2015

SHELLFISH FARMS AS AGRITOURISM DESTINATIONS: THE GROWERS' PERSPECTIVE

Maria Vasta
University of Rhode Island, mvasta24@gmail.com

SHELLFISH FARMS AS AGRITOURISM DESTINATIONS: THE GROWERS' PERSPECTIVE

BY

MARIA VASTA

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS

IN

MARINE AFFAIRS

UNIVERSITY OF RHODE ISLAND

2015

MASTER OF ARTS IN MARINE AFFAIRS THESIS

OF

MARIA VASTA

APPROVED:

Thesis Committee:

Major Professor Tracey Dalton

David Bidwell

Hirotsugu Uchida

Nasser H. Zawia

DEAN OF THE GRADUATE SCHOOL

UNIVERSITY OF RHODE ISLAND

2015

ABSTRACT

Agritourism encompasses a variety of different types of agricultural tourism products and can be defined broadly as the incorporation of commercial tourism into a working farm. Agritourism has been used on land as a way to diversify farm activities. As national shellfish aquaculture production in the United States increased over the years, aquaculture growers also began adopting agritourism components on their farms.

The primary objectives for this study were to (1) expand on current agritourism knowledge; (2) help to address the gap in existing literature pertaining to aquaculture farm-based tourism; and (3) provide shellfish growers and coastal managers with insights into this emerging use of coastal waters. To achieve these objectives, research focused on examining (1) the different types of agritourism currently implemented by shellfish farmers on the East and Pacific coasts of the US; (2) how shellfish growers perceive a variety of motivations for offering tourism on their farms; (3) how shellfish growers perceive challenges of offering tourism activities; and (4) how these perceptions vary among different stakeholder groups (e.g. East coast v. Pacific coast growers, growers with v. without agritourism).

In order to address these questions, 64 shellfish growers across 15 states along the East and Pacific coasts of the US were surveyed. Survey invitations were distributed via e-mail and responses were collected through an electronic survey. Results showed shellfish growers offer a variety of agritourism opportunities on their farms such as tours, farm dinners, and festivals. Almost half of all respondents currently offer tourism on their farms, and a third of respondents who do not currently have these opportunities indicated that they are planning to develop them in the future. Most respondents with agritourism

do not charge consumers to participate in these activities. Three categories of motivations for offering agritourism emerged: *Education and Outreach*, *Economics*, and *External Influences*. Shellfish growers from all stakeholder groups agreed most strongly with *Education and Outreach* and least strongly with *External Influences* as motivations for offering agritourism. Respondents with agritourism rated *Education and Outreach* higher than respondents without agritourism. This study also found that as a whole, the challenges that respondents agreed most strongly with were lack of resources to offer tourism, lack of infrastructure to support tourism, and additional costs associated with offering tourism. Pacific coast respondents felt the challenges to developing tourism more strongly than East coast respondents. This study concludes with management recommendations for coastal managers and regulators, as well as recommendations for future research.

ACKNOWLEDGEMENTS

First and foremost, I would like to thank my major professor, Dr. Tracey Dalton, for her unwavering guidance, patience, encouragement, and enthusiasm throughout my time at URI. Without your support there is no way I would be where I am today, and I am forever grateful for all you have helped me accomplish! I would like to thank my committee members, Dr. David Bidwell and Dr. Hirotsugu Uchida, for all of their time, insight, and support. I also wish to thank my defense chair, Dr. Caroline Gottschalk Druschke, for her assistance throughout the defense process. Special thanks go to Dave Beutel, Bob Rheault, Margaret Barrette, and Dr. Michael Rice for their professional insight and advice along the way. I would also like to express my thanks to the shellfish growers who participated in my study, whose valuable input made this project possible.

I would like to express my gratitude for Judy Palmer. I never would have made it through this journey without your friendly reminders and positive attitude. I would also like to thank my fellow graduate students for all the support they have shown throughout the years. In particular, I would like to acknowledge Cassie Audette, Dan Maggio, and Kristine Beran, who never failed to put a smile on my face when I needed it the most!

I especially want to thank my parents, Jane and John, and my siblings, Julia and Danny, for all the love and encouragement they showed me throughout my graduate career. I am so lucky to have such a wonderful and supporting family! Finally, I want express my eternal gratitude to Tyler, who never stopped believing in me and always helped me look on the bright side of life. I could not imagine better partners than you and Maxie to help me through this journey!

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CHAPTER ONE

INTRODUCTION

1.1 Introduction

Throughout the past 30 years, farm management in the United States has evolved to accommodate operators' desire to diversify their farming operations (Barbieri et al., 2008; Nickerson et al., 2001; Tew and Barbieri, 2012). Diversification refers to “the adoption of alternative enterprises on the holding," in this case the farm (p. 257; Evans and Ilbery, 1989). The diversification of a working farm environment typically entails the incorporation of a leisure, tourism, or recreational component into the farm's business plan. These activities collectively constitute agritourism, the body of "rural enterprises which incorporate both a working farm environment and a commercial tourism component” (p. 162; McGehee and Kim, 2004). The recreational opportunities that are defined as terrestrial agritourism ventures are numerous and diverse, including (but not limited to) hayrides, orchard visits, corn mazes, pick-your-own produce, on-farm festivals, guided horseback rides, fee hunting/fishing, petting zoos, on-farm markets, and educational opportunities (Tew and Barbieri, 2012; McGehee and Kim, 2004).

The decision to develop agritourism typically results in a number of benefits pertaining to the farmers, their local communities, and the tourists participating in the activities (Tew and Barbieri, 2012). These benefits include allowing family farms to stay in business, protecting cultural heritage, increasing productivity through increased resource usage, and enhancing local economies (Ilbery, 1991; Nickerson et al., 2001;

Ollenburg and Buckley, 2007; Veeck et al., 2006; Wilson et al., 2006; Tew and Barbieri, 2012). For the farmers personally, developing agritourism on their holdings can act as a method to increase profits, accomplish entrepreneurial objectives, and improve overall quality of life (Barbieri, 2009; McGehee and Kim, 2004; Nickerson et al., 2001; Ollenburg and Buckley, 2007).

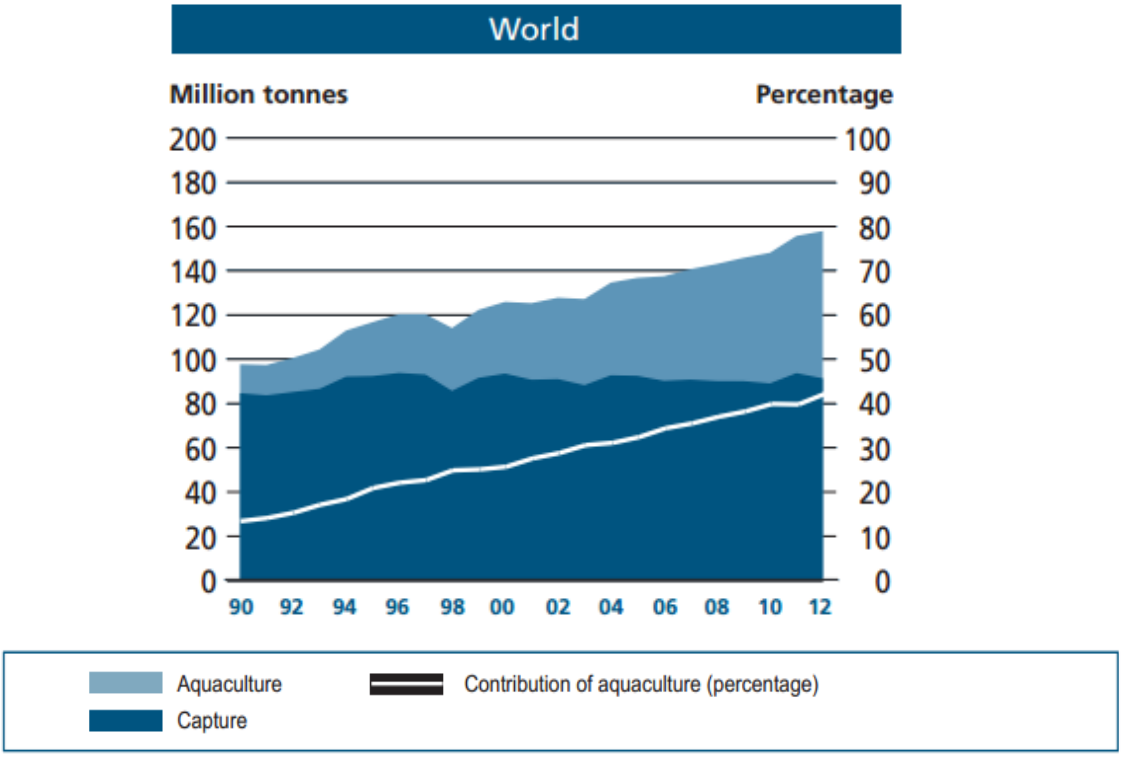
Agritourism has steadily increased in popularity throughout the years. According to the United States Department of Agriculture's (USDA's) Census of Agriculture, the number of farms offering *agritourism and recreational services* increased from 23,350 in 2007 to 33,161 in 2012 (USDA: NASS, 2012). The revenue generated annually through these services increased from $566.83 million in 2007 to $704.04 million in 2012 (USDA: NASS, 2012). The USDA's Census of Agriculture explains that the sources of revenue attributed to agritourism and recreational services include income from recreational activities like hunting, fishing, farm or wine tours, hay rides, and other activities (USDA: NASS, 2012). There is a growing body of literature devoted to the study of terrestrial farm-based tourism (agritourism); much of this research examines farm characteristics, operator demographics, and the factors motivating farmers to develop agritourism (e.g. Tew and Barbieri, 2012; Sharpley and Vass, 2006; Nickerson et al., 2001; McGehee and Kim, 2004; Barbieri, 2010; Ollenburg and Buckley, 2007; Kuehn and Hilchey, 2000). In addition to terrestrial establishments, aquaculture farms have also begun offering these activities to patrons.

Aquaculture is defined as the growth of aquatic plants and animals for any commercial, recreational, or public purpose (NOAA Fisheries, 2015). Shellfish aquaculture encompasses the farming of both mollusks and crustaceans (Goldburg et al.,

2001). Two-thirds of total US marine aquaculture production by value is attributed to bivalve mollusks like oysters, clams, and mussels (NOAA Fisheries, 2014).

The role of aquaculture in global food production and security is poised to increase in the future as human populations continue to expand and outstrip natural resource production. Aquaculture currently accounts for almost half of the total seafood produced for human consumption (FAO, 2014). In 2012, wild capture fisheries produced 91.3 million metric tons of seafood, an amount that has stayed relatively constant over the past decade (FAO, 2014). In contrast, annual global aquaculture production has been rising throughout the past decade, with aquaculture production accounting for 66.6 million metric tons of seafood in 2012 (FAO, 2014) (Figure 1).

Figure 1: Share of aquaculture in total fish production (Source: FAO, 2014)



Of the 66.6 million metric tons of seafood produced through aquaculture in 2012, crustacean production contributed 6.45 million metric tons while mollusk production contributed 15.17 million metric tons (FAO, 2014). In total, shellfish aquaculture produced 21.62 million metric tons of seafood, representing 32.5% of total global aquaculture production for 2012 (FAO, 2014) (Table 1).

Table 1: World production of farmed species groups from inland aquaculture and mariculture in 2012 (Source: FAO, 2014)

	Inland aquaculture	Mariculture	Quantity subtotal		Value subtotal	
	(Million tonnes)	*(Million tonnes)*	*(Million tonnes)*	*(Percentage by volume)*	*(US$ million)*	*(Percentage by value)*
Finfish	38.599	5.552	44.151	66.3	87 499	63.5
Crustaceans	2.530	3.917	6.447	9.7	30 864	22.4
Molluscs	0.287	14.884	15.171	22.8	15 857	11.5
Other species	0.530	0.335	0.865	1.3	3 512	2.5
Total	**41.946**	**24.687**	**66.633**	**100**	**137 732**	**100**

Scientists estimate that by 2030, aquaculture production will surpass wild-caught fisheries in terms of human food production, with farm-raised products accounting for 62 percent of total production (FAO 2014).

1.2 Significance of Study

As the shellfish aquaculture industry continues to expand in the US, farmers have begun diversifying their shellfish growing operations to accommodate public tourism activities on their farms. The activities include formal farm tours, informal farm tours, farm dinners, and other activities (Beutel, personal communication). The *animal aquaculture and other animal production* portion of the agricultural sector contains 6,297

farms offering agritourism and recreational services; these activities brought in $2.08 million in 2012 (USDA: NASS, 2012). Although these figures are not limited to shellfish aquaculture holdings alone, they provide an illustration of how lucrative agritourism activities may be. In addition to direct financial benefits, there may be other motivations driving aquaculturists to develop agritourism on their farms.

Despite the fact that interest in agritourism has been expanding over past decades, it appears that agritourism operator research has typically focused on farmers who already offer agritourism, rather than those who do not offer it. Additionally, it appears that agritourism research has traditionally focused only on terrestrial farms and not aquaculture farms despite the growth in this sector. To address these research gaps, this study investigates existing agritourism activities on aquaculture farms in the US and the incentives and disincentives for developing these activities.

In particular, this research examines (1) characteristics of agritourism activities currently offered by shellfish farmers on the East and Pacific coasts of the US; (2) shellfish growers perceptions of the potential motivations for offering tourism activities on their farms; (3) challenges in place preventing certain growers from offering tourism activities on their farms; and (4) how these perceptions vary among different stakeholder groups (East coast v. Pacific coast growers; growers with v. without agritourism).

Chapter two of this thesis provides background on terrestrial agritourism and shellfish aquaculture, focusing on agritourism characteristics, motivations and challenges, shellfish farming in the US, and shellfish growers associations . Chapter three details the methodology used to conduct this study, providing an overview of the study areas, study sample, online survey instrument, data collection, and data analysis. Chapter four

presents the results of this research. Chapter five contains a discussion of select findings as well as management and research recommendations. Finally, chapter six provides final concluding thoughts.

CHAPTER TWO

BACKGROUND

This chapter provides a literature review of terrestrial agritourism and shellfish aquaculture, focusing specifically on characteristics of agritourism, benefits from agritourism, motivators for developing these activities, challenges to agritourism development, US shellfish aquaculture production, regulation of this industry, and shellfish growers associations.

2.1 Terrestrial Agritourism

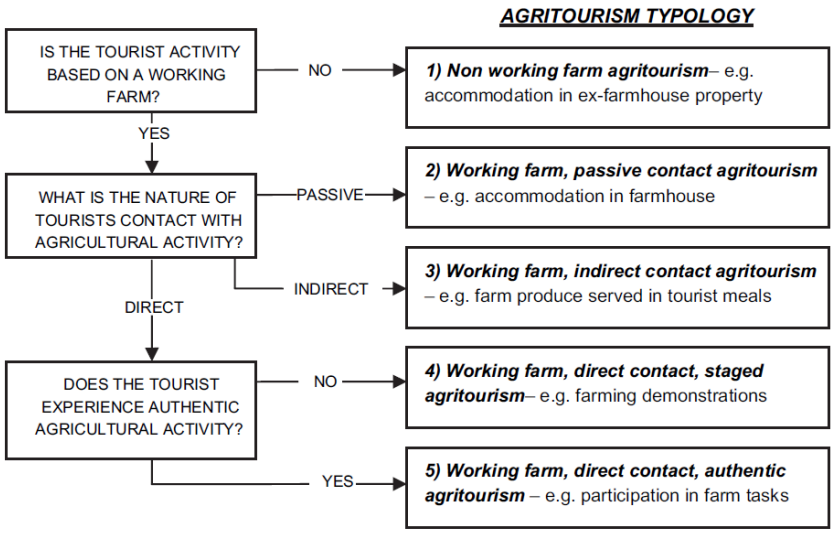
The phrase “agritourism" (also agrotourism, agri-tourism) has no one homogenous definition; instead, this term encompasses a variety of different types of agricultural tourism products (Phillip et al., 2010). In a very general sense, agritourism can be defined as “rural enterprises which incorporate both a working farm environment and a commercial tourism component” (p. 162; McGehee and Kim, 2004). The tourism component may include any number of recreational, educational, or leisure activities that have been incorporated into the farm's operation (Barbieri, 2013).

Many terrestrial farmers have turned to agritourism as a means of achieving farm diversification (Nickerson et al., 2001). Agritourism is not the only method employed by farmers to diversify their holdings, but it is unique from other avenues because it both increases the value of agricultural commodities and offers services to individuals outside of the farm (Barbieri, 2013). The need to diversify is driven by the fact that many small,

family-owned farms across the US are struggling to survive due to a number of stressors (Barbieri, 2013). These pressures are financial, societal, and regulatory in nature and include: cost-price squeezes, continuous advances in technology, buyouts by larger companies, and the loss of government subsidies (Barbieri, 2012). Small-scale farms can provide a number of environmental benefits by (1) mitigating soil and stream erosion; (2) combating water contamination; (3) helping limit urban development; (4) protecting the aesthetic value of landscapes; and (5) encouraging environmentally-conscious conservation behavior (Barbieri, 2013; Gold et al., 2009; Lambert et al., 2006). For these reasons, to offset reductions in farm incomes, and to renew rural communities, many government agencies and NGOs have attempted to support small farms and keep them in business through the development of agritourism (Barbieri, 2013).

According to previous typology studies, the exact classifications of farm-based recreational opportunities vary depending on three major factors: whether or not the experience takes place on a working farm, how much contact the participant has with agricultural activities, and the authenticity of the experience (Phillip et al., 2010; Flanigan et al., 2014). Depending how an activity ranks according to these criteria it falls into one of five general classes of agritourism: non-working farm agritourism, working-farm passive-contact agritourism, working-farm indirect-contact agritourism, working-farm direct-contact staged agritourism, and working-farm direct-contact authentic agritourism (Phillip et al., 2010) (Figure 2).

Figure 2: A typology for defining agritourism (Source: Phillip et al., 2010)



The recreational opportunities that are defined as terrestrial agritourism ventures are numerous and diverse. These vary by geographic region but commonly include activities such as hayrides, orchard visits, corn mazes, pick-your-own produce, on-farm festivals, guided horseback rides, fee hunting/fishing, petting zoos, on-farm markets, and educational opportunities (Tew and Barbieri, 2012; McGehee and Kim, 2004).

Certain factors are believed to contribute to the success of an agricultural tourism venture. These include the presence of a well-established tourism industry in the area, well-developed farm infrastructure, a large local and regional market, a mild climate, and the presence of a diverse agricultural industry (Lobo et al., 1999).

2.1.1 Benefits of Agritourism

Diversification of farm holdings through agritourism development typically results in economic gains to the owners through increased farm income and decreased financial strain (Barbieri, 2013). Agritourism ventures can help family farms stay in

business and help maximize farm productivity through fuller and more efficient use of resources (Ilbery, 1991).

In a study on US farms, 80.6% of respondents with agritourism reported that their farms experienced increased profits after diversifying (Barbieri, 2013). On average, the farm profits increased by 68.5% as a result of agritourism (Barbieri, 2013). In addition to these economic benefits, developing agritourism can also allow farmers to achieve their personal entrepreneurial goals and improve their overall quality of life (Barbieri, 2009; McGehee and Kim, 2004; Nickerson et al., 2001; Ollenburg and Buckley, 2007).

Agritourism is not the only method through which farmers diversify their farming operations. There are seven other types of enterprises through which diversification is commonly achieved: (1) non-traditional farming; (2) direct marketing; (3) passive diversification; (4) providing contracting services to others; (5) value-added processes; (6) historic preservation and restoration of old buildings, structures, and farm equipment; and (7) consulting and apprenticeships (Barbieri, 2013). However, evidence shows that compared to these other routes of diversification, agritourism may be more effective in helping farmers achieve certain goals. A study on Canadian agritourism farms showed that operators on these farms realize goals related to employing family members and interacting with customers to a higher degree than operators on other types of diversified farms (Barbieri, 2010).

Many of the benefits associated with agritourism extend past the farm and the operators themselves and influence surrounding communities (Lobo et al., 1999; Tew and Barbieri, 2012). The agritourism sector represents a valuable avenue through which to preserve rural American heritage and improve local economies (Ilbery, 1991).

Agritourism activities offered at the Flower Fields in San Diego, California not only allow farmers to diversify their revenue sources, increase their total revenue, and remain in operation, they also bring business to other members of the local economy and foster valuable public-private partnerships (Lobo et al., 1999). Another agritourism study in Missouri revealed that farm diversification helps to alleviate local issues by blending the industry with local communities, assists in maintaining rural lifestyles, and facilitates increased awareness and preservation of local customs and unique cultural traits (Tew and Barbieri, 2012).

Additionally, US farms with agritourism on average employ more people year-round than do farms that have diversified in alternative ways, such as developing non-traditional farming or offering contracting services to others (Barbieri, 2013). The average proportion of positions held by family members is also significantly less than that on other diversified farms. This implies that local communities and economies in areas surrounding agritourism farms benefit from increased abundance in employment opportunities (Barbieri, 2013).

2.1.2 Factors Motivating the Development of Agritourism

Many agritourism studies address eleven well-established goals that motivate farmers to diversify their operations: (1) offsetting fluctuations in agriculture income; (2) providing employment for family members; (3) providing additional farm income; (4) offsetting the loss of government agriculture programs; (5) meeting a need in the recreation/vacation market; (6) obtaining tax incentives; (7) providing companionship with guests/users; (8) capitalizing on a farmer's interest/hobby; (9) providing better use of

farm/ranch resources; (10) inspired by the successes of other farm/ranch recreation businesses; and (11) educating consumers (Nickerson et al., 2001; McGehee et al., 2007; McGehee and Kim, 2004; Ollenburg and Buckley, 2007; Tew and Barbieri, 2012; Barbieri, 2010).

Additional motivations not contained in this list include providing retirement income, ensuring future property ownership, sharing pride in the farm, providing current customers with new products, enhancing personal/family quality of life, and providing new challenges (Ollenburg and Buckley, 2007; Barbieri, 2010; Tew and Barbieri, 2012). Research findings suggest that economic objectives are deemed the strongest motivators by agritourism operators, but social goals still play strongly into the decision to diversify (Nickerson et al., 2001; McGehee and Kim, 2004; Ollenburg and Buckley, 2007; Kuehn and Hilchey, 2000; Barbieri, 2009). Previous agritourism studies in New York and Montana found that farmers tend to be motivated most heavily by an increase in income while external and social factors also play a part in the decision (Nickerson et al., 2001; Kuehn and Hilchey 2000).

Furthermore, certain personal characteristics of farmers may correlate with the decision to engage in agritourism as opposed to another form of diversification. A study examining farm operators in the US compared those who offer agritourism with those who diversified using alternative methods. Findings showed that agritourism operators had a significantly higher proportion of males than other diversified farm operators , a significantly higher proportion of agritourism operators relied on farming as their primary occupation, and a significantly smaller proportion of agritourism operators achieved advanced studies compared with other diversified operators (Barbieri, 2013).

2.1.3 Challenges as Disincentives to Developing Agritourism

There are a number of challenges in place that act as disincentives for developing agritourism on farm holdings. These challenges vary spatially and temporally, and many of them could be alleviated by financial or regulatory intervention by governing agencies (Yang, 2012). Some of these challenges typically associated with developing agritourism ventures include location, investment, marketing, and quality (Sharpley and Vass, 2006; Yang, 2012). "Location" refers to the fact that some areas are not appealing to tourists and therefore will not attract participants (Sharpley and Vass, 2006). "Investment" means that some agriculturists may not possess the resources necessary for farm diversification, while "marketing" refers to the fact that some farmers may not have the ability or resources required to effectively advertise their product (Sharpley and Vass, 2006; Yang, 2012). Finally, "quality" means that some agritourism products do not meet participants' expectations and requirements (Sharpley and Vass, 2006).

Zhang et al. (2009) note four similar challenges to implementing farm tourism including development of rural areas, lack of planning, a dearth in financial and human resources, and heightened commodization. Additional cited challenges that may act as disincentives for developing agritourism include complicated permitting processes, disconnects between management agencies, a lack of readily-availably regulatory information, a lack of professionalism, a lack of education and/or knowledge, a lack of time, and a lack of inclination (Leff, 2011; Iorio and Corsale, 2010; Colton and Bissix, 2005).

Table 2: Summary of cited motivations for and challenges to developing agritourism

Motivations	References
Offsetting fluctuations in agricultural income	Nickerson et al., 2001; McGehee et al., 2007; McGehee and Kim, 2004; Ollenburg and Buckley, 2007; Tew and Barbieri, 2012; Barbieri, 2010
Providing employment for family members	
Providing additional farm income	
Offsetting the loss of government agriculture programs	
Meeting a need in the recreation/vacation market	
Obtaining tax incentives	
Providing companionship with guests/users	
Capitalizing on a farmer's interest/hobby	
Providing better use of farm/ranch resources	
Inspired by the successes of other farm/ranch recreation businesses	
Educating consumers	
Providing retirement income	Ollenburg and Buckley, 2007; Barbieri, 2010; Tew and Barbieri, 2012
Ensuring future property ownership	
Sharing pride in the farm	
Providing current customers with new products	
Enhancing personal/family quality of life	
Providing new challenges	
Challenges	**References**
Appeal of farm location	Sharpley and Vass, 2006
Lack of financial resources	
Expectations of quality	
Marketing ability/resources	Sharpley and Vass, 2006; Yang, 2012
Development of rural areas	Zhang et al., 2009
Lack of planning	
Human resources	
Increased commodization	
Complicated permitting processes	Leff, 2011; Iorio and Corsale, 2010; Colton and Bissex, 2005
Lack of readily available regulatory information	
Lack of communication between management agencies	
Lack of professionalism	
Lack of education and/or knowledge	
Lack of time	
Lack of inclination	

2.2 Shellfish Aquaculture in the United States

Shellfish aquaculture accounts for almost 20% of total annual US aquaculture production; this number has been expanding over the past few decades (NOAA Fisheries, 2015). According to the USDA's Census of Aquaculture, in 2013 there were 3,093 total aquaculture farms in the US; 566 of these farms raised crustaceans and 756 raised mollusks (USDA: NASS, 2013). Annual sales in 2013 from farm-raised crustaceans accounted for $84.88 million while sales from farm-raised general mollusks raised $328.57 million (USDA: NASS, 2013). Crayfish, marine shrimp (*Peneaus spp*.), freshwater prawns (*Macrobrachium rosenbergii*), clams, oysters, and mussels (*Mytilus spp*.) are some of the most commonly cultured shellfish products in the US (APHIS, 1995). In addition to shellfish, the US cultures multiple species of food fish, sport fish, baitfish, ornamental fish, and miscellaneous products annually (USDA: NASS, 2013).

The exact methods utilized to raise shellfish vary depending on the species being cultured, but the typical growth cycle occurs in three stages: seed collection, nursery and on-growing, and harvest (Kaiser et al., 1998). During the first stage, "seed collection," shellfish seed is procured either from a hatchery or through natural spat-settling (FAO, 2011). The second stage, "nursery and on-growing," is the longest of the three stages. If necessary, young undersize shellfish are raised in a nursery until they are large and hearty enough to be moved to the grow-out area (Flimlin et al., 2008). Nurseries provide sheltered systems which protect and feed young oysters (Pangea Shellfish Company, 2013). These systems may be located in the water or on land, and they are typically designed in the style of wellers or raceways (Flimlin et al., 2008). In a weller system, the shellfish seed is placed in a silo or sieve; water is pumped continuously past the

organisms in order to ensure a continuing supply of nutrients (University of Florida, 2015). Wellers are classified based on the directionality of water flow; downwellers pump water past the shellfish from above, while upwellers pump water past the shellfish from below (Pangea Shellfish Company, 2013). In contrast, raceways pump water horizontally across containers holding the shellfish seed (University of Florida, 2015). The shellfish are moved to on-growing areas once they are large enough to survive. They are raised inside of bags, in cages, on long-lines, or on the sediment until they are of harvestable size (Flimlin et al., 2008). Once the organisms have reached harvestable size, stage three begins. The exact harvesting strategy employed by aquaculture farmers depends on the species being cultured and the gear used to accomplish this.

2.2.1 Regulatory Framework for Aquaculture

The management of aquaculture in the US is a cooperative effort involving many different federal, state, regional, and local authorities. Typically, separate authorities regulate specific areas of the aquaculture industry. In terms of federal governance, the Army Corps of Engineers, the Environmental Protection Agency (EPA), the Fish and Wildlife Service (FWS), the National Oceanic and Atmospheric Administration (NOAA), the National Marine Fisheries Service (NMFS), the Animal and Plant Health Inspection Service (APHIS), and the Food and Drug Administration (FDA) are all tasked with managing various aspects of the aquaculture industry (APHIS, 1995). On the state level, management of the aquaculture industry varies greatly on a state-by-state basis. In some states such as Rhode Island, aquaculture is licensed by the state itself. Other states, such

as Massachusetts, give local municipalities the authority to regulate and approve aquaculture permits.

In terms of federal policies, in 1998 and 1999 the Department of Commerce and NOAA implemented National Aquaculture Policies as management and support tools for the industry; however, over time it became clear that the US was not poised to achieve the 2025 production goals identified in these policies (FAO, 2011). Therefore, in 2004 the US Commission on Ocean Policy urged NOAA to increase aquaculture-related research efforts with the goal of advancing aquaculture technology, education, and extension (FAO, 2011). In order to accomplish these goals, as well as those established by the DOC in its 1999 policy, NOAA developed the 2004 National Marine Aquaculture Initiative (FAO, 2011). Later, in 2007, NOAA created a 10-year plan for marine aquaculture in order to help steer policy to facilitate the development of the US aquaculture industry (FAO, 2011).

That same year NOAA's aquaculture team and the Secretary of Commerce hosted a National Marine Aquaculture summit in order to discuss the various prospects and challenges facing the US aquaculture industry (FAO, 2011). The summit was attended by a variety of stakeholders including industry leaders, government officials, scientific researchers, policy experts, and non-governmental organization spokespeople (FAO 2015). Ultimately it was agreed that the lack of a streamlined regulatory process, a dearth in aquaculture research and development, and a scarcity of financial incentives were the three major factors limiting the growth of the industry (FAO, 2011). In response to these findings, NOAA released a draft of its National Policy for Sustainable Marine Aquaculture in 2011 (FAO, 2011). This policy is designed to simultaneously support the

expansion of the US aquaculture industry while protecting coastal ecosystems and marine resources (FAO, 2011).

This Marine Aquaculture Policy divides NOAA's statement of policy into nine different items. NOAA states that in terms of aquaculture, its policy is to: 1) to encourage and support sustainable aquaculture practices that benefit society and do not conflict with other users, ecosystems, or policies; 2) to ensure that aquaculture development will not harm the natural environment; 3) to encourage scientific research pertaining to sustainable aquaculture; 4) to make efficient and well-informed management decisions; 5) to support beneficial aquaculture investments; 6) to increase public understanding of the industry and NOAA's role in it; 7) to work with other federal agencies to alleviate the challenges in place limiting US aquaculture; 8) to increase international communication and collaboration pertaining to aquaculture; and 9) to work with other US agencies on a variety of scales to minimize user-conflict related to aquaculture (NOAA, 2011). In order to support these policies, NOAA has identified a number of priorities that future efforts should be focused on advancing (NOAA, 2011). These priority areas are: 1) science and research; 2) regulation; 3) innovation partnerships, and outreach; and 4) international cooperation (NOAA, 2011).

2.2.2 Policy Implications of Agritourism

In its Marine Aquaculture Policy, NOAA stresses the importance of “creating employment and business opportunities in coastal communities" (p. 1; NOAA, 2011), as well as ensuring that “the public has an accurate understanding of sustainable aquaculture development in federal waters and the associated environmental, social, and economic

challenges and benefits” of aquaculture in the US (p. 2; NOAA, 2011). NOAA's Aquaculture Office has worked to develop outreach efforts in order to enhance stakeholder knowledge of the relationship between shellfish aquaculture and the environment and how aquaculture is permitted in state waters (NOAA Fisheries, 2015). A better understanding of tourism activities taking place on shellfish farms in the US could help to advance these objectives and foster additional opportunities for outreach and education.

Studies on ecotourism, a relative of agritourism, suggest that participants who engage in ecotourism activities feel more educated after the experience (Tisdell and Wilson, 2005). Like agritourism, the phrase "ecotourism" has a number of definitions encompassing a variety of social, financial, and ecological elements, but at its core ecotourism is "an ethics-based approach to tourism; where the satisfaction of both conservation and tourism development ends is critical" (p. 194; Donohoe and Needham, 2006). Participants in ecotourism programs have also exhibited heightened awareness of human-environment interactions compared those who do not participate (Christensen et al., 2007). Some participants even express the desire to learn more while they engage in recreational ecotourism activities, suggesting that these offerings may be a valuable and publically appealing outlet for outreach and education (Lück, 2003). These findings imply that agritourism on shellfish farms may provide an avenue to address the "public awareness" objectives stated in NOAA's Marine Aquaculture Policy. To better understand how agritourism on shellfish farms affects public awareness, it is worthwhile to explore not only the impacts of these activities, but also which growers offer

agritourism opportunities, why they have developed these activities, and why others have not.

2.2.3 The East Coast and Pacific Coast Shellfish Growers Associations

Private sector associations also provide support for aquaculturists in the US. Based out of New Jersey, the East Coast Shellfish Growers Association (ECSGA) represents shellfish growers located from Maine to Florida (ECSGA, 2014). Based out of Washington, the Pacific Coast Shellfish Growers Association (PCSGA) represents farms along the western coast of the US including Alaska and Hawaii (PCSGA, 2014).

Table 3: States represented by members of the ECSGA and PCSGA (Source: ECSGA, 2014; PCSGA, 2014).

ECSGA	PCSGA
Maine (ME)	Alaska (AK)
New Hampshire (NH)	Hawaii (HI)
Massachusetts (MA)	Washington (WA)
Rhode Island (RI)	Oregon (OR)
Connecticut (CT)	California (CA)
New York (NY)	
Delaware (DE)	
New Jersey (NJ)	
Maryland (MD)	
Virginia (VA)	
North Carolina (NC)	
South Carolina (SC)	
Georgia (GA)	
Florida (FL)	

Both of these Associations serve as voices for their represented growers, informing policy makers and regulators as to the needs of individuals working in this industry (ECSGA, 2014; PGSGA, 2014). The Associations assist growers in addressing issues including environmental protection, shellfish safety, regulations, technology, and

marketing (ECSGA, 2014; PGSGA, 2014). Each Association has also adopted a set of standards used to guide sustainable shellfish culture; the ECSGA wrote a Best Management Plan, while the PCSGA adopted Environmental Codes of Practice. These policies are based on relevant science, and they reflect the many benefits and effects that shellfish farming has on surrounding ecological and social communities (ECSGA, 2014; PGSGA, 2014). Membership in either association is purely voluntary on the part of growers and farms.

2.3 Research Questions

In order to expand on current agritourism knowledge, help to address the gap in existing literature pertaining to aquaculture farm-based tourism, and provide shellfish growers and coastal managers with insights into tourism on shellfish farms, this research will address the following major research questions:

1. What are the characteristics of agritourism activities currently offered by shellfish farmers on the East and Pacific coasts of the US?
2. What are shellfish growers' perceptions of the potential motivations for offering tourism activities on shellfish farms?
3. What are the challenges in place preventing certain growers from offering tourism activities on their farms?
4. How do these perceptions vary among different stakeholder groups (East coast v. Pacific coast growers; growers with v. without agritourism)?

CHAPTER THREE

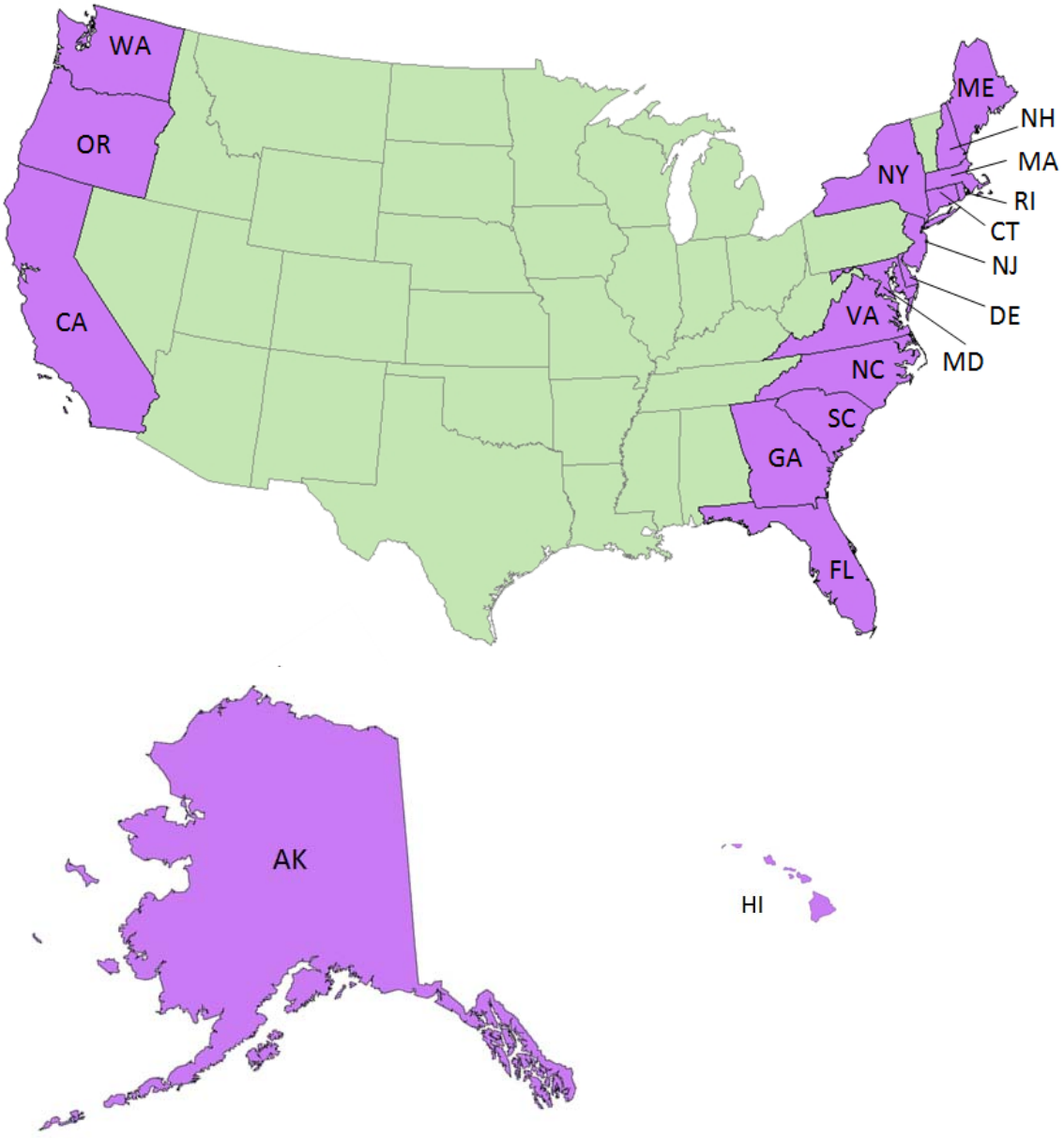
METHODOLOGY

Chapter three details the methodology employed in conducting this research. Information is provided explaining the study areas, study sample, methods of data collection, generation and distribution of the online survey instrument, and data analysis.

3.1 Study Region

This research examines shellfish growers' perceptions of agritourism on aquaculture farms on the East and Pacific coasts, including Hawaii and Alaska, of the US. The study region encompasses a wide geographic area spanning nineteen states (Figure 3).

Figure 3: Study region shown in purple



Using these shellfish growers associations from a broad geographic region allowed me to survey growers from shellfish farms with a wide variety of characteristics. Shellfish farms on the East and Pacific coasts vary across many aspects such as location, size, and number of employees. In general, shellfish farms on the Pacific coast of the US tend to be larger and employ more individuals than those on the East coast (Beutel, personal communication). Oysters, mussels, and clams are important crops for growers on both the Pacific and East coasts.

3.2 Study Sample

Surveys were distributed to members of the two primary shellfish growers associations on the East and Pacific coasts of the US: the ECSGA and PCSGA. There are approximately 204 members in the ECSGA and 120 members in the PCSGA. These estimates could be conservative or generous due to the fact that detailed membership records were not available from each shellfish growers association. Membership in a shellfish growers association is defined by whether or not an individual or farm pays dues in order to belong to an association. Shellfish growers who have signed up to receive e-mail notifications through the ECSGA Listserv but who do not pay for a membership in either shellfish growers association are therefore not considered as part of the study population. Any responses received from these individuals were consequently excluded from data analysis.

A total of 76 surveys were returned during the open period; four of these were excluded from analysis because they were incomplete and eight were excluded because respondents were not members of either shellfish growers association. This left a total of

64 total respondents for a response rate of approximately 19.8%. This is consistent with the fact that a poor/medium response rate is typical of many online surveys (Robson, 2011).

3.3 Online Survey Research

Web-based surveys have been used previously to research agritourism in the US (Barbieri, 2013). There are a number of advantages associated with the use of a web-based survey instrument as opposed to postal or in-person surveys. Advantages include: low cost, small time commitment, fast turnaround rate, high anonymity, and wide geographic distribution (Robson, 2011; Tuten et al., 2000; Wright, 2005). In addition, the use of an online survey allows the researcher to administer multiple surveys at once, and respondents can complete the questions at their own pace on their own time (Robson, 2011; Wright, 2005). Finally, the researcher is not present at the time an online survey is completed, minimizing the possibility that responses could be influenced by the researcher's presence, characteristics, or opinions (Robson, 2011).

There are also a number of challenges associated with the choice of an online survey for primary data collection. These challenges include: difficulty in establishing rapport with respondents, low response rates, difficulty in reaching targeted populations, and limitations to the number of questions asked (Tuten et al., 2000; Wright, 2005; Robson, 2011). Additionally since participants do not interact with researchers during an online survey, there is no way for the researcher to clarify any of the survey questions in real-time (Robson, 2011). Therefore, questionnaires must be very clear, specific, and self-explanatory. Finally, there could be a response bias present when an online questionnaire

is being employed; only respondents with computers, adequate internet, readily available contact information, etc. may receive and respond to the survey (Robson, 2011; Tuten et al., 2000; Wright, 2005).

3.4 Data Collection

I obtained the PCSGA membership list in September 2014 from the publically-accessible PCSGA website (PCSGA, 2014). I obtained access to the ECSGA LISTSERV in September 2014 by subscribing to it myself; membership was free and easily obtained through the ECSGA website (ECSGA, 2014). There were 101 farms with contact information included in the PCSGA list and 544 subscribers to the ECSGA LISTSERV as of September 2014. It is important to note that only roughly half of the 544 subscribers were shellfish growers, and not all of these growers were necessarily dues-paying members. In order to maximize my sample size for this research I contacted the entire ECSGA LISTSERV and invited them to participate in my research. I sought permission from the Executive Directors of each association to use the contact information provided on their websites prior to contacting any potential participants. Once permission was obtained, the content and distribution of all survey invitations and reminders was modeled after the Dillman et al. (2009) tailored design method. The initial survey invitation e-mail included an explanation of my identity, my study, my expectations of the respondents, their role in the research, and a link to my online survey (Appendix A).

Following the schedule recommended by Dillman et al.'s (2009) design method, a follow-up reminder e-mail was sent three weeks after the initial invitation in an attempt to

increase the response rate (Appendix B). This second e-mail reminded participants that they had already received an invitation to take part in my research, thanked those who had already completed the survey, urged those who had not to please consider doing so, reminded them about the study and their role in it, and provided the survey link. In order to inspire non-respondents to address the survey in a timely manner, an approaching deadline for survey completion was mentioned but not strictly identified in this reminder e-mail. Following the recommendations of Dillman et al. (2009), a second reminder e-mail was sent out six weeks after the first invitation. This final prompt contained an additional explanation of the research, another thank-you to respondents who had already participated, a deadline (date and time) after which the survey would close, and a link to the survey (Appendix C).

3.5 Online Survey

Prior to its distribution to the sample population, I pilot tested my survey instrument four times with different individuals. These individuals were not members of my target population due to 1) the unknown size of my sample, and 2) the desire to avoid further reducing the number of responses I may receive. Two of the pilot surveys were conducted with aquaculture regulators from each coast I planned to survey; one of these regulators has also worked personally as a shellfish grower. The third pilot survey was conducted with an individual with previous experience working on a finfish farm with future plans for a shellfish farm. The final pilot survey was conducted with an individual from the Marine Affairs Department at URI with previous work experience in the aquaculture industry. These interviewees were invited to test the online link to the survey,

complete the survey, and provide feedback on the content. This feedback was welcomed and incorporated into the final survey design where appropriate.

In total, 102 invitations to participate in the survey were sent out via e-mail. Of these, 101 were addressed to individual members of the PCSGA, while the final e-mail was sent to multiple individuals at once using the ECSGA LISTSERV. This was done for several reasons: 1) the PCSGA does not have its own LISTSERV but it provides a list of its member farms and their contact information online; 2) the ECSGA does have a LISTSERV but the member list provided online only contains a fraction of the total; 3) many members of the PCSGA are also subscribed to the ECSGA LISTSERV; and 4) the Executive Directors of both associations each recommended I collect data using this contact method. Out of the 102 original invitations distributed, four were returned to the sender due to incorrect information, outdated addresses, or individuals being away from their office on vacation.

In total, 76 surveys were returned via SurveyMonkey, of which 64 completed surveys were used for analysis. On average, it took approximately nine minutes for respondents to complete their surveys. The online surveys consisted of 20 questions plus a final optional question allowing respondents the opportunity to ask me questions or provide me with additional comments. Ten survey questions were open response in format, while the other 10 questions provided multiple choice answers. This mixed-methods approach to agritourism operator studies was recommended by Ollenburg and Buckley (2007), who state that “the combination of qualitative and quantitative data provided a more complete and reliable picture of operator motivations than either set alone" (p. 449; Ollenburg and Buckley, 2007).

The questions contained in this survey were designed to help collect information about the different types of agritourism currently offered by shellfish farmers on the East and Pacific coasts of the US; how growers perceive the potential motivations for offering tourism activities on shellfish farms; existing challenges preventing certain growers from offering tourism activities on their farms; and how shellfish grower perceptions vary among different stakeholder groups (East coast v. Pacific coast growers; growers with v. without agritourism).

The survey was divided into four major sections: 1) shellfish farm characteristics; 2) motivations for growers to develop agritourism; 3) challenges preventing growers from developing tourism; and 4) respondent demographic characteristics. Section 1 asks the respondent to answer questions about the state where his/her farm is located, the number of employees working on the farm, size of the farm (acres), age of the farm, and other farm features (Table 4).

Table 4: Definitions of farm characteristic variables

Variable	Definition
Farm Age	Age of the respondent's farm (years)
Farm Area	Area covered by respondent's farm (acres)
Percentage Leased	Percentage of the total farm area that is leased
Products	Number of different product types cultured on the respondent's farm (e.g., oysters, mussels, clams, geoducks, etc.)
Gear Types	Number of different gear types used to culture products on the respondent's farm (e.g., on bottom, mesh bags, rack-and-bag, suspended culture, etc.)

This section also asks respondents whether or not tourism is offered on the farm, and depending on the response, they were then asked: 1) reasons why tourism is offered, if they charge admission, types of activities offered, and years activities have been offered;

or 2) reasons why tourism is not offered. Section 2 asks all respondents (those who do and do not offer tourism on their farms) to rank their level of agreement on a five point Likert scale (1 = strongly disagree to 5 = strongly agree) with a series of statements pertaining to the motivations that may lead growers to develop agritourism. Section 3 asks only growers without tourism on their farms to rank their level of agreement on a five point Likert scale (1 = strongly disagree to 5 = strongly agree) with a series of statements pertaining to the challenges that may discourage them from developing tourism. Finally, section 4 of the survey asks the respondents to provide demographic information, such as their age, gender, highest level of education, and other features (Table 5).

Table 5: Definitions of demographic variables

Variable	Definition
Gender	The respondent's gender 0 = Male; 1 = Female
Age	The respondent's age (years)
Education Level	The highest education level the respondent has achieved 1 = High school 2 = Some college 3 =College (2-year degree) 4 = College (4-year degree) 5 = Graduate school
Annual Household Income	The respondent's annual household income 1 = Less than $15,000 2 = $15,000 - $24,999 3 = $25,000 - $49,999 4 = $50,000 - $74,999 5 = $75,000 - $99,999 6 = $100,000 - $149,999 7 = $150,000 or greater
Years in Shellfish Aquaculture	Length of time that the respondent has been working as a shellfish grower (years)
Primary Occupation	The respondent's primary occupation 0 = Other industry; 1 = Shellfish aquaculture

3.6 Data Analysis

3.6.1 Quantitative Data

Data pertaining to respondent demographics and farm characteristics were analyzed by computing descriptive statistics (mean, median, minimum, maximum, standard deviation) to explore possible trends within each respondent group. A Mann-Whitney *U* test was used to compare responses between stakeholder groups because the results of Shapiro-Wilk tests indicated that the data was non-normally distributed. Additionally, many of the variables being examined were ordinal, in which case a Mann-Whitney *U* test should be used.

Responses to motivation statements were also analyzed using descriptive statistics (mean, median, minimum, maximum, and standard deviation) to show possible trends within each respondent groups. Principal components analysis (PCA) was used to reduce the data from the motivation statements and reveal latent variables causing variation in the measured variables. This method of data reduction is common in other agritourism studies (Ollenburg and Buckley, 2007; Barbieri, 2009; McGehee and Kim, 2004; McGehee et al., 2009). A direct oblimin rotation was used to simplify and clarify the results of the PCA. Although varimax is the most commonly used rotation, an oblique rotation (such as the direct oblimin rotation) is preferred when analyzing data pertaining to the social sciences due to the fact that is detects correlation between factors (Costello and Osborne, 2005). If factors are correlated and an orthogonal rotation (such as varimax) is used, the results would not show the correlation; the use of an oblique rotation is therefore more accurate in describing the data (Costello and Osborne, 2005). This type of

rotation has been used in the past when analyzing motivation statements in agritourism research (Ollenburg and Buckley, 2007).

Based on the factors that resulted from the PCA, three new variables were computed for each respondent. Each variable corresponded with a factor: *Education and outreach, Economics,* and *External Influence.* Each new variable was computed by averaging the ratings that respondents gave the motivations within that factor. For example, to compute the *External Influence Score* variable for each respondent, respondent's rankings for relevant motivation statements were averaged:

$$\frac{\text{(Offset loss of support)} + \text{(Obtain tax incentives)} + \text{(Inspired by other growers)}}{3}$$

A Mann-Whitney *U* test was used to detect statistical differences in variable scores between stakeholder groups.

3.6.2 Qualitative Data

Prior to the multiple-choice statements, respondents were asked to explain in their own words their reasons for offering or not offering tourism. They were also asked to explain what types of tourism activities (if any) they currently offer on their farms. Responses for each question were compiled and assigned codes based on emergent themes expressed in the content of the responses. The total number of times each code was mentioned by all respondents, East coast respondents, and Pacific coast respondents were tallied. In addition, the number of different codes mentioned in each respondent's answer was totaled.

3.7 Limitations

For the purposes of limiting the population to a manageable size, and due to the fact that contact information was readily available, only shellfish growers belonging to the ECSGA or the PCSGA were included in this study. The opinions and characteristics of shellfish growers from outside these organizations were therefore not represented in the results. Due to this constraint, this analysis is likely not representative of all shellfish growers along the East and Pacific coasts of the US.

It proved very difficult to determine the exact number of members in each shellfish growers association; it was even harder to determine what percentage of members are shellfish growers. This is due to several factors. First of all, membership in these organizations is not limited to shellfish growers only; there are gear producers, seafood marketers, and other interested parties who choose to pay for membership in an association. Additionally, membership is not attained on the same level in each growers association. In the ECSGA, individual people register as members. In the PCSGA, individual farms register as members.

Furthermore, detailed membership lists are not kept for each association. There was no way to look up the number of shellfish growers who are members of the ECSGA, or the number of individuals employed on the farms who are members of the PCSGA. In addition to these challenges, since survey invitations were distributed via the use of a LISTSERV it was difficult to determine exactly how many potential respondents may have been contacted for participation in my study.

CHAPTER FOUR

RESULTS

The contents of this chapter are organized according to the respondents' demographic information, farm characteristics, agritourism activities, motivations for developing agritourism, and challenges to developing agritourism.

4.1 Overview

I received survey responses from 64 participants. Using information from association staff and websites, I estimated that there are about 320 members in the two associations, giving an approximate response rate of 19%. On average, respondents took approximately 9 minutes to complete the survey. Surveys were completed by shellfish growers working in 14 different states (Table 6).

Table 6: States from which survey responses were received (in order of response frequency)

East Coast n = 36	**Pacific Coast** n = 28
• Massachusetts (10) • New York (7) • Rhode Island (5) • Virginia (3) • New Jersey (2) • New Hampshire (2) • Connecticut (2) • Maryland (2) • Maine (2) • North Carolina (1)	• Washington (21) • Alaska (3) • California (3) • Oregon (1)

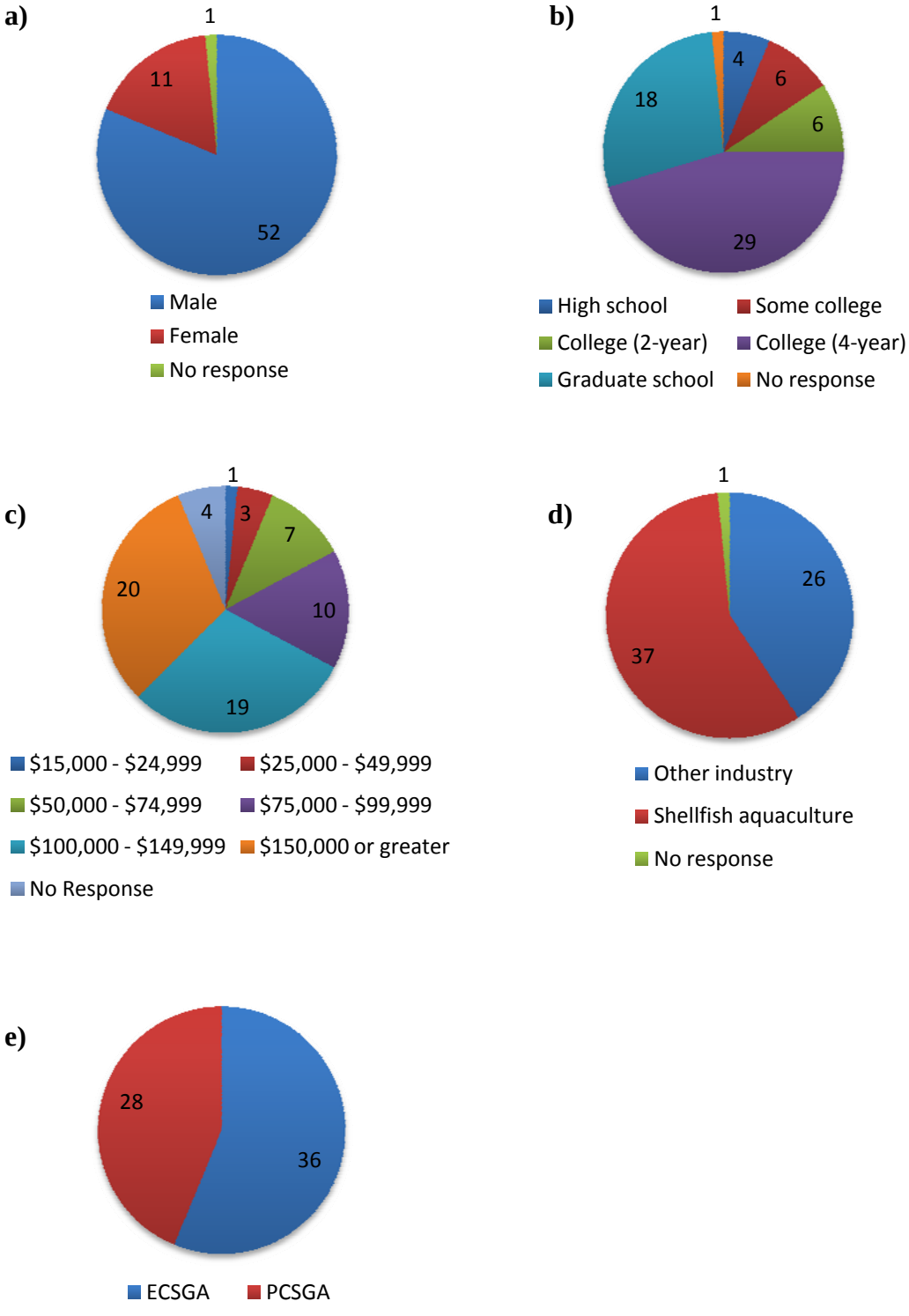
4.2 Respondent and Farm Characteristics

In order to understand more about my sample, the survey included questions pertaining to the respondents' basic demographic information and the characteristics of their farms.

4.2.1 Descriptive Statistics of Respondent Demographic Information

The majority of respondents (52) in this study were male (Figure 4a). Most respondents (47) reported that their highest achieved level of education was a 4-year college degree or higher, while few (4) reported high school as their highest achieved level of education (Figure 4b). The majority of all respondents (39) reportedly had annual household incomes of $100,000 or greater, while zero respondents reportedly had annual household incomes less than $15,000 (Figure 4c). Over half of all respondents (37) indicated that shellfish aquaculture is their primary occupation (Figure 4d). More than half of all respondents (36) were members of the ECSGA while the rest belonged to the PCSGA (Figure 4e). The bulk of the Pacific coast growers surveyed through this research were from the state of Washington; this may be due to the fact that the PCSGA is based out of Olympia, Washington and is therefore more closely connected to growers from its home state. Approximately 25% of all shellfish growers operating in Washington are reportedly within the membership of the PCSGA; this equals approximately 80 growers (Barrette, personal communication).

Figure 4: Respondent demographics by (a) gender, (b) education level, (c) annual household income, (d) primary occupation, and (e) growers association membership



The mean age of all respondents was 51.8; the youngest reported age was 27, while the oldest reported age was 77 (Table 7). On average, respondents had worked as shellfish growers for 15.2 years (Table 7). The shortest period of time working as a shellfish grower was 0.3 years, while the longest period of time was 67 years (Table 7).

Table 7: Descriptive statistics of demographics for all respondents

Variable	n*	Mean	Min	Max	SD
Age	62	51.8	27	77	11.38
Years in Shellfish Aquaculture	63	15.2	0.3	67	12.69

*n varies due to the fact that some respondents chose not to answer every question

Respondents' demographic characteristics varied by region. Shellfish growers from the East coast were, on average, older than growers from the Pacific coast, but growers from both regions had reported the same median education level and median annual household income (Table 8). There were significantly more women growers from the Pacific coast than from the East coast (U = 360.5, n_1 = 28, n_2= 34, p = .006) (Table 8). The median length of time that Pacific coast respondents had been working as shellfish growers was significantly higher than the median length of time that East coast respondents had been working as shellfish growers (U = 256.0, n_1 = 28, n_2 = 35, p = .001) (Table 8). There were significantly more Pacific coast growers reporting shellfish aquaculture as their primary occupation than East coast growers (U = 315.0, n_1= 28, n_2= 35, p = .005) (Table 8).

Table 8: Comparison of demographics for ECSGA and PCSGA respondents

Variable	ECSGA Respondents		PCSGA Respondents		*p* value	*U* Statistic
	n*	Median	n*	Median		
Age	34	57.0	28	54.0	.457	423.5
Gender (expressed as % female)	35	5.6%[a]	28	32.1%[a]	.006	360.5
Education	35	4.0	28	4.0	.319	422.5
Income	34	6.0	26	6.0	.389	386.5
Years in Shellfish Aquaculture	35	6.0[a]	28	19.5[a]	.001	256.0
Primary Occupation (expressed as % yes)	35	41.7%[a]	28	78.6%[a]	.005	315.0

* n varies due to the fact that some respondents chose not to answer every question
p value refers to the statistical significance of a Mann-Whitney U test
[a] denotes significant difference between ECSGA and PCSGA

Select characteristics of respondents without agritourism on their farms varied by region. The median age of respondents without agritourism on both coasts was 56 years (Table 9). Women growers made up 11.8% of East coast respondents without agritourism and 21.1% of Pacific coast respondents without agritourism (Table 9).Respondents without agritourism on both coasts reported that they had achieved a 4-year college degree (Table 9). The median annual household income of East coast respondents without agritourism was $75,000 - $99,999, while the median annual household income of Pacific coast respondents without agritourism was $100,000 - $149,999 (Table 9).Pacific coast shellfish growers without agritourism had been working in the shellfish aquaculture industry for significantly longer than East coast shellfish growers with no agritourism ($U = 44.5$, $n_1 = 17$, $n_2 = 19$, $p = .000$) (Table 9). The minority (29.4%) of East coast respondents without agritourism indicated that shellfish aquaculture is their primary occupation, while the majority (68.4%) of Pacific coast

respondents without agritourism indicated that shellfish aquaculture is their primary occupation (Table 9).

Table 9: Comparison of demographics for ECSGA and PCSGA respondents without tourism

Variable	ECSGA Respondents		PCSGA Respondents		*p* value	*U* Statistic
	n*	Median	n*	Median		
Age	17	56.0	19	56.0	.333	122.5
Gender (expressed as % female)	16	11.8%	19	21.1%	.683	139.0
Education	16	4.0	19	4.0	.367	124.5
Income	16	5.5	18	6.5	.297	113.5
Years in Shellfish Aquaculture	17	5.0[a]	19	20.0[a]	.000	44.5
Primary Occupation (expressed as % yes)	16	29.4%	19	68.4%	.061	95.5

* n varies due to the fact that some respondents chose not to answer every question
p value refers to the statistical significance of a Mann-Whitney U test
[a] denotes significant difference between ECSGA and PCSGA

There were no significant differences in demographic characteristics between respondents who do and do not offer agritourism. The median age of respondents with agritourism was 57, while the median age of respondents without agritourism was 54 (Table 10). Women growers made up 17.9% of respondents with agritourism and 16.7% of respondents without agritourism (Table 10). Growers with and without agritourism reported that they achieved a 4-year college degree (Table 10). The median annual household income for respondents with and without agritourism was $100,000 - $149,999 (Table 10). The median length of time that respondents with agritourism had had been working as shellfish growers was 14 years, and the median length of time that respondents without agritourism had been working as shellfish growers was 11 years (Table 10). The majority (67.9%) of respondents with agritourism indicated that shellfish

aquaculture is their primary occupation, and half (50.0%) of respondents without agritourism indicated that shellfish aquaculture is their primary occupation (Table 10).

Table 10: Comparison of demographics for respondents with and without agritourism

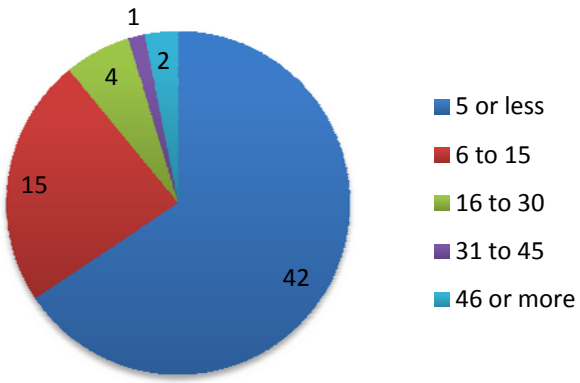
Variable	Respondents with Agritourism		Respondents without Agritourism		*p* value	*U* Statistic
	n*	Median	n*	Median		
Age	27	54.0	35	56.0	.966	469.5
Gender (expressed as % female)	28	17.9%	35	16.7%	.941	486.5
Education	28	4.0	35	4.0	.712	465.0
Income	26	6.0	34	6.0	.295	374.5
Years in Shellfish Aquaculture	27	14.0	36	11.0	.681	456.5
Primary Occupation (expressed as % yes)	28	67.9%	35	50.0%	.192	409.5

* n varies due to the fact that some respondents chose not to answer every question
p value refers to the statistical significance of a Mann-Whitney U test

4.2.2 Descriptive Statistics of Farm Characteristics

Over half of all respondents (42) reported that their shellfish farms had 5 or fewer employees, while few (7) reported that their farm had 16 or more employees (Figure 5).

Figure 5: Farm characteristics for all respondents by number of employees



On average, respondents' shellfish farms had been in operation for 29.5 years; the youngest farm was in operation for less than 1 year, while the oldest had been in operation for 159 years (Table 11). The mean size of the respondents' shellfish farms was 156.9 acres (Table 11). The smallest reported farm was 0.02 acres, and the largest reported farm was 4,000 acres (Table 11). On average, 62.1% of respondents' shellfish farm area was leased (Table 11). The smallest reported percentage leased was 0%, while the highest reported percentage leased was 100% (Table 11). The mean number of products raised per shellfish farm was 1.7; the lowest number of products raised on a farm was 1, while the highest number of products raised on a farm was 8 (Table 11). For a detailed list of product types cultured by respondents, see Appendix E. The mean number of gear types used per shellfish farm was 1.8; the lowest number of gear types used per farm was 0, while the highest number was 5 (Table 11). For a detailed list of gear types used by respondents, see Appendix F.

Table 11: Descriptive statistics of farm characteristics for all respondents

Variable	n*	Mean	Min	Max	SD
Farm Age	64	29.5	0	159	37.18
Farm Area	63	156.9	0.02	4000	555.37
Percentage Leased	63	62.1	0	100	43.59
Products	64	1.7	1	8	1.23
Gear Types	63	1.8	1	5	0.94

* n varies due to the fact that some respondents chose not to answer every question

Shellfish farm characteristics varied by region. The median age of East coast shellfish farms was significantly lower than the median age of Pacific coast shellfish farms (U = 161.5, n_1 = 36, n_2 = 28, p = .000) (Table 12). The median size of East coast shellfish farms was significantly smaller than those on the Pacific coast (U= 198.5, n_1 = 36, n_2 = 27, p = .000) (Table 12). The median percentage of leased farm area was

significantly higher for East coast farms than for Pacific coast farms (U= 345.0, n_1 = 36, n_2 = 27, p = .037) (Table 12). The median number of employees on East coast farms was significantly lower than the median number of employees on Pacific coast farms (U= 336.0, n_1 = 36, n_2 = 28, p = .007) (Table 12). The median number of product types cultured on East coast farms was significantly lower than the median number of product types cultured on Pacific coast farms (U= 314.0, n_1 = 36, n_2 = 28, p = .003) (Table 12). There was no significant difference between the median number of gear types used on East coast and Pacific coast farms (Table 12).

Table 12: Comparison of farm characteristics for ECSGA and PCSGA respondents

Variable	ECSGA Respondents		PCSGA Respondents		*p* value	*U* Statistic
	n	Median	n*	Median		
Farm Age	36	8.0[a]	28	38.5[a]	.000	161.5
Farm Area	36	4.5[a]	27	70.0[a]	.000	198.5
Percentage Leased	36	100.0[a]	27	50.0[a]	.037	345.0
Employees	36	1.0[a]	28	1.5[a]	.007	336.0
Products	36	1.0[a]	28	2.0[a]	.003	314.0
Gear Types	36	2.0	28	2.0	.287	414.5

* n varies due to the fact that some respondents chose not to answer every question
p value refers to the statistical significance of a Mann-Whitney U test
[a] denotes significant difference between ECSGA and PCSGA

Several characteristics of shellfish farms without agritourism varied by region. The median age of East coast shellfish farms without agritourism was significantly lower than the median age of Pacific coast shellfish farms without agritourism (U = 27.0, n_1 = 17, n_2 = 19, p = .000) (Table 13). The median size of East coast shellfish farms without agritourism was significantly smaller than those on the Pacific coast without agritourism (U= 82.0, n_1 = 17, n_2 = 19, p = .011) (Table 13). The median percentage of leased farm

area was significantly higher for East coast farms without agritourism than for Pacific coast farms without agritourism (U= 54.0, n_1 = 17, n_2 = 19, p = .000) (Table 13). The median number of employees on East coast and Pacific coast farms without agritourism was 5 or fewer (Table 13). The median number of product types cultured on East coast farms without agritourism was significantly smaller than the median number of product types cultured on Pacific coast farms without agritourism, but mean ranks indicated that the differences in mean ranks of these variables was minimal (U= 99, n_1 = 17, n_2 = 19, p = .049) (Table 13). The median number of gear types used on East coast farms without agritourism was 2, while the median number of gear types used on Pacific coast farms without agritourism was 1 (Table 13).

Table 13: Comparison of farm characteristics for ECSGA and PCSGA respondents without agritourism

Variable	ECSGA Respondents		PCSGA Respondents		*p* value	*U* Statistic
	n	Median	n	Median		
Farm Age	17	2.0[a]	19	34.0[a]	.000	27.0
Farm Area	17	4.0[a]	19	82.0[a]	.011	82.0
Percentage Leased	17	100.0[a]	19	25.0[a]	.000	54.0
Employees	17	1.0	19	1.0	.087	107.5
Products	17	1.0[a]	19	1.0[a]	.049	99.0
Gear Types	17	2.0	19	1.0	.707	150.5

* n varies due to the fact that some respondents chose not to answer every question
p value refers to the statistical significance of a Mann-Whitney U test
[a] denotes significant difference between ECSGA and PCSGA

Few shellfish farm characteristics varied significantly between respondents who do and do not offer agritourism. The median age of shellfish farms with agritourism was 15.5 years, while the median age of shellfish farms without agritourism was 12.0 years (Table 14). The median size of shellfish farms with agritourism was 6.0 acres, and the

median size of shellfish farms without agritourism was 7.8 acres (Table 14). The median percentage of leased farm area on farms with agritourism was 100.0% (Table 14). The median percentage of leased farm area on farms without agritourism was 87.5 (Table 14). Shellfish farms with and without agritourism reportedly employ 5 or fewer people (Table 14). The median number of product types cultured on shellfish farms with agritourism was significantly higher than that on shellfish farms without agritourism (U= 367.0, n_1 = 28, n_2 = 36, p = .032) (Table 14). The median number of gear types used by East coast and Pacific coast growers was 2.0 (Table 14).

Table 14: Comparison of farm characteristics for respondents with and without agritourism

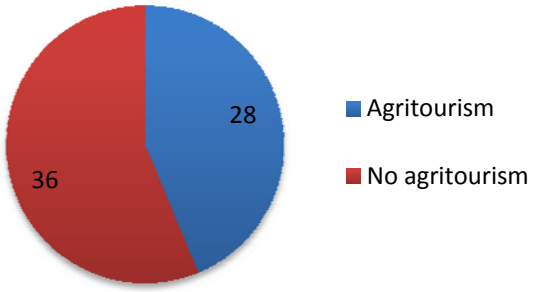
Variable	Respondents with Agritourism		Respondents without Agritourism		p value	*U* Statistic
	n*	Median	n	Median		
Farm Age	28	15.5	36	12.0	.424	445.0
Farm Area	27	6.0	36	7.8	.470	434.0
Percentage Leased	27	100.0	36	87.5	.988	485.0
Employees	28	1.0	36	1.0	.471	448.5
Products	28	1.5[a]	36	1.0[a]	.032	367.0
Gear Types	28	2.0	36	1.0	.099	378.5

* n varies due to the fact that some respondents chose not to answer every question
p value refers to the statistical significance of a Mann-Whitney U test
[a] denotes significant difference between respondents with agritourism and those without

4.3 Agritourism Activities

In order to answer my first research question, the survey included questions about any agritourism activities that respondents currently offer on their farms. Less than half of all respondents (28) reported that they currently offer agritourism opportunities on their farms (Figure 6).

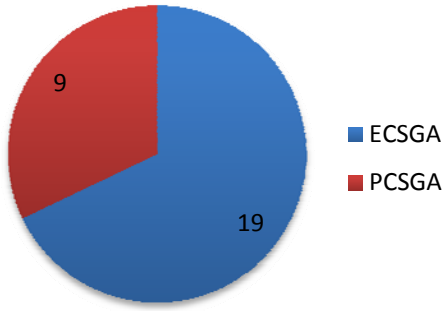
Figure 6: Number of respondents with and without agritourism activities on their farms



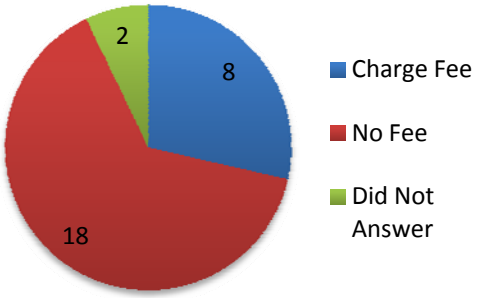
Of the twenty-eight respondents who do offer agritourism, the majority (19) were from the East coast (Figure 7a). More than half of the respondents (18) who do offer agritourism do not charge fees for participation in these activities (Figure 7b).

Figure 7: Agritourism activities by (a) growers association, and (b) whether fees are charged

a)



b)



Almost all respondents with agritourism provided information as to how long they have been offering these activities. On average, respondents with agritourism on their farms had been offering these activities for 9.1 years (Table 15). East coast and Pacific coast respondents had both been offering tourism for approximately the same amount of time (Table 15).

Table 15: Number of years that respondents have been offering agritourism

Variable	n	Mean	Min	Max	SD
All respondents	26	9.1	0.2	25	6.848
ECSGA Respondents	18	9.0	0.2	25	6.830
PCSGA Respondents	8	9.3	1	20	7.324

The majority of respondents with agritourism (25) reportedly offer tours of their shellfish farms; all other agritourism activities were mentioned far frequently by respondents (Table 16). East coast respondents reportedly offered a wider variety of agritourism activities than did respondents from the Pacific coast (Table 16). Tours were the most commonly offered agritourism activity by respondents from each coast, and product showcases and event hosting were among the least commonly mentioned activities (Table 16).

Table 16: Agritourism activities as reported by respondents (in order of response frequency)

All Respondents (Frequency) n = 28	ECSGA Respondents (Frequency) n = 19	PCSGA Respondents (Frequency) n = 9
• Tours (25) • Open Farm Days (3) • Farm Dinners (3) • Workshops(3) • Festivals (2) • Tastings (2) • Event Hosting (2) • Product Showcases (1)	• Tours (16) • Festivals (3) • Open Farm Days (2) • Workshops (2) • Farm Dinners (1) • Tastings (1) • Event Hosting (1) • Product Showcases (1)	• Tours (8) • Open Farm Days (2) • Festivals (1) • Event Hosting (1) • Product Showcases (1)

The majority of respondents with agritourism on their farms (18) offer only one type of activity on their farm. Some respondents (10) reported that they offer multiple different types of agritourism activities on their farms.

4.4 Motivations for Offering Agritourism

In order to answer my second research question, the survey included questions asking respondents about their motivations for offering agritourism on their shellfish farms. These questions took both multiple-choice and open-ended response formats; multiple choice questions asked respondents to rate a series of statements pertaining to motivations using a 5-point Likert scale.

4.4.1 Quantitative Data: Likert-scale Motivation Statements

Almost all respondents rated every motivation statement. On average, respondents disagreed with only one motivation statement, that offering tourism on shellfish farms could help growers offset the loss of government support (Table 17). Respondents agreed the most strongly with the statements relating to: educating the public about shellfish aquaculture's impacts on the environment, educating the public about shellfish aquaculture's impacts with other users, educating the public about shellfish aquaculture's impacts on the local economy, expanding their customer base, and improving customer relations (Table 17).

Table 17: Descriptive statistics of Likert-scale motivation ratings for all respondents (1 = Strongly Disagree, 2 = Slightly Disagree, 3 = Neutral/No Opinion, 4 = Slightly Agree, 5 = Strongly Agree)

Agritourism Motivations	n*	Mean	Min	Max	SD
Charge admission	64	3.8	1	5	1.17
Expand customer base	64	4.0	1	5	1.01
Fully use resources	64	3.5	1	5	1.02
Offset fluctuations in income	64	3.2	1	5	1.14
Provide family jobs	64	3.6	1	5	1.04
Capitalize on a hobby	64	3.5	1	5	1.07
Improve customer relations	62	4.2	1	5	0.98
Public education - environment	64	4.6	1	5	0.89
Public education - other users	64	4.4	1	5	0.97
Public education - economy	64	4.4	1	5	1.01
Satisfy a Public Interest	64	3.9	1	5	1.02
Inspired by other growers	64	3.5	1	5	0.99
Obtain tax incentives	64	3.1	1	5	1.10
Offset loss of support	63	2.8	1	5	1.01

* n varies due to the fact that some respondents chose not to answer every question

4.4.2 Factor Analysis of Likert-Scale Motivation Questions

A principal components analysis with an oblimin rotation of respondents' ratings of the motivation statements resulted in three factors (eigenvalues over 1; factor loadings over 0.4), accounting for 74.0% of the total variance (Table 18). Cronbach's alpha reliability analysis yielded coefficients higher than the commonly accepted minimum value (.70), signifying internal consistency within the motivations contained in each factor (Appendix G). The overall reliability measure was .922. Each of the fourteen motivations loaded onto at least one factor (factor loading > .400), and only "capitalize on a hobby" loaded on multiple factors. Cronbach's alpha reliability analysis indicated that the internal consistency of Factor 1 and Factor 3 increased when "capitalize on a hobby" was excluded; it was subsequently removed from these two factors (Appendix G).

Table 18: Rotated pattern matrix of the motivations for offering agritourism

Factors and Motivations	Factor Loadings	Explained Variance (%)	Eigenvalue
Factor 1: Education and Outreach		51.39	7.195
Public education - environment	.916		
Public education - other users	.916		
Improve customer relations	.882		
Public education - economy	.869		
Satisfy a public interest	.456		
Capitalize on a Hobby	*.445*		
Factor 2: Economics		12.74	1.784
Charge admission	1.008		
Fully use resources	.755		
Offset fluctuations in income	.680		
Expand customer base	.662		
Provide family jobs	.537		
Factor 3: External Influences		9.87	1.382
Offset loss of support	.943		
Obtain tax incentives	.878		
Inspired by other growers	.623		
Capitalize on a Hobby	*.474*		
Total variance explained		74.01	

Each of the three factors identified during the principal components analysis was assigned a name based on the motivations that loaded on each factor. The factors are as follows: Education and Outreach (F1), Economics (F2), and External Influence (F3) (Table 18). The five motivations that loaded on *Education and Outreach* relate to providing educational and recreational opportunities that fulfill a public desire for tourism and lead to improved customer relations through increased interaction (Table 18). The five motivations that loaded on *Economics* pertain to improving the economic stability of shellfish farms and growers' families. This is achieved through increasing farm income, creating additional opportunities for family employment, allowing growers to make full use of their resources, and helping to offset fluctuations in farm income due

to factors like poor harvests and seasonality (Table 18). The three motivations that loaded onto *External Influences* are associated with motivations outside of the farm that may inspire growers to develop agritourism. These include the opportunity to obtain additional tax incentives, the ability to offset the loss of government support, and being inspired by other growers who have agritourism on their farms (Table 18).

In order to compare these factors across stakeholder groups, three new variables were computed for each respondent (Table 19). *Education and Outreach* seemed to be a stronger motivation than *Economic* benefits or *External Influences* for respondents in this study (Table 19).

Table 19: Descriptive statistics of motivation variable scores for all respondents

Variable	Definition	n*	Mean	Min	Max	SD
Education and Outreach Score	Average of ratings for: Public education - environment, Public education - other users, Improve customer relations, Public education - economy, and Satisfy a public interest	62	4.4	1	5	0.788
Economics Score	Average of ratings for: Charge admission, Fully use resources, Offset fluctuations in income, Expand customer base, and Provide family jobs	64	3.6	1	5	0.891
External Influences Score	Average of ratings for: Offset loss of support, Obtain tax incentives, Inspired by other growers	63	3.1	1	5	0.898

*n varies due to the fact that some respondents chose not to answer every question

4.4.3 Comparing how ECSGA and PCSGA Respondents Perceive the Motivations for Offering Agritourism

There were no significant differences in the way that East coast and Pacific coast respondents perceived the motivations for offering agritourism on shellfish farms. Respondents from both coasts had the same median rating for *Education and Outreach*;

this was the highest rated variable for both groups, indicating that it was the strongest motivator for agritourism for both groups (Table 20). Respondents from the East coast tended to rate *Economics* higher as a motivation for offering agritourism than did respondents from the Pacific coast, but the difference was not statistically significant (Table 20). Respondents from both coasts rated *External Influences* the lowest as a motivation for developing agritourism, with the same median ratings (Table 20).

Table 20: Comparison of motivation variable scores for ECSGA and PCSGA respondents (1 = Strongly Disagree, 2 = Slightly Disagree, 3 = Neutral/No Opinion, 4 = Slightly Agree, 5 = Strongly Agree)

Variable	ECSGA Respondents		PCSGA Respondents		*p* value	*U* Statistic
	n*	Median	n*	Median		
Education and Outreach Score	34	4.6	28	4.6	.377	414.5
Economics Score	36	3.9	28	3.4	.061	366.0
External Influences Score	35	3.0	28	3.0	.368	425.5

*n varies due to the fact that some respondents chose not to answer every question
p value refers to the statistical significance of a Mann-Whitney *U* test

4.4.4 Comparing how Respondents with and without Agritourism Perceive the Motivations for Offering Agritourism

Some perceptions of motivations for offering agritourism did vary significantly between respondents who do and do not offer agritourism. Respondents with agritourism rated *Education and Outreach* significantly higher than respondents without agritourism did (U= 284.5, n_1 = 27, n_2 = 35, p = .007), indicating that they found this to be a stronger motivation (Table 21). Respondents with and without agritourism rated *Economics* in a similar way (Table 21). Respondents with and without agritourism rated *External Influences* the lowest out of the three variables (Table 21).

Table 21: Comparison of motivation variable scores for respondents with and without agritourism (1 = Strongly Disagree, 2 = Slightly Disagree, 3 = Neutral/No Opinion, 4 = Slightly Agree, 5 = Strongly Agree)

Variable	Respondents with Agritourism		Respondents without Agritourism		p value	*U* Statistic
	n*	Median	n*	Median		
Education and Outreach Score	27	4.8[a]	35	4.4[a]	.007	284.5
Economics Score	28	3.8	36	3.8	.828	488.0
External Influences Score	28	3.2	35	3.0	.147	386.0

* n varies due to the fact that some respondents chose not to answer every question
p value refers to the statistical significance of a Mann-Whitney U test
[a] denotes significant difference between respondents with agritourism and those without

4.4.5 Qualitative Data: Open-Ended Responses for Motivations

Almost all respondents (24) with agritourism activities on their farms described their motivations for offering these activities in open-response format. The two most dominant themes expressed by all respondents in these open-ended responses were education and outreach (18) and marketing (7) (Table 22). These themes correspond well with the *Education and Outreach* and *Economics* factors that resulted from the principal components analysis of the Likert-scale motivation statements, lending confidence to these findings. Development of additional products (1), farm assistance (1), grower enjoyment (1), charity (1), research (1), and other reasons (1) were among the least commonly mentioned reasons for offering agritourism (Table 22). East coast respondents reportedly offered a wider variety of agritourism activities than did respondents from the Pacific coast (Table 22). The two reasons for offering agritourism most commonly mentioned by East coast respondents were: education and outreach (14), and marketing (5) (Table 22). The two reasons for offering agritourism most commonly mentioned by Pacific coast respondents were: education and outreach (4), and marketing (2) (Table 22).

Table 22: Open-ended response motivations for offering agritourism activities on shellfish farms (in order of response frequency)

All Respondents (n = 28)	**ECSGA Respondents** (n = 19)	**PCSGA Respondents** (n = 9)
• Education and Outreach (18) • Marketing (7) • Public Demand (4) • Income (3) • Fostering Goodwill (2) • Additional Products (1) • Farm Assistance (1) • Grower Enjoyment (1) • Charity (1) • Research (1) • Other (1)	• Education and Outreach (14) • Marketing (5) • Public Demand (3) • Income (2) • Fostering Goodwill (2) • Additional Products (1) • Farm Assistance (1) • Grower Enjoyment (1) • Charity (1)	• Education and Outreach (4) • Marketing (2) • Public Demand (1) • Income (1) • Research (1) • Other (1)

The majority of respondents (18) stated that one single reason motivated them to offer agritourism on their farms. However, some respondents (9) provided multiple motivations for offering agritourism on their farms

4.5 Challenges to Developing Agritourism

In order to answer my third research question, the survey included questions asking respondents how they perceive the challenges to offering agritourism on shellfish farms. Only respondents who do not offer agritourism were asked to respond to these questions. These questions took both multiple-choice and open-ended response formats; multiple choice questions asked respondents to rate a series of statements pertaining to motivations using a 5-point Likert scale.

4.5.1 Descriptive Statistics of Likert-Scale Challenge Questions

Overall, respondents disagreed with the majority of the challenge statements. The two challenge statements that respondents disagreed with the most strongly were: respondents have no desire to offer agritourism, and the public has no interest in participating in shellfish farm tourism (Table 23). The three challenge statements that respondents slightly agreed with were: respondents lack the resources to offer agritourism on their farms, respondents' farms lack the infrastructure to accommodate tourism, and respondents do not want to pay additional costs to offer agritourism on their farms (Table 23).

Table 23: Descriptive statistics for Likert-scale challenge statements for all respondents (1 = Strongly Disagree, 2 = Slightly Disagree, 3 = Neutral/No Opinion, 4 = Slightly Agree, 5 = Strongly Agree)

Challenges	n*	Mean	Min	Max	SD
No desire to offer tourism	35	2.1	1	5	1.301
Farms not appealing to public	32	2.2	1	4	1.139
Too far from established tourism	32	2.4	1	5	1.318
Lack of resources	32	3.2	1	5	1.306
Lack of infrastructure	34	3.2	1	5	1.336
Lack of marketing ability	33	2.4	1	5	1.220
Lack of marketing resources	33	2.5	1	5	1.175
Lack of public interest	33	2.1	1	5	1.259
Do not want to pay additional costs	33	3.2	1	5	1.503

* n varies due to the fact that some respondents chose not to answer every question

4.5.2 Comparing how ECSGA and PCSGA Respondents Perceive the Challenges to Offering Agritourism

Respondents' ratings of the Likert-scale challenge statements varied significantly by region. Overall, East coast respondents disagreed with more challenge statements than did Pacific coast respondents. East coast respondents rated the "no desire to offer tourism" statement significantly lower than Pacific coast respondents ($U = 79.0$, $n_1 = 17$,

$n_2 = 18$, $p = .014$) (Table 24). East coast respondents rated the "farms not appealing to public" statement significantly lower than Pacific coast respondents ($U = 52.5$, $n_1 = 17$, $n_2 = 15$, $p = .004$) (Table 24). East coast respondents rated the "too far from established tourism" statement significantly lower than Pacific coast respondents ($U = 37.0$, $n_1 = 16$, $n_2 = 16$, $p = 0.00$) (Table 24). East coast respondents rated the "lack of resources" statement significantly lower than Pacific coast respondents ($U = 44.0$, $n_1 = 17$, $n_2 = 15$, $p = .001$) (Table 24). East coast respondents rated the "lack of public interest" statement significantly lower than Pacific coast respondents ($U = 56.5$, $n_1 = 17$, $n_2 = 16$, $p = .003$) (Table 24). Finally, East coast respondents rated the "do not want to pay additional costs" statement significantly lower than Pacific coast respondents ($U = 63.0$, $n_1 = 16$, $n_2 = 17$, $p = .008$) (Table 24). Overall, Pacific coast growers tended to see more challenges to offering tourism than East coast growers.

Table 24: Comparison of Likert-scale challenge statement ratings for ECSGA and PCSGA respondents (1 = Strongly Disagree, 2 = Slightly Disagree, 3 = Neutral/No Opinion, 4 = Slightly Agree, 5 = Strongly Agree)

Challenges	ECSGA Respondents		PCSGA Respondents		*p* value	*U* Statistic
	n*	Median	n*	Median		
No desire to offer tourism	17	1.0[a]	18	3.0[a]	.014	79.0
Farms not appealing to public	17	1.0[a]	15	3.0[a]	.004	52.5
Too far from established tourism	16	1.0[a]	16	3.5[a]	.000	37.0
Lack of resources	17	3.0[a]	15	4.0[a]	.001	44.0
Lack of infrastructure	17	2.0	17	4.0	.454	122.5
Lack of marketing ability	17	2.0	16	2.5	.260	104.5
Lack of marketing resources	17	2.0	16	2.5	.326	108.5
Lack of public interest	17	1.0[a]	16	2.5[a]	.003	56.5
Do not want to pay additional costs	16	2.0[a]	17	4.0[a]	.008	63.0

* n varies due to the fact that some respondents chose not to answer every question
p value refers to the statistical significance of a Mann-Whitney U test
[a] denotes significant difference between ECSGA and PCSGA

4.5.3 Qualitative Data: Open-Ended Responses for Challenges

All respondents without agritourism activities on their farms (36) described their reasons for not offering these activities in open-ended response format. The three most dominant themes overall were: time (11), future goal (9), and young farm (7) (Table 25). No demand (1), additional costs (1), infrastructure (1), and bureaucratic procedure (1) were the least commonly mentioned themes (Table 25). The three reasons for not offering agritourism most frequently mentioned by East coast respondents were: their farms are still too young (7), they do not have enough time (6), and they are planning on developing tourism in the future (5) (Table 25). The four reasons for not offering agritourism most frequently mentioned by Pacific coast respondents were: they do not

have enough time (5), they have no desire to offer tourism (5), they are planning on developing tourism in the future (4), and they sell their product wholesale (4) (Table 25).

Table 25: Open-ended response reasons for not offering agritourism activities on shellfish farms (in order of response frequency)

All Respondents (n =36)	**ECSGA Respondents** (n = 17)	**PCSGA Respondents** (n = 19)
• Time (11) • Future Goal (10) • Young Farm (7) • Sell Wholesale (5) • No Desire (5) • Privacy (3) • Liability (3) • Personnel (2) • Location (2) • Lack of Awareness (2) • No Demand (1) • Additional Costs (1) • Infrastructure (1) • Bureaucratic Procedure (1)	• Young Farm (7) • Time (6) • Future Goal (5) • Liability (2) • Sell Wholesale (1) • Personnel (1) • Additional Costs (1) • Infrastructure (1) • Location (1) • Lack of Awareness (1)	• Time (5) • No Desire (5) • Future Goal (4) • Sell Wholesale (4) • Privacy (3) • Personnel (1) • Liability (1) • Bureaucratic Procedure (1) • Location (1) • Lack of Awareness (1) • No Demand (1)

The majority of respondents (23) stated that one single reason was preventing them from offering agritourism activities on their farms. However, some respondents (13) provided multiple reasons for not offering agritourism on their farms.

CHAPTER FIVE

DISCUSSION

This chapter discusses important selected findings from this research, provides recommendations for shellfish growers and coastal managers, and concludes with suggestions for future research.

5.1 Overview of Shellfish Farm Agritourism

Respondents from the East coast and Pacific coast differed significantly from one-another in terms of three personal attributes. East coast respondents had more male respondents, had worked fewer years in shellfish aquaculture, and had fewer respondents whose primary occupation was shellfish aquaculture than Pacific coast respondents. In terms of farm characteristics, East coast respondents had smaller farms, had younger farms, leased more of their total farm area, employed fewer individuals, and grew fewer products than Pacific coast respondents. Differences in these farm characteristics may be due to geological differences in the coastlines of these two regions. Despite these differences in respondent characteristics and farms from the two regions, there were no significant differences in the way they rated the three motivation variables of *Education and Outreach, Economics,* and *External Influences*. Respondents from both coasts agreed most strongly with *Education and Outreach* as a motivation for offering agritourism, and least strongly with *External Influences* as a motivation. This suggests that the

characteristics of shellfish growers and their farms examined through this research are not related to the factors motivating growers to offer agritourism on their farms.

Respondents without agritourism from the East coast and those from the Pacific coast differed significantly from one-another in terms of how many years they had been working in shellfish aquaculture. Pacific coast respondents without agritourism had been working as shellfish growers for longer than East coast respondents without agritourism. In terms of the characteristics of the farms operated by these growers, East coast respondents without agritourism had smaller farms, younger farms, leased more of their farm area, and grew fewer products than Pacific coast respondents without agritourism. Respondents from the East and Pacific coast without tourism on their farms displayed many differences in the way they rated the challenge statements, with Pacific coast respondents agreeing more strongly with every challenge statement. These findings suggest that differences in the respondent and farm characteristics examined through this study may contribute to the extent to which growers from either coast experience challenges to implementing agritourism.

Respondents with and without agritourism (both coasts combined) did not differ significantly from one-another in terms of demographic characteristics, and the only farm characteristic that varied significantly between these two stakeholder groups was the number of products cultured on respondents' farms. Respondents with agritourism grew more products than respondents without agritourism. In terms of the motivations for offering agritourism on shellfish farms, respondents with agritourism agreed more strongly with *Education and Outreach* as a motivation than respondents without agritourism. Respondents with and without agritourism both agreed the least strongly

with *External Influences* as a motivation for developing agritourism. The fact that the respondent and farm characteristics were so homogenous between respondents with and without agritourism lends further support to the conclusion that these characteristics do not significantly affect a grower's motivations for offering agritourism on their farms.

On average, respondents offering agritourism on their farms had been offering these activities for approximately nine years. Since offering agritourism on shellfish farms appears to be a relatively recent phenomenon amongst the growers surveyed for this research, it is possible that in the future as these activities become more common, the role that individual and farm characteristics play in influencing a grower's decision to offer agritourism may change. Additionally, only shellfish growers who were members of the ECSGA or PCSGA were surveyed for this research; there could be more variation in these basic characteristics in growers who are not members of a shellfish growers association. Future studies should focus on examining potential links between these basic characteristics and the decision to offer agritourism on shellfish farms with an expanded shellfish grower population.

5.2 Agritourism Activities on Shellfish Farms

As a whole, the shellfish growers surveyed through this research expressed interest in including various forms of tourism in their business plans. Almost half of all respondents reported that they already offer at least one type of agritourism activity on their farms, and roughly a third of respondents without tourism specifically mentioned that they were planning to try to develop these opportunities in the future. Respondents cited eight different kinds of tourism activities currently taking place on their farms:

tours, open farm days, farm dinners, workshops, festivals, tastings, event hosting, and product showcases.

Interestingly, of all these types of activities, tours were overwhelmingly the most frequently offered form of agritourism. This agrees with existing agritourism literature, which shows that tours are the most common type of agritourism activity offered on many terrestrial farms as well (e.g., Tew and Barbieri, 2012; Barbieri and Mshenga, 2008). The popularity of tours on shellfish farms could likely be due to the fact that compared to other agritourism activities, providing tours requires relatively little resource use or additional infrastructure. For example, in order for a shellfish grower to offer dinners on his or her farm, the grower would likely have to provide space for seating, tables and chairs, dinnerware, food, staff, and time. However, in order to provide customers with a farm tour, a grower may only need to use their own time and that of one or two staff members. This would make tours simpler and less costly for growers to run than other activities. Additionally, many growers reported that they only offer tourism on their shellfish farms when people request those activities. It is likely easier to offer impromptu tours than other types of agritourism activities which require more planning and resource input. Finally, shellfish growers agreed most strongly with *Education and Outreach* as a motivation for offering shellfish farm tourism. Compared to other types of tourism activities, such as shellfish tastings, tours may provide customers with a more in-depth and informative exposure to shellfish farming. Future studies should focus on exploring different types of shellfish farm agritourism, examining the costs and benefits associated with offering various activities.

It was also interesting that the majority of respondents who offer agritourism on their farms do not charge fees for tourists to participate in these activities. This implies that directly increasing income through tourism is not a priority for growers and is likely not a strong motivation for offering tourism, supporting the finding that respondents did not rate *Economics* as the top motivation for offering agritourism on shellfish farms. Additionally, only three respondents mentioned supplementing their income as the reason they offer agritourism on their farms in the open-ended responses. Another explanation for why many shellfish growers do not charge customers to engage in tourism on their farms was suggested by one respondent, "I can't imagine that you would ever get people to pay to visit a farm." Perhaps growers choose not to charge fees because they believe no tourists would visit their farms if it cost money. A similar situation has been explained in wine tourism literature; one study suggested that if wineries implemented a small fee for wine tastings, they could risk losing up to 36% of their customers (Bruwer, 2003). Future studies should examine consumers' reasons for engaging in and their willingness to pay for shellfish farm tourism activities.

5.3 Motivations for Offering Agritourism

Overall, respondents agreed most strongly with the socially-oriented motivations for developing agritourism on shellfish farms. The highest rated motivation factor by all respondents was *Education and Outreach*. Open-ended responses about the reasons why shellfish growers offer tourism on their farms reflected a similar mindset. Education and outreach was the most commonly mentioned motivation in respondents' open-ended responses.

Principal components analysis of respondents' ratings of the Likert-scale motivation statements revealed three variables: *Education and Outreach*, *Economics*, and *External Influences*. These factors are somewhat similar to those found in terrestrial agritourism studies examining agritourism operators in Virginia (McGehee and Kim, 2004) and agritourism in Montana (Nickerson et al., 2001). The differences between the factors revealed in terrestrial farm studies and those in this study were expected due to differences in the activities. Shellfish growers practice different types of farming in different locations than terrestrial farmers do.

Respondents across all the stakeholder groups rated the *Education and Outreach* factor the highest, indicating that they agreed most strongly with this factor as a motivation for offering agritourism. Respondents agreed with *Economics* as a motivation for agritourism, but not as strongly as they did with *Education and Outreach*. *External Influences* were rated the lowest as a motivation for developing agritourism. Regulators and coastal managers should note that shellfish growers' focus on education and outreach corresponds well with NOAA's goal of ensuring that "the public has an accurate understanding of sustainable aquaculture development... and the associated environmental, social, and economic challenges and benefits." Therefore, agritourism may be an effective platform through which to address these goals. Future studies should examine how much consumers learn about sustainable aquaculture when they engage in agritourism on shellfish farms.

Interestingly, the fact that shellfish growers agreed the most strongly with *Education and Outreach* as a motivation for developing agritourism was not reflected in terrestrial farm tourism literature. Many terrestrial agritourism operators rated economic

goals, such as generating additional income or employing family members, higher than public education (e.g., Barbieri, 2010; McGehee and Kim, 2004; McGehee et al., 2007; Ollenburg and Buckley, 2007; Nickerson et al., 2001). Shellfish growers' focus on *Education and Outreach* could be due to the fact that shellfish aquaculture may be a less visible industry than terrestrial farming and many members of the public are not well-acquainted with it. Additionally, shellfish aquaculture proposals are often met with public outcry. Shellfish growers may believe that educating the public about their industry and building connections with their communities may help to ameliorate these situations and clarify misconceptions about their industry. It is also worth noting that although *Education and Outreach* emerged as a separate factor from *Economics*, shellfish growers' focus on *Education and Outreach* may be indirectly motivated by financial incentives. Shellfish growers may believe that by better educating consumers about their farms, their products, and their industry, they may experience increases in farm profits. Future studies should elaborate on the relationship between financial incentives and education and outreach.

5.3.1 Comparing Growers with and Without Agritourism

Growers with agritourism indicated that they were most strongly motivated by education and outreach, both through their ratings of the motivational factors and through their open-ended responses. Growers without agritourism also agreed that education and outreach was the strongest motivation for developing agritourism on shellfish farms. These similar ratings were not surprising due to the fact that there were very few

differences in the respondent or farm characteristics of these two stakeholder groups; they were relatively homogenous.

Growers with agritourism agreed with *Education and Outreach* as a motivation significantly more strongly than growers without agritourism. Since this was the only motivation rating that varied significantly between the two groups, this could indicate that education and outreach is the strongest motivation driving shellfish growers to actually offer agritourism on their farms. While both types of growers agree with education and outreach as a motivation, growers with tourism may believe more strongly in agritourism as an effective forum for achieving this goal.

5.4 Challenges to Developing Agritourism

As a whole, respondents did not agree strongly with any of the Likert-scale challenge statements. This could be due to the fact that these statements were adapted from terrestrial agritourism research and sea-based farms may experience different challenges than land-based farms. The challenges respondents agreed with the most include a lack of resources to offer tourism, lack of infrastructure to support tourism, and additional costs associated with offering tourism. Pacific coast growers felt the challenges to implementing agritourism more strongly than East coast respondents, agreeing more strongly with every challenge statement.

Respondents' open-ended responses as to why they do not offer agritourism on their farms align somewhat well with the challenges provided in the Likert-scale statements. Two of the most commonly stated reasons for not offering agritourism was lack of time and "young farm," which means the farm is not yet well-enough established

to support agritourism. Both of these relate to a "lack of resources," and "young farm" may even reflect a lack of infrastructure to support tourism. Additionally, "lack of time" may likely refer to the desire to avoid incurring the opportunity costs associated with implementing tourism on shellfish farms. This idea was expressed by a number of respondents; for example one respondent stated "we really need to harvest more, expand our distribution and get better at farming before we lead tours and get distracted." Interestingly, almost a third of respondents without agritourism reported that they were planning to develop those opportunities in the future. This supports the conclusion that overcoming challenges may be more of a barrier to implementing agritourism than being motivated to offer these activities.

5.4.1 Comparing East and Pacific Coast Growers without Agritourism

While East and Pacific coast growers tended to think the same way about the motivations for offering agritourism, there were differences in how they perceived the challenges to implementing these activities. The fact that Pacific coast growers experienced the challenges to implementing agritourism more strongly than East coast growers likely explains why more East coast respondents than Pacific coast respondents offered agritourism. It stands to reason that the easier it is to implement these activities, the more people would do so.

The differences in respondent and farm attributes between growers from these two regions may help explain why growers from the Pacific coast experience more challenges to implementing agritourism. Pacific coast shellfish growers reportedly had been working in shellfish aquaculture longer than East coast growers had. Additionally,

Pacific coast growers' farms were significantly older than East coast growers' farms. Perhaps Pacific coast growers are already well-established enough within their communities and local economies that they do not feel the need to engage the public in their farming operations. Additionally, Pacific coast respondents without agritourism had significantly larger farms than East coast respondents without agritourism, indicating that there may be a relationship between farm size and challenges to implementing agritourism. This hypothesis is supported by the fact that the median farm size for Pacific coast farms without agritourism was larger than the median farm size of all Pacific coast respondents, indicating that the larger farms surveyed from this region tended to be the ones not offering agritourism. Future research should examine the links between these basic characteristics and the challenges to offering agritourism on shellfish farms.

In the open-ended responses as to why respondents do not offer tourism on their farms, only Pacific coast growers stated that they had no interest in offering tourism on their farms. This was reflected again in the Likert-scale challenge statements when growers from the Pacific coast rated "no desire to offer tourism" significantly higher than East coast respondents. Therefore, even if the other challenges such as a lack of resources could be addressed and ameliorated, some shellfish growers may still choose not to implement agritourism on their farms. Managers should therefore not assume that providing assistance to overcome some of these challenges will result in shellfish growers implementing agritourism on their farms. Future research could explore how assistance would help growers overcome challenges to implementing agritourism. Additionally, researchers should investigate whether or not shellfish growers would establish tourism

on their farms even if they were given outside aid to design and implement these activities.

5.5 Recommendations

This section provides recommendations that emerged from my findings for coastal managers and aquaculture regulators, and recommends areas for future research in the subject of agritourism on shellfish farms.

5.5.1 Recommendations for Management

1. Aquaculture regulators and coastal managers who wish to improve public understanding of aquaculture (as stated in NOAA's Marine Aquaculture Policy) should consider that many shellfish growers think that public education is a good reason to offer tourism on shellfish farms, and some growers have already developed these activities.
2. Since respondents with and without agritourism both agreed with the same motivations for offering these activities on their farms, regulators promoting the development of these activities may want to focus on ameliorating the challenges to agritourism rather than strengthening the motivations for offering these activities.
3. Since lack of resources, lack of infrastructure, and the desire to avoid additional costs were the biggest challenges for respondents, regulators may want to focus on addressing these specific challenges in order to encourage more growers to implement agritourism on their farms.

4. Since East coast shellfish growers and Pacific coast shellfish growers felt the challenges to implementing agritourism to different degrees, coastal managers and regulators must tailor assistance appropriately to growers in either region. What works for one region may not work for another.

5.5.2 Recommendations for Future Research

1. To better understand agritourism opportunities on shellfish farms, future studies could expand the sample to include shellfish growers who are not members of the ECSGA or the PCSGA.
2. To improve understanding of how and why shellfish growers choose to offer agritourism on their farms, future studies should examine how growers first heard of these opportunities, why they chose to offer certain tourism activities on their farms, and what benefits they have experienced since implementing these activities.
3. This study examined which motivations shellfish growers perceive as being important in the decision to implement agritourism on their farms. In order to better identify areas where management assistance may be appropriate, future studies should work to determine how well growers feel they are performing on achieving their agritourism-related goals.
4. This study found that although all respondents agreed most strongly with education and outreach as a motivation for developing agritourism on shellfish farms, some shellfish growers still choose not to develop these activities on their farms. Future studies should examine what factors drive some shellfish growers to commit to offering agritourism on their farms

5. Since a primary purpose of offering agritourism on shellfish farms is to provide public education and outreach, future studies should focus on the consumers who choose to participate in shellfish farm agritourism. Specifically, studies should determine what motivates tourists to visit shellfish farms, how they heard about agritourism activities, and how their visit impacted their knowledge about and attitudes towards shellfish aquaculture.
6. Because less than half of respondents offering agritourism charge customers fees to participate in these activities, future studies should focus on examining customers' willingness to pay to partake in these activities. The potential to capitalize on these activities could be greater than shellfish growers believe.
7. This study found that shellfish growers without agritourism face a number of challenges to implementing these activities on their farms. Future studies should examine which challenges growers with agritourism faced in developing these activities, and how they managed or overcame these challenges.
8. In order to determine whether it would be appropriate for managers to assist growers overcome the challenges to implementing agritourism, future studies should focus on examining what types of assistance growers without agritourism would find most helpful, and if they want assistance at all.
9. In order to better understand why Pacific coast shellfish growers face more challenges than East coast growers in developing tourism, future studies should examine the differences between these two regions in greater depth.
10. Future studies could compare the perceptions of agritourism motivations and challenges amongst different employees on shellfish farms (e.g. farm business

managers v. aquaculturists). These differences may be more pronounced on larger farms which employ a wider variety of positions.

11. In order to better understand why *Education and Outreach* was rated so highly as a motivation by all groups examined through this research, future studies could ask shellfish growers what benefits they believe will result through increased consumer education. Specifically, studies should examine whether shellfish growers believe that increased farm profits may result from increased consumer education.

CHAPTER SIX

CONCLUSION

The role of aquaculture in food production and security is poised to increase in the future as human populations continue to expand and outstrip natural resource production. Shellfish aquaculture is of particular importance in the US, as two-thirds of total national marine aquaculture production by value is attributed to the culture of bivalve mollusks (NOAA Fisheries, 2015). NOAA stresses the importance of further development of this industry, which will bring additional employment and commercial opportunities to waterfront communities. As shellfish aquaculture has expanded over the years, some growers have begun to offer agritourism on their farms as a way to diversify their farming operations.

Agritourism has long been used as an avenue to achieve a number of diversification-related goals on terrestrial farms. However, no previous agritourism studies seem to have examined these activities on sea-based farms. This research expands on current agritourism knowledge, helps to address the gap in existing literature pertaining to aquaculture farm-based tourism, and provides shellfish growers and coastal managers with insights into this emerging use of coastal waters

This study found that shellfish growers along the East and Pacific coasts currently offer a variety of agritourism activities on their farms, ranging from impromptu tours to farm dinners to festivals. Tours are currently the most commonly offered type of agritourism on shellfish farms, likely due to the fact that compared to other forms of

agritourism, implementing tours imposes a relatively small burden on shellfish growers. Respondents from all stakeholder groups (East and Pacific coasts; growers with agritourism and growers without agritourism) agreed that the strongest motivational factor for developing these agritourism activities on shellfish farms was *Education and Outreach*, while *Economics* and *External Influences* were not rated as high. Respondents with agritourism on their farms agreed significantly more strongly with *Education and Outreach* as a motivation than growers without agritourism on their farms, suggesting that growers with these activities on their farms believe more strongly in agritourism as a platform for public education.

This study also found that East coast and Pacific coast shellfish growers encounter a number of challenges to implementing agritourism on their farms. The challenges they agreed with the most were the lack of resources to offer tourism, the lack of infrastructure to support tourism, and the limited desire to pay the additional costs associated with offering tourism. Pacific coast growers seem to feel these challenges more strongly than East coast growers do, a phenomenon that may be related to the differences in respondent and farm characteristics from these two regions.

As the shellfish aquaculture industry expands in the US, additional shellfish growers may become interested in incorporating agritourism into their business plans. The fact that shellfish growers recognize the need for public education and outreach overlaps with NOAA's assertion that the public must understand the sustainability of this industry and the "environmental, social, and economic challenges and benefits" associated with aquaculture in the US (NOAA, 2011). Agritourism on shellfish farms may provide a valuable outlet through which to promote this understanding. Since all

stakeholder groups agreed with the motivations for offering agritourism on their farms, regulators and managers wishing to encourage growers to adopt these activities may want to focus on ameliorating the challenges preventing some growers from offering agritourism.

APPENDICES

APPENDIX A: ECSGA/PCSGA RECRUITMENT E-MAIL

[Calling all shellfish growers,]; [Dear (Participant),]

You have been selected to take part in my University of Rhode Island (URI) graduate student research project about tourism and shellfish farms. Tourism activities may include (but are not limited to) regularly scheduled farm tours, farm tours on request, farm dinners, etc. Your name and e-mail were obtained from the [ECSGA/PCSGA] website, and you were chosen to participate in this study due to your experience with shellfish aquaculture in the US.

If you would like to take part in my study, please follow the SurveyMonkey link at the bottom of this e-mail and complete the online survey. The survey should take you approximately 10 - 15 minutes to complete, and the questions will ask about your shellfish farm and tourism on shellfish farms. Your responses will be sent to me anonymously via SurveyMonkey – the survey will not ask you for your name or any contact information. Your participation in this study is voluntary, and you may choose to skip any question in the survey. I am interested in hearing ALL shellfish growers' thoughts about tourism on farms, WHETHER OR NOT you offer tourism on your farm.

If you have any further questions or would like to obtain additional information about this study, please feel free to contact me (Maria Vasta) or Dr. Tracey Dalton, the people primarily responsible for this study. I am working with Dr. Tracey Dalton, a URI professor, as my advisor for this study.

Sincerely,

Maria Vasta
Graduate Student
Marine Affairs Department
University of Rhode Island
maria_vasta@my.uri.edu

Dr. Tracey Dalton
Professor
Marine Affairs Department
University of Rhode Island
dalton@uri.edu
(401) 874-2434

Survey Link: https://www.surveymonkey.com/s/shellfishgrowers

APPENDIX B: ECSGA/PCSGA FIRST FOLLOW-UP-UP E-MAIL

[Hello again shellfish growers,]; [Hello again (Participant),]

About a month ago you should have received an e-mail from me inviting you to complete an online survey as part of my Master's thesis research project exploring tourism on aquaculture farms.

First of all**, I would like to offer a sincere thank-you to all the growers who have already completed my survey**! I really appreciate you taking the time to help contribute to my research project. If you have already taken the survey, kindly disregard this e-mail.

For growers who have not yet completed the survey, it will only be open for a limited time and the closing deadline is fast approaching. I would appreciate it if you would take the time to follow the SurveyMonkey link at the bottom of this e-mail and complete the questions. The survey should only take 10-15 minutes to complete, and all the responses will be anonymous (no names or contact information are requested). Questions will ask about you, your shellfish farms, and your opinions on the benefits and challenges of farm tourism. Remember, I am interested in hearing ALL shellfish growers' thoughts about tourism on farms, WHETHER OR NOT you offer tourism on your farm.

Additionally, it was brought to my attention that some sections of the survey had technical glitches the first time I sent it out - I apologize for that. The problem has since been fixed, so if you were unable to complete any of the sections previously and you want to go back and complete them, please feel free to do so.

As always, if you have any further questions or would like to obtain additional information about this study, please feel free to contact me or Dr. Tracey Dalton (my adviser).

Thank you very much for your continuing help,
Maria

Survey Link: https://www.surveymonkey.com/s/shellfishgrowers

APPENDIX C: ECSGA/PCSGA FINAL FOLLOW-UP E-MAIL

[Hello again shellfish growers,]; [Hello again (Participant),]

Over the past 6 weeks you should have received two invitations from me inviting you to complete an online survey as part of my Master's thesis research project exploring tourism on aquaculture farms. This is the final invitation I will be sending out in regards to this survey. The **closing date of the survey is Friday October 24, 2014**. After 11:59 PM on the 24th you will no longer be able to participate in my study.

I would like to offer a sincere thank-you to all the growers who have already completed my survey! I really appreciate you taking the time to help contribute to my research project. If you have already taken the survey, kindly disregard this e-mail.

For growers who have not yet completed the survey, I would appreciate it if you would take the time to follow the SurveyMonkey link at the bottom of this e-mail and complete the questions. The survey should only take 10-15 minutes to complete, and all the responses will be anonymous (no names or contact information are requested). Questions will ask about you, your shellfish farms, and your opinions on the benefits and challenges of farm tourism. Remember, I am interested in hearing ALL shellfish growers' thoughts about tourism on farms, WHETHER OR NOT you offer tourism on your farm.

As always, if you have any further questions or would like to obtain additional information about this study, please feel free to contact me or Dr. Tracey Dalton (my adviser).

Thank you very much for your continuing help,
Maria

Survey Link: https://www.surveymonkey.com/s/shellfishgrowers

APPENDIX D: ONLINE SURVEY INSTRUMENT

Shellfish Farms and Tourism Activities

Thank you very much for choosing to participate in my study. This survey should take about 10 or 15 minutes to complete. **Section 1** of the survey asks for information on your shellfish farm and the tourism activities (if any) available on that farm. **Section 2** of the survey asks for information about factors motivating growers to offer tourism activities on farms. **Section 3** of the survey asks for information about the challenges to offering tourism activities on farms. **Section 4** asks for basic information about you. Please know that all responses are anonymous and will be kept confidential.

Section 1: For the following questions, please provide information on the shellfish farm that you operate, and the tourism activities (if any) available on that farm.

1. What state is your farm located in? _____

2. What year did your farm first open? _____

3. Are you a member of the following Shellfish Growers Associations? (please select all that apply)
   - o East Coast Shellfish Growers Association (ECSGA)
   - o Pacific Coast Shellfish Growers Association (PCSGA

4. How much area does your shellfish farm cover? (please include units, e.g. acres)
   _____

5. How much of this land is leased? (please include units, e.g. acres, %)
   _____

6. About how many employees work on your farm?
   - o Less than 5
   - o 6 - 15
   - o 16 - 30
   - o 31 - 45
   - o 46 or more

7. What types of products do you raise?
   - o Oysters
   - o Mussels
   - o Scallops
   - o Clams
   - o Geoducks
   - o Other (please specify) _____

8. What method(s) do you use to grow your products?
    - Bottom plant
    - Long-line
    - Floating cages
    - Suspended culture
    - Rack-and-bag
    - On beach
    - Hatchery
    - Other (please specify)

      _____

9. Do you currently offer tourism opportunities on your farm?
    - Yes
    - No

10. If YES to #9...

    a. What are these activities? (Please list all that apply)

       _____

    b. Do you charge visitors money to participate in these activities (Yes/No)

    c. How long have you been offering tourism activities on your farm?

       _____

    d. Why do you offer these activities on your farm?

       _____

11. If NO to #9, why don't you offer tourism opportunities on your farm?

    _____

Section 2: The following statements relate to why growers might offer tourism activities on their farms. Please select your level of agreement with each statement using the following scale:

1 = Strongly disagree
2 = Moderately disagree
3 = Neutral/no opinion
4 = Moderately agree
5 = Strongly agree

12. I think shellfish farm tourism...

	Strongly Disagree	Moderately Disagree	Neutral	Moderately Agree	Strongly Agree
a. Could provide additional income for growers by charging tourists for admission.	1	2	3	4	5
b. Could provide additional income for growers by expanding the farm's customer base.	1	2	3	4	5
c. Could allow growers to fully use their resources.	1	2	3	4	5
d. Could allow growers to offset fluctuations in farm income (due to seasonality, poor harvest, etc.)	1	2	3	4	5
e. Could allow growers to provide jobs for family members.	1	2	3	4	5
f. Could allow growers to capitalize on an interest/hobby.	1	2	3	4	5
g. Could allow growers to better relate to guests/customers.	1	2	3	4	5

h. Could allow growers to educate their customers the impacts shellfish farming has on the environment.	1	2	3	4	5
i. Could allow growers to educate their customers about the impacts shellfish farming has on other people's use of the area.	1	2	3	4	5
j. Could allow growers to educate their customers about impacts shellfish farming has on the local economy.	1	2	3	4	5
k. Could satisfy a public interest for additional tourism activities.	1	2	3	4	5
l. On one farm would inspire nearby growers to set up tourism activities on their own farm	1	2	3	4	5
m. Could help growers to obtain additional tax incentives.	1	2	3	4	5
n. Could help growers to offset the loss of government financial support.	1	2	3	4	5

Section 3: If you <u>DO NOT</u> offer tourism activities on your farm, please respond to the following statements. If you DO offer tourism activities on your farm, please skip to the next section by clicking the "Next" button at the bottom of this page. The following statements relate to the challenges to offering tourism activities on shellfish farms. Please select your level of agreement with each statement using the following scale:

1 = Strongly disagree
2 = Moderately disagree
3 = Neutral/no opinion
4 = Moderately agree
5 = Strongly agree

13. I do not offer tourism opportunities because...

	Strongly Disagree	Moderately Disagree	Neutral	Moderately Agree	Strongly Agree
a. I have no interest in tourism.	1	2	3	4	5
b. My farm is not an appealing place for tourists.	1	2	3	4	5
c. My farm is not located near established tourism industries.	1	2	3	4	5
d. I do not have the resources necessary to support tourism activities on my farm.	1	2	3	4	5
e. My farm does not have the infrastructure necessary to support tourism activities.	1	2	3	4	5
f. I do not have the ability to market tourism activities on my farm.	1	2	3	4	5
g. I do not have the resources to market tourism activities on my farm.	1	2	3	4	5

h. I do not think the public would be interested in tourism on my farm.	1	2	3	4	5

Section 4: For the following questions, please provide information on yourself. Please remember that all responses are anonymous and will be kept confidential.

14. About how many years have you been working as a shellfish grower?
    _____

15. What is your primary occupation? _____

16. What is your gender? _____

17. How old are you? _____

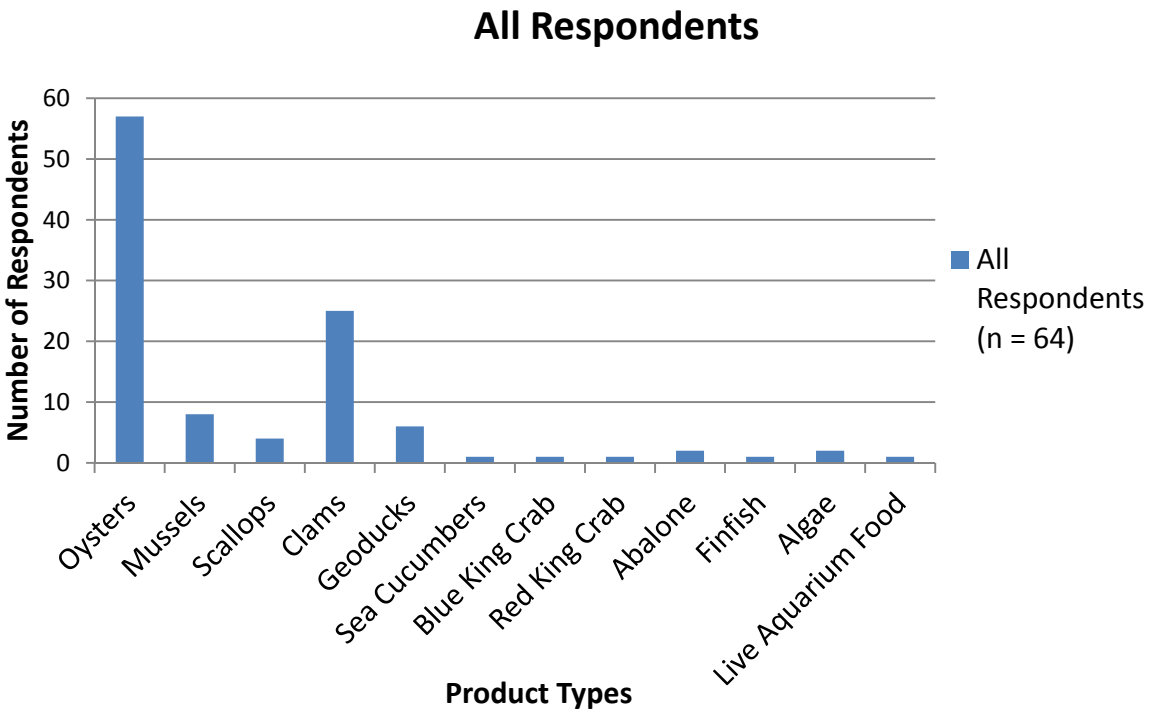
18. What is the highest level of education that you have completed (choose 1)?
    a. Middle school
    b. High school
    c. College (2-year degree)
    d. College (4-year degree)
    e. Graduate school (Master's degree or Ph.D., Professional degree)

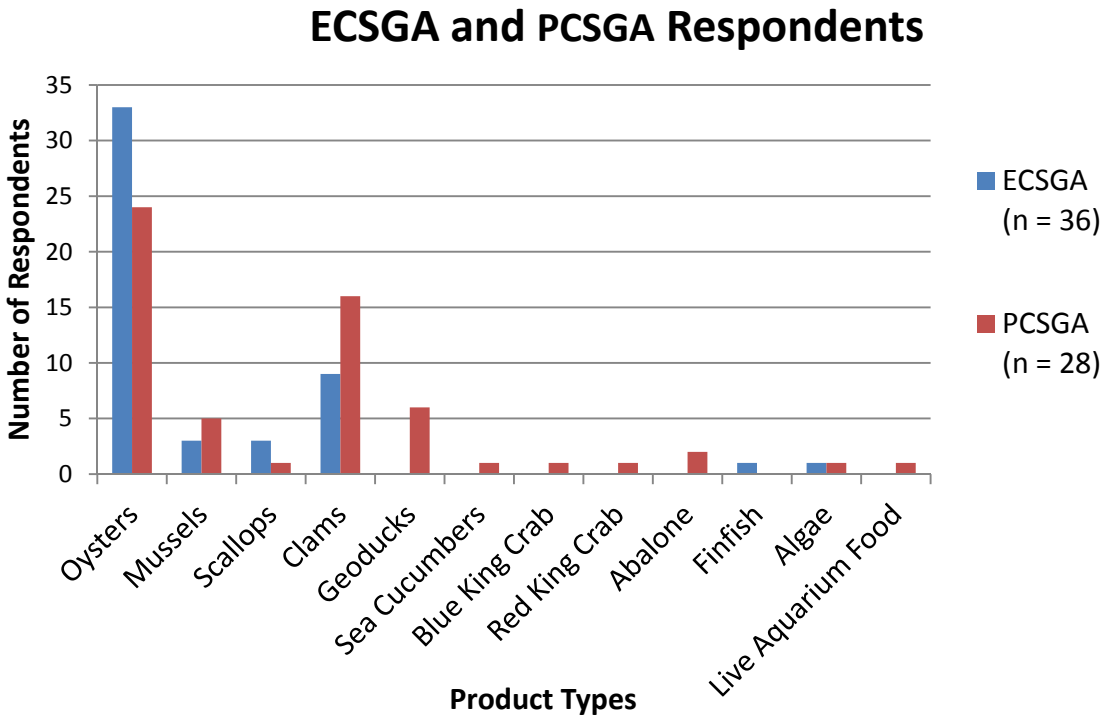
19. What is your ethnicity?
    a. Black or African American
    b. American Indian or Alaska Native
    c. Asian
    d. Native Hawaiian or Other Pacific Islander
    e. White
    f. Other

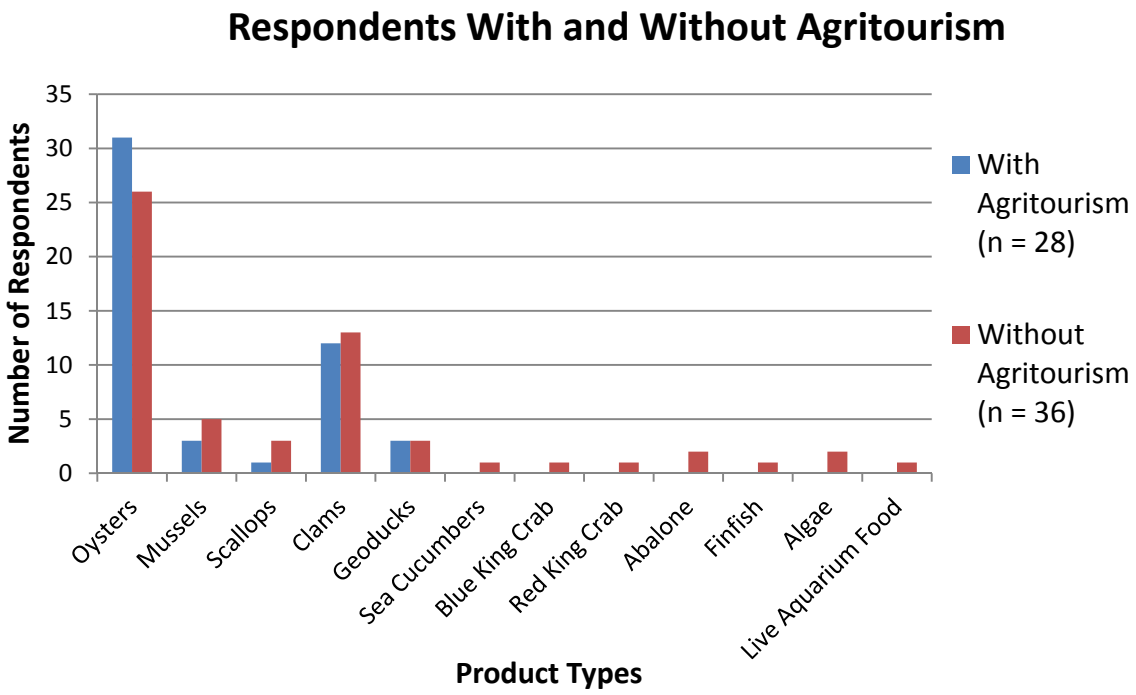
20. What is your annual household income (choose one)?
    a. Less than $15,000
    b. $15,000 – $24,999
    c. $25,000 - $49,999
    d. $50,000 – $74,999
    e. $75,000 – $99,999
    f. $100,000 – $149,999
    g. More than $150,000

21. Additional comments/questions about this survey?
    _____
    _____

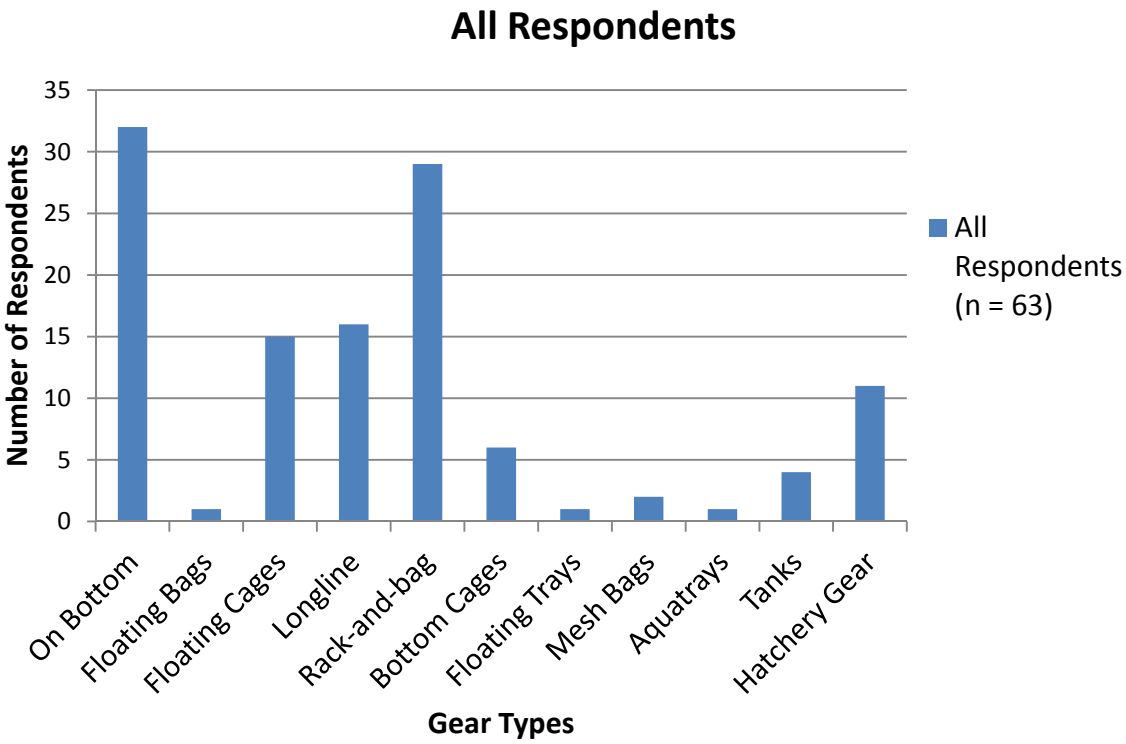
APPENDIX E: PRODUCTS CULTURED BY RESPONDENTS

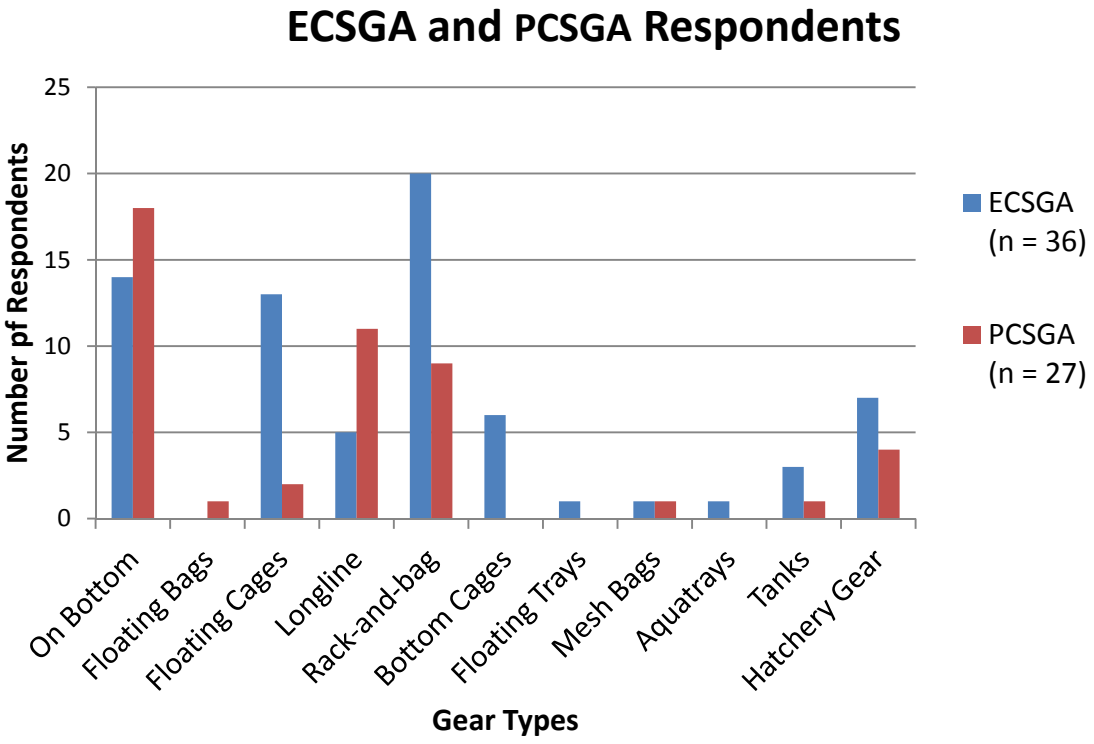


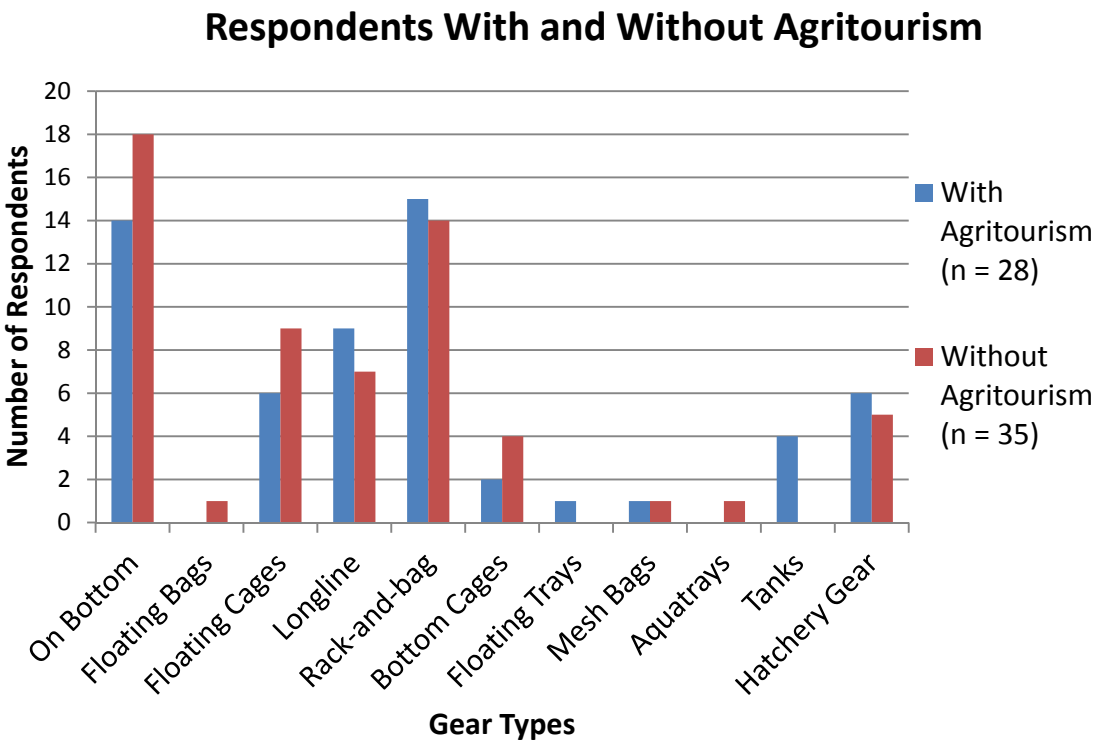



Respondents With and Without Agritourism
Number of Respondents
35
30
25
20
15
10
5
0
Oysters
Mussels
Scallops
Clams
Geoducks
Sea Cucumbers
Blue King Crab
Red King Crab
Abalone
Finfish
Algae
Live Aquarium Food
Product Types
With Agritourism (n = 28)
Without Agritourism (n = 36)

APPENDIX F: GEAR TYPES USED BY RESPONDENTS






Respondents With and Without Agritourism
Number of Respondents
20
18
16
14
12
10
8
6
4
2
0
On Bottom
Floating Bags
Floating Cages
Longline
Rack-and-bag
Bottom Cages
Floating Trays
Mesh Bags
Aquatrays
Tanks
Hatchery Gear
Gear Types
With Agritourism (n = 28)
Without Agritourism (n = 35)

APPENDIX G: RELIABILITY TESTING OF PCA RESULTS

Factor 1	**Cronbach's Alpha**
	.903
Items	**Cronbach's Alpha if Item Deleted**
Education - Environment	.877
Education - Users	.884
Customer Relations	.876
Education - Economy	.865
Public Interest	.896
Hobby	.915

Factor 2	**Cronbach's Alpha**
	.884
Items	**Cronbach's Alpha if Item Deleted**
Admission	.866
Use Resources	.865
Offset Fluctuations	.854
Customer Base	.848
Family Jobs	.863

Factor 3	**Cronbach's Alpha**
	.828
Items	**Cronbach's Alpha if Item Deleted**
Loss of Support	.786
Tax Incentives	.728
Inspire Others	.763
Hobby	**.**847

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