

## A COMPARISON OF RESIDENTS AND NON-RESIDENTS ON PERCEPTIONS OF OFF ROAD VEHICLE USE AND CARRYING CAPACITY

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**Abstract:** Numerous studies have been done to determine the social carrying capacity of outdoor recreation sites. These have usually been done in the context of visitor satisfaction, character of use, conflict, and perceived crowding. Although many authors have acknowledged that different user groups have various perceptions of conflict and crowding, the majority of these relationships have focused on segregating visitors/users by motivating and/or activity preferences. However, few studies have examined the relationship between crowding and conflict norms and visitor/user points of origin. The fact that local users of recreation sites may feel more ownership toward the sites, feel more displaced by other users, and have more accurate expectations about use than non-local users creates the premises that these groups have different preferences, attitudes, and standards toward social and environmental impact. A survey was conducted for a period of one year (May 2002-May 2002) at the Cape Hatteras National Seashore through a combination of on-site interviews and mail-back questionnaires. This survey addresses issues such as participant activities, perceptions and norms of carrying capacity and off-road vehicle use, demographic information, and satisfaction. In addition to providing results of measures on perceived crowding, satisfaction, and attitudes toward ORV use, this paper will concentrate on how residents (people residing within sixty miles of the seashore) differed from non-residents who have traveled to the seashore from further distances. More specifically, discussions will focus on why these groups may be

different, and how managers can use this information to reduce conflict and increase satisfaction for all park users.

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### Introduction

Management of our Nations outdoor recreation areas have attracted much attention and raised concerns about appropriate amounts and types of use over the past several years. Difficulties discerning the impact of recreational use in specific recreational settings became an important factor in the management of resources. The concept of determining pressures on park resources and visitor perceptions on their quality of experience is referred to as carrying capacity. Carrying capacity can be defined as the level of recreation use an area can sustain while maintaining a consistent quality of recreation (Wagner, 1964). Management objectives should focus on concerns about resource conditions and the perceived recreation quality of experiences that are derived from them (Stanky & Manning, 1986).

Research indicates that quality of visitor experiences and visitor satisfaction can be greatly reduced due to resource degradation, crowding, and/or other social impacts on the natural environment (Cole, 1994; Manning & O'Dell, 1997). Rising visitation has increased pressures on conserving park resources while management must also maintain visitor satisfaction. Visitor satisfaction has been regarded as the primary goal of outdoor recreation management (Ditton, Graefe, & Fedler, 1981; Manning, 1999; Schomaker & Knopf, 1982; Wagar, 1964) and therefore can create a challenge when balancing recreational opportunities while protecting natural resources.

The challenge of this balance is being addressed at Cape Hatteras National Seashore (CHNS) by determining resident and non-resident norms and attitudes toward crowd levels and Off Road Vehicle (ORV) use. Norms in resource management have been defined as standards for individuals and/or groups that are used as a basis for evaluating behavior, social, and environmental conditions relevant to the quality of recreational experience (Donnelly, Vaske, & Shelby 1992). Norms are created to establish a means for describing and predicting aspects related to carrying capacity and

establishing a foundation for the standards of quality an individual or group has come to expect from a certain resource or environment. For this study, the individuals and groups were identified to delineate the attitudes and standards that are formed among residents and non-residents.

Data from this research will determine if there is a relationship between perceptions and norms towards carrying capacity and off-road vehicle use among residents and non-residents of CHNS. Data analysis will address specific issues designed to identify more precise information on the preferences of both residents and non-residents with respect to expectations, perceived crowding levels, and suggested management adjustments regarding use limitations. Researchers and managers can use this information to assess current and changing conditions regarding visitor norms and preferences. This study will assist managers to address potential trade-offs when assessing the impacts of resources and maintaining the objectives of the park without diminishing visitor satisfaction. More specifically, results will assist NPS managers of CHNS in developing and evaluating appropriate management decisions, maintaining the standards of quality, and evaluating the norms and perceptions of separate user groups.

This paper is part of a larger study funded by the National Park Service under the United States Department of Interior. The initial purpose of this study was to assess the visitor attitudes and perceptions about management issues at Cape Hatteras National Seashore. Additional information such as participant activities, personal expenditures, perceptions and satisfaction rankings of carrying capacity and off road vehicle use, demographic information, and a numeric overall rating of the site by the participant was used. An attempt is made to identify satisfaction indicators and deconstruct the visitors' perceptions to determine what individual factors may influence overall expectations while visiting the Cape Hatteras National Seashore. The primary purpose of this study was to explore different expectations and perceptions between residents and non-residents to Cape Hatteras National Seashore.

### **Data Collection & Methods**

Data was gathered at CHNS from May 2001 to May 2002 at twenty-seven data collection sites that included off-road vehicle (ORV) beach access areas,

walkover beach access areas, visitor centers, lighthouses, and sound-side access areas along 70 miles of shoreline and 30,000 acres of land. Each data collection site was accessed during separate times of the week and times of the year to ensure that all types of visitors to the National Park would be represented in this study. The number of participants and ORV's were counted at each data collection site. Visitors of the walkover beach access areas and ORV beach access areas were randomly chosen to participate in an on-site survey. Once visitors were selected for the on-site survey they were asked to participate in an interview that consisted of sixteen questions. Respondents were informed that participation in this survey was completely voluntary and that responses would be kept completely confidential. Visitors answered questions that were designed to determine visitor demographics, visitor's perceptions of crowding capacity, and preferences/support for management actions that may be necessary to mitigate undesirable conditions. Questions included travel distance, duration of trip, perceptions of number of people and ORV's on the beach, visitor norm questions, and overall rating of park experience and satisfaction. More specifically, visitors were asked to estimate the number of visitors and ORV's that they had seen on the beach, specify the maximum number of people per day they find to be acceptable and tolerable, and specify the maximum number of people and ORV's they should see before managers limit use. Once participants completed the on-site survey they were asked to participate in a mail-back survey. The mail-back questionnaire collected additional information concerning visitor activities, ORV use, economic information, crowding information, aircraft information, and overall satisfaction and perceptions.

More specifically participants were asked:

1. How did the number of people you saw compare with what you expected to see on a scale of 1 ("a lot less than expected") to 5 ("a lot more than expected")?
2. How crowded did you feel on the beach today? 1 ("not crowded at all") to 9 ("extremely crowded")
3. How acceptable is the number of people you saw on the beach today? +4 ("very acceptable") to -4 ("very unacceptable")

**Table 1. — Visitor Norms Toward ORV's**

| Visitor Norms                 | Residents |      | Non-residents |      | Independent T |
|-------------------------------|-----------|------|---------------|------|---------------|
|                               | N         | Mean | N             | Mean |               |
| Maximum Number Acceptable     | 73        | 175  | 648           | 226  | -0.785        |
| Maximum Number Tolerable      | 56        | 253  | 496           | 496  | -3.96*        |
| Maximum Before Use is Limited | 23        | 295  | 242           | 414  | -0.684        |

\*Significant at .001

**Table 2. — Visitor Norms Toward ORV's**

| Visitor Norms                 | Residents |      | Non-residents |       | Independent T |
|-------------------------------|-----------|------|---------------|-------|---------------|
|                               | N         | Mean | N             | Mean  |               |
| Maximum Number Acceptable     | 81        | 116  | 672           | 60    | 1.92          |
| Maximum Number Tolerable      | 63        | 104  | 610           | 122   | -0.249        |
| Maximum Before Use is Limited | 40        | 87   | 452           | 91.65 | -0.054        |

**Table 3. — Crowding Perceptions Towards People**

| Visitor Perceptions                  | Residents |       | Non-residents |       | Independent T |
|--------------------------------------|-----------|-------|---------------|-------|---------------|
|                                      | N         | Mean  | N             | Mean  |               |
| Number of people vs. expectations    | 105       | 3.04  | 892           | 2.95  | 0.834         |
| How crowded do you feel?             | 104       | 2.72  | 890           | 2.82  | -0.554        |
| How acceptable is the # of people?   | 105       | 2.42  | 890           | 2.38  | 0.194         |
| Others on the beach...               | 105       | 0.67  | 889           | 0.68  | -0.109        |
| Overall I would like to have seen... | 104       | -0.22 | 883           | -0.36 | 0.853         |

**Table 4. — Crowding Perceptions Towards ORV's**

| Visitor Perceptions               | Residents |       | Non-residents |       | Independent T |
|-----------------------------------|-----------|-------|---------------|-------|---------------|
|                                   | N         | Mean  | N             | Mean  |               |
| Number of ORV's vs. expectations  | 104       | 2.95  | 885           | 3.24  | -2.52*        |
| Would you say that ORV's are...   | 105       | 3.16  | 889           | 3.23  | -2.4          |
| How acceptable is the # of ORV's? | 104       | 2.11  | 886           | 1.74  | 1.537         |
| ORV's on the beach...             | 104       | 1.42  | 884           | 1.28  | 0.591         |
| If ORV's were not allowed...      | 104       | -1.99 | 886           | -1.69 | -1.384        |

Significant at .001

4. Would you say the other people on the beach greatly enhanced or detracted from your enjoyment? +4 ("greatly enhanced my enjoyment") to -4 ("greatly detracted from my enjoyment")
5. Overall I would have liked to have to have seen far more or far less people on the beach. +4 ("far more") -4 ("far less")

Additional questions regarding ORV information were also addressed:

1. How did the number of people you saw compare with what you expected to see on a scale of 1 ("a lot less than expected") to 5 ("a lot more than expected")?

2. How crowded did you feel on the beach today? 1 ("not crowded at all") to 9 ("extremely crowded")
3. How acceptable is the number of people you saw on the beach today? +4 ("very acceptable") to -4 ("very unacceptable")
4. Would you say the other people on the beach greatly enhanced or detracted from your enjoyment? +4 ("greatly enhanced my enjoyment") to -4 ("greatly detracted from my enjoyment")
5. Overall I would have liked to have to have seen far more or far less people on the beach. +4 ("far more") -4 ("far less")

Questions were designed to allow participants opportunities for both negative and positive responses and allow for cross-sectional analysis between on-site and mail-back surveys. A modified Dillman (1978) approach was used to maximize response rates by sending a reminder post card and mail-back questionnaires to non-respondents.

## Results

For this study, 1706 on-site interviews and 1307 mail-back surveys (76.6%) were analyzed. For the purpose of this study, residents were categorized as individuals residing within 60 miles of CHNS (N = 130) and non-residents as individuals living beyond 60 miles of the CHNS (N = 1531). The data analyzed from these respondents provided a sample of 8% residents and 92% non-residents.

Results from comparing visitor norms toward crowd size between residents and non-residents (Table 1) shows that the residents found the maximum number of acceptable people to be 175, while non-residents maintained a mean of 226. The results of maximum number tolerable number of people among residents yielded a mean of 253, where non-residents provided a much higher number of 496. The maximum number of visitors before use is limited for residents was 295 with non-residents providing a number of 414. The average number of individuals that both residents and non-residents reported seeing was 105. These results show that both residents and non-residents are prepared to accept and tolerate more people than are currently being observed at CHNS. Interestingly, for all three questions, non-residents reported higher means than residents. Although the only significant (.001) difference was for the number of people tolerable, this pattern suggests that there may be differences between visitors and residents.

Results from comparing visitor norms toward ORV use (Table 2) indicated that visitor norms toward ORV's at CHNS were not being exceeded. Respondents reported seeing an average of 33 ORV's at the site they were interviewed. Residents proved to be slightly more tolerable than non-residents concerning the maximum number of ORV's acceptable to see on the beach. However, residents and non-residents provided similar responses on the maximum number tolerable and

the maximum number before ORV's use is limited. Numbers for residents and non-residents declined drastically in these results because both user groups paralleled the decision that managers should not limit use. Regardless, responses from both residents and non-residents confirmed that visitor norms at CHNS were not being exceeded. When comparing perceptions of crowd size between residents and non-residents, the responses were strikingly similar with no significant difference between the two groups (Table 3). Both groups reported that they saw about the number of people they anticipated, felt relatively un-crowded, were accepting of the number of other people they saw on the beach, felt that others on the beach neither enhanced or detracted from their experiences, and would have preferred seeing a few less people.

The relationship between crowding perceptions of ORV's among residents and non-residents is illustrated in Table 4. Resident's reported that their expectations of ORV use was actually "a little less than what they expected" where non-residents found that ORV use was "about what was expected" at CHNS. Both groups agreed that the number of ORV's on the beach was "neither acceptable nor unacceptable" and that use of the ORV's "neither enhance or detracted from their enjoyment of the park." One interesting finding from Table 4, is that while respondents felt ORV's "neither enhanced nor detracted from their enjoyment" they maintained that if management limited ORV use then they would visit the park "less often." Results from these findings show that attitudes and perceptions are consistent across both residents and non-resident visitors to CHNS.

## Conclusions and Implications

Results from this research will provide CHNS managers with specific data related to perceptions and norms of carrying capacity and off-road vehicle use, provide results of measures on perceived crowding, satisfaction, and attitudes toward ORV use among separate user groups. CHNS park managers can use this information to guide them towards making appropriate resource planning decisions, protection of resources, site design, minimize user conflict, and improve visitor communication. Carrying capacity research provides the foundation for the standards of quality and expectations that individuals and groups use

for establishing the norms and attitudes of crowding levels and off-road vehicle use at CHNS. The standards that are presented in this study provide the representation of all park users that is necessary to be considered when making management and policy decisions.

Data analysis indicated that both resident and non-resident perceptions of carrying capacity and off road vehicle use were not being exceeded at CHNS. Few differences between residents and non-residents expectations and satisfaction were noted. Overall norms and perceptions of both groups are distributed equally and are in agreement. Results hint that these two groups are not divergent and do not require separate treatments. Thus single messages can be used for the management of this setting.

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