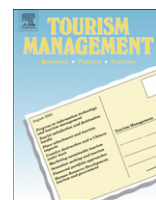




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Situational influences on normative evaluations of coastal tourism and recreation management strategies in Hawai'i

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ABSTRACT

Acceptance of tourism and recreation management strategies depends on situational factors including social, resource, and facility impacts. If an area has adequate facilities, little crowding, and minimal environmental impacts, modifying existing management may be opposed. If an area is damaged and overcrowded, actions such as limiting access may be acceptable. This article measures normative acceptance of management strategies and how situational factors differentially influence acceptance. Surveys of 1399 tourists and residents at coastal sites in Hawai'i included eight hypothetical scenarios describing impacts to four factors: use level/density, presence of litter, damage to reefs, and condition of facilities. Respondents rated their acceptance of improving awareness/education, restricting use, increasing facilities, and improving maintenance for each scenario. Factors differentially influenced acceptance of these actions. Damage to reefs was the most important factor influencing acceptance of improving awareness. Use level was most important when rating acceptance of restricting people, and facility conditions were most important in acceptance of increasing maintenance and facilities.

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1. Introduction

Coastal and marine environments are popular settings for tourism and recreation activities. In recent years in Hawai'i, for example, more than 80% of the state's seven million annual visitors engaged in coastal and marine activities with the majority participating in scuba diving (e.g., 200,000 people per year between 2001 and 2005) or snorkeling (e.g., three million people per year between 2001 and 2005; Friedlander et al., 2005; Hawai'i DBEDT, 2002; van Beukering & Cesar, 2004). Coastal and marine areas are also important recreation resources for local residents. Approximately 30% of households in Hawai'i, for example, had at least one person who participated in recreational fishing in 2004 (QMark, 2005). Other popular activities in these settings include ocean kayaking, swimming, sunbathing, beach walking, and surfing.

As the popularity of coastal and marine areas for tourism and recreation continues to increase, concerns have been raised that additional use could damage the ecological integrity of resources, reduce the quality of user experiences, depreciate the condition of facilities accommodating users, and generate conflict among

interest groups (Lück, 2008; Manning, 1999, 2007; Orams, 1999; Weaver, 2001). Regulatory agencies face a number of challenges in this context as they attempt to implement appropriate management strategies that mitigate social, environmental, cultural, and facility impacts of increasing public use to ensure that user satisfaction and environmental and facility conditions do not deteriorate (Ryan, 1995).

Given recent demographic shifts (Cordell, Bergstrom, Betz, & Green, 2004), changes in public attitudes and values (Manfredo, Teel, & Bright, 2003), and the increased effectiveness of interest groups (Needham & Rollins, 2005), a broad spectrum of the public now demands and expects involvement in decision making about coastal tourism and recreation management issues (Marion & Rogers, 1994). Groups may resort to administrative appeals, court cases, or ballot initiatives if they perceive that their concerns are not being addressed, and management actions lacking public support may be ineffective (Williamson, 1998). It is important, therefore, to understand user opinions about tourism and recreation management strategies in coastal areas (Higham & Lück, 2007; Ryan, 1995). This article examines tourist and resident support and opposition toward potential strategies for managing tourism and recreation impacts at several coastal sites in Hawai'i, and how situational factors such as coral reef damage, use levels, and amount of litter differentially influence support and opposition to these management strategies.

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1.1. Conceptual background

Management of tourism and recreation can be categorized into two general approaches. First, direct management strategies act directly on user behavior leaving little or no freedom of choice. Second, indirect strategies are more voluntary and attempt to influence decision factors on which users base their behavior (Manning, 1999, 2007; Needham & Rollins, 2009). To illustrate, direct management practices aimed at reducing litter in a coastal area could include a regulation prohibiting littering and then enforcing this policy with fines or other sanctions. An indirect practice could be an education program informing users of undesirable environmental and aesthetic impacts of litter, and encouraging users to stop littering. Additional direct actions include quotas and other methods for limiting use such as zoning, user fees, and prohibiting certain activities. Other indirect strategies include voluntary guidelines and facility upgrades and maintenance (e.g., trash cans, boardwalks). This article examines user reactions to three indirect management strategies (improve user awareness/education, increase maintenance or upkeep, provide more facilities or services) and one direct strategy (restrict use by limiting the number of people allowed) that were prioritized by local, county, and state agencies.

Norm theory offers a theoretical and conceptual approach for identifying public support and opposition toward these types of direct and indirect management practices (e.g., restrict use, increase maintenance), and can help explain why these types of practices are judged acceptable or unacceptable (Vaske & Needham, 2007). One line of research defines norms as standards that individuals use to evaluate activities, environments, or management strategies as good or bad, better or worse; norms are what people believe individual or agency behavior should be in a given context (Manning, 1999, 2007; Needham, Rollins, & Vaske, 2005; Shelby, Vaske, & Donnelly, 1996; Vaske & Donnelly, 2002; Vaske & Whittaker, 2004). In a coastal context, norms or evaluative standards may refer to the extent that agency strategies for addressing user crowding or damage to coral reefs would be acceptable or unacceptable to users.

Measuring norms toward tourism and recreation management strategies has traditionally involved asking single item questions to investigate whether people support or oppose individual strategies (Manning, 1999, 2007). Users in coastal areas may be asked, for example, whether they feel that providing more educational information on signs or brochures is acceptable or unacceptable (Shafer & Inglis, 2000; Tonge & Moore, 2007). This approach can be problematic for two reasons. First, it can result in a “ceiling effect” where many strategies are supported by most respondents, but implementing all supported strategies may be impossible for logistical or financial reasons (Lawson, Roggenbuck, Hall, & Moldovanyi, 2006; Oh, 2001). Research may reveal, for example, that users support restricting the amount of use and providing more information at a site, but budget cuts and lack of personnel may constrain the ability to provide educational materials and monitor use levels (Needham & Rollins, 2009). Second, acceptance of strategies can depend on situational factors such as associated levels of social, environmental, and facility impacts (Kneeshaw, Vaske, Bright, & Absher, 2004; Vaske & Needham, 2007). If a coastal area, for example, has adequate facilities, little crowding, and minimal coral reef impacts, modifying an existing management regime may not be supported by users. Conversely, if the reef is damaged and the site is overcrowded, then direct actions such as limiting use may be more acceptable. Practices acceptable in one context may not necessarily be acceptable in another, depending on the norms that individuals hold for a particular context and management action.

This traditional approach for measuring norms toward management rarely reflects the complexity of actual tourism and recreation management and decision making processes. This approach also generally fails to address contextual or situational factors that may differentially influence decisions to support or oppose particular management actions (Kneeshaw et al., 2004; Lawson et al., 2006; Sorice, Oh, & Ditton, 2007, 2009). A need exists in coastal tourism and recreation to understand both the range of contextual or situational factors influencing management, and how users and other interest groups respond to these factors (Sorice et al., 2009). Understanding these situational influences on public acceptance of management may increase manager confidence when choosing among various potential management alternatives. Given the complexity of most management situations, it may be more useful to examine how individuals tradeoff their support for specific management strategies in light of situational factors such as social, resource, and facility impact levels (Kneeshaw et al., 2004; Lawson et al., 2006).

Recent research has used multivariate statistical techniques such as conjoint analysis (Gustafsson, Herrmann, & Huber, 2003; Luce & Tukey, 1964) to investigate the relative importance that users place on various aspects of a tourism and recreation setting, and the extent that users consider tradeoffs among these situational factors in their normative support of management practices (Dennis, 1998; Kneeshaw et al., 2004; Lawson et al., 2006; Sorice et al., 2007, 2009; Teisl, Boyle, & Roe, 1996). Instead of asking individuals to rate their support for a single factor or strategy (i.e., traditional approach), these newer survey based techniques involve scenarios or profiles describing configurations of a combined set of factors. Respondents react to a package or profile of situational factors in a scenario and weigh tradeoffs among these factors when reporting norms for each management strategy. This approach provides managers with an understanding of how people could respond to implementation of strategies given combinations of current or future social, resource, and facility impacts or conditions (Sorice et al., 2007).

Conjoint analysis originated in mathematical psychology and marketing to estimate how different situational factors (e.g., car color, fuel efficiency, price) influence consumer purchasing preferences (Green & Srinivasan, 1978; Luce & Tukey, 1964). Consumers rarely have the option of purchasing products that are the best in every attribute, so they often make tradeoffs. Conjoint analysis determines what combination of a limited number of factors and levels is influential on respondent decisions. This approach has been used in tourism, recreation, and natural resources to examine factors influencing windsurfer satisfaction (e.g., crowding, wind; Ninomiya & Kikuchi, 2004); effects of wildfire (e.g., risk to homes, lightning or human started) on acceptance of management (e.g., put fire out, let it burn; Kneeshaw et al., 2004); camper tradeoffs among setting preferences such as facilities and fees (Lawson et al., 2006); and factors influencing tourism destination and activity choices (Suh & McAvoy, 2005; Thyne, Lawson, & Todd, 2006).

Steps in conjoint analysis include characterizing the decision problem, identifying and describing situational factors and their levels, developing an experimental design, constructing the data collection instrument, collecting data, and estimating the model (Holmes & Adamowicz, 2003). If the decision problem is acceptance of closing a particular beach, for example, factors influencing this decision may include crowding, beach erosion, facility conditions, endangered species presence, litter, dangerous shore break, and coral reef health. Researchers specify two or more levels for each factor (e.g., litter, no litter). The number of possible combinations increases exponentially as the number of factors and levels increases, and it is often too prohibitive and burdensome to have respondents consider all combinations of possible factors and

levels (i.e., full factorial design). In the beach example, if there are seven factors (e.g., crowding, litter) each with two levels (e.g., litter, no litter), a full factorial design would yield 2^7 or 128 possible combinations or scenarios. Elicitation studies (e.g., focus groups, meetings with managers) and literature reviews can be useful for prioritizing the most important factors and levels relevant to the situation, and then experimental procedures such as orthogonal fractional factorial designs can be used to create a smaller subset of scenario combinations in subsequent data collection instruments (Holmes & Adamowicz, 2003). This subset is included in the instrument and for conjoint analysis, respondents rank order scenarios or rate scenarios on normative scales.

The model in this study was designed for conjoint analysis, not discrete choice or stated preference analysis. Conjoint analysis differs from these other multivariate attribute or factor based modeling techniques in a number of ways. First, conjoint analysis typically requires that respondents evaluate one multivariate profile or scenario at a time and then rank order scenarios or rate each scenario on individual scales. Discrete or stated choice approaches, on the other hand, typically force respondents to choose among pairs of scenarios or profiles that differ in the factors describing them. Second, discrete or stated choice models are based on random utility theory that permits analytical approaches such as logit and probit modeling. Conjoint analysis is somewhat more simplistic in that it generates utility values or part-worth estimates identifying preferences for each factor level, estimates percentages for the averaged relative importance attributed to each factor, and provides model fit correlation statistics. Third, discrete or stated choice models often allow examination of interaction effects among situational factors, whereas conjoint analysis typically addresses the main effects for each factor (Holmes & Adamowicz, 2003; Louviere, 1988; Louviere, Hensher, & Swait, 2000).

Conjoint analysis software (e.g., SPSS Conjoint Module, LIMDEP) decomposes respondent evaluations into part-worth utility values for each level of each factor when factors are entered linearly. These values indicate the relative influence of each factor level on responses. In the beach example, if acceptance of closing the area is measured on a scale of 1 “very unacceptable” to 7 “very acceptable,” utility values of 6.10 for “high crowding” (e.g., more than 65% of users feel crowded) and 1.90 for “low crowding” (e.g., less than 35% feel crowded) suggest that respondents are more likely to accept the closure if crowding is high (Shelby, Vaske, & Heberlein, 1989). Utility values of factor levels can be added together with the constant to estimate responses to all possible scenario combinations, including those not asked in the instrument. Conjoint analysis eliminates cases with missing values or equal ratings across all scenarios because identical ratings indicate no preferences for different factors and their associated factor levels (Gustafsson et al., 2003). Averaged relative importance scores indicate the extent that each factor influences decisions, and are standardized percentages computed by taking the range of utility values for each factor and dividing them by the total range in utility values across all factors. These scores should be interpreted with caution, however, because they are not weights of factor attributes and they are influenced by the range of respective factor levels. In the beach example, if coral reef health has an averaged importance of 57% and crowding has an importance of 21%, reef health is a more influential factor in decisions about whether to close the beach. Pearson *R* and Kendall's tau model fit estimates are correlations between predicted and observed ratings, provide an estimate of the conjoint model goodness of fit, and range from 0 (poor fit) to 1 (perfect fit). Mathematical formulas for calculating these utility values, averaged relative importance scores, and fit statistics are beyond the focus of this article and are discussed elsewhere (Green & Srinivasan, 1978;

Gustafsson et al., 2003; Holmes & Adamowicz, 2003; Luce & Tukey, 1964).

Research has identified several prominent situational factors or indicators that influence acceptance of tourism and recreation management strategies in coastal and marine settings. Four of these factors (use level/density of users, recreation damage to coral reefs, presence of litter, condition of facilities) were identified in the literature and examined for their influence on user norms toward management strategies. These factors were chosen because of their saliency in the literature and relevance to coastal and marine tourism management. Use level (i.e., density of people) is important because visitation to many coastal and marine settings has increased (Inglis, Johnson, & Ponte, 1999; Lück, 2008; Orams, 1999). Research has shown that crowding and other impacts to the quality of experiences can occur when users encounter more people than they consider tolerable (Needham, Rollins, & Wood, 2004; Vaske & Donnelly, 2002). Studies have also demonstrated that activities such as snorkeling and scuba diving cause coral reef damage such as breakage, abrasion, and mortality (e.g., Barker & Roberts, 2004; Hawkins et al., 1999; Meyer & Holland, 2008; Rodgers & Cox, 2003; Rouphael & Hanafy, 2007; Rouphael & Inglis, 2002; Tratalos & Austin, 2001). One of the most offensive issues reported by people in a tourism and recreation context is litter (Manning, 1999). Encountering even a small amount of litter can diminish the quality of user experiences (Heywood & Murdock, 2002; Manning et al., 2004; Oigman-Pszczol & Creed, 2007). Finally, many developed coastal tourism and recreation areas contain facilities such as trash cans, bathrooms, and showers. These facilities accommodate people, but users can be dissatisfied with the site and their experience if these facilities are in a state of disrepair (e.g., Lew & Larson, 2005; Manning, 1999; Shafer & Inglis, 2000).

1.2. Research questions

This article applies conjoint analysis to determine the relative importance of these four situational factors and the influence of varying levels of these factors on normative judgments that users make about coastal tourism and recreation management strategies in Hawai'i. Two research questions are addressed. First, to what extent would users accept or reject different strategies for managing tourism and recreation at coastal sites in Hawai'i (e.g., limit use, improve site upkeep, improve user awareness and education)? Second, how do situational factors (e.g., use levels, reef damage, litter) differentially influence normative acceptance of these strategies?

2. Methods

2.1. Study areas

Data for this article were drawn from a larger study designed to develop a baseline understanding of various aspects of coastal and marine tourism and recreation in Hawai'i. Data were obtained from summer users visiting one of three coastal sites on the island of O'ahu, Hawai'i: (a) Pūpūkea Marine Life Conservation District (MLCD), (b) Waikīkī Diamond Head Shoreline Fisheries Management Area (FMA), and (c) Kailua Beach Park (Fig. 1). These were priority sites selected for study by local, county, and state agencies. Pūpūkea MLCD is on the north shore of the island and includes three bays: Waimea Bay, Three Tables, and Shark's Cove. Popular summer activities at this MLCD are swimming, beach walking, snorkeling, and scuba diving. Facilities such as restrooms, showers, parking, and trash cans are available. Waikīkī Diamond Head Shoreline FMA is on the leeward south coast of the island and extends from the Waikīkī War Memorial Natatorium east to Diamond Head Lighthouse. The popular areas for summer activities

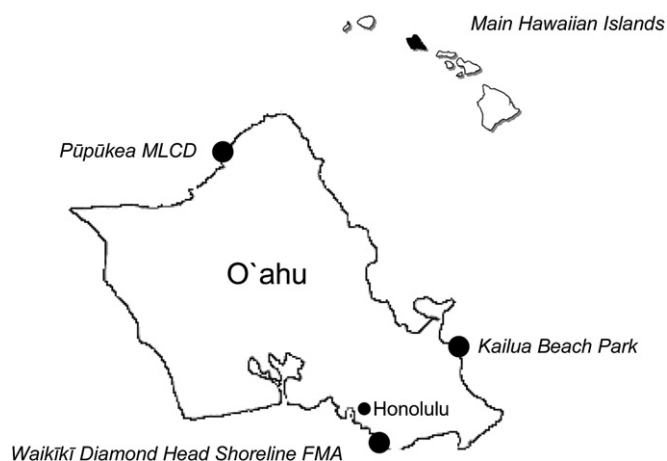


Fig. 1. Map of three study sites on the island of O'ahu, Hawai'i.

such as sunbathing, swimming, and surfing are Sans Souci/Kaimana Beach and Diamond Head Beach Park. Restrooms, showers, parking, picnic tables, and benches are located in this FMA. Kailua Beach Park is on the windward northeast coast of O'ahu and is renowned for its long sandy beach and turquoise waters. Facilities include showers, restrooms, picnic tables, trash cans, and several parking areas. Summer activities at Kailua Beach Park include sunbathing, swimming, beach walking, kayaking, kitesurfing, windsurfing, and fishing. Although these sites have regulatory and jurisdictional differences in that they range from a state marine protected area to a county beach park, they are similar in terms of activities and facilities. Coral reefs are present at all of these sites, although they are slightly more prevalent and popular at Pūpūkea MLCD (Friedlander et al., 2005).

2.2. Data collection

Surveys were administered onsite to tourists and residents visiting these three sites during two weeks in July 2007 and two weeks in August 2007. Tourism and recreation use trends show only marginal seasonal variation in visitation to coastal and marine areas in Hawai'i (Friedlander et al., 2005; Hawai'i DBEDT, 2002). The surveys were four pages in length, addressed a variety of concepts, and took respondents an average of 15 minutes to complete. To increase probability of achieving a representative sample of summer users, sampling at the sites was stratified and alternated so that surveys were administered at each site at least once for each day of the week and at least once for each of three time periods each day (8:00 AM to 10:30 AM, 11:30 AM to 2:00 PM, 3:00 PM to 5:30 PM). Given that these sites are relatively popular, it was not feasible or necessary to survey every person encountered during these survey periods. Individuals were selected through a systematic random sampling procedure to reduce selection bias (e.g., one random individual selected from every 5th or 10th selected group depending on the size and popularity of the site; Vaske, 2008). In total, 1601 summer users were approached and 1399 of these individuals completed the conjoint survey onsite (87% overall response rate). Sample sizes for this survey were 491 at Pūpūkea MLCD (93% response rate), 463 at Waikiki Diamond Head Shoreline FMA (84% response rate), and 445 at Kailua Beach Park (85% response rate). These sample sizes are large enough to ensure a margin of error of $\pm 4.6\%$ 19 times out of 20 for each site (± 2.6 for all sites combined; Vaske, 2008), but no accurate data exists on actual use levels at each site to determine if sample sizes are proportional to visitation (Friedlander et al., 2005).

2.3. Conjoint measures

2.3.1. Situational factors

For the conjoint analysis, written hypothetical scenarios were developed and embedded in the surveys to represent combinations of four situational factors and factor levels related to social, environmental, and facility impacts associated with coastal tourism and recreation. Two levels were used for each of the four factors:

1. Use level/density of people:
 - Low (e.g., less than 35% of people feel crowded)
 - High (e.g., more than 65% of people feel crowded)
2. Recreation damage to coral reefs:
 - Minimal (e.g., less than 25% of corals broken or trampled)
 - Substantial (e.g., more than 75% of corals broken or trampled)
3. Amount of litter:
 - None (e.g., no pieces of litter seen)
 - Some (e.g., one or more pieces of litter seen)
4. Condition of facilities (e.g., bathrooms, showers, signs, trash cans)
 - Good (e.g., more than 75% of facilities clean and in working order)
 - Poor (e.g., less than 25% of facilities clean and in working order)

These factor levels were based on past research. Shelby et al. (1989), for example, categorized low density or use level capacity when less than approximately 35% of users felt crowded, and high density or capacity when approximately 65% or more users were crowded. Several studies have described relatively minimal damage to coral reefs when less than approximately 25% of corals are broken or trampled, and substantial damage when more than approximately 75% of corals are impacted (e.g., Hawkins et al., 1999; Rodgers & Cox, 2003; Rodgers, Cox, & Newton, 2003; Zakai & Chadwick-Furman, 2002). Heywood and Murdock (2002) depicted no litter with zero pieces of litter and some litter with one or more pieces. Given that each of these four situational factors had two discrete levels, 2^4 or 16 possible combinations or scenarios would be necessary for a full factorial design. To reduce respondent burden, a subset of scenarios was generated using an orthogonal fractional factorial design in SPSS software's separate Conjoint Module. This reduced the number of scenarios asked in the surveys to eight (Table 1).

Table 1

Orthogonal fractional factorial design for scenarios with varying combinations of factors and levels.^a

Scenario	Use level/density	Reef damage	Litter	Facilities condition
1	High	Minimal	None	Poor
2	High	Substantial	Some	Poor
3	High	Minimal	Some	Good
4	Low	Minimal	None	Good
5	Low	Substantial	None	Poor
6	Low	Substantial	Some	Good
7	High	Substantial	None	Good
8	Low	Minimal	Some	Poor

^a Each factor had two dichotomous levels. Factor levels were: use level/density of people: low (e.g., less than 35% of users feel crowded), high (e.g., more than 65% of users feel crowded); recreation damage to coral reefs: minimal (e.g., less than 25% of corals broken or trampled), substantial (e.g., more than 75% of corals broken or trampled); amount of litter: none (e.g., 0 pieces of litter seen), some (e.g., 1 or more pieces of litter seen); condition of facilities: good (e.g., more than 75% of facilities clean and in working order), poor (e.g., less than 25% of facilities clean and in working order). Following each scenario, respondents rated four management actions (improve awareness/education of users, restrict number of people allowed in area, improve maintenance or upkeep of area, provide more facilities or services in area) on 5-point recoded scales of -2 "very unacceptable" to $+2$ "very acceptable" (Needham et al., 2008).

2.3.2. Management strategies

For each scenario, respondents were asked to assume that all four conditions were common at the site and then rate their acceptance of four different management strategies: (a) improve awareness/education of people at the site, (b) restrict the number of people allowed at the site (i.e., limit use), (c) improve maintenance or upkeep of the site, and (d) provide more facilities or services at the site. Most of these are indirect strategies except restricting the number of users, which is a direct action. Respondents rated 32 strategies (four for each of the eight scenarios) on 5-point recoded scales of -2 “very unacceptable” to $+2$ “very acceptable.” These ratings represented user norms about acceptable and unacceptable management strategies, and is consistent with past research (e.g., Kneeshaw et al., 2004).

To illustrate, the second scenario asked respondents to “imagine all four of the following conditions were common at [site where they completed the survey]: high density of use (use level) (e.g., more than 65% of people feel crowded), some litter (e.g., one or more pieces of litter seen), substantial recreation damage to coral reefs (e.g., more than 75% of corals broken or trampled), and poor condition of facilities (e.g., less than 25% of facilities clean and in working order). If all of these conditions were common at this site, how acceptable or unacceptable would it be for managers to take each of the following actions: improve awareness/education of users at this site, restrict the number of people allowed at this site, improve maintenance or upkeep at this site, and provide more facilities or services at this site?” Users read each written hypothetical scenario and then rated their acceptance of each management strategy on the 5-point scale. Surveys were specific to each site, but with the exception of site name (e.g., Kailua Beach Park), wording of scenarios and questions was identical across each survey (Needham et al., 2008).

Conjoint analysis was conducted on responses to each of the four management strategies (improve awareness, restrict use, improve maintenance, provide more facilities). Separate conjoint models were initially run for each of the three sites and for each main activity group at these sites. Given that these results paralleled those for the overall combined sample, there were no statistically significant differences among sites or activities ($p > .05$), and

the sites are similar in terms of activities and facilities, findings from the entire sample aggregated across all sites and activities are presented. Analysis was conducted in SPSS software's separate Conjoint Module.

3. Results

Conjoint analysis tested the influence of the situational factors (e.g., litter, damage to reefs) on user acceptance of the management strategies (e.g., improve awareness, restrict people). Table 2 shows the utility values generated by conjoint analysis for each situational factor level for each management strategy. These values are averages across respondents and assess how factor levels influence mean acceptance. The magnitude and sign of utility values (positive, negative) indicate the relative influence of each factor level on mean acceptance. A positive utility indicates that the situational factor level increased acceptance of the strategy (constant + factor level utility); a negative utility shows that the factor level decreased acceptance (constant – factor level utility).

Mean normative acceptance of each of the four management strategies as influenced by each of the eight situational factor levels is displayed in Table 2. “Improve awareness/education of users” is an indirect management strategy that was acceptable across all factor levels, which suggests that users believed that improving user awareness and education is currently acceptable and is acceptable even under the best case scenario at all sites (low use, minimal reef damage, no litter, good facilities). This strategy was most acceptable if reef damage was substantial ($M = 1.30$), use levels were high ($M = 1.13$), litter was present ($M = 1.08$), and facilities were in poor condition ($M = 1.05$).

“Restricting the number of people allowed in the area” is a direct management strategy that was, on average, acceptable across factor levels unless use levels were low ($M = -0.10$) and reef damage was minimal ($M = -0.06$). Use restrictions were not supported unless use levels were high ($M = 0.52$) and the amount of damage to reefs was substantial ($M = 0.48$). The strategy was also more acceptable if there was litter present ($M = 0.27$) and facilities were in poor condition ($M = 0.23$). This direct management strategy was, however, less acceptable than the other three actions (improve

Table 2
Mean acceptance ratings and utility values of management actions by situational factor levels from conjoint analysis.

Factor ^a	Improve awareness/education		Limit use/restrict people		Improve upkeep		More facilities	
	Averaged utility	Mean rating ^b	Averaged utility	Mean rating ^b	Averaged utility	Mean rating ^b	Averaged utility	Mean rating ^b
Use level/density								
Low	-0.103	0.924	-0.310	-0.098	-0.084	0.837	-0.085	0.501
High	0.103	1.130	0.310	0.522	0.084	1.005	0.085	0.671
Reef damage								
Minimal	-0.276	0.751	-0.268	-0.056	-0.022	0.899	0.021	0.607
Substantial	0.276	1.303	0.268	0.480	0.022	0.943	-0.021	0.565
Litter								
None	-0.057	0.970	-0.057	0.155	-0.126	0.795	-0.062	0.524
Some	0.057	1.084	0.057	0.269	0.126	1.047	0.062	0.648
Facilities condition								
Good	-0.019	1.008	-0.021	0.191	-0.354	0.567	-0.374	0.212
Poor	0.019	1.046	0.021	0.233	0.354	1.275	0.374	0.960
Constant	1.027		0.212		0.921		0.586	
Model fit ^c	0.987		0.988		0.982		0.998	

^a Factor levels were: use level/density of people: low (e.g., less than 35% of users feel crowded), high (e.g., more than 65% of users feel crowded); recreation damage to coral reefs: minimal (e.g., less than 25% of corals broken or trampled), substantial (e.g., more than 75% of corals broken or trampled); amount of litter: none (e.g., 0 pieces of litter seen), some (e.g., 1 or more pieces of litter seen); condition of facilities: good (e.g., more than 75% of facilities clean and in working order), poor (e.g., less than 25% of facilities clean and in working order).

^b Recoded scale for acceptance of management strategies was -2 “very unacceptable” to 0 “neither” to $+2$ “very acceptable.” Mean ratings were calculated by adding part-worth utility values together with the constant. Mean acceptance of improving awareness/education when use levels are low, for example, was calculated as: Total utility = $\beta_{(\text{constant})} + \beta_{(\text{low use level})}$ or $1.027 + (-0.103) = 0.924$.

^c The model goodness of fit statistic is the Pearson R correlation between predicted and observed acceptance ratings. All values were significant at $p < .001$.

Table 3

Averaged relative importance of each factor for each management action from conjoint analysis.^a

Factor	Improve awareness/ education	Limit use/ restrict people	Improve upkeep	More facilities
Use level/density	23	35	19	23
Reef damage	41	31	21	19
Litter	18	17	21	18
Facilities condition	18	17	39	40
Total	100	100	100	100

^a Cell entries are percentage averaged importance (%).

education, more facilities, better upkeep) across all situational factor levels and suggests that this is a controversial strategy that should be implemented as a last resort.

The indirect management strategy “improve maintenance and upkeep” was acceptable across all situational factor levels, but was most acceptable if facilities were in poor condition ($M = 1.28$). This strategy was also more acceptable if there was some litter ($M = 1.05$), use levels were high ($M = 1.01$), and there was substantial damage to coral reefs ($M = 0.94$). Similarly, “providing more facilities or services” is an indirect strategy that was, on average, acceptable across all factor levels, especially if facilities were in poor condition ($M = 0.96$). This strategy was also more acceptable if use levels were high ($M = 0.67$) and some litter was present ($M = 0.65$). These results suggest that users believed that improving maintenance and providing more facilities are currently acceptable and are acceptable even under the best case scenario at all sites (low use, minimal reef damage, no litter, good facilities). These findings show that situational factor levels differentially influenced acceptance of various management strategies, and Pearson R goodness of fit estimates ranged from 0.982 to 0.998 indicating a strong fit for these models.

The relative importance of each situational factor for each of the four management strategies is displayed in Table 3. These are averaged importance ratings across respondents and sum to 100% for each management action. They are not, however, weights of factor attributes because they are influenced by the range of respective factor levels. When rating acceptance of “improving awareness/education of users,” the most important factor was recreation damage to coral reefs (41%). This suggests that if coral reefs are damaged from recreation use, the most acceptable strategy would be to improve user information and awareness. Use level/density accounted for 23% of importance. Litter and condition of facilities were the least important factors influencing acceptance of this strategy (18%). In rating acceptance of “restricting the number of people allowed,” the most important factors were use level (35%) and damage to reefs (31%). Again, litter and condition of facilities (17%) were the least important factors influencing acceptance. When rating acceptance of “improving maintenance and upkeep” and “providing more facilities,” the most important factor was condition of facilities (39% and 40%, respectively). This suggests that the most acceptable strategies would be to improve maintenance and provide more facilities if facilities are considered to be in poor condition. Use level, reef damage, and litter were substantially less important in influencing acceptance of these two actions (18–23%). These results show that importance of the four factors to user acceptance ratings differed substantially according to the management strategies evaluated.

4. Discussion and conclusions

This article examined user acceptance of one direct and three indirect management strategies for addressing coastal tourism and

recreation impacts, and how situational factors differentially influenced acceptance. Conjoint analysis revealed that improving user awareness and education was acceptable across all impacts to situational factors (e.g., use level/density, coral reef damage, litter), suggesting that users believed that improving awareness is currently acceptable and is acceptable even under the best case scenario at all sites (low use, minimal reef damage, no litter, good facilities). Restricting use was acceptable unless use levels were low and reef damage was minimal. This strategy was most acceptable if use levels were high and there was substantial reef damage. Restricting use, however, was less acceptable than other management tactics across all factor levels, suggesting that this direct action is controversial and should be a strategy of last resort. Improving site upkeep and offering more facilities and services were acceptable across all factor levels, but were most acceptable if facilities were in poor condition. Users believed that improving maintenance and providing more facilities are currently acceptable and are acceptable even under the best case scenario at each site. When rating acceptance of improving user information and awareness, recreation damage to reefs was the most important factor. Use level/density was the most important factor in rating acceptance of restricting the number of people, and condition of facilities was the most important in rating acceptance of improving maintenance and providing more facilities. These findings have implications for management and research.

4.1. Management implications

From a management perspective, results indicated that situational factors and conditions differentially influenced normative acceptance of strategies for managing tourism and recreation impacts. Results also suggested that users will likely react differently to management actions in response to future changes in site conditions. Providing more educational information to users, for example, would be the most supported strategy if evidence of substantial coral reef damage from recreation emerges in the future. Users would also support improving site maintenance and upkeep followed by providing more facilities if evidence of litter and facility disrepair occur in the future. Users, therefore, are sensitive to situational conditions and believe that management needs to respond in different ways to cope with different impacts. These findings have the potential to inform and more accurately reflect the complexity of manager decisions associated with addressing overuse and other impacts in coastal and marine settings.

Respondents believed that the three indirect strategies of improved interpretive and educational information, better upkeep and maintenance, and more facilities and services would currently be acceptable at each of the sites. State and local (e.g., county) public government agencies are responsible for managing these sites. There is currently little educational information at each site except for a few signs stipulating direct rules and regulations. Given state and county funding and personnel constraints, several facilities are also in relatively poor condition. Trash cans are often overflowing on busy weekends and holidays, and bathroom stalls are often damaged and not functional. These conditions may explain why users would accept more educational information, improved upkeep and maintenance, and more facilities and services under current conditions. Managers of these sites are encouraged to address interpretive, maintenance, and facility issues to ensure that resources and user experiences do not deteriorate.

Limiting use was the only direct management strategy investigated and it was the most controversial among users. This is consistent with other research showing that direct actions are often less favored by tourists and recreationists (Manning, 1999, 2007; Needham & Rollins, 2009). Restricting the number of users

allowed at each site would currently be unacceptable and this would only be supported if there was evidence of substantial reef damage, prevalent litter, damaged facilities, and high use levels. This management action is sometimes viewed as the only approach to mitigating impacts from tourism and recreation use, but there are many other direct and indirect alternatives such as spatial and temporal zoning, user fees, site rehabilitation and hardening, and advertising alternative or underused sites (Manning, 1999). Results suggested that restricting use at these sites in Hawai'i would act directly on user behavior leaving little or no freedom of choice, is most controversial among users, and should be used by managers as a last resort and avoided unless absolutely necessary.

Sites in this study included a state managed marine protected area (Pūpūkea MLCD), a special resource use management area (Waikīkī Diamond Head Shoreline FMA), and a relatively unregulated county beach park (Kailua Beach). These sites reflect many of the coastal and marine tourism and recreation settings in Hawai'i, and could be considered along a continuum of management from an area protected and managed primarily for conservation purposes (Pūpūkea MLCD) to a beach park that is managed mostly for recreation use (Kailua Beach). Despite these regulatory and jurisdictional differences, user norms and tradeoffs toward management strategies were almost identical across the sites. This finding suggests that information from this study could be used in planning and managing other coastal sites in Hawai'i, but it is important to recognize that site specific management will always be necessary to some degree at other locations (Higham & Lück, 2007; Lück, 2008; Manning, 1999; Orams, 1999; Weaver, 2001).

This article also highlighted that conjoint analysis can reveal information useful for informing management of coastal resources. Utility values generated by conjoint analysis, for example, can allow managers to anticipate support for or opposition to specific management strategies (Kneeshaw et al., 2004). In addition, the averaged relative importance of situational factors and factor levels indicates their influence in determining user norms and acceptance of management policies. This importance attributed to different situational factors can also allow managers to identify public concerns that need to be addressed (Lawson et al., 2006).

4.2. Research implications

From a research perspective, techniques such as conjoint analysis are an improvement over earlier approaches for measuring normative acceptance of tourism and recreation management. Traditional methods use single item questions asking respondents if they would accept or reject individual strategies (Manning, 1999). In contrast, multivariate approaches such as conjoint analysis account for complexity and recognize that acceptance of strategies depends on situational factors (Dennis, 1998). These factors related to differing social, environmental, and facility impact levels can influence whether an action is deemed acceptable or unacceptable. Consistent with past research in other settings (e.g., Kneeshaw et al., 2004; Lawson et al., 2006), situational factors and impacts to these factors differentially influenced normative acceptance of tourism and recreation management actions in coastal and marine settings. More research is needed to employ these types of multivariate techniques in other coastal and marine areas.

This study used conjoint analysis to examine the influence of situational factors (e.g., use level, litter) on normative acceptance of management strategies (e.g., restrict use, provide more awareness/education). Other multivariate attribute or factor based modeling techniques such as discrete choice and stated preference analysis, however, can arguably be more powerful because they are based on random utility theory that permits analytical approaches such as logit or probit modeling, and allow examination of interaction

effects among situational factors (Holmes & Adamowicz, 2003; Louviere, 1988; Louviere et al., 2000). Conjoint analysis is somewhat more simplistic and restrictive in its application and utility, but was used in this study because it does not force respondents to choose from pairs of scenarios; instead it allows users to evaluate discrete scenarios and then answer follow up questions about management strategies in response to each scenario (Gustafsson et al., 2003; Kneeshaw et al., 2004). More research is needed, however, to apply various types of multivariate approaches and compare whether models generate similar findings that inform management of tourism and recreation settings.

Surveys used in this study depicted four situational factors in the scenarios, and amount of litter was consistently among the least important factors influencing support of each management action. This finding is somewhat surprising given that litter is often one of the most objectionable issues reported by people in terrestrial tourism and recreation settings (Manning, 1999, 2007). Additional studies are needed to confirm this finding in more coastal and marine areas. Other factors may also be important when evaluating normative acceptance of management strategies in these areas. Indicators such as water quality, pollution, density and variety of reef fish, conflict among activity groups, and beach erosion may have an equal or even greater influence on acceptance of tourism and recreation management strategies in these environments. Additional direct and indirect management actions such as spatial and temporal zoning should also be examined relative to these factors and factor levels (Manning, 1999).

Two impact levels for each situational factor were assessed in the scenarios (e.g., low, high; minimal, substantial). This constraint was imposed to reduce respondent burden given that surveys were administered onsite. Onsite surveys are typically shorter in length than mail or other surveys to minimize disruption to tourism and recreation experiences (Vaske, 2008). Adding factors and factor levels exponentially increases the number of possible combinations and as a result, more scenarios usually need to be asked. Future studies, however, should consider other categories to characterize situational factors. Researchers might consider, for example, including three or more factor levels for litter such as "none," "one to five pieces," and "more than five pieces" (e.g., Heywood & Murdock, 2002). Likewise, it may be useful to include "moderate" (e.g., 50% of people feel crowded) as a third level for the use level/density factor (e.g., Shelby et al., 1989; Vaske & Donnelly, 2002). Future research should explore the value of alternative formulations to factors and their associated impact levels.

It is important to recognize that this study considered people visiting coastal tourism and recreation sites in the summer. Future research, however, may show that other groups have different norms about acceptance of management actions. Researchers should examine responses of others with a vested interest in coastal and marine resources such as community organizations, first nations (e.g., native Hawaiians), and other special interest groups. Incorporation of multiple interest groups allows for a more complete understanding of norms about management of coastal and marine settings, and activities occurring in these and other environments (Needham & Rollins, 2005). Finally, findings are limited to several sites on one of the Hawaiian Islands and may not generalize to all coastal and marine environments or other settings where tourism and recreation are common. Applicability of these findings to the same sites in future years and to other activity groups and geographical areas remains a topic for further empirical investigation.

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