Comparing importance and confidence for production and source attributes of seafood among residents and tourists in South Carolina and Florida coastal communities

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Human Subjects

The research protocol, including informed consent procedures and documents, survey and survey communications, and privacy protection for human subjects for this study were reviewed and approved by the Clemson University Institutional Review Board. Informed consent required for experimentation with human subjects was obtained verbally during collection of addresses and included in the online survey introduction.

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Introduction

Sustainably produced ocean foods are an important pathway toward adoption of protein consumption patterns that reduce greenhouse gas emissions and assure sustainable food security (Hoegh-Guldberg. O., et al. 2019). Ultimately, achieving environmentally responsible seafood-related behaviors relies on well-informed consumers demanding and having access to sustainable seafood products and being confident that their purchase reflects their preferences (Boase et al., 2019; Elder & Kline, 2018; Verbeke et al., 2007b). While multiple personal, situational and environmental factors influence the choice, quantity, and frequency of seafood consumed (Boase et al., 2019; Carlucci et al. 2015, Mak et al. 2012), consumer confusion about environmental sustainability of marine fisheries has added complexity to seafood selection (e.g., Brécard, et al., 2009; Claret et al., 2012; Hall & Amberg, 2013).

Local and global initiatives, including marketing and outreach, work to better educate consumers about the seafood they are purchasing and improve demand as well as profitability for qualities related to sustainability (Czarnezki, Homan & Jeans, 2015; Gutierrez & Thornton, 2014; Leal et al., 2015). The seafood qualities highlighted by these efforts include production (i.e., *Wild-caught, Environmentally sustainable*) and source (i.e., *Harvested locally, Safe from pollutants*) attributes. While the current efforts appear to be somewhat successful (e.g., Brinson, & Rountree, 2011), unclear labeling, overlapping branding campaigns, and misconceptions and knowledge gaps regarding production and source attributes continue to diminish consumers'

ability to evaluate which seafood has their preferred attributes (Anderson & Anderson, 1991; Birch, Lawley & Hamblin, 2012; Boase et al., 2019; Czarnezki et al., 2015; Hilborn et al. 2015; Leal et al. 2015; McClenachan et al., 2016; Pardo, Jimenez, & Perez-Villarreal 2016; Parkes et al., 2010). The result is decision-making problems at the point of purchase that threaten adoption of seafood-related behaviors that are more environmentally sustainable (e.g., Elder & Kline, 2018).

Expansion of coastal aquaculture in the United States and worldwide has further increased the complexity of consumers' seafood choice. Mariculture or marine farming (i.e., aquaculture that involves breeding, rearing, and harvesting of aquatic organisms, such as fish and shellfish, in marine waters) has enormous potential for increased global seafood production, with environmental sustainability as a primary goal (FAO, 2018; Hoegh-Guldberg, et al. 2019; Kobayashi et al. 2015). For example, in the United States (U.S.), entrepreneurs are expanding shellfish (e.g., clams, oysters) mariculture which is enhancing the availability of local, sustainable and quality seafood in many coastal communities. Maricultured shellfish are among the lowest for greenhouse gas emissions and energy used relative to other marine and land-based protein sources (Hilborn, et al. 2018). However, including *Farmed in marine waters* on seafood labelling and in marketing efforts adds additional confusion to consumer's seafood decision-making (e.g., Weitzman & Bailey, 2018), primarily due to lingering negative perceptions about aquaculture quality and impacts of production on coastal ecology (Claret et al. 2016; Dalton et al., 2017; Hall & Amberg, 2013; Knapp & Rubino, 2016; Noakes, et al., 2003).

Numerous studies using different methodological approaches have demonstrated that consumers rate price, freshness, taste, safety, quality, nutritional benefits, ease of preparation and previous experience with seafood as among the most important attributes for purchase decisions (Carlucci,et al. 2015; Feucht et al., 2017; Gempesaw, et al., 1995; Hall & Amberg, 2013; Robinson & Hite, 2015). Production methods such as wild-caught, farmed or environmentally sustainable and source attributes, such as local origin, while rated lower in comparison to most of these top attributes, are still important to consumers seafood-related behaviors (Claret, et al., 2016; Hicks, Pivarnick & McDermott, 2008; Knapp & Rubino, 2016; Murray, Wolff & Patterson, 2017; Robertson, Carlsen, & Bright, 2002). Furthermore, consumers connect these production and source attributes to their more highly preferred attributes (Carlucci, et al., 2015; Manalo & Gempeshaw, 1997; Petrolia, Walton & Acquah, 2014).

Even if a quality attribute is important to a consumer, ultimately their ability to confidently distinguish seafood attributes contributes to their overall feeling of self-efficacy and influences the quantity, frequency and characteristics of fish consumed (Carlucci et al., 2015). This confidence may depend on a variety of variables, such as accurate labelling, advice from a respected retailer or chef, experience with the product, or trust in the food system (i.e., supply chain) associated with a brand (Anderson & Anderson, 1991; Lassoued & Hobbs, 2015). Sustainability and other production or source attributes are more difficult for consumers to evaluate through personal experience and require trust in others making claims about the source (Verbeke et al., 2007a). While sustainable seafood lists and eco-labeling may improve consumer confidence, seafood lists can be too broad to distinguish fisheries at a local level (Parkes et al., 2010), and eco-labelling suffers from inconsistency in requirements across labelling systems

(Czarnezki, Homan & Jeans, 2015) and inability to increase consumer demand for sustainable attributes (Hallstein & Villas-Boas, 2013; Grunert et al., 2014). Traceability (i.e., tracking the chain-of-custody of the product through the supply chain), an integral part of eco-labelling certification, has a reputation of mislabeling (Lewis & Boyle, 2017; Pardo et al. 2016; Leal et al., 2015), but that may be improving (Luque & Donlan, 2019). Finally, in many coastal communities, decline of fishing industry capacity has limited the availability of locally harvested seafood (Kite-Powell, Rubino & Morehead, 2013) which can force coastal restaurants and retailers to purchase imported products to keep prices low (e.g., Jodice et al. 2018). Trust in local seafood authenticity is undermined when these coastal restaurants and retailers suggest that seafood is local by using vague descriptions, having a waterfront location, or displaying fishing related imagery (Brookfield, Gray & Hatchard, 2005; Cline, 2012; Hanner et al., 2011; Khaksar et al., 2015).

Consequently, seafood-related purchase behaviors depend upon whether the situational factors enable consumers, who prioritize the associated production and source attributes, to confidently identify and connect these attributes with other easily confirmed, preferred attributes (e.g., fresh) (Manalo & Gempeshaw, 1997). Coastal communities that are also popular tourist destinations are useful locations to study and influence seafood preferences and behaviors because the availability of fresh, locally harvested seafood is an attraction of living on or visiting the coast (e.g., Voyer et al, 2017). Opportunities to view fishing boats, experience seafood products, or learn the local harvest story can be attractive to coastal consumers prioritizing other quality seafood attributes (Future of Fish, 2016; McClenachan et al., 2016; Witkin, Dissanayake, & McClenachan, 2015). Promotion and education about local seafood can also create interest in the

coastal community as a food tourism destination (Sims, 2009; Everett & Aitchison, 2008) and strengthen economic sustainability of the local fishing industry by retaining value in the region (Tolley, Gregory, & Marten, 2015).

Familiarity and exposure to seafood are relevant to both perceived importance and confidence in consumer seafood-related behavior (Carlucci et al, 20162015, Mak et al., 2012). Consumers who visit or live in coastal communities where commercial fishing is occurring have opportunities (e.g., encountering commercial fishermen in waterfront areas; developing relationships with retailers or restaurants selling local seafood; gathering information from family and friends or advertising in the region) to develop direct familiarity with local seafood harvest. Some coastal communities are creating opportunities for developing relationships with harvesters through direct sales (Brinson, Lee & Roundtree 2011; Stoll, Dubik & Campbell, 2015; Tolley et al, 2015). In this context, consumers can learn about and gain confidence about production and source attributes when making seafood purchasing decisions (Anderson & Anderson, 1991; Fernandez-Polanco & Luna, 2012). However, tourists generally have less opportunity than residents to gain familiarity with local seafood products and may have trouble determining authenticity of these products (Brookfield et al. 2005). Consequently, tourists are likely to rate importance or confidence lower than residents when evaluating production and source attributes associated with local seafood harvest (Cohen & Avieli 2004; Tiefenbacher, Day & Walton, 2000).

Consequently, the research reported here occurred in coastal tourism communities in South Carolina (SC) and Florida (FL), in the Southeast region of the U.S., where the seafood

production and source attributes of interest to the study were available. Both states sell locally harvested wild-caught (e.g., shrimp) and marine farmed shellfish (e.g., clams and oysters) seafood that is considered environmentally sustainable (Dumbauld, Ruesink & Rumrill, 2009; Froehlich et al. 2018; Parker et al., 2018). Both regions received federal subsidies for promotion of local, wild-caught shrimp in the mid-2000s. Both have a cooperative local foods branding program through their state department of agriculture, but the timing is different. "Fresh From Florida" branding started in 1990 and began including seafood in 1996. South Carolina began their "Certified SC Grown" branding program, including seafood, in 2007, and added a separate "Certified SC Seafood" logo and certification in 2013. Shellfish mariculture has enabled both states to provide a more consistent supply of local seafood and to develop niche markets for premium seafood. For example, harvesters are selling directly to well-known chefs or seafood restaurants, local retailers, and consumers at farmers markets or through member-based food share programs in the coastal communities. However, clam mariculture began in Florida in the 1990s and in South Carolina in the mid-2000s. In 2013, there were nine mollusk farms in South Carolina compared to 132 farms in Florida (National Agricultural Statistics Service, 2014). At the time of the study, there were a few successful oyster mariculture enterprises in South Carolina, and Florida was developing this production method in response to decline in wild oyster harvesting due to environmental factors. While both states offer similar seafood product attributes, the differences in timing of promotion and product availability have potential to cause differences in familiarity and preferences among seafood consumers.

The goal of this research was to measure coastal consumers' (i.e., residents' and tourists who eat seafood) importance and confidence ratings for production (i.e., *Wild-caught, Environmentally*

sustainable, Farmed in marine waters) and source (i.e., *Harvested locally, Safe from pollutants*) attributes of seafood. Since situational factors such as exposure to seafood (i.e., tourist or resident) in the coastal community and location (i.e., state) factors may be influential to seafood-related preferences, the research first focused on answering the question: Do significant differences exist between four subgroups (i.e., SC Tourists, SC Residents, FL Tourists and FL Residents) for importance and confidence measures for the production and source attributes?

Assessing whether there is incongruence between importance and confidence for the production and source attributes could further elucidate strengths and weaknesses of marketing and outreach programs designed to enhance sustainable seafood-related behaviors. While consumers may prioritize production and source attributes, they may still have low confidence in their ability to determine which seafood has these attributes (Anderson & Anderson, 1991; Verbeke et al. 2007b). Verbeke, et al. (2007b) explored consumer ratings of importance (i.e., "making the right decision") and confidence ("ease or difficulty in personal evaluations") for the broader attribute of seafood "quality" and found the majority rated confidence lower than importance. However, there has been no direct comparison of consumer ratings of importance of a seafood attribute and confidence in ability to select seafood with a preferred attribute for specific production and source dimensions of quality. Therefore, the second research question focused on determining whether there was a gap between consumer confidence and importance ratings for seafood. Specifically, is there a significant difference between importance and confidence measures within each subgroup, is that gap (i.e., confidence minus importance) positive or negative, and does gap size differ among the subgroups (i.e., consumer types)?

To enhance interpretation of the gap between importance and confidence for each attribute, this study adapted Importance-Performance analysis (IPA). Originally developed by Martilla and James (1977), the IPA is an effective decision-making tool for visually identifying the strengths and weaknesses of products and services on two dimensions, importance and performance (Oh, 2001; Lai & Hitchcock, 2015). The IPA enables visual identification of gaps between consumers' subjective ratings of importance and performance, as a means to identify where improvements are needed and which improvements would have the greatest impact on consumer satisfaction. The Importance-Confidence Analysis or ICA used in this study substitutes confidence for performance to understand whether the current levels of consumer outreach and promotion in coastal communities of South Carolina and Florida are successfully enhancing residents' and tourists' decision-making capacity regarding each of the production and source attributes.

Research Methods

Community selection

Six (i.e., three per state) coastal fishing communities were selected to reflect variability in levels of mariculture for shellfish (i.e., clams and/or oysters), tourism infrastructure (e.g., amount of accommodations, restaurants, and attractions) and visitation. Agency representatives from both states and involved in extension (i.e., Sea Grant), state aquaculture permitting or seafood promotion helped with community selection. The National Oceanic and Atmospheric Administration (NOAA) Social Indicators Database (www.st.nmfs.noaa.gov/humandimensions/social-indicators/map) was used to confirm involvement in commercial fishing. The level of tourism was determined by review of online state and county tourism data

(e.g., economic impact reports) and promotional materials targeting tourists. The communities were McClellanville, Isle of Palms and Beaufort in South Carolina and Cedar Key, Apalachicola, and Sebastian in Florida (Figure 1). Table 1 illustrates the relative levels of tourism and mariculture in these communities. These communities all have environmentally sustainable fisheries management and harvesters (e.g., vessels) present on the waterfront or waterways, and are promoting their locally harvested seafood through media, special events, restaurants, other culinary tourism opportunities and/or through focus on maritime culture and traditions.

Survey

This study was part of a larger research project examining resident and tourist support for mariculture at the coastal community level. Two questionnaires, one targeting tourists and one targeting residents, were developed and administered through a combination of on-site intercepts and follow-up procedures. Specific to the analysis presented here, both questionnaires included a seafood preferences section that was only available to respondents who indicated "yes" for the required "Do you eat seafood?" question, and that section included the importance-confidence component of the study along with several other questions. The importance-confidence questions involved five paired sets rating three production (i.e., *Wild-caught, Farmed in marine waters, Environmentally sustainable*) and two source (i.e., *Harvested locally, Safe from pollutants*) attributes. The lead in questions were, "How important it is that your seafood is..." and "Please indicate your level of confidence in your ability to determine if the seafood you are purchasing is..." Importance was rated on a scale of 1=Not important to 5=Very important, and confidence was rated on a scale of 1= Not confident to 5=Very confident. Tourists were asked to think about this issue "when you visit the coast", and coastal residents were asked about seafood purchase in

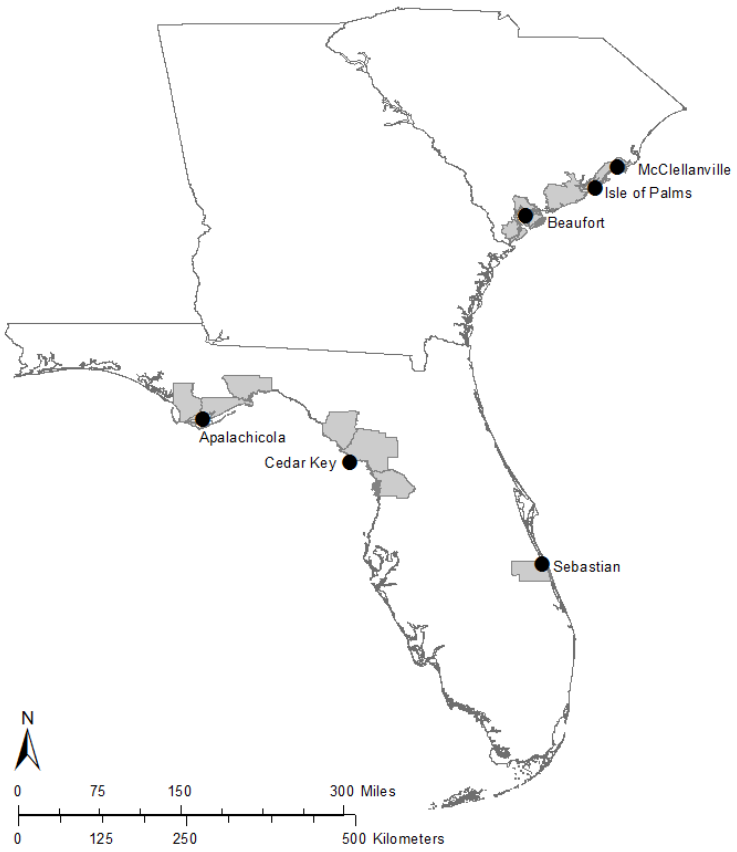

Figure 1. Coastal communities (points) included in the tourist and resident sampling, and counties (gray shaded) included in resident sampling. (Image credit: Yvan Satge, Clemson University)

Table 1. Relative level of mariculture and tourism development in study locations.

Mariculture Development	Tourism Development		
	HIGH	MEDIUM	LOW
HIGH		Cedar Key, FL	
MEDIUM	Beaufort, SC Isle of Palms, SC		McClellanville, SC
LOW	Sebastian, FL		Apalachicola, FL

general, with the assumption that most of their seafood purchase occurs in their coastal community. At the end of the survey, all respondents were asked to complete demographic

questions (e.g., age, gender, education level, employment status, marital status, and household income).

Data collection

The tourist and resident versions of the survey instrument were administered online via email invitation. Tourists were intercepted and email addresses collected in the South Carolina communities during the summer, and tourists and residents were intercepted in the Florida communities during fall, winter and spring. Intercepts occurred in coastal venues such as beaches, parks, and developed waterfronts, as well as downtown areas and at community events. Intercepts used a randomized sampling procedure that was based on every third person crossing an imaginary line. During the week following each onsite intercept session, a link to the online survey was emailed to respondents, and three reminders were sent at one-week intervals based on Dillman (2007).

The majority of residents were invited through a reputable address database vendor. To assure a sufficient sample size and accommodate expected levels of delivery failure and low response rate from vendor-based email invitation, all resident email addresses available for the county where the community was located were included in the sampling frame. For the more rural communities, all addresses from adjacent coastal counties were also included in the sampling. A total of 37,297 resident email addresses for the Florida (n=13,192) and South Carolina (n=24,105) received an invitation. The vendor sent the online survey link and invitation letter developed by the researchers. The vendor also administered three reminders, sent at one-week intervals, based on Dillman (2007). This approach yielded an insufficient resident response for

the Florida communities, which is why residents were also included in the sampling when tourist intercepts occurred in Florida.

Analysis

Since IPA depends on a target population that is homogeneous, segmentation is recommended to account for demographics or other diversity that exists, to avoid misinterpretation (Bruyere, Rodriguez & Vaske, 2002). Therefore, the potential for differences between tourists and residents (i.e., familiarity) and between states (i.e., promotional timing) was accounted for by dividing the sample into four subgroups – South Carolina (SC) Tourist, South Carolina (SC) Resident, Florida (FL) Tourist, and Florida (FL) Resident. Socio-demographic variables (i.e., gender, age, education level, employment status, and household income) were summarized and compared for each subgroup. Then, one-way ANOVA with the post hoc test was used to identify subgroup differences, based on familiarity (i.e., tourist vs. resident within state) or state (i.e., FL tourists vs. SC tourists, FL residents vs. SC residents), for each of the importance and confidence measures. Because subgroup sizes were unequal, in cases where Levene's test indicated violation of the assumption of homogeneity of variance (i.e., equal variances are not assumed) the more robust Welch's ANOVA and Games-Howell post hoc test was used to avoid Type I error (Field, 2013; Yigit & Gokpinar, 2010).

For the second research question, the first step involved paired-sample t-tests to examine whether a significant difference (i.e., gap) existed between the confidence and importance ratings for each attribute, within each subgroup. One-way ANOVA was then used to examine whether the size of the gap (i.e., confidence minus importance) for each attribute differed among the subgroups.

Finally, the Importance-Confidence Analysis (ICA), based on IPA, was developed for each subgroup. The ICA technique involved creation of a two-dimensional matrix between the single item, Likert scale measures for importance and confidence, for each attribute of interest. Specifically, the mean importance (X-axis) and confidence (Y-axis) values were plotted for each attribute as an intersectional point on the matrix. Whether this point suggested additional efforts (e.g., marketing, training) were needed depended on its position in a four quadrant matrix, defined by the intersecting guidelines (i.e., "crosshairs") representing the middle value for each scale. Based on Martilla and James (1977) terminology, the first quadrant of the matrix (i.e., upper right) represents attributes where both importance and performance ratings are greater than the crosshair values and is labelled – "keep up the good work". The second quadrant, labelled "possible overkill" (i.e., lower right) represents attributes rated high in performance but low in importance. The third quadrant, labeled "low priority" (i.e., lower left) represents attributes rated as low for importance and performance. The fourth quadrant, labeled "concentrate here" (i.e., upper left) represents attributes for which importance is above and performance is below the respective crosshairs.

The subjectivity inherent in positioning of the crosshairs of an IPA matrix has generated debate about reliability and validity limitations of IPA interpretation (Oh, 2001; Lai & Hitchcock, 2015). Most studies use the composite means for each dimension to position the crosshairs, a method considered to have higher discriminative power (Lai & Hitchcock, 2015). The ICA for this study utilized the recent Deng et al. (2017) mean-centered approach for positioning the crosshairs (Figure 2). This approach places the crosshairs based on the grand mean (which is 0) of the mean differences between the raw scores for importance and confidence and their

respective arithmetic means (see Deng et al., 2017, p. 228). Each point on the matrix was determined as the intersection of the mean-centered importance and confidence means for that attribute, within that subgroup. Then, an iso-rating line was positioned through the origin (0,0), representing the points at which the mean-centered importance and mean-centered confidence are equal. Deng et al. (2017) indicate this approach produces a more effective spread of the attributes in the IPA matrix, making it easier to compare the relative importance and performance of each attribute.

Results

Response rates

The vendor-based survey invitations to residents resulted in successful delivery (i.e., recipient clicked the survey link) to 1,654 South Carolina and 731 Florida email addresses. Of these invitations, 413 (24.9%) South Carolina and 162 (22.2%) Florida residents responded to the survey. The Florida resident intercepts resulted in 359 successful (i.e., no bounce) email invites and 139 (39.3%) survey responses. Of the 714 total resident surveys, there were 677 "yes" responses to the question "Do you eat seafood?" After removing 60 cases for incomplete responses to the importance-confidence question and an additional 146 for not responding to all of the demographic questions, 471 respondents remained in the analysis. Of these seafood eaters, a total of 268 (56.9%) were from South Carolina and 203 (43.1%) were Florida residents.

For Florida tourists, the onsite intercepts resulted in 564 email addresses, of which 474 were deliverable, and 273 (57.6%) responded to the survey. For South Carolina tourists, 896 emails were collected, 854 were deliverable, and 358 (41.9%) completed the survey. Combined, there

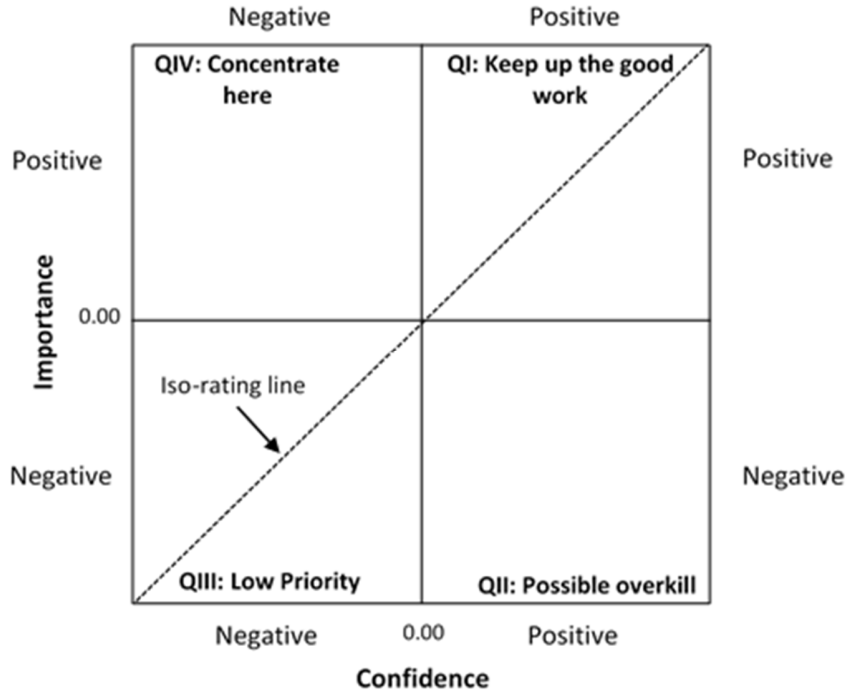

Figure 2. Importance-Confidence matrix using the mean-centered approach (based on Deng et al., 2017)

were 631 tourist surveys collected, of which 564 responded "yes" to the "Do you eat seafood?" question. After removing 53 cases for incomplete responses to the importance-confidence question and an additional 141 for not responding to all of the demographic questions, a total of 370 remained. Of these seafood eaters who were tourists, 53.8% of the respondents were from South Carolina (N=199) and 171 (46.2%) were from Florida.

A nonresponse bias analysis was conducted between resident respondents (N=471) and nonrespondents (N=206) and between tourist respondents (N=370) and nonrespondents (N=194). Nonrespondents were those who responded "Yes" to the "Do you eat seafood?", but failed to complete all of the Importance-Confidence items and/or did not complete the demographic

questions at the end of the survey. This analysis focused on whether resident and tourist respondents and nonrespondents differed on frequency of eating seafood. As part of the seafood preferences questions, residents and tourists were asked about their consumption frequency for seafood prepared at home and prepared at restaurants in the home community, using a categorical four point scale (1= Several times a week, 2=Once a week, 3=Once every two weeks, 4= Once a month). Chi-square analysis demonstrated no significant association between whether someone was in the response or nonresponse subgroup and frequency of eating seafood at home (residents: $X^2(3) = 0.215$, p=.975; tourists: $X^2(3) = 0.401$, p=.940) or at restaurants in their home community (residents: $X^2(3) = 5.638$, p=.131, tourists: $X^2(3) = 1.722$, p=.632).As a result, the researchers were comfortable that the final resident and tourists samples were representative of the survey respondents and proceeded with the proposed analyses.

Socio-demographic characteristics

Table 2 provides the socio-demographic profile for each of the four subgroups – SC tourist (N=199), SC resident (N=268), FL tourist (N=171), FL resident (N=203).

Subgroup Comparison of Importance-Confidence Ratings

To answer the first research question, "Do significant differences exist between four subgroups (i.e., SC Tourists, SC Residents, FL Tourists and FL Residents) for importance and confidence measures for the production and source attributes?", a series of ANOVAs were importance and confidence measures for the production and source attributes. Since the assumption of homogeneity of variance across subgroups was violated for importance of four attribute variables – *Environmentally sustainable*, *Wild-caught*, *Harvested locally*, *Safe from pollutants*, the Welch's ANOVA was used for all analyses. The Welch's ANOVA model for the

Table 2. Socio-demographic profile of Tourist and Resident subgroups

	% or *Mean*			
Variables	SC[1] Tourist (N=199)	SC Resident (N=268)	FL[2] Tourist (N=171)	FL Resident (N=203)
Gender				
Male	52.8	54.9	33.3	40.9
Female	47.2	45.1	66.7	59.1
Age				
Mean (SD)	*47.6 (15.0)*	*60.4 (12.7)*	*48.3 (16.3)*	*54.8 (13.8)*
Education Level				
≤12th grade	4.0	3.7	8.8	14.8
Some college or Associate degree	26.6	28.3	29.8	38.4
Bachelor's degree	32.2	35.5	31.6	23.6
Graduate or professional degree	37.2	32.5	29.8	23.2
Employment Status				
Full Time	59.8	42.9	56.7	45.3
Part Time	8.0	6.7	6.4	7.4
Student	5.5	1.1	2.4	1.5
Unemployed	7.6	7.5	7.0	5.9
Retired	18.1	37.3	22.2	33.0
Other	1.0	4.5	5.3	6.9
Household Income				
<$25,000	5.5	5.6	9.9	12.3
$25,000-$34,999	3.5	5.6	8.2	13.8
$35,000-$49,999	6.0	9.7	17.0	16.3
$50,000-$74,999	23.1	18.7	19.8	22.6
$75,000-$99,999	16.1	25.7	19.3	12.8
$100,000-$199,999	35.2	28.0	21.1	20.2
$200,000 or more	10.6	6.7	4.7	2.0
Community				
Beaufort, SC	32.2	34.8	0	0
Isle of Palms/McClellanville, SC	67.8	65.2	0	0
Cedar Key, FL	0	0	53.8	26.1
Apalachicola, FL	0	0	32.7	36.5
Sebastian, FL	0	0	13.5	37.4

[1]SC=South Carolina, [2]FL=Florida

four subgroups was significant ($p<.05$) for three importance (*Environmentally sustainable, Wild-caught, Harvested locally*) and three confidence (*Wild-caught, Farmed in marine waters, Harvested locally*) measures (Table 3). Post hoc comparisons (i.e. Games-Howell) between the South Carolina and Florida tourist subgroups and between the South Carolina and Florida resident subgroups demonstrated no significant difference for importance items or confidence items.

There were significant differences between tourists and residents within each state. In South Carolina, resident ratings for importance of *Environmentally sustainable*, *Wild-caught*, and *Harvested locally* were significantly higher ($p \leq .05$) than tourist ratings for these attributes. In South Carolina, resident ratings for confidence in their ability to determine *Wild-caught* was significantly higher than tourist ratings for this attribute. In Florida, residents rated *Wild-caught* importance and confidence significantly higher ($p < .05$) than tourists. Finally, there were some differences between tourist and resident subgroups between states. Florida residents gave higher ratings than South Carolina tourists for importance of *Environmentally sustainable*, *Wild-caught*, and *Harvested locally* and for confidence in *Wild-caught* and *Farmed in marine waters*. South Carolina residents gave higher ratings than Florida tourists for *Environmentally sustainable* and *Wild-caught* importance, and *Wild-caught* confidence.

Paired-Sample t-Tests

The second research question, "Is there a significant difference between importance and confidence measures within each subgroup, is that gap (i.e., confidence minus importance) positive or negative, and does gap size differ among the subgroups (i.e., consumer types)?" was then addressed. Since the post hoc test results for the first research question indicated no significant differences between tourist or resident subgroups due to location (i.e., state), the data was pooled into tourist (N=370) and resident (N=471) subgroups for the gap-analysis. Table 4 summarizes the pooled means, gap means (i.e., mean of confidence minus importance) and t-test results for the tourist and resident subgroups. Based on paired samples *t*-tests, there was a significant difference between confidence and importance ratings ($p \leq .001$) for all attributes for both the tourist and resident subgroups. For both subgroups, the mean difference between

Table 3. One way ANOVA (Welch's) comparing subgroups on importance and confidence attributes for seafood.

Importance (I)[1] & Confidence (C)[2] Items	All (N=841)		SC[3] Tourist (N=199)		SC Resident (N=268)		FL[4] Tourist (N=171)		FL Resident (N=203)				
	Mean	SD[3]	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	df	p
Production													
Environmentally sustainable (I)*	4.13	1.03	3.84[a,b]	1.18	4.32[a,c]	0.87	4.02[c]	1.11	4.26[b]	0.91	9.673	3, 429.79	.000
Environmentally sustainable (C)	2.68	1.25	2.49	1.18	2.72	1.18	2.72	1.31	2.77	1.33	2.120	3, 438.75	.097
Wild-caught (I)*	3.75	1.21	3.39[a,b]	1.33	4.06[a,c]	0.99	3.54[c,d]	1.35	3.87[b,d]	1.10	15.077	3, 426.48	.000
Wild-caught (C)	3.06	1.29	2.75[a,b]	1.28	3.25[a,c]	1.21	2.88[c,d]	1.33	3.27[b,d]	1.30	8.650	3, 439.62	.000
Farmed in marine waters (I)	2.90	1.26	2.80	1.30	2.98	1.23	2.80	1.30	2.97	1.21	1.270	3, 441.20	.284
Farmed in marine waters (C)	2.67	1.24	2.48[a]	1.19	2.68	1.20	2.66	1.28	2.83[a]	1.28	2.822	3, 440.99	.039
Source													
Safe from pollutants (I)*	4.73	0.68	4.64	0.68	4.78	0.64	4.72	0.74	4.75	0.68	1.831	3, 437.72	.141
Safe from pollutants (C)	2.59	1.27	2.55	1.23	2.53	1.22	2.73	1.27	2.59	1.35	0.911	3, 441.38	.435
Harvested locally (I)*	3.95	1.07	3.77[a,b]	1.21	4.14[a]	0.91	3.92	1.08	3.90[b]	1.07	5.346	3, 431.79	.001
Harvested locally (C)	3.20	1.28	2.97	1.24	3.34	1.26	3.11	1.30	3.30	1.29	4.023	3, 442.70	.008

*Violation of the assumption of homogeneity of variance; [1]Scale: 1=Not Important, 2= Slightly Important, 3= Somewhat Important, 4= Important, 5=Very Important; [2]Scale: 1= Not Confident, 2= Slightly Confident, 3= Somewhat Confident, 4= Confident, 5=Very Confident; [3]Standard Deviation; [3]SC=South Carolina, [4]FL=Florida; [a,b,c,d] Like superscripts indicate significant difference between means on the 5 point scales based on Games-Howell post hoc test ($p \leq .05$).

confidence and importance ratings was negative for all attributes, and the greatest mean difference between confidence and importance occurred for *Safe from pollutants*. Finally, the independent t-test comparing the size of each attribute gap showed no difference between tourist and resident subgroups for all seafood attributes, except for *Environmentally sustainable* importance. Specifically, the negative gap for *Environmentally sustainable* was significantly wider, [t(839)=2.260, p=.024], for residents than for than for tourists. This result reflects the finding that residents gave a higher rating than tourists for importance, while there was no significant difference in confidence (see Table 3).

Importance-Confidence Analysis (ICA)

The ICA graphs (Figure 3) for the tourist and resident subgroups were generated from the mean-centered values summarized in Table 4. *Harvested locally* appears in the upper right quadrant (I), "keep up the good work", for tourists and residents, suggesting that the current level of effort to improve consumer confidence on this attribute is sufficient relative to attribute importance. *Wild-caught* appears in the lower right quadrant (II), "Possible overkill" for both tourists and residents, suggesting less effort is needed to boost consumer confidence relative to importance for this attribute, particularly for tourists. *Farmed in marine waters* occurs in quadrant III, "low priority" (i.e., lower left), for both subgroups. Finally, occurrence in the upper left quadrant IV, "concentrate here", suggests *Environmentally sustainable* and *Safe from pollutants* should be interpreted as a high priority for increased focus on strategies that improve consumers' confidence in their ability to determine these seafood attributes at the point of purchase. The attributes that are the furthest distance above the iso-rating line have the greatest difference between mean-centered importance and confidence and should receive attention (i.e., since the

Table 4. Summary of values used to examine gaps between importance and confidence for tourist and resident subgroups

		Importance (I)[1] & Confidence (C)[2] Means				Mean Difference (Confidence - Importance)				Mean-centered values for ICA[4]	
		Tourist (N=370)		Resident (N=471)		Tourist (N=370)		Resident (N=471)			
Attribute	Scale	Mean	SD[3]	Mean	SD	Mean	SD	Mean	SD	Tourist	Resident
Production											
Environmentally sustainable^	I	3.92	1.15	4.30	0.89	-1.32*	1.50	-1.55*	1.44	0.18	0.29
	C	2.60	1.25	2.74	1.25					-0.13	-0.18
Wild-caught	I	3.46	1.34	3.98	1.04	-0.65*	1.41	-0.73*	1.32	-0.28	-0.03
	C	2.81	1.30	3.25	1.25					0.08	0.33
Farmed in marine waters	I	2.80	1.30	2.97	1.22	-0.24*	1.43	-0.23*	1.50	-0.94	-1.04
	C	2.56	1.24	2.75	1.24					-0.17	-0.17
Source											
Safe from pollutants	I	4.68	0.71	4.77	0.66	-2.05*	1.33	-2.21*	1.43	0.94	0.76
	C	2.63	1.25	2.56	1.28					-0.10	-0.36
Harvested locally	I	3.84	1.15	4.04	0.99	-0.81*	1.33	-0.72*	1.25	0.10	0.03
	C	3.04	1.27	3.32	1.27					0.31	0.40
Grand Mean	I[5]	3.74	0.87	4.01	0.63					0.00	0.00
	C[6]	2.73	1.11	2.92	1.06					0.00	0.00

[1]Scale: 1=Not Important, 2= Slightly Important, 3= Somewhat Important, 4= Important, 5=Very Important;
[2]Scale: 1= Not Confident, 2= Slightly Confident, 3= Somewhat Confident, 4= Confident, 5=Very Confident; [3]Standard Deviation;
[4]Values for Importance Confidence Analysis (ICA) are based on: Importance mean-centered=importance item mean minus importance grand mean, Confidence mean-centered=confidence item mean minus confidence grand mean; [5]Grand mean importance α=.751; Grand mean confidence α=.914; *Paired-sample t-test on importance vs. confidence items within subgroup is significant ($p \leq .001$); ^Independent-samples t-test between tourists and residents is significant for the mean difference between confidence and importance (p=.024).

iso-rating line is based on mean-centered values, attributes positioned furthest above the line have the greatest difference from the grand mean for importance and/or confidence). *Safe from pollutants* and *Farmed in marine waters* are positioned the furthest from the iso-rating line, for both subgroups. This distance for *Safe from pollutants* is a reflection of the importance mean-centered value (Table 4) being the highest positive value for all of the five attributes and further confirms the need to focus consumer education efforts on *Safe from pollutants* in order increase confidence. In contrast, *Farmed in marine waters* occurs below the iso-rating line because the importance mean-centered value is the largest negative value of the five attributes (Table 4) so it would usually be interpreted as low priority for marketing due to the low importance.

Discussion/Conclusions

This study directly compared consumer (i.e., tourists and residents) ratings of importance of seafood production (i.e., *Wild-caught*, *Environmentally sustainable, Farmed in marine waters*) and source (i.e., *Locally harvested*, *Safe from pollutants*) attributes with their confidence in their ability to select for these attributes. Prior to this study, there was no exploration of the gap between importance and confidence for consumer evaluation of specific attributes of seafood, other than for "quality" (Verbeke, et al., 2007b). This study was also the first adaptation of IPA, in the form of Importance-Confidence Analysis (ICA), for determining marketing and consumer education priorities for strengthening point of purchase decision-making about food production and source attributes. In addition, this study adds to the limited research comparing tourist and resident preferences for environmentally sustainable products in the coastal community (e.g., Oh, Draper & Dixon, 2010).

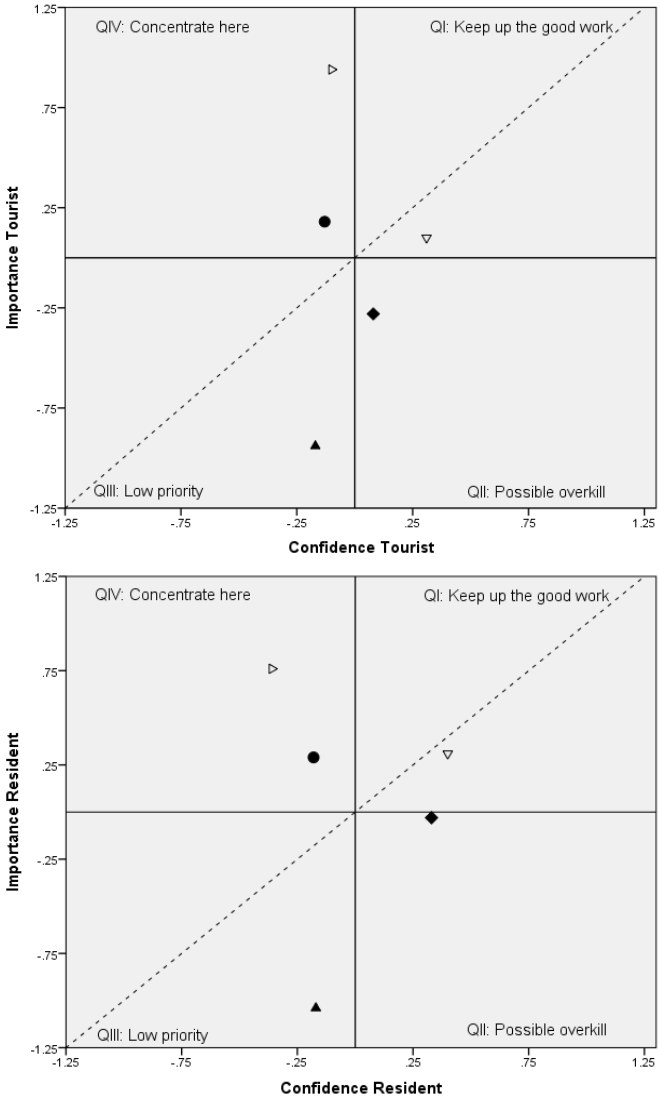

Figure 3. Importance Confidence Analysis (ICAof seafood attribute vs. confidence in ability to determine seafood attribute for each subgroup. Solid lines are the mean-centered means (0, 0) for importance and confidence; Dashed line is the iso-rating line (x=y); Legend – Production: ◆ = Wild-caught, ▲ = Farmed in marine waters, ● = Environmentally sustainable; Source: ▷ = Safe from pollutants, ▽ = Harvested locally.

The context of the study was specific to consumers (i.e., tourists and residents) purchasing seafood in popular coastal destinations in South Carolina and Florida, where commercial harvest and mariculture of seafood was occurring and where the production and source attributes of interest were available. The consumer ratings of production and source attributes were viewed as a reflection of existing situational variables in the coastal community, including seafood

availability and promotional efforts to shift food-related behavior toward seeking local, environmentally sustainable seafood as a quality product. The study included *Farmed in marine waters* as an attribute to reflect recent shellfish mariculture expansion in the region. By sampling both tourists and residents in coastal communities in two coastal states in the U.S. Southeastern region, this study captured the role of situational variables related to location (i.e., state) and exposure to seafood in the coastal community (i.e., resident or tourist).

While the first research question discovered some differences between resident and tourist subgroups, these differences did not occur within consumer type, indicating that it was not necessary to differentiate resident or tourist subgroups by state. This finding also suggests that promotional and educational outreach efforts are somewhat homogenous across the coastal communities in the two states, with regard to influencing importance and confidence factors in consumer seafood purchase decision-making. However, the results indicated that residents rated importance and confidence higher than tourists for some of the attributes within each state and between states. This finding supports the proposition that more exposure (e.g., living in the community compared to visiting) to seafood harvested in the coastal community should result in higher confidence or importance ratings, but only for certain production (i.e., *Environmentally sustainable, Wild-caught*) and source (i.e., *Harvested locally*) attributes. This conclusion is supported by prior findings that longer time coastal residents may be more sensitive to changes in the local fisheries (Dalton et al., 2017; Shafer et al., 2010) and have a closer bond to the local economy and food system (e.g., Kline et al. 2016; Petrolia et al. 2014). Variables related to time in community, exposure to seafood promotions and outreach, involvement with local seafood harvest, and knowledge about seafood harvest and preparation should be further investigated as

predictors of importance and confidence ratings for locally harvested seafood. Also, future research comparing tourist and resident preferences for environmentally sustainable products and practices is necessary to better target strategies for enabling and enhancing environmentally responsible behaviors in coastal communities.

The second research question, focused on examining the difference between confidence and importance, demonstrated that both the resident and tourist subgroups rated confidence lower than importance for all five attributes. This confirms that even in the coastal communities where seafood production and source attributes are available and accessible, existing promotional and educational efforts are not successfully enabling consumer confidence in identifying the seafood production and source attributes that are important to them, at the point of purchase. This problem undermines efforts to shift consumers towards environmentally sustainable seafood-related behaviors and enhance economic sustainability of the commercial fishing and tourism in coastal communities (Tolley, Gregory, & Marten, 2015). While the size of the gap between importance and confidence for four attributes was not significantly different between tourists and residents, *Environmentally sustainable* was higher for residents than for tourists. This is due to residents giving higher importance ratings than tourists to *Environmentally sustainable*, since there was no significant difference between subgroups for confidence (Table 3 & 4). These findings confirm that importance should not be evaluated without accounting for confidence in studies of variables influencing seafood-related behaviors (Carlucci, 2015).

The ICA provided further insight for interpretation of the difference between confidence and importance, useful for targeting future promotional and outreach needed to achieve

environmentally sustainable seafood-related behaviors in the coastal community. The ICA suggested that *Environmentally sustainable* and *Safe from pollutants* should receive the highest priority in strategies to improve consumer confidence, that efforts promoting *Wild-Caught* and *Harvested locally* were sufficient, and that *Farmed in marine waters* should receive low priority. The "low priority" rating for *Farmed in marine waters* illustrates why context is relevant to avoid misleading conclusions when interpreting IPA type matrix results (Lai & Hitchcock, 2015, Oh, 2001). Specifically, shellfish mariculture represents a recently introduced, sustainable product that is already supplementing the local seafood supply and enabling a niche market in the study communities (e.g., Niemark, 2016). The low importance ratings for this attribute may reflect lingering negative beliefs about marine farming as a production method (Fernández-Polanco & Luna, 2012) or lack of familiarity with shellfish farming activities and quality of these products in the study region (Petrolia, Walton, & Acquah, 2014). The low confidence ratings may suggest continued struggles that consumers have with identification of these products. If the goal is assuring sustainable seafood-related behavior among coastal consumers, and inclusion of quality and sustainable maricultured products is part of that plan, success will depend upon promotion to elevate importance and consumer education to elevate confidence for the *Farmed in marine waters* attribute. Furthermore, promotion of locally farmed seafood in conjunction with the high priority attributes found in the Q1 and QIV quadrants of the ICA would take advantage of the multi-dimensionality of consumer seafood preferences (Carlucci et al., 2015; Fernández-Polanco & Luna, 2012; Lawley et al. 2012). These findings for *Farmed in marine waters* are highly relevant given expansion of mariculture occurring in or planned for coastal regions of the U.S. and other nations and (FAO, 2018; Knapp & Rubino, 2016).

Further investigation of demographic and other predictive variables influencing the ratings of importance and confidence would strengthen interpretation of the ICA results (Bruyere et al., 2002; Fernández-Polanco et al., 2012; Carlucci et al., 2015). In addition, if a coastal community is developing or strengthening access to quality, local seafood (farmed or wild-caught) to enhance environmental sustainability of seafood-related behavior among tourists or residents (Elder & Kline, 2018), relationships between attribute preferences and other motivations for visiting or living in the coastal community should be examined. For example, place attachment, diversity of activity, and broader cultural variables can be more influential than interest in specific local seafood products in attracting tourists to a coastal community or resident reasons for staying in a community (Ednie, Daigle & Leah, 2010; Lacher et al., 2013).

This study had a sampling challenge. While all tourist addresses were collected from in person intercepts, most but not all resident addresses were acquired through a vendor. While the procedure for inviting and reminding respondents was effectively the same, homogeneity between the vendor and intercept subsets for Florida residents was a concern. However, exclusion of the intercept subset would have reduced the overall sample size and variability for the Florida resident subgroup. In the future, it would be preferable to use similar email address collection procedures for tourists and residents.

With regard to the selected analyses, importance has previously been measured separately using more robust discrete choice methods (e.g., Mauracher et al., 2013; Risius, Janssen & Hamm, 2017) and compared to confidence using cluster analysis (Verbeke et al., 2007b). The IPA is a relatively basic technique that continues to be used in assessing consumer evaluation of goal

performance (Lai & Hitchcock, 2015). As such, the ICA provided a simple approach for identifying gaps, relative successes and priorities for marketing and education in the context of seafood production and source attributes in the coastal community marketplace. Application of the Deng et al. (2017) recommendations helped address validity concerns regarding subjectivity the ICA interpretation. However, another common concern with IPA is the causal relationship between importance and performance measures (Oh, 2001). Although Carlucci (2015) and Verbeke et al. (2007b) suggest that confidence and importance are separate measures, the issue of the relationship between these measures needs further examination to better understand the multidimensional set of factors influencing seafood consumption. In the future, deeper understanding could be gained with a more complex, discrete choice/conjoint research design (e.g., rating of confidence level for different combinations of attributes and information types in different purchasing contexts).

The difference between confidence and importance should be explored for sustainable foods in other contexts, if the goal is to strengthen communication about positive production and source attributes of quality food products and further engage consumers in environmentally sustainable food-related behaviors. Measuring the importance and confidence gap is also a promising metric for comparing the outcome, in addition to behavior, of strategies (i.e., promotion, education, outreach) for improving engagement in environmentally sustainable behavior. In the case of coastal fishing communities, strategies should focus on enhancing opportunities (e.g., festivals, ecotours, restaurant features, access to the working waterfront) for tourist and resident interaction with local seafood products as part of the community experience. While these efforts should improve consumer confidence and recognition of credence cues related to a variety of seafood

production and source attributes in the coastal community, they may also enhance consumer confidence in other seafood markets. Lastly, the results of this study highlighted the need to further refine ICA as a different form of analysis than the IPA. This could include a relabeling of the four quadrants to reflect a closer examination of the relationship between 1) importance and marketing/promotion and 2) confidence and education/outreach.

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