants recognized the *Gulf of Maine Responsibly Harvested*<sup>®</sup> eco-label, which was incorporated into all the posters, serving station signs and stickers. Of those who purchased the fish tacos, 57% noticed the eco-label (on a sticker on the wax paper lining their taco order). For the larger posters, 27% of participants noticed them during lunch while 43% noticed at dinner. However, when asked if they read the posters, only 16% at lunch and 18% at dinner actually read the content of this outreach.

Finally, we asked the participants for their preferred method for informing dining customers on the sourcing of food, such as origin or production methods. Taste testing was the most desired method for marketing and promotion, followed by signage, then information sheets and social media. The least popular among available options was to listen to servers behind the grill line or stations describing food information. Specifically, to seafood, the prospect of offering free samples to try seafood entrées was positively received by 63% of those surveyed.

#### **4. DISCUSSION**

In general, the U.S. Department of Agriculture, U.S. Department of Commerce and the seafood industry should be encouraged with these findings that show strong interest in more seafood offerings in collegiate dining services. This stated preference of 43% of our surveyed participants preferring several servings per week falls in line with the seafood recommendation set by the U.S. Department of Agriculture (USDA), which equates to 8 ounces per week (2 servings per week at 4 ounces each) of a variety of seafood (USDA 2015). Average American consumption of seafood was estimated by the U.S. Department of Commerce to be 16 pounds of edible meat in 2017 (Van Voorhees 2016). This amount of approximately 4.9 ounces per week is well below the USDA seafood recommendation. Seafood consumption estimates by the USDA are more off-target: “seafood was one of the least consumed protein foods on a weekly per capita basis in 2014” with 2.7 ounces per week or about one-third of the recommended amount (Kantor 2016). Thus, even of those who eat seafood, most Americans are not consuming the recommended amount of fish and shellfish (Jahns et al. 2014).

Yet, stated preference by students may not equate to actual consumption. Only 15% of our participants ate seafood at an amount to meet the USDA guidelines. Whether it is perceived as too expensive, or not knowing how to cook seafood at home, or not recognizing the actual offering of local seafood in the cafeteria, there are plenty of barriers to seafood consumption. Other studies identified similar limitations to fish and shellfish consumption. For instance, high price perception of seafood was a barrier to seafood consumption in young adults of Norway and Russia (Ivoninskii 2016). Another study in Spain and Belgium found the perception of fish as being very expensive to be the main barrier (Brunsø et al. 2009). Lack of knowledge has been shown to reduce consumption, whether in regards to cooking seafood properly and tastefully (Birkner 2015) or using cues to identify quality seafood (Brunsø et al. 2009).

Perceived barriers for consumers can also be barriers for institutions. The higher price point for local food was reported as a top barrier for colleges and K-12 school systems (FINE 2018). More specifically, institutions need consistent volume available within an affordable price range and required processed form (FINE 2016). Comparable pricing of seafood with other land-based proteins was achieved through this study by using pollock, a more affordable fish species that is locally plentiful. In addition to pollock, underutilized species such as skate, Acadian redfish, white hake and dogfish are served at colleges with Sea to Campus seafood programs within the Gulf of Maine region (FINE 2016). These New England colleges have found today’s college students are willing to try these species, as opposed to traditionally popular white fish like cod and haddock, as long as the fish is local, healthy and properly prepared (Zwirn 2016).

This modern preparation, along with presentation, price equivalency and educational outreach may be key to the success for student acceptance. On the menu at the University of Massachusetts at Amherst is cashew-crusted baked pollock with jicama mango slaw and sweet chili glazed

pollock; while Wellesley College serves pollock in Cape Cod Rueben sandwiches or braised Cantonese-style (Zwirn 2016). Favored recipes at the University of New Hampshire are skate wing tacos de with pico de gallo, cilantro, roasted corn and chipotle mayo as well as seafood ceviche made with redfish, serrano peppers, citrus juice, and local kelp slaw (FINE 2016). This study's featured seafood dish, Korean BBQ pollock tacos served with Asian slaw and spicy mayo, had a similar taste portfolio to these dishes. Aside from preparation and presentation, seafood entrées should be offered at the same price as other main entrées (for a la carte cafeterias) or incorporated into a meal plan (either for a la carte or buffet dining styles) to assure student consumption. This entrée equivalence may require proper education among customers, as 8% of a la carte customers in this study did not choose the featured seafood item because they thought it was too expensive when not included as part of their meal plan. Other education information used within this study as well as other institutions promote the featured seafood entrée by highlighting sustainability characteristics of the underutilized fish and/or certification program through eco-labeling. These educational efforts need to be ongoing since the student customer base changes each academic year, as recognized by Colby College (FINE 2016).

Overall, the results point to strong student interest in consuming local seafood, with 48% of students stating that the local attribute was important or very important to them. Given the results showing lack of student attention to signage, it is a positive outcome that a local ecolabel garnered 23% recognition from students, especially since it is particular to seafood and has only been in use on the USM campus for 2 years. This result is one that Sodexo and the *Gulf of Maine Responsibly Harvested* program can build on in raising awareness of local seafood availability in the dining hall. In general, there is opportunity for college dining halls to explore different methods for communicating when they are sourcing local seafood and/or using a local ecolabel in order to increase uptake and satisfaction from their customers.

## 5. CONCLUSION

While minimizing barriers, collegiate dining services and other institutions have an opportunity to support locally abundant seafood as part of a more ecologically sustainable, economically viable and socially equitable food system. As a result of this study, the University of Southern Maine increased their Gulf of Maine seafood offerings three-fold, thereby contributing an additional \$10,551 per semester into the regional fisheries economy (Stone 2019). Furthermore, USM reached 99% of the 100% GMRI whitefish commitment this past February (McInnis 2019). This local seafood purchase aligned with the University of Maine System goal to serve 100% of fresh white fish through the *Gulf of Maine Responsibly Harvested*<sup>®</sup> program by 2020.

Collegiate dining services have a unique opportunity when orientating food options that align with socio-ecological values and proper education and outreach to shape dietary choice well beyond the college years (O'Hara and McClenachan 2018). There is great potential for more synergy between college dining in New England and the region's fishing economy. The results of

this research demonstrate that there is strong student demand for local seafood, with particular awareness of health benefits and economic contribution to the region. This dovetails with the seafood industry's goal of building regional markets for the full range of species available for fishermen to catch in the Gulf of Maine. It also aligns with the goals of foodservice operators like Sodexo to provide healthy food and to find local and sustainable food sources for their university clients. Other college dining operations in New England and beyond could carry out some of the recommendations from these results and could also replicate this research on their own campuses to determine the potential for serving more seafood and contributing to the local seafood economy. Understanding student willingness to explore new flavors paired with outreach and commitment from food service providers are ingredients for success sourcing regional, underutilized seafood.

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