FLORIDA BEACH USERS' PERCEPTIONS OF BEACH OWNERSHIP, EROSION MANAGEMENT, AND SEA LEVEL RISE

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The authors are especially grateful to Dr. Lori Pennington-Gray, Professor and Director of the Tourism Crisis Management Institute at the University of Florida Department of Tourism, Recreation & Sport Management, for her assistance with the development of the project through various stages of completion. The authors are also grateful to Katie Green, alumnus of the Art and Technology Program at the University of Florida Department of Fine Arts, for developing the digitally-altered beach width photos. Finally, the authors would like to thank the students in the spring 2014 Conservation Clinic, especially Alex Wilkins, Amanda Broadwell, and Carly Grimm, for aiding in survey question preparation.

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Executive Summary

Beaches are one of Florida's most valuable assets. Sea level rise (SLR) and associated shoreline migration pose a threat to beaches and coastal development, yet public perceptions of risk are complicated by SLR's gradual nature, politicization, and masking by beach nourishment. Although the Public Trust Doctrine holds coastal lands seaward of the mean high tide line in trust for public use, this boundary moves with the migrating shoreline. For communities where beaches abut private property such as residences and hotels, this changing boundary becomes an issue of contention as beach erosion leaves the public and private interest competing for an ever smaller swath of sand. While there are several ways for coastal managers to address erosion, three of the most common methods are beach nourishment, seawalls, and managed retreat.

Although beach ownership, erosion management, and SLR are interwoven in Florida's coastal management policies, beach users' perceptions of these issues are largely unknown. Florida's beach users represent a diverse group of stakeholders that includes out-of-state tourists, Florida residents and beach tourists, environmental interests, and coastal property owners who may be expected to assign value to the beach and coastal landscape in a variety of ways. It is important that policymakers understand these stakeholders' perceptions because their beach use drives the state's multi-billion dollar coastal real estate and beach tourism industries. As such, this project evaluates the following:

- Beach users' awareness of and attitude toward public and private beach ownership.
- Beach users' varying levels of support for different erosion management methods, as well as the potential impact of beach width on their beach use.
- Beach users' awareness of SLR and the risk it poses to Florida's beaches and coastal development.

To develop quantitative indicators of these objectives, 648 interviewer-administered intercept surveys of Florida beach users were conducted in June and July 2014, resulting in a 90% response rate. To achieve a geographically and demographically diverse sample, beach users were interviewed in two regions of the state. The Florida Panhandle and Northeast coast were selected because their beaches receive the highest use during the summer months during which the surveying was done. Within each region, interviews were conducted at three beaches of varying development levels. The Northeast beaches included (from high to low development) Jacksonville Beach in Duval County, and Ponte Vedra Beach (Mickler's Landing Access) and Anastasia State Park in St. Johns County. The Panhandle beaches (from high to low development) included Destin (Silver Shells Access) in Okaloosa County, and Dune Allen and Topsail Hill Preserve State Park in Walton County.

The key results of the survey are presented below, along with associated recommendations for extension education programs, constructive public policies, and future research directions. Detailed project results and recommendations, as well as descriptions of the data collection methods, are found in the body of this report.

Summary Conclusions

Beach users in the Panhandle were *more* likely to know that the dry sand beach may be private and *less* likely to know that the wet sand beach is almost always public, than beach users in the Northeast. The majority of beach users in both regions thought it was fair that the public may be excluded from the dry sand beach, with a positive relationship between beach users' perceived level of fairness and their reported likelihood to exclude the public if they owned the dry sand beach. Panhandle beach users reported higher fairness and likelihood to exclude than those in the Northeast, suggesting that private ownership of the dry sand beach may be more accepted as an institution in the Panhandle.

When shown digitally-altered photographs of the beach at one-half its current width, the majority of respondents reported that their use of the beach would be unaffected, suggesting that beach users' threshold of tolerance for beach erosion is relatively high. However, the reported impact on beach use increased demonstrably when shown a photograph of the beach at one-quarter its current width. Although the majority of beach users most preferred nourishment, both oceanfront property owners and beach users for whom the beach was "not very important" more strongly preferred seawalls and less strongly preferred retreat. On the contrary, respondents at low development beaches more strongly preferred retreat and less strongly preferred seawalls than respondents at more highly developed beaches. These varying preference patterns suggest that beach users' values are related to the type of beach they choose to visit and thus erosion management is not "one size fits all."

Finally, Florida's beach users, on average, perceive SLR as a moderate risk to the state's beaches and coastal development, indicating public awareness of this potential threat. While there was a positive relationship between SLR knowledge and risk perception, respondents who reported "a lot" of knowledge had a lower average SLR risk score than those who knew "some." This was a result of the fact that those who expressed strong skepticism of SLR often reported that they knew "a lot" about it. This pattern, as well as some respondents' polarized attitudes toward the SLR questions observed by the interviewer, may be indicative of the highly politicized nature of SLR.

Summary Recommendations

The following recommendations are offered for improving public awareness and understanding of SLR and the Public Trust Doctrine, as well as for guiding sustainable coastal management, specifically adaptation to SLR and beach erosion:

- There is need for better public education regarding beach ownership rights and the Public Trust Doctrine, evidenced by the fact that most beach users in the Panhandle knew that the dry sand beach may be private, but were unaware of their right to access the wet sand beach.

- Beach users appear to have a threshold of toleration for beach erosion before dwindling beach width begins to have an adverse impact on beach use. Coastal communities should consider this threshold when planning nourishment projects for the primary purpose of recreational improvements.

- While nourishment was the most preferred erosion management method, beach users' preference for seawalls and retreat differed with level of beach development. Coastal communities should take the type of beach into account when determining the most appropriate erosion management strategy.

- Given the positive relationship between SLR knowledge and risk perception among beach users, it is crucial that SLR information based on the best-available science from impartial and trusted sources reaches the public.

- Future investigations should examine the relationship of coastal property ownership with SLR perceptions and erosion management preferences to better understand property owners' perceptions of risk.

- Future investigations of beach user perceptions of erosion management should incorporate the relative costs and funding mechanisms of each method, as many respondents indicated an interest in this factor.

Introduction

In Florida, one of climate change's most profound manifestations occurs along the coastline, where rising sea level may accelerate shoreline migration and beach erosion. Tidal gauges around the state indicate that mean sea level has been rising throughout the twentieth century, posing a threat to beaches and coastal development.[1] Drawing from the range of issues and interest groups with a stake in the future of the coast, this project addresses the topics of sea level rise (SLR), beach ownership, and erosion management from the perspective of Florida's beach users. Beach users represent a diverse group of stakeholders that includes out-of-state tourists, Florida residents and beach tourists, environmental interests, and coastal property owners who may be expected to assign value to the beach and coastal landscape in a variety of ways. It is important that policymakers understand these stakeholders' perceptions because their beach use drives Florida's multi-billion dollar coastal real estate and beach tourism industries.

Although SLR is projected to cause inundation of low-lying areas throughout the state, coastal ecosystems are in an especially perilous position as the mainland's initial line of defense. Adapting is complicated for coastal communities because the relocation of threatened structures is often challenged by dense development and the economic impact and legal implications of relocation strategies. The gradual nature of SLR, coupled with the length of the planning horizon of most climate change issues, may blunt coastal stakeholders' perceptions of the risk it presents. This is confounded by beach nourishment activities that mask the perception of risk from coastal erosion and SLR. Perceptions of risk from SLR are further complicated by the political discourse that surrounds the debate over climate change and its anthropogenic drivers. Despite these impediments to a substantial public understanding and discussion of SLR, one of the places where its impacts are most evident is along the shoreline. As such, this project evaluates beach users' awareness of SLR and the perceived risk it poses to Florida's beaches and coastal development.

Florida's State Comprehensive Plan seeks to ensure "the public's right to reasonable access to beaches,"[2] but this agenda is complicated by dense private development along the coastline. The Florida Constitution recognizes that the Public Trust Doctrine holds coastal lands seaward of the mean high tide line (MHTL), or the "wet sand beach," in trust for public use.[3] The "dry sand beach" located landward of the MHTL may be privately owned, in which case the oceanfront property owner may retain the right to prevent public access to that land.[4] However, the MHTL (and thus the associated public-private beach boundary) is not static – it moves with the migrating shoreline. For communities in which beaches abut private property such as residences and hotels (as is the case for much of Florida's coastline), this changing boundary becomes an issue of contention as beach

[1] Permanent Service for Mean Sea Level (PSMSL). (2014). "Tide Gauge Data." <http://www.psmsl.org/data/obtaining/>. Retrieved 01 Dec 2014.

[2] Fla. Stat. § 187.201(8)(b)(2).

[3] Fla. Const. art. X, §11 reads: "The title to lands under navigable waters, within the boundaries of the state, which have not been alienated, including beaches below mean high water lines, is held by the state, by virtue of its sovereignty, in trust for all the people."

[4] The Florida Supreme Court has held that under the proper set of facts, the public may retain usufructory rights to the dry sand beach, an analysis that is undertaken on a case by case basis. See *City of Daytona Beach v. Tona-Rama, Inc.,* 294 So. 2d 73, 75 (Fla. 1974); For a general discussion of lateral public access to the dry sand beach see http://eluls.org/wp-content/uploads/2012/01/ELULS-Reporter-March-2014.pdf

erosion leaves the public and private interest competing for an ever smaller swath of sand. It is important that policymakers understand beach users' awareness of and attitude toward public and private beach ownership when addressing such conflicts.

The Florida Department of Environmental Protection (FL DEP) estimates that nearly half of the state's beaches are "critically eroding."[5] Coastal systems naturally migrate landward over time as sea level rises,[6] resulting in an ongoing battle to "hold the line" when shoreline migration threatens coastal development. While there are several ways for coastal managers to address erosion, three of the most common are beach nourishment, seawalls, and managed retreat. As a result of federal cost-sharing and its capacity to both preserve the beach and protect structures, nourishment has become the FL DEP's primary erosion management method, followed by armoring.[7] Conversely, policy analysts have considered retreat problematic due to limited coastal land for relocation and political considerations. While nourishment may be the best option for most beaches at this time, this may not be true for every beach in Florida, nor will it remain the case into the indefinite future if government funding wanes and SLR accelerates erosion. Thus, it is important to develop an understanding of beach users' varying levels of support for different erosion management methods.

Although SLR, beach ownership, and erosion management are interwoven in Florida's coastal management policies, public perceptions of these issues are largely unknown. As such, this project seeks to develop a better understanding of beach users' knowledge, awareness, perceptions, and attitudes with respect to these issues. The purpose is to inform coastal communities and tourism interests based on an improved understanding of the current level of awareness and concern of beach users. The results may help to determine which adaptation policies are most appropriate given public perceptions, as well as indicating which policy approaches beach users would likely support. This understanding is necessary to guide the development of appropriate extension education materials and constructive public policies to address the effects of SLR in Florida.

[5] FL DEP. (2014). Critically Eroded Beaches in Florida. <www.dep.state.fl.us/beaches/publications/pdf/CriticalErosionReport.pdf>.

[6] Titus, J. (1990). Greenhouse Effect, Sea Level Rise, and Barrier Islands: Case Study of Long Beach Island, New Jersey. *Coastal Management*, 18: 65-90. <http://infohouse.p2ric.org/ref/16/15090.pdf>.

[7] Ruppert, et al. (2008). Eroding Long-Term Prospects for Florida's Beaches: Florida's Coastal Management Policy. <http://www.law.ufl.edu/_pdf/academics/centers-clinics/clinics/conservation/resources/coastal_management_finalreport.pdf>.

Project Goal & Objectives

The project goal is to develop quantitative indicators of beach users' knowledge, awareness, perceptions, and attitudes with respect to private versus public beach ownership, beach erosion management, and sea level rise (SLR). In addition, the project investigates whether, and how, the indicators deviate across two of Florida's coastal regions, three different levels of beach development, and various beach user demographics. The project is organized into the following three objectives:

1. **Assess beach users' awareness of and attitude toward the Public Trust Doctrine and beach ownership.**

   - Determine if beach users are aware that the area seaward of the mean high tide line (the wet sand beach) is almost always public in Florida.[8]
   - Determine if beach users are aware that area landward of the mean high tide line (the dry sand beach) may be privately owned in Florida.
   - Assess the extent to which beach users perceive it as fair or unfair that owners of dry sand beach may exclude the public from utilizing that beach area.
   - Assess the extent to which beach users would be likely or unlikely to exclude the public from using their dry sand beach area if they owned beachfront property.

2. **Determine beach users' attitudes toward different erosion management methods, as well as the potential impact of eroding shorelines on their beach use.**

   - Evaluate the impact on beach use if the beach was one-half its current width.
   - Evaluate the impact on beach use if the beach was one-quarter its current width.
   - Assess the extent to which beach users support or oppose seawalls, retreat, and nourishment.
   - Determine which erosion management methods beach users most and least prefer.

[8] Possible exceptions to the Public Trust Doctrine include "conveyances of shorelands prior to Statehood, conveyances in accordance with international obligations, federal condemnation of State public trust land, Indian treaties, artificially created shorelands, and other minor exceptions." From Coastal States Organization, Inc. (1997). Putting the Public Trust Doctrine to Work, 2nd Ed, p. 159. <http://www.shoreline.noaa.gov/docs/8d5885.pdf>.

3. Understand beach users' knowledge and risk perceptions of SLR.

- Determine beach users' general knowledge of SLR.
- Evaluate the extent to which beach users identify SLR as a risk to the state's beaches and coastal development.
- Determine if a relationship exists between beach users' SLR knowledgeability and degree of perceived risk.

Study Areas & Methods

The project consisted of interviewer-administered intercept surveys of 648 Florida beach users in the summer of 2014. To achieve a geographically and demographically diverse sample, beach users were interviewed in two regions to represent Florida's Gulf of Mexico and Atlantic coasts. The Florida Panhandle and Northeast coast were selected because their beaches receive the highest use in the summer months during which the surveying was done. Within each region, interviews were conducted at three beaches representing three levels of shoreline development. Beach development level was designated as follows: high – high-rise condominiums and hotels; medium – single-family homes; and low – undeveloped state parks.

The Northeast beaches included (from high to low development) Jacksonville Beach in Duval County, and Ponte Vedra Beach (Mickler's Landing Access) and Anastasia State Park in St. Johns County (Figure 1). The Panhandle beaches (from high to low development) included Destin (Silver Shells Access) in Okaloosa County, and Dune Allen and Topsail Hill Preserve State Park in Walton County (Figure 1). Representative photos of each beach are included in Figure 2. The vicinities of Ponte Vedra Beach and Destin were specifically selected for the project because of these municipalities' history of beach access conflicts, as this may influence public perceptions of beach ownership in the area.[9] Parking was free at the medium and high development beaches. The state parks, both of which had campgrounds, charged an entrance fee.

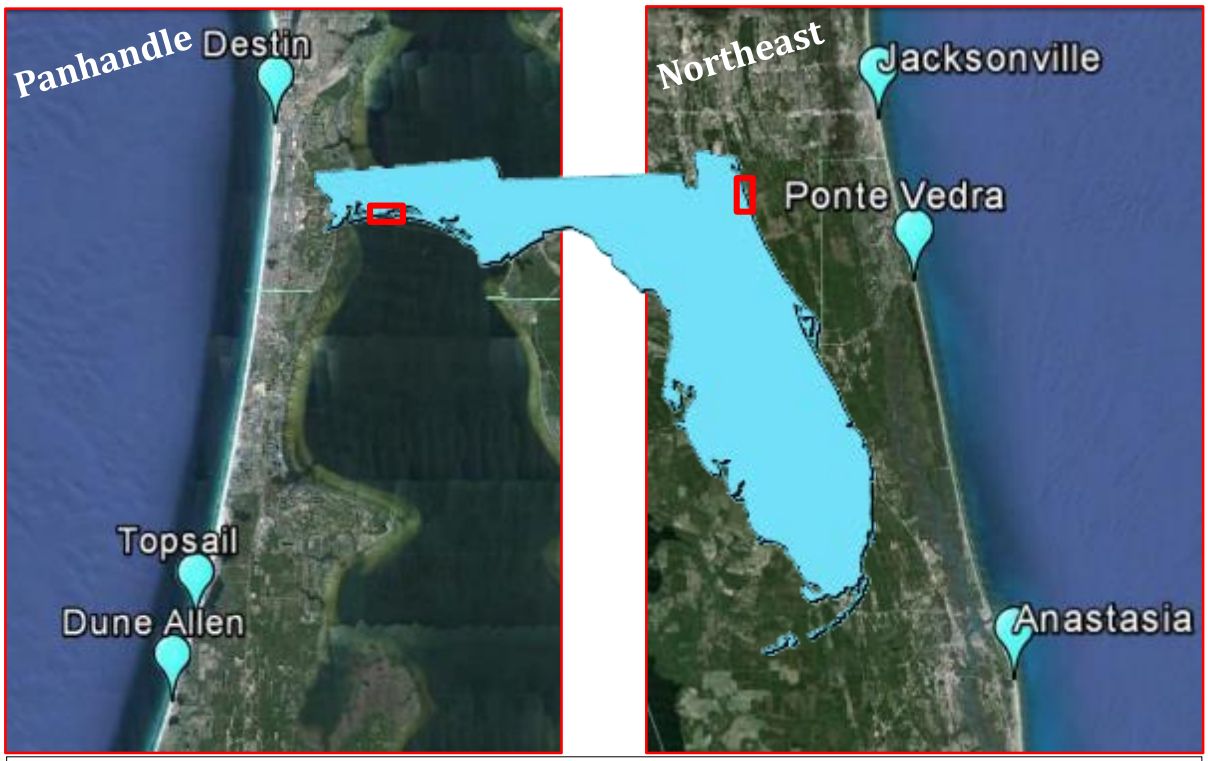


Figure 1. Region locator map and inset maps of the study beaches (Map data: Google, SIO, NOAA, U.S. Navy, NGA, GEBCO).

[9] For details regarding Destin, see *Stop the Beach Renourishment Inc. v. Fla. Dept. of Envtl. Prot.,* 560 U.S. 702 (2010). For details regarding Ponte Vedra Beach, see *The Surfrider Foundation et al. v. St. Johns County* (Fla. 7th Cir. Ct. 2004).

Figure 2. Representative photographs of the study beaches.

The initial survey was pre-tested on 20 beach users in May 2014, and subsequently revised according to respondent comments and interviewer observations. Following this pre-test, multiple trips were made to each region to conduct interviews in June and July 2014. Surveys were collected at each beach on weekdays and weekends between the hours of 10:30 a.m. and 7:30 p.m., resulting in a total of over 100 completed surveys per beach. The interviewer walked the beach in a zigzag pattern, approaching every other group of beach goers. Generally, one individual was interviewed from each group and the average interaction lasted 8.53 minutes. If more than one person in a given group agreed to be interviewed, the individual with the next birthday was selected for randomization. Beach goers' responses were collected by the interviewer on a tablet computer via

the Qualtrics Offline Surveys Application. Overall, the reaction to the survey was positive with few refusals to participate, eliciting a 90% response rate.

The survey consisted of 24 questions designed to assess project objectives, including knowledge and perception of SLR risk, awareness and attitude toward beach ownership, and preferences for erosion management methods (see *Appendix A* for full survey). It was hypothesized that these factors may differ across respondents' demographics and relationship to beach, beach development levels, and regions. The strength of respondents' relationship to the beach was determined via four interrelated variables – beach visitation rate, importance of the beach in their decision to live in or visit the area, property ownership within one-mile of the beach, and localism. Localism was self-assessed and measured by whether beach users considered themselves "locals" to the area, "visitors," or "somewhere in between." The "somewhere in between" response option, for example, was sometimes selected by beach users who were lifetime visitors to the area, but did not own property, or those who owned property, but rarely visited.

To assess awareness of the Public Trust Doctrine, following a brief explanation of the public-private boundary at the mean high tide line, beach users were asked if they had been previously aware of the distinction in ownership between the dry and wet sand beaches. To assess attitudes toward beach ownership, respondents were questioned about the fairness of excluding the public from the dry sand beach, as well as their likelihood to exclude the public if they owned beachfront property. The order in which respondents received the fairness and likelihood to exclude questions was randomized.

Additionally, survey participants were shown two digitally-altered photographs (8 by 10 inches) depicting the beach they were using at one-half and one-quarter its current width to assess the impact of beach width on beach use. The one-half width photograph was presented first, followed by the one-quarter width photograph (see photographs in *Appendix B*). Finally, the survey measured beach user's respective support and preference for seawalls, managed retreat, and beach nourishment, which were briefly explained to respondents using diagrams prior to questioning (see diagrams in *Appendix C*). Respondents' attitudes toward each erosion management method were subsequently measured in two ways. They were first asked to rate their support or opposition of each of method individually and then to rank the methods from most to least preferred. The order in which respondents were asked about their support for seawalls and retreat was randomized, and always followed by nourishment.

Beach users' level of SLR knowledge was self-assessed with five close-ended response options ranging from "a lot" to "none." SLR risk perceptions were measured with four statements (items), each using a five-point rating scale ranging from "strongly disagree" to "strongly agree." The order in which respondents received the SLR knowledge question or the set of risk perception statements was randomized. The SLR risk statements (below) were adapted from the SLR risk scale used by Alexander et al. (2012)[10] and had a high level of internal consistency:[11]

[10] Alexander, K.S., Ryan, A., and Measham, T.G. (2012). Managed retreat of coastal communities: understanding responses to projected sea level rise. *Journal of Environmental Planning and Management*, 55(4): 409-433.

[11] Internal consistency refers to the degree to which a set of survey items reflect the same general construct (i.e. perceived SLR risk). It is measured by Cronbach's alpha, which ranges from 0 to 1, with higher values indicating greater internal consistency. The SLR risk perception items had a Cronbach's alpha of 0.90.

Statement 1: The sea level is likely to rise significantly in the next 50 years.

Statement 2: Development along Florida's coast is likely to be threatened by SLR in the next 50 years.

Statement 3: Florida's beaches are likely to be threatened by SLR in the next 50 years.

Statement 4: Predictions of future SLR and its impacts are exaggerated.

The fourth statement was negatively worded and thus reverse-coded for analysis. Each respondent's score on each of the four items was summed and divided by four, creating an average risk perception score ranging from one (low perceived risk) to five (high perceived risk).

The results presented in the following sections of this report are based on statistical analysis performed using SPSS (v. 22). Non-parametric procedures for categorical data were used. All results are reported at a significance level (p-value) less than 0.05, unless indicated otherwise.

Demographic Data

Basic demographic data was collected from each respondent, as well as information to assess the strength of their relationship to the beach. These demographic and relationship to beach variables were selected to evaluate any potential relationships with the primary variables of interest to the study (i.e., perceptions of sea level rise, beach ownership, and erosion).

Basic Demographics

Respondent age ranged from 18 to 83 years, with an average age of 44.6 years. Respondents at high development beaches tended to be younger than those at low development beaches. The majority of respondents were female (62.3%), which seemed to reflect the actual gender spread of beach goers observed by the interviewer, as well as the greater willingness of females to participate in the survey (a potential source of bias). Respondents tended to be well educated, with over 60% having a Bachelor's degree or higher (Figure 3). Overall, the most educated beach users were found at medium development beaches, where respondent education levels were higher than those at low development beaches (Table 1). Age and education level did not differ significantly between the Northeast and the Panhandle.

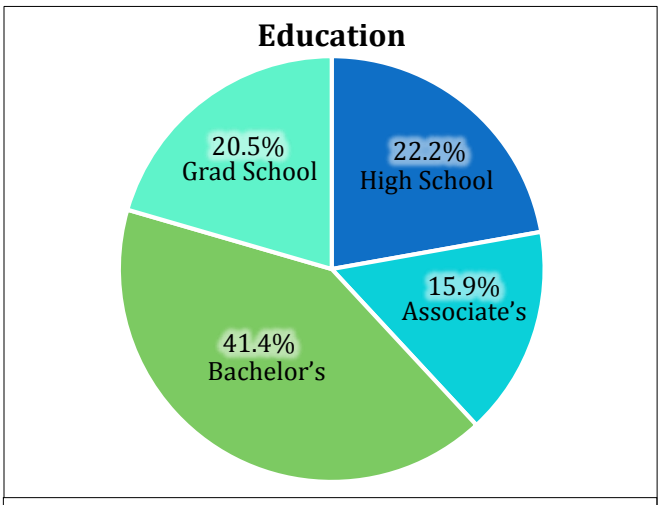


Figure 3. Respondent education distribution.

Table 1. Distribution of respondent education levels by level of beach development.

What is the highest level of education you have completed?		**High School**		**Associate's Degree**		**Bachelor's Degree**		**Graduate School**	
		Count	%	Count	%	Count	%	Count	%
Level of development	**Low**	62	29.4%	32	15.2%	72	34.1%	45	21.3%
	Medium	38	17.2%	30	13.6%	101	45.7%	52	23.5%
	High	44	20.4%	41	19.0%	95	44.0%	36	16.7%

Overall, the sample consisted of 45.5% Florida residents and 54.5% out-of-state visitors; however, most of the Florida residents were in the Northeast region and most of the out-of-state visitors were in the Panhandle (Figure 4). Of the Florida residents, 96.3% were permanent residents and only 3.7% were seasonal. Most seasonal residents were at the Panhandle beaches. Of the out-of-state visitors, about 97.7% were domestic, 1.1% were Canadian, and 1.1% were visiting from overseas.[12] Figure 5 is a map of domestic respondents' place of residence by United States ZIP code.

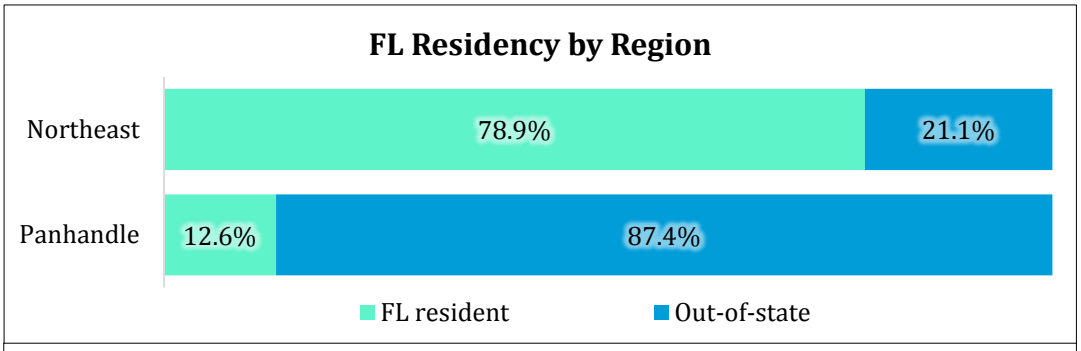


Figure 4. Distribution of Florida residents by region.

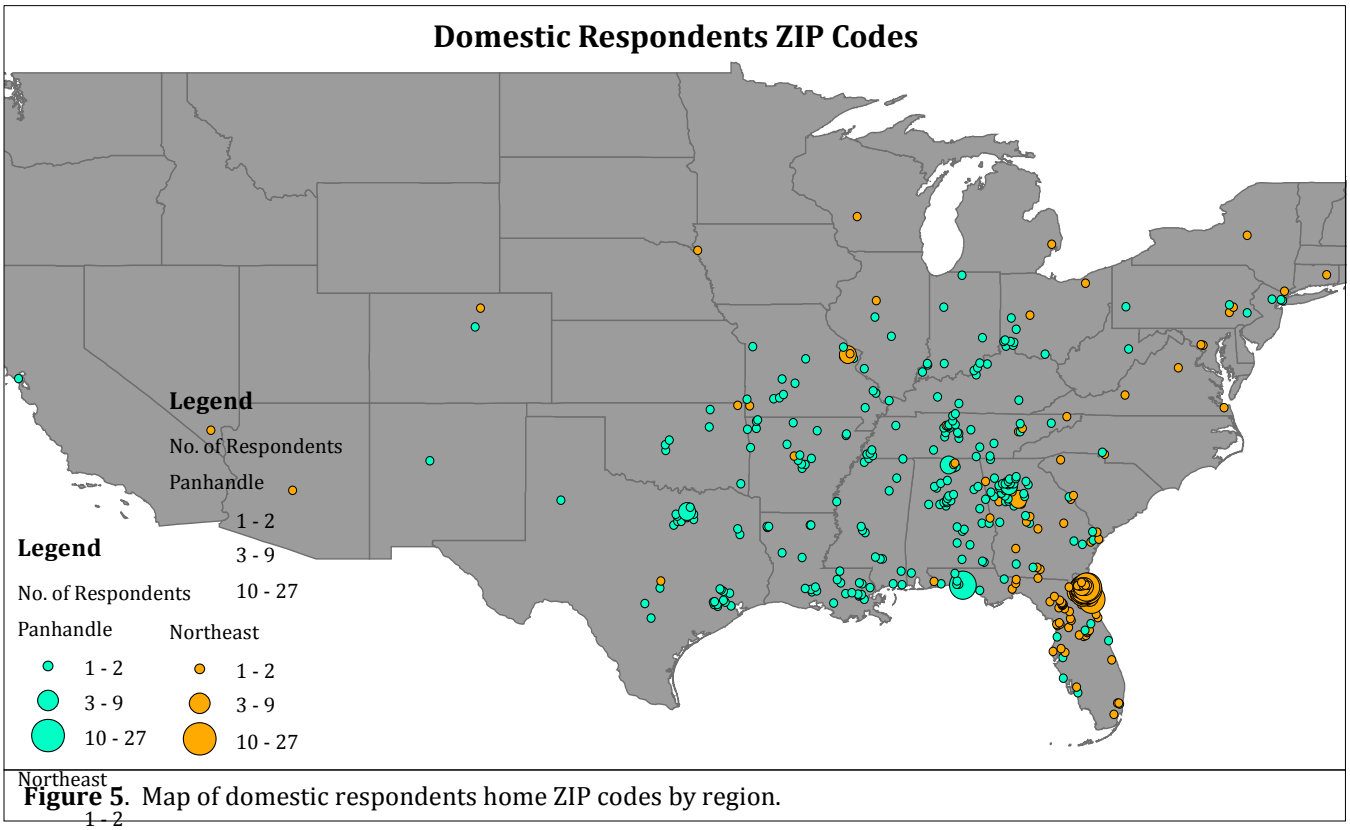


Figure 5. Map of domestic respondents home ZIP codes by region.

[12] Please note that the relatively small number of Florida seasonal residents and non-domestic visitors weakened statistical comparisons for these beach user groups.

Relationship to Beach Indicators

When asked how often they visited the beach, 20.5% of respondents said they visited weekly, 13.9% monthly, 36.0% yearly, 8.6% less than once per year, and 21.0% were first time visitors. Visitation rate differed significantly between the two regions, with respondents in the Northeast visiting more frequently than those in the Panhandle (Figure 6). Beach development level also was related to visitation rate, with respondents at high and medium development beaches visiting more frequently than those at low development beaches (Figure 7).

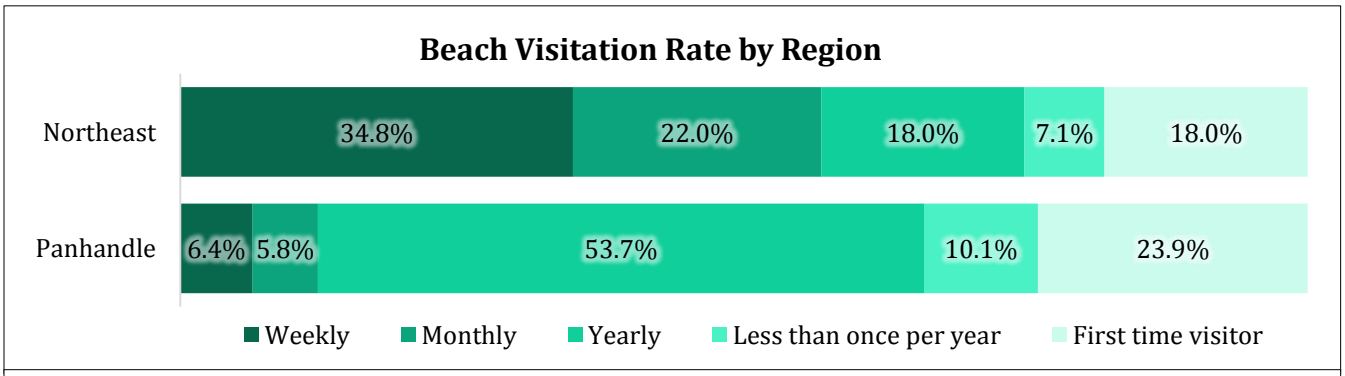


Figure 6. Beach visitation rate by region.

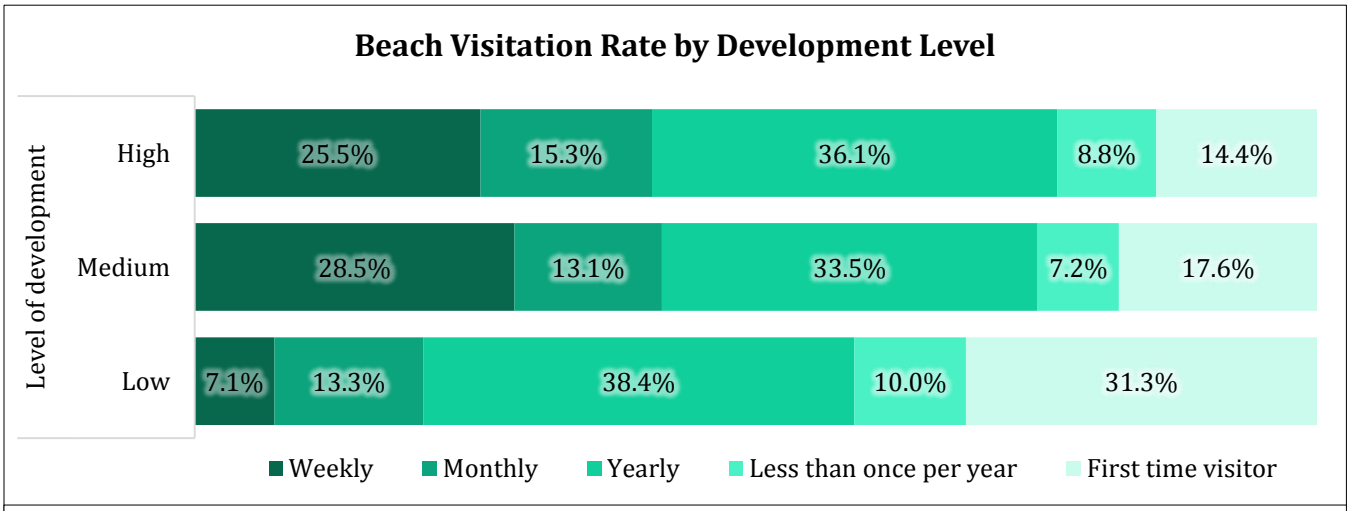


Figure 7. Beach visitation rate by level of beach development.

Respondents' visitation rate was closely related to localism, with more frequent visitation being associated with higher levels of localism. As such, more respondents in the Northeast identified themselves as "locals," while more respondents in the Panhandle called themselves "visitors" (Figure 8). Likewise, respondents at high and medium development beaches were more likely to identify themselves as "locals" than those at low development beaches. Overall, 29.6% of respondents called themselves "locals," 49.1% "visitors," and 21.3% said they considered themselves "somewhere in between."

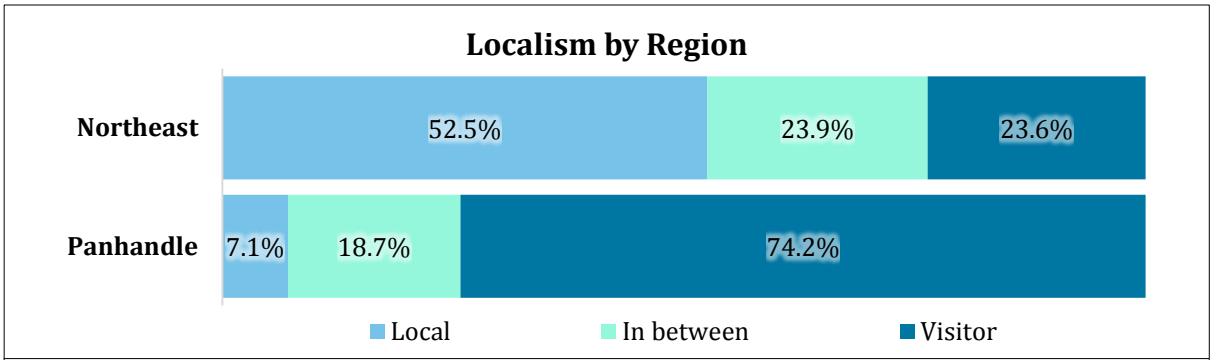


Figure 8. Localism by region.

Localism and visitation rates were related to the importance of the beach in respondents' decision to live in or visit the area. Overall, 62.5% of respondents said the beach was the most important reason for coming to the area, 23.5% said it was very important, 9.0% somewhat important, 2.6% not very important, and 2.5% said the beach did not matter at all. While the beach was an important factor in the decision to visit or live in the area for the majority of respondents, it was more important amongst respondents in the Panhandle than it was for those in the Northeast (Table 2). Thus, primarily as an effect of the large proportion of visitors in the Panhandle, visitors rated the beach of higher importance than did locals. Beach importance did not differ across levels of beach development.

Table 2. Beach importance by region.

"How important is the beach in your decision to live in or visit this area?"	**Region**			
	Panhandle		**Northeast**	
	Count	%	Count	%
Most important thing	244	74.8%	161	50.0%
Very important	60	18.4%	92	28.6%
Somewhat important	17	5.2%	41	12.7%
Not very important	4	1.2%	13	4.0%
Does not matter at all	1	0.3%	15	4.7%

As expected, localism and visitation rate were also related to owning property within one mile of the beach. Respondents who owned property within one mile of the beach were more likely to be locals and visit the beach more frequently. Overall, 9.3% of respondents owned property within one mile from the beach, with about 3.2% owning oceanfront, 0.9% within one-quarter mile from the beach, 0.8% within one-half mile from the beach, and 4.3% within one mile from the beach.[13] Property ownership did not differ between the Panhandle and the Northeast, nor did it differ meaningfully across levels of beach development.

[13] Please note that the relatively small number of respondents owning property about one-quarter and one-half mile from the beach weakened statistical comparisons for these groups.

Results

Survey results are presented in a question-and-answer format in accordance with the three project objectives (see *Project Goal & Objectives* section).

1. Assess beach users' awareness of and attitude toward the Public Trust Doctrine and beach ownership.

Q: Are beach users aware that the area seaward of the mean high tide line (the wet sand beach) is almost always public in Florida?

A: The majority of beach users (57.6%) reported that they were "not aware" that the wet sand beach is public land, and 2.5% were unsure.

Q: Are beach users aware that area landward of the mean high tide line (the dry sand beach) may be privately owned?

A: The majority of beach users (61.6%) reported that they were "aware" that the dry sand beach may be privately owned, and 2.2% were unsure.

Q: Do beach users think it is fair that owners of dry sand beach may exclude the public from utilizing that beach area?

A: The majority of respondents stated that it was "somewhat" (23.6%) or "very fair" (37.7%) that beachfront landowners can stop the public from using their privately-owned dry sand beach (Figure 9).

Q: How likely would beach users be to exclude the public from using their private dry sand beach area if they owned beachfront property?

A: Approximately half of respondents reported that they would be "somewhat" (20.8%) or "very likely" (29.0%) to stop the public from using their private dry sand beach area if they owned beachfront property (Figure 9).

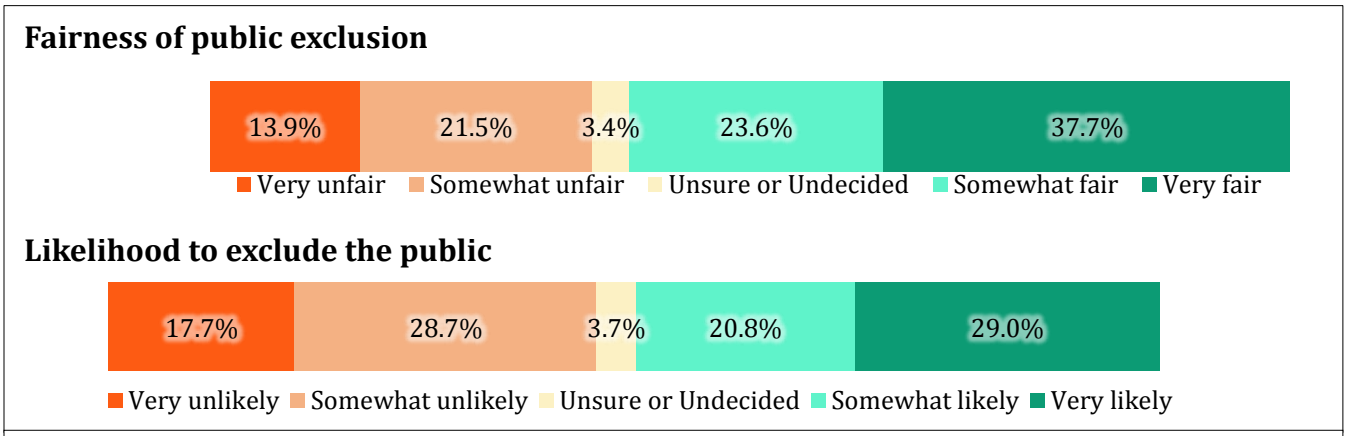


Figure 9. Perceived fairness of public exclusion and likelihood to exclude the public from the privately-owned dry sand beach.

2. Determine beach users' attitudes toward different erosion management methods, as well as the potential impact of eroding shorelines on their beach use.

Q: To what degree would beach users be impacted if the beach was one-half its current width?

A: The majority of respondents (56.5%) reported that it would not affect their visit if the beach was one-half its current width, 35.0% said it would decrease their enjoyment, and 8.5% said they would go to another beach (Figure 10). See *Appendix B* for the photograph used.

Q: To what degree would beach users be impacted if the beach was one-quarter its current width?

A: If the beach was one-quarter its current width, 24.1% of respondents reported that it would not affect their visit, 31.2% said it would decrease their enjoyment, and 44.8% said they would go to another beach (Figure 10). See *Appendix B* for the photograph used.

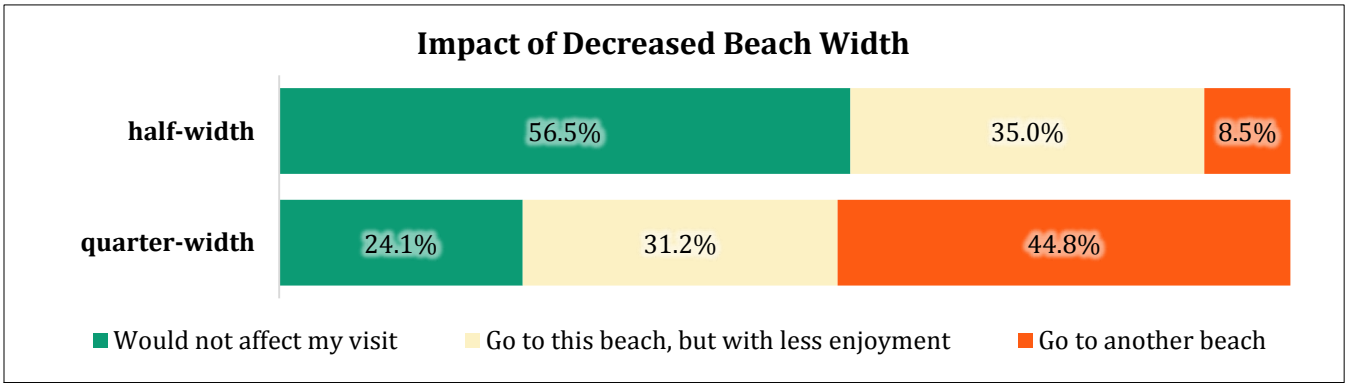


Figure 10. Impact of one-half and one-quarter width beach on beach use.

Q: To what extent do beach users support seawalls, retreat, and nourishment?

A: Respondents were asked to rate their support or opposition for seawalls, managed retreat, and beach nourishment on a 5-point scale ranging from "strongly oppose" (1) to "strongly support" (5). Nourishment was the most strongly supported erosion management method (mean response=4.37), while retreat was also supported by the majority of respondents (mean response=3.17) (Figure 11). On the other hand, the majority of respondents opposed seawalls (mean response=2.29).

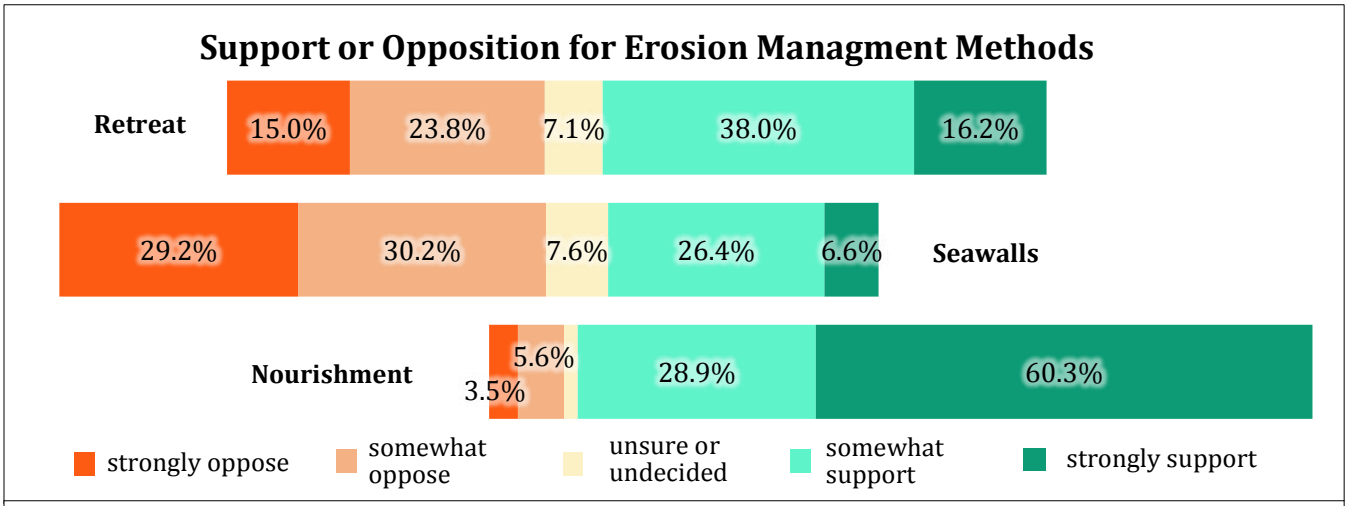


Figure 11. Support or opposition for erosion management methods.

Q: Which erosion management methods do beach users prefer most?

A: Respondents were asked to rank the three erosion management methods – seawalls, retreat, and nourishment – from most preferred (1) to least preferred (3). Nourishment was the most preferred option (mean=1.21), followed by retreat (mean=2.29) and seawalls (2.50). Figure 12 provides the distribution of rankings.

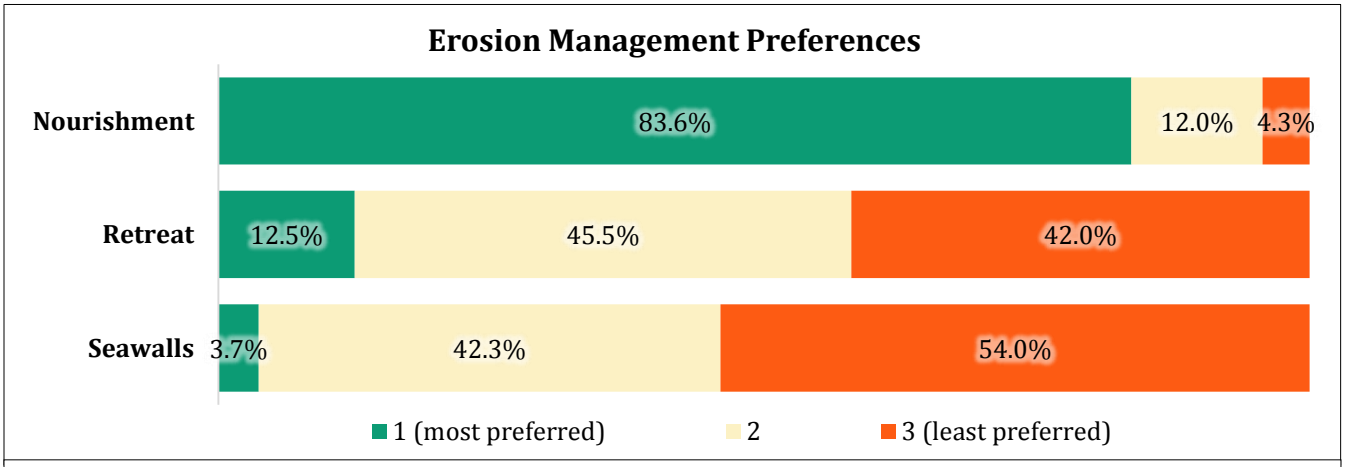


Figure 12. Ranks of erosion management methods from most to least preferred.

3. Understand Florida beach users' knowledge and risk perceptions of sea level rise (SLR).

Q: How much do beach users know about SLR?

A: Beach users' levels of SLR knowledge were fairly normally distributed, with the number of respondents reporting that they knew "none" or "very little" being approximately equal to those reporting that they knew "some" or "a lot" (Figure 13).

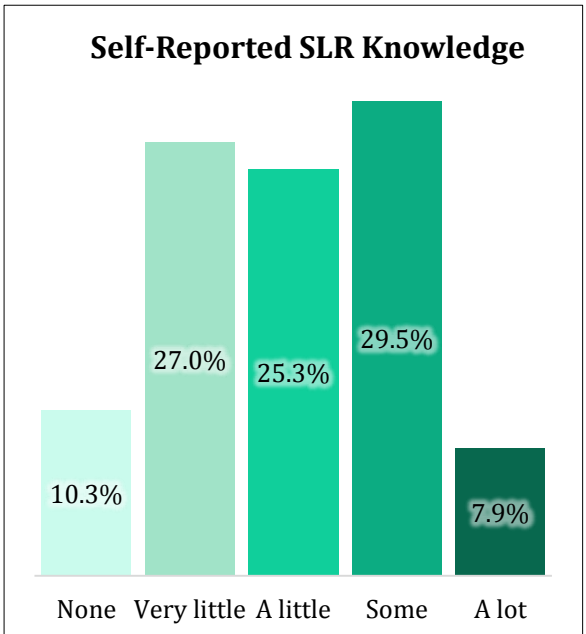


Figure 13. Self-reported SLR knowledge.

Q: To what extent do beach users identify SLR as a risk to the state's beaches and coastal development?

A: The distribution of responses to the four SLR risk perception statements is shown in Figure 14. While the majority of respondents "somewhat" or "strongly agreed" with Statements 1 through 3, responses to Statement 4 were nearly evenly divided. The mean SLR perception score was 3.57 (with scores of 1 indicating low perceived risk and 5 indicating high perceived risk). The distribution of risk perception scores was skewed left, indicating that more respondents perceived SLR as a moderate or high risk than those who perceived it as a low risk (Figure 15).

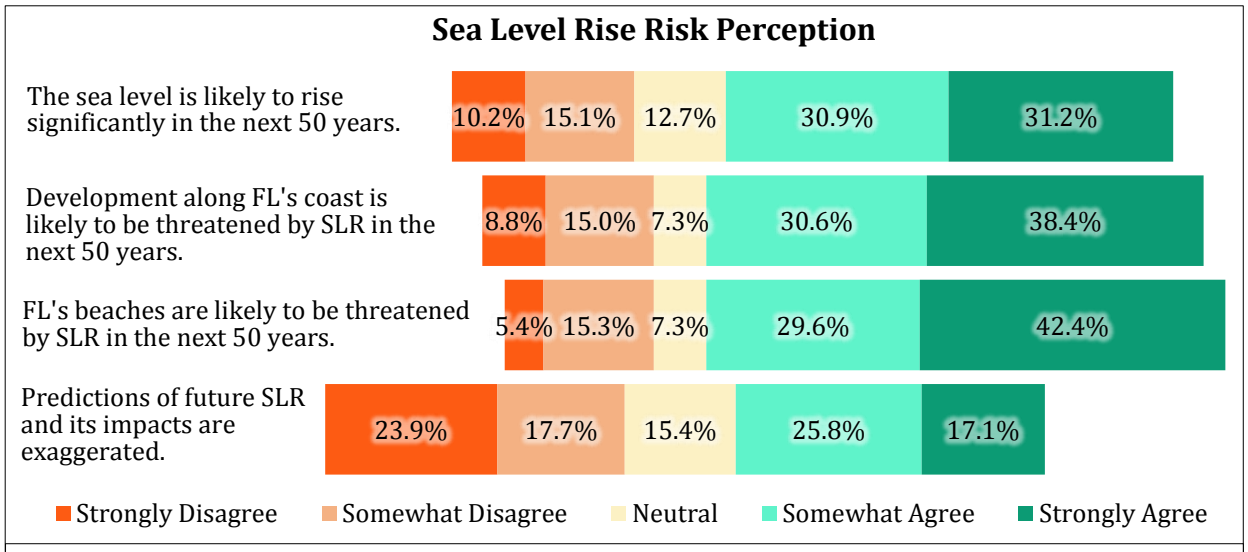


Figure 14. Responses to SLR risk perception statements.

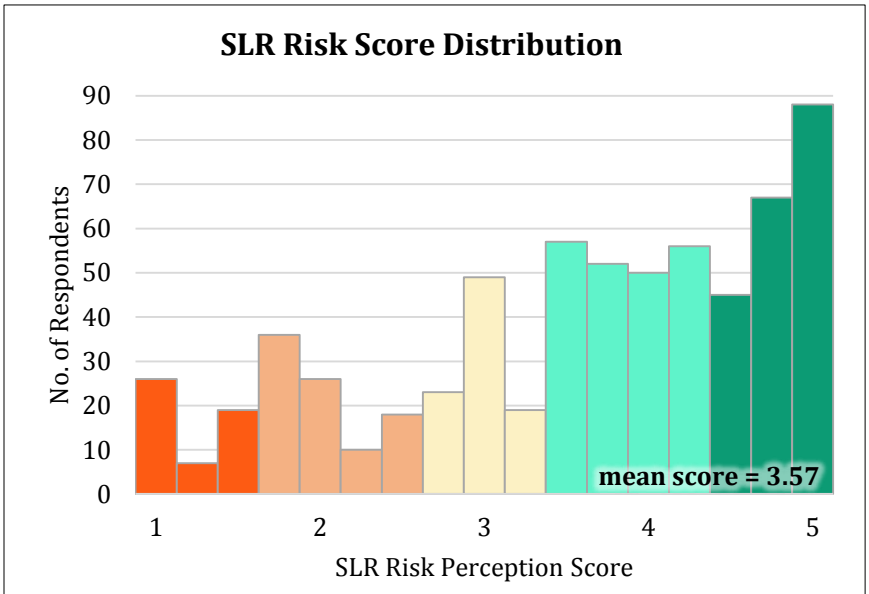


Figure 15. Distribution of mean SLR risk perception scores. The scale ranges from one (low perceived risk) to five (high perceived risk).

Q: Does a relationship exist between beach users' SLR knowledgeability and their perceived SLR risk?

A: An increase in SLR knowledge is generally associated with a corresponding increase in perceived SLR risk, with the exception of those beach users who reported knowing "a lot" about SLR. The relationship is imperfect because many of the respondents who expressed strong skepticism of SLR risk reported that they know "a lot" about SLR. Beach users who reported "some" knowledge had the highest mean risk perception score across all four SLR statements, as well as the highest overall SLR risk perception score.

Results by Demographics, Region, & Level of Beach Development

The number of questionnaires completed at each of the six beaches that were surveyed ranged from 104 to 112 (Table 3). Survey results by beach user demographics (including relationship to beach), region, and level of beach development are presented in a question-and-answer format in accordance with the three project objectives (see *Project Goal & Objectives* section).

Table 3. Count of completed surveys at each study beach.

Region	Beach	Count	Percent
Panhandle	Topsail Hill Preserve State Park	105	16.2%
	Dune Allen	109	16.8%
	Destin (Silver Shells Access)	112	17.3%
Northeast	Anastasia State Park	106	16.4%
	Ponte Vedra Beach (Mickler's Landing Access)	112	17.3%
	Jacksonville Beach	104	16.0%
	Total	648	100.0%

1. Assess beach users' awareness of and attitude toward the Public Trust Doctrine and beach ownership.

Q: Are beach users aware that the area seaward of the mean high tide line (the wet sand beach) is almost always public in Florida?

A: *Demographics* – Several of the demographic and relationship to beach variables were significantly related to respondents' awareness that the wet sand beach is almost always public. Males and respondents who owned property within one mile of the beach were more likely to be aware than females and those who did not own property within one mile of the beach, respectively (Figure 16). Additionally, Florida residents, locals, and respondents who visited more frequently were all more likely to report that they were aware.

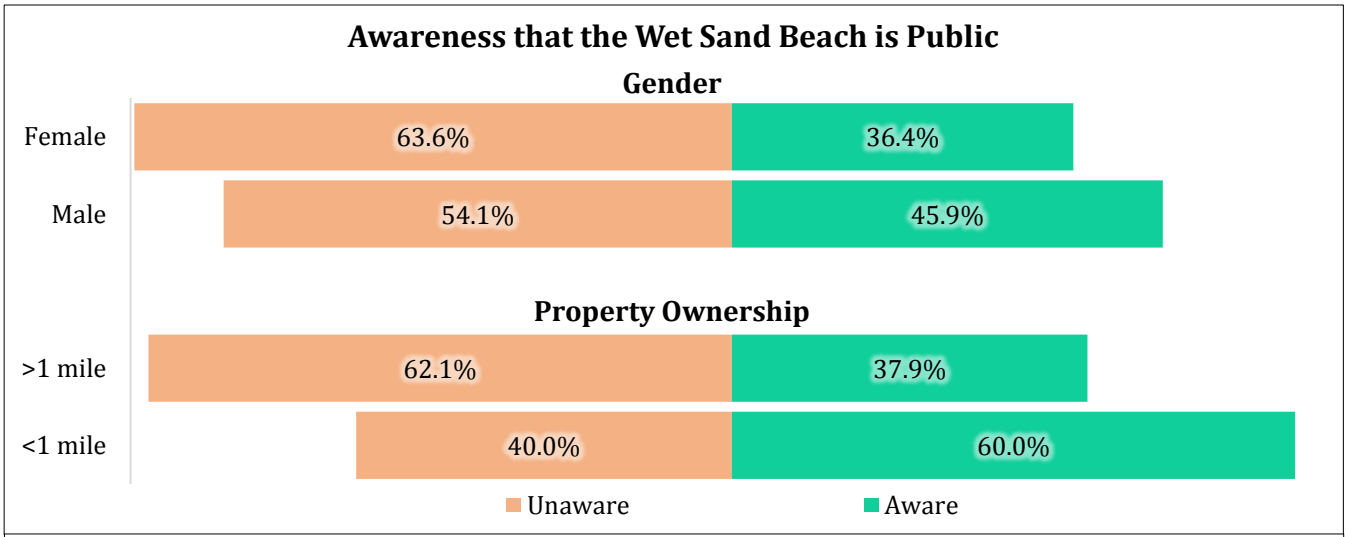


Figure 16. Awareness that the wet sand beach is almost always public by gender and property ownership.

Region – Respondents in the Northeast were significantly more likely to be aware that the wet sand beach is almost always public, while those in the Panhandle were more likely to be unaware (Figure 17).

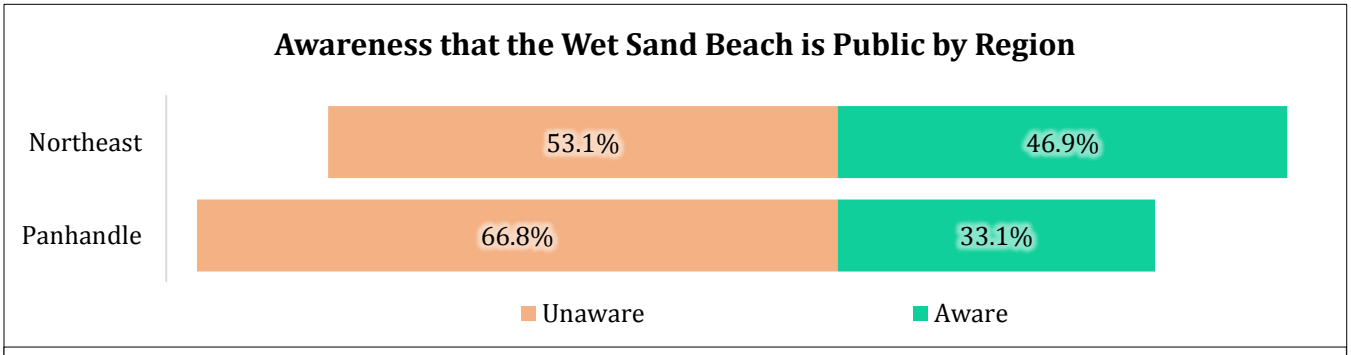


Figure 17. Awareness that the wet sand beach is almost always public by region.

Development level – Beach users' awareness that the wet sand beach is almost always public did not differ significantly across beach development levels.

Q: Are beach users aware that area landward of the mean high tide line (the dry sand beach) may be privately owned?

A: *Demographics* – Overall, Florida residents and locals were less likely to be aware that the dry sand beach may be privately owned than out-of-state residents and visitors (Table 4). However, this trend is not statistically significant within each region and is reversed in the Panhandle (Table 5). As such, this result is likely due to the significant relationship of residency and localism with region, which had the strongest association with awareness.

Table 4. Awareness that dry sand beach may be private by residency and localism.

"Were you aware that the dry sand beach may be privately-owned?"	**Aware**		**Unaware**	
	Count	%	Count	%
Florida resident	161	54.6%	134	45.4%
Out-of-state	238	67.4%	115	32.6%
Local	103	53.6%	89	46.4%
Somewhere in between	84	60.9%	54	39.1%
Visitor	212	66.7%	106	33.3%

Table 5. Awareness that dry sand beach may be private by residency and localism in the Panhandle.

"Were you aware that the dry sand beach may be privately-owned?"	**Aware**		**Unaware**	
	Count	%	Count	%
Florida resident (Panhandle)	34	82.9%	7	17.1%
Out-of-state (Panhandle)	199	69.8%	86	30.2%
Local (Panhandle)	18	78.3%	5	21.7%
Somewhere in between (Panhandle)	46	75.4%	15	24.6%
Visitor (Panhandle)	169	69.8%	73	30.2%

Region – Respondents in the Northeast were less likely to be aware that the dry sand beach may be privately owned, while those in the Panhandle were more likely to be aware (Figure 18).

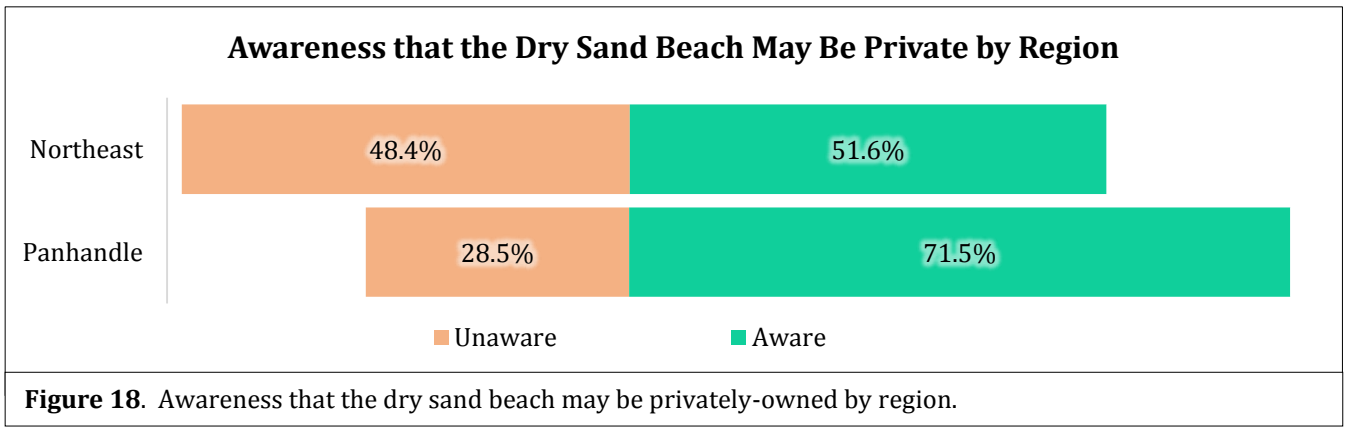


Figure 18. Awareness that the dry sand beach may be privately-owned by region.

Development level – Beach users' awareness that the dry sand beach may be privately owned did not differ significantly across beach development levels.

Q: Do beach users think it is fair that owners of dry sand beach may exclude the public from utilizing that beach area?

A: *Demographics* – Visitation rate was related to perceived fairness of beachfront property owners' right to exclude the public from privately owned dry sand beach. Respondents who visited yearly tended to call the right to exclude the public fairer than those visiting for the first time, monthly, or weekly. This pattern is likely related to visitation rate's relationship with region, which had the strongest association with perceived fairness.

Region – While the majority of respondents in both regions reported that beachfront property owners' right to exclude the public from privately owned dry sand beach was fair, respondents in the Northeast perceived it to be significantly less fair than those in the Panhandle (Figure 19).

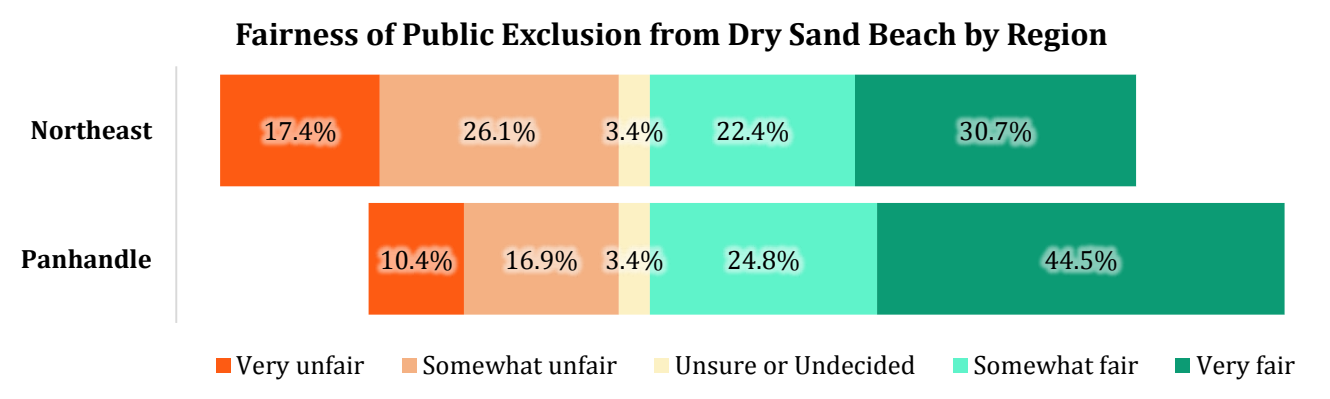


Figure 19. Perceived fairness of public exclusion from privately-owned dry sand beach by region.

Development level – Respondents at low development beaches tended to perceive beachfront property owners' right to exclude the public from privately-owned dry sand beach as less fair than respondents at medium or high development beaches (Figure 20).

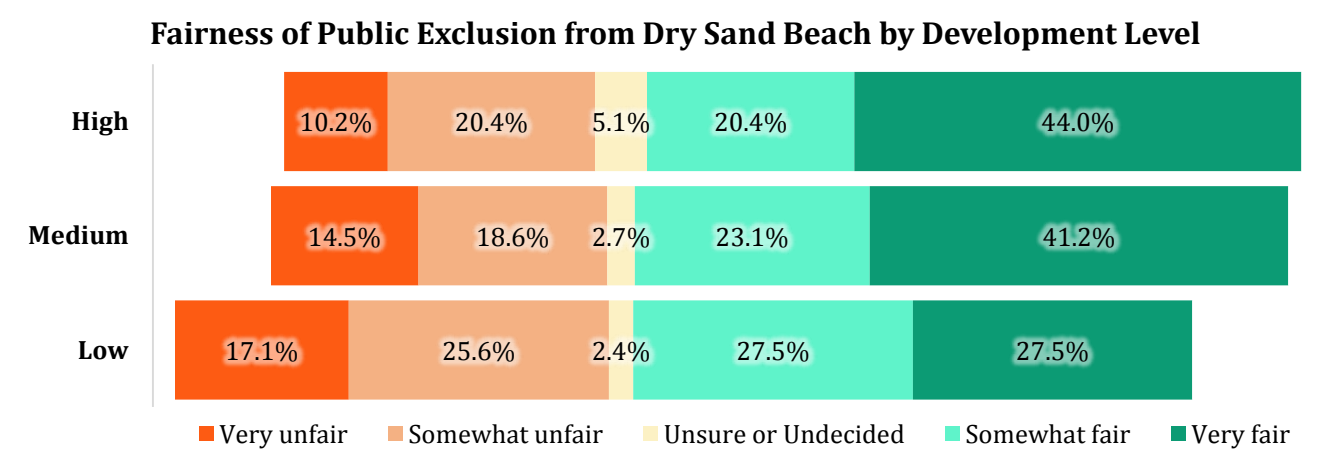


Figure 20. Perceived fairness of public exclusion from privately-owned dry sand beach by level of beach development.

Q: How likely would beach users be to exclude the public from using their private dry sand beach area if they owned beachfront property?

A: *Demographics* – Respondents who were out-of-state residents, visitors, or less frequent beach users were significantly more likely to exclude the public from their private dry sand beach; however, this is likely related to the significant association of these variables with region, which had the strongest association with likelihood to exclude.

Region – Respondents in the Panhandle were more likely to exclude the public from their private dry sand beach than those in the Northeast (Figure 21).

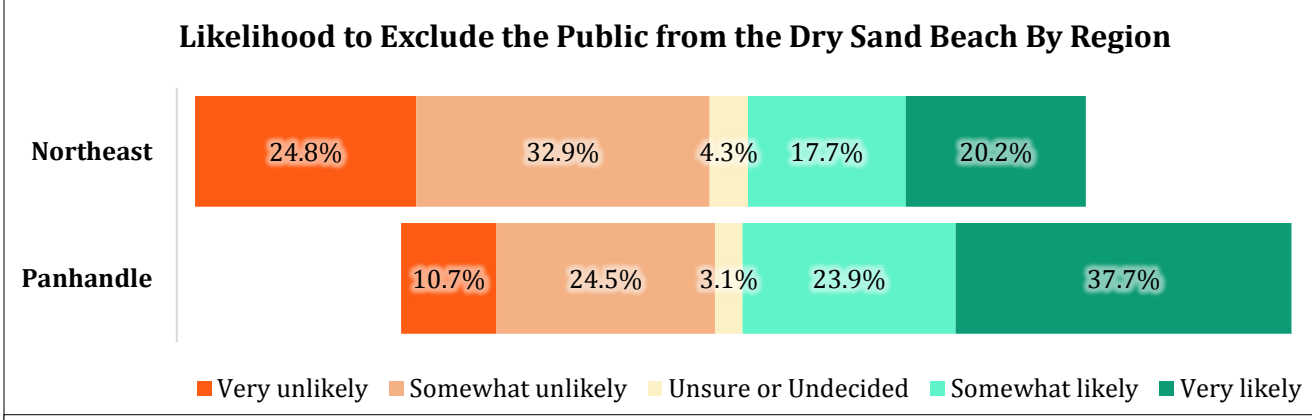


Figure 21. Likelihood to exclude the public from the privately-owned dry sand beach by region.

Development level – Although the relationship was not statistically significant, respondents at high development beaches reported the greatest likelihood to exclude the public from their private dry sand beach, followed by those at medium, and lastly low development beaches (Figure 22).

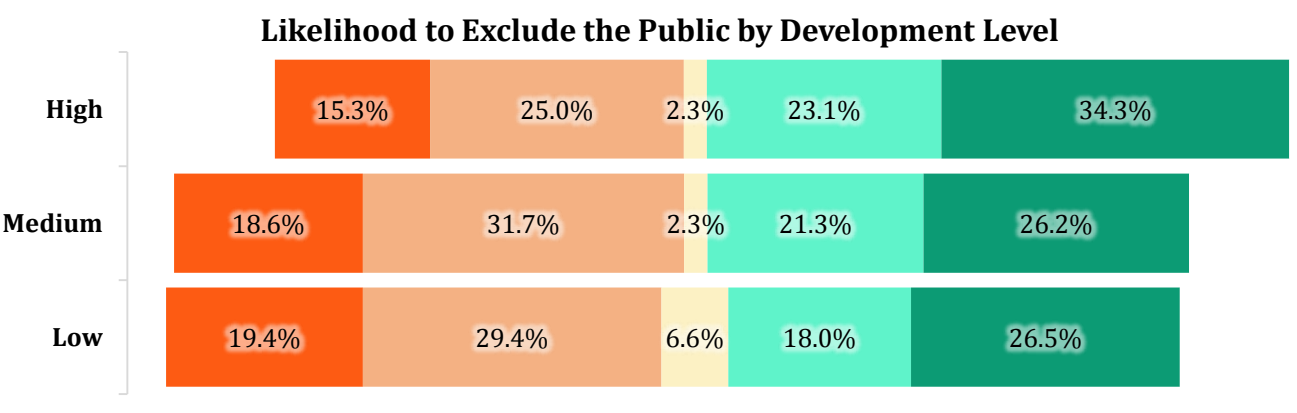


Figure 22. Likelihood to exclude the public from the privately-owned dry sand beach by level of beach development.

2. Determine beach users' attitudes toward different erosion management methods, as well as the potential impact of eroding shorelines on their beach use.

Q: To what degree would beach users be impacted if the beach was one-half its current width?

A: *Demographics* – The impact of a one-half width beach did not differ significantly across any of the basic demographics or relationship to beach variables.

Region – The impact of a one-half width beach did not differ significantly between regions.
Development level – Respondents at medium development beaches reported that a one-half width beach would have a greater impact on their beach use then those at low or high development beaches (Figure 23). However, this relationship may be attributed to the relatively small current beach width at the medium development beaches (see *Conclusions* section).

Q: To what degree would beach users be impacted if the beach was one-quarter its current width?

A: *Demographics* – The impact of a one-quarter width beach did not differ meaningfully across any of the demographic or relationship to beach variables.

Region – The impact of a one-quarter width beach did not differ significantly between regions.

Development level – As with the half-width beach photos, respondents at medium development beaches reported that a one-quarter width beach would have a significantly greater impact on their beach use then those at low or higher development beaches (Figure 23).

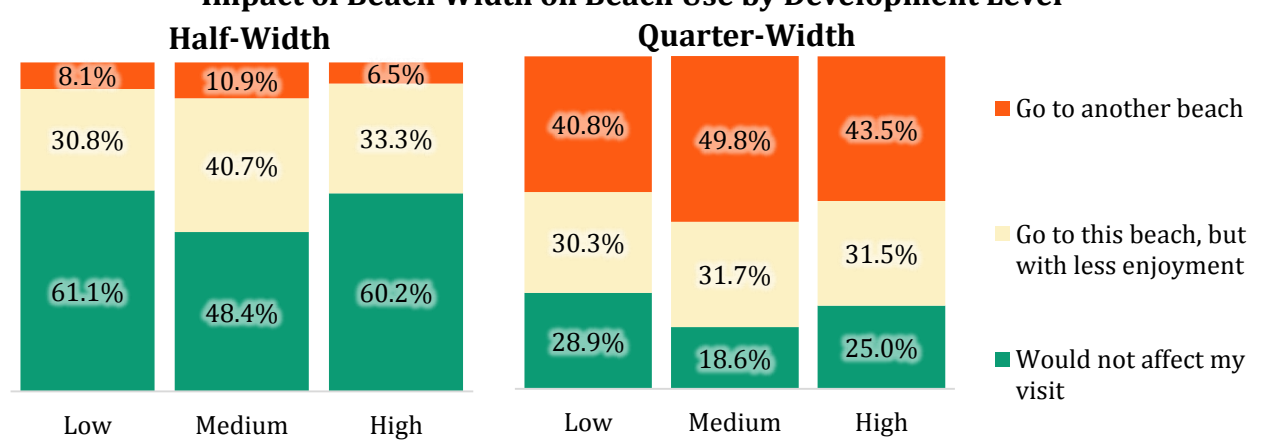


Figure 23. Impact of beach width on beach use by level of beach development.

Q: To what extent do beach users support seawalls, retreat, and nourishment?

A: *Demographics* – While nourishment was the most strongly supported erosion management method and retreat was also supported by the majority of respondents, females tended to be more supportive of nourishment and less supportive of retreat than males (Figure 24). Out-of-state visitors tended to be more supportive of nourishment than Florida residents (Figure 25). Support for the various erosion management methods did not differ across any of the other basic demographics or relationship to beach variables.

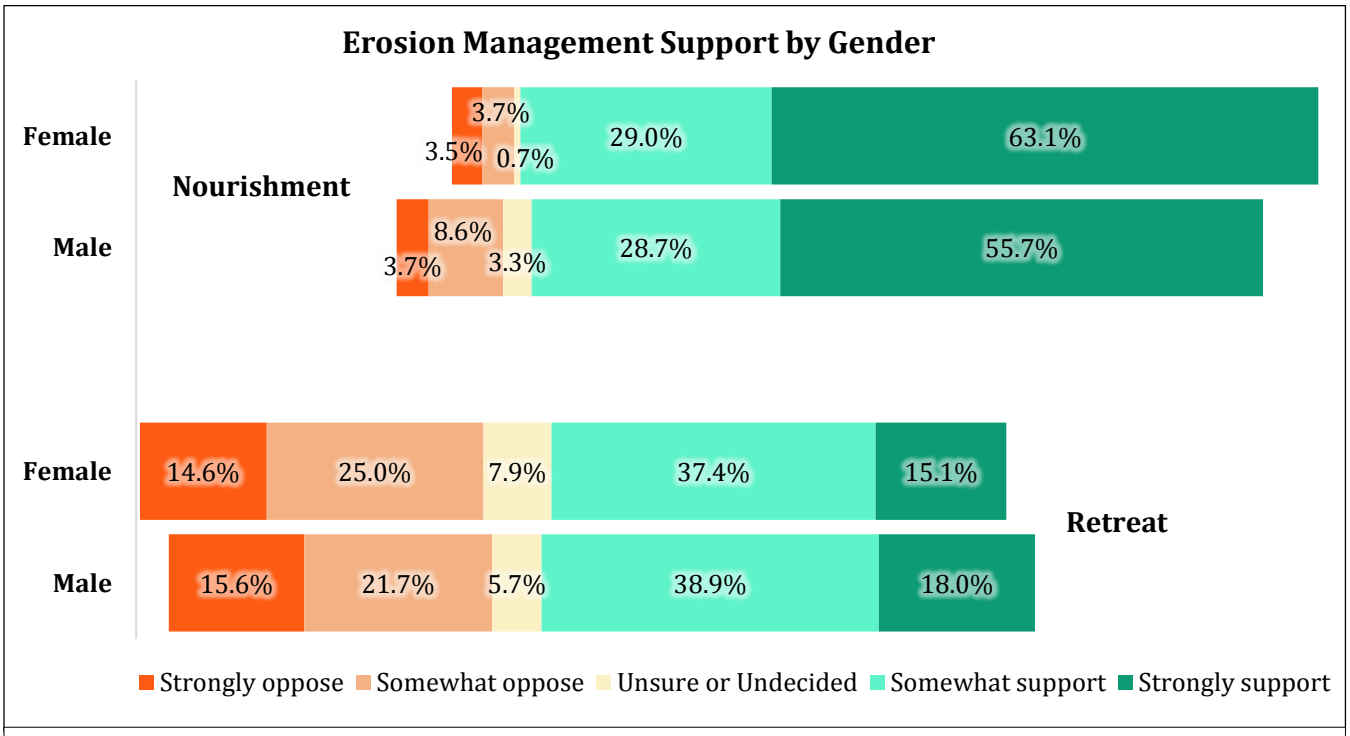


Figure 24. Support or opposition for beach nourishment and retreat by gender.

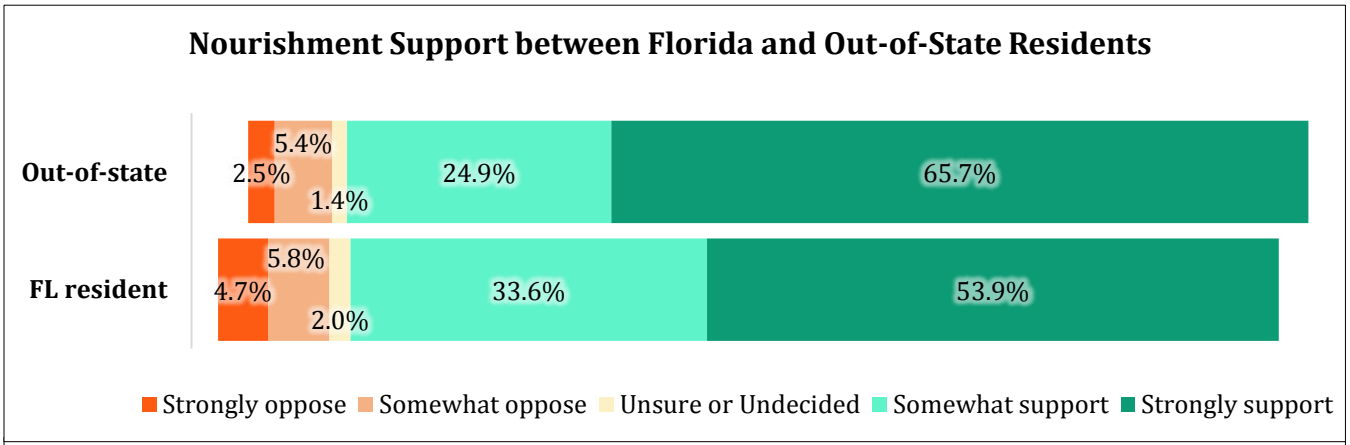


Figure 25. Support or opposition for beach nourishment for Florida residents and out-of-state visitors.

Region – Respondents in the Panhandle tended to be more supportive of nourishment than those in the Northeast (Figure 26). Degree of support for retreat and seawalls did not differ by region.

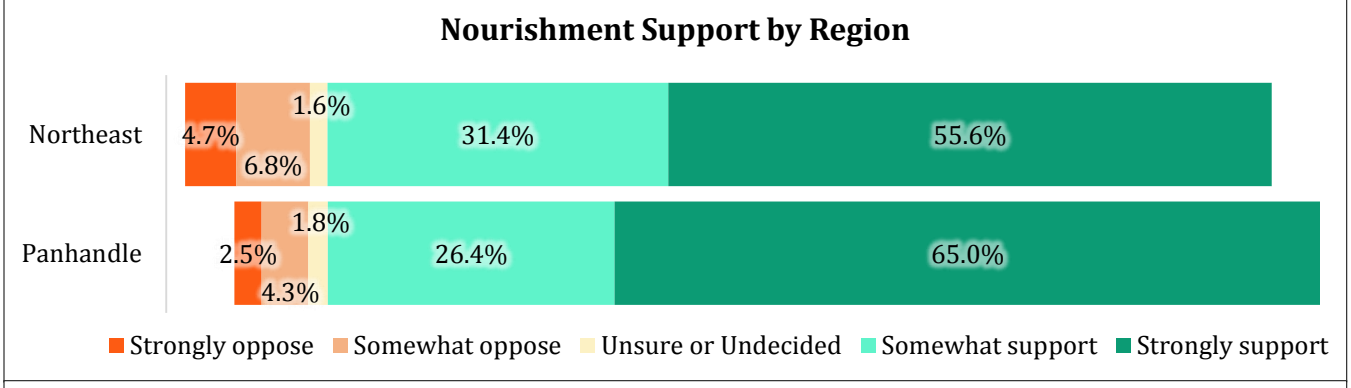


Figure 26. Support or opposition for beach nourishment by region.

Development level – Support for seawalls, retreat, and nourishment did not differ significantly by beach development level.

Q: Which erosion management methods do beach users prefer most?

A: *Demographics* – As with support for nourishment, females and out-of-state visitors indicated a higher preference for nourishment than males and Florida residents, respectively. Preference for erosion management methods did not differ across any of the other basic demographics. Importance of the beach was related to beach users' preference for seawalls and retreat. Respondents for whom the beach was "not very important" in their decision to live in or visit the area tended to report higher preference for seawalls and lower preference for retreat than those who said the beach was increasingly important. Property ownership also was related to erosion management preference. Respondents who owned oceanfront property reported higher preference for seawalls and lower preference for retreat than those who owned property about one mile from the beach or more than one mile from the beach (Figure 27).

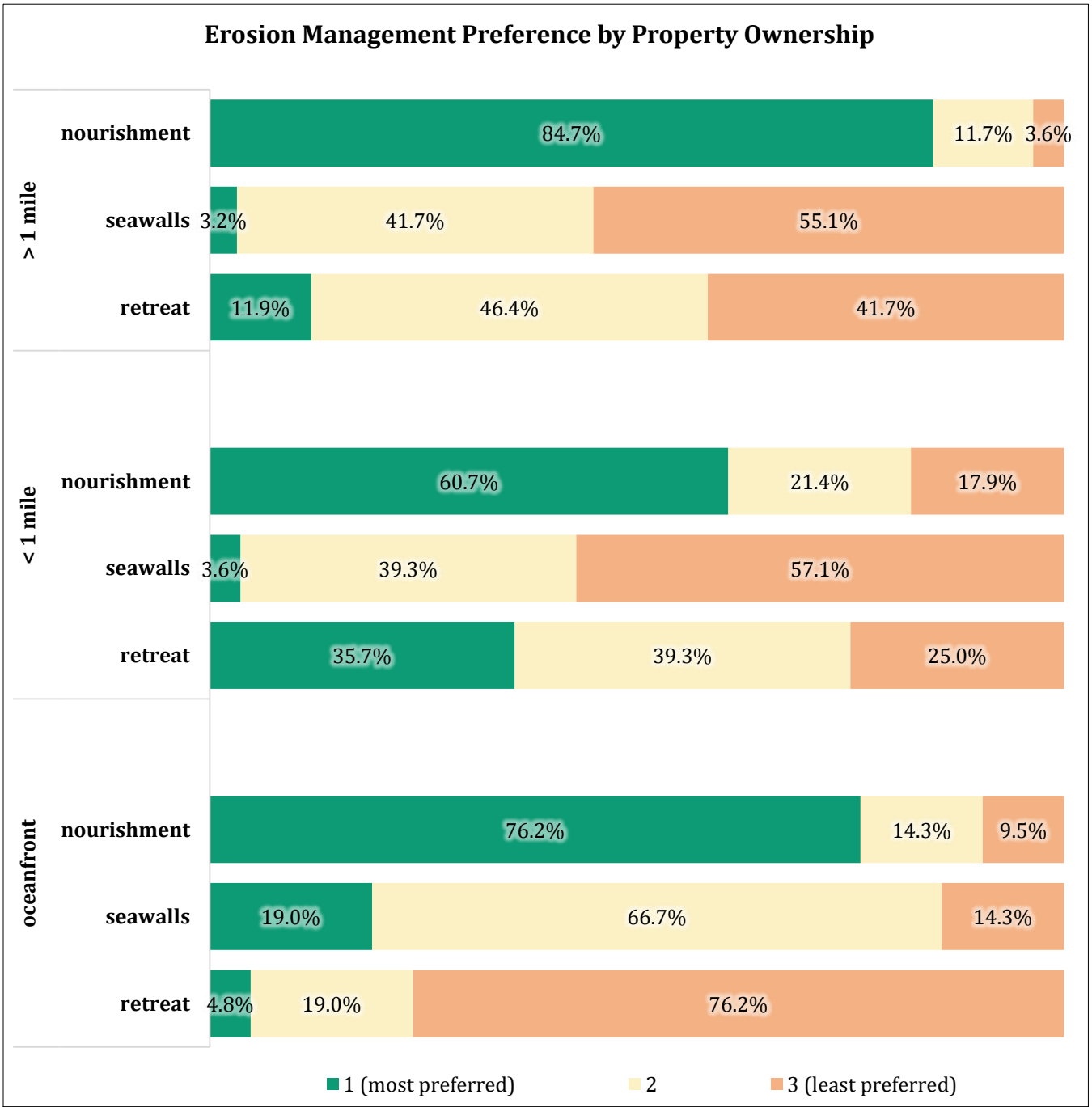


Figure 27. Erosion management preferences by coastal property ownership.

Region – Respondents in the Panhandle reported higher preference for nourishment and lower preference for retreat than those in the Northeast. Preference for seawalls did not differ significantly by region (Figure 28).

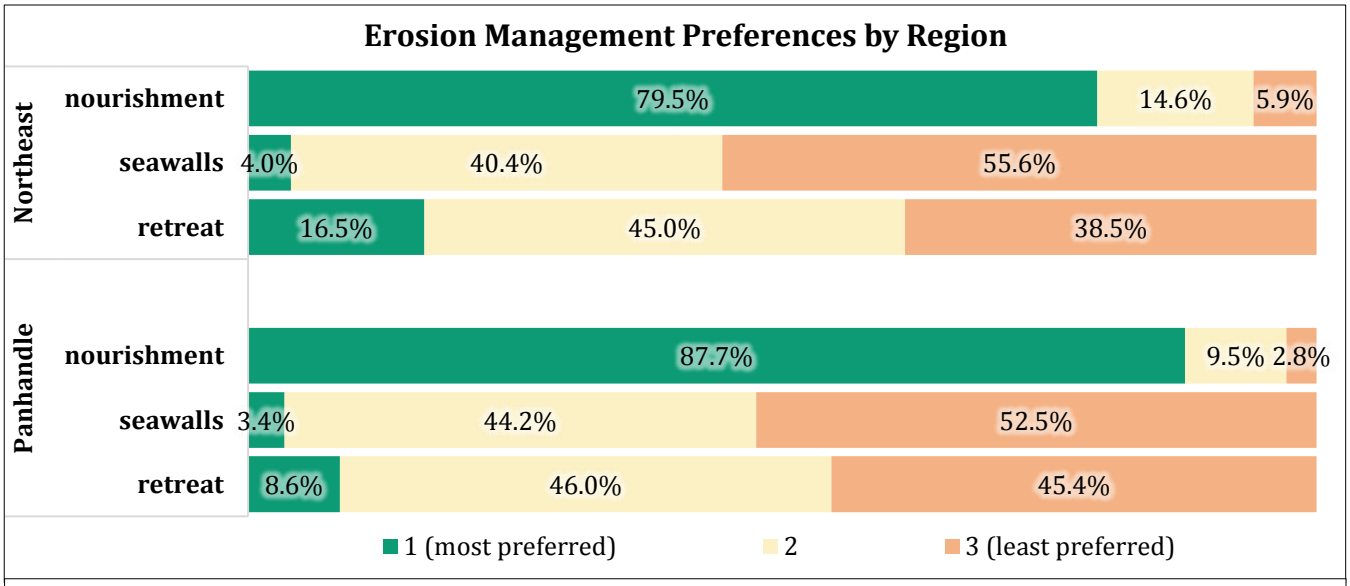


Figure 28. Erosion management preferences by region.

Development level – Respondents at low development beaches reported higher preference for retreat and lower preference for seawalls than those at medium or high development beaches (Figure 29).

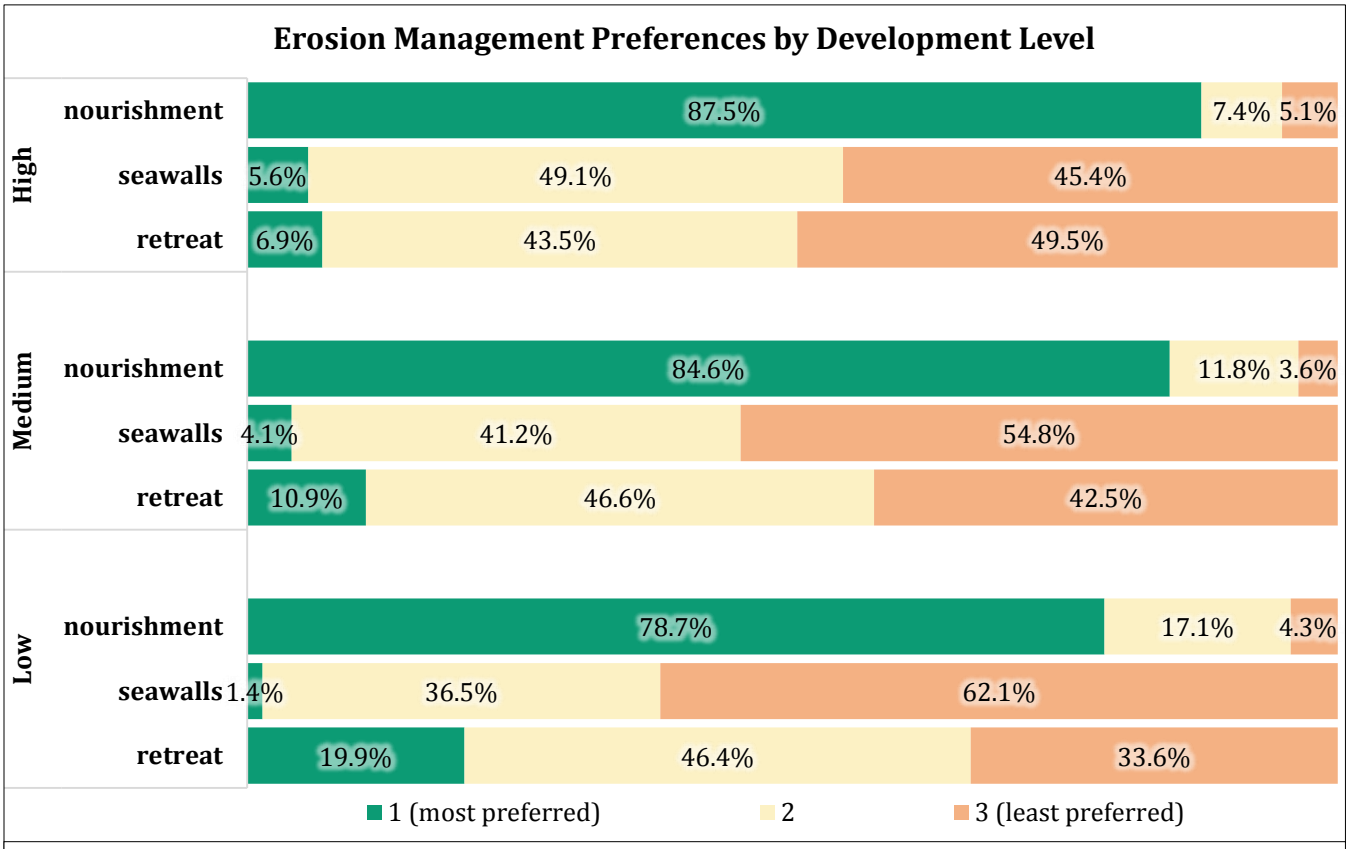


Figure 29. Erosion management preferences by beach development level.

3. Understand Florida beach users' knowledge and risk perceptions of sea level rise (SLR).

Q: How much do beach users know about SLR?

A: *Demographics* – Although an increase in respondent age or education was weakly associated with an increase in self-assessed SLR knowledge, the relationship was not statistically significant. Male respondents tended to report higher levels of SLR knowledge than did females, and Florida residents tended to report higher levels of SLR knowledge than did out-of-state beach users (Figure 30). There were no significant differences in the distribution of SLR knowledge levels across any of the relationship to beach variables (i.e. beach visitation rate, importance of beach, localism, or property ownership within one mile).

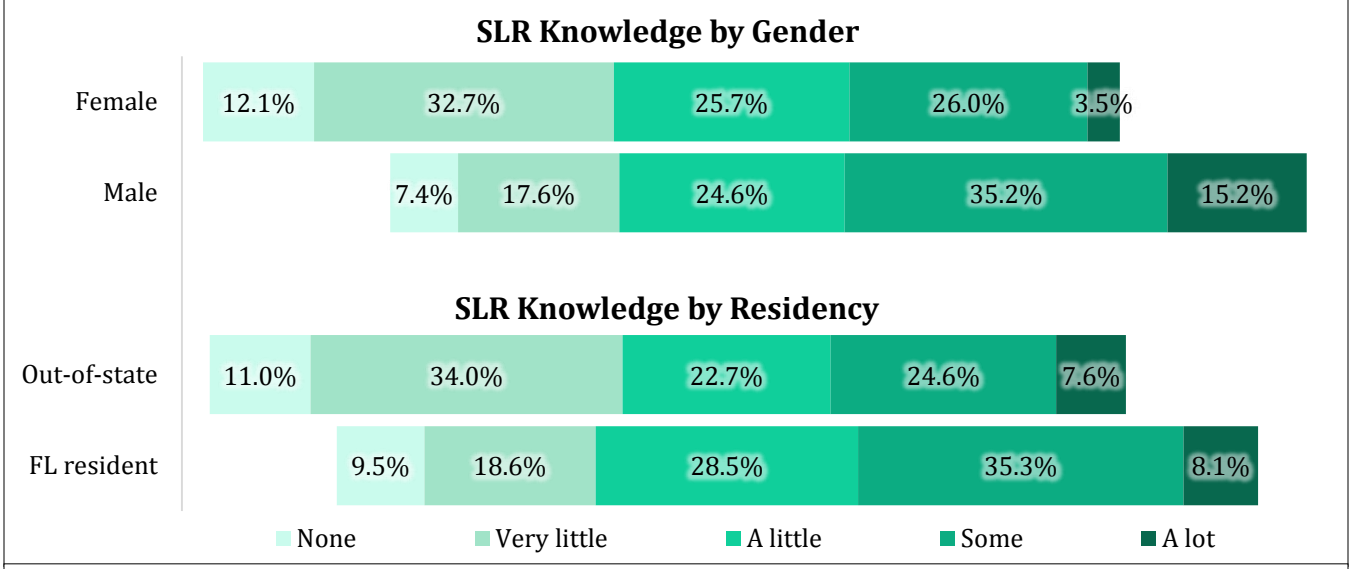


Figure 30. SLR knowledge by gender and residency.

Region – Beach users in the Northeast reported higher levels of SLR knowledge than those in the Panhandle; however, this is likely an effect of the much higher number of Florida residents in the Northeast (Figure 31).

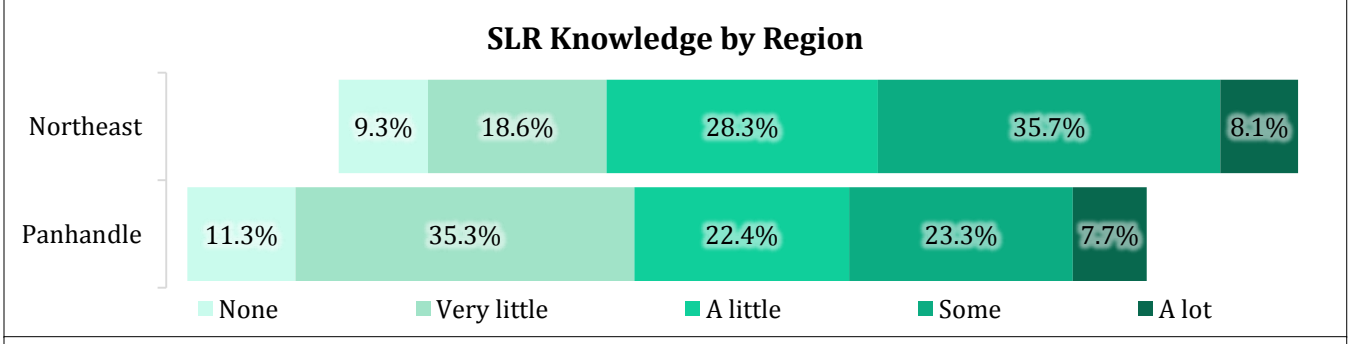


Figure 31. SLR knowledge by region.

Development level – Respondents at low development beaches reported significantly higher SLR knowledge than those at high development beaches. There was not a statistically significant difference in SLR knowledge at medium development beaches versus the other development levels (Figure 32).

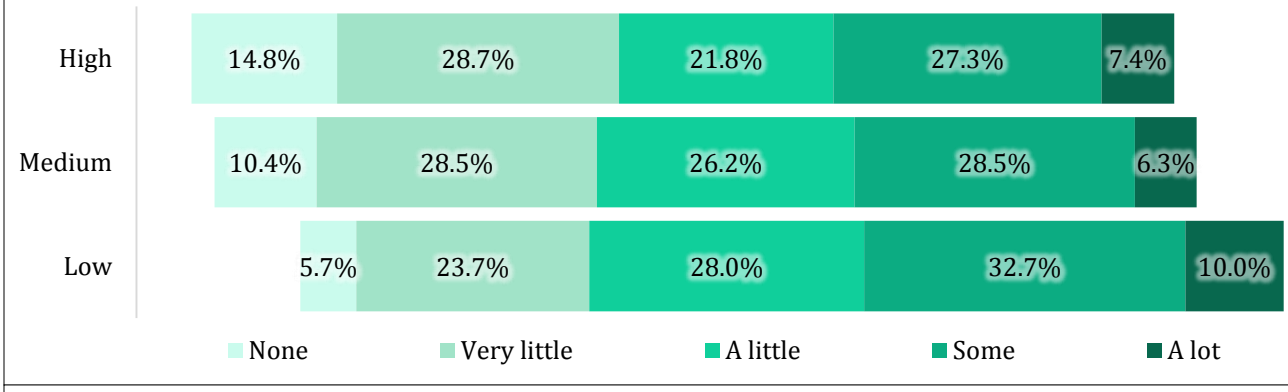


Figure 32. SLR knowledge by beach development level.

Q: To what extent do beach users identify SLR and shoreline migration as a risk to the state's beaches and coastal development?

A: *Demographics* – As with SLR knowledge, gender and residency had the strongest relationship with perceived SLR risk. Males were more likely to indicate low perception of SLR risk on the four SLR statements, but overall mean SLR risk scores did not differ significantly by gender. Florida residents were more likely to indicate high perception of SLR risk on three of the four SLR statements, resulting in Florida residents having significantly higher mean SLR risk scores than out-of-state visitors (Figure 33). SLR risk perceptions generally did not differ meaningfully across the relationship to beach variables (i.e. beach visitation rate, importance of beach, localism, or property ownership within one mile).

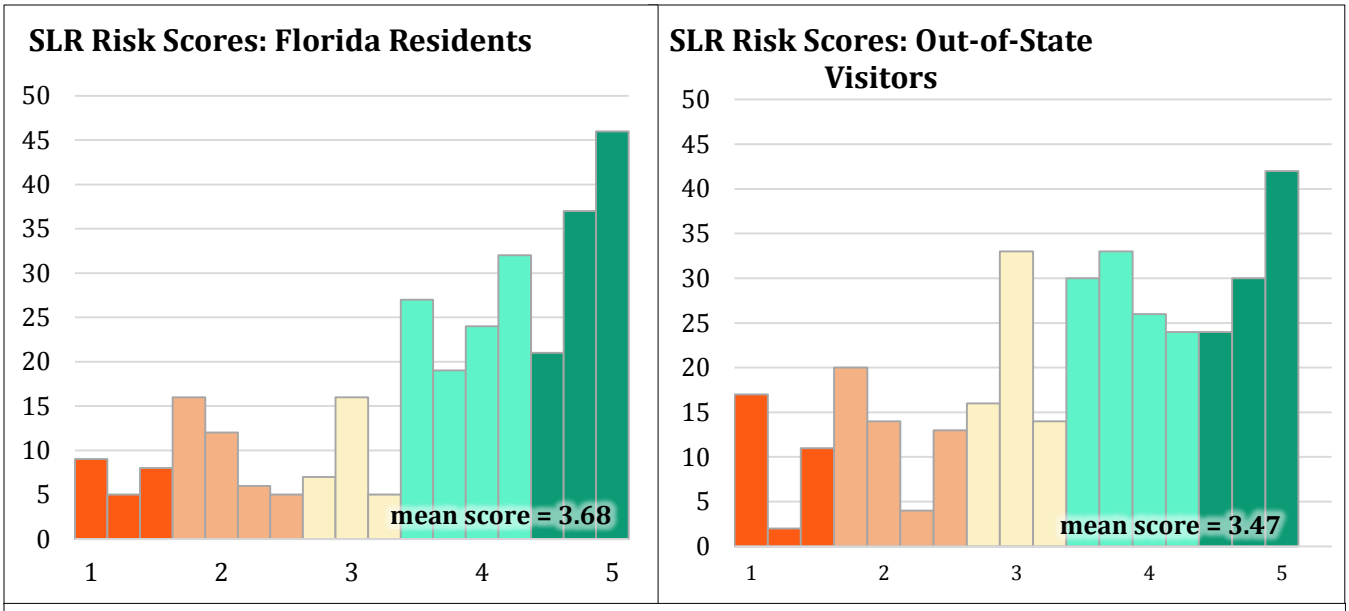


Figure 33. Distribution of mean SLR risk perception scores for Florida residents and out-of-state visitors. The scale ranges from one (low perceived risk) to five (high perceived risk).

Region – Respondents in the Northeast were more likely to indicate higher perception of SLR risk on two of the four SLR statements than respondents in the Panhandle. This resulted in Northeast beach users having significantly higher SLR risk scores than those in the Panhandle (Figure 34).

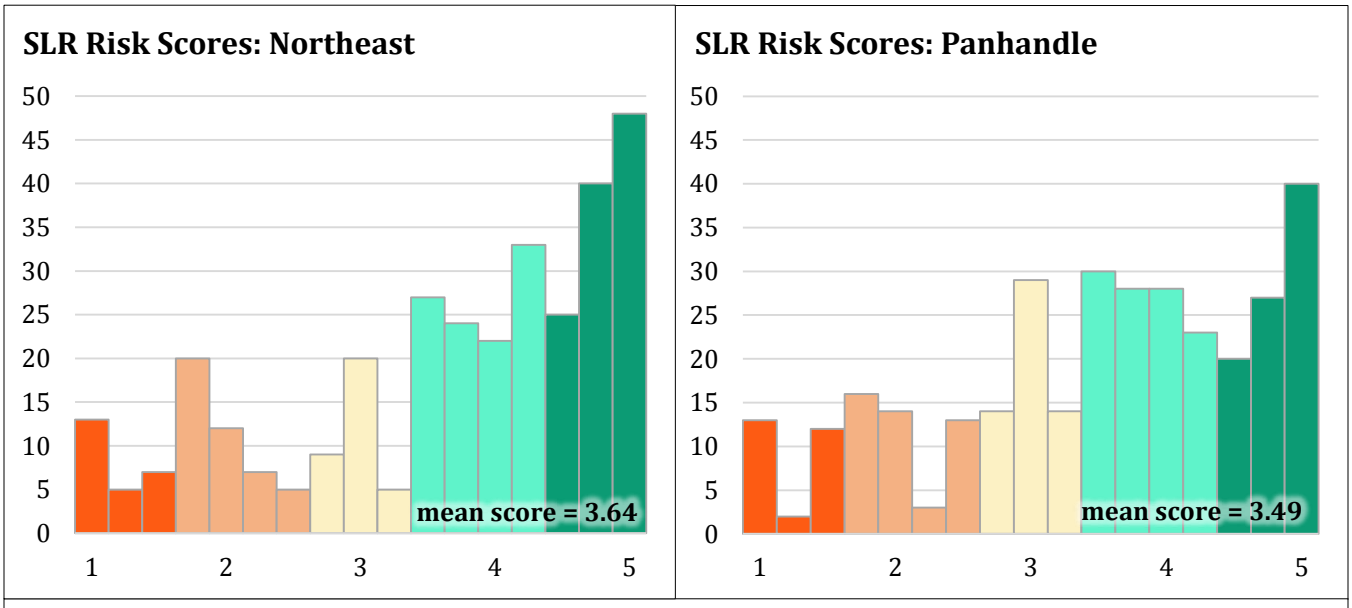


Figure 34. Distribution of mean SLR risk perception scores for each region. The scale ranges from one (low perceived risk) to five (high perceived risk).

Development level – Beach users' SLR risk perceptions did not differ significantly across beach development levels.

Q: Does a relationship exists between beach users' SLR knowledgeability and their perception of SLR risk?

A: *Demographics* – Differences in the relationship between SLR knowledgeability and risk perception were tested only for gender and Florida residency, as these were the only two demographic variables to which SLR knowledge and risk were significantly and meaningfully related. For all groups – males, females, Florida residents, and out-of-state visitors – an increase in SLR knowledge was generally associated with a statistically significant increase in perceived risk.

Region – The relationship between SLR knowledgeability and risk perception did not differ between the two regions.

Development level – A positive relationship between SLR knowledgeability and risk perception existed for all three development levels. However, differences in risk perception between the various levels of knowledge were only statistically significant at medium development beaches.

Conclusions

Survey conclusions are presented according to the three project objectives.

Objective 1. Assess beach users' awareness of and attitude toward the Public Trust Doctrine in terms beach ownership.

- The majority (57.6%) of respondents reported being "unaware" that the wet sand beach is almost always public. On the other hand, the majority (61.6%) of respondents reported being "aware" that the dry sand beach may be privately owned. Interestingly, respondents in the Panhandle were *more* likely to know that the dry sand beach may be private (Figure 18), yet *less* likely to know that the wet sand beach is almost always public (Figure 17).

- The majority (61.3%) of beach users reported that it was "somewhat" or "very fair" that owners of the dry sand beach may exclude the public from utilizing that area (Figure 9). Approximately 50% of beach users reported they would be "somewhat" or "very likely" to exclude the public from using their private dry sand beach if they owned beachfront property (Figure 9). An increase in perceived fairness was associated with an increase in likelihood to exclude. Respondents in the Panhandle tended to report higher perceived fairness and likelihood to exclude than those in the Northeast (Figures 19 and 21). Additionally, beach users at low development beaches tended to report the right to exclude as less fair than those at higher development beaches (Figure 20).

While exclusion of the public from the dry sand beach landward of the mean high tide line was very common at the Panhandle beaches, public exclusion did not exist at any of the Northeast beaches. As such, it is unsurprising that beach users in the Panhandle were more aware that the dry sand beach may be private. On the other hand, the fact that beach users in the Panhandle were less likely to know that the wet sand beach is almost always public suggests the need for greater public education regarding their rights under the Public Trust Doctrine.

There was a positive relationship between beach users' perceived fairness of public exclusion from the dry sand beach and their reported likelihood to exclude the public if they owned the dry sand beach. The fact that those in the Panhandle reported higher fairness and likelihood to exclude than those in the Northeast suggests that many beach users accept private ownership of the dry sand beach as an institution in the Panhandle. Conversely, in the Northeast beach users often conveyed that they had always assumed the beach was a public resource. Interestingly, the highest perceived fairness was found at Destin, where not only was the private beach most apparent due to signs and other trappings of ownership, but many respondents were using a beach that was evidently private.

Objective 2. Determine beach users' attitudes toward different erosion management methods, as well as the potential impact of eroding shorelines on their beach use.

- The majority (56.5%) of respondents reported that it "would not affect their visit" if the beach was one-half its current width. On the other hand, greater impacts on beach use were reported if the beach were one-quarter its current width, with about 45% of respondents reporting that they would go to a different beach (Figure 10). Current beach width had an effect on the level of impact reported by beach users. Specifically, the least impact at both half- and quarter-widths were reported at the widest beaches (Anastasia and Jacksonville), while the greatest impacts were reported at the narrowest beach (Ponte Vedra Beach).

- Beach nourishment was overwhelmingly the most strongly supported erosion management method. The majority of respondents also reported that they "somewhat" or "strongly support" retreat (54.2%), but "somewhat" or "strongly oppose" seawalls (59.4%) (Figure 11). Nourishment was also the most strongly preferred option, followed by retreat, and finally seawalls (Figure 12). Respondents for whom the beach was "not very important" in their decision to live in or visit the area tended to report higher preference for seawalls and lower preference for retreat than those who said the beach was increasingly important. Additionally, respondents who owned oceanfront property reported higher preference for seawalls and lower preference for retreat than those who owned property farther from the beach (Figure 27). Finally, respondents at low development beaches reported higher preference for retreat and lower preference for seawalls than those at medium or high development beaches (Figure 29).

The width of the beach depicted in the half- and quarter-width photographs was relative to the current beach width. As such, it is unsurprising that the current beach width played a role in the degree of impact that beach users reported, with the greatest impacts reported at the smallest beach (Ponte Vedra) and the least impacts reported at the widest beaches (Anastasia and Jacksonville). The fact that the majority of respondents reported that a one-half width beach would not affect their visit suggests that beach users' threshold of tolerance for beach erosion is relatively high, but that a demonstrable change in toleration occurs between one-half and one-quarter current beach width.

It is understandable that both oceanfront property owners and beach users for whom the beach was not very important were more likely to prefer seawalls to retreat. Beach users who do not highly value the beach itself may be expected to more strongly value other aspects of the coastal community, thus placing relatively higher priority on protecting coastal development in lieu of preserving the beach. Similarly, oceanfront property owners have a primary interest in protecting their investment, which is achieved with seawalls and not retreat. Finally, the fact that respondents at more strongly preferred retreat and less strongly preferred seawalls than respondents at more highly developed beaches suggests that beach users' values are related to the type of beach they choose to visit.

Objective 3. Understand beach users' knowledge and risk perceptions of SLR.

- The majority of beach users reported that they knew at least "a little" about SLR, with 25.3% knowing "a little," 29.5% knowing "some," and 7.9% knowing "a lot" (Figure 13). Males and Florida residents tended to report higher levels of SLR knowledge than did females and out-of-state beach users, respectively (Figure 30). Respondents at low development beaches and those in the Northeast region reported higher SLR knowledge than those at high development beaches and those in the Panhandle, respectively (Figures 31 and 32).

- The majority of beach users reported that they "somewhat" or "strongly agree" that in the next 50 years sea level is likely to rise (62.1%) and that its likely to threaten Florida's coastal development (69.0%) and beaches (72.0%). Respondents were divided as to whether they agreed or disagreed that SLR predictions are exaggerated (Figure 14). As with SLR knowledge, gender and Florida residency were the demographic variables most strongly related to perceived SLR risk, with females and Florida residents more likely to perceive SLR as a risk (Figure 33). The mean risk perception score on a scale of 1 (low risk) to 5 (high risk) was 3.57, indicating that beach users tend to perceive SLR as a moderate risk (Figure 15).

- In general, an increase in SLR knowledge was associated with an increase in perceived SLR risk.

Tidal gauges around Florida indicate that mean sea level has been rising throughout the twentieth century. If this pattern continues into the future, rising sea level has the potential to adversely impact coastal resources. The fact that Florida's beach users, on average, perceive SLR as a moderate risk to the state's beaches and coastal development suggests that there is public awareness of this potential threat.

There was a positive relationship between SLR knowledge and risk perception, with beach users who reported "some" knowledge having the highest average risk perception. While respondents who reported "a lot" of knowledge also had relatively high SLR risk perceptions, the group's average risk perception scores were diminished because many respondents who expressed strong skepticism of SLR reported that they knew "a lot" about it. This latter result, as well as some respondents' polarized attitudes toward the SLR questions observed by the interviewer, may be indicative of SLR's highly politicized nature and the importance of providing the public with SLR information based on the best-available science from an impartial and trusted source.

Recommendations

The following suggestions for extension education programs, constructive public policies, and future research directions are recommended:

- The fact that most beach users in the Panhandle knew that the dry sand beach may be private, but were unaware that the wet sand beach is almost always public, suggests **the need for better public education regarding public beach access rights** under the Public Trust Doctrine. Coastal communities should ensure that beach users are aware that they may still utilize the wet sand beach area seaward of the mean high tide line, especially at beaches where oceanfront property owners have installed signs or fencing to inhibit the public from using the private dry sand beach.

- Although the majority of Florida beach users believe it is fair that owners of the dry sand beach may stop the public from using it, many respondents added that while it is fair "because it is their property," owning the dry sand beach should not have been an option in the first place. As such, coastal communities should **take public input into account when considering options to balance private property rights with public use rights on beaches**.

- The majority of respondents reported that their visit to the beach would not be impacted if the beach was one-half its current width, but that a one-quarter width beach would decrease their enjoyment or cause them to go to a different beach. This suggests that there is a threshold of toleration for beach erosion before it begins to have adverse recreational impacts. As improved recreational capacity is one of the many factors involved in the decision to implement a beach nourishment project, coastal communities should **consider beach users' erosion toleration threshold when planning nourishment projects**.

- The fact that respondents at low development beaches more strongly preferred retreat and less strongly preferred seawalls than respondents at more highly developed beaches suggests that beach users' values are related to the type of beach they choose to visit. This finding illustrates that erosion solutions are not "one size fits" all. Coastal communities should **take the type of beach into account when determining the most appropriate erosion management strategy**.

- While most Florida beach users perceive SLR as a moderate risk to the state's beaches and coastal development, some respondents' polarized attitudes toward SLR observed by the interviewer were indicative of SLR's highly politicized nature. Given the politics of the SLR issue and the positive relationship between SLR knowledge and risk perception, **it is crucial that impartial and trusted sources provide SLR information based on the best-available science to the public.**

- Property ownership near the beach was related to both erosion management preferences and SLR risk. While differences appeared to exist between the perceptions of oceanfront property owners and those incrementally further from the beach, this project interviewed too few beach users owning property within one mile to make rigorous statistical comparison possible between groups. Future research should further investigate this relationship to **develop a better understanding of coastal property owners' perceptions of risk**, which may inform sustainable coastal development decisions.

- While the pros and cons of each erosion management method were explained to respondents, a limitation of this study is that cost of each management method was not presented. Considering that cost is often the most significant disadvantage of nourishment, the overwhelming support for nourishment found in this study may have been inflated. The **costs and funding mechanisms of each erosion management method should be incorporated into future investigations** of beach user perceptions.

Appendix A: Hard Copy of Survey Instrument

Q1 Hi, my name is Vanessa Dornisch and I am a graduate student at the University of Florida. As part of my thesis research, I am conducting a survey of visitors to Florida's beaches. The information collected through this survey will be used to better understand beach users' opinions on beach access, managing beach erosion, and sea level rise. The final results of the research will be made public and may help our leaders make decisions on how best to manage Florida's beaches. The survey should only take 10 minutes or less to complete. If you decide to participate, we won't record your name and so your answers will be completely anonymous. There are no "right" or "wrong" answers to the questions; I will ask you to just answer as best you can. You do not have to answer any questions that you do not want to, and you may stop this interview at any time without consequences. There are no direct benefits, compensation, or risks to participating. The only requirement is that survey participants be at least 18 years old. This card contains contact information if you have any further questions about this survey or your rights as a research participant.

Beach (observed by interviewer):
- ❍ Topsail Hill Preserve State Park (1)
- ❍ Dune Allen (2)
- ❍ Destin (3)
- ❍ Anastasia State Park(4)
- ❍ Ponte Vedra Beach (5)
- ❍ Jacksonville Beach (6)

First, I would like to ask you some questions about your use of this beach.

Q2 How often do you visit this beach?
- ❍ Weekly (1)
- ❍ Monthly (2)
- ❍ Yearly (3)
- ❍ Less than once per year (4)
- ❍ First time visitor (5)

Q3 On a scale of 1 to 10, how important is the beach in your decision to live in or visit this area? (One being not at all important and 10 being the most important factor).

Next, I am going to show you two photos of this beach. Please imagine how it would affect your use of this beach if it looked similar to the beach in the photo. Try to think only about the width of the beach, and ignore other factors such as the number of people on the beach, the weather, etc.

Q4 This photo of this beach has been digitally altered to depict how the beach may look if it was about one-half as wide as it is now.
- ❍ Would not affect my visit (1)
- ❍ Go to this beach, but with less enjoyment (2)
- ❍ Go to another beach (3)
- ❍ Unsure or undecided (4)

Q5 This photo of this beach has been digitally altered to depict how the beach may look if it was about one-quarter as wide as it is now.

- ❍ Would not affect my visit (1)
- ❍ Go to this beach, but with less enjoyment (2)
- ❍ Go to another beach (3)
- ❍ Unsure or undecided (4)

The next questions are about where you live.

Q6 Are you a resident of the state of Florida? This could be seasonal or permanent residency.

- ❍ Yes (1)
- ❍ No (2)

Q6a (If Yes) How many months of the year do you typically live in Florida?

- ❍ More than 6 months (1)
- ❍ 6 months or less (2)

Q6b (If No) Where are you visiting from?

- ❍ Domestic (1)
- ❍ Canadian (2)
- ❍ Overseas (3)

Q7 Do you consider yourself a local or a visitor to this beach? Or somewhere in between?

- ❍ Local (1)
- ❍ Visitor (2)
- ❍ Somewhere in between (3)
- ❍ Unsure or undecided (4)

Q8 Do you own any property within approximately one mile of this beach?

- ❍ Yes, oceanfront (1)
- ❍ Yes, within one-quarter mile (2)
- ❍ Yes, within one-half mile (3)
- ❍ Yes, within 1 mile (4)
- ❍ No (5)

The next part of the survey is about ownership of the beach, and how that affects public access. Everywhere along Florida's coast, the state owns the beach from the mean high tide line seaward. In other words, that area is almost always public. The rest of the sandy beach above the high tide line could be publicly or privately owned.

Q9 Were you aware that the beach area seaward of the high tide line (the wet sand beach) is almost always public in Florida?

- ❍ Yes (1)
- ❍ No (2)
- ❍ Unsure (3)

Q10 Were you aware that the dry part of the sandy beach may be privately owned?

- ❍ Yes (1)
- ❍ No (2)
- ❍ Unsure (3)

In some parts of the state, private beachfront property owners put up signs or fencing to keep people off of the sandy beach in front of their homes. Taking into consideration the legal aspects of beach ownership that we just discussed in the previous questions:

Q11 In your opinion, is it fair or unfair that private owners of dry sand beach can legally prevent people from utilizing the beach in front of their homes?

- ❍ Very unfair (1)
- ❍ Somewhat unfair (2)
- ❍ Unsure or Undecided (3)
- ❍ Somewhat fair (4)
- ❍ Very fair (5)

Q12 If you owned beachfront property in Florida, how likely is it that you would want to stop the public from using the sandy beach in front of your home, assuming you owned it?

- ❍ Very unlikely (1)
- ❍ Somewhat unlikey (2)
- ❍ Unsure or Undecided (3)
- ❍ Somewhat likely (4)
- ❍ Very likely (5)

Q13-16 The next questions are about sea level rise. I am going to read you four statements. Please tell me how much you agree or disagree with each statement. Remember, there are no right or wrong answers; I am just interested in your opinion.

	Strongly Disagree (1)	Somewhat Disagree (2)	Unsure or Undecided (3)	Somewhat Agree (4)	Strongly Agree (5)
The sea level is likely to rise significantly in the next 50 years. (1)	❍	❍	❍	❍	❍
Development along Florida's coast is likely to be threatened by sea level rise in the next 50 years. (2)	❍	❍	❍	❍	❍
Florida's beaches are likely to be threatened by sea level rise in the next 50 years. (3)	❍	❍	❍	❍	❍
Predictions of future sea level rise and its impacts are exaggerated. (4)	❍	❍	❍	❍	❍

Q17 How much would you say you know about sea level rise? (Note: The order in which Q13-16 and Q17 appeared was randomly switched).

- ❍ A lot (1)
- ❍ Some (2)
- ❍ A little (3)
- ❍ Very little (4)
- ❍ None (5)

The next part of the survey is about the different ways of managing and controlling beach erosion. Beach erosion is when sand is washed away from the beach by waves and currents, and the beach becomes smaller and smaller. In places with no human development along the shoreline, beach erosion is not a problem because the sandy beach can shift landward as the water rises higher on the beach. However, in most places the land directly behind the beach is developed, and that development is threatened by the ocean as the beach shrinks. I am going to explain three possible ways to react to beach erosion, and I would like you to please tell me your level of support or opposition for each.

Q18 One option is to build seawalls, which are protective walls of rock, metal, or another hard material in front of the development to protect it, blocking the movement of the beach. Keep in mind, this would not stop the erosion, so there may eventually be no beach. The ocean would come all the way up to the wall. But, the benefit is that development would be protected. (Note: The order in which Q18 and Q19 appeared was randomly switched).

- ❍ Strongly oppose (1)
- ❍ Somewhat oppose (2)
- ❍ Unsure or Undecided (3)
- ❍ Somewhat support (4)
- ❍ Strongly support (5)

Q19 Another option is to remove development along the beachfront and allow the beach to move landward to where the development previously was. Keep in mind, this means that homes, businesses, and roads would have to be removed and relocated. But, the benefit is there would still be a beach. (Note: The order in which Q18 and Q19 appeared was randomly switched).

- ❍ Strongly oppose (1)
- ❍ Somewhat oppose (2)
- ❍ Unsure or Undecided (3)
- ❍ Somewhat support (4)
- ❍ Strongly support (5)

Q20 A third option is to add sand to the beach through what are called beach renourishment projects. Usually, sand is taken from miles offshore and pumped onto the beach to make it wider. Keep in mind, this is considered a temporary solution because the sand may be washed away over time and need to be replaced. But, the benefit is that development is protected and there would still be a beach.

- ❍ Strongly oppose (1)
- ❍ Somewhat oppose (2)
- ❍ Unsure or Undecided (3)
- ❍ Somewhat support (4)
- ❍ Strongly support (5)

Q21 Next, I would like you to rank the three beach erosion management methods we just discussed from most preferred (1) to least preferred (3).

Finally, I just have a few questions to be sure our sample is representative.

Q22 Gender (observed by interviewer):
- ❍ Male (1)
- ❍ Female (2)

Q23 What year were you born?

Q24 What is the highest level of education you have completed?
- ❍ Middle School (1)
- ❍ High School (2)
- ❍ Associate's Degree (3)
- ❍ Bachelor's Degree (4)
- ❍ Graduate School (5)

Q25 What is the zip code of your primary residence?

Thank you so much for taking the time to complete my survey. The funding for this research is from the National Sea Grant Law Center and is part of a project to create a website that outlines public rights to access Florida's beaches and waterways. Do you have any questions or comments?

Appendix B: Digitally-Altered Beach Width Photos

NORTHEAST

JACKSONVILLE BEACH

half-width

quarter-width

NORTHEAST

PONTE VEDRA BEACH

(MICKLER'S LANDING ACCESS)

half-width

quarter-width

NORTHEAST

ANASTASIA STATE PARK

half-width

quarter-width

PANHANDLE

DESTIN

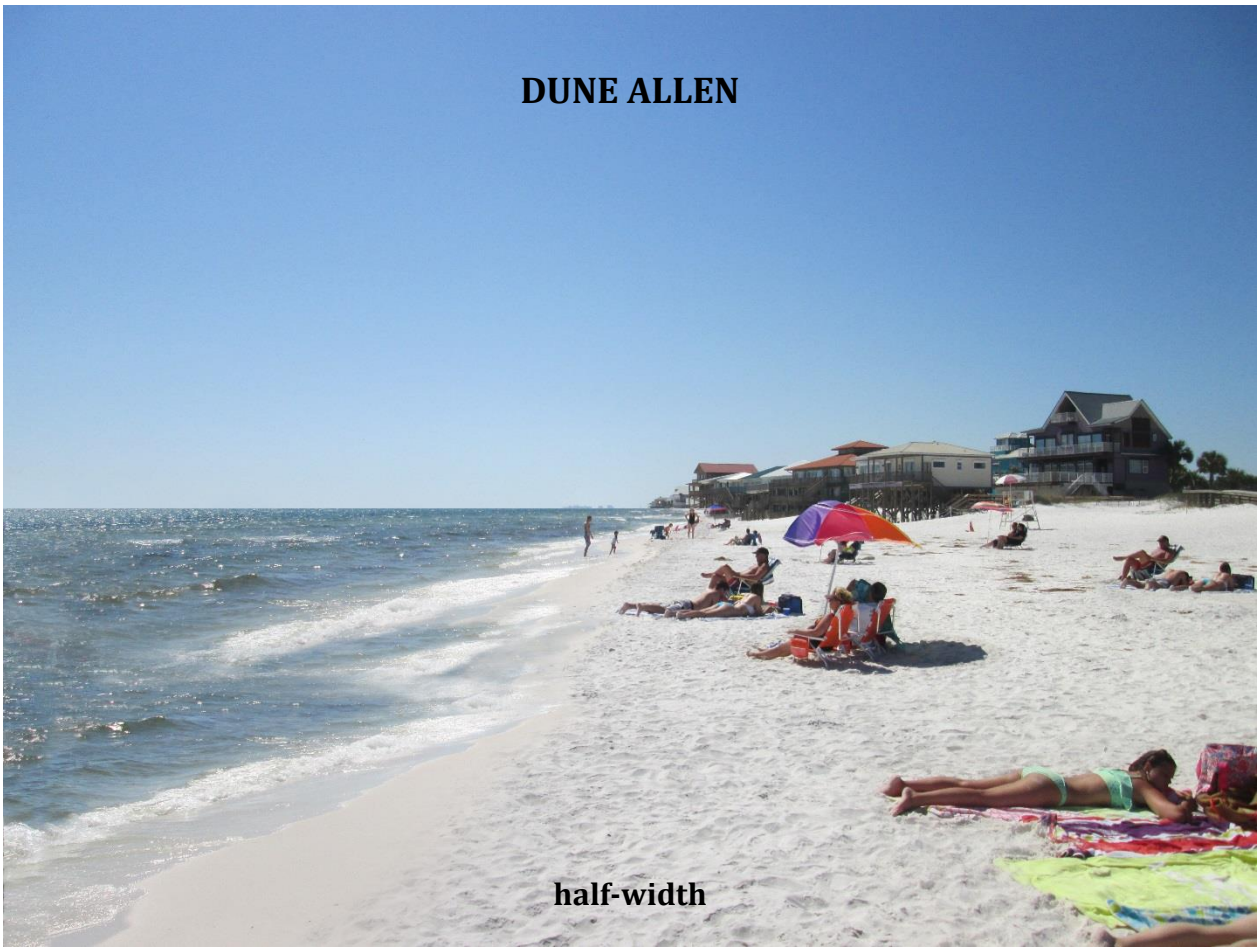
(SILVER SHELLS ACCESS)

half-width

quarter-width

PANHANDLE

DUNE ALLEN



half-width

quarter-width

PANHANDLE

TOPSAIL HILL PRESERVE STATE PARK

half-width

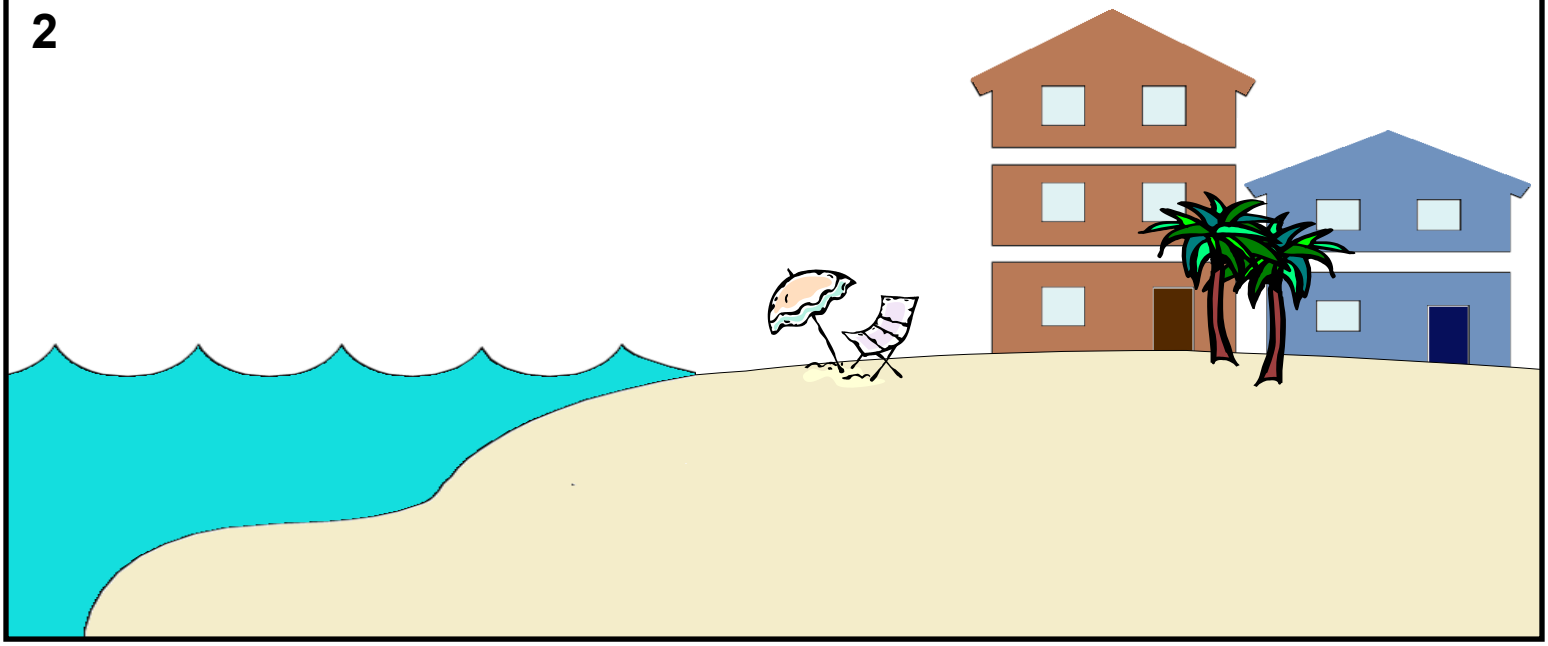
quarter-width

Appendix C: Erosion Management Method Diagrams

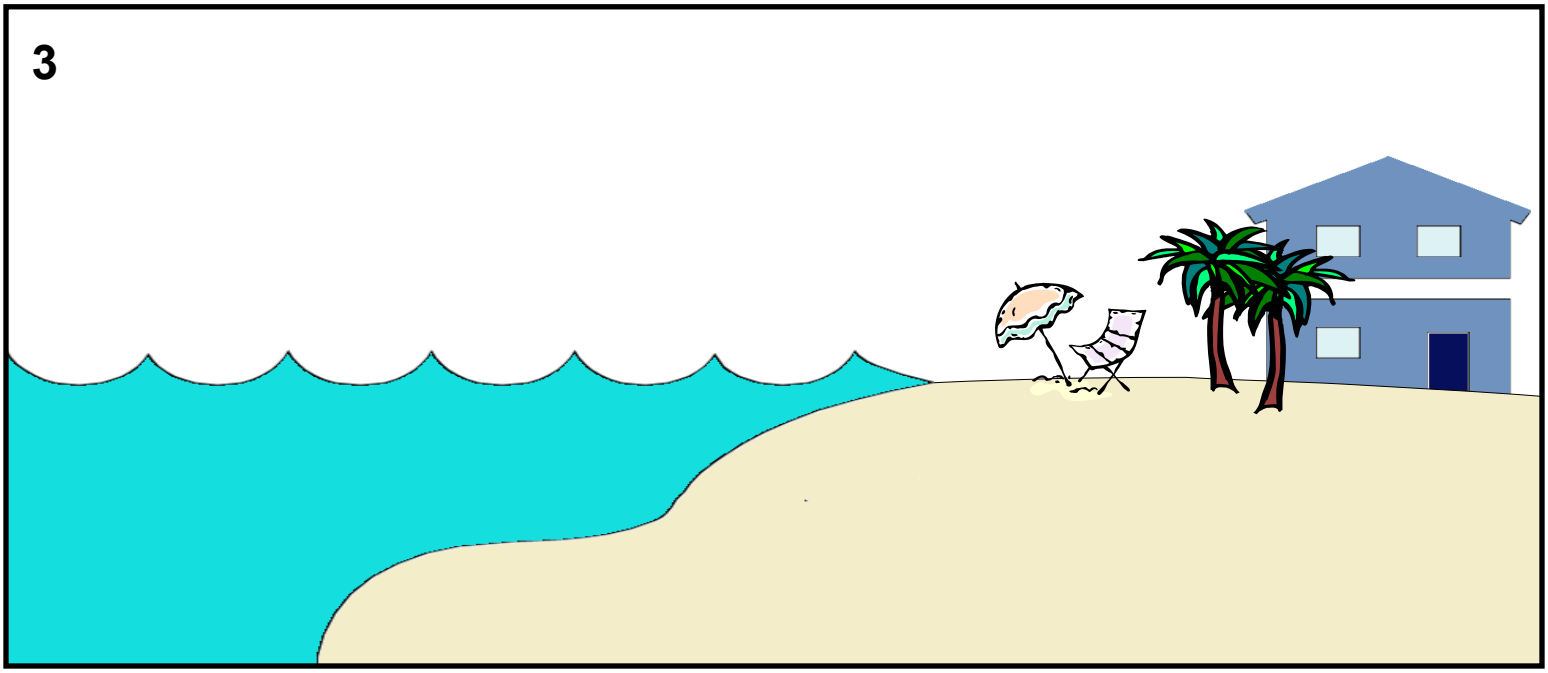
MANAGED RETREAT

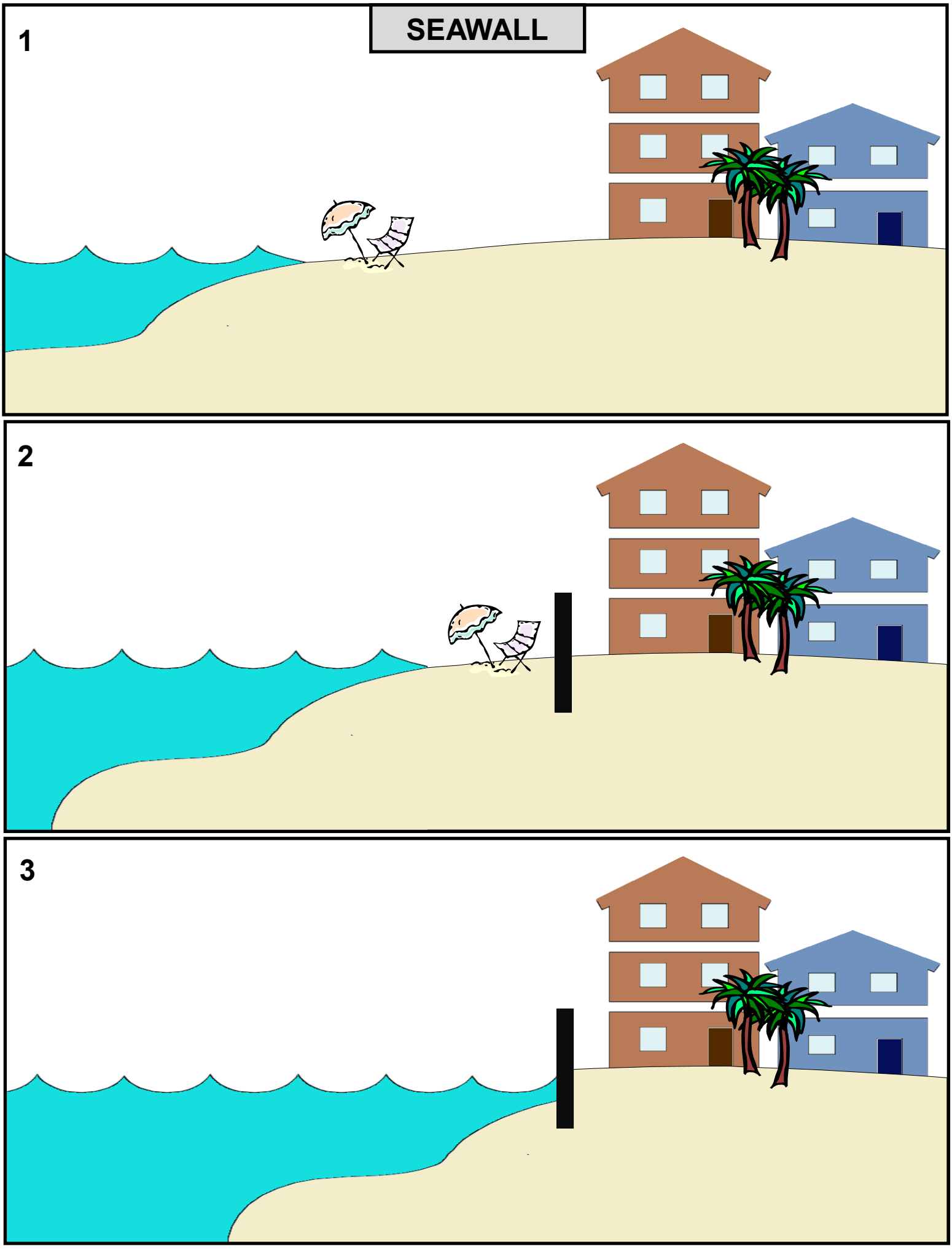
1

2



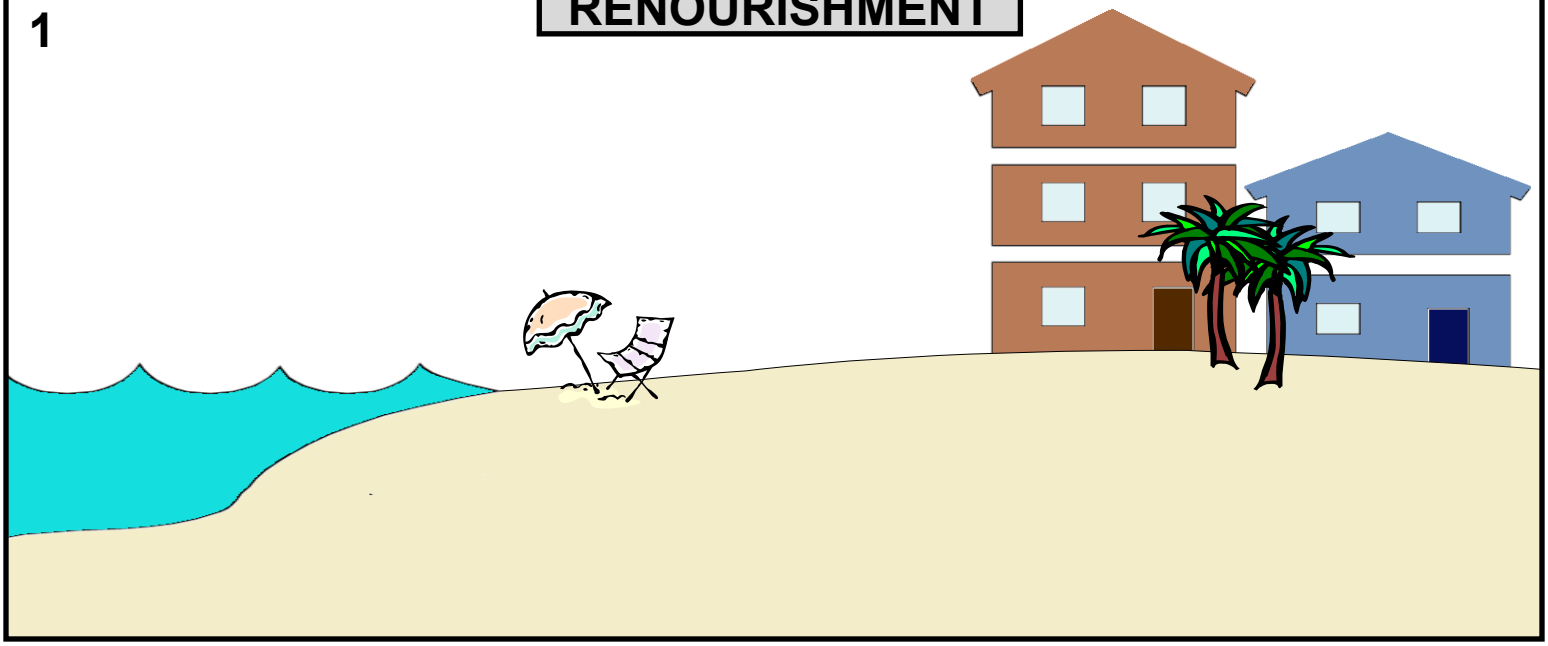
3



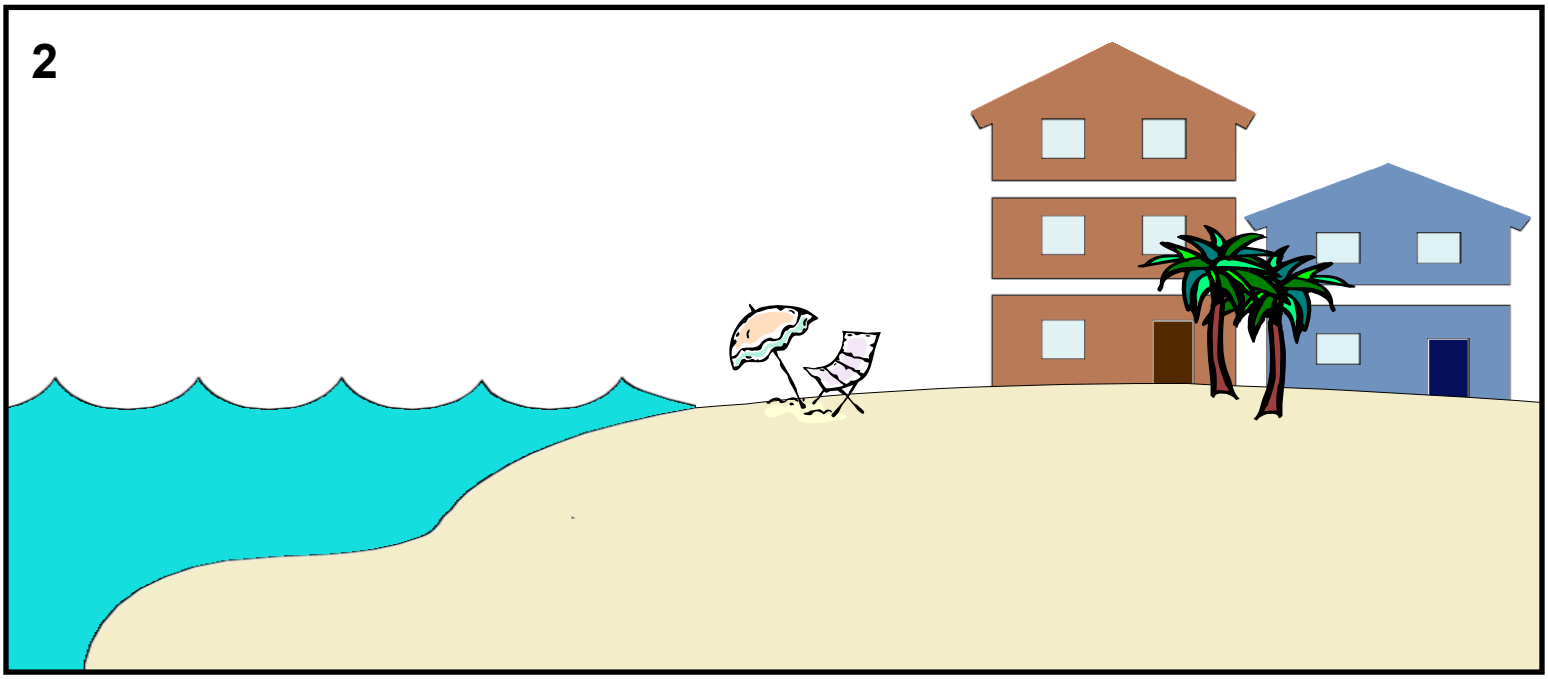

SEAWALL
1
2
3

RENOURISHMENT

1



2



3