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Dissertation

Evaluating the Internet as a Research Tool:

A Comparison of Telephone and World Wide Web

National Park Surveys

Submitted by:

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In partial fulfillment of the requirements
for the Degree of Doctor of Philosophy
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WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY DIANE B. GAEDE ENTITLED "EVALUATING THE INTERNET AS A RESEARCH TOOL: A COMPARISON OF TELEPHONE AND WORLD WIDE WEB NATIONAL PARK SURVEYS" BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

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DISSERTATION ABSTRACT

EVALUATING THE INTERNET AS A RESEARCH TOOL: A COMPARISON OF TELEPHONE AND WORLD WIDE WEB NATIONAL PARK SURVEYS

Use of the World Wide Web for survey data collection is relatively new, along with other forms of electronic surveys such as e-mail. Internet electronic surveys are gaining in use and acceptance as more and more businesses and households acquire personal computers and connect to the Internet.

Although web-based surveys offer several advantages (e.g., reduced data collection costs, interactive features encouraging response, use of open-ended items) compared to traditional mail, in-person, and telephone interviews, several methodological questions remain unanswered. For example, to what extent do the findings from a web survey approximate those from a phone survey? Are the demographic characteristics of web respondents statistically similar to a random sample of phone survey respondents? Does topic saliency affect web and telephone data collection?

To address these questions, this dissertation compares the findings from two surveys (two versions of a web survey and a telephone survey) containing identical questionnaire items. Both surveys were conducted in collaboration with the National Parks and Conservation Association (NPCA). The dissertation also compares item nonresponse among the two versions of web surveys that were posted.

Results show that web respondents resemble the profile user of the Internet; they are younger, male, and more educated than the telephone respondents. Web respondents are also more pro-national park oriented than telephone respondents. Implications for future research and use of electronic surveys are discussed.

Key words: Telephone surveys, web surveys, electronic surveys, item nonresponse, national parks

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CHAPTER ONE

INTRODUCTION

This dissertation analyzes how the Internet electronic survey mode compares methodologically in terms of advantages and disadvantages with telephone, in-person, and mail survey modes, and specifically compares a World Wide Web survey with the more well-established computer-assisted telephone interview (CATI) survey mode. The dissertation also examines item nonresponse in two World Wide Web surveys.

In the spring of 1996 a telephone survey was conducted for the National Parks and Conservation Association (Vaske, Haas, Whittaker, & Wakefield, 1996). In the summer and fall of 1996, the same national parks opinion survey was posted to NPCA's World Wide Web home page for Internet users to complete and submit electronically. The web survey consisted of two versions; the first was a complex branching version that took a lengthier amount of time to complete, while the second had no computerized branching and took less time to complete. Information about national park visitation rates and opinions on national park issues was collected, along with demographic information for both survey modes.

This dissertation follows the "papers option" and provides three journal articles with a linking introductory chapter and a discussion-oriented concluding chapter. Each paper is written to stand alone, and the intention is to build upon complementary survey methodology constructs. The research questions in the introductory chapter will guide the methodological comparisons in the three journal articles.

Results of the three articles report whether the telephone and web survey modes provide similar findings; with the first two articles focusing on demographics, limiting/controlling visitation, national park issues, and willingness-to-pay fee increases. The discussion examines factors of survey mode effects such as sample representation problems, context issues, prior direct experience, questionnaire length, and item nonresponse.

A. Concepts important to computerized survey modes

Survey methods are a collection of techniques for measuring variables of interest. When properly employed, surveys can be precise representations of whatever is being measured (Lavrakas, 1987). Survey research has grown over the last three decades to where most knowledge of societal trends and lifestyles comes from studies that use this methodology (Synodinos & Brennan, 1988). Parks and recreation research has benefited from the advancement of survey methodology and computerized data analysis.

In the past, standard survey modes employed have been face-to-face, mail, and telephone. With the advent of the computer and its capability of quickly collecting and analyzing data, there has been a very rapid evolution of the electronic survey. The first electronic surveys were the computer-administered personal interview (CAPI) and the computer-assisted telephone interview (CATI). The CAPI was developed as a tool in the face-to-face interview done in large public surveys when portable microcomputers became available in the 1980s (Weeks, 1992). The interviewer would read the questions from a computer screen and enter the respondent's answers directly via the keyboard. With the newer lightweight laptops, this has become a more widely used survey mode particularly in government research (Synodinos & Brennan, 1988). More recently, the computer-assisted self-interview (CASI) has become a part of the CAPI. This strategy has been particularly useful for sensitive data collection on health issues (Couper & Rowe, 1996).

The CATI was developed in the 1970s, when telephone surveying began to become more prominent as an alternative to the more expensive face-to-face interview. In the CATI, the interviewer calls the respondent and reads the questions from a display screen, and enters the answers given over the phone directly into the computer. (Dillman, 1978; Groves & Mathiowetz, 1984).

With the increased portability of microcomputers and the development of the touch-sensitive video screen, the self-administered questionnaire (or SAQ) became popular. In the SAQ, questions are displayed on the computer or video screen and answered directly by the subject without the intervention of an interviewer. The duty of the "interviewer" consists primarily of recruiting and assisting respondents. This mode is ideally suited for on-site data collection at high pedestrian traffic areas such as malls and trade/professional conferences (Gates & Solomon, 1982; Whalen, 1984).

The Internet, a high speed computer network that was started in the 1960s for the military and academic researchers to ship data and collaborate from different locations, has substantially contributed to the development of the computerized SAQ (CSAQ). The connectivity of the Internet meant CSAQs could be centrally distributed to remote geographical areas (O'Lear, 1996). The first Internet electronic mail or e-mail CASI surveys were conducted in the 1980s (Keisler & Sproull, 1986; Vaske & Grantham, 1990). E-mail surveys have grown in popularity along with the increase of Americans using e-mail on the Internet (Smith, 1997).

Since 1993 the explosive growth of the World Wide Web has generated the web CASI which can be found daily collecting hundreds of responses particularly for marketing research and opinion polls. Often e-mail messages to specialized populations will direct respondents to web surveys (Smith, 1997).

In the first and second articles, this study will compare results obtained from a CATI national parks survey to results obtained from a web survey. Implications of the advantages and disadvantages of web survey methodology will be discussed. In the third

article, item nonresponse differences between the branching and non-branching versions of the web survey will be examined for patterns.

B. Problem Statement

Computers now figure in most phases of survey research - instrument design, sampling, coding and editing, data entry, data cleaning, scale and index construction, data base organization, data base retrieval, statistical analysis, documentation, and report writing (Karweit & Meyers, 1983; Weeks, 1992). In survey administration, the instruments and survey modes that are available affect how questions are asked and how the data can be collected and analyzed. Summarized below are some of the reasons for collecting data via computer interactive interviewing (Synodinos & Brennan, 1988).

(1) Responses are entered directly into the computer so time-consuming tasks of hand-coding and editing data are integrated into the questionnaire administration phase.

(2) Computer interactive survey systems force researchers to integrate several steps into the writing and sequencing of the questionnaire. In principle, this should lead to higher quality data because detailed preplanning eliminates errors (Sudman, 1983).

(3) Changing, adding, and deleting questions is easier in computer interactive surveys than in mail or face-to-face surveys. Randomizing order of items, complicated conditional branching, and alternate response choices are feasible. This ability supports tailored testing and can reduce confusion and contribute to data integrity (Groves & Mathiowetz, 1984).

(4) Questionnaires can be personalized using information obtained in previous questions (e.g. using the respondent's name, services used, etc.). In principle, personalization is a very desirable feature because it may create greater rapport with repondents (Parasuraman, 1986).

(5) Recruiting and retaining competent face-to-face interviewers has become increasingly difficult (Gates & Jarboe, 1987; Ossip, 1986). Computer controlled survey systems like CATI and CASI benefit interviewers by having the computer conduct repetitive and tedious tasks. Computer interactive surveys can be monitored closely and greater quality control can be achieved (Mathiowetz & Cannell, 1980; Groves, 1989). Additionally, electronic SAQs may reduce some of the biases of the interaction between interviewers and respondents (Tull & Hawkins, 1987).

In acknowledging that CASIs have research-friendly features (direct data entry, higher quality question sequencing with randomizing order of items and conditional branching, and personalized information with reduced interviewer bias) questions arise about sampling representation. This is not so much a problem with e-mail CASIs, since known groups of survey respondents can be randomly selected and e-mailed a questionnaire (Parker, 1992; Walsh et al, 1992; Kittleson, 1995). In fact, mixed mode surveys (where both a paper and an electronic contact system is established for notifying the respondent of the survey coming), has been recommended for following up on survey non-respondents (Schaefer & Dillman, 1998).

Web CASIs pose a different, and methodologically difficult, problem. There is no master list of web respondents – some may have e-mail addresses, some may have telephone numbers, and some may not have either (GVU, 1997; Find/SVP, 1997). Since a random web sampling process cannot be established, questions about the appropriateness of a web CASI survey arise at the front end of the research process. Why should a web survey be conducted? Can a web survey appropriately be modeled after an on-site visitor survey? What useful information can be collected from a web survey?

Once the decision is made to conduct a web survey, what web respondent demographic profile will emerge? How different will web respondent demographics be from telephone respondent demographics? How will Internet user demographics affect

the web sample? How different will web respondent national park opinions be from telephone respondents'? Collecting this information will serve exploratory research purposes, as this issue has not been investigated from a recreational perspective.

C. Purposes of the Study

There are three main purposes of this dissertation, which are summarized in each of the articles. The purpose of the first article is to examine the differences between demographic data collected from randomly sampled telephone respondents and self-selected Web respondents. The specific research questions studied are:

1) Do web and telephone surveys yield statistically equivalent responses for demographic variables (sex, age, education, residence, and park visitor characteristics)? How do they differ?
2) Do web and telephone surveys yield statistically equivalent responses on two survey themes: a) support limiting/controlling visitation to national parks and b) current issues facing specific national parks? How do they differ?

The purpose of the second article is to show potential sources of bias between web and telephone respondents. Most of the research comparing survey mode focuses on context issues; the effect of survey type on how people interpret and answer questions (Schwarz & Sudman, 1992). While a variety of effects and biases have been defined, two appear relevant to recreation information: 1) social desirability and acquiescence; 2) cognitive demand effects.

Social desirability refers to respondents answering in a manner consistent with societal norms or the perceived viewpoint of the interviewer (Dillman et al., 1996; Fisher, 1993). *Acquiescence*, on the other hand, refers to respondents' tendency to agree with statements in a survey. Social desirability bias can be present in any survey mode, but comparative studies suggest that it is more evident during face-to-face and telephone surveys than mail surveys (DeMaio, 1984; de Leeuw & van der Zouwen, 1988; Dillman

& Tarnai, 1991; Dillman et al., 1996). Social desirability effects are potentially quite complex and result from multiple processes related to confidentiality of the survey, legitimacy of the research effort, and sensitivity of the specific questions (Groves, 1989).

For willingness-to-pay questions, social desirability may be a serious issue. Telephone respondents may be concerned about appearing "cheap" if they are unwilling to pay small increases in national park entrance fees. On a web survey, with greater apparent anonymity, respondents are theoretically less likely to say "yes" when they mean "no".

The specific research questions examining park visitation and potential sources of bias between telephone and web survey respondents is:

1) To what extent do web and phone survey respondents share similar socio-demographic characteristics?
2) Do web and phone surveys yield statistically equivalent responses for visitation variables?
3) Do web and phone survey respondents report statistically equivalent levels of willingness to pay increased park user fees?

The purpose of the third paper in this study is to identify and explain item nonresponse in web surveys. Item nonresponse means that data for a unit is partially missing. Respondents may refuse to answer a question because of privacy issues, or not understanding the question. Sometimes respondents do not see an answer they would have liked to have chosen, or think there isn't enough time to complete the survey, or just lose interest (Madow, Nisselson, & Olkin, 1983; Schafer, 1998). Item nonresponse may be higher on web surveys than telephone surveys, as phone respondents who have agreed to participate are generally willing to provide answers to questions asked. Web surveys, in contrast, allow respondents to avoid answering difficult or sensitive questions because there is no live interviewer or verbal prompts. In addition technology factors such as computerized branching to new pages, and Internet response time affect a web respondent's willingness to complete to survey.

Also relevant to this study are having a vested interest (i.e. topic saliency) in an issue, and prior direct experience with the attitude object. Research suggests that since behavior is ultimately determined by beliefs held by an individual (Fishbein & Manfredo, 1992), instantly retrieved beliefs from memory will most likely influence behavior (Cialdini, Kallgren, & Reno, 1991). The attitude-behavior consistency literature attributes two determinants in recalling attitudes and beliefs: *repeated expression* and *direct experience* with the attitude object (Fazio, 1986, Manfredo, Yuan & McGuire, 1992; Regan & Fazio, 1989). Article Three is concerned with direct experience.

Direct experience with the attitude object includes memories of behaviors or observations of other's behaviors that may lead to greater accessibility of attitudes and beliefs (Cooper & Croyle, 1984). For example, attitudes about national parks may be more accessible to those individuals who have visited several of them, than for those who have visited one or two, or have read about the topic. Increased experience with an object leads to greater attitude accessibility, and a greater likelihood that the attitude will influence behavior (Fazio, 1986, Manfredo, Yaun, & McGuire, 1992; Vincent & Fazio, 1992).

If attitudes that are based on direct experience have a greater influence on judgment and behavior because such attitudes are presumed to have possession of substantial information about the object, then web respondents with higher direct prior experience with national parks and who chose to start a survey on the topic could be expected to complete the survey more often than those web respondents who had less direct prior experience. The behavioral choice at hand was to complete all items on the national parks survey.

Based on the background discussion above, three hypotheses are addressed:

1. As survey complexity increases, item nonresponse increases.
2. As direct prior experience with national parks increases, item nonresponse will decrease.

3. Survey complexity and direct prior experience will interact to influence item nonresponse.

D. Assumptions and Limitations of the Study

First, since web surveys are new, there is a lack of research directly related to studying Internet survey modes, particularly Web surveys. It is assumed that conducting recreation research over the Internet, on the World Wide Web, is a worthwhile endeavor in order to better understand its potential and pitfalls. While there is a wealth of research on the primary survey modes of face-to-face, mail, and telephone interviews (Dillman, 1978; Groves, 1989) there are just a few early accounts of research on e-mail and web surveys. In the limited number of e-mail studies published, there are contradictory findings of response rates, although the research shows that better response rates occurred (from 10% to 70%) as acceptance of the e-mail survey has grown (Schuldt & Totten, 1994; Opperman, 1995; Mehta & Sivadas, 1995; Tse et al., 1995; Kittleson, 1995; Bachmann, Elfrink, & Vazanna, 1996).

A sampling limitation encountered was the self-selection of the Web respondents, which made the sample group non-probabilistic and therefore non-generalizable. Because there is no current directory of web users from which to randomly select a survey population, NPCA's homepage had a banner to get the potential respondent's attention. "Complete the first ever electronic survey of the national parks!" encouraged the promotional language.

Tied to this sampling limitation is the lack of electronic connectedness of most Americans. A recent study by Project 2000 Group at Vanderbilt University (Novak & Hoffman, 1998) found that only 26% of Americans have ever used the Web and that education affects computer and Internet access. The more highly educated the individual, the more likely he or she is to have a computer at work, and a computer at home, and to have accessed the Web in the last six months. At this point in the growth of electronic

connectivity, there is not enough Internet penetration into the general US population to consider the web survey as reaching a representative sample of US residents.

External validity problems may occur because the scope of the Web study included only those Internet-connected individuals who found the NPCA web page. Web respondents were part of a narrowly focused population already interested in the topic of national parks. Therefore, results are specific to the respondent group studied, and are not necessarily generalizable to Web respondents in general. The web respondents in this study are probably closer to the demographic profile of members of the National Parks and Conservation Association due to topic saliency. Also, biases related to the measurement procedure can be anticipated, largely due to definition and interpretation of terms. These problems are acknowledged in this study.

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Chapter Two

Paper One:

Using the Internet as a Survey Research Tool: Potentials and Pitfalls

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Introduction

Recent research shows that the average wilderness user is a 37-year-old, college-educated male (69%) who lives in an urban area (Cook & Borrie, 1995; Watson, Cole & Roggenbuck, 1995). The typical Internet user is a 35-year-old, college-educated male (67%) who lives in an urban area (GVU, 1997). Such dramatic similarities suggest at least three things. First, this column in *IJW* is aptly named. Second, wilderness users are likely to be Internet proficient. And finally, the Internet offers a viable technique for communicating with wilderness users.

This paper explores the potentials and pitfalls of using the Internet to gather information about the public's views on natural resource management. Data for this investigation were obtained from two surveys of national park visitors. The first, a phone interview, was based on a national random sample of individuals. The second was a World Wide Web-based survey and included a self-selected sample of respondents who voluntarily completed the online instrument. The two samples of individuals are compared relative to their demographic profiles, frequency of national park visitation, general beliefs regarding limiting / controlling visitation to national parks, and beliefs about current issues facing specific national parks.

Electronic surveys: The potential

Currently, about 50% of all U.S. households now have computers and about 22% have access to the Internet in their home. Although 35% of all Americans have accessed the Internet at least once (Witt, 1997), this estimate changes daily (Tapscott, 1998). Internationally, there are 10% to 15% fewer Internet users in Europe than in the U.S. and Canada. In third world nations less than 10% of the population is connected to the Internet (GVU, 1997), but this too is changing rapidly.

Electronic surveys distributed via the Internet offer the potential for gathering information from wilderness users on a range of topics of interest to natural resource managers. Web-based surveys offer at least three advantages. First, compared to traditional survey modes (e.g., telephone interviews), web-based surveys can be completed faster, especially for large samples where the number of telephones and trained interviewers limit the number of completions per day (Schaefer & Dillman, in press). Second, the costs associated with data

collection are substantially reduced for Internet surveys since the methodology eliminates postage, printing and/or interviewer costs (Smith, 1997; Walsh, Kiesler, Sproull, & Hesse, 1992). Third, graphic interfaces and branch / fill capabilities allow for survey presentation in formats that have previously been difficult to achieve (Schmidt, 1997). Despite these advantages, several methodological questions remain unanswered. For example, to what extent do the findings from a web survey approximate those from a phone survey? To what extent are web-based data generalizable to the larger population?

Electronic surveys: The pitfalls

All surveys strive to obtain a sample that is representative of the population in question. Survey mode (web surveys versus telephone interviews) is important because it influences who is included in the sample frame, as well as who responds from within that frame. Mode differences arise when the respondents and non-respondents for one type of survey differ from those of another.

Two types of non-response bias can be distinguished. First, *sample frame* or *coverage bias* refers to whether certain people in a population are not included in a sample frame because they are unreachable (Dillman, Sangster, Tarnai, & Rockwood, 1996); for example, individuals who do not have access to or use the Internet. Second, *sample non-response bias* focuses on differences between respondents and non-respondents who refuse to answer all or portions of the survey.

Phone and web surveys have different coverage and sample non-response problems. Coverage problems occur for telephone surveys because respondents must be available when the interviewer calls. Specific to web surveys, the available evidence suggests that when compared to the U.S. population, Internet users tend to be younger, predominantly male, and more highly educated (Webster, 1998; GVU, 1997), findings that have consequences for representing the population.

This study explores these potential sources of bias between web and telephone surveys for two samples of national park visitors. Responses to socio-demographic questions, park visitation rates, general beliefs about limiting / controlling park visitation, and beliefs about current issues facing specific national parks are examined.

Methods

Data for this study come from two National Parks and Conservation Association (NPCA) survey projects. The phone survey was based on a national random sample of individuals (Vaske, Haas, Whittaker, & Wakefield, 1996), while the web survey was based on a self-selected sample of respondents who voluntarily completed the online instrument.

The Telephone Survey

A sample of random digit numbers was purchased from a commercial sampling firm. The sample was designed to be proportional to the population of each state, and representative of the population in age, income, and ethnicity. The initial sample included 4,400 numbers.

Trained interviewers conducted the phone survey during the spring of 1996. Interviewers made up to three "callbacks" to numbers that were busy or had answering machines. Approximately 47% of the numbers did not result in contact. Of the remaining 53%, or 2,310 households, 809 individuals (18 or older) agreed to complete the survey (response rate = 35%).

The World Wide Web Survey

During the summer of 1996, the phone survey was converted to html (hypertext mark-up language) and was posted on the NPCA web home page from July 18 to December 1, 1996. During that time frame, approximately 16,114 individuals visited the NPCA home page. Of these, 1,653 opened the cover letter associated with the web survey.

The web survey sample consisted of respondents who voluntarily completed the computerized self-administered interview. Approximately 300 web surveys were received each month (July through November). After screening for and removing duplicate submissions (n = 33) of the survey, 1,120 completed questionnaires were available for analysis.

Variables Measured

Questions on the phone and web surveys measured the same variables. Respondents were first asked "Have you ever visited any national park areas (defined as "the 369 areas managed by the National Park Service; including National Parks and Monuments, National Recreation Areas, National Historic Sites, National Lakeshores and Seashores, and so on"). Responses were coded in a dichotomous choice (Yes or No) format. Only those individuals who indicated "Yes" are included here (81% - phone survey, n = 633; 98% - web survey, n = 1080).

A fill-in-the-blank question asked individuals to specify the number of national parks visited in the past three years. Four socio-demographic variables (gender, age, education, and place of residence) were included on both surveys. Table 1 shows the response options for these demographic questions.

Four questions examined respondents' support for limiting / controlling visitation to national parks. These questions ranged from limiting use to protect park experiences and the natural environment to instituting a reservation system and a shuttle bus system. Table 2 shows the actual wording of the questions. For each variable, responses were coded as "Yes," "No," or "Do not know."

Five questions addressed respondents' views on a range of issues facing specific National Parks (e.g., Grand Canyon, Great Smoky Mountains, Yellowstone, Voyageurs, and Everglades). The issues along with the question wording are shown in Table 3. Responses to each issue were coded as "Yes," "No," or "Do not know."

Results

Socio-Demographic and Park Visitation Comparisons

The two samples differed statistically on all four socio-demographic variables ($\chi^2 >$ 39.0, $p < .001$, in all tests, Table 1). Compared to 1996 US Census data, the telephone sample approximated the age, gender, and education characteristics of the U.S. population (U.S. Bureau of the Census, 1997). Relative to gender differences, phone respondents were 43% male (57% - female). In the web survey, the distribution was reversed (59% - male, 41% - female). Telephone respondents were, on average, older than web respondents ($M = 44.7$ and $M = 36.2$, respectively, $t = 11.13$, $p < .001$). After recoding this variable into discrete categories, the largest differences were in the two oldest age groupings. For example, 14% of the phone respondents were 65 or older, but only 2% of the web respondents were in this age category.

Table 1 about here

Consistent with other surveys of Internet users, the web sample was more highly educated than the phone sample (Table 1). For example, 43% of the individuals who volunteered to complete the web survey reported post-graduate work; only 18% of the phone sample indicated this level of education. At the other extreme, 2% of the web sample were in the "some

high school or less" category, compared to 10% of the phone respondents. Relative to place of residence, 57% of the individuals in the phone sample lived in areas with population densities less than or equal to 50,000, while 59% of the web respondents lived in cities over 50,000 (Table 1).

On average, the web respondents had visited twice as many national parks in the last three years ($\underline{M} = 8.48$) as the phone respondents ($\underline{M} = 3.91$) ($\underline{t} = 8.35$, $\underline{p} < .001$). Given that individuals in the web sample were on the NPCA web home page, their interest in national parks is likely to be greater and thus, it is not surprising that their visitation rates were also higher.

Taken together, these socio-demographic and park visitation comparisons highlight the magnitude of differences between the random sample of phone respondents and the self-selected sample of individuals who volunteered to complete the web survey. Although the socio-demographic distributions for the web respondents were similar to those reported in other studies of Internet users, the results reported here suggest that coverage bias issues are problematic for representing the U.S. population with web-based surveys.

General Beliefs about Limiting / Controlling Visitation

Four questions in the survey asked respondents whether they supported limiting / controlling visitation to national parks (Table 2). Similar to the socio-demographic and park visitation analyses, the phone and web samples differed statistically (based on the χ^2) on all four comparisons. However, unlike these previous comparisons where the strength of the association was relatively strong (average Phi = .30, see Table 1), the strength of the relationship between survey mode and beliefs about limiting / controlling visitation was not as strong (average Phi = .13, Table 2). Moreover, from an applied perspective, data from either sample would yield the same conclusion regarding acceptable national park management strategies. For example, over three-quarters of the respondents in the phone and web surveys supported the concepts of limiting visitor numbers, requiring reservations, and using shuttle buses to reduce crowding and protect park resources.

Table 2 about here

Beliefs about Specific National Park Issues

Five questions in the survey asked about current issues facing specific national parks (Table 3). Similar to the general beliefs questions, although the two samples differed statistically ($\chi^2 > 22.3$ $p < .002$, in all analyses), the pattern of responses shows considerable agreement regarding acceptable management strategies. For example, over 85% of both samples (87% - phone survey and 91% - web survey) were willing to pay more for their utilities if visibility problems due to pollution from power plant emissions were reduced in Grand Canyon and Smoky Mountain National Parks. Similarly, over 70% of all respondents believed the federal government should stop the mining by private corporations near Yellowstone National Park to avoid potential risks to the Park's land, water, and wildlife.

Table 3 about here

Conclusions

The findings presented here suggest several considerations regarding the use of electronic surveys. First, while Internet surveys reduce data collection costs and provide faster turn-around when compared to telephone interviews, population coverage problems are a major limitation of web-based surveys. Data reported here show marked differences in socio-demographic characteristics between the self-selected individuals who voluntarily completed the online survey and the random sample of phone respondents. Given the rapid rate at which Internet usage is increasing, it is not clear who is included in the sample frame. Moreover, there is currently no way for researchers to follow-up with non-respondents. In this study, for example, more individuals opened the web survey than actually completed the instrument.

While these sampling issues currently pose limitations for using web-based surveys, many of these problems may disappear as Internet usage continues to grow. Telephones were initially communication devices for the elite until they gained mass acceptance. As the cost of technology decreases, personal computers with an Internet connection are rapidly becoming a part of more American households. Similar to the telephone, once the Internet gains mass popularity, random sampling will become more feasible.

Second, these sampling issues carry over to other variables researchers may be interested in measuring. In this investigation, for example, web respondents visited twice as many national

parks when compared to phone respondents. Given that the web survey was accessed through the NPCA web site, such differences probably reflect a higher level of commitment to national parks than is found in the general population.

Third, caution must be used when evaluating respondents' general and specific beliefs regarding acceptable management strategies derived from different survey modes. While the percentages of individuals in identical response categories were similar, web respondents were generally more positive toward the management action than the phone respondents. If only the web data were available, managers would over estimate the extent to which the visiting public approved of the policy.

Taken together, these findings suggest that web-based survey research has the potential for assisting in management decisions. At the present time, however, population coverage and sample non-response biases severely limit widespread application of the methodology.

Footnote:

1. Analyses based on the entire sample yields the same conclusions.

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Table 2.1. Respondent demographics and park visitation rates by survey type [1]

	Phone (%)	Web (%)	χ^2	Phi
Gender			39.0	.16
Male	43	59		
Female	57	41		
Age			138.6	.30
13 – 24	9	18		
25 – 34	21	30		
35 – 44	26	25		
45 – 54	19	19		
55 – 64	11	6		
65 +	14	2		
Mean age [2]	44.7	36.2		
Education			245.6	.40
Some high school or less	10	2		
HS or Vocational Tech	24	4		
Some college / 2 year grad	26	24		
4 year college graduate	22	27		
Post grad work or degree	18	43		
Residence			67.6	.21
Farm or rural area	16	6		
Small town (< 5000)	13	8		
Small city (5,000 – 50,000)	28	27		
Large city (50,000-500,000)	21	24		
Very large city (500,000 +)	10	14		
Suburb	12	21		
Number of parks visited in the past 3 years			342.0	.45
0	21	2		
1	18	7		
2 to 3	32	24		
4 to 5	16	23		
6 to 10	8	24		
11 to 20	3	13		
More than 20	2	7		
Mean number of parks visited [3]	3.91	8.48		

1. All χ^2 values are significant at $p < .001$
2. $t = 11.13, p < .001$
3. $t = 8.35, p < .001$

Table 2.2. Support for limiting / controlling visitation to national parks by survey type [1]

	Phone (%)	Web (%)	χ^2	Phi
Should the National Park Service take steps to ensure crowding does not detract from park visits?			66.2	.21
Yes	78	86		
No	16	4		
Do not know	6	10		
Should the National Park Service limit visitors if the number of visitors is harming park resources?			12.1	.09
Yes	92	94		
No	6	3		
Do not know	2	3		
Would you be willing to make a reservation to enter popular parks if reservations would reduce crowding and protect park resources?			17.3	.11
Yes	89	91		
No	8	4		
Do not know	3	5		
Would you be willing to use shuttle buses in popular parks to reduce traffic congestion and help protect park resources?			16.5	.10
Yes	88	85		
No	9	8		
Do not know	3	7		

1. All χ^2 values significant at $p < .003$

Table 2.3. Specific national park issues by survey type [1]

	Phone (%)	Web (%)	χ^2	Phi
Pollution from power plants can significantly worsen visibility at National Parks like Grand Canyon and Great Smoky Mountains. Should companies be required to clean up their pollution, even if it meant you might pay more for utilities and consumer products?			22.3	.12
Yes	87	92		
No	7	2		
Do not know	6	6		
A private company plans to build a large gold mine less than three miles from Yellowstone National Park. Should the federal government stop the mine to avoid potential risks to the park's land, water, and wildlife?			27.8	.14
Yes	72	83		
No	12	6		
Do not know	16	11		
Congress is considering opening more land in Minnesota's Voyageurs National Park to snowmobiles. Should these areas be opened to snowmobiles?			108.5	.27
Yes	19	5		
No	60	80		
Do not know	21	15		
Restoring the natural conditions in Florida's Everglades National Park is a priority for Congress, but finding the money to pay for it has been difficult. One option is a tax on Florida's sugar cane industry, which contributes to the Park's pollution. Would you be willing to pay 5 cents more for a bag of sugar if you knew the money would help restore the Everglades?			23.5	.13
Yes	89	95		
No	7	3		
Do not know	4	2		
Some people think the wolves are an important part of the Yellowstone's ecosystem and add to its wilderness values. Other people who live near the park think the wolves will kill livestock or endanger people and should not have been returned. Do you think wolves should have been returned to Yellowstone?			119.7	.28
Yes	63	86		
No	17	4		
Do not know	20	10		

1. All χ^2 values significant at $p < .002$

Chapter Three:

Paper Two:

World Wide Web versus Telephone Surveys: Socio-Demographic, Park Visitation, and Willingness-to-Pay Comparisons

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Abstract

Conducting survey research via the World Wide Web is becoming more common. This paper compares web and phone surveys for collecting information on socio-demographic characteristics, national park visitation rates, and willingness to pay proposed fee increases. The phone survey was based on a national random sample of individuals (n = 809). The sample was designed to be representative of the population in each state. The web sample consisted of respondents (n = 1,120) who voluntarily completed the computerized self-administered survey. Results indicated that two samples differed statistically on four socio-demographic variables (gender, age, education, and place of residence) and on respondents' reported national park visitation rates. While not statistically significant after Bonferroni adjustments, web respondents were willing to pay higher fee increases than phone respondents. Findings are discussed relative to sample representation issues and strategic / social desirability biases in the two survey modes, as well as implications for future research and policy implications.

Key words: web surveys, phone surveys, sample representation, strategic bias, social desirability bias

Introduction

Data on psychological and economic issues are often obtained from surveys of recreation users. Information about visitors' willingness to pay for fees and services, for example, is central to the Contingent Valuation Method (Carson, 1991), or for exploring the revenue and political consequences of fee increases (Lundgren, 1996; Vaske & Donnelly, 1999). In all cases, a major methodological issue is deciding whether to collect this information through mail, telephone, or in-person surveys. Alternatively, recent advances in electronic surveys distributed via the Internet (web or e-mail) offer the potential for gathering information from customers on a range of topics (Abraham, Steiger, & Sullivan, 1998; Gaede & Vaske, 1999; Hewson, Laurent, & Vogel, 1996; Mullin & King, 1998).

Researchers have debated which type of survey (or "survey mode") provides the most accurate and useful results, as well as which is most cost effective (Bishop, Hippler, Schwarz, & Strack, 1988; Dillman, 1978; Siemiatycki, 1979; de Leeuw & van der Zouwen, 1988; Groves & Lyberg, 1988; Groves, 1989; Dillman & Tarnai, 1991; Dillman, Sangster, Tarnai, & Rockwood, 1996). An extensive literature has suggested the advantages and disadvantages of the three traditional survey modes (mail, phone, in-person), but definitive empirical evidence to support these ideas is more sparse. Because studies examining the use of e-mail (Abraham et al., 1998; Bachmann, Elfrink, & Vazzana, 1996; Kittleson, 1995; Mehta & Sivadas, 1995; O'Lear, 1996; Parker, 1992; Schaefer & Dillman, 1998; Schuldt & Totten, 1994) and the World Wide Web (Gaede & Vaske, 1999; Kehoe & Pitkow, 1996; Schmidt, 1997a, 1997b; Smith, 1997) as data

collection tools are still in their infancy, direct comparisons between the traditional and more recent methodologies in the published literature are limited.

While the empirical evidence comparing the traditional modes of data collection has documented substantive differences for some types of questions, it is not always clear if these effects are pervasive and applicable to all types of information (Dillman et al., 1996). Recent review articles (Dillman et al., 1996) and books (Groves, 1989) have proposed theoretical frameworks for examining survey mode effects, however, there is a continued need to document these effects for different types of survey questions, including recreation economic information (Loomis & Walsh, 1997). Only three studies could be identified that directly compared survey mode for economic information. Two of these investigations focused on willingness to pay for environmental policy decisions (Mannesto & Loomis, 1991; Loomis & King, 1994), while the third examined capital expenditures on recreation equipment and willingness to pay increased state park entrance fees (Whittaker, Vaske, Donnelly, & DeRuiter, 1998).

This paper compares web and telephone survey respondents on their willingness to pay increased entrance fees to visit national parks. Comparisons of demographic and visitation rates to national parks are also made. Results explore whether the two survey modes provide similar findings. Discussion focuses on factors that may account for any differences and how information from either type of survey may affect study conclusions or policy decisions. The goal is to examine methodological questions for continued theory building and hypothesis testing.

Considerations in Choosing Web versus Phone Surveys

A classic general discussion of survey mode differences is presented in Dillman (1978), but other researchers have increased our understanding of the issues (e.g., Groves & Lyberg, 1988; Fowler, 1993; Sudman & Bradburn, 1974; de Leeuw & van der Zouwen, 1988; Groves, 1989; Dillman et al., 1996). Taken together, these findings identify two general types of issues: 1) sample representation issues, and 2) context issues.

Sample Representation Issues

All surveys strive to obtain a sample that is representative of the population in question. Survey mode is important because it influences who is included in the sample frame, as well as who responds from within that frame. Some people can be difficult to survey by phone, either because they are hard to reach or they object to the intrusion. For web-based surveys, only about 19% of the U.S. population currently has access to the Internet in their home (FIND/SVP, 1997; Webster, 1998). Even among those with web access, identifying a specific population from which to draw a random sample is currently difficult. Mode differences arise when the respondents and non-respondents for one type of survey differ from those of another.

Two types of nonresponse bias can be distinguished (Edwards & Anderson, 1987; Loomis & King, 1994). First, *sample frame* or *coverage bias* refers to whether certain people in a population are not included in a sample frame because they are unreachable (Dillman & Tarnai, 1991; Groves, 1987; Walsh, Kiesler, Sproull, & Hesse, 1992). For example, individuals who do not use the Internet would not be included in a web-based

sample. This type of bias is difficult to control once a sampling frame has been chosen and data collection has begun. During the analysis phase, the data may be weighted by socio-demographic characteristics (if known) to help correct for this bias (Henry, 1990; Pfeffermann, 1993). Weighting by socio-demographic indicators, however, is only helpful if these measures are related to the variables of substantive interest (e.g., willingness to pay, park visitation).

Second, *sample nonresponse bias* focuses on differences between respondents and non-respondents who refuse to answer all or portions of the survey. While this bias may also be addressed by weighting underrepresented groups by socio-demographic variables (Mitchell & Carson, 1989; Pfeffermann, 1993), this only helps if the differences between respondents and nonrespondents for substantive variables are related to socio-demographic variables.

Phone and web surveys have different coverage and sample nonresponse problems. Coverage problems occur for telephone surveys because respondents must be available when the interviewer calls (Frey, 1989). Answering machines and "Caller ID" have become a popular ways of screening unwanted calls. While random digit dialing techniques provide good coverage of households in a geographic area, representative phone samples for other populations are more difficult to obtain. Voter registration lists, for example, often do not contain phone numbers. Specific to web surveys, the available evidence suggests that Internet users tend to be younger, predominantly male, and more highly educated than the general population (FIND/SVP, 1997; Webster, 1998); findings

that raise questions regarding the representativeness of samples obtained from the World Wide Web.

Sample nonresponse bias for different survey modes is not well understood. While research suggests that telephone surveys yield lower response rates than face-to-face interviews (Sykes & Collins, 1988; de Leeuw & van der Zouwen, 1988), direct comparisons between telephone and mail surveys on this issue are rare (Whittaker et al., 1998), and comparisons between phone and web surveys are only recently emerging as a topic of scientific inquiry (Gaede & Vaske, in press). Moreover, while research has explored strategies for improving response rates (and reducing nonresponse bias) within specific modes (e.g., Kanuk & Berenson, 1975; Dillman, 1978; Heberlein & Baumgartner, 1978; Fox, Crask, & Kim, 1988; Groves & Lyberg, 1988), comparisons between survey modes are difficult due to the variety of techniques examined (Mehta & Sivadas, 1995; Schuldt & Totten, 1994).

Item nonresponse may be higher on web surveys than telephone surveys. Phone respondents who have agreed to participate are generally willing to provide answers to questions asked. Web surveys, in contrast, allow respondents to avoid answering difficult or sensitive questions because there is no live interviewer or verbal prompts.

To the extent that a web or phone survey minimizes coverage differences, or differences in nonresponse rates, similar results are likely. In the real world, however, researchers do not always have the ability to control these biases, suggesting that survey mode effects need to be carefully considered during research design.

Context Issues

Most research comparing survey modes focuses on context issues; the effect of survey type on how individuals interpret and answer questions (Schwarz & Sudman, 1992). At least two context issues are relevant to recreation economic information: 1) social desirability and acquiescence, and 2) cognitive demand effects.

Social Desirability and Acquiescence

Social desirability refers to respondents answering in a manner consistent with societal norms or the perceived viewpoint of the interviewer (Dillman et al., 1996; Fisher, 1993). *Acquiescence*, on the other hand, refers to respondents' tendency to agree with statements in a survey. The concept differs from social desirability because acquiescence does not necessarily relate to societal norms. While socially desirable responses may not be evident for many questions, the form of the question may influence an acquiescent response (Dillman et al., 1996).

Any survey mode can contain social desirability bias. Comparative studies suggest social desirability bias is more evident in phone surveys than mail surveys (DeMaio, 1984; de Leeuw & van der Zouwen, 1988; Dillman & Tarnai, 1991; Dillman et al., 1996). With mail surveys (and presumably web surveys), perceived anonymity and confidentiality is one possible explanation (Dillman et al., 1996), but the presence of a live interviewer with phone surveys is another (de Leeuw & van der Zouwen, 1988; Aquilino, 1994). Social desirability effects are potentially quite complex, and result from multiple processes related to confidentiality of the survey, legitimacy of the research effort, and sensitivity of the specific questions (Groves, 1989).

For willingness-to-pay questions social desirability may be a serious issue. Respondents may be concerned about appearing "cheap," if they are unwilling to pay small increases in national park entrance fees. On a web survey, with greater apparent anonymity, respondents are theoretically less likely to say "yes" when they mean "no."

Social desirability effects in phone surveys may be minimized with improved interviewer training, but the extent to which this bias can be eliminated has been questioned in the literature (Fisher, 1993; Frey, 1989; Salizar, 1990). Acquiescence effects can be reduced by using a combination of positive and negative survey items, but social desirability may be impossible to remove from certain survey topics.

Cognitive Demand Effects

Phone surveys differ from web surveys in that information is presented aurally rather than visually, and the pace of phone surveys are dictated by a live interviewer rather than the respondent. As a result, time pressure in phone surveys can be greater and limit respondents' ability to retrieve information from memory or their records, and process cognitive information (Krosnick & Alwin, 1987; de Leeuw & van der Zouwen, 1988; Groves, 1989; Dillman et al., 1996). Phone responses are, therefore, more likely to be "top of the mind." For certain kinds of data (e.g., salient beliefs), the consequences of these immediate answers can be desirable. For other types of questions (e.g., recall data), a more thoughtful response may be better.

This is a potential issue for questions that ask respondents to recall the number of times they visited parks in the past year. Individuals should theoretically give more accurate answers if they could consult records of their participation or ask family

members as a mail (Ferber & Brinbaum, 1979; Vaske, Beaman, Manfredo, Covey, & Knox, 1996) or web survey allows. With the interviewer waiting for a response in a phone survey, estimates are likely to less accurately reflect their visitation rates.

A different problem may emerge in web surveys for willingness-to-pay questions. The web-based survey format allows individuals to consider their answers more carefully than time-constrained phone respondents. This increases the potential for "strategic responses," where people provide answers that they feel will benefit themselves in policy-related decisions. For a willingness-to-pay question about increased national park entrance fees, strategic response bias may be significant. Given time to reflect on these types of questions, individuals may reject even marginal fee increases if they believe their price of admission will be higher. If they perceive the quality of their park experience will not be diminished by the lack of increased revenue, it may be rational to strategically deny that higher fees are acceptable. Under the time pressure of a phone interview, however, fewer respondents are likely to develop this line of thought.

Research Questions

This study explores these potential sources of bias between web and telephone surveys for two samples. Responses to park visitation rates, willingness-to-pay fee increases, and socio-demographic questions are examined. Based on the above discussion, three research questions were addressed:

1. To what extent do web and phone survey respondents share similar socio-demographic characteristics?
2. Do web and phone surveys yield statistically equivalent responses for visitation variables?

3. Do web and phone survey respondents report statistically equivalent levels of willingness to pay increased park user fees?

Methods

Data from two National Parks and Conservation Association (NPCA) survey projects were used to examine these questions. The phone survey was based on a national random sample of individuals (Vaske, Haas, Whittaker, & Wakefield, 1996), while the web survey was based on a self-selected sample of respondents who voluntarily completed the on-line instrument (Gaede & Vaske, in press). Details of the two surveys are described below.

The Telephone Survey

A sample of random digit numbers was purchased from a commercial sampling firm. To the extent possible, the sample was purged of business and disconnected numbers, and included both listed and unlisted household numbers from across the United States. The sample was designed to be proportional to the population of each state, and thus representative of the population of the United States in age, income, ethnicity, and state population. The initial sample included approximately 4,400 numbers.

Trained interviewers at Colorado State University conducted the phone survey during the spring of 1996. Interviewers made up to three "callbacks" to numbers that were busy or had answering machines. Approximately 47% of the numbers did not result in contact (busy, no answer, answering machine, non-working number, fax, or business). Of the remaining 53%, or 2,310 households, 809 individuals (18 or older) agreed to complete the survey (response rate = 35%).[1]

The World Wide Web Survey

During the summer of 1996, the phone survey was converted to html (hyper text mark-up language). Similar to the phone survey, the web version contained automatic branching to appropriate items based on respondent answers to earlier questions. The survey was prominently posted on the NPCA home page from July 18 to December 1, 1996. During that time frame, approximately 16,114 individuals visited the NPCA home page. Of these, 1,653 opened the cover letter associated with the web survey.

The web survey sample consisted of respondents who voluntarily completed the computerized self-administered interview. Approximately 300 web surveys were received each month (July through November). After screening for and removing duplicate submissions (n = 33) of the survey, 1,120 completed questionnaires were available for analysis.

Variables Measured

Questions on the phone and web surveys measured the same variables. Respondents were first asked "Have you ever visited any National Park areas (defined as "the 369 areas managed by the National Park Service; including National Parks and Monuments, National Recreation Areas, National Historic Sites, National Lakeshores and Seashores, and so on"). Responses were coded in a dichotomous choice (yes or no) format. For those answering "Yes," a fill-in-the-blank question asked individuals to specify the number of national parks visited in the past three years.

A series of items addressed respondents' willingness to pay increased entrance fees. The first question in this sequence read: "Entrance fees for most large national

parks are $5 *per vehicle* for a visit up to seven days. Would you support an increase to $5 *per person* to help operate and maintain parks?" Responses were coded as "Yes" or "No." People who said "Yes" to the $5 per person fee increase were then asked if they would support an increase of either $6, $7, $8, $9 or $10 per person to operate and maintain parks. Each individual evaluated only one of these alternative fee increases. The dollar amount individuals evaluated was randomly assigned in both the phone and web surveys.

Respondents who said they were unwilling to pay the $5 per person fee increase were given three reasons why they might not have supported the higher entrance fee and asked to indicate if each statement played a role in their "No" answer. The three statements were: 1) "The amount of the increase was just too high," 2) "I already support the National Parks through taxes," and 3) "I don't trust the Park Service to use the money wisely or efficiently." Responses to each statement were coded as "Yes" or "No."

Four socio-demographic variables (gender, age, education, and place of residence) were included on both surveys. Age was a fill-in-the-blank question. Education was measured on a 5-point scale ranging from "some high school or less" to "post graduate work or degree." Residence was also a categorical variable with responses ranging from "farm or rural area" to "suburb - within 15 miles of a large or very large city."

Analysis Strategy

Comparisons of the web and telephone responses for the ratio-level variables (i.e., number of parks visited in the past three years and age) were made with t-tests. Categorical variables in the two surveys were compared using the χ^2 test for association. Statistically significant results were highlighted after Bonferroni adjustments of

significance criteria (e.g., with 6 willingness-to-pay variables, significance criteria drops to $p < .008$).[2] For the comparisons of the $6 through $10 willingness-to-pay questions, sample sizes are one-fifth of the number of respondents who said "Yes" to the $5 per person fee, because respondents were asked only one of these additional fee increases. For the $5 willingness-to-pay question, the full samples were used. For the questions about why respondents were unwilling to pay any additional fee, the sample sizes were 317 (those unwilling to pay) in the phone survey, and n = 247 in the web survey.

Results

Socio-Demographic Comparisons

The two samples differed statistically on all four socio-demographic variables ($\chi^2 > 58.7$, $p < .001$, in all tests, Table 1). Relative to gender differences, phone respondents were 59% female (41% - male). In the web survey, the distribution was reversed (41% - female, 59% - male). Telephone respondents were, on average, older than web respondents ($\underline{M} = 44.0$ and $\underline{M} = 36.0$, respectively, $t = 11.29$, $p < .001$). The age range for the telephone sample was 18 to 87, while web respondents ranged from 13 to 75 years old. After recoding this variable into discrete categories, the largest differences were in the two oldest age groupings. For example, 14% of the phone respondents were 55 to 64, but only 2% of the web respondents were in this age category.

Table 1 about here

Consistent with previous research that suggests Internet users have higher than average education levels compared to the general population (Kehoe & Pitkow, 1996; FIND/SVP, 1997), the web sample here was more highly educated than phone

respondents (Table 1). For example, 42% of the individuals who volunteered to complete the web survey reported post graduate work or an advanced degree while only 16% of the phone sample indicated this level of education. At the other extreme, 2% of the web sample were in the "some high school or less" category, compared to 12% of the phone respondents. Relative to place of residence, 59% of the phone sample lived in areas with population densities less than 50,000, while the same percentage (59%) of the web respondents lived in cities over 50,000 (Table 1).

Taken together, these socio-demographic comparisons highlight the magnitude of differences between the random sample of phone respondents and the self-selected sample of individuals who volunteered to complete the web survey. Although the distributions for the web respondents were similar to those reported in other studies of Internet users, the results reported here suggest that coverage bias issues are problematic for representing the U.S. population with web-based surveys.

National Park Visitation Rate Comparisons

While over 80% of all respondents to both surveys had visited a national park, the two distributions were statistically different ($\chi^2 = 160.3$, $p < .001$, Table 2). Nearly all (98%) of the individuals in the web sample had visited at least one national park, compared to 81% of those in the phone sample. On average, the web respondents had visited twice as many national parks in the last three years ($M = 8.48$) as the phone respondents ($M = 3.91$) ($t = 8.36$, $p < .001$). Given that individuals in the web sample were on the NPCA webpage, their interest in national parks is likely to be greater and thus, it is not surprising that their visitation rates were also higher.

Table 2 about here

Willingness to Pay Comparisons

The effects of survey type on the willingness-to-pay variables are given in Table 3. As might be expected, a higher percentage of the web respondents agreed with each of the fee increases. After Bonferroni adjustments ($p < .008$ rather than $p < .05$), only the $5 per person comparison was statistically significant ($\chi^2 = 62.8$, $p < .001$); 75% of the web respondents said "Yes" to this question, compared to 56% of the individuals in the phone sample. Differences approached non-adjusted significance for four of the five fee increase questions (p levels between .011 and .057).

Table 3 about here

No statistical differences emerged for the three reasons given in the surveys for not accepting the $5 per person fee (Table 3). Over 85% of both samples indicated "the amount of increase is too high." A majority of both groups felt they already support the National Parks through taxes, while about a fifth did not trust the Park Service to use the money wisely or efficiently.

Discussion

Results suggest several considerations about survey mode effects for public policy surveys, with implications for future research and policy decisions based on this kind of information. First, *while web surveys offer several advantages to the researcher (e.g., reduced data collection costs, faster turn-around time) compared to telephone interviews, population coverage problems remain an issue for web-based studies.* Data reported here show marked differences in socio-demographic characteristics between the self-selected

individuals who completed the on-line survey and the random sample of phone respondents. Given the rapid rate at which Internet use is increasing, it is not clear who is included in the sample frame. Moreover, there is currently no way for researchers to follow-up with non-respondents. In this study, for example, more individuals opened the web survey than actually completed the instrument.

While these sampling issues pose limitations for using web-based surveys at this time, some of these problems will diminish as Internet use continues to grow. Telephones were initially communication devices for the elite, but they eventually gained mass acceptance. Prior to that time, coverage problems were a serious concern in conducting telephone surveys (Converse, 1987). As the cost of technology decreases, PCs with an Internet connection are becoming a part of more American households. Similar to the telephone, the web seems poised to gain mass popularity, and random sampling via the Internet is likely to become more feasible. For the present, surveys distributed via e-mail represent a preferable alternative, particularly if the population of interest can be identified, sampled randomly, and surveyed electronically (O'Lear, 1996; Schaefer & Dillman, 1998).

Second, *these sampling issues are likely to influence other variables of interest.* In this investigation, for example, web respondents visited twice as many national parks compared to phone respondents. Because the web survey was accessed through the NPCA web site, these differences probably reflect a stronger commitment to national parks and park conservation than the general population.

For example, respondents' willingness-to-pay increased entrance fees sometimes differed with the two survey modes. Statistically, web respondents were more willing to pay the $5 per person fee than the phone respondents. While not statistically significant after Bonferroni adjustments, there were differences for four of the five other fee increase questions; a higher percentage of web respondents were willing to pay the fee increases than phone respondents. These differences may have arisen for two reasons. First, web respondents were more educated (and likely had higher incomes) than those surveyed by phone. Given the magnitude of the proposed fee increases, income may have influenced respondents' willingness to pay higher fees. Second, assuming the web sample had greater levels of commitment to parks, higher willingness-to-pay among this self-selected group is not surprising.

Although sources for the differences in willingness-to-pay were not specifically explored in this research, findings suggest two considerations for future research. First, there may be differing rates of *strategic bias* among the two survey modes. In an earlier investigation of willingness to pay state park fee increases among mail and phone respondents (Whittaker et al., 1998), strategic bias was thought to be greater among mail respondents because they conceivably had more time to contemplate the consequences of fee increases. The Whittaker et al. study asserted that the cognitive demand of developing strategic thought was more difficult with live interviewers or the time pressure of phone interviews. We think that web surveys are likely to be similar to mail surveys in this regard.

The data reported by Whittaker et al. (1998) also suggested more *social desirability bias* among phone respondents than mail respondents for willingness-to-pay variables. Respondents in that investigation knew the survey was being conducted for a state park agency, and may have wanted to avoid even implicit criticism of the parks to a live interviewer. Agreeing to pay higher fees was a socially desirable response. More importantly, the willingness-to-pay questions asked about relatively small fee increases (from $3 to $4 - $6 per vehicle), and phone respondents may have had concerns about appearing "cheap" to a live interviewer. In this study, the national park fee increases were more substantial (from $5 per vehicle to $5 - $10 per person). Social desirability bias in phone surveys may be less of an issue when the proposed fee increases are greater.

This study suggests the web is not appropriate for conducting surveys in this or other content areas at the present time. It is relatively clear, however, that web surveys have the potential for reducing both sample representation and context issue limitations. In this investigation, although the web sample appears to have included more respondents committed to park conservation and who were more willing to pay fee increases, the web respondents were similar to phone respondents on other park-related variables (Gaede & Vaske, in press). Considerably more research is needed to identify when web surveys are likely to provide similar results to those from other survey modes; in the meantime, web surveys should be undertaken cautiously.

As the popularity of the web increases, we suspect some of the sampling problems are likely to diminish. Aside from the time required to convert survey instruments to html, the data collection process for web-based surveys is inexpensive and less time

consuming than other survey modes. Accordingly, there are abundant opportunities for future research that compares survey modes, while experimentally controlling for these potential problems.

Footnotes

1. The relatively low response rate for the phone sample highlights the types of problems that may arise even when attempting to obtain random samples. In this particular study, budget constraints limited the number of callbacks to potential respondents.
2. Bonferroni adjustments increase the stringency of significance criteria when multiple tests are being performed to offset the chance that any particular test is significant. These adjustments involve dividing significance criteria (α) by the number of tests.

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Table 3.1. Respondent demographics by type of survey

	Phone (%)	Web (%)	χ^2	p-value
Gender			58.7	.001
Male	41	59		
Female	59	41		
Age			148.4	.001
13 - 24	10	19		
25 - 34	21	30		
35 - 44	25	25		
45 - 54	19	18		
55 - 64	11	6		
65 +	14	2		
Mean age [1]	44.0	36.0		
Education			326.6	.001
Some high school or less	12	2		
HS or Vocational Tech	26	4		
Some college / 2 year grad	26	25		
4 year college graduate	20	27		
Post grad work or degree	16	42		
Residence			93.3	.001
Farm or rural area	17	6		
Small town (< 5000)	13	8		
Small city (5,000 - 50,000)	29	27		
Large city (50,000-500,000)	20	24		
Very large city (500,000 +)	9	14		
Suburb - within 15 miles of a large or very large city	12	21		

1. $t = 11.29$, $p < .001$

Table 3.2. National park visitation rates by type of survey

	Phone (%)	Web (%)	χ^2	p-value
Have you ever visited a National Park?			160.3	.001
Yes	81	98		
No	19	2		
Number of parks visited in the past three years			345.5	.001
0	21	2		
1	19	7		
2 to 3	32	24		
4 to 5	16	23		
6 to 10	8	25		
11 to 20	3	13		
More than 20	<1	6		
Mean number of parks visited [1]	3.91	8.48		

1. $t = 8.36$, $p < .001$

Table 3.3. Willingness to pay fee increases by type of survey

	Phone (% Yes)	Web (% Yes)	χ^2	p-value [3]
Willingness to pay *per person* entrance fee:[1]				
$5.00	56	75	62.80	**.001**
$6.00	65	80	6.41	.011
$7.00	64	66	0.21	.645
$8.00	45	60	5.78	.016
$9.00	38	54	4.73	.029
$10.00	36	49	3.62	.057
Stated reasons for not agreeing with the $5.00 *per person* fee:[2]				
Amount of increase is too high	86	87	0.33	.564
Already support the National Parks through taxes	57	51	3.33	.067
Do not trust the Park Service to use the money wisely or efficiently	21	17	2.25	.133

1. The sample size for the $5 fee evaluation was based on the entire samples (n = 809 - phone survey; n = 1,120 - web survey). For the remaining fee evaluations, sample sizes are one-fifth of the sample of those who said "Yes" to the $5 per person fee, because each individual was only asked one of these additional fee increase questions.
2. These questions were only asked of those respondents who said "No" to the $5 per person fee.
3. Significant results (in bold) are based on Bonferroni adjustments. With 6 tests, $p < .008$ (instead of .05).

Chapter Four:

Paper Three

Item Nonresponse in World Wide Web Surveys

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Abstract

Item nonresponse poses a serious threat to the validity of survey research. Few studies have addressed the impact of item nonresponse specifc to electronic (e-mail or web) surveys. This study examines the influence of two independent variables – survey complexity and prior experience with the survey topic – on item nonresponse. Data for this investigation were obtained from a National Park and Conservation Association survey designed to assess the public's reactions to a series of National Park issues. Repondents were randomly assigned to one of two versions of the survey. The complex version of the instrument contained a number of branching points and took more time to complete due to the branching. The simple version of the survey displayed all questions on a single (scrollable) page that allowed individuals to see the entire instrument and did not force a response before moving onto the next set of items. Direct prior experience with National Parks was measured by simply asking individuals to indicate how many parks they had visited in the past 3 years. Results indicated that consistent with Hypothesis 1, respondents completing the complex version of the survey answered fewer items than those who had been assigned the simple version of the questionnaire. In addition, those with more direct prior experience with National Parks answered more of the questions than those with less direct experience (Hypothesis 2). Contrary to Hypothesis 3, however, survey complexity did not generally interact with direct prior experience.

Key words: item nonresponse, web surveys, survey length

Introduction

Recent advances in electronic surveys distributed via the Internet (World Wide Web or e-mail) offer the potential for gathering information from the public on a wide range of topics (Gaede & Vaske, 1999; Hewson, Laurent, & Vogel, 1996; Mullin & King, 1998; Smith, 1997). Similar to mail surveys, e-mail and web surveys are mostly text-based, visually presented, void of an interviewer presence, and less likely to elicit social desirability bias (Brown, Decker, & Connelly, 1989; Martin & Nagao, 1989; Rosenfeld, Booth-Kewley, & Edwards, 1993; Schuldt & Totten, 1994; Schaefer & Dillman, 1998). Like traditional survey modes (in-person, telephone, and mail), Internet electronic surveys have advantages and disadvantages. Disadvantages include the need for computer proficiency and connectivity, compatible e-mail software and web browser technology, standard questionnaire layout and design, and potential item nonresponse bias (Gaede & Vaske, 1999; Schmidt, 1997a, 1997b; Smith, 1997; Schaefer & Dillman, 1998; Synodinos & Brennan, 1988). Advantages include randomizing order of items and complex conditional branching and contingencies (Synodinos & Brennan, 1988; Rosenfeld et al, 1993).

Web surveys in particular offer the opportunity to construct a visually pleasing yet complex instrument with several branching choices. The effect of survey presentation and branching is important because it concerns web survey design issues. There are situations, for example, where a researcher may choose between asking a two-step question with a branch or asking a single question with an expanded list of responses. Eliminating the

branch may correspondingly increase the complexity of the question, create ambiguity, and influence nonresponse (Messmer & Seymour, 1982).

The purpose of this study is to investigate the item nonresponse effects of two web surveys with different survey page presentations and branching patterns. Two variables – survey complexity and direct prior experience with survey topic – are hypothesized to influence response.

Survey nonresponse

Survey nonresponse is defined as any missing information, either intentional or otherwise, that makes analysis of the data set more difficult. Two types of nonresponse – unit nonresponse and item nonresponse – have been identified in the literature. Unit nonresponse means that all data are missing for a unit (e.g., an entire survey). Item nonresponse is defined as partially missing data (e.g., one or more questions on a survey). Respondents may refuse to answer a question because of privacy issues (e.g., income), or not understanding the question. Sometimes respondents do not see an answer they would have liked to have chosen, or think there isn't enough time to complete the survey, or just lose interest (Madow, Nisselson, & Olkin, 1983; Schafer, 1998). This study focuses on item nonresponse.

Two aspects of item nonresponse are the amount of and patterns of missing data. Amount of item nonresponse is the number of survey questions left unanswered, while patterns of nonresponse refer to the distribution of unanswered questions across the survey instrument (Tomaskovic-Devey, Leiter, & Thompson, 1995). Past research on

item nonresponse can be divided into at least two areas: 1) respondent characteristics and 2) instrument characteristics (Messmer & Seymour, 1982).

Respondent Characteristics

Respondent characteristics may be represented by the demographics of the individual (sex, age, education) or by the person's interest in the topic area. Most prior research has focused on the respondent's demographic profile as it pertains to nonresponse concerns. Early studies, for example, found that females had more item nonresponse than males (Ferber, 1966; Francis & Busch, 1975) while later studies showed either no gender differences (Messmer & Seymour, 1982; Kupek, 1998), or that females had less item nonresponse than males (Burkham & Lee, 1998). Age has been more consistently linked to item nonresponse, with findings showing that the percentage of items missing increases with age (Ferber, 1966; Colsher & Wallace, 1989; Sherbourne & Meredith, 1992). In general, as education increases, item nonresponse decreases (Craig & McCann, 1978; Ferber, 1966; Francis & Busch, 1975; Kupek, 1998). Relative to this study, reporting these demographic considerations are likely to have little influence given previous research that has repeatedly shown most web users are male, young, and educated (Gaede & Vaske, 1999; GVU, 1997).

Beyond the demographic characteristics of respondents that can influence item nonresponse, an individual's direct prior experience with the survey's topic may influence their motivation to complete either the entire survey or selected items on the questionnaire. Direct experience with an object (e.g., the survey's topic) includes memories of behaviors or observations of other's behaviors that may lead to greater

accessibility of attitudes and beliefs (Cooper & Croyle, 1984). For example, attitudes about national parks may be more accessible to those individuals who have visited several of them, than for those who have visited one or two, or have read about the topic. Increased experience with an object leads to greater attitude accessibility, and a greater likelihood that the attitude will influence behavior (Fazio, 1986, Manfredo, Yaun, & McGuire, 1992; Vincent & Fazio, 1992), which relative to this paper implies completing the survey.

Attitudes based on direct experience are more easily retrieved from memory than those not based on direct experience (Fazio & Zanna, 1981). In a timed study, people whose attitudes were based on direct experience responded to inquiries about their attitudes with shorter latencies than did people whose attitudes were not based on direct experience (Fazio, Chen, McDonel, & Sherman, 1982). Thus, individuals with more experience should find it easier to complete the survey and may have lower item nonresponse.

Instrument Charactersistics

With respect to instrument characteristics, research shows that the extent of item nonresponse appears to be independent of questionnaire length (Craig & McCann, 1978; Dillman, Sinclair, & Clark, 1993). Questions that are easy to answer and that provide sufficient space for answering reduce item nonresponse (Ford, 1968; Heberlein & Baumgartner, 1978; Sherbourne and Meredith, 1992). Survey branching and survey complexity influence the ease with which respondents can complete an instrument. Findings based on a traditional mail survey show that the frequency of item nonresponse

was greater for questions immediately following a branch instruction than for those questions which did not follow a branch (Messmer & Seymour, 1982).

In terms of respondents' willingness to complete an electronic survey, research suggests that individuals often prefer computerized surveys over paper and pencil instruments (Booth-Kewley, Edwards, & Rosenfeld, 1992; Erdman, Klein, & Griest, 1983; Watson, et al., 1990; White, Clements, & Fowler, 1985). Electronic versions of an instrument, however, may affect item nonresponse. A computer's one-question-at-a-time display mode may make it harder for the respondent to "figure out the survey" while completing it. In addition, the respondent has no idea how many more items are left to complete. This lack of knowledge may prove frustrating for respondents who want to know how much longer it will take until completion (Rosenfeld, et al., 1993). The time factor for completion has been examined in terms of speed (using the Minnesota Multiphasic Personality Inventory) with studies finding that questionnaire completion time was significantly less on the computer than on paper (Dunn, Lushene, & O'Neil, 1972; Honaker, 1988; Russell, Peace, & Mellsop, 1986; White et al, 1985.) The link between item nonresponse and time to complete a web survey has not been examined per se in the literature.

Hypotheses

This study explores the effects of survey complexity (defined as item presentation and branching) and direct prior experience (defined as number of national parks visited) in relation to item nonresponse on web surveys. Two versions of the same web survey, the first with complex branching after one- or a few- items-at-a-time page presentation,

and the second with no computerized branching and all items displayed on the page, were posted to the National Parks and Recreation Association's (NPCA) web home page. Based on the background discussion above, three hypotheses are addressed:

1. As survey complexity increases, item nonresponse increases.
2. As direct prior experience with national parks increases, item nonresponse will decrease.
3. Survey complexity and direct prior experience will interact to influence item nonresponse.

Methodology

During the summer of 1996 a National Parks and Conservation Association (NPCA) telephone survey was converted to html (hyper text mark-up language) and posted to the NPCA home page. In order to have found the web survey, a respondent would have been doing a web browser search on the key words "national parks" and followed a link to the NPCA home page, or the respondent could have been a member of NPCA. Upon connecting to http://www.npca.org, the viewer was encouraged to complete the survey with the invitation to "Let decision makers know how you feel about national park issues and priorities. Complete the first electronic survey on the national parks today!". No other advertising or incentives were used to bring potential web respondents to the survey. The present study compares two versions of the web survey that were alternately posted over a four month period.

Responses to both versions of the survey were collected as soon as the respondent clicked to read the introduction that promised confidentiality and anonymity. Survey

designers had built in a "cookie" program (software monitoring system) that recorded where and when a respondent completed or abandoned the survey, and that captured the data typed in up to that point regardless of whether the final "submit" button was clicked.

The first version of the survey contained 45 questions that were written to 13 web "page" presentations. Six of the web pages contained one question, and seven of the web pages contained 2 questions or more. There were a total of 5 branching questions. At each page or branch, the respondent was asked to answer the questions and click on either a dichotomous choice radio button or a "next page" radio button. The final page had a "submit survey" button. This first "multi-page/branching" version of the survey was prominently posted on the NPCA home page from July 18 to September 23, 1996. During that time approximately 824 web users opened the cover letter associated with the web survey. After screening for and removing duplicate submissions (n = 22) of the survey, 792 version one questionnaires were available for analysis. In several timed tests, it was found that the amount of time to complete the first complex branching version was 15 to 25 minutes, depending upon the speed of Internet transmission connections.

The second version of the web survey also contained 45 questions for respondents to complete, however all 45 questions were on one long web "page" with all branching instructions written to the respondent, i.e. "If you answered "Yes," go to Question 2. If you answered "No," scroll down to Question 5." This second "no branching" version of the survey was posted on the NPCA home page from September 23 to December 1, 1996. During that time approximately 338 web respondents opened the cover letter associated with the web survey. After screening for and removing duplicate submissions (n = 11),

327 version two questionnaires were available for analysis. In several timed tests, it was found that the amount of time to complete the second one page/no branching version was 13 to 20 minutes, depending upon the speed of Internet transmission connections.

Responses to the 45 questions were totaled up in two different ways to determine how far web respondents got in completing the web survey. The first method broke the survey down into branching pages, and created item response indexes that totaled up the number of questions completed. The second method used an SPSS array programming function to determine the last question in the survey that was completed. The two dependent variables in the study consisted of 1) 'Total' - the number of questions completed out of the total of 45, and 2) 'Last question answered' – the number of the last question completed by the respondent, before quitting the survey. Two independent variables were examined: 1) survey complexity, and 2) direct prior experience.

Results

Across both survey versions, 71% of those who started the survey completed all 45 questions, while 29% of respondents left one or more items blank. The item completion rates for each of the physical pages in the survey are displayed in Figure 1. In general, those answering the simple version completed more items than respondents taking the complex version.

Figure 1 about here

On average, 36.10 questions were answered in the complex survey, while 40.12 items were completed in the simple version ($t = 4.70$, $p < .001$, Table 1). With the

complex suvey, the last question answered was, on average, 36.57, while for the simple survey the last question answered was 41.15 ($t = 5.30$, $p < .001$).

(Table 1 about here)

Across the thirteen physical web pages (in the complex branching version) significant differences were observed in eleven of the tests. For example, page two of the survey contained four items. On average, those answering the simple survey completed 3.74 items while those answering the complex survey completed 3.44. The two exceptions to this pattern of significant difference occurred for page 1 "Have you ever visted a national park?" where nearly all respondents completed the question independent of survey complexity . Given that this is the first question, this finding is anticipated.

The second exception occurred on page 8, where respondents branched if they answered "no" to the willingness to pay an increased entry fee question. Because this question had very complex branching, incorporating a branch within a branch, less respondents arrived at this page. Although there was no significant difference between complex and simple surveys, more complex survey respondents completed the branch within the branch because they were forced into it, whereas in the simpler version, people could have skipped over it.

Taken together, these findings are consistent with Hypothesis 1 and show that individuals completing the simple web survey completed more of the items than those answering the complex survey.

Consistent with Hypothesis 2, individuals with more direct prior experience with national parks (having visited 6 or more) completed a higher proportion of the items

regardless of survey type. Significant differences were observed in all 12 comparisons, with lower prior direct experience resulting in higher item nonresponse. For example, page 11 of the survey contained 8 items on park specific issues. On average, those answering with low prior direct park experience completed 6.98 questions, while those with high prior direct experience completed 7.58. Page 12 of the survey contained 7 items on voting intentions for Representatives or Senators, relative to their stance on National Parks issues. On average, those answering with low prior direct experience completed 5.93 questions, while those with high prior direct park experience completed 6.37. No exceptions were found to this analysis, the more direct prior experience by the web respondent in terms of park visitation, the higher the average item response rate.

(Table 2 about here)

Overall, the higher prior direct experience respondent group answered 42.33 of the 45 total questions versus 39.82 for the lower prior national park experience respondents ($t = 4.02$, $p < .001$, Table 2). The last question answered for the higher group was 42.87, compared to 40.33 for the lower($t = 4.04$, $p < .001$).

Hypothesis 3 predicted that survey complexity and direct prior experience would interact to influence item nonresponse. As shown in Table 3, this hypothesis was not supported. Only one of the interaction effects was statistically significant (Physical survey page 11, $F = 4.02$, $p = .045$). With both independent variables in the model, main effects for survey complexity only were observed for page 3. After this physical page in the survey, prior direct experience in national parks was significant for pages 4 through

10. On four of the survey pages (8, 11, 12, and 13) both survey complexity and prior direct experience main effects are significant.

Table 3 about here

Discussion

Results suggest several considerations about web survey design and item presentation and branching. Web survey respondents are a specialized, narrow sub-population of the general American public, well educated and enthusiastic about using the Internet as a survey mode. As web surveys most closely resemble mail surveys, it is likely that topic saliency and direct prior experience, layout and design, length of the survey, and anonymity and confidentiality will affect web item nonresponse rates.

Second, it appears the two web samples had great levels of commitment to national parks, as the overall response rate was 70%. While 30% of respondents failed to complete the survey, most of those with high item non-response were among the more complex survey group. Researchers knew completing the complex survey could take 20-25 minutes when Internet transmission was slow, and attribute the higher nonresponse rate to either 1) lack of interest in the topic or 2) slow Internet response time.

These findings suggest two considerations for future research. First, given the Internet climate of instantaneous delivery of information, web survey respondents do not like waiting for the survey to come back with the next question, particularly when Internet traffic is heavy and response time is slow. At the present time it appears that 10 – 15 minutes of continuously completing a web survey is the preferred range.

Therefore, web survey design should either incorporate faster response time (almost impossible to control) or have a minimum amount of branching and a maximum number of questions per web survey "page."

As the popularity of the web increases, we suspect respondents will become more adept at, and used to, completing web surveys and will in fact prefer them over mail and telephone surveys as they will be faster to complete and less intrusive on family time. Accordingly, there are abundant opportunities for future research that examines web self-administered surveys and compares them to other survey modes.

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Table 4.1. Average number of items completed by survey type

Page [2]	# of Vars on Page	Content	Survey Branching [1] Complex Branching	No Branching	t-value	p-valu
1	1	Have you ever visited a national park? [3]	.98	.99	1.48	.140
2	4	If yes, a) Number of parks visited in last 3 years; [4] b) Satisfaction with natural resource mgmt. [5] c) Satisfaction with cultural resource mgmt. [5] c) Should Congress fund more national parks [3]	3.44	3.74	4.24	.001
3	1	If yes, should this be a priority? [6]	.85	.94	4.66	.001
4	1	Should Congress spend more to buy private land inside national park boundaries? [3]	.85	.93	4.08	.001
5	1	If yes, should this be a priority? [6]	.84	.90	3.32	.001
6	1	Would you support an increase to $5 per person to help operate and maintain parks? [3]	.84	.92	4.07	.001
7	1	If yes, [7] would you support an increase to $6 (or $7, or $8, or $9, or $10) to help operate and maintain parks?	.84	.92	3.93	.001
8	3	If no, why: [3] a) amount of increase was just too high b) already support parks through taxes c) don't trust NPS to use money wisely	2.39	2.31	1.07	.274
9	5	Limiting national park visitation [8]	4.06	4.52	4.36	.001
10	5	Impact of federal government shutdown [8]	4.00	4.46	4.36	.001
11	8	Park specific issues [8]	6.36	7.19	4.79	.001
12	7	Voting intentions for Representatives or Senators relative to their stance on National Parks issues [8]	5.34	6.10	4.69	.001
13	7	Respondent's demographic profile [9]	5.28	6.19	5.67	.001
Total	45		36.10	40.12	4.70	.001
Last question answered			36.57	41.15	5.30	.001

1. Cell entries represent the average number of items completed.
2. Page refers to the physical page visible to respondents completing the complex branching survey. For the no branching survey, respondents saw one continuous page of questions.
3. Variable initially coded as 1 = Yes and 0 = No.
4. Variable initially coded from open-ended response.
5. Variable initially coded as 1 = Excellent, 2 = Good, 3 = Fair, 4 = Poor.
6. Variable initially coded as 1 = Low, 2 = Medium, 3 = High priority.
7. In the complex survey, respondents branched to one of the additional fee increases (i.e., $6, $7, $8, $9, or $10). The fee type presented was randomized. In the simple survey, one additional fee increase was embedded into the survey at random.
8. Variable initially coded as 1 = Yes, 0 = No, 8 = Don't know.

9. The 7 demographic questions included age, sex, education, party affiliation, political orientation, place of residence, and zipcode.

Table 4.2. Average number of items completed by prior direct experience

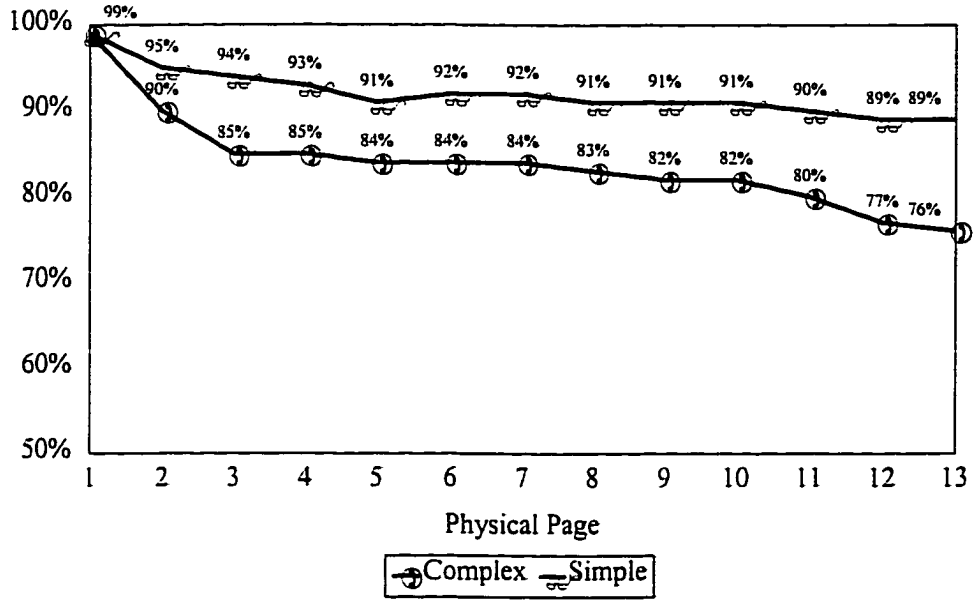
Page [2]	# of Vars on Page	Content	Prior Natl Park Experience [1] Low	High	t-value	p-valu
2	4	If yes, a) Satisfaction with natural resource mgmt. [4] b) Satisfaction with cultural resource mgmt. [4] c) Should Congress fund more national parks [3]	2.90	2.96	2.70	.001
3	1	If yes, should this be a priority? [5]	.95	.98	2.13	.001
4	1	Should Congress spend more to buy private land inside national park boundaries? [3]	.94	.98	3.49	.001
5	1	If yes, should this be a priority? [5]	.92	.96	3.08	.001
6	1	Would you support an increase to $5 per person to help operate and maintain parks? [3]	.93	.97	3.04	.001
7	1	If yes, [6] would you support an increase to $6 (or $7, or $8, or $9, or $10) to help operate and maintain parks?	.93	.97	2.94	.001
8	3	If no, why: [3] a) amount of increase was just too high b) already support parks through taxes c) don't trust NPS to use money wisely	2.52	2.72	3.44	.001
9	5	Limiting national park visitation [7]	4.48	4.79	3.93	.001
10	5	Impact of federal government shutdown [7]	4.44	4.69	3.02	.001
11	8	Park specific issues [7]	6.98	7.58	4.28	.001
12	7	Voting intentions for Representatives or Senators relative to their stance on National Parks issues [7]	5.93	6.37	3.11	.001
13	7	Respondent's demographic profile [8]	5.90	6.37	3.31	.001
Total	45		39.82	42.33	4.02	.001
Last question answered			40.33	42.87	4.04	.001

1. Cell entries represent the average number of items completed.
2. Page refers to the physical page visible to respondents completing the complex branching survey. For the no branching survey, respondents saw one continuous page of questions.
3. Variable initially coded as 1 = Yes and 0 = No.
4. Variable initially coded as 1 = Excellent, 2 = Good, 3 = Fair, 4 = Poor.
5. Variable initially coded as 1 = Low, 2 = Medium, 3 = High priority.
6. In the complex survey, respondents branched to one of the additional fee increases (i.e., $6, $7, $8, $9, or $10). The fee type presented was randomized. In the simple survey, one additional fee increase was embedded into the survey at random.
7. Variable initially coded as 1 = Yes, 0 = No, 8 = Don't know.
8. The 7 demographic questions included age, sex, education, party affiliation, political orientation, place of residence, and zipcode.

Table 4.3. Survey Complexity by Prior Experience Interaction

Survey Page	Page description	Independent Variable	F-value	p-value
2	Satisfaction with NPS	Survey Complexity	1.27	.260
		Prior Experience	3.04	.081
		Interaction	2.57	.109
3	More funding for national parks	Survey Complexity	4.36	.037
		Prior Experience	2.05	.153
		Interaction	1.37	.243
4	Buy private land in national parks	Survey Complexity	2.10	.147
		Prior Experience	6.87	.009
		Interaction	1.14	.268
5	Is this a priority?	Survey Complexity	.56	.454
		Prior Experience	7.20	.007
		Interaction	.01	.909
6	Willing to pay $5 per person entry fee	Survey Complexity	1.88	.170
		Prior Experience	4.67	.031
		Interaction	1.78	.183
7	Willing to pay $6 to $10 entry fee?	Survey Complexity	1.44	.230
		Prior Experience	3.90	.049
		Interaction	2.64	.104
8	If no, why not?	Survey Complexity	17.05	.001
		Prior Experience	10.87	.001
		Interaction	.15	.701
9	Limit national park visitation	Survey Complexity	2.61	.106
		Prior Experience	7.86	.005
		Interaction	2.87	.091
10	Impact of federal government shutdown	Survey Complexity	2.90	.089
		Prior Experience	4.11	.043
		Interaction	2.75	.097
11	Park specific issues	Survey Complexity	5.50	.019
		Prior Experience	9.04	.003
		Interaction	4.02	.045
12	Voting intentions relative to national parks issues	Survey Complexity	7.20	.007
		Prior Experience	5.00	.026
		Interaction	2.05	.153
13	Respondent's demographic profile	Survey Complexity	11.65	.001
		Prior Experience	7.11	.008
		Interaction	.62	.432

Figure 4.1. Item response rates by survey complexity



CHAPTER FIVE

DISCUSSION

Results from the three articles suggest several considerations about survey mode effects for public policy surveys, with implications for future research and policy decisions based on this kind of information. First, while web surveys offer several advantages to the researcher (e.g., reduced data collection costs, faster turn-around time) compared to telephone interviews, population coverage problems remain an issue for web-based studies. Data reported in the previous articles show marked differences in socio-demographic characteristics between the self-selected individuals who completed the on-line survey and the random sample of phone respondents.

While Internet use is rapidly increasing, it is not clear who is included in the sample frame. Moreover, there is currently no way for researchers to follow-up with web non-respondents. In the web data collection effort, for example, more individuals opened the web survey than actually completed the instrument. This leaves the researcher with a potentially large response rate problem of unknown bias from refusals, and no clear way to correct it. Another problem with web surveys is response bias through "spamming". Spamming is when an inordinate amount of web respondents who feel strongly about the survey topic take the survey, and strongly bias the results.

While these sampling issues pose limitations for using web-based surveys at this time, some of these problems will diminish as Internet use continues to grow. As the cost of technology decreases, PCs with an Internet connection are becoming a part of more American households. Similar to the telephone, the web seems poised to gain mass popularity, and random sampling via the Internet is likely to become more feasible. For the present, web surveys connected to e-mail survey introduction letters represent a preferable alternative, particularly since e-mail populations of interest can be identified, sampled randomly, and surveyed electronically (O'Lear, 1996; Schaefer & Dillman, 1998).

In terms of questionnaire construction, it is very quick and easy to convert survey instruments to html, for display on the web. Once a survey is constructed in a word processing format, conversion to html (hyper text mark-up language) is now available within the word processing software itself. All a researcher or an agency needs is a web home page on a server, and memory to store the instrument and the results.

The data collection process for web-based surveys is inexpensive and less time consuming than other survey modes, because of the electronic capture ability of web surveys software. Currently, there are about 15 to 20 commercially available web survey software programs that enable the researcher to design, post and collect data from web surveys. Accordingly, there are abundant opportunities for future research that uses the Internect electronic survey (either web or e-mail) to collect social science data.

The option of mixed mode design seems a likely survey design option in the meantime. It does seem likely that some populations will be completely accessible by e-mail in the near future (Schaefer & Dillman, 1998). For these populations, an e-mail

notification can direct the respondent to a web site (with an automatic link) for easy survey completion.

In addition to decreasing costs and providing more timely data, a mixed mode survey strategy can reduce non-coverage error (Schaefer & Dillman, 1998). This is critical with an emerging form, such as e-mail or the web, which has yet to be adopted by the majority of the population. The costs and speed advantages of e-mail make it ideal for a first mode of contact in surveys. Researchers can begin with an e-mail approach and use progressively more expensive follow up methods for nonrespondents until an acceptable response level is reached.

Additionally, with e-mail researchers know immediately whether members of the sample have valid addresses. Thus, alternative methods can be implemented much sooner than with traditional mail (Schaefer & Dillman, 1998). Finally, it's been argued that individuals may have a mode preference and that offering an alternative response format may improve response rates (Goyder, 1987; Groves & Kahn, 1979).

Conclusion

With the advent of electronic communication and the Internet, e-mail and web surveys are becoming valid research tools for the social science researcher. This dissertation suggests that arriving at a standard web survey method based on techniques found successful in mail and phone survey research may still be several years away, Unlike e-mail surveys which have already shown viability for a standard method in terms of multiple, carefully-timed personal contacts (such as has been successful in mail survey techniques), the web survey still has grave sampling representation problems.

Also, current usage of the web is not as prevalent as e-mail, with studies showing e-mail to web usage (95% versus 88%) with more time being spent on e-mail than on the Internet (51 minutes per day versus 29) (Carley-Baxter, 1997; Carley-Baxter & Dillman, 1997, GVU, 1997).

Internet interviewing has several advantages over CATI systems, including no interviewer cost, reduced equipment cost, a world sample, convenient timing, and fast response. (Gjestland,1996).

Advantages and Disadvantages

Some of the advantages of Internet surveys are:

Ease of Use:

For the practiced computer user, receiving a questionnaire, clicking on answers to reply to the questions, and returning the questionnaire electronically means that no paper is used, and the survey can be completed "on the spot" and returned. This is easier than a paper mail survey, and about as convenient as a telephone survey while not having to deal directly with an interviewer.

Ease of Distribution and Collection:

When the e-mail addresses of the sample population are known, "tele-responder" software can electronically send out the survey to respondents. Results can be automatically loaded into a database, and the e-mail addresses of those who respond can be coded and checked off as "completed". Second and third follow up letters and surveys can be sent to those in the population not responding, at pre-programmed intervals.

Graphic design complexity:

The goal is to develop an appealing survey, with minimal cost of effort (make it a 'point, click and send' survey) and minimal cost of time so that a feeling of trust can be created. Web surveys are advantageous because of the opportunity to use visually graphic and interactive media. Internet surveys are part of the wave of future communication. Video, TV, kiosk, and cable surveys (all electronic) are growing survey modes.

Some of the disadvantages of Internet surveys are:

Representativeness:

Sample frame determination and the random selection of the survey sample population. For web-based surveys, only about 19% of the U.S. population currently have access to the Internet in their home (FIND/SVP, 1997; Webster, 1998). Even among those with web access, identifying a specific population from which to draw a random sample is currently difficult to impossible.

Survey Completion:

Once Internet respondents have been identified and sent a survey to complete, how does the researcher make it attractive, fast, and easy, for them to respond? Web surveys can be visually appealing, but if the response time is slow, web survey respondents can easily quit in the middle if they become frustrated. Researchers may have a potentially large item nonresponse problem.

Privacy:

How do issues of privacy interact with the administration of an electronic survey? As the Internet has grown increasingly commercialized, companies are trying to identify individual web customers, while web users are trying harder to hide, or are submitting

false information (Hoffman, Novak, & Peralta,1997). How does an Internet research project ensure accurate information submission and integrity of data?

While scientists seek answers to more complex problems, and survey respondents seem more reluctant to participate in research projects, perhaps the development of alternative survey modes will re-engage survey subjects in the research process. Results from the studies in this dissertation encourage mixed survey modes being employed. Research strategies might begin with the least expensive contact method (Internet) and follow up with progressively more expensive and time-consuming survey modes. Hopefully research begun with this dissertation will further survey methodology research in the area of survey mode comparison, context effects, and item nonresponse. In addition, more research on web survey design for high response rates and accurate data collection will further knowledge and understanding of how web surveys must develop.

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Appendix A

NPCA Telephone Survey

April, 1996

```
* TITLE: Your National Parks: A National Opinion Survey
* FILE:  FONE.ASC
* DATE:  Final Version on 15 April 1996

.BEEPER OFF

.QU = DAY, TYPE = STRING = "#-##"
Enter today's date: month and day

For example, April 3 would be 4-03
.AN
###
.NE

.QU = CALLER, TYPE = STRING = "##-####"
Enter the last six digits of your SS number
(for use as a caller ID number)
.AN
.NE

.QU = TELSTATE, TYPE = STRING = "@@"
Enter the two letter abbreviation of the state you are calling
.AN
.NE

.QU = PHONE, TYPE = STRING = "(###)###-####"
Enter the area code and phone number you are calling
.AN
.NE

.BEEPER ON

.QU = RESPONSE, TYPE = MULT
Hello, I'm calling from Colorado State University and my name
is ___. We are conducting a survey about the National Parks.
This is not a fund raising call.  The questions take less than
ten minutes to answer.  Would you be willing to participate?

(If asked, we chose random phone numbers nationwide.)
(We are interested in your opinions even if you never visit
parks.)
(Results will help guide National Parks into the next century.)
(Conducted for National Parks and Conservation Association.)

IF YES.............THANK YOU
IF NO..............MAY I CALL BACK AT A BETTER TIME
.AN
YES (continue call)
.GOTO = ADULT
NO
.NE

.QU = NONRESP, TYPE = MULT
Before you hang-up, could I ask just one quick question?
```

Have you ever been to a National Park, Monument, National Historic
Site or other part of the National Park System?
.AN
1 YES
.GOTO = GOODBYE
2 NO
.GOTO = GOODBYE
(No answer or hung up before you could ask)
.GOTO = GOODBYE
.NE

.QU = ADULT, TYPE = MULT
Just for the record, I need to confirm that you are 18 or older.
.AN
YES
NO
.GOTO = GOODBYE
.NE

.QU = PREPARKS, TYPE = VOID
For your information, any time I refer to National Parks during this survey, I mean the 369 areas the National Park Service manages, including National Parks and Monuments, National Recreation Areas, National Historic Sites, and so on.
.AN
Press ENTER to continue
.NE

.QU = VISIT, TYPE = MULT
First of all, have you ever visited any of these National Park areas?
.AN
YES
NO
.GOTO = PKCOND1
(Not sure)
.GOTO = PKCOND1
(No answer)
.GOTO = PKCOND1
.NE

.QU = HOWMANY, TYPE = NU, LOW=0, HIGH = 999
About how many different National Parks have you been to in the past three years?

(Type a number or 999 for "I don't know")
.AN
000
.NE

.QU = PKCOND1, TYPE = MULT

In general, how well do you think natural resources in the National Parks are being protected? By natural resources, we mean all the plants, animals, air, water and natural features in the parks.

(Your choices here are: excellent, good, fair, and poor)
.AN
EXCELLENT
GOOD
FAIR
POOR
(No answer)
.NE

.QU = PKCOND2, TYPE = MULT
In general, how well do you think cultural resources in the National Parks -- such as historic buildings, Indian ruins, and battlefields -- are being protected?

(Your choices again are: excellent, good, fair, and poor)
.AN
EXCELLENT
GOOD
FAIR
POOR
(No answer)
.NE

.QU = NEWPARKS, TYPE = MULT
Do you think Congress should establish new National Parks to protect additional natural and cultural resources?

(Yes/no. If yes: should it be a low, medium, or high priority?)
.AN
NO
YES, LOW PRIORITY
YES, MEDIUM PRIORITY
YES, HIGH PRIORITY
(Do not know or no answer)
.NE

.QU = FUND, TYPE = MULT
There is a government fund set aside to buy land for conservation and recreation. Congress, however, uses less than five percent of this money each year. Should Congress spend more of this money to buy private land inside National Park boundaries from willing sellers?

(Yes/no. If yes: should it be a low, medium, or high priority?)
.AN
NO
YES, LOW PRIORITY
YES, MEDIUM PRIORITY
YES, HIGH PRIORITY

```
(Do not know or no answer)
.NE

.QU = FEEONE, TYPE = MULT
These next questions focus on ways to pay for National
Park programs.

Right now, entrance fees for most large National Parks are
$5 PER CARLOAD for a visit of up to seven days.  Would you
support an increase to $5 PER PERSON to help operate
and maintain parks?
.AN
YES
NO
.GOTO = PREFEE
(No answer)
.GOTO = GOLDAGE
.NE

.QU = FEERAND, TYPE = RANDOM
Randomize which WTP question.
.AN
Skip to FEE6
.GOTO = FEE6
Skip to FEE7
.GOTO = FEE7
Skip to FEE8
.GOTO = FEE8
Skip to FEE9
.GOTO = FEE9
Skip to FEE10
.GOTO = FEE10
.NE = GOLDAGE

.QU = FEE6, TYPE = MULT
And would you support an increase to $6 PER PERSON
to help operate and maintain parks?
.AN
YES
.GOTO GOLDAGE
NO
.GOTO PREFEE
(No answer)
.GOTO GOLDAGE
.NE

.QU = FEE7, TYPE = MULT
And would you support an increase to $7 PER PERSON
to help operate and maintain parks?
.AN
YES
.GOTO GOLDAGE
NO
.GOTO PREFEE
```

```
(No answer)
.GOTO GOLDAGE
.NE

.QU = FEE8, TYPE = MULT
And would you support an increase to $8 PER PERSON
to help operate and maintain parks?
.AN
YES
.GOTO GOLDAGE
NO
.GOTO PREFEE
(No answer)
.GOTO GOLDAGE
.NE

.QU = FEE9, TYPE = MULT
And would you support an increase to $9 PER PERSON
to help operate and maintain parks?
.AN
YES
.GOTO GOLDAGE
NO
.GOTO PREFEE
(No answer)
.GOTO GOLDAGE
.NE

.QU = FEE10, TYPE = MULT
And would you support an increase to $10 PER PERSON
to help operate and maintain parks?
.AN
YES
.GOTO GOLDAGE
NO
.GOTO PREFEE
(No answer)
.GOTO GOLDAGE
.NE

.QU = PREFEE, TYPE = VOID
We'd like to know why you answered no.  I'm going to list
three reasons why you might not have been willing to support
higher entrance fees.  For each, tell me if the statement
played a part in your "no" answer.
.AN
Press ENTER to continue
.NE

.QU = TOOHIGH, TYPE = MULT
The amount of the increase was just too high.
.AN
YES
NO
```

(No answer)
.NE

.QU = PAYTAX, TYPE = MULT
I already support the National Parks through taxes.
.AN
YES
NO
(No answer)
.NE

.QU = NOTRUST, TYPE = MULT
I don't trust the Park Service to use the money
wisely or efficiently.
.AN
YES
NO
(No answer)
.NE

.QU = GOLDAGE, TYPE = MULT
People over 62 can buy a Golden Age Passport that allows
them free entrance into National Parks for the rest of
their life. The Passport has a one-time cost of $10.
Do you think this program should be continued?
.AN
YES
NO
(No answer)
.NE

.QU = LIMREC, TYPE = MULT
The next four questions ask about limiting visitation to the
National Parks.

Do you think the National Park Service should take steps to
ensure crowding does not detract from park visits?
.AN
YES
NO
(Don't know)
(No answer)
.NE

.QU = LIMPROT, TYPE = MULT
Do you think the National Park Service should limit visitors
if the number of visitors is harming park resources?
.AN
YES
NO
(Don't know)
(No answer)
.NE

.QU = LIMRES, TYPE = MULT
Would you be willing to make a reservation to enter popular parks during the peak season if reservations would reduce crowding and help protect park resources?
.AN
YES
NO
(Don't know)
(No answer)
.NE

.QU = LIMTRANS, TYPE = MULT
Would you be willing to use shuttle buses in popular parks during peak season to reduce traffic congestion and help protect park resources?
.AN
YES
NO
(Don't know)
(No answer)
.NE

.QU = AWARE, TYPE = MULT
Were you aware of recent park closures caused by the federal government shutdowns?

(The shutdowns were last fall and winter)
(The shutdowns were caused by the federal budget stalemate)
.AN
YES
NO
.GOTO = PREISS
(Don't know)
.GOTO = PREISS
(No answer)
.GOTO = PREISS
.NE

.QU = CLOSE1, TYPE = MULT
Were you personally affected or inconvenienced by the recent park closures?
.AN
YES
NO
.GOTO = PREISS
(No answer)
.GOTO = PREISS
.NE

.QU = CLOSE2, TYPE = MULT
How were you affected? I'll read a statement and you tell me yes or no.

I had to change my travel plans.

.AN
YES
NO
(No answer)
.NE

.QU = CLOSE3, TYPE = MULT
I was turned away from a Park when I arrived.
.AN
YES
NO
(No answer)
.NE

.QU = CLOSE4, TYPE = STRING =
"@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@"
Were you affected in any other way?

INTERVIEWER TYPES IN KEY WORDS....
(For example....hurt my business, lost my job, etc.)
.AN
.NE

.QU = PREISS, TYPE = VOID
The next seven questions ask about more specific issues and parks.

These are yes/no questions, but if you don't know about the park or the issue, feel free to answer "I don't know" instead.
.AN
Press ENTER to continue.
.NE

.QU = ISSUE1, TYPE = MULT
The National Park Service opposes a second road into the middle of
Alaska's Denali National Park because it wants to protect the park's
wilderness character. A few members of Congress, however, want this road constructed. Do you think Congress should override the National Park Service on these kinds of construction projects?
.AN
YES, CONGRESS SHOULD MAKE THESE KINDS OF DECISIONS
NO, THE PARK SERVICE SHOULD MAKE THESE KINDS OF DECISIONS
(Don't know)
(No answer)
.NE

.QU = ISSUE2, TYPE = MULT
The National Park Service says pollution from power plants and industry significantly worsens visibility at Grand Canyon, Great Smoky
Mountains and other National Parks. Should companies be required

to
clean up their pollution, even if it meant you might pay more for utilities and consumer products?
.AN
YES
NO
(don't know)
(No answer)
.NE

.QU = ISSUE3, TYPE = MULT
A private company plans to build a large gold mine less than three miles from Yellowstone National Park. There are concerns that the mine could pose risks to the park's land, water, and wildlife. Should the federal government stop the mine in order to avoid these risks?
.AN
YES
NO
(Don't know)
(No answer)
.NE

.QU = ISSUE4, TYPE = MULT
For its size, Minnesota's Voyageurs National Park has more land open
for snowmobile use than any other park. Congress is considering opening the remainder of the park's wilderness areas to snowmobiles.
Should these wilderness areas be opened to snowmobiles?
.AN
YES
NO
(Don't know)
(No answer)
.NE

.QU = ISSUE5, TYPE = MULT
At National Parks like Grand Canyon and Great Smoky Mountains, companies offer low flying airplane or helicopter sightseeing trips.
Some people think these flights should be limited or banned because the sight and sound of them detracts from other people's enjoyment. Do you think these flights should be limited or banned?

(If yes: Do you think there should be limits or a ban?)
.AN
YES, THERE SHOULD BE LIMITS ON FLIGHTS
YES, THERE SHOULD BE A BAN ON FLIGHTS
NO
(Don't know)
(No response)
.NE

.QU = ISSUE6, TYPE = MULT
There is widespread agreement that restoring natural conditions in Florida's Everglades National Park is a priority, but finding the money to pay for it has been difficult. One option is a tax on Florida's sugar cane industry, which is a major source of pollution in the park. Would you be willing to pay 5 cents more for a bag of sugar if you knew the money would help restore the Everglades' natural environment?
.AN
YES
NO
(Don't know)
(No answer)
.NE

.QU = ISSUE7, TYPE = MULT
Wolves were returned to Yellowstone National Park after being gone for
almost 50 years. Many people think the wolves are an important part
of the park's ecosystem and add to its wilderness values. Other people
who live near the park, however, think the wolves will kill livestock
or endanger people and should not have been returned. Do you think
wolves should have been returned to Yellowstone?
.AN
YES
NO
(Don't know)
(No answer)
.NE

.QU = STATE, TYPE = RANDOM
Randomize state question.
.AN
Skip to STATE1
.GOTO = STATE1
Skip to STATE2
.GOTO = STATE2
Skip to STATE3
.GOTO = STATE3
.NE = PREVOTE

.QU = STATE1, TYPE = MULT
And finally: Some people think Mount Rushmore or other National Parks should be turned over to state governments to run. Other people oppose this, saying some states will not manage these parks
to a national standard or to benefit the nation at large.

In general, do you think parks should be turned over to states?
.AN

YES
NO
(Don't know)
(No answer)
.NE= PREVOTE

.QU = STATE2, TYPE = MULT
And finally: Some people think Grand Canyon or other National Parks should be turned over to state governments to run. Other people oppose this, saying some states will not manage these parks
to a national standard or to benefit the nation at large.

In general, do you think parks should be turned over to states?
.AN
YES
NO
(Don't know)
(No answer)
.NE = PREVOTE

.QU = STATE3, TYPE = MULT
And finally: Some people think Grand Canyon, Mount Rushmore or other National Parks should be turned over to state governments to
run. Other people oppose this, saying some states will not manage
these parks to a national standard or to benefit the nation at large.

In general, do you think parks should be turned over to states?
.AN
YES
NO
(Don't know)
(No answer)
.NE

.QU = PREVOTE, TYPE = VOID
We're almost done. For these next seven questions, I'll read you a position that a Congressional representative or senator might
have, and you say whether it would make you more likely to vote for them.

If you don't care about the issue, you can say "it does not matter."
.AN
Press ENTER to continue
.NE

.QU = VTCUT, TYPE = MULT
Would you be more likely to vote for your representative
if he or she wanted to increase the National Park Service budget?

.AN
YES
NO
(Does not matter)
(No answer)
.NE

.QU = VTCLOSE, TYPE = MULT
Would you be more likely to vote for your representative
if he or she wanted to close some National Parks?
.AN
YES
NO
(Does not matter)
(No answer)
.NE

.QU = VTEXPAND, TYPE = MULT
Would you be more likely to vote for your represenatative
if he or she wanted to add some new areas to the National
Park system?
.AN
YES
NO
(Does not matter)
(No answer)
.NE

.QU = VTSELL, TYPE = MULT
Would you be more likely to vote for your representative
if they wanted some National Parks to be turned over to states?
.AN
YES
NO
(Does not matter)
(No answer)
.NE

.QU = VTPVT, TYPE = MULT
Would you be more likely to vote for your representative if
he or she wanted some National Parks to be sold to
private interests?
.AN
YES
NO
(Does not matter)
(No answer)
.NE

.QU = VTDEV, TYPE = MULT
Would you be more likely to vote for a presidential
candidate who is committed to protecting the National Parks?
.AN
YES

```
NO
(Does not matter)
(No answer)
.NE

.QU = VOTEGEN, TYPE = MULT
And finally: In general, is your representative's record on
National Parks important to you when you vote?
.AN
YES
NO
(no answer)
.NE

.QU = PREDEMO, TYPE = VOID
My last few questions are about your background.
.AN
Press ENTER to connue.
.NE

.QU = AGE, TYPE = NU, LOW = 18, HIGH = 99
How old are you?

(Minimum value = 18, refuse = 99)
.AN
00
.NE

.QU = ED, TYPE = MULT
What is the last grade of school you completed?  Stop me
when I get to it.
.AN
SOME HIGH SCHOOL OR LESS
HIGH SCHOOL OR VOCATIONAL TECH GRADUATE
SOME COLLEGE OR TWO-YEAR GRADUATE
FOUR YEAR COLLEGE GRADUATE
POST GRADUATE WORK OR DEGREE
(no answer/refusal)
.NE

.QU = PARTY, TYPE = MULT
Do you consider yourself a republican, democrat, or independent?
.AN
REPUBLICAN
DEMOCRAT
INDEPENDENT
(other)
(no response)
.NE

.QU = LIBCON, TYPE = MULT
In general, do you consider yourself liberal, moderate, or
conservative?
.AN
```

```
LIBERAL
MODERATE
CONSERVATIVE
(other)
(depends on the issue)
(no answer)
.NE

.QU = SIZE, TYPE = MULT
How would you describe where you live?  Stop me when I
get to it.
.AN
FARM OR RURAL AREA
SMALL TOWN (LESS THAN 5,000 PEOPLE)
SMALL CITY (5,000 TO 50,000 PEOPLE)
LARGE CITY (50,000 TO 500,000 PEOPLE)
VERY LARGE CITY (OVER 500,000 PEOPLE)
SUBURB -- WITHIN 15 MILES OF A LARGE OR VERY LARGE CITY
(no answer/refusal)
.NE

.QU = ZIP, TYPE = NU, LOW = 00000, HIGH = 99999
And finally, what is your zip code?
.AN
00000
.NE

.QU = GOODBYE, TYPE = VOID
Thanks very much for participating.
We really appreciate your help.
Goodnight.

(Results should be published in early summer; look for
news of the survey results in major newspapers and on TV.)

HANG UP.....
.AN
Press ENTER to continue.
.NE

.QU = SEX, TYPE = MULT
Please enter the respondent's gender.....
.AN
MALE
FEMALE
.NE

.SAVEIF (FINISH = 1)
.QU = FINISH, TYPE = MULT
If you want to save this record, press SAVE.
If you want to erase this record, press ERASE.
.AN
SAVE
.GOTO = END
```

```
ERASE
.NE

.QU = MAKESURE, TYPE = MULT
Are you sure you want to erase this record?
.AN
YES
NO
.GOTO = FINISH
.NE

.QU = END, TYPE = MULT
(Press ENTER and exit)
.AN
PRESS ENTER
.NE
```

Appendix B

NPCA World Wide Web Survey

Complex Branching Version

April, 1996

National Parks and Conservation Association

Delicate Arch, Arches National Park, Utah© David Muench

Citizens Protecting America's Parks

The *National Parks and Conservation Association (NPCA)* is America's only private nonprofit citizen organization dedicated solely to protecting, preserving, and enhancing the U.S. National Park System. An association of "Citizens Protecting America's Parks," NPCA was founded in 1919 and today has more than 450,000 members.

Let decision makers know how you feel about national park issues and priorities. Complete the first electronic survey on national parks today!

Your National Parks: A National Opinion Survey

NPCA Information

- **The NPCA Press Room**
- **NPCA Newsstand**
- **Learn about Membership in NPCA**
- **The National Park Trust**
  The only land conservancy dedicated exclusively to America's national parks.
- **NPCA: A Proud History (1919-present)** and **Conservation Policies**

- **GrassRoots Programs**

  The Walk to Canada: Tracing the Underground Railroad

Information on America's National Parks

- **National Park Service Home Page**
- **National Parks Photo Gallery**
- **A Collection of Park-related Web Sites**

Hot Topics | Visiting Parks | Park News | Comments

You are visitor 32943 since September 22, 1995.

Mail to: npca@npca.org
URL: http://www.npca.org
America Online Keyword: PARKS
Last revision: 9/19/96

Your National Parks: A National Opinion Survey

Dear American Citizen:

National Parks are an important part of America's heritage, protecting places of great natural or historical interest and providing opportunities for enjoyment and education. As we approach the turn of the century, however, there are many challenges facing the National Parks. In order to face these challenges well, it is important to know what people think about them.

You are one of a number of people we hope will complete NPCA's first-ever electronic nationwide survey on the National Parks. By filling out this questionnaire, you will help decision-makers understand how the American public feels about park issues and priorities. We are interested in your opinions even if you do not, or have never, visited National Parks.

This survey is being conducted by researchers at Colorado State University for the National Parks and Conservation Association. This is a scientific survey of national opinion. It is not a fund raising effort. This survey is confidential.

Thank you very much for your assistance.

Sincerely,

Dr. Jerry J. Vaske
Diane B. Gaede
Principal Researchers
Electronic National Parks Public Opinion Survey

Begin Survey

Questions People Ask About the Survey

Do I have to answer every question?

Yes, please try to. What is important here is that you express **your** feelings and opinions -- so there are not really any right or wrong answers. But we do need to know your feelings on every item. Rather than leaving any items blank, just check the answer that comes **closest** to what you feel or believe. Although some of the questions may appear similar, actually all of the items are **different and important.** Please don't leave any blanks.

Back to List of Questions

Will my name be used?

ABSOLUTELY NOT! In fact we don't know your name. Your opinions will all be recorded numerically in a form that only a computer can read. Finally, our data are reported only for large groups like this: "Of the people in our survey, 60% were male and 40% female." We never say, "John Doe believes such and such." The American Psychological Association, of which we are members, has strong rules about confidentiality. You may be assured that your personal views will never be revealed.

Back to List of Questions

What happens if I don't fill it out ?

1. The scientific validity of this study will be hurt and its value decreased.

2. Your views will not be included. Important decisions may be made by people who are uninformed about how you feel.

Begin Survey

Your National Parks: A National Opinion Survey

In this survey, when we use the term National Parks we mean the 369 areas the National Park Service manages; including National Parks and Monuments, National Recreation Areas, National Historic Sites, National Lakeshores and Seashores, and so on.

1. Have you ever visited any of these National Park areas?

Yes
No

Your National Parks: A National Opinion Survey

In this survey, when we use the term National Parks we mean the 369 areas the National Park Service manages; including National Parks and Monuments, National Recreation Areas, National Historic Sites, National Lakeshores and Seashores, etc.

2. About how many different National Parks have you been to in the past three years?

   Number of National Parks visited in past 3 years: [ ]

3. In general, how well do you think natural resources in the National Parks are being protected? By natural resources, we mean all the plants, animals, air, water, and natural features in the parks.

   - ○ Excellent
   - ◉ Good
   - ○ Fair
   - ○ Poor

4. In general, how well do you think cultural resources in the National Parks -- such as historic buildings, Indian ruins, and battlefields -- are being protected?

   - ○ Excellent
   - ○ Good
   - ◉ Fair
   - ○ Poor

5. Do you think Congress should establish new National Parks to protect additional natural and cultural resources?

   - (Yes)
   - (No)

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6. There is a government fund set aside to buy land for conservation and recreation. Congress, however, uses less than five percent of this money each year. Should Congress spend more of this money to buy private land inside National Park boundaries from willing sellers?

Yes
No

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E-mail: survey@ari.net

These next questions focus on ways to pay for National Park programs.

7. Right now, entrance fees for most large National Parks are $5 PER CARLOAD for a visit of up to seven days. Would you support an increase to $5 PER PERSON to help operate and maintain parks?

Yes

No

8. Would you support an increase to $6 PER PERSON to help operate and maintain parks?

Yes

No

We'd like to know why you answered no. Here is a list of three reasons why you might not have been willing to support higher entrance fees. For each reason, click on "Yes" if the statement played a part in your "No" answer.

9. The amount of the increase was just too high.

- Yes
- No

10. I already support the National Parks through taxes.

- Yes
- No

11. I don't trust the Park Service to use the money wisely or efficiently.

- Yes
- No

Next Page

The next four questions ask about limiting visitation to the National Parks.

12. People over 62 can buy a Golden Age Passport that allows them free entrance into National Parks for the rest of their life. The Passport has a one-time cost of $10. Do you think this program should be continued?

- ○ Yes
- ○ No

13. Do you think the National Park Service should take steps to ensure crowding does not detract from park visits?

- ○ Yes
- ○ No
- ○ Don't Know

14. Do you think the National Park Service should limit visitors if the number of visitors is harming park resources?

- ○ Yes
- ○ No
- ○ Don't know

15. Would you be willing to make a reservation to enter popular parks during the peak season if reservations would reduce crowding and help protect park resources?

- ○ Yes
- ○ No
- ○ Don't know

16. Would you be willing to use shuttle buses in popular parks during peak season to reduce traffic congestion and help protect park resources?

- ○ Yes
- ○ No
- ○ Don't know

Next Page

Your National Parks: A National Opinion Survey

The next 5 questions concern the federal government shutdown that happened last fall and winter.

17. Were you aware of park closures last fall and winter caused by the federal government shutdowns?

- ○ Yes
- ○ No
- ○ Don't know

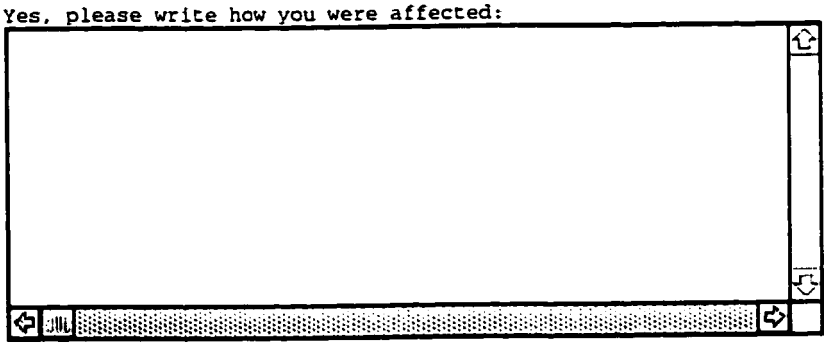
18. Were you personally affected or inconvenienced by the recent park closures?

- ○ Yes
- ○ No

How were you affected?
Please click 'Yes' or 'No' to the statements below:

		Yes	No
19.	I had to change my travel plans.	○	○
20.	I was turned away from a Park when I arrived.	○	○
21.	Were you affected in any other way?	○	○

If Yes, please write how you were affected:



Next Page

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28. Wolves were returned to Yellowstone National Park after being gone for almost 50 years. Many people think the wolves are an important part of the park's ecosystem and add to its wilderness values. Other people who live near the park, however, think the wolves will kill livestock or endanger people and should not have been returned.

Do you think wolves should have been returned to Yellowstone?

- Yes
- No
- I don't know

29. Some people think Grand Canyon, Mount Rushmore or other National Parks should be turned over to state governments to run. Other people oppose this, saying some states will not manage these parks to a national standard or to benefit the nation at large.

In general, do you think parks should be turned over to states?

- Yes
- No
- I don't know

Next Page

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Your National Parks: A National Opinion Survey
(There are 21 questions left.)

The next seven questions ask about more specific issues and parks.
These are Yes/No questions, but if you don't know about the park or the issue, feel free to answer "I don't know" instead.

22. The National Park Service opposes a second road into the middle of Alaska's Denali National Park because it wants to protect the park's wilderness character. A few members of Congress, however, want this road constructed. Do you think Congress should override the National Park Service on these kinds of construction projects?

- Yes, Congress should make these kinds of decisions
- No, the Park Service should make these kinds of decisions
- I don't know

23. The National Park Service says pollution from power plants and industry significantly worsens visibility at Grand Canyon, Great Smoky Mountains, and other National Parks. Should companies be required to clean up their pollution, even if it meant you might pay more for utilities and consumer products?

- Yes
- No
- I don't know

24. A private company plans to build a large gold mine less than three miles from Yellowstone National Park. There are concerns that the mine could pose risks to the park's land, water, and wildlife. Should the federal government stop the mine in order to avoid these risks?

- Yes
- No
- I don't know

25. For its size, Minnesota's Voyageurs National Park has more land open for snowmobile use than any other park. Congress is considering opening the remainder of the park's wilderness areas to snowmobiles. Should these wilderness areas be opened to snowmobiles?

- Yes
- No
- I don't know

26. At National Parks like Grand Canyon and Great Smoky Mountains, companies offer low flying airplane or helicopter sightseeing trips. Some people think these flights should be limited or banned because the sight and sound of them detracts from other people's enjoyment. Do you think these flights should be limited or banned? If Yes: Do you think there should be limits or a ban?

- Yes, there should be limits on flights
- Yes, there should be a ban on flights
- No
- I don't know

27. There is widespread agreement that restoring natural conditions in Florida's Everglades National Park is a priority, but finding the money to pay for it has been difficult. One option is a tax on Florida's sugar cane industry, which is a major source of pollution in the park. Would you be willing to pay 5 cents more for a bag of sugar if you knew the money would help restore the Everglades' natural environment?

- Yes
- No
- I don't know

Your National Parks: A National Opinion Survey

For these next questions, we want to know your voting likelihood on National Parks issues. Would you be more likely to vote for your Congressional Representative or Senator if:

	Yes	No	Does not matter
30. He or she wanted to increase the National Park Service budget?	O	O	O
31. He or she wanted to close some National Parks?	O	O	O
32. He or she wanted to add some new areas to the National Park system?	O	O	O
33. He or she wanted some National Parks to be turned over to states?	O	O	O
34. He or she wanted some National Parks to be sold to private interests?	O	O	O

35. Would you be more likely to vote for a presidential candidate who is committed to protecting the National Parks?

- O Yes
- O No
- O I don't know

36. In general, is your Congressional Representative or Senator's record on National Parks important to you when you vote?

- O Yes
- O No

Next Page

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Your National Parks: A National Opinion Survey

Here are the final questions: (Note: this information will be used in a general way, as in "40% of Park visitors are men between 25-30 years old.")

37. How old are you? [ ] years old

38. What is your gender?

- ○ Male
- ○ Female

39. What is the last grade of school you completed?

- ○ Elementary school
- ○ Junior high school
- ○ Some high school
- ○ High school or vocational tech graduate
- ○ Some college or two-year graduate
- ○ Four year college graduate
- ○ Post graduate work or degree

40. Do you consider yourself a Republican, Democrat, or Independent?

- ○ Republican
- ○ Democrat
- ○ Independent
- ○ Other

41. In general, do you consider yourself liberal, moderate, or conservative?

- ○ Liberal
- ○ Moderate
- ○ Conservative
- ○ Other
- ○ Depends on the issue

42. Where do you live?

- ○ Farm or rural area
- ○ Small town (less than 5,000 people)
- ○ Small city (5,000 to 50,000 people)
- ○ Large city (50,000 to 500,000 people)
- ○ Very large city (over 500,000 people)
- ○ Suburb - within 15 miles of a large or very large city

43. What is your zip code? (We use this in a general way for regional comparisons.) [ ]

Final analysis of responses should be done in the summer.
Are you interested in receiving a copy of the survey results?
If yes, enter your email address here:

[ ]

Submit Survey

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E-mail: survey@ari.net

Appendix C

NPCA World Wide Web Survey

Simple Non-Branching Version

September, 1996

National Parks and Conservation Association

Survey on the National Parks

00822

- Brief Overview of the Survey
- Questions People Ask
- Begin Survey

Contact Information:

Comments to NPCA about the survey: SurveyNPCA@aol.com

Comments to the survey author: dgaede@lamar.colostate.edu

Return to: NPCA Home Page

URL: http://www.npca.org/
America Online Keyword: PARKS
Last revision: 7/2/96

Your National Parks:
A National Opinion Survey

In this survey, when we use the term National Parks we mean the 369 areas the National Park Service manages; including National Parks and Monuments, National Recreation Areas, National Historic Sites, National Lakeshores and Seashores, and so on.

1. Have you ever visited any of these National Park areas?

- ○ Yes
- ○ No

If you answered "Yes," go to Question 2.
If you answered "No," scroll down to Question 5.

2. About how many different National Parks have you been to in the past three years?

Number of National Parks visited in past 3 years: ⌐

3. In general, how well do you think natural resources in the National Parks are being protected? By natural resources, we mean all the plants, animals, air, water, and natural features in the parks.

- ○ Excellent
- ○ Good
- ○ Fair
- ○ Poor

4. In general, how well do you think cultural resources in the National Parks -- such as historic buildings, Indian ruins, and battlefields -- are being protected?

- ○ Excellent
- ○ Good
- ○ Fair
- ○ Poor

5. Do you think Congress should establish new National Parks to protect additional natural and cultural resources?

- ○ Yes
- ○ No

If Yes: should it be a low, medium, or high priority?

- ○ Yes, Low Priority
- ○ Yes, Medium Priority
- ○ Yes, High Priority
- ○ Do not know

6. There is a government fund set aside to buy land for conservation and recreation. Congress, however, uses less than five percent of this money each year. Should Congress spend more of this money to buy private land inside National Park boundaries from willing sellers?

- ○ Yes
- ○ No

If Yes: should it be a low, medium, or high priority?

- ○ Yes, Low Priority
- ○ Yes, Medium Priority
- ○ Yes, High Priority
- ○ Do not know

The next questions focus on ways to pay for National Park programs.

7. Right now, entrance fees for most large National Parks are $5 PER CARLOAD for a visit of up to seven days. Would you support an increase to $5 PER PERSON to help operate and maintain parks?

- Yes
- No

If you answered "Yes," go to Question 8.
If you answered "No," scroll down to Question 9.

8. Would you support an increase to $7 PER PERSON to help operate and maintain parks?

- Yes
- No

(After Question 8, please go to Question 10.)

9. We'd like to know why you answered "No." Here is a list of three reasons why you might not have been willing to support higher entrance fees. For each reason, click on "Yes" if the statement played a part in your "No" answer.

9a. The amount of the increase was just too high.

- Yes
- No

9b. I already support the National Parks through taxes.

- Yes
- No

9c. I don't trust the Park Service to use the money wisely or efficiently.

- Yes
- No

10. People over 62 can buy a Golden Age Passport that allows them free entrance into National Parks for the rest of their life. The Passport has a one-time cost of $10. Do you think this program should be continued?

- Yes
- No

The next four questions ask about limiting visitation to the National Parks.

11. Do you think the National Park Service should take steps to ensure crowding does not detract from park visits?

- Yes
- No
- Don't Know

12. Do you think the National Park Service should limit visitors if the number of visitors is harming park resources?

- Yes
- No
- Don't know

13. Would you be willing to make reservations to enter popular parks during peak season if reservations would reduce crowding and help protect park resources?

- Yes
- No
- Don't know

14. Would you be willing to use shuttle buses in popular parks during peak season to reduce traffic congestion and help protect park resources?

- Yes
- No
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The next five questions concern the federal government shutdown that happened last fall and winter.

15. Were you aware of park closures last fall and winter caused by the federal government shutdowns?

- Yes
- No
- Don't know

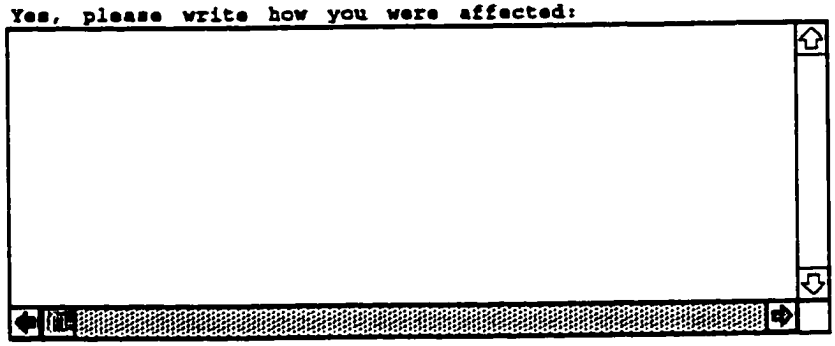
16. Were you personally affected or inconvenienced by the recent park closures?

- Yes
- No

How were you affected?
Please click "Yes" or "No" to the statements below:

	Yes	No
17. I had to change my travel plans.	O	O
18. I was turned away from a Park when I arrived.	O	O
19. Were you affected in any other way?	O	O

If Yes, please write how you were affected:



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Yes
No
I don't know

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Yes
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I don't know

23. For its size, Minnesota's Voyageurs National Park has more land open for snowmobile use than any other park. Congress is considering opening the remainder of the park's wilderness areas to snowmobiles. Should these wilderness areas be opened to snowmobiles?

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Yes, there should be a ban on flights
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I don't know

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I don't know

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Yes
No
I don't know

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In general, do you think parks should be turned over to states?

Yes
No
I don't know

For these questions, we want to know your voting likelihood on National Parks issues.

○ Suburb - within 15 miles of a large or very large city

41. What is your zip code? (We use this in a general way for regional comparisons.)

Final analysis of responses should be done in the summer.
Are you interested in receiving a copy of the survey results?
If yes, enter your email address here:

Submit Survey

Cancel Survey

Before you go ...
We'd like your comments!

We really appreciate your help, and we'd like to know
how you rate this survey compared to others you've completed.

The Survey was:
On a scale of 1 - 7, please indicate the value that most closely reflects your experience:

Easy to use ---------- Difficult to use

○1 ○2 ○3 ○4 ○5 ○6 ○7

Easy to navigate ---------- Difficult to navigate

○1 ○2 ○3 ○4 ○5 ○6 ○7

Slow to complete ---------- Fast to complete

○1 ○2 ○3 ○4 ○5 ○6 ○7

Confusing ---------- Clear

○1 ○2 ○3 ○4 ○5 ○6 ○7

If you had to choose between completing an Internet, Paper, or Telephone Survey, which best describes your preference?

○ Internet ○ Paper ○ Telephone ○ No Preference

How many hours do you spend browsing the Web per week?

○ Less than 1 ○ 2 to 5 ○ 6 to 10 ○ 11 to 20 ○ More than 20

Submit Survey