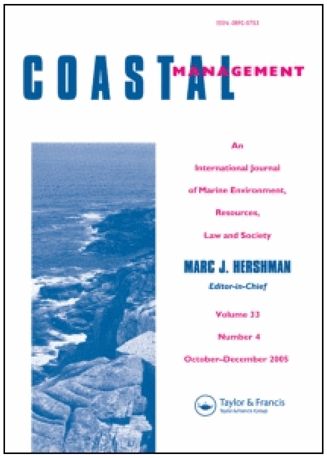

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Visitor Preferences for Public Beach Amenities and Beach Restoration in South Florida

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Visitor Preferences for Public Beach Amenities and Beach Restoration in South Florida

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Coastal erosion threatens many sandy beaches and the ecological, economic, social and cultural amenities they provide. The problem is especially chronic in South Florida. A frequent solution for beach restoration involves sand replacement, or nourishment, but is temporary, expensive, and has usually been funded by governmental sources. However, as such agencies reduce their share and require more local funding, beach nourishment must rely on other funding sources, including beach recreationists. Our study characterized three South Florida beaches and probed visitor willingness-to-pay for beach nourishment. We found that even beaches within close proximity attract different user types. Users are amenable to higher fees if they lead to greater resource protection.

Keywords beaches, coastal policy, contingent valuation, nourishment, South Florida

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Introduction

Coastal erosion is increasingly a public policy concern, as development proceeds apace in littoral areas (Heinz Center, 1999). Coastal restoration and enhancement has become important as coastal resources and space become more limited. Artificial inlets and coastal development have jeopardized beaches, which exist in a dynamic state of sand accumulation and loss. Beach nourishment can be thought of as a soft stabilization approach to erosion control, rather than the hard stabilization approach, which includes the construction of seawalls or jetties and actually accelerates erosional processes. Since the first inlets were created in the early 20th century, coastal sand transport that would have replenished beaches is now blocked from redeposition. Reinforcement features, such as seawalls and groins, have only interfered with the natural process, and they have led to additional, localized erosion events. Coastal development has displaced stabilizing features with beachfront properties.

The threat of coastal erosion in Florida is a significant economic concern because of the considerable recreational and flood protection benefits that its beaches offer. The shorefront region provides many recreational amenities for its residents and visitors, and Florida's natural coastline, which contains almost 800 miles of sand beaches, is one of the states most important economic assets. Beaches generate over $15 billion of revenue for Florida's economy, through sales, taxes, and payroll creation (BNHI, 1994). The beaches also provide essential ecological functions, buffering the Florida coastline via sedimentary protection, linking mangrove and coral reef ecosystems, providing habitat for several hundred species of animals and plants, and serving as nesting sites for endangered reptiles and birds. However, Florida's beaches are disappearing faster than many other state natural resources. An estimated third to a half of all Florida beaches are critically eroded[1] (Schmidt & Woodruff, 1999), and almost all of Miami-Dade County's beaches fall under that category (Clark, 1989). Over 18 miles of Miami-Dade County are eroded, of which 17 miles are critically eroded (Bureau of Beaches and Coastal Systems, 2002).

Beach nourishment offers a temporary but expensive solution—about $6 million per mile (Florida Department of Community Affairs, 1996)—therefore, raising important issues of who should pay and how much. Since 1950, the federal government has spent $1.5 billion on beach nourishment and has already committed an additional $1.3 billion to future projects (Sudar et al., 1995). Roughly one of every three federal dollars for beach erosion control and storm damage control is spent in Florida (Schmidt & Woodruff, 1999). The Water Resources Development Act of 1999 reduced the current federal cost share for beach nourishment, making the cost and distributional issues more contentious (NRC, 1995).

Beach nourishment in Florida warrants a notable case study given the high proportion of federal beach nourishment dollars spent in Florida and the importance of beaches to the state's economy (e.g., Schmidt & Woodruff, 1999; Letson & Milon, 2002). The beaches of South Florida in particular are an essential component of the region's ecology, economy, and culture. Many beaches in Dade County provide shelter and nesting sites to endangered sea turtles, including the loggerhead sea turtle *(Caretta caretta)* (Cheeks, 1997). The adjacent, submerged parts of the beaches house juveniles of dozens of recreational and commercial species. Millions of visitors use Miami-Dade County beaches annually; foreign tourists spend over $2 billion in Miami Beach alone every year (NRC, 1995). The regional beaches also help sustain South Florida's cultural identity.

We explore a South Florida case study (Key Biscayne/Virginia Key) in order to examine how variations in amenities and visitor types across beaches influence visitors' willingness to pay for beach protection and to determine whether nonrecreational issues such as sea turtle habitat might also influence visitors' preferences.

A History of Beach Nourishment

To understand how current policy debates are motivating interest in beach nourishment, we review the history of this approach to coastal erosion protection. Beach nourishment was first performed in Coney Island, New York, in 1922–1923 (NRC, 1995). Since then, it has developed into a periodic activity funded by various governmental agencies at the federal, state, and local levels. Although several projects have been performed unilaterally at the various governmental levels and by private interests (Pompe & Rinehart, 2000), the most commonly utilized model that has evolved involves cost sharing between the federal government and state and/or local agencies. However, over the past decade, the amount furnished by such state and local sources, especially in Florida, has been reduced to a point such that future projects may receive federal funding only if local sponsors can bear a higher percentage of the costs.

The Federal Role

The federal role in beach nourishment has oscillated between two major trends of federal cooperation and funding. The federal role was effectively created when Congress enacted Public Law 71-520 (33 USC sec. 426), which authorized the U.S. Army Corps of Engineers (ACE) to work with state agencies in developing shore erosion studies. In the 1930s, the ACE's Beach Erosion Board (BEB) cooperated with state and local governments in the construction of mostly hard structures (such as bulkheads) to combat erosion (NRC, 1995).

Following World War II, the ACE's approach to combatting beach erosion shifted from hard structures toward the replacement of sand (American Coastal Coalition, 2000). Since 1950, the ACE has sponsored 82 beach nourishment projects and paid \$881 million of the \$1.49 billion spent on those projects (Pompe & Rinehart, 2000). Also, legislation in the postwar years increased federal aid to construction projects. Public Law 79-727 (33 USC sec. 426e) in 1946 mandated federal aid in beach construction costs where projects protected publicly owned shores. In 1956, under Public Law 84-826, federal funds could be spent on the periodic nourishment of sand when it was found to be a more suitable and economically feasible measure than hard structures, and funds could be spent on the protection of private property if such protection were incidental to the protection of public shores (33 USC sec. 426e). By 1962, the total costs of shore protection studies were borne by the federal government (33 USC sec. 426e).

From the 1980s to the present, there has been a dramatic shift in the federal funding framework. Congress passed the Coastal Barriers Resource Act in 1982 (16 USC sec. 3501 et. seq.) and the Coastal Barrier Improvement Act in 1990 (16 USC sec 3503; American Coastal Coalition 1999; NRC, 1995). This program denied financial assistance for most new beach projects on coastal barrier islands to prevent development and reduce federal subsidies. In 1986, under the Water Resources Development Act (33 USC sec. 2201 et. seq.), the federal role in funding was reduced further. This Act recognized storm damage reduction and/or recreation as the primary purposes of shoreline protection projects, and it reduced the share of construction costs borne by the federal government, as well as lowering the federal share of feasibility studies to 50%. Finally and most recently, the Water Resources Development Act of 1999 established a trend to reduce federal cost share and place more of the responsibility on the state and local governments (33 USC sec. 2213). Under the act, nonfederal sponsors are obligated to pay 40% for all projects authorized after January 1, 2001 and 50% for all projects authorized after January 1, 2003 (33 USC sec. 2213 (d) (2)).

The State of Florida Role

The state government has taken an active role in beach nourishment activities since 1957, when the Florida Legislature authorized the Florida governor and the Cabinet, acting as the Trustees of the Internal Improvement Fund, to serve as the erosion agency (Schmidt & Woodruff, 1999). In 1961, the Legislature passed the historic Beach and Shore Preservation Act (Florida Statutes Chapter 161) that formalized the protection and use of shore resources. In 1963, the Legislature created the Division of Beaches and Shores, as well as an Erosion Control Account that was to be used to disperse cost-sharing funds to support beach nourishment and restoration (Schmidt & Woodruff, 1999).

The selection process for the allocation of funds changed from a legislatively prioritized system to a ranked priority framework in 1982; however, the Legislature did still fund projects that were not processed under the priority framework (Schmidt & Woodruff, 1999). When erosion levels continued to increase throughout the 1980s and 1990s, the Legislature created a dedicated beach-funding program, administered under the Florida Department of Environmental Protection by the Office of Beaches and Coastal Systems.

The beach-funding program, which dedicates a maximum of $30 million in 2000–2001 and every subsequent year to the Ecosystem Management and Restoration Trust Fund, makes funds available for beach restoration and nourishment projects based on a priority order (Schmidt & Woodruff, 1999). Under the program, the state shall fund up to 50% of all construction and monitoring activities related to beach nourishment and restoration within beach sites that fulfill priority criteria and are located in an area that has been designated as a critical erosion area (as defined by the Florida Department of Environmental Protection). The remainder of the funding is to be procured by the local sponsor and may include ACE support. Priority criteria to secure funding for beach nourishment projects include severity of erosion, economic and environmental benefits, project performance, available federal funding, whether the site is a demonstration project, state commitment, and local commitment. Thus, the approval of state funding is partly contingent upon whether the nourishment project has other sources of funding available (Florida Department of Environmental Protection, 2000).

Estimates of the Economic Value of Beach Access

Some researchers have questioned whether the review process for beach nourishment proposals creates incentives to underestimate sand needs and costs in general (e.g., Pilkey, 2000). What makes coastal erosion control an increasingly contentious issue is both the value of the resources in question and the manner in which we share them. Because the beaches in question are usually public resources, decisions regarding beach nourishment are nearly always public ones. Of particular concern is, first, the efficiency issue of whether a given project is worthwhile, meaning project benefits sufficiently in excess of costs; and second, the distributive issue of who pays these costs and who receives these benefits. Economics has attempted to address these very issues, particularly the former (e.g., Appendix E in NRC, 1995).

A growing economic literature exists estimating the value of beach access but is surprisingly small considering the high levels of participation in beach recreation and the high cost of beach protection (Freeman, 1995). That literature includes estimates of the value of beach access (which vary over a surprisingly wide range), how those values might be influenced by water quality degradation in general and oil spills in particular, and how beach nourishment can enhance beach use values.

A number of researchers have estimated beach access values, both in Florida and elsewhere. Bell and Leeworthy (1990) used a travel cost model to estimate the value of Florida's beaches to out-of-state visitors. Leeworthy and Wiley (1991) use a travel cost model to estimate recreational use values for Island Beach State Park on the central New Jersey coast. Silberman and Klock (1988) and Silberman, Gerlpwski, and Williams (1992) used contingent valuation bidding games to estimate recreational and existence values for beaches in northern New Jersey. Parsons, Massey, and Tomasi (1999) used a random utility model with an endogenous choice set to estimate recreational benefits to Delaware residents from access to 62 beaches between Sandy Hook, NJ, and Assateague Island, VA.

Several other studies have estimated the contribution of water quality to beach recreation. Feenberg and Mills (1980) and Bockstael, Hanemann, and Kling (1987) used random utility models to estimate increased use values from reductions in water pollutants at Boston-area beaches. McConnell (1986) used travel cost and contingent valuation approaches to estimate lost beach recreational use values from PCB contamination in the harbor of New Bedford, MA. Bockstael, McConnell, and Strand (1989a) used travel cost and contingent valuation approaches to estimate the value of water quality for Chesapeake Bay beach use. Smith, Zhang, and Palmquist (1997) used a contingent valuation approach to estimate enhanced beach recreational use values from controlling marine debris at North Carolina and New Jersey beaches. Murray, Sohngen, and Pendleton (2001) used a travel cost model to estimate the value of reducing water quality beach advisories in the Great Lake beaches located along Lake Erie's Ohio shore.

In at least two instances, estimates of beach recreational use values have helped determine damages to beaches from oil spills. The Florida Department of Environmental Protection used a random utility model to estimate the lost use values associated with a 1993 oil spill that damaged 13 miles of beaches in Pinellas County, near Tampa, and received a $2.5 million damage settlement (Bell, 2002). To assess lost use values associated with an oil spill from the tanker *American Trader* off Huntington Beach, CA, in 1990, trustees used a benefits transfer approach and ultimately secured a jury award of $11.42 million (Leeworthy & Wiley 1993; Chapman, Haneman, & Rund, 1998; Dunford, 1999).

At least 4 published economic studies have addressed the particular topic of beach nourishment. Landry, Keeler, and Kriesel (2003) use a hedonic price model to estimate the benefits of beach erosion protection, including beach nourishment to property owners in Tybee Island, GA. Bell (1986) used contingent valuation to evaluate enhanced recreational benefits to Florida residents from hypothetical nourishment projects at 24 Florida beaches. In their study of Delaware beaches, Parsons and Powell (1998) stated that in densely developed areas, such as Ocean City, MD, and Miami Beach, FL, economic research suggests that the estimated costs of beach nourishment tend to be justified by measurable benefits. However, the Heinz Center study found that annual expected erosion damages exceeded nourishment costs in only one of the ten Atlantic and Gulf coast counties they considered. Clearly, beach nourishment has a much greater chance of passing a benefit/cost test in high-density areas. Another study, Pompe and Rinehart (1999), used a hedonic price model to estimate enhanced recreational and flood protection benefits from beach nourishment at Seabrook Island, SC. Since beach access on Seabrook Island is limited to its landowners, this study was notable in its ability to indicate how beach protection benefits would be distributed, as a possible guide to who should pay project costs.

Surveys such as Freeman (1995) cited the dearth of economic estimates of beach recreational benefits and the need for benefits transfer. While the transfer of recreational benefits per person per day can be done reliably (e.g., Downing & Ozuna, 1996), with professional judgment (for online guidance, see http://www.marineeconomics.noaa.gov), the current capability to transfer benefits that are sensitive to policy changes is quite limited. Beach recreational value estimates, and their sensitivity to policy variables such as nourishment, must be linked to the particular resources and users in question. To address the need for economic analysis of beach recreation in South Florida, we use a contingent valuation approach to estimate enhanced recreational use values from hypothetical beach nourishment for Key Biscayne/Virginia Key beaches. While we seek general information about visitor preferences for beach amenities, our specific hypothesis of interest is that respondents will offer a higher willingness to pay when they are aware that turtle nesting habitat is among the recreational amenities enhanced by beach nourishment.

The Study Area: South Florida Beaches

Key Biscayne is the southernmost barrier island on the lower east coast of South Florida, containing a 4.3-mile beach system along its eastern seaboard (Blank, 1996; Srinivas & Taylor, 1996). Two of these beaches, located within Crandon Park (under the jurisdiction of Miami-Dade County) and Bill Baggs Cape Florida State Recreation Area, are important recreational destinations for local residents as well as tourists. Crandon Park beach extends 1.9 miles, and the beachfront of Bill Baggs extends 1.2 miles. Both beaches face the Atlantic Ocean. A third location, Hobie Beach, is situated along Virginia Key, the island immediately to the north of Key Biscayne. Created as a result of a fill during the construction of the Rickenbacker Causeway in the 1940s, Hobie Beach (divided between the City of Miami and Miami-Dade County) is an extremely narrow, 2-mile recreational area abutting Biscayne Bay. Please refer to Figure 1 for a map of all three beaches and the study area.

South Florida beaches have been exposed to severe erosion events. Sections of Virginia Key and Crandon Park were restored as part of a federally authorized beach erosion control project in 1969, and portions of Bill Baggs were restored under another federally authorized project in 1987 (Srinivas & Taylor, 1996).

Study Methodology

This research project used a direct questionnaire study that solicited information from beach visitors at the three Key Biscayne/Virginia Key sites. The study utilized contingent valuation (CV) in a survey format to determine the value that visitors place on beach restoration at the three locations. The questionnaire (Appendix I) consisted of 12 questions probing users on their reasons for visiting a particular site, its amenities, their most frequent activities, and their willingness to pay for beach restoration based on increased recreational opportunities versus resource protection (CV questions on recreational opportunities versus resource protection were asked alternatively of each survey participant).

The questionnaires were performed on a bimonthly basis (one weekday/one weekend day) at each site for a period of a year in order to reach the seasonal, foreign, in and out of state visitors, and local residents that use the beaches. We were prepared to conduct the interviews in either English or Spanish and allowed the respondents to choose between the two. To standardize effort, surveys were conducted between 11 a.m. and 4 p.m., and every other person was surveyed. On each beach, the survey conductor worked for a period of two hours or until the surveyor reached the end of the beach (whichever came first). Surveys were not conducted if there was rain or a threat of rainfall. The surveys were conducted exclusively by graduate students from the Division of Marine

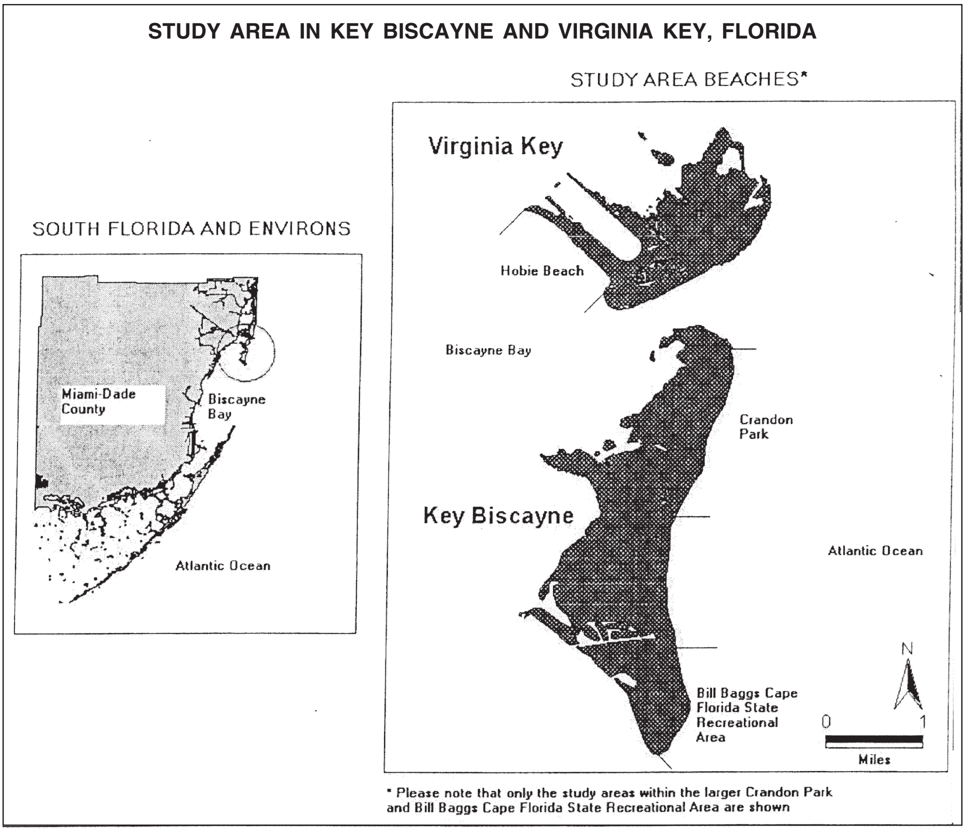

Figure 1. Study area.

Affairs at the University of Miami who had been trained in the classroom on the economic concepts of CV and who demonstrated an aptitude for field research.

The survey commenced in November 1998, and continued through December 1999. Students conducted two survey visits per beach monthly, one each on weekdays (Mondays–Thursdays) and weekends (Fridays–Sundays). Figure 2 shows surveys completed by month.

Following a short pilot session in November and December 1998, surveys were conducted regularly for each beach from January through June 1999. However, with the onset of a heavy rainy season (in July 1999) and an exceptional hurricane season (including landfall by Hurricane Irene on October 15, 1999, and significant threats from Hurricane Floyd and others), survey sessions had to be curtailed or even abandoned. As can be noted in Figure 2, the number of surveys decreased drastically after June 1999.

Overall, 1,587 surveys were completed. Most surveys (35.2%) were conducted at Bill Baggs, and 32.3% and 32.5% were conducted at Hobie Beach and Crandon Park, respectively. Table 1 presents the breakdown on survey totals by beach.

Results

Results are presented for all beaches, as well as each individual beach, in the following sections: demographic information, beach preference and quality findings, and willingness-to-pay totals. Significant differences among beaches are reported wherever applicable.

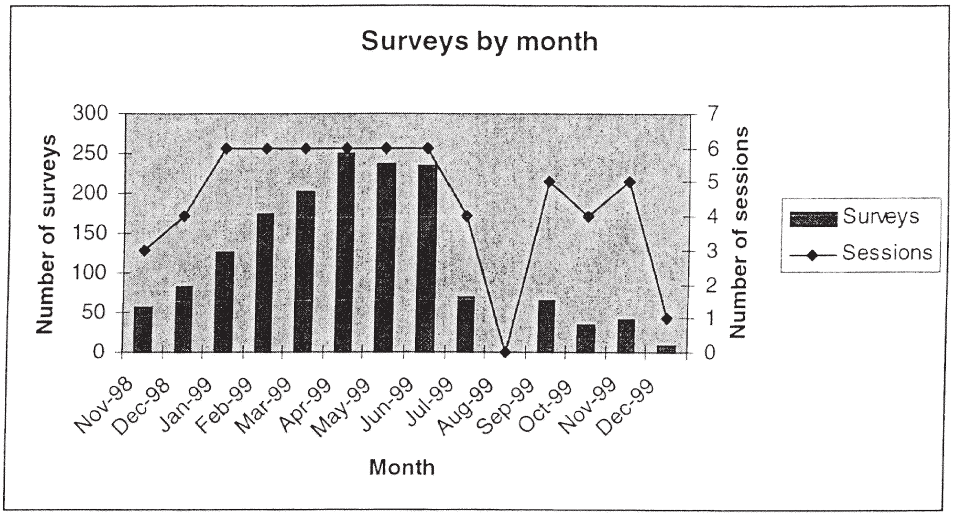

Figure 2. Number of surveys conducted per month.

Demographic Information

Respondents were asked to provide basic demographic information to determine their age group, domicile, preferred activities, expenses, and frequency of visits.

The average age category for all visitors was 26–45 years old, and over 82% of the respondents were under 45 years old. The three beaches differed in the age group that they attract, as the age group means for both Hobie Beach and Crandon Park visitors were significantly lower than the mean for Bill Baggs (Kruskal-Wallis Test; $p < 0.01$). As Figure 3 demonstrates, there is a lower percentage of younger visitors at Bill Baggs (26–45 years old) than at the other two sites, as well as a greater percentage of visitors over 55 years old. This disparity in ages may be a reflection of the amenities offered by Bill Baggs, which contains the historic Cape Florida lighthouse and a full menu cafe, as well as other monetary and recreational factors.

A majority of the visitors surveyed do own their homes (almost 54%), and that percentage is higher for visitors going to Crandon Park (60%) and Bill Baggs (55.8%) than those going to Hobie Beach (51.6%). Almost 85% of the visitors travel in groups of five or smaller, and the most common visitor size is two (31.6%). Typically, the average visitor size is larger at Bill Baggs (3.8 persons) than at Crandon Park (3.5 persons) or Hobie Beach (3.0 persons).

Table 1
Survey totals by beach

	Surveys (number)	Surveys (%)	Weekday/weekends (%)
1. Hobie Beach	512	32.3	48.4/51.6
2. Crandon Park	516	32.5	39.3/60.7
3. Bill Baggs	559	35.2	44.2/55.8
Total	1587		44.0/56.0

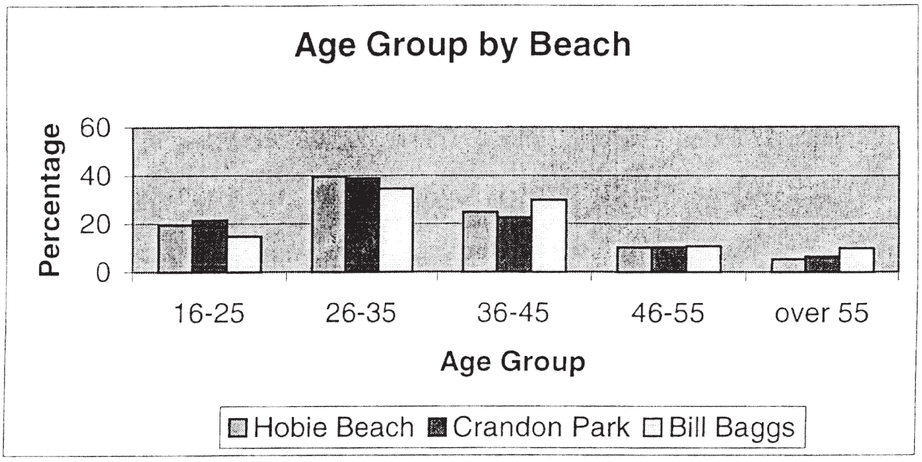

Figure 3. Age of visitors by beach.

In terms of residency, 79.1% of the beach visitors surveyed are Florida residents, and 67.9% are residents of Miami-Dade County. A total of 11.2% are foreign visitors, while an almost equal amount, 9.4%, are visitors from other parts of the United States. Figure 4 presents the residency of visitors by beach.

As Figure 4 shows, the percentage of Miami-Dade visitors is highest at Hobie Beach, where locals comprised over three-quarters (76.2%) of the population. A higher percentage of locals used Hobie Beach than Crandon Park (62%) or Bill Baggs (65.5%). Conversely, participation from foreign and other U.S. visitors is lower at Hobie Beach when compared with visitation rates at the other two beaches. These percentages demonstrate the differences in visitor types among the three beaches, and they suggest that Hobie Beach represents a more local beach, whereas Crandon Park and Bill Baggs attract more visiting tourists.

Average income levels for Miami-Dade visitors, as implied by their zip codes, also varied between beaches. We used the respondents' zip code to determine median income for that zip code from the U.S. census. Our "average median income" is a simple

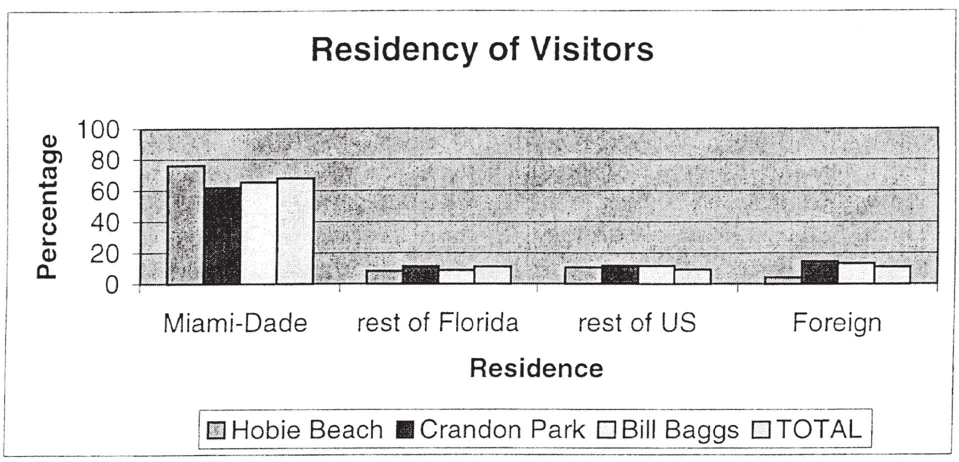

Figure 4. Age of visitors by beach.

average of these median incomes across all visitors of each site. Although the average median income for the entire sample was $33,726, it was only $30,742 among Miami-Dade residents visiting Hobie Beach. The average incomes were higher for both Crandon Park and Bill Baggs, at $36,000 and $34,857, respectively. The income differences by site are significant at a 95% confidence level, according to an ANOVA F test (critical $F = 3.00$ versus calculated $F = 17.66$).

To determine the activity profiles of visitors, respondents were asked whether they had participated in a variety of activities over the past month. Table 2 presents the percentage that participated in each activity type.

As shown in Table 2, the most popular activities for the respondents included swimming, sunbathing, and walking. A greater percentage of Hobie Beach visitors participated in activities such as sunbathing, jet-skiing, and fishing than their counterparts at the other two beaches. The Hobie Beach population includes more local residents who probably have had more opportunities to participate in beach-related activities over the past month.

Most visitors (81.7%) going to one of the three beaches spent $30 or less on their visit, and only 1.7% spent more than $100 per trip. However, there are differences in expenditures between beaches. Bill Baggs visitors spent more than did visitors to Hobie Beach or Crandon Park; this difference may be related to the fact that the entrance fee to Bill Baggs is the highest among all three sites, that Bill Baggs is located at the furthest end of the island, and that visitors may expend more than what they would for a simple beach visit due to the location's Cape Florida Lighthouse and the restaurant.

Finally, almost 28% of all respondents were seasonal or first-time visitors to the site in which they were interviewed, and 22.8% only visited the site a few times a year. The remaining half visit the site between one and over five visits per month, and the most common response was 2–5 times per month. These results suggest two types of beach goers: occasional or seasonal visitors and repeat visitors. When visitation rates are compared across beaches, as shown in Figure 5, more beach-specific differences are evident.

Figure 5 demonstrates additional differences in visitor types to the three beaches. There are fewer seasonal or first-time visitors to Hobie Beach (17.6%) than to Bill Baggs (32.2%) or Crandon Park (33%). As visitation rates increase, there are more frequent visitors to Hobie Beach (19.7%) than to Bill Baggs (7.2%) or Crandon Park (5.2%). These percentages show that, although the beaches are located in close proximity, Bill Baggs and Crandon Park are more tourist-based beaches than Hobie Beach. Part of the difference in visitation rates could also be related to the fact that Hobie Beach is the only free site and the only site that allows dogs, as well as its relative accessibility from mainland Miami.

Table 2
Beach activities (in percentages of persons participating)

Activity	Hobie Beach	Crandon Park	Bill Baggs	Total
1. Swimming	52.3	46.3	50.0	49.6
2. Sunbathing	65.8*	53.7	54.7	58.0
3. Jet-skiing	11.7*	4.6	4.5	6.9
4. Fishing	18.4*	9.5	10.9	12.8
5. Kayaking	2.2	0.4	2.2	1.6
6. Walking	40.4	37.4	38.3	38.7
7. Other	9.0*	3.3	2.5	4.8

*Refers to significantly different percentage of activity (Kruskal-Wallis Test; $p < 0.05$).

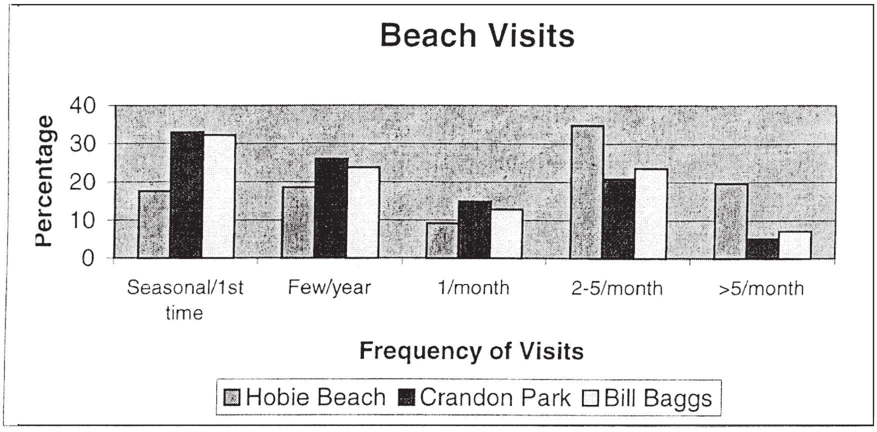

Figure 5. Frequency of beach visits.

Beach Preference and Quality

As part of this section, respondents provided information on why they chose the particular site and how they rated the conditions on the beach.

Visitors were provided with six choices from which to determine why they selected that particular site. The choices ranged from availability of space, cleanliness, and amenities offered at the site, to distance from home, wildlife/vegetation, or any other reason. The most important reason for the entire sample was the availability of space (35.7%), followed by other reasons (17.7%), distance from home (16.3%), and amenities (15.7%). Interesting, only 6.8% agreed with cleanliness of park conditions as the most important reason for choosing the particular beach. Interbeach differences are presented in Table 3.

Visitors more frequently chose Crandon Park and Bill Baggs for space availability reasons than did those visiting Hobie Beach. The latter contains a narrow strip of beach, and these percentages reflect that perception among visitors. Instead, Hobie Beach visitors chose their location for a variety of other interests, including amenities offered (by which the visitors invariably referred to vendors), distance from home, and other reasons. The other reasons almost always were related to taking dogs to the beach, as Hobie Beach is the only site in the area that allows pets and is often called "dog beach."

On a scale from 1–5 in declining quality, over 50% (ranking of 2 and higher) of all visitors were satisfied with the cleanliness of the beaches, and 80% (ranking of 3 and higher) felt that the beaches were in fair condition. However, the mean response for

Table 3
Reasons for visitation (in percentages)

Reason for visit	Hobie Beach*	Crandon Park*	Bill Baggs*	Total
1. Space availability	24.4	42.4	39.9	35.7
2. Cleanliness	2.0	8.3	9.8	6.8
3. Amenities	27.2	10.7	9.8	15.7
4. Distance	22.8	15.9	10.6	16.3
5. Wildlife/vegetation	2.3	8.0	12.5	7.8
6. Other	21.3	14.5	17.4	17.7

*All three beaches differ from each other in terms of reasons for visitation (χ^2 test; $p < 0.05$).

cleanliness on Hobie Beach was significantly lower at 3.4 (between fair and poor), compared to 2.1 and 2.4 (between good and fair) for Crandon Park and Bill Baggs, respectively (Kruskal-Wallis Test; $p < 0.01$).

Similarly, although 61.4% (ranking of 2 or higher) of the total population felt that the width of the beaches was good for recreational activities, only 37.9% of Hobie Beach respondents agreed. The mean response (3.0, or fair) was significantly lower than the responses from Bill Baggs (2.4, between good and fair) and Crandon Park (1.8, between excellent and good) visitors (Kruskal-Wallis Test; $p < 0.05$). It should be noted as well that all three beaches' means are significantly different from each other, and that Crandon Park is the widest of all three beaches and does offer substantial area for recreational activities.

Willingness to Pay

Respondents were asked about their willingness to pay (WTP) for beach nourishment that would result in a wider beachhead for improved recreational access or that would enhance nesting habitat for turtles. Respondents were not asked both questions; instead, surveyors alternated the questions as they interviewed successive visitors. Respondents who were asked the turtle nesting habitat question were aware that beach nourishment would also enhance other recreational opportunities, but we assume that respondents on the recreational access question did not know that nourishment would enhance turtle nesting habitat. Thus, we interpret the difference between the two WTP estimates as the incremental willingnhess to pay for turtle nesting habitat. Respondents were randomly offered a take-it-or-leave-it price of \$3, \$5, or \$8, which was stated in terms of an incremental parking fee.

We used a random utility model (RUM) to evaluate respondents' WTP for the recreational and turtle nesting habitat benefits of beach nourishment (Freeman, 2003, pp. 433–437). The RUM approach is well established in the recreational demand literature (e.g., Parsons, Massey, & Tomasi, 1999; Letson & Milon, 2002) and assumes that recreational satisfaction is positively related to favorable beach characteristics and inversely to the cost of gaining access to a recreational site. The approach also assumes that each individual respondent faces a decision among discrete levels of beach access and will choose the provision level that maximizes his or her utility. While choices by the individuals are not "random" per se, analysts cannot observe all factors that go into making them; thus, from the perspective of economic analysis, choice is inherently random (Freeman, 2003). In our model, the beach goers' utility depends on the degree of crowding, appreciation of wildlife (i.e., sea turtles), whether the respondent is a local resident or visitor, the season that the beach visit occurred, and the hypothetical cost of the beach nourishment to the beach goer. We estimated the model using logistical regression, specifically, a conditional logit model.

In the first regression, the dependent variable that measures the willingness to support for beach nourishment is CROWD. CROWD is equal to 1 if the respondent supports the nourishment that will enhance beach recreation and otherwise. The logistic regression model is used to estimate the factors which influence the respondent's decision. In our choice of independent variables, we sought to evaluate the influences of crowding concerns and price, while isolating the influences of residency and seasonality in visitation. The variable OCTMARCH is 1 if the beach visit occurred during the winter tourist season and 0 if not. The variable DADE is 1 if the respondent is a resident of Miami-Dade County. Note that in addition to residency, the DADE variable also offers a crude proxy for lower income. The variable WIDTH is the respondent's assessment of the beach width for recreational purposes and ranges from 1 (excellent) to 5 (poor). The

Table 4
Logistic regression results: Willingness to pay for beach nourishment to alleviate crowding

Variable	β	exp(β)	l/exp(β)	*t* Statistic
Constant	20.79			5.07***
Oct.–Mar.	–0.89	0.41	2.44	–3.00***
Dade	–0.56	0.57	1.74	–1.80*
Width	0.40	1.48	0.67	2.60***
Price	–2.79	0.06	16.23	–5.45***
Hobie	–0.75	0.47	2.11	–2.12**

N	802	Likelihood ratio statistic	344.07***
McFadden's LRI	0.32	Critical χ^2 (p = 0.01 & 4 d.f.)	13.28
Restricted log likelihood	–539.94	% correctly predicted	92%
Maximized log likelihood	–367.90		

Statistical significance: *10%, **5%, ***1%.

variable CROWD.BID is the take-or-leave price for the beach nourishment, in $/visit, and takes on the values $3, $5, and $8. In the logistic regression, the dependent variable, the "logit" or log odds ratio (i.e., $\ln[p/(1 - p)]$, where p is the probability of acceptance), is estimated as a linear function of the explanatory variables.

All variables are significant and have the expected signs. Tables 4 and 5 contain the variable names, the estimated coefficients (i.e., b*)*, two transformations of b intended to ease interpretation of the results (i.e., exp(b) and 1/exp(b)), and the Student's *t* statistic. Note that exp(b) is the effect of the independent variable on the "odds ratio," $p/(1 - p)$, The value for 1/exp(b) has a more intuitive explanation and represents, for example in Table 4, that Miami-Dade County residents are 1.74 times more likely to reject beach nourishment, and that winter recreationists are 2.44 times more likely to reject. As anticipated, price also diminishes acceptance, while crowding concerns increase the likelihood of support.

Hobie Beach visitors were 2.11 times less likely to support beach nourishment to improve recreational access. We added the dummy variable to indicate the Hobie Beach

Table 5
Logistic regression results: Willingness to pay for beach nourishment to enhance sea turtle nesting habitat

Variable	β	exp(β)	1/exp (β)	*t* Statistic
Constant	30.31			1.87*
Oct.–Mar.	–1.03	0.36	2.80	–3.88***
Dade	–0.97	0.38	2.64	–3.27***
Nature	0.43	1.54	0.65	1.65*
Price	–3.77	0.02	43.30	–1.86*

N	783	Likelihood ratio statistic	372.51***
McFadden's LRI	0.40	Critical χ^2 (p = 0.01 & 4 d.f.)	13.28
Restricted log likelihood	–469.04	% correctly predicted	89%
Maximized log likelihood	–282.79		

Statistical significance: *10%, **5%, ***1%.

location because a log likelihood ratio test on the initial results was significant for a structural break in the data pooled by location. Recall that Hobie Beach receives a higher proportion of local visitation than do the other sites and also that its visitors have lower incomes. Crowding is most severe at this location since it has the narrowest average beach width (39.2 feet), compared with Crandon Park and Bill Baggs, which average 440 feet and 240 feet wide. Because local visitors have the highest frequency of use, WTP when expressed on an annual basis for Hobie may be higher than that for visitors to the other two locations, a result that would be consistent with the findings of Bell and Leeworthy (1986) and Kaoru, Smith, and Lin (1995).

Mean willingness to pay equals $1.69 per visit and is expressed as the compensating variation, or the hypothetical payment that would equate the expected values of the indirect utility function before and after the beach nourishment (Bockstael, McConnell, & Strand, 1989b).[2] Another evaluation of beach width is the marginal or implicit price of beach width, calculated as the inverse of the ratio of the coefficients on WIDTH and PRICE, which here equals $0.14. As a measure of goodness of fit, we report the estimated likelihood ratio statistic, 344.07, which is greater than the critical χ^2 for $p = 0.01$ and 4 degrees of freedom, 13.28, indicating the overall regression equation is highly significant. For convenience, we also provide the value for McFadden's likelihood ratio index, the restricted and maximized values of the log likelihood function, and the percentage of correct predictions by the estimated equation.

In the second regression, the dependent variable which measures the willingness to support for beach nourishment is TURTLE. TURTLE is equal to 1 if the respondent supports the nourishment that will enhance sea turtle nesting habitat and 0 otherwise. The logistic regression model is used to estimate the factors which influence the respondent's decision. In our choice of independent variables, we sought to evaluate the influences of nature concerns and price, while isolating the influences of residency and seasonality in visitation. The variables OCTMARCH and DADE are the same as the previous regression. The variable NATURE indicates if the respondent visited a beach in the last month to engage in nature walking or birdwatching. The variable TURTLE.BID is the take-or-leave price for the each nourishment, in $/visit, and takes on the values $3, $5, and $8.

All variables are significant and have the expected signs. Higher prices discourage support, and support is less likely if beach visit occurs in winter or if the respondent is a Miami-Dade county resident. Nature concerns enhance support for the nourishment. The estimated likelihood ratio statistic (372.51) exceeds the critical χ^2 of 13.28, indicating that the overall regression equation is highly significant.

Mean willingness to pay equals $2.12 per visit, and the marginal or implicit price of beach habitat equals $0.11. We performed a one-tailed Wilcoxon rank sum test to compare mean WTP for recreation and for turtle nesting habitat and are able to reject the H_0 of equal means ($p << 0.001$). When told that beach nourishment would also enhance turtle nesting habitat, respondents express significantly higher WTP, apparently out of concern for resource protection.

Our results may underestimate WTP for at least two reasons. First, we assume the number of beach visits is fixed. Because our approach is to model the choice of type of trip per occasion, and each respondent has made a trip, it is not possible to integrate the decision on the total number of trips into the decision model. If the hypothetical nourishment is important enough to substantially change the number of visits made, our findings will underestimate WTP. Second, our assumption that site selection is given or exogenous may also create downward bias. Nourishment at a given site might also attract recreationists currently visiting other sites, further increasing the value of the improvement. To consider cross-site substitution effects, we would have needed to model a nested decision structure in which the beach visitation decision and site selection are jointly made. Unfortunately, difficulties in apportioning travel costs among the multiple visitor attractions in South Florida discouraged us from that approach. For these reasons, our WTP estimates should be considered lower bounds.

Discussion

Florida's economic prosperity from tourism is directly tied to its beach quality, which increasingly is threatened by coastal erosion (Florida Department of Community Affairs, 1996). We explore a South Florida case study (Key Biscayne/Virginia Key) to see how variation in amenities and visitor types across beaches influences visitors' willingness to pay for beach protection. We also investigate whether nonrecreational issues, such as sea turtle habitat, might influence visitors' preferences. The wide range of existing benefits estimates for beach access, and the need to gauge their sensitivity to policy variables such as beach nourishment, warrants additional recreational beach valuation, particularly for South Florida.

Two themes stem from our findings. First, the differences in visitors and amenities across the beach sites should influence resource managers' decisions of where to nourish and who should pay, which is consistent with the findings and arguments of Pompe and Rinehart (1999, 2000). As a local park, Hobie Beach may seem deserving, since it has the greatest incidence of locals, highest frequency of use, and the most crowding. Moreover, if beach nourishment is to promote local recreational opportunities, then arguably locals (Miami city and county) should pay. On the other hand, if we view nourishment as a periodic investment to maintain our infrastructure for tourism, then Crandon Park and Bill Baggs make more sense. However, if nourishment is for visitors, arguably policy officials should find a way to make them pay. Our second theme or major finding is that beach visitors do appear to care about turtle nesting habitat. When informed that beach nourishment would also enhance habitat, respondents increased their WTP over that offered for enhanced recreational opportunities alone.

Differences in Visitors and Amenities across the Beach Sites

Our results suggest differences among visitors and amenities at the three beaches. Visitors at Hobie Beach and Crandon Park are generally younger than those at Bill Baggs. Also, Hobie Beach receives more local visitors than does either Crandon Park or Bill Baggs, and the latter beaches attract over twice as many foreign visitors as does Hobie Beach. Although most visitors tend to frequent all beaches for traditional activities such as swimming and sunbathing, Hobie Beach visitors tend to participate in more activities, such as personal watercraft use and fishing, than do visitors at the other two beaches. Hobie Beach respondents also tend to spend less than their counterparts but are the most frequent beach visitors.

The variety of amenities present clearly motivates both beach visitation and site selection. Most visitors to Crandon Park and Bill Baggs chose those beaches due to their space availability, and a majority of the respondents reported that the width of these beaches was conducive for recreational opportunities. By contrast, Hobie Beach visitors acknowledged the narrower strip of their beach and did not consider space the most important factor in their site selection. Instead, they pointed to amenities, distance from home, and other reasons as equally important factors in determining their trip to the site. These differences in beach selection preferences suggest that beach visitation is motivated by factors other than crowding, beach head space, distance from home, cleanliness, and other expected differences. At Hobie Beach, for example, reasons for visitation range from the ability to bring pets to the availability of food and beverage vendors.

Because of these differences in visitor types and amenities, the issue of beach nourishment and associated cost-sharing strategies for each beach type must be approached separately. Visitors to Crandon Park and Bill Baggs have a lower frequency of beach use but also display a higher WTP than do visitors at Hobie Beach on a per-visit basis. Similar findings have been reported by Bell and Leeworthy (1990) and are likely related to the higher costs in parking and/or entrance fees, as well as the longer travel distances associated with the former beaches. Therefore, any cost-sharing measure that would incorporate user fees should consider the contribution of such visitors to these types of beaches. Although these visitors may be willing to pay higher amounts than are visitors to Hobie Beach, the amounts that they contribute are likely lower on an annual basis. In both cases, users display a willingness to contribute to the sustainability of the resources they enjoy, and their contributions are not limited to traditional conceptions of beach width, space, and cleanliness.

Turtle Nesting Habitat

At all beaches and among all visitor types, the WTP for turtle nesting habitat as improved by beach nourishment ($2.12 per visit) was significantly higher than the WTP for beach recreational activities as improved by beach nourishment ($1.69 per visit). These results suggest that visitors, while perhaps not understanding the importance of turtle nests, do perceive their contributions as helping the environment. However, our turtle habitat WTP estimates should be interpreted with caution since a related study (Theis, 2000) found that WTP totals may be related both to the amount of information provided to the respondents and to their actual understanding of the resource in question.

Conclusions

Our study finds important differences among beach visitors and preferences at sites within short distances of each other. We also find visitors are willing to pay for beach nourishment as it relates to additional recreational opportunities and resource protection. While preferences vary between sites, cost sharing appears to be viable at these three South Florida beaches. Differences in visitor types suggest that any user fee imposed on beach goers should be implemented differently for local beaches versus those beaches that attract more nonlocal visitors. With a site-specific approach, decision makers can utilize a user fee that will shift the burden of paying for beach nourishment from governmental sources to the users themselves.

Notes

1. Florida's Bureau of Beaches and Coastal Systems defines critically eroded beaches as those that are eroded to a degree such that development, recreation, wildlife, or cultural resources are threatened or lost, as well as segments between critical erosion areas that may currently be stable but whose inclusion is necessary for the management of coastal systems or design integrity of adjacent management projects (Bureau of Beaches and Coastal Systems, 2002).

2. Following Whitehead and Haab (2000), we calculate the expected compensating variation of a loss of access to beach nourishment as equal to $-\ln[1 - p]/\beta_p$, where p is the probability that the individual will support beach renourishment and β_p is the coefficient on price.

References

American Coastal Coalition. 1999. *ACC backgrounder: The Coastal Barrier Resources Act of 1982.* Available at http://www.coastalcoalition.org/facts/cobra1982.html.

American Coastal Coalition. 2000. *Chronology of federal programs to provide shoreline protection assistance.* Available at http://www.coastalcoalition.org/facts/nourish/background/acctime.html.

Beaches and Nearshore Habitats Initiative (BNHI). 1994. *Guide to public participation in Florida's beach management decision-making process.* Miami, FL: American Littoral Society/Coastal Research and Education, Inc.

Bell, F. W. 2002. Damage assessment of the Tampa Bay oil spill using the Travel Cost Method. In *Florida's coastal environmental resources: A guide to economic valuation and impact analysis,* ed. D. Letson and W. Milon, 53–62. Gainesville, FL: Florida Sea Grant.

Bell, F. W. 1986. Economic policy issues associated with beach nourishment. *Policy Studies Review* 6(2):374–381.

Bell F. W., and V. R. Leeworthy. 1986. *An economic analysis of the importance of saltwater beaches in Florida.* Florida Sea Grant Report No. 82. Gainesville, FL: Florida Sea Grant.

Bell, F. W., and V. R. Leeworthy. 1990. Recreational demand by tourists for saltwater beach days. *Journal of Environ. Econ. Manage.* 18:189–205.

Blank, J. G. 1996. *Key Biscayne.* Sarasota, FL: Pineapple Press, Inc.

Bockstael, N. E., W. M. Hanemann, and C. L. Kling. 1987. Estimating the value of water quality improvements in a recreational demand framework. *Water Resources Research* 23(5):951–960.

Bockstael, N. E., K. E. McConnell, and I. E. Strand. 1989a. Measuring the benefits of improvements in water quality: The Chesapeake Bay. *Marine Resource Economics* 6(1):1–18.

Bockstael, N. E., K. E. McConnell, and I. E. Strand. 1989b. A random utility model for sportfishing: Some preliminary results for Florida. *Marine Resource Economics* 6(4):245–260.

Bureau of Beaches and Coastal Systems. 2002. *Critical beach erosion areas in Florida.* Available at http://www.dep.state.fl.us/beaches/publications/pdf/errptall.pdf.

Chapman, D. J., M. Haneman, and P. Ruud. 1998. *American Trader* oil spill: A review from the beaches. *Association of Resource and Environmental Economists Newsletter* 18(2):12–25.

Cheeks, R. J. 1997. *Effects of various sand types on nest temperature and batching success in the Loggerhead (Caretta caretta) sea turtle.* Florida Atlantic University Master's Thesis. Boca Raton, FL: Florida Atlantic University.

Clark, R. R. 1989. Beach conditions in Florida: A statewide inventory and identification of the beach erosion problem areas in Florida. *Beaches and Shores Technical and Design Memorandum* 89:1–167.

Downing, M., and T. Ozuna Jr. 1996. Testing the reliability of the benefit function transfer approach. *J. Environ. Econ. Manage.* 30(3):316–332.

Dunford, R. W. 1999. The *American Trader* oil spill: An alternative view if recreation use damages. *Association of Resource and Environmental Economists Newsletter* 19(1):12–25.

Feenberg, D., and E. S. Mills. 1980. *Measuring the benefits of water pollution abatement.* New York: Academic Press.

Florida Department of Community Affairs. 1996. *Florida State of the Coast Report.* Report of the Florida Coastal Management Program, pursuant to NOAA Award #NA570Z0267.

Florida Department of Environmental Protection. 2000. *Guidelines, The State of Florida Department of Environmental Protection, Florida Beach Erosion Control Program.* Available at http://www.dep.state.fl.us/beach/pdf/gdlines.pdf.

Freeman, A. M. 2003. *The measurement of environmental and resource values: Theory and methods.* Washington, DC: Resources for the Future (2nd ed.).

Freeman, A. M. 1995. The benefits of water quality improvements for marine recreation: A review of the empirical evidence. *Marine Resource Economics* 10(4):385–406.

H. John Heinz III Center for Science, Economics and the Environment. 1999. *The hidden costs of coastal hazards—Implications for risk assessment and mitigation.* Covelo, CA: Island Press.

Kaoru, Y., V. K. Smith, and J. L. Liu. 1995. Using random utility models to estimate the recreational value of estuarine resources. *Amer. J. Agricul. Econ.* 77(1):141–151.

Landry, C. E., A. G. Kessler, and W. Kriesel. 2003. An economic evaluation of beach erosion management alternatives. *Marine Resource Economics* 18(2):105–127.

Leeworthy, V. R., and P. Wiley 1991. *Recreational use value for Island Beach State Park.* Unpublished NOAA paper.

Leeworthy, V. R., and P. C. Wiley 1993. *Recreational use value for three Southern California beaches.* Rockville, MD: Strategic Environmental Assessments Division, National Oceanic and Atmospheric Administration.

Letson, D., and J. W. Milon, eds. 2002. *Florida's coastal environmental resources: A guide to economic valuation and impact analysis.* Gainesville, FL: Florida Sea Grant. Report SGR124.

McConnell, K. E. 1986. *The damages to recreational activities from PCBs in New Bedford Harbor.* Report prepared for NOAA.

Murray, C., B. Sohngen, and L. Pendleton. 2001. Valuing water quality advisories and beach amenities in the Great Lakes. *Water Resources Research* 37(10):2583–2590.

National Research Council (NRC). 1995. *Beach nourishment and protection.* Washington, DC: National Academy Press.

Parsons, G., M. Massey, and T. Tomasi. 1999. Familiar and favorite sites in a random utility model of beach recreation. *Marine Resource Economics* 14(4):299–315.

Parsons, G., and M. Powell. 1998. *The cost of beach retreat: A hedonic price analysis of Delaware beaches.* Working Paper 98-14, University of Delaware, College of Marine Studies, Department of Economics, and Department of Natural Resources and Environmental Control.

Pilkey, O. H. 2000. What you know can hurt you: Predicting the behavior of nourished beaches. In *Prediction: Science, decision making and the future of nature,* ed. D. Sarewitz, R. A. Pielke Jr., and R. Byerly Jr., 59–184. Covelo, CA: Island Press.

Pompe, J., and J. Rinehart. 1999. Establishing fees for beach protection: Paying for a public good. *Coastal Management* 27(1):57–67.

Pompe, J., and J. Rinehart. 2000. Toward a more equitable distribution of beach nourishment costs. *Shore & Beach* 68(2):15–17.

Schmidt, D. V., and P. E. Woodruff, 1999. Florida beach preservation: A review. *Shore & Beach* 67(4):7–13.

Silberman, J., and M. Klock. 1988. The recreational benefits of beach nourishment. *Ocean and Shoreline Management* 11:73–80.

Silberman, J., D. Gerlpwski, and N. Williams. 1992. Estimating existence values for users and nonusers of New Jersey beaches. *Land Economics* 68(2):225–236.

Smith, V. K., X. Zhang, and R. Palmquist. 1997. Marine debris, beach quality and non-market values. *Environmental and Resource Economics* 10:223–247.

Srinivas, R., and R. B. Taylor. 1996. Longshore transport modeling and performance of beach nourishment alternatives at Key Biscayne, FL. In *Future of beach nourishment: Proceedings of the 1996 National Conference on Beach Preservation Technology.* Tallahassee, FL.

Sudar, R., J. Pope, T. Hillyer, and J. Crumm. 1995. Shore protection projects of the U.S. Army Corps of Engineers. *Shore & Beach* 63(2):3–16.

Theis, M. 2000. *A study in beach visitor preference of beach nourishment activities for improved recreation versus wildlife habitat on Key Biscayne, Florida beaches applying the Contingent Valuation method.* University of Miami undergraduate thesis. Coral Gables, FL: University of Miami.

Whitehead, J. C. and T. C. Haab. 2000. Southeast Marine Recreational Fishery Statistical Survey: Distance and catch based choice sets. *Marine Resource Economics* 14(4):283–298.

APPENDIX I: SURVEY INSTRUMENT

1. What is your zip code? ___________________

2. Which of the following includes your age?

   16–25 26–35 35–45 46–55 over 55

3. Do you rent or own your residence? Rent _____ Own _____

4. How many passengers on this trip (including yourself)?

   1 2 3 4 5 6 7

5. In the last month, did you go to the beach in order to participate in any of the following activities:

   a. swimming/snorkeling yes no
   b. sunbathing yes no
   c. jet-skiing/water-biking yes no
   d. fishing yes no
   e. kayaking yes no

f. nature walk/birdwatching yes no
g. other (_______________) yes no

6. What is your average expenditure during this type of trip, including park entrance, parking, food, and fuel?

   less than \$10 \$10–\$30 \$30–\$100 over \$100

7. How often do you visit this beach site?

   a. a few times a year
   b. at least one visit per month
   c. 2–5 visits per month
   d. over 5 visits per month
   e. seasonal/first-time visitor

8. Which of these other nearby sites do you visit as often?

   a. Crandon Park
   b. Bill Baggs State Park
   c. Hobie Beach
   d. other ______________

9. Which is the MOST important reason you chose this beach:

   a. Availability of space/less crowded conditions
   b. Cleanliness of park conditions
   c. Amenities (concessions, parking, etc.)
   d. Distance from home
   e. Wildlife/vegetation
   f. other _______________

10. How would you rate the state of cleanliness on this beach, in terms of debris present?

    excellent good fair poor very good

11. How would you rate the width of the beachhead, in terms of space present for recreational activities?

    excellent good fair poor very good

12. (a) Would you be willing to pay an increase/amount of \$3/5/8 in a parking fee to fund beach renourishment activities to improve the size of the beach, thereby improving recreational opportunities?

    NO \$3 \$5 \$8

    (b) If beach renourishment were performed on this beach to enhance turtle nesting sites (using the correct sand type, minimizing compacted sand, and performing all work during the summer and in daylight hours), would you be willing to pay an increase/amount of \$3/5/8 in a parking fee to fund that project?

    NO \$3 \$5 \$8