

Social Carrying Capacity in Recreational Settings: A Literature Review

M. Watson



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SOCIAL CARRYING CAPACITY IN RECREATIONAL SETTINGS:
A LITERATURE REVIEW

MEREEN WATSON
October 1988

SUMMARY

More than twenty years of research on the concept of social carrying capacity has yielded specific points about which there is general agreement and which GBRMPA should take into consideration in its attempt to manage increasing visitor use of the Marine Park.

- The establishment of visitor limits, alone, has proven to be an ineffective strategy for recreation management concerned with carrying capacity.
- Perceptions of crowding have more to do with the nature of visitor interactions, the settings and visitor attributes and expectations than they do with visitor density.
- A recreation management program using carrying capacity concepts will involve (1) research on visitor experiences, norms, goals and their perceptions of social impacts, (2) the establishment of clear and specific management objectives about desired conditions and (3) setting standards by which to measure conditions over time.
- Social carrying capacity research should: have clear objective measures, be longitudinal, study whole recreational regions and not be based on reported visitor satisfaction.

KEYWORDS: social carrying capacity, crowding, recreation management

Technical memoranda are of a preliminary nature, and represent the views of the author, not necessarily those of the Great Barrier Reef Marine Park Authority.

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EXECUTIVE SUMMARY

This report introduces the concept of 'social carrying capacity' as it is presented in the literature to date. It is intended to be used as a conceptual overview for managers rather than as a comprehensive academic critique. The papers were selected using a GBRMPA library search of recently published material in recreation and leisure journals.

The major points on social carrying capacity relevant to the management of the Marine Park are as follows:

- Social carrying capacity for the Marine Park will not be effectively established simply by setting visitor limits at recreation settings.
- A program to establish social carrying capacity must include: (1) research about recreationist experiences, norms and goals and their perceptions of social impacts, (2) the establishment of clear management objectives for desired visitor experiences and recreational setting attributes, and (3) standards by which to measure conditions over time.
- Perceptions of crowding have more to do with the nature of the interactions, the settings and recreationists' attributes and expectations than they do with user density.
- Social carrying capacity research should
 - . have clear objective measures,
 - . be longitudinal, that is, be conducted over a long time frame,
 - . study recreational regions rather than just one setting in order to observe recreational displacement, and
 - . not be based on visitor satisfaction.
- Management objectives must be very specific about desired conditions.
- The most useful models that may be used for applying the social carrying capacity appear to be Limits of Acceptable Change (LAC) and the Recreation Opportunity Spectrum (ROS). Further attention is warranted.
- Management response to unacceptable or crowded conditions in recreation settings may include an array of actions that do not involve use limitations.

Section 1 of this report elaborates on the above points as they are addressed by the literature. The reader should gain a fairly quick overview of the concept of social carrying capacity from this section. The vast majority of the research that has been conducted on social carrying

capacity has been in U.S. wilderness settings. As such the details of visitor use and preferences are not directly applicable to the Australian Marine Park setting. However, the material should help GBRMPA managers to approach this concept armed with some foresight about the nature of the study of visitor experiences, goals and perceptions and the impacts of encounters between different groups.

Summaries of the literature are located in Section 2. Thirty-nine papers and one book were reviewed. Papers are summarised where their content was instructive and not repetitious of points made in other papers. Two of the papers themselves review and synthesise years of relevant literature on (1) social carrying capacity (Graefe, Vaske & Kuss 1984a) and (2) crowding (Manning 1986) in recreational settings. The reader is referred to these papers in particular for a useful introduction to and synopsis of these topics. A copy of every paper reviewed has been placed on file with GBRMPA.

In Section 3 eighteen research reports that have been submitted to GBRMPA over the years are reviewed for their relevance to the concept of social carrying capacity in the Marine Park. Each of the reports was reviewed for its attention to visitor use, experiences and perceptions, specifically:

- characteristics of visitors to the Marine Park,
- the nature of visitor use (party size, lengths of stay, activities engaged in, spatial and temporal distribution),
- experiences or goals sought by participation in certain activities at specific settings, and
- social impact indicators such as numbers of contacts of a particular type, numbers of contacts at particular times or places, and perceived crowding at particular types of locations.

Although very few GBRMPA research reports address the concept of carrying capacity by name, many include information that is relevant to the GBRMPA for the development of that concept for use in the Marine Park. Unfortunately much of the pertinent data for specific regions or sites is not sufficiently thorough to stand alone.

It is recommended that GBRMPA nominate a number of representative reef complexes in the Marine Park and begin, as soon as possible, long term research on and monitoring of:

- the characteristics of the many different recreationists who visit those areas,
- the experiences each type of recreationist seeks,

- the activities they undertake to achieve those experiences, and
- the physical setting attributes and the levels and types of social impacts that substantially influence those experiences.

Such a program is a prerequisite for the development of defensible policies that will safeguard the diversity of experiences managers wish to provide for visitors to the Marine Park.

1 SOCIAL CARRYING CAPACITY CONCEPTS

1.1 DEFINITION OF SOCIAL CARRYING CAPACITY

Despite the varied and opinionated papers on the subject of social carrying capacity, there has developed a set of conceptual points about which there is general agreement. The widely accepted definition of social carrying capacity is 'the level of use beyond which experience parameters exceed acceptable levels specified by evaluative standards' (Graefe, Vaske & Kuss 1984a). During the twenty years over which this concept has been researched, the approach for establishing social carrying capacity has been in evolution. No longer is the emphasis on user numbers. It is now understood that carrying capacity for any recreational setting is not a fixed value (Becker et al. 1984; Bultena 1981; Stankey 1978; Stankey & McCool 1984). Nor is there one widely accepted formula for determining such a level. Rather the determination of social carrying capacity is ultimately a value judgement made by managers based on (1) the nature of the various experiences that managers wish to provide for visitors and (2) the standards by which managers have chosen to measure those experiences.

Stankey and McCool (1984) state that the essential elements of the concept of carrying capacity include the ideas that (1) recreationists seek multiple satisfactions from their chosen activities, and dependent upon these, encounters with others might add, detract, or be neutral in their effect on those experiences; (2) visitor satisfaction is a function of more than use levels - the type, frequency, and location of encounters are important intervening variables; (3) clearly stated management objectives are essential to identifying carrying capacities; and (4) the emphasis in management needs to be on the outputs, the experiential and environmental conditions desired, not on inputs such as use levels.

For the Marine Park manager, the tasks must be: to identify the experiences that the various recreationists are seeking in the Marine Park and how encounters with others affect those experiences, to seek understanding about the type, frequency and location of encounters that are occurring at given settings, and to identify clear management objectives for each management area in the Marine Park with emphasis on the desired experiential and environmental conditions.

1.2 RECREATIONISTS' NORMS

A 'norm' is defined by Vaske et al. (1986) as "any standard or rule that states what human beings should or should not think, say or do under given circumstances". Norms may be social (shared by members of a social group) or personal (according to an individual's own expectations and ideals). Conflict results when individuals with

contrasting standards interact, which can occur between people engaged in the same activities as well as those engaged in different activities.

Understanding the norms of recreationists is helpful for understanding the differing perceptions of crowding. Not surprisingly, researchers have found that different groups of recreationists have different recreational experience norms for acceptable distances between individuals, for interactions at a campsite, and for perceived levels of ecological impact. It has also been shown that there are some consistencies in the norms for certain types of experiences despite differences in locations. Using the Marine Park as an example, it would be possible to study reef divers from one region and infer that reef divers in a similar situation but a different location would share similar norms. Groups of recreationists may share personal, attitudinal and behavioural characteristics which lead to shared norms about crowding and other perceptions. (Vaske et al. 1986; Shelby 1981; Manning 1985) Additionally, people are capable and willing to specify their norms when asked.

In addition to providing information on encounter preferences held by recreationists, norms can be used by managers as examples of 'ideal conditions' for a given setting. "Coupled with an assessment of the existing situation, such norms can be used to develop realistic management objectives." (Stankey & McCool 1984)

1.3 RECREATIONISTS' GOALS

Managers will also be helped by an understanding of the goals of people who use recreational settings. One study conducted on river recreationists (Schreyer & Roggenbuck 1978) found that those people with strong expectations for experiencing 'stress release/solitude' and 'self awareness' on the river trip showed the greatest sensitivity to crowding. To those seeking 'action/excitement' crowding was much less an issue. Along similar lines, Graefe et al. (1986) found that highly specialised hikers feel more crowded and prefer to see fewer people than did less specialised hikers. These preferences were consistently the strongest predictors of perceived crowding, rather than numbers of contacts.

An interesting paper by Vaske et al. (1982) made distinctions between the goals held by 'consumptive versus non-consumptive' recreationists. Consumptive recreationists such as fishermen or hunters have one clear and overriding goal over which they have little control - the capture of the desired commodity. Those recreationists with more diffuse goals (seeing nature, getting away from routine, or being with friends) have more control over the desired outcome of their experiences and thus experience more success in reaching their goals. As a result fishermen are less likely on average to express satisfaction about their recreational experiences.

The definition of recreationists' experience goals is an integral aspect in the development of a Recreation Opportunity Spectrum for management of recreation areas. This model is applied with success in U.S. terrestrial wilderness settings by the U.S. Forest Service and in the New South Wales National Park Service in Australia. It merits the attention of the GBRMPA for adaptation in the Marine Park. See later discussion on 'Models for Application of Social Carrying Capacity'.

1.4 CROWDING

All the papers in this review which address the subject of crowding in recreational settings (Absher & Lee 1981; Bultena et al. 1981; Graefe et al. 1984a, 1986; Gramman 1982; Knudson & Curry 1981; Manning 1985, 1986; Schreyer & Roggenbuck 1978; Stankey 1973) support the finding that "crowding is less a response to social density than a product of the interaction setting, how it is defined, and the particular attributes, preferences, and expectations of the people present" (Absher & Lee 1981). Manning (1985, 1986) offers a comprehensive list of the factors which give a basis to people's perceptions of crowding:

- (a) visitor characteristics - their motivations, preferences, and expectations, their levels of experience, their attitudes toward wilderness, and their demographic characteristics;
- (b) characteristics of the recreationists that are encountered - the type and size of the group, the group's behaviour, and perceptions of likeness between the groups; and
- (c) situational variables - type of area where encounter occurred, location of the encounter within the area such as trail versus campsite, and environmental factors of the area such as proximity of campsites or insufficient facilities.

Different recreationist groups are characterised by different tolerances to social impacts. Researchers have identified a number of things that distinguish these groups, including - whether or not the groups encountered are using motorised equipment, the nature of their method of travel, their group size, the specialisation of their activities, and if their behaviour is considered objectionable, for example, being insensitive to or degrading the environment.

Graefe, Vaske and Kuss (1984a) synthesised the results of work by many researchers to produce a table listing 'sensitive versus tolerant user groups'. Sensitive user groups include canoeists, hikers, skiers, fishermen, backpackers, wilderness users, small groups, frequent participants, experienced visitors, specialists, wilderness purists, and nature/solitude seekers. Tolerant user groups include motorboaters, trailbikers, snowmobilers, off-road vehicle users, those who engage in

water-related sports other than fishing, horseback riders, developed recreation area users, larger groups, infrequent participants, inexperienced visitors, generalists, urbanists and thrill seekers.

This grouping should serve as an invitation to the Marine Park managers to conduct similar studies to highlight the differences in tolerances to crowding between the various users of the Marine Park.

1.5 RESEARCH FOR SOCIAL CARRYING CAPACITY

1.5.1 The Need for Objective Measures

Past studies have shown that managers' intuitions and users' opinions about recreational values often differ (Driver 1976). To avoid making decisions that are not consistent with the goals and preferences of recreationists, Driver called for the development of more objective measures for:

- (1) the attributes of the physical and social settings that are perceived by potential users to be necessary for a quality recreation experience,
- (2) the type and number of recreational experiences sought from specific recreation environments,
- (3) the characteristics of potential and actual recreationists having demands for different types of recreation experiences and the cause-effect relationships between these characteristics and recreation demand, and
- (4) the personal experiences and benefits realised from specific recreation opportunities.

That challenge is pertinent to the Marine Park today. Information should be sought about the settings necessary for quality Reef experiences, about the type of experiences people seek from specific Reef environments, about the nature of the recreationists who plan to or do use the Reef and about the specific experiences that are being realised.

In their review of twenty years of literature on social carrying capacity, Graefe et al.(1984a) conclude - "All conceptual models converge on the notion that understanding quality in the recreation experience requires an initial understanding of the goals or types of experiences sought by visitors." This is a key role of research for social carrying capacity. Burch (1984), quoting Stankey, makes the point -

"Carrying capacity ... is not a scientific concept, but a management notion. The research role ... is describing the social and ecological consequences of alternative use levels, thus providing the opportunity for managers to judge whether these consequences are consistent with area management

objectives. ...while research can help managers who are concerned with carrying capacity, it cannot supply answers about what the carrying capacity of a site is or should be."

Graefe et al.(1984b) suggest that the information to be obtained include the amount, type and distribution of use as well as the appropriate impact indicators. Measurements must be specific. Research on visitor use must address party size, length of stay, activities engaged in, and spatial and temporal distribution of use. Research on visitor impacts should record number of contacts of a particular type, number of contacts at particular times or places, and perceived crowding at particular types of locations.

1.5.2 Need for Longitudinal Research

Research in a particular area will not be completed after one examination. The relationships documented may change over time due to changes in the environment, in the recreationists themselves or in the recreation opportunities available. In this collection of reviewed papers, at least three sets of researchers emphasised the importance of doing longitudinal studies (Schreyer & Roggenbuck 1978; Graefe et al. 1984b; Vaske et al. 1980). Vaske states "studies conducted during a single time frame will consistently find a majority of satisfied users, regardless of the number of recreationists present. To learn more about the impact of crowding on the recreational experience, it is necessary to locate resources, that, for the moment do not receive extensive usage, but where density levels are projected to increase. By following the initial visitors through the area's various stages of development, it is then possible to document the impact of increased visitor numbers on the perceived quality of the experience."

1.5.3 Recreational Displacement

Although study results are not uniform there is reason to suspect that rising use levels may cause recreational displacement (Graefe et al.1984a; West 1981; Vaske et al. 1980; Becker 1981). That is, when long time users of a setting encounter rising use levels at that location they will feel more crowded than do relative newcomers and seek other settings to satisfy their preference for a less crowded experience.

In light of this possibility, GBRMPA is advised to carry out research on the recreational use of whole reef systems or groups in order to get an accurate understanding of use patterns over time. Becker's study (1981) illustrates the problem in doing otherwise. Users of two different rivers in one recreation region were studied (1) to assess how river densities affected the choice of river and the time of visits by user groups and (2) to determine the criteria people use to evaluate their preference for one or the other river. Users on both rivers expressed equal satisfaction. The author states - "If viewed as

individual (unrelated) rivers, findings would appear to sustain the idea of no relationship between area density and user satisfaction. However, when viewed as a system, findings sustain the idea of user movement to achieve a desired social experience, or preferred environmental setting. Users are purposefully avoiding areas of each river because of high use levels or perceived environmental conditions." Becker warns managers that letting use levels increase and managing for those higher levels will result in only "density-tolerant" activities being available so that those preferring other experiences will be excluded entirely.

1.5.4 Visitor Satisfaction

A second and related point must be made - that visitor satisfaction is not considered to be a useful measure for carrying capacity. New visitors appear to expect and be tolerant of greater number of recreationists. As a result, there is a strong likelihood in a setting where usage levels are rising that the character of the experience is changing markedly despite reports of high user satisfaction. See Vaske et al. (1980), Heberlein (1977), Knudson and Curry (1981) and Graefe et al. (1984b).

1.5.5 Examples of Studies Pertinent for Consideration by GBRMPA

Examples of the type of research that GBRMPA may wish to support or undertake include studies by Manfredo et al. (1983), Sowman and Fuggle (1987), Stankey (1973), Vaske et al. (1986), Perdue (1987) and Heberlein, Alfano and Ervin (1986). The study by Heberlein et al. is highly recommended to the GBRMPA as the only study in which a government management agency, under pressures similar to those faced by the GBRMPA, conducted research that applied social carrying capacity concepts to a marine recreational setting. Boaters were asked their preferences for numbers of contacts with other boats at two island locations. As a result, the researchers were able to project the likely impact from the addition of 100, 200, 300 or 400 new slips at the marina. These studies are summarised in the following section of this report. Salm (1986) in a general introductory paper on coral reef carrying capacity, suggests that the determinants of coral reef carrying capacity for "underwater tourism" include (1) the size and shape of the reef, (2) the composition of coral communities, (3) different activities carried out on the reef, and (4) level of experience of snorkelers and divers. GBRMPA must derive a more comprehensive list of determinants that incorporates not only underwater recreation experiences, but all the other possibilities for recreation that are competing for the resources in the Marine Park.

1.5.6 Research Techniques

There is no one method that stands out as the preferred technique for obtaining user information. Of the studies reviewed in this report, there was a fairly even

distribution between on-site interviews or questionnaires, mail questionnaires or some combination of the two. Only one study reported using telephone interviews. Paradise (1984) offers a general list of techniques for obtaining user information with some discussion of the relative advantages and disadvantages of each.

1.6 MANAGEMENT OBJECTIVES

The "essential research question" posed by Graefe et al. (1984b) is "What use pattern will result in a visitor experience that is consistent with impact standards selected for a given area?" The question presupposes that managers have done thorough groundwork to establish what is desirable for the managed area. There is a consensus that broad and non-specific management objectives are not useful. They must be replaced with very specific statements about desired conditions. A few examples:

Management objectives have been too broad. For example, "for the benefit and enjoyment of the people" is unmeasurable. A more specific and useful statement of objectives in the Wilderness Act declares that wilderness should provide "outstanding opportunities for solitude or a primitive and unconfined type of recreation." (Schreyer & Roggenbuck 1978)

"Management objectives must go beyond such generalities as 'protect the resource' and 'provide satisfying experiences'. To be effective, management objectives need to define the type of experience to be provided in terms of measurable statements of appropriate ecological and social conditions." (Stankey (1980) quoted by Graefe et al. (1984a))

"To be effective, the objectives must define specifically what type of recreational experience is to be provided...Where there are more than one of these, they should be ranked. Management objectives should also indicate for who the experience is to be provided." (Heberlein 1977)

"The findings underscore the need for establishing a clearer definition of the kind of experience a particular area should provide. Because new generations of visitors appear to expect and be tolerant of greater numbers of recreationists, it is likely that average user satisfaction levels will remain high, despite the changing character of the experience." (Vaske et al. 1980)

Carrying capacity is a meaningless term "unless it is expressed conditionally in relation to objectives which specify capacity for what." (Graefe et al. 1984b)

"Objectives should be prescriptive, that is they should tell what conditions should be like. They must be site-specific and detailed. They describe

the nature of the experience to be produced, they serve as the operational objectives by which all management decisions must be formulated, they define what tools and strategies are appropriate for use by managers, and they serve as a check to test progress toward their achievement." (Stankey 1978)

1.7 APPLICATION OF CARRYING CAPACITY CONCEPTS

There are a number of accepted models for applying the carrying capacity concept. An in-depth presentation and analysis of those models has not been undertaken for this report. Instead, this review presents an account of the models that are referenced in the literature. The GBRMPA is advised to undertake further investigation of specific carrying capacity models to assess their relative usefulness and appropriateness to the Marine Park setting.

1.7.1 The Shelby and Heberlein Model

Shelby and Heberlein (1986) use a framework that involves descriptive and evaluative components to determine carrying capacity for a setting. First a description is required of the observable characteristics of a recreation system. These include management parameters (those things an agency can directly manipulate such as numbers of visitors entering the park, type of use allowed, length of stay) and impact parameters (what happens to visitors or the environment as a result of visitor use patterns and other management parameters). The evaluative component considers different objective states produced by management parameters in an effort to determine their relative merit. Here, value judgements are made about the acceptability of various impacts. (Graefe et al. 1984a)

This model suggests that three conditions are necessary to establish social carrying capacity:

- (1) a known relationship between use level or other management parameters and experience parameters,
- (2) agreement among relevant groups about the type of recreation experience to be provided, and
- (3) agreement among the relevant groups about the appropriate levels of experience parameters.

Regarding the first condition, the literature has documented widely the lack of success associated with focusing on use levels. Managers are warned away from this alternative and should instead look at an array of other parameters as previously discussed.

The "crux of the evaluative component is the selection of standards expressing what conditions are desired in a given area." (Graefe et al. 1984b) Unlike the descriptive component, this can be done with or without scientific input based on an agency's legislative mandates, policies and availability of resources. The judgements to be made by managers in defining these

standards include (1) the selection of the type of experience to be provided, (2) the selection of indicators to represent impacts on experiences, and (3) the setting of levels of acceptable limits for the impact variables.

Although Shelby and Heberlein's model seems to comprehensively take into account all the factors necessary for development of carrying capacity it is more difficult to visualise than other models. The authors take some time to explain their two-fold approach but the emphasis is on process and the reader is left wondering where the process is going. Managers may wish to refer to their book as a useful guide for methods in description and evaluation, but seek other theoretical constructs on which to base management policies for social carrying capacity.

1.7.2 Stankey and McCool's Limits of Acceptable Change (LAC)

This is a more clearly presented model for determination of social carrying capacity that gives a straightforward rationale and direction to managers. Stankey and McCool (1984) define the focus of their LAC model to be management of desired environmental and social conditions, recognising that it is the condition of the resource and social setting that is important. The authors state that when managers have applied the concept of social carrying capacity in the past, their lack of success has been due to the problem of establishing a predictable linkage between use levels and impact. This difficulty would remain, they argue, as long as the concept centred around the question 'how much is too much?'. In contrast, LAC manages impacts of use but not use directly.

The nine steps in the LAC model are:

- (1) Identify area issues and concerns.
- (2) Define and describe opportunity classes.
- (3) Select indicators of resource and social conditions.
- (4) Inventory existing resource and social conditions.
- (5) Specify standards for resource and social indicators for each opportunity class.
- (6) Identify alternative opportunity class allocations reflecting area issues and concerns and existing resource and social conditions.
- (7) Identify management actions for each alternative.
- (8) Evaluate and select a preferred alternative.
- (9) Implement actions and monitor conditions.

In the only study that reviews the relative merits of the Shelby and Heberlein versus the Stankey and McCool models, Boteler (1985) found that the Stankey and McCool model proved more useful because it included relevant legal and

political factors in its decision-making process. The endorsement was qualified by the author's discomfort with the final solution, however, that resulted in a decision to employ a common denominator approach to recreation experiences in this particular highly-politicised case.

As a theoretical framework for application of the complex concept of carrying capacity, LAC seems especially simple, reasonable and well grounded in theory. It merits further attention by GBRMPA managers.

1.7.3 Recreation Opportunity Spectrum (ROS) Model

ROS is a system for inventorying, planning and managing outdoor recreation resources using an experience-based approach (Driver & Brown 1983). It offers managers a guide for identifying and quantifying recreation experiences.

To produce and measure use of recreation opportunities the authors suggest that managers and researchers:

- (1) establish a clear definition of a recreation opportunity,
- (2) quantify the demand for recreation,
- (3) determine the type, amount and quality of opportunities to be provided,
- (4) determine interactions between recreation and other uses under multiple-use management, and
- (5) measure use of the opportunities provided. (Driver & Brown 1983)

The nature of the types of experiences desired by recreationists may include, among other things - developing skill; competing or achieving; learning; being creative; exploring; being with friends or family; experiencing nature; exercising; taking risks; seeking thrills or stimulation of various types; manipulating machines; seeking privacy/solitude; reflection/introspection; and coping with a wide variety of adverse stimuli experienced in the home, neighborhood and work environment. Driver (1977) has organised these experiences into a list of 43 'Recreation Experience Preference' scales for research purposes.

The work by Driver and other ROS researchers should be investigated further toward possible use in framing the research on the recreation experiences being provided and safeguarded in the Marine Park.

1.7.4 Other Models

There are other frameworks that various authors have used to conduct their research. Graefe and Vaske (1987) have developed a model similar to that used by Stankey and McCool to manage specifically for quality tourist

experiences. The paper draws heavily from concepts already reviewed in this report, however, and offers little new material.

Heberlein (1977) and Vaske et al. (1986) use a construct called the 'Return Potential Model' as a basis for quantifying where and to what extent different subpopulations of recreationists share the same normative standards. It appears to be a useful tool to address density and crowding norms and could perhaps be used in conjunction with other research. Heberlein et al. (1986) employed this model in their assessment of the effect of additional marina development on boating experiences at a U.S. national lakeshore. The reader is referred to the summaries of their papers in the next section of this report.

1.8 MANAGEMENT ACTIONS IN RESPONSE TO CONDITIONS

In the event that desired conditions in the recreation setting are exceeded, the literature once again warns the manager away from simple visitor use limitations. Possible management responses to perceived crowding include the redistribution of spatial and temporal use patterns, better design of use systems and facilities, more emphasis on maintaining environmental quality (control littering, for example), fostering higher rates of compliance with rules and regulations (communicate with the public about park objectives), providing users with a greater basis for choice, eliminating motorcraft and all unnecessary structures, and zoning to alleviate resource damage. (Stankey 1973; Manning 1985; Becker et al. 1984)

Frost and McCool (1988) argue that education can be just as effective a tool as other management actions and found this to be true in their study of visitors to a U.S. national park during bald eagle migration. "If the visitor understands the rationale for the regulation, there may be more understanding of the regulation and consequently, more voluntary compliance with it... Thus perceptions of the adequacy of information seemed to be a factor in the acceptance of restrictions... With a good rationale and careful explanation of the rationale, visitor regulation, at least in some places, may enhance recreational experiences."

Researchers queried people living near a busy river estuary in South Africa about effective ways to prevent congestion on the estuary. In order of preference, respondents listed registration and strict control of sailing and power craft, restricting development in the area, activity zoning, limiting the number of power boats allowed on the estuary per household, and time zoning (Sowman & Fuggle 1987). Similar investigations by GBRMPA about the prevention of over-use or over-development of certain reef/island areas could be undertaken.

Salm (1986) offers a number of ways to manage for "maximum use and enjoyment of the (coral reef) resource by tourists without diminishing the quality of the underwater

experience". He suggests that underwater guidebooks be made available to tourists as a way to increase public awareness. He has found them to be an effective education tool that is also highly valued by tourists both for their usefulness and as souvenirs. "They help to heighten public awareness of the need for conservation of reef creatures and for taking care not to damage them. Thus, by helping to redirect interest away from exploitation to 'in situ' appreciation, these guides help increase the carrying capacity of coral reefs." Other suggestions by Salm include vesting responsibility with the tour and dive operators to regulate client activities as a condition for licensing; creating alternative sites for viewing by strategic placing of wrecked ships or other vehicles as a reef substrate, establishing underwater trails and rest floats to minimise coral damage, etc. These options deserve attention by GBRMPA in light of rising use levels on certain reef areas.

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2.2 SUMMARIES

JAMES D. ABSHER, ROBERT G. LEE "DENSITY AS AN INCOMPLETE CAUSE OF CROWDING IN BACKCOUNTRY SETTINGS" Leisure Sciences, Vol 4, No 3, 1982, pp.231-247

Objective

This paper is an attempt to address a number of given factors that affect crowding, but the discussion is convoluted and unnecessarily complex.

Conclusions

Like other papers on this topic, the author reaches the conclusion that - "In the end, crowding is less a response to social density than a product of the interaction setting, how it is defined, and the particular attributes, preferences, and expectations of the people present." (p.244)

ROBERT H. BECKER "DISPLACEMENT OF RECREATIONAL USERS BETWEEN THE LOWER ST. CROIX AND UPPER MISSISSIPPI RIVERS" Journal of Environmental Management, Vol 13, 1981, pp.259-267

Objective

"..to examine users from both the Upper Mississippi and Lower St Croix rivers for evidence of displacement. Specifically, the study objectives were: (1) to determine the extent user densities affect choice of river location and time of visit for various user groups; (2) to determine the criteria individuals use for evaluating preference for specific rivers." (p.263)

Methodology

During summer and fall of 1977 and winter of 1978, approximately 2500 questionnaires were distributed over both rivers to on-site users to examine user attitudes and perceptions with respect to riverway use, use pattern variation, use levels and user satisfaction, and user expectations.

Findings

Users on both rivers were equally satisfied with their experience. "If viewed as individual (unrelated) rivers, findings would appear to sustain the idea of no relationship between area density and user satisfaction. However, when viewed as a system, findings sustain the idea of user movement to achieve a desired social experience, or preferred environmental setting." (p.266)

Displacement is occurring. "Users are purposefully avoiding areas of each river because of high use levels or perceived environmental conditions.

Given a course of events which allows use levels to increase, and subsequently managing for these higher levels, will result in only density-tolerant activities and people remaining on the Lower St Croix. Some persons will either be excluded from participating or have to shift their expectations and activities. With the knowledge of this process, recreation managers should decide who they want to create what type of experiences for, and then implement measures to insure its occurrence." (p.266)

Application to the Marine Park

This study is an encouragement to managers to look at reef complexes or regions as a whole with respect to visitor destination and use, rather than investigating individual reef usage exclusively. Changes in usage patterns on one reef may be reflected at nearby reefs.

R.H. BECKER, ALAN JUBENVILLE, G.W. BURNETT "FACT AND JUDGMENT IN THE SEARCH FOR A SOCIAL CARRYING CAPACITY"
Leisure Sciences, Vol 6, No 4, 1984, pp.475-485

Objective

To discuss the reasons behind the failure of the concept of social carrying capacity to deliver a workable solution to the management of use levels in national parks.

Discussion

The problem lies in the push for a technical solution to a subjective question. For such a solution to occur there needs to be "a high level of concurrence on social values and on scientific fact" (p.478). There must be (according to Shelby & Herberlein, in press, 1984):

- a known relationship between use levels or other management parameters and experience parameters;
- agreement among relevant groups about the type of recreational experience to be provided; and
- agreement among the relevant groups about the appropriate levels of experience parameters.

Decisions about carrying capacity are political and judgemental. "...the universal use of recreational carrying capacity standards may have more to do with coinciding lines of ideology held by the manager and researchers than by the empirical data." (p.480)

"Perhaps the greatest contributions social science can make is to remind resource managers that we live in a world of choice and possibility rather than determinism, to provide them with frameworks for improving decision-making and policy formulation when decisions and policies are ultimately based on political and judgemental strategies." (p.481)

"Even when site damage occurs as a result of excessive use, the response should not be a 'knee-jerk' reaction to reduce visitor numbers but should also consider other options such as 'hardening' the site, zoning, education, or subtly encouraging relocation options." (p.483)

Application to the Marine Park

This paper is a recognition that managers can not successfully identify an immutable carrying capacity for the Marine Park, but must be satisfied that their judgements about carrying capacity are simply that, judgements, which inevitably involve subjectivity.

FRANKLIN E. BOTELER "CARRYING CAPACITY DETERMINATION FOR WHITEWATER RIVERS IN WEST VIRGINIA" Proceedings - National Wilderness Research Conference: Current Research, USDA Forest Service General Technical Report INT-212, July 1985, pp. 471-473

Objective

To illustrate how, in attempts to solve a deadlock among private and state governmental groups, the Stankey and McCool model for determining carrying capacities proved useful.

Background

The Shelby and Heberlein model involves descriptive and evaluative components in determining carrying capacity. This model requires that there be (1) a known relationship between use level or other management parameters and experience parameters, (2) agreement among relevant groups about the type of recreation experience to be provided, and (3) agreement among relevant groups about appropriate levels of the experience parameters.

The Stankey and McCool model focuses instead on the management of conditions and uses the Limits of Acceptable Change (LAC) planning process.

In the State of West Virginia, whitewater use of rivers as a commercially provided recreation skyrocketed such that in 1981 the State put a moratorium on licensing of new commercial outfitters. In response to overuse, attempts were made to establish appropriate carrying capacities.

The Studies

The Department of Natural Resources was mandated to appoint a whitewater citizen advisory board, composed mainly of representatives from the industry, in setting carrying capacities. The board found it impossible to agree on the type of recreation experience to be provided. As a result, three studies were commissioned on whitewater use. The first two failed due to the same problem. The third study attempted to work within the politicised decision-making process. Rather than focusing on experiences, the key parameter in setting carrying capacity became a concern with user safety. The involved parties accepted this as a reason to limit use numbers.

Conclusions

"The indicator of relevant social conditions was the relationship of queues in the rapids to user safety. The specified standard became minimizing queues...The utility of Stankey and McCool's model was found in its ability to include relevant legal and political factors in the decision-making process." (p.473)

"One limitation of this approach is that it has resulted in the establishment of use limits that are higher than some relevant groups might want. Use limits have been set with little attention to experiential desires of the various user groups... In short, responding to necessities of the sociopolitical decision-making environment has resulted in a defacto, common-denominator recreational experience rather than the variety of experience enlightened management would desire." (p.473)

Application to the Marine Park

Although the Marine Park is already zoned for particular uses, this article is relevant in light of the many commercial operators that have sprung up to provide visitors with a reef experience. Either the Shelby/Heberlein or Stankey/McCool model for determining carrying capacity may be appropriate in the absence of politically sensitive decisions involving a spectrum of users or providers of reef experiences. When decisions are unavoidably politicised in the Marine Park then the author's experiences should be taken into consideration.

GORDON BULTENA, DONALD FIELD, PETER WOMBLE, DON ALBRECHT
"CLOSING THE GATES: A STUDY OF BACKCOUNTRY USE-LIMITATION
AT MOUNT MCKINLEY NATIONAL PARK" Leisure Sciences, Vol 4,
No 3, 1981, pp. 249-267

Objective

This study is one of very few that was designed to evaluate the backcountry use-limitation policy that has been implemented under the social carrying capacity concept.

Introductory discussion

Use-limits have been defended by resource administrators "on the grounds that:

- (1) rising visitation levels are producing ever more frequent contacts between wilderness travelers
- (2) contact beyond a minimal level leads to a felt-sense of crowding
- (3) crowding detracts from the quality of the wilderness experiences being sought by visitors." (p.251)

But recent studies have challenged some of the assumptions of use-limitation policies. "It has been found ...that:

- (1) increased use of wilderness areas need not produce more frequent contact between visitors,
- (2) there is only a modest relationship, at best, between contacts and visitors' feelings of being crowded,
- (3) neither the frequency of contacts, nor degree of felt crowding, seems important for trip satisfaction." (p.250-251)

Factors that can result in a felt-sense of crowding include the character of the contacts themselves, the users' personal preferences for interaction with others, visitors' expectations about the level of use in an area, and seeing human impacts on the environment.

Mount McKinley National Park instituted a backcountry use-limitation policy in 1974 to protect the ecosystem of the park and to ensure that wilderness values, especially solitude, were available to hikers. The backcountry is partitioned into thirty-four management zones with a daily limit on the number of persons permitted to camp in all but two of the zones.

Methodology

Use limits were raised in four zones for the purposes of the study. 4447 backcountry permit holders were contacted personally. 4000 completed a pre-trip questionnaire, and 72 per cent of these (N =2829) returned the post-trip questionnaire. Recreational density was measured by the number of parties camped daily in each of the zones. Other measured variables included interparty contacts, preferences for contacts, expectations for contacts, perceptions of human-use impacts, crowding and trip satisfaction.

Conclusions

"Density was correlated with contacts, and these contacts, in turn, were related to crowding. Crowding, however, was not important to the hikers' satisfaction with their wilderness trips, nor was this satisfaction influenced by the frequency of their contacts in the backcountry." (p.264)

Users' expectations for backcountry contacts, preferences for contacts, and sightings of human-use impacts upon the environment were all related to crowding, which "points to the need to consider more than just numbers of parties when managing for solitude" (p.264). Possible management strategies might include (1) creating greater awareness among hikers of likely contact levels in different areas to aid them in their travel route decisions and facilitate realistic expectations for contact, or (2) conducting an aggressive litter and environmental rehabilitation program to reduce the appearance of intense backcountry use and alleviate felt-crowding.

"The findings suggest that use-levels at Mount McKinley could be increased without inducing more crowding or lessening trip satisfaction." (p.265)

Application to the Marine Park

The conclusions lend further strength to the argument that crowding is a perception that is not related strictly to user numbers. A variety of management actions may be used to address potential or existing perceptions of crowdedness.

WILLIAM R. BURCH, JR. "MUCH ADO ABOUT NOTHING - SOME REFLECTIONS ON THE WIDER AND WILDER IMPLICATIONS OF SOCIAL CARRYING CAPACITY" Leisure Sciences, Vol 6, No 4, 1984, pp. 487-496

Objective

As title suggests, this article is an expose on the shortcomings of the results of social carrying capacity research thus far.

Conclusions

"In short, we have a large amount of research driven by a poorly understood concept whose main function is to help managers control something they do not understand." (p.489)

The author quotes G.Stankey (1979) on the role of research in social carrying capacity -

Carrying capacity ... is not a scientific concept, but a management notion. The research role ... is describing the social and ecological consequences of alternative use levels, thus providing the opportunity for managers to judge whether these consequences are consistent with area management objectives. ... while research can help managers who are concerned with carrying capacity, it cannot supply answers about what the carrying capacity of a site is or should be (p.490).

"Carrying capacity is a term borrowed from wildlife ecology and range management. In these areas, the term has a rather precise and sometimes measurable use - "the largest number of organisms of a particular species that can be maintained indefinitely in a given part of the environment (Wilson, 1975)...(So carrying capacity) is a tricky concept for those who want to limit participants in a particular recreation use" (p.491).

The Graefe et al.(1984b) article "helps to highlight several problems that can occur when social scientists join the resource management team. Not the least of such problems is becoming apologists for authoritarian political decisions they would not approve of in other realms of political life." (p.495)

Application to the Marine Park

This paper is another warning to managers who hope to find in the concept of social carrying capacity a more solid foundation for decision-making than it can actually provide.

B.L. DRIVER "TOWARD A BETTER UNDERSTANDING OF THE SOCIAL BENEFITS OF OUTDOOR RECREATION PARTICIPATION" In Southern States Recreation Research Applications Workshop USDA Forest Service General Technical Report SE-9, 1976, pp.163-189

Objectives

- (1) "To describe the state of knowledge for identifying and measuring the personal-social benefits of recreation,

- (2) to interpret the relevancy of that body of knowledge to recreation resource planners and managers, and
- (3) to outline important research needs on that subject." (p.164)

Discussion

Past studies have indicated that managers' intuitions and users' opinions about recreational values frequently differ. More objective measures are needed for:

- (1) the attributes of the physical and social setting that are perceived by potential users to be necessary for a quality recreation experience,
- (2) the type and number of recreation experience sought from specific recreation environments,
- (3) the characteristics of potential and actual recreationists having demands for different types of recreation experiences and the cause-effect relationships between these characteristics and recreation demand, and
- (4) the personal experiences and benefits realised from specific recreation opportunities. (p.167)

As well as behavioural data, there are four other knowledge bases that must be considered by outdoor recreation resource planners and managers: resource location, historical use, economic, and administrative/political.

The author suggests a three-step procedure for identifying and quantifying the personal-social benefits of recreation management:

- (1) Identify and measure the relative importance of the desired and expected consequences of different types of recreationists who are engaging in specific recreation activities.
- (2) Assume that the desired and expected consequences of large groups of recreationists are reasonably well related to the personal and social benefits "sought". Then form hypotheses about the personal-social benefits derived by clearly defined types of users who rate particular activities high in importance for providing certain types of experiences.
- (3) Test the hypotheses under experimental-controlled conditions, including the evaluation of benefits over time.

".. past outdoor recreation research indicates that certain types of desired experiences are pervasive in importance and are managerially relevant. These

include: developing skills; competing or achieving; learning; being creative; exploring; being with friends, the family or like-minded associates; experiencing nature; exercising; taking risks; seeking thrills or stimulation of various types; manipulating machines; seeking privacy-solitude; reflecting-introspecting; and coping with a wide variety of adverse stimuli experienced in home, neighborhood, and work environment." (p.179)

"Research is needed to define and quantify the expected and desired consequences or experiences sought and the short-term and long-term benefits gained by different types of users who participate in specific types of outdoor recreation activities; the relationships between these benefits and conditions experienced back home need to be investigated more thoroughly; and research designs should employ techniques using subjective-verbal, unobtrusive-observational, and physiological measures." (p.182)

Application to the Marine Park

The author's advice to look beyond managers' intuitions about users' opinions on recreational values is well taken. His prescription is that objective and thorough research on recreation participation should be undertaken.

B.L. DRIVER "ITEM POOL FOR SCALES DESIGNED TO QUANTIFY THE PSYCHOLOGICAL OUTCOMES DESIRED AND EXPECTED FROM RECREATION PARTICIPATION" Fort Collins, CO: USDA Forest Service mimeo, 1977

Objective

To present "the current item pool for the Recreation Experience Preference (REP) scales being developed to identify and quantify the relative importance of different psychological outcomes that are desired and expected from recreation participation." (p.1)

Contents

- (I) item pool
- (II) a graphic presentation of the dimensional structures of the preference scales and combinations of statistically related scales
- (III) two Pearson product-moment inter-correlation matrices, one showing the interrelationship between all of the REP scales and the other showing relationships between the preference "domains" into which scales tapping similar themes have been collapsed

The item pool domains include: achievement, leadership/autonomy, risk-taking, equipment, family

togetherness, being with people, meeting-observing new people, learning/discovery, relationships with nature, reflect on personal values, creativity, nostalgia, exercise/physical fitness, physical rest, escape personal/social pressures, escape physical pressures, security, escape family, temperature.

Application to the Marine Park

This is a detailed explanation of Driver's research technique for assessing outcomes of recreational participation. It is referenced in this summary to advise managers and researchers of its availability for application to the Marine Park setting.

BEVERLY DRIVER, PERRY J. BROWN "CONTRIBUTIONS OF BEHAVIOURAL SCIENTISTS TO RECREATION RESOURCE MANAGEMENT"
Behaviour and the Natural Environment, I. Altman and J.F. Wohlwill (eds), New York: Plenum Press 1983

Objective

To look at "the responsibilities of outdoor-recreation policymakers and managers" and "to encourage more social and behavioural scientists to devote their attention to the issues raised." (p.308)

Discussion

Responsibilities of recreation "policymakers and managers:

- to determine how many scarce public resources ...will be allocated to outdoor-recreation programs, when, where, for whom, and at what price to the users.
- to provide appropriate, high-quality recreation opportunities once basic allocations have been made.
- to protect the biophysical and cultural-historical recreation resources from unacceptable change or damage.
- to reasonably protect the users from harm.
- to evaluate the effectiveness of the results of the above actions." (p.309)

Behavioural scientists can help improve outdoor-recreation policy making and management by:

- "contributing to the basic body of knowledge about recreation and its many values" (p.312), and

- "assisting practitioners in their use of knowledge that has not yet been applied or by carrying out applied research." (p.313)

To produce and measure use of recreation opportunities:

- (1) establish a clear definition of a recreation opportunity,
- (2) quantify the demand for recreation,
- (3) determine the type, amount, and quality of opportunities to be provided,
- (4) determine interactions between recreation and other uses under multiple-use management,
- (5) measure use of the opportunities provided.
(p.313)

Application to the Marine Park

This detailed paper argues for more and better research into recreation and resource policy and management. Its intended audience is policy makers and scientists rather than managers.

FROST, JEFFREY E. AND STEPHEN F. McCOOL "CAN VISITOR REGULATIONS ENHANCE RECREATIONAL EXPERIENCES?"
Environmental Management, Vol 12, No 1, 1988, pp.5-9

Objective

To report on a study conducted in Glacier National Park in Montana, USA, on how recreationists perceive the necessity and effect of visitor regulations.

Methodology

Visitors to Glacier's bald eagle concentration were mailed questionnaires designed to solicit information about visitor demographics, expectations, knowledge, and perceptions of regulations. There was a 91 per cent return rate, N = 471.

Conclusions

"If the visitor understands the rationale for the regulation, there may be more understanding of the regulation and, consequently, more voluntary compliance with it. The results of this study lend support to this. Almost 90 per cent of visitors who were aware of restrictions felt they were necessary, and less than 3 per cent felt they were not." (p.6)

"Thus perceptions of the adequacy of information seemed to be a factor in the acceptance of restrictions." (p.6)

"These results suggest the importance of an interpretive program as a complement to management actions that attempt to regulate or influence visitor behaviour. ...With a good rationale and careful explanation of the rationale, visitor regulation, at least in some places, may enhance recreational experiences."(p.8)

Application to the Marine Park

This study emphasises that visitors to the eagle concentration were characteristic of visitors to wilderness, that is, they had "high levels of educational attainment, held disproportionately high managerial and technical occupations, median age in the mid-30s". This profile may or may not parallel that of visitors to the Marine Park. But the principle of using education rather than regulation in recreation management is worth pursuing.

ALAN R. GRAEFE, MAUREEN P. DONNELLY, JERRY J. VASKE
"CROWDING AND SPECIALIZATION: A REEXAMINATION OF THE CROWDING MODEL" Proceedings - National Wilderness Research Conference: Current Research USDA Forest Service General Technical Report INT-212, July 1986, pp.333-338

Objective

To examine "the influence of reported contacts, expectations, and preferences on crowding perceptions reported by individuals at different levels of specialization within a particular recreation activity - hiking." (p.333)

Hypothesis

"Hikers who are inexperienced and participate infrequently will lack well-defined expectations and preferences for meeting others while hiking and, therefore, will depend more heavily on contacts in evaluating crowding in a wilderness setting. Highly specialized individuals, on the other hand, will have a clearer idea of how many other hikers they expect and prefer to see, and their perceptions of crowding will be influenced to a greater extent by these variables than by the number of people encountered." (p.334)

Methodology

Data were collected through a survey of White Mountain National Forest hikers in the summer of 1982. Interviews were conducted (N=334) on both

heavily used and lightly used trails in designated wilderness and adjacent backcountry areas.

Hikers were divided into high, medium, and low specialisation groups using a composite index composed of the number of years of hiking experience, number of times hiking per year, and self-reported skill level.

The dependent variable was perceived crowding during the day's hike, measured on a nine-point scale ranging from "not at all crowded" to "extremely crowded".

The independent variables included number of reported contacts, expectations for contacts, and preferences for meeting others.

Conclusions

Highly specialised hikers did in fact feel more crowded and prefer to see fewer people than did lower specialised hikers.

There were no differences in the expected number of contacts between groups of differing specialisation.

Preferences were consistently the strongest predictors of perceived crowding, rather than numbers of contacts.

Application to the Marine Park

One may hypothesise that in the Marine Park, the more specialised divers prefer to see fewer people than lower specialised divers. This type of information on user characteristics and perceptions of crowding should be the focus of future GBRMPA research in order to come to a better understanding of social carrying capacity in the Marine Park.

ALAN R. GRAEFE, JERRY J. VASKE "A FRAMEWORK FOR MANAGING QUALITY IN THE TOURIST EXPERIENCE" *Annals of Tourism Research*, Vol 14, No 3, 1987, pp. 390-404

Objective

To "summarize current understanding of the factors that influence individuals' perceptions of a quality recreation/tourist experience" and integrate "this understanding with a management process aimed towards protecting quality recreation/tourist experiences."
(p.391)

Discussion

The management framework proposed includes an eight step sequential process for assessing and managing

tourism impacts that are designed "to facilitate dealing with three basic issues inherent to impact management:

- the identification of problem conditions (or unacceptable impacts to the tourist experience)
- the determination of potential causal factors affecting the occurrence and severity of the unacceptable impacts
- the selection of potential management strategies for ameliorating the unacceptable impacts." (p.395)

- Step 1 - compile and review previous research, legislation and policies to summarise existing situation.
- Step 2 - review management objectives and produce a clear statement of specific area objectives.
- Step 3 - identify measurable social and ecological variables and examine those most pertinent to area management objectives. Produce a list of indicators and units of measurement.
- Step 4 - restate management objectives in terms of the desired conditions for selected impact indicators to produce a quantitative statement of desired conditions.
- Step 5 - compare standards with existing conditions to determine their consistencies and discrepancies.
- Step 6 - identify probable causes of unacceptable impacts by examining use patterns and other potential factors affecting their occurrence and severity.
- Step 7 - examine the full range of direct and indirect management strategies dealing with probable causes of visitor impacts using a matrix approach that considers the pros and cons of each strategy option.
- Step 8 - Implementation.

Application to the Marine Park

A potential management guide for developing the social carrying capacity concept in the Marine Park, emphasising tourism rather than wilderness recreation.

ALAN R. GRAEFE, JERRY J. VASKE, FRED R. KUSS "SOCIAL CARRYING CAPACITY: AN INTEGRATION AND SYNTHESIS OF TWENTY YEARS OF RESEARCH" Leisure Sciences, Vol 6, No 4, 1984a, pp.395-431

Definition

Social carrying capacity is the "level of use beyond which experience parameters exceed acceptable levels specified by evaluative standards." (p.396, Shelby & Heberlein, in press)

Objective

To review and synthesize what is currently known about social carrying capacity by examining the research related to the relationship between recreational use levels and perceptions of quality in the recreation experience.

Discussion

Re: Expectancy theory

- most people participate in recreation activities to satisfy multiple expectations
- the motivations for participation in a given activity may vary considerably among individuals engaged in the same activity or using the same environment, or even with a given individual at different times.

All conceptual models "converge on the notion that understanding quality in the recreation experience requires an initial understanding of the goals or types of experiences sought by visitors." (p.399)

"Social carrying capacity research has progressed from an initial emphasis on the effects of user numbers to investigations of the social, personal, and situational factors affecting density evaluations. (Altman,1975; Gramann,1982)" (p.399)

The consequences of increased interaction between users of an area "usually include increased perceptions of crowding and decreased visitor satisfaction." (p.399)

Whether or not an area is crowded is a subjective judgement of an individual, not an objective fact.

"Visitor experiences may be influenced more by the perception of human impacts on the environment, for example, than by the presence of large numbers of other visitors..." (p.401)

"...visitors may respond to a resource disturbance more negatively if they attribute the cause to be human intervention as opposed to natural processes.

On the other hand, visitor perceptions may also be related to their own style of use." (p.401)

"The potential for conflicts between users also increases with increasing use levels. Conflict represents a special case of use dissatisfaction where the recreationist attributes the source of goal interference to the behaviour of other individuals.." (p.402)

"When people modify their normative standards to compensate for increasing use levels, the end result is a change in the character of the recreation experience to be found at a given area. Thus current visitors of a heavily used area may be as satisfied as visitors 5 or 10 years ago when use levels were much lower, but they are receiving a different type of experience." (p.402)

'Recreational displacement', according to Schreyer, is a change in behaviour that results when an individual "(1)perceives that the desired outcomes of an experience are not attained, and (2) does not wish to reemphasize other aspects of that experience." (p.403)

There is general agreement that the goal of recreation management is to maximise user satisfaction, but existing research has failed to document the empirical relationships between use levels and visitor satisfaction which is necessary for the development of evaluative standards and the delineation of a capacity limit. In general, summary statistics have shown that there is no significant relationship between reported contacts and satisfaction. "Recreationists are just as satisfied on high-use days as they are on low-use days." (p.408)

"...crowding perceptions are influenced by use densities, but this relationship is mediated by a variety of other situational and subjective variables." (p.409)

"Recent investigations suggest that user perceptions of environmental disturbance and crowding may be interrelated... Vaske et al., for example, found that the perception of environmental disturbance was the strongest predictor of perceived crowding in a wilderness area." (p.410)

Re: behavioural adjustments

- "...factors important to user displacement includes litter, noise, worn-out campsites, large groups, motorboats, and other visitors at entry points." (p.411)

- "Overall, research on the displacement hypothesis reveals a mixed pattern of findings... Given the amount of empirical evidence, the idea of recreation displacement provides only a tentative explanation for the effects of user numbers on visitors behaviour." (p.411)

Re: Variations in Tolerance to Impacts

- many studies highlight the conflicts which exist between motorised and non-motorised user groups. "Non-mechanized users are generally more sensitive to the presence and behaviour of others than are mechanized visitors." (p.413)
- sensitive user groups include canoeists, hikers, skiers, fishermen, backpackers, wilderness users, small groups, frequent participants, experienced visitors, specialists, wilderness purists, and nature/solitude seekers.
- tolerant user groups include motorboaters, trailbikers, snowmobiles, off-road vehicle users, water-related sports other than fishing, horsemen, developed recreation area users, larger groups, infrequent participants, inexperienced visitors, generalists, urbanists and thrill seekers.
- "Method of travel and group size are the most visible cues for determining the extent of perceived similarity between different user types." (p.415)
- "...most users feel that seeing large parties reduces the perceived quality of the experience." (p.416)
- "Conflict results when individuals with contrasting standards of behaviour...interact...Such differences in personal standards may exist among participants engaged in the same activity, as well as people participating in different activities." (p.416)
- conflicts also result "when individuals who have specialized in a certain activity encounter recreationists participating in less intense activities" (p.416), for example fishermen versus other water-related activities.
- "Such differences suggest that it is not enough to ask visitors how many contacts with recreationists they will tolerate. Rather, the answer depends on the types and perceived similarity of the visitor groups encountered." (p.417)

Re: Site-specific influences

- "Visitors reactions to contacts with others also vary depending on the location of the encounter." "Seeing others at the trailhead or on the trail, for example, generally has less impact than encounters at the campsite." (p.417)
- "The label assigned to a given area may also affect users' experience evaluations." (p.418)

Implementation of Carrying Capacity

"...implementation of social carrying capacity requires an understanding of how recreationists impact each other and the environment, and the factors related to the occurrence of these impacts." (p.419)

Determination of carrying capacity requires first "a description of the relationships between specific conditions of use (e.g. types of use, site factors, amount of use) and the impacts associated with these conditions." Secondly there must be an "evaluative dimension which incorporates value judgements about the acceptability of various impacts." (p.419)

"The **descriptive component** is concerned with the observable characteristics of a recreation system", both management parameters (those things an agency can directly manipulate such as numbers of visitors entering the park, type of use allowed, length of stay) and impact parameters (what happens to visitors or the environment as a result of visitor use patterns and other management parameters. (p.419)

"The **evaluative component** considers different objective states produced by management parameters in an effort to determine their relative merit." (p.420)

According to Shelby and Heberlein, three conditions are necessary to establish social carrying capacity:

- (1) a known relationship between use level or other management parameters and experience parameters
- (2) agreement among relevant groups about the type of recreation experience to be provided
- (3) agreement among the relevant groups about the appropriate levels of experience parameters. (p.420)

Conclusions

"...visitor perceptions of a quality recreation experience vary considerably both within and between activities. Thus the definition of the type of experience to be provided in a given area in essence

requires a decision favoring one user group over competing groups seeking different types of experiences." (p.421)

"Effective implementation is more likely if evaluative standards are set prior to empirical investigations." (p.421)

"Recent literature shows a trend toward the use of tangible, specific criteria in the wording of evaluative standards" for example - numbers of other campers to be seen at any one campsite, numbers of times litter will be seen, etc. (p.421)

"...most authors have also argued that evaluative standards should be incorporated into clear and specific management objectives for a given area."
"..management objectives must go beyond such generalities as 'protect the resource' and 'provide satisfying experiences'. To be effective, management objectives need to define the type of experience to be provided in terms of measurable statements of appropriate ecological and social conditions (Stankey 1980)". (p.422)

Application to the Marine Park

This paper is an excellent summary of the concept of social carrying capacity and thus provides managers with an efficient means of approaching the issue.

ALAN R. GRAEFE, JERRY J. VASKE, FRED R. KUSS "RESOLVED ISSUES AND REMAINING QUESTIONS ABOUT SOCIAL CARRYING CAPACITY" Leisure Sciences, Vol 6, No 4, 1984b, pp. 497-507

Objective

"...to summarize what we know and what we don't know about social carrying capacity with particular reference to the articles in this issue" (of Leisure Sciences). (p.498)

Discussion

"Our current understanding (of social carrying capacity) may be divided into two categories:

- (1) what we know about the impacts of increasing use levels on the quality of the visitor experience,
- (2) what we know about the difficulty of applying this understanding to the determination of carrying capacities." (p.497)

Resolved Issues

Response to increasing recreational use depends on an interrelated set of impact variables. Some forms of impact, for example numbers of contacts or perceived crowding, are more direct or obvious than others such as displacement or altered experiences.

"Use/impact relationships vary depending on what aspects of use are considered and the specific individual and situational variables." (p.499)

There is "an inherent and well documented variation in tolerance among individuals and user groups." (p.499)

"All types of contacts between visitors do not have the same effects." (p.499) For example, some types of contacts, such as those with large or motorised groups, asymmetrically affect one group more than another.

"Even the response of one individual to a particular type of contact may vary with location and time." (p.499)

Re: Implementation - carrying capacity is a meaningless term "unless it is expressed conditionally in relation to objectives which specify capacity for what." (p.499)

Unresolved Issues

The statistical relationship between use levels, crowding and satisfaction remains unclear.

There is lack of agreement in the literature on how to implement the carrying capacity concept. "Stankey and McCool elaborate to a great degree on how to identify problem conditions while Shelby and Heberlein deal more specifically with how to isolate the use levels and other aspects of visitation and management that have caused or contributed to the problem conditions." (p.502)

Implications for future research

"The essential research question... is what use pattern will result in a visitor experience that is consistent with impact standards selected for a given area?" (p.503)

The information required includes the amount, type, and distribution of use as well as the appropriate impact indicators. Measurements must be specific. For example, information regarding use should include party size, length of stay, activities engaged in, spatial and temporal distribution of use. Data regarding impact would include the number of contacts

of a particular type, number of contacts at particular times or places, perceived crowding at particular types of locations.

Research will not be completed after one examination because the "relationships documented may change over time or in response to changes in other management actions." (p.503)

The "crux of the evaluative component" (as opposed to the descriptive component) of carrying capacity "is the selection of standards expressing what conditions are desired in a given area." This selection, unlike the descriptive component, may be made "with or without the input of scientific research", based on legislative mandates, agency policy, and availability of competing resources and opportunities. (p.505)

Three types of judgements must be made in arriving at the needed standards:

- (1) the selection of the type of experience to be provided
- (2) the selection of impact indicators most salient to this type of experience
- (3) the specification of appropriate levels of acceptable limits for the designated impact variables. (p.505)

Research has identified some norms of various user groups relative to certain impact variables in certain types of settings which may help managers select specific indicators and standards for those indicators, but results are still sketchy.

In sum, it is impossible to design an experience for everyone, so decisions must be made regarding whose norms are to be favored in a given carrying capacity decision.

Application to the Marine Park

The guidelines offered in this paper should be helpful when designing research projects in the Marine Park. The authors' discussion and comparison between the Stankey and McCool and the Shelby and Heberlein models for implementing carrying capacity concepts also gives the reader some basis for making decisions about which model might be most appropriate for use in the Marine Park.

JAMES H. GRAMANN "TOWARD A BEHAVIOURAL THEORY OF CROWDING IN OUTDOOR RECREATION: AN EVALUATION AND SYNTHESIS OF RESEARCH" Leisure Sciences, Vol 5, No 2, 1982, pp.109-126

Objective

"..to develop a conceptual background against which crowding research in outdoor recreation may be evaluated and synthesized." (p.110)

Perspectives on crowding

Physical density is only one factor affecting people's feelings of crowdedness. How the density is evaluated is just as important.

Stimulus overload model - "crowding perceptions are greatest when the level of social stimulation exceeds that desired and the individual is unable to reduce that stimulation through adaptive strategies." (p.111)

Social interference model - "human behaviour is often goal directed, and crowding attributions occur when the number, behaviour, or proximity of other persons in a setting is incompatible with an important goal and thus interferes with its attainment." (p.112)

In addition to numbers of contacts with others, a major source of crowding evaluations from some recreation studies is exposure to certain types of objectionable behaviour by others. The type of recreationists encountered, rather than any rude or objectionable behaviour per se, can also affect crowding reports. Research on conflict between recreational groups indicate that activities often differ in the kinds of psychological goals important to participants, and that behaviour in pursuit of one set of activity goals may hinder the ability of participants in other activities to fully realise their own goals.

Application to the Marine Park

The author has worked hard to synthesise all relevant research findings on crowding but the results are written more for social psychologists than managers and seems unnecessarily complex. Good background information, but the paper on crowding by Manning(1985) is simpler and more to the point.

JAMES H. GRAMANN, RABEL J. BURDGE "THE EFFECT OF RECREATION GOALS ON CONFLICT PERCEPTION: THE CASE OF WATER SKIERS AND FISHERMEN" Journal of Leisure Research, Vol 13, No 1, 1981, pp. 15-27

Objective

"..to empirically examine the utility of the 'goal interference' model for understanding a well-recognized conflict between water skiers and fishermen at one midwestern reservoir." (p.16)

Conflict definition

Recreational conflict stems from "incompatibilities between one party's goals and another party's behaviour (Fink,1968). Goals and behaviours may be defined as incompatible when the achievement of a goal by one person is frustrated by the behaviour of another person." (p.17)

Hypotheses

- (1) "Among all boat fishermen, those who did not experience reckless boating should differ from those who did on the basis of recreation goals." (p.17)
- (2) "In a comparison between the recreation goals of water skiers and both categories of fishermen, the goals of water skiers and fishermen not reporting reckless boating should be more similar than the goals of water skiers and fishermen reporting reckless boating." (p.18)

Methodology

A survey was taken of visitors to a reservoir in Illinois in 1978. A systematic stratified probability sample was drawn at various access points and campgrounds around the reservoir. The final response rate to an eight page questionnaire was 78.2 per cent. (N = 1566) "Recreation goals were operationalized by scores on 46 'Recreation Experience Preference' scales (Driver, 1977). Items were designed to assess preferences for such recreational experiences as achievement, risk-taking, social contact, relationships with nature, exercise, and other recreation goals." (p.19)

Conclusions

Only weak support was shown for the goal interference conflict model. The authors go on to discuss possible reasons for the results but have obviously been left confused. They conclude by calling for more research into this area as one that is of concern to managers and researchers.

"One of the widely held objectives of public management of recreation areas is to maximize the flow of benefits to people through provision of quality recreational experiences. If ... the quality of the recreational experience is reduced through user conflicts, a management problem will exist in that the objective of maximized public benefits will not be fully achieved." (p.25)

Application to the Marine Park

Although the researchers may not have posed their hypotheses in a way that ultimately proved useful or enlightening with regard to recreational conflict, the subject of conflict between users is pertinent to managers of the Marine Park. Seeking to accurately understand the conflicts should continue to be one of the goals of research.

THOMAS A. HEBERLEIN "DENSITY, CROWDING, AND SATISFACTION: SOCIOLOGICAL STUDIES FOR DETERMINING CARRYING CAPACITIES" Proceedings from the Symposium: River Recreation Management and Research, Minneapolis, Minnesota, Jan 24-27, 1977, pp. 67-76

Objective

To give a "sociological direction to carrying capacity research" and integrate prior work on crowding and carrying capacity.

Discussion

"Social scientists are hard pressed to gather the appropriate data to determine the impact of humans on the recreational experience of others." (p.69)

"Managers seem more comfortable saying, "The parking lot isn't big enough so you can't come in," rather than saying "You can't come in because too many people will reduce the quality of the experience for others." (p.69)

"The theoretical basis for establishing social carrying capacity is weak, and current methodologies ill-suited for making such a determination." (p.70)

"The emphasis on satisfaction is always couched in terms of constraints (such as management objectives). I will try to show that it is those constraints, rather than satisfaction, which are really the important parameters in establishing social carrying capacity." (p.70)

Studies, both by the author and others, show that "the correlations between satisfaction and density

measures were not significantly different than zero." (p.71)

"For a wilderness experience, the number of visitors may reach the point where the experience is no longer provided even though there may not be a noticeable reduction in satisfaction of the visitors present. Consequently, if certain types of recreational experiences are to be provided in the face of increased user demand, some criterion other than satisfaction must be used to establish social carrying capacity." (p.72)

The establishment of social carrying capacity involves three steps:

- (1) Specific management objectives - "To be effective, the objectives must define specifically what type of recreational experience is to be provided... Where there are more than one of these, they should be ranked. Management objectives should also indicate for whom the experience is to be provided." (p.76)
- (2) Visitor Assessment - "The next step is to determine what actually happens. How often are people in contact with each other? Where do they camp and stop? What adjustments are made by visitors to reduce crowding?" (p.76)
- (3) Normative Assessment - "By going to various groups and asking if the contacts are too few or too many, the manager can get a sense of the variety of norms that exist for visitor density in a particular setting, for a particular activity."

With these assessments accomplished managers have a basis from which to define and defend their policies.

Application to the Marine Park

This paper highlights the inadequacy of using visitor satisfaction as a measure of social carrying capacity and goes on to prescribe better measures that should be taken. Highly recommended for managers addressing issues of crowding.

THOMAS A. HEBERLEIN, GERALDINE E. ALFANO, LAURIE H. ERVIN
"USING A SOCIAL CARRYING CAPACITY MODEL TO ESTIMATE THE
EFFECTS OF MARINA DEVELOPMENT AT THE APOSTLE ISLANDS
NATIONAL LAKESHORE" Leisure Sciences, Vol 8, No 3, 1986,
pp.257-274

Objective

- (1) To determine the effects of marina slip development on the boating experience at the Apostle Island National Lakeshore.
- (2) To determine if an approach developed in linear wilderness systems will be useful in more complex systems involving nonwilderness activities.

Discussion

"Although the National Park Service cannot directly control marina development since such development is in the hands of the private sector and local governments, the potential impacts of increased boating in the islands are of critical interest to the resource manager. Evidence that extreme impacts might occur could lead the Park Service to be opposed to development, or to consider management strategies to reduce the impacts associated from increased boating from marina development." (p.258)

The addition of more marina slips will affect the recreation experience in that more boats would be seen while sailing and the limited island mooring sites would become more crowded.

Descriptive component of research - How many marina slips are there now? How many boats actually leave these slips each day? How many are moored at each crucial site among the islands? What is the relationship between the boats leaving and the location where they are likely to moor?

Evaluative component of research - A value judgement is needed to determine how many slips should be built, how many are too many? Sources for evaluative standards include management objectives for the area and the recreationists themselves. The management objectives are to provide recreation but do not imply specific numbers of boats at mooring sites and are thus too general. So this research team needed to find out if there existed any standard for number of boats moored among boaters.

"If there is no agreement about the standards then there is no social carrying capacity for marina slip development." (p.261)

Methodology

The number of empty marina slips and the number of boats mooring at each location in the islands was

counted each day for a 74 day period between June 26 and September 7, 1981, which according to previous research should include 60 per cent of the boating visitors.

The evaluative standards were obtained by asking boaters how they would feel about mooring with 1, 3, 5, 7, 9, 11, 15, 25, or 35 other boats at the two most popular mooring locations. Jackson's 'return potential curve', as used by Vaske in previous research, was used to create a means to assess the social carrying capacity. 225 questionnaires were distributed to boaters leaving marinas or while moored at one of the islands. The return rate for this method was only 42 per cent so more surveys were mailed to a random sample of slip owners at four marinas and to those who chartered boats in the area. Return rate was 70 per cent, total N = 323.

Conclusions

Boaters did have distinct preferences for numbers of contacts at both locations studied. Boaters were positive about mooring with from 1 to 5 boats and close to neutral for 7 to 11 contacts, but when the number of boats reaches 15 or more, boaters were consistently negative about the experience. From this information the researchers were able to project the likely impact from the addition of 100, 200, 300 or 400 new slips, given that their assumptions held true for consistent user preferences and behaviour.

Application to the Marine Park

This paper is one of only a few examples of research that is directly applicable to the Marine Park setting and demonstrates the usefulness of the concept of social carrying capacity to management.

JOHN C. HENDEE, GEORGE H. STANKEY, ROBERT C. LUCAS
"WILDERNESS CARRYING CAPACITY" Wilderness Management,
Miscellaneous Publication No. 1365, October 1978, pp.169-188

Objective

To explore the origins of the carrying capacity concept, consider the concept's application to wilderness, and briefly review what is known about it.

This is a well written presentation of the concept of carrying capacity and its application, but it is sufficiently similar in content to other papers reviewed here that to summarize it would be repetitive. However, the book in which this chapter is found provides an extensive discussion of wilderness management which might be useful to

GBRMFA managers. Among the chapter titles are 'The Wilderness Classification Process', 'Some Principles of Wilderness Management', 'Wilderness Management Planning', 'Visitor Management: Approaches to Managing Wilderness Use and Visitor Behaviour', and 'Site Management: Approaches to Managing Wilderness Campsites, Trails, and Visitor Impacts'.

DOUGLAS M. KNUDSON, ELIZABETH B. CURRY "CAMPERS' PERCEPTIONS OF SITE DETERIORATION AND CROWDING" Journal of Forestry, February 1981, pp.92-94

Objective

"..to determine:

- (1) Whether camper opinions and observation were reliable monitors of site conditions.
- (2) Campers' opinions on spacing of sites and crowding as elements of social carrying capacity.
- (3) Campers' opinions of options for management within carrying capacity limits." (p.92)

Methodology

On-site interviews of 405 campers regarding:

- camper opinion and awareness of environmental conditions on the site,
- camper opinion about crowding,
- camper opinion about alternative site management practices,
- actual conditions of ground cover, tree damage, and campsite spacing.

Conclusions

Re: Environmental Conditions

The majority of campers rated ground cover as satisfactory to excellent even in an area where over three-fourths of the sites were 100 per cent bare or disturbed.

"The wide variation in actual ground cover conditions was not matched by differences in camper ratings, even though ratings were significantly lower as the condition was poorer." (p.93)

Re: Crowding

"The interviews revealed only slight dissatisfaction with close spacing and crowding." (p.93)

"This study did not reveal conclusive evidence of high occupancy producing a sense of crowding or other dissatisfaction..." (p.94)

Re: Management Solutions

Campers were willing to have limits imposed by managers to reduce crowding, however, and most often suggested the establishment of new or expanded facilities and limitation on the use of existing facilities.

Two-thirds favoured closing portions of the campground to improve tree and ground cover, as needed.

"The results suggest that interviews with campers are not to be used as sensitive indicators or warnings of resource deterioration." (p.94)

Application to the Marine Park

These findings reemphasise the findings of other studies that show that satisfaction will always be fairly high for current visitors to recreation areas, although their experiences may be drastically different from previous visitors. As such, visitor satisfaction is a poor measure for carrying capacity research.

DAVID W. LIME "PRINCIPLES OF RECREATIONAL CARRYING CAPACITY" Proceedings: Southern States Recreation Research Applications Workshop, Asheville, N.C. USDA Forest Service General Technical Report SE-9, 1976, pp.122-134

Objective

To "identify six basic principles that relate to carrying capacity and that seem relevant to outdoor recreation management.." (p.124)

Discussion

1. Carrying capacity can be defined only in light of management objectives for the area in question. Management issues include:
 - (1) general use intensity or level of solitude desired,
 - (2) type(s) of use desired
 - (3) level of development and accessibility of recreation facilities desired,
 - (4) general degree of naturalness desired.
2. Obtaining attitudes and preferences of recreation users and non-users can help administrators set

objectives and may suggest needed changes in current policy. Public attitudes may be categorised according to their:

- (1) perception of a site as a local, State, regional or national resource,
 - (2) motives for visiting the area,
 - (3) previous outdoor recreation experiences,
 - (4) knowledge of alternative activities and areas.
3. A full range of recreation opportunities within a region to satisfy the diversity of recreation tastes is desirable.
 4. The character and amount of change permitted to occur to the resource resulting from recreation use must relate directly to management objectives.
 5. There are many techniques to manage an area for its carrying capacity; the techniques selected, however, should depend on the management objectives for the area. Managers should seek to:
 - reduce conflicts among competitive uses,
 - reduce the destructiveness of some users,
 - increase the durability of the physical resource, and
 - provide increased opportunities for visitor enjoyment.
 6. The recreation manager is still left with the difficult decision of deciding how much and what kinds of use are acceptable for a given area, and how and where such uses are to be managed and sustained.

Application to the Marine Park

Although this author has presented nothing new in his discussion, the material is well organised, to the point and provides a useful starting point for policy development on carrying capacity.

MICHAEL J. MANFREDO, B.L. DRIVER, PERRY J. BROWN "A TEST OF CONCEPTS INHERENT IN EXPERIENCE BASED SETTING MANAGEMENT FOR OUTDOOR RECREATION AREAS" Journal of Leisure Research, Vol 15, No 3, 1983, pp.263-283

Objective

A model proposed by Driver and Brown gives a general framework for understanding why recreationists are motivated to engage in specific recreation activities at specific areas. Two major conclusions can be drawn from their model:

- (1) "We define recreation opportunities as options to engage in a specific activity at a specific

setting to realize desired experiences." (3 facets - demands for an activity opportunity, a setting opportunity, an experience opportunity). (p.264)

- (2) The "goals of recreation management (providing desired opportunities for experiences) best can be met by understanding the relationship between the valued psychological outcomes of a recreation activity and the types of settings which facilitate those outcomes." (p.264)

"The purpose of this research was to provide an initial test of these concepts by examining the relationship between activities, experiences, and settings desired by wilderness recreationists using the Wind River Range in Wyoming." (p.265)

Hypotheses

- (1) There are definable segments of wilderness recreationists which differ according to the experience they desire. Desired experience is defined here as it has been in several past studies; it is the package of specific psychological outcomes desired by a recreationist when choosing to engage in a specific recreation activity.
- (2) Physical, social and managerial setting preferences differ among wilderness recreationists desiring different types of experiences.
- (3) Activity participation differs among wilderness recreationists desiring different experiences. (p.266)

Methodology

Mail questionnaires to non-commercial recreation visitors of two wilderness areas were used during the summer of 1978. Names and addresses were obtained from interviews at trailheads and mailback postcards distributed on windshields of cars parked at trailheads. There was a 74 per cent response rate, N = 307.

Conclusions

Each hypothesis was supported. According to the model, recreationists choose settings and activities on the basis of how they are expected to meet valued experience outcomes, so users with different experience preferences have different setting and activity preferences.

"..these experiential data can, with additional judgement, aid managers at several points in the planning process...by focusing on the setting

attributes valued differentially for these experiences, managers might develop criteria and standards for inventorying land for its ability to provide different recreation opportunities." (p.280)

Application to the Marine Park

This is a detailed example of the type of research that GBRMPA may wish to undertake.

ROBERT E. MANNING "CROWDING NORMS IN BACKCOUNTRY SETTINGS: A REVIEW AND SYNTHESIS" *Journal of Leisure Research*, Vol 17, No 2, 1985, pp.75-89

Objective

To examine "a large and growing genre of research on crowding in outdoor recreation." (p.75)

Discussion

Factors that give a basis to crowding norms

Characteristics of visitors

1. motivations, preferences, and expectations
2. experience levels
3. attitudes toward wilderness
4. demographics

Characteristics of those encountered

1. type and size of group
2. behaviour of the group
3. perceptions of likeness between groups

Situational variables

1. type of area
2. location within an area, for example trail versus campsite
3. environmental factors such as proximity of campsites, insufficient facilities

Re: Management and Research

- diversity in use density opportunities is needed in outdoor recreation
- there may be considerable consensus on crowding norms within the diversity of public tastes. Selected groups of recreationists may share personal, attitudinal, and behavioural characteristics which lead to shared crowding and other norms.
- estimates of crowding norms developed from survey research might be interpreted more appropriately as the lower bounds of encounter tolerance.

- determining appropriate encounter levels for a recreation opportunity is ultimately a value judgement which must be made by managers.
- the decision of appropriate encounter levels is complex as suggested by the normative interpretation of crowding.
- the complexity of crowding suggests it is subject to multiple management strategies. Rather than focusing on density limits, crowding might also be managed by redistributing spatial and temporal use patterns, more enlightened design of trail and campsite systems and other use facilities, more emphasis on maintaining environmental quality, fostering higher rates of compliance with rules and regulations, and greater concern for developing and managing outdoor recreation opportunities to appeal to relatively homogenous groups of users. (p.445-446)

Application to the Marine Park

This is a cogent summary of all the literature that addresses 'crowding' and is highly recommended to the reader. It gives a valuable reference of concerns for research on crowding in the Marine Park.

ROBERT E. MANNING "DENSITY AND CROWDING IN WILDERNESS: SEARCH AND RESEARCH FOR SATISFACTION" Proceedings - National Wilderness Research Conference: Current Research
USDA Forest Service General Technical Report INT-212,
July 1986, pp.440-448

Objective

This paper reviews and synthesises the literature on crowding and its relationship to visitor satisfaction in wilderness and related environments. It then presents a model of crowding that the author hopes will lead to a better understanding of the complex issue of crowding.

Discussion

Since other papers in this review have covered the same material and have already been summarised I won't repeat the information here. This is an excellent synthesis of the concept, however.

The model (p.446) might well serve as a useful tool to a manager needing to better understand the problem of crowding in specific settings.

Below is a partial list of management and research implications:

- there is considerable diversity among visitors about appropriate contact levels
- based on this diversity among visitors a variety of contact opportunities should be provided
- recreation areas and zones should be established and managed to encourage relatively homogeneous groups in terms of party type and size, behaviour, and other factors which contribute to perceptions of likeness
- determining appropriate contact levels for a recreation opportunity is ultimately a value judgement which must be made by managers
- different contact levels within an area or zone may be appropriate depending upon when and where contacts occur and whom is encountered
- crowding is subject to multiple management approaches including use limitations, spatial and temporal use redistribution, facility design, maintenance of environmental quality, compliance with rules and regulations and planning for relatively homogeneous groups of visitors.
- satisfaction is not a proper criterion for managing crowding in recreation areas. If the process of displacement is operating or if in some way the population of visitors is changing, satisfaction is likely to remain high despite changing density condition. The ultimate result will be loss of diversity in outdoor recreation opportunities, particularly low-density alternatives.
- longitudinal study of the process of displacement is needed to determine the extent to which it operates.
- management and research attention should be focused on contact levels in addition to more readily available density or overall use level. Contacts are more directly related to perceptions of crowding than density of use.
- estimates of crowding norms based on survey research might best be interpreted as the lower bounds of contact tolerance. Such estimates might be increased to the extent that groups are compatible.

Application to the Marine Park

This is an excellent and concise summary of the subject of crowding for managers in any recreation setting.

A.M. O'REILLY "TOURISM CARRYING CAPACITY: CONCEPT AND ISSUES" Tourism Management, Dec 1986, pp. 254-258

Objective

To examine the concept of carrying capacity in countries that are tourist destinations.

Discussion

Two definitions of tourism capacity

- (1) "...the capacity of the destination area to absorb tourism before negative impacts of tourism are felt by the host country." (p.254)
- (2) "...the levels beyond which tourist flows will decline because certain capacities as perceived by the tourists themselves have been exceeded, and therefore the destination area ceases to satisfy and attract them and thence they will seek alternative destinations." (p.254)

2 major factors in tourism development are:

- the characteristics of the tourists such as age, sex, income, availability of spending money, their motivations, attitudes and expectations, their backgrounds and behaviour patterns. Also the level of use of the facility, the visitor density, lengths of stay, types of tourist activity and levels of tourist satisfaction.
- the characteristics of the destination area and its population.

Measuring carrying capacity

Three studies (conducted in Ireland, France and Cyprus) are mentioned that attempted to measure actual densities and distributions of sunbathers at the seashore by aeral photographs taken on a busy Sunday afternoon, supplemented by a questionnaire survey distributed to beach users. A comparison of the two surveys revealed that many users would accept a density of 1000 persons per hectare or 10 square metres per person without considering a beach overcrowded.

Application to the Marine Park

This paper bases its discussion on visitor satisfaction as a means to assess carrying capacity. As such it is not particularly helpful in light of what is written elsewhere about the inadvisability about using visitor satisfaction as a criteria.

RICHARD R. PERDUE "THE INFLUENCE OF AWARENESS ON SPATIAL BEHAVIOUR IN RECREATIONAL BOATING" Leisure Sciences, Vol 9, 1987, pp. 15-25

Objective

"..to determine (a) the nature of the relationship between lake awareness by boat owners and lake attractiveness and distance from home and (b) whether the ability to predict patterns of spatial behaviour in recreational boating could be enhanced by a measure of lake awareness." (p.16)

Methodology

Questionnaires were mailed to a random sample of 1870 boat owners residing in the study region on boating participation during the six months preceding the survey. There was a 51 per cent response rate after corrections. Awareness of three major boating lakes was measured as having 'heard of' each lake. Preferences of a selected set of twelve lake attributes for each of the three major boating lakes in the region included water quality, lake bottom quality, lakeshore attractiveness, boating quality, fishing quality, waterskiing quality, boating safety, quality of boat access, quality of boating facilities, launch area crowding, lake surface crowding, and friendliness of other boats. A model of lakes use was developed.

Conclusions

"Awareness of recreational boating opportunities appears to be a negative function of distance and a positive function of lake attractiveness...when distance and attractiveness were controlled for, lake use increased as a function of awareness." (p.23-24)

"The results of this research suggest further research on the role of information as a factor influencing recreation behaviour." (p.23)

Application to the Marine Park

There is certainly widespread public awareness of the existence of the Marine Park, but the public's awareness of specific reefs or islands is less certain. Substitute the above study's term 'lake awareness' with 'reef awareness'. This type of

research would bring to light patterns of spatial behaviour in recreational boating in the Marine Park.

W.E.J. PARADICE "OBTAINING RECREATION USER INFORMATION"
Australian Parks and Recreation, Feb 1984, pp. 43-52

Objective

To explore two issues-

- (1) How do managers obtain a reasonable estimate of the total number of visitors in a wildland setting?
- (2) How do managers obtain information from visitors about preferences, improved facilities and other data which will allow more effective decisions?

Discussion

Three types of user information are needed:

- (1) information on the types of activities in which recreationists participate,
- (2) the preferred physical, social and managerial features of the setting in which the recreationist chooses to pursue his/her preferred activity,
- (3) the desired psychological outcomes or experiences that a recreation participant is attempting to obtain in the specific activity and setting.

Some sampling techniques to estimate total visitor use include self count (registrations books and boards, permit-vending machines, etc.), direct count, (television and camera observation, aerial observation, surveys, head counts, etc.) and indirect count techniques (electronic eye counters, mechanical counters).

Methods of obtaining user preference information include the interview, questionnaire, telephone interview, physical evidence, archives, and simple and "contrived observation". These methods are listed in a table where their relative advantages, disadvantages and use are discussed.

Application to the Marine Park

This paper is somewhat elementary in content but does provide some material about various techniques for obtaining visitor information.

RODNEY V. SALM "CORAL REEFS AND TOURIST CARRYING CAPACITY: THE INDIAN OCEAN" UNEP Industry and Environment, January/February/March 1986, pp.11-14

Objective

To "review the types of damage to the Indian Ocean coral reefs caused specifically by underwater tourism, discuss some determinants of reef carrying capacity for recreation, and propose means to increase this by managing the use of coral areas and reef resources." (p.11)

Summary of Major Points

There is ample documentation that "tourism and recreation have damaged coral reefs" in Southeast Asia and Malaysia.

Anchors and attached chains, when thrown onto reefs, smash corals directly on landing, by dragging, or when wrenched free after entangling coral branches.

Tourists may trample corals and cause damage when grounding boats, but "evidence from the region suggests that these ... are less pervasive and damaging than those resulting from sedimentation, commercial collection of reef organisms for the ornamental trade, explosive fishing, coral mining, and entanglement of fishing nets." (p.11)

The goal in establishing marine parks is to maintain the quality of recreational resources, yet "the attraction protected marine areas have for tourists can cause diving activity in limited reef areas, possibly in excess of (both environmental and social) carrying capacity." (p.11)

Determinants of coral reef carrying capacity for underwater tourism include:

- (1) Size and shape of the reef. Large reefs can accommodate more people than smaller ones. Irregular shaped reefs offer more options for exploration and less likelihood of contact with other divers.
- (2) Composition of coral communities, for example the fragility of coral colonies and the percentage cover by living corals. "Rocky reefs with scattered coral colonies have a greater carrying capacity than banks of fragile staghorn coral." (p.12)
- (3) Different activities carried out on the reef. "Consumptive pursuits selectively deplete populations of target species." "Nonconsumptive activities ... require aesthetic quality and the

absence of disturbance of subjects under focus by other divers and snorkellers." (p.12)

- (4) Level of experience of snorkellers and divers. Beginners cause more damage than more experienced people. Learners should be kept to reefs that have a "higher intrinsic carrying capacity, (such as those with) boulder type corals, rocky reefs with scattered clusters of coral or to the sandy periphery of reefs and the gullies through them." (p.12)

Suggested options for achieving the goal of managing reefs and people "in a way that enables maximum use and enjoyment of the resource by tourists without diminishing the quality of the underwater experience." (p.12)

- (1) Increasing public awareness. "Underwater guide(book)s are a powerful educational tool and are highly valued by tourists both for their usefulness and as souvenirs. They help to heighten public awareness of the need for conservation of reef creatures and for taking care not to damage them. Thus, by helping to redirect interest away from exploitation to 'in situ' appreciation, these guides help increase the carrying capacity of coral reefs." (p.13)
- (2) Regulating activities. To achieve more effective enforcement, "responsibility for the control of client activities can be vested formally with the tour and dive operators. The penalty for non-compliance may include loss of operating license." (p.13) A system of self-policing can be required of sub-aqua clubs.
- (3) Creating alternatives. Glass bottom boats carry large numbers of people over reefs without damaging the coral. Wrecked ships and other abandoned vehicles provide a substrate for reef organisms. "When placed strategically on sandy areas near heavily dived reefs, such as those close to sub-aqua clubs and major hotels, and deep enough to avoid becoming hazards to local shipping and trawl fisheries, these wrecks can attract divers and remove some of the tourist pressure on coral reefs." (p.13)
- (4) Establishing marine protected areas. Apart from zoning strategic areas of the reefs, moorings can be installed near popular reefs that suffer anchor damage. Underwater trails can also be designed to lead people along routes to keep fragile corals safe, and rest floats can be placed along the trails to allow visitors to rest without standing on the corals. "Signs placed at the beginning and underwater along trails facilitate reef interpretation, raise awareness

of reef vulnerability and can occupy the attention of tourists who might have chosen collection of shells and corals as the alternative." (p.14)

Application to the Marine Park

This paper does not address the issue of establishing carrying capacity levels but instead provides concrete and creative suggestions to coral reef managers on how to optimise those levels for the safety of the reef and enjoyment by visitors. It is one of very few papers in this review that is especially relevant to the Great Barrier Reef Marine Park.

RICHARD SCHREYER, JOSEPH W. ROGGENBUCK "THE INFLUENCE OF EXPERIENCE EXPECTATIONS ON CROWDING PERCEPTIONS AND SOCIAL-PSYCHOLOGICAL CARRYING CAPACITIES" Leisure Sciences, Vol 1, No 4, 1978, pp. 373-394

Objective

To show that crowding perceptions are tied to differing expectations that people may have for a recreation experience, using float trip use on whitewater rivers as an illustration.

Discussion

The problems of carrying capacity assessment have to do with management objectives that are too broad, such as "for the benefit and enjoyment of the people". A more specific and useful statement of objectives in the Wilderness Act declares that wilderness should provide "outstanding opportunities for solitude or a primitive and unconfined type of recreation."

"The conclusions that can be drawn from expectancy research in recreation are that -

- (1) people have a variety of expectations for participating in recreational activities;
- (2) the expectations for participating in one recreatin activity are ususally different from the expectations for participating in another activity;
- (3) people engaged in the same activity sometimes seek different outcomes;
- (4) different types of recreationists using the same environment sometimes seek different outcomes; and

(5) such antecedent conditions as demographic, socioeconomic and environmental variables have seldom, by themselves, been useful in explaining and predicting the motivations of recreationists." (p.377)

"A management strategy that is geared toward general enjoyment values rather than specific kinds of experience expectations will average both perceptions of crowding in to a number that conceptually may be useless. Rather, the differing sensitivities to crowding for the various expectations must be determined." (p.378)

Methodology

During the summer of 1975, a questionnaire was distributed to river recreationists as they disembarked from their trips at the boat ramp. The questionnaire asked respondents' attitudes concerning management strategies for the monument, perceptions and evaluations of encounters with others on the trip, a wilderness attitude scale (27 statements pertaining to perceived appropriate uses, values and benefits of wilderness areas to which respondents were asked to agree or disagree), a scale measuring experience expectations (with categories including - learning about nature, action/excitement, stress release/solitude, affiliation, autonomy/achievement, self awareness, and status) and certain background and trip-related variables. Out of the 1141 questionnaires distributed, the response rate was 76 per cent, N = 854.

Results

Of the experience expectations, 'action/excitement' was most important, second was 'learn about nature', and 'stress release/solitude' was a distant third.

Those users with experience expectations strong in 'stress release/solitude' and 'self awareness' showed the greatest sensitivity to crowding.

Conclusions

"When existing groups such as day versus overnight users or commercial versus private versus educational users were examined, significant differences in expectation scores emerged." (p.390)

"If primary management objectives include or emphasize experiences that are relatively density-independent, then there may be no justification for the establishment of social-psychological carrying capacities at use levels anywhere near current use levels. However, justifications may use ecological impact arguments, space limitation arguments, or arguments related to other management objectives to

maintain such levels. Conversely, if highly crowding-sensitive experiences are identified as management objectives, then capacities may be set..." (p.391)

Longitudinal studies should be developed for recreation participation, rather than one-time surveys, since the nature of users and their expectations of experiences change over time.

"If perceptions of crowding are not experience-specific but rather user-specific, then trying to assess crowding through analysis of current users may be no more useful than trying to understand ecology by taking a single picture of a hillside. Rather, we should be concerned with the kinds of experiences we are attempting to provide opportunities for, and then assessing the sensitivity to crowding associated with those experiences." (p.393)

Application to the Marine Park

This classic paper explains in detail why longitudinal studies should be undertaken in recreation areas in order to obtain accurate information about the nature and expectations of users. It is as relevant for the Marine Park as it is for any other area.

BO SHELBY "ENCOUNTER NORMS IN BACKCOUNTRY SETTINGS: STUDIES OF THREE RIVERS" *Journal of Leisure Research*, Vol 13, No 2, 1981, pp. 129-138

Objective

To measure the normative components (personal norms, social norms, range of tolerable contacts, and crystallisation of norms) for three different kinds of experiences in an efficient and informative way.

Methodology

Data for the Grand Canyon came from self-administered questionnaires by participants at public meetings on a proposed River Management Plan for Grand Canyon (including private boaters, passengers on commercial trips, commercial boatmen, conservation group members and others) and from floaters on two rivers in Oregon. Attendees completed 434 questionnaires.

River floaters on the Rogue River were sampled during the summer of 1977. Questionnaires were completed by 343 commercial passengers and 194 private floaters.

River floaters on the Illinois River were sampled during the spring of 1979. Data was collected at the end of the river trips. 90 per cent of those

interviewed completed and returned the mailed questionnaire. (Sample size not given.)

Results

"The most remarkable finding is the similarity across locations of the norms defining the three types of experiences, including encounter norms on the rivers and at camp." (p.133)

Conclusions

- (1) Crowding involves normative definitions of what is appropriate.
- (2) It is possible to measure and analyse characteristics of encounter norms.
- (3) Norms vary depending on where encounters take place.
- (4) Norms for certain kinds of experiences may be quite similar, even in different areas.
- (5) The amount of shared agreement (crystallisation) probably varies from one experience to another.
- (6) There is a need to better describe and define recreation experiences. (p.136-137)

Application to the Marine Park

This study's conclusions suggest that certain representative areas in the Marine Park could be identified and studied with some confidence that their use and impact variables and norms would be similar in other comparable areas in the Marine Park.

BO SHELBY , THOMAS A. HEBERLEIN CARRYING CAPACITY IN RECREATION SETTINGS Oregon: Oregon State University Press, 1986, 164 pp.

Book Overview

This book develops a general conceptual framework for carrying capacity which can be applied to a variety of situations. It claims relevance to both researchers who conduct capacity studies and resource managers who make capacity decisions.

The authors use a model of descriptive and evaluative components to determine carrying capacity. As well as presenting theoretical discussion the book may be used as a handbook for application of the concept.

Chapter headings include:

- 1 - Recreational Carrying Capacity
- 2 - Describing Recreational Use
- 3 - Evaluating Use: Satisfaction
- 4 - Evaluating Use: Feeling Crowded
- 5 - Evaluating Use: Contact Preference Standards
- 6 - Moving Ahead with Carrying Capacity Research
- 7 - The Next Step: Allocating Use

The appendices contain specific directions for and examples of research techniques for obtaining information necessary both for carrying capacity and use-allocation systems.

The authors are well represented, themselves, in the professional literature. They also provide an extensive bibliography.

Application to the Marine Park

The authors' model for doing research and developing the concept of carrying capacity in recreational settings merits consideration. The Authority may wish, however, to compare it with other models such as 'Limits of Acceptable Change' and 'Recreation Opportunity Spectrum'.

M.R. SOWMAN AND R.F. FUGGLE "ASSESSING RECREATIONAL CARRYING CAPACITY: A CASE STUDY OF THE KROMME RIVER ESTUARY, SOUTH AFRICA" J. Shoreline Management, Vol 3, 1987, pp.53-75

Objective

To use the concept of recreational carrying capacity to provide "the theoretical framework for assessing the level of shoreline development that will lead to appropriate levels of boating pressure on a South African estuary." (p.54)

Methodology

Four hundred and seventy-eight (478) questionnaires were hand-delivered to all households in the area between 28 December 1985 and 4 January 1986. Of these, 333 questionnaires were returned. Direct observations were also made of the recreational activities pursued on the area of water under investigation. Observations were made for seven days from three vantage points along the estuary.

Conclusions

The majority of people who utilise the estuary for recreational boating perceived the resource as crowded, indicating that the social carrying capacity had been reached.

Respondents were asked their opinion on the most effective ways to prevent congestion on the estuary, choosing from a list of strategies including activity zoning, time zoning, registrations and strict control of sailing and power craft, limiting the number of powerboats allowed on the estuary per household, and restricting development in the area.

The responses provided "a useful guide to decision-making authorities as to the measures to prevent congestion on the water that would be acceptable to those utilising the estuary." (p.71)

"Questionnaire analysis revealed that the proposed development of facilities for commercial boats in the Kromme River estuary is strongly opposed by the majority (79 per cent) of property owners and holidaymakers to the area. It is anticipated that the establishment of such facilities will have serious negative social impacts on recreationists using the Kromme River estuary." (p.71)

Application to the Marine Park

This type of study is one that GBRMPA might at some time consider in the face of extensive commercial development in the Marine Park.

GEORGE H. STANKEY "DISPERSED RECREATION USE AND USERS IN KOSCIUSKO NATIONAL PARK, AUSTRALIA: A PROFILE AND COMPARISON WITH THE UNITED STATES" Proceedings - National Wilderness Research Conference: Current Research USDA Forest Service General Technical Report INT-212, July 1986, pp.287-296

Objective

To "examine the similarities and differences between the users of a wildernesslike setting in Australia and their counterparts in the United States. Such an analysis is intended to shed light on the extent to which such settings share similar clientele and provoke common behaviours in their respective cultural settings and to appraise the extent to which approaches to use management might be mutually applicable." (p.289)

Methodology

"The study analysed responses to a questionnaire mailed to overnight and day users of the Summit Area during the summer of 1982-83." (p.290) Nine hundred and twenty-one (921) questionnaires were returned. "Four variables concerning visitor characteristics were collected - age, sex, residence, and membership in a conservation or outdoor recreation club." (p.290) "Respondents were asked to provide information about their trip including party size,

type of group, length of stay, and recreational activities in which they participated."(p.291) Finally the visitors were asked about the number of other parties encountered and their evaluation of them.

Findings

Characteristics of hikers in Australia and the United States were very similar in all instances but one. Although reported levels of daily encounters were not sharply dissimilar, evaluations of these encounters were quite different. U.S. hikers were more ready to describe the reported number of encounters as too many. Australian hikers were more accepting or indifferent to encounters.

Conclusions

The author suggests that Australia's unique geography, society, and legal and political institutions demand "that wilderness management in Australia must evolve its own course"(p.296).

Application to the Marine Park

Since the Marine Park hosts a wide variety of visitors, both domestic and international, these cultural differences should be revealed in Marine Park research on visitor characteristics and experiences.

STANKEY, G.H. "THE APPLICATION OF THE CARRYING CAPACITY CONCEPT TO WILDERNESS AND OTHER LOW-DENSITY RECREATION AREAS" Wilderness Australia Conference, Canberra, July 1978, 30 pp.

Objectives

- (1) Clarify the carrying capacity concept, its role as a management strategy, limitations in its applicability.
- (2) Examine how managers might apply the concept.
- (3) Look at some management actions that might hold use at capacity levels.

Discussion

Carrying capacity is not an inherent, fixed value. It can be diminished by unregulated overuse or enhanced by thoughtful management. (p.2)

Capacity ...is a function of more than simple numbers of users. ..Use intensity by itself is a poor predictor of impact. Type of use encountered and

the location of encounters are better for measuring impacts on users.

Four propositions

- (1) The determination of carrying capacity is ultimately a judgemental decision. (p.5)
- (2) Carrying capacity decisions depend on clear management objectives, that is, formal statements of the environmental and social conditions that management seeks to maintain or restore. (p.6)
- (3) In making carrying capacity decisions, the range of available alternative opportunities must be taken in to account. (p.6)
- (4) Carrying capacity is a probabilistic concept, not an absolute measure. It is intended to serve as a framework to accomodate the most probable pattern of events. (p.7)

Management "objectives are prescriptive i.e. they tell what conditions should be like." (p.14) They "must be both site-specific and detailed." (p.15) "They describe the nature of the experience to be produced, they serve as the operational objectives by which all management decisions must be formulated, they define what tools and strategies are appropriate for use by managers, and they serve as a check to test progress toward their achievement." (p.15)

Re: Establishing Social Limits of Change - define the ideal experience with respect to setting, intensities of use, opportunities for discovery and challenge, etc. Two factors for establishing social use limits are human contact and visitor perception of resource quality. Seek to develop standards appropriate to the type of users who have priority in that setting. Managers must have information about total numbers of encounters, encounters with other kinds of users, crowding at campsites, etc. before judgements about acceptable limits for each element can be made.

If conditions threaten to exceed established capacity levels, three types of action are possible:

- (1) change the area's management objectives
- (2) take management actions to 'harden' the resource
- (3) restrict use in some way, for example total amount, distribution, type, timing.

Application to the Marine Park

Stankey's Limits of Acceptable Change model is one of a number of alternative models that may be followed to develop the concept of carrying capacity in the

Marine Park. Whether or not his model will ultimately be chosen as the preferred prescription, his discussion is instructive.

STANKEY, G.H. "VISITOR PERCEPTION OF WILDERNESS RECREATION CARRYING CAPACITY" USDA Forest Service Research Paper INT-142, 1973, 61 pp.

Objectives

- (1) To provide insight into wilderness visitor attitudes toward the use parameters of amount, type, distribution, and behaviour.
- (2) To probe visitor attitudes toward the concept and specific techniques of use rationing.
- (3) To measure the relationship between actual recreation use encountered and the respondent's perception of capacity. (p.7)

Methodology

Visitors to four wilderness areas in northern central U.S. completed a questionnaire on parameters of use that could potentially affect capacity standards. The questionnaire was designed to provide a description of the party, information regarding previous outdoor recreation experience, attitudes and perceptions toward various parameters of wilderness recreation use, attitudes toward possible management alternatives regarding wilderness carrying capacity, and a socioeconomic description of the respondent. (p.10) Sample size was 624.

Eighteen items were constructed that focused on attitudes toward encountering various levels of use in the wilderness, attitudes toward various forms of use in the wilderness, and attitudes toward various wilderness management policies. A five point scale ranged from 'strongly agree' to 'strongly disagree'.

Other items were listed as possible features in a wilderness area and respondents were asked to state their desirability in the context of the wilderness.

Respondents were then classified on the basis of their overall 'purism' score. Purists are those who demonstrated a consistently high level of agreement with the Wilderness Act's definition of wilderness.

Conclusions

The impact of encounters varies between groups.

Conflicts between groups arise with respect to method of travel, for instance between motorised versus non-motorised boats.

The presence of large parties can be a factor in reduced satisfaction of visitors.

Solitude is an important aspect of wilderness experience.

Depreciative behaviour of the environment by others is an extremely negative factor in the recreational experience.

Possible management actions to be considered include reducing the size of parties that are allowed to visit, control littering, provide wilderness users a greater basis for choice, eliminate motorcraft, examine existing access to wilderness boundaries to consider ways to achieve more equitable distribution of use, eliminate all unnecessary structures, establish fish and game restrictions, encourage off-season use, zone to alleviate resource damage and enhance visitor satisfaction, close damaged campsites, communicate the objectives of the wilderness system, restrict use.

Application to the Marine Park

This is a lengthy and detailed report that is not fairly summarised in a page. It is an excellent example of careful research on the perceptions of recreation visitors, intended for use in defining the Limits of Acceptable Change for managed areas.

GEORGE H. STANKEY, STEPHEN F. McCOOL "CARRYING CAPACITY IN RECREATIONAL SETTINGS: EVOLUTION, APPRAISAL AND APPLICATION" Leisure Sciences, Vol 6, No 4, 1984, pp. 453-473

Objective

To trace the historical evolution of the carrying capacity concept, offer critical appraisal and to introduce a reformulated approach to the carrying capacity issue - Limits of Acceptable Change (LAC).

Discussion

Three aspects of carrying capacity are "central to both understanding the research on the topic and its effective application" (p.454):

- (1) All formal articulations of recreational carrying capacity carry with them the notion that there is no straightforward relationship between use level, or density, and measures of satisfaction.
- (2) Graefe et al.'s review (1984a) of the literature, while useful was too narrow. This paper builds upon and clarifies the framework they used.

- (3) The 'Limits of Acceptable Change Management System' provides a framework "whereby the principles, concepts, and findings embodied in carrying capacity research can be applied." (p.455)

The essential elements of the concept of carrying capacity include the ideas "that:

- (1) recreationists sought multiple satisfactions from recreation engagements, and dependent upon these, encounters with others might add, detract, or be neutral in their effect on those experiences;
- (2) the satisfaction visitors report is a function of more than use level - the type, frequency, and location of encounters are important intervening variables;
- (3) clearly stated objectives are essential to identifying carrying capacities;
- (4) the emphasis in management needs to be on the outputs - the experiential and environmental conditions desired - not on inputs such as use levels." (p.455)

In sum, there is agreement "that carrying capacity is a management system directed toward maintenance or restoration of ecological and social conditions defined as acceptable and appropriate in area management objectives; it is not a system directed toward manipulation of use levels per se." (p.458)

Re: encounter preferences

"Encounter preferences alone should not be taken as predictive of the relationship between actual use levels and satisfaction or quality. Collectively, information on encounter preferences provides a profile of the social norms held by recreationists. However, such norms have a useful function: they inform managers of ideal conditions, that is, what a visitor would like to encounter in a given situation. Coupled with an assessment of the existing situation, such norms can be used to develop realistic management objectives." (p.465)

Re: application of the carrying capacity concept

"Much of the reason for the lack of success (in applying the concept of carrying capacity) stems from the difficulty ...of establishing a predictable linkage between use level and impact. As long as the carrying capacity concept was formulated around a question of 'how much is too much', this difficulty would remain." (p.466)

Limits of Acceptable Change (LAC)

"The focus of the LAC process is on management of the environmental and social conditions identified as desired." (p.466)

"...LAC focuses on management of conditions rather than use levels per se...It recognizes that it is the condition of the resource and social setting that is important; it manages impacts of use but not use directly." (p.466)

The nine steps of LAC include:

- (1) Identify area issues and concerns.
- (2) Define and describe opportunity classes.
- (3) Select indicators of resource and social conditions.
- (4) Inventory existing resource and social conditions.
- (5) Specify standards for resource and social indicators for each opportunity class.
- (6) Identify alternative opportunity class allocations reflecting area issues and concerns and existing resource and social conditions.
- (7) Identify management actions for each alternative.
- (8) Evaluate and select a preferred alternative.
- (9) Implement actions and monitor conditions.

Application to the Marine Park

As already noted this model is worth consideration for implementation of carrying capacity concepts in the Marine Park.

JERRY J. VASKE, ALAN R. GRAEFE, BO SHELBY, & THOMAS A. HEBERLEIN "BACKCOUNTRY ENCOUNTER NORMS: THEORY, METHOD AND EMPIRICAL EVIDENCE" *Journal of Leisure Research*, Vol 18, No 3, 1986, pp. 137-153

Objective

To discuss the conceptual definition of norms, how norms are measured, the extent to which normative standards are shared by various subpopulations of backcountry recreationists, and the implication of such standards for managing backcountry.

Discussion

A norm is defined as "any standard or rule that states what human beings should or should not think, say or do under given circumstances." (p.138)

"Standards shared by members of a social group are labeled 'social norms'." (p.139)

"Personal norms refer to the individual's own expectations, personal ideals against which events are evaluated." (p.139) Conflict results when individuals with contrasting standards interact, which can occur with people engaged in the same activities as well as different activities.

The Return Potential Model (p.140) uses a horizontal axis as the behavioural dimension to measure, for example, encounters with others, and the vertical axis is an evaluation of the behaviour as favourable or unfavourable. Lines can be described for individual ratings as well as for groups by using the mean ratings for all members of a group.

Analysis of the shape of the resulting curve reveals a number of structural characteristics of norms - the range of tolerable contacts, the intensity of the norm and the crystallisation of the norm.

Application to the Brule River study

The study's objective was to evaluate canoers' perceptions of crowding as a function of their norms for meeting recreationists engaged in each of three activities: fishing, tubing (inner-tube river floating) and canoeing.

Methodology - canoers were asked how they felt about seeing 1,2,3,5,7,9,14,20 and 25 other canoers, tubers and fishermen. Response categories ranged from very pleasant, pleasant, neutral, unpleasant and very unpleasant.

Findings - perceptions of crowding were significantly higher when reported contacts exceeded personal and social norms.

A synopsis of ten similar studies is also given in this paper with the following conclusions:

- encounter norms exist for particular types of contacts with certain types of visitors at particular places and for certain types of experiences. Recreationists have norms for acceptable distances between individuals, interactions at a campsite, and perceived levels of ecological impact.

- individuals are capable and willing to specify their norms when asked.
- the Return Potential Model provides a basis for quantifying where and to what extent different subpopulations of recreationists share the same normative standards.
- there is some consistency in the norms for certain types of experiences.

Conclusions

Normative data are helpful in the evaluative component of resource decisions in two respects:

- (1) Information about norms shows the extent to which consensus exists.
- (2) When conflicts do exist, normative data specify the positions of various groups and document the extent of disagreement, thus putting arguments about values on a more empirical basis.

Application to the Marine Park

Research for social carrying capacity in the Marine Park should endeavor to reveal the norms that exist for the various recreational groups who use the Marine Park.

JERRY J. VASKE, MAUREEN P. DONNELLY, THOMAS A. HEBERLEIN
"PERCEPTIONS OF CROWDING AND RESOURCE QUALITY BY EARLY AND MORE RECENT VISITORS" Leisure Sciences, Vol 3, No 4, 1980, pp.367-381

Objective

"To empirically examine the relationship between the year of first visit to an area and visitors' current evaluations of both the physical and social conditions of that setting." (p.369)

Social and Resource Evaluation Hypotheses

"Those who made earlier visits to the setting under lower use level conditions will evaluate the number of contacts as too many and will feel more crowded, given a constant level of contacts, than will more recent recreationists who initially visited the area under higher use level conditions." (p.370)

"Those who made earlier visits to the setting under lower use level conditions will more often evaluate the physical environment as being degraded, than will the more recent visitors." (p.371)

Methodology

From a mailed questionnaire the perceptions of a systematic random sample of boaters who visited the Apostle Islands National Lakeshore were evaluated and compared on the basis of the length of time since their first visit to the islands.

A census was first conducted to determine the names and addresses of all the people who visited the islands during the summer of 1975. Visitors names were provided by the local excursion boat, the rangers on two islands, and from self-registration cards located on another island. The primary source for contacting boaters was the area marinas. Four specialised versions of the survey were constructed: a general background questionnaire and special user surveys for boaters, campers, and day-visitors. Each respondent filled out the general background questionnaire and one of the special user surveys. Of the 1200 questionnaires mailed, there were 647 of the 972 responders who indicated boating as their primary activity. Those responses made up the data for this report.

Conclusions

"Overall, the findings support the social evaluation hypothesis. Boater and camper contacts were similar for each category of time of first trip; however, the earliest arrivers to the Apostle Islands evaluated the contacts more negatively." (p.375)

"Research...also suggests that individuals may take certain steps to avoid situations where contacts exceed their tolerance level.... When asked if they had ever avoided islands due to crowding, boaters who first visited the Apostles before 1970 were more likely to avoid the heavily used islands than the 1975 visitors." (p.375)

The resource evaluation hypothesis was also supported. The earliest boaters more often identified physical indicators of human presence as being a problem on the islands than did the other two groups.

"This research indicates that boaters who initially experienced the Apostle Islands prior to the area's national designation more often report that there are too many boaters and campers than do those visitors who first arrived after 1970... These evaluative differences exist despite the fact that all boaters report the same number of encounters with other recreationists." (p.377)

"The findings imply that as use levels increase, recent visitors become more tolerant of both environmental degradation and contacts with others.

People who are sensitive to increasing numbers of users and the physical impacts associated with this use must either readjust their expectations to conform to the changing nature of the experience or move on to less crowded areas." (p.377)

"...studies conducted during a single time frame will consistently find a majority of satisfied users, regardless of the number of recreationists present. To learn more about the impact of crowding on the recreational experience, it is necessary to locate resources, that, for the moment, do not receive extensive usage, but where density levels are projected to increase. By following the initial visitors through the area's various stages of development, it is then possible to document the impact of increased visitor numbers on the perceived quality of the experience." (p.379)

The "findings underscore the need for establishing a clearer definition of the kind of experience a particular area should provide. Because new generations of visitors appear to expect and be tolerant of greater numbers of recreationists, it is likely that average user satisfaction levels will remain high, despite the changing character of the experience." (p.379)

"Rather than focusing on the evaluations of current visitors it is necessary to base management strategies on the values of individuals whose definition of the experience conforms with management objectives." Failure to do so "may lead to continual changes in both the nature of the recreational experience and the condition of the physical environment." (p.379)

Application to the Marine Park

The emphasis here is on the necessity for longitudinal studies to assess the changes in the experience provided in recreation areas and the changes in the preferences and tolerances of the visitors. The author's conclusions support the findings elsewhere in the literature that visitor satisfaction is a poor measure of carrying capacity.

JERRY J. VASKE, MAUREEN P. DONNELLY, THOMAS A. HEBERLEIN,
AND BO SHELBY "DIFFERENCES IN REPORTED SATISFACTION
RATINGS BY CONSUMPTIVE AND NONCONSUMPTIVE RECREATIONISTS"
Journal of Leisure Research, Vol 14, No 3, 1982, pp.195-
206

Objective

To examine the characteristics of recreation activities and their influence on user satisfaction, theorising that participants in consumptive and nonconsumptive activities differ in terms of the specificity and clarity of their recreation goals and their control in achieving these goals.

Discussion

Re: Consumptive versus nonconsumptive recreation activities

- "Consumptive activities are dominated by one clear and specific goal, the acquisition of the commodity to be consumed...The importance of the consumable commodity is reinforced by the individual's reference group." (p.196-197)
- The goals of nonconsumptive activities are often more diffuse and less central to the definition of the activity, for example seeing nature, being away from home and routine activities, being with family and friends, etc.
- A second big difference involves the amount of control the recreationists have in selecting environments that provide the outcomes central to their recreation goals. Hunters are less likely to achieve the goal that is central to their activity. "The presence of this more specific and clear goal that is less subject to the control of a consumptive recreationist has implications for the participant's overall evaluation of the recreation experience." (p.198)

Hypotheses

- (1) Satisfaction ratings reported by consumptive recreationists will be lower than those reported by nonconsumptive recreationists.
- (2) Hunters and fishermen who achieve the defining goal will report higher satisfaction ratings than those consumptive users who did not bag game.

Methodology

Six surveys were done on hunters and fishermen and seven studies of nonconsumptive types of recreationists were completed. Five of the surveys used mailed questionnaires and the remaining were

based on on-site interviews. Over 7000 individuals were contacted.

Satisfaction was measured with the same question: "Overall, how would you rate your day/trip?"

Conclusions

Forty-two per cent of the hunters and fishermen rated their experience as "poor" or "fair" while only four per cent of the nonconsumptive individuals reported similar feelings.

Sixty-nine per cent of the nonconsumptive users said they had an "excellent" or "perfect" experience, but only twenty-two per cent of the hunters and fishermen indicated this level of satisfaction.

"...in general, nonconsumptive recreationists are more satisfied than consumptive users." (p.203)

Re: Research Implications

"The theory about the clarity of the goals and the control in achieving the goal could be more precisely tested by gathering comparable data on successful and unsuccessful climbers and bird watchers. The unsuccessful members of these groups should be closer to the overall satisfaction ratings of consumptive rather than nonconsumptive recreationists.

Individual differences within an activity could also be included in future research. Recreationists who engage in activities in order to achieve a few specific important goals should evaluate their experiences more negatively when these goals are not met, than individuals who seek out activities for more general reasons."(p.204)

Re: Policy implications

"..overall satisfaction is, by itself, not an adequate management criterion." (p.204) Individuals seek particular activities rather than simply try to maximise nonwork satisfaction.

Application to the Marine Park

Given the multitude of consumptive recreationists that use the Marine Park, these findings are interesting and pertinent. Once again the reader is warned that satisfaction levels are a faulty measure of carrying capacity.

PATRICK C. WEST "ON-SITE SOCIAL SURVEYS AND THE DETERMINATION OF SOCIAL CARRYING CAPACITY IN WILDLAND RECREATION MANAGEMENT" USDA Forest Service Research Note NC-264, 1981, pp. 1-4

Objective

"To directly measure the displacement thesis in a study of backcountry users at the Sylvania Recreation Area in the Ottawa National Forest in Michigan."
(p.2)

Methodology

An on-site survey of 321 backcountry campers was conducted during the summer of 1978. A phone survey of past users was also conducted and succeeded in interviewing 301 persons.

Conclusions

Perceptions of crowding do not differ significantly between old-time users and newcomers to the area.

There was no relation between feeling crowded and the intent to return.

So the displacement thesis was not supported in this study, where old time users who knew an area before the crowds came tend to feel the most crowded and thus do not return.

Application to the Marine Park

The concept of recreational displacement is supported in some studies but not in others. The study of displacement will become more pertinent as the Marine Park becomes more crowded.

3 GBRMPA RESEARCH REPORTS

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3.2 COMMENTARIES

**AUSTRALIAN TRAVEL INDUSTRY ASSOCIATION - J. CLARINGBOULD,
J. DEAKIN, P. FOSTER DATA REVIEW OF REEF-RELATED TOURISM
1946-1980 GBRMPA Research Publication, February 1984**

The data in this report is spotty but may be useful as a background document. There is some data on length of stay and seasonality for tourists.

**S. M. DRIML GREAT BARRIER REEF TOURISM - A REVIEW OF
VISITOR USE GBRMPA Research Publication, June 1987**

On pp.36-37 in the section on Island Tourist Resorts, there is a some data presented on people who visit island resorts taken from surveys from the Queensland Tourist and Travel Corporation. Four tables describe trip purpose, origin of visitors, what attracts visitors to the island resorts, and the activities in which the visitors had participated.

This report is otherwise an important background document describing the extent of tourism on the Great Barrier Reef with respect to visitor nights at island resorts, commercial passenger boating, and private boat use. In her concluding comments, the author points to the technological changes that have made the reef more accessible to tourists. These changes are significant for issues of social carrying capacity.

**ECONOMIC ASSOCIATES AUSTRALIA GBRMPA - GREEN ISLAND
ECONOMIC STUDY GBRMPA Research Publication, 1983**

Section 4 of the Green Island report goes into some detail on visitor attitudes toward their experiences on Green Island. The consultants drew on studies conducted by the National Parks and Wildlife Service in 1979 and one by the Queensland Fisheries Service in 1978. Some of the data is most pertinent to basic policy development on social carrying capacity, including:

- the attractions which prompted visits to the Cairns region,
- an assessment of the relative importance of a visit to Green Island during the visit to the Cairns region,
- the patronage and preferences of the island's attractions,
- the perception of crowding on the island,
- valuation of the island attractions based on willingness-to-pay,

- a question about the features that attracted visitors to Green Island,
- ratings of the features as very good, satisfactory or needing improvement, and
- suggestions about how the island experience could be improved.

ENVIRONMENT SCIENCE AND SERVICES APPLICATION OF RECREATION OPPORTUNITY SPECTRUM CONCEPTS TO MARINE PARK PLANNING A Report to GBRMPA, September 1984

No application of ROS concepts were attempted in this report. Rather a discussion of and argument for the use of certain ROS concepts is made with respect to Marine Park planning. As with the preceding study by Means, the authors conclude by encouraging GBRMPA to place greater emphasis on the provision and management of 'recreation settings' rather than sticking to an 'activities-based' approach. A number of points are given in justification of this recommendation. The advice seems appropriate and consistent with the social carrying capacity literature which emphasises the provision of experience diversity in recreation settings.

ENVIRONMENT SCIENCE AND SERVICES A USER-BASED EVALUATION OF THE ZONING PLAN AND DAY-TO-DAY MANAGEMENT IN THE CAPRICORNIA SECTION OF THE GBRMP GBRMPA Research Publication, March 1987

Although the subject of this report does not pertain directly to social carrying capacity concerns, there are some useful data and approaches contained in the report. First, there is a comprehensive list and definition of users in the Capricornia area. Second, the study design, incorporating user awareness of the Zoning Plan, impacts of the Zoning Plan on users, and user attitudes and preferences, could serve as a example for a similar study on visitor use, characteristics, expectations and goals for Marine Park experiences, and social impact indicators. Any research on visitor use for social carrying capacity should be at least as thorough.

M. J. GIBBINGS TOURISM AND THE GREAT BARRIER REEF A Report Prepared for the GBRMPA 1979

No pertinent data.

**WENDY D. GOODBURN APPLICATION OF THE RECREATION
OPPORTUNITY SPECTRUM PLANNING FRAMEWORK TO SAILING IN THE
VICINITY OF THE WHITSUNDAY ISLANDS, NORTH QUEENSLAND**
Thesis, University of Sydney, 1987

Like the Pearce & Moscardo study on Norman Reef, the Whitem study at Beaver Cay, and the Means study at four islands, this honours thesis directly addresses carrying capacity issues in the Marine Park setting. She uses the ROS model in the Whitsundays.

Three distinct types of yachtsmen are defined in this study - locals, those who reside outside the region, and charterers. The author then interviewed a sample of these groups about their preferences for environmental settings in which activities were undertaken at selected anchorage locations. The results showed that there are statistically significant differences between the three groups of yachtsmen in regard to preferences for trips, their boats and the environmental settings of their chosen anchorages.

The author shows understanding about the pressures that managers of the Marine Park are facing and, using the ROS model, approached her task with these problems in mind. She finds the ROS model applicable to the Marine Park setting (as did K. Means, see "An Investigation into the Use of the Recreation Opportunity Spectrum within a Marine Park", 1984) and shows how she applied ROS concepts and criteria. Her interviews were thorough and yielded good information. She emphasises, as do many others, that "quality recreation experiences are best assured by providing a diversity of opportunities (Clark and Stankey, 1979)". Her conclusions and recommendations to management are detailed and specific. This report is one of the few that is directly pertinent to carrying capacity concerns.

**FRANCIS GREENLEAF ENVIRONMENTAL CONCERN FOR THE GREAT
BARRIER REEF - AN INVESTIGATION OF ATTITUDES OF THE CAIRNS
AND TOWNSVILLE COMMUNITIES** Dissertation, James Cook
University, November 1980

Residents of Townsville and Cairns were interviewed in this study to assess and compare their attitudes toward the GBR environment. Although the style of this author's presentation is quite technical and heavy-going, her research conclusions on pp.125-126 provide a detailed characterisation of persons who have strong feelings about the 'fragility of the reef in coping with the activities of man' and the 'utility of the GBR'. Among other characteristics, these individuals are more likely to visit the GBR with greater frequency than other individuals interviewed. Such characterisations of residents may be useful for comparison with other studies on the environmental attitudes toward the GBR of visitors who reside outside the immediate region.

DARYL HUDSON A PRELIMINARY STUDY OF ISLAND DAYTRIPPERS
AND NATIONAL PARK VISITORS IN THE CAIRNS REGION
Dissertation, Griffith University, 5 November 1981

This study also contains information relevant to social carrying capacity concerns. It describes characteristics, perceptions and travel patterns of visitors to the Cairns region who visited one of three National Parks or made daytrips to nearby islands, including Dunk Island, Bedarra Island, Fitzroy Island, Green Island, and Low Isles.

The author admits to study design faults that may limit the accuracy of the results. The interpretation of the findings is also lacking in great insight. However the data could be put to use in conjunction with other studies of those islands to produce a picture of tourist use over time.

INSTITUTE OF APPLIED SOCIAL RESEARCH - T. HUNDLOE, S.
DRIML, S. SHAW, J. TRIGGER, PROPOSED CAIRNS SECTION
ECONOMIC IMPACT STUDY 1981

Does not focus on user experiences or expectations beyond very general statements about resort use.

A. M. KAY & M. J. LIDDLE MANUAL FOR THE ASSESSMENT,
LOCATION AND DESIGN OF REEFWALKING ACTIVITIES 1985
Technical Report for the GBRMPA

This report contains some information on:

- visitor characteristics and party sizes of those doing reef walking (p.3).
- the motivations of the tourists, students and scientists who reef walk (p.4)
- the expectations of each of these groups of reef walkers when they go to the reef (p.4-5).

The discussion on Resource Evaluation begins by asking a few questions about use and the attraction that a reef offers to satisfy visitor needs, but most of the manual focuses strictly on environmental concerns rather than social.

There is a brief discussion (5.8, p.21) of the concept of carrying capacity which focuses strictly on the environmental capacity and numbers of visitors. This assessment is appropriate for organised reef-walking experiences. It does not address other types of recreation experiences that may be desired by other visitor types who visit reefs.

The manual concludes with the statement - "Very detailed studies looking at patterns [of use] within the reef walking site and visitor behaviour are beyond the scope of this manual." It then suggests that visitors fill out a

questionnaire such as the one in the manual (Figure 26). For more useful information about the visitors themselves, their expectations, and their impressions of their experience this questionnaire might easily be expanded for GBRMPA research on social carrying capacity issues.

A. M. KAY & M. J. LIDDLE THE IMPACT OF REEF WALKING AT
HARDY REEF 1984 Report to the GBRMPA

This report has a section and a table (Table 2) on Levels of Use at Hardy Reef (Sec. 3.1) that describe the major sources of reef walking groups and an estimate of the frequency of visits and the number of people per visit. A good starting point for further descriptive research on visitor use at Hardy Reef.

KATHY A. MEANS AN INVESTIGATION INTO THE USE OF THE
RECREATION OPPORTUNITY SPECTRUM WITHIN A MARINE PARK
College of Idaho Thesis, November 1984

Four camping islands located in the Marine Park (Tryon, Northwest, Masthead, and Lady Musgrave) were studied with respect to application of the Recreation Opportunity Spectrum, a concept for recreation management that is closely attuned to social carrying capacity concepts. As such the data obtained directly relate to visitor use, perceptions and expectations in the Marine Park although their activity (camping) is a terrestrial one rather than marine.

Three categories of campers were delineated, conflict between users was studied, and camper attitudes toward Marine Park management was assessed. There is an emphasis on the collection of social and management impact data that is lacking in or represent a very small portion of all other GBRMPA project reports. The author provides useful interpretation and application of ROS concepts with respect to the Marine Park setting. She encourages managers to adopt an approach based on the provision of recreational settings rather than activities in order to meet the desires of a diversity of campers.

A useful and highly recommended report.

PHILIP L. PEARCE & GIANNA M. MOSCARDO STUDY OF THE
SOCIAL IMPACT OF TOURIST BOATS AND FACILITIES ON EXISTING
USERS OF NORMAN REEF October 1987

The research findings of this report are an important beginning in defining the goals and experiences of visitors to coral reefs in a Marine Park rather than those of wilderness visitors to national parks. This is a prime example of the kind of information that GBRMPA should be seeking for different types of reef users. The consultants studied the influence of a tourist-focused reef viewing operation on the clients of dive charter operators at one reef, specifically - perceptions of

crowding, level of satisfaction with the total experience at Norman Reef, perceptions of the quality of Norman Reef and the wilderness aspect of their experience. These variables match those found in the carrying capacity literature.

The findings suggest that the addition of a tourist operation to a reef previously used only by dive charter operators did not adversely affect the overall satisfaction or perceptions of crowding of the divers. The carrying capacity literature warns, however, that user satisfaction always remains high despite vastly differing experiences and is thus not a very useful indicator for social carrying capacity where managers are attempting to preserve a range of experiences.

Significant findings include:

- the fact that the presence of tourist hardware is negatively influences diver satisfaction, more so than the tourists themselves. (This finding is similar to wilderness visitors who may perceive the evidence of human use of the wilderness more perturbing than contacts with other visitors.)
- the concern by divers that the tourist operation would harm the reef. (This again supports the above point.)
- the fact that diver goals are to master diving and view marine life rather than to achieve a 'wilderness experience'. (It will be important to survey the goals of other types of reef users and divers who may express more interest in a natural rather than commercially developed marine experience. The term 'wilderness' may be a misnomer in this setting.)

GBRMPA managers, in the wake of this report, must keep in mind that the experiences and perceptions of the divers are representative only of that population of reef users. Other studies will be required to assess the impacts that various commercial operations have on the specific experiences sought by other reef visitors.

UNISEARCH LIMITED - DAVID R. GALLAGHER RECREATION SITE
CARRYING CAPACITY University of NSW September 1981

A brief theoretical discussion of the concepts of ecological and social carrying capacity is presented in terms of economics. Not useful for direct application of concepts by managers.

UNISEARCH LIMITED - S. GLASSER & I. WILKINSON REEF
TOURISM ATTITUDINAL AND SOCIO-ECONOMIC STUDY A Report to
the GBRMPA, June 1981

Much like the 1988 Vanclay study of tourist perceptions, this study reports on the characteristics, vacationing behavior, and attitudes of visitors to the Great Barrier Reef in general. It found a diversity of tourist types who visit the Reef who get "different satisfactions" from their vacations. Its recommendations for future research (p.vii) are most pertinent to this review.

This study should be reviewed in conjunction with Vanclay's report to compare overall results and to assess any changes that may have occurred over time, as is suggested in the carrying capacity literature. The sample size is nearly three times that of Vanclay's study and the discussion and interpretation of the overall material seems more thorough.

In follow up to this report conducted in 1980/81 and Vanclay's study conducted in 1986, it would be useful to summarise the results and standardise an investigative format for future longitudinal studies of visitors to the Great Barrier Reef.

FRANK VANCLAY TOURIST PERCEPTIONS OF THE GREAT BARRIER
REEF Report to the GBRMPA, March 1988

This report is ambitious, far-reaching and relevant to the concept of social carrying capacity. It contains information on each of the categories of interest - visitor characteristics, nature of visitor use, visitor expectations or goals, and general perceptions of crowding. The data should provide a very useful basis for consideration of the concept of social carrying capacity when decisions are being made about visitor use and Marine Park development.

Of the visitors who visit North Queensland primarily to visit the Reef, these tend to be first time visitors who may or may not intend to visit ever again. The majority of international visitors are in this category. Most tourists, regardless of whether they were first time international visitors or Australians whose goal was relaxation in a tropical climate, expressed concern about over-development and that there should be no more development on the Reef. The physical facility needs of these two groups was found to be similar. The author suggests that facilities planned for tourists need not be different for the different groups, that there already might be too much luxury hotel development and not enough provided for low and middle income family groups. Vanclay also found that tourists are sensitive to coral quality and expressed greater satisfaction when the coral viewed was higher quality.

Due to the report's relatively small sample size (354) which included two tourist seasons and covered locations



throughout the vast region of the Marine Park, it will not be appropriate to generalize its findings to specific sites in the Marine Park. Rather it should serve as a general guide to GBRMPA managers on domestic and international visitor perceptions. It should also spur interest in making more specific investigations in regions of concern to managers.

NOEL WHITTEM A COMPARATIVE STUDY OF PREFERENCES OF TWO
DISTINCT DAY-VISITOR GROUPS TO THE GREAT BARRIER REEF: A
CASE STUDY OF VISITORS TO BEAVER CAY Thesis, November
1983

This honours thesis is an excellent example of a detailed examination of two types of visitors to a specific site - Beaver Cay. The information it contains is relevant to considerations of social carrying capacity and includes all four types of information of concern to this review - visitor characteristics, nature of use, expectations and preferences, and perceptions of crowding. The author's recommendations are concise and pertinent to Marine Park management concerns.