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# RECREATIONAL CARRYING CAPACITY STUDIES IN KILLBEAR PROVINCIAL PARK, ONTARIO

by

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# INTRODUCTION

The problem of determining acceptable levels of development and use in Parks of all sorts remains unsolved. The late sixties saw an increasing awareness of environmental issues generally, and environmental impact specifically. Legislation purporting to accommodate the needs of impact assessment was brought foreward. Scientists and environmentalist groups made a lot of irresponsible charges, statements, and accusations about little issues that effectively robbed their credibility when major issues arose. And meanwhile the problem of environmental impact in parks was getting considerable, if one sided, attention. The notion has often been advanced that some application of the concept of carrying capacity be applied as a management tool to reconcile park use and preservation. Natural values appear to erode rapidly before the bulldozer and some system for mediating disputes between "cut and fill" oriented managers or planners and others with an environmental conscience has to be found. Consequently the notion of carrying capacity - variously but generally defined as the level and type of use best suited to the intrinsic capability of the landscape - has had wide appeal.

Research into recreational carrying capacity has, in the past, been divided between the social aspects of human crowding (and over-crowding) and straight-line physical impact on vegetation or soils or tree roots, etc. The term "environmental impact" could easily be used to describe both aspects of the research effort because they dove-tail conceptually, and because mental and social environments are every bit as real as forest or field environments. Generally, however, attempts have not been made to integrate the two factors, and correlate changes in the environment (either social or physical) with increments in park usage.

Progress on the social science side of research culminated in the realization that people, and groups of people, share common perceptions and attitudes and show common behaviours which may or may not attend those attitudes (Mercer, 1971; Ross, 1974; LaPage, 1963; Catton, 1969; Beaman and Lindsay, 1974; etc.,etc). All of this research and writing is of benefit except for one thing. In the final analysis carrying capacity standards become value judgement on the part of managers or park executive officers. This is because attitude scales and extensive questioning of park visitors can go on forever before objective standards based on human consensus can be formulated.

On the other hand, the reseachers in the area of physical impacts on park environments have difficulty applying their results in the design process because political and economic pressures often override ecological considerations, and because many park managers, or their superiors, consider some of this research to be paranoid and over-reactive. Its common for painstaking ecological research and considered opinion about the negative effects of a certain campground development, or other facility, to be overlooked by management on the grounds that "trade-offs" must be made somewhere. Furthermore, we now know that <u>any</u> attempt to accommodate humans on a landscape leads to some degree of impact, but this knowledge alone does not culminate in a decision about how much impact will be allowed. In other words, it does not lead to capacity standards either.

The purpose of the research reported on here was to collect information from both sides of the fence in such a way that it might be brought together and then <u>in concert</u> it might lead to capacity standards. Both visitor and physical data were collected in order to reveal the relationships between people and the recreation environment.

Research Design:

A detailed research program can be found in another document (Wilkes, 1975). My studies indicated that the best approach would be to measure participation rates of people in various activities and to use this information to cluster park visitors into groups with within-group similarity in recreation persuits. This has been done with some sucess by Romsa(1973, 1974) and Beaman and Lindsay (op.cit). The CORDS data however was used to cluster groups on the basis of participation or nonparticipation in a limited number of key activities. My data gives evidence not only of proportions of who participates but also the average number of minutes in any typical day the specific activity was engaged in. This information was collected by direct interview administered to parties camping on twenty-two randomly selected campsites. The interview is attached as Exhibit 1.

Once visitors were clustered into activity groups, or "activity packages", it was deemed necessary to determine how much physical space was required to accommodate the activities. This was to be done by indirect observational techniques (Burch, 1964; Lofland, 1971; Campbell, 1970; Yates, 1974). The idea here was to correlate activities with space to determine what the demands were on the physical-spatial resources of the park. Activities that conflict in the same space can presumably be separated either spatially or temporally or the least significant activity might even be prohibited. Furthermore, the spatial-temporal requirements of activity packages, in relation to the total usable space in the park may be a concrete step in determining the optimum "packing" of activities over time, and thus determining social capacity. Ecological theories pertaining to resource partitioning (partitioning the same resources - a park - either spatially or temporally between groups of "competing" users) can be used, I feel, to

determine the optimum packing of activity groups in a single park landscape (Terborgh, 1971; Anderson and Shugart, 1974; M'Closkey and Fieldwick, 1975, Schoener, 1974).

The third component of the research design was to collect detailed vegetation data in both the campground, beach, and undisturbed areas. Of major importance here would be species shifts or changes in plant associations as a direct result of human use. The presence of aliens or exotics or of complete reversals in the percent presence or coverage of species would be valuable when compared to the duration and intensity of use on the disturbed areas. In fact, an index of disturbance in the vegetation per unit human use might be achievable, which, when monitored at permanent stations around the park may give the signal that the point of unacceptable alteration has been reached.

Belt transects measuring fifteen feet by thirty feet and sampled randomly with a two square foot enclosure were used to sample vegetation at the beach and were oriented perpendicular to the water's edge. Point-centered quarter and milacre plots were used to sample forest vegetation and ground cover (Ohmann, 1973; Ohmann and Ream, 1971).

Very little of this work was accomplished because of time and manpower constraints. Also, many of the results contained herein are incomplete pending more elaborate computerized treatment.

Results:

A) The Campsites:

The campsites chosen for interviews were simply numbers read from a random numbers table and applied to the corresponding site. Each site was mapped and thoroughly inspected prior to the summer. Table (1) gives the results of this inspection plus a summary of the groups interviewed on each site.

Table 1

## CAMPSITE INSPECTION AND VISITOR SUMMARY

| | CAMPSITE NUMBERS (N=22) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2 | 45 | 94 | 112 | 212 | 242 | 261 | 283 | 304 | 338 | 356 | |
| Area ($ft^2$) | 2024 | 1564 | 2184 | 2650 | 2464 | 2160 | 1863 | 3696 | 2320 | 1850 | 2220 | |
| No. groups per season | 6 | 4 | 3 | 1 | 6 | 4 | 5 | 5 | 3 | 2 | 4 | |
| No. people per season | 28 | 17 | 16 | 4 | 23 | 19 | 24 | 25 | 13 | 10 | 17 | |
| Average group size | 4.7 | 4.3 | 5.3 | 4 | 3.8 | 4.8 | 4.8 | 5 | 4.4 | 5 | 4.3 | ..... Con't |

| | CAMPSITE NUMBERS (N=22) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 373 | 441 | 540 | 557 | 561 | 581 | 727 | 766 | 776 | 829 | 853 | AVERAGES |
| Area ($ft^2$) | 1554 | 2916 | 2206 | 1976 | 1700 | 1632 | 2344 | 2995 | 2552 | 1656 | 1748 | 2024 sq/ft. |
| No. groups per season | 5 | 3 | 6 | 3 | 4 | 3 | 4 | 4 | 2 | 3 | 4 | 3.8 groups/ site/season |
| No. people per season | 19 | 12 | 28 | 23 | 16 | 15 | 19 | 16 | 9 | 9 | 13 | 17.1 people/ site |
| Average group size | 3.8 | 4 | 4.7 | 7.7 | 4 | 5 | 4.8 | 4 | 4.5 | 3 | 3.3 | 4.8 per group |

At first it was thought that there might be some relationship between campsite size and intensity ofuse. The campsites tend to grow a little over the years as they become more trampled, but the limited data here shows no relationship. Campsite 283 in Beaver Dams campground is located near the site of an old horse stable (circa 1900) and is part of an open field situation. People do however spread out all over the site. The error in these figures stems from the fact that some groups may have been missed altogether if they were on the site only overnight. In the case of campsite 112 in Kilcoursie campground, the same party occupied the site all summer; managing to evade park authorities.

These figures may be profitably cross-tabulated with certain site characteristics to determine if site attractivity accounts for higher seasonal use. A system of campsite preselection however would preclude any relationship.

Killbear has approximately 950 campsites. The total area of available camping surface, excluding access roads and parking driveways at each site is about 45 acres, using 2024 square feet as an average per campsite. The average density of campsites is supposed to be three to five per acre, meaning that of each acre of park, between 700 and 1200 square yards are camping space.

Interviews

The interview itself was administered to occupants of selected sites only if they had spent one full day in the park the day before the interview. This requirement was felt necessary if respondents were to recall fairly accurately what they did the day before. But it immediately disqualified groups just arriving and consequently wasted the interviewers time. Another approach would be to interview the next campsite on either side until a group was found that did satisfy the requirement. Probably 30% more interviews would

have been completed if this approach had been adopted.

The age breakdown on the interview reflects for both males and females: supervised activity for the 0-15 age groups; unsupervised for the 15-20 age group, child-bearing and rearing for the 20-45 age group and non child-bearing and rearing for the group over 45. There are two problems with this. First, a youngster of 15 has far greater mobility and interests than a babe-in-arms. Second, the age groupings overlap at 14,20 and 45. This caused some confusion, and it was an oversight at the time of constructing the interview. (Also, we had no respondents zero years old!) In fact, the construction and administering of interviews taught us many things that aren't mentioned in the literature related to interviewing.

Table 2 shows age breakdowns of participants registered on the site and those interviewed.

Table 2

Age Breakdown of Park Visitors (N=376)

| | Total on campsite (N) | Total actually interviewed ($N_1$) | %N | $\%N_1$ |
|---|---|---|---|---|
| Males 0-15 | 90 | 27 (30%) | 23.9 | 12.6 |
| 15-20 | 19 | 7 (36.8%) | 5.0 | 3.3 |
| 20-45 | 69 | 50 (72.5%) | 18.4 | 23.4 |
| 45 | 23 | 14 (61%) | 6.1 | 6.5 |
| Females 0-15 | 71 | 33 (46.5%) | 18.8 | 15.4 |
| 15-20 | 15 | 6 (40%) | 4.0 | 2.8 |
| 20-45 | 68 | 57 (83.8%) | 18.1 | 26.6 |
| 45 | 21 | 20 (95.2%) | 5.6 | 9.3 |
| | N=376 | $N_1$=214 | | |

Some inferences might be made here. First it seems that at any given time during a typical Killbear day, only about 56.9 percent of the campers are on their sites. Furthermore it appears that men and women 20-45 years old spend a larger proportion of their day at the site than other groups, except older women. Only five percent of the total number of people on the sites were adolescent males (15-20) and only four percent were females (15-20) suggesting that younger people may stay in the city during the summer, or go elsewhere without their parents. The figures show clearly though, that family groups are the largest customers of park resources and facilities.

The summaries presented in Table 3 show participation rates and average length of participation in various activities arranged by age group. The table shows the number of individuals interviewed in each age group; and the number in each box, above the diagonal, represents the fraction that participated. The number below the diagonal represents the average number of minutes the respondents spent doing each item on the activity list. The column marked "percent participation" shows the percentage of people in each activity category (all age groups) who participated, out of the total available to participate. For example, only 29 of 214 people interviewed spent time diving from rocks (13.5%).

The meaning of the activities was confusing to respondents. Some people could not decide what we meant by swimming or bird watching, or what the difference was between walking and hiking. Each activity will be explained below.

Swimming meant actually moving in the water. Most people take "swimming" to mean all the activities one does at the beach. It was curious to find such a wide range of interpretations to one word. The average swimming times per age group are undoubtedly inflated. It hardly seems possible that most people could sustain thirty minutes of continuous swimming. Only 66% of park visitors swim.

Standing in the shallows is a popular activity especially with younger age

Table 3

NUMBERS OF PARTICIPANTS AND AVERAGE
LENGTH OF PARTICIPATION IN SELECTED ACTIVITIES

| ACTIVITY | ♂ 0-15 N=27 | ♂ 15-20 N=7 | ♂ 20-45 N=50 | ♂ 45 N=14 | ♀ 0-15 N=33 | ♀ 15-20 N=7 | ♀ 20-45 N=57 | ♀ 45 N=20 | % Participation |
|---|---|---|---|---|---|---|---|---|---|
| Swimming | 18/35.9 | 7/35.6 | 38/25.3 | 11/33.2 | 19/38.1 | 7/33.5 | 35/30.8 | 7/30 | 66 |
| Stand in Shallows | 19/57 | 6/15.8 | 27/33.8 | 8/41.8 | 20/50.5 | 4/20.3 | 37/43.8 | 4/30 | 58.4 |
| Dive off Rocks | 5/15 | 6/48.3 | 9/30.7 | 2/20 | 4/28.7 | 1/60 | 2/15 | | 13.5 |
| Sunbathe (idle) | 15/102.3 | 6/130 | 39/113.5 | 10/121.5 | 17/83.2 | 7/141.4 | 47/121.5 | 11/106.3 | 71 |
| Beach Sport - Float, air mattress, etc. | 10/31.5 | | 9/23.8 | 2/37.5 | 10/63.1 | 2/45 | 13/47.7 | 1/15 | 34.5 |
| Beach Sport - frizbee | 8/34.8 | 2/30 28.5% | 8/20 | 1/30 | 4/31.4 | 1/30 | 6/19.3 | 1/30 | 14.4 |
| Beach Sport - football | 1/15 | | | | | | | | 0.46 |



.....(2)

Table 3 .....Con't (2)

NUMBERS OF PARTICIPANTS AND AVERAGE
LENGTH OF PARTICIPATION IN SELECTED ACTIVITIES

| ACTIVITY | ♂ 0-15 N=27 | ♂ 15-20 N=7 | ♂ 20-45 N=50 | ♂ 45 N=14 | ♀ 0-15 N=33 | ♀ 15-20 N=7 | ♀ 20-45 N=57 | ♀ 45 N=20 | % Participation |
|---|---|---|---|---|---|---|---|---|---|
| Beach Sport - Beach ball | 4/35 | 1/5 | 6/25.8 | 1/20 | 5/15 | 1/5 | 4/26 | 2/17.5 | 11.2 |
| Play at Water's Edge | 14/58.2 | 2/10 | 6/30 | 3/145 | 14/58.5 | 1/10 | 10/34.5 | 4/60 | 25.2 |
| Canoeing | 5/87 | 1/120 | 5/78 | 1/60 | 4/52.5 | 2/37.5 | 5/72 | | 10.7 |
| Sailing | | | 1/90 | | | | | | 0.46 |
| Power Boating | 5/126 | 1/120 | 5/84 | 2/105 | 2/30 | 1/30 | 7/57.4 | 2/75 | 11.6 |
| Water Skiing | 1/15 | 1/30 | 2/60 | | 1/30 | 1/30 | 1/30 | | 3.2 |
| Fishing | 6/105 | 2/82.5 | 4/60 | 1/120 | 1/90 | | 2/60 | | 7.4 |



.....(3)

Table 3 ..... Con't (3)

NUMBERS OF PARTICIPANTS AND AVERAGE
LENGTH OF PARTICIPATION IN SELECTED ACTIVITIES

| ACTIVITY | ♂ 0-15 N=27 | ♂ 15-20 N=7 | ♂ 20-45 N=50 | ♂ 45 N=14 | ♀ 0-15 N=33 | ♀ 15-20 N=7 | ♀ 20-45 N=57 | ♀ 45 N=20 | % Participation |
|---|---|---|---|---|---|---|---|---|---|
| Eat/Drink on Beach | 5/25 | 2/83 | 6/68 | 1/60 | 5/36 | 2/37.5 | 10/20.5 | | 14.4 |
| Skin/Scuba Dive | 5/104 | 1/60 | 3/110 | | 2/90 | 1/90 | 3/47.5 | | 28.5 |
| Campsite idle (Tent) | 7/81.4 | 6/142.5 | 22/167 | 5/96 | 8/105 | 2/150 | 27/154.6 | 4/165 | |
| Campsite idle (Trailer) | 9/166 | | 24/251 | 10/207 | 10/117.3 | 2/270 | 30/220 | 13/186.9 | |
| Campsite Idle (pick-up) | 1/210 | | 1/240 | 1/450 | 2/112 | 1/210 | 2/225 | 1/390 | |
| Campsite active (Tent) | 11/139 | 7/231.4 | 24/201.6 | 5/180 | 9/213.3 | 4/165 | 25/220.8 | 4/195 | |
| Campsite active (Trailer) | 14/248.5 | | 23/230.8 | 11/242.7 | 15/193.3 | 3/200 | 30/223 | 13/237.6 | |

.....(4)

Table 3 .....Cont (4)

NUMBERS OF PARTICIPANTS AND AVERAGE
LENGTH OF PARTICIPATION IN SELECTED ACTIVITIES

| ACTIVITY | ♂ 0-15 N=27 | ♂ 15-20 N=7 | ♂ 20-45 N=50 | ♂ 45 N=14 | ♀ 0-15 N=33 | ♀ 15-20 N=7 | ♀ 20-45 N=57 | ♀ 45 N=20 | % Participation |
|---|---|---|---|---|---|---|---|---|---|
| Campsite active (Pick-up) | 1/240 | | 1/180 | 1/90 | 2/120 | 2/300 | 2/210 | 1/90 | |
| Birdwatch | 3/45 | 1/20 | 5/18 | 4/45 | | | 5/61 | 3/40 | 9.8 |
| Photography | | | 1/15 | | | 1/30 | | | 0.93 |
| Visit other Campsites | 11/80 | 4/80 | 22/148.8 | 6/165 | 15/89 | 4/68.8 | 21/135.9 | 6/180 | 41.5 |
| Pleasure Drive | 4/67.5 | 4/37.5 | 12/64.2 | 5/66 | 5/59 | | 13/83 | 5/66 | 22.4 |
| Climbing | 14/51.4 | 3/18.3 | 16/28.1 | 7/29.2 | 11/31.5 | 4/25 | 20/26.5 | 7/41.4 | 38.3 |
| Picnic not on beach | | | | 1/3 | 1/60 | | | 1/3 | 1.40 |

.....(5)

Table 3 ..... Con't (5)

NUMBERS OF PARTICIPANTS AND AVERAGE
LENGTH OF PARTICIPATION IN SELECTED ACTIVITIES

| ACTIVITY | ♂ 0-15 N=27 | ♂ 15-20 N=7 | ♂ 20-45 N=50 | ♂ 45 N=14 | ♀ 0-15 N=33 | ♀ 15-20 N=7 | ♀ 20-45 N=57 | ♀ 45 N=20 | % Participation |
|---|---|---|---|---|---|---|---|---|---|
| Hiking | 3/55 | 1/90 | 3/55 | 1/90 | 1/45 | 1/30 | 2/38 | 1/90 | 6.1 |
| Walking | 16/51.6 | 5/45 | 27/48.7 | 7/51.4 | 15/60.6 | 5/66 | 27/42.7 | 11/60 | 52.8 |
| Bicycling | 5/98 | | 4/57.5 | | 4/71.3 | 3/80 | 3/50 | | 8.8 |
| Interpretive Talk | 4/127.5 | | 2/82.5 | 2/120 | 1/45 | | 4/72.5 | 1/120 | 6.5 |
| Interpretive Walk including self guiding | 2/60 | | 2/65 | 3/110 | 4/110 | 1/150 | 5/102 | 3/110 | 9.3 |
| Church | 1/90 | | 1/90 | | 1/90 | | 1/90 | | 1.8 |
| Go to store | 17/101 | 6/115 | 39/109.4 | 15/140 | 23/132 | 4/60 | 39/111.4 | 14/160 | 73.3 |



.....(6)

Table 3.....Con't (6)

NUMBERS OF PARTICIPANTS AND AVERAGE
LENGTH OF PARTICIPATION IN SELECTED ACTIVITIES

| ACTIVITY | ♂ 0-15 N=27 | ♂ 15-20 N=7 | ♂ 20-45 N=50 | ♂ 45 N=14 | ♀ 0-15 N=33 | ♀ 15-20 N=7 | ♀ 20-45 N=57 | ♀ 45 N=20 | % Participation |
|---|---|---|---|---|---|---|---|---|---|
| View Wildlife | 11/34 | 4/11.3 | 20/36.3 | 4/31 | 15/32 | 4/37.5 | 30/26.4 | 7/33.5 | 44.3 |
| Get wood | 4/27.5 | 1/30 | 12/26 | 4/ 50 | 1/15 | | 4/35 | | 12.1 |
| Pick berries | 1/60 | | 1/60 | | | 1/10 | | | 1.4 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

groups, as the figures show. People also appear to spend more time doing it. Wading or remaining still in the water qualified as standing in the shallows, and was meant to reflect the fact that people do more than swim (move) when they get into the water.

Diving off the Rocks meant making a specific effort to climb up on to rocks or a cliff face to dive into the water. This appeals to men in their late teens, especially at Harold's Point, but it is apparently not a very popular general activity.

Sunbathing meant simply being present at the beach and inactive. Seventy one percent of the respondents participated. The popularity of sunbathing may decline at either end of the age spectrum.

Beachsports, as opposed to idly sitting, turned out to include playing or laying on float-toys or air mattresses, etc., frizbeeing, football and beach ball. These four were the only four given by respondents. Obviously floats, inflatable toys or air mattresses are quite popular. Since only 66% of the people actually went swimming, the 34.5% who used them constitutes actually a larger proportion of the swimming population.

Playing at the waters edge meant spending an extended period of time at the wet sand zone at the waters edge. Such play activities as digging or building sandcastles, etc., are the province of young males and females, as the figures show.

Canoeing, sailing, power boating, water skiing and fishing are relatively straight-forward. Power boats have caused some concern to swimmers and others at the beach because of the thoughtless behaviour of some boaters. The figures here show that only 11 percent of the people interviewed had boats. I believe the sample is too small to extrapolate to the whole population of campers. However, the other activities probably play a minor part in recreation at Killbear.

Few people appear to picnic on the beach. In fact, since day users were not included in the sampling program it might be safe to assume that picnicking itself is not a significant activity. This is likely so because campsites, and consequently eating conveniences, are so near. The campsite data was meant to indicate what proportion of time was spent at the campsite on a typical day. Table 3 also indicates, by age group, the style of camping in terms of equipment. This is important because the equipment campers use reflects their ability to pay and consequently their economic status and also may be a general clue to both their perceptions of a park experience and their range of expectations. This by no means exludes the choice of equipment by taste alone. These notions are reflected in recreation research. (Priddle and Clark, 1971; Hendee, et al, 1968; Burch, 1966, 1967).

By far the most popular method of camping was the tent-trailer, followed closely by tents and house trailers. Notice the general increase in idle and active time at the capsite when tenters and trailer users are compared. Notice also that males and females aged 20-45 are on the campsite more and spend longer amounts of time there than other age groups. Presumably this is due to their familial responsibilities (preparing meals or clearing up). I believe visitor behaviour on campsites is very important because the campsite is the beginning and end of a park experience, and is the hub of activity and family "togetherness", etc., during the visit. Although individuals radiate out into the park from the campsite, they must at last return there and often share experiences there. Consequently the campsite itself must figure prominently in the recreation experience. This puts the onus on managers to carefully consider densities, facilities, traffic, wood provision, etc., when campsites are installed. The role of the campsite in a park experience must be researched more carefully.

Most of the other activities were more sparcely persued. People spent much more time visiting other campsites than was supposed. Males and females aged 15-20, although they are scarce in the park relative to other age groups, are probably interested in a highly social experience but the figures show only a medium mix with other campers at their sites. The heavily social groups appear to be in the older age brackets. Killbear is by no means a park to which people go for a "wilderness" or low density experience, and it seems consistent that the social component of a typical day would be high here.

Pleasure driving was assumed to be either in or out of the park. Most groups participated. The major complaint, aside from noise, from people while they were on their sites was cars cruising around the campground. Its hard to say if people regarded this as pleasure driving.

Climbing meant the purposeful act of scaling a hill, and was not meant to be included in walking or hiking per se. All the groups participated. The rocky and hilly nature of Killbear probably offers quite a stimulus to people to climb around. However, climbing in itself is probably not a significant activity related to a specific activity cluster.

Picnicking at locations other than the beach is an insignificant activity, but may be one which requires more space or "territory" than simply lying on the beach.

The difference between hiking and walking was that hiking was purposeful, destination-oriented activity, or a trip, so to speak. Walking on the other hand was more a leisurely, passive activity. This difference was understood by the respondents, as the responses indicate. It appears that both the number of hikers and the duration of hiking was much less than for walking. This is presumably to be expected in a park where visitors are after a more "social" atmosphere and the activities that attend it.

Bicycling is self explanatory. Without comparative figures from other studies it cannot be concluded whether or not the frequency of bicycling in Killbear reflects the general trend toward increased use of bicycles. One would expect however, that bicycling would be consistent with other activities in Killbear.

Attendance at interpretive functions appears to be poor. However, the capacity of the interpretive program is limited to only about 5% of Killbear's enormous camper population, so that the percentage of respondents attending an interpretive function reflects the actual situation. Males (15-20) don't appear to be much interested, but the interest shown by other groups, if the number of participants reflect this, is not much higher.

The remaining activities were those added to the interview list by the respondents themselves. Church was attended in the park by one family of four. Church services are offered once a week and attendance at a service does not reflect activity typical of any chosen day.

Seventy three percent of park visitors go to the store on any given day. This means either going to town, or popping out to the local marina for light shopping or refreshment. The traffic volume at the main gate and campground gates that this activity generates is a serious management problem requiring thoughtful planning of access.

The fact that so many people left the park each day to go to the store reflects a number of interesting possibilities. Perhaps a large number of campers than we think are poorly equipped with groceries or other necessities and must aquire them after their arrival. Perhaps this reflects poor trip or holiday planning on their part. Perhaps going to the store is a "displacement" activity that kills time when campers are otherwise bored or tired of park-related activities. Perhaps its a reflection of their behaviour when they are at home, back in the city or wherever they come from.

The average time spent going to the store was 116 minutes; almost two hours out of each day, spent outside the park. There is almost certainly a large market in Killbear for a park concession but I believe park management is more against installing one than the campers. Here is another example where management holds different views than the customers (Hendee and Harris, 1970). I believe that the fact that going to the store plays such a large role in the typical campers day, says a great deal about the camper and the park.

Viewing wildlife, getting wood and picking berries were the other important persuits. Females appear to be the wildlife viewers and males the wood fetchers. There may be some interesting role-playing going on here. Other activities not listed in Table 3, but were mentioned once or twice, were: collecting driftwood, watching other people, watching stars, fixing a boat (3 hrs) golfing (outside park, 5 hrs) and closing a business deal (2 hrs).

Table 4 shows the results of notes taken during the interview which reflect equipment used by specific groups of users.

Table 4

Equipment used by User type

| | % of total groups | % with tents | % with pick-up campers | % with tent-trailers | % with trailers |
|---|---|---|---|---|---|
| Family groups | 69 | 33 | 1 | 47 | 19 |
| Young couples | 8.5 | 85 | - | 15 | - |
| Older couples | 3.6 | 66 | - | 33 | - |
| Non-family groups | 18.9 | 66 | 6 | 13 | 13 |

Generally, from Table 4, family groups dominate the camping scene and favour tent-trailers, young couples and older couples favour tents only and neither group used self contained vehicles (this is surprising, especially for the older couples). Non family groups (teenage men, etc.) favour tents over other types of equipment.

Table 5 lists the percentage of respondents by origin. Vehicle license plate numbers were recorded in case a follow-up questionnaire is used.

Table 5

Origins of Campers

| | |
|---|---|
| Toronto area (Whitby to Mississauga) | 51% |
| South Western Ontario | 37.8% |
| Other Ontario | 6.0% |
| Other Canada | 1.8% |
| United States | 3.4% |

Discussion

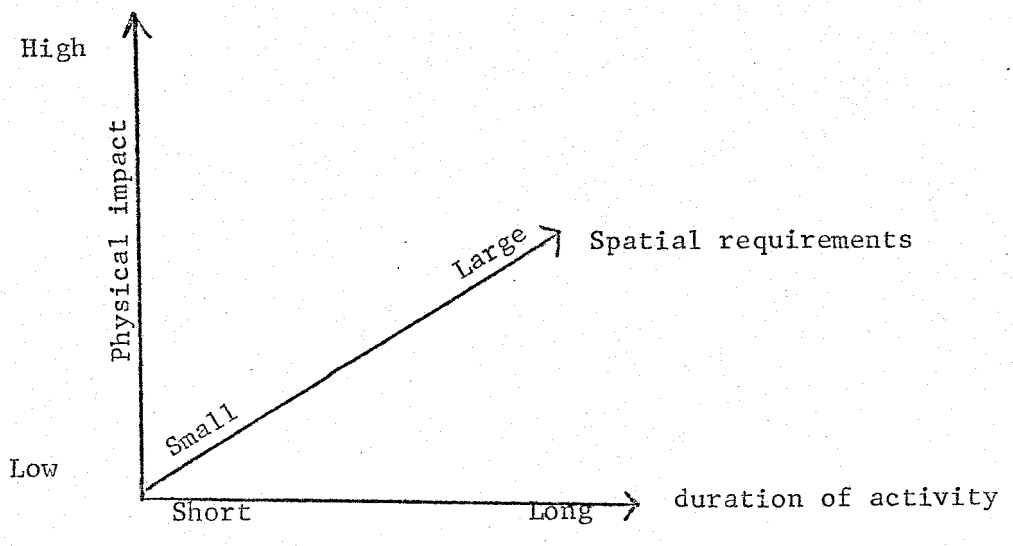
The data presented above is raw data that can be used for further analysis. To reiterate the point of this research, clusters of individuals were wanted based on recreational activites, and the space requirements of each cluster derived. Clustering might now be accomplished using computer methods outlined in Romsa (1974) or Wishart (1969). The data can be partitioned along a number of lines; by activity, by age group, by camping style (tent, tent-trailer, etc.), or on the basis of participation - non participation. In any event further and elaborate analysis is required to extract more of the type of information required.

But the present results are useful. They show that camping is a dynamic passtime consisting of a population of individuals particpating in a wide variety of activities, mixing together and drawing apart, interacting with each other and the park environment. The social environment of Killbear Park appears to be important to the visitors, for many of the activities listed are done in groups or near other groups. Human tolerance of the presence or density of other groups - necessary from a carrying capacity context - doing other things, in the same environment, enteres us into the bewildering and contradictory realm of attitude studies:

> "Interviews and questionnaires intrude as a foreign element into the social setting they would describe, they create as well as measure attitudes, they elicit atypical roles and responses, they are limited to those who are accessible and will cooperate, and the responses obtained are in part, by dimensions of individual differences, irrelevant to the topic at hand" (Webb, et al, 1966:1)

The information presented here indicates that there are three dimensions to the carrying capacity problem; physical, spatial and temporal, which might form three axes of the same matrix (figure 1).

Figure 1. Three dimensional matrix for the positioning of physical spatial and temporal variables.



The temporal component has been reported on here. Studying the spatial component using observational techniques is possible but complex. The observation schedule, attached as exhibit 2, proved too difficult and time consuming. We were after far too much information and the activity patterns of the persons observed were too complex to record. Data on the physical component, chiefly from vegetation sampling was gathered but has not been analyzed, and its inclusion is beyond the scope of this paper.

The problem of carrying capacity is soluble. Each park environment can be placed somewhere in the three dimensional matrix shown in figure 1. Perhaps a matrix for each activity or park value would have to be prepared; and calibrating the model is difficult. The major problem beyond this will be to overcome the array of human values toward park landscapes that have caused the problem in the first place.

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