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# ENCOUNTERS, NORMS, AND CROWDING AT SIX COASTAL AND MARINE AREAS IN HAWAI'I

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This article examined encounters, norms, and crowding of 1,422 individuals at six coastal and marine areas in Hawai'i. Encounters and crowding differed among these sites with 38-55% of users feeling crowded. On average, however, users encountered fewer than half as many people (i.e., 63-192 per  $500 \times 200$  yards) compared to their normative standard for the maximum use density they felt should be allowed at each site (i.e., 206-381 people per  $500 \times 200$  yards). Only 11-21% of users encountered fewer than their norm, and these individuals felt more crowded than those who encountered fewer than their norm. Crowding and encounters were important indicators at each site, and there was relatively high agreement regarding use densities that should and should not be allowed at each site. All three concepts (i.e., encounters, norms, crowding) should be measured when addressing social capacity issues.

Key words: Encounters; Norms; Crowding; Social carrying capacity; Indicators; Standards of quality

#### Introduction

Coastal and marine environments are popular for tourism and recreation with activities and visitation continuing to increase in many areas. The number of people visiting Australia's Great Barrier Reef, for example, increased almost 10-fold between the early 1980s and late 1990s (Inglis, Johnson, & Ponte, 1999). In the Galapagos Islands, visitation increased from 17,500 in 1980 to 71,500 in 2000 and to more than 145,000 in recent years (Taylor, Dyer, & Stewart, 2003; Weaver, 2008). The number of people visiting marine areas in southeast Alaska (e.g., Glacier Bay, Tracy Arm) increased from 85,000 in 1980 to more than 1 million by 2007 largely due to more access via cruise ships (Zegre, Needham, Kruger, & Rosenberger, 2012). Marine areas attract more than 80% of the annual visitors to Hawai'i and popular marine areas in this state now receive up to 1.75 million visitors per year (e.g., Hanauma Bay) (Friedlander et al., 2005).

A number of studies have documented environmental impacts in coastal and marine areas caused by activities such as snorkeling, swimming, and scuba diving (e.g., Barker & Roberts, 2004;

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Dinsdale & Harriott, 2004; Hawkins & Roberts, 1993; Kay & Liddle, 1989; Meyer & Holland, 2008; Rodgers & Cox, 2003; Zakai & Chadwick-Furman, 2002). Activities in these areas can also have social impacts because people sometimes behave in ways that can be viewed as unacceptable by other users. Social impacts include noise (Freimund, Vaske, Donnelly, & Miller, 2002), conflict among activity groups (Graefe & Thapa, 2004), and crowding (Manning, Valliere, Minteer, Wang, & Jacobi, 2000; Vaske & Shelby, 2008). Some studies have examined social issues such as perceptions of crowding and tolerances for encounters with other groups in coastal and marine environments (e.g., Anderson & Loomis, 2011; Bell, Needham, & Szuster, 2011; Ceurvorst & Needham, 2012a; Inglis et al., 1999; Kuentzel & Heberlein, 2003; Lankford, Inui, & Whittle, 2008; Manning, Johnson, & VandeKamp, 1996; Needham & Szuster, 2011; Needham, Szuster, & Bell, 2011; Shafer & Inglis, 2000; Szuster, Needham, & McClure, 2011).

Research has shown that to understand and manage these types of social impacts of use in an area, it is necessary to identify relationships among the number of other people that users encounter during their visit, the extent that these users feel crowded, and their normative evaluations of conditions (e.g., use levels, encounters) they feel should and should not be allowed to occur in the area (Manning, 2007, 2011; Shelby & Heberlein, 1986; Vaske & Donnelly, 2002). In coastal and marine environments, however, these concepts have often been studied individually and in isolation; less is known about relationships among encounters, norms, and crowding in these settings. This article helps to address this knowledge gap by examining relationships among encounters, norms, and crowding at six coastal and marine areas in Hawai'i.

#### Conceptual Background

## Encounters, Norms, and Crowding

Tourism and recreation managers are often interested in user evaluations of conditions and impacts (Manning, 2011). Encounters, norms, and crowding have received substantial attention as evaluative measures of conditions related to use levels and use densities (see Manning, 2007, 2011; Shelby & Heberlein, 1986, for reviews). Reported encounters are subjective counts of the number of other people that an individual remembers seeing in a setting (Vaske & Donnelly, 2002). Perceived crowding is a subjective negative evaluation that this number of encounters or people observed is excessive (Vaske & Shelby, 2008). Several studies have examined encounters and crowding in tourism and recreation settings (see Manning, 2007, 2011; Vaske & Donnelly, 2002; Vaske & Shelby, 2008, for reviews) with some of these occurring in coastal and marine areas (e.g., Bell et al., 2011; Lankford et al., 2008; Shafer & Inglis, 2000; Szuster et al., 2011).

Understanding these reported encounters and perceptions of crowding, however, may not reveal a maximum acceptable or tolerable level of use, or an understanding of how this human use should be monitored and managed (Needham, Rollins, & Wood, 2004). The concept of norms offers a theoretical and applied basis for addressing these issues (Vaske & Whittaker, 2004). One line of research commonly defines norms as standards that individuals use for evaluating activities, environments, management actions, or conditions as good or bad, better or worse (Shelby, Vaske, & Donnelly, 1996). Norms clarify what people believe conditions should or should not be in a given area or context (Heywood, 1996). Research suggests that when users perceive a setting as crowded, they have at least implicitly compared conditions they experienced (e.g., number of encounters) with their normative evaluations of conditions they believe should or should not be allowed to occur in the area (e.g., use densities) (Vaske & Donnelly, 2002).

## Indicators and Standards of Quality

These normative evaluations can provide a basis for measuring indicators and forming standards of quality (Manning, 2011). Indicators (e.g., encounters) are social, resource, or managerial variables defining the quality of settings and experiences (Shelby et al., 1996). These indicators can be measured to form standards of quality (e.g., no more than 50 people should be encountered per day) or points where indicator conditions reach levels that users feel should or should not be allowed to occur (Manning, 2007). Indicators can be monitored to ensure that standards are maintained, and management actions may be needed if standards are violated. This approach is central to frameworks such as Limits of Acceptable Change (LAC), Visitor Impact Management (VIM), Visitor Experience and Resource Protection (VERP), and the Tourism Optimization Management Model (TOMM) (see Manning, 2004, for a review). In these frameworks, the traditional social carrying capacity question of "how much use or impact is too much" is redefined as "how much use or impact is acceptable or should be allowed" (Manning, 2011). This focuses management attention on desirable conditions rather than just the amount of use and its impact. Basing decisions on how much impact and what kinds of conditions are acceptable and unacceptable might allow managers to better address their clientele's needs.

To illustrate using a simplified example, the provision of opportunities for solitude is a management objective in some tourism and recreation environments (Manning, 2007; Weaver, 2008). This objective, however, may be too broad to guide management given that it does not specify what constitutes solitude and how it should be measured and monitored. These issues may be clarified by formulating indicators and standards of quality. Interviews or a survey of users may show that the number of encounters with other users is an important component of solitude, suggesting that it may be one indicator of solitude. Normative evaluations may then reveal that once most users encounter 150 or more people in a given area, they feel crowded and do not achieve an acceptable level of solitude. This suggests that encounters with 150 or more people may represent an appropriate standard for this given area (Ceurvorst & Needham, 2012a).

## Social Norm Curves

In the tourism and recreation literature, most studies of norms or evaluative standards are based on Jackson's (1965) model that describes norms with graphs called social norm curves (Manning, Valliere, Wang, & Jacobi, 1999) or impact acceptability curves (Shelby et al., 1996). Measurement of a social norm is derived from averages of evaluations provided by individuals in a population. These graphs represent the amount of indicator change increasing from left to right along the horizontal axis (Fig. 1). The vertical axis depicts evaluative responses with the most positive evaluation at the top of the axis, most negative on the bottom, and a neutral category in between. These curves can be analyzed for characteristics such as the minimum acceptable condition, intensity or importance of the indicator, and crystallization or level of agreement about the norm.

On these curves, the minimum acceptable condition is the point where the social norm curve crosses the neutral line and respondents perceive that indicator impacts are no longer acceptable or should not be allowed. In many studies, this point has been considered the standard of quality for the indicator being measured (see Manning, 2007, 2011; Shelby et al., 1996; Vaske & Whittaker, 2004, for reviews). Norm intensity is one measure of the salience or importance of the indicator to respondents and is the relative distance from the neutral line at each



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

point on the curve independent of the number and direction of respondent evaluations (e.g., unacceptable, acceptable). One measure of intensity involves summing these distances across all points on the curve; the greater the cumulative distance from the neutral line, the higher the norm intensity and more important the indicator is to respondents (Shelby & Heberlein, 1986; Vaske, Shelby, Graefe, & Heberlein, 1986). A flat curve close to the neutral line suggests that the indicator is of little importance and few people will be upset if a standard is violated, whereas a curve that declines sharply and remains negative implies that the indicator is important and more people may be impacted (Freimund et al., 2002). Norm crystallization measures normative consensus or agreement among respondents regarding indicator conditions and impacts. One approach for measuring crystallization is to average the standard deviations for points comprising the norm curve (Bell et al., 2011; Ormiston, Gilbert, & Manning, 1998; Whittaker, 1997). If norm crystallization is high (i.e., small standard deviations), managers may have more confidence in using normative data to formulate and monitor standards of quality at a site (Manning, 2011).

#### Normative Research in Tourism and Recreation

This normative approach has been used mostly in tourism and recreation studies to understand encounter norms, or the maximum number of other people that users will accept seeing or feel should be allowed to visit an area (see Manning, 2007, 2011; Shelby et al., 1996; Vaske et al., 1986; Vaske & Whittaker, 2004, for reviews). Many of these studies have been conducted in terrestrial parks and protected areas. Some applications of this approach, however, have occurred in coastal and marine environments, such as with scuba divers in the Florida Keys (Anderson & Loomis, 2011), both snorkelers and scuba divers in an offshore marine protected area in Hawai'i (Bell et al., 2011; Needham et al., 2011), tour boat passengers in Glacier Bay, Alaska (Manning et al., 1996), private boaters in the Apostle Islands, Wisconsin (Kuentzel & Heberlein, 2003), snorkelers in the Great Barrier Reef in Australia (Inglis et al., 1999), and visitors in the marine sections of Gwaii Haanas National Park Reserve in Canada (Freimund et al., 2002).

Many of these studies, however, did not empirically examine relationships among norms and other concepts such as reported encounters and perceived crowding at these locations.

Research has shown that when encounters exceed an individual's norm for seeing other people, perceived crowding is often higher compared to those who encounter fewer people than their norm. A comparative analysis of 13 studies involving more than 10,000 tourists and recreationists, for example, demonstrated that when people reported fewer encounters than their norm, they felt not at all crowded, whereas those who encountered more than their norm felt slightly to moderately crowded (Vaske & Donnelly, 2002). This pattern was evident and statistically significant in all 13 studies and suggests that encounters, norms, and crowding are linked. This finding has been replicated in more recent studies (e.g., Bell et al., 2011; Needham et al., 2004) and illustrates the concept of norm congruence where respondents judge conditions as less acceptable when they experience conditions violating their norms (Manning et al., 1996).

The purpose of this article is to build on this body of research by empirically examining congruence among encounters, norms, and crowding at six coastal and marine areas in Hawai'i. Two research questions are addressed. First, what are users' reported encounters, perceptions of crowding, and normative evaluations of use densities (i.e., minimum acceptable condition, norm intensity, norm crystallization) at each of these sites, and are there any differences among sites? Second, what proportion of users at each site encounter more people than their norm, and do these users feel more crowded than those who encounter fewer people than their norm?

#### Methods

#### Study Areas

Data for this article were drawn from a larger study designed to develop a baseline understanding of various aspects of coastal and marine tourism and recreation at several areas on the island of O'ahu, Hawai'i (e.g., Needham et al., 2008). Data were obtained from people visiting Kailua Beach Park, Waikīkī Diamond Head Shoreline Fisheries Management Area (FMA), and Pūpūkea Marine



*Figure 2.* Map of study areas on the island of O'ahu, Hawai'i. There were two study sites within Waikīkī Diamond Head Shoreline FMA (Diamond Head Beach Park, Sans Souci/Kaimana Beach) and three sites within Pūpūkea MLCD (Waimea Bay, Three Tables, Shark's Cove).

Life Conservation District (MLCD) in the summer (Fig. 2). These were priority sites selected for study by local and state agencies. Kailua Beach Park is on the windward northeast coast of the island. Waikīkī Diamond Head Shoreline FMA is on the leeward south coast and extends from the Waikīkī War Memorial Natatorium east to the Diamond Head Lighthouse. This study focused on two main sites in this area: Diamond Head Beach Park and Sans Souci/Kaimana Beach. Pūpūkea MLCD is on the north shore of the island and this study focused on three main sites in this area: Waimea Bay, Three Tables, and Shark's Cove. Although these study areas have regulatory and jurisdictional differences in that they range from a state marine protected area to a county beach park, they are relatively similar in terms of activities, facilities, and natural resources (Friedlander et al., 2005; Needham & Szuster, 2011).

## Data Collection

Data were obtained from questionnaires administered onsite to tourists and residents visiting these sites during 2 weeks in July 2007 and 2 weeks in August 2007. Travel use trends show only marginal seasonal variation in visitation to coastal and marine areas in Hawai'i (Friedlander et al., 2005; Hawai'i Department of Business, Economic Development, and Tourism, 2002). The questionnaire was four pages in length, measured several concepts, and took respondents an average of 15 min to complete. To increase the probability of achieving a representative sample of summer users, sampling was stratified and alternated so that questionnaires were administered at each site at least once for each day of the week and at least once for each of three time periods each day (8:00 AM to 10:30 AM, 11:30 AM to 2:00 PM, 3:00 PM to 5:30 PM). It was not feasible or necessary to contact every person at each site, so individuals were selected through a systematic random sampling procedure to reduce selection bias (i.e., one random individual selected from every *n*th group depending on the size and popularity of the site) (Vaske, 2008). In total, 1,422 summer users completed onsite questionnaires asking about their encounters, norms, and crowding (87% overall response rate). Sample sizes were n = 476 at Kailua Beach Park, n = 462 at Waikīkī Diamond Head Shoreline FMA (Diamond Head Beach Park: n = 173, Sans Souci/Kaimana Beach: n = 289), and n = 484 at Pūpūkea MLCD (Waimea Bay: n = 198, Three Tables: n = 145, Shark's Cove: n = 141). No accurate data exist on actual use levels at each site to determine if these sample sizes are directly proportional to summer visitation (Friedlander et al., 2005).

# Analysis Variables

Encounter Norms. Identical to previous studies in other areas, photographs were used in these questionnaires to measure norms regarding use densities at each site (e.g., Bell et al., 2011; Manning & Freimund, 2004; Needham et al., 2004; Szuster et al., 2011). Visual methods are thought to be more realistic than written approaches for measuring norms because they allow users to see what conditions would look like and permit researchers to depict a range of situations by manipulating photographs of a site. There are, however, some disadvantages of this approach including respondent burden and the imposition of static site conditions (Manning, 2007, 2011). Respondents viewed six photographs depicting varying use densities at the site where they were surveyed (Fig. 3). These photographs showed 0-800 people per  $500 \times 200$  yards with the number of people doubling in each image (0, 50, 100, 200, 400, 800 people per  $500 \times 200$  yards). To reflect use patterns at the sites on most days as accurately as possible, use densities were divided so that 70% of people in each photograph were on land (i.e., beach, shore) 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 was ocean (i.e., 100 yards); the length was the same for both (i.e., 500 yards). Using Adobe Photoshop, the image of 800 people per  $500 \times 200$  yards was created first and people were randomly removed to create five other photographs of differing use densities. People were randomly positioned, but their age, sex (males, females), and number in the foreground and background were balanced. The density scale for these images was measured in the field at  $500 \times 200$  yards (i.e., approximately five American football fields).

Consistent with previous research (see Manning, 2007, 2011; Needham et al., 2004, for reviews), respondents were told to ignore the generic backgrounds in the photographs, focus on the use density in each image, and assume that it was occurring at the site where they were surveyed. Respondents rated conditions in each image on 9-point recoded scales of -4 "should definitely not allow" to +4 "should definitely allow" with interior narratives of "should



Photograph E: 400 people per 500 x 200 yards

Photograph F: 800 people per 500 x 200 yards

Figure 3. Photographs depicting increasing densities of people.

maybe not allow" and "should maybe allow." It can be argued that this scale is more consistent with conventional definitions of norms than other scales often used for measuring the concept (e.g., acceptance, preference), reinforces the sense of obligation associated with most definitions of norms, and eliminates any temporal aspects inferred in other scales using similar wording (e.g., "should never," "should always") (Heywood, 1996; Heywood & Murdock, 2002). Validity tests comparing this scale with the most commonly used scale for measuring norms (i.e., "very unacceptable" to "very acceptable") showed that although the acceptance scale revealed slightly lower intensity and more restrictive norms and crystallization, these differences were minimal or small, implying that these scales generate similar evaluations (Ceurvorst & Needham, 2012b).1

*Reported Encounters.* To measure reported encounters, respondents were asked to select one of these six photographs that most accurately represented conditions they encountered most often during their visit to the site on the day they were surveyed. This approach for measuring reported encounters is identical to methods used in some previous studies examining this concept (e.g., Bell et al., 2011; Needham et al., 2004; Vaske & Donnelly, 2002).

*Perceived Crowding.* Perceptions of crowding were measured by asking users how crowded they felt by the total number of people at the site on the day they were surveyed. Responses were recorded on the 9-point perceived crowding scale of 1 "not at all crowded" to 9 "extremely crowded." This scale has been used extensively and tested rigorously (see Shelby, Vaske, & Heberlein, 1989; Vaske & Donnelly, 2002; Vaske & Shelby, 2008, for reviews).

# Results

# Respondent Profile

In total, 57% of respondents were female and 43% were male. There was, however, a statistically significant difference among sites, as the majority at Diamond Head Beach Park were male (69%), whereas the majority at the other sites were female (54–67%),  $\chi^2$  (5, N=1,336) = 62.35, p < 0.001. The

Cramer's V effect size was 0.21. Using guidelines from Cohen (1988) and Vaske (2008), this effect size suggests that differences among sites in the proportions of males and females were between "small" and "medium" or "minimal" and "typical," respectively. The average age of respondents was 37 years, but those at Diamond Head Beach Park (M = 33years) and Waimea Bay (M = 34 years) were slightly younger than those at the other sites (M = 36-40)years), F(5, 1,293) = 8.97, p < 0.001. The eta ( $\eta$ ) effect size of 0.18 suggests that these differences were relatively "small" (Cohen, 1988) or "minimal" (Vaske, 2008). The majority of respondents (53%) were local residents of Hawai'i; 37% lived in other states and 10% in other countries. In total, 65% of respondents at Sans Souci/Kaimana Beach and 73% at Diamond Head Beach Park were residents of Hawai'i, whereas 35-51% of those at the other sites lived in this state,  $\chi^2$  (10, N = 1,320) = 103.23, p < 0.001, V = 0.19. Most respondents (75%) had previously visited the site where they were surveyed; only 25% were first time visitors on the day they were contacted. Slightly fewer respondents were repeat visitors to Shark's Cove and Three Tables (59%) compared to the other sites (68–86%),  $\chi^2$  (5, N=1,419) = 65.52, p < 0.001, V = 0.21.<sup>2</sup>

#### Reported Encounters

The largest number of respondents at Kailua Beach Park reported that the photographs depicting 100 (36%) or 200 (34%) people per 500 × 200 yards represented encounter levels they experienced most often at this site (Table 1). These encounter levels were similar to those at both Sans Souci/Kaimana Beach and Waimea Bay, but larger proportions of respondents at these sites encountered 200 people per  $500 \times 200$  yards (43% and 55%, respectively). At Three Tables and Shark's Cove, most respondents encountered 50 (28% and 31%, respectively) or 100 (43% and 32%, respectively) people per  $500 \times 200$ yards. The site with the lowest encounters was Diamond Head Beach Park where 70% encountered 50 people per  $500 \times 200$  yards. There was a significant difference among sites in these percentages of reported encounters,  $\chi^2$  (25, N=1,338)=339.42, p < 0.001. The Cramer's V effect size of 0.23 suggests that the strength of this difference can be characterized as "small" to "medium" (Cohen, 1988) or

	Survey Site Location <sup>1</sup>								
Encounters <sup>2</sup>	Kailua Beach Park	Diamond Head Beach Park	Sans Souci/ Kaimana Beach	Waimea Bay	Three Tables	Shark's Cove			
0 people/500 × 200 yards	3	9	2	1	1	1			
50 people/500 $\times$ 200 yards	21	70	12	8	28	31			
100 people/500 $\times$ 200 yards	36	15	28	22	43	32			
200 people/500 × 200 yards	34	5	43	55	25	24			
400 people/500 × 200 yards	6	1	14	14	3	11			
800 people/500 $\times$ 200 yards	0	0	1	0	0	1			
Mean (people/500 $\times$ 200 yards) <sup>3</sup>	141ª	63 <sup>b</sup>	181°	192°	118 <sup>a</sup>	146 <sup>a</sup>			

Table 1Reported Encounters at Each Site

<sup>1</sup>Cell entries are percentages (%) unless specified as means.

<sup>2</sup>Respondents were asked which photograph most accurately represented what they saw most often at the site on the day they were surveyed.  $\chi^2$  (25, N=1,338) = 339.42, p < 0.001, V = 0.23.

 ${}^{3}F(5, 1, 332) = 38.91, p < 0.001, \eta = 0.36$ . Means with different letter superscripts across the row differ at p < 0.05 using Tamhane's T2 post hoc tests for unequal variances.

"minimal" to "typical" (Vaske, 2008). In addition, the average (i.e., mean) number of encounters differed substantially among sites, F(5, 1,332) = 38.91, p < 0.001,  $\eta = 0.36$ . Tamhane's T2 post hoc tests for unequal variances showed that compared to the other sites, the average number of encounters was significantly higher at both Sans Souci/Kaimana Beach (M = 181 people per  $500 \times 200$  yards) and Waimea Bay (M = 192), whereas encounters were much lower at Diamond Head Beach Park (M = 63).

## Perceived Crowding

In total, 55% of respondents felt crowded (3–9 on scale) at Shark's Cove; 47% felt crowded at Sans Souci/Kaimana Beach; 43% and 42% felt crowded at Waimea Bay and Three Tables, respectively; and fewer than 40% felt crowded at Diamond Head Beach Park (39%) and Kailua Beach Park (38%) (Table 2). Average levels of perceived crowding differed significantly among sites, F(5, 1,336) = 2.60, p = 0.024. The  $\eta$  effect size of 0.10, however, suggests that this difference was "small" (Cohen, 1988) or "minimal" (Vaske, 2008). Scheffe post hoc tests for equal variances showed that, on average, Shark's Cove had the highest crowding (M = 3.28 or "slightly crowded") and Kailua Beach Park had the lowest (M = 2.61 or "not at all crowded").

#### Encounter Norms

The social norm curves of respondents at each site are illustrated in Figure 4 and described in Table 3. As shown by the minimum acceptable conditions on the norm curves (i.e., points where curves cross the neutral point), there was a significant difference among sites in normative standards regarding use densities, F(5, 1, 326) = 23.45, p < 0.001. The  $\eta$  effect size of 0.29 suggests that this difference was "medium" (Cohen, 1988) or "typical" (Vaske, 2008). Tamhane's T2 post hoc tests indicated that respondents felt that significantly higher use densities should be allowed at Waimea Bay (M = 381 people per 500  $\times$  200 yards), whereas much lower use densities should be allowed at Diamond Head Beach Park (M = 206). Minimum acceptable conditions at the other sites ranged from 318 (Shark's Cove) to 366 (Sans Souci/Kaimana Beach) people per  $500 \times 200$  yards. Norm crystallization (i.e., agreement) also differed among sites. Crystallization was highest at Shark's Cove and lowest at Diamond Head Beach Park. This is represented by the lowest average standard deviations for the norm curve at Shark's Cove (SD = 1.97) and highest at Diamond Head Beach Park (SD = 2.17) compared to the other sites (SD = 2.06 - 2.15). The Levene's test for homogeneity revealed a significant difference

Crowding <sup>2</sup>	Survey Site Location <sup>1</sup>								
	Kailua Beach Park	Diamond Head Beach Park	Sans Souci/ Kaimana Beach	Waimea Bay	Three Tables	Shark's Cove			
1 Not at all crowded	44	44	35	37	37	27			
2 Not at all crowded	18	17	18	20	21	18			
3 Slightly crowded	14	16	17	12	19	15			
4 Slightly crowded	5	7	11	10	7	14			
5 Moderately crowded	7	3	5	6	3	10			
6 Moderately crowded	4	4	5	8	7	5			
7 Moderately crowded	5	3	6	4	2	6			
8 Extremely crowded	1	3	2	2	2	4			
9 Extremely crowded	2	3	1	1	2	1			
Mean (on 1–9 scale) <sup>3</sup>	2.61ª	2.65ª	2.90 <sup>ab</sup>	2.86 <sup>ab</sup>	2.68ª	3.28 <sup>b</sup>			

Table 2	
Perceived Crowding at Each	Site

<sup>1</sup>Cell entries are percentages (%) unless specified as means.

<sup>2</sup> Respondents were asked to what extent they felt crowded by the total number of people at the site on the day they were surveyed measured on a 9-point scale of 1 "not at all crowded" to 9 "extremely crowded."  $\chi^2$  (40, N = 1,342) = 59.36, p = 0.025, V = 0.09. <sup>3</sup> F(5, 1,336) = 2.60, p = 0.024,  $\eta = 0.10$ . Means with different letter superscripts across the row differ at p < 0.05 using Scheffe post hoc tests for equal variances.

in crystallization among sites, F(5, 1, 326) = 4.29, p < 0.001. Norm intensities (i.e., importance) also differed among sites, with the highest at the Pūpū-kea MLCD sites (Waimea Bay = 14.31, Three Tables = 14.62, Shark's Cove = 14.49) and lowest

at Diamond Head Beach Park (12.91), F(5, 1,326) = 11.74, p < 0.001,  $\eta = 0.18$ . Respondents felt that use densities were most important at the Pūpūkea MLCD sites and least important at Diamond Head Beach Park.



Figure 4. Mean social norm curves for densities of people at each site.

	Survey Site Location									
Norm Curve Characteristics	Kailua Beach Park	Diamond Head Beach Park	Sans Souci/ Kaimana Beach	Waimea Bay	Three Tables	Shark's Cove	F	df	р	η
Norm intensity <sup>1</sup>	13.69ª	12.91 <sup>b</sup>	13.59ª	14.31°	14.62°	14.49°	11.74	5, 1326	< 0.001	0.18
Minimum acceptable condition <sup>2</sup>	340.21ª	206.32 <sup>b</sup>	365.94ª	381.29°	329.14 <sup>ad</sup>	318.12 <sup>ad</sup>	23.45	5, 1326	< 0.001	0.29
Crystallization <sup>3</sup>	2.14	2.17	2.15	2.06	2.10	1.97	4.294	5,1326	< 0.001	

# Table 3 Social Norm Curve Characteristics at Each Site

<sup>1</sup>Cell entries are mean intensity at each site measured as the total distances from the neutral line across all points on the curve, independent of the direction of the evaluation (max. = 24). Means with different letter superscripts across the row differ at p < 0.05 using Tamhane's T2 post hoc tests.

<sup>2</sup>Cell entries are mean number of people per  $500 \times 200$  yards at each site where the norm curve crosses the neutral "0" line. Means with different letter superscripts across the row differ at p < 0.05 using Tamhane's T2 post hoc tests.

<sup>3</sup>Cell entries are average of the standard deviations of all points comprising each norm curve.

<sup>4</sup>Represents the *F* value for the Levene's test for homogeneity.

# Relationships Among Encounters, Norms, and Crowding

At all six sites, most respondents (79–89%) reported encountering fewer people than their norm (Table 4). The largest proportion of respondents reported encountering more people than their norm at Shark's Cove (21%) and the smallest proportion encountered more than their norm at Three Tables (11%). Consistent with the concept of norm congruence, perceived crowding at each site was significantly higher for respondents reporting more encounters than their norm (M=3.36-4.68 or "slightly crowded"

to "moderately crowded") than those encountering fewer than their norm (M=2.46–2.99 or "not at all crowded" to "slightly crowded"), t(124-407) = 2.44-4.20, p = 0.015 to < 0.001. Perceived crowding was highest for respondents who reported encountering more people than their normative standard. The point-biserial correlation ( $r_{\rm pb}$ ) effect sizes ranged from 0.15 to 0.29, suggesting that the strength of these relationships among encounters, norms, and perceived crowding can be characterized as "small" to "medium" (Cohen, 1988) or "minimal" to "typical" (Vaske, 2008).

Table 4

Relationship Among Reported Encounters, Norms, and Perceived Crowding at Each Site

Survey Site Location	Reported Encounters Compared to Norm <sup>1</sup>		Mean Crow					
	Saw Fewer Than Norm	Saw More Than Norm	Saw Fewer Than Norm	Saw More Than Norm	t dj	df	р	r <sub>pb</sub>
Kailua Beach Park	84	16	2.46	3.36	3.32	407	< 0.001	0.18
Diamond Head Beach Park	85	15	2.47	3.41	4.20	142	< 0.001	0.25
Sans Souci/Kaimana Beach	85	15	2.76	3.62	2.44	250	0.015	0.15
Waimea Bay	84	16	2.69	4.16	3.27	175	< 0.001	0.24
Three Tables	89	11	2.53	4.31	3.11	124	0.002	0.27
Shark's Cove	79	21	2.99	4.68	3.48	129	< 0.001	0.29

<sup>1</sup>Cell entries are percent (%) who encountered either fewer than or more than their norm.

<sup>2</sup> Cell entries are mean perceived crowding scores on a 9-point scale of 1 "not at all crowded" to 9 "extremely crowded" for those who encountered either fewer than or more than their norm.

#### Discussion

This article examined encounters, norms, crowding, and the congruence among these issues at six coastal and marine sites in Hawai'i. Encounters and crowding differed among sites with 38-55% of respondents feeling crowded. On average, however, respondents encountered fewer than half as many people (i.e., 63-192 per 500 × 200 yards) compared to their normative standard for the maximum use density they felt should be allowed at each site (i.e., 206-381 people per 500×200 yards). Only 11-21% of respondents encountered more people than their normative standard, and these respondents felt more crowded than those who encountered fewer than their norm. Crowding and encounters were important indicators at each site, and there was relatively high agreement regarding use densities that should and should not be allowed at each site. These findings have implications for management and future research.

#### Implications for Management

From a management perspective, results showed that at five sites (Kailua Beach Park, Diamond Head Beach Park, Sans Souci/Kaimana Beach, Waimea Bay, Three Tables) between 38% and 47% of respondents felt crowded. Shelby et al. (1989) and Vaske and Shelby (2008) recommended that when 36-50% of users feel crowded at a site, it should be characterized as "low normal." Under these circumstances, major access, displacement, and crowding problems are unlikely to exist and the areas may offer unique low-density experiences (Vaske & Shelby, 2008). At Shark's Cove, however, 55% of respondents felt crowded, suggesting that this site can be considered "high normal"; although it is not exceeding its social capacity, it may be tending in that direction and should be monitored to reduce any future problems (Vaske & Shelby, 2008).

One approach for monitoring and mitigating these use-related issues involves ensuring that conditions do not exceed user norms. Use densities were important to respondents at these sites (i.e., norm intensity) and there was relatively high agreement (i.e., crystallization) regarding conditions that should and should not be allowed to occur. On average, respondents possessed normative standards that use densities per  $500 \times 200$  yards exceeding 206 people at Diamond Head Beach Park, 318 people at Shark's Cove, 329 people at Three Tables, 340 people at Kailua Beach Park, 366 people at Sans Souci/Kaimana Beach, and 381 people at Waimea Bay should not be allowed to occur. Respondents, on average, encountered fewer than half as many people compared to these maximum use densities and only 11–21% saw conditions that exceeded these standards. These results suggest that although there does not appear to be a major problem with current use densities at these sites, managers should ensure that proactive steps such as active monitoring are taken so that these standards are not frequently exceeded in the future.

Although managing for levels equal to or better than these standards may help to alleviate impacts such as crowding in tourism and recreation settings, this represents a double-edged sword for managers. On one hand, implementing standards to reduce encounters and crowding may improve user experiences. On the other hand, these standards may result in many people being restricted or displaced from an area. In addition, reservation and quota systems, which are commonly used for restricting use and managing crowding, are often not supported by many users and can be costly to implement and enforce (Manning, 2007). Alternatives such as spatial or temporal zoning may be more feasible for managing standards of quality and reducing encounters and crowding, especially if standards for use densities at any of these sites were to be frequently exceeded in the future. These types of approaches have proven to be useful at a number of tourism and recreation sites including national parks, alpine ski areas, and marine protected areas (see Manning, 2011; Needham & Rollins, 2009; Orams, 1999; Weaver, 2008, for reviews).

These results showed that 38–55% of respondents felt crowded, but only 11–21% had their encounter norms surpassed. This suggests that density of use is only one indicator of crowding at these sites and other indicators, such as possible uneven distribution of this use and depreciative behavior of users, may also influence crowding. To reduce crowding, managers could address these types of issues by carefully assessing other possible causes of crowding at each site and implementing strategies such as improving interpretive and educational information to inform users about appropriate behavior and alternative locations to visit within these sites.

The site-specific findings presented here also suggest the need for managing individual sites separately. Shark's Cove, for example, had the highest crowding (55%), largest proportion of users encountering more people than their norm (21%), among the highest average encounter rates (146 people per  $500 \times 200$  yards) and most restrictive norms (318) people per 500 × 200 yards), and highest crystallization or agreement about conditions that should and should not be allowed to occur. Norm intensity was also high at Shark's Cove. Use densities, therefore, are an important issue and should be monitored carefully at this site. On the other hand, respondents at Diamond Head Beach Park had among the lowest encounters and crowding, the least agreement about conditions that should and should not be allowed, and considered use densities to be the least important at this site. Other indicators, therefore, may warrant more attention at this site.

In addition, these findings highlight the importance of examining all three concepts (i.e., reported encounters, norms, perceived crowding) to inform, establish, and manage standards of quality related to visitation and social capacity issues. Indicators such as encounters help to describe existing conditions and evaluative dimensions such as perceived crowding can further describe user feelings about existing impacts, but by themselves do not enable standards to be set based on what is deemed appropriate or inappropriate (Vaske & Donnelly, 2002). The normative approach used widely in tourism and recreation research facilitates an understanding of appropriate and inappropriate conditions, thereby providing a basis for formulating standards of quality that can be used for informing management actions (Manning, 2011; Shelby et al., 1996).

# Implications for Research

From a research perspective, results paralleled Vaske and Donnelly's (2002) comparative analysis of 13 studies; when respondents' reported encounters exceeded their norms, perceived crowding was statistically higher compared to when encounters were less than their norms. Results also showed that encounters and crowding differed among sites, which is consistent with findings of previous tourism and recreation studies (e.g., Cole & Stewart, 2002; Needham et al., 2004; Patterson & Hammitt, 1990; Vaske, Donnelly, & Petruzzi, 1996). These sitespecific results are not only similar to findings of studies conducted in other settings, but they also underscore the importance of tailoring survey questions to specific sites (e.g., Waimea Bay, Three Tables, Shark's Cove) within a larger management area (e.g., Pūpūkea MLCD), as opposed to more general survey questions and methods that typically compel users to average their perceptions and experiences across an entire management area (Needham et al., 2004).

Although 38-55% of respondents reported feeling crowded at these sites, only 11-21% encountered more people than their norm. This finding is consistent with some previous research showing that users may report feeling crowded even if their encounter norms have not been exceeded (Vaske & Donnelly, 2002). There are a few possibilities for why the number of users who felt crowded exceeded the number who encountered more people than their norm. First, people are typically not evenly distributed at most sites. Instead, they often gather together in groups within close proximity to each other. This close proximity of people may cause users to feel crowded by just a few groups even though there are fewer people in total than they would tolerate. A respondent, for example, may be surrounded by three or four groups of people who make this individual feel crowded, but the total density of people at the site may still be lower than his or her norm for this site. Future research is needed to determine if uneven distribution of people and their proximity to respondents influences encounters and crowding (Bell et al., 2011).

A second possible explanation for why respondents felt crowded, but did not encounter more people than their norm is that many could have underestimated the total density of people at each site. In many tourism and recreation settings, it can be challenging to see and accurately count the actual number or density of people. Studies have shown that in high use areas, users often underreport encounters compared to actual use levels, and this underestimation influences normative standards and management strategies (e.g., Bell et al., 2011; Shelby & Colvin, 1982). An individual, for example, may feel that no more than 200 people per  $500 \times 200$  yards should be allowed at a site (i.e., their norm), but report seeing 150 people per  $500 \times 200$  yards when there are actually 250 people per 500×200 yards present. This individual's norm would not be surpassed by his or her reported encounters, and if this trend is consistent across users, managers might erroneously conclude that normative standards are not being violated and that management action is unnecessary, when the opposite is actually true. Reported encounters, however, are still important regardless of whether they reflect the actual density of use because they represent each individual's perceived reality and also influence the quality of their experiences (Manning, 2007, 2011). Research should examine the extent that this trend occurs in tourism and recreation, and how it may influence relationships among encounters, normative standards, and crowding.

Third, it is possible that some potential underestimation of encounters stems from the photographs used for measuring encounters and norms. In this study, photographs depicted 0, 50, 100, 200, 400, and 800 people per  $500 \times 200$  yards to represent a realistic range of possible use densities at each site, but gaps between these numbers could have generated some error in user responses. A person who encountered 300 people per  $500 \times 200$  yards, for example, would have been forced to choose between the images of 200 and 400 people, causing him or her to slightly underestimate or overestimate the density of people encountered. Given that these reported encounters were used for determining if encounter norms were violated, some respondents may have been slightly misclassified. Those who underestimated their encounters, for example, may have been classified as seeing fewer people than their norm when they likely encountered more than their norm. This limitation applies to all studies using photographs representing a subset of scenarios (see Manning, 2007, 2011; Manning & Freimund, 2004; Needham & Rollins, 2009, for reviews), but showing all possible use density scenarios exponentially increases the number of images needed and dramatically increases respondent burden. Research is needed to empirically examine any effects of these subsets of scenarios on measurement of encounters and norms.

In this study, these photographs measuring the social indicator of use density also represent a subset of all possible indicators of tourism and recreation use in coastal and marine settings. Norm intensity was relatively high, suggesting that use density is an important or salient indicator at these study sites. However, other social indicators such as noise, type of activity group encountered, and discourteous behavior may also be important. More research is required to examine other social indicators in these settings. Identical to past studies (e.g., Freimund et al., 2002; Manning et al., 1999; Needham et al., 2004), these photographs also depicted the number of people per unit area (i.e.,  $500 \times 200$  yards). One approach for translating norms into standards of quality for an entire site would be to divide the site's total area by the corresponding unit standard (i.e.,  $500 \times 200$ yards) and then multiply by the minimum acceptable condition. When adopting this approach, however, caution should be exercised because people seldom space themselves evenly across a site. Research is required, therefore, to explore the extent that this approach can extrapolate to a landscape level. These images also depicted static representations of indicator conditions at each site and techniques using videos or other graphics and multimedia may depict more realistic conditions (Freimund et al., 2002; Manning & Freimund, 2004).

The minimum acceptable condition (i.e., standard of quality) at each site was represented as indicator conditions where norm curves crossed the neutral line, which is consistent with most studies (see Manning, 2007, 2011; Shelby et al., 1996; Vaske et al., 1986, for reviews). An issue of debate, however, is whether standards should be based on alternative points along the curves. Should standards be based, for example, on conditions that the largest number of users feel should be allowed (i.e., highest points on the curves such as 0 or 50 people per  $500 \times 200$ yards) or should they be based on impacts that fewer than the majority of users feel should be allowed? Basing standards on conditions that the largest number of users feel should be allowed is often impractical (Manning, 2007). In this study, for example, this would result in almost all people being prohibited from each site. Conversely, if standards are based on impacts that only a small proportion of users feel should be allowed, conditions may deteriorate to a point where most people are displaced to other settings and may not return. It remains an issue for managers and researchers to specify clear objectives for a site and then collaborate to determine and monitor indicators and standards of quality that meet these objectives (Ceurvorst & Needham, 2012a).

Finally, results presented here are limited to six sites on one Hawaiian island, including a state marine protected area (Pūpūkea MLCD), a special resource use management area (Waikīkī Diamond Head Shoreline FMA), and a relatively unregulated county beach park (Kailua Beach Park). These areas are generally representative of most coastal and marine tourism and recreation settings in Hawai'i, and could be considered along a continuum of management from an area protected and managed primarily for conservation (Pupukea MLCD) to a beach park that is managed mostly for human use (Kailua Beach Park). Results, however, may not generalize to all coastal and marine settings where tourism and recreation are common. This study, for example, found low to moderate levels of crowding and relatively few users who encountered more people than they felt should be allowed at each of these sites. Studies in other marine areas, however, have reported much higher crowding with many users encountering more than their norm (e.g., Bell et al., 2011). Encounters, norms, and crowding among other activity groups in different coastal and marine environments, therefore, remain topics for further empirical examination.

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#### Notes

<sup>1</sup>Debriefing with respondents during questionnaire pretests suggested that they had no difficulty interpreting these scales and photographs used for measuring encounter norms.

<sup>2</sup>The potential influence of these sociodemographic characteristics on respondent encounters, norms, and crowding was examined at each site. Only 13 of 72 (18%) tests for differences (i.e., 4 sociodemographic questions \* 3 concepts \* 6 sites = 72 tests) were significant at p < 0.05, and there were no consistent patterns in these differences. Effect sizes ( $V, r_{pb}$ ) also ranged from only 0.01 to 0.27 and averaged 0.08. Using guidelines from Cohen (1988) and Vaske (2008), these effect sizes suggest that the strength of any relationships among sociodemographic characteristics and concepts examined in this article were generally "small" or "minimal" at each site. Taken together, sociodemographic characteristics did not have any substantial influence on evaluations of encounters, norms, and crowding at each site.

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