Recreation Carrying Capacity and Management at Kailua Beach Park on Oahu, Hawaii

Final Report

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Although several people assisted with this project, any errors, omissions, or typographical inconsistencies in this final project report are the sole responsibility of the first author. All text, tables, figures, results, conclusions, and recommendations in this final project report were written by the first author and represent views of the first author based on the data and do not necessarily represent views of the funding agencies, other coauthors, or others who assisted with this project.

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ABSTRACT

As popularity of Hawaii's beaches and reefs increases, there is a need to measure and monitor recreation carrying capacity indicators to ensure that coastal resources and user experiences do not deteriorate. Objectives of this project were to measure: (a) social and facility indicators of recreation carrying capacity (e.g., crowding, encounters) to reveal thresholds when impacts become unacceptable; (b) support and opposition of management strategies for minimizing impacts (e.g., educate, limit use) and how situational factors (e.g., reef damage, use levels) differentially influence support; and (c) the extent of conflict among activity groups. Other concepts examined included recreationists' satisfaction with conditions, value orientations toward reefs, future use pattern changes (e.g., displacement), and demographic characteristics. Data were obtained from surveys of users at Kailua Beach Park (n = 921). Results showed that most users were swimmers, sunbathers, and beach walkers, and the majority of users were repeat visitors who resided in Hawaii. Most users had protectionist (i.e., biocentric, nature-centered) value orientations toward reefs. Overall satisfaction was extremely high and despite moderate encounters and crowding, most users encountered fewer people than their maximum tolerance, which was approximately 758 people at one time at Kailua Beach Park. There were not enough of some facilities (e.g., park benches) to accommodate current use and demand, suggesting that some facility capacity indicators had reached their thresholds. More education and interpretation was the most strongly supported management strategy. When rating acceptance of user education, the most important factor was recreation damage to reefs. In rating acceptance of limiting use, the most important factor was use level. When rating acceptance of improving site maintenance and providing more facilities, the most important factor was condition of facilities. There was minimal conflict among most groups at Kailua Beach Park, but approximately one-third of users reported conflict with windsurfers, kitsesurfers, and boaters (e.g., kayak, motor) at the site. Most users also believed that people handling or standing on coral was a problem at this site. Recommendations for management are discussed.

EXECUTIVE SUMMARY

Objectives

Hawaii hosts approximately seven million visitors each year who spend more than US $11 billion in the state, and in the last 20 years tourism has increased over 65%. More than 80% of Hawaii's visitors engage in recreation activities in the state's coastal and marine areas with the majority of these individuals participating in snorkeling or diving. Other popular coastal recreation activities include ocean kayaking, swimming, sunbathing, beach walking, and surfing. Beaches and reefs are also important resources for local residents. For example, approximately 30% of households in Hawaii have at least one person who fishes for recreation.

As popularity of Hawaii's coastal areas continues to increase, demand for access and use can disrupt coastal processes, damage ecological integrity of sensitive environments, reduce the quality of user experiences, and generate conflict among stakeholders regarding appropriate management responses. As a result, agencies are faced with challenges that include estimating use thresholds (i.e., carrying capacities) and how to manage and monitor use levels to ensure that thresholds are not violated and user experiences are not compromised by such things as crowding and conflict. The purpose of this project, therefore, was to examine carrying capacity, conflict, and management related to recreation use at Kailua Beach Park on the east coast of Oahu, Hawaii. Objectives of this project were to:

- Use social science approaches to measure, determine, and inform social and facility indicators of recreation carrying capacities, and determine thresholds when perceived impacts for these indicators reach unacceptable levels.
- Estimate the extent to which indicators of recreation carrying capacities are currently being exceeded and if this is impacting user experiences.
- Measure support and opposition toward management strategies for minimizing coastal recreation impacts (e.g., educate, limit use) and how situational factors (e.g., reef damage, use levels, litter) differentially influence support of these strategies.
- Determine the extent to which user conflicts exist both within and among various recreation activity groups.
- Compare the extent to which evaluations of coastal recreation impacts differ among groups (e.g., visitors versus locals, various tourism / recreation activity groups).

Other concepts examined in this project included recreationists' satisfaction with current conditions, perceptions of crowding, value orientations toward coastal environments, likelihood of future use and changes in use patterns (e.g., temporal and spatial displacement), and sociodemographic characteristics.

Data Collection

Data were obtained from surveys administered onsite to recreationists at Kailua Beach Park. Individuals at this site during July and August 2007 were approached in parking areas and on the beach / shore, and asked to complete a survey onsite. To increase the probability of achieving a

representative sample of summer users, sampling was alternated so that surveys were administered at least once for each day of the week and at least once for each of three time periods each day (8:00 to 10:30 a.m., 11:30 a.m. to 2:00 p.m., 3:00 to 5:30 p.m.). Individuals were selected through a systematic random sampling procedure (i.e., one random person selected from every n^{th} selected group). In total, 921 surveys were completed by users (response rate = 85%). This sample size allows generalizations about the population of summer users at the 95% confidence level with a margin of error of ± 3.2%.

Results Summary

Personal and Trip Characteristics

- The most popular summer activity groups at Kailua Beach Park were swimmers / waders (35%) and sunbathers (33%). Beach walkers were the third most popular activity group (15%). An additional 7% of respondents were boaters (e.g., kayakers, canoeists), 5% were windsurfers or kitesurfers, and 2% were surfers.
- Almost all (92%) respondents were visiting on their own without being a member of an organized or guided tour (e.g., ocean kayak guide companies).
- In total, 78% of respondents had previously visited Kailua Beach Park before; the remaining 22% of respondents were visiting the area for the first time.
- The largest percentage of users at Kailua Beach Park were classified as having a strong protectionist value orientation toward coral reef areas (44%) followed by those with a moderate protection orientation (36%). The fewest users had a mixed protection – use orientation toward reef areas (20%).
- In total, 39% of respondents at Kailua Beach Park were male and 61% were female. Females were more likely to hold a stronger protectionist value orientation toward reef areas (72%), whereas males were more likely to have a mixed protection – use orientation (53%). Swimmers and sunbathers were slightly more likely to be female, and anglers, kitesurfers, and windsurfers were more likely to be male.
- In total, 48% of respondents were younger than 40 years of age, but the largest proportion was between 40 and 49 years old (26%). The average (i.e., mean) age of users was 40 years old. Respondents with a mixed protection – use orientation toward reef areas were slightly younger than those with a strong protection orientation. Some groups such as beach walkers tended to be slightly older than those participating in other activities.
- Almost all respondents resided in the United States (90%) with the largest proportion living in Hawaii (58%) or California (14%). Residents of Hawaii were more likely than nonresidents to have previously visited the site, were slightly more likely than nonresidents to participate in activities such as beach walking, and were less likely to participate in activities such as sunbathing and swimming at the site.

Satisfaction with and Importance of Conditions and Experiences

- Overall satisfaction of summer users at Kailua Beach Park was extremely high, as 90% were satisfied with their visit and almost no respondents (5%) were dissatisfied.

- The majority of respondents were satisfied with most aspects of their experience and the conditions at Kailua Beach Park, especially with not having to pay a fee to visit the area, the clean ocean water, and the absence of litter. Respondents were less satisfied with the park benches and opportunities to see small (e.g., fish) and large (e.g., turtles) marine life, and were most dissatisfied with the condition of bathrooms at Kailua Beach Park.
- The majority of respondents at Kailua Beach Park rated almost all aspects of their experience and the conditions at this site as important, especially clean ocean water, absence of litter, and no user fees (over 90% of users rated as important). The least important characteristic at Kailua Beach Park was park benches (19% unimportant).
- On average, respondents rated all characteristics (i.e., experiences, conditions) as important at Kailua Beach Park and were satisfied with all characteristics at this site. These findings suggest that managers of Kailua Beach Park should "keep up the good work" in their current management of characteristics at the site.

Social Carrying Capacity Indicators

- Respondents at Kailua Beach Park encountered, on average, approximately 136 other users at this site.
- Respondents would accept encountering, on average, a maximum of approximately 276 to 302 other people at Kailua Beach Park. When results are extrapolated to a landscape level and aggregated across the entire site, the social carrying capacity indicator standard of quality is approximately 758 people at Kailua Beach Park.
- Users with a strong protectionist value orientation toward coral reef areas rated relatively low use levels as more acceptable and higher use levels as less acceptable than respondents with a mixed protection – use value orientation.
- In total, 38% of respondents felt crowded by the total number of people encountered at Kailua Beach Park in the summer. This site had "low normal" crowding, suggesting that a problem situation related to social issues such as crowding does not exist at this time.
- Respondents felt most crowded by the number of sunbathers and swimmers encountered at Kailua Beach Park (32%). In addition, 20% of users felt crowded by the number of boaters (e.g., kayak, motor), windsurfers, and kitesurfers at this site. At Kailua Beach Park, residents of Hawaii felt significantly more crowded by windsurfers and kitesurfers.
- At Kailua Beach Park, 75% of respondents encountered fewer people than the maximum number of people they would accept seeing at the site. Perceived crowding was highest for respondents who reported more encounters than their maximum tolerance level.
- Over 74% of respondents felt that the number of other people they encountered at Kailua Beach Park had no effect on their enjoyment. Users who encountered more people than they believed was acceptable were more likely to say that the number of people they encountered reduced their enjoyment, but the largest percentage of these users still felt that this number of encounters had no effect on their enjoyment (72%). This suggests that although crowding and use levels are important social issues at Kailua Beach Park, high use levels may not substantially distract from users' experiences at this site; some

users may feel crowded and encounter more people than they feel is acceptable, but this may not substantially alter their overall enjoyment and satisfaction at the site.

Facility Carrying Capacity Indicators

- On average, respondents typically saw fewer bathrooms, showers, trash cans, picnic tables, park benches, and information signs than what is actually present at Kailua Beach Park. In addition, they believed that there should still be more of each facility than what they saw. When comparing the actual number of each facility to how many respondents think should be at the site, however, it is evident that there are enough bathrooms, trash cans, picnic tables, and signs at Kailua Beach Park. According to users, there are not enough showers or park benches at Kailua Beach Park.
- At Kailua Beach Park, the majority of respondents reported encountering fewer of each facility than what they feel should be at the site (i.e., their norm). Satisfaction scores for these facilities were lower for users reporting fewer of each facility than what they feel should be at the site (i.e., their norm). These findings suggest that users want more of each facility and this would increase satisfaction with facilities at this site.
- When users' norms are compared to the actual number of facilities at Kailua Beach Park, there are actually enough of most facilities at the site (i.e., there was actually the same number or more of most facilities than what users felt should be at the site). This finding suggests that: (a) users underestimate the number of many facilities at this site by reporting fewer encounters with facilities than what is actually present, and (b) there are enough of most types of facilities at Kailua Beach Park to meet or exceed users' expectations and needs. At Kailua Beach Park, however, there were actually fewer park benches than what summer users feel should be at this site.

Recreation Conflict and Coping Behavior

- The most commonly reported conflict events observed at Kailua Beach Park were sunbathers and swimmers not looking where they were going (51%) and being too close (48%). One third of respondents also reported observing windsurfers and kitesurfers being too close (37%) and not looking where they were going (34%), sunbathers and swimmers being rude or discourteous (34%), and boaters (e.g., kayak, motorboat) being too close (30%). Fewer summer users (less than 20%) reported observing any conflict behaviors associated with snorkelers, divers, and anglers at Kailua Beach Park.
- The largest percentage of respondents (35%) experienced conflict with windsurfers and kitesurfers at Kailua Beach Park. In addition, 29% of users experienced conflict with boaters (e.g., kayak, motorboat) and 27% experienced conflict with sunbathers and swimmers. Fewer summer users experienced conflict with anglers (22%), surfers (20%), and snorkelers and divers (16%) at this site. Taken together, however, less than 35% of respondents experienced conflict with activity groups at Kailua Beach Park.
- Compared to nonresidents, residents of Hawaii experienced more conflict with all activity groups at Kailua Beach Park. For example, 46% of residents experienced conflict with windsurfers and kitesurfers at Kailua Beach Park, whereas 23% of nonresidents experienced conflict with this activity group at this site. Likewise, 36% of residents compared with 20% of nonresidents experienced conflict with boaters.

- Although a relatively small number of users (28%) observed people handling or standing on coral during their visits to Kailua Beach Park, the majority of users (62%) think that people handling or standing on coral is a problem at this site. Residents of Hawaii were more likely to have observed people handling or standing on coral during their visits to Kailua Beach Park, and feel that these depreciative behaviors were a problem at this site.
- In response to crowding and conflict, most respondents (75%) are still unlikely to change their behavior; they will come back to Kailua Beach Park realizing that conditions they experienced are suitable. However, 71% of respondents are likely to come back, but avoid peak use times such as weekends and holidays, and 65% are likely to come back earlier or later in the day when less people may be in the area, suggesting that many users are likely to be temporally displaced because of conditions they experienced. Only 23% of users are likely to go to other beach or marine areas on other parts of Oahu Island or go to other nearby or adjacent beach or marine areas, suggesting that most users are unlikely to be spatially displaced because of conditions they experienced. Most respondents are also unlikely to experience a product shift by changing the way that they think about the area and deciding that it offers a different type of experience than they first believed (28%).

Evaluations and Tradeoffs of Potential Management Strategies

- The management strategy that received support from the most respondents (44%) was providing more educational and interpretive information. Users were divided on whether there should be more enforcement of rules and regulations at Kailua Beach Park. Users were more likely to oppose designated parking for tour buses (48% oppose, 38% support) and zoning of activities (40% oppose, 29% support). Respondents were most strongly opposed to allowing commercial activities (e.g., tour operators) at Kailua Beach Park (53% oppose, 25% support).
- Respondents were presented with eight scenarios of varying use levels, impacts to coral reefs, amounts of litter, and conditions of facilities (i.e., factors), and then evaluated the acceptability of four management strategies for each scenario (improve education and awareness of users, restrict number of people [i.e., limit use], improve maintenance and upkeep, provide more facilities). Improving education and awareness was the most strongly supported management action for each scenario. Even for the scenario describing the lowest amount of negative impact for each factor, improving education and awareness was acceptable, suggesting that respondents believed that education and awareness of users at Kailua Beach Park currently needs to be improved. If conditions deteriorate (e.g., more damage to reefs, litter), this action would be even more acceptable.
- Improving maintenance or upkeep was the second most strongly supported management action for each scenario. This strategy was acceptable even for the scenario describing the lowest amount of negative impact for each factor, suggesting that users believed that maintenance and upkeep at Kailua Beach Park needs to be improved. If conditions worsen (e.g., more reef damage, litter), this strategy would be even more acceptable.
- The third most strongly supported management strategy for each scenario was providing more facilities and services. More facilities and services was acceptable even for the scenario describing the lowest amount of negative impact for each factor, suggesting that

many current users would support more facilities and services at Kailua Beach Park. If conditions deteriorate (e.g., more damage to reefs, litter), providing more facilities and services would be even more acceptable.

- Respondents were most strongly opposed to restricting the number of people allowed in the area. If site conditions worsen, however, restricting use would become more acceptable. If use levels are high, there is a substantial amount of litter and damage to coral reefs from recreation, and facilities are in disrepair, users would be more supportive of strategies designed to restrict the number of people allowed in the area.
- The most strongly supported strategy of improving education and awareness of people also generated the most consensus among respondents, suggesting that this would be the least controversial action. There was also strong consensus for improving maintenance and upkeep. The least acceptable strategy was restricting the number of people allowed in the area, but this was also the most controversial; it is likely that restricting the number of people allowed would generate controversy among users unless conditions deteriorated to a point where use levels were extremely high, there was substantial damage to reefs, litter was abundant, and facilities were in disrepair.
- Conjoint analyses showed that situational factor levels differentially affected acceptance of management strategies. The strategy "improve education and awareness of users" was rated as acceptable across all factor levels, but was most acceptable if the amount of damage to reefs was substantial. "Restricting the number of people allowed in the area" was acceptable for two factor levels, but was unacceptable if use levels were low and reef damage was minimal; if use levels were low and reef damage was minimal, this would not be a supported strategy. This strategy was most acceptable if use levels were high and the amount of damage to reefs was substantial. "Improve maintenance and upkeep" and "provide more facilities or services" were acceptable across all factor levels, but were most acceptable if facilities were in poor condition.
- When rating acceptance of "improving education and awareness of users," the most important factor was recreation damage to reefs. In rating acceptance of "restricting the number of people allowed" (i.e., limit use), the most important factors were use level and damage to coral reefs. When rating acceptance of "improving maintenance and upkeep" and "providing more facilities," the most important factor was condition of facilities.

Recommendations

- At Kailua Beach Park, users were heterogeneous, exhibiting a range of demographic characteristics and preferences. This suggests that not all users will respond in the same manner to changes in conditions and management. Despite this diversity of users, the largest proportion of respondents had previously visited the site before and were residents of Hawaii, suggesting that managers should take opinions of repeat visitors and local residents into consideration when making decisions affecting Kailua Beach Park.
- The largest proportion of respondents had strong protectionist value orientations toward coral reef areas (i.e., biocentric, nature-centered), suggesting that recreation or other uses that have deleterious effects on coral reef ecosystems are not likely to be supported at Kailua Beach Park. Research has shown that individuals' value orientations influence

their attitudes, intentions, and behaviors, so knowing users' value orientations can be useful for estimating possible reactions to potentially controversial management actions. In addition, value orientations are stable and resistant to change, so attempts to inform and educate individuals with protectionist value orientations toward reef areas to consider adopting a favorable attitude and vote in support of actions that may be harmful to reef areas are unlikely to be successful.

- Although overall satisfaction of summer users at Kailua Beach Park was extremely high, users were not satisfied with every aspect of the setting or their experience. Users were most dissatisfied with the availability and condition of park benches and bathrooms. These issues deserve management attention.
- Respondents were most satisfied with the clean ocean water, absence of litter, and that they were not required to pay a fee to visit the area. These and other conditions should be maintained and monitored to ensure that user satisfaction does not decline.
- Users rated all aspects of their experience and the conditions at Kailua Beach Park as important and were satisfied with these aspects, suggesting that managers should "keep up the good work" in their current management of the area. However, conditions such as picnic tables, park benches, informational signage, and opportunities to see small and large marine life should be monitored to ensure that satisfaction does not decline.
- Kailua Beach Park had "low normal" crowding (38% of users felt crowded), suggesting that a major problem situation with summer use crowding does not exist at this time. Use levels and users' perceptions of crowding should be monitored to ensure that crowding does not increase.
- The majority of users reported encountering fewer people than the maximum number that they would accept encountering, suggesting that summer use levels are not a major problem at Kailua Beach Park. Use levels, however, should be monitored to ensure that they do not frequently exceed approximately 758 people at one time at Kailua Beach.
- The majority of users reported encountering fewer bathrooms, showers, trash cans, picnic tables, benches, and information signs than they feel should be at Kailua Beach Park. In other words, users want more of each facility and this would increase their satisfaction. From a management perspective, however, this may not be financially or logistically feasible. When the number of each facility that users' felt should be at Kailua Beach Park was compared to what was actually at this site, there were enough of most facilities, but managers should consider installing more park benches at Kailua Beach Park.
- There was not a substantial amount of conflict among activity groups at Kailua Beach Park. The most prevalent conflicts were with windsurfers and kitesurfers (35%), boaters (e.g., kayak, motorboat; 29%), and sunbathers and swimmers (27%). Some zoning of these activity groups to keep them apart is already being used to mitigate conflict at Kailua Beach Park, but these levels of conflict are relatively minor so may not deserve much additional direct management attention. Additional zoning may also be logistically impossible and enforcement would be expensive and time consuming. It may be more appropriate to do more to inform users of appropriate behaviors by improving user education and awareness (e.g., signs, brochures, orientation sessions, contact with staff).

- A relatively small percentage of users actually observed people handling or standing on coral at Kailua Beach Park (28%), but 62% of users believed that this depreciative behavior was still a problem at Kailua Beach Park. Research has shown that touching or standing on coral reefs can cause harmful effects such as coral breakage and mortality. In addition, this behavior could pose safety risks to humans (e.g., cuts, scrapes, infections). As a result, management attention may be needed to reduce the amount of handling and standing on coral at Kailua Beach Park. A first step would be to conduct additional research to determine the extent to which people are actually standing on or handling any coral at Kailua Beach Park. If this was indeed happening to a large extent, then the next step would be to provide interpretive and educational material (e.g., signs, brochures, orientation sessions) informing users of the various problems associated with these behaviors. Following implementation of these indirect management actions, monitoring and additional follow-up research should be conducted to examine the extent to which participation in these behaviors has been reduced. If these approaches are unsuccessful, more direct management tactics such as regulations and enforcement may be necessary.
- The management strategy that would be supported by the most users at Kailua Beach Park would be providing more interpretive and educational information (e.g., signs, brochures, orientation sessions, contact with personnel / lifeguards). Zoning of activities, parking for tour buses, and commercial activities (e.g., recreation tour operators) would be opposed by users. If managers decide that bus parking, additional zoning, and / or commercial activities are necessary in the future, users and local residents should be involved in informing the decision making process and a highly visible educational campaign should be implemented educating users and the community about the rationale for any decisions.
- Respondents believed that improved interpretive and educational information, more upkeep and maintenance of facilities, and more facilities would currently be acceptable at Kailua Beach Park. Restricting the number of users allowed at this site (i.e., limiting use) would currently be unacceptable. If there is ever evidence of substantial coral reef damage from recreation, the most supported management strategy would be to provide more interpretive and educational information to users. If there is evidence that facilities (e.g., bathrooms, showers, trash cans) are in disrepair, the most supported management strategies would be to improve upkeep and maintenance followed by providing more facilities. Restricting the number of people allowed at Kailua Beach Park would only be supported if there was evidence that use levels were extremely high, coral reefs were damaged substantially, litter was prevalent, and facilities were in disrepair.

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INTRODUCTION AND PURPOSE

Coastal environments such as coral reef areas provide natural breakwaters against storms, reduce erosion, and support an array of interdependent life forms such as fish, coral, turtles, and marine mammals (Allen, 1992; Barker & Roberts, 2004). Coral reefs are habitat for over one-third of all fish species and the net primary productivity of reefs is higher than many tropical forests (Beatley, 1991). The diversity of these resources coupled with rising public interest in the natural environment is attracting an increasing number of tourists and recreationists to coastal areas (Dinsdale & Fenton, 2006; Orams, 1999). In Australia's Great Barrier Reef Marine Park, for example, the number of recreationists and tour operators has increased more than tenfold since 1980 and annual financial gains now exceed US $750 million (Barker & Roberts, 2004; Dinsdale & Harriott, 2004; Inglis, Johnson, & Ponte, 1999).

In Hawaii, coastal environments such as beaches and coral reefs are focal points for recreation and tourism use. Hawaii hosts approximately seven million visitors each year who spend more than US $11 billion in the state, and in the last 20 years tourism has increased over 65% (Friedlander et al., 2005). More than 80% of Hawaii's visitors engage in recreation activities in the state's coastal and marine areas with the majority of these individuals participating in diving (200,000 per year) or snorkeling (3 million per year) while visiting (Hawaii DBEDT, 2002; van Beukering & Cesar, 2004). Other popular coastal recreation activities include ocean kayaking, swimming, sunbathing, beach walking, and surfing.

Although coastal environments are popular for recreation use, these areas are also a natural resource that has considerable social, cultural, environmental, and economic importance to the people of Hawaii. The state's coral reef areas, for example, generate US $800 million in revenue and $360 million in added value each year (Cesar & van Beukering, 2004; Davidson, Hamnett, & Minato, 2003). Reefs are also an important resource for local residents, as approximately 30% of households in the state have at least one person who fishes for recreation. Almost 10% of households in the state also fish for subsistence purposes (QMark, 2005).

As popularity of Hawaii's coastal areas continues to increase, demand for access and use can disrupt coastal processes, damage ecological integrity of sensitive environments, reduce the quality of user experiences, and generate conflict among stakeholders regarding appropriate management responses (Orams, 1999). As a result, agencies are faced with challenges that include determining use thresholds (i.e., carrying capacities) and how to manage and monitor use levels to ensure that thresholds are not violated and user experiences are not compromised by such things as crowding and conflict.

Hawaii's Local Action Strategy to Address Recreational Impacts to Reefs (RIR-LAS) identified an urgent need to develop approaches "to efficiently determine and set carrying capacity limits for various recreational activities at various sites around the state" (Kerr, Bos, & Clark, 2005, p. 14). Likewise, the Hawaii Coral Reef Initiative Research Program (HCRI-RP) recently identified recreation capacity and management of Hawaii's coastal environments and marine life conservation districts (MLCDs) as a research and monitoring priority (i.e., priority 3 in FY 2006-2007 request for proposals). The broad purpose of this project, therefore, was to address these research needs by examining carrying capacity, conflict, and management related to recreation

use at coastal sites in Hawaii. This report presents results of a project examining these issues at Kailua Beach Park on the east coast (i.e., windward side) of Oahu, Hawaii.

PROJECT OBJECTIVES

Primary objectives of this project were to collect and analyze recreation use data at coastal sites in Hawaii (i.e., Kailua Beach Park), and:

- Use social science approaches to measure, determine, and inform social and facility indicators of recreation carrying capacities, and determine thresholds when perceived impacts for these indicators reach unacceptable levels.
- Estimate the extent to which indicators of recreation carrying capacities are currently being exceeded and if this is impacting user experiences.
- Measure support and opposition toward management strategies for minimizing coastal recreation impacts (e.g., educate, limit use) and how situational factors (e.g., reef damage, use levels, litter) differentially influence support of these strategies.
- Determine the extent to which user conflicts exist both within and among various recreation activity groups.
- Compare the extent to which evaluations of coastal recreation impacts differ among groups (e.g., visitors versus locals, various tourism / recreation activity groups).

Other concepts examined in this project included recreationists' satisfaction with current conditions at coastal sites in Hawaii, perceptions of crowding, value orientations toward coastal environments, likelihood of future use and changes in use patterns (e.g., temporal and spatial displacement), and sociodemographic characteristics.

Taken together, this information can be used to help inform:

- Understanding of current recreation users and their preferences at coastal sites in Hawaii.
- Recommendations for current management of recreation use and impacts at coastal sites in Hawaii.
- Future estimation and monitoring of recreation carrying capacity and management issues at coastal sites in Hawaii.
- Future decision making and management.

CONCEPTUAL FOUNDATION

Recreation Carrying Capacity

Coastal environments are not immune to human impact pressures associated with participation in recreation activities. Studies have empirically demonstrated that recreation activities such as

snorkeling and diving can damage environmental conditions of coastal resources such as beaches and nearshore coral reefs (e.g., Barker & Roberts, 2004; Dinsdale & Harriott, 2004; Hawkins et al., 1999; Kay & Liddle, 1989; Liddle & Kay, 1986; Lynch et al., 2004; Tratalos & Austin, 2001). Schleyer and Tomalin (2000), for example, found that a use level of 9,000 annual dives at a South African reef site damaged 10% of the coral. In Hawaii, Rodgers and Cox (2003) reported a pattern of decreasing coral coverage and fish abundance with increasing diving and snorkeling use, with fewer than 200,000 total users (i.e., 60 people in the water per hour) causing 100% coral mortality. Over a one year period, Tissot and Hallacher (2000) found that pressure and trampling from divers increased the potential for deleterious environmental consequences such as coral breakage. These studies suggest that coastal areas may possess inherent numerical thresholds where recreation use levels simply overwhelm the capacity of resources to support these activities. The issue of how much use can be accommodated without deteriorating user experiences and threatening preservation or conservation of natural resources has conventionally been addressed under the rubric of carrying capacity. ***Recreation carrying capacity*** can be defined as the amount of use that an area can support and still offer sustained quality of recreation based on social, environmental, and managerial attributes. In other words, it attempts to address the question "how much use is too much" (Manning, 1999).

Recreation studies in Hawaii have focused primarily on ***environmental carrying capacity***, or the level at which biophysical resources of an area are significantly impacted by human use. The Rogers and Cox (2003) and Tissot and Hallacher (2000) studies are two of several studies illustrating attempts to measure environmental carrying capacities of coastal recreation areas in the state. Environmental carrying capacity, however, is difficult to measure because it is influenced by factors such as weather, site characteristics and durability, type of use, time and duration of use, and species composition (Cole, 1992). It is also recognized and accepted in the recreation and tourism literature that this resource oriented view must be augmented by consideration of other issues (Manning, 1999, 2007). Shelby and Heberlein (1986), for example, described two additional types of recreation carrying capacity: (a) ***social carrying capacity*** or the level of use beyond which social impacts and experiences such as crowding and user conflict are unacceptable, and (b) ***facility carrying capacity*** or the amount and type of facilities acceptable for accommodating a particular use level. Many studies have focused on environmental carrying capacities and ignored social and facility capacities. This oversight is problematic because management actions such as use limits or quotas that are designed to alleviate environmental impacts such as coral breakage may not address social problems such as conflicts between incompatible user groups (Farrell & Marion, 2002; Inglis et al., 1999).

The concept of recreation carrying capacity has received considerable attention in the literature (see Manning, 1999, 2007; Needham & Rollins, 2005; Needham, Rollins, & Wood, 2004a; Shelby & Heberlein, 1986 for reviews), but efforts to apply the concept in natural resource settings have often resulted in frustration. The term "carrying capacity" implies that it is possible to identify a single number, which represents a threshold where human use overwhelms the ability of the resource to sustain itself. However, several types of carrying capacity exist (e.g., social, environmental, facility) and numerous indicators can be used to measure each capacity. Social carrying capacity, for example, consists of multiple indicators such as encounters, crowding, conflict, noise, and satisfaction. Environmental carrying capacity indicators may include coral breakage, trampling, fish abundance, and water quality. Measuring all of these indicators would be expensive and time consuming, and each indicator may yield a different

capacity number on scales that are not compatible or comparable. Calculating a single recreation carrying capacity number for an area, therefore, is neither feasible nor realistic.

There are also additional difficulties in attempting to apply the carrying capacity concept. For example, carrying capacity has often been misapplied to set use levels without considering how they meet management objectives. In addition, a capacity number can sometimes be changed in response to political pressures without considering relevant stakeholders (e.g., users, agencies, operators). Carrying capacity numbers are often too simplistic, based on arbitrary judgments, and fail to minimize impacts. The concept tends to overemphasize importance of "amount" of use and fails to consider other factors such as type of use and behavior of users. Finally, by focusing on amount of use, carrying capacity numbers often imply use limits or quotas if they are exceeded, which draws attention away from other strategies that may be available to managers such as temporal or spatial zoning and user education. Use limits are also controversial and heavy-handed because they may unnecessarily restrict user freedom, they are difficult and expensive to implement, and they may be perceived as a threat to generating tourism income, thus causing a lack of interest group or stakeholder "buy in" (Farrell & Marion, 2002).

Recreation almost always causes some social and environmental impacts, but descriptive scientific studies that attempt to identify a simple cause and effect relationship between human use and impact typically fail to provide clear guidance on where and when use thresholds are exceeded. It is important to recognize that some impact and change is inevitable and at some point the amount, nature, and type of change becomes unacceptable. The critical question, therefore, is not "how much use is too much," but more importantly "how much impact or change is acceptable or should be allowed" (Manning, 1999, 2007).

To overcome difficulties associated with measuring carrying capacities, recreation and tourism researchers have turned to contemporary planning and management frameworks such as Limits of Acceptable Change (LAC; Stankey et al., 1985), Visitor Experience and Resource Protection (VERP; Manning, 2001), and Visitor Impact Management (VIM; Graefe, Kuss, & Vaske, 1990) to address this question of "how much impact or change is acceptable" (see Manning, 2004 for a review). These frameworks necessitate quantitatively measuring select social, resource, and facility ***indictors*** at specific sites (e.g., user crowding, perceived coral health) to reveal ***standards of quality*** or thresholds at which these indicator conditions become unacceptable (e.g., no more than 500 users per site at one time). These indicators are subsequently monitored by field personnel to ensure that standards are maintained, and if violated the application of acceptable management actions may need to be imposed (e.g., zoning, education, limit use).

These frameworks offer a proven tool for managers to understand the extent that indicator impacts are acceptable or unacceptable, identify the importance of indicators, and describe the amount of consensus among users regarding acceptable indicator conditions (McCool & Cole, 1997; Needham, Rollins, & Vaske, 2005). These frameworks also emphasize consideration of desired future outcomes and the inclusion of monitoring ensures that managers are explicitly aware of changing resource and experiential conditions, which enhances capability of managers to respond to changing conditions. Taken together, these frameworks are iterative and adaptive, and shift the emphasis and definition of recreation carrying capacity from "how many users can be accommodated in an area" to "what are the desired conditions of this area" (Manning, 2004).

This approach to measuring and managing recreation carrying capacities is currently being used by several natural resource agencies (e.g., National Park Service) to address terrestrial social impacts including crowding and resource impacts such as erosion (e.g., Donnelly, Vaske, Whittaker, & Shelby, 2000; Manning, 2001; Needham et al., 2004a, 2005; Vaske & Donnelly, 2002). Needham et al. (2004a), for example, found that many recreationists at several sites reported high levels of crowding because they encountered more people than they believed each site could adequately handle. It was concluded that these indicators of social carrying capacity (i.e., use levels, crowding) were being exceeded. Directional trails, zoning, user fees, and education were supported management strategies for alleviating these social impacts. In a marine setting, Inglis et al. (1999) showed that seeing 14 users (e.g., snorkerlers) from shore and encountering six users in the water were threshold points at which social conditions became unacceptable and management attention was needed at the Great Barrier Reef in Australia.

This project used social science approaches to: (a) measure social (e.g., conflict, crowding) and facility (e.g., bathrooms, informational signage) indicators of recreation carrying capacity, (b) determine thresholds when perceived impacts for these indicators reach unacceptable levels, and (c) estimate the extent to which indicators of recreation carrying capacities are currently being exceeded and if this is impacting user experiences at coastal recreation sites in Hawaii.

Recreation Encounters, Norms, and Crowding

Encounters and crowding are two of the most commonly measured indicators of social carrying capacity in recreation settings (see Vaske & Donnelly, 2002 for a review). ***Reported encounters*** describe a subjective count of the number of other people that an individual remembers observing in a setting. ***Perceived crowding*** is a subjective negative evaluation that this number of people observed or number of encounters with other people, groups, or activities is too many (Needham et al., 2004a; Shelby, Vaske, & Heberlein, 1989; Vaske & Donnelly, 2002).

Popularity of recreation in many natural resource settings has led to concern about crowding and as a result, a wide body of research has attempted to understand and address this concern (see Manning, 2007; Shelby & Heberlein, 1986; Shelby et al., 1989 for reviews). Understanding users' reported encounters and perceived crowding, however, may *not* reveal maximum acceptable use levels or an understanding of how use should be managed and monitored. The structural norm approach offers a conceptual and applied basis to help address these issues. One line of research defines ***norms*** as standards that individuals use for evaluating activities, environments, or management strategies as good or bad, better or worse (e.g., Donnelly et al., 2000; Shelby, Vaske, & Donnelly, 1996; Vaske, Shelby, Graefe, & Heberlein, 1986). In other words, norms clarify what people believe conditions or behavior *should be.* Norm theory provides a basis for measuring indicators and formulating standards of quality, which are central to contemporary recreation and tourism planning frameworks such as LAC, VERP, and VIM.

A simplified example may help to illustrate. The provision of opportunities for solitude is a management goal in many parks and related recreation and tourism settings (Dearden & Rollins, 2002; Manning, 1999; Weaver, 2001). This goal, however, may be far too broad to guide management since it does not specify what constitutes solitude and how it should be measured and monitored. Indicators and standards of quality may help to resolve these issues. Surveys of recreationists may show that the number of encounters with other people is an important aspect

of solitude, suggesting that it may be one indicator of solitude. Normative research may reveal that once many recreationists encounter 10 or more people in a specific area, they feel crowded and do not achieve an acceptable level of solitude. This suggests that encounters with 10 or more people may represent an appropriate standard of quality for a specific area.

Much of the normative work in recreation and tourism is based on Jackson's (1965) model that describes norms (i.e., evaluative standards) using a graphic device called a ***social norm curve*** (Manning, Valliere, Wang, & Jacobi, 1999) or an ***impact acceptability curve*** (Vaske et al., 1986). Measurement of a social norm is derived from averages of evaluations provided by individuals within a population. This graph represents the amount of indicator change increasing from left to right along the horizontal axis (Figure 1). The vertical axis represents evaluative responses with the most positive evaluation at the top of the axis, the most negative on the bottom, and a neutral category in between. The majority of recreation and tourism studies have used "acceptability" as the evaluative response (see Manning et al., 1999 for a review). The curve can be analyzed for structural characteristics such as the minimum acceptable condition, norm intensity or strength, and degree of consensus about the norm (i.e., norm crystallization).

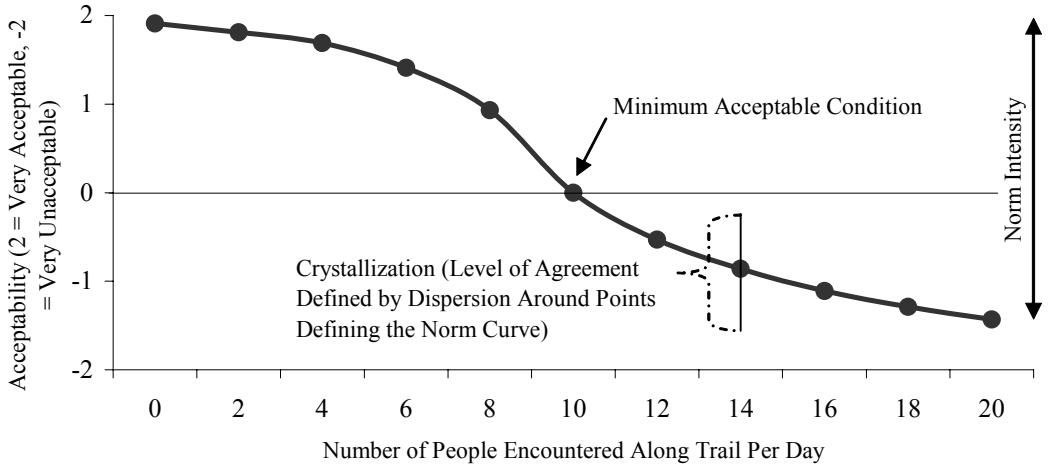


Figure 1. Hypothetical social norm curve (modified from Manning et al., 1999)

The ***minimum acceptable condition*** is the point where the norm curve crosses the neutral line and indicator conditions become unacceptable. This point usually represents the indicator conditions that 50% of respondents feel are acceptable and 50% feel are unacceptable. In most studies, this point represented the standard of quality for the measured indicator. ***Norm intensity*** is the importance of the indicator to respondents and is measured by the relative distance from the neutral line at each point on the curve, independent of the direction of evaluation (e.g., acceptable, unacceptable; Shelby et al., 1996). Intensity is measured as the sum of these distances across all points on the curve (Shelby & Heberlein, 1986; Vaske et al., 1986). The greater the cumulative distance from the neutral line, the higher the intensity and more important the indicator to respondents. A flat curve close to the neutral line suggests that few people will be upset if the standard is violated, whereas a curve that declines sharply or remains negative implies that more people may be impacted (Shelby et al., 1996). ***Crystallization*** is a measure of consensus or agreement among respondents for the indicator conditions. In most studies, this is

presented as the average of the standard deviations (i.e., interval around the mean containing the majority or 68% of responses) for all points comprising the curve (Shelby & Heberlein, 1986; Shelby et al., 1996). If crystallization is high (i.e., small average standard deviation), managers may have confidence in using normative data to help formulate standards of quality for carrying capacity indicators that can then be monitored and managed (Manning, 1999, 2007).

Research suggests that when users perceive a setting to be crowded, they have at least implicitly compared conditions that they actually experienced (e.g., number of encounters) with their normative evaluation of what they feel are acceptable or unacceptable conditions for the setting (e.g., use levels; Vaske & Donnelly, 2002). For example, a comparative meta-analysis of multiple studies involving thousands of recreationists and tourists demonstrated that when encounters exceeded a user's norm for seeing others, perceived crowding was higher compared to those who encountered less than their norm (Vaske & Donnelly, 2002).

This project measured encounters and crowding, and used the structural norm approach to: (a) determine thresholds when perceived impacts for indicators reached unacceptable levels, and (b) estimate the extent to which indicators are currently being exceeded at coastal sites in Hawaii.

Recreation Conflict and Behavioral Responses

Like encounters and crowding, conflict is another indicator of social carrying capacity in recreation and tourism settings. Empirical research has revealed several different types of conflict that can occur between people participating in similar or different types of outdoor recreation (see Graefe & Thapa, 2004; Manning, 1999 for reviews). ***One-way*** or ***asymmetrical conflict*** occurs when one activity group experiences conflict with or dislikes another group, but not vice versa. A study of snowmobilers and cross-country skiers, for example, showed that skiers disliked encounters with snowmobilers, but snowmobilers were not in conflict with skiers (Vaske, Needham, & Cline Jr., 2007). ***Two-way conflict*** occurs when there is resentment or dislike in both directions (e.g., skiers in conflict with snowboarders, snowboarders in conflict with skiers; Thapa & Graefe, 2003; Vaske, Carothers, Donnelly, & Baird, 2000). Conflict between users engaged in different activities (e.g., hikers versus mountain bikers) is known as ***out-group conflict***, whereas conflict between participants in the same activity (e.g., hikers versus other hikers) is known as ***in-group conflict*** (Manning, 1999).

Most recreation and tourism studies have examined ***interpersonal*** or ***goal interference conflict*** where the actual physical presence or behavior of an individual or group interferes with goals, expectations, or behavior of another individual or group (Vaske et al., 2007). A snorkeler, for example, may experience interpersonal conflict if he or she is cut off by or collides with a surfer. Recent research has also introduced and explored the concept of ***social values conflict*** (Vaske, Donnelly, Wittmann, & Laidlaw, 1995; Vaske et al., 2007). Social values conflict occurs between groups who do not share similar opinions, norms, or values about an activity. Unlike interpersonal conflict, social values conflict is defined as conflict that can occur even when there is no direct physical contact or interaction among groups (Vaske et al., 2007). For example, although encounters with horseback riders may be rare in recreation settings such as parks and wilderness areas, recreationists may philosophically disagree about the appropriateness of such animals in these settings. A study of wildlife viewers and hunters showed that viewers did not witness many hunters or hunting behaviors (e.g., see animals be shot, hear shots fired) in a

backcountry area because management regulations and rugged terrain and topography separated the two groups (Vaske et al., 1995). Regardless, viewers still reported conflict with hunters simply because of a conflict in values regarding the appropriateness of hunting in the area.

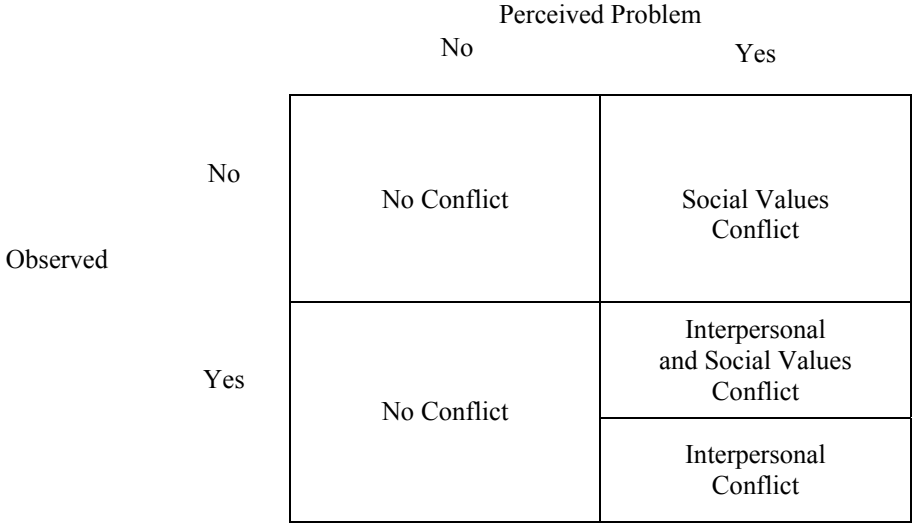


Figure 2. Conflict evaluation typology (Vaske et al., 2007)

To differentiate social values and interpersonal conflict, studies have operationalized conflict by combining responses from two sets of questions asked in surveys of recreationists (Vaske et al., 1995, 2007). First, individuals indicated how frequently events happened to them during their visit (e.g., being rude or discourteous, passing too closely). Responses were coded as observed (i.e., at least once) or did not observe the event (i.e., never saw). Second, users evaluated if they perceived each event to be a problem (i.e., no problem or problem). Combining the occurrence of observation variables with the corresponding perceived problem variables produces a conflict typology (Figure 2). Individuals who observed or did not observe a given event, but did not perceive it to be a problem were considered to have experienced no conflict (i.e., no social values or interpersonal conflict). Those who never saw a given event, but believed that a problem existed were considered to be expressing social values conflict. Users who saw a given event and believed that it caused a problem were judged to be indicating either interpersonal conflict or a combination of both interpersonal and social values conflict (Vaske et al., 2007).

Understanding the extent and type of conflict is important for managing recreation and tourism settings because some management strategies may be effective for addressing one type of conflict, but not another. When conflict stems from interpersonal conflict, for example, spatial zoning or temporal segregation of incompatible groups may be effective. When the source of conflict is a difference in social values, user information and education may be needed (Graefe & Thapa, 2004; Vaske et al., 2007). Managers need to understand the basis of user concerns and type of conflict occurring to develop strategies for managing conflict.

Recreationists may cope with crowded conditions or conflict events by choosing to visit an alternative location or return to the same location at a different time. ***Temporal displacement*** involves coping with negative events such as conflict and crowding by shifting the time of

visitation. If an area is most crowded, for example, on weekends and during peak seasons, some users may visit during weekdays or off-peak time periods instead. Users may also choose to visit a different location. This ***spatial displacement*** can involve shifts in use to other areas within the same recreation area (i.e., *intrasite displacement*) or to completely different recreation settings (i.e., *intersite displacement*). If a user encounters more people than expected or experiences conflict events, he or she might not change their location or time of visitation, but rather change their definition of the experience. This is known as ***product shift***. A wilderness area, for example, may be reevaluated as a semi-primitive recreation area by a recreationist because he or she encountered levels of conflict and crowding inconsistent with their initial expectation of a wilderness area (Hall & Shelby, 2000; Manning, 1999; Shelby, Bregenzer, & Johnson, 1988).

This project measured the extent to which conflict exists within and among various recreation activity groups at coastal sites in Hawaii. This project also examined whether recreationists would cope with negative crowding and conflict events by shifting their time or location of visitation (i.e., displacement), or definition of the setting and experience (i.e., product shift).

Recreation Satisfaction

Satisfaction is a consistent goal in recreation and tourism management; recreationists want to have satisfactory experiences and managers want to provide opportunities to ensure that this occurs (Manning, 1999). ***Satisfaction*** can be defined as positive perceptions or feelings that an individual forms, elicits, or gains from engaging in activities; it is the degree to which one is content or pleased with his or her general experiences and the setting (Beard & Ragheb, 1980). Satisfaction is the congruence between expectations (i.e., motivations) and outcomes (Mannell, 1999). According to Hendee (1974) and Mannell (1999), this concept can be divided into ***global*** or ***overall satisfaction*** with the entire experience and ***facet*** or ***multiple satisfactions*** with various subcomponents of the setting or experience (e.g., parking, litter, signs).

Recreation and tourism researchers have typically measured global evaluations of the overall experience or outing, but there is often little variance in global measures because overall recreation satisfaction tends to be uniformly high across studies (i.e., 80% to 95% satisfied; see Manning, 1999 for a review). As a result, global or overall evaluations of satisfaction are of only limited usefulness for managers. Satisfaction with more specific attributes of the setting and experience (e.g., weather, parking, fees, signs, litter), however, can vary with some satisfactions outweighing others (Hendee, 1974). In other words, an individual's satisfaction with an activity or experience is complex; he or she may evaluate several aspects of the activity and experience (e.g., resource, social, managerial). Satisfaction is based on different experiences that often provide different types of satisfactions, and satisfaction is based on multiple factors that differ from person to person rather than a single overall or global evaluation of satisfaction. Compared to a single measure of overall satisfaction, therefore, examining users' satisfaction with multiple aspects of the setting and experience can be more meaningful for informing management.

According to Pierce, Manfredo, and Vaske (2001), it is important to not only measure overall satisfaction and satisfaction with components of the setting and experience, but also to determine the relative importance of these factors and components. Recreationists may be satisfied with a particular aspect of the setting or their experience, but it may not be important to them that the characteristic is actually provided. For example, users may be satisfied with informational signs

about rules and regulations, but feel that signs are not an important characteristic of good recreation settings or experiences.

Importance-performance (IP) analysis is a useful tool for measuring relationships between users' satisfaction with specific attributes and the importance they attach to these attributes. This approach reveals conditions that may or may not require management attention (e.g., Bruyere, Rodriguez, & Vaske, 2002; Vaske, Beaman, Stanley, & Grenier, 1996). An importance-performance matrix offers a visual understanding of relationships between the two measures (Figure 3). Importance is represented on the vertical axis (i.e., *y*-axis) with average ratings (i.e., means) from "not important" to "very important." Average performance (i.e., satisfaction) is measured on the horizontal axis (i.e., *x*-axis) from "very dissatisfied" to "very satisfied." When combined, the axes intersect and produce a matrix of four quadrants interpreted as "concentrate here" (high importance, low satisfaction; Quadrant A), "keep up the good work" (high importance and satisfaction; Quadrant B), "low priority" (low importance and satisfaction; Quadrant C), and "possible overkill" (low importance, high satisfaction; Quadrant D). This matrix provides managers with an easily understandable picture of the status of services, facilities, and conditions as perceived by users (e.g., Bruyere et al., 2002; Vaske et al., 1996).

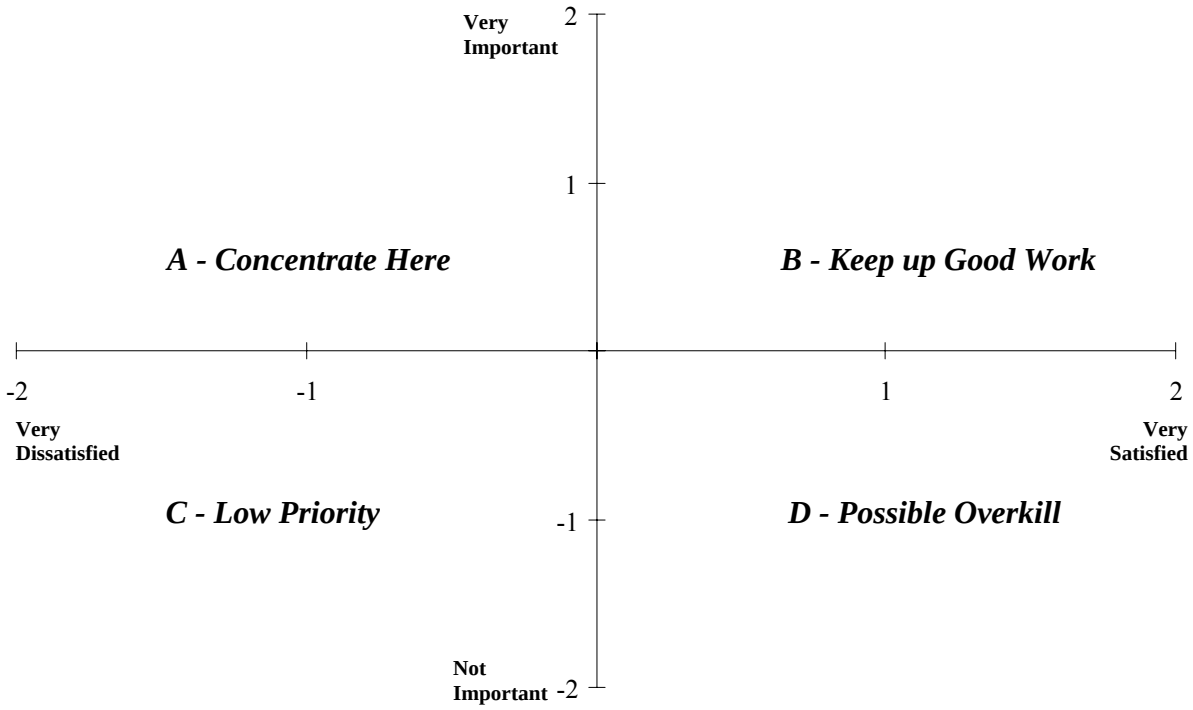


Figure 3. Importance-performance matrix for measuring satisfaction

This project measured the extent to which users were satisfied with current conditions (e.g., parking availability, absence of litter, presence of lifeguards, bathrooms, opportunities to see small and large marine life) at coastal recreation sites in Hawaii. Importance-performance matrices were used to compare users' satisfaction with these components of the setting and experience with the relative importance that they attributed to these components.

Recreation Management and Tradeoffs

A recent study in Hawaii demonstrated that residents believed that the tourism industry is approaching capacity and the islands are being managed for tourists at the expense of locals (QMark, 2005; "Tourism poll tells us to pay heed to locals," 2006). Residents believed that pollution, overfishing, and nearshore recreation were major threats to Hawaii's coastal areas, and that enforcement, new rules / guidelines, restricting use, and setting aside areas may be valuable strategies for managing these threats (QMark, 2005). Other recent studies have shown that the majority of marine recreationists considered Hawaii's coastal areas to be healthy, but felt that more management was necessary to improve facilities and infrastructure, scientific assessment and monitoring, and enforcement (e.g., Cesar & van Beukering, 2004; Cesar, van Beukering, Dierking, Pintz, & Friedlander, 2004; Friedlander et al., 2005). These studies highlighted the importance and need for understanding user support and opposition toward management strategies designed to mitigate effects of recreation in coastal settings.

Traditional approaches for evaluating recreationists' attitudes toward management strategies have simply involved asking users the extent to which they supported or opposed individual management strategies (Manning, 1999). Users may be asked, for example, whether they support or oppose providing more educational information such as signs, brochures, or orientation sessions (e.g., Lankford, Inui, Whittle, Luna, & Tyrone, 2005). These approaches, however, may result in a "ceiling effect" where almost all strategies are supported by most respondents, but actually implementing all strategies may not be logistically or financially feasible (Oh, 2001). Implementing a strategy may also not be possible without impacting something else. Therefore, there is a need in recreation management to understand the range of contextual factors and alternatives influencing management, and how the public responds to these factors. Given this complexity of recreation and tourism management, it may be more useful to examine users' tradeoffs in their support of management strategies and regimes depending on a range of situational factors such as different levels of social, resource, and facility impacts. For example, if a coastal recreation site has adequate facilities, little crowding, and minimal coral reef impacts (i.e., situational factors), modifying any current management regimes may not be supported by users. Conversely, if the reef is damaged and the site is overcrowded, zoning or prohibiting some activities may be supported by users.

Recent research has used multivariate statistical techniques such as stated choice modeling and conjoint analysis to quantitatively measure the relative importance that users place on selected factors of recreation settings and the extent to which individuals make tradeoffs in their support of alternative management practices (e.g., Kneeshaw, Vaske, Bright, & Absher, 2004; Lawson, Roggenbuck, Hall, & Moldovanyi, 2006; Needham, 2008). Instead of asking users to rate their support for a single factor or attribute at one time, individuals choose among various scenarios describing alternative configurations of a set of factors. When evaluating each scenario, users weigh tradeoffs among the factors. This approach provides managers with an understanding of how users would prefer setting factors to be prioritized when preferred conditions cannot be provided for all factors simultaneously. In addition, this approach allows researchers and managers to rank alternative configurations of study factors from most acceptable to least acceptable for each management alternative (Lawson et al., 2006; Needham, 2008).

In stated choice and conjoint analyses, scenarios are used in surveys to represent combinations of situational factors and impact levels. For example, with three factors (use level, coral damage, litter) and three impact levels for each factor (low, medium, high), 3^3 or 27 scenarios would be necessary to represent all possible combinations. To reduce respondent burden, software is used to create a much smaller subset of scenarios based on an orthogonal fractional factorial design. Respondents rate their acceptability of several possible management actions for each scenario (e.g., improve user education, restrict number of users, improve area upkeep). Information about all other possible scenario combinations can be determined using conjoint analysis and can predict acceptance of management actions for scenarios that are not evaluated by respondents. By presenting users with scenarios describing different situational factors, they can make tradeoffs in decisions about the appropriateness of specific management actions given different situations that are presently occurring or may happen in the future (Kneeshaw et al., 2004).

This project used conjoint analysis to measure user support and opposition toward several potential strategies for managing recreation and tourism impacts at coastal sites in Hawaii (e.g., educate, limit use), and how situational factors such as coral reef damage, use levels, and amount of litter differentially influence support and opposition of these strategies.

Segmentation and Value Orientations

Recreationists are heterogeneous, exhibiting a range of attitudes, skills, and behaviors (Needham, Vaske, Donnelly, & Manfredo, 2007). Given this diversity among users, researchers have emphasized the importance of segmenting people into meaningful homogeneous subgroups to improve understanding of responses to conditions and management (Bright, Manfredo, & Fulton, 2000; Manfredo & Larson, 1993; Vaske et al., 1996). Studies, for example, have differentiated between males and females (Dougherty, Fulton, & Anderson, 2003; Manfredo, Fulton, & Pierce, 1997; McFarlane, Watson, & Boxall, 2003; Zinn & Pierce, 2002), consumptive and nonconsumptive users (e.g., anglers versus wildlife viewers; Duffus & Dearden, 1990; Vaske et al., 1995), involved and uninvolved users (Cole & Scott, 1999; Needham et al., 2007), residents and nonresidents (Needham, Vaske, & Manfredo, 2004c), and urban and rural residents (Cordell, Bergstrom, Betz, & Green, 2004). Studies have also segmented the public based on competing views of interest groups and citizen advocacy organizations (Decker, Krueger, Baer, Knuth, & Richmond, 1996; Needham, Rollins, & Wood, 2004b).

Studies have also segmented users according to their value orientations about general objects or resources (e.g., Bright et al., 2000; Vaske & Needham, 2007). ***Value orientations*** refer to general classes of objects (e.g., wildlife, forests) and are revealed through the pattern and direction of basic beliefs (Fulton, Manfredo, & Lipscomb, 1996; Vaske & Donnelly, 1999). Value orientations toward wildlife, for example, have been measured by asking individuals how strongly they identify with *protectionist* oriented belief statements (e.g., "wildlife should have equal rights as humans") and *utilitarian* or use oriented beliefs (e.g., "wildlife should be used by humans to add to the quality of human life") (Bright et al., 2000; Zinn & Pierce, 2002). Similar research has examined public value orientations toward forest lands (Vaske & Donnelly, 1999). Little research, however, has examined recreationists' value orientations toward coastal environments such as beaches and coral reef areas. This project addressed this knowledge gap.

Patterns of basic beliefs have consistently factored into a value orientation dimension called the ***protection-use*** continuum (e.g., Bright et al., 2000; Dougherty et al., 2003; Fulton et al., 1996; Layden, Manfredo, & Tucker, 2003; Vaske & Needham, 2007). This protection-use orientation is similar to the ***biocentric-anthropocentric*** value orientation continuum (e.g., Shindler, List, & Steel, 1993; Steel, List, & Shindler, 1994; Thompson & Barton, 1994; Vaske & Donnelly, 1999). An anthropocentric or use value orientation represents a human-centered view of the non-human world. This approach assumes that providing for human uses and benefits is the primary aim of natural resource allocation and management regardless of whether uses are for commodity benefits (e.g., timber) or for aesthetic or physical benefits (e.g., marine recreation). The environment is seen as a set of materials to be used by humans as we see fit (Scherer & Attig, 1983). There is no notion that the non-human aspects of nature are valuable in their own right or for their own sake. In short, an anthropocentric or use orientation emphasizes the instrumental value of natural resources for human society rather than their inherent worth (Steel et al., 1994).

In contrast, a biocentric or protectionist value orientation is a nature-centered approach. The value of all ecosystems, species, and natural organisms is elevated to center stage. Human desires and human values are still important, but are viewed within a larger perspective. This approach assumes that environmental objects have inherent and instrumental worth, and that human uses and benefits are not necessarily the most important uses of natural resources. In matters of natural resource management, these inherent values are to be equally respected and preserved even if they conflict with human-centered values (Thompson & Barton, 1994).

Protectionist (i.e., biocentric) and use (i.e., anthropocentric) value orientations are not mutually exclusive; these orientations can be arranged along a continuum with protectionist orientations on one end and use orientations on the other. The scale midpoint represents a mix of these two extremes (Shindler et al., 1993; Vaske & Donnelly, 1999). Users arranged along the continuum can then be segmented into more homogeneous subgroups (Bright et al., 2000).

This project segmented recreationists into subgroups according to their sociodemographic and activity characteristics (e.g., locals versus visitors, activity groups) and their value orientations toward coastal environments to improve understanding of responses to various conditions (e.g., crowding, conflict, facilities) and management alternatives (e.g., support of education, restricting use) at coastal recreation sites in Hawaii.

METHODS / APPROACH

Study Areas

Data for this project report were obtained from summer users at Kailua Beach Park on the east coast (i.e., windward side) of the island of Oahu, Hawaii (Figure 4). This area is renowned for its long sandy beach and turquoise waters. Facilities in this area include showers, restrooms, picnic tables, trash cans, lifeguard stations, and several parking areas. Self guided recreation activities at Kailua Beach Park include sunbathing, swimming, beach walking, kayaking, kitesurfing (i.e., kiteboarding), windsurfing, surfing, and fishing. Outrigger canoe clubs also frequent the area. Winds often blow onshore creating a sandy substrate that reduces visibility in

nearshore waters and limits snorkeling and diving. At the south end of the park is a boat launch area that is popular for fishing and surfing, whereas the north end is where many kayakers, windsurfers, and kitesurfers launch. Peak visitation is from June to August and December to January, but the beach and park areas are popular all year.

Figure 4. Map of location of Kailua Beach Park

Guided and unguided commercial recreation activities such as kayak tours and windsurfing / kitesurfing lessons are also common at Kailua Beach Park. Commercial activities include parking vehicles, dropping off passengers and equipment, and leading tours on the shore and in the ocean. These activities typically occur between 8:00 a.m. and 6:00 p.m. daily with peak use times between 10:00 a.m. and 4:00 p.m. (CSV Consultants, 2007).

Community interest group initiatives for Kailua Beach Park include education and outreach campaigns (e.g., shirts and pamphlets educating about safe and courteous activity participation), motions to reduce the amount of commercial activity, and efforts to mitigate any conflict among activities. Interest groups have also worked with state agencies to create signage delineating activity zones. The Kailua Beach Park area is designated as an Ocean Recreation Management Area (ORMA) with zones regulating commercial and noncommercial uses. Designated activity zones at Kailua Beach Park are marked with buoys and include swimming, windsurfing launch / land, and kayaking and canoeing launch / land zones (CSV Consultants, 2007).

Data Collection

Data were obtained from surveys (Appendix A) administered onsite at Kailua Beach Park. During two weeks in July 2007 (July 9 to 22) and two weeks in August 2007 (August 2 to 15), individuals at this site were approached in parking areas and on the beach / shore, and asked to complete a survey onsite. Onsite surveys were required because personal contact information required for alternative approaches such as telephone or mail surveys was unavailable (e.g., anglers are not required to purchase fishing licenses in Hawaii, lifeguards rarely collect information about users). To increase probability of achieving a representative sample of summer users, sampling was alternated so that surveys were administered at least once for each day of the week (i.e., Monday to Sunday) and at least once for each of three time periods each day (8:00 to 10:30 a.m., 11:30 a.m. to 2:00 p.m., 3:00 to 5:30 p.m.).

To minimize survey length and reduce respondent burden, it was necessary to develop two different survey versions to address all of the project objectives (Appendix A). Each respondent, however, was asked to complete only one version of the survey, not both versions. Given that use levels are relatively high at this site, it was not feasible or necessary to survey every person. As a result, individuals were selected through a systematic random sampling procedure (e.g., one random individual selected from every n^{th} selected group). This reduced selection bias and is among the most widely accepted onsite sampling approaches for selecting a representative sample from a large number of recreationists (Salant & Dillman, 1994).

Users were asked if they would be willing to complete a survey, asked to read a letter of consent / recruitment, and then asked to complete and return the survey onsite. The survey version (i.e., version 1 or 2) that respondents received was systematically alternated (e.g., first person selected received version 1, the next person received version 2, the next person received version 1, etc.). Each survey version was printed in color on one legal sized (8 ½ x 14) piece of paper printed on both sides. Surveys took respondents less than 15 minutes to complete. Respondents were provided with a clipboard and pen to complete a survey onsite. This approach is consistent with research in recreation and human dimensions of natural resources (Mitra & Lankford, 1999).

A total of $n = 921$ users completed surveys onsite (response rate = 85%; survey version 1: $n = 476$, version 2: $n = 445$). This sample size allows generalizations about the overall population of summer users at the Kailua Beach Park area at the 95% confidence level with a margin of error of approximately ± 3.2% (Salant & Dillman, 1994). A nonresponse check and respondent compensation (i.e., incentives) were not necessary due to this large sample size and high response rate.

Surveys included questions on a range of topics including prior visitation, activity participation, satisfaction, encounters, crowding, conflict, norms, value orientations, support for and tradeoffs among management strategies, and sociodemographic characteristics. Percentages, cross-tabulations, and inferential bivariate and multivariate statistical techniques (e.g., chi-square, *t*-tests, reliability analysis, impact acceptability curve analysis, exploratory factor analysis, cluster analysis, conjoint modeling) were used to analyze and present results. Effect size statistics were also calculated and reported where appropriate (e.g., Cohen, 1988; Vaske, Gliner, & Morgan, 2002). The actual surveys are presented in Appendix A and basic descriptive findings of uncollapsed survey questions (i.e., percentages) are included in Appendix B.

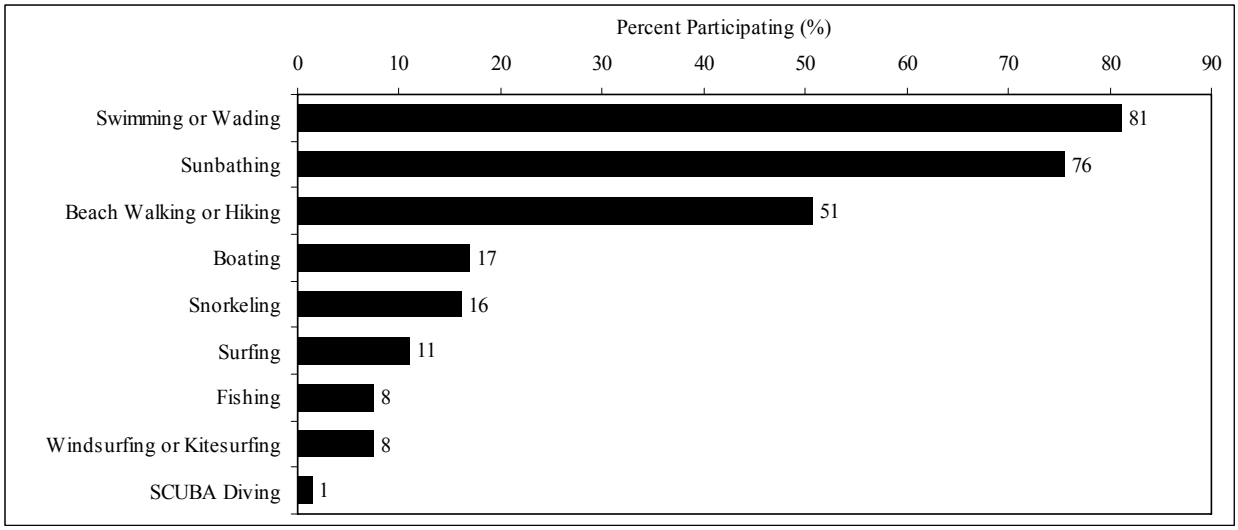
RESULTS AND ANALYSES

The following analyses and results are presented in several major sections: (a) personal and trip characteristics (e.g., activity groups, previous visitation, value orientations, residency, age); (b) satisfaction with and importance of conditions and experiences, (c) social carrying capacity indicators (e.g., encounters, crowding); (d) facility carrying capacity indicators; (e) conflict and behavioral responses (e.g., displacement, product shift); and (f) support, opposition, and tradeoffs for management actions. To highlight important findings, most data were recoded into major response categories (e.g., agree, disagree; support, oppose) for purposes of this report. Uncollapsed frequencies (e.g., strongly, slightly agree) are shown in Appendix B.

Personal and Trip Characteristics

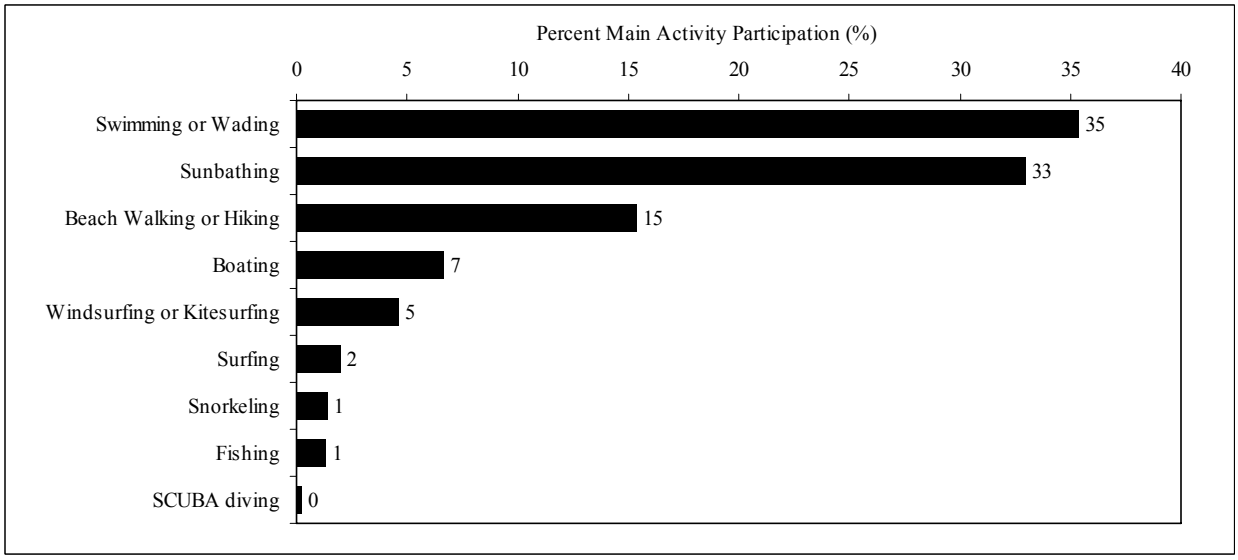
Activity Groups. Respondents were asked to indicate all of the activities in which they participated during their visit to the site on the day they were surveyed. Figure 5 shows that the most popular summer activities at Kailua Beach Park were swimming / wading (81%) and sunbathing (76%). In addition, 51% of users were beach walking / hiking in this area. Another 17% of respondents were boating (e.g., kayaking, canoeing), 16% were snorkeling, and 11% were surfing at Kailua Beach Park. An additional 8% of respondents were fishing, windsurfing, or kitesurfing. Few respondents (1%) were SCUBA diving in this area.

Figure 5. All activities in which respondents participated in the summer [1]



[1] Percentages do not total 100% because respondents selected all activities in which they were participating (check all that apply).

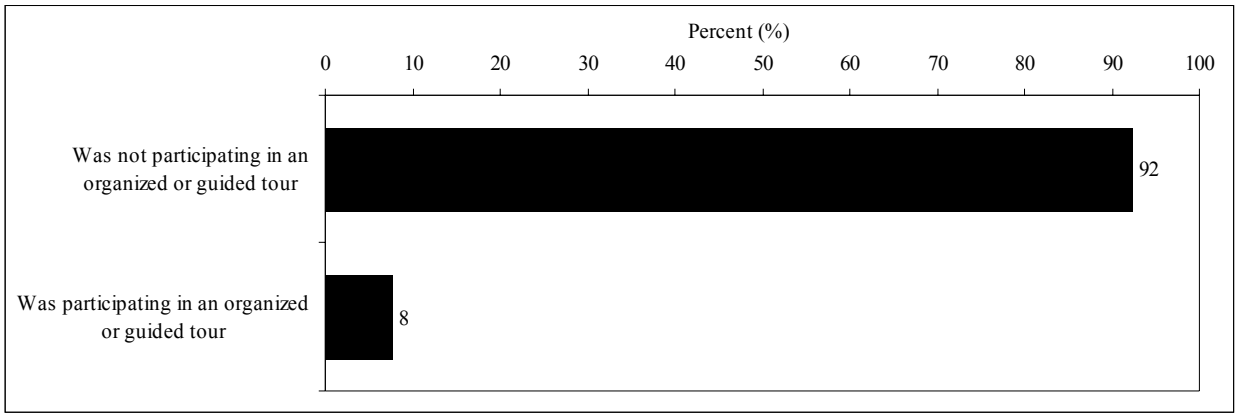
Figure 6. Main activity groups in the summer



Respondents were then asked to select from this list of activities the one main activity in which they were participating at the site on the day they were surveyed. Figure 6 shows that the most popular main summer activity groups at Kailua Beach Park were both swimmers / waders (35%) and sunbathers (33%). Beach walkers were the third most popular main activity group (15%). An additional 7% of respondents were boaters (e.g., kayakers, canoeists), 5% were windsurfers or kitesurfers, and 2% were surfers. Few people considered snorkeling, fishing, or diving (1%) as their main activity at Kailua Beach Park.

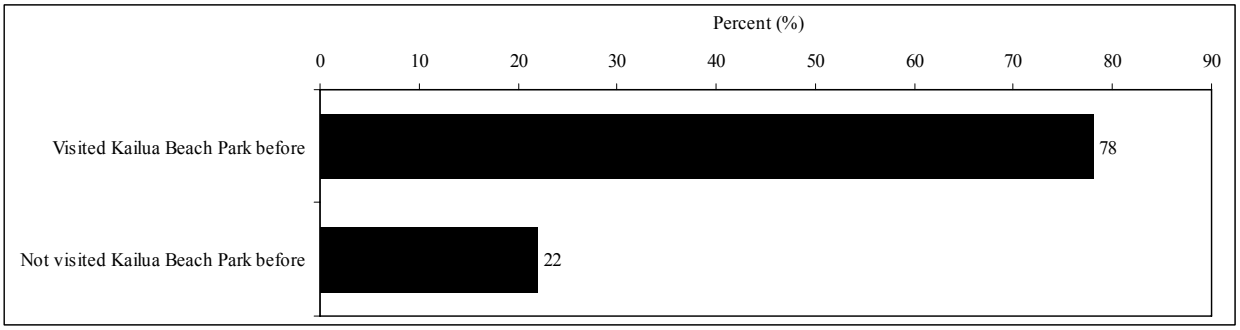
Participation in Organized Tours. Respondents were asked whether they were participating in this main activity at the site as part of an organized or guided tour. In total, 92% of respondents were visiting on their own without being a member of a tour; the remaining 8% were visiting the area as part of an organized or guided tour (e.g., ocean kayak guide companies; Figure 7).

Figure 7. Respondents who visited as part of an organized / guided tour



Previous Visitation. In total, 78% of respondents had previously visited Kailua Beach Park before (Figure 8). The remaining 22% of respondents were visiting the area for the first time when they completed the survey.

Figure 8. Respondents who had visited Kailua Beach Park before their current trip



Value Orientations toward Reef Areas. An individual's value orientation toward coastal environments such as coral reef areas was constructed from four survey variables designed to measure protectionist (i.e., biocentric) basic beliefs and four variables measuring use (i.e., anthropocentric) beliefs. Respondents indicated their agreement with the following protectionist

statements: (a) "coral reef areas should be protected for their own sake rather than to simply meet the needs of humans," (b) "coral reef areas should have rights similar to the rights of humans," (c) "recreational use of coral reef areas should not be allowed if it damages these areas," and (d) "coral reef areas have value whether humans are present or not." The four variables measuring use (i.e., anthropocentric) basic beliefs were: (a) "humans should manage coral reef areas so that humans benefit," (b) "the needs of humans are more important than coral reef areas," (c) "recreational use of coral reef areas is more important than protecting the species that live there," and (d) "the primary value or coral reef areas is to provide for humans." Variables were recoded on 5-point scales from -2 ‘‘strongly disagree’’ to +2 ‘‘strongly agree’’ and with the exception of the context (i.e., reef areas), are identical to items used in past studies measuring public value orientations toward wildlife (e.g., Fulton et al., 1996) and forests (e.g., Vaske & Donnelly, 1999).

Table 1. Factor analysis of basic beliefs toward coral reef areas

	Factor loadings	
Variables	Factor 1 Protectionist (i.e., biocentric) basic beliefs	Factor 2 Use (i.e., anthropocentric) basic beliefs
Coral reef areas have value whether humans are present or not	.77[a]	-.14
Recreational use of coral reef areas should not be allowed if it damages these areas	.75[a]	-.12
Coral reef areas should be protected for their own sake rather than to simply meet the needs of humans	.73[a]	-.16
Coral reef areas should have rights similar to the rights of humans	.71[a]	-.05
The primary value of coral reef areas is to provide for humans	-.16	.82[a]
Recreational use of coral reef areas is more important than protecting species that live there	-.31	.75[a]
The needs of humans are more important than coral reef areas	-.28	.69[a]
Humans should manage coral reef areas so that humans benefit	.14	.61[a]
Eigenvalue	2.39	2.13
Percent (%) variance explained [b]	29.89	26.59

[a] Factor assignment / membership
[b] Cumulative variance explained = 56.5%

A principal components exploratory factor analysis (EFA) with varimax rotation was used to determine the number of dimensions underlying these basic belief statements. Membership of individual variables in a particular factor is based on factor loadings attributed to each variable. In general, factor loadings should be ≥ .40 and eigenvalues should be ≥ 1.0 (Bryant & Yarnold, 1995). The exploratory factor analysis extracted two factors from the eight basic belief statements, explaining 57% of the total variance. Table 1 displays factor loadings, eigenvalues,

and explanatory contribution associated with each factor. Variables strongly correlated with Factor 1 were the four protectionist (i.e., biocentric) basic beliefs. Factor 2 contained the four use oriented (i.e., anthropocentric) basic belief variables.

Table 2. Reliability analyses of protectionist and use value orientations

Orientations and items	Mean [1]	Std. dev. [1]	Item total correlation	Alpha (α) if deleted	Cronbach alpha (α)
Protectionist (i.e., biocentric)					.75
Recreational use of coral reef areas should not be allowed if it damages these areas	1.02	1.04	.56	.68	
Coral reef areas have value whether humans are present or not	1.37	.87	.57	.68	
Coral reef areas should be protected for their own sake rather than to simply meet the needs of humans	1.24	.98	.55	.68	
Coral reef areas should have rights similar to the rights of humans	.57	1.17	.50	.72	
Use (i.e., anthropocentric) [2]					.76
The primary value of coral reef areas is to provide for humans	-1.20	1.03	.62	.64	
Recreational use of coral reef areas is more important than protecting species that live there	-1.19	1.05	.61	.65	
The needs of humans are more important than coral reef areas	-1.07	1.13	.54	.74	
Overall value orientation index					.78

[1] Items coded on 5-point scale recoded as: -2 "strongly disagree" to +2 "strongly agree"

[2] The item "humans should manage coral reef areas so that humans benefit" was removed from the use orientation scale due to poor reliability.

The reliability and internal consistency of these protectionist (i.e., biocentric) and use (i.e., anthropocentric) basic belief scales was then examined using Cronbach alpha (α) reliability coefficients. This statistic ranges from 0 (no measurement reliability) to 1 (perfect reliability). A Cronbach alpha coefficient ≥ 0.65 is viewed as acceptable and indicates that multiple items are measuring the same concept or dimension (Cortina, 1993, Nunnally & Bernstein, 1994).

Table 2 shows that alpha values were .75 for the protectionist (i.e., biocentric) orientation and .76 for the use (i.e., anthropocentric) orientation, suggesting that the survey variables for each reliably measured their respective orientation. Item total correlations represent correlations between the score on a given variable and the sum of the other variables associated with the orientation. In general, item total correlations should be ≥ .40; all variables in the protectionist (i.e., biocentric) scale and all but one in the use (i.e., anthropocentric) scale (i.e., "humans should manage coral reef areas so that humans benefit") met this criterion. Deletion of any variable from the protectionist scale did not improve reliability of the orientation, but deletion of the item "humans should manage coral reef areas so that humans benefit" from the use scale substantially improved reliability of the use orientation so it was dropped from all further analysis. Reliability of the overall value orientation scale was high (α = .78).

Table 2 also shows that, on average, respondents agreed with all of the protectionist (i.e., biocentric) variables and disagreed with all of the use oriented (i.e., anthropocentric) items. For example, respondents agreed most strongly with the statement that "coral reef areas have value whether humans are present or not" and disagreed most strongly with the statement that "the primary value of coral reef areas is to provide for humans."

Having demonstrated the factor structure and reliability of variables used to measure users' value orientations toward coastal environments such as reef areas, K-means cluster analysis was then performed on these variables to segment users into groups. Cluster analysis allows classification of individuals into smaller more homogeneous groups based on patterns of responses across multiple survey variables or factors (Hair & Black, 2000). A series of two to six group cluster analyses showed that a three group solution provided the best fit for the data. To validate this solution, data were randomly sorted and a cluster analysis was conducted after each of four random sorts. These additional analyses supported the solution identifying three distinct groups of individuals, labeled:

- Mixed protection – use orientation (cluster 1).
- Moderate protection orientation (cluster 2).
- Strong protection orientation (cluster 3).

The largest percentage of users at Kailua Beach Park were classified in the strong protection orientation group (i.e., cluster 3 = 44%) followed by the moderate protection orientation group (i.e., cluster 2 = 36%). The fewest users were classified in the mixed protection – use orientation group (i.e., cluster 1 = 20%). The cluster analysis did not identify any discernable group of individuals who clearly possessed use (i.e., anthropocentric) value orientations toward coral reef areas.

To improve understanding of each of these three different cluster groups, they were compared in terms of their responses to the original value orientation variables (Table 3). Mixed protection – use respondents reported the lowest average (i.e., mean) agreement on most of the protectionist oriented variables and the highest agreement on most of the use oriented items. Conversely, respondents in the strong protectionist group had the highest average agreement on most of the protectionist oriented variables and the highest disagreement on most of the use oriented items. Respondents in the moderate protection group usually fell in between the mixed protection – use and strong protection orientation groups for each variable. ANOVA and Tamhane T2 post-hoc tests showed that responses differed substantially among the three groups at Kailua Beach Park, $F(2, 809) \geq 137.24$, $p < .001$. In addition, all eta (η) effect sizes in Table 3 were $\geq .50$ suggesting "large" or "substantial" differences among the three cluster groups in their responses for each of the original value orientation items (Cohen, 1988; Vaske et al., 2002).

There were no statistically significant relationships between cluster group membership (i.e., mixed protection – use, moderate protection, strong protection) and: (a) the main activity in which respondents participated at Kailua Beach Park, or (b) whether respondents had previously visited this site, $\chi^2 \leq 1.34$, $p \geq .511$, $V \leq .04$.

Table 3. Value orientation items by cluster groups

Orientations and items	Cluster groups [1] 1. Mixed protection – use	2. Moderate protection	3. Strong protection	*F*-value	*p*-value	Eta (η)
Protectionist (i.e., biocentric)						
Recreational use of coral reef areas should not be allowed if it damages these areas	.47[a]	.56[a]	1.66[b]	170.01	< .001	.54
Coral reef areas have value whether humans are present or not	.80[a]	1.13[b]	1.84[c]	137.23	< .001	.50
Coral reef areas should be protected for their own sake rather than to simply meet the needs of humans	.62[a]	.89[b]	1.83[c]	169.48	< .001	.54
Coral reef areas should have rights similar to the rights of humans	.26[a]	-0.23[b]	1.38[c]	262.64	< .001	.63
Use (i.e., anthropocentric)						
The primary value of coral reef areas is to provide for humans	.19[a]	-1.32[b]	-1.74[c]	381.09	< .001	.70
Recreational use of coral reef areas is more important than protecting species that live there	.26[a]	-1.24[b]	-1.82[c]	474.25	< .001	.74
The needs of humans are more important than coral reef areas	.29[a]	-1.06[b]	-1.71[c]	305.06	< .001	.66

[1] Cell entries are means. Items recoded on 5-point scale of -2 "strongly disagree" to +2 "strongly agree." Means with different letter superscripts across each row differ at $p < .05$ using Tamhane T2 post-hoc tests.

Sociodemographic Characteristics. In total, 39% of respondents at Kailua Beach Park were male and 61% were female (Figure 9). In addition, Figure 10 shows a clear relationship between value orientations and whether respondents were male or female. Females were more likely to hold stronger protectionist value orientations toward coral reef areas (72%), whereas males were more likely to hold mixed protection – use orientations (53%). This relationship between value orientations and whether respondents were male or female was statistically significant, $\chi^2(2, N = 786) = 31.20$, $p < .001$, $V = .20$. Other analyses showed that although swimmers and sunbathers were slightly more likely to be female, and anglers and kitesurfers / windsurfers were slightly more likely to be male at Kailua Beach Park, effects sizes were generally ≤ .10 suggesting that any differences between males and females in activity participation were weak or minimal.

Figure 9. Percentage of males and females at site

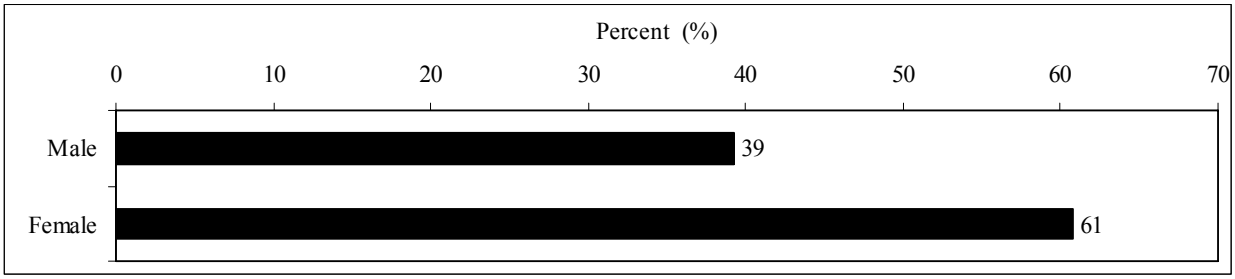
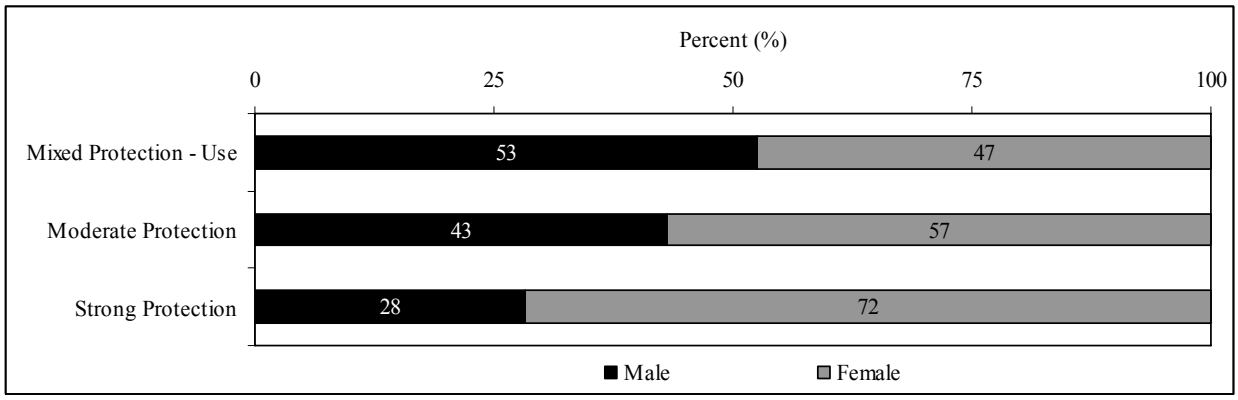


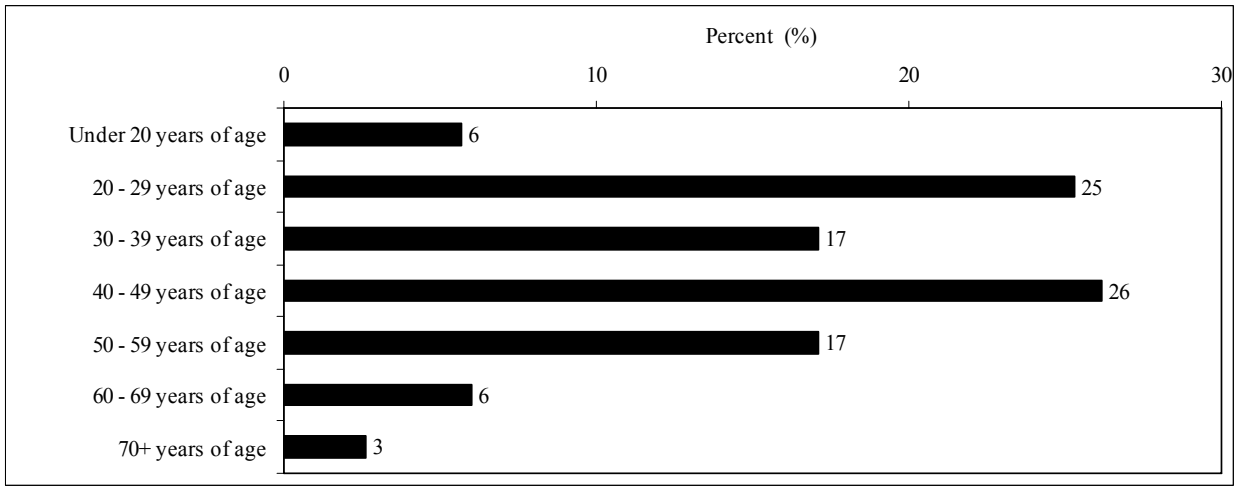
Figure 10. Percentages of males and females in each cluster group [1]



[1] $\chi^2(2, N = 786) = 31.20, p < .001, V = .20$.

In terms of age, 48% of users surveyed at Kailua Beach Park were younger than 40 years of age, but the largest proportion of users was between 40 and 49 years old (26%; Figure 11). In total, 31% of respondents were under 30 years old, 17% were 30 to 39 years old, 26% were 40 to 49 years old, 17% were 50 to 59, and 9% were over 60 years old. The average (i.e., mean) age of respondents was 40 years old. The proportion of users under 20 years of age might be underestimated in this study because human subjects / regulatory compliance protocols required that no individuals under the age of 18 years old be surveyed in this project.

Figure 11. Age of users at site [1]



[1] Average age of users = 39.6 years.

Analyses also showed that, on average, respondents classified as having a mixed protection – use orientation toward coral reef areas were slightly younger (mean age = 38.2 years) than those in the strong protection group (mean age = 41.2 years). This difference among value orientation groups was statistically significant, $F(2, 765) = 4.70$, $p = .009$. The eta (η) effect size, however, was .11, suggesting that this difference in age among the three value orientation cluster groups was weak or minimal (Cohen, 1988; Vaske et al., 2002). Additional analyses also showed that some main activity groups such as beach walkers tended to be slightly older than those

participating in other activities at Kailua Beach Park (e.g., sunbathing, swimming). These differences in age for some main activity groups were statistically significant, but effect sizes were relatively weak or minimal, $F(8, 805) = 4.04$, $p < .001$, $\eta = .19$.

Table 4 shows that almost all respondents surveyed at Kailua Beach Park resided in the United States (90%). The largest proportion of these residents of the United States lived in Hawaii (58%) or California (14%).

Table 4. Respondent location of residence

	Percent (%)
Country	
United States	90
Canada	3
Japan	2
Germany	1
Australia	1
Other	3
US State	
Hawaii	58
California	14
Washington	3
New York	3
Texas	2
Massachusetts	2
Other	18

Table 5 shows that there was no relationship between whether or not respondents at Kailua Beach Park resided in Hawaii and their value orientations toward reef areas, $\chi^2(2, N = 761) = 3.65$, $p = .161$, $V = .07$. However, additional analyses showed that, not surprisingly, residents of Hawaii were significantly more likely than nonresidents to have previously visited Kailua Beach Park, $\chi^2(1, N = 826) = 153.71$, $p < .001$, $V = .42$. Residents of Hawaii were also slightly more likely than nonresidents to participate in beach walking at the site (residents = 21%, nonresidents = 9%) and were less likely than nonresidents to participate in sunbathing (28% versus 40%).

Table 5. Percentage of Hawaiian residents and nonresidents in each cluster group

	Cluster groups [1]		
Site	1. Mixed protection – use	2. Moderate protection	3. Strong protection
Hawaii resident	59	50	55
Not Hawaii resident	41	50	45

[1] Cell entries are percentages (%). $\chi^2(2, N = 761) = 3.65$, $p = .161$, $V = .07$.

Section Summary. Taken together, results showed that:

- The most popular summer activity groups at Kailua Beach Park were swimmers / waders (35%) and sunbathers (33%). Beach walkers were the third most popular activity group

(15%). An additional 7% of respondents were boaters (e.g., kayakers, canoeists, motorboat), 5% were windsurfers or kitesurfers, and 2% were surfers.

- Almost all (92%) respondents were visiting on their own without being a member of an organized or guided tour (e.g., ocean kayak guide companies).

- In total, 78% of respondents had previously visited Kailua Beach Park before; the remaining 22% of respondents were visiting the area for the first time.

- The largest percentage of users at Kailua Beach Park were classified as having a strong protectionist value orientation toward coral reef areas (44%) followed by those with a moderate protection orientation (36%). The fewest users had a mixed protection – use orientation toward reef areas (20%).

- In total, 39% of respondents at Kailua Beach Park were male and 61% were female. Females were more likely to hold a stronger protectionist value orientation toward reef areas (72%), whereas males were more likely to have a mixed protection – use orientation (53%). Swimmers and sunbathers were slightly more likely to be female, and anglers, kitesurfers, and windsurfers were more likely to be male at Kailua Beach Park.

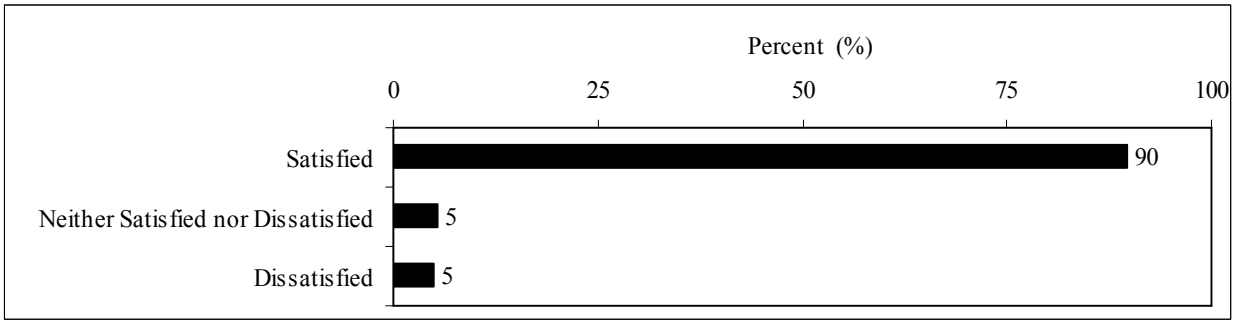
- In total, 48% of users at Kailua Beach Park were younger than 40 years of age, but the largest proportion of users was between 40 and 49 years old (26%). The average (i.e., mean) age of respondents was 40 years old. Respondents with a mixed protection – use orientation toward coral reef areas were slightly younger (mean age = 38.2 years) than those with a strong protection orientation (mean age = 41.2 years). Some activity groups such as beach walkers tended to be slightly older than those participating in other activities such as sunbathing and swimming at Kailua Beach Park.

- Almost all respondents at Kailua Beach Park resided in the United States (90%) with the largest proportion living in Hawaii (58%) or California (14%). Residents of Hawaii were more likely than nonresidents to have previously visited the site, were slightly more likely than nonresidents to participate in activities such as beach walking, and were less likely to participate in activities such as sunbathing and swimming at the site.

Satisfaction with and Importance of Conditions and Experiences

Overall Satisfaction. Respondents were asked "overall, how satisfied are you with your visit to Kailua Beach Park today?" Overall satisfaction of summer users was extremely high, as 90% were satisfied with their visit and almost no respondents (5%) were dissatisfied (Figure 12). There were no relationships between overall satisfaction and value orientations toward coral reef areas, main activity group, or whether or not respondents lived in Hawaii ($p > .05$). In other words, satisfaction was high irrespective of users' value orientations, activities, or residency.

Figure 12. Overall respondent satisfaction with their visit



Satisfaction with Specific Conditions and Experiences. Although almost all respondents were satisfied with their overall visit to Kailua Beach Park (Figure 12), this does not indicate that they were satisfied with every aspect of their experience or conditions at this area. In fact, uniformly high levels of overall satisfaction are common in recreation and tourism research, thus are of only limited usefulness for managers (Manning, 1999).

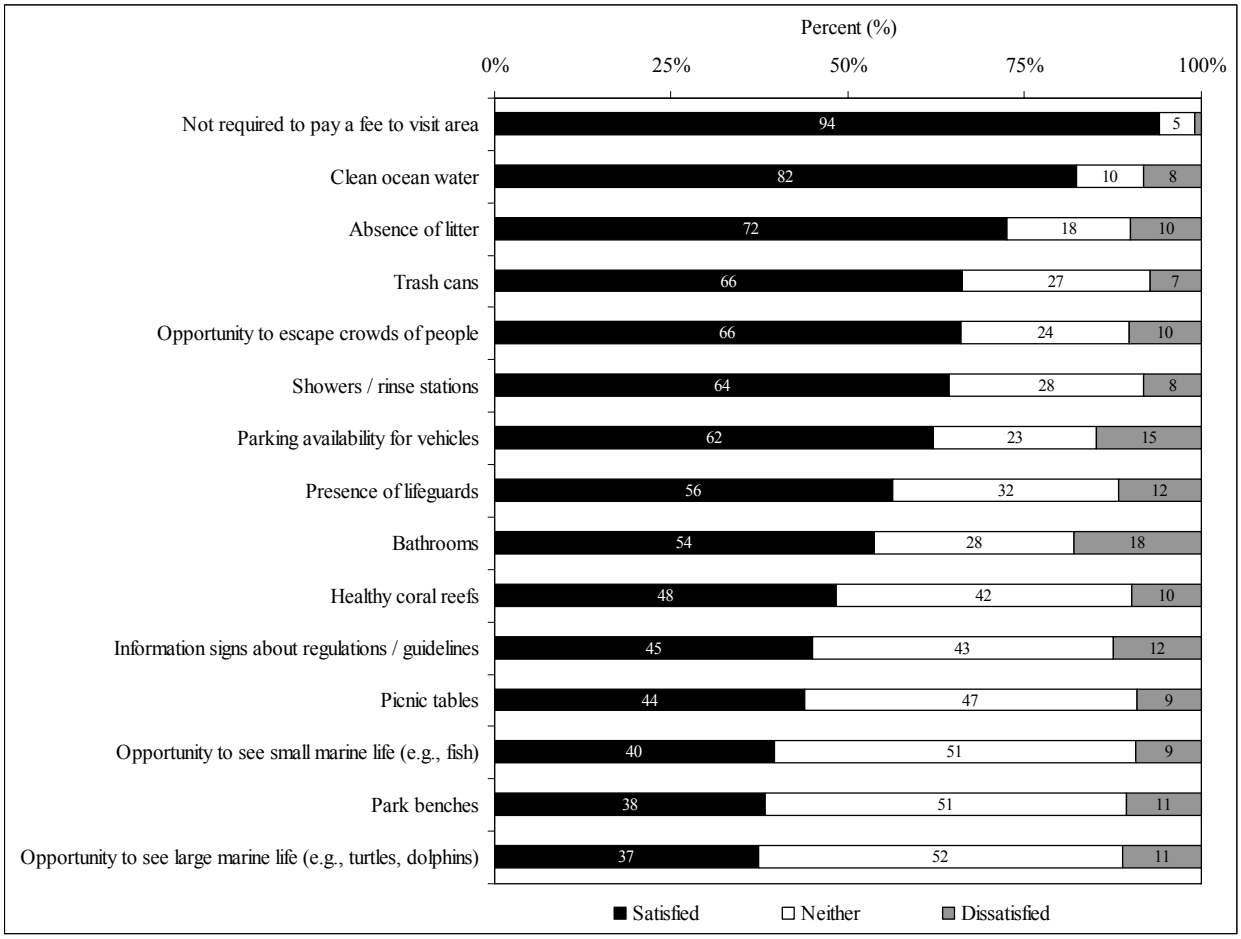
As discussed earlier, Hendee's (1974) "multiple satisfactions" approach suggests that recreation and tourism resources offer people the opportunity for a range of experiences which, in turn, give rise to various human satisfactions. In other words, an individual's satisfaction with an activity or experience is complex; he or she may evaluate several aspects of the setting and experience (e.g., resource, social, managerial). Satisfaction is based on multiple factors that differ from person to person rather than a single overall or global evaluation of satisfaction. This study, therefore, asked users the extent to which they were satisfied with 15 aspects of their experience and the conditions at Kailua Beach Park (e.g., parking availability, bathrooms, absence of litter) on 5-point scales recoded from -2 "very dissatisfied" to +2 "very satisfied."

Figure 13 shows that the majority of respondents were satisfied with many aspects of their experience and the conditions at Kailua Beach Park. The largest proportion of users was satisfied with not having to pay a fee to visit the area (94% satisfied). Over 80% of respondents were also satisfied with the clean ocean water (82%) and over 70% were satisfied with the absence of litter (72%). More than 60% of respondents were satisfied with the trash cans (66%), opportunities to escape crowds of other people (66%), showers / rinse stations (64%), and parking availability for vehicles (62%). The majority of users were also satisfied with the bathrooms (54%) and presence of lifeguards (56%) at Kailua Beach Park. Although the majority of respondents were satisfied with many aspects of their experience and the conditions at Kailua Beach Park, they were less satisfied with the park benches (38% satisfied) and opportunities to see small (e.g., fish) and large (e.g., turtles) marine life at this site (37% to 40%). Respondents were most dissatisfied with the condition of bathrooms at Kailua Beach Park (18% dissatisfied).

Additional analyses showed that there were no statistically significant relationships between respondents' value orientations toward coral reef areas and their satisfaction with experiences and conditions at Kailua Beach Park ($p > .05$). There were also no substantial relationships between respondents' main activity group (e.g., sunbathers, snorkelers) and their satisfaction with experiences and conditions at this site. On the other hand, there were some differences in satisfaction between residents of Hawaii and those who were not residents of the state. Compared to nonresidents, residents of Hawaii were significantly less satisfied with the picnic

tables, park benches, availability of parking, cleanliness of ocean water, litter, and opportunities for escaping crowds of people at Kailua Beach Park $t(356 \text{ to} 373) \geq 2.14$, $p \leq .033$, $r_{pb} \geq .11$.

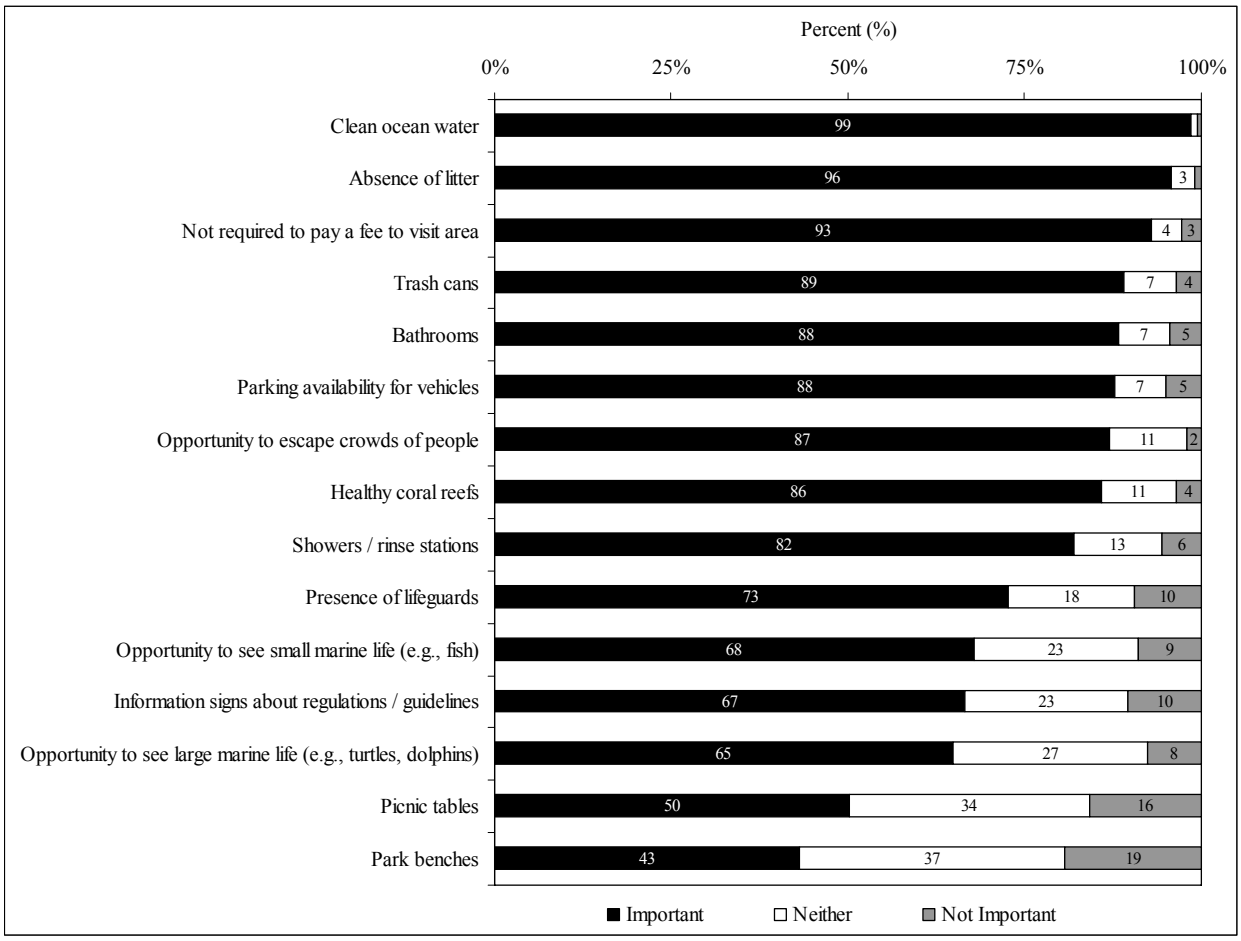
Figure 13. Respondent satisfaction with conditions and experiences at Kailua Beach Park



Importance of Specific Conditions and Experiences. Research has demonstrated that although recreationists and tourists may be satisfied with a particular aspect of the setting or their experience, it may not be important to them that the characteristic is actually provided or available in the setting (see Manning, 1999 for a review). For example, users may be satisfied with informational signage about regulations at an area, but feel that signs are not an important characteristic of good recreation / tourism experiences in a particular setting.

The majority of users surveyed at Kailua Beach Park believed that it was important to provide almost all of the characteristics listed in Figure 14 at this area. Clean ocean water, absence of litter, and no user fees were rated as important characteristics by over 90% of respondents (Figure 14). Trash cans, bathrooms, available parking, opportunities to escape crowds of people, healthy coral reefs, and showers / rinse stations were important for over 80% of respondents. Lifeguards, opportunities to see small and large marine life, informational signage, and picnic tables were also important for the majority of users at this site. The least important characteristic at Kailua Beach Park was park benches (43% important, 19% unimportant; Figure 14).

Figure 14. Respondent importance that conditions and experiences are provided at Kailua Beach Park



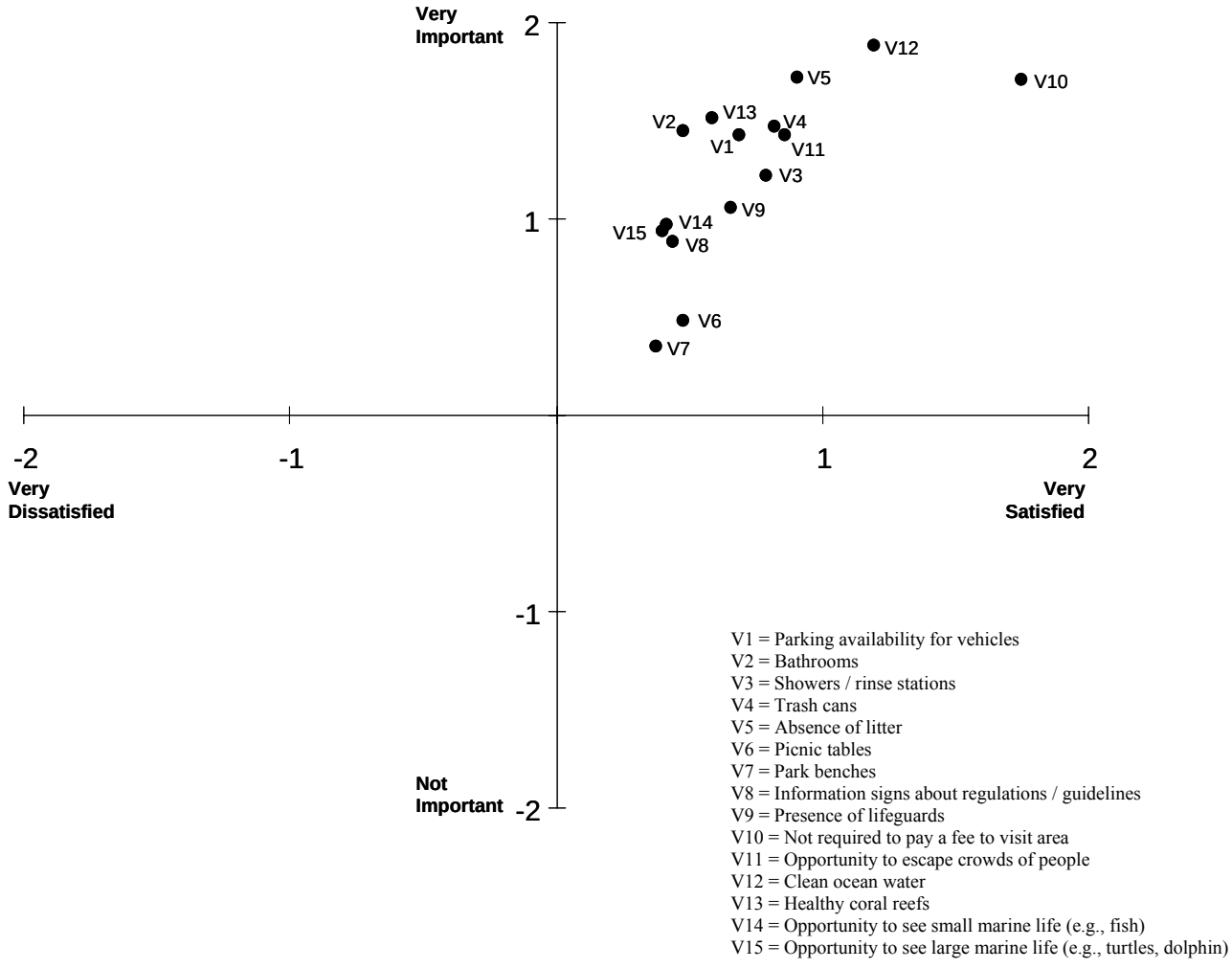
Additional analyses showed that clean ocean water, healthy coral reefs, absence of litter, and opportunities to see small and large marine life were significantly more important for users at Kailua Beach Park with a stronger protectionist orientation toward coral reef areas, $F(2, 381 \text{ to} 384) \geq 8.10$, $p < .001$, $\eta \geq .20$. There were no substantial relationships between respondents' main activity group (e.g., sunbathers, snorkelers) and importance of conditions and experiences at Kailua Beach Park. On the other hand, there were some differences in importance between residents of Hawaii and those who were not residents of the state. Compared to nonresidents, residents of Hawaii rated showers, picnic tables, park benches, no user fees, healthy coral reefs, and opportunities to see large marine life at Kailua Beach Park as significantly more important, $t(368 \text{ to } 375) \geq 2.05$, $p \leq .041$, $r_{pb} \geq .11$.

Importance – Performance Analysis. Given that respondents can be satisfied with a particular characteristic of the setting or experience, but feel that it is not important that the characteristic is actually provided, it is important to understand relationships between both importance and performance (i.e., satisfaction). As discussed earlier, combining these two measures allows for creation of an importance – performance (IP) matrix that offers managers a visual understanding of relationships between the two measures (Figure 3). Importance is represented on the vertical axis (i.e., *y*-axis) with average ratings (i.e., means) recoded from -2 "not important" to +2 "very

important." Average performance (i.e., satisfaction) is recoded and measured on the horizontal axis (i.e., *x*-axis) from -2 "very dissatisfied" to +2 "very satisfied." When combined, the axes intersect and produce a matrix of four quadrants interpreted as "concentrate here" (high importance, low satisfaction; Quadrant A), "keep up the good work" (high importance and satisfaction; Quadrant B), "low priority" (low importance and satisfaction; Quadrant C), and "possible overkill" (low importance, high satisfaction; Quadrant D) (Figure 3).

Figure 15 shows that, on average, respondents rated all characteristics (i.e., experiences, conditions) as important at Kailua Beach Park. Users were also satisfied with all characteristics at this site. These findings suggest that managers of Kailua Beach Park should "keep up the good work" (Quadrant B) in their current management of characteristics at the site. Closer inspection of results in Figure 15, however, suggests that some characteristics could become problematic in the future. For example, picnic tables, park benches, informational signage, and opportunities to see small and large marine life were important at Kailua Beach Park, but users were only slightly satisfied with these characteristics at this site. It is recommended that these issues be monitored to ensure that satisfaction does not decline.

Figure 15. Importance – performance analysis at Kailua Beach Park



Section Summary. Taken together, results showed that:

- Overall satisfaction of summer users at Kailua Beach Park was extremely high, as 90% were satisfied with their visit and almost no respondents (5%) were dissatisfied.
- The majority of respondents were satisfied with most aspects of their experience and the conditions at Kailua Beach Park, especially with not having to pay a fee to visit the area, the clean ocean water, and the absence of litter. Respondents were least satisfied with the park benches and opportunities to see small (e.g., fish) and large (e.g., turtles) marine life, and were most dissatisfied with the condition of bathrooms at Kailua Beach Park.
- The majority of respondents at Kailua Beach Park rated almost all aspects of their experience and the conditions at this site as important, especially clean ocean water, absence of litter, and no user fees (over 90% of users rated as important). The least important characteristic at Kailua Beach Park was park benches (19% unimportant).
- On average, respondents rated all characteristics (i.e., experiences, conditions) as important at Kailua Beach Park and were satisfied with all characteristics at this site. These findings suggest that managers of Kailua Beach Park should "keep up the good work" in their current management of characteristics at the site. However, conditions such as picnic tables, park benches, informational signage, and opportunities to see small and large marine life should be monitored to ensure that satisfaction does not decline in the future at this site.

Social Carrying Capacity Indicators

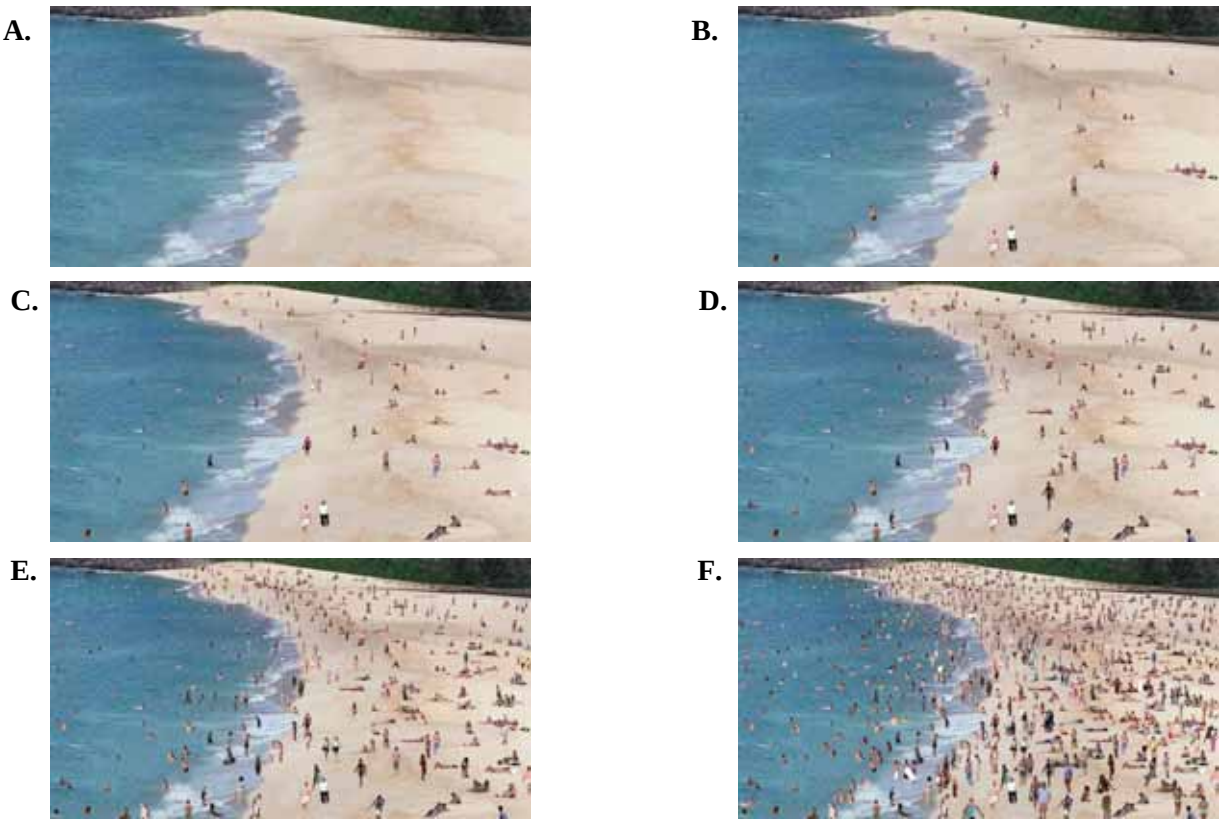
As discussed earlier, the concepts of reported encounters, norms, and perceived crowding have received considerable attention in the recreation and tourism literature because they can be used together to: (a) estimate standards of quality for social carrying capacity indicators, and (b) examine the extent to which these standards are being met or exceeded at a particular location (see Manning, 1999, 2007 for reviews). *Reported encounters* describe a subjective count of the number of other people that an individual remembers observing in a setting. *Perceived crowding* refers to a subjective and negative evaluation that this reported number of encounters or people observed in an area is too many. Understanding reported encounters and perceived crowding, however, may not reveal maximum acceptable or tolerable use levels or an understanding of how use should be managed and monitored. Norms offer a theoretical and applied approach for helping to address these issues. *Norms* are standards that individuals use for evaluating activities, environments, or management strategies as good or bad, better or worse; they help to clarify what people believe conditions or behavior should be. Research suggests that when recreationists perceived a setting to be crowded, they likely encountered more than their norm for what they believe should be acceptable conditions or impacts (e.g., use levels) in the setting.

Reported Encounters with Other Users. Previous research has typically measured reported encounters in recreation and tourism settings by simply asking respondents to approximate how many other people they saw or encountered during their trip to a particular site (see Vaske & Donnelly, 2002 for a review). Responses are typically recorded in either: (a) an open ended format (i.e., fill in the blank) where respondents write a number corresponding to how many people they encountered, or (b) a close ended format where respondents circle one number from

a series of numbers provided on a survey that corresponds to how many people they encountered (e.g., 5, 10, 20, 40 people). This project measured encounters using the close ended format where respondents were asked "approximately how many other people did you see in total at Kailua Beach Park today" and were given 15 different encounter levels from which to choose (0, 5, 10, 20, 35, 50, 75, 100, 200, 350, 500, 750, 1000, 1500, 2000+ people).

Recent studies, however, have demonstrated that it may be unrealistic to expect respondents to accurately ascertain from these written descriptions or lists in surveys exactly how many people they encountered or what would be acceptable or unacceptable. This is especially relevant in frontcountry settings were use levels are often high. It may be difficult, for example, for respondents to visualize what 1500 other people at a beach area would look like. Therefore, researchers have started using image capture technology (ICT) to measure perceptions of conditions such as encounters and use levels. ICT involves using computer software to manipulate and create visuals. Visuals provide a realistic and cognitively easier assessment of impacts and conditions, as they allow users to see what conditions would be like. Respondents evaluate several photographs depicting conditions (e.g., use levels) varied from low to high.

Figure 16. Photographs for measuring encounters and use level norms



In addition to the close ended format discussed above, this project also employed a visual approach for measuring reported encounters and other related social carrying capacity indicators. Six photographs of increasing numbers of people were embedded within the surveys (Figure 16). These photographs depicted 0 to 800 people per 500 x 200 yards with the number of people

doubling in each image (0, 50, 100, 200, 400, and 800 people per 500 x 200 yards). To reflect use patterns on most days as accurately as possible, use levels were divided so that 70% of the people in each photograph were on land (i.e., beach, park) and 30% were in the ocean. The photographs were divided so that approximately half of the width was beach / land (i.e., 100 yards) and half of the width was ocean (i.e., 100 yards); the length was the same for both land and ocean (i.e., 500 yards). Using Adobe Photoshop software, the photograph of 800 people was created first and people were randomly removed from both the ocean and beach / land to create five other visuals of different use levels. People were randomly positioned, but their age, sex, and number in the foreground and background was relatively balanced. The density scale for the photographs was measured in the field at 500 x 200 yards. Similar to past research (see Manning, 1999, 2007; Needham et al., 2004a, 2005 for a review), respondents were told to ignore the generic backgrounds in the visuals, focus on the use level in each visual, and assume that it was occurring at Kailua Beach Park. To measure reported encounters, respondents were asked "which one photograph is like what you saw most often at Kailua Beach Park today?"

Encounters and capacities for a particular site may be estimated by: (a) dividing the site's total area by the corresponding unit standard in the photographs, which for these photographs was 500 x 200 yards (i.e., 500 x 100 yards ocean, and 500 x 100 yards land); and then (b) multiplying these resulting numbers by respondents' evaluations at the site. For example, the formulas in Table 6 were used to extrapolate results from the photographs to a landscape level to estimate encounters and capacities at Kailua Beach Park for photograph E (i.e., 400 people / 500 x 200 yards [280 people on land (70%), 120 people in ocean (30%)]):

Table 6. Example formula for estimating encounter numbers based on photographs for Kailua Beach Park

	Actual site size (length x width) in yards		Photograph size (length x width) in yards				Number of people in photograph		Number of people at site
Beach area (land)	(1150 x 25)	÷	(500 x 100)	=	0.575	*	280	=	161
Park area (land)	(1150 x 120)	÷	(500 x 100)	=	2.760	*	280	=	773
Water area (ocean)	(1150 x 25)	÷	(500 x 100)	=	0.575	*	120	=	69
									Total = 1003

Photograph E contains 400 people per 500 x 200 yards (i.e., 280 people per 500 x 100 yards on land and 120 people per 500 x 100 yards in the ocean). Based on the example in Table 6, however, if a respondent indicated on the survey that photograph E represented the encounter level they saw at Kailua Beach Park, this would suggest that they actually encountered approximately 1003 people at this site simply because this site is much larger than the amount of land and ocean captured in the photograph. The photographs, therefore, extrapolated to approximately 0 people for photograph A, 125 people for photograph B, 251 people for photograph C, 501 people for photograph D, 1003 people for photograph E, and 2006 people for photograph F.

Table 7 shows that, on average, respondents at Kailua Beach Park encountered 136 other users at the site using the close ended approach. Using the photographic approach, however, average reported encounters increased to 354 people. The most common (i.e., mode) encounter level

specified using the close ended format at Kailua Beach Park was 100 people and the photograph that was most commonly noted as representing conditions at this site was photograph C, which also shows 100 people but represents approximately 251 people at this site. Although the difference in reported encounters between the two methodological approaches was statistically significant, this difference is not surprising because Kailua Beach Park is such a large site with a large grassy park area that is used by people who many beach users may not encounter, $t(444) = 16.57$, $p < .001$. On average, respondents reported encountering approximately 100 to 140 other people, but when this number is extrapolated across the entire beach and park area, it increases to over 300 people, many of who most respondents likely do not actually encounter. There were no statistically significant relationships ($p > .05$) between respondents' reported encounters at Kailua Beach Park and their value orientations toward coral reef areas or whether they were residents of Hawaii or nonresidents.

Table 7. Average reported encounters at Kailua Beach Park

Method	Mean encounters [1,2,3]
Closed format	136.4
Photograph format	354.3

[1] Cell entries are mean number of people encountered for: (a) the close ended format where respondents circled a number on the survey to reflect their number of encounters (e.g., 0, 5, 10, 20, 35), and (b) the photograph format where respondents selected one photograph (Figure 16) that was like what they saw most often at the site.

[2] Most common reported encounter = 100 people; most common photograph listed = C (251 people)

[3] Paired sample *t*-test = 16.57, $p < .001$.

Taken together, these results suggest that the close ended format may be a more accurate approach for measuring each individual respondent's *reported encounters* at a particular site. Given the large size of some coastal sites, however, it is unlikely that each respondent saw every person at the site where they were completing the survey (i.e., Kailua Beach Park). The photographic approach, therefore, may be more useful for estimating *use levels* across an entire site, especially when responses to the photographs are extrapolated to a landscape level and aggregated across the entire site.

Normative Acceptance for Encountering Other Users. As discussed earlier, understanding users' reported encounters may not reveal maximum acceptable use levels or an understanding of how use should be managed and monitored. Norms offers a conceptual and applied basis to help address these issues (i.e., standards that individuals use for evaluating activities, environments, or management strategies as good, bad, or what should be). This project employed two methods for measuring users' norms regarding encounters and use levels. First, consistent with past research, a single-item question asked respondents to report the maximum number of people that they would accept encountering / seeing at the site where they completed the survey. Users were presented with a list of 15 numbers from 0 to 2000+ other people (0, 5, 10, 20, 35, 50, 75, 100,

200, 350, 500, 750, 1000, 1500, 2000+ people) and asked "what is the maximum number of other people that you would accept seeing at any one time at Kailua Beach Park?" Results from this single-item measure of respondents' encounter norms showed that they would accept encountering, on average (i.e., mean), a maximum of approximately 276 other people at Kailua Beach Park (Table 8). The most common maximum number of other people that respondents believed they would accept encountering (i.e., mode) was 200 at Kailua Beach Park. There were no statistically significant relationships ($p > .05$) between respondents' normative tolerances for encounters at Kailua Beach Park and their value orientations toward coral reef areas or whether they were residents of Hawaii or nonresidents.

Table 8. Maximum number of other people respondents would accept encountering

Site	Maximum number of people acceptable [1]
Average (mean)	275.9
Standard deviation	318.3
Median (middle)	200
Mode (most common)	200

[1] Cell entries are numbers of other people.

Although substantial research has asked recreationists and tourists to report their acceptance or tolerance of encounters with other users (i.e., norm) by simply circling a number from a list of numbers on a survey, as done here (i.e., 0 to 2000+ users), recent studies have demonstrated that it may be unrealistic to expect respondents to accurately ascertain from these written descriptions or lists what would be acceptable or unacceptable, especially in frontcountry or other high use areas (see Manning, 2007 for a review). The second approach for measuring norms in this project, therefore, involved respondents rating their acceptance of each of the six photographs in Figure 16 on 9-point scales of -4 “very unacceptable” to +4 “very acceptable” if it was to occur at Kailua Beach Park. This approach is consistent with recent research (e.g., Manning, 2007; Needham et al., 2004a, 2005). As discussed earlier, the average (i.e., mean) acceptability ratings can then be plotted on social norm curves (i.e., impact acceptability curves) to provide a mechanism for devising standards of quality, or thresholds at which conditions for indicators such as use levels reach unacceptable levels (Figure 1). Norms can be analyzed for various structural characteristics including the minimum acceptable condition (i.e., point where curve crosses the neutral line and conditions become unacceptable, which often represents the standard of quality), norm intensity (i.e., importance of indicator to respondents), and norm crystallization (i.e., consensus or agreement among respondents).

Figure 17 shows results from using the photographic approach for measuring encounter norms. The social norm / impact acceptability curve shows that, on average, respondents rated visuals containing 0, 50, 100, and 200 people per 500 x 200 yards as acceptable at Kailua Beach Park. Conversely, respondents considered 400 and 800 people per 500 x 200 yards to be unacceptable at this beach park. Interestingly, the photograph containing 50 people was considered, on average, to be slightly more acceptable than the image containing no people, suggesting that respondents are more likely to accept some level of use rather than no use at all. The point where the curve crosses the neutral line (i.e., minimum acceptable condition) was 302 people per

500 x 200 yards. This point can be used to represent the standard of quality for this site, or use level threshold per 500 x 200 yards before conditions deteriorate. When this number is extrapolated to a landscape level and aggregated across the entire site, the standard of quality is approximately 758 people at Kailua Beach Park. Table 9 shows that there was a moderate amount of crystallization (i.e., agreement, consensus) regarding acceptable conditions at Kailua Beach Park (*SD* = 2.01, max = 4.0). Crystallization is represented by the average standard deviations for the norm curve; a low standard deviation implies a higher degree of crystallization (i.e., agreement, consensus). Norm intensity (i.e., indicator importance) at Kailua Beach Park was also moderate (12.9, max. = 24), suggesting that respondents felt that use level / density was a relatively important indicator at this site (Table 9).

Figure 17. Social norm / impact acceptability curve for encounters with other people

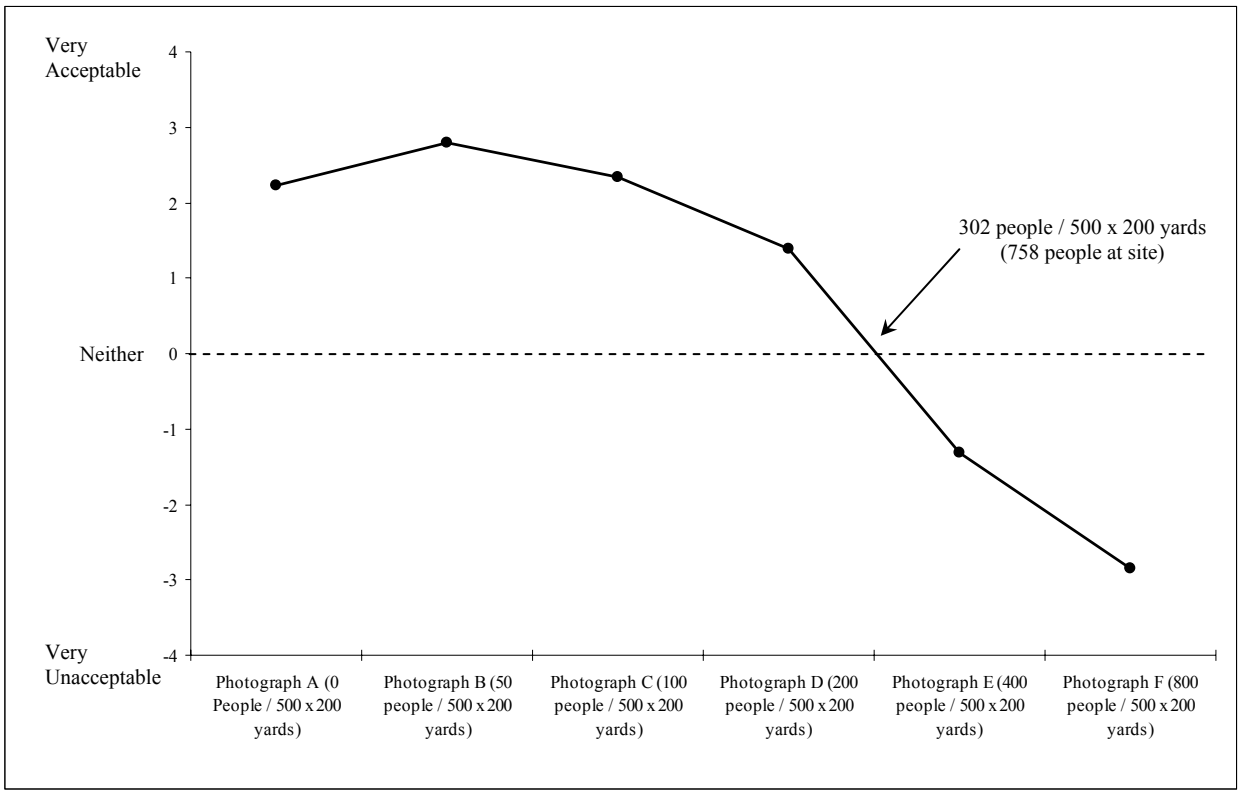


Table 9. Social norm / impact acceptability curve characteristics at Kailua Beach Park

Site	Norm curve characteristics
Norm intensity (maximum = 24)	12.9
Minimum acceptable condition [1]	302.2
Norm crystallization (range = 0 to 4) [2]	2.0

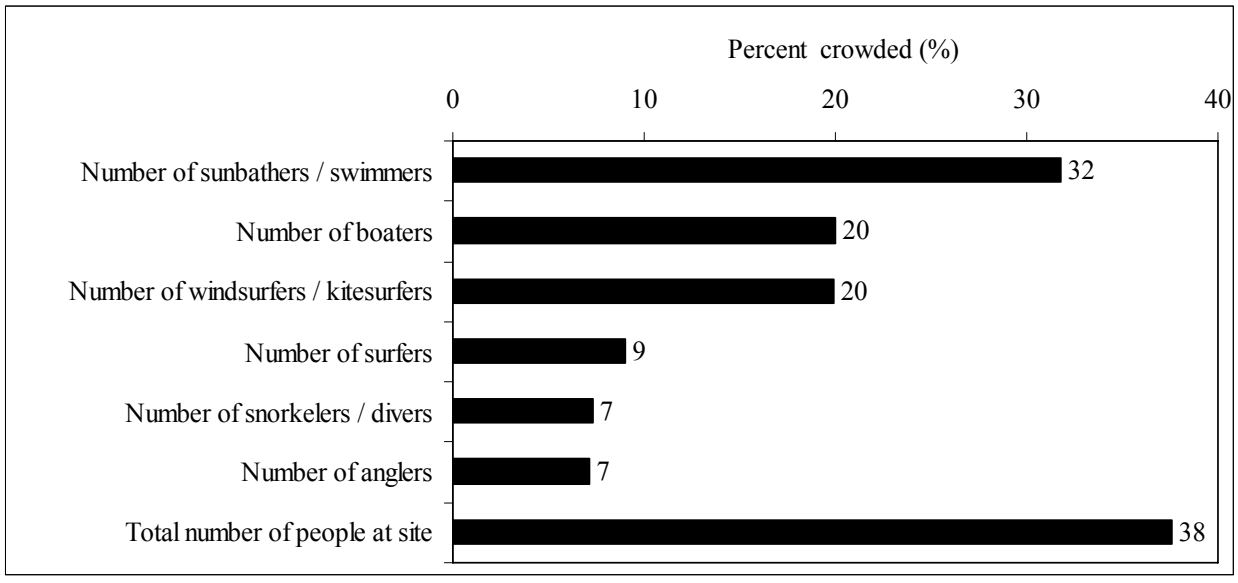
[1] Cell entries are numbers of other people per 500 x 200 yards.

[2] Cell entries are the average standard deviations of the points comprising each norm curve.

Additional analyses showed that users with a strong protectionist value orientation toward nearshore reef areas rated photographs with relatively low use levels (e.g., photographs A, B) as more acceptable and visuals with higher use levels (e.g., photographs E, F) as less acceptable than respondents with a more mixed protection – use value orientation. In most cases, however, this relationship between value orientations and encounter norms was statistically insignificant ($p > .05$) and effect sizes were less than .15, suggesting a weak or minimal relationship between the concepts (Cohen, 1988; Vaske et al., 2002). In addition, the minimum acceptable condition (i.e., point where norm curve crosses the neutral point) did not differ among the value orientation cluster groups ($p > .05$). Ancillary analyses also showed no significant differences ($p > .05$) in encounter norms between residents of Hawaii and nonresidents of this state.

Perceived Crowding. In the survey, respondents were asked to report the extent to which they felt crowded by the following activities at Kailua Beach Park: (a) number of sunbathers / swimmers, (b) number of snorkelers / divers, (c) number of surfers, (d) number of windsurfers / kitesurfers, (e) number of boaters (e.g., kayak, motor), and (f) number of anglers (i.e., people fishing). Users were also asked to report the extent to which they felt crowded by the total number of people at this site. Consistent with most research on perceived crowding, responses were measured on 9-point scales of 1 "not at all crowded" to 9 "extremely crowded" and were then recoded to 0 "not crowded" (i.e., 1 and 2 on scale) and 1 "crowded" (3 to 9 on scale; Vaske & Donnelly, 2002).

Figure 18. Perceived crowding at Kailua Beach Park in the summer [1]



[1] Percentages (%) of users who did feel crowded (3-9).

In total, 38% of respondents felt crowded by the total number of other people encountered at Kailua Beach Park in the summer (Figure 18). Shelby et al. (1989) suggested that when 35% to 50% of recreationists feel crowded at a site, crowding at the site could be characterized as "low normal." Kailua Beach Park had "low normal" crowding, suggesting that a problem situation does not exist at this time (Shelby et al., 1989). Respondents felt most crowded by the number of sunbathers and swimmers encountered at Kailua Beach Park (32%), but 20% of respondents

also felt crowded by the number of boaters (e.g., kayak, motor), windsurfers, and kitesurfers at this site. There were no relationships between respondents' value orientations toward coral reef areas and their perceptions of crowding ($p > .05$). There were, however, a few differences in crowding between residents and nonresidents of Hawaii, especially for crowding from windsurfers and kitesurfers. At Kailua Beach Park, residents of Hawaii felt significantly more crowded by windsurfers and kitesurfers (residents = 28%, nonresidents = 11%), $\chi^2(1, N = 406) = 18.21$, $p < .001$, $\phi = .21$.

Relationships among Encounters, Norms, and Crowding. To estimate whether there are potential social carrying capacity related problems at a recreation site, it is important to examine relationships among encounters, norms, and crowding. In particular, it is important to determine what proportion of users is encountering more people than they would tolerate at a site (i.e., their norm). Research has shown that when recreationists encounter more people than they feel are acceptable (i.e., norm), they feel more crowded compared to those who encounter less than they would accept. If many users are encountering more people than they feel is acceptable, management may need to do more to address social capacity related issues (e.g., quota, zoning).

Table 10. Relationships among encounters, norms, and crowding at Kailua Beach Park

	Reported encounters compared to norm [1]		Average crowding scores [2]				
Site	% Fewer encounters	% More encounters	Fewer than norm	More than norm	*t*-value	*p*-value	Effect size (r_{pb})
Kailua Beach Park	75	25	2.24	4.06	5.34	< .001	.36

[1] Percent of users who encountered either fewer than or more than their norm (minimum acceptable condition).
[2] Mean perceived crowding based on a 9-point scale from 1 "not at all crowded" to 9 "extremely crowded."

Table 10 shows relationships among encounters, norms, and crowding at Kailua Beach Park. The majority of respondents reported encountering fewer people than their norm. In fact, 75% of respondents encountered fewer people than their norm at this site; 25% encountered more than their norm. Crowding scores were significantly higher for users reporting more encounters than their norm, $t(270) = 5.34$, $p < .001$. The point-biserial correlation effect size of $r_{pb} = .36$ suggests that the strength of the relationship among encounters, encounter norms, and perceived crowding can be considered relatively “large” (Cohen, 1988) or “substantial” (Vaske et al., 2002). Consistent with past research (Vaske & Donnelly, 2002), these findings generally suggest that perceived crowding was highest for respondents who reported more encounters than their norm (i.e., standards). Taken together, results in Table 10 showed that: (a) perceived crowding was highest for recreationists who reported more encounters than they would accept, and (b) approximately 75% of users at Kailua Beach Park encountered fewer people than the maximum that they would accept encountering at this site.

Respondents were also asked "how did the number of other people that you saw at Kailua Beach Park today affect your enjoyment?" Responses were coded as "reduced my enjoyment," "had no effect on my enjoyment," and "increased my enjoyment." Table 11 shows that 74% of users felt

that the number of other people they encountered had no effect on their enjoyment. However, respondents who encountered more people than they believed was acceptable for this site (i.e., their norm) were significantly more likely to say that the number of people they encountered reduced their enjoyment, whereas those who encountered less than their norm were more likely to say that encounters increased or had no effect on enjoyment, $\chi^2(2, N = 287) = 24.20$, $p < .001$, $V = .30$. Interestingly, the largest percentage of users who encountered more people than they would tolerate still felt that this number of encounters had no effect on their enjoyment (72%). This finding suggests that although crowding and use levels are important social issues at Kailua Beach Park, high use levels may not substantially distract from users' experiences at this site.

Table 11. Effect of encounters on user enjoyment of site visit

	Reported encounters compared to norm [1]						
Effect of use level	Fewer than norm	More than norm	Total at site	Mean crowding [2]	χ^2-value	*p*-value	Cramer's *V*
Kailua Beach Park					24.20	< .001	.30
Reduced enjoyment	4	21	8	5.24			
No effect on enjoyment	75	72	74	2.45			
Increased enjoyment	21	7	18	1.96			

[1] Cell entries are percentages (%).
[2] Mean perceived crowding based on a 9-point scale from 1 "not at all crowded" to 9 "extremely crowded."

Section Summary. Taken together, results showed that:

- Respondents at Kailua Beach Park encountered, on average, approximately 136 other users at this site.
- Respondents would accept encountering, on average, a maximum of approximately 276 to 302 other people at Kailua Beach Park. When results are extrapolated to a landscape level and aggregated across the entire site, the social carrying capacity indicator standard of quality is approximately 758 people at Kailua Beach Park.
- Users with a strong protectionist value orientation toward nearshore reef areas rated relatively low use levels as more acceptable and higher use levels as less acceptable than respondents with a mixed protection – use value orientation.
- In total, 38% of respondents felt crowded by the total number of people encountered at Kailua Beach Park in the summer. This site had "low normal" crowding, suggesting that a problem situation related to social issues such as crowding does not exist at this time.
- Respondents felt most crowded by the number of sunbathers and swimmers encountered at Kailua Beach Park (32%). In addition, 20% of users felt crowded by the number of boaters (e.g., kayak, motor), windsurfers, and kitesurfers at this site. At Kailua Beach Park, residents of Hawaii felt significantly more crowded by windsurfers and kitesurfers (residents = 28%, nonresidents = 11%).

- At Kailua Beach Park, 75% of respondents encountered fewer people than the maximum number of people they would accept seeing at the site. Perceived crowding was highest for respondents who reported more encounters than their maximum tolerance level.
- Over 74% of respondents felt that the number of other people they encountered at Kailua Beach Park had no effect on their enjoyment. Users who encountered more people than they believed was acceptable were more likely to say that the number of people they encountered reduced their enjoyment, but the largest percentage of these users still felt that this number of encounters had no effect on their enjoyment (72%). This suggests that although crowding and use levels are important social issues at Kailua Beach Park, high use levels may not substantially distract from users' experiences at this site; some users may feel crowded and encounter more people than they feel is acceptable, but this may not substantially alter their overall enjoyment / satisfaction at the site.

Facility Carrying Capacity Indicators

The previous section addressed social carrying capacity indicators at Kailua Beach Park. Another objective of this project, however, was to measure facility indicators of recreation carrying capacities and determine thresholds when perceived impacts for these facility indicators reach unacceptable levels. Facility carrying capacity is the amount and type of facilities acceptable for accommodating a particular use level (Shelby & Heberlein, 1986). Most studies have ignored facility capacities (Manning, 2007). As shown in the previous section, this project examined relationships among multiple concepts to measure social carrying capacity indicators (i.e., encounters, norms, crowding). A similar approach was used to examine facility carrying capacity indicators. Four separate measures related to facility capacity were employed in this project: (a) respondents' number of *encounters* (i.e., number seen) with six types of facilities at the site (i.e., bathrooms, showers / rinse stations, trash cans, picnic tables, park benches, information signs about regulations / guidelines); (b) the *actual number* of these six types of facilities at the site; (c) respondents' *norms* regarding how many of each of these types of facilities should be at the site; and (d) respondent *satisfaction* with these facilities at the site.

To measure encounters with facilities, the surveys asked respondents "how many of each of the following facilities have you seen at Kailua Beach Park" and instructed them to circle one number from a list of 16 numbers (0 to 20+) for each of the six facilities (i.e., bathrooms, showers / rinse stations, trash cans, picnic tables, park benches, information signs). The actual number of each type of facility was recorded during site visits by the researchers. To measure respondents' norms regarding facility indicators, the surveys presented users with the list of six facilities, asked "how many of each of the following facilities do you feel should be at Kailua Beach Park," and instructed users to circle one number from a list of 16 numbers (0 to 20+) for each of the six facilities. Finally, the surveys asked users the extent to which they were satisfied with these facilities at the site on 5-point scales from 1 "very dissatisfied" to 5 "very satisfied."

Table 12 shows the actual number of each facility at Kailua Beach Park (i.e., bathrooms, showers, trash cans, picnic tables, park benches, signs), the average number of each facility that respondents encountered, and respondents' norms regarding how many of each facility should be at this site. The most common facility at Kailua Beach Park is trash cans (49) followed by picnic

tables (19) and informational signs (13). There are also six bathrooms, four showers / rinse stations, and three park benches at Kailua Beach Park.

On average, respondents typically saw fewer of most facilities than what is actually present at Kailua Beach Park (Table 12). At this site, for example, there are 49 trash cans, but respondents only encountered an average of approximately five trash cans. Although respondents encountered fewer facilities than what is actually present at this site, they believed that there should still be more of each facility than what they saw. For example, respondents reported encountering an average of approximately five trash cans, but believed that there should be 11 or more trash cans at Kailua Beach Park. This suggests that users want more of each facility at Kailua Beach Park. When comparing the actual number of each facility to how many respondents think should be at the site, however, it is evident that there are enough bathrooms, trash cans, picnic tables, and signs at Kailua Beach Park. According to users, there are not enough showers / rinse stations or park benches at Kailua Beach Park. There were no relationships between users' responses to facilities at Kailua Beach Park and their value orientations toward coral reef areas. There were, however, significant differences ($p < .05$) between residents of Hawaii and nonresidents of the state in their responses to facilities. Compared to nonresidents, residents of Hawaii reported encountering more of each facility and believed that there should be more of each facility at Kailua Beach Park.

Table 12. Facility encounters, norms, and actual numbers at Kailua Beach Park

	Actual number	Respondent average encounters (number seen)	Respondent average norm (number that should be)
Bathrooms	6	2.27	4.25
Showers / rinse stations	4	2.41	4.74
Trash cans	49	5.39	11.58
Picnic tables	19	4.08	9.25
Park benches	3	3.06	8.40
Information signs	13	2.64	6.90

Table 13 shows relationships among facility encounters (i.e., number seen), norms (i.e., number should be), and satisfaction at Kailua Beach Park. Over 71% of respondents reported encountering fewer of each facility than what they feel should be at the site (i.e., their norm). For example, 71% of respondents encountered fewer bathrooms than they believe should be at Kailua Beach Park. Satisfaction scores were lower for users reporting fewer of each facility than what they feel should be at the site (i.e., their norm). Taken together, results in Table 13 showed that: (a) satisfaction with facilities was lowest for recreationists who reported fewer of each facility than what they feel should be at Kailua Beach Park, and (b) over 71% of users at this site encountered fewer of each facility than what they feel should be at Kailua Beach Park. These findings suggest that users want more of each facility at Kailua Beach Park and this would increase satisfaction with facilities at this site.

Table 13. Relationships among facility encounters, norms, and satisfaction at Kailua Beach Park

	Encounters (number seen) compared to norm [1]		Average satisfaction [2]				
Facility	% Fewer encounters	% More encounters	Fewer than norm	More than norm	*t*-value	*p*-value	Effect size (r_{pb})
Bathrooms	71	29	3.36	3.67	2.35	.020	.13
Showers / rinse stations	73	27	3.70	4.02	2.92	.004	.15
Trash cans	83	17	3.76	4.07	2.25	.027	.12
Picnic tables	81	19	3.40	3.74	2.52	.014	.15
Park benches	84	16	3.33	3.62	2.05	.042	.11
Information signs	82	18	3.37	3.67	2.01	.045	.11

[1] Percent of users who encountered either fewer than or more than they feel should be at the site.
[2] Mean satisfaction based on a 5-point scale from 1 "very dissatisfied" to 5 "very satisfied."

The majority of respondents at Kailua Beach Park encountered fewer of each facility than what they feel should be at this site (i.e., their norm), which suggests that users want more of each facility at this site (Table 13). Table 14, however, shows that when these norms are compared to the actual number of facilities at Kailua Beach Park, there are actually enough of most facilities at this site. For example, 71% of respondents reported seeing fewer bathrooms at Kailua Beach Park than what they felt should be at this site (i.e., norm). The actual number of bathrooms at this site, however, was equal to or greater than the number specified by 87% of respondents. In other words, there was actually the same number or more of most facilities at Kailua Beach Park than what users felt should be at this site. This suggests that: (a) users underestimate the number of many facilities by reporting fewer encounters with facilities than what is actually present at the site, and (b) there are enough of most types of facilities at Kailua Beach Park to meet or exceed users' expectations and needs. There was, however, one exception to this pattern of findings. At Kailua Beach Park, there were actually fewer park benches than what summer users believed should be at this site.

Table 14. Relationships between norms and actual number of facilities at Kailua Beach Park

	Encounters (number seen) compared to norm [1]		Actual number compared to norm [2]	
Facility	% Fewer encounters	% More encounters	Fewer than norm	More than norm
Bathrooms	71	29	13	87
Showers / rinse stations	73	27	36	64
Trash cans	83	17	0	100
Picnic tables	81	19	13	87
Park benches	84	16	**83**	17
Information signs	82	18	11	89

[1] Percent of users who encountered either fewer than or more than they feel should be at the site.
[2] Percent of users whose norm was higher or lower than actual conditions at the site.

Section Summary. Taken together, results showed that:

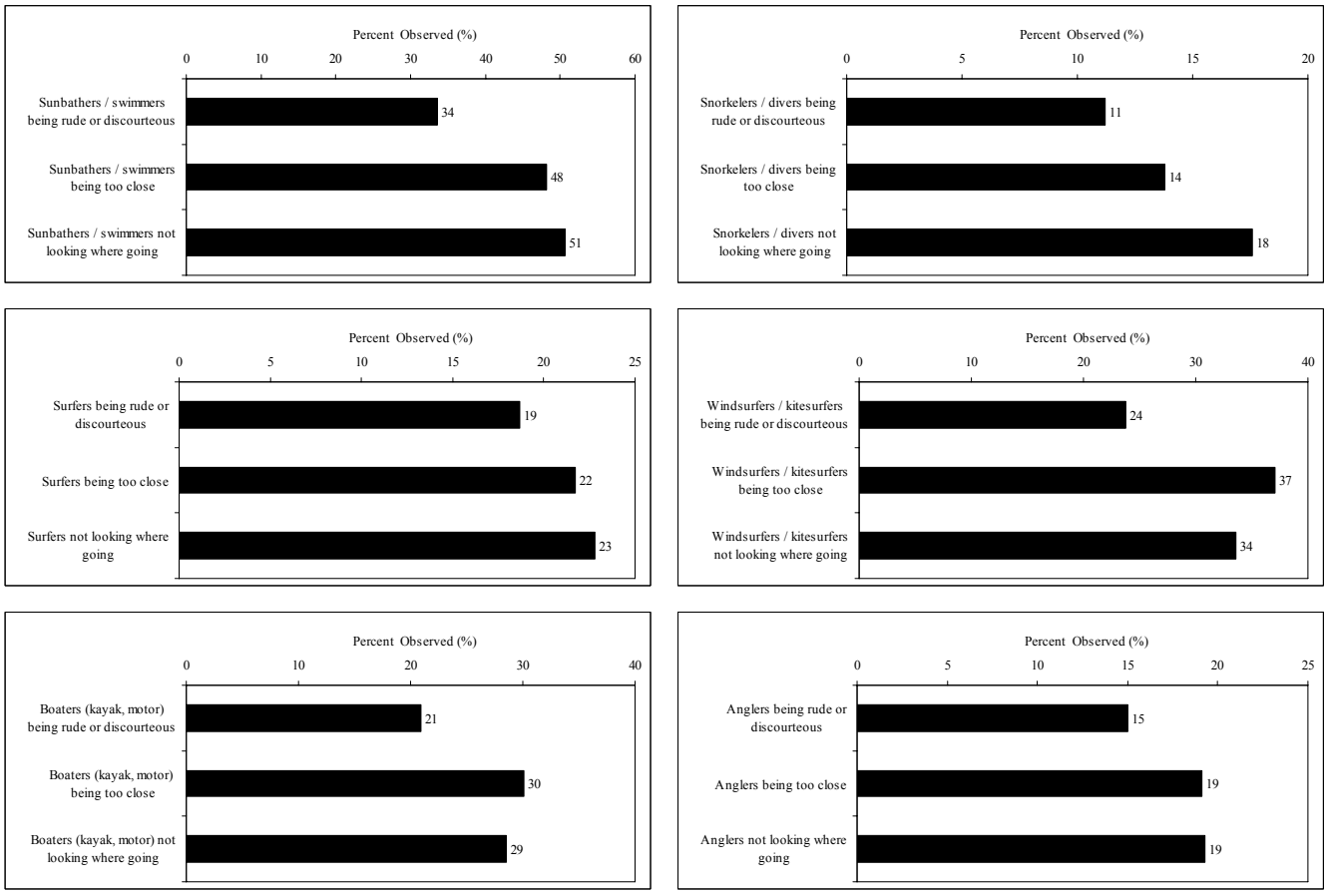
- On average, respondents typically saw fewer bathrooms, showers / rinse stations, trash cans, picnic tables, park benches, and information signs than what is actually present at Kailua Beach Park. In addition, they believed that there should still be more of each facility than what they saw. When comparing the actual number of each facility to how many respondents think should be at the site, however, it is evident that there are enough bathrooms, trash cans, picnic tables, and signs at Kailua Beach Park. According to users, there are not enough showers / rinse stations or park benches at Kailua Beach Park.
- At Kailua Beach Park, the majority of respondents reported encountering fewer of each facility than what they believed should be at the site (i.e., their norm). Satisfaction scores for these facilities were lower for users reporting fewer of each facility than what they believed should be at the site (i.e., their norm). These findings suggest that users want more of each facility and this would increase satisfaction with facilities at this site.
- When users' norms are compared to the actual number of facilities at Kailua Beach Park, there are actually enough of most facilities at the site (i.e., there was actually the same number or more of most facilities than what users felt should be at the site). This finding suggests that: (a) users underestimate the number of many facilities at this site by reporting fewer encounters with facilities than what is actually present, and (b) there are enough of most types of facilities at Kailua Beach Park to meet or exceed users' expectations and needs. At Kailua Beach Park, however, there were actually fewer park benches than what summer users believed should be at this site.

Recreation Conflict and Coping Behavior

Conflict with Activity Groups. As discussed above, there are multiple types of conflict (e.g., interpersonal, social values). Consistent with past research (Vaske et al., 1995, 2007), respondents in this project were first asked how frequently they had observed three different situations / events for six different activity groups at Kailua Beach Park. The six activity groups were: (a) sunbathers or swimmers, (b) snorkelers or divers, (c) surfers, (d) windsurfers or kitesurfers, (e) boaters (e.g., kayak, motorboat), and (f) anglers (i.e., people fishing). Respondents were asked how frequently they had observed each of these activity groups: (a) being rude or discourteous, (b) being too close, and (c) not looking where they were going (anglers: not looking where they cast their line / hook). Responses for these situations / events were measured on 4-point scales of "never," "once or twice," "sometimes," and "many times." For analysis purposes and consistent with past research (Vaske et al., 2007), responses were recoded as "observed" (i.e., at least once) or "did not observe" the event (i.e., never saw event).

Figure 19 shows that the most commonly reported conflict events observed at Kailua Beach Park were sunbathers and swimmers not looking where they were going (51%) and being too close (48%). Over 30% of respondents also reported observing windsurfers and kitesurfers being too close (37%) and not looking where they were going (34%), sunbathers and swimmers being rude or discourteous (34%), and boaters (e.g., kayak, motorboat) being too close (30%). Fewer summer users (less than 20%) reported observing any conflict behaviors associated with snorkelers / divers and anglers at Kailua Beach Park.

Figure 19. *Observed* activity group behavior at Kailua Beach Park [1]



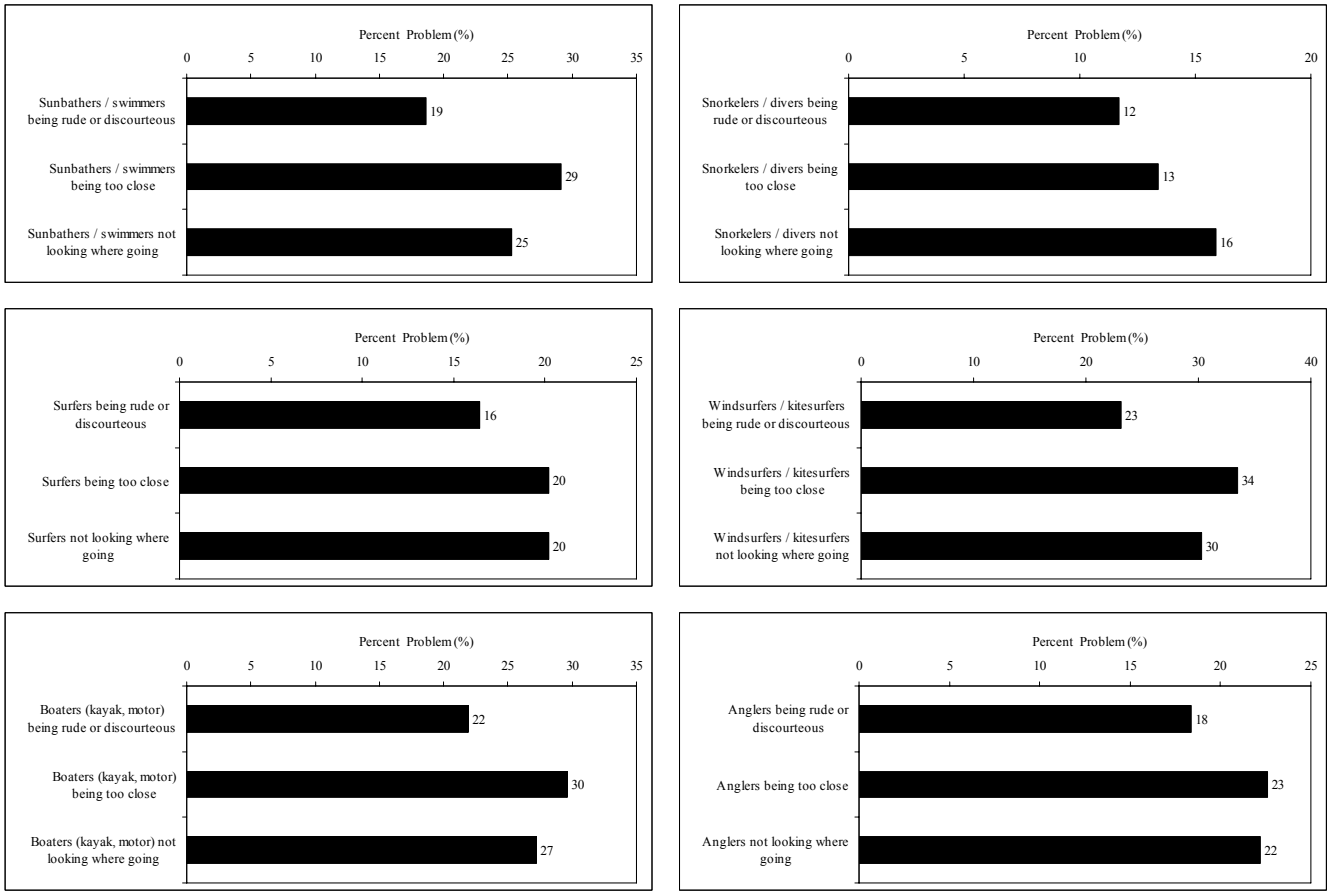
[1] Percentages (%) of users who observed the event at least once.

Users were then asked if they believed that each of the three events for each of the six activity groups was a problem at Kailua Beach Park. Responses were coded on 4-point scales from "not at all a problem" to "extreme problem." For analysis purposes and consistent with past research (Vaske et al., 2007), variables were recoded as "no problem" or "problem." Figure 20 shows that that the most problematic events at Kailua Beach Park were windsurfers and kitesurfers being too close (34%) and not looking where they were going (30%), boaters (e.g., kayak, motorboat) being too close (30%), and swimmers being too close (30%).

Similar to previous research, combining the frequency of occurrence (observed, not observed) variables with the corresponding perceived problem (no problem, problem) variables for each respondent produced conflict typologies with three possible attributes for each activity group: (a) no conflict, (b) interpersonal conflict, and (c) social values conflict (Figure 2). In other words, this analysis strategy resulted in three situations / events (e.g., being too close, rude or discourteous) common to all six activity groups where respondents were described as having: (a) no conflict, (b) interpersonal conflict, or (c) social values conflict. Separate K-Means cluster analyses were conducted on the three variables for each of the six activity groups to obtain an overall view of the total proportion of respondents in each activity experiencing each type of conflict. For each activity, cluster analyses were performed for 2, 3, and 4 group solutions. The 3-group solution provided the best fit. To confirm these solutions, the data were randomly sorted

four times and cluster analyses were conducted after each sort. These analyses supported the initial three group solution. The first cluster of individuals did not express any conflict (i.e., no conflict). Cluster 2 individuals consistently indicated social values conflict and those in cluster 3 consistently expressed interpersonal conflict.

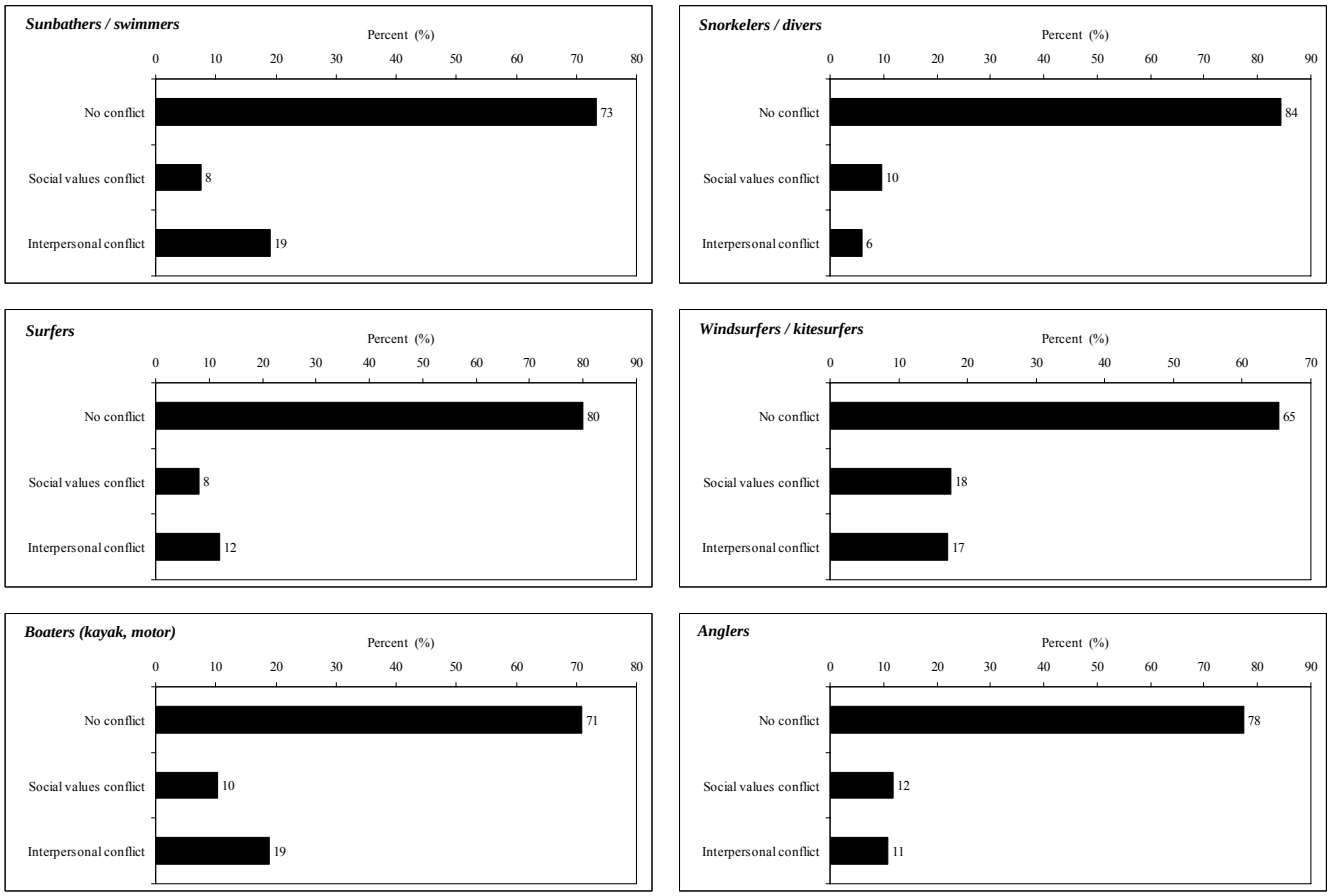
Figure 20. Perceived activity group *problem* behavior at Kailua Beach Park



[1] Percentages (%) of users who perceived the event to be a problem.

Figure 21 shows that the majority of respondents did not experience conflict with activity groups at Kailua Beach Park. The largest percentage of respondents (35%) experienced conflict with windsurfers and kitesurfers at Kailua Beach Park (65% no conflict), with this conflict split between both interpersonal and social values conflict. In addition, 29% of users experienced conflict with boaters (e.g., kayak, motorboat) with most of this being interpersonal conflict. Another 27% of respondents experienced conflict with sunbathers and swimmers at Kailua Beach Park with most of this also being interpersonal conflict. Fewer summer users experienced conflict with anglers (22%), surfers (20%), and snorkelers and divers (16%) at this site. Taken together, however, less than 35% of respondents experienced conflict with each of the six activity groups at Kailua Beach Park.

Figure 21. Overall amount of each type of conflict at Kailua Beach Park



[1] Percentages (%) of users who experienced each type of conflict with the activity group.

Additional analyses showed that compared to nonresidents, residents of Hawaii experienced significantly more conflict with all activity groups at Kailua Beach Park, $\chi^2(2, N = 403 \text{ to } 409) \geq 7.94$, $p \leq .019$, $V \geq .14$ (Table 15). For example, 46% of residents experienced conflict with windsurfers and kitesurfers at Kailua Beach Park, whereas only 23% of nonresidents experienced conflict with this activity group at this site. Likewise, 36% of residents compared with 20% of nonresidents experienced conflict with boaters (e.g., kayak, motorboat) at Kailua Beach Park, and 32% of residents compared with 21% of nonresidents experienced conflict with sunbathers and swimmers at this site in the summer (Table 15).

Depreciative Behavior toward Coral Reefs. In addition to these activity conflicts, the surveys also asked respondents two questions regarding if they had seen users at the site handling or standing on coral and whether they believed that this was a problem at the site. First, users were asked how often they had seen people handling or standing on coral during any of their visits to the site. Responses were measured on a 4-point scale of "never," "once or twice," "sometimes," and "many times." For analysis purposes, responses were recoded as "observed" (i.e., at least once) or "did not observe." Second, users were asked if they thought that people handling or standing on coral was a problem at the site. Responses were coded on a 4-point scale from "not

at all a problem" to "extreme problem." For analysis purposes, responses were recoded as "no problem" or "problem."

Table 15. Differences between residents and nonresidents in amount of each type of conflict [1]

Conflict with activity group	Residents	Nonresidents	χ^2 - value	*p* - value	Cramer's *V*
Sunbathers or swimmers			7.94	.019	.14
no conflict	68	79			
social values conflict	8	8			
interpersonal conflict	25	14			
Snorkelers or divers			25.19	< .001	.22
no conflict	79	90			
social values conflict	10	9			
interpersonal conflict	11	1			
Surfers			18.72	< .001	.21
no conflict	74	86			
social values conflict	7	9			
interpersonal conflict	19	5			
Windsurfers or kitesurfers			44.31	< .001	.32
no conflict	54	77			
social values conflict	18	18			
interpersonal conflict	28	5			
Boaters			20.58	< .001	.22
no conflict	64	80			
social values conflict	9	10			
interpersonal conflict	27	10			
Anglers			19.36	< .001	.21
no conflict	72	85			
social values conflict	11	11			
interpersonal conflict	17	4			

[1] Cell entries are percentages (%) of users who experienced each type of conflict with the activity group.

Figure 22. Percent of users who have observed people handling or standing on coral and think it is a problem at Kailua Beach Park

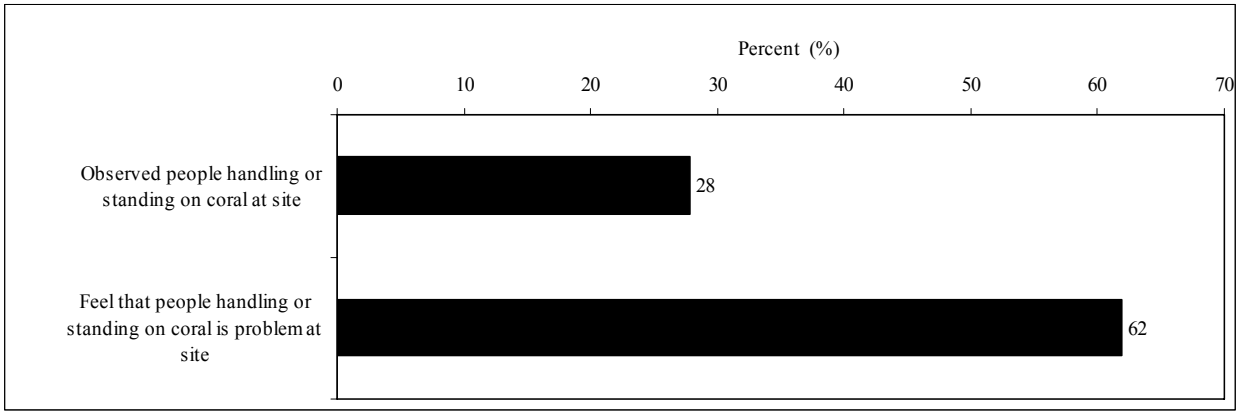


Figure 22 shows that only 28% of users at Kailua Beach Park observed people handling or standing on coral during their visits to the site. Conversely, the majority of users (62%) think that people handling or standing on coral is a problem at Kailua Beach Park. Research has shown that behaviors such as handling and standing on coral can cause deleterious effects such as coral breakage and mortality (e.g., Hawkins et al., 1999; Rodgers & Cox, 2003).

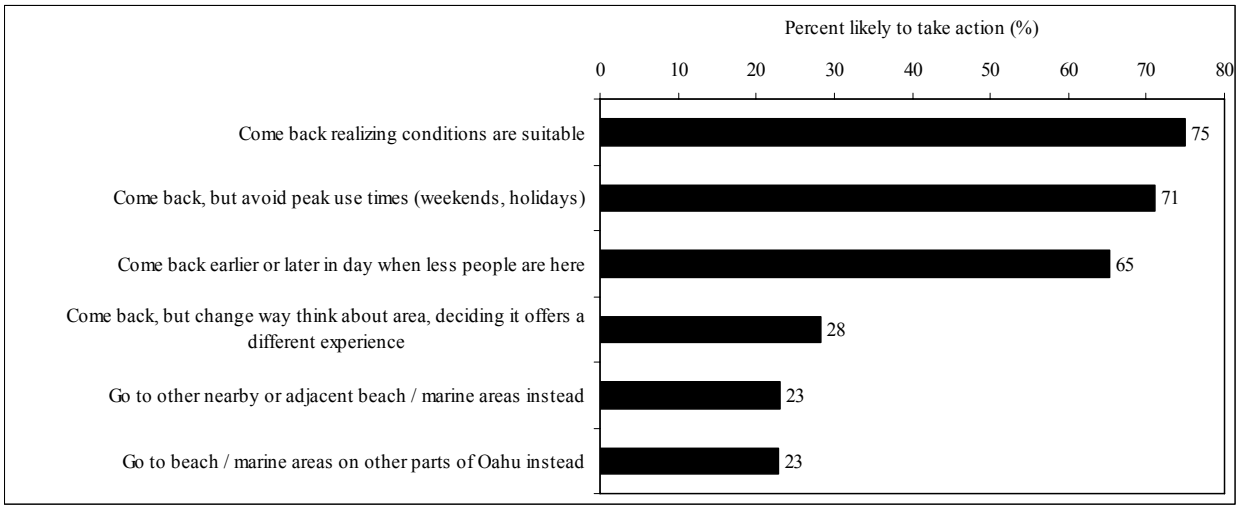
Additional analyses showed that residents of Hawaii were significantly more likely (40%) than nonresidents (13%) to have observed people handling or standing on coral during their visits to Kailua Beach Park, $\chi^2(1, N = 383) = 36.55$, $p < .001$, $\phi = .30$. Residents were also significantly more likely to feel that these depreciative behaviors were a problem at Kailua Beach Park (residents = 65%, nonresidents = 54%), $\chi^2(1, N = 361) = 4.01$, $p = .045$, $\phi = .11$. There were no statistically significant relationships ($p > .05$) between respondents' value orientations toward coral reef areas (e.g., use, protection) and whether they observed people handling or standing on coral, or if they believed that these behaviors were a problem at Kailua Beach Park.

Recreation Displacement and Product Shift. As discussed above, recreationists and tourists may cope with crowding and conflict by choosing to visit alternative locations or return to the same location at different times. This project measured three different coping behaviors: (a) *temporal displacement* (i.e., shift time of visit), (b) *spatial displacement* (i.e., shifts to other areas within the same recreation area [intrasite] or to completely different recreation settings [intersite]), and (c) *product shift* (i.e., reevaluate and change definition of experience or setting). Respondents were asked "assuming that you could be on Oahu Island again in the future, how likely would you take the following actions based on the number of people or behavior of other activity groups that you have seen at Kailua Beach Park?" Two items were used to measure temporal displacement: (a) "come back to Kailua Beach Park, but avoid peak use times (weekdays, holidays)," and (b) "come back to Kailua Beach Park earlier or later in the day when less people are here." Two items were used to measure spatial displacement: (a) "go to other nearby or adjacent beach / marine areas instead" (i.e., intrasite), and (b) "go to other beach / marine areas on other parts of Oahu Island instead" (i.e., intersite). One item was used to measure product shift: "come back to Kailua Beach Park, but change the way I think about this area, deciding that it offers a different type of experience than I first believed." Finally, one item was used to measure no behavior change: "come back to Kailua Beach Park realizing that conditions I saw today are suitable." Responses to these six items were measured on 5-point scales from "very unlikely" to "very likely." These variables are generally consistent with past research measuring these coping behaviors (e.g., Hall & Shelby, 2000; Shelby et al., 1988).

Figure 23 shows that the largest percentage of respondents (75%) is unlikely to change their behavior; they will come back to Kailua Beach Park realizing that conditions they experienced are suitable. However, 71% of respondents are likely to come back, but avoid peak use times such as weekends and holidays. In addition, 65% of users are likely to come back earlier or later in the day when less people are in the area. Both of these items suggest that many users are likely to be temporally displaced because of conditions they experienced. Only 23% of users are likely to go to other beach or marine areas on other parts of Oahu Island or go to other nearby or adjacent beach or marine areas instead, suggesting that most users are unlikely to be spatially displaced because of conditions they experienced. Most respondents are also unlikely to experience a product shift by changing the way that they think about the area and deciding that it

offers a different type of experience than they first believed (28%). There were no statistically significant and substantial differences ($p > .05$, effect sizes < .20) in likelihood of adopting these six behaviors between: (a) residents and nonresidents of Hawaii, and (b) the three value orientation cluster groups at Kailua Beach Park.

Figure 23. Coping behavior in response to conditions at Kailua Beach Park



Section Summary. Taken together, results showed that:

- The most commonly reported conflict events observed at Kailua Beach Park were sunbathers and swimmers not looking where they were going (51%) and being too close (48%). One third of respondents also reported observing windsurfers and kitesurfers being too close (37%) and not looking where they were going (34%), sunbathers and swimmers being rude or discourteous (34%), and boaters (e.g., kayak, motorboat) being too close (30%). Fewer summer users (less than 20%) reported observing any conflict behaviors associated with snorkelers, divers, and anglers at Kailua Beach Park.

- The largest percentage of respondents (35%) experienced conflict with windsurfers and kitesurfers at Kailua Beach Park. In addition, 29% of users experienced conflict with boaters (e.g., kayak, motorboat) and 27% experienced conflict with sunbathers and swimmers at Kailua Beach Park. Fewer summer users experienced conflict with anglers (22%), surfers (20%), and snorkelers and divers (16%) at this site. Taken together, however, less than 35% of respondents experienced conflict with activity groups at Kailua Beach Park.

- Compared to nonresidents, residents of Hawaii experienced more conflict with all activity groups at Kailua Beach Park. For example, 46% of residents experienced conflict with windsurfers and kitesurfers at Kailua Beach Park, whereas 23% of nonresidents experienced conflict with this activity group at this site. Likewise, 36% of residents compared with 20% of nonresidents experienced conflict with boaters (e.g., kayak, motorboat) at Kailua Beach Park.

- Although a relatively small number of users (28%) observed people handling or standing on coral during their visits to Kailua Beach Park, the majority of users (62%) think that people handling or standing on coral is a problem at this site. Residents of Hawaii were more likely to have observed people handling or standing on coral during their visits to Kailua Beach Park, and feel that these depreciative behaviors were a problem at this site.

- In response to crowding and conflict, most respondents (75%) are still unlikely to change their behavior; they will come back to Kailua Beach Park realizing that conditions they experienced are suitable. However, 71% of respondents are likely to come back, but avoid peak use times such as weekends and holidays, and 65% of users are likely to come back earlier or later in the day when less people are in the area, suggesting that many users are likely to be temporally displaced because of conditions they experienced. Only 23% of users are likely to go to other beach or marine areas on other parts of Oahu Island or go to other nearby or adjacent beach or marine areas instead, suggesting that most users are unlikely to be spatially displaced because of conditions they experienced. Most respondents are also unlikely to experience a product shift by changing the way that they think about the area and deciding that it offers a different type of experience than they first believed (28%).

Evaluations and Tradeoffs of Potential Management Strategies

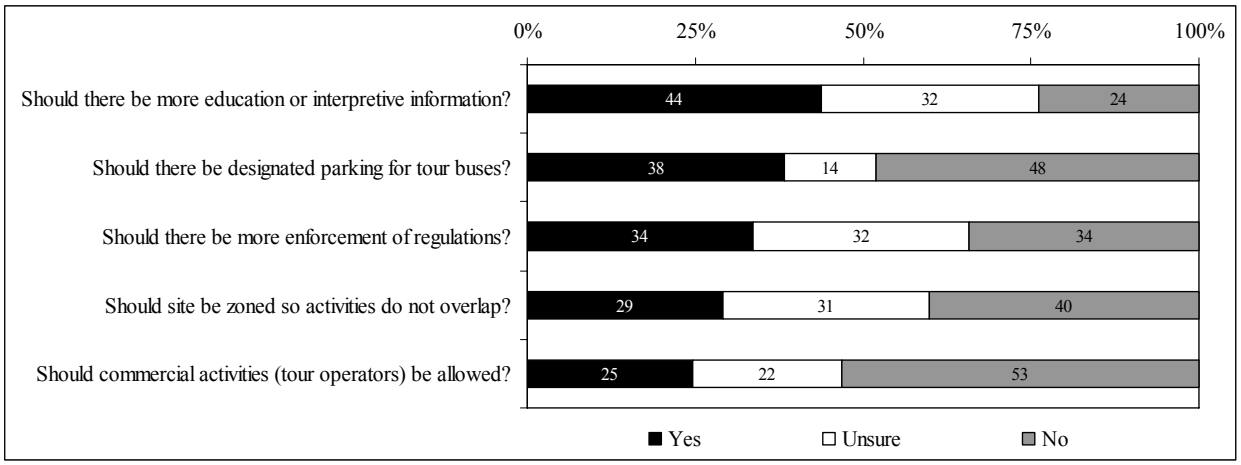
Support and Opposition of Potential Management Strategies. Recent studies have highlighted the importance and need for understanding user support and opposition toward management strategies designed to mitigate negative effects of coastal recreation in Hawaii (e.g., Cesar & van Beukering, 2004; Cesar et al., 2004; Friedlander et al., 2005). There are two general categories of approaches for managing recreation use. First, *direct* management strategies act directly on user behavior leaving little or no freedom of choice (Manning, 1999). Second, *indirect* management strategies attempt to influence the decision factors upon which users base their behavior (Manning, 1999). To illustrate, direct management practices aimed at reducing litter in a beach environment could include a regulation prohibiting littering and then enforcing this regulation with fines or other sanctions. An indirect management practice would be an education program designed to inform users of undesirable ecological and aesthetic impacts of litter, and encourage them to avoid littering.

This project asked summer users whether they supported or opposed five different direct and indirect management strategies: (a) "should commercial activities (e.g., recreation tour operators) be allowed at Kailua Beach Park," (b) "should there be designated parking areas for tour buses at Kailua Beach Park," (c) "should there be more enforcement of rules and regulations at Kailua Beach Park," (d) "should Kailua Beach Park be zoned so that different recreation activities do not overlap in the same areas," and (e) "should there be more educational or interpretive information at Kailua Beach Park?" Responses were coded as "no," "yes," or "unsure."

Figure 24 shows that that none of the strategies received support from the majority of users at Kailua Beach Park. The strategy that received support from the most respondents (44%) was to provide more educational and interpretive information. Users were divided on whether there should be more enforcement of rules and regulations at this site. Users were more likely to

oppose designated parking for tour buses (48% oppose, 38% support) and zoning of activities (40% oppose, 29% support). Respondents were most strongly opposed to allowing commercial activities (e.g., recreation tour operators) at Kailua Beach Park (53% oppose, 25% support).

Figure 24. Support for management strategies at Kailua Beach Park



In general, there were minimal differences in support and opposition of most of these management strategies between: (a) residents and nonresidents of Hawaii, and (b) the three value orientation cluster groups. However, residents of Hawaii were significantly more likely than nonresidents to support more enforcement of rules and regulations at Kailua Beach Park and providing more educational and interpretive information at this site, $\chi^2(2, N = 390 \text{ to } 418) \geq 6.20$, $p \leq .045$, $V \geq .12$. In addition, users with a strong protection orientation toward coral reef areas were most likely to support zoning of activities at Kailua Beach Park, and oppose designated parking for buses at this site, $\chi^2(4, N = 396 \text{ to } 404) \geq 10.66$, $p \leq .031$, $V \geq .12$.

Tradeoffs in Acceptance of Potential Management Strategies. There is a need in recreation planning and management to understand the range of contextual factors and conditions influencing management, and how the public responds to these factors. Traditional approaches for evaluating recreationists' attitudes toward conditions and management strategies have typically involved asking users the extent to which they believed that conditions are important or if they supported or opposed individual management alternatives (Manning, 1999). These approaches were used in this study and results are discussed earlier in this section (e.g., should there be more enforcement of rules and regulations, should there be more educational or interpretive information). These approaches, however, rarely reflect the complexity of recreation and tourism management, as they do not address contextual factors that may influence decisions to support or oppose particular management actions. It may be more useful, therefore, to examine users' tradeoffs in their support of management strategies and regimes depending on a range of situational factors such as different levels of social, resource, and facility impacts. For example, if a coastal recreation site has adequate facilities, little crowding, and minimal coral reef impacts (i.e., situational factors), modifying any current management regimes may not be supported by users. Conversely, if the reef is damaged and the site is overcrowded, actions such as zoning or limiting use levels may be supported by users. Understanding these types of

situational influences on public acceptance of coastal recreation management may increase manager confidence when choosing among various potential actions.

Recent research has used multivariate statistical techniques such as stated choice modeling and conjoint analysis to quantitatively measure the relative importance that respondents place on selected factors of recreation settings and the extent to which individuals make tradeoffs in their support of alternative management practices (e.g., Kneeshaw et al., 2004; Lawson et al., 2006). Instead of asking respondents to rate their support for a single factor or attribute at one time, they evaluate scenarios describing alternative configurations of a set of factors. When evaluating each scenario, respondents weigh tradeoffs among factors when considering their acceptance of management strategies. This approach provides managers with an understanding of how recreationists would likely respond to implementation of management actions given combinations of current or future social, resource, and facility conditions (Lawson et al., 2006).

Conjoint analysis models how people make complex decisions based on multiple factors (e.g., Dennis, 1998; Luce & Tukey, 1964). The technique can be used to assess how situational factors such as use level, coral reef damage, and facility conditions influence recreationists' acceptance of coastal recreation management strategies (e.g., limit use, provide education). By presenting individuals with descriptions of different scenarios, respondents can make implicit tradeoffs in their decisions about acceptable management strategies. For the conjoint analysis in this project, scenarios were used to represent combinations of four situational factors and factor levels related to impacts associated with coastal recreation. Two factor levels were used for each factor:

- Number of people (i.e., use level)
  (low vs. high).
- Recreation damage to coral reef areas
  (minimal [less than 25% broken, trampled] vs. substantial [over 75% broken, trampled]).
- Amount of litter
  (none vs. some).
- Condition of facilities (e.g., bathrooms, showers, trash cans, signs)
  (good vs. poor).

A full factorial design involving all of these factors and factor levels would produce 2^4 or 16 possible combinations or scenarios. To reduce respondent burden, a smaller subset of scenarios was created using an orthogonal fractional factorial design in SPSS software (conjoint module). This reduced the number of scenarios asked in the surveys to eight (Table 16).

For each scenario, respondents were asked to imagine that all four conditions were common at the site and then rate their acceptance of four different management strategies: (a) improve education / awareness 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. Respondents rated 32 separate management actions (four for each of the eight scenarios) on 5-point scales from 1 “very unacceptable” to 5 “very acceptable.” For analysis purposes, scales were recoded to -2 “very unacceptable” to +2 “very acceptable.” Information about main effects of all other possible combinations (scenarios) can be determined

additively from the constants and utility scores generated by conjoint analysis, and can be used to predict acceptance of management strategies for scenarios that were not evaluated.

Table 16. Orthogonal fractional factorial design for scenarios with varying combinations of factors and levels [1]

Scenario	Use level	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

[1] Each factor has two dichotomous levels. Following each scenario, respondents rated four management actions (improve education / awareness 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 scales recoded as -2 "very unacceptable" to +2 "very acceptable."

Before presenting results of the conjoint analysis, it is important to examine the descriptive (i.e., univariate) findings of responses to management strategies for the scenarios. When analyzing and presenting descriptive responses to management strategies, it is important to assess not only the extent to which respondents would support or oppose particular strategies, but also the level of consensus or agreement among respondents. If a management action is supported, but there is little consensus among respondents, implementation of the strategy could be highly controversial and cause user disapproval and discontent, and possible backlash toward managers.

To understand the extent of support or opposition and degree of consensus among respondents, it is necessary to examine several basic summary statistics that describe responses to management variables in terms of central tendency (e.g., mean), dispersion (e.g., standard deviation), and form (e.g., skewness; Loether & McTavish, 1976). A goal of human dimensions research is to provide information that will improve management decision making. When communicating results to managers, therefore, it is imperative that researchers provide clear statistical information and convey the practical implications of findings. Although these various basic descriptive summary statistics can efficiently convey meaning, an accurate understanding of a variable's distribution requires consideration of all measures simultaneously, which can be challenging to communicate and understand. The ***Potential for Conflict Index (PCI)***, therefore, was developed to facilitate understanding and interpretation of statistical data (e.g., Manfredo, Vaske, & Teel, 2003; Vaske, Needham, Newman, Manfredo, & Petchenik, 2006). The PCI was used in this project to understand the: (a) extent of support and opposition toward the four potential management strategies for each of the scenarios, and (b) degree of consensus among users regarding these strategies.

The management variables in this project used response scales with an equal number of response options surrounding a neutral center point. Numerical ratings were assigned in continuous fashion and recoded with a neutral point of 0 (e.g., -2, -1, 0, 1, 2, where -2 = very unacceptable, 0

= neither, and 2 = very acceptable). The PCI describes the ratio of responses on either side of a rating scale's center point. The greatest potential for conflict (PCI = 1.0) occurs when there is a bimodal distribution between two extreme values of the response scale (e.g., 50% very unacceptable, 50% very acceptable, 0% neither). A PCI value of 1.0 suggests total disagreement among respondents and no consensus. A distribution with 100% at any one point on the scale yields a PCI value of 0, which suggests total agreement, complete consensus, and no potential for conflict. The PCI is computed with a frequency distribution and follows the formula:

$$PCI = \left[1 - \left| \frac{\sum_{i=1}^{n_a} |X_a|}{Xt} - \frac{\sum_{i=1}^{n_u} |X_u|}{Xt} \right| \right] * \frac{Xt}{Z}$$

where:

X_a = an individual's "support" (or "likely" or "acceptable") score

n_a = all individuals with "support" scores

X_u = an individual's "oppose" (or "unlikely" or "unacceptable") score

n_u = all individuals with "oppose" scores

$$Xt = \sum_{i=1}^{n_a} |X_a| + \sum_{i=1}^{n_u} |X_u|$$

Z = the maximum possible sum of all scores = *n*extreme score on scale* (e.g., $Z = 2n$ for scale with 5 response options); n = total number of subjects

Following computation of the PCI, results are displayed as "bubble" graphs to visually and simultaneously describe a variable's form, dispersion, and central tendency. The size of the bubble depicts the PCI and indicates degree of dispersion (e.g., extent of potential conflict regarding acceptability of a management strategy). A small bubble suggests high consensus and little potential for conflict; a large bubble suggests less consensus and more potential for conflict.

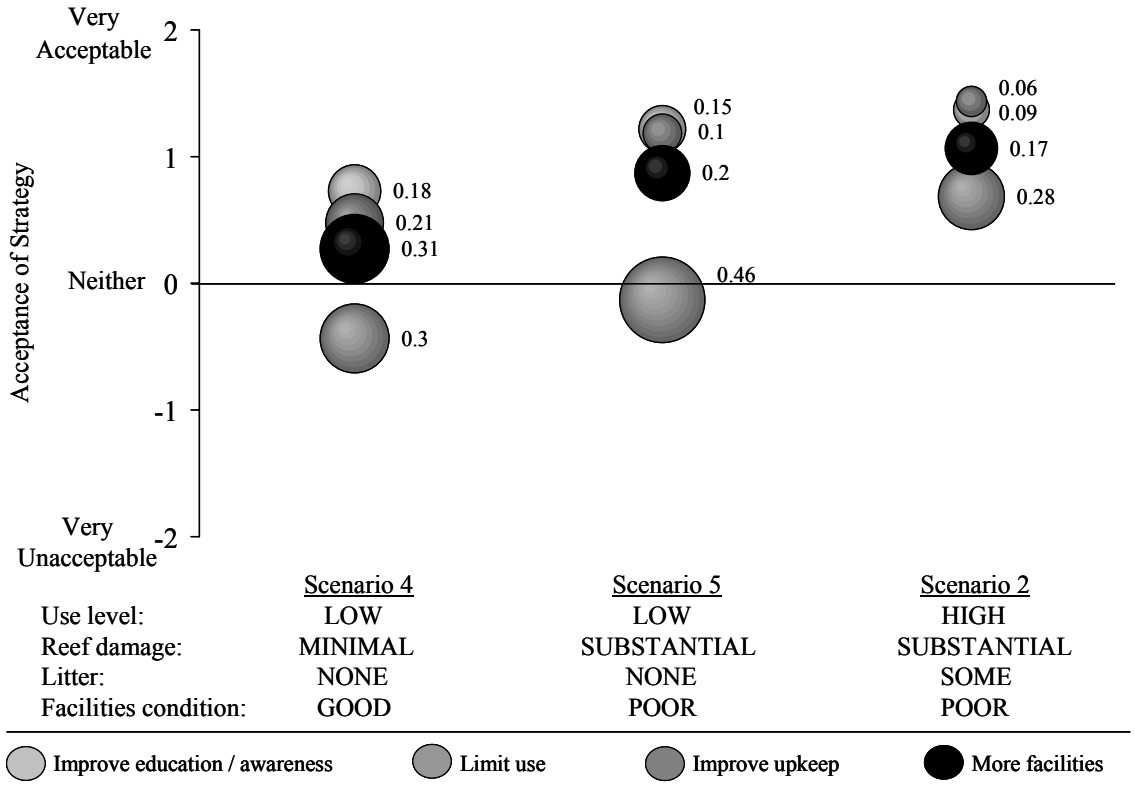
Unlike a standard deviation, which is centered on the mean, the PCI is centered on the neutral point. Although both statistics can communicate agreement, the PCI is based on absolute values and: (a) does not necessitate the relatively normal distribution required by a standard deviation, (b) accounts for all (100%) of respondents instead of just the 68% that are included in one standard deviation, (c) is communicated in standardized units (i.e., 0 to 1) rather than the original scale, which facilitates easier comparisons across items measured on different scales, and (d) has more intuitive and visual appeal for managers (Manfredo et al., 2003; Vaske et al., 2006).

The center of the bubble is plotted on the *y*-axis (e.g., extent of acceptance) and indicates the average (i.e., mean) response to the variable (i.e., central tendency). With the neutral point of the response scale on the *y*-axis, it is apparent that respondents' average evaluations are situated above or below the neutral point (i.e., the action is acceptable or unacceptable). Information about a distribution's skewness is reflected by the position of the bubble relative to the neutral point (i.e., bubbles at the top or bottom of the graph suggest high degrees of skewness).

Figure 25 displays the PCI values and mean acceptance for each of the four management strategies for three of the eight scenarios. To ease interpretation, only three scenarios (instead of

all eight) are displayed in Figure 25: (a) scenario 4 (low number of people, minimal recreation damage to coral reef, no litter, good condition of facilities), (b) scenario 5 (low number of people, substantial recreation damage to coral reef, no litter, poor condition of facilities), and (c) scenario 2 (high number of people, substantial recreation damage to coral reef, some litter, poor condition of facilities). These three scenarios are displayed because each factor level in scenario 4 represents the lowest amount of negative impact for each factor (e.g., few people, minimal reef damage). Conversely, each factor level in scenario 2 represents the greatest amount of negative impact for each factor (e.g., many people, substantial reef damage). Impacts to each factor level in scenario 5 (and all other scenarios not displayed) were in between those in scenarios 2 and 4.

Figure 25. PCI and mean acceptance of each management strategy across scenarios at Kailua Beach Park [1]



[1] Numbers next to each bubble are the potential for conflict index (PCI), which ranges from 0 (no conflict, complete consensus) to 1 (maximum conflict, no consensus). The center of each bubble is the average (i.e., mean) acceptance of the management strategy.

On average, improving education and awareness of people in the area was the most strongly supported management action for most scenarios at Kailua Beach Park (Figure 25). Even for scenario 4, which represents the lowest amount of negative impact for each factor, improving education and awareness was acceptable (M = 0.73 where -2 = very unacceptable, +2 = very acceptable). This suggests that respondents believe that education and awareness of users at Kailua Beach Park currently needs to be improved. In addition, if conditions deteriorate (e.g., more damage to reefs, more litter), this management action would be even more acceptable (e.g., M = 1.37 for scenario 2).

Improving maintenance or upkeep of the area was the second most strongly supported management action for each scenario. Like improving education and awareness, improving maintenance or upkeep was acceptable even for scenario 4 (lowest amount of negative impact for each factor; $M = 0.48$). This suggests that respondents believe that maintenance and upkeep of Kailua Beach Park currently needs to be improved. In addition, if conditions worsen (e.g., more damage to reefs, more litter), this management action would be even more acceptable (e.g., $M = 1.43$ for scenario 2).

The third most strongly supported management strategy for each scenario was providing more facilities and services in the area. More facilities and services was, on average, acceptable even for scenario 4 (lowest amount of negative impact for each factor; $M = 0.27$), suggesting that many current users would support more facilities and services at Kailua Beach Park. If conditions deteriorate (e.g., more damage to reefs, more litter), providing more facilities and services would be even more acceptable (e.g., $M = 1.06$ for scenario 2).

On average, respondents were opposed to restricting the number of people allowed in the area if conditions in scenario 4 were common (i.e., lowest amount of negative impact for each factor; $M = -0.43$). This suggests that if use levels are low, there is minimal litter and recreation damage to reefs, and facilities are in good condition, management strategies aimed at restricting the number of people allowed would be opposed by the majority of users. If site conditions worsen, however, restricting use would become more acceptable (e.g., $M = 0.68$ for scenario 2). In other words, if use levels are high, there is a substantial amount of litter and damage to coral reefs from recreation, and facilities are in disrepair, users would be, on average, supportive of strategies designed to restrict the number of people allowed in the area.

The PCI values showed that the most strongly supported strategy of improving education and awareness of people also generated substantial consensus among respondents, suggesting that this would be one of the least controversial actions (PCI = 0.09 to 0.18; Figure 25). There was also substantial consensus across scenarios for improving maintenance and upkeep of the area (PCI = 0.06 to 0.21). Conversely, there was a relatively large amount of disagreement (i.e., lack of consensus) regarding acceptability of providing more facilities and services if conditions in scenario 4 were common (i.e., lowest amount of negative impact for each factor; PCI = 0.31), but consensus increased as conditions worsened (e.g., PCI = 0.17 for scenario 2). The least acceptable strategy was restricting the number of people allowed in the area, but this was also the most controversial (PCI = 0.28 to 0.46). Given the size of the PCI values for this strategy, it is likely that restricting the number of people allowed in the area would generate controversy among users unless conditions deteriorated to a point where use levels were extremely high, there was substantial damage to reefs, litter was abundant, and facilities were in disrepair. There was more agreement among respondents regarding acceptability of all four management strategies as conditions deteriorated, as shown by the PCI values that became smaller as negative impacts to each factor in the scenarios increased (e.g., from scenario 4 to scenario 2). Effect sizes showed that there were weak or minimal differences between residents of Hawaii and nonresidents regarding acceptance of these management actions at Kailua Beach Park ($r_{pb} \leq .17$).

The next step in assessing the influence of situational factors on acceptance of management strategies is through conjoint analysis. In conjoint analysis, the factors (i.e.., number of people, damage to coral reef, litter, condition of facilities) are considered the independent variables and

acceptance ratings for each of the four management actions (i.e., improve education / awareness, restrict use, improve maintenance / upkeep, provide more facilities) are the dependent variables. The output displays utility scores or part-worth estimates identifying preferences for factor levels, percentages of averaged importance attributed to each factor, and correlations between predicted and observed acceptability ratings (i.e., Pearson R goodness of model fit statistics). Conjoint analysis decomposes each respondent's ratings of a management action into utility scores for each factor. Utility scores represent the influence of each factor level on acceptance ratings of management actions for a particular scenario. Utility scores can be added together with the constant to predict acceptance of each management strategy for of all possible scenarios, including those not asked in the survey. Unlike ordinary least squares (OLS) regression, conjoint analysis eliminates cases with missing values and cases with equal ratings (i.e., ties) across all scenarios. If a respondent rated "restricting the number of people" for scenario 1 as ''very acceptable," for example, and then repeated this same answer for all eight scenarios, he or she would be eliminated from the analysis for this management strategy because this individual would not have a preference for the different factors and their associated levels. Averaged importance scores are standardized percentages computed by taking the range of utility scores for each factor and dividing them by the total range in utility values across all factors.

Conjoint analysis was conducted separately for responses to each of the four management actions at Kailua Beach Park (i.e., improve education / awareness, restrict use, improve maintenance / upkeep, provide more facilities). Utility scores were used to assess how factor levels influence mean acceptance ratings for each of the coastal recreation management actions. Table 17 displays the utility scores for each of the factor levels for each management strategy derived from the conjoint analyses. Utility scores represent averages across respondents and assess how factor levels affect mean acceptance. The magnitude and sign of the utility score (positive or negative) indicate the relative influence of each factor level on mean acceptance. A positive utility score indicates that the factor level increased acceptance of the management strategy (constant + factor level utility); a negative utility score suggests that the factor level decreased mean acceptability (constant – factor level utility).

Mean acceptance of each of the four management strategies as influenced by each of the eight situational factor levels are displayed in Table 17. The management strategy "improve education and awareness of users" was rated as acceptable across all factor levels, but was most acceptable if the amount of damage to coral reefs was substantial (M = 1.24). This strategy was also more acceptable if use levels were high (M = 1.10) and was slightly more acceptable if there was some litter present (M = 1.03) and facilities were in poor condition (M = 1.02).

"Restricting the number of people allowed in the area" (i.e., limit use) was rated, on average, as acceptable for two factor levels, but was unacceptable if use levels were low (M = -0.22) and reef damage was minimal (M = -0.13); if use levels were low and reef damage was minimal, this would not be a supported strategy. This management strategy was most acceptable if use levels were high (M = 0.49) and the amount of damage to coral reefs was substantial (M = 0.40). The strategy was also more acceptable if there was some litter present (M = 0.21) and facilities were in poor condition (M = 0.16). This direct management strategy, however, was less acceptable than the other three strategies (i.e., improve education, more facilities, improve upkeep) across all factors levels, suggesting that this should be a strategy of last resort.

The management strategy "improve maintenance and upkeep" was rated as acceptable across all factor levels, but was most acceptable if facilities were in poor condition ($M = 1.32$). This strategy was also more acceptable if there was some litter present ($M = 1.04$) and use levels were high ($M = 1.03$). Similarly, "providing more facilities or services" was rated, on average, as acceptable across all factor levels, especially if facilities were in poor condition ($M = 1.00$). This strategy was also more acceptable if use levels were high ($M = 0.73$) and there was some litter present ($M = 0.71$). Pearson R goodness of fit statistics ranged from 0.977 to 0.994, indicating strong fit for the conjoint models. Taken together, these results show that situational factor levels differentially influenced acceptance of coastal recreation management strategies.

Table 17. Mean acceptance ratings and utility scores of management actions by situational factor levels at Kailua Beach Park

	Improve education / awareness		Limit use / restrict people		Improve upkeep		More facilities	
Factor	Averaged utility	Mean rating [1]	Averaged utility	Mean rating [1]	Averaged utility	Mean rating [1]	Averaged utility	Mean rating [1]
Use level								
Low	-0.125	0.850	-0.353	-0.216	-0.113	0.806	-0.095	0.538
High	0.125	1.099	0.353	0.490	0.113	1.031	0.095	0.729
Reef damage								
Minimal	-0.263	0.711	-0.262	-0.125	0.021	0.940	0.041	0.674
Substantial	0.263	1.237	0.262	0.399	-0.021	0.897	-0.041	0.593
Litter								
None	-0.060	0.915	-0.069	0.068	-0.124	0.794	-0.076	0.558
Some	0.060	1.034	0.069	0.206	0.124	1.042	0.076	0.710
Facilities condition								
Good	-0.047	0.927	-0.022	0.115	-0.400	0.519	-0.371	0.263
Poor	0.047	1.021	0.022	0.159	0.400	1.318	0.371	1.004
Constant	0.974		0.137		0.918		0.634	
Model fit [2]	0.986		0.993		0.977		0.994	

[1] Scale for acceptance of management strategies was recoded as -2 "very unacceptable" to 0 "neither" to +2 "very acceptable"

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

The relative importance of each factor for each of the four management strategies is displayed in Table 18. The numbers are averaged importance ratings across all respondents and sum to 100% for each management action. When rating acceptance of "improving education and awareness of users," the most important factor was recreation damage to reefs (41%). This suggests that if reefs are damaged from recreation use, the most acceptable strategy would be to improve user information and education. Use level accounted for 23% of importance. Litter and condition of facilities were least important factors influencing acceptance of this management action (18%). In rating acceptance of "restricting the number of people allowed" (i.e., limit use), the most important factors were use level (37%) and damage to coral reefs (30%). Again, litter (16%) and

condition of facilities (17%) were least important factors influencing acceptance of this management action. When rating acceptance of "improving maintenance and upkeep" and "providing more facilities," the most important factor was condition of facilities (41% and 40%, respectively). This suggests that if facilities are in poor condition, the most acceptable strategies would be to improve maintenance and upkeep, and provide more facilities. Use level, reef damage, and litter were substantially less important in affecting acceptance of these two management actions (17% to 23%). Taken together, these results indicate that the relative importance of the four factors to mean acceptance ratings substantively differed according to the management actions evaluated.

Table 18. Relative importance of each factor for each management action at Kailua Beach Park [1]

Factor	Improve education / awareness	Limit use / restrict people	Improve upkeep	More facilities
Use level	23	37	19	23
Reef damage	41	30	20	19
Litter	18	16	20	17
Facilities condition	18	17	41	40

[1] Cell entries are percentage averaged importance (%).

Section Summary. Taken together, results showed that:

- The management strategy that received support from the most respondents (44%) was providing more educational and interpretive information. Users were divided on whether there should be more enforcement of rules and regulations at Kailua Beach Park. Users were more likely to oppose designated parking for tour buses (48% oppose, 38% support) and zoning of activities (40% oppose, 29% support). Respondents were most strongly opposed to allowing commercial activities (e.g., tour operators) at Kailua Beach Park (53% oppose, 25% support).
- Respondents were presented with eight scenarios of varying use levels, impacts to coral reefs, amounts of litter, and conditions of facilities (i.e., factors), and then evaluated the acceptability of four management strategies for each scenario (improve education and awareness of users, restrict number of people [i.e., limit use], improve maintenance and upkeep, provide more facilities). Improving education and awareness was the most strongly supported management action for each scenario. Even for the scenario describing the lowest amount of negative impact for each factor, improving education and awareness was acceptable, suggesting that respondents believed that education and awareness of users at Kailua Beach Park currently needs to be improved. If conditions deteriorate (e.g., more damage to reefs, litter), this action would be even more acceptable.
- Improving maintenance or upkeep was the second most strongly supported management action for each scenario. This strategy was acceptable even for the scenario describing the lowest amount of negative impact for each factor, suggesting that users believed that maintenance and upkeep at Kailua Beach Park needs to be improved. If conditions worsen (e.g., more reef damage, litter), this strategy would be even more acceptable.

- The third most strongly supported management strategy for each scenario was providing more facilities and services. More facilities and services was acceptable even for the scenario describing the lowest amount of negative impact for each factor, suggesting that many current users would support more facilities and services at Kailua Beach Park. If conditions deteriorate (e.g., more damage to reefs, litter), providing more facilities and services would be even more acceptable.
- Respondents were most strongly opposed to restricting the number of people allowed in the area. If site conditions worsen, however, restricting use would become more acceptable. If use levels are high, there is a substantial amount of litter and damage to coral reefs from recreation, and facilities are in disrepair, users would be more supportive of strategies designed to restrict the number of people allowed in the area.
- The most strongly supported strategy of improving education and awareness of people also generated the most consensus among respondents, suggesting that this would be the least controversial action. There was also strong consensus for improving maintenance and upkeep. The least acceptable strategy was restricting the number of people allowed in the area, but this was also the most controversial; it is likely that restricting the number of people allowed would generate controversy among users unless conditions deteriorated to a point where use levels were extremely high, there was substantial damage to reefs, litter was abundant, and facilities were in disrepair.
- Conjoint analyses showed that situational factor levels differentially affected acceptance of management strategies. The strategy "improve education and awareness of users" was rated as acceptable across all factor levels, but was most acceptable if the amount of damage to reefs was substantial. "Restricting the number of people allowed in the area" was acceptable for two factor levels, but was unacceptable if use levels were low and reef damage was minimal; if use levels were low and reef damage was minimal, this would not be a supported strategy. This strategy was most acceptable if use levels were high and the amount of damage to reefs was substantial. "Improve maintenance and upkeep" and "provide more facilities or services" were acceptable across all factor levels, but were most acceptable if facilities were in poor condition.
- When rating acceptance of "improving education and awareness of users," the most important factor was recreation damage to reefs. In rating acceptance of "restricting the number of people allowed" (i.e., limit use), the most important factors were use level and damage to coral reefs. When rating acceptance of "improving maintenance and upkeep" and "providing more facilities," the most important factor was condition of facilities.

RECOMMENDATIONS

Based on these results from surveys of users at Kailua Beach Park, the following management recommendations are proposed:

- At Kailua Beach Park, users were heterogeneous, exhibiting a range of demographic characteristics and preferences. This suggests that not all users will respond in the same manner to changes in conditions and management. Despite this diversity of users, the

largest proportion of respondents had previously visited the site before and were residents of Hawaii, suggesting that managers should take opinions of repeat visitors and local residents into consideration when making decisions affecting Kailua Beach Park.

- The largest proportion of respondents had strong protectionist value orientations toward coral reef areas (i.e., biocentric, nature-centered), suggesting that recreation or other uses that have deleterious effects on coral reef ecosystems are not likely to be supported at Kailua Beach Park. Research has shown that individuals' value orientations influence their attitudes, intentions, and behaviors, so knowing users' value orientations can be useful for estimating possible reactions to potentially controversial management actions. In addition, value orientations are stable and resistant to change, so attempts to inform and educate individuals with protectionist value orientations toward reef areas to consider adopting a favorable attitude and vote in support of actions that may be harmful to reef areas are unlikely to be successful.

- Although overall satisfaction of summer users at Kailua Beach Park was extremely high, users were not satisfied with every aspect of the setting or their experience. Users were most dissatisfied with the availability and conditions of park benches and bathrooms. These issues deserve management attention.

- Respondents were most satisfied with the clean ocean water, absence of litter, and that they were not required to pay a fee to visit the area. These and other conditions should be maintained and monitored to ensure that user satisfaction does not decline.

- Users rated all aspects of their experience and the conditions at Kailua Beach Park as important and were satisfied with these aspects, suggesting that managers should "keep up the good work" in their current management of the area. However, conditions such as picnic tables, park benches, informational signage, and opportunities to see small and large marine life should be monitored to ensure that satisfaction does not decline.

- Kailua Beach Park had "low normal" crowding (38% of users felt crowded), suggesting that a major problem situation with summer use crowding does not exist at this time. Use levels and users' perceptions of crowding should be monitored to ensure that crowding does not increase.

- The majority of users reported encountering fewer people than the maximum number that they would accept encountering, suggesting that summer use levels are not a major problem at Kailua Beach Park. Use levels, however, should be monitored to ensure that they do not frequently exceed approximately 758 people at one time at Kailua Beach.

- The majority of users reported encountering fewer bathrooms, showers, trash cans, picnic tables, park benches, and information signs than they feel should be at Kailua Beach Park. In other words, users want more of each facility and this would increase their satisfaction. From a management perspective, however, this may not be financially or logistically feasible. When the number of each facility that users' felt should be at Kailua Beach Park was compared to what was actually at this site, there were enough of most facilities, but managers should consider installing more park benches at this site.

- There was not a substantial amount of conflict among activity groups at Kailua Beach Park. The most prevalent conflicts were with windsurfers and kitesurfers (35%), boaters (e.g., kayak, motorboat; 29%), and sunbathers and swimmers (27%). Some zoning of these activity groups to keep them apart is already being used to mitigate conflict at Kailua Beach Park, but these levels of conflict are relatively minor so may not deserve much additional direct management attention. Additional zoning may also be logistically impossible and enforcement would be expensive and time consuming. It may be more appropriate to do more to inform users of appropriate behaviors by improving user education and awareness (e.g., signs, brochures, orientation sessions, contact with staff).

- A relatively small percentage of users actually observed people handling or standing on coral at Kailua Beach Park (28%), but 62% of users believed that this depreciative behavior was still a problem at Kailua Beach Park. Research has shown that touching or standing on coral reefs can cause harmful effects such as coral breakage and mortality. In addition, this behavior could pose safety risks to humans (e.g., cuts, scrapes, infections). As a result, management attention may be needed to reduce the amount of handling and standing on coral at Kailua Beach Park. A first step would be to conduct additional research to determine the extent to which people are actually standing on or handling any coral at Kailua Beach Park. If this was indeed happening to a large extent, then the next step would be to provide interpretive and educational material (e.g., signs, brochures, orientation sessions) informing users of the various problems associated with these behaviors. Following implementation of these indirect management actions, monitoring and additional follow-up research should be conducted to examine the extent to which participation in these behaviors has been reduced. If these approaches are unsuccessful, more direct management tactics such as regulations and enforcement may be necessary.

- The management strategy that would be supported by the most users at Kailua Beach Park would be providing more interpretive and educational information (e.g., signs, brochures, orientation sessions, contact with personnel / lifeguards). Zoning of activities, parking for tour buses, and commercial activities (e.g., recreation tour operators) would be opposed by users. If managers decide that bus parking, additional zoning, and / or commercial activities are necessary in the future, users and local residents should be involved in informing the decision making process and a highly visible educational campaign should be implemented educating users and the community about the rationale for any decisions.

- Respondents believed that improved interpretive and educational information, more upkeep and maintenance of facilities, and more facilities would currently be acceptable at Kailua Beach Park. Restricting the number of users allowed at this site (i.e., limiting use) would currently be unacceptable. If there is ever evidence of substantial coral reef damage from recreation, the most supported management strategy would be to provide more interpretive and educational information to users. If there is evidence that facilities (e.g., bathrooms, showers, trash cans) are in disrepair, the most supported management strategies would be to improve upkeep and maintenance followed by providing more facilities. Restricting the number of people allowed at Kailua Beach Park would only be supported if there was evidence that use levels were extremely high, coral reefs were damaged substantially, litter was prevalent, and facilities were in disrepair.

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APPENDIX A: SURVEY INSTRUMENTS

V1. ID: _____

Recreationists' Experiences and Preferences at Kailua Beach Park

The Hawaii Division of Aquatic Resources and Hawaii Coral Reef Initiative are conducting this survey to understand your experiences at Kailua Beach Park and opinions about how this area should be managed. Your input is important and will help managers. Participation is voluntary and answers are anonymous. ***Please answer all questions and return to the field researcher***.

1. You are at Kailua Beach Park right now. ***Prior to today***, had you ever been to Kailua Beach Park before? **(check ONE)**
   - ☐ No
   - ☐ Yes → if yes, how many previous times have you been to Kailua Beach Park? **(write response)** _____ time(s)

2. Please check ***all*** of the activities in which you are participating ***at Kailua Beach Park today***. **(check ALL THAT APPLY)**
   - ☐ ***A.*** Sunbathing
   - ☐ ***B.*** Swimming or Wading
   - ☐ ***C.*** Fishing
   - ☐ ***D.*** Snorkeling
   - ☐ ***E.*** SCUBA Diving
   - ☐ ***F.*** Beach Walking or Hiking
   - ☐ ***G.*** Boating (e.g., Kayak, Canoe, Motorboat)
   - ☐ ***H.*** Surfing
   - ☐ ***I.*** Windsurfing or Kitesurfing

3. From the activities in Question 2 above, what is the ***ONE main activity*** in which you are participating ***at Kailua Beach Park today***? **(write ONE letter that matches your response)**
   Letter for main activity _____

4. How would you describe your skill level in this main activity? **(check ONE)**
   ☐ Beginner ☐ Novice ☐ Intermediate ☐ Advanced ☐ Expert

5. Are you participating in this main activity today as part of an organized or guided tour? **(check ONE)** ☐ No ☐ Yes

6. Overall, how satisfied are you with your visit to Kailua Beach Park today? **(check ONE)**
   ☐ Very Dissatisfied ☐ Dissatisfied ☐ Neither ☐ Satisfied ☐ Very Satisfied

7. Approximately how many other people did you see in total at Kailua Beach Park today? **(circle ONE number)**
   0 5 10 20 35 50 75 100 200 350 500 750 1000 1500 2000 + *people*

8. How did the number of other people you saw at Kailua Beach Park today affect your enjoyment? **(check ONE)**
   ☐ Reduced My Enjoyment ☐ Had No Effect on My Enjoyment ☐ Increased My Enjoyment

9. What is the ***maximum*** number of other people you would accept seeing at any one time at Kailua Beach Park?
   It is OK to see as many as: **(circle ONE number OR check one of the other two options)**
   0 5 10 20 35 50 75 100 200 350 500 750 1000 1500 2000 + *people*
   OR ☐ The number of people doesn't matter to me ☐ It matters to me, but I can't specify a number

10. How important is it that you have the opportunity to escape crowds of people at Kailua Beach Park? **(check ONE)**
    ☐ Not at all Important ☐ Slightly Important ☐ Moderately Important ☐ Extremely Important

11. To what extent did you feel crowded by each of the following at Kailua Beach Park today? **(circle one number for *EACH* item**

	Not at all Crowded		Slightly Crowded		Moderately Crowded			Extremely Crowded	
Number of sunbathers or swimmers	1	2	3	4	5	6	7	8	9
Number of snorkelers or SCUBA divers	1	2	3	4	5	6	7	8	9
Number of surfers	1	2	3	4	5	6	7	8	9
Number of windsurfers or kitesurfers	1	2	3	4	5	6	7	8	9
Number of boaters (e.g., kayak, motor)	1	2	3	4	5	6	7	8	9
Number of anglers (people fishing)	1	2	3	4	5	6	7	8	9
Total number of people at Kailua Beach	1	2	3	4	5	6	7	8	9

12. We are interested in how many people you are willing to see at Kailua Beach Park. Please rate how ***ACCEPTABLE*** the density of people is in ***EACH*** photograph below ***IF IT WAS TO OCCUR AT KAILUA BEACH*** **(circle one number for *each* photo)**

	Very Unacceptable		Unacceptable		Neither			Acceptable	Very Acceptable
Photograph A	1	2	3	4	5	6	7	8	9
Photograph B	1	2	3	4	5	6	7	8	9
Photograph C	1	2	3	4	5	6	7	8	9
Photograph D	1	2	3	4	5	6	7	8	9
Photograph E	1	2	3	4	5	6	7	8	9
Photograph F	1	2	3	4	5	6	7	8	9

A.

B.

C.

D.

E.

F.

13. Now, please rate the extent to which you feel that the density of people in ***EACH*** photograph above ***SHOULD OR SHOULD NOT BE ALLOWED TO OCCUR AT KAILUA BEACH PARK***. **(circle one number for *each* photo)**

	Should Definitely Not Allow		Should Maybe Not Allow		Neither			Should Maybe Allow	Should Definitely Allow
Photograph A	1	2	3	4	5	6	7	8	9
Photograph B	1	2	3	4	5	6	7	8	9
Photograph C	1	2	3	4	5	6	7	8	9
Photograph D	1	2	3	4	5	6	7	8	9
Photograph E	1	2	3	4	5	6	7	8	9
Photograph F	1	2	3	4	5	6	7	8	9

14. Which ***ONE*** photograph above is like what you saw ***most often*** at Kailua Beach Park today? **(check ONE)**
    ☐ Photo A ☐ Photo B ☐ Photo C ☐ Photo D ☐ Photo E ☐ Photo F

15. To what extent do you disagree or agree with each of the following statements? **(circle one number for *each* statement)**

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
Humans should manage coral reef areas so that humans benefit.	1	2	3	4	5
The needs of humans are more important than coral reef areas.	1	2	3	4	5
Recreational use of coral reef areas is more important than protecting the species that live there.	1	2	3	4	5
The primary value of coral reef areas is to provide for humans.	1	2	3	4	5
Coral reef areas should be protected for their own sake rather than to simply meet the needs of humans.	1	2	3	4	5
Coral reef areas should have rights similar to the rights of humans.	1	2	3	4	5
Recreational use of coral reef areas should not be allowed if it damages these areas.	1	2	3	4	5
Coral reef areas have value whether humans are present or not.	1	2	3	4	5

16. ***Assuming you could be on Oahu Island again in the future***, how likely would you take the following actions based on the number of people or behavior of other activity groups you have seen at Kailua Beach Park? **(circle one number for *each* action**

	Very Unlikely	Unlikely	Neither	Likely	Very Likely
Come back to Kailua Beach, but avoid peak use times (weekends, holidays).	1	2	3	4	5
Come back to Kailua Beach earlier or later in day when less people are here.	1	2	3	4	5
Come back to Kailua Beach, but change the way I think about this area, deciding that it offers a different type of experience than I first believed.	1	2	3	4	5
Come back to Kailua Beach realizing conditions I saw today are suitable.	1	2	3	4	5
Go to other nearby or adjacent beach / marine areas instead.	1	2	3	4	5
Go to other beach / marine areas on other parts of Oahu Island instead.	1	2	3	4	5

17. To what extent do you feel that you have seen or experienced conflict with each of the following activity groups during any of your visits to Kailua Beach Park? **(circle one number for *each* activity group)**

How much conflict with …	No Conflict		Slight Conflict		Moderate Conflict			Extreme Conflict	
… sunbathers or swimmers	1	2	3	4	5	6	7	8	9
… snorkelers or SCUBA divers	1	2	3	4	5	6	7	8	9
… surfers	1	2	3	4	5	6	7	8	9
… windsurfers or kitesurfers	1	2	3	4	5	6	7	8	9
… boaters (e.g., kayak, motorboat)	1	2	3	4	5	6	7	8	9
… anglers (people fishing)	1	2	3	4	5	6	7	8	9

18. To what extent do you disagree or agree with each of the following statements? **(circle one number for *each* statement)**

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
Just knowing that ***sunbathers or swimmers*** are at Kailua Beach Park bothers me, even if I never see or hear them.	1	2	3	4	5
Just knowing that ***snorkelers or SCUBA divers*** are at Kailua Beach Park bothers me, even if I never see or hear them.	1	2	3	4	5
Just knowing that ***surfers*** are at Kailua Beach Park bothers me, even if I never see or hear them.	1	2	3	4	5
Just knowing that ***windsurfers or kitesurfers*** are at Kailua Beach Park bothers me, even if I never see or hear them.	1	2	3	4	5
Just knowing that ***boaters*** (e.g., kayak, motorboat) are at Kailua Beach Park bothers me, even if I never see or hear them.	1	2	3	4	5
Just knowing that ***anglers (people fishing)*** are at Kailua Beach Park bothers me, even if I never see or hear them.	1	2	3	4	5

19. How often ***have you seen*** each of the following during any of your visits to Kailua Beach? **(circle one number for *each* item)**

	Never	Once or Twice	Sometimes	Many Times
Sunbathers or swimmers being rude or discourteous	0	1	2	3
Sunbathers or swimmers being too close	0	1	2	3
Sunbathers or swimmers not looking where they are going	0	1	2	3
Snorkelers or SCUBA divers being rude or discourteous	0	1	2	3
Snorkelers or SCUBA divers being too close	0	1	2	3
Snorkelers or SCUBA divers not looking where they are going	0	1	2	3
Surfers being rude or discourteous	0	1	2	3
Surfers being too close	0	1	2	3
Surfers not looking where they are going	0	1	2	3
Windsurfers or kitesurfers being rude or discourteous	0	1	2	3
Windsurfers or kitesurfers being too close	0	1	2	3
Windsurfers or kitesurfers not looking where they are going	0	1	2	3
Boaters (e.g., kayak, motorboat) being rude or discourteous	0	1	2	3
Boaters (e.g., kayak, motorboat) being too close	0	1	2	3
Boaters (e.g., kayak, motorboat) not looking where they are going	0	1	2	3
Anglers (people fishing) being rude or discourteous	0	1	2	3
Anglers (people fishing) being too close	0	1	2	3
Anglers (people fishing) not looking where they cast their line / hook	0	1	2	3

20. To what extent do you feel that each of the following is a ***problem*** at Kailua Beach Park? **(circle one number for *each* item)**

	Not at all a Problem	Slight Problem	Moderate Problem	Extreme Problem
Sunbathers or swimmers being rude or discourteous	0	1	2	3
Sunbathers or swimmers being too close	0	1	2	3
Sunbathers or swimmers not looking where they are going	0	1	2	3
Snorkelers or SCUBA divers being rude or discourteous	0	1	2	3
Snorkelers or SCUBA divers being too close	0	1	2	3
Snorkelers or SCUBA divers not looking where they are going	0	1	2	3
Surfers being rude or discourteous	0	1	2	3
Surfers being too close	0	1	2	3
Surfers not looking where they are going	0	1	2	3
Windsurfers or kitesurfers being rude or discourteous	0	1	2	3
Windsurfers or kitesurfers being too close	0	1	2	3
Windsurfers or kitesurfers not looking where they are going	0	1	2	3
Boaters (e.g., kayak, motorboat) being rude or discourteous	0	1	2	3
Boaters (e.g., kayak, motorboat) being too close	0	1	2	3
Boaters (e.g., kayak, motorboat) not looking where they are going	0	1	2	3
Anglers (people fishing) being rude or discourteous	0	1	2	3
Anglers (people fishing) being too close	0	1	2	3
Anglers (people fishing) not looking where they cast their line / hook	0	1	2	3

21. Should there be more educational or interpretive information at Kailua Beach? **(check ONE)** ☐ No ☐ Yes ☐ Unsure

22. Should Kailua Beach be zoned so different recreation activities don't overlap in the same areas? ☐ No ☐ Yes ☐ Unsure

23. Are you: **(check ONE)** ☐ Male ☐ Female

24. What is your age? **(write response)** _____ years old

25. Where do you live? **(write responses)** State / Province _____ Country _____

V2. ID: _____

Recreationists' Experiences and Preferences at Kailua Beach Park

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1. You are at Kailua Beach Park right now. ***Prior to today***, had you ever been to Kailua Beach Park before? **(check ONE)**
   - ☐ No
   - ☐ Yes → if yes, how many previous times have you been to Kailua Beach Park? **(write response)** _____ time(s)

2. Please check ***all*** of the activities in which you are participating ***at Kailua Beach Park today***. **(check ALL THAT APPLY)**

☐ ***A.*** Sunbathing	☐ ***D.*** Snorkeling	☐ ***G.*** Boating (e.g., Kayak, Canoe, Motorboat)
☐ ***B.*** Swimming or Wading	☐ ***E.*** SCUBA Diving	☐ ***H.*** Surfing
☐ ***C.*** Fishing	☐ ***F.*** Beach Walking or Hiking	☐ ***I.*** Windsurfing or Kitesurfing

3. From the activities in Question 2 above, what is the ***ONE main activity*** in which you are participating ***at Kailua Beach Park today***? **(write ONE letter that matches your response)**

   Letter for main activity _____

4. How would you describe your skill level in this main activity? **(check ONE)**

   ☐ Beginner ☐ Novice ☐ Intermediate ☐ Advanced ☐ Expert

5. Are you participating in this main activity today as part of an organized or guided tour? **(check ONE)** ☐ No ☐ Yes

6. Overall, how satisfied are you with your visit to Kailua Beach Park today? **(check ONE)**

   ☐ Very Dissatisfied ☐ Dissatisfied ☐ Neither ☐ Satisfied ☐ Very Satisfied

7. Listed below are several characteristics. On the left, please rate how ***important*** it is to you that each characteristic is provided at Kailua Beach. Then, on the right, rate how ***satisfied*** you are with each characteristic at Kailua Beach. **Please answer *both* the importance (on left) *and* satisfaction (on right) questions for *each* characteristic by circling numbers for *each* item.**

Rate IMPORTANCE						***Rate SATISFACTION***					
Not Important		Neither		Very Important	Characteristics at Kailua Beach Park	Very Dissatisfied		Neither		Very Satisfied	
1	2	3	4	5	Parking availability for vehicles	1	2	3	4	5	
1	2	3	4	5	Bathrooms	1	2	3	4	5	
1	2	3	4	5	Showers / rinse stations	1	2	3	4	5	
1	2	3	4	5	Trash cans	1	2	3	4	5	
1	2	3	4	5	Absence of litter	1	2	3	4	5	
1	2	3	4	5	Picnic tables	1	2	3	4	5	
1	2	3	4	5	Park benches	1	2	3	4	5	
1	2	3	4	5	Information signs about regulations / guidelines	1	2	3	4	5	
1	2	3	4	5	Presence of lifeguards	1	2	3	4	5	
1	2	3	4	5	Not required to pay a fee to visit the area	1	2	3	4	5	
1	2	3	4	5	Opportunity to escape crowds of people	1	2	3	4	5	
1	2	3	4	5	Clean ocean water	1	2	3	4	5	
1	2	3	4	5	Healthy coral reefs	1	2	3	4	5	
1	2	3	4	5	Opportunity to see small marine life (e.g., fish)	1	2	3	4	5	
1	2	3	4	5	Opportunity to see large marine life (turtle,dolphin)	1	2	3	4	5	

8. How many of ***each*** of the following ***HAVE YOU SEEN*** at Kailua Beach Park? **(circle one number for *EACH* item)**

	Number *I HAVE SEEN* at Kailua Beach Park															
Bathrooms	0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20+
Showers / rinse stations	0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20+
Trash cans	0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20+
Picnic tables	0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20+
Park benches	0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20+
Information signs about regulations / guidelines	0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20+

9. How many of ***each*** of the following ***DO YOU FEEL SHOULD BE*** at Kailua Beach Park? **(circle one number for *EACH* item)**

	Number *THAT SHOULD BE* at Kailua Beach Park															
Bathrooms	0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20+
Showers / rinse stations	0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20+
Trash cans	0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20+
Picnic tables	0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20+
Park benches	0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20+
Information signs about regulations / guidelines	0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20+

10. Should commercial activities (e.g., recreation tour operators) be allowed at Kailua Beach? ☐ No ☐ Yes ☐ Unsure

11. Should there be designated parking areas for tour buses at Kailua Beach Park? ☐ No ☐ Yes ☐ Unsure

12. Should there be more enforcement of rules / regulations at Kailua Beach Park? ☐ No ☐ Yes ☐ Unsure

13. How often have you seen people handling or standing on coral during any of your visits to Kailua Beach Park? **(check ONE)**

    ☐ Never ☐ Once or Twice ☐ Sometimes ☐ Many Times

14. To what extent do you feel that people handling or standing on coral is a problem at Kailua Beach Park? **(check ONE)**

    ☐ Not at all a Problem ☐ Slight Problem ☐ Moderate Problem ☐ Extreme Problem

15. To what extent do you disagree or agree with each of the following statements? **(circle one number for *each* statement)**

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
Humans should manage coral reef areas so that humans benefit.	1	2	3	4	5
The needs of humans are more important than coral reef areas.	1	2	3	4	5
Recreational use of coral reef areas is more important than protecting the species that live there.	1	2	3	4	5
The primary value of coral reef areas is to provide for humans.	1	2	3	4	5
Coral reef areas should be protected for their own sake rather than to simply meet the needs of humans.	1	2	3	4	5
Coral reef areas should have rights similar to the rights of humans.	1	2	3	4	5
Recreational use of coral reef areas should not be allowed if it damages these areas.	1	2	3	4	5
Coral reef areas have value whether humans are present or not.	1	2	3	4	5

The following shaded boxes contain 8 scenarios that describe potential conditions at Kailua Beach. ***NO SCENARIOS ARE THE SAME***. ***Carefully read each scenario then answer ALL questions after each scenario*** **by circling one number for *each* action.**

Scenario 1: Imagine ***all four*** of the following conditions were common at Kailua Beach Park:

- **HIGH** number of people (use level)
- **NO** litter
- **MINIMAL** recreation damage to coral reef (less than 25% broken, trampled)
- **POOR** condition of facilities (e.g., bathrooms, showers, trash cans, signs)

16. ***If all conditions in Scenario 1 were common*** how acceptable would it be for managers to take ***EACH*** of the following actions?

	Very Unacceptable	Unacceptable	Neither	Acceptable	Very Acceptable
Improve education / awareness of people in this area	1	2	3	4	5
Restrict the number of people allowed in this area	1	2	3	4	5
Improve maintenance or upkeep of this area	1	2	3	4	5
Provide more facilities or services in this area	1	2	3	4	5

Scenario 2: Imagine ***all four*** of the following conditions were common at Kailua Beach Park:

- **HIGH** number of people (use level)
- **SOME** litter
- **SUBSTANTIAL** recreation damage to coral reef (over 75% broken, trampled)
- **POOR** condition of facilities (e.g., bathrooms, showers, trash cans, signs)

17. ***If all conditions in Scenario 2 were common*** how acceptable would it be for managers to take ***EACH*** of the following actions?

	Very Unacceptable	Unacceptable	Neither	Acceptable	Very Acceptable
Improve education / awareness of people in this area	1	2	3	4	5
Restrict the number of people allowed in this area	1	2	3	4	5
Improve maintenance or upkeep of this area	1	2	3	4	5
Provide more facilities or services in this area	1	2	3	4	5

Scenario 3: Imagine ***all four*** of the following conditions were common at Kailua Beach Park:

- **HIGH** number of people (use level)
- **SOME** litter
- **MINIMAL** recreation damage to coral reef (less than 25% broken, trampled)
- **GOOD** condition of facilities (e.g., bathrooms, showers, trash cans, signs)

18. ***If all conditions in Scenario 3 were common*** how acceptable would it be for managers to take ***EACH*** of the following actions?

	Very Unacceptable	Unacceptable	Neither	Acceptable	Very Acceptable
Improve education / awareness of people in this area	1	2	3	4	5
Restrict the number of people allowed in this area	1	2	3	4	5
Improve maintenance or upkeep of this area	1	2	3	4	5
Provide more facilities or services in this area	1	2	3	4	5

Scenario 4: Imagine ***all four*** of the following conditions were common at Kailua Beach Park:

- **LOW** number of people (use level)
- **NO** litter
- **MINIMAL** recreation damage to coral reef (less than 25% broken, trampled)
- **GOOD** condition of facilities (e.g., bathrooms, showers, trash cans, signs)

19. ***If all conditions in Scenario 4 were common*** how acceptable would it be for managers to take ***EACH*** of the following actions?

	Very Unacceptable	Unacceptable	Neither	Acceptable	Very Acceptable
Improve education / awareness of people in this area	1	2	3	4	5
Restrict the number of people allowed in this area	1	2	3	4	5
Improve maintenance or upkeep of this area	1	2	3	4	5
Provide more facilities or services in this area	1	2	3	4	5

Scenario 5: Imagine ***all four*** of the following conditions were common at Kailua Beach Park:

- **LOW** number of people (use level)
- **NO** litter
- **SUBSTANTIAL** recreation damage to coral reef (over 75% broken, trampled)
- **POOR** condition of facilities (e.g., bathrooms, showers, trash cans, signs)

20. ***If all conditions in Scenario 5 were common*** how acceptable would it be for managers to take ***EACH*** of the following actions?

	Very Unacceptable	Unacceptable	Neither	Acceptable	Very Acceptable
Improve education / awareness of people in this area	1	2	3	4	5
Restrict the number of people allowed in this area	1	2	3	4	5
Improve maintenance or upkeep of this area	1	2	3	4	5
Provide more facilities or services in this area	1	2	3	4	5

Scenario 6: Imagine ***all four*** of the following conditions were common at Kailua Beach Park:

- **LOW** number of people (use level)
- **SOME** litter
- **SUBSTANTIAL** recreation damage to coral reef (over 75% broken, trampled)
- **GOOD** condition of facilities (e.g., bathrooms, showers, trash cans, signs)

21. ***If all conditions in Scenario 6 were common*** how acceptable would it be for managers to take ***EACH*** of the following actions?

	Very Unacceptable	Unacceptable	Neither	Acceptable	Very Acceptable
Improve education / awareness of people in this area	1	2	3	4	5
Restrict the number of people allowed in this area	1	2	3	4	5
Improve maintenance or upkeep of this area	1	2	3	4	5
Provide more facilities or services in this area	1	2	3	4	5

Scenario 7: Imagine ***all four*** of the following conditions were common at Kailua Beach Park:

- **HIGH** number of people (use level)
- **NO** litter
- **SUBSTANTIAL** recreation damage to coral reef (over 75% broken, trampled)
- **GOOD** condition of facilities (e.g., bathrooms, showers, trash cans, signs)

22. ***If all conditions in Scenario 7 were common*** how acceptable would it be for managers to take ***EACH*** of the following actions?

	Very Unacceptable	Unacceptable	Neither	Acceptable	Very Acceptable
Improve education / awareness of people in this area	1	2	3	4	5
Restrict the number of people allowed in this area	1	2	3	4	5
Improve maintenance or upkeep of this area	1	2	3	4	5
Provide more facilities or services in this area	1	2	3	4	5

Scenario 8: Imagine ***all four*** of the following conditions were common at Kailua Beach Park:

- **LOW** number of people (use level)
- **SOME** litter
- **MINIMAL** recreation damage to coral reef (less than 25% broken, trampled)
- **POOR** condition of facilities (e.g., bathrooms, showers, trash cans, signs)

23. ***If all conditions in Scenario 8 were common*** how acceptable would it be for managers to take ***EACH*** of the following actions?

	Very Unacceptable	Unacceptable	Neither	Acceptable	Very Acceptable
Improve education / awareness of people in this area	1	2	3	4	5
Restrict the number of people allowed in this area	1	2	3	4	5
Improve maintenance or upkeep of this area	1	2	3	4	5
Provide more facilities or services in this area	1	2	3	4	5

24. Are you: **(check ONE)** ☐ Male ☐ Female

25. What is your age? **(write response)** _____ years old

26. Where do you live? **(write responses)** State / Province _____ Country _____

APPENDIX B: UNCOLLAPSED FREQUENCIES

V1. ID: _____

Recreationists' Experiences and Preferences at Kailua Beach Park

The Hawaii Division of Aquatic Resources and Hawaii Coral Reef Initiative are conducting this survey to understand your experiences at Kailua Beach Park and opinions about how this area should be managed. Your input is important and will help managers. Participation is voluntary and answers are anonymous. ***Please answer all questions and return to the field researcher***.

1. You are at Kailua Beach Park right now. ***Prior to today***, had you ever been to Kailua Beach Park before? **(check ONE)**
   21% No
   79% Yes → if yes, how many previous times have you been to Kailua Beach Park? **(write response)** _____ time(s)

2. Please check ***all*** of the activities in which you are participating ***at Kailua Beach Park today***. **(check ALL THAT APPLY)**
   77% ***A.*** Sunbathing; 16% ***D.*** Snorkeling; 16% ***G.*** Boating (e.g., Kayak, Canoe, Motorboat)
   81% ***B.*** Swimming or Wading; 1% ***E.*** SCUBA Diving; 12% ***H.*** Surfing
   8% ***C.*** Fishing; 53% ***F.*** Beach Walking or Hiking; 8% ***I.*** Windsurfing or Kitesurfing

3. From the activities in Question 2 above, what is the ***ONE main activity*** in which you are participating ***at Kailua Beach Park today***? **(write ONE letter that matches your response)**
   33% ***A.*** Sunbathing; 2% ***D.*** Snorkeling; 7% ***G.*** Boating (e.g., Kayak, Canoe, Motorboat)
   34% ***B.*** Swimming or Wading; 0% ***E.*** SCUBA Diving; 2% ***H.*** Surfing
   2% ***C.*** Fishing; 17% ***F.*** Beach Walking or Hiking; 4% ***I.*** Windsurfing or Kitesurfing

4. How would you describe your skill level in this main activity? **(check ONE)**
   6% Beginner; 8% Novice; 30% Intermediate; 26% Advanced; 30% Expert

5. Are you participating in this main activity today as part of an organized or guided tour? **(check ONE)** 93% No; 7% Yes

6. Overall, how satisfied are you with your visit to Kailua Beach Park today? **(check ONE)**
   2% Very Dissatisfied; 3% Dissatisfied; 6% Neither; 46% Satisfied; 44% Very Satisfied

7. Approximately how many other people did you see in total at Kailua Beach Park today? average = 136.38 people

8. How did the number of other people you saw at Kailua Beach Park today affect your enjoyment? **(check ONE)**
   8% Reduced My Enjoyment; 76% Had No Effect on My Enjoyment; 16% Increased My Enjoyment

9. What is the ***maximum*** number of other people you would accept seeing at any one time at Kailua Beach Park?
   average = 275.92 people, 14% The number of people doesn't matter to me, 25% It matters to me, but I can't specify a number

10. How important is it that you have the opportunity to escape crowds of people at Kailua Beach Park? **(check ONE)**
    17% Not at all Important; 20% Slightly Important; 43% Moderately Important; 20% Extremely Important

11. To what extent did you feel crowded by each of the following at Kailua Beach Park today? **(circle one number for *EACH* item)**

	Not at all Crowded		Slightly Crowded		Moderately Crowded			Extremely Crowded	
Number of sunbathers or swimmers	47%	21%	14%	4%	5%	4%	3%	1%	2%
Number of snorkelers or SCUBA divers	77%	16%	3%	1%	2%	1%	0%	1%	0%
Number of surfers	75%	16%	3%	2%	1%	1%	1%	0%	0%
Number of windsurfers or kitesurfers	62%	18%	8%	3%	2%	1%	1%	0%	4%
Number of boaters (e.g., kayak, motor)	62%	19%	9%	3%	3%	2%	2%	1%	1%
Number of anglers (people fishing)	84%	9%	3%	1%	1%	1%	1%	1%	1%
Total number of people at Kailua Beach	44%	18%	14%	5%	7%	4%	5%	1%	2%

12. We are interested in how many people you are willing to see at Kailua Beach Park. Please rate how ***ACCEPTABLE*** the density of people is in ***EACH*** photograph below ***IF IT WAS TO OCCUR AT KAILUA BEACH*** **(circle one number for *each* photo)**

	Very Unacceptable		Unacceptable		Neither	Acceptable		Very Acceptable	
Photograph A	8%	1%	3%	3%	8%	6%	6%	7%	58%
Photograph B	2%	2%	1%	1%	3%	8%	11%	18%	54%
Photograph C	2%	1%	1%	1%	5%	16%	19%	26%	29%
Photograph D	2%	1%	4%	8%	10%	25%	23%	12%	15%
Photograph E	19%	14%	19%	16%	9%	12%	6%	3%	3%
Photograph F	63%	10%	8%	8%	3%	3%	3%	1%	2%

A.

B.

C.

D.

E.

F.

13. Now, please rate the extent to which you feel that the density of people in ***EACH*** photograph above ***SHOULD OR SHOULD NOT BE ALLOWED TO OCCUR AT KAILUA BEACH PARK***. **(circle one number for *each* photo)**

	Should Definitely Not Allow		Should Maybe Not Allow		Neither	Should Maybe Allow		Should Definitely Allow	
Photograph A	8%	1%	1%	2%	13%	3%	3%	8%	63%
Photograph B	2%	1%	1%	1%	9%	4%	3%	16%	64%
Photograph C	1%	1%	1%	1%	9%	6%	11%	23%	49%
Photograph D	2%	1%	3%	4%	14%	14%	11%	19%	33%
Photograph E	21%	12%	18%	12%	9%	7%	5%	7%	10%
Photograph F	59%	9%	6%	8%	5%	3%	2%	2%	6%

14. Which ***ONE*** photograph above is like what you saw ***most often*** at Kailua Beach Park today? **(check ONE)**
    3% Photo A; 21% Photo B; 36% Photo C; 35% Photo D; 6% Photo E; 0% Photo F

15. To what extent do you disagree or agree with each of the following statements? **(circle one number for *each* statement)**

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
Humans should manage coral reef areas so that humans benefit.	18%	22%	15%	25%	20%
The needs of humans are more important than coral reef areas.	45%	34%	12%	5%	5%
Recreational use of coral reef areas is more important than protecting the species that live there.	50%	32%	9%	5%	4%
The primary value of coral reef areas is to provide for humans.	51%	31%	11%	6%	2%
Coral reef areas should be protected for their own sake rather than to simply meet the needs of humans.	2%	5%	8%	39%	46%
Coral reef areas should have rights similar to the rights of humans.	6%	12%	25%	34%	24%
Recreational use of coral reef areas should not be allowed if it damages these areas.	3%	7%	15%	36%	40%
Coral reef areas have value whether humans are present or not.	2%	2%	7%	37%	52%

16. ***Assuming you could be on Oahu Island again in the future***, how likely would you take the following actions based on the number of people or behavior of other activity groups you have seen at Kailua Beach Park? **(circle one number for *each* action**

	Very Unlikely	Unlikely	Neither	Likely	Very Likely
Come back to Kailua Beach, but avoid peak use times (weekends, holidays).	3%	8%	18%	37%	34%
Come back to Kailua Beach earlier or later in day when less people are here.	4%	8%	23%	38%	28%
Come back to Kailua Beach, but change the way I think about this area, deciding that it offers a different type of experience than I first believed.	7%	18%	47%	22%	6%
Come back to Kailua Beach realizing conditions I saw today are suitable.	2%	4%	19%	48%	27%
Go to other nearby or adjacent beach / marine areas instead.	11%	26%	41%	18%	5%
Go to other beach / marine areas on other parts of Oahu Island instead.	13%	25%	39%	17%	6%

17. To what extent do you feel that you have seen or experienced conflict with each of the following activity groups during any of your visits to Kailua Beach Park? **(circle one number for *each* activity group)**

How much conflict with …	No Conflict		Slight Conflict		Moderate Conflict			Extreme Conflict	
… sunbathers or swimmers	68%	16%	6%	2%	4%	3%	1%	0%	1%
… snorkelers or SCUBA divers	78%	13%	2%	2%	3%	1%	1%	0%	1%
… surfers	75%	13%	4%	4%	2%	1%	0%	0%	1%
… windsurfers or kitesurfers	65%	13%	8%	5%	2%	2%	2%	1%	2%
… boaters (e.g., kayak, motorboat)	67%	14%	6%	2%	6%	2%	1%	1%	1%
… anglers (people fishing)	74%	13%	5%	2%	3%	1%	1%	1%	1%

18. To what extent do you disagree or agree with each of the following statements? **(circle one number for *each* statement)**

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
Just knowing that ***sunbathers or swimmers*** are at Kailua Beach Park bothers me, even if I never see or hear them.	63%	25%	9%	2%	1%
Just knowing that ***snorkelers or SCUBA divers*** are at Kailua Beach Park bothers me, even if I never see or hear them.	61%	27%	10%	2%	1%
Just knowing that ***surfers*** are at Kailua Beach Park bothers me, even if I never see or hear them.	60%	26%	10%	3%	2%
Just knowing that ***windsurfers or kitesurfers*** are at Kailua Beach Park bothers me, even if I never see or hear them.	58%	24%	10%	6%	2%
Just knowing that ***boaters*** (e.g., kayak, motorboat) are at Kailua Beach Park bothers me, even if I never see or hear them.	53%	27%	12%	6%	3%
Just knowing that ***anglers (people fishing)*** are at Kailua Beach Park bothers me, even if I never see or hear them.	53%	25%	13%	6%	4%

19. How often ***have you seen*** each of the following during any of your visits to Kailua Beach? **(circle one number for *each* item)**

	Never	Once or Twice	Sometimes	Many Times
Sunbathers or swimmers being rude or discourteous	66%	21%	9%	4%
Sunbathers or swimmers being too close	52%	22%	21%	6%
Sunbathers or swimmers not looking where they are going	49%	26%	19%	6%
Snorkelers or SCUBA divers being rude or discourteous	89%	6%	5%	1%
Snorkelers or SCUBA divers being too close	86%	7%	6%	1%
Snorkelers or SCUBA divers not looking where they are going	82%	9%	8%	1%
Surfers being rude or discourteous	81%	10%	7%	2%
Surfers being too close	78%	11%	8%	2%
Surfers not looking where they are going	77%	12%	9%	2%
Windsurfers or kitesurfers being rude or discourteous	77%	10%	9%	4%
Windsurfers or kitesurfers being too close	63%	19%	11%	7%
Windsurfers or kitesurfers not looking where they are going	66%	16%	14%	4%
Boaters (e.g., kayak, motorboat) being rude or discourteous	79%	10%	9%	2%
Boaters (e.g., kayak, motorboat) being too close	70%	14%	13%	3%
Boaters (e.g., kayak, motorboat) not looking where they are going	72%	14%	11%	4%
Anglers (people fishing) being rude or discourteous	85%	8%	6%	1%
Anglers (people fishing) being too close	81%	11%	5%	3%
Anglers (people fishing) not looking where they cast their line / hook	81%	11%	7%	2%

20. To what extent do you feel that each of the following is a ***problem*** at Kailua Beach Park? **(circle one number for *each* item)**

	Not at all a Problem	Slight Problem	Moderate Problem	Extreme Problem
Sunbathers or swimmers being rude or discourteous	81%	13%	5%	1%
Sunbathers or swimmers being too close	71%	18%	10%	1%
Sunbathers or swimmers not looking where they are going	75%	18%	7%	1%
Snorkelers or SCUBA divers being rude or discourteous	88%	8%	4%	1%
Snorkelers or SCUBA divers being too close	87%	9%	4%	0%
Snorkelers or SCUBA divers not looking where they are going	84%	10%	5%	1%
Surfers being rude or discourteous	84%	10%	6%	1%
Surfers being too close	80%	14%	5%	1%
Surfers not looking where they are going	80%	14%	5%	1%
Windsurfers or kitesurfers being rude or discourteous	77%	12%	7%	4%
Windsurfers or kitesurfers being too close	67%	19%	10%	5%
Windsurfers or kitesurfers not looking where they are going	70%	16%	9%	5%
Boaters (e.g., kayak, motorboat) being rude or discourteous	78%	12%	6%	4%
Boaters (e.g., kayak, motorboat) being too close	70%	16%	9%	5%
Boaters (e.g., kayak, motorboat) not looking where they are going	73%	15%	8%	4%
Anglers (people fishing) being rude or discourteous	82%	12%	4%	2%
Anglers (people fishing) being too close	77%	15%	5%	3%
Anglers (people fishing) not looking where they cast their line / hook	78%	14%	5%	3%

21. Should there be more educational or interpretive information at Kailua Beach? **(check ONE)** 24% No 44% Yes 32% Unsure

22. Should Kailua Beach be zoned so different recreation activities don't overlap in the same areas? 40% No 29% Yes 31% Unsure

23. Are you: **(check ONE)** 37% Male 63% Female

24. What is your age? **(write response)** average = 39.48 years old

25. Where do you live? **(write responses)** State / Province see report Country see report

V2. ID: _____

Recreationists' Experiences and Preferences at Kailua Beach Park

The Hawaii Division of Aquatic Resources and Hawaii Coral Reef Initiative are conducting this survey to understand your experiences at Kailua Beach Park and opinions about how this area should be managed. Your input is important and will help managers. Participation is voluntary and answers are anonymous. ***Please answer all questions and return to the field researcher***.

1. You are at Kailua Beach Park right now. ***Prior to today***, had you ever been to Kailua Beach Park before? **(check ONE)**
   23% No
   77% Yes → if yes, how many previous times have you been to Kailua Beach Park? **(write response)** time(s)

2. Please check ***all*** of the activities in which you are participating ***at Kailua Beach Park today***. **(check ALL THAT APPLY)**

74% ***A.*** Sunbathing	17% ***D.*** Snorkeling	18% ***G.*** Boating (e.g., Kayak, Canoe, Motorboat)
81% ***B.*** Swimming or Wading	2% ***E.*** SCUBA Diving	10% ***H.*** Surfing
8% ***C.*** Fishing	49% ***F.*** Beach Walking or Hiking	7% ***I.*** Windsurfing or Kitesurfing

3. From the activities in Question 2 above, what is the ***ONE main activity*** in which you are participating ***at Kailua Beach Park today***? **(write ONE letter that matches your response)**

33% ***A.*** Sunbathing	1% ***D.*** Snorkeling	7% ***G.*** Boating (e.g., Kayak, Canoe, Motorboat)
37% ***B.*** Swimming or Wading	0% ***E.*** SCUBA Diving	2% ***H.*** Surfing
1% ***C.*** Fishing	14% ***F.*** Beach Walking or Hiking	6% ***I.*** Windsurfing or Kitesurfing

4. How would you describe your skill level in this main activity? **(check ONE)**
   7% Beginner 10% Novice 28% Intermediate 29% Advanced 27% Expert

5. Are you participating in this main activity today as part of an organized or guided tour? **(check ONE)** 92% No 8% Yes

6. Overall, how satisfied are you with your visit to Kailua Beach Park today? **(check ONE)**
   2% Very Dissatisfied 4% Dissatisfied 5% Neither 50% Satisfied 40% Very Satisfied

7. Listed below are several characteristics. On the left, please rate how ***important*** it is to you that each characteristic is provided at Kailua Beach. Then, on the right, rate how ***satisfied*** you are with each characteristic at Kailua Beach.

Rate IMPORTANCE						***Rate SATISFACTION***				
Not Important		Neither		Very Important	Characteristics at Kailua Beach Park	Very Dissatisfied		Neither		Very Satisfied
5%	1%	7%	24%	64%	Parking availability for vehicles	3%	12%	23%	37%	26%
3	2	7	24	65	Bathrooms	6	12	28	36	18
2	3	13	34	48	Showers / rinse stations	2	6	28	40	25
2	2	7	26	63	Trash cans	2	6	27	41	25
0	1	3	18	78	Absence of litter	3	7	18	41	32
9	7	34	29	22	Picnic tables	2	7	47	29	15
9	11	37	24	19	Park benches	3	7	51	25	14
5	5	23	30	36	Information signs about regulations / guidelines	4	8	43	29	16
5	5	18	27	46	Presence of lifeguards	4	8	32	31	25
2	1	4	10	83	Not required to pay a fee to visit the area	1	1	5	12	82
1	1	11	29	58	Opportunity to escape crowds of people	2	8	24	33	33
1	0	1	8	90	Clean ocean water	3	5	10	33	49
2	1	11	15	71	Healthy coral reefs	3	7	42	24	24
3	6	23	26	42	Opportunity to see small marine life (e.g., fish)	4	6	51	24	15
3	4	27	25	40	Opportunity to see large marine life	3	8	52	20	17

8. How many of ***each*** of the following ***HAVE YOU SEEN*** at Kailua Beach Park? **(circle one number for *EACH* item)**

	Number *I HAVE SEEN* at Kailua Beach Park
Bathrooms	2.27
Showers / rinse stations	2.41
Trash cans	5.39
Picnic tables	4.08
Park benches	3.06
Information signs about regulations / guidelines	2.64

9. How many of ***each*** of the following ***DO YOU FEEL SHOULD BE*** at Kailua Beach Park? **(circle one number for *EACH* item)**

	Number *THAT SHOULD BE* at Kailua Beach Park
Bathrooms	4.25
Showers / rinse stations	4.74
Trash cans	11.58
Picnic tables	9.25
Park benches	8.40
Information signs about regulations / guidelines	6.90

10. Should commercial activities (e.g., recreation tour operators) be allowed at Kailua Beach? 53% No 25% Yes 22% Unsure

11. Should there be designated parking areas for tour buses at Kailua Beach Park? 48% No 38% Yes 14% Unsure

12. Should there be more enforcement of rules / regulations at Kailua Beach Park? 34% No 34% Yes 32% Unsure

13. How often have you seen people handling or standing on coral during any of your visits to Kailua Beach Park? **(check ONE)**
    72% Never 11% Once or Twice 12% Sometimes 5% Many Times

14. To what extent do you feel that people handling or standing on coral is a problem at Kailua Beach Park? **(check ONE)**
    38% Not at all a Problem 29% Slight Problem 18% Moderate Problem 14% Extreme Problem

15. To what extent do you disagree or agree with each of the following statements? **(circle one number for *each* statement)**

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
Humans should manage coral reef areas so that humans benefit.	24%	13%	19%	22%	22%
The needs of humans are more important than coral reef areas.	49	24	17	6	5
Recreational use of coral reef areas is more important than protecting the species that live there.	52	23	16	6	3
The primary value of coral reef areas is to provide for humans.	52	27	13	5	4
Coral reef areas should be protected for their own sake rather than to simply meet the needs of humans.	4	3	10	31	53
Coral reef areas should have rights similar to the rights of humans.	7	11	26	28	27
Recreational use of coral reef areas should not be allowed if it damages these areas.	3	5	17	34	41
Coral reef areas have value whether humans are present or not.	2	1	9	31	57

The following shaded boxes contain 8 scenarios that describe potential conditions at Kailua Beach. ***NO SCENARIOS ARE THE SAME***. ***Carefully read each scenario then answer ALL questions after each scenario*** **by circling one number for *each* action.**

Scenario 1: Imagine ***all four*** of the following conditions were common at Kailua Beach Park:

- **HIGH** number of people (use level)
- **NO** litter
- **MINIMAL** recreation damage to coral reef (less than 25% broken, trampled)
- **POOR** condition of facilities (e.g., bathrooms, showers, trash cans, signs)

16. ***If all conditions in Scenario 1 were common*** how acceptable would it be for managers to take ***EACH*** of the following actions?

	Very Unacceptable	Unacceptable	Neither	Acceptable	Very Acceptable
Improve education / awareness of people in this area	2%	5%	13%	45%	35%
Restrict the number of people allowed in this area	9	26	26	25	15
Improve maintenance or upkeep of this area	2	2	5	36	55
Provide more facilities or services in this area	4	5	14	38	40

Scenario 2: Imagine ***all four*** of the following conditions were common at Kailua Beach Park:

- **HIGH** number of people (use level)
- **SOME** litter
- **SUBSTANTIAL** recreation damage to coral reef (over 75% broken, trampled)
- **POOR** condition of facilities (e.g., bathrooms, showers, trash cans, signs)

17. ***If all conditions in Scenario 2 were common*** how acceptable would it be for managers to take ***EACH*** of the following actions?

	Very Unacceptable	Unacceptable	Neither	Acceptable	Very Acceptable
Improve education / awareness of people in this area	2	4	7	27	59
Restrict the number of people allowed in this area	7	15	17	28	34
Improve maintenance or upkeep of this area	2	3	7	27	61
Provide more facilities or services in this area	5	7	13	28	47

Scenario 3: Imagine ***all four*** of the following conditions were common at Kailua Beach Park:

- **HIGH** number of people (use level)
- **SOME** litter
- **MINIMAL** recreation damage to coral reef (less than 25% broken, trampled)
- **GOOD** condition of facilities (e.g., bathrooms, showers, trash cans, signs)

18. ***If all conditions in Scenario 3 were common*** how acceptable would it be for managers to take ***EACH*** of the following actions?

	Very Unacceptable	Unacceptable	Neither	Acceptable	Very Acceptable
Improve education / awareness of people in this area	1	5	16	42	36
Restrict the number of people allowed in this area	11	22	26	26	15
Improve maintenance or upkeep of this area	1	5	22	40	32
Provide more facilities or services in this area	4	10	29	36	21

Scenario 4: Imagine ***all four*** of the following conditions were common at Kailua Beach Park:

- **LOW** number of people (use level)
- **NO** litter
- **MINIMAL** recreation damage to coral reef (less than 25% broken, trampled)
- **GOOD** condition of facilities (e.g., bathrooms, showers, trash cans, signs)

19. ***If all conditions in Scenario 4 were common*** how acceptable would it be for managers to take ***EACH*** of the following actions?

	Very Unacceptable	Unacceptable	Neither	Acceptable	Very Acceptable
Improve education / awareness of people in this area	5	9	22	36	28
Restrict the number of people allowed in this area	23	27	28	13	9
Improve maintenance or upkeep of this area	5	10	35	31	19
Provide more facilities or services in this area	9	14	34	30	15

Scenario 5: Imagine ***all four*** of the following conditions were common at Kailua Beach Park:

- **LOW** number of people (use level)
- **NO** litter
- **SUBSTANTIAL** recreation damage to coral reef (over 75% broken, trampled)
- **POOR** condition of facilities (e.g., bathrooms, showers, trash cans, signs)

20. ***If all conditions in Scenario 5 were common*** how acceptable would it be for managers to take ***EACH*** of the following actions?

	Very Unacceptable	Unacceptable	Neither	Acceptable	Very Acceptable
Improve education / awareness of people in this area	4	7	8	25	56
Restrict the number of people allowed in this area	17	26	26	18	14
Improve maintenance or upkeep of this area	2	6	11	33	48
Provide more facilities or services in this area	5	9	17	31	38

Scenario 6: Imagine ***all four*** of the following conditions were common at Kailua Beach Park:

- **LOW** number of people (use level)
- **SOME** litter
- **SUBSTANTIAL** recreation damage to coral reef (over 75% broken, trampled)
- **GOOD** condition of facilities (e.g., bathrooms, showers, trash cans, signs)

21. ***If all conditions in Scenario 6 were common*** how acceptable would it be for managers to take ***EACH*** of the following actions?

	Very Unacceptable	Unacceptable	Neither	Acceptable	Very Acceptable
Improve education / awareness of people in this area	4	4	11	27	54
Restrict the number of people allowed in this area	14	25	25	19	17
Improve maintenance or upkeep of this area	4	8	22	37	29
Provide more facilities or services in this area	7	14	31	31	17

Scenario 7: Imagine ***all four*** of the following conditions were common at Kailua Beach Park:

- **HIGH** number of people (use level)
- **NO** litter
- **SUBSTANTIAL** recreation damage to coral reef (over 75% broken, trampled)
- **GOOD** condition of facilities (e.g., bathrooms, showers, trash cans, signs)

22. ***If all conditions in Scenario 7 were common*** how acceptable would it be for managers to take ***EACH*** of the following actions?

	Very Unacceptable	Unacceptable	Neither	Acceptable	Very Acceptable
Improve education / awareness of people in this area	4	3	10	27	57
Restrict the number of people allowed in this area	9	16	19	27	29
Improve maintenance or upkeep of this area	5	10	30	31	24
Provide more facilities or services in this area	7	14	33	31	16

Scenario 8: Imagine ***all four*** of the following conditions were common at Kailua Beach Park:

- **LOW** number of people (use level)
- **SOME** litter
- **MINIMAL** recreation damage to coral reef (less than 25% broken, trampled)
- **POOR** condition of facilities (e.g., bathrooms, showers, trash cans, signs)

23. ***If all conditions in Scenario 8 were common*** how acceptable would it be for managers to take ***EACH*** of the following actions?

	Very Unacceptable	Unacceptable	Neither	Acceptable	Very Acceptable
Improve education / awareness of people in this area	5	7	15	38	35
Restrict the number of people allowed in this area	20	26	31	15	8
Improve maintenance or upkeep of this area	2	3	8	37	49
Provide more facilities or services in this area	4	8	13	34	41

24. Are you: **(check ONE)** 41% Male 59% Female

25. What is your age? **(write response)** ___average = 39.70_____ years old

26. Where do you live? **(write responses)** State / Province see report Country see report