Beach User Perception of the Economic and Ecological Services of Sand Dunes at Pensacola Beach, Florida

EMILY HARRIS
University of West Florida

***PHILLIP P. SCHMUTZ**
University of West Florida

CHLOE A. JACKSON
University of West Florida

MIRANDA ANAYA
University of West Florida

MARTHA JOHNSON
University of West Florida

GUY CHAPMAN
University of West Florida

HIGHLIGHTS:

- Beach users demonstrated a robust knowledge of the ecosystem services that coastal dunes provide.
- Local residents and tourists showcased statistically different levels in their willingness to support dune maintenance and restoration initiatives.
- Socio-economic indicators played an important role in a beach users' willingness to support dune management strategies.
- Increased environmental education would benefit beach users (both tourists and locals), the community, and ultimately the environment.

Abstract: As coastal communities are experiencing increased impacts from climate stressors, it is becoming more important for policy makers to establish sound policy objectives for the protection of these communities. Top-down focused policies are not always successful as they do not always align with the wants and needs of a community. Bottom-up information, on the other hand, can be highly insightful for local policy makers to help design management strategies that include social needs and potential conflicts as they take into account the public's attitudes, perceptions, and expectations of the environment. This study sought to assess how beach users – local residents and tourists – perceive the environmental

* Corresponding Author

and economic ecosystem services that coastal dunes provide as well as their views on management strategies for the protection of these environments at Pensacola Beach. A total of sixty surveys were conducted at various beach locations in Pensacola Beach, Florida. Results indicated that beach users, both local and tourist, understood the environmental and economic value of coastal dunes, yet the different user groups showcased differing levels of willingness to support dune management initiatives. Local residents showed a substantially higher propensity to support dune management both financially as well as through action.

KEYWORDS: Dune conservation, Tourism, Coastal management, Florida Gulf Coast

INTRODUCTION

The warm weather, variety of recreational attractions, and abundant natural resources of coastal environments have facilitated a dramatic rise in tourism, producing a major economic boom for coastal communities (Ariza et al. 2014). Surveys conducted by *TripAdvisor*, the *Washington Post*, and *Expedia* found that 72 percent of Americans express a favorable opinion of going to the beach for vacation, 52 percent plan to visit the beach in the next 12 months, and 44 percent actually go to the beach each year, spending 40 percent of their allotted vacation days at the beach (Houston 2013). Coastal tourism is now the largest and fastest-growing sector of the US service economy, with coastal counties receiving about 85 percent of US citizen tourist-related revenues (approximately $25 billion in federal tax revenue annually) and international tourists providing an additional $9.5 billion in annual federal tax revenue (Klein et al. 2004, Houston 2013). Overall, coastal environments in the US have more than double the annual visitors (2.2 billion) than the Bureau of Land Management, theme parks, national parks, state parks, and recreational areas combined (1.08 billion annual visitors) (Houston 2013).

The popularity of coastal tourism, however, has led to extensive degradation of coastal habitats in recent years (Defeo et al. 2009). Additionally, coastal communities are experiencing heightened environmental stressors from rising sea levels and increased frequency and severity of storms (Boon 2012). Research has shown that these impacts not only weaken the ecological status of coastal habitats, but also diminish the recreational experience of tourists (Koutrakis et al. 2011), which can lead to negative economic impacts to host communities (Alexandrakis et al. 2015). Accordingly, these anthropogenic and environmental stressors facilitate the need for community managers to develop strong, unified management strategies that invest in the protection of coastal habitats.

A major issue, however, with many coastal management strategies is that they largely reflect a top-down approach, assuming that the policies and practices put in place accurately express the best available knowledge and fully incorporate the perspectives, concerns, and preferences of the public user (Shipman and Stojanovic 2007, Ariza et al. 2008, Roca and Villares 2008, Vaughan and Ardoin 2014). Collecting bottom-up information from surveys, polls, interviews, and/or town hall meetings, however, provides an opportunity to better understand public attitudes, perceptions, and expectations,

and helps to design management guidelines that include societal needs/wants and identify potential conflicts. Duvat (2012) stressed this concept, highlighting that the public should be aware of why projects are needed, how projects are being funded, and how the public will benefit from them. Montgomery (2007) and Vaz et al. (2009) found that when people feel as if their opinions are being heard, that they have a voice in the decision-making process, and that they understand the project benefits, they are more likely to support the management program/initiative. Furthermore, many management projects are funded, in whole or in part, by public funds (i.e., tax revenue); therefore, discussions and input from the public need to be considered to provide accountability and reflect on the desires of the beneficiaries.

In recent years, numerous studies have documented beach users' perceptions on a variety of coastal management scenarios primarily focusing on aspects of beach quality[1] (e.g., Chen and Teng 2016, García-Morales et al. 2018), recreational services and infrastructure amenities (e.g., Lozoya et al 2014, García-Morales et al. 2018), conservation and preservation efforts (e.g., Lucrezi and van der Walt 2016, Prati et al 2016), and hazard mitigation (e.g., Greenberg et al. 2014). Studies have also sought to assess beach users' willingness to pay for things such as maintenance of beach quality, conservation and preservation actions, and tourism infrastructure services (e.g., Blignaut et al. 2016, Dribeka and Voltaire 2017, Enriquez-Acevedo et al. 2018).

What distinguishes this study from previous research is our focus on coastal dune systems. A major reason that tourists visit and residents choose to live in coastal communities is the beauty that coastal environments, such as dune systems, provide. Aside from their visual splendor, coastal sand dunes offer a plethora of economic and ecological ecosystem services to coastal communities (Van der Biest et al. 2017). Yet perhaps the most important ecosystem service that coastal dunes offer is their function as natural barriers against storms and waves, protecting residential and commercial investments (French 2001). Unfortunately, coastal sand dunes are often the first landform to fall victim to coastal development (Nordstrom et al. 2002, Martínez et al. 2004, Nordstrom 2008). Van der Biest et al. (2017) argued that this may be caused by a failure to make the environmental and economic benefits of dune systems – beyond their beauty – tangible and specific to coastal stakeholder groups. In spite of the growing awareness of the importance of coastal dunes by geophysical and social scientists, few authors have documented how coastal stakeholder groups understand the ecosystem services coastal dunes provide or the value of investing in coastal dune management initiatives (Nordstrom and Mitteager 2001, Burger 2015, Lucrezi et al 2016, Burger et al. 2017).

In addition to our focus on coastal dunes, we specifically compared differences between tourists and local residents. In recent decades, social scientists and environmental psychologists have begun to recognize individuals' emotional and affective bonds with places – often referred to as place attachment or sense of place (Prohansky et al. 1983, Twigger-Ross and Uzzel 1996, Scannell and Gifford 2010). Yi Fu Tuan (1974) in his book *Topophilia: A Study of Environmental Perception, Attitudes and Values*, describes landscapes as social constructs in which people establish a relationship to the place, depending on their cultural values, interests, and individual experiences. Based on this

notion, local residents and tourists should showcase differing attitudes toward coastal dune management strategies due to differences in their interests, in how they utilize the coastal system, and in their personal experiences with the coastal environment. Studies indicate that people who positively appraise a place and/or feel attached to it demonstrate a greater degree of environmental responsibility (Stedman 2002, Halpenny 2010, Stylidis 2018). As the impacts of tourism development on coastal landscapes affect both residents and tourists differently, evaluating the distinct perception and behaviors by these contrasting stakeholder groups is essential to understanding the effectiveness of management schemes. Previous research focusing on tourism place attachment tends to focus on tourists or local residents independently; only a few authors have compared views of both residents and tourists at the same destination (e.g., Roca et al 2009, Dixon et al. 2012, Vaughan and Ardoin 2014, Dribeka and Voltaire 2017). Accordingly, this study will expand on the limited research evaluating how different beach user groups – tourists or local residents – value coastal sand dunes. We focused our study on two key ecosystem service components: environmental (i.e., importance of dunes as ecological habitats) and economic (i.e., value as protective service for infrastructure). We also evaluated beach users' assessment of dune management strategies (i.e., sound investment and willingness to pay).

STUDY SITE

Our study was conducted in the Pensacola Beach community located on Santa Rosa Island in Escambia County, Florida, which has a population of approximately 9,000 (Pensacola Beach Demographics n.d.) (Figure 1). Santa Rosa Island stretches 77 km east to west from Destin Pass to the terminus at Fort Pickens and is part of a larger, micro-tidal wave-dominated, barrier island/spit system in the central Gulf of Mexico (Stone et al. 2004). The island has an average width of 500 m, with a discontinuous foredune system ranging in height up to 7 m with an average elevation of 2-3 m and intermittent sets of dune hummocks, sand flats, shrub forests, and wetland grasses throughout the interior and back-barrier of the island (Stone et al. 2004). In the past few decades, the Pensacola Beach community and Santa Rosa Island have had to adjust to many environmental changes and recover from both natural and man-made hazards, such as rebuilding from the destruction caused by hurricanes Ivan and Dennis that made direct landfall in 2004 and 2005, which caused extensive erosion to the beach and dune systems along Santa Rosa Island (Houser et al., 2007, Houser and Hamilton 2009), as well as the cleaning up from the impacts of BP's Deepwater Horizon oil spill in 2010. These events prompted the Santa Rosa Island Authority (SRIA)[2], local governing council for the Pensacola Beach community, to facilitate multiple beach nourishment and dune restoration projects to repair these environments over the past decade (Lewis et al. 2016).

Escambia County and the Pensacola Beach community benefit tremendously from the beautiful beach and dune environments of Santa Rosa Island, as the area continuously ranks as one of the top beaches in the nation according to USA Today's 10 Best Awards, (USA Today 2018). This distinction as a top beach destination has produced

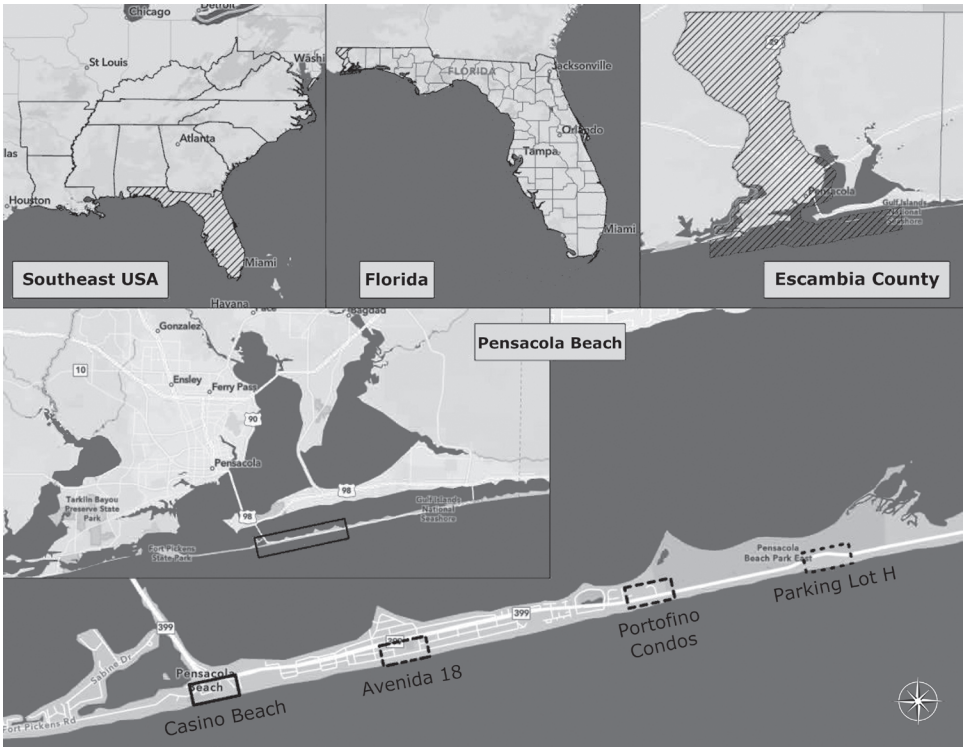

Figure 1. Map of the four survey locations within Pensacola Beach.

extensive economic prosperity for the community, with over two million annual visitors generating around $10 million in tourism revenue annually (Escambia County 2018). In the summer of 2017, the SRIA voted to construct 11 dune boardwalks throughout Pensacola Beach at a cost of $1.2 million (Leavenworth 2017, SRIA 2017). According to the SRIA (2017), the boardwalks were constructed to "provide beach users access to the beach and keep people off the dunes." Motivated by the SRIA dune boardwalk management initiative, this research developed out of a curiosity to evaluate the success of dune protection strategies and the public's opinion of their need.

We chose four sites – Casino Beach, Avenida 18, Portofino, and Parking Lot H – in and around the Pensacola Beach community to conduct our study (Figure 1). These sites were chosen due to their similarities in the beach and dune geophysical environments and the fact that each contains at least one new dune boardwalk, yet each location exhibits differences in tourist and local resident visitation habits. Casino Beach is the prime tourist center for the Pensacola Beach community with numerous amenities such as a large, easily accessible parking lot (1,000+ spaces), a pavilion, public restrooms, lifeguard stations, beach chair rentals, volleyball courts, and plentiful restaurants and bars. There is also a public pier used for fishing and sightseeing. Due to the amount of

development along this part of the island, sand dunes are sparse. There is a large section of this part of the beach with no dunes due to the pavilion and parking lot. The second study site was at Avenida 18, which is a side street off Florida State Road 399. Avenida 18 is known to locals for its quieter beach experience. It is located within a residential neighborhood, thus there is limited public parking and no classic tourist amenities, yet there are a number of houses that tourists can rent. This is also a popular spot for local surfers. There are several dune walk-through footpaths and two of the newly constructed boardwalks providing access to the beach. The third study site was located at the far eastern end of the Pensacola Beach community, across from the Portofino Island Resort condominiums. The surrounding area does not offer many commercial amenities, other than a small parking lot with two boardwalks for beach access; however, the beach is directly across the street from the 300-room luxury high-rise Portofino condominium complex. The Portofino complex provides many tourist amenities (e.g., beach chairs, kayak and paddle board rentals, outdoor rinse showers), making this area of the beach popular for those staying at the condominiums and others seeking these services. The fourth study site, Parking Lot H, is located within an Escambia County park and is a few miles east of the Portofino Condos and not far from the entrance into Gulf Islands National Seashore. Although this part of the beach is backed by a large parking lot (200+ spaces), the county park locale offers a more natural setting as there is no infrastructure (i.e., houses/condos) for a few miles surrounding the site. The beach at Parking Lot H can be accessed via several dune walk-through footpaths and three of the newly constructed boardwalks.

METHODS

This research utilized both qualitative and quantitative methods to gain perspective on beach users' perception of the ecosystem services at Pensacola Beach, Florida. Paper surveys were administered to willing participants 18 years or older alongside a description of the project and guarantee of confidentiality. Participants were asked to respond to a total of 21 questions, and on average, the survey required between 10 to 15 minutes to complete. Upon agreeing to participate in the survey, beach users were provided with general information on the survey and given a consent form to read upon which verbal consent was given for willingness to participate in the study. No additional information or help was provided unless the participant requested help clarifying a question. If multiple people in a group opted to participate in the survey, the group was asked to avoid conversation to eliminate influencing others' responses. Upon completion of the survey, participants were handed an educational pamphlet on sand dunes and contact information.

The twenty-one survey questions consisted of eight demographic questions and thirteen research-focused questions. The thirteen research-focused questions revolved around three basic themes – environmental, economic, and willingness to pay – to assess how beach users value dune environments. Ten of the research-focused questions were formatted using a five-point Likert scale: Strongly Agree, Agree, Neither Agree or

Disagree, Disagree, and Strongly Disagree. Three of these questions included follow-up written free-response questions to gain additional information on the chosen response to those specific questions.

We analyzed the survey response data using IBM SPSS Statistics software, producing frequency distributions for all data and using cross tabs to compare resident and tourist responses. Results obtained from the survey were tested for statistically significant differences using Pearson's Chi-Square test. The significance level for all analyses was set at $p < 0.05$. The written free-response questions were analyzed using standard content analysis techniques.

RESULTS

Demographics

A total of 60 surveys were conducted over the course of two weekends in July 2017; sixteen administered at Casino Beach, fifteen at Avenida 18, fifteen at the Portofino Condos, and fourteen from Parking Lot H. Table 1 outlines the demographics of the survey participants. A general participant of our survey would be characterized as a Caucasian, married female with a bachelor's degree living with a household income of less than $70,000 (Table 1). There was a higher proportion of female participants that took the survey compared to male (3:2 ratio, 62 percent female). When approaching couples or a group, men tended to defer to their spouse to take the survey. This, however, is a prevailing trend in survey questionnaire research which reflect higher participation rates by

Table 1. Demographics of survey participants.

Theme	Question Options	Responses
Gender	Male	38%
	Female	62%
Education	High School or Equivalent	13%
	Some College, did not finish	18%
	Associates Degree	12%
	Bachelor's Degree	39%
	Master's Degree	13%
	Professional Degree (MD, JD, etc.)	3%
	Doctoral Degree (PhD)	2%
Household Income	Less than $70,000	50%
	$70,000 – $140,000	29%
	Greater than $140,000	21%
Marital Status	Single	27%
	Married	53%
	Divorced	8%
	Widow	2%
	Unmarried Partner	10%

women in research surveys compared to men (Smith 2008). We acknowledge that the higher number of women to men survey participants could skew our data as research illustrates that women tend to report stronger environmental concerns and behaviors than men (Gifford and Nilsson 2014). For example, 71 percent of female participants were willing to contribute to funding dune management initiatives compared to only 45 percent of male participants. Additionally, 68 percent of females surveyed stated they do not agree that it is OK to alter/destroy dunes for economic growth compared to only 48 percent of males.

Analysis of the demographic data at each of the beach survey locations depicted variations in beach user tendencies around the Pensacola Beach community. At Casino Beach and the Portofino Condo areas, we surveyed predominantly tourists – 81 percent, whom were primarily from the American southeast; Louisiana, Georgia, Texas, Tennessee, and Kentucky. Although each of these two locations were principally the same beach user group – tourists, reported education and income levels differed substantially between the two sites with 100 percent of beach users at the Portofino condo complex reporting income levels higher than $70,000 compared to only 28 percent at Casino Beach.

This finding was not entirely surprising as the Casino Beach area has a large, 1000+ space free parking lot and an assortment of less expensive hotels. It is also the first beach access area visitors encounter upon driving onto Santa Rosa Island and into the Pensacola Beach community. Conversely, Portofino is a high-end condominium complex that can rent for $500 a night during the peak spring and summer visitor seasons and is semi-isolated at the far eastern end of the Pensacola Beach community requiring a casual visitor to drive an additional few miles past the main beach area and hotels. Survey participants at Avenida 18 and Parking Lot H were predominantly locals – 71 percent – and stated they frequented these beach locations a couple of times per month. The main differences between these two locations were in the reasons beach users stated for visiting the sites. At Avenida 18, participants reported an overwhelming desire for leisure activities (i.e., walking, sunbathing) whereas for Parking Lot H, participants – who were mostly male, 82 percent – noted the more secluded natural aspect of the site and its recreational ability (i.e., fishing). In either case, the overall theme for beach users choosing to visit these two locations were for their quieter, more secluded, natural beauty. These findings align with those by Roca and Villares (2008) and Roca et al. (2009) who observed that local users were more concerned with natural settings, while tourists, who were generally only coming for a short stay, were more concerned with the provision of facilities and did not feel as disturbed by overcrowding and non-natural environments.

All Survey Responses

Our survey involved three basic themes to assess how beach users value dune environments – environmental, economic, and willingness to pay. Table 2 shows the percentage of responses separated by theme for all beach survey participants, independent of being a local resident or tourist. Overall, we found that beach users encompass a positive understanding of the environmental ecosystem services that coastal dunes provide and consider dunes important for economic purposes; however, participants were unwilling to actively fund dune management projects.

Table 2. Percentage of survey participant responses related to questions associated to each of the three survey questions themes – environmental, economic, and willingness to pay.

Theme	Question/Statement	Responses		
Environmental	Dunes are important to the coastal ecosystem and surrounding natural environment.	97% Agree	2% Disagree	1% Unsure
	It is important to maintain and protect vegetation on the dunes.	95% Agree	0% Disagree	5% Unsure
Economic	It is okay to alter the dune environment in the name of economic growth?	23% Agree	65% Disagree	12% Unsure
	Dunes are important to protect the local economy.	79% Agree	2% Disagree	19% Unsure
	Dunes protect infrastructures from rising sea level and/or tropical cyclones.	93% Agree	0% Disagree	7% Unsure
Willingness to Pay	Funding is necessary to protect and preserve coastal dune systems?	90% Agree	3% Disagree	7% Unsure
	Escambia County allocated $1.1 million on the building of 11 boardwalks. What do you think of the use of these funds for this project?	38% Agree	12% Disagree	50% Unsure
	Are you willing to contribute to help fund dune maintenance and restoration?	23% Yes		77% No

Throughout the survey, beach users were given opportunities to provide written responses to a variety of questions. By far the most dominant response from survey participants was that dunes are important natural habitats for wildlife, showcasing a positive awareness of the ecological services dunes provide. Beach users also expressed that playing or walking on the sand dunes is prohibited because it can destroy them, thus conveying an understanding of negative environmental behaviors. These statements corroborate data from our survey questions, where greater than 95 percent of participants agreed that dunes are important environmental features and maintaining dune vegetation is important (Table 2, Environmental Theme). Another prominent response given in the follow-up answers was the significance of dunes as a protective barriers from storm waves, preventing erosion and flooding – 32 percent of all written responses. This finding supports data from our survey question that sought to understand how beach users comprehend the economic ecosystem services that coastal dunes provide as a protection for infrastructure. In total, 93 percent of all participants showed a positive awareness that dunes provide protection from climatic stressors such as rising sea levels and/or tropical cyclones. Additionally, 79 percent of survey participants agreed that dunes protect the local economy (Table 2, Economic Theme). Overall, these findings are encouraging. Unfortunately, results from our question asking beach users if they believe "it is okay to alter the dune environment in the name of economic growth" produced by far the lowest positive environmental response as only 65 percent of beach users expressed that altering dune environments is not okay, with an additional 12 percent indicating

that they were unsure of their thoughts on the statement (Table 2, Economic Theme). The high rate of responses to this question is concerning since altering the coastal environment decreases the ecosystem services of coastal dune habitats.

Our most interesting findings occurred from our research questions regarding a beach users' willingness to pay for dune management initiatives. Data show that 90 percent of all survey participants agreed that funding is necessary to protect coastal dune environments; however, only a small percentage – 23 percent – were willing to actively contribute to dune management initiatives. Our survey did not directly ask why when either a tourist or local resident responded "no" to this question; however, some inferences can be made from our question asking beach users how they felt about the use of $1.1 million by Escambia County to construct the dune boardwalks. Survey participants who responded with a negative willingness to pay for dune restorations tended to disagree with or were unsure how they felt about the use of the $1.1 million funds to construct the boardwalks – 75 percent overall. These survey participants tended to indicate, within the follow-up written response section to this question, that the boardwalk structures were a waste of taxpayer dollars, and they pay enough taxes and should not have to pay extra to fund these types of projects. These responses correspond with other willingness to pay research. In a study by Dribeka and Voltaire (2017), the authors found that most beach visitors felt that public authorities already spend enough on conservation and maintenance efforts and it is not their job – the public's – to help finance such projects. Marzetti et al (2016) found the same basic sentiments, as beach goers thought that coastal management should be paid for by the state, not them.

We also compared demographics against beach users' willingness to pay for coastal dune management strategies (Table 3). Our data show that women were more willing to pay than men ($p = 0.048$) and that younger generation participants (<40 years of age), though not statistically significant ($p = 0.52$), were more willing to pay than older survey respondents. These findings are supported within the literature, which have found that women and younger generations tend to exhibit greater awareness of environmental threats and are thus more inclined to support environmental causes (Stern et al. 1993, Gifford and Nilsson 2014). Additionally, we found an increasing trend in willingness to pay based on advancement of educational achievement. Participants with advanced degrees (i.e., Master's, Professional, or Doctoral) exhibited the highest percentage of willingness to pay at 73 percent while survey participants with only a high school education showed the lowest willingness to pay, 58 percent. Analyzing across education levels, however, showed no statistical difference; indicating that education as a whole does not influence a beach users' willingness to pay. Our data also revealed an inverse relationship between income and a willingness to pay. This was particularly evident at the Portofino Resort survey location where reported income levels were the highest, yet only two out of fifteen survey respondents stated they would contribute to dune maintenance and restoration. Although the relationship was not significant ($p = 0.29$), the trend is contrary to reports documented within the literature that depict a

Table 3. Percentage of beach users' willingness to pay for dune maintenance and restoration based on demographics.

		Are you willing to contribute to help fund dune maintenance and restoration?	
		Yes	**No**
Gender* [$p = 0.048$]	Male	45%	55%
	Female	71%	29%
Age [$p = 0.52$]	< 40 years of age	64%	36%
	> 40 years of age	57%	43%
Education [$p = 0.69$]	High School or Some College	58%	42%
	Associates or Bachelor's Degree	60%	40%
	Advanced Degree (Master's, Professional, Doctoral)	73%	27%
Household Income [$p = 0.29$]	Less than $70,000	67%	33%
	$70,000 – $140,000	47%	53%
	Greater than $140,000	46%	54%

*indicates statistical significance, $p < 0.05$ [Pearson Chi-Square Test]

positive correlation between willingness to pay and income levels (Blignaut et al. 2016, Marzetti et al. 2016, Dribeka and Voltaire 2017).

Local Resident vs. Tourist Survey Responses

It is encouraging to discover that beach users, in general, value coastal dune environments; however, a primary goal of this study was to assess variances between local residents and short-term, out-of-town visitors (i.e., tourists). When breaking down the data for each of these user groups, we found differences in both their knowledge of the environmental and economic importance of dune environments as well as their willingness to support dune management strategies.

We identified twenty-seven of the sixty survey participants as tourists and twenty-three participants as local residents of the greater Pensacola region. We classified survey participants as a tourist or local resident based on their answer to the survey question "How long have you been visiting or coming to Pensacola beach?". If a participant marked 'I live here', we categorized them as a local resident. We subsequently compared the zip codes provided with the listed responses to the above question to correlate a spatial representation of responses. Results illustrated that listed zip codes for all participants indicating 'I live here' were located within the greater Pensacola region. The participant with the most proximal zip code to Pensacola Beach that did not mark 'I live here' was

located in southern Mississippi. Ten survey participants did not answer the above question or report their zip code; thus, we were not confident in identifying them as either a tourist or a local. Consequently, we did not include them in our analysis of local versus tourist perceptions of dune environments.

Table 4 outlines local resident and tourist responses for the two questions pertaining to the environmental ecosystem services theme. Our data show that both local residents (100 percent) and tourists (70–80 percent) agreed that dunes are important to the beach ecosystem and that it is important to protect their natural vegetation. The high percentage of these values, particularly for tourists, is encouraging. However, further analysis determined a statistically significant difference between the local and tourist responses to both questions. This indicates that overall, local residents have a higher understanding of the environmental value of coastal dunes than tourists.

Table 5 displays local and tourist responses for each of the three economic ecosystem services questions from our survey. As discussed above and illustrated in Table 2, a notable percentage of all beach users were either unsure or they felt that it is justifiable to alter dune environments for economic growth. However, when looking at local versus tourist responses to this question, we found a significant difference in responses, $p = 0.01$. Only one local resident agreed with the statement while 44 percent of tourists agreed or were unsure of their thoughts on the question. Interestingly, all but one of the tourists surveyed at the Portofino condo complex agreed, and that beach user responded with an unsure answer. These findings correlate with trends in the literature, which suggest that because tourists are temporary visitors, they have a diminished attachment and investment in the environment and are thus more accepting of development and habitat degradation, assuming the community continues to keep up with their vacation wants and needs (Jędrzejczak 2004, Vaughan and Ardoin 2014, Dribeka and Voltaire 2017). We did find it interesting that 22 percent of local residents were unsure how they

Table 4. Percentage of survey participant responses between local residents and tourists related to questions associated to the environmental value theme.

	Dunes are important to the coastal ecosystem and surrounding natural environment.* [$p = 0.013$]		
	Agree	Disagree	Unsure
Local	100%	0%	0%
Tourist	71%	15%	11%
	It is important to maintain and protect vegetation on the dunes.* [$p = 0.03$]		
	Agree	Disagree	Unsure
Local	100%	0%	0%
Tourist	81%	4%	15%

*indicates statistical significance between Local and Tourist response, $p < 0.05$ [Pearson Chi-Square Test]

Table 5. Percentage of survey participant responses between local residents and tourists related to questions associated to the economic value theme.

	Dunes are important to protect the local economy. [$p = .549$]		
	Agree	Disagree	Unsure
Local	74%	4%	22%
Tourist	78%	0%	22%
	It is okay to alter the beach and dune environment in the name of economic growth?* [$p = 0.014$]		
	Agree	Disagree	Unsure
Local	4%	74%	22%
Tourist	37%	56%	7%
	Dunes protect infrastructures from rising sea level and/or tropical cyclones. [$p = 0.124$]		
	Agree	Disagree	Unsure
Local	96%	0%	4%
Tourist	81%	0%	19%

*indicates statistical significance between Local and Tourist response, $p < 0.05$ [Pearson Chi-Square Test]

felt about the statement. Unfortunately, our survey did not have a follow up written response to this question, thus we cannot specifically assess what might be a cause for the high percentage of uncertainty to this question. However, the literature suggests that this may be caused by a failure to make the benefits of dune systems tangible and specific to coastal stakeholder groups (Van der Biest et al. 2017). Ultimately, these findings suggest a need for more education on the economic benefits of coastal dunes and the potential negative relationship between environmental destruction and economic impact, particularly for tourists, although local residents could benefit as well.

In the responses to, "Dunes protect infrastructures from rising sea level and/or tropical cyclones," we found an overall strong agreement for all beach users (see Table 2). This trend does not change between local residents and tourists: 96 percent and 81 percent, respectively. The above findings are encouraging, however, these data are puzzling based on the very high proportion of beach users that stated they do not agree with increasing climate stressors, such as the frequency and intensity of oceanic storm systems and sea level rise. In order to contextualize the responses to the above statement, the survey included a follow-up set questions assessing beach users' general belief in climate change. We found that 64 percent of locals and 69 percent of tourists disagreed or were unsure if they believed that sea levels are rising and severe weather events are increasing

and/or becoming more intense. The high portion of locals that disagreed with increasing climate stressors was surprising. We hypothesized that local residents would have a higher awareness of climate change and their impact on the local community. Considering the affirmative agreement reported in our survey regarding the importance of coastal dunes as a protective barrier to climate hazards, it is difficult to evaluate a cause for the low percentage of belief in increasing climate change found by users at Pensacola Beach, particularly local residents. Nevertheless, the findings do correlate with national trends regarding belief in climate change especially for regions that tend to lean politically conservative, such as the Florida panhandle (McLaughlin 2018, Gustafson et al., 2019, Kennedy and Hefferon 2019).

Table 6 depicts local residents' and tourists' views on the need for investment in dune management strategies as well as a beach users' personal willingness to pay for dune restoration initiatives. Overall, survey participants – both local residents and tourists – agreed that funding is necessary to protect coastal dune environments, 96 percent and 85 percent, respectively. However, we found a statistically significant difference between the two beach user groups' willingness to actively contribute to dune management initiatives. Our data shows that 83 percent of locals reported a willingness to monetarily support coastal dune management strategies compared to only 41 percent of tourists.

Table 6. Percentage of survey participant responses between local residents and tourists related to questions associated with a beach users' willingness to pay theme.

	Funding is necessary to protect and preserve coastal dune systems. [$p = 0.26$]		
	Agree	Disagree	Unsure
Local	96%	0%	4%
Tourist	87%	7%	11%
	Are you willing to contribute to help fund dune maintenance and restoration?* [$p = 0.003$]		
	Yes	No	
Local	83%	17%	
Tourist	41%	59%	
	Escambia County allocated $1.1 million on the building of 11 boardwalks. What do you think of the use of these funds for this project? [$p = 0.29$]		
	Agree	Disagree	Unsure
Local	43%	4%	52%
Tourist	33%	19%	48%

*indicates statistical significance, $p < 0.05$ [Pearson Chi-Square Test]

The willingness of locals to support funding at a higher rate than tourists is also evident in other studies. Montgomery (2007) found that beach users, who tended to be primarily tourists, strongly agree that beach nourishment is necessary for the protection of houses, roads, and utilities from coastal flooding, yet were hesitant to personally help pay for the nourishment costs. Dribeka and Voltaire (2017) found that 43 percent of tourists were unwilling to pay for beach maintenance, compared to only 15 percent for local residents.

Regarding our question about the $1.1 million that Escambia County allocated for the construction of 11 boardwalks, both local residents and tourists primarily expressed unsure responses in the need and benefit of the boardwalks (Table 6). This was particularly true for local residents, where 52 percent of local survey participants stated that they were unsure if the construction of the boardwalks was economically beneficial. Participants stated in the follow-up response to this question that they could not make an informed answer because they did not know the cost benefit of the boardwalks and would like additional information about why they were constructed and with what funds.

DISCUSSION

The results outlined within this paper provide valuable support to decision makers in the form of quantitative information on the social preferences and knowledge of the ecosystem services of coastal sand dunes by beach users. Based on our findings, a key area of focus we believe needs to be addressed by local environmental managers and the Pensacola Beach municipality is greater need for environmental education and engagement to raise awareness of the ecosystem services that coastal dune environments provide and the benefits of conservation and preservation campaigns amongst beach visitors, specifically tourists but also local residents. To protect beaches from being altered for the sake of economic growth, the public must be educated at the local community level, since that population controls the votes of policy makers that manage and dictate land-use changes and development (Burger 2003). Our data reveal a need for policy makers and community leaders to better engage with the public to explain why the SRIA and Escambia County felt such projects were necessary, and what revenues were used for the funding of such management projects. Research has shown that if the public knows how and why projects are being conducted to preserve natural environments, they are more accepting of the financial expenditures and willing to support future projects (Montgomery 2007, Vaz et al. 2009, Duvat 2012). Additionally, Petrosillo et al. (2007) concluded that through education, positive behavioral adjustments occur as people understand more clearly that human societies are dependent on the services and functions provided by the earth's natural systems.

Rangel et al. (2015) and Lucrezi et al. (2016) highlighted several benefits of environmental education campaigns: knowledge of authorities responsible – public and governance – for beach management strategies, information on critical coastal issues, direct involvement of the public in coastal management, and promotion of pro-environmental behaviors, thus minimizing impacts. The distinct location demographic

trends in visitation of beach users, particularly local or tourist beach segments, shown within our study would allow the SRIA and Escambia County to focus their education and engagement efforts. The larger presence of locals at the Avenida 18 and Parking Lot H areas of Pensacola Beach provides an opportunity for the SRIA and Escambia County to engage in more active and personal education campaigns with the community by involving the local public directly in citizen science projects. Citizen science, also known as community-based monitoring, has become popular in recent years and citizens now participate in a wide variety of scientific environmental projects (Irwin 2018). Research has shown that community-based monitoring has many benefits to local residents, such as increasing scientific literacy, knowledge about local ecosystems, and information on the various environmental issues present in their community (Conrad and Hilchey 2011, McKinley et al. 2017, Irwin 2018). Furthermore, McKinley et al. (2017) found that increased engagement in citizen science projects helped pass environmental conservation legislation to protect against future infrastructure development as well as secure more funding for ecosystem restoration projects.

In addition to citizen science campaigns, Chen and Teng (2016) found that passive informational provisions in the forms of signage, pamphlets, brochures, and digital media are highly effective tactics to induce pro-environmental behaviors for short-term visitors. Furthermore, the United Nations highlighted the use of passive information provision as a good vehicle for environmental education (UN 2002). Since Casino Beach and the Portofino Condo areas are popular tourist locations, the use of passive informational provisions provided by the various hotels and restaurants that tourists frequent could be easy outreach and educational engagement campaigns. Although passive informational management strategies may be geared towards tourists, they also engage local residents that utilize the same economic services (i.e., restaurants and bars) in the community.

Furthermore, Marzetti and Disegna (2015) found a significant and positive correlation between knowledge of coastal management initiatives and willingness to pay; showing that the more visitors know about management strategies, the higher their probability of paying. Unfortunately, our data do not support this statement. Only 37 percent of all survey participants – 40 percent local residents and 33 percent tourists – who agreed with the use of funds to construct the dune boardwalks also were willing to personally support additional dune restoration initiatives. These findings ultimately illustrate that enhancing educational output would greatly benefit the Pensacola Beach community – visitors and environments – through the securing of environmental funding.

Additionally, our study revealed that socio-economic indicators play an important role in a beach users' willingness to pay for dune maintenance and restoration (see Table 3). A number of recent studies, however, have observed that socio-economics is not the only determinant of a person's willingness to pay, highlighting a decreased willingness to pay linked to perceptions of ecosystem degradation (Kontogianni et al. 2014, Marzetti et al. 2016, Enriquez-Acevedo et al. 2018). For example, Marzetti et al. (2016) found coastal erosion as the number one concern of beach users and that the majority of respondents (52 percent) were unwilling to pay for beach conservation. Therefore, ecosystem health could yield a serious threat to the economic viability of coastal communities (Alexandrakis et al. 2015).

Unfortunately, the US lags behind much of the world in the investment into the protection and restoration of its coastal habitats (Powell et al. 2019). Given the importance of coastal dunes for ecosystem and economic resilience against storms, restoration projects that aim to build up dune areas and prevent vegetation loss should continue to be considered as an important management strategy. Fortunately for the local area, Escambia County, Florida has invested heavily in research, conservation, and restoration in coastal dune environments over the past few decades (Lewis et al. 2016). On Pensacola Beach, there have been three major dune restoration projects completed in the past 20 years – 2002–2003, 2005–2006 after Hurricane Ivan, and 2016 – along with a number of smaller projects (Olsen Associates, Inc. 2018). Although restoration can be expensive and it is not always successful, it is imperative that we continue to protect existing habitats – either through restoration efforts or probably more importantly, sound policy strategies – in order to prevent further degradation of their environmental and economic services. Jackson et al. (2020) showed that management strategies focused just on maintaining the current habitat standards could increase the exposure of coastal communities to climate stressors, such as sea-level rise and tropical cyclones. Conversely, focusing on management initiatives designed to increase habitat abundance dramatically increases the ecosystem services that coastal habitats, such as dunes, provide and thus diminishes the exposure risks to coastal property owners from climate stressors.

CONCLUSION

With increasing impacts from climate stressors, it is becoming more important for policy makers to establish sound policy objectives for the protection of coastal communities. Research shows that top-down focused strategies are not always successful as they do not always align with the wants and needs of a community. Therefore, policy-makers should pay attention to the public's awareness and knowledge of the local environment when developing management policies. These grassroots sources of information can provide a great deal of insight for local policy-managers in order to establish successful policy objectives.

This study sought to assess how beach users – local residents and tourists – perceive the environmental and economic ecosystem services that coastal dunes provide as well as their views on management strategies for protecting these environments at Pensacola Beach. This was accomplished via a survey questionnaire conducted along different sections of the Pensacola Beach, Florida community. Overall, we found that beach users have a generally positive perception of coastal dunes and believe their protection is important both environmentally and for economic purposes. However, when analyzing the data between the two distinct user groups, local residents versus tourists, we found differences between the two in both their knowledge of environmental ecosystem services, acceptance in altering dune environments for economic growth, and their willingness to monetarily support dune management strategies. Overall, our findings showed that local residents exhibited a higher knowledge of the economic and ecological benefits that coastal dunes provide and were more likely to support protective dune management strategies than tourists.

NOTES

1. Beach quality is often used as a general term to refer to the quality of beach users' experience through aspects of either the sanitary quality or beach cleanliness (i.e., litter and water pollution), social quality (i.e., safety, overcrowding, parking), and/or environmental quality (i.e., beach width, sand type, wading conditions).

2. The Santa Rosa Island Authority (SRIA) was ratified in 1947 by the Florida State Legislature to institute a more permanent governmental body for the Pensacola Beach community. The mission of the SRIA is to ensure that all construction and development on Pensacola Beach are consistent with local, state and federal regulations pertaining to environmental protection, and disaster recovery and mitigation action plans. The SRIA does not receive state or federal tax revenue It is fully funded from lease fees collected from beach businesses and residences.

ACKNOWLEDGMENTS

The authors wish to thank two anonymous reviewers, whose comments and suggestions helped to substantially improve an earlier version of this manuscript. We would also like to thank Dr. Amy Potter of Georgia Southern University for her guidance in the development of the research survey instrument.

REFERENCES CITED

Alexandrakis, G., Manasakis, C., and Kampanis, N.A. 2015. Valuating the Effects of Beach Erosion to Tourism Revenue: A Management Perspective. *Ocean and Coastal Management* 111: 1–11. https://doi.org/10.1016/j.ocecoaman.2015.04.001.

Ariza, E., Jiménez, J.A., and Sardá, R. 2008. A Critical Assessment of Beach Management on the Catalan Coast. *Ocean and Coastal Management* 51: 141e160. https://doi.org/10.1016/j.ocecoaman.2007.02.009.

Ariza, E., Lindeman, K.C., Mozumder, P., and Suman, D.O. 2014. Beach Management in Florida: Assessing Stakeholder Perceptions on Governance. *Ocean and Coastal Management* 96: 82–93. https://doi.org/10.1016/j.ocecoaman.2014.04.033.

Blignaut, J., Mander, M., Inglesi-Lotz, R., Glavan, J., and Parr, S. 2016. The Amenity Value of Abu Dhabi's Coastal and Marine Resources to its Beach Visitors. *Ecosystem Services* 19: 32–41. https://doi.org/10.1016/j.ecoser.2016.04.005.

Boon, J.D. 2012. Evidence of Sea Level Acceleration at U.S. and Canadian Tide Stations,Atlantic Coast, North America. *Journal of Coastal Research* 28 (6): 1437–1445. https://doi.org/10.2112/JCOASTRES-D-12-00102.1.

Burger, J. 2003. Assessing Perceptions about Ecosystem Health and Restoration Options in Three East Coast Estuaries. *Environmental Monitoring and Assessment* 83 (2): 145–162. https://doi.org/10.1023/A:1022505300319.

Burger, J. 2015. Ecological Concerns Following Superstorm Sandy: Stressor Level and Recreational Activity Levels Affect Perceptions of Ecosystem. *Urban Ecosystems* 18 (2): 553–575. https://doi.org/10.1007/s11252-014-0412-x.

Burger, J., et al. 2017. Perceptions of Caucasian Users about Avian Resources and Beach Restoration Following Hurricane Sandy. *Urban Ecosystems* 20 (2): 363–373. https://doi.org/10.1007/s11252-016-0598-1.

Chen, C., and Teng, N. 2016. Management Priorities and Carrying Capacity at a High-Use Beach from Tourists' Perspectives: A Way Towards Sustainable Beach Tourism. *Marine Policy* 74: 213–219. https://doi.org/10.1016/j.marpol.2016.09.030.

Conrad, C.C., and Hilchey, K.G. 2011. A Review of Citizen Science and Community-Based Environmental Monitoring: Issues and Opportunities. *Environmental Monitoring Assessment* 176: 273–291. https://doi.org/10.1007/s10661-010-1582-5.

Dixon, A.W., Oh, C., and Draper J. 2012. Access to the Beach: Comparing the Economic Values of Coastal Residents and Tourists. *Journal of Travel Research* 51(6) 742–753. https://doi.org/10.1177/0047287512451136.

Dribeka, A., and Voltaire, L. 2017. Contingent Valuation Analysis of Willingness to Pay for Beach Erosion Control Through the Stabiplage Technique: A Study in Djerba (Tunisia). *Marine Policy* 86: 17–23. https://doi.org/10.1016/j.marpol.2017.09.003.

Duvat, V. 2012. Public Perception of Beach Quality: Lessons Learnt from a French Case Study. *HAL CCSD*. https://hal.archives-ouvertes.fr/hal-00821861.

Enriquez-Acevedo, T., Botero, C.M., Cantero-Rodelo, R., Pertuz, A., and Suarez, A. 2018. Willingness to Pay for Beach Ecosystem Services: The Case Study of Three Colombian Beaches. *Ocean and Coastal Management*. 161: 96–104. https://doi.org/10.1016/j.ocecoaman.2018.04.025.

Escambia County Clerk of the Circuit Court and Comptroller. 2018. Florida Comprehensive Annual Financial Report, 2018. Retrieved from https://www.escambiaclerk.com/ArchiveCenter/ViewFile/Item/47.

Defeo, O., et al. 2009. Threats to Sandy Beach Ecosystems: A Review. *Estuarine, Coastal and Shelf Science* 81:1–12. https://doi.org/10.1016/j.ecss.2008.09.022.

French, P.W. 2001. *Coastal Defences: Processes, Problems and Solutions*. Routledge: London Press.

García-Morales, G. et al. 2018. Evaluation of Beach Quality as Perceived by Users. *Journal of Environmental Planning and Management*. 61 (1): 161–175. https://doi.org/10.1080/09640568.2017.1295924.

Gifford, R., and Nilsson, A. 2014. Personal and Social Factors that Influence Pro-Environmental Concern and Behaviour: A Review. *International Journal of Psychology* 49(3):141–57. https://doi.org/10.1002/ijop.12034.

Greenberg, M.R., et al. 2014. Public Support for Policies to Reduce Risk After Hurricane Sandy. *Risk* Analysis 34 (6): 997–1012. https://doi.org/10.1111/risa.12203.

Gustafson, A., Bergquist, P., Leiserowitz, A., and Maibach, E. 2019. A Growing Majority of Americans Think Global Warming is Happening and are Worried. Yale University and George Mason University. New Haven, CT: Yale Program on Climate Change Communication.

Halpenny, E.A. 2010. Pro-Environmental Behaviours and Park Visitors: The Effect of Place Attachment. *Journal of Environmental* Psychology. 30 (4): 409–421. https://doi.org/10.1016/j.jenvp.2010.04.006.

Houser, C., Hamilton, S., Meyer-Arendt, K. and Oravetz J. 2007. EOF Analysis of Morphological Change during Hurricane Ivan. *Coastal Sediments 2007*: 986–995. https://doi.org/10.1061/40926(239)76.

Houser, C., and Hamilton, S. 2009. Sensitivity of Post-Hurricane Beach and Dune Recovery to Event Frequency. *Earth Surface Processes and Landforms* 34: 613–628. https://doi-org.ezproxy.lib.uwf.edu/10.1002/esp.1730.

Houston, J.R. 2013. The Economic Value of Beaches - A 2013 Update. *Shore & Beach* 81 (1): 3–11.

Irwin, A. 2018. No PhDs Needed: How Citizen Science is Transforming Research. *Nature* 562 (7728): 480–482. https://doi.org/10.1038/d41586-018-07106-5.

Jackson, C.A., Schmutz, P., Harwell, M.C., and Littles, C.J. 2020. The Ecosystem Service of Property Protection and Exposure to Environmental Stressors in the Gulf of Mexico. *Ocean and Coastal Management* 184: 105017. https://doi.org/10.1016/j.ocecoaman.2019.105017.

Jędrzejczak, M.F. 2004. The Modern Tourist's Perception of the Beach: Is the Sandy Beach a Place of Conflict Between Tourism and Biodiversity?. In *Managing the Baltic Sea*. *Coastline Reports* (2), edited by G. Schernewski & N. Löser, 109–119. EUCC - The Coastal Union.

Kennedy, B., and Hefferon, M. 2019. U.S. Concern about Climate Change Is Rising, but Mainly among Democrats. *Pew Research Center.* Retrieved from https://www.pewresearch.org /fact-tank/2019/08/28/u-s-concern-about-climate-change-is-rising-but-mainly-among -democrats/.

Klein, Y.L., Osleeb, J.P., and Viola, M.R. 2004. Tourism-Generated Earnings in the Coastal Zone: A Regional Analysis. *Journal of Coastal Research*: 20 (4): 1080–1088. https://doi .org/10.2112/003-0018.1.

Kontogianni, A., et al. 2014 Eliciting Beach Users' Willingness to Pay for Protecting European Beaches from Beachrock Processes. *Ocean and Coastal Management* 98: 167–175. http://dx.doi.org/10.1016/j.ocecoaman.2014.06.019.

Koutrakis, E., et al. 2011. ICZM and Coastal Defence by Beach Users: Lessons from the Mediterranean Coastal Area. *Ocean and Coastal Management* 54, 821–830. https://doi.org/10.1016/j.ocecoaman.2011.09.004.

Leavenworth, C. 2017. $1.2 Million Price Tag Expected for Beach Boardwalks. Retrieved from https://weartv.com/news/local/12-million-price-tag-expected-for-beach-boardwalks.

Lewis, M.J., Kirschenfeld, T., and Goodheart, T. 2016. Environmental Quality of the Pensacola Bay System: Retrospective Review for Future Resource Management and Rehabilitation. U.S. Environmental Protection Agency, Gulf Breeze, FL. EPA/600/R- 16/169.

Lucrezi, S., and van der Walt, M. 2016. Beach Goers' Perceptions of Sandy Beach Conditions: Demographic and Attitudinal Influences, and the Implications for Beach Ecosystem Management. *Journal of Coastal Conservation*. 20 (1): 81–96. https://doi.org/10.1007 /s11852-015-0419-3.

Lucrezi, S., Saayman, M., and Van der Merwe, P. 2016. An Assessment Tool for Sandy Beaches: A Case Study for Integrating Beach Description, Human Dimension, and Economic Factors to Identify Priority Management Issues. *Ocean and Coastal Management, 121*, 1–22. https://doi .org/10.1016/j.ocecoaman.2015.12.003.

Lozoya, J.P., Sardá, R., and Jiménez, J.A. 2014. Users Expectations and the Need for Differential Beach Management Frameworks along the Costa Brava: Urban vs. Natural Protected Beaches *Land Use Policy* 38: 397–414 https://doi.org/10.1016/j.landusepol.2013.12.001.

Martínez, M.L., Maun, M.A., and Psuty, N.P. 2004. The Fragility and Conservation of the World's Coastal Dunes: Geomorphological, Ecological, and Socioeconomic Perspectives. In *Coastal Dunes, Ecology and Conservation*, edited by M. L. Martínez and N. P. Psuty, 355–369. Springer-Verlag Berlin Heidelberg. Ecological Studies, Vol. 171.

Marzetti, S., and Disegna, M. 2015. ICZM and WTP of Stakeholders for Beach Conservation: Policymaking Suggestions from an Italian Case Study. *Tourism Economics* 21 (3), 601–628. https://doi.org/10.5367/te.2013.0360.

Marzetti, S., et al. 2016. "Visitors' Awareness of ICZM and WTP for Beach Preservation in Four European Mediterranean Regions." *Marine Policy* 63: 100–108. https://doi.org/10.1016/j.marpol.2015.10.005.

McKinley, D.C., et al. 2017. Citizen Science Can Improve Conservation Science, Natural Resource Management, and Environmental Protection. *Biological Conservation* 208: 15–28. https://doi.org/10.1016/j.biocon.2016.05.015.

McLaughlin, T. 2018. NW Florida Dominates 'Most Conservative Cities' Ranking. Retrieved from www.nwfdailynews.com/news/20180326/nw-florida-dominates-most-conservative-cities-ranking.

Montgomery, M.C. 2007. Beach Nourishment at Pensacola Beach, Florida: Assessment of Public Perception. Master's Thesis, The University of West Florida, Pensacola, FL.

Nordstrom, K.F., and Mitteager, W.A. 2001. Perceptions of the Value of Natural and Restored Beach and Dune Characteristics by High School Students in New Jersey, USA. *Ocean and Coastal Management* 44 (7): 545–559. https://doi.org/10.1016/S0964-5691(01)00065-5.

Nordstrom, K.F., Jackson, N.L., Bruno, M.S., and de Butts, H.A. 2002 Municipal Initiatives for Managing Dunes in Coastal Residential Areas: A Case Study of Avalon, New Jersey, USA. *Geomorphology* 47: 1-2, 137–152. https://doi.org/10.1016/S0169-555X(02)00084-3.

Nordstrom, K.F., 2008. *Beach and Dune Restoration*. Cambridge University Press.

Olsen Associates, Inc. 2018. Pensacola Beach, FL, Beach Restoration Project. Retrieved from http://www.olsen-associates.com/projects/project?nid=104.

Pensacola Beach Demographics. Retrieved from https://www.point2homes.com/US/Neighborhood/FL/Pensacola/Pensacola-Beach-Demographics.html

Petrosillo, I., Zurlini, G., Corlianò, M.E., Zaccarelli, N., and Dadamo. M. 2007. Tourist Perception of Recreational Environment and Management in a Marine Protected Area, Landscape *Urban Planning* 79: 29–37. https://doi.org/10.1016/j.landurbplan.2006.02.017.

Powell, E.J., Tyrrell, M.C., Milliken, A., Tirpak, J.M., and Staudinger, M.D. 2019. A Review of Coastal Management Approaches to Support the Integration of Ecological and Human Community Planning for Climate Change. *Journal of Coastal Conservation* 23 (1): 1–18. https://doi.org/10.1007/s11852-018-0632-y.

Prati, G., Albanesi, C., Pietrantoni, L., and Airoldi, L. 2016. Public Perceptions of Beach Nourishment and Conflict Management Strategies: A Case Study of Portonovo Bay in the Adriatic Italian Coast. *Land Use Policy* 50: 422–428. https://doi.org/10.1016/j.landusepol.2015.06.033.

Prohansky, H., Fabian, A., and Kaminoff, R. 1983. Place identity: Physical World Socialization of the Self. *Journal of Environmental Psychology* 3 (1): 57–83. https://doi.org/10.1016/S0272-4944(83)80021-8.

Rangel, M.O., et al. 2015. Eco-Touristic Snorkeling Routes at Marinha Beach (Algarve): Environmental Education and Human Impacts. *Marine Policy* 60: 62–69. https://doi.org/10.1016/j.marpol.2015.05.017.

Roca, E., and Villares, M. 2008. Public Perceptions for Evaluating Beach Quality in Urban and Semi-Natural Environments. *Ocean and Coastal Management* 51 (4): 314–329. https://doi.org/10.1016/j.ocecoaman.2007.09.001.

Roca, E., Villares, M., and Ortego, M. 2009. Assessing Public Perceptions on Beach Quality According to Beach Users' Profile: A Case Study in the Costa Brava (Spain). *Tourism Management* 30 (4): 598–607. https://doi.org/10.1016/j.tourman.2008.10.015.

Scannell, L., and Gifford, R. 2010. Defining Place Attachment: A Tripartite Organizing Framework. *Journal of Environmental Psychology* 30 (1): 1–10. https://doi.org/10.1016/j.jenvp.2009.09.006.

Santa Rosa Island Authority (SRIA). 2017. Regular Board Meeting Minutes, January 11, 2017. Retrieved from http://sria-fla.com/admin/documents/january_11_2017_regular_board_meeting_agenda__bu.pdf.

Shipman, B., and Stojanovic, T. 2007. Facts, Fictions, and Failures of Integrated Coastal Zone Management in Europe. *Coastal Management* 35 (2e3): 375e398. https://doi.org/10.1080/08920750601169659.

Smith, W.G. 2008. Does Gender Influence Online Survey Participation? A Record-Linkage Analysis of University Faculty Online Survey Response Behavior; San Jose State University: San Jose, CA, USA. https://files.eric.ed.gov/fulltext/ED501717.pdf (accessed on 27 May 2019).

Stedman, R. 2002. Toward a Social Psychology of Place: Predicting Behaviour from Place-Based Cognitions, Attitude, and Identity. *Environment and Behaviour* 34, 561–581. https://doi.org/10.1177/0013916502034005001.

Stern, P.C., Dietz, T., and Kalof, L. 1993. Value Orientations, Gender, and Environmental Concern. *Environment and Behavior* 25 (3) 322–348. https://doi.org/10.1177/0013916593255002.

Stone, G.W., Liu, B., Pepper, D.A., Wang, P. 2004. The Importance of Extratropical and Tropical Cyclones on the Short-Term Evolution of Barrier Islands along the Northern Gulf of Mexico, USA. *Marine Geology* 210: 63–78.

Stylidis, D. 2018. Place Attachment, Perception of Place and Residents' Support for Tourism Development. *Tourism Planning & Development* 15 (2): 188–210. https://doi.org/10.1080/21568316.2017.1318775.

Tuan, Y.F. 1974. *Topophilia: A Study of Environmental Perception, Attitudes and Values*. Englewood Cliffs, NJ: Prentice-Hall.

Twigger-Ross, C.L, and Uzzel, D.L. 1996. Place and Identity Processes. *Journal of Environmental Psychology* 16: 205–220. https://doi.org/10.1006/jevp.1996.0017.

United Nations (UN). 2002. The United Nations General Assembly Resolution 57/254. United Nations Decade of Education for Sustainable Development. Retrieved from https://undocs.org/en/A/RES/57/254.

USA Today. 2018. USA Today 10 Best Readers' Choice Travel. Retrieve from https://www.10best.com/awards/travel/best-florida-beach-2018/.

Van der Biest, K., et al. 2017. Dune Dynamics Safeguard Ecosystem Services. *Ocean and Coastal Management* 149: 148–158. https://doi.org/10.1016/j.ocecoaman.2017.10.005.

Vaughan, M.B., and Ardoin, N.M. 2014. The Implications of Differing Tourist/Resident Perceptions for Community-Based Resource Management: A Hawaiian Coastal Resource Area Study. 22 (1): 50–68. https://doi.org/10.1080/09669582.2013.802326.

Vaz, B., Williams, A.T., Pereira da Silva, C., and Phillips, M. 2009. The Importance of User's Perception for Beach Management. *Journal of Coastal Research* SI 56: 1164–1168.

EMILY HARRIS (eharris@uwf.edu) earned her BS in Environmental Management in 2016 and MS in Environmental Science in 2019 from the University of West Florida. She is currently employed as the Program and Research Assistant with the University of West Florida's Office of Undergraduate Research as well as a Lecturer with the Department of Earth and Environmental Sciences.

PHILLIP P. SCHMUTZ, PH.D. (pschmutz@uwf.edu), is an Assistant Professor in the Department of Earth and Environmental Science at the University of West Florida. His research interests focus on themes in coastal and aeolian geomorphology as well as beach and dune restoration and management.

CHLOE A. JACKSON (chloej0293@gmail.com) earned her BS from Florida State University in 2015 and her MS in Environmental Science from the University of West Florida in 2019. She is currently employed as an ORISE (Oak Ridge Institute for Science and Education) researcher with the Environmental Protection Agency focusing on the incorporation of ecosystem services into restoration monitoring and effectiveness.

MIRANDA ANAYA (mpa6@students.uwf.edu) earned her BS in Environmental Management from the University of West Florida in 2018. She is currently employed as a city planner for Citrus County Florida Board of County Commissioners.

MARTHA JOHNSON (muj1@students.uwf.edu) received her BS in Environmental Management from the University of West Florida in 2018. She is currently employed as an Environmental Specialist with the Florida Department of Environmental Protection.

GUY CHAPMAN (gwc9@students.uwf.edu) received his BS in Environmental Management from the University of West Florida in 2018. He is currently self-employed as a scuba instructor.