The Impact of Invasive Plants on the Recreational Value of Florida's Coastal, Freshwater and Upland Natural Areas

D.C. Adams[1], D.J. Lee[2], S. Bucaram[3], and A.N. Bwenge[3]
[1] Lecturer, Food and Resource Economics Department, University of Florida
[2] Associate Professor, Food and Resource Economics Department, University of Florida
[3] Graduate Student, Food and Resource Economics Department, University of Florida

Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Portland, OR, July 29 – August 1, 2007

Copyright 2007 by D.C. Adams, D.J. Lee, S. Bucaram and A.N. Bwenge. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

The Impact of Invasive Plants on the Recreational Value of Florida's Coastal, Freshwater and Upland Natural Areas

Introduction and Background

In the past century, over 1,300 exotic plant species were introduced and established in Florida; 124 of these are destructive to natural areas (FLEPPC, 2006). In Florida, ecotourism activities such as hiking, camping, and birding in public parks, forests, wildlife management areas and privately owned natural areas have an estimated economic impact of $7.8 bn/yr, with $2.9 bn/yr from wildlife viewing alone (Egbert, Heller, and Harding, 2000). Freshwater fishing lures over 34 mn participants to Florida who spend in excess of $35 bn/yr (Zhang and Lee, 2006). Excessive growth of invasive weeds hinders these recreational activities.

Invasive species are defined as “alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.” (Executive Order 13112, 1999). Today there are an estimated 5,000 to 6,000 invasive species in the United States (Pimentel, 2003; Burnham, 2004) invading about 700,000 hectares of natural areas per year (Pimentel, 2000). Damages from invasive species cost government agencies and private citizens more than $138 billion per year, excluding ecosystem impacts (Pimentel, 2002). In the case of aquatic and wetland habitats in the United States, these species are considered a serious problem as they impact human uses of water resources and affect their ecological value through the degradation of water quality (Madsen, 1997). In Florida the situation is one of the most severe since invasive non-native plants pollute 96% of State’s public lakes and rivers that comprise 1.26 million acres.

Control of invasive species in Florida is a constant and growing drain on scarce resources (Glisson, 1994), with private expenditures of $265 mn/yr by agriculture and silviculture industries (Lee, 2005), and state expenditures of $103 mn/yr (FLDEP, 2006). Recent works by the authors examine losses to fishing from invasive aquatic weeds in Florida’s lakes and the economics of managing upland invasive species on Florida’s public lands (Adams and Lee, 2006; Lee and Kim, 2006).

One specific concern about invasive species is their impact on individuals’ satisfaction when they engage in outdoor recreational activities. This recreational activity is affected by invasive aquatic plants (e.g., hydrilla, water hyacinth, and water lettuce), which can cover the surface of aquatic areas (e.g., rivers and lakes) during summer months, driving fish away. These invasive aquatic species can also affect swimming, boating, and other recreational uses. Invasive upland plants such as Brazilian Pepper and *Melaleuca* also dramatically impact activities such as camping, hiking, and birding. The impact on recreational activities by invasive plants in Florida’s river and lake, wooded, and ocean and beach natural areas can be substantial.

This new study, funded by the Florida Department of Environmental Protection, examines the impact of invasive plants on recreational activities on Florida’s coastal, freshwater and upland natural areas using a multi-attribute utility (MAU) model. Study participants were asked to choose from a set of pair-wise alternatives comprising a group of attributes at varying levels, including levels of invasive species coverage and other variables important to decisions about recreational activities. Six MAU surveys were electronically distributed to Florida residents following a prescribed methodology (Milon and Hodges, 2002; Alvarez, Sherman and VanBeselaere, 2003; Tsuge and Washida, 2003; Lee, Adams, and Rossi, 2006). We specified a conditional Logit model (McFadden, 1974) to estimate the relative weights associated with a change in Fees, Invasive Species, Native Animal Species, Native Plant Species, and Facilities. Using “Fees” as a payment vehicle, we estimate the average Florida resident’s marginal willingness to pay for changes to attributes, including having fewer invasive plants and more positive attributes such as facilities and the presence of native animal and plant species. These results provide useful information for cost-benefit analyses of public programs to control invasive aquatic plants in Florida.

Research Methodology

This study examines the relationship between invasive weeds and recreational activities in Florida’s parks. Invasive species’ impacts on natural areas may not be fully captured by market goods or services. When nonmarket or non-use values are impacted, only stated preference techniques are able to capture the impacts. One such method is the use of a Multiattribute Utility Model (MAU) survey in which respondents choose from a set of pair-wise alternatives comprising a bundle of attributes at varying levels. The MAU contingent choice model is preferred among the three commonly used attribute-based stated preference methods—ranking, ratings, and choice. The MAU is able to avoid many bias problems because it more closely mimics actual consumer behavior (choosing among two competing goods based on a limited set of important attributes) (Green and Srinivasan, 1979).

The MAU survey is a series of forced-choice questions. In each question, the respondent must select their preference among two hypothetical goods with a limited set of attributes that vary. With each choice, the respondent is facing a tradeoff between attribute levels, and will select the bundle that maximizes their utility. As they make their choices between the two bundles, the utility associated with changes in the levels of specific attributes can be specified.

If each attribute reflects an independent dimension of the good, is measurable and easy to understand, and the number of attributes does not exceed the cognitive abilities of the respondent (usually less than nine attributes), then the MAU survey should be able to capture respondents' WTP for changes in the attribute bundles (Keeney and Raiffa, 1976; Louviere, 1988; Saaty, 1980; de Palma et al., 1994; Miller, 1956). For example, consider one bundle of five attributes: X^A, where the utility is $U^A = \alpha + \beta_1 x_1{}^A + \beta_2 x_2{}^A + \beta_2 x_3{}^A + \beta_4 x_4{}^A + \beta_5 x_5{}^A + \varepsilon$. If the respondent prefers bundle X^A to bundle X^B, it implies that utility $U(X^A) > U(X^B)$. It is assumed that utility U(X, Z) is stochastic in resource attributes X and respondent profile Z; the linear parameters α and β are estimated using a conditional logit model (Milon and Hodges, 2002). For a respondent with profile Z, the probability that the respondent will choose bundle X^A over bundle X^B equals the probability that the difference between the deterministic components exceeds the difference between the random components, $\Pr(A) = \Pr[v(X^A, Z) - v(X^B, Z) > (\varepsilon^B - \varepsilon^A)]$.

Use of the conditional logit model requires that the error ε be assumed independently and normally distributed. Under these assumptions, the conditional logit model is appropriate and probability values can be estimated using a statistical software package such as Limdep or Stata. For example, Siikamäki (2001) estimated a conditional logit model to assess willingness to pay for biodiversity in private forests.

The model estimates can predict the alternative a respondent would choose from any set of bundles (McFadden, 1974). If payment attributes are included, interpretations from the model can be used to estimate marginal willingness to pay to participate in recreational activities in natural areas with fewer invasive plants and more native species. Consider a subject *i* and a response choice *j*, and let there be *k* variables that impact recreational utility. Let $x_{ij} = (x_{ij1}, x_{ij2}, \ldots, x_{ijk})'$. For every set of response choices C_i for respondent *i*, the probability that the respondent will choose bundle *j* is

Equation 1. $$\pi_j = \frac{e^{(\beta' x_{ij})}}{\sum_{k \in C_i} e^{(\beta' x_{ik})}}$$

For each pair of alternatives *a* and *b*, the probability that the respondent will choose *a* over *b* is expressed as a logit function:

Equation 2. $$\log\left[\frac{\pi_a(x_{ia})}{\pi_b(x_{ib})}\right] = \beta'(x_{ia} - x_{ib})$$

where the relative influence of the explanatory variables *k* depend on the distance between the respondent's internal value of that variable for the alternative bundles.

In this study, we first specify what relevant variables to include in the MAU survey questions, and then we estimate the parameters of the conditional logit function to estimate the marginal utility coefficient for each attribute, and the marginal willingness to pay for changes in attribute levels. For example, assume an attribute *A*. We can estimate the marginal willingness to pay for changes to *A* by dividing the marginal utility of the attribute level changes by the marginal utility of the price coefficient, *P*:

Equation 3. $$MWTP\,(A) = \frac{\partial U_a / \partial A}{\partial U_p / \partial P}.$$

The economic value of specific bundles can be calculated by summing the MWTP of all of the attributes for each level specific by that bundle. The total economic value for a change in invasive species plant coverage follows from similar calculations.

Survey Design

We use a web-based survey method to administer the MAU surveys. Participants are requested by e-mail to participate in the surveys, and the e-mail contains a link to the uniform resource locator (URL) web address for the surveys (Shannon et al., 2002). Web-based surveys are a valuable tool for conducting survey research (Dillman, 2000). Web-based surveys are preferred for their relatively low cost of administration when they can be accessed by a diverse pool of potential respondents (Dillman, 2000; Alvarez et al., 2003). The rapid improvement in web survey methodology and widespread internet access is leading some survey design experts to suggest that web surveys are likely to replace telephone, mail and other traditional methods of survey data collection (Couper, 2000) despite the relatively lower response rates from web-based surveys (Solomon, 2001).

Web-based surveys are actually preferred for their ability to improve on print surveys' ability to provide graphical content (Dillman and Bowker, 2001), and for their ability to simplify the survey process with the use of skip-pattern designs that allow the respondent to navigate past certain survey questions if the respondent becomes unwilling to continue answering questions, or if previous answers make follow-up questions unnecessary (Dillman, Tortura, and Bowker, 1998; Bowers, 1999; Redline and Dillman, 1999). In our case, a web-based survey was even more essential because of our need to provide graphical materials (pictures of invasive plants and park activities) to respondents.

All surveys may suffer from four types of errors: coverage, sampling, non-response, and measurement (Groves, 1987; Dillman and Bowker, 2001). Measurement error (respondents answers a different question than is being asked) and sampling error (resulting from only questioning a subset of the target population) are common for all modes of survey questioning. Web surveys are not expected to greater problems with sampling or measurement error than with print surveys (Dillman, 2000). We conducted several iterations of pre-tests to reduce measurement error. The survey draft underwent several revisions and was extensively pre-tested using experts (4) and University of Florida students (242).

Web surveys are particularly plagued by potential coverage error and non-response error, yet there is evidence that web surveys perform well (Dillman and Bowker, 2001; Berrens et al., 2003). For example, web-based surveys have performed better at predicting US Presidential votes than telephone surveys (Berrens et al., 2003). Internet samples can produce relational inferences very similar to those from telephone surveys (Berrens et al., 2004).

Coverage error is considered the biggest potential problem with web surveys (Couper, 2000). Coverage error is the mismatch in demographic or other characteristics between the intended population and the group surveyed. In the case of web surveys, a researcher may wish to target a portion of the population that is not well represented by internet access. In that case, an unrepresentative sample may bias results. Recent surveys of US residents' computer ownership and internet access suggest that, given widespread internet access, coverage error may not be as big a problem today. In 2003, 54.7% of US residents had internet access, up from 41.5% as of the 2000 US Census (Newburger, 2001; Day et al., 2005). Failing to account for coverage error may lead to results that are not representative of the target population, and will limit the viability of the statistical inferences made about from the results.

One method of avoiding major coverage bias problems is to only sample from a subset of your population that is representative of your target population *given that they have internet access*. In this way, internet access is no longer a limitation to survey participation. To account for coverage error, we contracted with Zoomerang to draw from a sample that is representative of Florida residents, as defined by the year 2000 US Census. For each of our six surveys, Zoomerang drew a random sample of 6665 potential respondents from a panel of Zoomerang members that were representative of Florida residents by age, sex, education, and income.

Non-response error arises when not all of the respondents with access to the survey complete the survey, and the non-respondents would have answered in a way that is different from the respondents (Couper, 2000). Comparisons of email and traditional mail surveys of the same populations suggest that the response rate of web surveys is far less than that of mail surveys when incentives are not included (Couper, 2000). However, recent studies suggest that while the non-response rates may be higher for internet surveys, the non-response bias may not be (Huggins and Eyerman, 2001).

To limit non-response error, we follow a methodology specified by Dillman, Tortura and Bowker (1998). This includes:

1. Introducing the questionnaire with a welcome screen that "is motivational, emphasizes the ease of responding, and instructs respondents on the action needed for proceeding to the next page."
2. Choosing an initial question that is likely to be interesting to most respondents, easy to answer, and fully visible on the screen.
3. Presenting each question in a format similar to that found in paper surveys.
4. Avoiding differences in graphical appearance between questions.
5. Providing specific instructions.
6. Allowing respondents to skip questions that they do not feel like answering.
7. Providing the respondents a sense of their nearness to completing the survey.
8. Avoiding questions known to have measurement problems, such as open-ended questions or check all that apply options.

There are five commonly accepted procedures for dealing with nonresponse error (Lindner et al., 2001). They include ignoring nonrespondents, comparing respondent characteristics to the characteristics of the target population, comparing survey answers of non-respondents to respondents using follow-up surveys (typically by mail or phone if the initial survey is web-based), and comparing the survey answers of early respondents to those of late respondents. In Table 1, we provide a comparison of respondent demographic characteristics to those of Florida residents.

Table 1. Comparison of Survey Respondent Demographic Characteristics

Survey	**RLAS**	**RLPS**	**OBAS**	**OBPS**	**WAS**	**WPS**	**Florida**$^{\Phi}$
Urban	25.8%	30.2%	27.1%	31.3%	27.2%	28.0%	47.0%
Suburban	58.0%	53.7%	57.5%	54.4%	55.5%	55.0%	44.0%
Rural	16.3%	16.2%	15.4%	14.2%	17.3%	17.0%	9.0%
Male	36.2%	36.7%	34.6%	36.5%	34.5%	36.0%	48.8%
Female	63.8%	63.3%	65.4%	63.5%	65.5%	64.0%	51.2%
18 - 25 years	1.9%	1.5%	2.4%	1.1%	2.0%	1.2%	7.8%
26 - 35 years	8.7%	9.3%	8.5%	9.9%	9.7%	11.2%	16.9%
36 - 45 years	20.5%	22.3%	21.6%	19.4%	20.0%	19.0%	20.1%
46 - 55 years	24.6%	23.8%	23.7%	25.5%	25.2%	27.3%	16.8%
56 - 65 years	28.8%	25.4%	27.1%	26.5%	25.3%	24.8%	12.6%
More than 65 years	15.5%	17.6%	16.8%	17.7%	17.8%	16.5%	25.9%

High School or less	36.6%	40.3%	33.8%	36.6%	32.5%	39.1%	48.9%
Associate or some college	25.9%	25.1%	26.3%	25.7%	26.1%	27.6%	28.8%
Bachelor's degree	24.6%	19.1%	24.7%	21.5%	24.2%	19.8%	14.3%
Advanced degree beyond bachelor's	12.9%	15.5%	15.2%	16.2%	17.2%	13.5%	8.0%
Less than $14,999	4.8%	5.1%	3.9%	5.0%	6.1%	5.9%	16.3%
$15,000 - $34,999	20.9%	23.0%	21.3%	21.3%	18.9%	21.5%	28.7%
$35,000 - $59,999	29.1%	28.5%	28.1%	32.7%	29.2%	31.5%	24.8%
$60,000 - $74,999	16.7%	15.7%	17.3%	14.5%	13.3%	14.0%	11.1%
$75,000 - $99,999	15.0%	14.5%	15.0%	13.5%	17.0%	13.8%	8.7%
$100,000 - $149,999	9.7%	10.4%	10.8%	9.0%	11.4%	9.4%	6.3%
More than $150,000	3.7%	2.8%	3.6%	4.0%	4.1%	3.9%	4.1%

$^{\Phi}$US Census 2000

$^{\gamma}$RLAS is River and Lake Animal Species, RLPS is River and Lake Plant Species, OBAS is Ocean and Beach Animal Species, OBPS is Ocean and Beach Plant Species, WAS is Wooded Park Animal Species, and WPS is Wooded Park Plant Species.

A comparison of demographic characteristics reveals some potential non-response bias, yet our surveys are roughly representative of the State of Florida with respect to several characteristics (income, education, and some age ranges), but not with respect to sex, rural/urban location, and some age ranges. The target of our surveys was Florida residents who visit Florida's natural areas at least once per year. The demographic characteristics may not signal a problem with nonresponse bias, but rather may indicate the particular demographic composition of visitors to Florida's natural areas. Future work will test the hypothesis that early and later respondents have the same demographic characteristics. If we fail to reject this hypothesis, then we can assume that nonresponse bias is not an issue with these surveys.

Survey Development and Design

No previous work has measured the impact of invasive aquatic or upland plants on recreation via survey instruments. Because no previous work has been done in this area, we had to conduct our own baseline research to ascertain public preferences and priorities (i.e., variables that affect utility). The MAU surveys were developed, tested, and validated and electronically distributed to Florida residents following a prescribed methodology (Milon and Hodges, 2002; Alvarez and VanBeselaere, 2003; Tsuge and Washida, 2003; Lee, Adams, and Rossi, 2006).

In September, 2006, we developed, pre-tested, and administered preliminary informational surveys to two groups—Florida state park managers and Florida residents. This involved three preliminary surveys: 1) of 158 park managers and natural area recreation experts to ensure relevant characteristics were included in the two preliminary surveys of Florida residents; 2) of 40,000 Florida residents to determine their level of knowledge of invasive species to aid in the design of the background information and photograph description sections of the MAU survey; and 3) of 40,000 Florida residents to determine the levels of attributes that may impact recreational decisions with respect to coastal, freshwater, and upland natural areas.

We first queried state park managers. Park managers were asked a series of questions to aid in the survey design. Park managers identified several primary attributes likely to have significant impact on park attendance. Results from this survey aided in the design of two surveys of Florida residents—one on knowledge of invasive species, and the other a ranking exercise to order the importance of natural area attributes. Armed with information from state park managers, we sampled Florida residents to determine park characteristics that most impacted their recreation decisions, and what level of knowledge of invasive species Florida residents have. We needed this info to be sure that our surveys included the most relevant attributes after we narrowed down the attribute list, what levels the attributes should take, and to know what level of background information needed to be provided to the typical respondent to be able to make informed MAU decisions.

The objective of the knowledge of invasive species survey was to investigate Florida residents' perceived and actual knowledge of invasive plants. One of the primary hypotheses of this study is that Florida residents that are knowledgeable about invasive species have higher willingness to pay to prevent their establishment and subsequently to control their spread. In the knowledge survey, respondents were asked to rate their knowledge of exotic invasive species in Florida natural areas on a Likert-like scale (e.g., 1- no knowledge, 5- expert knowledge). Respondents were then asked to correctly classify twelve common aquatic and upland invasive and non-invasive plants in Florida as either invasive or not invasive. Respondents were shown pictures of the plants that included each plant's common name. Respondents were then asked whether they were negatively affected by invasive plants, and whether invasive plants influenced their recreation site choices. Finally, we asked demographic questions, including a question about environmental consciousness. Using these survey questions, we investigated whether environmental consciousness was an indicator or actual or perceived knowledge of invasive species. In late Fall 2006, we used Expedite email marketing to send 40,000 emails to Florida residents requesting their participation in the surveys. We achieved a typically low response rate for web-based surveys that do not include incentive offerings (e.g., $1 paid to a respondent for completing a survey)—0.82% response rate.

We conducted another set of web-based surveys of Florida residents to help determine the relative importance of several possible natural area attributes. We asked residents which nature-related outdoor activities they participated in within the past 12 months among a list of choices. We also asked respondents to rank the relative importance of attributes suggested by park managers, as well as those commonly included in surveys in the natural resource and environmental economics literature. Demographic questions were also included. We used the Expedite email marketing service to deliver the surveys to 80,000 Florida residents in late October, 2006, and achieved a response rate of 0.37%.

Results from the two preliminary surveys of Florida residents were used with an ordered probit model to determine 1) the relative weights associated with natural area characteristics that residents consider making natural area-based recreation decisions in Florida, and 2) what socioeconomic factors determine residents' knowledge of invasive species. Observations on Gender, Frequency of visit, Location of residence, Age, Marital status, Education level, Employment status, Income, Environmental consciousness, and Type of residency (seasonal or permanent)) were observed, compared to invasive species knowledge levels and importance ratings, and fit into this multiple regression model:

$$y_i = \sum_{j=1}^{5}\gamma_j + \beta_1 Gen_1 + \sum_{k=1}^{6}\delta_k Fre_k + \sum_{l=1}^{2}\phi_l Loc_l + \sum_{m=1}^{5}\varphi_m Age_m + \sum_{n=1}^{2}\kappa_n Mar_n + \sum_{q=1}^{5}\lambda_q Edu_q + \sum_{r=1}^{5}\mu_r Emp_r + \sum_{s=1}^{6}\nu_s Inc_s + \sum_{v=1}^{3}\pi_v Cons_v + \chi_1 Res_1 + \varepsilon .$$

The most important attributes for Floridians when making decisions to participate in nature related activities in coastal, freshwater, and upland areas in Florida were: Plant Species, Animal Species, and Facilities. Three groups—Age over 65, no environmental consciousness, and high school education provided the *lowest* level of influence by these attributes, but the percentages influenced are still high. This suggests that variations in these chosen attributes should account for much of the variation in willingness to pay for recreation and will perform well in the full survey.

Final Survey Instruments

Based on the results of our initial surveys of Florida residents, we drafted a multi-attribute utility survey instrument, including background information on invasive species, and demographic questions. In addition to MAU tradeoff questions, the survey included a brief description of the study, potential problems with specific invasive plants, and photos depicting invasive plants in natural areas.

The MAU survey draft underwent several revisions and was extensively pre-tested using experts (n=4) and University of Florida students (n=242).We re-specified the attribute levels, demographic questions, and survey language and graphics based on our responses. We asked respondents to include feedback. The surveys were retooled until respondents expressed no significant cognitive problems and attribute levels were appropriately specified (Appendix E).

To capture the full spectrum of natural resource systems, we designed MAU surveys for each of three types of Florida parks—River and Lake, Ocean and Beach, and Wooded Park, and included relevant attributes invasive plant species, native animal species, native plant species, condition of facilities, and park entrance fee. To avoid respondent fatigue, we further separated the survey questions into six surveys by type of park (River and Lake, Ocean and Beach, or Wooded Park) and type of native species impacted by the presence of invasive plants (Animal Species or Plant Species). We ask the respondents to assume that each of the two park choices are 1) the only alternatives, 2) the same distance from the respondent's home, and 3) Both parks offer same described activities and facilities. Figure 1 provides an example of a MAU question for a River and Lake park.

Figure 1. An Example of a MAU Survey Question for a River and Lake Park

	PARK A	PARK B
Facilities condition	Adequate	Excellent
Native plant diversity	Moderate	High
Presence of invasive species	None	Numerous and dense
Fees	$10	Free

Which of the two parks do you prefer?

Park A Park B

We did not include a third option "status quo" option in our contingent choice question format. This is appropriate for estimation of willingness to pay for environmental goods or services when it is impossible to determine the status quo, you want to measure preferences rather than actual choices, and you are not attempting to analyze an existing policy. In Florida, there are over 7,700 lakes over 10 acres, 2,276 miles of shoreline, over 11,000 miles of river and streams, 663 miles of beaches, and over 100,000 campsites (StateofFlorida.com, 2007). It would not be possible to generalize about state of river and lake, wooded, or ocean and beach parks.

The final instrument consisted of introductory information on invasive species, including pictures of invasive plants commonly found in Florida and information on typical impacts of invasive plants, a list of activities typically done in Florida state parks, including pictures typical for that park type (river and lake, ocean and beach, or wooded park), and seven multi-attribute choice questions. The survey was streamlined so it could be completed in about six minutes. The final survey instruments are provided in Appendix D.

Results

The six surveys were administered in early May, 2007 using an online survey site (www.surveymonkey.com) in conjunction with an email marketing firm (www.zoomerang.com). The survey included an introductory letter (Appendix A) as well as MAU and demographic questions (Appendix D). For each of the six surveys, 6665 emails were sent soliciting participation. The response rates for each of the six surveys were between 8.48% and 9.23%, which is typical for web-based surveys (Dillman et al., 2001; See Table 2). Respondents who successfully completed the surveys were provided 50 "Zoom points." Zoomerang survey panel participants collect points that can be redeemed for merchandise. The approximate value of 50 Zoom points is $0.65.

To increase responses to each of our six surveys, we gave respondents the option of continuing to another set of MAU questions on another type of park of their choice. For example, if the respondent was initially solicited to respond to a River and Lake Animal Species survey, they were then given the option of also taking either an Ocean and Beach Animal Species or a Wooded Park Animal Species survey before completing demographic questions. Between 34.2% and 83.24% of initial respondents chose to proceed to another set of MAU questions. This suggests that the surveys were not perceived to be too difficult or time intensive.

Table 2. Response Rates for the Final Survey Instruments

Survey	**RLAS**	**OBAS**	**WAS**	**RLPS**	**OBPS**	**WPS**
Residents Surveyed	6665	6665	6665	6665	6665	6665
Responses 1st park	573	589	566	615	586	579
Rate of Response	8.60%	8.84%	8.49%	9.23%	8.79%	8.69%
Responses to both 1st and 2nd park MAU questions	828	1039	762	831	1063	775
Total Valid Responses	681	890	640	618	911	648
Rate of Participation in Second Set of Questions	55.50%	78.53%	34.20%	37.69%	83.24%	34.20%

A discussion of the summary statistics of the demographic characteristics will follow in a later version. Please see Table 1 above for a comparison of survey respondents' demographic characteristics.

Using a multinomial logit model (Equation 2), we estimated the coefficients associated with the following variables: facilities, invasive species, fee, and animal or plant species. The regression results for each of the six surveys are reported in Appendix B. All of the coefficients were significant at the 0.001 level of significance. In our regression model, we assume a linear relationship with the levels of each attribute. For example, the parameter estimate for Facilities for the River and Lake Plant Species survey is $3.56. We included three levels of Facilities in our surveys: minimal, adequate, excellent. A change from minimal to adequate is valued at $3.56, as is a move from adequate to excellent. A later version of this paper will include regression results and MWTP estimates that do not assume this linear relationship, but instead include dummy variables for each of the park attribute levels.

According to Equation 3, we calculate marginal willingness to pay (MWTP) for each of the attributes using as a ratio of each coefficient to the coefficient for Fees:

Equation 5. $$MWTP = -\frac{\beta_k}{\beta_{Fees}}.$$

The MWTP results are reported in Table 3 below and also in Appendix B.

Table 3. Marginal Willingness-to-Pay ($) Estimates for Changes in State Park Attributes

Survey	**RLAS**	**RLPS**	**OBAS**	**OBPS**	**WAS**	**WPS**
Invasive Plants	-6.88	-6.84	-7.03	-5.81	-7.15	-6.84
Native Animals	5.26	4.07	5.12	n/a	n/a	n/a
Native Plants	n/a	n/a	n/a	3.40	5.91	4.24
Facilities	4.72	4.87	4.77	3.30	4.48	4.12

For each of the three park types and for both types of native species (plants and animals), the MWTP for improvement in Facilities, Native Animals and Native Plants are positive as expected. The MWTP for

Facilities are in the range of $3.30 – 4.87, and are relatively similar across the park types and for both animal and plant species. A comparison of the MWTP for Native Plants and Native Animals suggests that Florida residents place more relatively more value on increasing the abundance of native animals than plants. The MWTP for an increase in Native Plants is between $3.40 – 4.24, while for Native Animals it is between $5.12 – 5.91. The MWTP for an increase in Invasive Plants is fairly similar across the six surveys. The MWTP to reduce invasive plant species is between $5.81 – 7.15. Excluding the Ocean and Beach Plant Species survey, the MWTP would have a very narrow range of $6.84 – 7.15. This indicates that, on average, Florida residents have a marginal willingness to pay to reduce invasive species that is higher than the MWTP to improve facilities, or increase native animals or plants.

The model was also run using demographic variables to produce interaction terms with Invasive Plants, Native Animals or Plants, Facilities, and Fees. The socio-economic demographic variables were largely insignificant (See Appendix C).

We also ran the model with the variables Knowledge (what level of invasive species knowledge the respondent had—Expert, Moderate, None), Affected (whether the respondent considered themselves negatively impacted by invasive species—Yes or No), Actions (whether the respondent had taken personal actions against invasive species—Yes or No), and Benefits (whether the respondent perceived invasive plants as beneficial—Yes or No). The results are included in Table 4 below. As expected, in each case, marginal willingness to pay was higher with invasive species knowledge and for the people who felt affected by invasive plants. It was also higher for those who claimed to have taken action against invasive plants. As expected, MWTP was lower for respondents who perceived benefits from IS than for those who did not. It is interesting that knowledge of invasive species is statistically significant, yet formal education levels are not significant and are very low. This suggests that informal education on invasive species impacts may have a positive impact of voters' willingness to pay for projects that reduce the coverage of invasive plants, regardless of formal education level.

We also tested estimated MWTP by region. We asked each respondent to indicate in what County they reside. Using the results from this question, we generated MWTP estimates by region—South, Central, and North Florida. As expected, the more densely populated and relatively higher income areas of Florida—South and Central Florida—had higher MWTP for reduction in IS.

Table 4. Impact of Knowledge, Affected, Actions and Benefits on MWTP ($) for to Reduce IS

Survey	**RLAS**	**RLPS**	**OBAS**	**OBPS**	**WAS**	**WPS**
Knowledge						
Expert	9.14	10.63	7.81	6.54	9.43	9.63
Moderate	7.20	7.52	7.16	5.93	7.52	7.39
None	5.26	4.40	6.51	5.31	5.60	5.15
Affected						
Yes	10.64	9.96	9.90	8.41	10.86	9.00
No	4.90	5.57	5.72	4.77	5.35	5.84
Actions						
Yes	11.09	9.68	10.50	7.04	12.76	8.76
No	6.10	6.41	6.55	5.63	6.22	6.49
Benefits						
Yes	1.47	6.39	3.20	3.99	4.09	5.48
No	8.07	6.91	7.92	6.11	7.84	8.27
Location						
South Florida	6.85	6.86	7.73	5.38	8.14	7.63
Central Florida	6.98	6.91	7.18	6.43	6.72	7.05
North Florida	6.62	6.64	6.11	4.65	7.42	5.78

Using the MWTP estimates, we can test the following hypotheses:

1. The public assigns a negative value to the problem of invasive plants, reflected in less willingness to pay when residents engage in recreational activities in aquatic areas with a high presence of invasive plant species. We fail to reject this hypothesis. All of our MWTP estimates are based on highly significant coefficients, and the MWTP to reduce invasive species are large (over $5.81 per person).

2. The value that the public assigns to the problem of invasive plants, though important, is inferior in absolute value when compared to the assessment that the public gives to other attributes and services that these aquatic areas provide. We reject this hypothesis. In absolute terms, Florida residents are willing to spend more to reduce invasive species coverage than they are to improve facilities, native animal species, or native plant species (See Table 3).

3. The value that the public assigns to the presence of invasive plants is contingent on the level and extent of knowledge that they have about this problem and their previous experience. We fail to reject this hypothesis. Our estimates suggest the level of knowledge of invasive species has a strong, direct impact on MWTP (See Table 4).

4. The public's demographic characteristics will not influence their expressed assessment of value to the problem of the presence of invasive plants in aquatic areas in Florida. We fail to reject this hypothesis. Socio-economic factors are largely insignificant in our estimations of the logit model coefficients (See Appendix C). Formal education, age, sex, and income have no statistically significant impact on MWTP.

Conclusion

This study employs a Multiattribute Utility Analysis survey to reveal the value of recreation in natural areas with differing levels of invasive species, and thus provide useful information for benefit-cost analyses of public programs to control and reduce the spread of invasive weeds in Florida. Invasive species are a widespread problem, significantly impacting recreation, agricultural production and endangered species in many US states. Valuation of the recreational impact of invasive species is important for the proper design of a policy response.

We find that Florida residents have a high willingness to pay to reduce invasive species coverage in River and Lake, Wooded, and Ocean and Beach parks. Further, their MWTP to reduce invasive species is higher than their MWTP to improve park facilities or increase the abundance of native plants or animals. Residents' level of knowledge of invasive species has a high and direct impact on MWTP, but socio-economic factors do not. These results suggest that an educational campaign on invasive species may increase Florida residents' willingness to pay for projects that reduce invasive species.

References:

Adams, D.C. and D.J. Lee (2006) "Statewide bioeconomic model of the invasive aquatic plants hydrilla, water hyacinth, and water lettuce," Draft report to FL-DEP-BIMP

Alvarez, R.M. and VanBeselaere, C. (2003) "Web-Based Surveys" California Institute of Technology

Berrens, R.P., A.K. Bohara, H.C. Jenkins-Smith, C.L. Sivla, and D.L. Weimer (2003) "Advent of Internet Surveys for Political Research: Comparison of Telephone and Internet Samples," Polit. Anal. 11:1 – 23.

Berrens, R.P., A.K. Bohara, H.C. Jenkins-Smith, C.L. Sivla, and D.L. Weimer (2004) "Information and Effort in Contingent Valuation Surveys: Application to Global Climate Change Using National Internet Samples," J. Envir. Econ. and Manag. 47:331 – 363.

Bowers, D.K. (1999) "FAQs on Online Research," Marketing Research, 10(1):45 – 48. http://business.nmsu.edu/~mhyman/M610_Articles/Bowers_Marketing_Research_1999.pdf

Couper, M.P. (2000) "Web Surveys: A Review of Issues and Approaches," Public Opinion Quarterly 64(4):464 – 494.

Dillman, D.A. (2002) *Mail and Internet Surveys: The Tailored Design Methods*, 2nd Ed., New York: John Wiley and Sons, Inc.

Dillman, D.A., Tortora, R.D., and Bowker, D. (1998). "Principles for constructing Web surveys," Retrieved from http://survey.sesrc.wsu.edu/dillman/papers/websurveyppr.pdf

Dillman, D. A. and Bowker, D. K. (2001). “The Web Questionnaire Challenge to Survey Methodologists,” In U.-D. Reips, & M. Bosnjak (Eds.), *Dimensions of Internet science* (pp. 159-178). Lengerich: Pabst Science Publishers. Retrieved from http://survey.sesrc.wsu.edu/dillman/papers.htm

Dillman, D.A., G. Phelps, R.D. Tortora, K. Swift, J. Kohrell, and J. Berck, (2001) “Response Rate and Measurement Differences in Mixed Mode Surveys Using Mail, Telephone, Interactive Voice Response and the Internet,” at http://survey.sesrc.wsu.edu/dillman/papers/Mixed%20Mode%20ppr%20_with%20Gallup_%20POQ.pdf, accessed May 21, 2007.

Egbert, A.L., V.J. Heller, and D.B. Harding (2000) “Monetary value of nature: an economic impact assessment of three lakes wildlife management area,” Florida Fish and Wildlife Conservation Commission, cited in Florida *Forest Steward*, vol. 8, no 1

FLEPPC, 2006, Florida Exotic Pest Plant Council, http://www.fleppc.org/

Glisson, M. W. (1994) “Invasive Non-indigenous Species in Florida’s State Parks”. In *An Assessment of Invasive Non-indigenous Species in Florida’s Public Lands*. Technical Report TSS-94-100, Florida Department of Environmental Protection, Tallahassee, Florida

Groves R.M. (1987) “Research on Survey Data Quality: Survey Research as a Methodology Without a Unifying Theory,” Public Opinion Quarterly 51:S156 – S172.

Huggins, V. and J. Eyerman (2001) “Probability Based Internet Surveys: A Synopsis of Early Methods and Survey Research Results,” Research Conference of the Federal Committee of Statistical Methodology, http://www.fcsm.gov/01papers/Huggins.pdf

Lee, D. J. and C.S. Kim (2005) “Managing Upland Invasive Plants on Florida Public Lands.” Paper presented at USDA-TSTAR Annual Meeting, 06/01/2005, San Juan Puerto Rico

Lee, D.J., D.C. Adams, D.C., and F. Rossi (2006) “Economic risk from introduction of an invasive specie: Zebra Mussels in Florida Waterway,” Draft report for FRE Staff Paper Series.

Lindner, J.R., T.H. Murphy, and G.E. Briers (2001) “Handling Nonresponse in Social Science Research,” J. Agr. Ed. 42(4):43 – 53.

McFadden, D. (1974) “Conditional logit analysis of qualitative choice behavior,” in P. Zarembka (ed.), *Frontiers in Econometrics*, New York: Academic Press, pp. 105-142.

Milon, J.W. and A. Hodges (2002) “Everglades restoration planning: multiattribute utility analysis,” in D. Letson and J.W. Milon (eds.), *Florida Coastal Environmental Resources: A Guide to Economic Valuation and Impact Analysis*, Gainesville: Florida Sea Grant College Program, pp. 63-76.

Newburger, E. (2001) “Home Computers and Internet Use in the United States: August 2000,” US Census Bureau Report P23-207, September, 2001. http://www.census.gov/prod/2001pubs/p23-207.pdf

Day, J.C., A. Janus, and J. Davis (2005) “Computer and Internet Use in the United States,” US Census Bureau Cuttent Population Reports P-23-208, October, 2005, http://www.census.gov/prod/2005pubs/p23-208.pdf

Shannon, D.M. , T.E. Johnson, S. Searchy, and A. Lott (2002) “Using Electronic Surveys: Advice from Survey Professionals,” Practical Assessment, Research & Evaluation, 8(1). http://pareonline.net/getvn.asp?v=8&n=1

Siikamäki, J. (2001) Valuing Benefits of Finnish Forest Biodiversity Conservation – Logit Models for Pooled Contingent Valuation and Contingent Rating/Ranking Survey Data, Department of Agricultural and Resource Economics Seminar, UC Davis, http://are.berkeley.edu/courses/envres_seminar/s2001/siikamaki.doc

Solomon, D. (2001) “Conducting Web-based surveys: Practical assessment, Research & Evaluation,” 7 (19). Eric Clearinghouse on Assessment and Evaluation. Retrieved from http://ericae.net/pare/getvn.asp?v=7&n=19

StateofFlorida.com (2007) “Florida Quick Facts,” http://www.stateofflorida.com/Portal/DesktopDefault.aspx?tabid=95

Tsuge, T. Washida T. (2003) “Economic valuation of the Seto Inland Sea by using an Internet CV Survey”. Marine pollution bulletin 47:230-236.

Zhang, Y. (1999) “Using the Internet for Survey Research: A Case Study,” Journal of the American Society for Information Science, 51(1):57 – 68.

Appendix A. Survey Cover Letter: Ocean and Beach Park Example

Dear Florida Resident,

We are requesting your participation in a University of Florida survey on **Recreation and Invasive Plants in Florida's State Parks** *(the link to the survey webpage is located at the bottom of this letter).* You have been selected as a part of a small sample of Florida residents who are being asked to complete this online questionnaire. Please take a few minutes to complete the survey.

This survey is divided in three parts. In the first part you will be asked to provide different valuations about a specific natural area and a second one of your choice, which is optional. In the second part you will be asked to give your opinion about what effects invasive species have had in your decision of which location to attend and enjoyment when engaging in outdoor recreational activities. Finally, we will ask you to give us some socio-economic information for our analysis.

Remember that to participate in this survey you must be 18 years or older. Participation is voluntary. You do not have to answer any questions you do not wish to answer. You are free to stop the questionnaire at any time. There are no anticipated risks, compensation, or other direct benefits to you as a participant in this study. You may be assured of complete confidentiality. You will not be identified or connected with the questionnaire in any way and participation is totally anonymous. Results will only be reported as summarized data. The information gathered in this study may be published in professional journals or presented at scientific meetings, but will not be accessible as individual data.

The survey is funded by the Florida Department of Environmental Protection and is administered by the University of Florida and the Institute of Food and Agricultural Sciences. For questions about this study, please feel free to contact graduate student investigators Santiago Bucaram (santibu@ufl.edu) or Frida Bwenge (fbwenge@ufl.edu). For questions about your rights as a research participant, please contact the University of Florida Institutional Review Board (PO Box 112250, Gainesville, Fl 32611, telephone 352-392-0433).

Please remember that your answers to this survey are extremely important and may impact your future enjoyment of Florida's state parks.

Thank you for your cooperation.

WEB SURVEY LINK: http://www.surveymonkey.com/s.asp?u=864193701263

Appendix B. Logit Model Regression Results Without Demographic Interaction Terms

River and Lake Animal Species

	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.295	0.036	8.14	0	0.224	0.367
AS	0.329	0.036	9.14	0	0.259	0.4
IS	-0.431	0.037	-11.8	0	-0.502	-0.359
FE	-0.063	0.006	-10.45	0	-0.074	-0.051

	Mg WTP	Lower Limit	Upper Limit
FA	4.7204	3.0175	7.2092
AS	5.2605	3.4804	7.8619
IS	-6.8843	-6.7605	-7.0652

River and Lake Plant Species

	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.357	0.039	9.25	0	0.281	0.432
PS	0.298	0.038	7.82	0	0.223	0.373
IS	-0.5	0.038	-13.06	0	-0.575	-0.425
FE	-0.073	0.006	-11.6	0	-0.085	-0.061

	Mg WTP	Lower Limit	Upper Limit
FA	4.8792	3.2892	7.1159
PS	4.077	2.6133	6.136
IS	-6.8397	-6.7289	-6.9955

Ocean and Beach Animal Species

	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.306	0.032	9.54	0	0.243	0.368
AS	0.328	0.032	10.28	0	0.265	0.39
IS	-0.45	0.032	-14.12	0	-0.513	-0.388
FE	-0.064	0.005	-12.26	0	-0.074	-0.054

	Mg WTP	Lower Limit	Upper Limit
FA	4.7755	3.2713	6.8521
AS	5.125	3.5764	7.2628
IS	-7.0391	-6.9111	-7.2157

Ocean and Beach Plant Species

	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.213	0.032	6.74	0	0.151	0.275
PS	0.22	0.031	7.11	0	0.159	0.28
IS	-0.375	0.031	-12.02	0	-0.436	-0.314
FE	-0.064	0.005	-12.44	0	-0.075	-0.054

	Mg WTP	Lower Limit	Upper Limit
FA	3.3042	2.0238	5.0638
PS	3.4063	2.1312	5.1586
IS	-5.8102	-5.8379	-5.7723

Wooded Park Animal Species

	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.287	0.038	7.590	0	0.213	0.361
PS	0.378	0.038	9.980	0	0.304	0.453
IS	-0.457	0.038	-12.090	0	-0.532	-0.383
FE	-0.064	0.006	-10.390	0	-0.076	-0.052

	Mg WTP	Lower Limit	Upper Limit
FA	4.485	3.773	5.528
PS	5.915	4.976	7.291
IS	-7.153	-6.017	-8.817

Wooded Park Plant Species

	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.307	0.038	8.13	0	0.233	0.381
PS	0.316	0.037	8.47	0	0.243	0.389
IS	-0.509	0.038	-13.54	0	-0.583	-0.436
FE	-0.074	0.006	-12.01	0	-0.087	-0.062

	Mg WTP	Lower Limit	Upper Limit
FA	4.128	2.694	6.122
PS	4.25	2.809	6.253
IS	-6.846	-6.738	-6.997

Appendix C. Logit Model Regression Results for Demographic Interactions

RIVER AND LAKE ANIMAL SPECIES COMBINATION

GENDER						
	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.292	0.045	6.420	0.000	0.203	0.381
AS	0.317	0.045	7.000	0.000	0.228	0.406
IS	-0.443	0.046	-9.670	0.000	-0.533	-0.353
FE	-0.060	0.007	-8.030	0.000	-0.075	-0.045
GFA	0.011	0.076	0.140	0.885	-0.137	0.159
GAS	0.035	0.075	0.460	0.644	-0.112	0.181
GIS	0.033	0.076	0.440	0.661	-0.115	0.182
GFE	-0.007	0.013	-0.580	0.559	-0.032	0.017

	Mg WTP	
	MALE	FEMALE
FA	$ 4.50	$ 4.86
AS	$ 5.22	$ 5.28
IS	$ (6.09)	$ (7.39)

AGE						
	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.276	0.054	5.090	0.000	0.170	0.383
AS	0.304	0.055	5.500	0.000	0.196	0.412
IS	-0.475	0.056	-8.500	0.000	-0.585	-0.366
FE	-0.049	0.009	-5.550	0.000	-0.067	-0.032
FAAG1	-0.026	0.131	-0.200	0.842	-0.282	0.230
ASAG1	0.053	0.126	0.420	0.676	-0.194	0.300
ISAG1	0.327	0.124	2.630	0.009	0.083	0.571
FEAG1	-0.022	0.021	-1.030	0.303	-0.064	0.020
FAAG2	0.059	0.077	0.770	0.439	-0.091	0.210
ASAG2	0.057	0.077	0.750	0.456	-0.093	0.208
ISAG2	0.009	0.078	0.110	0.912	-0.145	0.162
FEAG2	-0.026	0.013	-2.060	0.040	-0.051	-0.001

	Mg WTP		
	18-34	35-54	55->65
FA	$ 3.50	$ 4.44	$ 5.58
AS	$ 4.99	$ 4.78	$ 6.15
IS	$ (2.07)	$ (6.18)	$ (9.61)

EDUCATION						
	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.205	0.102	2.010	0.044	0.005	0.404
AS	0.428	0.100	4.270	0.000	0.232	0.625
IS	-0.438	0.102	-4.290	0.000	-0.637	-0.238
FE	-0.070	0.017	-4.140	0.000	-0.102	-0.037
FAED1	0.070	0.118	0.590	0.552	-0.161	0.301

ASED1	-0.138	0.117	-1.180	0.237	-0.366	0.091
ISED1	-0.025	0.119	-0.210	0.830	-0.258	0.207
FEED1	0.008	0.019	0.410	0.681	-0.030	0.046
FAED2	0.091	0.124	0.730	0.463	-0.153	0.335
ASED2	-0.103	0.123	-0.840	0.402	-0.344	0.138
ISED2	0.047	0.125	0.380	0.706	-0.197	0.291
FEED2	0.013	0.020	0.610	0.539	-0.028	0.053
FAED3	0.171	0.126	1.360	0.174	-0.075	0.417
ASED3	-0.088	0.124	-0.710	0.479	-0.331	0.155
ISED3	0.013	0.126	0.100	0.920	-0.234	0.259
FEED3	0.002	0.021	0.110	0.912	-0.038	0.043

	Mg WTP			
	LOW	LOW-INT	INT	HIGH
FA	$ 4.47	$ 5.20	$ 5.59	$ 2.95
AS	$ 4.73	$ 5.72	$ 5.07	$ 6.16
IS	$ (7.53)	$ (6.86)	$ (6.32)	$ (6.30)

INCOME						
	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.3020	0.0989	3.0500	0.0020	0.1082	0.4959
AS	0.3042	0.1005	3.0300	0.0020	0.1073	0.5012
IS	-0.4080	0.1018	-4.0100	0.0000	-0.6076	-0.2084
FE	-0.0436	0.0162	-2.6900	0.0070	-0.0755	-0.0118
FAIN1	-0.1584	0.1224	-1.2900	0.1950	-0.3982	0.0814
ASIN1	0.0115	0.1224	0.0900	0.9250	-0.2284	0.2514
ISIN1	0.0322	0.1245	0.2600	0.7960	-0.2117	0.2761
FEIN1	-0.0253	0.0201	-1.2600	0.2080	-0.0648	0.0141
FAIN2	0.0584	0.1094	0.5300	0.5930	-0.1560	0.2729
ASIN2	0.0410	0.1108	0.3700	0.7120	-0.1762	0.2581
ISIN2	-0.0576	0.1123	-0.5100	0.6080	-0.2776	0.1624
FEIN2	-0.0210	0.0180	-1.1700	0.2420	-0.0562	0.0142

	Mg WTP		
	LOW	INT	HIGH
FA	$ 2.08	$ 5.58	$ 6.92
AS	$ 4.58	$ 5.34	$ 6.97
IS	$ (5.45)	$ (7.20)	$ (9.35)

LOCATION						
	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.32731	0.113904	2.87	0.004	0.104062	0.550558
AS	0.29056	0.112528	2.58	0.01	0.070008	0.511111
IS	-0.26162	0.114139	-2.29	0.022	-0.48533	-0.03791
FE	-0.05565	0.018798	-2.96	0.003	-0.09249	-0.01881
FALOC	-0.01627	0.056547	-0.29	0.774	-0.1271	0.094561
ASLOC	0.020805	0.056073	0.37	0.711	-0.0891	0.130706
ISLOC	-0.08953	0.057107	-1.57	0.117	-0.20146	0.022396
FELOC	-0.00375	0.009356	-0.4	0.688	-0.02209	0.014586

	Mg WTP		
	URBAN	SUBURBAN	RURAL
FA	$ 5.24	$ 4.67	$ 4.16
AS	$ 5.24	$ 5.26	$ 5.28
IS	$ (5.91)	$ (6.98)	$ (7.93)

OCEAN AND BEACH ANIMAL SPECIES COMBINATION

GENDER						
	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.340	0.036	9.340	0.000	0.269	0.412
AS	0.318	0.038	8.400	0.000	0.244	0.392
IS	-0.468	0.039	-12.120	0.000	-0.544	-0.393
FE	-0.066	0.006	-10.960	0.000	-0.078	-0.055
GFA	-0.155	0.078	-1.980	0.048	-0.308	-0.002
GAS	0.049	0.073	0.680	0.497	-0.093	0.192
GIS	0.071	0.069	1.030	0.301	-0.064	0.207
GFE	0.010	0.012	0.800	0.423	-0.014	0.034

	Mg WTP	
	MALE	FEMALE
FA	$ 3.28	$ 5.12
AS	$ 6.48	$ 4.78
IS	$ (7.00)	$ (7.04)

AGE						
	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.349	0.041	8.500	0.000	0.269	0.430
AS	0.432	0.046	9.380	0.000	0.342	0.522
IS	-0.601	0.049	-12.150	0.000	-0.698	-0.504
FE	-0.072	0.007	-9.780	0.000	-0.086	-0.057
FAAG1	-0.065	0.137	-0.470	0.639	-0.334	0.205
ASAG1	-0.133	0.124	-1.070	0.282	-0.375	0.109
ISAG1	0.439	0.114	3.840	0.000	0.215	0.663
FEAG1	-0.010	0.022	-0.460	0.646	-0.052	0.033
FAAG2	0.002	0.069	0.030	0.974	-0.133	0.138
ASAG2	-0.068	0.068	-1.000	0.317	-0.201	0.065
ISAG2	0.171	0.070	2.430	0.015	0.033	0.309
FEAG2	-0.001	0.012	-0.120	0.908	-0.025	0.022

	Mg WTP		
	18-34	35-54	55->65
FA	$ 3.49	$ 4.81	$ 4.88
AS	$ 3.67	$ 4.98	$ 6.03
IS	$ (1.99)	$ (5.89)	$ (8.39)

EDUCATION						
	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.42225	0.0543653	7.77	0	0.315696	0.528804
AS	0.3822493	0.0689223	5.55	0	0.2471641	0.5173345
IS	-0.5737072	0.0765389	-7.5	0	-0.7237207	-0.4236937
FE	-0.0885558	0.0105733	-8.38	0	-0.109279	-0.0678326
FAED1	-0.1772912	0.0867822	-2.04	0.041	-0.3473811	-0.0072013
ASED1	-0.0207955	0.0926548	-0.22	0.822	-0.2023956	0.1608046
ISED1	0.0977725	0.0960034	1.02	0.308	-0.0903907	0.2859357
FEED1	0.0284418	0.0148819	1.91	0.056	-0.0007261	0.0576097
FAED2	-0.1834271	0.0889372	-2.06	0.039	-0.3577408	-0.0091134
ASED2	-0.0714005	0.0932033	-0.77	0.444	-0.2540757	0.1112747
ISED2	0.1507357	0.1009689	1.49	0.135	-0.0471597	0.3486311
FEED2	0.0283326	0.0161785	1.75	0.08	-0.0033766	0.0600418
FAED3	-0.1071415	0.1019831	-1.05	0.293	-0.3070246	0.0927417
ASED3	-0.0633261	0.1023938	-0.62	0.536	-0.2640144	0.1373621
ISED3	0.2211823	0.1022551	2.16	0.031	0.020766	0.4215985
FEED3	0.0307122	0.0168724	1.82	0.069	-0.0023571	0.0637816

	Mg WTP			
	LOW	LOW-INT	INT	HIGH
FA	$ 4.07	$ 3.97	$ 5.45	$ 4.77
AS	$ 6.01	$ 5.16	$ 5.51	$ 4.32
IS	$ (7.92)	$ (7.02)	$ (6.09)	$ (6.48)

INCOME						
	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.420	0.056	7.510	0.000	0.310	0.529
AS	0.519	0.076	6.870	0.000	0.371	0.667
IS	-0.626	0.083	-7.530	0.000	-0.789	-0.463
FE	-0.078	0.011	-7.240	0.000	-0.099	-0.057
FAIN1	-0.201	0.096	-2.100	0.036	-0.390	-0.013
ASIN1	-0.238	0.103	-2.310	0.021	-0.440	-0.036
ISIN1	0.184	0.106	1.720	0.085	-0.025	0.392
FEIN1	0.007	0.016	0.430	0.668	-0.025	0.039
FAIN2	-0.156	0.074	-2.130	0.034	-0.301	-0.012
ASIN2	-0.209	0.086	-2.430	0.015	-0.377	-0.041
ISIN2	0.200	0.094	2.130	0.033	0.016	0.385
FEIN2	0.021	0.013	1.570	0.117	-0.005	0.047

	Mg WTP		
	LOW	INT	HIGH
FA	$ 3.09	$ 4.65	$ 5.40
AS	$ 3.98	$ 5.48	$ 6.68
IS	$ (6.26)	$ (7.51)	$ (8.06)

LOCATION

	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.2354038	0.0995387	2.36	0.018	0.0403114	0.4304961
AS	0.3100912	0.0987938	3.14	0.002	0.1164589	0.5037235
IS	-0.2818633	0.0986537	-2.86	0.004	-0.4752211	-0.0885056
FE	-0.0565921	0.0162046	-3.49	0	-0.0883525	-0.0248317
FALOC	0.0374109	0.050017	0.75	0.454	-0.0606206	0.1354424
ASLOC	0.0097301	0.0498687	0.2	0.845	-0.0880108	0.107471
ISLOC	-0.0898136	0.0498723	-1.8	0.072	-0.1875616	0.0079344
FELOC	-0.0039566	0.0081463	-0.49	0.627	-0.0199231	0.0120098

	Mg WTP		
	URBAN	SUBURBAN	RURAL
FA	$ 4.51	$ 4.81	$ 5.08
AS	$ 5.28	$ 5.11	$ 4.96
IS	$ (6.14)	$ (7.15)	$ (8.05)

RIVER AND LAKE PLANT SPECIES COMBINATION

GENDER						
	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.366	0.048	7.580	0.000	0.271	0.461
AS	0.280	0.048	5.820	0.000	0.186	0.375
IS	-0.523	0.048	-10.810	0.000	-0.617	-0.428
FE	-0.068	0.008	-8.630	0.000	-0.083	-0.052
GFA	-0.022	0.081	-0.270	0.785	-0.180	0.136
GPS	0.052	0.079	0.650	0.513	-0.103	0.207
GIS	0.058	0.079	0.730	0.464	-0.098	0.214
GFE	-0.015	0.013	-1.120	0.263	-0.041	0.011

	Mg WTP	
	MALE	FEMALE
FA	$ 4.16	$ 5.39
PS	$ 4.02	$ 4.13
IS	$ (5.62)	$ (7.70)

AGE						
	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.354	0.059	6.030	0.000	0.239	0.469
PS	0.325	0.059	5.480	0.000	0.209	0.442
IS	-0.620	0.060	-10.340	0.000	-0.738	-0.503
FE	-0.072	0.010	-7.550	0.000	-0.091	-0.054
FAAG1	-0.038	0.138	-0.280	0.783	-0.309	0.233
PSAG1	0.000	0.133	0.000	1.000	-0.262	0.261
ISAG1	0.392	0.132	2.980	0.003	0.134	0.650

FEAG1	-0.017	0.023	-0.740	0.462	-0.061	0.028
FAAG2	0.024	0.082	0.290	0.770	-0.136	0.184
PSAG2	-0.047	0.082	-0.580	0.562	-0.207	0.113
ISAG2	0.157	0.082	1.910	0.056	-0.004	0.318
FEAG2	0.001	0.013	0.060	0.954	-0.025	0.027

	Mg WTP		
	18-34	35-54	55->65
FA	$ 3.55	$ 5.27	$ 4.89
PS	$ 3.65	$ 3.88	$ 4.49
IS	$ (2.56)	$ (6.46)	$ (8.56)

EDUCATION						
	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.417	0.098	4.240	0.000	0.224	0.610
PS	0.375	0.098	3.810	0.000	0.182	0.568
IS	-0.550	0.098	-5.590	0.000	-0.743	-0.357
FE	-0.079	0.016	-4.900	0.000	-0.110	-0.047
FAED1	-0.109	0.116	-0.940	0.346	-0.336	0.118
PSED1	-0.097	0.115	-0.840	0.400	-0.322	0.129
ISED1	0.037	0.115	0.320	0.751	-0.190	0.263
FEED1	0.004	0.019	0.220	0.822	-0.033	0.041
FAED2	-0.022	0.125	-0.180	0.859	-0.268	0.223
PSED2	-0.053	0.125	-0.430	0.668	-0.297	0.191
ISED2	0.087	0.124	0.700	0.482	-0.156	0.331
FEED2	0.004	0.020	0.180	0.856	-0.036	0.044
FAED3	-0.055	0.132	-0.410	0.679	-0.313	0.204
PSED3	-0.123	0.132	-0.940	0.349	-0.381	0.135
ISED3	0.064	0.132	0.480	0.629	-0.195	0.322
FEED3	0.015	0.022	0.680	0.499	-0.028	0.057

	Mg WTP			
	LOW	LOW-INT	INT	HIGH
FA	$ 4.14	$ 5.27	$ 5.65	$ 5.30
PS	$ 3.73	$ 4.28	$ 3.92	$ 4.76
IS	$ (6.90)	$ (6.17)	$ (7.58)	$ (6.99)

INCOME						
	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.427	0.107	3.980	0.000	0.217	0.638
PS	0.361	0.108	3.360	0.001	0.150	0.572
IS	-0.493	0.107	-4.610	0.000	-0.702	-0.283
FE	-0.070	0.017	-4.010	0.000	-0.104	-0.036
FAIN1	-0.107	0.129	-0.830	0.406	-0.361	0.146
PSIN1	-0.107	0.129	-0.830	0.408	-0.360	0.147
ISIN1	-0.071	0.129	-0.550	0.581	-0.325	0.182
FEIN1	-0.002	0.021	-0.100	0.921	-0.043	0.039

FAIN2	-0.067	0.119	-0.570	0.571	-0.299	0.165
PSIN2	-0.054	0.118	-0.460	0.648	-0.286	0.178
ISIN2	0.019	0.118	0.160	0.875	-0.213	0.250
FEIN2	-0.005	0.019	-0.260	0.792	-0.043	0.033

	Mg WTP		
	LOW	INT	HIGH
FA	$ 4.45	$ 4.81	$ 6.12
PS	$ 3.53	$ 4.10	$ 5.17
IS	$ (7.85)	$ (6.33)	$ (7.06)

LOCATION						
	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.342	0.115	2.990	0.003	0.118	0.567
AS	0.299	0.113	2.640	0.008	0.077	0.520
IS	-0.356	0.113	-3.140	0.002	-0.578	-0.133
FE	-0.062	0.019	-3.330	0.001	-0.099	-0.026
FALOC	0.008	0.058	0.140	0.892	-0.106	0.121
ASLOC	0.000	0.057	0.000	0.997	-0.112	0.112
ISLOC	-0.078	0.058	-1.350	0.176	-0.191	0.035
FELOC	-0.006	0.009	-0.620	0.535	-0.024	0.013

	Mg WTP		
	URBAN	SUBURBAN	RURAL
FA	$ 5.14	$ 4.84	$ 4.58
AS	$ 4.38	$ 4.03	$ 3.73
IS	$ (6.36)	$ (6.91)	$ (7.38)

OCEAN AND BEACH PLANT SPECIES COMBINATION

GENDER						
	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.213	0.036	5.880	0.000	0.142	0.284
AS	0.220	0.037	5.930	0.000	0.147	0.293
IS	-0.378	0.038	-9.880	0.000	-0.453	-0.303
FE	-0.063	0.006	-10.400	0.000	-0.075	-0.051
GFA	0.001	0.076	0.020	0.988	-0.147	0.149
GPS	0.014	0.069	0.200	0.842	-0.122	0.150
GIS	0.005	0.067	0.070	0.942	-0.126	0.136
GFE	-0.005	0.012	-0.450	0.650	-0.029	0.018

	Mg WTP	
	MALE	FEMALE
FA	$ 3.13	$ 3.38
PS	$ 3.41	$ 3.48
IS	$ (5.43)	$ (5.98)

AGE						
	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.233	0.040	5.850	0.000	0.155	0.311
PS	0.270	0.042	6.370	0.000	0.187	0.353
IS	-0.499	0.047	-10.720	0.000	-0.590	-0.408
FE	-0.075	0.007	-10.350	0.000	-0.089	-0.061
FAAG1	0.236	0.152	1.560	0.120	-0.061	0.533
PSAG1	0.106	0.130	0.820	0.415	-0.149	0.361
ISAG1	0.250	0.114	2.200	0.028	0.027	0.473
FEAG1	-0.022	0.024	-0.950	0.341	-0.068	0.024
FAAG2	0.034	0.070	0.490	0.625	-0.103	0.172
PSAG2	-0.016	0.066	-0.240	0.810	-0.145	0.113
ISAG2	0.188	0.068	2.760	0.006	0.055	0.322
FEAG2	0.006	0.012	0.510	0.609	-0.018	0.030

	Mg WTP		
	18-34	35-54	55->65
FA	$ 4.83	$ 3.91	$ 3.12
PS	$ 3.87	$ 3.71	$ 3.61
IS	$ (2.57)	$ (4.54)	$ (6.68)

EDUCATION						
	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.28	0.05	5.44	0.00	0.18	0.38
PS	0.34	0.06	5.24	0.00	0.21	0.46
IS	-0.58	0.07	-8.04	0.00	-0.72	-0.44
FE	-0.09	0.01	-8.55	0.00	-0.11	-0.07
FAED1	-0.08	0.08	-1.05	0.29	-0.24	0.07
PSED1	-0.09	0.08	-1.07	0.29	-0.25	0.07
ISED1	0.20	0.09	2.17	0.03	0.02	0.38
FEED1	0.02	0.01	1.55	0.12	-0.01	0.05
FAED2	-0.07	0.10	-0.69	0.49	-0.25	0.12
PSED2	-0.12	0.10	-1.21	0.23	-0.30	0.07
ISED2	0.30	0.10	3.10	0.00	0.11	0.49
FEED2	0.02	0.02	1.48	0.14	-0.01	0.06
FAED3	0.05	0.11	0.47	0.64	-0.16	0.26
PSED3	-0.12	0.10	-1.14	0.26	-0.32	0.08
ISED3	0.27	0.10	2.66	0.01	0.07	0.47
FEED3	0.02	0.02	0.91	0.36	-0.02	0.05

	Mg WTP			
	LOW	LOW-INT	INT	HIGH
FA	$ 3.09	$ 3.44	$ 4.68	$ 3.26
PS	$ 3.86	$ 3.49	$ 3.09	$ 3.87
IS	$ (5.99)	$ (4.45)	$ (4.37)	$ (6.70)

INCOME

	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.296	0.054	5.490	0.000	0.190	0.402
PS	0.298	0.068	4.400	0.000	0.166	0.431
IS	-0.566	0.077	-7.330	0.000	-0.717	-0.415
FE	-0.087	0.011	-8.250	0.000	-0.108	-0.067
FAIN1	-0.093	0.097	-0.970	0.334	-0.283	0.096
PSIN1	-0.030	0.098	-0.310	0.758	-0.222	0.162
ISIN1	0.182	0.101	1.790	0.073	-0.017	0.380
FEIN1	0.011	0.016	0.650	0.517	-0.021	0.043
FAIN2	-0.066	0.073	-0.900	0.369	-0.210	0.078
PSIN2	-0.062	0.079	-0.790	0.429	-0.217	0.092
ISIN2	0.250	0.089	2.820	0.005	0.076	0.424
FEIN2	0.027	0.013	2.010	0.045	0.001	0.053

	Mg WTP		
	LOW	INT	HIGH
FA	$ 2.64	$ 3.82	$ 3.39
PS	$ 3.50	$ 3.92	$ 3.42
IS	$ (5.01)	$ (5.25)	$ (6.49)

LOCATION						
	Coef.	Std. Err.	z	P>|z|	95% C.I	
FA	0.2860923	0.094388	3.03	0.002	0.1010951	0.4710894
PS	0.270176	0.0921116	2.93	0.003	0.0896406	0.4507115
IS	-0.3741191	0.0928183	-4.03	0.000	-0.5560397	-0.1921986
FE	-0.0731042	0.0154717	-4.73	0.000	-0.1034283	-0.0427802
FALOC	-0.0385439	0.0485948	-0.79	0.428	-0.133788	0.0567002
PSLOC	-0.0280316	0.0474544	-0.59	0.555	-0.1210404	0.0649772
ISLOC	0.000708	0.0478877	0.01	0.988	-0.0931502	0.0945663
FELOC	0.0045999	0.0079675	0.58	0.564	-0.0110161	0.0202159

	Mg WTP		
	URBAN	SUBURBAN	RURAL
FA	$ 3.61	$ 3.27	$ 2.87
PS	$ 3.53	$ 3.35	$ 3.14
IS	$ (5.45)	$ (5.83)	$ (6.27)

Appendix D. Final Survey Instrument

1. Do you live in Florida?

Yes

No

2. What is the county of your primary residence in Florida? (Choose from the menu below)

3. How frequently have you participated in nature related outdoor activities at each of the following locations during the past 12 months?

	Daily	Weekly	Monthly	Once every 2 to 3 months	Once every 4 to 6 months	Once every 7 to 12 months	Not at all
OCEAN AND BEACH							
RIVER AND LAKE							
WOODED PARK							

Florida has:

- A unique geography and climate
- The highest plant diversity in the U.S.
- A wide exposure to invasive plants

Invasive plants are non-native species that cause economic and ecological damage. They can:

- Impact native plants and animals
- Alter natural areas
- Disrupt native ecosystems

BRAZILIAN PEPPER

AUSTRALIAN PINE

HYDRILLA

WATER HYANCINTH

Invasive plants can:

- Limit access to fishing, camping, and hunting areas
- Interfere with boating and swimming
- Prevent animals from reaching food, shelter, and breeding sites
- Crowd out native plants
- Reduce recreational enjoyment in Florida State Parks

We are focusing on three types of public parks:

(1) Ocean and beach parks
(2) River and lake parks
(3) Wooded and forested parks

WOODED PARK

We would like to know more about how invasive plants affect your recreation decisions and your enjoyment of Florida parks.

In the questions to follow we would like you to:

(1) Compare pairs of "WOODED" parks based on the 4 features shown in the table on the right
(2) Indicate your preference by choosing ONE park
(3) Do this 7 times

This part of the survey should take no more than 5 minutes

1.- PARK FACILITIES CONDITION: Park facilities include parking lots, boat docks, boat ramps, picnic tables, restrooms, showers, among others
2.- DIVERSITY OF PLANT SPECIES: Include all the plants which are natural or indigenous to Florida
3.- FEES: Include fees for admission, parking, camping among others
4.- PRESENCE OF INVASIVE SPECIES: All non-native plants known to disrupt ecosystem processes

About the two Wooded parks:

(1) The two parks are your only alternatives
(2) Each park is the same distance from your home
(3) Both parks offer the following activities and facilities

PARK ACTIVITIES	
Bicycling	Horse trails
Hiking	Wildlife viewing
PARK FACILITIES	
Cabins	Picnic Areas
Camping	Restrooms
Lodge	**AREA:** 500 ACRES

	PARK A	PARK B
Facilities condition	Minimal	Adequate
Native plant diversity	Moderate	High
Presence of invasive species	Few and dispersed	Numerous and dense
Fees	$10	$20

Which of the two parks do you prefer?

Park A Park B

	PARK A	PARK B
Facilities condition	Minimal	Excellent
Native plant diversity	Low	High
Presence of invasive species	None	Few and dispersed
Fees	Free	$20

Which of the two parks do you prefer?

Park A Park B

	PARK A	PARK B
Facilities condition	Excellent	Adequate
Native plant diversity	High	Low
Presence of invasive species	None	Numerous and dense
Fees	$20	Free

Which of the two parks do you prefer?

Park A Park B

	PARK A	PARK B
Facilities condition	Minimal	Excellent
Native plant diversity	High	Moderate
Presence of invasive species	Few and dispersed	None
Fees	$10	$20

Which of the two parks do you prefer?

Park A Park B

	PARK A	PARK B
Facilities condition	Adequate	Excellent
Native plant diversity	Moderate	High
Presence of invasive species	None	Numerous and dense
Fees	$10	Free

Which of the two parks do you prefer?

Park A Park B

	PARK A	PARK B
Facilities condition	Excellent	Minimal
Native plant diversity	Moderate	High
Presence of invasive species	Few and dispersed	Numerous and dense
Fees	$10	Free

Which of the two parks do you prefer?

Park A Park B

	PARK A	PARK B
Facilities condition	Excellent	Minimal
Native plant diversity	High	Low
Presence of invasive species	Numerous and dense	None
Fees	$20	$10

Which of the two parks do you prefer?

Park A Park B

There are two other types of parks that are highly impacted by invasive plants. Of the two, which one would you answer more questions about?

Ocean and Beach

River and Lake

Neither. I would like to proceed to other questions

OCEAN AND BEACH

We would like to know more about how invasive plants affect your recreation decisions and your enjoyment of Florida parks.

In the questions to follow we would like you to:

(1) Compare pairs of "OCEAN AND BEACH" parks based on the 4 features shown in the table on the right

(2) Indicate your preference by choosing ONE park

(3) Do this 7 times

This part of the survey should take no more than 5 minutes

1.- PARK FACILITIES CONDITION: Park facilities include parking lots, boat docks, boat ramps, picnic tables, restrooms, showers, among others
2.- DIVERSITY OF PLANT SPECIES: Include all the plants which are natural or indigenous to Florida
3.- FEES: Include fees for admission, parking, camping among others
4.- PRESENCE OF INVASIVE SPECIES: All non-native plants known to disrupt ecosystem processes

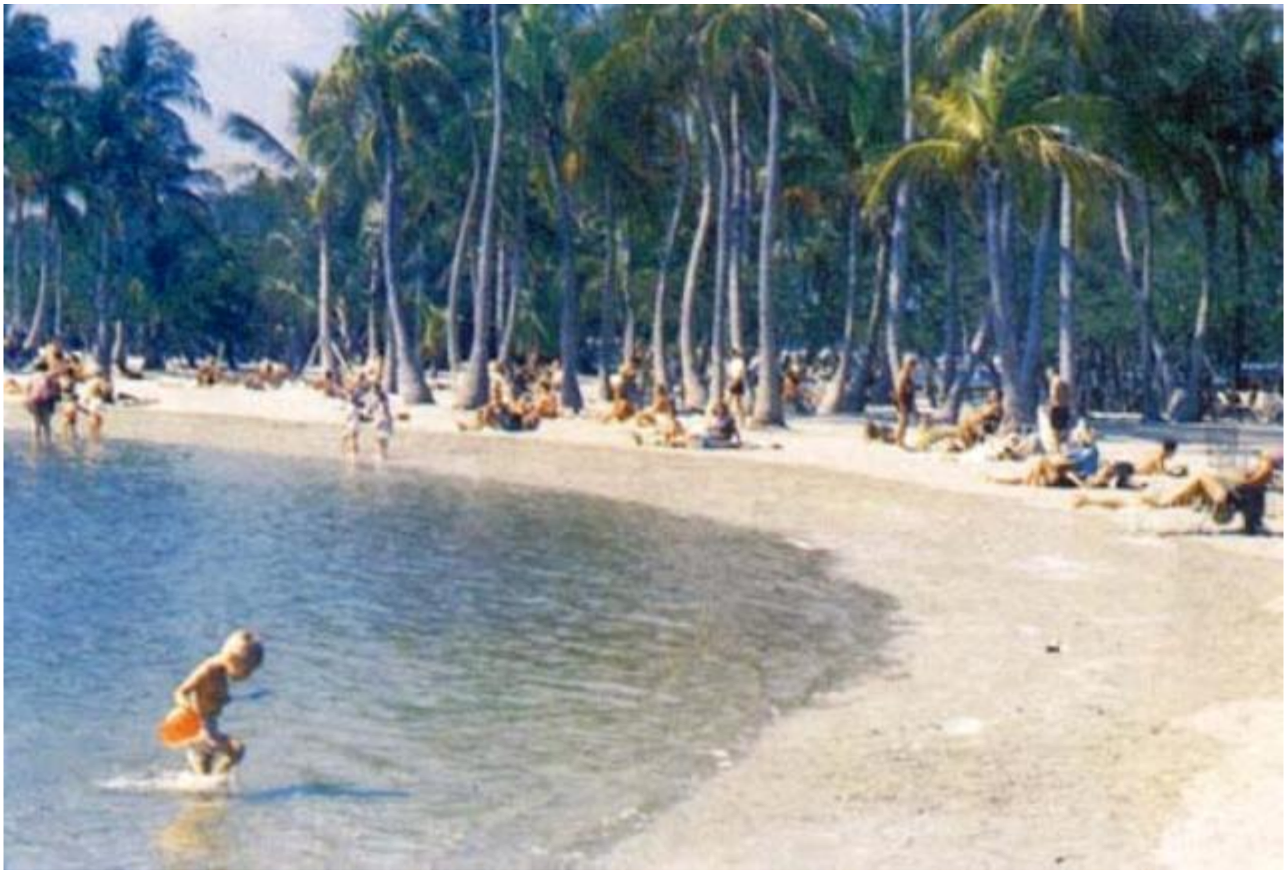
About the two Ocean and Beach parks:

(1) The two parks are your only alternatives

(2) Each park is the same distance from your home

(3) Both parks offer the following activities and facilities

PARK ACTIVITIES	
Boating	Sunbathing
Fishing	Surfing
Scuba	Swimming
Snorkeling	Tubing
PARK FACILITIES	
Cabins	Restrooms
Camping	Showers
Picnic Areas	**AREA: 500 ACRES**



RIVER AND LAKE

We would like to know more about how invasive plants affect your recreation decisions and your enjoyment of Florida parks.

In the questions to follow we would like you to:

(1) Compare pairs of "RIVER AND LAKE" parks based on the 4 features shown in the table on the right

(2) Indicate your preference by choosing ONE park

(3) Do this 7 times

This part of the survey should take no more than 5 minutes

1.- PARK FACILITIES CONDITION: Park facilities include parking lots, boat docks, boat ramps, picnic tables, restrooms, showers, among others
2.- DIVERSITY OF PLANT SPECIES: Include all the plants which are natural or indigenous to Florida
3.- FEES: Include fees for admission, parking, camping among others
4.- PRESENCE OF INVASIVE SPECIES: All non-native plants known to disrupt ecosystem processes

About the two River and Lake parks:

(1) The two parks are your only alternatives

(2) Each park is the same distance from your home

(3) Both parks offer the following activities and facilities

PARK ACTIVITIES	
Bicycling	Horse trails
Boating	Kayaking/ Canoeing
Fishing	Swimming
Hiking	Wildlife viewing
PARK FACILITIES	
Cabins	Picnic Areas
Camping	Restrooms
Lodge	**AREA: 500 ACRES**

	PARK A	PARK B
Facilities condition	Minimal	Adequate
Animal species diversity	Moderate	High
Presence of invasive species	Few and dispersed	Numerous and dense
Fees	$10	$20

Which of the two parks do you prefer?

Park A Park B

	PARK A	PARK B
Facilities condition	Minimal	Excellent
Animal species diversity	Low	High
Presence of invasive species	None	Few and dispersed
Fees	Free	$20

Which of the two parks do you prefer?

Park A Park B

	PARK A	PARK B
Facilities condition	Excellent	Adequate
Animal species diversity	High	Low
Presence of invasive species	None	Numerous and dense
Fees	$20	Free

Which of the two parks do you prefer?

Park A Park B

	PARK A	PARK B
Facilities condition	Minimal	Excellent
Animal species diversity	High	Moderate
Presence of invasive species	Few and dispersed	None
Fees	$10	$20

Which of the two parks do you prefer?

Park A Park B

	PARK A	PARK B
Facilities condition	Adequate	Excellent
Animal species diversity	Moderate	High
Presence of invasive species	None	Numerous and dense
Fees	$10	Free

Which of the two parks do you prefer?

Park A Park B

	PARK A	PARK B
Facilities condition	Excellent	Minimal
Animal species diversity	Moderate	High
Presence of invasive species	Few and dispersed	Numerous and dense
Fees	$10	Free

Which of the two parks do you prefer?

Park A Park B

	PARK A	PARK B
Facilities condition	Excellent	Minimal
Animal species diversity	High	Low
Presence of invasive species	Numerous and dense	None
Fees	$20	$10

Which of the two parks do you prefer?

Park A Park B

Please indicate your knowledge of invasive plants prior to this survey.

I knew a lot about invasive plants
I knew a little about invasive plants
I knew nothing about invasive plants

Indicate your agreement or disagreement with the following statements:

	Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree
Invasive plants have affected my enjoyment of outdoor recreation activities in State Parks					
Invasive plants have affected the number of my visits to State Parks					
Invasive plants have affected which State Parks I attend					
Invasive plants can also provide benefits to Florida's parks					

Have you taken any personal actions in response to invasive plants in Florida?

Yes
No

Examples of actions against invasive species are:
To become active to help remove invasive plants from natural areas;
To drive or travel farther to visit an alternative location with fewer invasive plants;
To donate money or supplies to help remove invasive plants from natural areas; among others

Please indicate whether you have done any of the following in response to invasive plants:

I helped remove invasive plants from natural (public) areas
I made a personal contribution (money or supplies) to help remove invasive plants from natural (public) areas.
I have driven to farther parks just to avoid invasive species plants
Other (please specify)

DEMOGRAPHIC QUESTIONNAIRE

Please indicate the area that best describes where you live

Urban Area – city or town
Suburban Area- within 5 miles of a city center or town
Rural Area - more than 5 miles from a city center or town

Please indicate your gender

Male
Female

Please indicate your age

18 - 24
25 – 34
35 – 44
45 – 54
55 – 64
65 or older

Please indicate your marital status

Single, never married
Married
Divorced
Widowed

How many people including yourself occupy the residence where you live?

1
2
3
4
5
more than 5

How many people under age 18 live with you?

None
1

2
3
4
5
more than 5

Indicate the highest level of education you have completed
Some high school
High school graduate
Associate (AA) or 2 year technical degree
Bachelor (BA, BS, or other 4 year degree)
Advanced or Professional training beyond a bachelor degree

Indicate your race or ethnic background
White/Caucasian
Black/African-American
Hispanic, Latino, Chicano
Asian or Pacific Islander
Native American

Is anyone in your household affiliated with an environmental organization?
Yes
No

What is your employment status? (Check only one answer)
Employed
Not employed, but seeking work
Not employed and not seeking work
Student
Retired

What is your annual household income before taxes? (Check only one answer)
Less than $14,999
$15,000 - $34,999
$35,000 - $59,999
$60,000 - $74,999
$75,000 - $99,999
$100,000 - $149,999
More than $150,000

Thank you for participating in this study. The information you provided is important. For questions about this study, please contact graduate research assistants Santiago Bucaram (santibu@ufl.edu) or Frida Bwenge (fbwenge@ufl.edu). For questions about your rights as a research participant, contact the University of Florida Institutional Review Board (PO Box 112250, Gainesville, Fl 32611, telephone 352-392-0433). Click here to qualify for your incentive
Thank you for your time. This study was developed exclusively for Florida residents.
For questions about this study, please contact graduate research assistants Santiago Bucaram (santibu@ufl.edu) or Frida Bwenge (fbwenge@ufl.edu).
For questions about your rights as a research participant, contact the University of Florida Institutional Review Board (PO Box 112250, Gainesville, Fl 32611, telephone 352-392-0433).
THANK YOU!

Appendix E. Survey Question Used to Test for Survey Cognitive Issues

FINAL QUESTIONS

Please enter your name or STUDENT CLASS ID number

Please indicate your impression of this survey (Check all that apply)

- Easy to complete
- Difficult to complete
- Clear instructions
- Confusing instructions
- Interesting
- Repetitive
- Informative
- Wordy
- Too short
- Too long
- Length is ok
- Attractive
- Unattractive

Enter here any comments on the design of this survey. We value your opinion.

THANK YOU!!!