

Title: Understanding the Demand for Local Seafood to Improve Accessibility Throughout an Urban San Diego

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Date: 07-02-2020

CASG Publication Number: CASG-2020-004

Completed for Bachelor of Science in Environmental Systems



Understanding the Demand for Local Seafood to Improve Accessibility Throughout an Urban San Diego

Abstract

The availability of local seafood in San Diego is largely limited to the coastline, indicating that inland communities may not be accessing the wealth of fresh seafood landed within San Diego. Tuna Harbor Dockside Market (abbreviated as THDM) provides access to sustainably-sourced seafood that was landed within San Diego. However, the extent that local seafood reaches all communities in San Diego through coastal outlets such as this market is not well understood. This study investigates the racial-ethnic and geographic demographics of the visitors to THDM, their seafood preferences at THDM and at other markets, and whether factors like time of day and weather affected visitation patterns at THDM. In-person surveys were conducted during market hours from November 2019 to March 2020, then analyzed using descriptive statistics and Chi Square Goodness of Fit. The visitors at THDM were found to be disproportionately Asian and White-identifying, but geographically visitors were distributed all across San Diego County. Asian visitors were found to prefer non-mainstream seafood products like whole fish, crab, and snails. White visitors preferred filleted fish and, from other markets, smoked seafood products. Black and Latinx visitors seemed to prefer buying seafood at other markets. THDM was also found to be valuable to the tourism industry as tourists composed approximately 15% of the visitors surveyed. Weather patterns and time of day also affected the proportions of groups represented, as visitation patterns by each racial-ethnic group varied depending on time of day and weather conditions.

Introduction

As a coastal city, San Diego is one of the places that give California its reputation for sunny beaches and vibrant harborfront scenes. San Diego also has a rich seafood history; once known as the “Tuna Capital of the World”, San Diego was a major contributor to the rise of the tuna industry as we know it (Rohit, 2018). However, most of the seafood consumed in San Diego today is sourced from outside of the region and even the country (Talley & Batnitzky, 2015; Gephart et al. 2019). Studies revealed that the availability of local, San Diego sourced seafood in San Diego markets and restaurants is limited, with only a relatively small proportion of businesses offering local seafood, most of which is located within 2 km of the coast (Talley et al., 2016; Soto, 2018). This narrow geographic window of availability indicates that locally landed seafood may not be reaching inland communities, which include ethnically and culturally diverse groups and disadvantaged areas (Talley et al., 2016, Soto, 2018). A lack of broad availability of fresh, responsibly sourced, local seafood may contribute to variable consumption patterns among people of different ages, income, and education levels (Jahns, et al. 2014). This finding indicates that the achievement of “ocean to plate” for all San Diego residents is a work in

progress, but it is a goal worth striving for. Strong local food supply chains confer many environmental, social, and economic benefits, including transparency in the sourcing of food production, provision of jobs, boosts to the local economy, and increased availability of fresh food (Talley et al., 2016). Understanding the demand for locally sourced seafood by the diverse groups who live and visit the San Diego area could help to inform a strengthening of the local seafood system throughout the city, from coast to inland.

Therefore, this project aims to improve our understanding of the people who purchase San Diego-sourced seafood and their seafood buying habits in order to inform marketing efforts and increase availability of San Diego's seafood throughout the city. Only one market exclusively sells San Diego-sourced seafood: the Tuna Harbor Dockside Market (hereafter THDM), San Diego's only fishermen's market. This Saturday-only dockside market was established in 2015 to sell local seafood directly from San Diegan fishermen to San Diegan visitors. THDM's goals are to reconnect the public to fishing and aquaculture communities in San Diego by selling high quality, local, sustainable seafood and providing a space for education about San Diego's fishing history and the environmental impacts of our seafood choices (THDM, 2020). In collaboration with THDM, this project specifically addressed the following questions: Who visits the market and buys San Diego sourced seafood? When do people buy? What do people buy? Where else, besides THDM, do people like to buy seafood?

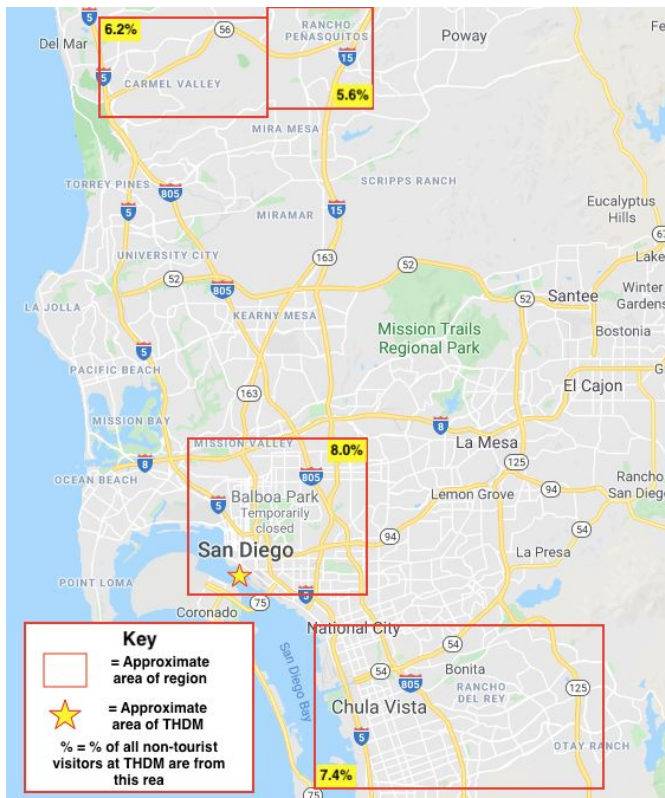
Methods

Oral surveys were conducted six times from 23 November 2019 to 14 March 2020 at the Saturday-only THDM. In an effort to reduce sample bias, visitors were selected haphazardly as surveyors stood in one location and asked everyone who walked past whether they would be willing to participate. During times with less foot traffic, surveyors walked through the market and haphazardly selected visitors who were not in the middle of a transaction or conversation. We cautiously treat the responses of these haphazardly-chosen participants as reflections of the overall pool of THDM visitors, and acknowledge that there may be biases associated with the sample of people who were willing to participate. The majority of surveys were conducted in English, although two were in Cantonese, one in Mandarin, and one was in Spanish.

The date, time, and weather conditions (sunniness and temperature) during each survey were recorded. Visitors were asked questions about their THDM visitation frequency, other seafood market visitations, and the products commonly purchased at the various markets. Participants were also asked to provide their self-identified racial and/or ethnic identity and their home zip code, along with any suggestions they felt could make the market better for them. All of the surveys were anonymous, non-incentivized, and voluntary, with participants able to decline answering any questions.

Survey responses were entered in Google Sheets and summarized by hour as appropriate (e.g., sums, averages). The mileage between the zip code centroid and THDM by car was calculated using Google Maps and recorded. Descriptive statistics (sums, averages, standard errors) using proportional data were used to summarize and visualize all variables. Relationships between the number of visitors (total visitors and numbers from each racial/ethnic group) and both the hour of day and weather conditions (sunniness and temperature) were explored using simple regressions in JMP Pro 15 Statistical Software. Preferences for each type of seafood product were compared among racial-ethnic groups using raw data and Chi Square Goodness of Fit test in JMP Pro 15.

The presence of tourists was also taken into account, to minimize their influence as outliers in data analyses of distances traveled to go to THDM. Tourists were defined as either having a non-Californian zip code, a zip code that was over 180 miles away from THDM, or if the participant self-identified as a tourist. Survey results for American Indian groups and Other groups were removed from analyses because there was not enough representation from these groups to confidently analyze their visitation behavior. Those who did identify as American Indian were added to the Bi-racial category, as all the respondents who identified as American Indian also identified with more than one racial-ethnic group.



Results and Discussion

A total of 196 visitors completed surveys throughout this study period. They provided information about who they are, when they buy, what types of seafood they buy at THDM, and where else they buy seafood from.

Who visits the THDM?

About 16% said that they were regular visitors, almost one quarter each visited the market at least twice (22%) if not semi-regularly (24%), and over one

Fig. 1. Map of regions with the most non-tourist visitors to THDM from 23 Nov 2019 to 14 Mar 2020. n=196.

third (38%) were first time visitors. Almost half of the first time visitors (15% of all participants) were tourists. The 167 non-tourist visitors traveled an average of 21.4 miles one-way to go to THDM (range: 1.8 to 137 miles one-way). The distribution of visitors was extremely widespread over San Diego County, with the highest proportions of visitors coming from within the city of San Diego (8%), followed by visitors from Chula Vista (7.4%), Carmel Valley (6.2%), and Rancho Peñasquitos (5.6%) (Fig. 1).

Over half (52%) of the 196 participants at the THDM during this study period self-identified as Asian, nearly one quarter identified as White, and 8% or fewer identified as another group (Fig. 2). Of those who identified as Asian and also specified a race or ethnicity, 47% were Filipino, 13% were Vietnamese, 13%

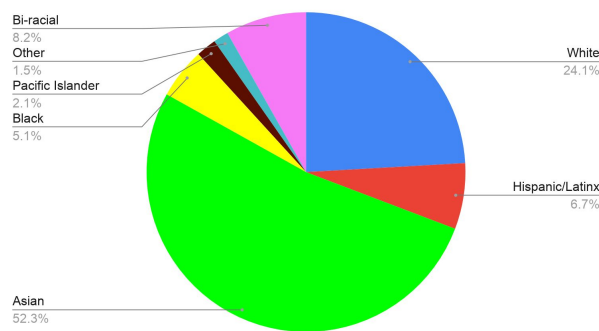


Fig. 2. Percentages of survey respondents within each self-identified racial-ethnic group at the Tuna Harbor Dockside Market, San Diego, CA during winter 2019-2020.

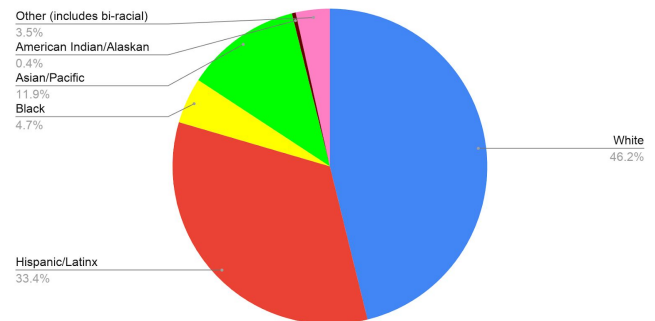


Fig. 3. Percentages of people within major racial-ethnic groups in San Diego County in 2019. (County of San Diego, 2019a).

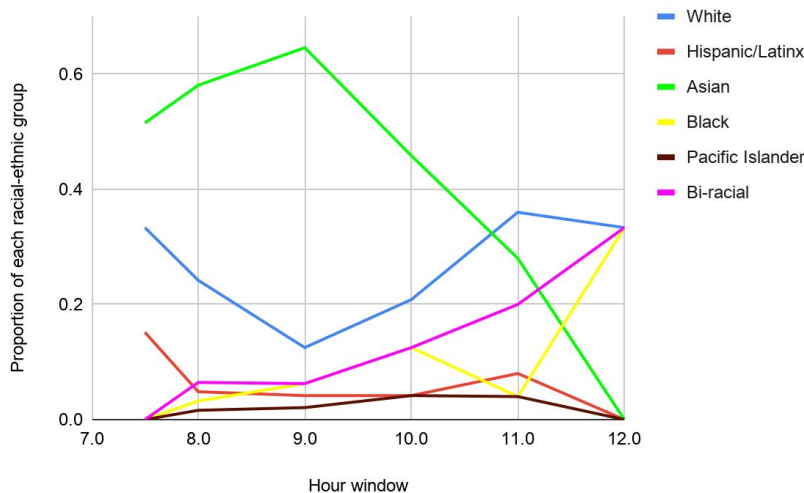


Fig. 4. Proportion of visitors from self-identified racial-ethnic groups at the THDM throughout an average day. Proportions reflect pooled hourly data from across the study period of Nov 2019-March 2020. n=196 surveys

were Chinese, 13% were Japanese, 10% were Indian, and 3% were Laoatian. Of the six who both identified as Latinx only and also specified a race or ethnicity, five identified as Mexican and one as Portugese. People identifying as other groups did not further specify except for one person who identified as White and also of Irish descent. The tourists interviewed did not reflect

overall demographics, with 43% identifying as White and 40% as Asian. A comparison with county demographic data (County of San Diego, 2019a) reveals a disproportionately large representation of Asian- and Pacific Islander-identifying visitors (55% total) and bi-racial visitors (8%) at the THDM compared to 12% and about 3%, respectively, in the county (Fig. 3). Conversely, there were proportionally fewer White (24%) and Latinx (7%) visitors at the THDM than expected based on county data (White: 46%, Latinx: 33%; Figs. 2,3).

When were visitors buying?

Asian-identifying visitors tended to visit the THDM earlier in the day; they were the predominant group waiting in line for the market to open at 8 am until about 10 am ($p=0.05$, $R^2=0.14$, $n=26$; Fig. 4). There were two peaks in visitation of White-identifying visitors- one at the opening of the market and the other later in the day starting at 11:00 am ($p=0.08$, $R^2=0.19$, $n=26$; Fig. 4). Visits from Bi-racial and Black customers tended to increase as the day went on ($p\leq 0.02$, $R^2\geq 0.19$, $n=26$), while the Latinx and Pacific Islander-identifying visitors did not vary significantly throughout the day ($p>0.13$). Visitors who were tourists represented anywhere from 9% to 33% of the survey responses from every given hour window. Interestingly, tourist survey responses were the least in the 8:00 am hour window instead of the 7:30 am hour window. The 12:00 pm hour window had the greatest tourist representation, however due to the low number of responses in general at that time, this finding may not be the most accurate. As tourists buy less often than non-tourist visitors, the tourist representation before the start of the market was surprising in that it suggests that tourists who purchase seafood come to the market early, while the tourists who come to the market later during the day may be there for other reasons (e.g., sightseeing).

Weather conditions also affected the number of visitors with higher

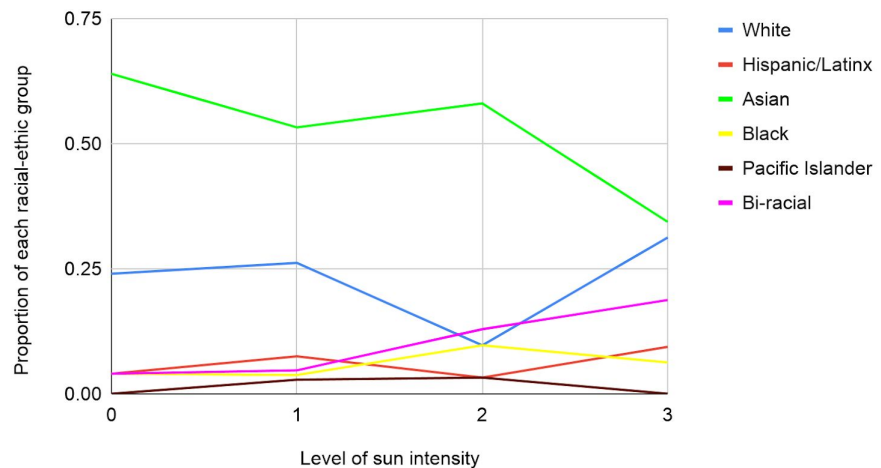


Fig. 5. Proportions of each racial-ethnic group at THDM from 23 Nov 2019- 14 March 2020 with sun intensity, with 0 being overcast with precipitation and 3 being full sun. Data were pooled from across the study period of Nov 2019-March 2020. n=196.

attendance during sunnier and warm weather, and declines with cooler, cloudier and rainy weather (personal observation). While these visitation patterns were generally similar across groups, the proportion of Asian-identifying visitors greatly dominated during the more inclement weather conditions (sun intensity=0-2; Fig. 5) and only became more similar to other groups when conditions were clear (sun intensity=3; Fig. 5). This finding may indicate that Asian visitors were more willing to endure inclement weather for seafood than other racial-ethnic groups were.

What were visitors buying?

Most of the participants (82%) said that they buy seafood from THDM. It was noted, however, that only 43% of tourist participants bought from THDM as compared to 89% of the non-tourist participants. On average, customers buy 1.9 different types of seafood offered at

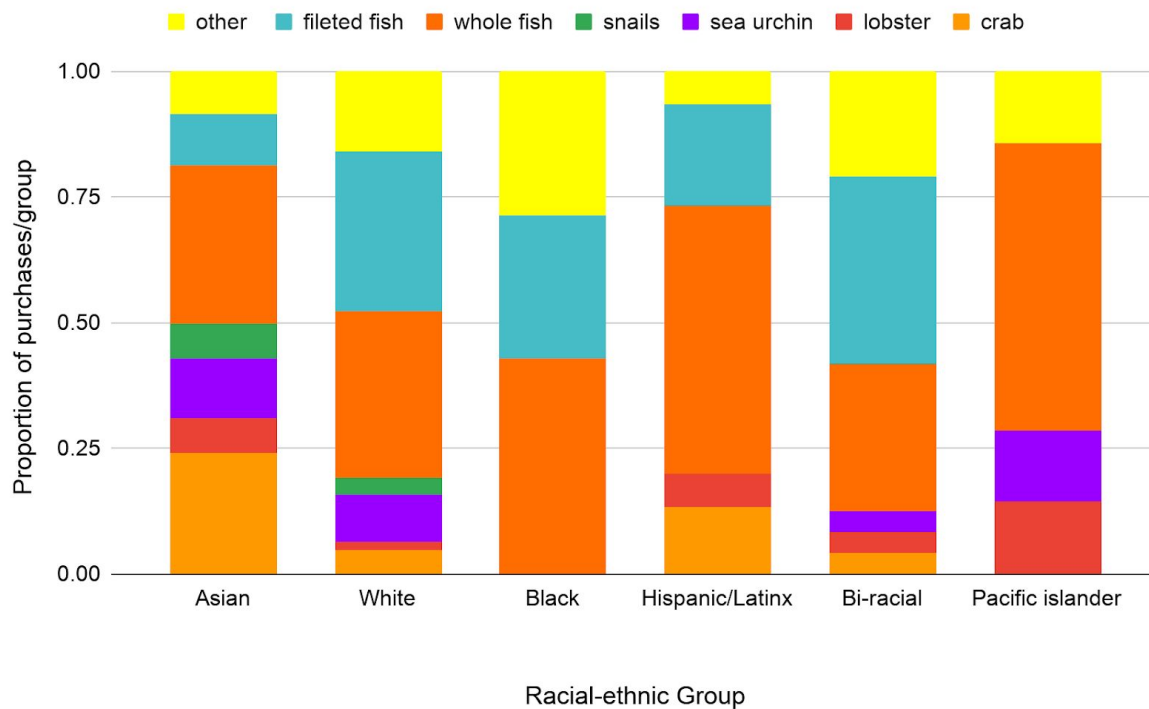


Fig. 6. Seafood preferences of customers from different self-identified racial/ethnic groups at the Tuna Harbor Docks Market, San Diego, California. Data are from Nov. 2019-March 2020. n=306 responses from 194 people.

THDM, with each person purchasing from one to seven types. Of the total 307 responses, whole fish was the most popular product (34% of total responses), fileted fish and crab tied for second

most popular (about 17% for each), red sea urchin and other products (i.e. spot prawns, cephalopods) made up 10-11% of responses, spiny lobster and snails (Kelleys whelk and top snail) made up 5-6% of responses, and 3% of responses were for prepared food.

Overall, Asian- and White-identifying customers made up the majority of responses about purchases (57% and 21%, respectively). Comparisons of the types of seafood that customers said they buy at the market revealed that seafood choice was not independent of self-identified racial/ethnic groups. Asian-identifying customers were usually more likely or as likely to purchase crab, lobster, red sea urchin, snails and whole fish than if preferences were independent of racial/ethnic group (Chi Square \geq 9, $p\leq$ 0.07, $n=194$), with these taxa comprising 80% of their purchases (Fig. 5). Asian- and White-identifying customers were the only ones to buy snails. White-, Black- and Bi-racial identifying customers were each as much or more likely to buy filleted fish and other products (e.g., spot prawn, squid) than if preference was independent of racial/ethnic identity (Chi Square \geq 18, $p<$ 0.001, $n=194$); these items along with whole fish comprised 80% or more of purchases for these groups (Fig. 5). Self-identifying Latinx customers were as much or more likely to buy whole fish, filleted fish and crab (Chi Square \geq 13, $p\leq$ 0.04, $n=194$), comprising 86% of their purchases (Fig. 5). Self-identifying Pacific Islander customers were as much or more likely to buy whole fish and red sea urchin than if preference was independent of racial/ethnic identity (Chi Square \geq 13, $p\leq$ 0.05, $n=194$); these products, along with lobster, comprised 86% of purchases (Fig. 5).

Where else do visitors buy seafood and what do they buy?

Most participants (82%) said that they purchase seafood from other markets, including wholesale outlets (Costco), chain grocery stores (Whole Foods, Ralphs, Vons), Asian groceries (including 99 Ranch, Seafood City, H Mart, Vien Dong, Zion, Manila Seafood, Lucky Seafood, Mitsuwa, Shun Fat) and local seafood markets (Point Loma Seafood, Catalina Offshore). Based on a total of 348 responses, filleted fish was the most commonly purchased product from markets (31% of responses), followed by whole fish (24%), lobster (6%), and a variety of other products (including prawns, squid, octopus, and bivalves) (22% total).

On average, people buy 1.8 types of seafood from other markets with each person stating that they buy anywhere from 1 to 6 types of products. Types of seafood bought at supermarkets generally tracked the products bought at THDM (e.g., filleted fish, whole fish, crab), except for several items only available at THDM, including red sea urchin and two species of local snails, and items only consistently available at supermarkets, including a variety of canned and smoked products. All groups purchased canned products from grocery stores (Fig. 6), but preference was not correlated with racial-ethnic group (Chi Square=4, $p=$ 0.63, $n=192$). All groups also purchased smoked products from grocery stores (Fig. 6), but more White-identifying and fewer

Asian-identifying customers preferred these products than if preference was independent of race-ethnicity (Chi Square=13, p=04, n=192).

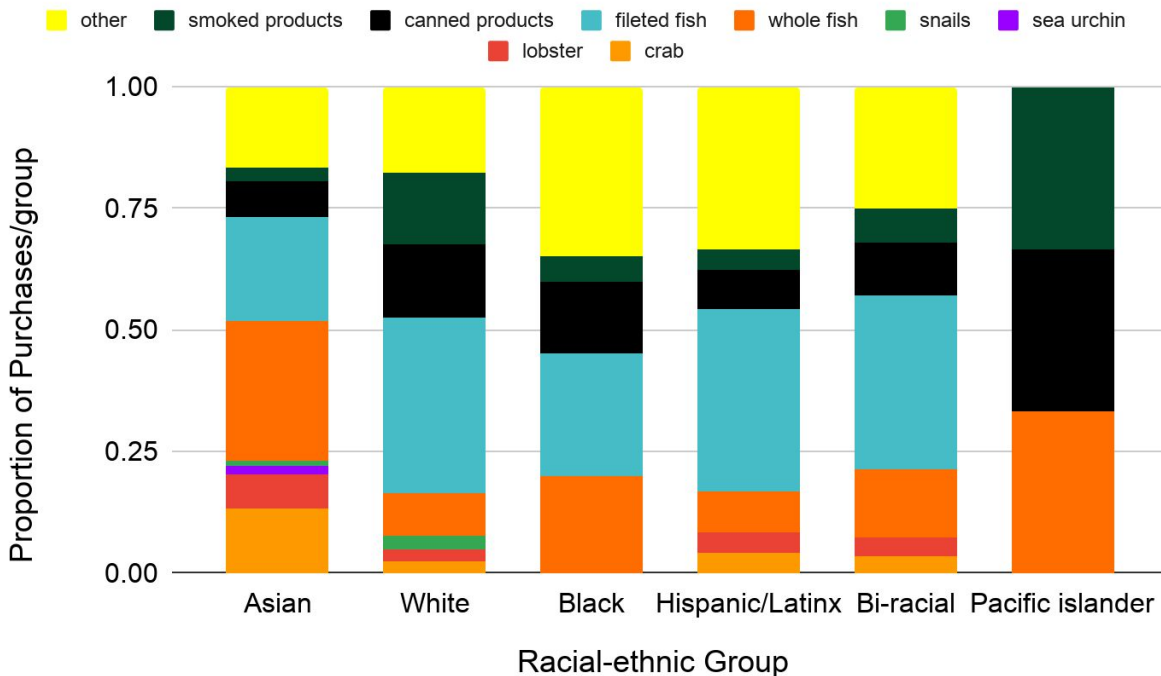


Fig. 7. Seafood preferences of customers from different self-identified racial/ethnic groups at markets outside of the Tuna Harbor Docks Market. Data are from Nov. 2019-March 2020. n=306 responses from 194 people.

Preferences for filleted fish at supermarkets, compared with THDM, stayed about the same for all groups except Asian-identifying, who were twice as likely (21% vs 10% of responses) to buy filleted fish at supermarkets (Figs. 5 and 6). Preferences for whole fish in supermarkets compared with THDM were 2-6x lower for all groups except Asian-identifying customers whose preference did not change (about 30% of responses; Figs. 5 and 6).

Seafood purchasing patterns at grocery stores may be tied with convenience, as grocery stores are closer to home, have more variety of goods, and have more hours. As such, more visits and easier access may result in more variety of purchases. Many THDM visitors stated that some of the barriers to buying local seafood at THDM included difficult parking, limited hours of operation, and a limited selection of seafood. Visitors also suggested implementing multi-lingual signs, more fish cleaning stations, quick steaming services, and more seating areas as ways that THDM could improve. These comments indicate that visitors would be more willing to come if the barrier of inconvenience is addressed. Currently, choices at THDM are tied to fresher products and being able to interact with fishermen, which makes people more adventurous and

comfortable with products, and more likely to buy whole fish (Talley & Batnitzky, 2015). Therefore, increasing access to locally-sourced seafood will most likely involve both coastal seafood outlets like THDM, and markets throughout San Diego.

The addition of smoked, canned and other value-added products (Green, 2004; Morrissey & DeWitt, 2013) to the selection at the THDM, and efforts to increase the hours of operation and, potentially, the number of fishermen's markets could get more local seafood into the hands of people willing and able to make the trip to the docks. However, more coastal infrastructure including processing and canning facilities, freezer and dry storage space, and marketing space will be needed for that to happen (Talley et al. 2017). Supplying more local products, including filleted fish and other value added products to area supermarkets would also increase accessibility of locally-sourced seafood throughout the city to meet the existing demand. However, many barriers along the seafood supply chain would need to be overcome, which calls for strategies to increase seafood supplies (Southwest Fisheries Science Center [SFSC], 2019), coastal and inland infrastructure to prepare and distribute product, outreach and marketing to increase public familiarity with local products and producers, and the value of a local food system (Talley et al., 2016; County of San Diego, 2019b).

Limitations to this study

As with any survey-based effort, there were biases related to who was willing and able to take the survey. Because the majority of surveys were in English, non-English speaking visitors were largely excluded from this study. Sampling effort also varied throughout the study, as the number of surveyors ranged from one to three within and across sampling days, so the number of surveys per hour or day could not be used to indicate the number of visitors to the market. Several external events also influenced the number and types of visitors to THDM, including a street fair that attracted more tourists to the market than usual, the Lunar New Year, which attracted more Asian-identifying visitors, a storm that ended market hours early, and market restrictions from COVID-19.

Conclusions and Future Research

Visitors willing to come to the coast to buy local, fresh seafood hailed from all over San Diego County, but visitor demographics were predominantly Asian or White. Different racial-ethnic groups preferred different types of seafood, and there were differences in seafood preferences at THDM as compared to seafood preferences at other markets. These findings indicate that although seafood consumption is not broadly linked to racial-ethnic group (Jahns et al., 2014), the specific types of seafood preferred may vary with racial-ethnic groups over local

scales. Furthermore, customers appear to come to THDM for fresher seafood, while seafood at other markets are purchased more so for convenience. Tourists are also visiting THDM even though they do not buy as much seafood, which indicates that THDM could benefit from partnerships with local restaurants that can cater to tourists' needs.

In the future, a year-long study may show better patterns in terms of demographics and preferred seafood, as well as preferences for seasonal seafood that may have not been available or as abundant during the months of survey collection. Future studies would also benefit by providing non-English surveys to collect a more accurate representation of visitors at the market. Studies of tourists at THDM and their motives for coming would also be beneficial, as they may provide insight into tourist preferences in San Diego. Behavioral studies of visitor engagement at THDM would also be beneficial in providing insight on what attracts people to THDM. Research on racial groups and general seafood preferences in San Diego would also be beneficial as they may help us understand where and how to direct conservation efforts towards. For example, Black and Latinx communities were found to be less likely to buy seafood from THDM but reported buying seafood elsewhere, while Asian consumers were more likely to buy non-mainstream seafood species like crab, snails, and lobsters. Further research is needed to identify why these patterns are the case, and can inform better marketing and policy strategies to increase equitable access to local, sustainable seafood. Research on tourist groups may also be beneficial, as knowing what attracts tourists to THDM and what their seafood preferences are may inform partnerships between THDM and other local businesses to strengthen the relationship between the local seafood system and the tourism industry in San Diego.

Comments from respondents also indicated that some visitors did not understand the mission and goals of THDM (i.e., its commitment to local and sustainable seafood), which indicate that more educational outreach at the THDM and beyond may be needed to help raise public awareness of local fisheries and fishing communities. Currently, THDM incorporates educational material through their own website and Facebook page, California Sea Grant's biweekly touch table events and Slow Food Urban San Diego's monthly Seafood Saturdays event. Both events aim to communicate seafood sustainability and the importance of local seafood to visitors.

Acknowledgements

I would like to thank Professor Theresa Talley for her guidance and mentorship on this project, and Nina Venuti for connecting me with Sea Grant and Tuna Harbor Dockside Market. I would also like to thank Elizabeth Bushnell, Kristy Nguyen and Lupita Barajas for using their time to help me with survey collecting, and the THDM fishermen for sharing their experience and knowledge of San Diego's diverse sea life with me.

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