Visitor Behaviors and Beliefs About Impact Management at Cape Poge and Wasque

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Preface

Managing any natural resource requires information on the ecological and social impacts resulting from recreational use. Recognition of this situation has generated a large and diverse body of literature over the past three decades. The introduction of this report briefly reviews this literature, emphasizing findings and issues related to barrier beaches. The results from a visitor survey at two barrier beaches -- Cape Poge Wildlife Refuge and Wasque Reservation -- are then presented. We describe the recreationists' activities and summarize their evaluations of potential environmental impact conditions and possible management actions.

The objectives are to (1) provide a systematic view of what visitors to these areas do and what they find acceptable, and (2) contribute another component to The Trustees of Reservations overall management program. The information presented here must be evaluated in conjunction with other ecological research projects designed to protect the physical environment and wildlife populations.

Major Findings

* Visitors to Cape Poge and Wasque are aware of the fragility of these barrier beaches (97%), and report a strong personal obligation to protect the shorebirds (89%) and the dunes (90%). To achieve these objectives, approximately three fourths of the individuals who usually access the area on foot are willing to reduce the number of their visits. About half of the ORV users are willing to restrict their visitation.

* Almost all visitors indicate that Cape Poge and Wasque are well managed (93%).

* Differences of opinion exist regarding what should be the primary focus of The Trustees' management efforts. Those who usually gain access on foot believe that wildlife management (84%) and preservation (76%) are more important than the provision of recreation opportunities. A majority of ORV users support wildlife management efforts (72%), but are more oriented toward recreation activities.

* Relative to specific management practices, both groups believe there should be more fencing efforts to protect the nesting areas of shorebirds (84%) and the dunes (68%). Most feel there are enough signs in the area to direct visitors (70%). About half indicate a need for pedestrian boardwalks and a majority (58%) favor *not* increasing the size of the Wasque parking lot.

* Over half of all visitors (53%) think Cape Poge and Wasque are approaching the limit of the number of people the areas can tolerate, but 64 percent are *against* reducing the number of visitors. Forty-two percent feel that current visitor numbers create long ferry lines.

* Beliefs about the presence of 4-wheel drive vehicles in the area varied according to the visitors usual method of access. As expected, those who typically gain access on foot view ORVs as damaging to the environment in general (82%), the dunes (92%) and to wildlife (87%). Although these percentages are lower for ORV users, some recognize the impacts that their vehicles have on the environment (34%), the wildlife (48%) and the dunes (60%).

* A quarter of the ORV users believe they should pay higher entrance fees because of the damage they cause to the environment. On average, the ORV users are willing-to-pay $60.00 for their annual permit.

* ORV users oppose excluding their activity from the area (91%), but are more supportive of some restrictions. Consistent with their general beliefs about wildlife management, 45 percent are willing to suspend their activity at Cape Poge when shorebirds are nesting. This suggests that while a total ban of ORV's at Cape Poge or Wasque would not be well received by this group, less restrictive constraints on ORVs can be implemented to protect wildlife populations.

Major Findings (cont.)

* The ORV users' sensitivity to environmental/wildlife concerns can be partially explained by their motivations for visiting Cape Poge and Wasque. Less than 10 percent of the ORV users considered 4-wheel driving as their primary reason for their visit. This means that although ORV users access the area using a vehicle, driving along the beach is less important than other reasons for visiting. The vehicle serves as a means to engage in a beach related activity, rather than as a primary activity itself.

* For the ORV group, fishing (39%), followed by being near the ocean (18%) and sunning (12%) were the most frequently noted primary reasons for their visit. Being near the ocean (34%) and sunning (30%) were also important primary motivations for those who accessed the area on foot. For this latter group, however, only 2 percent noted fishing as a prime reason.

* The ORV users in our sample had been visiting Cape Poge and Wasque for more years and come more often during a season than those who usually access the area on foot.

* People who responded to the survey represent the diversity of individuals who visit Cape Poge and Wasque. About half of the visitors (46%) usually access the area on foot, while 54 percent typically use a 4-wheel drive vehicle. A third were under 30, nearly 40 percent were between 30 and 40 years of age and a fifth were 41 to 50. The remaining 11 percent were over 50 years old. The sample was approximately evenly divided between males (53%) and females (47%). One hundred respondents were members of the Chappaquiddick Island Association, 314 were members of the Trustees of Reservations, and 138 owned property on the island.

Acknowledgements

This report represents the efforts of many individuals. The authors would like to thank Robert D. Deblinger and Thomas S. Foster of The Trustees of Reservations for their insights and support throughout the project. The Chappaquiddick Island Association cooperated fully in the effort. Thanks are also due to the many individuals who provided helpful comments on early drafts of the survey and volunteered their time to assist in the interviewing process. Interviews were also conducted by John Kanter, Dale Oberlag and Mary Jo Fitzgerald. Lori Sommer directed the interviewers and invested many hours in the project for which we are indebted. The secretaries at The Trustees of Reservations provided valuable data entry assistance.

A special thanks are due Robert and Edo Potter for opening their home to the investigators and student interviewers during the data collection period.

Credits for the strength of this study are clearly shared. Responsibility for it's shortcomings rests solely with the authors.

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Introduction

Recreational use of natural areas can have a variety of direct and indirect consequences for both the natural environment and the character of the visitor experience. Even low levels of use have been shown to directly disrupt the amount and type of vegetative cover, reduce wildlife populations' feeding and breeding habitats, or alter the quality or nature of the recreation experience. Indirect impacts associated with these changes may result in the displacement of sensitive species and/or user groups by those more tolerant of varying amounts and types of use.

Efforts to document, describe and evaluate recreation impacts have generated a large and diverse body of literature over the past three decades (Kuss, Graefe, & Vaske, 1989). Much of this literature is concerned with determining the number of users that can be accommodated by an area without loss in the quality of the natural environment and/or visitor experience.

This report briefly summarizes the ecological and social impact literature. Impacts resulting from human activity on barrier beaches are emphasized. Findings from a survey of visitors to two barrier beaches – Cape Poge Wildlife Refuge and Wasque Reservation – are then presented. The results from this investigation provide a systematic view of what visitors do and what they find to be acceptable. Our analyses are intended to contribute another component to the overall management program of the area. The information presented here must be evaluated in conjunction with the findings from other ecological research projects.

Ecological Impacts

Research on the ecological impacts of outdoor recreation has focused on the identification of relationships between recreation use and various components of natural resources. Studies suggest that recreational use most strongly affects vegetative loss, soil erosion and compaction, and wildlife behavior and population levels. Previous bibliographies and summary articles indicate that the impacts on soil and vegetation are best known, while impacts on wildlife are least understood (Vaske, Graefe, & Kuss, 1983).

Vegetation and Soil Impacts

Recreational use of barrier beaches affects soil and vegetation in a variety of ways. The most typical vegetation impacts include direct reduction in plant growth and ground cover needed for dune stabilization. Associated soil changes that can contribute to a decline in plant vigor include the increase in soil compaction, a reduction in organic matter, and an increase in runoff and erosion (Cole & Schreiner, 1981). Vegetation and soil impacts are complex and interrelated, as evidenced by the variety of factors that have been examined (Verburg, 1977).

Available evidence indicates that the relationship between use intensities and vegetative cover is curvilinear, with even low use resulting in a substantial loss in the original vegetation (Cole, 1982; Vaske, et al., 1983). A major shift in vegetative cover typically follows the initial loss in cover. Delicate and fragile species are replaced by more resistant species (Verburg, 1977). Several authors indicate that the extent of impact is more closely related to inadequate trail design, location and maintenance than to overuse (Helgath, 1975; Bratton, Hickler, & Graves, 1977). Bratton, et al. (1977) further suggest that the *intensity* of damage is primarily a function of site factors and type of use, while the *area* of damage is a function of the number of users.

Some types of recreation have greater impact than other activities. Studies conducted in barrier beach environments repeatedly show that Off Road Vehicles (ORVs) impact the vegetative cover necessary for stabilizing dunes (Brodhead & Godfrey, 1977; Bury, McCool, & Wendling, 1976). In some cases, the area will recover with time; in others, devegetation can result in wind erosion and blowouts. Narrow barrier spits often have trails on both ocean and marsh sides, weakening the system as a whole and increasing the likelihood of storm overwash.

Wildlife Impacts

Although a recent bibliography included over 700 citations related to human-wildlife interaction (Drogin, Graefe, Vaske, & Kuss, 1989), information on the effects of recreation on wildlife is incomplete. Findings are often mixed and animal responses to human intruders are divergent, even in a single species (Ream, 1980).

Impacts of recreation on wildlife can be a direct result of harassment of animals or can occur indirectly through loss of habitat, food supply or productivity. Direct wildlife harassment, as defined by Ream (1979) includes "events which cause excitement and/or stress, disturbance of essential activities, severe exertion, displacement and sometimes death" (p. 153). Harassment can be either intentional or unintentional. Several authors suggest that the major impact results from recreationists in "nonconsumptive" activities who unknowingly produce stressful situations for wildlife (Wilkes, 1977; Ream, 1979). Other writers add that the presence of pets (e.g., dogs) in recreation areas is a serious form of wildlife harassment, with especially severe effects in winter when wildlife's energy resources are already heavily stressed.

Studies examining the indirect influence of human activity on wildlife behavior and population levels document a loss of habitat as a response to human interference. Research on large mammals has found that movement and feeding patterns can be modified by vehicle traffic and roads (Tracy, 1977) or by the presence of recreationists (Faro & Eide, 1974). In some cases, these modifications become permanent displacement of habitat. Research on smaller animals documents similar habitat losses (Stebbins, 1974). Turtle nesting sites, for example, are easily compacted by ORVs and the tire ruts disorient the turtles as they return to the sea. Research on shorebirds also suggests that nesting habitats are easily destroyed by ORV activity (Bart, 1977). Other studies (Blodget, 1978), however, show that out-of-vehicle activity

can be more disturbing to shorebirds than vehicular traffic. In general, big game species tend to be more affected by direct interaction, whereas birds and amphibians are affected more by indirect impacts such as the modification of the structure of the vegetation.

Human disturbance has been shown in some investigations to result in reduced productivity rates. Research on birds suggests that disturbing nests causes adults to fly off, leaving eggs vulnerable to predation or hatch failure (Hunt, 1972; Bart, 1977). For young birds, disturbance can lead to premature flight and increased injury and predation (Garber, 1972). Such effects have been observed for a variety of species of birds. For those species that have been studied more, such as osprey and eagles, findings have been mixed, with some studies suggesting that nest disturbance had no effect on reproductive success (Ames & Mersereau, 1964; Mathisen, 1968).

Research has generally found mixed results regarding the relationship between recreational use levels and wildlife population variables. In some instances, populations have declined, while increases have been noted for certain species in other situations. In a desert environment, Sheridan (1978) found that moderate use led to a 60 percent loss of animal activity while heavy use resulted in a 75 percent loss. Other studies, however, report a positive relationship between use level and wildlife populations. The abnormally high populations of certain species in impacted environments is generally attributed to an increase in food supply from recreation visitors, and have been documented for small mammals (Carothers & Aitchison, 1976; Clevenger & Workman, 1977) and birds (Garton, Hall, & Foin, 1977).

Overall, the available empirical evidence highlights the complexity involved in understanding recreational impacts on both the physical environment and specific wildlife populations. Relatively low numbers of visitors can seriously disrupt the amount of vegetative cover in given areas and result in erosion problems. Among certain species of wildlife, encounters with even a few humans can alter behavior patterns and influence productivity and survival rates. These findings stress the importance of recognizing the inherent differences between species and resource characteristics when evaluating the impacts associated with recreation use.

Social Impacts

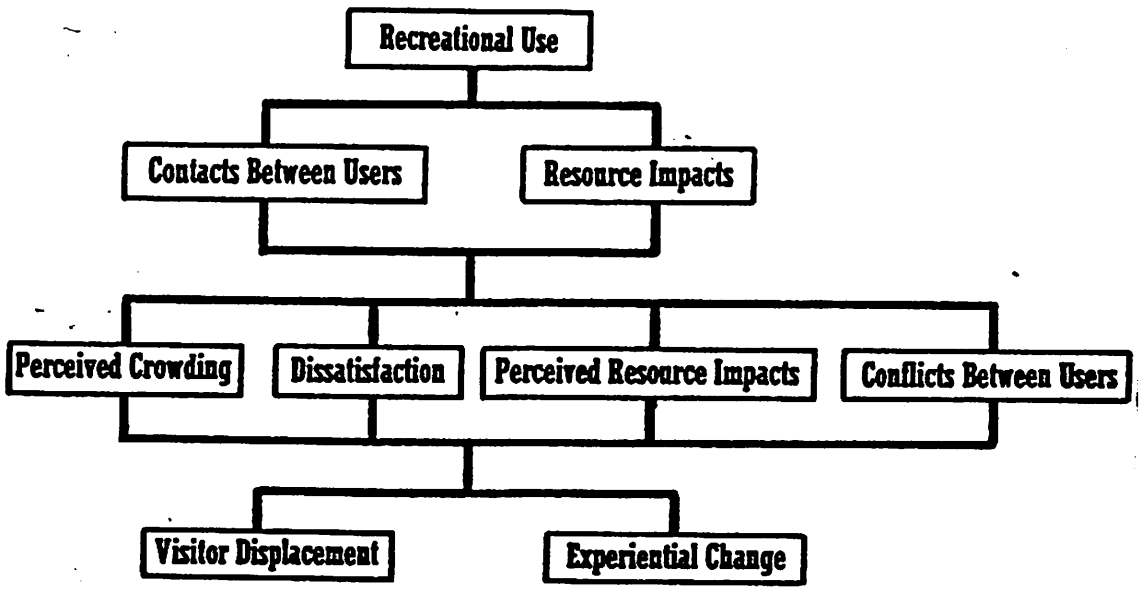
Understanding how people perceive a recreation experience requires an initial understanding of recreation participation and motivation. Studies of motivation suggest that people engage in recreation activities with the expectation that their action will lead to certain rewards (Vroom, 1964; Driver & Tocher, 1970). The specific expectations people have for a given experience are influenced by individual and environmental factors such as the amount and type of previous experience, situational variables and personality characteristics (Lawler, 1973; Schreyer & Roggenbuck, 1978). Most people participate in recreation activities to satisfy multiple expectations (Driver & Tocher, 1970, Hendee, 1974). In evaluating their experiences, recreationists compare the outcomes they actually experienced with the rewards they expected or wanted to receive from the experience. The overall evaluation of a given situation is influenced by the degree to which the perceived

experience agrees with the expected or desired outcome for each relevant aspect of the experience (Peterson, 1974).

Increasing use levels can affect perceptions of quality by interfering with the achievement of recreationists' motivations. Previous studies show that there is no single predictable response of recreationists to varying use levels (Graefe, Vaske, & Kuss, 1984). Rather, visitors are affected by a series of inter-related impacts which result from recreational use of the area (Figure 1). Recreational use leads most directly to tangible outcomes like contacts between visitors or impacts on the natural environment (e.g., tire ruts). These social and natural impacts lead to a variety of perceptual and behavioral responses by recreationists such as increased crowding, dissatisfaction, conflicts between users, or negative evaluations of the environment. Contacts with other visitors and resource impacts may result in differing combinations of impacts at the next level (Figure 1), but not all of these second and third level impacts will occur in all situations. When they do occur, they can either reinforce each other or cancel each other out. For example, people who feel crowded may also experience more conflicts with other visitors. Alternately, individuals who judge an area to be crowded, may opt to visit an alternative area which has lower visitation.

Most of the social impact literature has focused on crowding and visitor satisfaction. The findings presented in this report are concerned with conflicts between visitors and recreationists' perceptions of environmental impact.

Figure 1. Social impacts of increasing recreational use



Visitor Perceptions of Conflict

The potential for conflict between recreationists increases with increasing use levels. Conflict represents a special case of dissatisfaction where the visitor attributes the behavior of other individuals as inappropriate (Jacob & Schreyer, 1980). The extent of conflict varies according to the degree to which various groups perceive each other as different. Most previous discussions of conflict in outdoor recreation have focused on the relationships between activity groups, particularly between individuals using motorized versus non-motorized equipment (Shelby, 1980; Adelman, Heberlein, & Bonnicksen, 1982). For example, visitors who prefer a solitude walk along the beach may find ORVs incompatible with the kind of experience they expected. The intrusion of just one vehicle and the ruts from dune's edge to waterline can disturb the aesthetic values hikers and birdwatchers seek (Noe, Hull, & Wellman, 1982).

Perceptions of conflict, however, may not always occur. Individuals who visit a barrier beach to be with their friends in a social atmosphere may not be disturbed by the presence of ORVs. The response to a given situation thus depends on the individual's expectations and norms. Norms are standards that individuals use for evaluating activities or environmental conditions as good or bad, better or worse (Vaske, Shelby, Heberlein, & Graefe, 1986). Previous research suggests that impact norms are "activated" when certain conditions are met (Heberlein, 1975). First, individuals need to possess an awareness of the consequences their behavior has on the needs of others or on the physical environment. Second, individuals must accept some responsibility for their actions. The extent to which people are aware of the consequences and ascribe some personal responsibility influences how situations are evaluated.

Acceptance of rules and regulations regarding ORV use may depend to a significant degree on whether 4-wheel drive users are aware of the problems their actions may have on the environment as well as the experience of other recreationists, and whether they are willing to accept blame for those problems.

Visitor Perceptions of the Natural Environment

How visitors perceive impacts in natural environments is not well documented. Studies looking at visitor evaluations of site impacts (Stankey, 1973; Lee, 1975; Harris, 1978) generally focus on how the impacts relate to levels of satisfaction and not whether the impacts are perceived as acceptable or unacceptable. Lucas (1979, 1980), for example, shows that site degradation resulting from visitor impact does not significantly influence visitors' choices of areas or their overall satisfaction with a particular site.

Previous studies suggest that individuals are more sensitive to clear evidence of other humans (e.g., litter) than to other perhaps more serious impacts on site conditions such as eroded trails (Stankey, 1973). Lowenthal (1962) indicates that landscape perceptions are influenced by individual beliefs about the origin of the observed condition. Thus, visitors may respond to a resource condition more negatively if they attribute the cause to be human disturbance as opposed to natural processes. On the other hand, visitors' perceptions may be related to their own style of use. The impacts associated

with motorized vehicles, for example, may be more acceptable to ORV users than to sunbathers.

These observations suggest three aspects of the impact issue: (1) recognition of the impact, (2) perceived importance of the impact relative to the other attributes of the setting, and (3) evaluation of the impact condition as acceptable or unacceptable (Lucas, 1979; Graefe, et al., 1984). Resource impacts may be recognized or unrecognized by the user (Cole & Benedict, 1983). If recognized, the effects may be minimal if the impact is unimportant relative to other setting attributes (e.g., amount of area for sunning), or if the impact is acceptable to users.

Traditionally, perceptions of acceptable impact levels for natural environments have been based on managerial judgments. Managers are concerned with site degradation, but it does not follow that the public will perceive such degradation as unacceptable or undesirable (Downing & Clark, 1979). In a study by Lucas (1970), Forest Service administrators ranked the quality of recreational sites much differently than users. Similarly, Peterson (1974) found that managers were more aware of "the depreciatory consequences of recreation use" than visitors. Brown and Shoemaker (1974) looked at functional and desirable characteristics of existing sites in the Spanish Peaks Primitive Area, and concluded that the sites visitors liked best were often those with the heaviest impact.

Most managers are trained in the biological sciences and are familiar with ecological processes. Working in the same environment over a period of time gives them the opportunity to observe trends. In contrast, visitors generally deal with impacts confined to individual sites, and are not aware of change which takes place over time or throughout management units (Hendee & Pyle, 1971). Although these factors suggest that managers' views might be given more weight (Marion & Lime, 1986), information about visitors' perceptions of impacts may help avoid or resolve conflict and lead to better management decisions.

This brief review of the ecological and social impact literature suggests that managing recreation resources requires both descriptive and evaluative (judgmental) considerations. The *descriptive component* identifies specific problem conditions (*impacts*) which result from recreational use (Shelby & Heberlein, 1986). For example, descriptive data might indicate that "doubling the number of visitors will decrease dune grass cover by 30 percent (an ecological impact), and will increase conflicts between users by 40 percent (a social impact)." The descriptive component focuses on documenting the relationships within the system and thereby provides the data needed to predict the impacts of different management alternatives. The *evaluative component* involves value judgments about the acceptability of specific levels of impact and is concerned with the desirability of different management alternatives.

This report describes the activities of visitors to two barrier beaches – Cape Poge Wildlife Refuge and Wasque Reservation – and summaries their evaluations of potential environmental impact conditions and possible management actions.

Study Site Description

Approximately five miles south of Cape Cod lies the island of Martha's Vineyard and neighboring Chappaquiddick. The Cape Poge Wildlife Refuge and Wasque Reservation on Chappaquiddick are owned and managed in the public interest by The Trustees of Reservations. Cape Poge, at the northeastern tip of the island consists of 489 acres. Three miles in length, the area is primarily a narrow sand spit, but there are also salt marsh, fresh and brackish ponds, cedar thickets, and some upland areas. Except for a few seasonal homes still in private ownership, this corner of Chappaquiddick constitutes the Refuge.

Directly adjacent to Cape Poge is the 200 acre Wasque Reservation. Wasque physically differs from Cape Poge in that much of the area consists of upland shrubs and fields. The barrier beach portion of Wasque includes salt marsh, two small ponds and a large estuary.

The two areas provide opportunities for beach related recreation activities such as fishing, sunning, and swimming, as well as 4-wheel drive usage. The potential for human-wildlife conflicts and environmental impacts has increased as the number of visitors has increased.

Methodology

Interviews were conducted with Cape Poge and Wasque visitors during August/September 1987, and June/July, 1988. A one-page, self-administered survey was used to assess visitors' behaviors and attitudes. The survey contained questions pertaining to the visitors:

1) prior experience with the two areas
2) perceptions of user conflicts
3) knowledge of impacts of different types of recreational use on wildlife and other aspects of the environment
4) normative evaluations of the appropriate number of visitors and their impacts on the environment
5) evaluations of current management practices
6) selected demographics.

A total of 1079 interviews were conducted during 1987 and 917 were collected in 1988. Only 3 percent (n = 70) of the respondents completed the survey in both years. Because the number of repeat interviews was small, all individuals were included in the analyses.

Two thirds of the interviews were conducted at Wasque Beach (Table 1). Eighteen percent were collected at East Beach and the remaining at South Beach and Cape Poge. This distribution reflects the locations of where interviewers were stationed rather than the popularity of a given access point.

Table 1. Interview points at Cape Poge and Wasque

Access Point	Percentage of Respondents Entering Area	Leaving Area
Wasque Beach	68%	69%
East Beach	18	18
South Beach	14	12
Cape Poge	–	1
TOTAL	100%	100%

The respondents in the sample were representative of different age groups and gender. About a third were under 30, nearly 40 percent were between 30 and 40 years of age and a fifth were 41 to 50 (Table 2). The remaining 11 percent were over 50 years old. The sample was approximately evenly divided between males (53%) and females (47%). One hundred respondents were members of the Chappaquiddick Island Association, 314 were members of the Trustees of Reservations, and 138 owned property on the island. About half of the visitors (46%) usually access the area on foot, while 54 percent typically use a 4-wheel drive vehicle.

The analyses in this report focus on similarities/differences between individuals who access the area on foot versus those using ORVs. Readers interested in other comparisons are referred to the Appendices.

Appendix A: Primary reason for visiting

Appendix B: Month of interview (Note: June/July = 1988 and August/September = 1987).

Appendix C: Member of The Trustees of Reservations

Appendix D: Own Property on Chappaquiddick Island.

Table 2. Characteristics of respondents

	Number of Respondents	Percent of Respondents
Age		
Under 30	563	31%
30 to 40	729	39
41 to 50	353	19
Over 50	207	11
Sex		
Males	996	53%
Females	891	47
CIA Member		
No	1786	95%
Yes	100	5
Trustees Member		
No	1562	83%
Yes	314	17
Own Property		
No	1735	93%
Yes	138	7
Usual Method of Access		
On Foot	887	46%
ORV	1045	54

Results

Reasons for Visiting

Cape Poge and Wasque provide visitors with a variety of experiences. Those who accessed the area on foot rated being near the ocean, seeing a unique area, sunning, swimming and being alone as important reasons for visiting (Table 3). With the exception of birdwatching, a majority of the ORV users indicated that each of the reasons listed in Table 3 attracted them to the area. The relatively low rating for birdwatching among both groups may have been influenced by the study's sampling procedures. Interviewers were present from 10 a.m. to 5 p.m. daily. Thus, birdwatchers who visited the area during the early morning or early evening would not have been included in our sample. Being near the ocean, seeing a unique area and sunning were the most important reasons for both groups. Four-wheel driving ranked fourth in importance among the ORV users.

Table 3. Importance of reasons for visiting Cape Poge and Wasque

	Usual Method of Access		
Reasons for Visiting[1]	On Foot	ORV Users	Chi-Square
Being near the ocean	98%	94%	45.89**
Seeing a unique area	92	88	11.04*
Sunning on the beach	91	79	66.96**
Swimming	75	67	22.48**
Being alone	62	62	27.32**
Birdwatching	21	34	42.78**
Fishing	16	70	635.16**
4-wheel driving	7	71	904.31**

1 Cell entries represent the percentage of individuals who responded quite or very important to each reason for visiting

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

When asked to identify their primary reason for visiting, only 9 percent of the ORV users listed 4-wheel driving as their primary motivation (Table 4). For this group, fishing (39%), followed by being near the ocean (18%) and sunning (12%) were the most frequently noted primary reasons. None of the other reasons were listed by more than 10 percent of the ORV users as primary considerations for their visit. This suggests that although the ORV users access the area using a vehicle, driving along the beach is less important than other reasons for visiting. *The vehicle serves as a means to engage in an activity rather than as a primary activity itself.* Among the people who usually access on foot, the three primary motivations were being near the ocean (34%), sunning (30%) and seeing a unique area (16%).

Table 4. Primary reason for visiting Cape Poge and Wasque

Primary Reason For Visiting Area	Usual Method of Access	
	On Foot	ORV Users
Being near the ocean	34%	18%
Sunning on the beach	30	12
Seeing a unique area	16	10
Swimming	10	5
Being alone	6	5
Fishing	2	39
Birdwatching	1	2
4-wheel driving	1	9
TOTAL	100%	100%

$X^2 = 420.05$, $p < .001$

Prior Experience and Current Participation

ORV users have been visiting Cape Poge and Wasque for a greater number of years (Mean = 9.6) and visit more often during the year (Mean = 18.0) compared to those who access on foot (Mean = 4.3 and 3.9 respectively) (Tables 5 and 6). A majority of this latter group made their first visit to the area during the interview period. Nearly a third of the ORV users had been visiting for more than 11 years and a quarter visit more than 20 times each year.

Table 5. Number of years visiting Cape Poge and Wasque

Number of Years Visiting Area	Usual Method of Access	
	On Foot	ORV Users
1st year	54%	21%
2 to 3 years	17	18
4 to 5 years	9	12
6 to 10 years	11	19
11 to 20 years	7	19
more than 20 years	2	11
TOTAL	100% (870)	100% (1021)
Mean	4.26	9.59

$X^2 = 290.26$, $p < .001$

Table 6. Number of visits per season to Cape Poge and Wasque

Number of Visits Per Season	Usual Method of Access	
	On Foot	ORV Users
1	57%	18%
2 to 3	20	11
4 to 5	9	9
6 to 10	6	18
11 to 20	5	20
21 to 30	2	11
more than 30	1	13
TOTAL	100% (849)	100% (996)
Mean	3.94	18.01

$X^2 = 521.16$, $p < .001$

Beliefs About Management

Almost all visitors believe that Cape Poge and Wasque are fragile environments and that the areas are well managed (Table 7). Differences were noted, however, for the type of experience that should be provided. Those who accessed the area on foot felt more strongly about managing the area for wildlife and ranked preservation higher than recreation uses.

Table 7. Beliefs about general management issues

General Management Beliefs[1]	Usual Method of Access		Chi-Square
	On Foot	ORV Users	
Cape Poge and Wasque are fragile environments	98%	96%	7.57
Cape Poge and Wasque are well managed	95	92	61.84**
Managing for wildlife is more important than managing for other uses	84	72	53.24**
Preservation is more important than recreation	76	56	121.28**

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Most visitors felt that there should be more fencing to protect the shorebirds and that there is not enough fencing to protect the dunes (Table 8). Similarly, two thirds of the respondents believed there are enough signs to direct visitors. ORV users were more likely than on foot visitors to favor building boardwalks for pedestrians and increasing the size of the Wasque parking lot.

Table 8. Beliefs about specific management issues

Specific management beliefs[1]	Usual Method of Access		Chi-Square
	On Foot	ORV Users	
There should be more fencing of nesting areas to protect shorebirds	87%	83%	13.41*
There is not enough fencing to protect the dunes	76	62	48.47**
There are enough signs to show people where to go	66	73	10.65*
Boardwalks should be built for pedestrians	44	51	21.15**
The size of the parking lot at Wasque should be increased	33	42	4.20

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Beliefs about Overuse and 4-Wheel Drive Vehicles

A majority of both groups felt Cape Poge/Wasque is approaching the limit of the number of people the area can tolerate (Table 9). About 40 percent believe visitors create long ferry lines. Only a third, however, expressed a desire to reduce the current number of visitors. Not surprisingly, twice as many of the on foot visitors compared to the ORV users think there are too many 4-wheel drive vehicles using Wasque.

Table 9. Beliefs about overuse at Cape Poge and Wasque

Beliefs About Overuse[1]	Usual Method of Access		Chi-Square
	On Foot	ORV Users	
Cape Poge/Wasque is approaching the limit of the number of people the area can tolerate[2]	56%	51%	14.08*
There are too many 4-wheel drive vehicles using Wasque	74	34	284.59**
Visitors to Cape Poge and Wasque create long ferry lines	44	41	63.14**
It would be more desirable if the number of visitors were reduced	35	38	13.76*

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

2 This question was only asked in the 1988 survey.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

According to the on foot visitors, 4-wheel drive vehicles are harmful to the dunes, wildlife and the environment (Table 10). This group also believes that 4-wheel drive users are *not* unfairly blamed for wildlife problems and favor higher entrance fees for ORV's. Although the ORV users hold opposing views on these issues, 60 percent believe their vehicles are harmful to the dunes and nearly half feel they harm wildlife.

Table 10. Beliefs about 4-wheel drive vehicles at Cape Poge and Wasque

Beliefs About 4-Wheel Drives[1]	Usual Method of Access		Chi Square
	On Foot	ORV Users	
The number of 4-wheel drive vehicles at Cape Poge/Wasque is harmful to the dunes[2]	92%	60%	159.22**
The number of 4-wheel drive vehicles is harmful to wildlife	87	48	358.92**
4-wheel drive vehicles damage the environment	82	34	495.21**
4-wheel drive users should pay higher entrance fees because of the damage they cause the environment	77	25	523.90**
4-wheel drive users are unfairly blamed for wildlife problems caused by pedestrians	38	69	201.51**

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

2 This question was only asked in the 1988 survey.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

The ORV users are against a total ban on their activity, but will tolerate some restrictions on their behavior (Table 11). While only 9 percent accepted the idea of not allowing ORVs at Cape Poge and Wasque, 12 percent felt banning vehicles would be alright if a public shuttle were provided and 18 percent would accept restricting ORV use to Wasque. The highest support (45%) was given for restricting vehicles when the shorebirds are nesting. Over 90 percent of the on foot visitors agreed with this latter management strategy. Interestingly, forty percent of the on foot visitors were against a total ban on vehicles.

Table 11. Beliefs about controls on 4-wheel drive vehicles

Beliefs About Controls on 4-wheel Drives[1]	Usual Method of Access		Chi-Square
	On Foot	ORV Users	
4-wheel drive vehicles should not be allowed at Cape Poge and Wasque	60%	9%	716.58**
It would be OK to ban 4-wheel drive vehicles from the beach if a public shuttle were provided	63	12	676.69**
It would be OK to ban 4-wheel drive vehicles from Cape Poge, if they were allowed at Wasque	53	18	310.50**
4-wheel drive vehicles should not be allowed at Cape Poge when shorebirds are nesting	91	45	562.34**

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

The survey also included four questions relating to the respondent's level of personal obligation to protect the area and their willingness to restrict their activities to achieve this goal (Table 12). Both groups felt personally obligated to protect the birds and the dunes, but the on foot visitors were more willing to reduce their visitation to meet this end.

Table 12. Perceived responsibility for dune and wildlife protection

Perceived Responsibility[2]	Usual Method of Access[1]		Chi-Square
	On Foot	ORV Users	
I feel a strong personal obligation to protect the birds	93%	86%	13.72*
I feel a strong personal obligation to protect the dunes	93	89	9.14*
I would be willing to reduce the number of my visits to Cape Poge/ Wasque if it meant protecting the birds	72	54	54.69**
I would be willing to reduce the number of my visits to Cape Poge/ Wasque if it meant protecting the dunes	71	55	52.06**

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

2 These questions were asked only on the 1988 survey.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Conclusions

Based on this sample of respondents, visitors to Cape Poge and Wasque are concerned about the area and feel personally responsible for protecting the wildlife and dunes. Such findings persisted across all of the respondents to the survey, regardless of whether the individual typically accessed the area in a vehicle or on foot.

In general, the individuals in our survey felt the areas are well managed. Informal discussion with a number of the walk-on respondents, however, suggested some confusion regarding who manages the area. Some thought the area was a public beach and wondered why the fees were not comparable to other state or national beaches. Consistent with this confusion, many of these individuals believed public beaches should have restrooms and waste disposal facilities. Given that none of the ORV users offered similar remarks, additional efforts to educate the sunbathers is warranted.

Differences of opinion existed regarding an acceptable focus of The Trustees' management efforts. Those who accessed the area on foot rated recreation secondary to preservation and wildlife management. ORV users supported wildlife management, but rated recreation management higher than preservation. The differences between the two groups, however, were not major; both groups generally favored protecting the environment.

With regard to specific management actions, the respondents supported increased fencing to protect the dunes and wildlife. The need for pedestrian boardwalks was recommended by about half of the visitors. Increasing the number of signs in the area to direct visitors and increasing the size of the Wasque parking lot, however, were deemed unnecessary.

There was some indication from the visitors that Cape Poge and Wasque are approaching the limit of the number of people the areas can tolerate. In recognition of this situation, approximately three fourths of walk-ons were willing to reduce the number of their visits, while only about half of the ORV users said this concession was acceptable. At least four explanations can be offered to account for this difference:

1) The current fee structures vary for the two groups. Because ORV users pay a higher initial fee, limiting access may not be considered appropriate.

2) ORV users have a longer and more consistent history of use in the area. They have been visiting for a greater number of years and make more trips during a season than the walk-ons who were relatively new to the area. Changing this traditional behavior pattern would have a greater impact on ORV users than the walk-on visitors.

3) More of the ORV users own property on Chappaquiddick Island or in the surrounding region. This may lead to a more proprietary view of the resource.

4) Because the walk-on visitors are less committed (fewer visits and property ownership responsibilities) to the area, other resources may offer acceptable alternatives. Limiting use at Cape Poge and Wasque would thus not be an imposition.

Beliefs about the presence of 4-wheel drive vehicles in the area varied according to the visitors usual method of access. Over 85 percent of the walk-on visitors considered ORVs to be damaging to the dunes and wildlife. Sixty percent of the ORV users recognized the impacts that their vehicles have on the dunes, but did not believe they were as harmful to wildlife. Two thirds of the 4-wheel drive users felt they were unfairly blamed for wildlife impacts caused by pedestrians.

To compensate for the damage vehicles can cause to the environment, a quarter of the ORV visitors considered higher entrance fees acceptable. On average, the ORV users were willing-to-pay $60.00 for their annual permit.

ORV users opposed excluding their activity from the area, but did support some restrictions. Consistent with their general beliefs about wildlife management, 45 percent were willing to suspend their activity at Cape Poge when shorebirds are nesting. Thus, while a total ban of ORV's at Cape Poge or Wasque would not be well received by this group, less restrictive constraints on ORVs can be implemented to protect wildlife populations.

The ORV users' sensitivity to environmental/wildlife concerns can be partially explained by their motivations for visiting Cape Poge and Wasque. Driving along the beach was not a primary reason for their visit. The vehicle merely serves as a way to engage in a desired activity such as fishing or sunbathing.

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Appendix A

Primary reason for visiting

Table A1. Importance of reasons for visiting Cape Poge and Wasque

Reasons for Visiting[1]	Primary Reason For Visiting				
	Birding	Fishing	Ocean Related	4-Wheel Driving	Chi-Square
Birdwatching	96%	33%	23%	29%	153.79**
Seeing a unique area	92	85	91	93	25.72*
Being near the ocean	88	91	98	96	90.22**
Being alone	76	52	65	59	30.35**
Sunning on the beach	60	69	90	86	131.08
Fishing	57	99	26	47	813.24**
Swimming	50	50	76	67	114.48**
4-wheel driving	39	66	27	87	354.99**

1 Cell entries represent the percentage of individuals who responded quite or very important to each reason for visiting

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table A2. Number of years visiting Cape Poge and Wasque

Number of Years Visiting Area	Primary Reason For Visiting			
	Birding	Fishing	Ocean Related	4-Wheel Driving
1st year	24%	12%	46%	33%
2 to 3 years	20	18	17	21
4 to 5 years	–	14	10	12
6 to 10 years	24	23	12	18
11 to 20 years	16	20	10	12
more than 20 years	16	13	5	4
TOTAL	100% (25)	100% (321)	100% (1154)	100% (83)
Mean	11.72	10.49	5.53	6.29

$X^2 = 440.57$, $p < .001$

Table A3. Number of visits per season to Cape Poge and Wasque

Number of Visits Per Season	Primary Reason For Visiting			
	Birding	Fishing	Ocean Related	4-Wheel Driving
1	36%	13%	46%	20%
2 to 3	8	12	17	9
4 to 5	–	9	9	15
6 to 10	12	16	10	24
11 to 20	20	20	10	11
21 to 30	12	12	4	6
more than 30	12	18	4	15
TOTAL	100% (25)	100% (317)	100% (1120)	100% (79)
Mean	27.88	20.58	7.69	14.08

$X^2 = 378.31$, $p < .001$

Table A4. Beliefs about general management issues

General Management Beliefs[1]	Primary Reason For Visiting				
	Birding	Fishing	Ocean Related	4-Wheel Driving	Chi-Square
Cape Poge and Wasque are fragile environments	100%	97%	98%	96%	3.65
Cape Poge and Wasque are well managed	96	92	94	90	24.30
Managing for wildlife is more important than managing for other uses	88	71	80	72	29.36**
Preservation is more important than recreation	74	53	71	51	64.52**

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table A5. Beliefs about specific management issues

General Management Beliefs[1]	Primary Reason For Visiting				
	Birding	Fishing	Ocean Related	4-Wheel Driving	Chi-Square
There should be more fencing of nesting areas to protect shorebirds	88%	80%	86%	80%	18.32*
There is not enough fencing to protect the dunes	87	63	71	56	32.95**
Boardwalks should be built for pedestrians	67	46	47	49	18.57*
There are enough signs to show people where to go	64	75	67	81	14.91
The size of the parking lot at Wasque should be increased	27	39	42	49	14.02

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table A6. Beliefs about overuse at Cape Poge and Wasque

General Management Beliefs[1]	Primary Reason For Visiting				
	Birding	Fishing	Ocean Related	4-Wheel Driving	Chi-Square
Cape Poge/Wasque is approaching the limit of the number of people the area can tolerate[2]	80%	49%	54%	57%	27.31*
There are too many 4-wheel drive vehicles using Wasque	61	26	61	30	220.29**
It would be more desirable if the number of visitors were reduced	59	35	37	35	31.01**
Visitors to Cape Poge and Wasque create long ferry lines	48	40	45	36	30.29**

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

2 This question was only asked in the 1988 survey.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table A7. Beliefs about 4-wheel drive vehicles at Cape Poge and Wasque

Beliefs About 4-Wheel Drive Vehicles[1]	Primary Reason For Visiting				
	Birding	Fishing	Ocean Related	4-Wheel Driving	Chi-Square
The number of 4-wheel drive vehicles at Cape Poge/Wasque is harmful to the dunes[2]	80%	52%	86%	56%	94.63**
4-wheel drive vehicles damage the environment	67	31	68	36	248.29**
The number of 4-wheel drive vehicles is harmful to wildlife	65	40	78	51	212.22**
4-wheel drive users are unfairly blamed for wildlife problems caused by pedestrians	52	73	47	59	136.63**
4-wheel drive users should pay higher entrance fees because of the damage they cause the environment	46	23	61	25	244.99**

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

2 This question was only asked in the 1988 survey.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table A8. Beliefs about controls on 4-wheel drive vehicles

Beliefs About Controls on 4-Wheel Drive Vehicles[1]	Primary Reason For Visiting				
	Birding	Fishing	Ocean Related	4-Wheel Driving	Chi-Square
4-wheel drive vehicles should not be allowed at Cape Poge when shorebirds are nesting	73%	42%	79%	42%	228.90**
4-wheel drive vehicles should not be allowed at Cape Poge and Wasque	61	5	42	12	298.60**
It would be OK to ban 4-wheel drive vehicles from Cape Poge, if they were allowed at Wasque	60	15	42	12	177.40**
It would be OK to ban 4-wheel drive vehicles from the beach if a public shuttle were provided	42	8	47	12	290.89**

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table A9. Perceived responsibility for dune and wildlife protection

Perceived Responsibility[2]	Primary Reason For Visiting[1] Birding	Fishing	Ocean Related	4-Wheel Driving	Chi-Square
I feel a strong personal obligation to protect the birds	100%	92%	92	79	15.52
I feel a strong personal obligation to protect the dunes	100	93	93	83	11.72
I would be willing to reduce the number of my visits to Cape Poge/Wasque if it meant protecting the birds	90	52	70	54	34.97**
I would be willing to reduce the number of my visits to Cape Poge/Wasque if it meant protecting the dunes	90	49	69	48	36.17**

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

2 These questions were asked only on the 1988 survey.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Appendix B

Month of Interview

Table B1. Importance of reasons for visiting Cape Poge and Wasque

Reasons for Visiting[1]	Month of Interview				Chi-Square
	June	July	August	September	
Being near the ocean	94%	98%	95%	85%	37.77**
Seeing a unique area	88	89	91	74	49.90**
Sunning on the beach	84	90	85	34	141.03**
Being alone	65	67	60	43	23.76*
Swimming	57	82	68	25	209.65**
Fishing	48	47	41	89	73.34**
4-wheel driving	38	51	37	49	42.63**
Birdwatching	30	26	28	32	10.65

1 Cell entries represent the percentage of individuals who responded quite or very important to each reason for visiting

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table B2. Number of years visiting Cape Poge and Wasque

Number of Years Visiting Area	Month of Interview June	July	August	September
1st year	41%	29%	41%	38%
2 to 3 years	15	21	16	16
4 to 5 years	12	11	10	10
6 to 10 years	14	16	15	20
11 to 20 years	10	16	12	14
more than 20 years	9	8	7	2
TOTAL	100% (255)	100% (631)	100% (1011)	100% (50)
MEAN	6.76	7.62	6.75	5.94

$X^2 = 188.51$, $p < .05$

Table B3. Number of visits per season to Cape Poge and Wasque

Number of Visits Per Season	Month of Interview June	July	August	September
1	39%	27%	41%	48%
2 to 3	16	15	15	15
4 to 5	8	10	9	4
6 to 10	6	18	11	2
11 to 20	10	15	12	12
21 to 30	6	8	5	13
more than 30	15	7	6	6
TOTAL	100% (247)	100% (621)	100% (977)	100% (52)
MEAN	13.30	11.60	10.76	10.65

$X^2 = 212.75$, $p < .001$

Table B4. Beliefs about general management issues

General Management Beliefs[1]	Month of Interview				Chi-Square
	June	July	August	September	
Cape Poge and Wasque are fragile environments	95%	95%	98%	96%	16.18
Cape Poge and Wasque are well managed	94	93	93	91	16.79
Managing for wildlife is more important than managing for other uses	79	76	78	80	12.33
Preservation is more important than recreation	68	64	66	56	10.73

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

Table B5. Beliefs about specific management issues

Specific Management Beliefs[1]	Month of Interview				Chi-Square
	June	July	August	September	
There should be more fencing of nesting areas to protect shorebirds	87%	83%	85%	77%	8.89
There is not enough fencing to protect the dunes	71	68	67	62	13.47
There are enough signs to show people where to go	68	73	69	65	12.66
Boardwalks should be built for pedestrians	50	53	44	43	16.35
The size of the parking lot at Wasque should be increased	39	43	43	41	8.35

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

Table B6. Beliefs about overuse at Cape Poge and Wasque

Beliefs About Overuse[1]	Month of Interview				Chi-Square
	June	July	August	September	
Cape Poge/Wasque is approaching the limit of the number of people the area can tolerate[2]	50%	53%	–	–	2.38
There are too many 4-wheel drive vehicles using Wasque	57	47	50	33	26.63*
It would be more desirable if the number of visitors were reduced	38	42	33	20	31.64**
Visitors to Cape Poge and Wasque create long ferry lines	43	42	43	37	8.16

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

2 This question was only asked in the 1988 survey.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table B7. Beliefs about 4-wheel drive vehicles at Cape Poge and Wasque

Beliefs About 4-Wheel Drive Vehicles[1]	Month of Interview				Chi-Square
	June	July	August	September	
The number of 4-wheel drive vehicles at Cape Poge/Wasque is harmful to the dunes[2]	79%	73%	–	–	10.32*
The number of 4-wheel drive vehicles is harmful to wildlife	73	65	67	32	55.61**
4-wheel drive vehicles damage the environment	61	51	59	37	43.82**
4-wheel drive users should pay higher entrance fees because of the damage they cause the environment	53	43	52	28	35.07**
4-wheel drive users are unfairly blamed for wildlife problems caused by pedestrians	52	60	51	66	22.68**

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

2 This question was only asked in the 1988 survey.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table B8. Beliefs about controls on 4-wheel drive vehicles

Beliefs About Controls on 4-Wheel Drive Vehicles[1]	Month of Interview				Chi-Square
	June	July	August	September	
4-wheel drive vehicles should not be allowed at Cape Poge when shorebirds are nesting	68%	63%	68%	54%	39.52**
4-wheel drive vehicles should not be allowed at Cape Poge and Wasque	40	26	34	4	50.73**
It would be OK to ban 4-wheel drive vehicles from the beach if a public shuttle were provided	42	28	39	12	42.32**
It would be OK to ban 4-wheel drive vehicles from Cape Poge, if they were allowed at Wasque	36	32	33	26	4.33

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table B9. Perceived responsibility for dune and wildlife protection

Perceived Responsibility[2]	Month of Interview[1] June	July	Chi-Square
I feel a strong personal obligation to protect the birds	93%	87%	7.07
I feel a strong personal obligation to protect the dunes	91	90	1.00
I would be willing to reduce the number of my visits to Cape Poge/Wasque if it meant protecting the birds	64	62	4.91
I would be willing to reduce the number of my visits to Cape Poge/Wasque if it meant protecting the dunes	59	64	10.61*

1 These questions were asked only on the 1988 survey.

2 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

* Chi-square values are significant at the $p < .05$ level.

Appendix C

Member of The Trustees of Reservations

Table C1. Importance of reasons for visiting Cape Poge and Wasque

Reasons for Visiting[1]	Member of the Trustees		Chi-Square
	Yes	No	
Being near the ocean	96%	96%	.44
Seeing a unique area	89	90	23.08**
Sunning on the beach	81	87	8.38*
Swimming	70	70	6.52
Fishing	69	40	94.65**
Being alone	68	61	16.71**
4-wheel driving	54	38	35.51**
Birdwatching	47	24	74.77**

1 Cell entries represent the percentage of individuals who responded quite or very important to each reason for visiting

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table C2. Number of years visiting Cape Poge and Wasque

Number of Years Visiting Area	Member of the Trustees	
	Yes	No
1st year	9%	43%
2 to 3 years	11	19
4 to 5 years	12	10
6 to 10 years	26	13
11 to 20 years	27	10
more than 20 years	15	5
TOTAL	100% (311)	100% (1523)
MEAN	13.15	5.69

$X^2 = 286.11$, $p < .001$

Table C3. Number of visits per season to Cape Poge and Wasque

Number of Visits Per Season	Member of the Trustees	
	Yes	No
1	8%	43%
2 to 3	7	16
4 to 5	8	9
6 to 10	21	11
11 to 20	22	11
21 to 30	17	4
more than 30	17	6
TOTAL	100% (301)	100% (1485)
MEAN	24.84	8.38

$X^2 = 329.71$, $p < .001$

Table C4. Beliefs about general management issues

General Management Beliefs[1]	Member of the Trustees		Chi-Square
	Yes	No	
Cape Poge and Wasque are fragile environments	98%	97%	11.12*
Cape Poge and Wasque are well managed	91	93	17.53**
Managing for wildlife is more important than managing for other uses	73	78	7.02
Preservation is more important than recreation	41	33	10.16*

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table C5. Beliefs about specific management issues

Specific Management Beliefs[1]	Member of the Trustees: Yes	Member of the Trustees: No	Chi-Square
There should be more fencing of nesting areas to protect shorebirds	84%	85%	1.09
There are enough signs to show people where to go	73	69	11.91*
There is not enough fencing to protect the dunes	69	68	4.35
Boardwalks should be built for pedestrians	46	48	1.60
The size of the parking lot at Wasque should be increased	35	44	18.45**

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table C6. Beliefs about overuse at Cape Poge and Wasque

Beliefs About Overuse[1]	Member of the Trustees: Yes	Member of the Trustees: No	Chi-Square
Cape Poge/Wasque is approaching the limit of the number of people the area can tolerate[2]	54%	52%	6.05
There are too many 4-wheel drive vehicles using Wasque	48	50	8.35*
Visitors to Cape Poge and Wasque create long ferry lines	46	42	15.85*
It would be more desirable if the number of visitors were reduced	45	35	12.42*

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

2 This question was only asked in the 1988 survey.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table C7. Beliefs about 4-wheel drive vehicles at Cape Poge and Wasque

Beliefs About 4-Wheel Drives[1]	Member of the Trustees		Chi-Square
	Yes	No	
The number of 4-wheel drive vehicles at Cape Poge/Wasque is harmful to the dunes[2]	69%	75%	2.34
The number of 4-wheel drive vehicles is harmful to wildlife	60	68	11.18*
4-wheel drive users are unfairly blamed for wildlife problems caused by pedestrians	60	53	10.70*
4-wheel drive vehicles damage the environment	47	58	16.93**
4-wheel drive users should pay higher entrance fees because of the damage they cause the environment	42	50	14.61*

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

2 This question was only asked in the 1988 survey.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table C8. Beliefs about controls on 4-wheel drive vehicles

Beliefs About Controls on 4-Wheel Drives[1]	Member of the Trustees: Yes	Member of the Trustees: No	Chi-Square
It would be OK to ban 4-wheel drive vehicles from Cape Poge, if they were allowed at Wasque	23%	35%	36.29**
4-wheel drive vehicles should not be allowed at Cape Poge when shorebirds are nesting	23	35	36.29**
4-wheel drive vehicles should not be allowed at Cape Poge and Wasque	17	34	44.41**
It would be OK to ban 4-wheel drive vehicles from the beach if a public shuttle were provided	17	40	73.97**

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table C9. Perceived responsibility for dune and wildlife protection

Perceived Responsibility[2]	Member of the Trustees[1] Yes	No	Chi-Square
I feel a strong personal obligation to protect the dunes	92%	91%	3.76
I feel a strong personal obligation to protect the birds	89	89	5.30
I would be willing to reduce the number of my visits to Cape Poge/ Wasque if it meant protecting the birds	60	64	1.11
I would be willing to reduce the number of my visits to Cape Poge/ Wasque if it meant protecting the dunes	60	64	1.56

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

2 These questions were asked only on the 1988 survey.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Appendix D

Own Property on Chappaquiddick

Table D1. Importance of reasons for visiting Cape Poge and Wasque

Reasons for Visiting[1]	Own Property on Chappaquiddick		Chi-Square
	Yes	No	
Being near the ocean	89%	96%	15.57*
Seeing a unique area	87	90	10.13*
Sunning on the beach	77	86	13.45*
Fishing	72	43	52.55**
Swimming	71	70	1.21
Being alone	60	62	1.19
Birdwatching	48	27	30.77**
4-wheel driving	47	41	3.35

1 Cell entries represent the percentage of individuals who responded quite or very important to each reason for visiting

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table D2. Number of years visiting Cape Poge and Wasque

Number of Years Visiting Area	Own Property on Chappaquiddick	
	Yes	No
1st year	10%	39%
2 to 3 years	7	19
4 to 5 years	5	11
6 to 10 years	27	8
11 to 20 years	29	12
more than 20 years	22	11
TOTAL	100% (137)	100% (1693)
MEAN	15.85	6.26

$X^2 = 286.81$, $p < .001$

Table D3. Number of visits per season to Cape Poge and Wasque

Number of Visits Per Season	Own Property on Chappaquiddick	
	Yes	No
1	5%	39%
2 to 3	6	16
4 to 5	6	9
6 to 10	12	13
11 to 20	29	11
21 to 30	21	5
more than 30	33	7
TOTAL	100% (131)	100% (1652)
MEAN	34.58	9.65

$X^2 = 269.61$, $p < .001$

Table D4. Beliefs about general management issues

General Management Beliefs[1]	Own Property on Chappaquiddick: Yes	Own Property on Chappaquiddick: No	Chi-Square
Cape Poge and Wasque are fragile environments	94%	97%	13.13*
Cape Poge and Wasque are well managed	86	93	16.27**
Managing for wildlife is more important than managing for other uses	67	78	13.34*
Preservation is more important than recreation	64	65	5.23

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table D5. Beliefs about specific management issues

Specific Management Beliefs[1]	Own Property on Chappaquiddick		Chi-Square
	Yes	No	
There should be more fencing of nesting areas to protect shorebirds	83%	84%	.99
There is not enough fencing to protect the dunes	65	68	1.77
There are enough signs to show people where to go	72	70	1.84
Boardwalks should be built for pedestrians	53	47	2.50
The size of the parking lot at Wasque should be increased	36	43	8.86*

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table D6. Beliefs about overuse at Cape Poge and Wasque

Beliefs About Overuse[1]	Own Property on Chappaquiddick: Yes	Own Property on Chappaquiddick: No	Chi-Square
Cape Poge/Wasque is approaching the limit of the number of people the area can tolerate[2]	51%	53%	2.86
Visitors to Cape Poge and Wasque create long ferry lines	64	40	67.57**
There are too many 4-wheel drive vehicles using Wasque	49	49	2.81
It would be more desirable if the number of visitors were reduced	49	35	19.08**

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

2 This question was only asked in the 1988 survey.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table D7. Beliefs about 4-wheel drive vehicles at Cape Poge and Wasque

Beliefs About 4-Wheel Drives[1]	Own Property on Chappaquiddick: Yes	Own Property on Chappaquiddick: No	Chi-Square
The number of 4-wheel drive vehicles at Cape Poge/Wasque is harmful to the dunes[2]	66%	75%	3.32
The number of 4-wheel drive vehicles is harmful to wildlife	54	67	9.32*
4-wheel drive users are unfairly blamed for wildlife problems caused by pedestrians	54	55	3.45
4-wheel drive users should pay higher entrance fees because of the damage they cause the environment	52	48	2.22
4-wheel drive vehicles damage the environment	50	56	4.93

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

2 This question was only asked in the 1988 survey.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table D8. Beliefs about controls on 4-wheel drive vehicles

Beliefs About Controls on 4-Wheel Drives[1]	Own Property on Chappaquiddick: Yes	Own Property on Chappaquiddick: No	Chi-Square
4-wheel drive vehicles should not be allowed at Cape Poge when shorebirds are nesting	55%	67%	9.70*
It would be OK to ban 4-wheel drive vehicles from Cape Poge, if they were allowed at Wasque	26	33	6.85
4-wheel drive vehicles should not be allowed at Cape Poge and Wasque	18	32	13.64*
It would be OK to ban 4-wheel drive vehicles from the beach if a public shuttle were provided	18	37	27.35**

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Table D9. Perceived responsibility for dune and wildlife protection

Perceived Responsibility[2]	Own Property on Chappaquiddick[1] Yes	No	Chi-Square
I feel a strong personal obligation to protect the dunes	88%	92%	7.74
I feel a strong personal obligation to protect the birds	82	90	5.28
I would be willing to reduce the number of my visits to Cape Poge/ Wasque if it meant protecting the birds	49	64	4.94
I would be willing to reduce the number of my visits to Cape Poge/ Wasque if it meant protecting the dunes	48	64	7.07

1 Cell entries represent the percentage of individuals who responded strongly or somewhat agree with each statement.

2 These questions were asked only on the 1988 survey.

* Chi-square values are significant at the $p < .05$ level.

** Chi-square values are significant at the $p < .001$ level.

Appendix E

The Questionnaire

CAPE POGE AND WASQUE USER SURVEY

1. Where did you enter and plan to leave Cape Poge or Wasque today?
   On the map above, please place an X where you entered the area
   and an O where you plan to leave.

2. How do you usually access Cape Poge or Wasque (CHECK ONE)?

   _____ 4-wheel drive _____ on foot

3. Please indicate how important each of the following reasons is for you visiting Cape Poge or Wasque?

	Not Important	Slightly Important	Quite Important	Very Important
bird watching	1	2	3	4
fishing	1	2	3	4
sunning on the beach	1	2	3	4
4-wheel driving	1	2	3	4
being near the ocean	1	2	3	4
being alone	1	2	3	4
seeing a unique area	1	2	3	4
swimming	1	2	3	4

4. On a typical visit, what is your primary reason for visiting Cape Poge or Wasque? Please circle ONLY ONE of the reasons listed in question 3 above.

5. About how many years have you been visiting Cape Poge or Wasque? _____ years

6. About how many times do you visit Cape Poge or Wasque during a normal season?

   _____ times per season

7. Please indicate how strongly you agree or disagree with each of the following:

	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
Cape Poge and Wasque are fragile environments	1	2	3	4
The number of 4-wheel drive vehicles at Cape Poge/Wasque is harmful to the:				
shorebirds	1	2	3	4
dunes	1	2	3	4
4-wheel drive users are unfairly blamed for wildlife problems caused by pedestrians	1	2	3	4
Managing for wildlife is more important than managing for other uses	1	2	3	4
Cape Poge and Wasque are well managed	1	2	3	4
There are too many 4-wheel drive vehicles using Wasque	1	2	3	4
4-wheel drive vehicles should not be allowed at Cape Poge/Wasque	1	2	3	4
Cape Poge/Wasque is approaching the limit of the number of people the area can tolerate	1	2	3	4
Visitors to Cape Poge and Wasque create long ferry lines	1	2	3	4
There should be more fencing of nesting areas to protect shorebirds	1	2	3	4
It would be OK to ban 4-wheel drive vehicles from the beach if a public shuttle were provided	1	2	3	4

	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
It would be OK to ban 4-wheel drive vehicles from Cape Poge, if they were allowed in Wasque	1	2	3	4
4-wheel drive vehicles should not be allowed at Cape Poge when shore-birds are nesting	1	2	3	4
Preservation of the natural resource is more important than recreation at Cape Poge/Wasque	1	2	3	4
It would be more desirable if the number of visitors were reduced at Cape Poge and Wasque	1	2	3	4
I feel a strong personal obligation to protect the:				
shorebirds	1	2	3	4
dunes	1	2	3	4
I would be willing to reduce the number of my visits to Cape Poge/Wasque if it meant protecting the:				
shorebirds	1	2	3	4
dunes	1	2	3	4
4-wheel drive vehicles damage the environment	1	2	3	4
4-wheel drive users should pay higher entrance fees because of the damage they cause to the environment	1	2	3	4
There is not enough fencing to protect the dunes	1	2	3	4

	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
Boardwalks should be built for pedestrians	1	2	3	4
There are enough signs to show people where to go	1	2	3	4
The size of the parking lot at Wasque should be increased	1	2	3	4

8. If the number of 4-wheel drive vehicles using Cape Poge and Wasque were to be limited, what would be an acceptable number of vehicles? Please specify the total number of vehicles you feel would be appropriate for each situation listed below.

   It would be OK to have _____ vehicles within sight while fishing.

   It would be OK to have _____ vehicles within sight while sunning on the beach.

9. If you are using a 4-wheel drive today, is the vehicle: _____ owned? _____ rented?
   _____ Not using a 4-wheel drive

10. What is your age? _____

11. Are you _____ male _____ female?

12. Do you personally own property on Chappaquiddick Island? _____ no _____ yes

13. Do you belong to the Chappaquiddick Island Association? _____ no _____ yes

14. Are you a member of The Trustees of Reservations? _____ no _____ yes

15. How much would you be willing to pay for an annual 4-wheel drive vehicle permit for Cape Poge/Wasque?

    $_____

16. Did you complete this questionnaire last year? _____ no _____ yes

Because we are interested in your opinions, we would like to contact you at some later date. If you are interested in helping out in some additional studies, please complete the following:

Name: _____

Address: _____

City: _____ State: _____ Zipcode: _____