

EVALUATING THE MARKETING AND CONCEPTUALIZATION OF FARMED OYSTERS
ALONG THE NC OYSTER TRAIL

by

Kara Nunnally

Dr. Grant Murray, Advisor

Robin Fail, Advisor

April 22, 2022

Master's project submitted in partial fulfillment of the requirements for the
Master of Environmental Management degree in the Nicholas School of the Environment of
Duke University

Table of Contents

Introduction.....	4
Context.....	4
Issue.....	7
Opportunity.....	11
Research Question and Goals.....	12
Methods and Analysis.....	13
Online Sources.....	13
Interviews.....	14
Results.....	16
Online Sources.....	16
Interviews.....	18
Conclusion.....	25
Recommendations.....	26
Brand.....	26
Building Capacity.....	27
Data Collection.....	27
Personalized Experience.....	28
Public Outreach.....	31
Financial and Business Support.....	32
Reflection.....	33
References.....	35
Appendices.....	37
Appendix A. List of the Online Source Websites.....	37
Appendix B. Interview Questions.....	39

Executive Summary

The growth of the North Carolina shellfish industry was prompted by legislative actions by the North Carolina General Assembly and by support from non-profit organizations, academia, and recent initiatives like the NC Oyster Trail. The motivation for this project was to develop a means through a brand management strategy to support the recently set goal of a \$45 million shellfish aquaculture industry by 2025 and to create an effective stakeholder outreach and education strategy about the industry, its products, and benefits within the context of a recent survey on consumer preferences and values for seafood. The central research question for this project was: How do oyster farmers, restaurateurs, and seafood mongers along the NC Oyster Trail conceptualize and market their farmed oyster products to consumers? The primary goal of this project was to understand what happens during consumer interactions along the NC Oyster Trail, and provide a brand statement recommendation. A secondary goal was to develop recommendations for the NC Oyster Trail to build capacity for its growth and consumer education of farmed oysters and the benefits of the shellfish aquaculture industry.

The qualitative methods included creating an inventory of online data from the shellfish farm tours, oyster delivery, restaurants, and seafood markets on the NC Oyster Trail as well as semi-structured interviewees with people from selected NC Oyster Trail sites. The data collected was analyzed using counting methods to illuminate trends related to the primary goal. The data was also reviewed for supplementary information to shed light on aspects related to the secondary goal.

The online data results showed less than 24% of the menu items with an oyster addressed a consumer preference based on the recent survey parameters or indicated where it came from. The interview data showed the number of times terms associated with a consumer preference occurred. The interview data also provided context as to the trends and challenges people along the NC Oyster Trail face as well as impressions of and recommendations for the NC Oyster Trail.

Five main conclusions were made based upon the project data. These were:

- 1) It is unclear whether the current conceptualization and marketing of farmed oysters along the NC Oyster Trail address consumer preferences.
- 2) Consumer challenges present some uphill battles for people associated with the NC Oyster Trail sites.

- 3) Negative connotations exist among consumers about the shellfish aquaculture industry and farmed oysters.
- 4) There is no consistency for language across the NC Oyster Trail sites.
- 5) Building capacity within the NC Oyster Trail can elevate the brand of farmed oysters and the industry and can ultimately support the growth the NC Oyster Trail.

The following recommendations were made:

- 1) The NC Oyster Trail volunteers, administrators, and people associated with NC Oyster Trail sites can use the following brand statements in their marketing and consumer discussions to stimulate the industry: Taste the famous flavors of coastal Carolina year-round. Join the people and the places that cultivate your unique experience.
- 2) The NC Oyster Trail should build capacity for the brand of farmed oysters and shellfish aquaculture industry and to grow the NC Oyster Trail through the following strategies:
 - a. Data collection, such as required on-site QR code surveys for NC Oyster Trail-goers and logo requirements on NC Oyster Trail site websites;
 - b. Personalized experiences, such as a website redesign, a system to generate a personalized guide for NC Oyster Trail-goers, and options for guided tours;
 - c. Public outreach, such as expanding social media presence and content to YouTube as well as exploring new advertisement methods and markets; and,
 - d. Financial and business support, such as funding from new grant sources and private entities, as well as ongoing evaluations and trainings to address the needs of NC Oyster Trail sites.

Introduction

There has been a global shift toward aquaculture as a means of producing protein-rich seafood to support the human population. North Carolina's shellfish industry has recently grown due to increased attention to shellfish farming, specifically for oysters, through legislative actions by the North Carolina General Assembly and the support from non-profit organizations, academia, and initiatives like the North Carolina Oyster Trail.

Context

Coastal North Carolina waters have experienced centuries of commercial and recreational oyster harvest. In 1858, the state began leasing small areas to residents (initially no more than two acres per person) for the private use of producing and harvesting shellfish.¹ North Carolina began a cultch planting program in 1915 to help maintain and build wild oyster stocks due to decades of overharvesting and negative anthropogenic effects that affected water quality. This program lasted for almost a century, but oyster populations and landings continued to fluctuate with an overall decline.²

In response to declining oyster landings from North Carolina waters, the North Carolina General Assembly created the North Carolina Blue Ribbon Advisory Council on Oysters in 1992 to understand the causes of declining oyster populations and make recommendations to replenish stock. By 2003, a variety of state agencies, institutions, and non-profits co-developed the *Oyster restoration and protection plan for North Carolina: A Blueprint for action* (hereinafter "Oyster Blueprint"). The Oyster Blueprint has served as a roadmap for reaching milestones and measuring progress related to protecting and restoring oyster stocks, harvesting oysters including by way of shellfish aquaculture, and oyster education and public outreach.³ In 2016, the North Carolina General Assembly mandated a shellfish aquaculture plan based on stakeholder engagement which was submitted to the General Assembly as the *North Carolina strategic plan for shellfish mariculture: A Vision to 2030* (hereinafter "Strategic Plan") on December 30, 2018.⁴

¹ Fodrie, J., Peterson, C., Voss, C., & Baillie, C. (2018). *North Carolina strategic plan for shellfish mariculture: A Vision to 2030*. North Carolina Shellfish Mariculture Advisory Committee. <https://collaboratory.unc.edu/wp-content/uploads/sites/476/2019/01/NC-Strategic-Plan-for-Shellfish-Mariculture-Final-2018.pdf>

² Ibid; North Carolina Coastal Federation (2021). *Oyster Restoration and Protection Plan for North Carolina: A Blueprint for Action*, fourth edition. Ocean, N.C. <https://www.nccoast.org/wp-content/uploads/2021/08/Oyster-Blueprint-2021-2025-FINAL-web.pdf>

³ Ibid.

⁴ S.L. 2016-94 Section 14.11.(d) and S.B. 257 13.13.(b).

This report included relevant social, economic, cultural, and environmental information on shellfish mariculture such as a review of other states' and countries' plans, policies, and laws that affect shellfish farming, as well as lease siting, enforcement, access, and ecological considerations.⁵

The Oyster Blueprint, most recently published as its fourth edition for 2021-2025, reported the many accomplishments since its inception in 2003 to 2020. The accomplishments included: growing the shellfish farming industry from \$250,000 to \$5 million; increasing the number of oyster aquaculture operations in the state ten times over; measuring the economic benefit of oyster restoration (for each \$1 invested, \$4.05 in benefit are realized); creating education materials about the state's safe oyster growth and harvest; launching new communications tools for public outreach; and educating tens of thousands of people on oysters. Looking forward for the 2021-2025 timeframe, the fourth edition includes 8 strategies and 45 actions for oysters in the state. Two strategies are of particular note in this Oyster Blueprint. One is to “build the shellfish aquaculture industry to create a \$45 million industry by 2025” while the other is to “create communication and outreach strategies that engage stakeholders and the general public to actively support the goals, strategies and actions outlined in the Blueprint.”⁶

Similarly, the Strategic Plan outlined 21 recommendations in 2018 specifically aligned to grow the annual shellfish mariculture value to \$100 million by 2030. These recommendations fell within the themes of supporting shellfish growers, establishing an efficient regulatory structure, making statutory changes, improving water quality, and focusing on research gaps. Most notably for the purposes of this project, though, was one of three recommendations under the theme of marketing and promotional needs. This recommendation was to “appropriate funding for the North Carolina Department of Agriculture and Consumer Services and the North Carolina Department of Commerce to develop a North Carolina Oyster Trail.”⁷ The Strategic Plan cited research to support the utility of such a trail in building a successful shellfish

⁵ Fodrie, J., Peterson, C., Voss, C., & Baillie, C. (2018). *North Carolina strategic plan for shellfish mariculture: A Vision to 2030*. North Carolina Shellfish Mariculture Advisory Committee. <https://collaboratory.unc.edu/wp-content/uploads/sites/476/2019/01/NC-Strategic-Plan-for-Shellfish-Mariculture-Final-2018.pdf>

⁶ North Carolina Coastal Federation (2021). *Oyster Restoration and Protection Plan for North Carolina: A Blueprint for Action*, fourth edition. Ocean, N.C. <https://www.nccoast.org/wp-content/uploads/2021/08/Oyster-Blueprint-2021-2025-FINAL-web.pdf>

⁷ Recommendation #7. Fodrie, J., Peterson, C., Voss, C., & Baillie, C. (2018). *North Carolina strategic plan for shellfish mariculture: A Vision to 2030*. North Carolina Shellfish Mariculture Advisory Committee. <https://collaboratory.unc.edu/wp-content/uploads/sites/476/2019/01/NC-Strategic-Plan-for-Shellfish-Mariculture-Final-2018.pdf>.

mariculture industry. This included the growth of culinary tourism with a focus on local foods around the United States, and the number of people visiting North Carolina each year, which was estimated at 48.6 million in 2016. With a conservative budget of \$200,000 per year for the North Carolina Oyster Trail (NC Oyster Trail), the authors estimated the initiative could yield more than \$500 million in economic benefit to the state by year 10.⁸

The NC Oyster Trail began forming in 2019 after the Strategic Plan was submitted in late 2018 to help stimulate growth of the shellfish aquaculture industry, namely for oysters and oyster farming. Part of the existing actions and strategies from previous editions of the Oyster Blueprint also helped shape the NC Oyster Trail, which is now explicitly included in the Oyster Blueprint. The mission of the NC Oyster Trail is “to provide experiences that help sustain and grow N.C. oysters, resulting in economic, environmental and social benefits to the state’s seafood industry and coastal communities.”⁹

The NC Oyster Trail is a grassroots initiative administered by North Carolina Sea Grant and North Carolina Coastal Federation, with support from North Carolina Shellfish Growers Association. Currently, one staff person at North Carolina Sea Grant coordinates marketing and leads pertinent research initiatives while one staff person at North Carolina Coastal Federation organizes volunteers and manages the membership for the NC Oyster Trail. The businesses and organizations (hereinafter “sites”) on the NC Oyster Trail are primarily recruited by these local volunteers around the state.¹⁰ Prospective sites apply and must agree to the following membership requirements: providing an engaging and memorable experience with consumers that includes the main “tourist takeaways” like the environmental benefits of farmed oysters; completing an online quiz; displaying membership banners with the NC Oyster Trail logo; and, offering at least one NC oyster year-round or when open, as not all businesses or organizations are open year-round. Once the application is approved, sites join with a \$50 one-time setup fee and a \$100 annual membership fee that helps fund the NC Oyster Trail operations. As part of the NC Oyster Trail, sites receive social media and print promotions, educational materials, and access to applicable research to support their business and operations.¹¹

⁸ Ibid.

⁹ NC Oyster Trail. (2022). *About*. <https://ncoystertrail.org/>

¹⁰ Discussed during virtual, informal call with Jane Harrison of North Carolina Sea Grant and Erin Fleckenstein of North Carolina Coastal Federation on March 1, 2022. J. Harrison and E. Fleckenstein are the primary administrators of the NC Oyster Trail as of spring 2022.

¹¹ NC Oyster Trail. (2022). *Membership*. <https://ncoystertrail.org/membership/>

The NC Oyster Trail has been commonly referred to as the mechanism to make North Carolina the Napa Valley of oysters, likening the success of the famous and lucrative wine region to the potential of the renowned merroir, diversity, and tradition of North Carolina oysters.¹² As of early 2022, the NC Oyster Trail had 65 sites across the state which included shellfish farm tour locations, restaurants, seafood markets, oyster delivery services, art and educational centers, festivals and events, and outdoor recreation opportunities. See Figure 1 for a map of the NC Oyster Trail sites.¹³

Figure 1.



This screenshot shows the 65 sites across the NC Oyster Trail from the eastern-most point of the Trail in Hatteras, NC to the western-most point in Charlotte, NC. The left-hand legend indicates the four main site types relevant for this project. Screenshot taken from <https://ncoystertrail.org/oyster-trail-sites/> and enriched using Canva.

Issue

As with any industry and product, there must be consumer demand for farmed oysters and steady supply of farmed oysters for the industry to grow and produce economic benefit. Though there have been studies that assessed various aspects of consumer demand for seafood

¹² NC Oyster Trail. (2022). *About*. <https://ncoystertrail.org/>

¹³ Ibid. NC Oyster Trail. (2022). *Trail map*. <https://ncoystertrail.org/oyster-trail-sites/>

products and North Carolina seafood products, there have been few attempts at understanding the specific demand and market position for oysters, both wild and farmed.¹⁴ For example, North Carolina Sea Grant recently published a study in 2021 that surveyed North Carolina residents (n=1,600) about their consumption of seafood and to estimate the possible demand for seafood from the state based on willingness to pay. The study revealed 75% of the survey respondents preferred North Carolina seafood over imported seafood. However, there was not a distinction for oysters as a preferred seafood product nor whether oysters were preferred as wild-caught or farmed in the survey instrument.¹⁵ This study supported the general notion of North Carolina oysters being valued and possibly succeeding in the state seafood market, but more nuanced research will be required to understand the current and future markets within and outside of the state as well as to understand wild-harvest versus farm-raised oyster demand.¹⁶

Moving to a more granular level from consumer demand is understanding consumer preferences, values, and beliefs about seafood. Some studies have examined the different attributes that consumers consider and prioritize when purchasing seafood products.¹⁷ These attributes can include those related to the production and externalized impact of the seafood product such as: sustainability, wild-caught or farm-raised, local economic impact, affect on local culture, harvested locally, and impacts to the local environment. These attributes can also

¹⁴ This information was also mentioned in Fodrie et al. 2018, the Strategic Plan. *Andreatta, S. & Parlier, A. (2007). Harnessing consumer preferences to create new markets for North Carolina seafood.* The University of North Carolina at Greensboro, The Department of Anthropology. https://ncseagrant.ncsu.edu/ncseagrant_docs/FRG/06-ST-02-Final_Report.pdf; Kros, J., Rowe, J., & Nash, B. (2013). *A Supply chain analysis of North Carolina's commercial fishing industry.* The Rural Center. https://ncseagrant.ncsu.edu/ncseagrant_docs/products/2010s/supply_chain_analysis_nc_commercial_fishing.pdf; Mosher, K. (2011). *LOCAL CATCH: And the survey says: Local seafood reigns.* Coastwatch Winter 2011 Issue. <https://ncseagrant.ncsu.edu/coastwatch/previous-issues/2011-2/winter-2011/local-catch-and-the-survey-says-local-seafood-reigns/>; Pages, H. (2017). *Transparency content and the consumer journey.* Response Media. https://www.responsemedia.com/wp-content/uploads/2017/07/RM_Transparency_Survey_Final.pdf; and, Ritter, L., B. Nash, B., & Small, W. (2006). *Branding seafood: Developing a marketing plan to sell value-added seafood products.* North Carolina Sea Grant. https://ncseagrant.ncsu.edu/ncseagrant_docs/products/2000s/bp_branding_seafood.pdf

¹⁵ Nash, B., Harrison, J., & Whitehead, J. (2021) *Consumer demand for North Carolina seafood.* North Carolina Sea Grant. <https://ncseagrant.ncsu.edu/wp-content/uploads/2021/03/Consumer-Demand-for-North-Carolina-Seafood.pdf>

¹⁶ Fodrie, J., Peterson, C., Voss, C., & Baillie, C. (2018). *North Carolina strategic plan for shellfish mariculture: A Vision to 2030.* North Carolina Shellfish Mariculture Advisory Committee. <https://collaboratory.unc.edu/wp-content/uploads/sites/476/2019/01/NC-Strategic-Plan-for-Shellfish-Mariculture-Final-2018.pdf>

¹⁷ Brayden, W. C., Noblet, C. L., Evans, K. S., & Rickard, L. (2018). Consumer preferences for seafood attributes of wild-harvested and farm-raised products. *Aquaculture Economics & Management*, 22(3), 362–382. <https://doi.org/10.1080/13657305.2018.1449270>; Davidson, K., Pan, M., Hu, W., & Poerwanto, D. (2012). Consumers' willingness to pay for aquaculture fish products vs. wild-caught seafood – A Case study in Hawaii. *Aquaculture Economics & Management*, 16(2), 136–154. <https://doi.org/10.1080/13657305.2012.678554>; Roheim, C. A., Sudhakaran, P. O., & Durham, C. A. (2012). Certification of shrimp and salmon for best aquaculture practices: Assessing consumer preferences in Rhode Island. *Aquaculture Economics & Management*, 16(3), 266–286. <https://doi.org/10.1080/13657305.2012.713075>

include those related to consumer perception and effect on the person such as: taste, freshness, safety, affordability, accessibility, and health or nutritious value.¹⁸ However, there is still little known about the specific consumer preferences and values for oysters, both wild and farmed, in North Carolina.

Of specific concern for this project is a recent, preliminary study that surveyed North Carolinians on their seafood preferences, values, and beliefs of production-based and personal-based attributes. The survey included questions specifically listing oysters and questions about shellfish aquaculture in the state.¹⁹

In 2020, Dr. Grant Murray at the Duke University Marine Laboratory in Beaufort, North Carolina, along with a team of researchers and collaborators from other institutions, developed and distributed a seafood values survey (hereinafter “Seafood Values Survey”). The online Qualtrics survey was sent to three populations in North Carolina to assess consumer preferences and values regarding seafood. The first population included patrons of the Core Sound Waterfowl Museum (n=287) located in Carteret County. The second population included patrons of the community-support fishery Walking Fish (n=87), which primarily serves the central, landlocked areas of Wake and Durham Counties. The third population was a Qualtrics-generated group of people located across the state of North Carolina (n=1,040). In total, 1,414 individuals completed the survey. The consumer preferences and values were measured in general for seafood as well as for specific seafood items such as blue crabs, clams, oysters, tuna, shrimp, flounder salmon, and mullet.²⁰

The preliminary conclusions from the survey data indicated the personal attributes (i.e., attributes that directly affect the consumer) are more important to the consumer when purchasing or consuming seafood than the externalized attributes (i.e., attributes associated with production). However, a cross-analysis with the survey data and demographic data collected revealed that those consumers living closer to the North Carolina coast increasingly rated the externalized attributes as important as well. The data also showed that consumers have a higher preference for

¹⁸ Witter, A., Murray, G., & Sumaila, U. R. (2021). Consumer seafood preferences related to alternative food networks and their value chains. *Marine Policy*, 131, 104694. <https://doi.org/10.1016/j.marpol.2021.104694>; Murray, G., Wolff, K., & Patterson, M. (2017). Why eat fish? Factors influencing seafood consumer choices in British Columbia, Canada. *Ocean & Coastal Management*, 144, 16–22. <https://doi.org/10.1016/j.ocecoaman.2017.04.007>

¹⁹ Though this data has not yet been published, I was granted access to the information and given permission to use the data and discussion for this project.

²⁰ Murray, G., Fail, R., Fairbanks, F., Campbell, L., D’Anna, L., & Stoll, J. (2020). *Seafood values survey (unpublished)*.

wild-caught seafood across species. Most survey respondents associated wild-caught products with the attributes rated more importantly to them (e.g., taste, health, freshness), while some respondents associated farm-raised products as aligning with the attributes rated more importantly to them (e.g., affordability, accessibility). Some respondents had mixed associations between important attributes, specifically safety (a personal attribute), and wild-caught versus farm-raised products. The researchers suggested these results juxtapose the potential of local oyster farms providing the same attributes as wild-caught given that oyster aquaculture can deliver fresh, healthy, high quality seafood products to consumers, especially for coastal residents.²¹

The aforementioned information indicated there is a disconnect on the connotations that “wild-caught” and “aquaculture” elicit, meaning there may be a terminology, or language gap, between scientists, industry leaders, and consumers. In addition, there were two data points that stood out which formed and helped scope the research question for this project. First, of the 784 consumers (55% of all respondents) that responded they consume and/or purchase oysters, 68% buy oysters from restaurants, seafood markets, and/or direct from the commercial fisherman/seafood farmer. This proved that these sites are best-positioned to reach and educate consumers. Second, of the 1,344 consumers (95% of all respondents) that answered this question, 1,072 (80%) identified with the statement “[g]rowing the North Carolina seafood industry is critical to sustaining our coastal communities and economies, whether it is through traditional commercial fishing, a new focus on growing the shellfish aquaculture sector, or a combination of both” as either “more like how I think” (372) or “most like how I think” (700).²² This finding implied there is support for growing the shellfish aquaculture industry from consumers that eat and purchase as well as those that do not eat nor purchase oysters. Taken together, these data were indicative of possible shortcomings in aligning consumer values and the common language of the North Carolina shellfish aquaculture, or oyster farming, industry. However, these data also provided hope that a common language exists to stimulate consumer interest in oyster production and consumption, education about oyster farming benefits, and shellfish aquaculture industry growth.

²¹ Ibid.

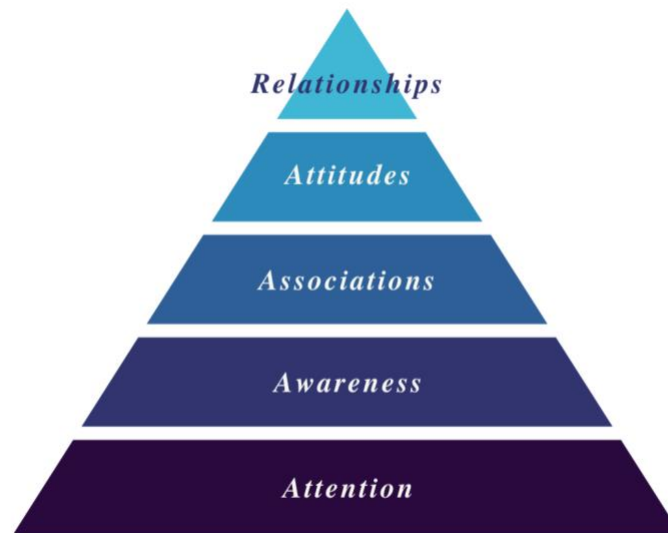
²² Ibid.

Opportunity

When considering consumer interest, consumer education, and industry growth, a brand for the product and/or industry is essential. Luna et al. 2018 describe a brand as “a product or service that is distinguished by and marketed on the basis of a distinctive and enduring personality.”²³ Further, the experts considered brand as part of a pyramid in which each of the five levels build upon each other.²⁴ For an adapted version of this brand pyramid, see Figure 2.

At the base is attention to the brand message, or simply, visibility of a brand to consumers. Above that is brand awareness, which includes a consumer’s comprehension and memory of the brand. Next is a consumer’s brand associations or the ways a consumer thinks about a brand. At the fourth level is attitudes, or a consumer’s feelings toward a brand. Finally, at the top of the brand pyramid is the successful formation of relationships by the brand with consumers.²⁵ A brand that addresses these brand pyramid levels and understands the relationships between the levels can develop a more informed consumer base and ensure the stable growth of the industry.

Figure 2.



Brand management pyramid adapted from Luna et al. 2018.

²³ Luna, D., Lerman, D. B., & Morais, R. (2018). The Language of Branding: Theory, Strategies, and Tactics. In *The Language of Branding: Theory, Strategies, and Tactics*. <https://doi.org/10.4324/9780203139691>

²⁴ Ibid.

²⁵ Ibid.

In this case, the NC Oyster Trail can serve as a catalyst for a brand management strategy that ultimately benefits the shellfish aquaculture industry. This brand can help educate consumers on the industry, products, and impacts. Referring to Figure 2, attention has been established by the NC Oyster Trail and other oyster aquaculture initiatives across the state. Relationships is part of brand management that falls outside the scope of this project because of the variability of the factors at play. For example, relationships are largely dependent upon each consumer and each NC Oyster Trail site experience and/or exposure to the oyster aquaculture industry. Therefore, the second, third, and fourth levels of brand management, or awareness, associations, and attitudes, are most applicable for the purposes of this project.

Understanding what is currently being done at oyster farms, restaurants, and seafood markets on the NC Oyster Trail can facilitate a brand management strategy that influences consumer purchasing behavior. This brand can address consumer values through common language and align with the levels of awareness, by building a common understanding of the industry and its products; associations, by inspiring thoughtful considerations about the industry; and, attitudes, by instilling a positive emotional connection with the industry.

Research Question and Goals

Like any industry, shellfish aquaculture in North Carolina has many elements to its strengths, opportunities, threats, and weaknesses. For the purpose this project, I chose to focus on the specific language used to speak about and ways in which people associated with the NC Oyster Trail sties promote farmed oysters. The Strategic Plan provides a sense of where the industry can go, the Oyster Blueprint provides an action plan to get there, and the Seafood Values Survey is a basis for consumer preferences. Combining these foundations with the sites on the NC Oyster Trail as a catalyst for the industry, I developed the following research question:

How do oyster farmers, restaurateurs, and seafood mongers along the NC Oyster Trail conceptualize and market their farmed oyster products to consumers?

The primary goal of this project was to understand what is actually happening during consumer interactions with NC Oyster Trail sites to determine what consumer preferences are or are not being addressed to enhance the brand and reputation of North Carolina farmed oysters. A secondary goal was to develop recommendations for the NC Oyster Trail to support industry growth by way of increasing the visibility of the NC Oyster Trail and to help build an informed consumer base to stimulate demand.

Methods and Analysis

Online Sources

The first phase of data gathering included an online search of publicly available information for the NC Oyster Trail (hereinafter “Trail”) and its associated site locations. This portion was focused on identifying the Trail sites for this project, reviewing online menus, and exploring websites and social profiles for the presence or lack of details on farmed oysters to examine how these entities present farmed oyster products to consumers.

First, I identified each Trail site from the Trail Map webpage²⁶ which yielded a total of 65 sites. Then, I limited the sites to the categories applicable to this project based on the Seafood Values Survey data which were “restaurants,” “seafood markets,” “shellfish farm tours,” and “oyster delivery.” This final yield included 55 sites (21 restaurants, 13 seafood markets, 15 shellfish farm tours, 3 oyster delivery, 2 combined restaurant and seafood market, and 1 combined seafood market and oyster delivery). I then categorized each site as “Northeast Coast,” “Central Coast,” “Southeast Coast,” or “Inland” to get a rough geographic distribution across the state.²⁷

Second, I visited each website listed for the 55 Trail sites (see Appendix A for a complete list). For restaurants and seafood markets, I catalogued in an Excel spreadsheet the menu items that had a title and/or description that included the term “oyster.” In total, there were 21 restaurants and 2 combined restaurant and seafood markets that had menu items available online.

²⁶ NC Oyster Trail. (2022). *Trail map*. <https://ncoystertrail.org/oyster-trail-sites/>

²⁷ For this project, I defined “Northeast Coast” as anywhere north of Ocracoke to the Virginia border and within those latitudes along the coastal plain; “Central Coast” as anywhere south of Ocracoke to Sneads Ferry and within those latitudes along the coastal plain; “Southeast Coast” as anywhere south of Sneads Ferry to the South Carolina border and within those latitudes along the coastal plain; and, “Inland” as anywhere within the state located west of the coastal plain.

Sites that noted where or how the business sourced their oysters and/or affiliations with North Carolina oyster farms were also input in an Excel spreadsheet by including the source(s) and affiliation(s) names. Once the data was input into the Excel spreadsheet, I then counted each occurrence of “oyster” and tallied the number of times a term was included that indicated a consumer value. These terms related to a personal attribute, such as “fresh,” or a production attribute, such as “local” or the term described where it was produced or harvested (e.g., “NC,” “Morehead City”). I also included “ask a server” as this indicated an opportunity for the consumer to learn more.

Interviews

The second phase of data gathering included identifying representatives from Trail sites to interview over a Zoom meeting, over the phone, or during an in-person meeting. My goal was to include three to five perspectives from three populations on the Trail that correlated with the Trail site types. These were: oyster growers, defined as people in North Carolina that farm oysters and distribute to locations along the Trail as shellfish farm tours or oyster delivery sites; restaurateurs, defined as people in North Carolina who own, operate, and/or manage a restaurant or seafood market site on the Trail that sell oysters to consumers; and, seafood mongers, defined as people that sell oysters in business to business transactions or direct to consumer in seafood markets.

Initially, I identified the first round of interviewee candidates first based on the highest number of oyster-related menu items or mentions on their website and second whether there was an email address for that site. For each Trail site category (restaurants, seafood markets, shellfish farm tours, oyster delivery), I contacted one in each region available (Northeast Coast, Central Coast, Southeast Coast, or Inland). The first contact attempt with interviewee candidates was via email, with a second email following-up within three to seven business days. Within five to seven business days of no response to the second email inquiry, I phoned the site to secure an interview. If no contact was made, I selected another site within that category and region, if available. However, this staggered approach did not yield the response rate I needed to reach my interview goal. So, I transitioned to emailing the majority of the Trail sites remaining on the list that I had not yet contacted, throwing out my prior criteria list. Ultimately, I decided to visit the Southeast Coast (Wilmington area) and Northeast Coast (Hatteras, Ocracoke areas) in person to

garner a few more interviews. I chose these areas because they had concentrated Trail site locations, and a variety of Trail site types (i.e. multiple shellfish farm tours, restaurants, and seafood markets).

Each interviewee received a copy of informed consent and the interview questions over email or as a printed handout prior to the interview. In the case for three interviewees, I verbally reviewed the informed consent before asking interview questions, and I requested verbal confirmation before proceeding with the interview. At the beginning of each interview, I introduced myself, provided background on the goals and intended audience of the project, and explained the general purpose of a Master's Project at the Nicholas School of the Environment. For those that received a copy of the informed consent over email, it was reviewed again prior to the start of each interview. Verbal confirmation was received to either record audio or take written notes for all interviews. I also reviewed their preferences to receive research findings, which all agreed to receive, and how this interview would be anonymously referenced in this project (e.g., "a person affiliated with the North Carolina shellfish farming industry"). However, most interviewees revised this reference language resulting in more specific phrases such as "oyster farmer in Ocracoke" and "Raleigh-based seafood market and restaurant."

Overall, I conducted 14 interviews: 4 over Zoom, 2 over the phone, and 8 in person. The 14 interviews included 5 shellfish farm tours, 1 oyster delivery service, 6 restaurants, and 2 restaurant/seafood market combinations. Regarding geographic distribution, one represented the Inland area, two the Central Coast, six the Southeast Coast, and five the Northeast Coast. Interviews lasted between five minutes and one hour.

The interviews were semi-structured. I asked questions that addressed the primary objective of this project. These questions typically came during the first part of the interview and included the ways the interviewees conceptualized farmed oysters, any trends in consumer behavior the interviewees had observed over time, and how interviewees advertised and marketed farmed oyster products. To address the secondary goal of this research, I asked the interviewees about their impressions of the NC Oyster Trail and whether they had any recommendations to improve the NC Oyster Trail. A list of the interview questions is located in Appendix B of this report.

I transcribed the Zoom audio recordings, and transcribed the written notes from the phone and in-person interviews. I collated all the transcripts into one Word document and labeled each

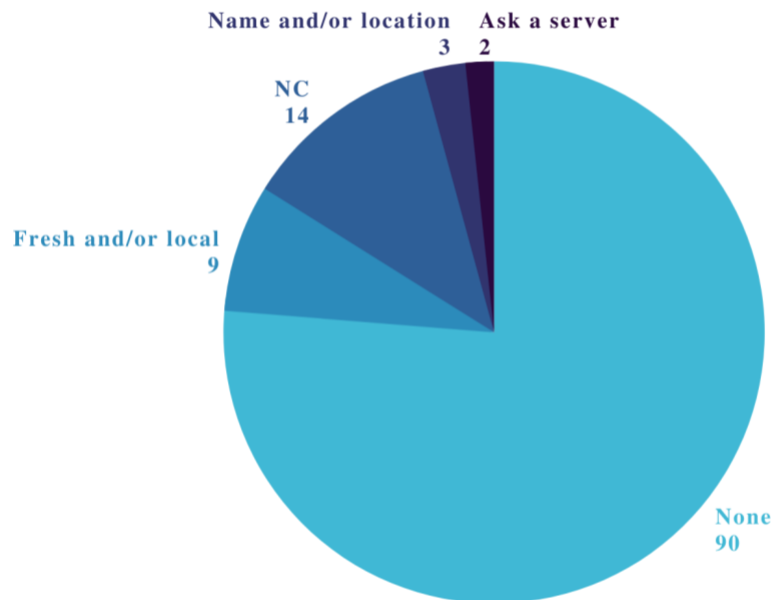
section by the interview using a coding system. I checked for spelling accuracy, removed interviewee and site identifiers for anonymity, and removed my questions and commentary which may have interfered with the analysis. I developed a word counting structure under two categories: 1) consumer preferences for personal and production-based attributes, and 2) general oyster farming and product marketing. Each category had a group of terms that were variations on the personal or production-based attributes from the Seafood Values Survey, or were a group of terms and variations that were related to or elicited the personal or production-based attributes from the Seafood Values Survey. I searched for each term, and read the sentence context to ensure it qualified to be counted in the analysis (i.e., it was not repeated nor a restatement of a question I asked). I did not double count words between groups; rather, I used context clues to categorize each as appropriate to the intention of the sentence. For example, I did not include singular instances of “quality” referring to the quality of the oyster with instances of “water quality.” Similarly, “culture” was separated into the human culture (category 1), and culture as a practice (category 2). In addition, I combed the transcripts for specific ideas and recommendations the interviewees shared during their interviews to help inform additional recommendations.

Results

Online Sources

Of the 118 online menu items that listed “oyster” in the title or description from the 21 restaurants and 2 combined restaurant and seafood markets on the Trail, 28 items or 24% had a term that indicated where the oysters came from, conveyed a consumer attribute, or opened an opportunity to learn more about the oyster. See Figure 3.

Figure 3.



This pie chart depicts all 118 online menu items that had oyster in the title and/or description. Of those, 90 did not use any terms associated with a consumer value. 28 items included a descriptive term that indicated a consumer value based on personal preference and/or a consumer value based on production preference.

The use of “NC” and “North Carolina” indicated the restaurant described where the oysters came from. The use of “local” and/or “fresh” demonstrated where they came from, loosely, and conveyed a consumer attribute. Most often, these terms were used together (e.g., “fresh and local oysters” or “local, fresh oysters”), and were counted together, despite them representing a personal preference (freshness) and a production attribute (local). There were also instances of the item or description sharing the common, or site-specific name of the oyster (e.g., Dukes, Fat Bellies) and/or the geographic point from which the oysters were sources (e.g., Morehead City, Stump Sound). Finally, “ask you server” was counted as a term because it opened the opportunity for the server to clarify a common or site-specific name, location, or attribute associated with the oysters for that menu item. These data are relevant to the research question and primary goal of this project because they illuminated the way in which Trail sites are or are not addressing consumer values, whether personal or production-based.

Interviews

The interview data helped answer the research question and two research goals for this project. Counting the number of times a term occurred helped remove the details from the interview data. To achieve these counts, I collated all of the interviewees responses into a Word document, and excluded any of my questions or commentary. I also reviewed the surrounding context of the term to ensure that it was appropriate to be counted for that category or at all. The questions I asked during the interviews elicited responses that included the specific language the interviewees use while describing the product to consumers. These questions were: How do you talk about or advertise oysters with customers/buyers? What language do you use? Why? Do you avoid any language? If so, why? What trends have you seen in your customers/general consumer base surrounding discussion and purchase of oysters? Where do you see these trends going in the future?

The first set of terms I counted indicated a consumer value, whether a personal or production-based attribute (or externalized impact). This process provided insight into whether the language people use along the NC Oyster Trail address consumer preferences, and if so, which ones are most often used. Table 1 shows a breakdown of category 1 counts (organized by total applicable count), which all directly aligned with the consumer preferences from the Seafood Values Survey.

Table 1.

Type of Consumer Preference	Seafood Values Survey Term	Term Variations Counted in Interviews	Total Applicable Count
Production-based	Local	Local	48
Production-based	Good for local economies	Economy / local economy / economic / community / communities / money / career / profession / livelihood	33
Production-based	Good for local environments	Environment / environmental / green / ecosystem / ecological / ecofriendly	22
Production-based	Sustainable	Sustainable / sustainability / sustain / steward / good stewards / stewardship	21
Personal	Tasty	Taste / tastes / tasty	18
Personal	Healthy	Health / health benefits / healthy / healthier / nutrition / nutritious	12
Personal	Fresh	Fresh / freshness / fresher / freshest	8
Production-based	Good for local culture	Culture / cultural / heritage / tradition / identity	7
Personal	Safe	Safe / safety / safer	7
Personal	Affordable	Low cost / cheap / cheaper / affordable / affordability / expense / expensive / cost effective	4
Personal	Easy to access	Access / accessible / easy to access / accessibility	1

Similarly, I counted the number of times that different terms occurred associated with general shellfish aquaculture and farmed oyster product marketing for category 2. This helped shed light into language consistencies or inconsistencies that are either directly related to consumer preferences, or those tangential to but not directly related to consumer preferences as characterized by the Seafood Values Survey. For example, the Seafood Values Survey asked respondents to list their preference for wild-caught or farmed seafood products within one question. However, I separated the specific production method (i.e., wild-caught or farmed) in category 2 to further drill into the terms used or not used for describing production method. Table 2 shows the breakdown of key term counts for category 2 (organized by total applicable count), and the estimated associations to consumer preferences as characterized by the Seafood Values Survey.

Table 2.

Estimated Type of Consumer Preference	Term Variations Counted in Interviews	Total Applicable Count
Production-based	Farm / farmed / farmer / farm raised / farm raise / farming / farmers	226
Production-based	Wild / wild caught / caught / catch / wild harvesting	99
Production-based	North Carolina / NC / state	57
Personal / Production-based	Size / small / smaller / big / bigger	38
Production-based	Grow / grown / grower	36
Personal / Production-based	Salt / salty / salinity / saltwater	32
Production-based	Water quality / clarity / clean	32
Production-based	Fisher / fisherman / fishermen / commercial / recreational / subsistence	28
Production-based	Aquaculture / mariculture / agriculture	21
Production-based	Unique / special / one of a kind / different	21
Production-based	Locally / locally sourced / locally harvested / locally grown	15
Production-based	Shell	14
Personal	Appearance / look / feel	14
Personal	Quality	13
Production-based	Source / sourced	10
Production-based	Harvest / harvesting / harvested	9
Production-based	Cultivate /cultivated	6
Personal	Meat	6
Production-based	Culture / cultured	5
Production-based	River / freshwater / brackish	5
Production-based	Raise / raised	4
Personal	Sweet	4
Production-based	Handcrafted / handcraft / crafted	3
Production-based	Variety / various / varieties	3
Personal / Production-based	Deep cup	3
Personal	Mellow / bland	2
Personal	Merroir	2
Personal	Brine / briny	1
Production-based	Site / site specific	1

From these two categories of term counts, the production-based attributes, both externalized impacts and production methods, were mentioned the most during interviews. Specifically, the data indicated that the production impacts – where oysters come from

geospatially (local), economic impacts (good for local economies), and environmental impacts (good for the local environment) – were most prevalent when the interviewees talk about farmed oysters with consumers. The data also showed the interviewees used terms related to “farmed” oysters and “farming” methods most often while juxtaposing this to “wild” oysters and wild harvest methods. Further, the terms “aquaculture” and “mariculture” were used less often despite those terms being used often in the literature. “Aquaculture” and “mariculture” are also used within the industry to distinguish the practice from commercial fishing or wild harvest methods.²⁸

As part of the secondary goal of this project, I asked questions about the trends and challenges Trail sites face when working with consumers, face in general, and those they may face in the future. In particular, most interviewees shared consumer have pervasive misconceptions about farmed oysters. The most prevalent was that one can only eat oysters in months with “r” for reasons of safety and taste. Specifically, locals, or people who reside in North Carolina coastal areas, are more accustomed to this misconception. On the other hand, some interviewees shared tourists and first-time oyster consumers (particularly first-timers with raw oysters) are usually open to anything and typically do not have preferences. These tourists and first-timers are generally curious and ask questions. Another consumer misconception are the negative connotations about “aquaculture,” “mariculture,” and “oyster farming” that may stem from the large-scale finfish and crustacean aquaculture operations such as with salmon and shrimp. Interviewees shared the increase of press and social media coverage of such large-scale finfish operations have cast doubts about the efficacy and benefit of aquaculture as a whole, which has been applied to shellfish aquaculture. However, unlike the aquaculture portrayed in the media, shellfish aquaculture or oyster farming in North Carolina is practiced in natural settings in the same location as wild oysters and it benefits the local environment in a number of ways. Another challenge for Trail sites is the consumer idea that wild oysters taste better than farmed oysters. However, most interviewees shared they witnessed consumers being impressed by or preferring the taste of the farmed oysters over the wild harvest oysters once they tried them. This applied to raw on the half shell as well as prepared (e.g., steamed, roasted, fried,

²⁸ See the Strategic Plan and Oyster Blueprint as examples.

baked).²⁹ Similarly, a few interviewees shared consumers may think they prefer wild oysters on the half shell, but farmed oysters suit the half shell market better because of their deep cups, presentation, and shuckability (i.e., the ease and efficiency with which a person can shuck an oyster). Finally, for oyster growers in particular, consumers typically order farmed oysters in “bushels” rather than by count, which is from the wild oyster landing process. Wild oysters tend to be harvested and landed in clumps, which made selling by the bushel common practice. With farmed oysters, they are separated by size, and cared for and harvested individually, so selling by the count is more accurate and business-savvy.

The challenges people along the Trail sites face in general and those they may see in the future ranged from variability issues along the Trail to issues within the regulatory and operational framework of the industry. For one, there is seasonal variability, variability of visitor profiles, and variability between the geographic regions of the Trail (i.e., Northeast Coast, Central Coast, Southeast Coast, and Inland). For example, the Northeast Coast restaurateurs typically see more tourists (primarily out-of-state visitors) in the summer and are generally closed in winter months whereas restaurateurs in the Southeast Coast have a year-round operation with a balance of locals and tourists. Some Trail site locations supplement their North Carolina farmed oysters with out-of-state oysters, typically from Maryland, Virginia, Texas, and sometimes South Carolina, due to seasonal variability or lack of supply. Interviewees shared inconsistent Trail marketing tactics and data collection among the Trail sites. For example, some interviewees explicitly noted other Trail sites they have been to that did not have any Trail information or marketing. Others answered they did or did not actively promote the Trail in their establishments or online. Some shared they asked their customers if they had heard of the Trail and whether that brought them in. This was a mix of “no one has ever said yes” to “I’ve had a handful say they’d visited as part of the Oyster Trail,” while others shared they had not asked any customer before. Similarly, some Trail sites actively educate their teams to share information with consumers about oysters, oyster farming, the local environment, and the social, ecological, and economic benefits of oysters. Some interviewees admitted they did not actively educate their teams. The regulatory and operational issues included costs and lack of clear support. First, many of the interviewees associated with oyster delivery and shellfish farm tour sites shared their

²⁹ The latter taste profile may be harder to distinguish and is largely dependent upon consumer preference and use of the oyster.

financial burdens and concerns such as increasing insurance coverages and fees, gear prices, and labor costs. Further, most of the interviewees from shellfish farm tour operations have liability and certification issues based on their status as a “shellfish farm tour” site on the Trail. For example, there is confusion as to what licenses and permits are needed to take Trail-goers on a vessel to the shellfish farm site, what is needed to shuck oysters, and whether consumers can eat raw oysters at the shellfish farm site.³⁰ Second, some of these interviewees from the oyster delivery and shellfish farm tour sites described concern over the changing and restrictive regulations such as: lease applications, lease moratoria, shellfish sanitation protocols, permanent closures, possible future closures, and access to technical and financial assistance. Finally, the loss of the state-funded oyster shell recycling program has burdened many Trail sites that want and need to responsibly discard their oyster shells, despite efforts by the North Carolina Coastal Federation that offers a similar program.

Further as part of the secondary goal of this project, I asked questions about the impressions of and recommendations for the Trail. Impressions were mixed. On the one hand, some interviewees felt the Trail is not upholding its promises to Trail sites that were made during recruitment (i.e., guided tours, increased business), and these interviewees often exhibited frustration. In addition, some felt the Trail is disorganized, and its marketing is either too little, too stale, or not getting in front of new and appropriate audiences. On the other hand, some interviewees felt the Trail was successful in their marketing, promoting their Trail site, driving consumer interest, and bringing people to their business.

Each of the interviewees had a least one recommendation for the Trail, most of which were echoed in other interviews. The most common recommendation was about education. Interviewees shared the need to highlight the year-round edibility and safety of farmed oysters; the variety of really good oysters across the state and the influence of hyperlocal microclimates; and, the environmental benefits of oyster aquaculture. One idea in particular was to liken the merroir of oysters and terroir of wine by using the analogy: “saltwater is to oysters, as soil is to grapes.” This was also mirrored in the recommendations to educate consumers to alleviate misconceptions. Specifically, education on the differences between wild and farmed oysters, the

³⁰ These concerns apply to various state agencies including Division of Marine Fisheries under the North Carolina Department of Environmental Quality, North Carolina Department of Agriculture and Consumer Services, and North Carolina Department of Health and Human Services as well as the federal regulations under the United States Coast Guard.

wild oyster season and why it exists, the distinction among diploid and triploid oysters,³¹ and the co-benefits of wild and farmed oyster populations in close proximity. Finally, interviewees shared the sentiment that getting locals and tourists alike on site to show how shellfish aquaculture works, particularly for shellfish farm tours, adds human element to the industry and inspires curiosity in consumers.

The other recommendations centered on operations and marketing. Some interviewees suggested there needed to be a more stringent membership accountability model for all Trail sites to ensure service of majority North Carolina oysters. Systematic data collection was also a recommendation from a handful of interviewees. This included both data collection at the site level (i.e., asking customers if they knew about the Trail and if that is what brought them in) to get specific information, as well as by the Trail itself (i.e., who is going on the Trail, how do they get there, where do they come from, what do they know) to get general information about the Trail. There were also a few instances of interviewees acknowledging the Trail has limited funding, and the suggestion was made to advocate for more money from the North Carolina General Assembly. Finally, some interviewees requested more resources for their Trail sites, specifically for the shellfish farm tours, to aid in providing the best experience to consumers. This ranged from trainings on regulations to marketing best practices. As for marketing recommendations, some interviewees shared the Trail should get in front of out-of-state groups and consumers as well as place brochures and marketing along the major highways.

At the end of each interview, I asked each person whether they learned something new or realized something as a result of our conversation. A person associated with a Carteret County oyster nursery said:

One thing I've realized is that we do need a consistent message. We do need to all come to consensus on the nomenclature and what we're going to call ourselves and what we do. So I think that's really important...branding. If you're not consistent, if you don't see the same thing over and over and over again, you miss the boat.

³¹ Diploid oysters are wild oysters with two sets of chromosomes that reproduce in nature. Triploid oysters are farmed oysters with an added chromosome that do not reproduce and grow faster than diploid (wild) oysters, making them ideal for shellfish aquaculture.

Conclusion

The results show there is room for an improved brand that instills common language for educating North Carolinians and tourists on farmed oysters and shellfish aquaculture. Overall, I made five main conclusions based on my research question and related to the two research goals.

- 1) **It is unclear whether the current conceptualization and marketing of farmed oysters along the NC Oyster Trail address consumer preferences.** Consumers typically value personal preferences more than production-based attributes regarding seafood. However, the analysis revealed production-based impacts (local, good for local economies, good for local environments) were stated more often by the people associated with sites along the Trail. Meanwhile personal preferences (taste, fresh, healthy) were said less frequently, indicating an imbalance of addressing what consumers are looking for and value when purchasing or consuming seafood and/or farmed oysters. Further, consumers more often preferred wild caught seafood and associated wild-caught with personal attributes (taste, freshness, healthiness). However, this narrative has the opportunity to shift because farmed oysters also provide those attributes often at a higher, more effective rate.
- 2) **Consumer challenges present some uphill battles for people associated with the NC Oyster Trail sites.** The most common myth is that a person should only eat oysters in months with “r” for taste and safety. However, farmed oysters are tasty when eaten year-round because they are not spawning in the summer months like their wild counterparts and they are safer to consume despite rising water temperatures in warmer months. Further, there is variation among the regional markets. For example, there is confusion over whether the NC Oyster Trail is catering to tourists, locals, both, or neither, and there is a seasonal difference within and among markets.
- 3) **Negative connotations exist among consumers about the shellfish aquaculture industry and farmed oysters.** Consumers may associate “oyster farms,” “mariculture,” and, most often, “aquaculture” with the negative impacts of finfish farms and operations (salmon and shrimp) widely-circulated to the public in recent press coverage. These large-scale operations occur in unnatural environments or conditions, affecting the perspective of oyster farming methods. However, shellfish aquaculture is conducted in

pristine, natural environments and conditions beside wild oysters offering the added protection of monitoring and care provided by the oyster farmer.

- 4) **There is no consistency for language across the NC Oyster Trail sites.** For example, when speaking about production method, some interviewees used “farmed” although they explicitly said there is a shift and movement in the industry to use “cultivated.” However, they may not have used the term at all or often in conversation or admitted they had not started using it with consumers. In addition, some shared they were testing language such as “cultured,” “handcrafted,” “grown,” and “raised” to describe to consumers how the oyster was provided in front of them.
- 5) **Building capacity can elevate the industry and farmed oyster brand and grow the NC Oyster Trail.** Capacity-building cannot be attempted in a silo; rather, it must be addressed with synergistic strategies. These strategies include:
 - a. Tangible ways to implement data collection to support decision making, both for Trail sites and the Trail-goers (consumers);
 - b. Suggestions for personalized experiences that may increase Trail-goer (consumer) satisfaction, referrals, and retention;
 - c. Public outreach that includes social media strategies and methods to diversify the advertising platforms that include in-state and out-of-state audiences; and,
 - d. Internally-focused growth to gain financial support and develop the operational ability of Trail sites.

Recommendations

Brand

The NC Oyster Trail volunteers, administrators, and the people associated with the Trail sites can use the following brand statements in their marketing and consumer discussions to stimulate the industry. These can be used separately or together, and are not necessarily a tagline nor do they need to be formally published. Rather, these brand statements are intended to address consumer preferences, and to develop stronger consumer awareness and positive associations and attitudes toward farmed oysters:

**Taste the famous flavors of coastal Carolina year-round.
Join the people and the places that cultivate your unique experience.**

Specifically, these brand statements place the consumer at the center of the brand and address the personal preferences by eliciting the values of taste (“taste,” “flavors”), freshness, health, and safety (“year-round”), as well as access (“join”). These statements also nod to the production-based values of impacts on local economies (“people”), environments (“places”), and culture (“people,” “places”), localness (“coastal Carolina”), and quality (“famous,” “unique”) as well as production method (“cultivate”).

Building Capacity

Four areas of improvement for the NC Oyster Trail were illuminated during the analysis. These areas of improvement are to build capacity for the farmed oyster brand and to grow the NC Oyster Trail through data collection, personalized experiences, public outreach, and financial and business support.

Data Collection. Collecting data is essential for the NC Oyster Trail to understand its position in the market, and, ultimately, to inform decision-making. Data collection can identify Trail-goer demographics and motivations, explain consumer and Trail-goer trends, hold Trail sites accountable to their membership agreements, be held accountable for the NC Oyster Trails’ commitments to its members, and further find innovative ways to engage consumers and members. The administrative organizations for the NC Oyster Trail, particularly North Carolina Sea Grant, already provide a huge benefit for large-scale research efforts that support the Trail, its members, and the shellfish aquaculture industry. However, smaller data collection efforts can be implemented at a relatively low-cost. For example:

- 1) NC Oyster Trail sites should be required to display an official NC Oyster Trail QR code or include a small card with a QR code that accompanies a receipt for the consumer to take a satisfaction survey. This QR code would direct Trail-goers to a short survey that can be accessed by a smartphone, and may include questions such as:
 - a. Where did you visit on the NC Oyster Trail today?

- b. How did you hear about the NC Oyster Trail?
- c. How satisfied were you with your experience?
- d. Did you learn anything new or exciting?
- e. Anything else you'd like to share?
- f. Would you like to receive updates about the NC Oyster Trail?

These questions may include pre-populated answers to choose from or a short text box to input additional information. Local volunteers could distribute the material and/or monitor the use of these materials. Interns or funding may be available to offset design and print costs.

- 2) NC Oyster Trail sites should be required to include the official NC Oyster Trail logo on their websites, as able, in an easily visible location that links directly to ncoystertrail.org. Further, this linked logo should be equipped with tracking link, or unique URL, that will identify where the click originated from along with other information. This data can be reviewed using Google Analytics, the ncoystertrail.org website host analytics, or a vendor such as Linkly. Trained local volunteers or Trail administrators may assist with implementing and monitoring the use of this strategy. The process will require specific technical literacy and may require a fee, so identifying interns or contractors may be necessary and funding may be available to offset costs.

Personalized Experience. Providing a personalized experience for Trail-goers can increase consumer satisfaction with their Trail experience and their associations and attitudes toward farmed oysters. In turn, this can help word-of-mouth marketing, helping the Trail gain referral traffic, as well as increase the likelihood that a consumer will visit the same or new Trail site(s) in the future. Though there is a place to contact the NC Oyster Trail and sign-up for periodic newsletter about the Trail, there is currently not a clear mechanism located on the ncoystertrail.org site to capture interested or former Trail-goers. The website currently highlights recruiting businesses and organizations to become members of the Trail instead of driving consumer traffic to the Trail sites. This lack of attention directly on the consumer or Trail-goer does not encourage engagement of consumers or reciprocity between the consumer and the Trail and its sites.

- 1) The NC Oyster Trail website should be redesigned to streamline navigation and content for potential and current members as well as consumers, both interested and former Trail-goers. The current navigation bar at the top of the website includes: “About,” “Trail Map,” “NC Oyster Week,” “Contact,” and “NC Oyster Blueprint.” These navigation headings could be revised, added to, or expanded to include nested webpages that are more explicit as to the audience for that page or information. For example, “About” could be expanded into two nested webpages, such as “Visit the Trail” or “Join the Trail,” that appear when a website visitor hovers over “About” in the navigation bar. The former being targeted to consumers while the latter is targeted to prospective Trail members. The process will require specific technical literacy and may require a fee, so identifying interns or contractors may be necessary and funding may be available to offset costs.
- 2) The NC Oyster Trail website should develop a clear pathway for prospective and former Trail-goers to self-identify online and receive personalized guides that include pre-visit materials such as hyper-local information for the Trail and educational materials, or post-visit materials.
 - a. For self-identification, there should be a clear call-to-action for consumers on the website. For example, on each consumer-centered page (re the aforementioned recommendation), there should be a button or the like that reads “Tell Us Where You’re Going.” This would open a page where a consumer could fill out a short survey that includes optional questions such as:
 - i. Where do you plan to visit on the NC Oyster Trail?
 1. Include answer option in survey design to indicate the person already visited the NC Oyster Trail
 - ii. What towns or areas of North Carolina will you be visiting?
 - iii. When do you plan to visit, and for approximately how long?
 - iv. Where will you be visiting from?
 - v. Would you like to receive updates about the NC Oyster Trail?

These questions may include pre-populated answers or dropdown menus to choose from and a short text box to input additional information. Once submitted, this form would send an auto-confirmation to the consumer and the Trail administrators. The

Trail administrators would then review the information and choose from a personalized guide template to send to the consumer.

b. Personalized guide templates should be developed based on the self-identification survey answers and stored for easy access. Ideally, this would be interactive and include a pre-determined list of options for Trail sites and their hours of operation, city/town/region information, and examples of flavor profiles and experiences.

For example, if a self-identification survey came through for a Trail-goer visiting Wilmington during the summer, the personalized guide could include:

- i. All the Wilmington area sites, short descriptions, and hours of operation.
- ii. An example itinerary of a day trip or multi-day trip with Trail stops and excursions in that area.
- iii. Information about the general farmed oyster flavor profiles in the area.
- iv. Notes about the health and safety of eating farmed oysters in months without “r.”
- v. Education on the other benefits of farmed oysters.
- vi. An NC Oyster Trail passport with each site on the Trail that Trail-goers could “mark off” and make notes about once they have been to that site.

Further, former Trail-goers may receive a link to the survey discussed in the data collection recommendation section. The processes will require specific technical literacy for the self-identification, capacity to build the framework for the personalized guides, and will likely require a fee. Identifying interns or contractors may be necessary and funding may be available to offset costs.

3) The NC Oyster Trail should explore paid options for tour guides to take consumers to Trail sites. Though this would be the most extensive of the personalized experience recommendations, there is a huge opportunity to meaningfully engage with consumers during their visit to NC Oyster Trail sites. The fees may cover the cost of administering this program and/or the day-of labor. The tour guides could be generated from the local volunteers or a hired staff person. The process will require specific budgeting, program development, and hiring and training capacity. Identifying interns or contractors may be necessary and funding may be available to offset costs.

Public Outreach. Utilizing social media in different ways and diversifying the audience for the NC Oyster Trail will help establish the common language and engage prospective Trail-goers. The NC Oyster Trail has an online presence on social media (Instagram and Facebook) in addition to the ncoystertrail.org website. Specifically, the social media posts promote the Trail sites and highlight the benefits of farmed oysters. The Trail also has print advertising at some site locations and through printed swag items. Further, the Trail has direct marketing at physical locations such as county and regional visitor centers, and through other entities such as Visit NC. Though these methods have been successful, there is room to try new marketing tactics.

- 1) The NC Oyster Trail should implement YouTube to tell stories about the Trail and Trail sites, educate about farmed oysters and the industry, and highlight Trail-goer testimonials. These videos can be formatted in long and short form, adapted for social media clips, enhanced for accessibility (i.e., those hard of hearing, hard of seeing, needing translation) and embedded on the ncoystertrail.org site. Adding this social media platform and producing video content will require specific technical literacy, content development, release form management, and potentially significant costs and equipment. Identifying interns or contractors may be necessary and funding may be available to offset costs.
- 2) The NC Oyster Trail should explore new advertisement methods and markets. For example:
 - a. Billboards on the major highways in metropolitan areas across the state and when entering Eastern North Carolina (e.g., I-40, I-95, I-85, I-77, and State Highways 64, 70, and 17).
 - b. Partnering with North Carolina state agencies to sponsor events and programming and/or to include NC Oyster Trail advertising on their websites (e.g., Department of Transportation, Department of Commerce, Department of Agriculture and Consumer Services, Department of Environmental Quality, Department of Natural and Cultural Resources, Department of Health and Human Services).
 - c. Partnering with county, town, and regional agencies or joining private entities to sponsor events and programming and/or to include NC Oyster Trail advertising on their websites (e.g., Economic Development Partnership of North Carolina,

Tourism Development Authority, chambers of commerce, Southeast Tourism Society)

- d. North Carolina State Fair, regional fairs, and farmers markets around the state of North Carolina supported by staff or volunteers
- e. Seafood and tourism-related fairs, expos, conferences, and events open to the public in-person or virtually around the United States
- f. Real estate agencies and rental companies to welcome new home-owners and visitors to the coast
- g. National Aquaculture Association website alongside other state oyster trails (e.g. Rhode Island, Maine, Virginia)

These marketing opportunities will require bandwidth to implement, negotiation skills, and may require fees to cover membership, labor, and/or development costs. Identifying interns or contractors may be necessary to compile an extensive list and develop a cost-benefit analysis, and funding may be available to offset costs.

Financial and Business Support. At the base of the growth of the shellfish aquaculture industry and the NC Oyster Trail is financial stability and support. Further, the Trail sites must be equipped with the information needed to successfully operate and strategies are needed to gain funding from the North Carolina General Assembly and other public and private entities. The aforementioned recommendations will not be feasible nor possible without these support systems. The NC Oyster Trail administrators already recognize the need for financial support of the Trail and business support for their Trail sites.

- 1) The NC Oyster Trail should seek funding from new grants sources and private entities that will provide the seed money for some of these recommendations. Further, the NC Oyster Trail should pursue creative opportunities for sub-awards on grants with other organizations and initiatives. Gaining financial support in these ways can provide social proof and stakeholder buy-in when applying to other grants and lobbying for state appropriations as well as provide an opportunity to collect the needed testimonies and data to prove the worth of the NC Oyster Trail in future applications and lobbying efforts. These fund-seeking opportunities will require bandwidth to research, negotiation skills, and writing skills. Identifying interns or contractors may be necessary to compile a

prospect list and develop relationships with funders. There may be cost requirements to cover labor and lobbying influence.

- 2) The NC Oyster Trail should address the needs of their Trail sites through ongoing evaluations and trainings. By implementing a formal and consistent feedback system outside of the volunteer network and meetings, the Trail administrators can identify areas that need large-scale research, areas that need revised or new data collection strategies, areas for consumer experience improvements, and areas for business training. Further, trainings and educational materials on operations will help Trail sites stay current on regulations and policies that may impact their business. For example, the Trail administrators could host one or more virtual or in-person training workshops for the people associated with shellfish farm tours to review captain's license requirements and health and safety protocols to ensure everyone can take Trail-goers on an approved and legal shellfish farm tour. Further, these trainings may allow for collective problem-solving and co-development of best practices by the Trail sites themselves. These business support opportunities will require technical literacy to develop an evaluation tool, and program development and expertise to effectively implement trainings. Identifying field experts and contractors may be necessary to develop these trainings. There will be costs required to cover speakers and labor as well as training materials and supplies. Funding may be available to offset costs.

Reflection

This project has been an amazing journey, and I am so grateful to my advisors Dr. Grant Murray and Robin Fail for their guidance, feedback, mentorship, and friendship. Further, I am grateful for Erin Fleckenstein and Jane Harrison for being so gracious and willing to listen to an unsolicited research and recommendation pitch. Finally, I am incredibly honored to have spoken with so many wonderful people along the NC Oyster Trail, and to have built a relationship with these actors in the industry.

Though there are a number of items I would have done differently, I truly wish I had the resources to broaden the scope of this research to include all (or most) perspectives from the NC Oyster Trail and to engage with consumers directly. I feel this approach would shed more light into my research question and research goals. However, I am confident in the data I acquired

during this short project and feel this research can set the foundation for future inquiry from an untraditional approach.

This experience has given me confidence to pursue similar social and qualitative research, and be able to ask for help with research topics or methods I am unclear about. I also learned to lean on my own areas of expertise and experience, despite them being untraditionally associated with the field. I was reminded of the importance of staying open-minded and leveraging interdisciplinary approaches.

This project will help me in my professional career not only from a practical process implementation and research analysis standpoint, but also from the content knowledge and relationships I built. I was and am genuinely interested in the success of the individuals associated with the NC Oyster Trail and the shellfish aquaculture industry in North Carolina. This experience sparked a new entrepreneurial light in me, and I am seeking opportunities to stay involved. Further, the people and places I met along the journey have truly impacted me as a researcher and human. Everyone was so open and willing to share, and each person and place had a story to tell. It reminded me that in the end, we are all out for the same “things” and education is a key component of achieving those things no matter the form it comes in. Ultimately, I will take these lessons learned from the research process, data collection, and analysis alongside the knowledge and people I met along the way into my consulting career and remember to pay it forward when the time comes for a Duke master’s candidate to one day interview me.

References

- Andreatta, S. & Parlier, A. (2007). *Harnessing consumer preferences to create new markets for North Carolina seafood*. The University of North Carolina at Greensboro, The Department of Anthropology. https://ncseagrant.ncsu.edu/ncseagrant_docs/FRG/06-ST-02-Final_Report.pdf
- Brayden, W. C., Noblet, C. L., Evans, K. S., & Rickard, L. (2018). Consumer preferences for seafood attributes of wild-harvested and farm-raised products. *Aquaculture Economics & Management*, 22(3), 362–382. <https://doi.org/10.1080/13657305.2018.1449270>
- Davidson, K., Pan, M., Hu, W., & Poerwanto, D. (2012). Consumers' willingness to pay for aquaculture fish products vs. wild-caught seafood – A Case study in Hawaii. *Aquaculture Economics & Management*, 16(2), 136–154. <https://doi.org/10.1080/13657305.2012.678554>
- Fodrie, J., Peterson, C., Voss, C., & Baillie, C. (2018). *North Carolina strategic plan for shellfish mariculture: A Vision to 2030*. North Carolina Shellfish Mariculture Advisory Committee. <https://collaboratory.unc.edu/wp-content/uploads/sites/476/2019/01/NC-Strategic-Plan-for-Shellfish-Mariculture-Final-2018.pdf>
- Kros, J., Rowe, J., & Nash, B. (2013). *A Supply chain analysis of North Carolina's commercial fishing industry*. The Rural Center. https://ncseagrant.ncsu.edu/ncseagrant_docs/products/2010s/supply_chain_analysis_nc_commercial_fishing.pdf
- Luna, D., Lerman, D. B., & Morais, R. (2018). The Language of Branding: Theory, Strategies, and Tactics. In *The Language of Branding: Theory, Strategies, and Tactics*. <https://doi.org/10.4324/9780203139691>
- McClenachan, L., Dissanayake, S. T. M., & Chen, X. (2016). Fair trade fish: Consumer support for broader seafood sustainability. *Fish and Fisheries*, 17(3), 825–838. <https://doi.org/10.1111/faf.12148>
- Mosher, K. (2011). *LOCAL CATCH: And the survey says: Local seafood reigns*. Coastwatch Winter 2011 Issue. <https://ncseagrant.ncsu.edu/coastwatch/previous-issues/2011-2/winter-2011/local-catch-and-the-survey-says-local-seafood-reigns/>
- Murray, G., Fail, R., Fairbanks, F., Campbell, L., D'Anna, L., & Stoll, J. (2020). *Seafood values survey (unpublished)*.

- Murray, G., Wolff, K., & Patterson, M. (2017). Why eat fish? Factors influencing seafood consumer choices in British Columbia, Canada. *Ocean & Coastal Management*, 144, 16–22. <https://doi.org/10.1016/j.ocecoaman.2017.04.007>
- Nash, B., Harrison, J., & Whitehead, J. (2021). *Consumer demand for North Carolina seafood*. North Carolina Sea Grant. <https://ncseagrant.ncsu.edu/wp-content/uploads/2021/03/Consumer-Demand-for-North-Carolina-Seafood.pdf>
- NC Oyster Trail. (2022). *About*. <https://ncoystertrail.org/>
- NC Oyster Trail. (2022). *Membership*. <https://ncoystertrail.org/membership/>
- NC Oyster Trail. (2022). *NC oyster week*. <https://ncoystertrail.org/oyster-trail-sites/>
- NC Oyster Trail. (2022). *Trail map*. <https://ncoystertrail.org/oyster-trail-sites/>
- North Carolina Coastal Federation (2021). *North Carolina oyster blueprint: An Action for plan for restoration and protection*. <https://ncoysters.org/>
- North Carolina Coastal Federation (2021). *Oyster Restoration and Protection Plan for North Carolina: A Blueprint for Action*, fourth edition. Ocean, N.C. <https://www.nccoast.org/wp-content/uploads/2021/08/Oyster-Blueprint-2021-2025-FINAL-web.pdf>
- Pages, H. (2017). *Transparency content and the consumer journey*. Response Media. https://www.responsemedia.com/wp-content/uploads/2017/07/RM_Transparency_Survey_Final.pdf
- Ritter, L., B. Nash, B., & Small, W. (2006). *Branding seafood: Developing a marketing plan to sell value-added seafood products*. North Carolina Sea Grant. https://ncseagrant.ncsu.edu/ncseagrant_docs/products/2000s/bp_branding_seafood.pdf
- Roheim, C. A., Sudhakaran, P. O., & Durham, C. A. (2012). Certification of shrimp and salmon for best aquaculture practices: Assessing consumer preferences in Rhode Island. *Aquaculture Economics & Management*, 16(3), 266–286. <https://doi.org/10.1080/13657305.2012.713075>
- Witter, A., Murray, G., & Sumaila, U. R. (2021). Consumer seafood preferences related to alternative food networks and their value chains. *Marine Policy*, 131, 104694. <https://doi.org/10.1016/j.marpol.2021.104694>

Appendices

Appendix A. List of the Online Source Websites

<http://localsseafood.com/our-fish-markets/>

<http://localsseafood.com/north-carolina-oyster-guide/>

<http://www.localsoysterbar.com/>

<http://www.threelittlepats.com/>

<https://capefearoystercompany.com/>

<https://capehatterasoyster.com/>

<https://catchwilmington.com/>

<https://chadwickseafood.com/>

<https://coquinafishbar.com/>

<https://downeastmariculture.com/>

<https://earpsseafoodmarket.com/>

<https://eatncoysters.com/>

<https://froggydog.com/>

<https://middle-sound-mariculture.business.site/>

<https://nseaoyster.co/>

<https://parleyssipandsteam.com/>

<https://pinpointrestaurant.com/>

<https://plum-pointe-kitchen.business.site/>

<https://roystersnc.com/>

<https://rustyhooksdockside.com/>

<https://seacowmobilemarket.com/>

<https://sealevelnc.com/>

<https://seaviewcrabcompany.com/>

<https://slashcreek.com/>

<https://soundsideoysterfarms.com/>

<https://strochraleigh.com/>

<https://tidewateroysterbar.com/>

<https://whiteoakoystercompany.com/>

<https://www.blackbeardsgrillandsteambar.com/>

<https://www.bluewatergrillobx.com/>
<https://www.crystalcoastoysters.co/>
<https://www.facebook.com/Hoop-Pole-Creek-Oyster-Company-115281176782892>
<https://www.facebook.com/Hooper-Family-Seafood-101193655324114>
<https://www.facebook.com/ocracokeoystercompany/>
<https://www.facebook.com/pages/category/Fishing-Store/Good-Time-Charlies-Charters-568284143314784/>
<https://www.facebook.com/savageinletoysters/>
<https://www.facebook.com/The-Flying-Melon-Caf%C3%A9-118855304797847/>
<https://www.ghostfleetoysterco.com/>
<https://www.howardspub.com/>
https://www.instagram.com/devil_shoal_oysters/
<https://www.mandolinraleigh.com/>
<https://www.oysterscarolina.com/>
<https://www.saltboxseafoodjoint.com/>
<https://www.seabirdnc.com/>
<https://www.seaviewcrabcompany.com/>
<https://www.seaviewcrabcompany.com/pages/kitchen-deli>
<https://www.seavisions.net/>
<https://www.stickybottomoysters.com/>
<https://www.theshuckinshack.com/location/surf-city/>
<https://www.wbbeer.com/>

Appendix B. Interview Questions

1. What is your understanding of shellfish aquaculture, the process of farming oysters, and how they get to consumers?
2. Where do you source your oysters for your farm/restaurant/business?
3. Who is your intended audience/customer base?
4. How do you talk about or advertise oysters with customers/buyers?
 - a. What language do you use?
 - i. Why?
 - b. Do you avoid any language?
 - i. If so, why?
5. What trends have you seen in your customers/general consumer base surrounding discussion and purchase of oysters?
 - a. Where do you see these trends going in the future?
6. Where do you perceive gaps, if any, in consumer preferences and their purchasing habits?
7. How has the NC Oyster Trail helped oyster farmers in North Carolina?
 - a. Has it hurt?
8. Do you feel that the NC Oyster Trail is successful in showcasing locally sourced oysters?
 - a. Why or why not?
9. In what ways can the NC Oyster Trail improve its general marketing to different audiences (i.e. oyster growers, consumers, tourists, potential partners)?
 - a. How about improving the marketing for NC farmed oysters?
10. What challenges do you foresee for the NC Oyster Trail and oyster farming in North Carolina?
 - a. How do you plan to meet/overcome those challenges?
 - b. What partnerships, if any, do you think are key in overcoming those challenges?
11. Do you feel you learned or realized something today during our discussion?
 - a. If so, what and how will you act upon it?