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OUTDOOR RECREATION MOTIVATION AND ATTITUDES TOWARD GAS AND OIL DEVELOPMENT: THE PIGEON RIVER COUNTRY STATE FOREST EXPERIENCE

By

Kelly L. Hazel

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ABSTRACT

OUTDOOR RECREATION MOTIVATION AND
ATTITUDES TOWARD GAS AND OIL DEVELOPMENT:
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Controversy surrounding gas and oil development in natural areas is replete with citizen action, courtroom and legislative battles. A decade long controversy resulted in oil companies extracting gas and oil resources in the southern third of Pigeon River Country State Forest (PRCSF). Consequently, the PRCSF, located in northern lower Michigan, was the focus of an intense study of visitor's recreational activities, motivations, values, and attitudes. An eleven page survey was mailed to a random sample of summer Forest visitors (N-426). The relationship between recreation motivation, activity participation and environmental concern; and the relationship between attitudes toward development and recreation motivations, value-perceptions of the Forest, and experience with gas oil development was examined. Results indicated that recreation motivation was a better predictor of environmental concern than recreation activity. Motivations and values were consistent with attitudes, while increased experience correlated positively with anti-development sentiments. Implications for theory, research and forest management are discussed.

To Jan L. Como (Mother)
Thank-you

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Any research project usually has more than one person responsible for getting things done. This project was no exception. The amount of work that goes into mail survey research is often overlooked, if not degraded, by those who have never attempted, or only half attempt to accomplish a truly relevant, reliable and valid mail survey study. Developing interesting and pertinent questions, designing a survey which is understandable, easily answered and scored, and which flows from one topic to the next; putting together an attractive package in order to increase response rates and managing hundreds of out-going and in-coming surveys; and coding, verifying and analyzing the wealth of data, all take tremendous effort on the part of the project's staff. My thanks to all those who helped pull this off!

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INTRODUCTION

Nationally, gas and oil development in natural settings has stimulated much controversy over the effects development has or may potentially have on the environment and wildlife in those settings (see Sumner, 1982). Before the Wilderness Act of 1964, the U.S. Forest Service routinely rejected requests for oil and gas leases on all designated national wilderness, wild or primitive areas. However, with the passage of the Act, rejection of requests for mineral leases became more debatable. Section 4(d)(3) of the Wilderness Act stated: "all laws pertaining to mineral leasing shall apply in all wilderness areas until midnight, December 31, 1983". This loophole, considered a political concession to the mining industry granted in order to get the act passed, allowed oil and gas development in wilderness areas at the discretion of appropriate federal agencies. The Arab oil embargo of the early 1970s and the concurrent discovery of an energy crisis in the United States, coincided with an increase in private industry's effort to exploit available mineral resources, including those within designated wilderness areas (Sumner, 1982).

Similar problems have arisen on state owned public lands, and in particular, on state forest lands in Michigan. In July of 1970, a major oil discovery prompted a decade-long controversy in Michigan regarding whether or not the state should allow private industry to drill for oil on the Pigeon River Country State Forest (PRCSF). Before that time, areas in southern Michigan had long yielded large quantities of oil and gas, while periodic exploration in the north had proved unprofitable. When the petroleum industry requested leases on state-owned lands in the north, little, if anything, was thought to ever come of them. However, subsequent seismic explorations indicated deposits in a doughnut-shaped formation that was once the shoreline

of an ancient lake bed. The northern edge of what was called the Niagaran Reef formation ran through the south-central portion of PRCSF (Charles, 1985).

At the time of the oil strike, the Pigeon River Country included portions of three small state forests, all managed by Michigan's Department of Natural Resources (DNR). The area consisted of roughly 500 square miles of mostly wild lands bounded on four sides by highways: I-75 to the west, M-68 to the north, M-33 to the east, and M-32 to the south (Charles, 1985). In 1974, a 140-square mile tract was officially designated as a state forest, i.e. the Pigeon River Country State Forest (PRCSF), and Edward W. Caveney was named the forest's manager. Later, in 1982, 6,640 acres were added (Green Timbers addition) and designated as a "no motorized vehicle access" area and managed for wildlife, timber and recreational benefits.

The decade long controversy over the oil and gas development was highlighted by citizen and environmentalist concern, court cases, legislative involvement and administrative and corporate compromises (see Appendix A: Chronology of Events). Although the Michigan Supreme Court upheld the DNR's right to turn down requests for drilling on already leased lands, and, in particular, the PRCSF, drilling has continued to occur, yet only on the southern third of the Forest.

Senate Bill 1119, designed to permit drilling for oil and gas in Michigan's state parks, offshore areas of the Great Lakes, and other protected areas in the state, seriously threatened the DNR's and the Natural Resources Commission's decision-making power over when, where, and how private industry could drill for mineral deposits on public lands (Charles, 1985). In order to protect the future of Michigan's natural areas, and the PRCSF in particular, a compromise was made between the oil companies and the DNR which allowed drilling only in the southern third of the Forest. Under the compromise plan, only the major lease holder (Shell Oil) would develop the resource. Costs and profits would be shared by all lease

holders. The plan eliminated competitive pipelines and unnecessary roads. Wildlife impacts were to be mitigated through monitoring, research, directional drilling, shared flowlines, a single collection facility, and other provisions. The "Amended Consent Order" also required the oil companies to provide the DNR with $85,000 for studies to identify the impacts of oil and gas development on recreational use and wildlife. The money was also to be used to investigate factors affecting wildlife population dynamics in order to make recommendations for enhanced wildlife management within the PRCSF (Langenau, Peyton, Wickham, Caveney, & Johnston, 1984; Moran, 1982).

In 1981, the Pigeon River Country Study Committee was formed to oversee all research in the Forest. In the summer of that year, the committee proposed and carried out a comprehensive study of the impacts of gas and oil development in the forest. The findings from that study are detailed in the committee's annual reports (Moran, 1982; Pigeon River Country Study Committee, 1983, 1984). One part of that study was a mail survey of recreational visitors of the southern third of the Forest (area open for gas and oil development). The survey was intended to discover how people felt about the gas and oil development in the PRCSF, what their recreational patterns were, and their overall attitude toward environmental preservation versus economic development.

Results of the attitude survey (Caveney, Langenau & Wickham, 1982; Langenau et al., 1984), indicated that most Forest visitors disapproved of the oil and gas development. They felt that oil company traffic, off-road vehicle use, and access to back-country would increase and that these increases would have serious effects on the elk herd (Caveney et al., 1982). Hierarchical multiple regression showed that the level of approval with oil and gas development was associated more with measured beliefs about impacts than with the value priorities (economic development versus environmental preservation) measured (Langenau et al., 1984).

Aside from the fact that only the southern third of the Forest received any research effort, many issues were left unmeasured which would have greatly added to the explanatory power of the findings. Questions which would have been valuable and should have been asked are: did the person actually see any development activities; how does the person perceive and value the Forest; what was the person's motivations (aside from activity dependent motivations) for coming to PRCSF; and how does a person's outdoor recreational experience relate to more general environmental concern issues?

Five years have passed since the original impact study; the initial flood of development activities by the oil companies has subsided. How has the Forest and it's users been affected? How has visitors' experiences with oil and gas development activities in the Forest influenced their attitudes toward the development? How do visitors' recreational motivations and general concern for the environment relate to their attitudes toward development? And, how do people's image, or value-perception, of the PRCSF relate to their attitude toward development?

The following pages describe only a part of the most recent project of the Pigeon River Country Study Committee, intended to determine current attitudes of PRCSF visitors toward gas and oil development in the Forest (see also Stanley, 1987). The overall project's purpose was to duplicate previous efforts while at the same time increasing the explanatory power of the findings by addressing and measuring issues previously overlooked. Methods included sending a mail survey to a sample of an entire year's worth of visitors to the Forest--June 1986 through June 1987, on a quarterly basis. This thesis represents findings related to analyses of the summer quarter's sample only--June through August. The following, Chapter 1, outlines and discusses previous research dealing with (a) recreation, (b) the social aspects of outdoor recreation, (c) recreation motivation, (d) outdoor recreation related to environmental attitudes, and (d) issues involved with the

perception of and attitudes toward environmental impacts of man-made resource development in natural areas. The chapter ends with the formulation of general research questions and details specific hypotheses explored in this thesis.

Chapter 2 details the methods used in generating the recreation sample from which a representative percentage of visitors, who were to participate in the attitude survey, was obtained. Also discussed are the procedures used in developing and implementing the mail survey. Chapter 3 presents the results of analyses of the summer quarter sample of PRCSF visitors as they relate to the specific research questions and hypotheses. The thesis ends, chapter 4, with a discussion of the results as they relate to previous research and theories, implications for forest management, and directions for future research efforts.

CHAPTER 1

Background Research

Recreation

Recreation is defined as an experience or a state of mind which stems from a person's voluntary participation in activities during nonobligated time (Driver & Tocher, 1970; Hammit, 1980). The recreation experience is the "sum of the participant's mental, physical, spiritual, or other responses to a recreation engagement" (Fisher, Bell, & Baum, 1984, p. 323). Clawson and Knetsch (1963) described the recreational experience as a multi-phase experience consisting of: (a) an anticipation phase where the person envisions and plans the event, (b) travel to the chosen recreational site, (c) onsite activities and experiences, (d) the return trip home, and (e) recollection or memory of the experience. It is assumed that each of the phases has the potential to offer various levels of satisfaction which then translate into benefits to the recreation participant.

Included in the process of the recreational experience are activities in which people seek to participate. These activities can be broken down into eight basic behaviorally oriented types of recreation involvement: (a) socializing behaviors (e.g. dancing and dating), (b) associative behavior (e.g. joining clubs), (c) competitive behaviors (e.g. sports and games), (d) risk-taking behaviors (e.g. climbing mountains, sky diving and gambling), (e) exploratory behavior (e.g. traveling to foreign places and snorkeling), (f) vicarious experience (e.g. reading and watching sporting events), (g) sensory stimulation (e.g. drinking and sex), and (h) physical expression (e.g. exercise and yoga) (Fisher et al., 1984). Further, involvement in recreation changes throughout the lifespan in both intensity and mode of activity; each person seeking

out his or her own desired mix of activities at different times and in different places to suit different need states. Carlson, Deppe, and MacLean (1972) suggested that an individual's choice of recreation activity depends on and is motivated by four issues: (a) the person's mental and physical capabilities, (b) the availability of appropriate recreational environments, (c) the person's skill development and appreciations, and (d) the value society as a whole places on recreation as an appropriate outlet.

Carlson et al. (1972), in their discussion of recreation in American life, defined both personal and societal benefits of recreation activities. Personal benefits include: physical well-being, mental and emotional health, intellectual development, ability to organize and exhibit responsibility, character development, social adjustment, esthetic and spiritual values, social integration, a chance for adventure, identity, commitment, and self-realization. Benefits to society include community attractiveness, civic spirit, education, safety, and economic profit.

Social Aspects of Outdoor Recreation

Early empirical research in outdoor recreation was primarily descriptive, focusing on activities and socio-economic characteristics of participants along with their attitudes and preferences toward setting management. Research into the social characteristics of participation in leisure activities began in the early 1930s and increased during the 1950s and 1960s when time for leisure became more generally available (Manning, 1986). Participation in leisure activities has been generally found to be related to a variety of socio-economic factors. Sessoms (1961, 1963), reviewing 48 recreation studies, ascertained five socio-economic variables that were consistently related to outdoor recreation patterns:

1. Age: the older the individual, the more passive were the activities and the fewer the recreation activities pursued.
2. Income: the higher one's income, the more numerous were the activities sought.

3. Occupation: the higher one's occupational prestige, the more numerous and varied were the activities sought.
4. Residence: urban residents tended to have a higher participation rate in outdoor recreational activities than did rural residents.
5. Family stage: the presence of young children tended to reduce the number of recreation outings and made the recreation pattern more home-centered. (Manning, 1986)

However, Kelly (1980) observed that socio-economic characteristics have differential effects on participation according to the character of the recreation activity. Age was strongly and inversely related to activities requiring physical strength and endurance, and income was related to only a few activities that had high costs (Manning, 1986).

Mueller and Gurin (1962) concluded that people's participation in outdoor recreation activities is "remarkably widespread". General participation was statistically related, though only weak to moderate in strength, to age, race, region of residence, place of residence, education, income, and family life cycle. Income had a positive but curvilinear relationship to participation in outdoor recreation; participation rose with income up to a certain level, then declined slightly. It appeared that income was related to participation only as it limited opportunity (Manning, 1986). Lucas (1964), noted similar results and suggested that income is not a causal factor but simply correlated with education and occupation. "Income seems to be more necessary than sufficient as an explanation of recreation choices. Money does not form tastes, it limits their expression" (p. 46).

Burch (1964) using primarily observational techniques, found preliminary empirical support for the notion that recreation activities are often characterized by the group structure of their participants, with different groups having unique objectives and needs. Further theoretical development led to a "personal community hypothesis" of recreation: that participation in recreation is influenced by one's "social circles of workmates, family and friends" (Burch, 1969).

In support, Kennedy (1974), in a study of deer hunters, observed that differences in motivation and perceived rewards of hunting were related to whether participants hunted with a group or primarily by themselves. Group hunters appreciated the social and security aspects of a group and seemed to enjoy companionship as much as actually hunting deer. while those who tended to hunt alone were primarily interested in bagging a deer and focused more on the disadvantages of hunting with a group.

Buchanan, Christensen and Burdge (1981), studying both social group influences on and motivations for three water-based recreation activities, discovered that social groups varied in the frequency with which they participated in the activities studied and that the variability was related to the different motivations associated with the activities. The activity with the greatest mix of social groups (defined as family, friendship, and family/friendship) also had the greatest variability in motivations. These findings and others, suggest that social groups are attracted to recreation activities based on motivations inherent within the group (Manning, 1986), and that the motivation-activity combination affects the various benefits the person perceives the activity as providing.

Recreation Motivation

Maslow's theory of a hierarchy of human needs (Maslow, 1943) stated:

> "Any motivated behavior, either preparatory or consummatory, must be understood to be a channel through which many basic needs may be simultaneously expressed or satisfied....any act has more than one motivation....Human needs arrange themselves in hierarchies of pre-potency. That is to say, the appearance of one need usually rests on the prior satisfaction of another, more pre-potent need. No need or drive can be treated as if it were isolated or discrete; every drive is related to the state of satisfaction or dissatisfaction of other drives." (p. 370-371)

Maslow maintained that his theory of human motivation was holistic and dynamic, and applied to both work and non-work spheres of life. Recent investigations of the relationship of recreational participation to a Maslow-type hierarchy of needs (Mills, 1985; Young & Crandall, 1984) seem promising and support the concept of motivation as an important determinant of outdoor recreation.

However, beginning in the early 1970s, Driver and associates began laying a conceptual foundation for the study of recreation motivation (Manning, 1986) based on expectancy-value theory. This theory of behavior motivation, arisen out of Lewinian field theory (Arkes & Garske, 1977), suggests that people engage in activities in specific settings to realize a group of psychological outcomes which are known, expected, and valued (Atkinson & Birch, 1972; Fishbein & Ajzen, 1974). Thus, people choose and participate in recreational activities in order to meet personally established goals and to satisfy needs. Recreational activities, therefore, are viewed as more a means to an end than an end in themselves. An empirical approach for testing this concept was also developed and received widespread application over the past decade (Manning, 1986).

Four analysis levels of the demand for outdoor recreation were recognized (Manning, 1986) and stimulated recreation motivation research: (a) demands for the activities themselves, (b) demands for the various settings in which activities take place, (c) demands for experiences such as satisfactions, need abatement (motivation as described by Maslow) and desired psychological outcomes, and (d) demands for ultimate benefits derived from satisfying recreational experiences. Much of the recreation motivation research, and this thesis, focused on the first level, i.e. motivations for specific activities.

Research indicates that there are a variety of motivations for participating in outdoor recreation and that these motivations can be empirically identified (Manning, 1986). Crandall (1980) delineated seventeen recreation activity motivation categories which have both conceptual and empirical support: (a) enjoying nature and escaping

civilization, (b) escape from routine and responsibility, (c) physical exercise, (d) creativity, (e) relaxation, (f) social contact, (g) meeting new people, (h) sexual contact, (i) family contact, (j) recognition and status, (k) social power, (l) altruism, (m) stimulus seeking, (n) self-actualization, (o) achievement/challenge/competition, (p) avoiding boredom, and (q) intellectual estheticism. It was further suggested that needs, reasons, and motivations are concepts that cause leisure to be sought, while satisfactions, need satisfaction and psychological outcomes are the resultant outcomes of a recreational experience. Further, motivations are considered to be complex. Different activities meet different needs for different people at different times. Also, different activities are engaged in for different reasons by the same people at different times.

Basically, three tenets have emerged from past research comparing people's motivational demands for recreation and specific outdoor recreational activities in which people participate (Knopf, 1983). First, motive structures are activity dependent, people doing different activities are searching for different mixes of outcomes. Second, people tend to value the psychological products of the activity more than the activity itself. And third, recreational participants engaging in the same activity can often be divided into motivationally distinguishable groups (Brown & Haas, 1980; Bryan, 1977; Dorfman, 1979; Hautaluoma & Brown, 1979; Hendee, 1974; Hollender, 1977; Knopf, Peterson & Leatherberry, 1983; Mills, 1985).

Attitudes and Preferences of Recreation Participants

Attitudes and preferences of recreation participants were also an early focus of research. Recognition of recreation as a social activity led to the notion that information on visitor attitudes and preferences for facilities and services was desirable in formulating policy. Several researchers measured wilderness, wildlife refuge, and state park visitors' preferences for man-made development (Fowler & Bury, 1973; Hendee & Harris, 1970; Peterson, 1974; Shafer & Burke, 1965; Wohlwill & Heft, 1977). Shafer and Burke (1965) concluded that

campers differed significantly from noncampers in their preference for swimming areas, fireplaces, camping facilities and campsite spacings. Noncampers preferred comfort amenities such as fireplaces instead of fire rings and log cabins instead of tents. Similarly, Fowler and Bury (1973), discovered that differences in visitor evaluations of developed areas on a wildlife refuge were related to distance driven by visitors to the area and plans to return to the area in the future. Those visitors living within 100 miles and those planning to return expressed more positive evaluations of the area.

Research on attitudes and preferences of recreational visitors was further stimulated by findings which suggested that the expectations and preferences of recreational users differ in substantive ways from the perceptions of managers (Hendee & Harris; 1970; Merriam, Wald & Ramsey, 1972; Peterson, 1974; Rosenthal & Driver, 1983; Twight & Catton, 1975; Wellman, Dawson & Roggenbuck, 1982). The findings were highly consistent; users tended to define recreational areas primarily in terms of recreation utility, while managers defined them in terms of natural areas designed for preservation (Merriam et al., 1972). Managers also overestimated backcountry and wilderness visitor support for facility development and the prevalence of purist attitudes, and underestimated the responsiveness of visitors to measures of behavioral control in those settings (Hendee & Harris, 1970). Also, managers were much more aware of impacts and problems such as litter, vandalism, theft, human waste, environmental impacts at campsites and along trails, water pollution, wildlife disturbance, excessive noise, and conflicts between user groups than were visitors (Peterson, 1974).

More recently, it was discovered that people who differed in their motives for recreating also responded differently to environmental features, and felt differently about the priorities for environment management and use (Cooksey, Dickenson & Loomis, 1982; Gramann & Burdge, 1981; Schreyer & Roggenbuck, 1978; Schreyer, Lime & Williams, 1984). Knopf (1983) concluded that people with different

motivations for coming to an area have different preferences for management actions. People's preferences tended to be congruent with their motivations: socially oriented recreation participants tended to oppose measures to control crowding, while escape motivated recreationists preferred management actions to limit crowding.

Most of the motivation/management preference research has focused on the social carrying capacity hypothesis (Graefe, Vaske & Kuss, 1984; Schreyer & Roggenbuck, 1978). Little research has focused on the association between motivations and man-made development issues. Outdoor recreation motivations should also be congruent with preferences for development. More specifically, if an outdoor recreationist expresses a high nature oriented motivation for coming to an area, their assessment of the natural environment should be more critical to their overall experience. Anything that reduces the "natural" aspect of the environment they have chosen to recreate in, will more likely have a negative effect on their enjoyment of their recreational experience in that environment. Therefore, they will be more opposed to any type of man-made intervention within that environment.

Past research clearly indicated that there are several influencing factors affecting the choice of recreational activity (socio-economic, personal community factors, and motivations) and that these factors influence the person's evaluation of the experience and the setting in which the experience takes place. But, how does participation in recreation relate to attitudes toward other non-recreation related issues?

Recreation and Environmental Concern

Though people's general level of concern with environmental problems is high, research has shown that some subgroups in the population tend to express more concern than others (Lipsey, 1977). Opinion polls have shown consistent relationships between respondent characteristics and levels of environmental concern. In general, the more educated and the younger, the higher the level of concern

(Lipsey, 1977). Geisler, Martinson, and Wilkening (1977) also observed that age, education and place of residence were most strongly related to the variation in environmental concern. Other factors have also been observed to predispose people to increased awareness of environmental issues. Among those factors are informational campaigns and the mass media, a person's own values, activities that bring people into contact with the environment, instigating experiences (such as an oil spill near one's home or train derailment with toxic chemicals involved), and first hand exposure to noxious environmental conditions (such as the infamous smog around Los Angeles) (Lipsey, 1977).

Evidence suggests that a person's value orientation, particularly with regard to nature, has a significant influence on their perception of environmental problems. Sewell (1971) discovered that public officials and environmental engineers whose personal value orientation emphasized the subjugation of nature to human control tended to feel that environmental problems were not a matter for great concern and therefore public involvement in such matters was not desirable. Nonexploitive values were more prevalent in members of antipollution organizations than nonmembers (Levenson, 1973). Lipsey (1977) suggested that participating in activities which bring one close to nature may also produce heightened awareness and sensitize the person to the fragility of the ecosystem, dangers of pesticides, problems with soil erosion, and so on.

Dunlap and Heffernan (1975) suggested four possible reasons for expecting participation in outdoor recreation to be positively associated with environmental concern. First, involvement in outdoor recreation creates an awareness of environmental problems through exposure to the natural environment. Second, it creates a commitment to the protection of recreation sites which become valued by the recreationists through repeated visits. Third, it cultivates an esthetic taste for a "natural" environment which fosters generalized opposition to environmental harm and degradation. And, fourth, outdoor

recreation participation exposes people to informational and educational programs which stress the importance of environmental quality and protection thereof.

However, empirical support for this hypothesis is generally weak (Dunlap & Heffernan, 1975; Pinhey & Grimes, 1979; Van Liere & Noe, 1981). Van Liere and Noe (1981) discussed possible reasons why association magnitudes were generally low despite efforts to improve measurement of both outdoor recreation activities and environmental attitudes. They suggested that higher associations may be found if environmental attitudes were measured at a more specific level, e.g. environmental concern specific to a recreation area, or environmental problems which impact specifically on a particular group of activities. However, this would not address the more general concern of how outdoor recreation is related to the development of a general pro-environmental protection orientation. A second possible reason was that outdoor recreation is not significantly associated with environmental attitudes. Past research, nevertheless, has shown that a relationship did exist, though weak, and was not spurious when controlling for age, sex, and education (Dunlap & Heffernan, 1975; Van Liere & Noe, 1981). However, existing research has not looked at variables that may be mediating the relationship. As a result, a third possible reason can be suggested: the link between outdoor recreation and environmental concern is more complex than assumed by existing research. Factors which may affect both the choice of recreational activity and the interpretation given to a recreational experience, such as recreation motivation, social influences, experience use history, and recreational specialization/preferences, may influence the impact that an outdoor experience has on the person's perception of environmental damage and their attitudes toward various environmental concerns.

Recreational preferences have been shown to effect values regarding animals and preferences for outdoor environments. Kellert (1978) established that hunters and antihunters differed in their

attitudes toward wildlife. Hunters tended to fall into three general categories-utilitarian, nature oriented, and dominionistic; while anti-hunters expressed more humanistic and moralistic attitudes towards animals. Noe, Hampe and Malone (1981) observed that preferences for roadway scenes differed between non-team sport participants and team sport participants. Their findings indicated that people who participated in outdoor activities involving non-team sports, which require individual effort and skill, tended to prefer a roadway scene where the vegetation was mowed; conversely, they disliked unmowed and untrimmed vegetation.

The hypothesis that involvement in activities which are considered more appreciative of nature (such as hiking, bird watching, cross-country skiing, etc.) is more strongly associated with environmental concern than activities which take something from the environment (i.e. consumptive) or that in some way harm the environment (such as dirt bike riding and snowmobiling) has received much stronger empirical support than the more general hypothesis that outdoor recreational participation is associated with environmental concern (Dunlap & Heffernan, 1975; Geisler et al., 1977; Van Liere & Noe., 1981). The hypothesis that abusive activities are negatively correlated with environmental concern has also received some support when measuring people's degree of backing for government action (expenditures) to control environmental problems. Snowmobilers showed knowledge of environmental problems but did not regard public action as the solution to those problems (Geisler et al., 1977). However, although correlations between outdoor recreation participation and environmental concern tended to be stronger when partialling out types of recreational activities, the coefficients were still rather low in magnitude. It was argued that the distinction between consumptive, appreciative and abusive recreational activities may not be conceptually valid, since many outdoor activities encompass all of the dimensions. Further, recreationists frequently engage in several outdoor activities during a particular trip, some may

be appreciative, some consumptive, and some abusive. Therefore, measuring all activities participated in during a particular trip along with other activities enjoined in over the year may be a better descriptor of the person's outdoor recreational preference (Van Liere & Noe, 1981).

Other studies (Dunlap & Heffernan, 1975) ascertained that outdoor recreationists tended to be more concerned about protecting aspects of the environment which are directly related to the outdoor recreation experience (e.g. protection of forests for public enjoyment) than air and water pollution in general. This result is not surprising in that research on the attitude-behavior relationship has shown that the more similarity and specificity of an attitude and a behavior the stronger the relationship between the two (Weigel, 1983; Wicker, 1969). Therefore, it is also possible that the relationship between recreating on a specific site will be more highly correlated with concern about the possible environmental degradation to that site by possible development, crowding, and overuse than to more general recreational environment issues.

Area Experience and Perception of Environmental Impacts

Another specialized issue within the general category of recreation research is the perception by visitors of environmental impacts, especially in backcountry and wilderness settings. In general, visitors' perceptions of recreational impacts tend to be limited. With the exception of litter, visitors rarely complained about site conditions and usually rated the environmental conditions as good or better in campsites and on trails as well as with other resources such as water and wildlife (Lucas, 1979). Hammit and McDonald (1983), surveyed floaters on several southeastern rivers as to their extent of past experience with river floating and their perception of five environmental impacts. Experience was positively related to the person's perception of impact, but, a large majority, even those with a high level of experience, failed to notice any of the five impacts studied.

How does a person's experience with man-made development in a recreational setting affect their perception of and consequent attitudes regarding the development? In an effort to answer this question, several researchers have attempted to study the effect that experience with a particular kind of development has on people's attitude toward that development (Becker, 1983; Langenau, Jamsen, & Levine, 1977; Langenau et al., 1984; Thompson & Blevins, 1983; Van der Pligt, Eiser, & Spears, 1986; Wohlwill & Heft, 1977). Van der Pligt et al. (1986), studying attitudes toward nuclear energy, observed that people living near an existing power station had more favorable attitudes than people not living near an existing plant. Experience of living near a nuclear plant affected not only people's perception of various potential costs and benefits of nuclear power, but also the importance people attached to various consequences. Pro-development respondents were more optimistic about and attached greater value to the importance of possible economic benefits; while anti-development respondents were more pessimistic about risks and attached greater value to various risks of building and operating a nuclear power station.

Thompson and Blevins (1983), studying people's attitudes toward increased mineral extraction and processing in the Northern Great Plains region of the United States, also discovered that attitudes were related to experience with development. Though the majority of respondents expressed concern for the environment, residents in counties which already had high levels of energy development activity were less concerned with environmental protection of the area than residents in low development counties.

In relation to recreational environments, Wohlwill and Heft (1977) found that visitors to two contrasting natural recreation environments differed in their preferences for development and facilities. Attitudes toward development, and toward the provision of facilities and amenities, were more favorable among users of the more highly developed recreation area. Becker (1983), studying people's opinions

about clear-cutting, concluded that the closer visitors lived to the forest, the more likely they were to recognize clear-cuts and therefore approve of clear-cutting as a forest management tool. Langenau et al. (1984) also observed that living near an area with development correlated with attitudes toward the development. Respondents who owned property within 50 miles of the Pigeon River Country State Forest were more likely to approve of gas and oil development of the Forest than respondents who did not own property within 50 miles of the Forest.

In contrast to the above assumptions, Vaske, Donnelly and Heberlein (1980) discovered that people with higher levels of experience use history, i.e. people who began recreating in an area prior to development, had higher levels of perceived environmental damage to the area. Experience use history influences the frame of reference through which people evaluate a situation (Knopf, 1983), such as perception of crowding (Vaske et al., 1980), perceptions of conflict (Schreyer et al., 1984), motivations for recreating (Schreyer & Lime, 1984), and evaluations of potential management strategies (Hammitt & McDonald, 1983; Schreyer et al., 1984). Overall, findings (Knopf, 1983) imply that recent visitors are more tolerant of environmental degradation. People who first visited a natural area when the ecosystem was relatively pristine have a lower tolerance for environmental change than those who first visited the area at a later time when the evidence of human impact was greater. Therefore, recreational users' perceptions of wilderness quality are influenced by when they first visited a particular area.

Ulrich (1983), in his discussion of a person's esthetic and affective response to natural environments and human adaptation, suggested that high levels of experience with a given setting gives rise to attachments or symbolic associations. Adjustments to particular levels of stimulation, made by the person who remains in the environment, will affect the observer's esthetic and emotional reaction to that environment. People who are sensitive to environmental damage

must either readjust their expectations and evaluations to conform to the changing nature of the environment or move on to less impacted areas. Evidence (Anderson & Brown, 1984; Becker, 1981; Becker, Niemann & Gates, 1981; Vaske et al., 1980) suggests that the displacement process does occur within a recreational system. Visitors who are more sensitive to environmental and social impacts seek out areas within the system that are more to their liking.

Recreation Area Value-perception

Some environments are more general in appearance while others are strongly imbued with meaning and seen to possess highly specialized characteristics, e.g. a beautiful waterfall or a particularly rare species of plant or animal. The more specialized the environment, the stronger the image that environment will have and the greater the impact of that image on the individual (Shafer, 1969). Mercer (1971) discussed the role of images of a recreational environment in the recreation experience and coined the term "recreational utility" to describe the image represented by a site or region. People perceive various environments in terms of how those environments either encourage their recreational participation or discourage participation. Furthermore, personal definitions of recreation places are seen as the result of either direct experience or of socio-cultural value messages, e.g. national parks are a part of America's "cultural heritage" (Schreyer & Roggenbuck, 1981). Recreational environments mean more to an individual than a collection of physical attributes; each has a history of past experiences, and, therefore, an accumulation of emotion and meaning (Knopf, 1983).

Knopf (1983) proposed that "to understand what recreation settings deliver to the individual, we have to move away from strict reliance on objective analyses of environmental attributes and begin looking at the environment from the eyes of the experiencer" (p. 223). Recreationists bring to each setting an image of what the environment offers, and that image, in turn, creates more information about the

environment than the environment actually supplies. Research on environmental cognition in recreation, although in its infancy, defined four principles of recreational environment perception. First, different recreationists looking at the same collection of stimuli see different things. Second, what may start out as physically undifferentiated space becomes mentally differentiated space as recreationists impose meaning on it. Third, use history, i.e. repeated visitations to a setting, allows the individual to form an affective bond that sets the resource apart from others. And, four, images held by recreationists affect their behavior (Knopf, 1983).

Several researchers have discussed the influence that images have on people's evaluations of natural areas and how those images relate to perceived crowding (Schreyer & Roggenbuck, 1981), preferences for recreation management options (Merriam et al., 1972; Schreyer & Roggenbuck, 1981), recreational use patterns (McCool, 1985), and perception of scenic beauty (Anderson, 1981). Merriam et al. (1972) ascertained that managers and campers perceived state parks differently in terms of basic park purposes. Managers saw parks primarily as natural areas for preservation, while users saw parks primarily as recreation areas. Anderson (1981) discovered that wilderness area and national park labels elevated people's evaluations of landscape quality, while labels of leased grazing range and commercial timber stand reduced observers' judgements of attractiveness.

However, very little research has been done to determine whether a person's image of an area relates to his or her attitude toward specific economic development options available to forest management. Thompson and Blevins (1983), studying attitudes toward energy development, concluded that examinations of how people perceive and value an area are needed in order to better understand people's attitudes toward development of the area. Utter (1983) observed that people in Montana were least likely to approve of gas and oil development in designated wilderness areas. In

contrast, people were in favor (68%) of gas and oil development on public lands which border wilderness areas. However, if the adjacent lands were within national forests, the number approving exploration dropped to 47%. Clearly, initial research indicates that people's perceptions of the value of an area affect their preferences for development of that area.

Literature Summary

To summarize, people are motivated to participate in recreational activities. There are a variety of recreational activity motivations which have both conceptual and empirical support. The presence and/or strength of specific motivations are dependent on person, setting and activity characteristics. Motivations are the driving force behind activity participation and have been shown to affect experience satisfaction. Further, motivations influence the frame of reference by which people evaluate their recreational experience and the setting in which the experience takes place.

Participation in outdoor recreation influences a person's perception of environmental problems. Outdoor recreation participation is hypothesized to increase awareness of and concern with environmental problems through a person's exposure to the natural environment and educational campaigns at various recreational sites. Factors which affect both the person's choice of recreational activity and the interpretation given to the experience, such as recreation motivation, can influence the impact an outdoor experience has on the person's perception of environmental damage and their attitudes toward environmental concerns.

More specific to issues pertinent to the PRCSF, i.e. gas and oil development, the perception of and experience with man-made development in natural areas affects both a person's opinion about and attitude toward the development. Living near or in areas with high levels of development correlates with higher levels of approval. Conversely, visiting an area prior to development or more often-- high experience use history--increases a person's perception of

environmental damage in the area. Experience use history influences the frame of reference through which a recreation visitor evaluates a situation. New-comers to an area can be expected to be more tolerant of environmental degradation than less recent visitors. However, no research has focused on the relationship between a person's degree of experience with and attitudes toward gas and oil development in natural areas.

Also, the image or the perceived value of a chosen recreational environment influences a person's evaluation of that area. However, very little research has focused on whether a person's image of an area relates to her/his attitude toward development in the area, particularly gas and oil development. Central to the PRCSF problem is how do recreational users feel about gas and oil development in the Forest. And, knowing what visitor's do feel, what motivations, experiences and values are related to those feelings.

Recreation and Attitudes Toward Gas and Oil Development in the Pigeon River Country State Forest

General Questions

There were six general questions regarding activities, motivations and attitudes of visitors to the Pigeon River Country State Forest addressed by the research reported in this thesis. Since the primary issues centered around recreational participants in the Forest the first question asked:

1. Over the last 12 months, in what recreational activities did visitors participate while within the PRCSF?

A list of 28 items for a recreational activity measure were generated from a similar project completed five years ago and reported by Caveney et al. (1982). Respondents were simply asked to indicate, by checking a box next to the activity, whether they had participated in the activity while visiting the Forest in the last 12 months (see item

13 of the questionnaire in Appendix B).

Since past research hypothesized a relationship between outdoor recreation and environmental concern, it was necessary to determine whether that relationship existed for the PRCSF sample. Thus:

2. What are PRCSF visitors' attitudes regarding both general and recreational environment protection, preservation, and degradation?

Environmental concern was measured with similar methods to those used by Dunlap & Heffernan (1975). Items for this scale were primarily gleaned from two pieces of literature: Dunlap & Heffernan (1975) and Geisler et al. (1977). The scale contained ten items which related to several divergent areas of environmental concern. The items ranged from saving natural areas for the future to maintenance of forested areas for public enjoyment to more general environmental concerns such as toxic waste, water and air pollution (see item 18 of the questionnaire in Appendix B). Further, the items were conceptually subdivided into two groups: (a) four items pertained to preserving or protecting aspects of the environment which may be encountered during an outdoor recreational experience, and (b) six items pertained to more general environmental degradation such as water and air pollution and toxic waste. Respondents were asked to rate each of the ten environmental issues as to whether they thought the government should spend more, less, or the same amount of money on them.

Recreation motivation was also a primary concern of this thesis.

3. What motivates people to recreate in the Forest?

Items for a recreation motivation scale were generated from a review of the literature, and included those items from scales that had been shown to be reliable and valid in past research (Brown & Haas, 1980; Driver, 1977; Fowler & Bury, 1973; Gramann & Burdge, 1981; Hammit & Brown, 1984; Knopf, Peterson, & Leatherberry, 1983; Mills, 1985; Rosenthal, Waldman, & Driver, 1982; Schreyer & Roggenbuck, 1978). The initial pool of items included 74 motivational statements of which

only 26 were chosen for the final measure. Items were chosen on a conceptual basis to fit into several subscales which included: nature motivation, stress escape motivation, solitude motivation, social motivation (both out-group and in-group), self-enhancement motivation, and challenge/excitement motivation. Subjects were asked to rate each of the 26 items as to how important it was to them with regard to their primary outdoor recreation activity while visiting the PRCSF. The items were ranked on a four point scale ranging from not at all important to very important (see item 11 of the questionnaire in Appendix B).

Central to the issue of gas and oil development in the Forest was :

4. What are PRCSF visitors' opinions about and attitudes toward gas and oil development in the Forest?

The strength of PRCSF visitors' approval or disapproval of gas and oil development in the Forest was measured using a single opinion item. Specifically, participants were asked: "What do you personally think about gas and oil development of the Pigeon River Country State Forest?" Answers were recorded on a seven point Likert-type scale (Likert, 1932) ranging from strongly disapprove to strongly approve (see item 16 of the questionnaire in Appendix B).

Gas and oil development attitudes were measured with an 11 item scale which was developed to include both beliefs and feelings about development, the oil companies, Forest management, and the Forest in general. Items for this scale were generated from a representative sample of comments made five years ago in the original study (Caveney et al., 1982) and from talking with PRCSF visitors during the pilot phase of the questionnaire's development. Items were worded so that both pro- and anti-development attitudes were highlighted in order to reduce bias toward one side or the other. The original scale that was tested during the second pilot study contained fifteen items. Four items were deleted due to vagueness or because they were considered to be measuring a conceptually similar idea as another. The final scale contained 11 conceptually distinct items: seven

pro-development statements and four anti-development statements. Participants were asked to indicate their level of agreement with each statement on a five point summated rating scale (Likert, 1932) ranging from strongly disagree to strongly agree with the middle range representing the undecided option (see item 17 of the questionnaire in Appendix B).

In order to determine correlates of gas and oil development attitudes, two other issues were also measured. The first:

5. How do people view the Forest, i.e. what do they perceive the value of the Forest to be?

was measured by asking participants to rank ten statements, referring to possible definitions of the Forest, as to which three best described how they viewed the PRCSF. The ten items included economic views, utilitarian views, recreational views, and nature oriented views and were generated from pilot interviews and discussions with PRCSF personnel (see item 3 of the questionnaire in Appendix B).

The second:

6. To what extent have PRCSF visitors experienced the gas and oil development in the Forest?

was measured by asking participants to indicate whether or not they had ever seen any of eight gas and oil development activities while visiting the PRCSF. A "not sure" category was also included to decrease possible bias due to guessing (see item 14 of the questionnaire in Appendix B).

Hypotheses

There were seven hypotheses which allowed for an in-depth description of the interrelationships of the variables and concepts measured for this thesis. These hypotheses were based on previous research and intended to both confirm or refute previous findings and to explore new relationships. First, does the type of recreational activities in which a person chooses to participate correlate with their level of environmental concern? It was previously hypothesized (Dunlap & Heffernan, 1975; Geisler et al., 1977; Pinhey & Grimes,

1979; Van Liere & Noe, 1981) that participation in appreciative recreational activities was more related to environmental concern than consumptive activity participation, while participation in abusive recreational activities was negatively related to environmental concern. However, the results were conflicting.

Therefore, to answer this question, respondents were categorized into three recreational user types: abusive, consumptive, and appreciative. Abusive activity participants were those respondents who had, in the past 12 months, participated in activities which are considered injurious of the environment (3 and 4 wheel ATV riding, motorcycle riding, motorboating, and snowmobiling). Consumptive users were those visitors who took something from the environment while recreating in the Forest (hunters, fisherpeople, berrypickers, mushroom hunters, and wood gatherers). Appreciative activity types were those users who did not participate in any of the previously categorized activities.

The basic argument behind the method used in this thesis to determine outdoor recreation activity types was that regardless of the other activities a person pursues, if they pursue at least one abusive activity, the potential harm to the environment exists during that pursuit. Therefore, the abusive category was generated first. Second, if a person takes something from the environment during any of their visits, but does not participate in an abusive activity, they should be placed in the harvest category. The drawback to this categorization is that the full range and/or personal intent of the recreational activities in which a person participates is not represented by this typology. A person who hikes, through naivete or malicious intent, can also harm the environment. However, the primacy of environmental degradation of inherently abusive recreational pursuits needs to be considered. Regardless of how many other inherently non-abusive activities in which a person may participate, their pursuit of environmentally harmful recreational endeavors needs to override any other categorization. Similar arguments can be made for the

harvest type categorization. Only when the primacy of abusive activity participation and, secondly, harvest activity participation are considered, can a clear and distinct relationship or non-relationship between recreational activity type categorizations, as have been regarded and utilized in past research, and environmental concern be determined.

Pearson product-moment correlation coefficients were computed for the comparison of environmental issues and recreation type. The resultant correlations were used to test:

Hypothesis 1: The correlations between recreation type (abusive to consumptive to appreciative) and each of the ten environmental issues are positive.

To answer the question as to whether or not PRCSF users were more concerned with protection, preservation, and degradation of recreational environments than general environmental concern issues, as proposed by Dunlap and Heffernan (1975), environmental concern items were conceptually categorized into two subscales measuring general environmental concern and recreational environmental concern. A t-test of paired samples was used to test:

Hypothesis 2: PRCSF users exhibit a higher mean level of concern for protecting aspects of the environment necessary for pursuing outdoor recreational activities than for more general environmental issues such as air and water pollution.

The ten environmental issues were also combined to form an index of environmental concern. Analysis of variance with environmental concern as the dependent variable and recreation type as the independent variable was used to test:

Hypothesis 3: There is a significant difference between recreation types on environmental concern. Abusive recreational users have the lowest mean level of environmental concern, while appreciative users have the highest mean level of environmental concern.

Since the magnitude of associations between recreation participation, defined by a recreation activity typology, and environmental concern had been low (Geisler et al., 1977) and were not expected to be much higher in the PRCSF study, a mediating variable was proposed based on a review of the literature--recreation motivation. Recreation motivation affects both the choice of an activity and the interpretation given to the experience, and therefore, influences the impact an outdoor experience has on a person's perception of the quality of the environment. Therefore, recreation motivation was hypothesized to correlate with a person's level of environmental concern? Pearson product-moment correlation coefficients were used to test:

Hypothesis 4: Nature, escape and solitude motivations for recreating on PRCSF are positively correlated with environmental concern, while social, self enhancement and challenge are not related to environmental concern.

More specifically, how does recreation motivation relate to a person's opinion about and attitude toward gas and oil development in the Pigeon River Country State Forest? Pearson product-moment correlation coefficients were also used to test:

Hypothesis 5: Nature and solitude motivations are positively correlated with negative attitudes toward and disapproving opinions of gas and oil development.

As discussed in the research review, personal definitions of a recreational environment influence a person's evaluation of recreational areas. A person's evaluation of a chosen recreational area in turn influences their attitudes regarding resource development in that area. In order to assess the degree of the relationship between a person's value perception of the PRCSF and their feelings about gas and oil development in the Forest, respondents were categorized into four value-perception types--economic, recreation, harvest, and nature esthetic--dependent on their ranking of the ten image

definitions of the Forest studied. Economic types were those who rated economic items with a 1, 2 or 3. Harvest types were those who rated harvest items with a 1, 2 or 3. Nature esthetic types were those who rated wilderness, backcountry, solitude, or wildlife related items with a 1, 2, or 3. Recreation types were those who did not fall into the other categories and rated recreation items with a 1, 2 or 3. Analysis of covariance with opinion (approval-disapproval) about gas and oil development as the dependent variable, value-perception type as the independent variable with property ownership within 50 miles of the Forest as the covariate was used to test:

Hypothesis 6: The mean level of approval of gas and oil development is lower for those who express nature oriented values regarding the Forest, while the mean level of approval is higher for those expressing an economic benefit value orientation.

It was expected that perception of and experience with gas and oil development in the Forest affects a person's opinion about and attitude toward the development. As was shown in previous research, both living near or owning property near developed areas (Becker, 1983; Langenau et al., 1984) and high levels of experience in the area (Vaske, Donnelly & Heberlein, 1980) affected attitudes--often in opposite directions. Consequently, it was necessary to determine how a person's experience with gas and oil development while visiting the Forest related to their attitude toward the development. Yes responses to eight gas and oil development activity experience items were tabulated which resulted in a gas and oil development experience scale ranging from 0 to 8. Anti-development attitudes were determined by computing the individual's mean score on an anti-development scale created by reverse scoring pro-development items and including anti-development items. Pearson product-moment correlation coefficients were computed to test:

Hypothesis 7: Levels of gas and oil experience are positively correlated with anti-development attitudes.

Hypothesis 8: Anti-development attitudes are negatively correlated with property ownership within 50 miles of the Forest.

Therefore, first order partial correlation coefficients were computed to test:

Hypothesis 9: The level of correlation between gas and oil experience and anti-development attitudes increases when controlling for property ownership within 50 miles of the Forest.

CHAPTER 2

Methods

Study Area

The Pigeon River Country State Forest is located in northern lower Michigan. The lower half is in the northeastern corner of Otsego County, the upper half in Cheboygan County and extends east into Montmorency County (Franz, 1985). The Forest includes more than 93,000 acres, thus providing ample acreage for recreational pursuits. Specific features of the Forest include 7 campgrounds, 59 miles of pathways, 27 miles of horse trails, 7 limestone sinkholes used for fisheries research, 8 lakes, 1 flooding, and several trout streams (Langenau et al., 1984). The largest herd of wild elk east of the Mississippi lives within the PRCSF, along with black bears, coyote, bald eagles, deer, ospreys, turkey, and pileated woodpeckers.

Specific management objectives adopted by the Natural Resources Commission for the PRCSF are: (a) to provide favorable habitat for elk; (b) to furnish food, cover and seclusion for wildlife; (c) to provide recreational opportunities for people in keeping with the quiet, peaceful and wild character of the area; (d) to manage, harvest and use the timber and mineral resource of the area; (e) to protect water quality and provide a fishery; (f) to manage game species for hunting and viewing opportunities; and (g) to protect the forest from over-use and over-development.

Along with recreation and timber sales, the southern third of the Forest is open for gas and oil exploration and extraction. Approximately 20 producing well sites are located in this area. At the time of this study, three new sites were proposed and slated for drilling during FY86-87, one of which was being drilled toward the end of the sampling period. In 1985, the oil and gas production in the Forest

amounted to 763,741 barrels of oil and 6,403,445 mcf of gas. Revenues accrued to the State from production privilege fees, severance taxes, royalties, and rentals amounted to over 8 million dollars (Pigeon River Country Study Committee, 1985).

Instrument Design and Development

The primary instrument used in this study was a mail questionnaire developed by Kelly L. Hazel and Jennifer M. Stanley (principal investigators) in cooperation with the Pigeon River Country Study Committee and various faculty members at Michigan State University (MSU). A thorough review of relevant literature served to ensure the validity of the mail questionnaire's content and theoretical background. Several meetings of the principal investigators, the Area Forester, and the study committee were held between April 29 and September 4, 1986 in order to determine necessary and appropriate content for the overall project. A meeting was also held with this investigator's Master's research committee on July 24, 1986 for approval of issues and relevant content for this thesis. Human subject's approval of the instrument and methods of data collection was obtained on August 22, 1986 to extend through the duration of the data collection phase of the project (see Appendix F for administrative agreement and human subject approval).

Two pilot interviews occurred, one each, on August 10 and 17, 1986 within the Pigeon River Country State Forest (recreational survey postcards were concurrently being place on vehicles in order for the recreation census to be completed in time for the first mailing of the attitude survey). Volunteer interviewers recruited from MSU and PRCSF personnel interviewed approximately 20-25 people recreating in the forest on each of the pilot days. The first pilot study involved the interviewers asking, in open-ended format, twenty questions related to: (a) number of years the interviewee had been visiting the Forest, (b) type of recreational activities in which s/he had participated while visiting the Forest, (c) distinguishing the most important features of the Forest, (d) describing the Forest to someone

who had never been there, (e) opinions about gas and oil development in the Forest, and (f) opinions about other environmental issues/behaviors (see Appendix C for pilot interview). The primary purpose of this pilot study was to determine item content for several scales (recreation motivation, Forest value perception, and gas and oil belief/value scales) and to get a general awareness for the issues about which visitors were concerned.

The second pilot study involved the interviewers sitting down with PRCSF visitors who agreed to participate, while they filled out a pilot questionnaire (see Appendix D for pilot questionnaire). This allowed the investigators to decide whether or not questions were easily understandable, whether there were any problems with particular sections or items, and whether people would be willing to fill out a mail questionnaire of roughly 10-11 pages in length. Several items were deleted or revised after this pilot study and severe editing occurred in order to decrease the overall length of the final version.

The final version of the mail questionnaire, which contained 32 closed-ended questions, was 11 pages in length and was designed using guidelines proposed by Dillman (1978). Directions indicating who should complete the survey, how to answer the survey, not to write a name on the questionnaire and how and to whom to return the survey once completed were located on the inside of the front cover. Further, parents were asked to return the questionnaire unanswered with a note indicating if the questionnaire was sent to a child 12 years old or younger. The last two pages and the back cover included plenty of space for comments. Inside the back cover were directions for how to request a summary of the results and when they would be available (see Appendix B for questionnaire).

The questionnaire was written and formatted using a Macintosh 512K and MacWrite software and then printed by an Imagewriter II on 8-1/2 by 11 inch paper. The mailed version was mass-printed on ivory-colored paper into a 5-1/2 by 8-1/2 inch booklet. The front cover was designed by the Pigeon River Country State Forest's

Assistant Area Forester. The design of the front cover was also used for the certificate of participation used as a token incentive and sent to all subjects.

A map of the PRCSF was designed by the Department of Natural Resources (DNR) based on the official map of the Forest with which most visitors were familiar. This map was to be used in answering the first item of the questionnaire. The map included landmarks and border lines to indicate the north, south and Green Timbers areas (see Appendix B for the map).

Obtaining the Recreation Sample

The recreation sample was obtained between June 1, 1986 and August 31, 1986 by the optimum allocation sampling method (Cochran, 1963; Kish, 1965; Neyman, 1934; see also Ryel, Caveney, & Hull, 1982). Sample days were allocated within three classifications of a priori use level--high, medium, and low--based on the Area Forester's past experience and knowledge of recreational usage of the Forest (see Table 1 for stratification of survey sampling days by months), and then distributed among sample areas.

Because of the large geographical size of the PRCSF, it was impossible to survey the entire Forest in the same day, therefore, the Forest was divided into 11 units. The units were then divided among the sample days using a five area design: A, B, C, N, and G (see Figure 1 for areas). Area A consisted of the entire unit A. Area B consisted of units EB and WB. Area C consisted of units NC and SC. Area N consisted of units N1, N2, N3, N4, and N5, and area G consisted of the Green Timbers unit (a no motorized vehicle access area). This design was used to ensure the comparability of the results of the recreational census for the southern third of the Forest to research findings from a similar project conducted five years ago (Ryel et al., 1982).

Two thousand one hundred ninety-six postcards were placed on vehicles parked within PRCSF boundaries on 92 sample days, during the summer quarter, in selected areas in order to obtain a recreational census. Each of four PRCSF temporary staff made three

Table 1
Stratification of Census Survey Sample Days

	Stratum			
	High Use	Medium Use	Low Use	Total
June, 1986	6	9	15	30
July	9	13	9	31
August	5	5	21	31
Total	20	27	45	92

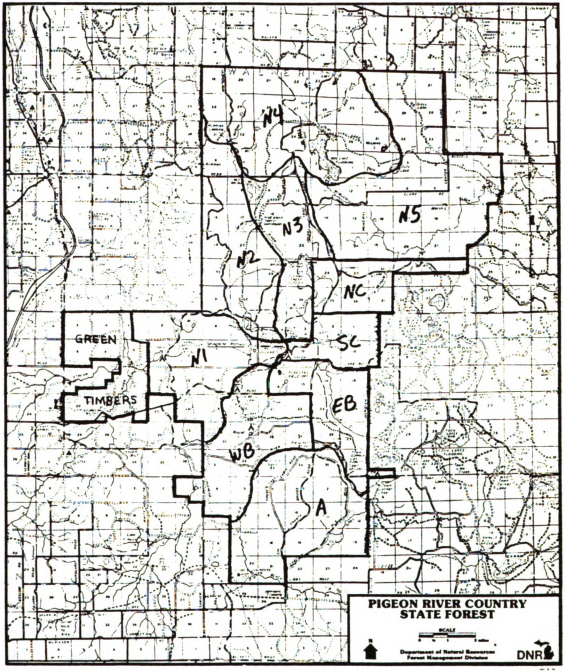


Figure 1
Sample Units

circuits during the sampled day, one each at 8:00 am, noon, and 5:00 pm, of the sampled unit to which they were assigned. Along with recording the car's license plate number, they placed the recreational census survey business reply postcards on all vehicles parked within PRCSF boundaries or collected the filled out card directly from the person (see Appendix E for survey postcard).

A summer quarter total of 1,399 (64%) cards were returned to the Forest Headquarters. Since many summer visitors spent more than one or two days in the Forest, they may have received more than one recreational survey postcard (up to one card for every day of their visit); especially since almost every day during the summer at least one area was being surveyed. Many people returned at least one of the cards they received, while others returned all or most of them. However, it was speculated that many people, having returned one postcard, figured that they no longer needed to return other postcards they received. Consequently, the percentage of returns underrepresented the actual number of individuals that visited the forest.

Obtaining the Mail Survey Sample

The census survey obtained a total of 3,198 usable names and addresses, which, as discussed above, included both single and duplicated names and addresses. A random sample was obtained from the returned recreational census survey cards for the purposes of a mail survey. However, the units were not sampled on an equal basis during the recreational census survey (due to the five area design), i.e. the units in the southern portion (areas A, B and C) were sampled at a three times higher rate than units in the north or Green Timbers areas (N and G). Therefore, in order to obtain a representative and proportionally correct sample of visitors for the mail survey, it was necessary to sample names from postcards returned by visitors from the north and Green Timbers units at a three times higher rate than visitors from the units in the south. Given the type and extent of questions being asked, it was determined

by this investigator in conjunction with her Master's research committee, that an initial overall sample size of about 600 was sufficient to ensure optimal sample sizes for individual questions and manipulation of variables in relationship to analyses for the hypotheses. Area sample percentages were determined based on obtaining this overall sample size and sampling at a 3:1 rate for the northern and southern census samples, respectively.

The Forest census survey personnel, prior to the sample-pull day, assigned each usable name and address on each card a unique number within each of the five census survey areas. The mail survey sample was drawn on September16, 1986 in order to allow sufficient time for postcards placed on vehicles toward the end of the census period to be returned and included in the mail survey sample. Subjects for the mail survey were selected on a random basis, using a table of random numbers, by the principal investigators and one of the temporary Forest personnel hired for the project. Five subsamples were drawn in order to obtain the proper north to south area ratio (3:1) percentage for each census area. The initial sample (prior to deletion of duplicates) included 573 names--237 (11% of the southern units' sample) from areas A, B and C, 300 (32% from the northern units' sample) from area N, and 36 (32% of the Green Timbers unit's sample) from area G.

After the initial sample was drawn, the names, addresses and other relevant information from the postcards were entered into a data base at the DNR's Forestry Division. Duplicated names and addresses were then deleted from the file. Seventy four names and addresses were redrawn from the unsampled postcards in order to replace the purged duplicates. The final mail survey sample consisted of 592 non-duplicated names and addresses--22 (15% of unit A's census sample) from area A, 106 (12% of area B's census sample) from area B, 128 (12% of area C's census sample) from area C, 292 (31% of area N's census sample) from area N, and 42 (38% of G) from the Green Timbers unit. See Figure 2 for a diagram of the sampling process.

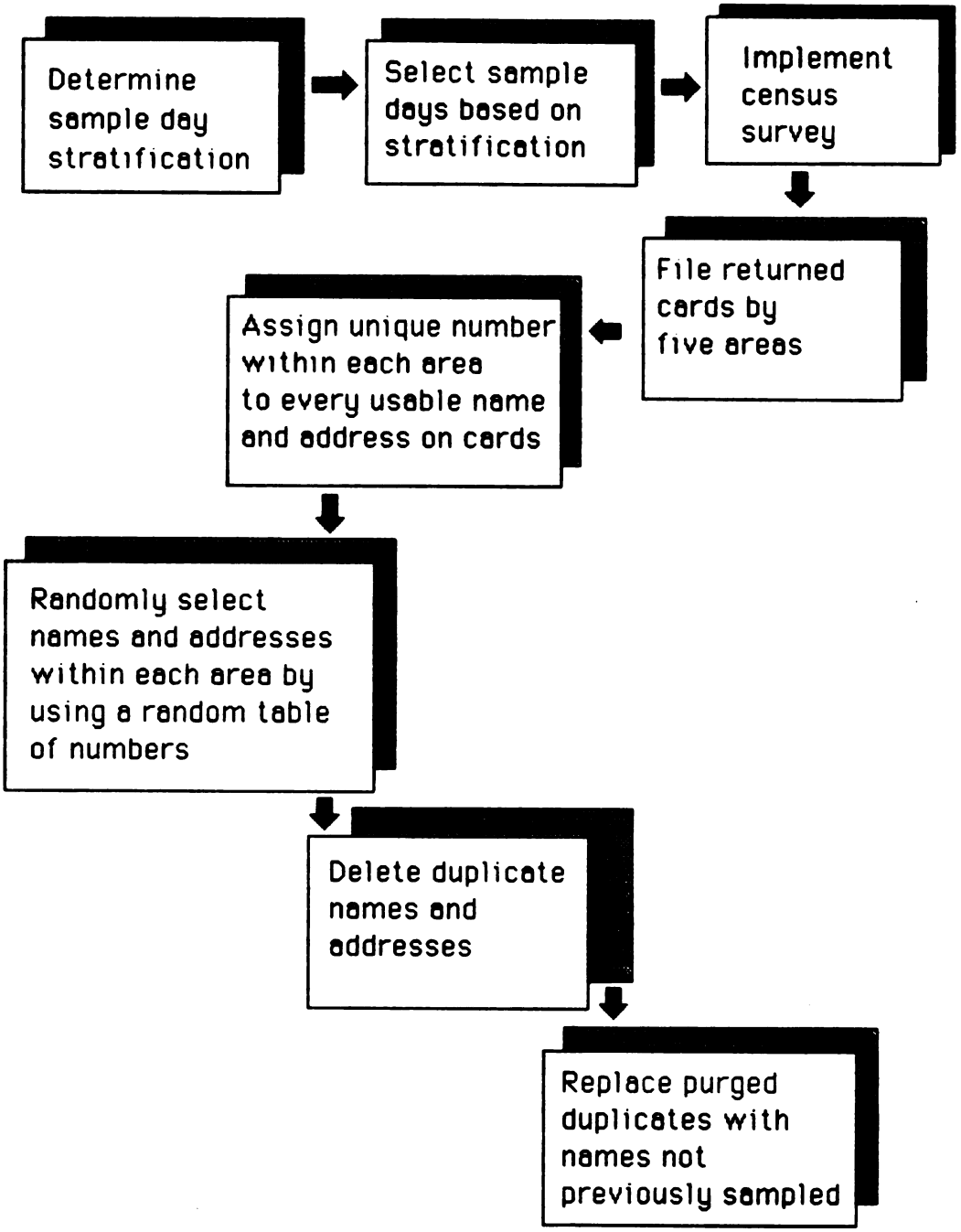


Figure 2
Sampling Flow Chart

Questionnaire Mailing

The first mailing of the questionnaire occurred on October 7, 1986. This initial mailing included the questionnaire booklet, a map of the area, a cover letter signed (original signatures were used for the initial mailing only) by the principal investigators and the Area Forester, a stamped self-addressed return envelope, and a certificate of participation. The cover letter explained the purpose of the research, voluntary participation, assurances of the respondent's anonymity, and the importance of the respondent's participation in the project (see Appendix E for copies of the cover letters).

Special letterhead stationary was designed to lend credibility and enhance the importance of the project in the subject's eyes. Specially printed envelopes and the design of the questionnaire booklet added to the attractiveness of the entire package. Individually addressed and signed letters along with real stamps (as opposed to metered and business reply envelopes) added the personal touch, while the participation certificate further encouraged the subject to respond. All of these techniques have been shown to increase mail survey response rates (Dillman, 1978).

However, in order to ensure an optimal response rate, two follow-up mailings were used. The first follow-up mailing was a simple and inexpensive post card reminder sent to all subjects and was mailed on October 15, 1986, one week after the initial mailing. The second follow-up mailing included a letter encouraging participation and a replacement questionnaire, map and return envelope. The second follow-up package was mailed to 226 non-respondents on October 28, 1986, three weeks after the initial mailing. A third follow-up mailing was initially scheduled for December 6, 1986, but due to illness, this mailing was delayed and then canceled because of the holidays. However, by November 25, an acceptable return rate had already been achieved and therefore the project's integrity was preserved.

To ensure the completeness of responses, and to aid in the

follow-up mailings, a code number system was used. Questionnaires were numbered; the number and the corresponding person's name and address kept on file until the questionnaire was returned and reviewed. All questionnaires were reviewed for completeness by the principal investigators. If a question was left unanswered without any explanation as to why, or an answer needed to be clarified, the researchers contacted (by mail) the respondent and asked him/her for an answer or clarification. A log was kept of all activities during the mailing process in order to keep track of clarification follow-ups.

Coding and Data Entry

Several of the questions on the survey involved written responses. The summer quarter questionnaire returns were reviewed and written responses tabulated prior to developing a coding scheme for those questions. The final code book was written by the project co-directors and completed on November 20, 1986.

Two experienced coders were hired by the DNR and were trained by the principal investigators on November 24. These coders were MSU students from the Department of Social Work and had coded for this researcher the previous summer while working on another project. Training included reviewing and explaining the code book, pointing out difficult coding areas, and how to translate the questionnaire information onto a coding sheet. A special coding form was also designed to aid the coders and decrease errors. Responses from the questionnaire were coded into 80 column format with six lines per case for key punch entry onto an IBM mainframe computer.

Further coding, which included information to which only the principal investigators were allowed access, was done at the same time the code sheets were reviewed for accuracy, i.e. verified. Coding was completed by January 19, 1987, and the code sheets given to the DNR for data entry on January 20, 1987.

Data entry and verification was the responsibility of the DNR. A private vendor was contracted and given instructions as to what columns included alpha characters and how to enter data from the

special coding sheets. Data entry and verification of the entered data were completed and the data set downloaded from the DNR's IBM mainframe computer to a transportable computer tape for uploading on the MSU IBM mainframe on February 11, 1987. Data uploading to the MSU mainframe was completed on February 16, 1987. Very few errors were made during the coding and data entry phases. Consequently, the data was cleaned and ready for analysis by February 24, 1987.

Analysis

Analyses for this thesis began on February 25 and was completed by April 22, 1987, using the Statistical Package for the Social Sciences-X (SPSS Inc., 1986) on an IBM 3090-180 VF mainframe located on the campus of Michigan State University. A MacIntosh 512K was used with MacTerminal software to communicate with the mainframe.

CHAPTER 3

Results

Response Rate

The last survey was received 70 days after the first mailing. The first survey was received within three days. The mean length of response time was 15 days. The largest number of responses received in one day, 74, occurred within six days of the initial mailing; the next (62) within 13 days. Two hundred twenty-six subjects were sent a third follow-up letter and questionnaire. Of the 592 surveys sent out, 476 were returned (80%). Of the returned surveys, 15 were undelivered, 24 were returned unanswered as they were addressed to children under the age of 12 years, and 11 were left blank with no explanation or had only scarce answers and therefore were considered useless and not coded. The remaining 426 (72%) usable surveys were coded and used in the following analysis.

Respondent Characteristics

Seventy percent of the summer recreation respondents were male; the average age was 38 years ($\pm$14). High school graduates made up 88% of the sample, while 45% reported some college experience and 15% reported some level of graduate studies. Occupations were diverse with 20% in skilled trades, 11% in management, 10% were retired or disabled. Homemakers and sales or clerical each made up 9% of the respondents, 8% were students, 7% were professionals with advanced degrees and 4% were unskilled labor. The largest gross family income group (23%) accrued $15,000 to $24,999 annually, the next largest (22%) reported an income of $35,000 to $49,999. Twenty-one percent of the sample reported an annual gross family income of $25,000 to $34,999 while 13% reported income over $50,000. Ten percent of the respondents had an income between $10,000 and $14,999, and the remaining 6% accrued under $10,000

annually.

The average distance driven to the Forest was 190 miles, however the range was from 0 to 2,200 miles, the mode being 250 miles. Thirty-one percent of the respondents drove 101 to 200 miles, while another 31% drove 201 to 300 miles. Ninety-four percent of the respondents were Michigan residents, of which 27% owned property within 50 miles of the Forest. The largest percentage of respondents (29%) reported that the best description of their current area of residence was a small town or village. Twenty-one percent lived in a rural area other than a farm. Sixteen percent indicated that they resided in a suburb of a medium or large city, 13% said small city, 8% indicated a farm, 7% a medium city, and the remaining 4% lived in a large city. Otsego County was the place of origin for 13% of the respondents. Oakland County had 9% of the sample. Wayne, Macomb, Ingham, and Cheboygan counties each had 5%, while another 3% of the sample resided in each of Eaton and Genesee counties. The remaining counties had less than 2% of the sample (see Figure 3).

Thirty-eight percent of the respondents were traveling with one other person, 19% with three other people, 14% with two, 10% with four, and another 10% by themselves. The respondents were equally distributed among the three months of the sampling period with 37% visiting the Forest in August, 34% in July, and 29% in June. The average number of days respondents spent visiting the PRCSF on the trip for which they were surveyed was 6, the mode (23% of the respondents) spent three days. Eighteen percent of the respondents spent only one day in the Forest, 17% spent four days, 14% spent two, 16% spent between seven and fourteen days. Eleven percent spent between five and seven days, and the remaining 2% spent fifteen or more days in the Forest. Both the southern and northern areas each had 46% of the respondents while the remaining 8% of the respondents were surveyed from the Green Timbers area. However, when asked as to what areas they spent the most time in during the last five years 36% said the northern areas, 35% the southern, and 22%

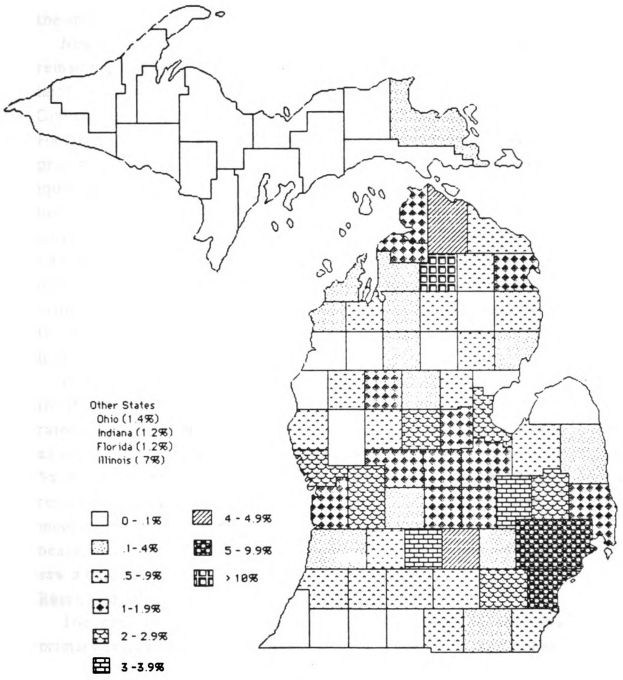


Figure 3
Percentage of Respondents by County of Residence

indicated the Green Timbers area (7% indicated some combination of the areas).

New-comers to the Forest made up 21% of the sample, with the remaining 79% visiting the Forest an average of 23 times within the last five years. The earliest anyone had first visited the Pigeon River Country was 1912; while 26% of the respondents first visited the Forest in 1986. Of those indicating that they had visited the Forest prior to the trip on which they were surveyed, 14% of the respondents indicated they had first visited the area between 1912 and 1959, 16% between 1960 and 1969, 29% between 1970 and 1979. The largest percentage of the respondents (36%) first visited the Forest between 1980 and 1986. However, when those visitors who were new-comers on the day they were surveyed are included, the percentage of new visitors to the Forest since 1980 was more than 50%. The majority of the respondents (93%) indicated that they plan to return to the PRCSF in the near future.

Less than 2% of the respondents indicated that their enjoyment of the trip on which they were surveyed was poor or very poor. 34% rated their overall enjoyment of their visit as good, while 63% rated it as very good. The majority of the respondents saw some wildlife, only 5% did not indicate seeing any wildlife. Seventy-eight percent of the respondents indicated that they saw deer, 64% saw elk, 35% saw a medium sized fur bearer (raccoon, rabbit, porcupine, skunk, otter, beaver, etc.), 8% saw a fox or coyote, 6% a bear, 5% a turkey, and 4% saw a bald eagle.

Recreational Activities

The majority of the summer respondents (41%) indicated that their primary recreational activity on the visit to the Forest for which they were surveyed was fishing (11% lake, 22% stream), 37% said camping, 12% were trail users (3% horseback riding, 6% hiking, 2% backpacking, 1% motorized), 8% were scenic users (5% sightseeing, 3% viewing wildlife) and 3% were hunting (2% bear hunting) or scouting. Year round activities on the Forest are shown in Table 2. When the rate of

Table 2
Year-round Recreational Activity Participation

Scenic Driving	80%
Camping	78%
Wildlife Viewing	72%
Hiking	60%
Stream Fishing	53%
Swimming	50%
Boating	49%
Lake Fishing	44%
Picnicking	39%
Photography	38%
Berrypicking	37%
Mushroom Hunting	23%
Gathering Fuel Wood	22%
Deer-gun Hunting	17%
Grouse or Woodcock Hunting	17%
Other Small Game Hunting	15%
Deer-Archery Hunting	12%
Cross Country Skiing	7%
3 or 4 Wheeling	6%
Snowmobiling	4%
Horseback Riding	4%
Bear Hunting	2%
Elk Hunting	1%
Coyote or Bobcat Hunting	1%
Snowshoeing	1%

N-426

Note. Percentages based on the number of respondents who indicated participating in activity in the Forest during the last 12 months

other seasonal activities, such as cross country skiing (7%) and snowmobiling (4%) in the winter, deer hunting (17%) in the fall, and mushroom hunting (23%) in the spring, were compared with the rate of summer recreation activities (swimming 50%, camping 78%, and hiking 60%), the summer PRCSF visitors rarely participated in other seasonal sports in the Forest. Therefore, the results reported in this thesis should be generalized only to summer visitors of the PRCSF, and not to other seasonal visitors. However, the results can be generalized to other forested areas with similar visitor characteristics, especially forests which are being developed and managed similar to PRCSF.

A recreation activity typology was created using a Do if-Else if-Else-End if compute routine. Those respondents who indicated that they, in the past 12 months, while visiting the Forest had participated in any of four activities considered as detrimental to the environment (motor boating, snowmobiling, motor dirt bike riding, and/or 3 or 4 wheel ATV riding) were coded as recreation activity type 'abusive'. Else, those respondents who indicated participating in any of 13 consumptive activities (firearm deer hunting, archery deer hunting, elk hunting, grouse or woodcock hunting, other small game hunting, lake fishing, stream fishing, berrypicking, gathering fuel wood, mushroom hunting, bear hunting, trapping, and coyote or bobcat hunting) were coded as recreation activity type 'consumptive'. All others, not falling into the above categories, were coded as recreation activity type 'appreciative' which included activities such as cross country skiing, horseback riding, hiking, backpacking, camping, swimming, etc.

Using the year-round activities to categorize respondents into recreational activity types, resulted in 13% of the sample falling into the abusive category, 75% into the consumptive category, and 12% falling into the appreciative category. Given that a large percentage of the people who visit the Forest in the summer fish, these categories should be representative of the distribution of activities types for the summer sample. An analysis of respondent characteristics of the

subsamples is shown in Table 3. Pearson product-moment correlations indicated that people who owned property within 50 miles of the Forest were more likely to fall into the abusive recreational category while those who did not own property were more likely to fall into the appreciative category ($r=-.21$, $p<.0005$). Also, the farther a person drove to get to the Forest and the more educated, the less likely they were to participate in abusive and consumptive recreational activities ($r=.11$, $p<.01$ and $r=.19$, $p<.0005$ respectively).

Environmental Concern

As shown in Table 4, summer visitors to PRCSF were concerned about the environment. The majority of the respondent's indicated that they think the government should spend more money on all ten of the environmental issues measured. Correlations with recreational type were small in magnitude and, in general, were not significant, indicating that the abusive-consumptive-appreciative recreational activity type categorization was not related to levels of concern for the environment. Therefore,

> Hypothesis 1: The correlations between recreation type (abusive to consumptive to appreciative) and each of the ten environmental issues are positive.

was rejected. Three- and four-wheel ATV riders and people who fish were just as concerned for the environment as hikers and backpackers.

Environmental concern scales. The ten items of the environmental concern scale were submitted to an internal consistency analysis, i.e. Cronbach's alpha (Cronbach, 1951). One item-- maintaining forested areas for public enjoyment-- was deleted to increase the reliability of the scale. The final scale used in the analysis included nine internally consistent items (alpha=.80), with a scale mean of 2.71, standard deviation of .29, and skewness=-1.11. The mean of the inter-item correlations was .32 (see Table 5 for inter-item correlation matrix). Item means, standard deviations and

Table 3
Recreation Activity Type Descriptors

	Abusive[a]	Consumptive[b]	Appreciative[c]	Correlation
Age (mean)	36	38	41	.09*
Sex (% female)	27	27	46	.10*
Residence (% city)	19	27	34	.14**
Income (median)	15K-25K	25K-35K	25K-35K	.09*
Occupation (median)	skilled	skilled	skilled/sales	--
Education (median)	high school	some college	some college	.19***
Own property within 50 miles of Forest (percent)	53	25	16	-.21***
Miles driven to Forest (mean)	123	197	222	.11**
Anti-development (mean scale score)	3.22	3.43	3.32	.03

Note. n^a=55 n^b=319 n^c=52
* $p<.05$ ** $p<.01$ *** $p<.001$

Table 4
Environmental Concern and Recreation Activity Type

Environmental Concern Items	%Less	%Same	%More	Correlation with Activity Type
Maintaining forested areas for public enjoyment	2	42	56	.11**
Litter control and clean up	0	35	65	-.04
Recreation Environmental Concern Items				
Saving unspoiled natural areas for the future	1	22	77	.04
Protecting endangered species of wildlife	1	23	75	.06
Preserving forests and other natural areas for wildlife	0	24	76	.04
Preventing oil and gas exploration in wilderness areas	7	38	55	.02
Control damage done to natural areas from over use	0	23	77	.05
General Environmental Concern Items				
Toxic waste pollution control and clean up	1	18	81	.07
Controlling air pollution	1	36	63	.00
Preventing agricultural or industrial pollution of water	1	16	84	.02

Note. N-426
** $p<.01$

Table 5
Environmental Concern Inter-Item Correlations

Items	1	2	3	4	5
1. Litter control and clean up	--				
2. Saving unspoiled natural areas for the future	.19				
3. Protecting endangered species of wildlife	.18	.45			
4. Preserving forests and other natural areas for wildlife	.21	.44	.36		
5. Preventing oil and gas exploration in wilderness areas	.18	.38	.31	.31	
6. Control damage done to natural areas from over use	.39	.33	.28	.25	.29
7. Toxic waste pollution control and clean up	.22	.22	.26	.27	.32
8. Controlling air pollution	.35	.38	.35	.39	.29
9. Preventing agricultural or industrial pollution of water	.22	.34	.29	.29	.26

	6	7	8
7. Toxic waste pollution control and clean up	.41		
8. Controlling air pollution	.36	.45	
9. Preventing agricultural or industrial pollution of water	.35	.51	.48

item to scale correlations are shown in Table 6. Item homogeneity was acceptable for this scale, therefore, the environmental concern scale is judged to have content validity. The correlation between environmental concern and anti-development was .47, thus, showing a moderate level of concurrent predictive validity.

The environmental concern items were then subdivided into two conceptually uniform subscales: general and recreational environmental concern. These subscales were scrutinized for internal consistency and low reliability items deleted. The final scales had alphas equaling .72 (mean=2.75, sd=.35, skew=-1.4) and .71 (mean=2.70, sd=.33, skew=-1.09) respectively. Inter-item correlation means for the scales were .48 and .34 respectively. Item homogeneity was also acceptable for these subscales (see Table 7 for item-to-scale correlations).

General vs. Recreational environmental concern.

Hypothesis 2: PRCSF users will exhibit a higher mean level of concern for protecting aspects of the environment necessary for pursuing outdoor recreational activities than for more general environmental issues such as air and water pollution

also was not supported (t=3.14, df=424, one tail $p>.05$, two-tail $p<.002$). The trend, as shown by the means of the two scales (2.75 general and 2.70 recreation), was in the opposite direction. However, the magnitude of the difference between the two means was quite small and therefore should be considered as insignificant. PRCSF summer recreational visitors were equally concerned for both general and recreational environments.

Respondent characteristics and recreation activity type related to environmental concern. As previously discussed, nine of the environmental issue items were combined to make a scale measuring the degree of overall environmental concern. Age (r=-.17, $p<.0005$), education (r=.14, $p<.002$), and urban residence (r=.18, $p<.0005$) correlated significantly with environmental concern while

Table 6
Environmental Concern Item and Scale Statistics

Scale
Alpha=.80
Mean=2.71
SD=.29, Skew=-1.11
Inter-item correlation mean=.31 (min.=.18, max.=.51)

Items	Mean	SD	Item-Total Corr.
1. Litter control and clean up	2.66	.48	.37
2. Saving unspoiled natural areas for the future	2.76	.46	.55
3. Protecting endangered species of wildlife	2.74	.47	.49
4. Preserving forests and other natural areas for wildlife	2.75	.44	.49
5. Preventing oil and gas exploration in wilderness areas	2.48	.63	.46
6. Control damage done to natural areas from over use	2.76	.43	.52
7. Toxic waste pollution control and clean up	2.79	.42	.52
8. Controlling air pollution	2.61	.51	.60
9. Preventing agricultural or industrial pollution of water	2.83	.38	.54

Table 7
General and Recreational Environmental Concern Scales

General Environmental Scale

Alpha=.72, Mean=2.75, SD=.35, Skew=-1.40

Inter-item correlation mean=.48 (min.=.45, max.=.51)

Items	Mean	SD	Item-Total Corr.
7. Toxic waste pollution control and clean up	2.79	.42	.55
8. Controlling air pollution	2.61	.51	.54
9. Preventing agricultural or industrial pollution of water	2.83	.38	.58

Recreation Environmental Scale

Alpha=.71, Mean=2.70, SD=.33, Skew=-1.09

Inter-item correlation mean=.34 (min.=.25, max.=.45)

Items	Mean	SD	Item-Total Corr.
2. Saving unspoiled natural areas for the future	2.76	.46	.58
3. Protecting endangered species of wildlife	2.74	.47	.49
4. Preserving forests and other natural areas for wildlife	2.75	.44	.47
5. Preventing oil and gas exploration in wilderness areas	2.48	.63	.45
6. Control damage done to natural areas from over use	2.76	.43	.39

income ($r=.07$, $p>.05$) did not. Also, people owning property within 50 miles of the PRCSF also expressed less concern for the environment ($r=-.17$, $p<.0005$).

Hypothesis 3: There is a significant difference between recreation types on environmental concern. Abusive recreational users have the lowest mean level of environmental concern, while appreciative users have the highest mean level of environmental concern

Hypothesis three also was not supported (see Table 8). The trend that appreciative and consumptive users (mean=2.71 and 2.72 respectively) were somewhat higher in concern than abusive users (mean=2.66) who also fell below the sample mean (2.71), was not significant. Therefore, analysis of variance indicated that recreation activity types did not differ significantly in level of overall environmental concern.

Recreation Motivation

Summer visitors to the PRCSF indicated that having fun, enjoying the sights, sounds and smells of nature, and being in a quiet and peaceful place (means=3.7) were their primary motives for recreating in the Forest (see Table 9). Meeting people (mean=1.4), doing something impressive (mean=1.6) and being able to share things with others at home (mean=2.1) were the least motivating influences.

Recreation motivation scales. The 26 recreation motivation items were subjected to a principal components analysis with varimax rotation using pairwise deletion of missing values in order to determine empirically consistent dimensions. Kaiser-Meyer-Olkin measure of sampling adequacy (an index for comparing the magnitudes of the observed correlations to the magnitude of the partial correlations) was estimated at .86, indicating that the measure was meritorious (Kaiser, 1974) and, therefore, adequate for the factor analytic method. Principal components extracted six unique factors with eigenvalues greater than 1.0 and which accounted for 58.4% of the variance. Varimax rotation converged in 13 iterations. Item

Table 8

Anova: Environmental Concern by Recreation Activity Type

Cell Means

Abusive: 2.66 (n-55)

Consumptive: 2.72 (n-318)

Appreciative: 2.71 (n-52)

Total: 2.71 (n-425)

Source	SS	df	MS	F
Activity type	.196	2	.098	1.14 $p>.05$
Residual	36.266	422	.086	
Total	36.462	424	.086	

Table 9
Recreation Motivation Item Statistics

Motivation Variables	%Not Import.	%Slight Import.	%Med. Import.	%Very Import.	$\bar{X}$	SD
To enjoy the sights, sounds and smells of nature	1	3	21	76	3.7	.55
To see wild animals	1	6	28	66	3.6	.65
To be in a quiet and peaceful place	1	4	16	80	3.7	.57
To get away from the pressures of work or school	4	8	21	67	3.5	.80
To relax	1	5	22	72	3.6	.63
To practice your skills and abilities	11	16	31	42	3.0	1.00
To challenge nature or wildlife	28	26	27	18	2.4	1.08
To harvest	23	24	30	23	2.5	1.08
To do things on your own	11	20	33	36	2.9	1.00
To meet people	70	19	7	4	1.4	.81
To be with your family or friends	10	12	26	52	3.2	1.00
To share your skills and knowledge with others	34	29	23	13	2.2	1.04
To share intimacies with people you love	19	21	27	20	2.7	1.11
To learn more about yourself	27	26	27	33	2.4	1.09
To think about who you are and where your life is going	33	26	21	20	2.3	1.13
To have fun	1	4	20	75	3.7	.59
To enjoy the excitement of a challenging experience	14	21	30	35	2.9	1.05
Physical exercise	11	24	38	27	2.8	.96

Table 9 (cont'd.)

Motivation Variables	%Not Import.	%Slight Import.	%Med. Import.	%Very Import.	$\bar{X}$	SD
To experience something new and different	17	22	36	25	2.7	1.03
To do an impressive thing	65	18	11	6	1.6	.92
To be able to share your experiences with others at home	36	18	11	6	2.1	1.06
To breath clean air	4	10	23	64	3.5	.82
To be in a safe environment	13	18	23	46	3.0	1.08
To get away from civilization	3	8	22	67	3.5	.76
To be alone	23	23	25	30	2.6	1.14
To be in a place with very little human evidence	7	12	27	54	3.3	.93

Note. N=426

communalities (squared multiple correlation coefficients), indicating the strength of the linear association among the variables, ranged from .43 to a high of .76 (see diagonals in Table 10 for item communalities).

The six obtained components were scrutinized for conceptual meaningfulness with particular attention paid to a priori item-to-dimension designations. Items which did not load highly into dimensions as originally designed, and could not conceptually be directed into other dimensions or empirically directed based on inter-item correlations (see Table 10 for corrected inter-item correlation matrix) and factor loadings, were deleted (see Table 11 for rotated component loadings). The six recreational motivation dimensions found in this study were named as follows: escape/solitude, self enhancement, social, challenge, nature, and intimacy. From these components, six scales were developed using items with high communalities and component loadings. The scales were then subjected to reliability analysis. The resulting statistics are shown in Table 12 through Table 17. All scales had respectable alphas, inter-item correlations and correlation means, and item-to-scale correlations. Inter-scale correlations are shown in Table 18.

Only the nature scale did not obtain a minimum alpha of .60. This was due to the high intercorrelations of items in the escape/solitude scale and the nature scale. Some of the items that were originally intended to fall into a nature scale factored into the escape/solitude scale. However, due to the importance of the nature dimension to the subsequent analysis, both the nature and escape/solitude scales were maintained as a separate dimensions measuring a person's degree of nature related recreation motivation.

Recreation motivation related to respondent characteristics and recreation activity types.

Pearson product-moment correlations between recreation motivation dimensions and sample characteristics (see Table 19)

Table 10

Recreation Motivation Corrected Item Correlations

Items	1	2	3	4	5	6	7	8	9
1. Enjoy nature	.65								
2. See wildlife	.45	.49							
3. Quiet place	.52	.34	.55						
4. Escape pressures	.21	.14	.44	.69					
5. Relax	.42	.28	.54	.60	.64				
6. Practice skills	.06	.29	.08	.22	.12	.67			
7. Challenge	.05	.30	.03	.09	.02	.61	.68		
8. Harvest	.01	.30	.06	.20	.14	.51	.47	.55	
9. On own	.27	.27	.27	.26	.28	.29	.37	.19	.42
10. Meet people	-.07	.13	-.01	.18	.16	.17	.23	.31	.21
11. Family/friends	.21	.22	.17	.20	.34	.01	-.04	.13	.12
12. Share skills	-.03	.18	-.06	.04	.05	.28	.37	.30	.26
13. Share intimacies	.23	.13	.19	.19	.31	-.03	-.02	-.05	.23
14. Learn self	.13	.09	.14	.23	.21	.27	.35	.04	.44
15. Think self	.15	.05	.18	.27	.25	.16	.25	-.03	.43
16. Fun	.41	.42	.29	.16	.31	.22	.22	.23	.26
17. Excitement	.18	.35	.06	-.01	.03	.46	.61	.34	.43
18. Exercise	.22	.27	.09	-.01	.08	.20	.35	.14	.37
19. New experience	.20	.19	.15	.09	.15	.14	.29	.08	.39
20. Impressive	-.13	.08	-.08	.05	-.00	.24	.41	.28	.31
21. Share at home	-.00	.15	.02	.10	.13	.09	.26	.23	.30
22. Clean air	.39	.26	.38	.22	.35	-.06	.09	-.01	.39
23. Safe environment	.17	.17	.24	.27	.33	-.03	.11	.14	.32
24. Escape civilization	.33	.17	.47	.49	.48	.07	.09	.03	.35
25. Be alone	.29	.14	.37	.37	.32	.23	.25	.03	.37
26. Little human evid.	.47	.27	.49	.35	.41	.13	.14	-.01	.34

Table 10 (cont'd.)

Items	10	11	12	13	14	15	16	17	18
10. Meet people	.47								
11. Family/friends	.34	.66							
12. Share skills	.40	.32	.47						
13. Share intimacies	.23	.53	.28	.57					
14. Learn self	.19	.22	.36	.45	.76				
15. Think self	.17	.19	.29	.44	.72	.70			
16. Fun	.18	.37	.24	.29	.21	.17	.43		
17. Excitement	.25	.07	.42	.14	.44	.36	.30	.67	
18. Exercise	.23	.19	.36	.28	.43	.39	.29	.50	.47
19. New experience	.22	.12	.29	.27	.46	.45	.22	.44	.43
20. Impressive	.39	.04	.39	.08	.31	.28	.07	.44	.35
21. Share at home	.47	.27	.42	.25	.28	.28	.18	.36	.37
22. Clean air	.17	.11	.12	.23	.28	.34	.23	.28	.34
23. Safe environment	.38	.21	.24	.21	.19	.25	.17	.22	.28
24. Escape civilization	.06	-.00	-.03	.12	.26	.33	.13	.11	.13
25. Be alone	-.05	-.16	-.02	.06	.39	.41	.09	.25	.18
26. Little human evid.	-.09	-.05	-.08	.11	.27	.31	.20	.19	.17

	19	20	21	22	23	24	25	26
19. New experience	.46							
20. Impressive	.37	.56						
21. Share at home	.38	.51	.59					
22. Clean air	.43	.28	.37	.65				
23. Safe environment	.36	.41	.52	.54	.63			
24. Escape civilization	.27	.14	.16	.49	.39	.59		
25. Be alone	.29	.13	.04	.37	.19	.50	.58	
26. Little human evid.	.26	.01	.01	.44	.21	.51	.52	.57

Note. Corrected for attenuation, i.e. communalities are in the diagonal

Table 11
Dimensions of Recreation Motivation

Items	Escape/ Solitude	Self-Enhanc	Social	Chal-lenge	Nature	Intimacy
1. Enjoy nature	.36	.10	-.07	.06	.70	.09
2. See wildlife	.15	-.01	.09	.32	.59	.12
3. Quiet place	.61	.03	-.02	-.02	.41	.08
4. Escape pressures	.77	.02	.04	.18	-.12	.23
5. Relax	.69	.01	.08	.04	.21	.33
6. Practice skills	.12	.16	-.05	.79	.06	-.01
7. Challenge	-.01	.30	.18	.72	.12	-.14
8. Harvest	.07	-.15	.21	.68	.07	.11
9. On own	.28	.41	.27	.24	.22	.01
10. Meet people	.02	.03	.52	.26	-.08	.35
11. Family/friends	.05	.05	.15	.00	.18	.78
12. Share skills	-.15	.28	.38	.35	.02	.33
13. Share initmacies	.11	.39	.11	-.14	.14	.59
14. Learn self	.18	.81	.11	.16	-.02	.20
15. Think self	.26	.76	.15	.02	-.03	.16
16. Fun	.11	.11	.08	.22	.49	.33
17. Excitement	-.09	.46	.31	.49	.32	-.07
18. Exercise	-.08	.46	.34	.17	.32	.09
19. New experience	.09	.49	.39	.07	.22	-.00
20. Impressive	-.04	.26	.62	.30	-.10	-.06
21. Share at home	.00	.18	.71	.13	.02	.19
22. Clean air	.38	.26	.50	-.18	.38	-.08
23. Safe environment	.32	.06	.71	-.06	.13	.08
24. Escape civilization	.69	.19	.21	-.05	.13	-.13
25. Be alone	.55	.41	.01	.11	.11	-.29
26. Little human evid.	.57	.27	-.02	-.01	.37	-.19

Table 12
Escape/solitude Motivation Scale

Scale statistics
Alpha=.78
Mean=3.39
SD=.57, Skew=-1.16
Inter-item correlation mean=.39 (min.=.28, max.=.59)

Item statistics	Mean	SD	Item-Total Corr.
4. escape pressures	3.53	.78	.51
5. relax	3.66	.62	.55
24. escape civilization	3.57	.72	.59
3. quiet place	3.74	.57	.51
26. little human evidence	3.32	.91	.58
25. be alone	2.66	1.13	.52

Table 13
Self-enhancement Motivation Scale

Scale statistics
Alpha-.78
Mean-2.6
SD-.76, Skew=-.06
Inter-item correlation mean-.42 (min.-.33, max.-.73)

Item statistics	Mean	SD	Item-Total Corr.
14. learn about self	2.42	1.09	.68
15. think about self	2.28	1.12	.61
19. new experience	2.69	1.03	.49
18. exercise	2.79	.95	.52
9. on own	2.96	.99	.49

Table 14
Social Motivation Scale

Scale statistics
Alpha=.71
Mean=2.97
SD=.90, Skew=-.57
Inter-item correlation mean=.38 (min.=.33, max.=.47)

Item statistics	Mean	SD	Item-Total Corr.
10. meet people	1.45	.80	.45
21. share at home	2.10	1.04	.54
20. impressive	1.59	.92	.53
12. share skills	2.14	1.04	.48

Table 15
Challenge Motivation Scale

Scale statistics
Alpha=.76
Mean=2.70
SD=.80, Skew=-.15
Inter-item correlation mean=.45 (min.=.28, max.=.59)

Item statistics	Mean	SD	Item-Total Corr.
6. practice skills	3.04	1.00	.61
7. challenge nature	2.35	1.08	.67
8. harvest	2.50	1.07	.44
17. excitement of challenge	2.85	1.07	.54

Table 16
Nature Motivation Scale

Scale statistics
Alpha=.55
Mean=3.59
SD=.49, Skew=-1.56
Inter-item correlation mean=.31 (min.=.21, max.=.36)

Item statistics	Mean	SD	Item-Total Corr.
1. enjoy nature	3.71	.56	.46
2. see wildlife	3.56	.66	.33
22. breath clean air	3.47	.81	.34

Table 17
Intimacy Motivation Scale

Scale statistics
Alpha=.63
Mean=2.97
SD=.90, Skew=-.57
Inter-item correlation mean=.46 (min.=.46, max.=.46)

Item statistics	Mean	SD	Item-Total Corr.
11. family/friends	3.19	.99	.21
13. share intimacies	2.72	1.11	.21

Table 18
Motivation Inter-scale Correlations

Scales	1	2	3	4	5	6
1. Nature	--					
2. Challenge	.27	--				
3. Social	.24	.46	--			
4. Intimacy	.28	.10	.31	--		
5. Self-enhancement	.48	.45	.51	.36	--	
6. Escape/solitude	.56	.19	.09	.19	.45	--

Table 19
Recreation Motivation and Respondent Characteristics

Motivations	Sex	Age	Education	Income	Own Property within 50 Miles	Recreat. Activity Type
Nature	.08*	.04	-.07	-.01	-.04	-.02
Challenge	-.10*	-.11**	-.23***	-.13**	-.05	-.24***
Social	-.01	.01	-.30***	-.15***	.03	-.06
Intimacy	.16***	-.00	-.19***	.03	-.01	-.05
Self-enhancement	.05	-.09*	-.03	-.02	-.09*	.03
Escape/Solitude	.06	-.11**	.09*	.06	.01	.07

Note. Pearson product-moment correlations between respondent characteristics and motivation scale scores.
*$p<.05$ **$p<.01$ ***$p<.001$

indicated differences based on sex, age, education, and income. Women tended to score higher on intimacy ($r=.16$, $p<.0005$) while men tended to score higher on challenge ($r=-.10$, $p<.018$). Younger visitors scored higher on challenge ($r=-.11$, $p<.01$) and escape ($r=-.12$, $p<.008$) than older individuals. The less education a person completed, the higher were the challenge ($r=-.23$, $p<.0005$), social ($r=-.30$, $p<0005$), and intimacy ($r=-.19$, $p<.0005$) motivations. Also, the lower the person's gross family income, the higher were the challenge ($r=-.13$, $p<.004$) and social ($r=-.15$, $p<.001$) motivations.

Correlations between motivation dimensions and recreation activity types indicated that only the challenge dimension showed significant differences in motivation level due to activity type ($r=-.24$, $p<.0005$). Abusive and consumptive activity participants were more motivated by challenging experiences than appreciative activity participants. Recreational activity types were equally motivated by nature, escape/solitude, social, intimacy and self enhancement recreation motivations.

Recreation Motivation and Environmental Concern

Hypothesis 4: Nature, escape and solitude motivations for recreating on PRCSF are positively correlated with environmental concern, while social, self-enhancement and challenge motivations are not related to environmental concern.

As shown in Table 20, environmental concern was significantly correlated with nature ($r=.16$, $p<.0005$), escape/solitude ($r=.25$, $p<.0005$), self-enhancement ($r=.19$, $p<.0005$), and challenge ($r=.10$, $p<.02$) motivations. The strongest correlation was between escape/solitude motivations and environmental concern, which indicated that people who were motivated to visit the Forest for reasons related to escaping civilization and going to a place of solitude and little human evidence were more likely to express high levels of concern for the environment. Other motivations (social and intimacy) were not significantly correlated with environmental concern. Thus,

Table 20
Recreation Motivation and Attitudes

Motivations	Environmental Concern	Opinion: Approval	Anti-development
Nature	.16***	-.04	.06
Challenge	.10*	-.02	.01
Social	-.02	.02	-.09*
Intimacy	-.05	.01	-.05
Self Enhancement	.19***	-.09*	.06
Escape/Solitude	.25***	-.10*	.17***

Note. Pearson product-moment correlations between motivation scale scores and environmental concern scale score, approval of gas and oil development (opinion), and anti-development attitude scale score.
*$p<.05$ **$p<.01$ ***$p<.001$

hypothesis four was not supported, due to motivations other than nature, solitude and escape being related to environmental concern.

However, specific opinions regarding and negative attitudes toward gas and oil development in the Forest showed a different pattern of correlations (see Table 20).

Hypothesis 5: Nature and solitude motivations are positively correlated with negative attitudes toward and disapproving opinions of gas and oil development.

Both escape/solitude and self-enhancement motivations were negatively correlated with approval ($r=-.10$, $p<.02$ and $r=-.09$, $p<.03$ respectively). Escape/solitude motivation was also correlated with anti-development attitudes ($r=.17$, $p<.0005$), while social motivation was negatively correlated with anti-development attitudes ($r=-.09$, $p<.03$). The pattern of correlations suggested that, once again, escape/solitude motivations were most predictive of anti-development attitudes and disapproval of gas and oil development in the Forest (considered as a specific recreational environmental concern). Therefore, hypothesis five was supported.

Gas and Oil Development Attitudes and Opinions

Anti-development scale development. Table 21 shows the percentage and mean responses to the 11 gas and oil development attitude items. These items were combined to form a single anti-development attitude scale (mean=3.39, sd=.82). All pro-development items were reversed scored, the mean of the scale summation for each respondent calculated, and internal consistency (reliability) of the scale checked using Cronbach's coefficient alpha (Cronbach, 1951). Reliability of the anti-development scale was .89. Item and scale statistics are shown in Table 22. The unidimensionality of the scale was suggested by the results of a principal components analysis, as the first unrotated factor accounted for 48.4 percent of the variance. Further, all 11 items loaded highly on this factor with the loadings ranging from .53 to .85. These results suggested that it was appropriate to treat all 11 items as forming an

Table 21
Percent Response to Gas and Oil Development Attitude Items

Attitude Items	Strongly Disagree	Disagree	Undec.	Agree	Strong Agree
The oil companies and the DNR have done an excellent job with gas and oil development in the PRCSF; the program should continue as planned (mean=3.21,sd=1.13)	17	20	36	22	5
Gas and oil development has greatly decreased the peace, solitude and esthetic value that the PRCSF offers (mean=3.10,sd=3.79)	7	29	27	23	15
The PRCSF isn't any different from any other state forest and therefore should be managed just like any other state lands, including gas and oil development (mean=3.79,sd=1.20)	39	23	23	12	4
The areas that are cleared for drilling, if seeded and maintained, are beneficial to and attract wildlife (mean=2.63,sd=1.04)	6	12	32	37	12
The possible dangers and harm from oil spills, blowouts and leakages override the economic benefits from gas and oil drilling on the PRCSF; drilling should not be allowed (mean=3.55,sd=1.17)	5	16	26	26	27
Gas and oil development of the PRCSF is alright as long as the oil companies can keep the machinery quiet, limit odors, and not harm the environment (mean=3.05,sd=1.35)	20	22	13	33	12

Table 21 (cont'd.)

Attitude Items	Strongly Disagree	Disagree	Undec.	Agree	Strong. Agree
Gas and oil drilling should also be allowed in the northern area of the PRCSF, not just in the southern area as is currently allowed (mean=3.91, sd=1.18)	45	19	26	6	5
Gas and oil development of the PRCSF is ok as long as someone who is more interested in the land and wildlife than the money is watching over and monitoring the process (mean=2.79, sd=1.37)	16	16	18	31	20
PRCSF is unique and any degradation or destruction of this area by gas and oil development is a crime (mean=3.96, sd=1.12)	3	10	15	28	43
Oil and gas companies are fully aware of environmental impacts the industry has on the land and are not going to damage the environment any more than recreationists (mean=3.74, sd=1.12)	31	33	21	12	3
Drilling for oil and gas on the PRCSF should only be done as a last resort in an economic/energy emergency (mean=3.44, sd=1.23)	6	18	26	24	26

Note. N=426

Table 22
Anti-development Scale and Item Statistics

Scale

Alpha=.89

Mean=3.39

SD=.82

Inter-item correlation mean=.42 (min.=.19, max.=.75)

Items	Item-Total Corr.	Factor Loading	Communality
1. The oil companies and the DNR have done an excellent job with gas and oil development in the PRCSF; the program should continue as planned (mean=3.21, sd=1.13) (R)	.79	.85	.74
2. Gas and oil development has greatly decreased the peace, solitude and esthetic value that the PRCSF offers (mean=3.10, sd=3.79)	.60	.68	.47
3. The PRCSF isn't any different from any other state forest and therefore should be managed just like any other state lands, including gas and oil development (mean=3.79, sd=1.20) (R)	.47	.55	.33
4. The areas that are cleared for drilling, if seeded and maintained, are beneficial to and attract wildlife (mean=2.63, sd=1.04) (R)	.47	.56	.45
5. The possible dangers and harm from oil spills, blowouts and leakages override the economic benefits from gas and oil drilling on the PRCSF, drilling should not be allowed (mean=3.55, sd=1.17)	.71	.77	.59

Table 22 (cont'd.)

Items	Item-Total Corr.	Factor Loading	Communality
6. Gas and oil development of the PRCSF is alright as long as the oil companies can keep the machinery quiet, limit odors, and not harm the environment (mean=3.05, sd=1.35) (R)	.78	.84	.78
7. Gas and oil drilling should also be allowed in the northern area of the PRCSF, not just in the southern area as is currently allowed (mean=3.91, sd=1.18) (R)	.66	.73	.55
8. Gas and oil development of the PRCSF is ok as long as someone, who is more interested in the land and wildlife than the money, is watching over and monitoring the process (mean=2.79, sd=1.37) (R)	.68	.76	.72
9. PRCSF is unique and any degradation or destruction of this area by gas and oil development is a crime (mean=3.96, sd=1.12)	.48	.55	.56
10. Oil and gas companies are fully aware of environmental impacts the industry has on the land and are not going to damage the environment any more than recreationists (mean=3.74, sd=1.12) (R)	.65	.72	.54
11. Drilling for oil and gas on the PRCSF should only be done as a last resort in an economic/energy emergency (mean=3.44, sd=1.23)	.45	.53	.60

Note. N=426 (R)=item was reversed scored for anti-development scale.

internally consistent and unidimensional scale measuring anti-development attitudes.

Since the items were generated from actual comments made by visitors of the Forest in relationship to what they felt about the gas and oil development in the Forest, the scale that was developed was judged to be valid with regard to content. High inter-item correlations and high item-to-total scale score correlations, i.e. item homogeneity, was used as an empirical test of content validity (Ghiselli, Campbell, & Zedeck, 1981). As shown in Table 23, the items were respectably intercorrelated (correlations ranging from .19 to .75, mean=.42) and had high item-to-total correlations (none lower than .45); thus indicating item homogeneity. The degree to which a person's mean score for the anti-development scale correlated with their opinion (strength of approval or disapproval) about gas and oil development was used to test the concurrent predictive criterion validity of the scale. Scores on the anti-development scale correlated highly with scores on a single item (item 16 of the questionnaire) measuring approval of gas and oil development in the Forest ($r=-.81$, $p<.0005$).

Anti-development attitudes and property ownership.

Hypothesis 8: Anti-development attitudes are negatively correlated with property ownership within 50 miles of the Forest

Pearson product-moment correlations indicated that people who owned property within 50 miles of the Forest scored lower on the anti-development attitude scale ($r=-.15$, $p<.001$) than those who did not. Therefore, hypothesis eight was supported. Also, younger individuals were more anti-development than older ($r=-.11$, $p<.013$). Other respondent characteristic variables did not significantly distinguish levels of anti-development sentiment.

Opinion about gas and oil development in the Forest.

Approval or disapproval of gas and oil development was measured with a single item. The sample mean was 2.84 (sd=1.7) with 32% of

Table 23
Anti-development Inter-item Correlations

Items	1	2	3	4	5	6	7
1. excellent job (R)	--						
2. decreased esthetic value	.55						
3. PRCSF no different (R)	.41	.29					
4. beneficial to wildlife (R)	.44	.27	.22				
5. too dangerous	.62	.59	.32	.36			
6. alright if no harm (R)	.72	.52	.39	.48	.59		
7. allow north drilling (R)	.58	.41	.44	.32	.48	.56	
8. ok if watchdog (R)	.65	.47	.33	.41	.53	.74	.49
9. PRCSF unique	.39	.33	.24	.22	.41	.32	.38
10. oil companies aware of impacts (R)	.59	.39	.43	.38	.42	.54	.50
11. only as last resort	.35	.30	.24	.19	.41	.36	.37

	8	9	10
9. PRCSF unique	.28		
10. oil companies aware of impacts (R)	.44	.41	
11. only as last resort	.23	.36	.38

Note. (R)-item was reverse scored

the respondents indicating that they strongly disapproved of gas and oil development in the Forest. Seventeen percent of the respondents moderately disapproved, 16% slightly disapproved, 16% were undecided, 7% slightly approved, 10% moderately approved, and only 1% strongly approved of gas and oil development in the Forest. Similar to anti-development attitudes and individual characteristic correlations, Pearson product-moment correlations between gas and oil development opinion and respondent characteristics indicated that younger individuals were less approving of gas and oil development than older ($r=.13$, $p<.005$). And, people who owned property within 50 miles of the forest were more approving of gas and oil development in the Forest ($r=.15$, $p<.001$). Other demographic variables did not significantly correlate with development opinion.

Value-perception of PRCSF

PRCSF summer visitors primarily value the Forest as a place to go for peace, quiet, and solitude; next as a place for people to see wildlife and enjoy nature, and thirdly as a place to go hunting or fishing. Very few respondents indicated that they value the PRCSF as a source of timber and mineral products as their first, second, or third choice of the ten possible descriptions (see Table 24). Respondents were categorized into four value-perception types based on their ranking of the ten value-perception items. The variable which categorized respondents into value-perception types was created in the same manner as the recreation activity type categorization. Respondents who, in question three of the survey, ranked "a source of timber and mineral products" with a 1, 2, or 3 were coded as an 'economic' value-perception type. Else, respondents who ranked "a place to go hunting or fishing" with a 1, 2 or 3, were coded as a 'harvest' value-perception type. Else, those respondents who ranked any of four nature oriented items ("wilderness", "backcountry", "a place for fish and wildlife to live", or "a place to go for peace, quiet, and solitude") with a 1, 2, or 3 were coded as a 'nature esthetic' value-perception type. All others were coded as a 'recreation'

Table 24
PRCSF Value-perception

Value-perception	Ranking %1	%2	%3	%Top three	Mean	Over-all
A place to go for peace, quiet, and solitude	18	13	21	52	2.05	1
A place for people to see wildlife and enjoy nature	11	15	13	39	2.04	2
A place to go hunting and fishing	15	12	9	36	1.85	3
A place for fish and wildlife to live	12	12	10	34	1.94	4
Wilderness	12	10	9	31	1.87	5
A place to go camping	10	11	9	31	1.98	6
A place for outdoor recreation	5	5	6	16	2.07	7
Backcountry	4	6	6	16	2.18	8
A place for family recreation	3	5	6	14	2.24	9
A source of timber and mineral products	1	0	0	1	1.75	10

Note. N-426 Mean-mean rating for those who ranked item as one of top three choices.

value-perception type since they would have primarily ranked items pertaining to outdoor recreation with a 1, 2, or 3.

Of the 381 respondents who were able to be categorized (11% of the respondents failed to answer the question correctly and therefore were not categorized), 1% were categorized as economic value-perception type, 6% as recreation, 39% as harvest, and 53% as nature esthetic value-perception type. Appropriateness of the obtained typology was checked by tabulating responses across types to the ten value-perception items (see Table 25). Table 26 shows the breakdown of respondent characteristics within each of the value-perception type categories.

Value-perception and Approval/disapproval of Development

Hypothesis 6: The mean level of approval of gas and oil development is lower for those who express nature oriented values regarding the Forest, while the mean level of approval is higher for those expressing an economic benefit value orientation.

Since property ownership within 50 miles of the Forest was negatively related to disapproval of gas and oil development, property ownership was used as a control variable. Analysis of covariance indicated that significant differences existed between value-perception types in relationship to approval/disapproval of gas and oil development of the Forest (see Figure 4). Nature esthetic value types were more disapproving than all three other types, while economic types were the most approving. The variance due to property ownership primarily affected the opinion variable means of the economic and nature esthetic value-perception types, directing the means toward increased levels of approval. Hypothesis six was supported.

Gas and Oil Activities Experience

A majority of summer visitors to the Pigeon River Country State Forest indicated they had seen gas or oil pipeline markers (73%) and areas cleared for gas or oil pipelines (56%) while visiting the Forest.

Table 25
Percent Response to Value-perception Items
by Value-perception Type

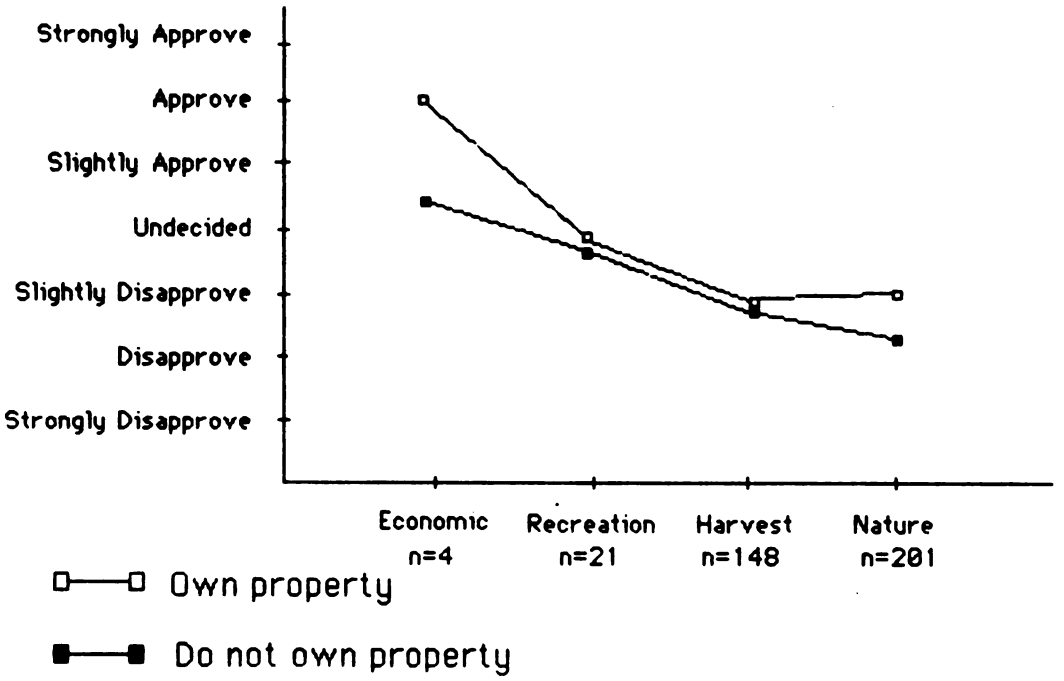
	Value-perception type			
Items	Economic[a]	Recreation[b]	Harvest[c]	Nature[d]
Wilderness	0	0	24	46
Backcountry	25	0	9	26
A source of timber and mineral products	100	0	0	0
A place for outdor recreation	0	79	13	16
A place to go camping	0	88	27	33
A place for people to see wildlife and enjoy nature	50	79	24	54
A place to go hunting and fishing	75	0	100	0
A place for fish and wildlife to live	0	0	38	43
A place for family recreation	25	67	12	11
A place to go for peace, quiet, and solitude	25	0	52	71

Note. n^a=4 n^b=21 n^c=148 n^d=201

Table 26
Value-perception Type Descriptors

	Economic[a]	Recreation[b]	Harvest[c]	Nature[d]
Age (mean)	51	42	38	37
Sex (% female)	0	54	16	38
Residence (% city)	0	34	33	26
Income (median)	35K-50K	25K-35K	25K-35K	25K-35K
Occupation (median)	skilled	skilled	skilled	skilled
Education (median)	some college	high school	some college	some college
Own property within 50 miles of Forest (percent)	50	13	31	22
Miles driven to Forest (mean)	149	181	209	186
Mean number of times visiting PRCSF in last five years	73	18	22	12

Note. n^a-4 n^b-21 n^c-148 n^d-201



Source	SS	df	MS	F	
Property owner	16.77	1	16.77	6.18	p<.013
Percept-value	54.29	3	18.09	6.66	p<.0005
Explained	71.06	4	17.77	6.54	p<.0005
Residual	1002.08	369	2.72		
Total	1073.15	373	2.88		

Eta= 22
Multiple R= 26
Covariate raw regression coefficient=.49

Figure 4
ANCOVA: Opinion by Value-perception Type with Property Ownership

Less than half of the respondents said they had seen gas or oil pipelines (47%), gas or oil trucks (46%), operating well sites (45%), seeded dry holes (44%), a drilling rig (35%), or a gas and oil processing site (33%).

A count command was used in creating a scale pertaining to experience with gas and oil development in the Forest. "Yes" responses to the eight gas and oil activity items were tabulated to form a nine point scale ranging from 0 to 8 on experience level with a mean of 3.73 (sd=2.62, kurtosis=-1.14). Fifteen percent of the sample indicated that they did not experience any gas and oil activities (score=0). Ten percent of the sample scored a 1, another 10% scored a 2, 15% scored a 3, 12% a 4, 10% a 5, 8% a 6, 8% a 7, and 12% of the respondents scored an 8 on the gas and oil activities experience scale. As a validity/reliability check, scale scores were correlated with an item which indicated whether the person spent more time in the developed or the non-developed areas of the Forest. Gas and oil activities experience correlated .17 ($p<.0005$) with primary area indicating those who spent more time in the developed areas saw more development activities (mean=4.27) than those who spent most of their time in non-developed (mean=3.36) areas of the Forest. Also, those who owned property within 50 miles of the Forest had higher levels of gas and oil activities experience ($r=.21$, $p<.0005$).

Gas and oil activities experience and anti-development attitudes.

Hypothesis 7:Levels of gas and oil experience are positively correlated with anti-development attitudes.

Hypothesis 9: The level of correlation between gas and oil experience and anti-development attitudes increases when controlling for property ownership within 50 miles of the Forest.

Pearson product-moment correlations between mean scale scores on the anti-development attitude scale and gas and oil activities experience scale indicated that visitors who experience more gas and

oil activities were more likely to express anti-development attitudes ($r=.18$, $p<.0005$), supporting hypothesis 7. Since property ownership within 50 miles of the Forest was correlated significantly with both measures and in opposite directions for each, controlling for this variable was deemed necessary. First order partial correlations between anti-development and gas and oil activities experience indicated that the strength of the relationship increased ($r=.21$, $p<.0005$) when controlling for property ownership; thus, hypothesis 9 was supported.

Results Summary

Table 27, summarizes the results with regard to the hypotheses tested. In general, recreation motivation was a better predictor of environmental concern than the previously argued recreational activity typology. Motivations, particularly escape/solitude, also correlated with a more specific environmental concern issue, gas and oil development in PRCSF. Visitors' image or value-perception of the Forest was also related to their approval/disapproval of the development such that nature esthetic value types were less approving than economic benefit types. And finally, increased experience with gas and oil activities in the Forest was related to anti-development attitudes--the correlation increased when controlling for property ownership within 50 miles of the forest.

Table 27
Summary of Hypotheses Results

Hypothesis	Supported	Statistics
1: The correlations between recreation type and each of the ten environmental issues are positive	NO	Table 4
2: PRCSF users exhibit a higher mean level of concern for protecting aspects of the environment necessary for pursuing outdoor recreational activities than for more general environmental issues	NO	t=3.14 df=424 p>.05
3: There is a significant difference between recreation types on environmental concern. Abusive recreational users have the lowest mean level of environmental concern, while appreciative users have the highest mean level of concern	NO	F=1.14 p>.05
4: Nature, escape/solitude motivations are positively correlated with environmental concern, while social, self enhancement and challenge motivations are not	YES?NO	Table 20
5: Nature and solitude motivations are positively correlated with negative attitudes toward and disapproving opinions of gas and oil development	YES/NO	Solitude r=.17, -.10 p<.001, .05 Nature r=.06, -.04 N.S.

Table 27 (cont'd.)

Hypothesis	Supported	Statistics
6: The mean level of approval of gas and oil development is lower for those who express nature oriented values regarding the Forest, while the mean level of approval is higher for those expressing and economic benefit value orientation	YES	F=6.66 p<.0005
7: Level of gas and oil experience are positively correlated with anti-devlopment attitudes	YES	r=.18 p<.0005
8: Anti-development attitudes are negatively correlated with property ownership within 50 miles of the Forest	YES	r=-.15 p<.001
9: The level of correlation between gas and oil experience and anti-development attitudes increases when controlling for property ownership within 50 miles of the Forest	YES	r=.21 p<.0005

CHAPTER 4

Discussion

Who visits the Pigeon River Country State Forest in the summer? Results indicate the average visitor is a male in his mid 30's with at least a high school education, possibly some college. His gross family income is between 25 and 35 thousand dollars per year and he generally lives in an urban area in southern lower Michigan. He rarely comes alone to the Forest, usually with one or two other people and spends an average of three days camping and/or fishing. His primary motivations for coming to the Forest are to enjoy nature, seek solitude, relax, have fun, and see animals. He prefers not to meet new people and is not interested in impressing others with his recreation accomplishments. Granted, this does not describe everyone who visits the Forest in the summer. Many visitors are family members sharing their summer vacation with each other and often with friends. Some visitors are loners, while others prefer large groups. Many visitors are explorers, hiking or backpacking, always on the lookout for the rare sight of an elk or a deer. Others are day visitors trying to cool off with a dip in the lake or just driving through the Forest admiring the scenery.

In addition to general characteristics and activities of PRCSF users, three general areas concerning attitudes and experiences were explored. First on the list was the relationship between outdoor recreation participation and environmental concern and possible mediating influences. Second, motivations for recreating on the PRCSF were delineated and their relationship to attitudes was examined. And last, attitudes toward gas and oil development in the Forest were determined with a focus on the relationship between attitudes and value-perceptions. Further, the effect that experience with development activities has on attitudes was also ascertained. The

following discussion will review and integrate the results of these explorations, relate the results to research and theories presented in chapter one, point to and address limitations of the research, propose areas for future research, and discuss implications for resource decision making and management.

Recreational users of PRCSF are rather homogeneous when it comes to their concern for the environment. The majority would prefer the government spent more on environmental issues. The issue as to whether participation in outdoor recreation is or is not associated with environmental concern is fuzzy. If the general population can be assumed to have a normal distribution on the environmental issues measured, the recreation sample's extreme skewness toward the higher end of the scale supports the notion that outdoor recreation is related to environmental concern. However, what the general population does score on the issues measured is not known, as a non-outdoor recreational control group was not used in this particular study.

Further, the causal relationship between outdoor recreation and environmental concern is also unknown. It may be that experience with the environment causes increased awareness and concern for its protection or, conversely, only those who already have strong environmental protection attitudes seek outdoor recreation opportunities. Even more likely, is the possibility that a positive feedback loop exists, such that, any amount of involvement in outdoor activities increases awareness which consequently increases involvement and so on.

As found in previous studies (Dunlap & Heffernan, 1975; Pinhey & Grimes, 1979; Van Liere & Noe, 1981), association magnitudes between categories of outdoor recreation activities and environmental concern, if significant, were small. The present study's results, which were more similar to those found by Geisler and associates (1977), suggest that the link between outdoor recreation and environmental concern is more complex, thus, a search for mediating factors is

suggested. What was related to environmental concern was the same class of variables as found in the past: age, education and place of residence (Lipsey, 1977; Geisler et al., 1977; Tucker, 1978; Van Liere & Dunlap, 1980). Also, three recreation related mediating factors were suggested and also tested: general vs. recreational environmental concern (hypothesis two), activity types (hypothesis three), and motivations (hypothesis four).

Hypothesis two, originally tested by Dunlap & Heffernan (1975), insisted that recreationist's concern for the environment was not homogeneous, but that they would be more concerned about environmental issues most relevant to their recreational pursuit. The present study, however, does not support this hypothesis; Pigeon River Country State Forest visitors, in general, are just as concerned about air and water pollution as they are about preserving forest lands. In comparing the methodology of the two studies, the discrepancy may be due to differences in recreation activity measurement and characteristics of the two samples (general public vs. visitors to a recreational area). Therefore, the extent of the generalizability of this study, in regards to the relationship between outdoor recreation participation and types of environmental concern (i.e., general vs. recreational), may be limited to backcountry and wilderness recreational users.

The research presented in this thesis also showed that recreational activity, whether it was abusive or appreciative, was not related to environmental attitudes. This project's findings clearly showed that the use of a recreational activity typology, such as abusive, consumptive and appreciative categories, to predict attitudes and values was neither appropriate nor productive, especially when looking at a rather homogeneous group of backcountry recreational users. In agreement with Geisler and associates (1977), this study's results lead one to question the conceptual distinction between appreciative, consumptive and abusive behaviors (as defined by recreational activity choice) as predictors of environmental attitudes.

With the ever increasing numbers of recreational users in wilderness and backcountry settings, even the most unobtrusive activity, when thousands of people are yearly participants, can degrade the environment despite the appreciative intent of the activity or of the participants. Also, wilderness and backcountry users are a rather attitudinally homogeneous group; any differences are marginal. If one were to compare non-backcountry users to backcountry users in attitudes and extent of abusive activities, stronger relationships may be found. However, the relationships probably will have more to do with the inherent decision making processes (i.e., motivations and perceptions) with regard to the chosen recreational settings than the chosen activity itself.

A related difficulty in using recreational typologies is that people frequently engage in more than one type of activity at once or in the course of their yearly endeavors; some of the activities may be appreciative, some consumptive, and some abusive. To proportionately quantify the entire range of activities, along with behavioral observation to accurately interpret the extent of abusiveness to the environment of each outing, would be a huge undertaking. A much better and easier to generate recreational activity typology might be derived empirically using factor or cluster analysis techniques such as that used by Levine and Langenau (1979) and Langenau et al. (1984). Finding factors of activities in which people tend to participate and then clustering participants based on their factor scores, may provide a much more conceptually accurate and empirically based recreational activity typology. Whether an empirically based typology would be useful as a predictor of attitudes and values would have to be tested.

More promising, however, is the significant relationship found between specific decision making processes, such as motivations, and environmental concern (hypothesis four). Motivations and attitudes were congruent; those respondents who were highly motivated by escape/solitude, nature, and self-enhancement needs had higher

levels of environmental concern. Yet, the issue of whether motivations direct attitudes or attitudes cause needs which give rise to motivations, is still debatable. Nevertheless, in regards to predicting environmental concern, where associations between recreation activity and environmental concern were found to be negligible, associations were significant, although not as large as one would hope, in regards to escape/solitude motivation. As a result, research exploring decision making processes, such as motivations, as predictors of environmental attitudes may be a much more promising line of inquiry. Consequently, if forest and recreational managers are interested in attitudes and values of recreational participants, they should probably spend more effort measuring user motivations for recreating as opposed to the current and most often used method of quantifying activities.

In measuring motivations, an understanding of the character of the recreational area and the type of visitors the area recruits is essential. As found in this study, nature appreciation motivations, and escape/solitude motivations were highly intercorrelated (r=.56) which led to difficulties in independently defining these motivations. The essential character of the sample was probably the primary cause of the high intercorrelations. Many people who travel to the PRCSF in the summer were escaping the city and searching for the solitude of nature. This would be true for many backcountry and wilderness visitors and probably less true for visitors to more developed recreational areas.

Overall, six dimensions of recreation motivation were delineated: escape/solitude, self-enhancement, social, challenge, nature, and intimacy. These dimensions, although not all inclusive, were consistent with past research regarding recreation motivation (Crandall, 1980). In addition, motivations were found to be differentially correlated with user characteristics such as education,, gender, age, and income. In regards to motivation theory, the six dimensions were intercorrelated in such a manner as to suggest a

hierarchy of importance. For example, self-enhancement was the most highly intercorrelated dimension (mean r=.45) while intimacy was the least intercorrelated (mean r=.25), suggesting a Maslow-type "self-actualization" motivation principle (i.e. the higher the motivation in the hierarchy the more correlated it will be with the lower motivations since the person would have to fulfill the lower motivations in order for motivations higher in the hierarchy to be fulfilled). However, although stimulating, the hypothesis that recreation motivations are hierarchical in nature is speculative and would have to be born out in future research.

In chapter one, three tenets of motivation for outdoor recreation were outlined (Knopf, 1983): (a) motive structures are activity dependent, (b) psychological products of the activity are valued more than the activity itself, and (c) recreation activity participants can be divided into motivationally distinguishable groups. Results supporting hypothesis five, suggest a fourth tenet of recreation motivation: motive structures are not only activity dependent but also setting dependent, i.e. the strength of particular motivations will be dependent upon attitudes and values either promoted or hindered by the particular recreational setting chosen. To illustrate, those people who have strong escape/solitude needs will prefer to recreate in settings which are perceived to fulfill those needs. Similarly, recreation settings which have peaceful and tranquil qualities will tend to encourage and stimulate escape/solitude motivations while those that have more development or high visitor usage will tend to inhibit escape/solitude motivations. Further, and in agreement with past findings (Cooksey et al., 1982; Gramann & Burdge, 1981; Knopf, 1983; Schreyer & Roggenbuck, 1978; Schreyer et al., 1984), motivations are congruent with management preferences that retain or enhance the specific need fulfilling quality of the setting. As a case in point, escape/solitude motivations were not only significantly correlated with environmental concern in general but also with anti-development attitudes specific to PRCSF.

However, in regards to determining attitudes toward and preferences for development of recreational settings, the overall results suggest value-perceptions of the recreational setting (hypothesis six) and experience with development activities (hypotheses seven and nine) as being better predictors. Though the correlations were relatively moderate, PRCSF visitor images of the Forest were found to be congruent with their attitudes toward gas and oil development. Thus, results support past research relating the influence of images on people's preferences for management options (Anderson, 1981; McCool, 1985; Merriam et al., 1972; Schreyer & Roggenbuck, 1981). Nevertheless, whether the congruence between attitudes and perceptions results from visitors choosing recreational areas based on their motivational needs or whether images are created regardless of the actual reality of the setting, is not important. What is important, is the recognition that people tend to seek out and choose areas which, in their eyes, have the potential to fulfill basic needs. If those needs are perceived as not met by the setting, their judgment of the their experience and the quality of the area will be more critical. All other decisional influences held constant, their likelihood of returning to the area will probably be lessened.

In congruence with the 'recreation utility' hypothesis (Mercer, 1971) and the conclusions of Thompson and Blevins (1983), planners need to be aware of the image a recreational setting has in the eyes of its users. People perceive recreation settings in terms of how those settings either encourage their recreational participation or discourage participation. As Knopf (1983) suggests, images held by recreationists affect their behavior. Therefore, if changes are made to the setting, such as gas and oil development, that are not congruent with the value-perception of it's users, a drop in recreational usage could be the least of a recreational manager's problems. Other problems could arise when environmentally concerned, nature-value oriented users are displaced to other recreational systems (as evidenced by Anderson & Brown, 1984; Becker, 1981; Becker et al., 1981; Vaske et al., 1980)

and replaced by less concerned users attracted to the area for reasons other than the area's wilderness or backcountry setting.

As mentioned previously, experience with development in a recreational setting is related to attitudes toward that development. Within PRCSF, people who spend the majority of their time recreating in the southern portion of the Forest see significantly more gas and oil development activities than people who spend most of their time in the north, non-developed areas. Results indicate that a person's degree of experience with gas and oil development while visiting the PRCSF is associated with their attitudes toward that development (hypotheses 7 through 9). In concordance with past research (Becker, 1983; Thompson & Blevins, 1983; Van der Pligt et al., 1986; Wohlwill & Heft, 1977) and in agreement with Langenau and associates (1984), property ownership was negatively correlated with anti-development attitudes. Further, when property ownership was controlled, the relationship between experience and anti-development increased in strength. Therefore, except for those people who own property near the Forest, the more a person experienced the development, the higher was their anti-development attitude.

At least two hypotheses regarding the etiology of the phenomenon of property ownership being negatively correlated with anti-development sentiment can be suggested. The first, arising from utility analysis theory (Boudreau & Berger, 1985), suggests that property owners or those living near or in areas with development have a higher probability of seeing and attributing more benefits from the development than those who are not so closely involved. Thus, seeing more benefit, people are more willing to be supportive of the development. Conclusions made by Thompson and Blevins (1983) and Van der Pligt et al. (1986) support the notion that people living in or near development see more benefits.

A second explanation, arises from cognitive dissonance theory (Festinger, 1957). For people who choose to remain in or near the developed setting, negative attitudes toward the development may

give rise to a dissonant relationship between their actions and beliefs. Such perceptions of discord are uncomfortable and thus motivate the perceiver to modify dissonant elements in order to restore balance. Attempts to maintain a personally perceived 'fit' among beliefs and between beliefs and actions require the person to either change their actions or to reevaluate their beliefs. In the case of property owners near the PRCSF, changing actions (i.e. selling property or discontinuing use of the Forest) is probably more difficult or less appealing than making a change in their belief system; resulting in a more positive attitude toward gas and oil development.

In general, however, it can be concluded that experience with gas and oil development is positively correlated with negative attitudes toward the development Yet, due to the cross-sectional nature of the research, it is not known whether gas and oil activity experience causes the anti-development attitude or whether the attitude causes the person to be more sensitive to the development and, therefore, see more of it. A longitudinal analysis, though more difficult due to possible displacement of recreationists with strong negative feelings about the development to other recreational systems, would be a much better method for determining this relationship.

In recognition of the limitations of cross-sectional research, future research efforts on the Forest should utilize longitudinal methods, with particular attention paid to attitudes and values of the users. Efforts should center around determining the extent to which the gas and oil development has caused displacement among the PRCSF users. A longitudinal analysis of the participants of this study would allow forest planners to determine whether the influx of new recreational visitors to the Forest (50% of this study's sample were newcomers to the Forest as of 1980) is replacing the outflux of disgruntled users (due to the gas and oil development), or whether recreation turnover within the Forest is independent of the development. Given the current evidence, continued development activities can be expected to generate increasingly negative attitudes toward the development for

the general recreational visitor. Therefore, such future efforts would be particularly important and informative if the results showed a shift in the value-perception and attitudes of PRCSF visitors.

In regards to generalizability, a second limitation of the research rests on the assumption that the PRCSF is an unique forest in Michigan which has been the center of much controversy. The people who visit the Forest are assumed to have strong attachments to the area. Therefore, their attitudes and preferences may not extend beyond the PRCSF. Thirdly, it was shown that very few summer visitors were year round recreational participants in the Forest. Each season recruits to the forest new and different types of activity participants. A fall sample of visitors may have totally different attitudes toward development and Forest management options than a summer sample. Further analysis of an entire year's worth of recreational users is necessary in order to determine whether people's attitudes, values, and preferences differ between seasons.

Nevertheless, the values and attitudes expressed by this sample can be generalized to other similar backcountry and wilderness recreational settings, especially in settings where gas and oil development exists or is being proposed. Resource planners need to be aware of the human dimensions of economic development such as gas and oil exploration and extraction. Development activities in wilderness and recreational areas not only effect the natural environment but also the people who use the areas. Their values, attitudes and preferences need to be accounted for and addressed during decision making processes. Research such as this is just a first but necessary step in the process.

In conclusion, whatever their recreational preference, PRCSF visitors have two things in common--their high concern for the environment and their disapproval of gas and oil development in the Forest. Their motivations for coming to PRCSF are congruent with their attitudes and preferences. People come to the forest to get away from civilization and to escape the mechanical elements of human

populations, thus strong negative attitudes toward development are not surprising. As shown in this study, users choose to recreate in and value settings because of the perceived need satisfying qualities those settings provide. For high nature and escape/solitude motivated visitors, any degradation of the setting by man-made intervention is bound to negatively impact on the solitude of the recreational experience and thus decrease their enjoyment. Similarly, visitors who value the PRCSF in terms related to the wilderness, backcountry, and nature esthetic aspect of the setting, will also be negatively effected by gas and oil development activities. Further, users' continued exposure to gas and oil pipelines, drilling sites and oil trucks can be expected to increase negative attitudes toward the development. The extent to which these factors encourage and directly influence displacement of PRCSF's recreational visitors needs to be determined in future longitudinal research efforts.

Environmental impacts are often, in recent history, taken into account when planning for man-made interventions such as mineral extractions. Rarely are recreational setting user's preferences addressed during the decision making processes, especially when debating the costs and benefits of gas and oil development. In effect, impacts from the development on recreational users are ignored. This research points to the implicit fact that an understanding of user motivations, value-perceptions (images) and attitudes is paramount to any decision making process. The land belongs to the people, people are effected by decisions which effect the land. Economic indices should not always be the primary motivating factor in natural resource planning decisions. Both the environmental and human dimensions of resource decisions need to become paramount in the decision making process. To date, data relevant to environmental impacts have yet to be able to slow down private industry's tendency to encroach upon and exploit public lands. In the future, if greater emphasis is placed on the benefits (i.e. stress release, sense of well being and accomplishment, etc.) natural areas provide to users, and

the negative effects of development on those human benefits, maybe fewer natural areas will fall prey to the economic interests of private industry.

APPENDICES

APPENDIX A
Chronology of Events

APPENDIX A

Chronology of Events

(Excerpted from Charles, 1985; Johnston, 1982; and Moran, 1982)

1918-1919	Seven Rocky Mountain Elk are released in Otsego County in an attempt to reestablish a wild elk population in Michigan
1919	Parish S. Lovejoy begins a drive to increase the State's landholdings in the Pigeon River Country
May 14. 1970	DNR approves Shell Oil's request to drill at the Charlton #1-4 site
July 1, 1970	Shell oil announces a major oil strike at Charlton #1-4 site on the Lost Cabin Trail, a two-track path near the Pigeon River Research Station
July 23, 1970	Gerald Eddy, DNR's state supervisor of wells, announced that oil companies would be allowed to drill eight wells per square mile
Sept.. 1970	Natural Resources Commission orders the supervisor of wells to stop issuing oil and gas drilling permits for sites in the Pigeon River Country
Oct. 1, 1970	The Michigan Environmental Protection Act (HB-3055), designed to give citizens the right to sue both polluters and government agencies that are negligent in preventing pollution, becomes effective and, three months later, is signed into law by Governor William G. Milliken.
Dec., 1970	Natural Resources Commission drafts a new oil and gas leasing policy which prohibits drilling within a quarter of a mile of any lake or principal stream to which the state holds mineral rights, regardless of whether it is

	on state or public lands. The Commission also bans drilling in all state parks and recreation areas, state forest campgrounds, and dedicated game areas, and it prohibits the development of a drilling area until the company holding the lease has received written approval from the area forester for locating access roads and disposing of destroyed forest products. Also, if a lease holder fails to begin development within three years and if the company did not apply for an extension, the lease will be terminated.
April, 1971	Michigan Attorney General, Frank Kelley, hands down a legal opinion stating that the DNR does have the authority to deny oil drilling permits on already leased land if drilling will threaten the environment. Further, the DNR is legally required to prevent drilling where it will cause "unnecessary damage to, or destruction of, the surface, soils, animal, fish or aquatic life" of the area or where it will "molest, spoil or destroy state-owned land."
July 21, 1971	Ford Kellum unveils a plan to establish a 120 square mile elk wilderness area in the heart of the Pigeon River Country
Sept., 1971	Ford Kellum organizes the Pigeon River Country Association to help fight against the oil and gas development of the PRCSF
January, 1972	Ralph MacMullan, director of the DNR, vetoes oil company requests to open the Black River Swamp west of Lost Cabin Trail to oil drilling under a unitization plan that requires all drilling to be done by a single company rather than by a number of individual firms.
May, 1972	Natural Resources Commission approves lease sales on

	nearly 500,000 acres of state lands in northern Michigan. Anticipated revenues from the oil companies are estimated at between three and six million dollars.
June, 1972	McClure Oil Company (Michigan Oil) acquires lease rights to lands on the Round Lake Trail just two miles east of the Pigeon River Research Station
July 10, 1972	Natural Resources Commission designates the Pigeon River Country as a special resource management area
1973	Oil embargo by Middle East oil exporting nations sends America into an "energy crisis"
March 15, 1973	The DNR becomes the one regulatory agency for all of Michigan's environmental matters as well as natural resource matters under the order of Governor Milliken
August, 1973	Pat Huber, a geological engineer for Shell Oil, explains to the Natural Resources Commission that the richest deposits of oil are located in the southern portion of the Pigeon River Country in Otsego County and that they diminished as they run north into Cheboygan County. He estimates that all of the oil can be removed from PRCSF within 25 years and that the oil companies can thus be out of the area completely by the year 2000
Oct. 10-11. 1973	Frederick S. Abood recommends that permits be issued to the oil industry to drill in all parts of the Pigeon River Country, and that the DNR has no choice but to approve the permit to drill at the Corwith #1-22 site
Dec., 1973	The Natural Resources Commission adopts a proposed management plan for the Pigeon River Country calling for the DNR to "protect and maintain the natural

beauty of [the state's] forests and waters, to sustain a healthy elk herd and wildlife populations and to practice management and wise use of all its resources....to avoid disturbance during the critical time of nesting, young-bearing and the early weeks of life of wild young; off-road activities of logging will not be permitted from April 15 through June 30 in either elk range or wildlife habitat management areas." In addition, the plan calls for closing some roads and banning all motorized vehicles from the area as well as returning some segments to their natural wild state.

Jan. 31, 1974 — 140 square mile tract within the Pigeon River Country is officially designated as a State Forest. Ned Caveney is appointed to be the first manager of the Pigeon River Country State Forest.

Feb., 1974 — The West Michigan Environmental Action Council joins in the fight against oil development on the PRCSF claiming that Frederic Abood had overlooked several important aspects of the state and federal Environmental Protection Acts in recommending that the Corwith #1-22 well drilling permit be granted.

April 12, 1974 — The Natural Resources Commission formally denies a drilling permit for the Corwith #1-22 well.

May 17, 1974 — An eighteen member Pigeon River Country Citizen's Advisory Council is established to assure response of management to the wishes and needs of people, help gain understanding, assistance, and support for the programs of management and decisions made, maintain a balance between various interests served, avoid implementation of programs or actions with potentially adverse effects, and to help overcome

problems encountered in the management of the PRCSF.

August, 1974 Michigan Oil Company files suit in the Ingham County Circuit Court asking that the Natural Resources Commission's decision to impose a drilling ban be overturned

March, 1975 A DNR survey of the Pigeon River Country estimates the total elk population to be between 170 to 180. Continuing poaching is cited as the principal cause of the reduction in the herd.

June 4, 1975 Ingham County Circuit Court Judge Thomas Brown hands down his ruling concerning the Corwith #1-22 drilling site: the State of Michigan has every right to refuse permission to drill on land in the Pigeon River Country.

Aug. 14, 1975 Howard Tanner presents a 31 page "hydrocarbon management plan" which calls for permitting drilling in the southern third of the Pigeon River Country where four wells were already operating.

Aug.26, 1975 Governor Milliken orders the DNR to draft an environmental impact statement for proposed oil development in the Pigeon River Country. The Michigan Environmental Review Board also requests that the DNR draft a statement to review whether oil drilling should be allowed in the area at all.

Dec.7, 1975 Natural Resources Commission reviews the environmental impact statement prepared by a DNR task force headed by Jack Bails. The report recommended that if drilling was allowed at all, it should be restricted to the southern third of the forest.

Dec., 1975 The Pigeon River Country Advisory Council votes nine

	to two to approve the recommendations of the DNR's environmental impact study for limited, unitized drilling in the southern third of the Forest.
Dec. 31, 1975	The executive committee of the Michigan Chapter of the Sierra Club votes to endorse the DNR proposal to allow limited drilling in the Pigeon River Country as a compromise move to make the best of a bad situation.
Jan. 22, 1976	The Michigan Chapter of the Sierra Club's executive committee reverses it's December 31st decision
Feb. 7, 1976	The Pigeon River Country Advisory Council reverses it's December decision and votes nine to two to oppose all futher drilling in the Pigeon River Country State Forest
May 10, 1976	Governor Milliken comes out strongly against oil drilling in the Pigeon River Country State Forest. He also opposes any lease extensions for the oil companies that do not contain "no-drill" clauses.
May 14, 1976	A compromise "Stipulation and Consent Order" was entered into by the Natural Resources Commission and Shell Oil Company, Amoco Production Company, and Norther Michigan Exploration Company. This compromise provides for limited oil and gas development in the southern portion of the PRCSF. In return, the northern two-thirds of the Forest would be off limits to oil and gas development for 25 years. Shell Oil Company is declared the sole operator representing all leaseholders.
May 21, 1976	Shell Oil, Amoco, and Northern Michigan Exploration (Consumers Power Company) file applications with the DNR for permits to do exploratory drilling in the PRCSF
June 11, 1976	The Natural Resources Commission approves of a "Stipulation and Consent Order", a compromise plan

between the DNR and major lease holders that allows for drilling in 15,000 acres of the southern third of the PRCSF. The plan also calls for a moratorium on drilling in some northern sectors of the Forest for as many as ten years and for extending other leases on northern lands for 25 years with nondevelopment stipulations.

Aug. 13, 1976 The Natural Resources Commission refuses a formal request by Attorney Roger Connor, representing the Pigeon River Country Association, the West Michigan Environment Action Council, Trout Unlimited, the Sierra Club, and the Michigan Nature Association, that it review its June decision to allow drilling in the Forest

October 1976 The coalition of conservation groups dedicated to protecting the PRCSF from gas and oil exploitation, represented by Attorney Roger Connor, files suit in the Ingham County Circuit Court asking that the Commission's agreement with the oil companies be overturned

Oct. 21, 1976 The Michigan Court of Appeals rules to uphold the DNR's refusal to grant drilling rights to Michigan Oil Company at the Corwith #1-22 site

Nov. 9, 1976 Judge Thomas Brown rules that the Natural Resources Commission's agreement with the oil companies did not in itself authorize drilling. He holds that all drilling permits will have to be subject to further review to prove that drilling will not cause any environmental damage. He also notes that citizens have the right to contest any permits under the provisions of the Michigan Environmental Protection Act and the Oil and Gas Act.

May 6, 1977 The Michigan Supreme Court refuses to overturn

	lower court rulings blocking the Michigan Oil Company from drilling at the Corwith #1-22 site
Dec., 1977	Shell oil company drills a discovery oil well in Section 11 of Charlton Township. Before a second well can be drilled the Michigan Supreme Court temporarily enjoined further drilling in the Forest.
Jan. 7, 1978	Survey results are released which show an increase in the elk population from 159 sighted the previous year to 255. The increase is attributed to more effective prevention of poaching and an increase in quiet areas following restrictions of oil and gas exploration activities.
Feb. 20, 1979	The Michigan Supreme Court rules by a four to three majority that the consortium of oil developers could not drill its ten proposed exploratory wells in the PRCSF because of the environmental damage it would cause. In the related Corwith #1-22 case, the high court rules by a similar four-justice majority that the Natural Resources Commission had acted within its legal authority in denying Michigan Oil Company a permit to drill for oil in the PRCSF
1980	Michigan slides into an economic recession bordering on a full-scale depression. Shell Oil Company lobbies with State legislators in an effort to woo them with promises of a quick fix to their financial problems. Senate Bill 1119 is written to permit drilling for oil and gas in Michigan's state parks, offshore areas of the Great Lakes, and other protected areas.
April 3, 1980	SB-1119 is sent to the Senate Commerce Committee instead of the Senate Conservation Committee. Lawmakers, staunchly defending the bill, note that lifting the drilling ban in the PRCSF would bring an

extra 800 million dollars into the state treasury. Governor Milliken threatens to veto the bill unless legislators make a number of changes, including: a restriction of drilling to the southern third of the PRCSF and imposition of strict environmental safeguards on all development.
The bill is passed and signed into law early in 1980.

Nov. 24, 1980 A new "Amended Consent Order" is put into effect, calling for sequential development from south to north in the area open to oil and gas development. Shell Oil Co. and the DNR are required to show that they can operate, observing all of the environmental safeguards, before drilling can proceed into the more sensitive areas to the north. The Pigeon River Country State Forest Advisory Council is empowered to review all oil and gas activities and to provide the Director of the DNR with recommendations for his guidance. The Amended Consent Order requires the oil companies to provide $85,000 for studies to "identify the impacts on recreational use and wildlife and to investigate the factors of wildlife population dynamics in order to make recommendations for enhanced wildlife management within the PRCSF." A Pigeon River Country Study Committee composed of DNR staff is formed to design and direct the studies.

Dec.15, 1980 Ingham County Circuit Court rules that all exploration and drilling in the northern two-thirds of the forest will be banned for a period of 20 years.

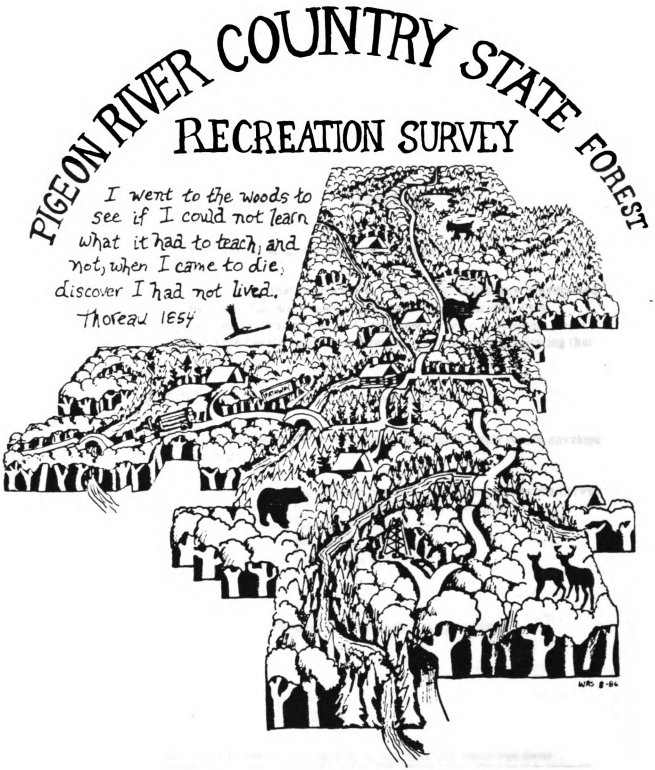
1982 The First Annual Report of the Pigeon River Country State Forest Study Committee is published.

Sept. 8, 1982 6640 acres are added to the Pigeon River Country State Forest. The area, formally called "Green

	Timbers", is to be managed as a no-motorized vehicle access area and recommendations for specific management objectives regarding wildlife habitat and timber harvesting are made.
March 1986	A proposal is made by the Pigeon River Country Study Committee to re-examine the impacts of gas and oil development. The proposed study will survey both the northern and southern regions of the Forest and will also include a survey of the new "Green Timber" addition.
June 1, 1986	Plans are finalized and the proposed research of the PRCSF begins with the cooperation of several Michigan State University graduate students and faculty.

APPENDIX B
Questionnaire and Map

APPENDIX B
Questionnaire and Map



Pigeon River Country State Forest Recreation Survey

Directions

* Please answer all questions as best as you can.

* It is important that the person to whom the questionnaire is addressed fills it out. This will ensure representativeness. Parents: if the questionnaire was addressed to someone 12 years or younger, please return the questionnaire unanswered with a statement indicating that fact.

* Do not write your name on the questionnaire.

* Return the questionnaire using the addressed pre-paid return envelope provided to:

Pigeon River Country State Forest Recreation Survey
C/O Department of Natural Resources
Forest Management Division
Box 30028
Lansing, Michigan 48909

Thank-you for your cooperation

Cover art by: Bill Starrett, Assistant Area Forester, Pigeon River Country State Forest
Research is sponsored by: Michigan Department of Natural Resources and Michigan State University

1. We're interested in finding out what areas of the Pigeon River Country State Forest people go to the most. In the past five years, in what area would you say you have spent the most time? Find the area you spend the most time in by using the map provided. Check the box of the area. Then, if you have a particular spot or campground that you visit often, please tell us the name of it.

☐ NORTHERN AREA

☐ SOUTHERN AREA

☐ GREEN TIMBERS

Favorite spot? _____

2. We would like to know how you feel about the management of the Pigeon River Country State Forest. Please indicate whether you would like more, the same, or less of the following. Circle one answer for each item

[Circle your answer]

Backcountry/roadless areas	LESS	SAME	MORE
Timber harvesting for wildlife habitat improvement and maintenance	LESS	SAME	MORE
Hiking trails	LESS	SAME	MORE
Enforcement of Forest rules by DNR personnel	LESS	SAME	MORE
Off-road vehicle trails	LESS	SAME	MORE
Cross-country ski trails	LESS	SAME	MORE
Access to lakes and streams	LESS	SAME	MORE
Forest openings for wildlife viewing	LESS	SAME	MORE
Game-law enforcement patrols	LESS	SAME	MORE
Improved boat landings at lakes or campsites	LESS	SAME	MORE
Campsites with a view of water (lake or river)	LESS	SAME	MORE
Picnic tables at campsites or lakes	LESS	SAME	MORE
Mature virgin forest stands	LESS	SAME	MORE
Visible evidence of gas and oil development	LESS	SAME	MORE
Horseback riding trails and facilities	LESS	SAME	MORE
Timber harvesting for economic benefit	LESS	SAME	MORE

-2-

3. How do you view the Pigeon River Country State Forest (PRCSF). Please number (rank) the statements below to indicate what the PRCSF means to you. Put a 1 by the one statement which in your opinion, best describes the PRCSF, a 2 by the second best statement, and a 3 by the third best statement and so forth to 10. **Please, use each number only once**

___ Wilderness
___ Backcountry
___ A source of timber and mineral products
___ A place for outdoor recreation
___ A place to go camping
___ A place for people to see wildlife and enjoy nature
___ A place to go hunting or fishing
___ A place for fish and wildlife to live
___ A place for family recreation
___ A place to go for peace, quiet, and solitude

4. We're also interested in finding out what types of things and experiences people prefer when they visit the PRCSF. How desirable are the following to you in regards to your outdoor recreation experience on the PRCSF? **Circle** the number of the answer which best describes your feelings.

	Very Undesirable	Somewhat Undesirable	Undecided	Somewhat Desirable	Very Desirable
Absence of man-made features (except trails)	1	2	3	4	5
Improved roads	1	2	3	4	5
Areas off limits to motorized vehicles	1	2	3	4	5
Forests, flowers and wildlife much the same as before the pioneers	1	2	3	4	5
Fully developed campgrounds with showers, flush toilets, and electrical hookups	1	2	3	4	5
Camper trailer or RV for overnight visits	1	2	3	4	5
Large geographical area	1	2	3	4	5
Remoteness from towns or cities	1	2	3	4	5
Little evidence of other visitors before you	1	2	3	4	5
No motorized travel by visitors except on roads	1	2	3	4	5
Restaurants nearby	1	2	3	4	5
Lodges and motels nearby	1	2	3	4	5
Advanced reservations at campsites	1	2	3	4	5
Nature interpretive trails with signs identifying plant and animal life in forest	1	2	3	4	5

5. Please indicate how strongly you would approve or disapprove of the following future management options for the Pigeon River Country State Forest. Circle the number of your answer for each of the items.

	Strongly Disapprove	Moderately Disapprove	Undecided	Moderately Approve	Strongly Approve
Catch and release fishing	1	2	3	4	5
Regulations that produce big fish	1	2	3	4	5
Prohibit taking or attempting to take game with bait	1	2	3	4	5
Restrict all motorized vehicles to a designated road system	1	2	3	4	5
Prohibit low-flying aircraft	1	2	3	4	5

On _____, a recreational survey postcard was placed on the vehicle you were traveling in while visiting the Pigeon River Country State Forest. We would like to know a few things about your experiences in the Forest during that trip. **Please refer your answers to questions 6 through 11 only to the trip during which you were asked to fill out a recreational survey card.**

6. What do you consider is the **one** primary activity you were engaged in while on the Pigeon River Country State Forest (PRCSF)? If you did more than one thing (example. camping and stream fishing), pick the one you consider to be the most important. If you were hunting, please list type of game (example: woodcock hunting, archery deer hunting, etc). If you were fishing, please indicate whether it was stream fishing or lake fishing.

PRIMARY ACTIVITY: _____

7. We would like to know how long your visit lasted. How many days did you actually spend in the PRCSF during the trip on which you were contacted?

_____ **DAYS**

8. How would you rate your overall enjoyment of your visit to the Pigeon River Country State Forest? Check the box which indicates your answer.

- ☐ **VERY POOR**
- ☐ **POOR**
- ☐ **NEITHER GOOD NOR POOR**
- ☐ **GOOD**
- ☐ **VERY GOOD**

9. What kinds of wildlife did you see while visiting the Pigeon River Country State Forest? Please list.

_____

-4-

10. Do you plan to return to the PRCSF in the near future? Circle your answer.

NO

YES

11. We're also interested in people's motivations for their choice of outdoor activities. Why did you choose to do what you did (your primary recreational activity) while visiting the PRCSF? Circle the number of the answer which best describes the degree of importance of each of the following motivations for your outdoor recreation while visiting the PRCSF.

	Not at all Important	Slightly Important	Moderately Important	Very Important
To enjoy the sights, sounds and smells of nature	1	2	3	4
To see wild animals	1	2	3	4
To be in a quiet and peaceful place	1	2	3	4
To get away from the pressures of work or school	1	2	3	4
To relax	1	2	3	4
To practice your skills and abilities (fishing, hunting, hiking, outdoor cooking, etc.)	1	2	3	4
To challenge nature or wildlife	1	2	3	4
To harvest (mushroom or berry picking, hunting, fishing, cutting wood, etc.)	1	2	3	4
To do things on your own	1	2	3	4
To meet people	1	2	3	4
To be with your family or friends	1	2	3	4
To share your skills and knowledge with others	1	2	3	4
To share intimacies with people you love	1	2	3	4
To learn more about yourself	1	2	3	4
To think about who you are and where your life is going	1	2	3	4
To have fun	1	2	3	4
To enjoy the excitement of a challenging experience	1	2	3	4
Physical exercise	1	2	3	4
To experience something new and different	1	2	3	4
To do an impressive thing	1	2	3	4
To be able to share your experiences with others at home	1	2	3	4
To breath clean air	1	2	3	4
To be in a safe environment	1	2	3	4
To get away from civilization	1	2	3	4
To be alone	1	2	3	4
To be in a place with very little human evidence	1	2	3	4

12. Had you visited the Pigeon River Country State Forest before the trip on which you were contacted? Circle your answer.

NO

YES ——→ **12a.** If yes, in what year did you first visit the Forest?

YEAR? _____

12b. How many times in the last five years have you visited the PRCSF?

_____ TIMES

13. During the past 12 months, which of the following activities have you done within the Pigeon River Country State Forest? Check all the boxes that apply.

- ☐ Cross country skiing
- ☐ Non-motorized boating (tubing, canoeing, sailing, etc.)
- ☐ Motorized boating
- ☐ Horseback riding
- ☐ Firearm deer hunting
- ☐ Archery deer hunting
- ☐ Elk hunting
- ☐ Grouse or woodcock hunting
- ☐ Other small game hunting
- ☐ Scenic driving
- ☐ Hiking
- ☐ Camping
- ☐ Swimming
- ☐ Lake fishing
- ☐ Stream fishing
- ☐ Snowmobiling
- ☐ Picnicking
- ☐ Berry picking
- ☐ Backpacking
- ☐ Work (logging or oil company)
- ☐ Motorized trailbike riding (2 wheel)
- ☐ 3 or 4 wheel ATV riding
- ☐ Non-motorized bike riding
- ☐ Gathering fuel wood
- ☐ Watching birds and wildlife
- ☐ Nature photography
- ☐ Mushroom hunting
- ☐ Group sport such as baseball, football, volleyball, etc.
- ☐ Other, please specify _____

14. Have you ever seen any of the following gas and oil development activities while visiting the PRCSF? Circle one answer to each item.

	(circle your answer)		
Drilling site with drilling rig	NO	YES	Not Sure
Well site in operation (no drilling rig)	NO	YES	Not Sure
Oil and gas processing site	NO	YES	Not Sure
Area cleared for drilling, but now seeded (dry hole)	NO	YES	Not Sure
Gas (yellow) or oil (red) pipeline markers/signs	NO	YES	Not Sure
Gas or oil pipelines	NO	YES	Not Sure
Areas cleared for gas or oil pipelines	NO	YES	Not Sure
Gas or oil trucks	NO	YES	Not Sure

15. How has gas and oil development of the Pigeon River Country State Forest affected your recreational enjoyment while on the forest? Check one box only.

- ☐ REDUCED my enjoyment A LOT
- ☐ REDUCED my enjoyment A LITTLE
- ☐ My enjoyment was NOT INFLUENCED
- ☐ INCREASED my enjoyment A LITTLE
- ☐ INCREASED my enjoyment A LOT

16. What do you personally think about gas and oil development of the Pigeon River Country State Forest? Check one box only.

Strongly Disapprove	Disapprove	Slightly Disapprove	Undecided	Slightly Approve	Approve	Strongly Approve
☐	☐	☐	☐	☐	☐	☐

17. How strongly do you agree or disagree to the following statements regarding gas and oil development in the Pigeon River Country State Forest (PRCSF)? Circle one answer for each item

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
The oil companies and the DNR have done an excellent job with gas and oil development in the PRCSF; the program should continue as planned	1	2	3	4	5
Gas and oil development has greatly decreased the peace, solitude and esthetic value that the PRCSF offers	1	2	3	4	5
The PRCSF isn't any different from any other state forest and therefore should be managed just like any other state lands, including gas and oil development	1	2	3	4	5
The areas that are cleared for drilling, if seeded and maintained, are beneficial to and attract wildlife	1	2	3	4	5
The possible dangers and harm from oil spills, blowouts and leakages override the economic benefits from gas and oil drilling on the PRCSF, drilling should not be allowed	1	2	3	4	5
Gas and oil development of the PRCSF is alright as long as the oil companies can keep the machinery quiet, limit odors, and not harm the environment	1	2	3	4	5
Gas and oil drilling should also be allowed in the northern area of the PRCSF, not just in the southern area as is currently allowed	1	2	3	4	5

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Gas and oil development of the PRCSF is ok as long as someone who is more interested in the land and wildlife than the money is watching over and monitoring the process	1	2	3	4	5
PRCSF is unique and any degradation or destruction of this area by gas and oil development is a crime	1	2	3	4	5
Oil and gas companies are fully aware of environmental impacts the industry has on the land and are not going to damage the environment any more than recreationists	1	2	3	4	5
Drilling for oil and gas on the PRCSF should only be done as a last resort in an economic/energy emergency	1	2	3	4	5

18. We're also interested in what people think about environmental issues. Please tell us what you think about the following environmental concerns. **Indicate whether you think the government should spend more, the same, or less money on the following issues** Circle one answer for each item.

	[circle your answer]		
A. Maintaining forested areas for public enjoyment	LESS	SAME	MORE
B. Saving unspoiled natural areas for the future	LESS	SAME	MORE
C. Protecting endangered species of wildlife	LESS	SAME	MORE
D. Litter control and clean up	LESS	SAME	MORE
E. Controlling air pollution	LESS	SAME	MORE
F. Preventing agricultural or industrial pollution of water	LESS	SAME	MORE
G. Preserving forests and other natural areas for wildlife	LESS	SAME	MORE
H. Preventing oil and gas exploration in wilderness areas	LESS	SAME	MORE
I. Toxic waste pollution control and clean up	LESS	SAME	MORE
J. Control damage done to natural areas from over use	LESS	SAME	MORE

19. Which of the above environmental issues do you feel are the most important and, therefore, should have the highest priority? Put the letter of the concern listed above (in question 18) in the space provided to indicate your first, second and third priorities.

____ **FIRST PRIORITY**

____ **SECOND PRIORITY**

____ **THIRD PRIORITY**

-8-

20. How much do you agree or disagree with the following statements about economic and environmental trade offs. Circle one answer for each item.

	Strongly Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Strongly Agree
Some natural areas should be preserved despite the loss of economic benefits	1	2	3	4	5
Needs of local communities for jobs should come before Michigan's need for environmental quality	1	2	3	4	5
Too many areas are being managed for recreation instead of economic development	1	2	3	4	5
Some natural areas should be left alone for plant and animal life to live and grow undisturbed, not for people's recreation or economic development	1	2	3	4	5
Industries should be forced to shut down if they refuse to meet government pollution standards	1	2	3	4	5
Even if a business is causing a lot of pollution, it should not be forced to stop operations if it would put people out of work	1	2	3	4	5

21. We're also interested in the people who visit the forest, what they are like and things they do at home so that we can better understand the people who use the Forest Please, indicate whether you have or have not done the following activities, and whether you would be willing to do it sometime in the future. **Please, circle an answer for both questions: Have done? and Would be willing?**

	Have Done? (circle answer for both questions)		Would be Willing? (circle answer for both questions)	
Join a group or club which is concerned solely with environmental issues	NO	YES	NO	YES
Contact a community agency to find out what can be done about pollution and environmental degradation	NO	YES	NO	YES
Contact a Congressperson or a Government official about environmental problems	NO	YES	NO	YES
Volunteer your time to an organization to help improve or protect the natural or city environment	NO	YES	NO	YES
Attend a meeting which focused on topics related to protecting and/or improving the natural or city environment	NO	YES	NO	YES
Switch products for environmental reasons	NO	YES	NO	YES
Subscribe to environmental/ecological publications	NO	YES	NO	YES

	Have Done? (circle answer for both questions)		Would be Willing? (circle answer for both questions)	
Make a monetary contribution to environmental causes	NO	YES	NO	YES
Grow a vegetable or fruit garden	NO	YES	NO	YES
Can and store fresh fruits or vegetables for later use	NO	YES	NO	YES
Have a home energy audit to determine the types and amount of weatherization your home needs	NO	YES	NO	YES
Heat your home with wood fuel	NO	YES	NO	YES
Improve the weatherization of your home (i.e. caulking, insulation, storm windows, etc.)	NO	YES	NO	YES
Support a stricter bottle law	NO	YES	NO	YES

Finally, we would like to ask you some questions about yourself to help interpret the results.

22. Please indicate how often and why you may or may not do the following. Circle the number which indicates how often you do the following activities. Then, put a check in the box to indicated your reasons for doing or not doing the activity. **Personal** means that it's your personal preference. **Economic** means it is for economic reasons. If you check the **Other** box, please specify your reasons in the space below the item

	How often? Never	Rarely	Sometimes	Often	Always
Ride a bicycle for exercise/recreation	1	2	3	4	5
Why? ☐ Personal ☐ Economic ☐ Other					
Recycle newspapers used at home	1	2	3	4	5
Why? ☐ Personal ☐ Economic ☐ Other					
Participate in a carpool	1	2	3	4	5
Why? ☐ Personal ☐ Economic ☐ Other					
Limit energy use	1	2	3	4	5
Why? ☐ Personal ☐ Economic ☐ Other					
Do your own home or car maintenance	1	2	3	4	5
Why? ☐ Personal ☐ Economic ☐ Other					
Buy furniture or clothing at garage sales or second hand stores	1	2	3	4	5
Why? ☐ Personal ☐ Economic ☐ Other					
Make furniture or clothing for family	1	2	3	4	5
Why? ☐ Personal ☐ Economic ☐ Other					
Make gifts instead of buying them	1	2	3	4	5
Why? ☐ Personal ☐ Economic ☐ Other					

-10-

23. To what organizations do you belong? Put a check in the box if you belong to the organization. If you do not belong to any organizations, check the box which says **None**.

- ☐ Wilderness Society
- ☐ Sierra Club
- ☐ Audubon Society
- ☐ Nature Conservancy
- ☐ Trout Unlimited
- ☐ Bass Anglers Sportsmans Society
- ☐ National Rifle Association
- ☐ National Wildlife Federation
- ☐ Bowhunters Association
- ☐ East Michigan Environmental Action Council
- ☐ West Michigan Environmental Action Council
- ☐ Pigeon River Country Association
- ☐ Chamber of Commerce
- ☐ Michigan oil and gas association
- ☐ Michigan United Conservation Clubs
- ☐ Deer Hunters Association
- ☐ **None**
- ☐ Other organization, please specify _____

24. In what State and county do you live?

STATE (name) _____

COUNTY (name) _____

25. How many miles (one-way) did you drive to get to the Pigeon River Country State Forest from your permanent residence?

_____ **MILES**

26. Do you own property within 50 miles of the Pigeon River Country State Forest? **Circle** answer.

NO

YES → **26a.** If yes, how would you classify this property and how long have you owned it? Check the box next to the type of property, then indicate the number of years you have owned it in the space provided.

Type?	Years Owned?
☐ Permanent residence	_____
☐ Summer residence	_____
☐ Undeveloped property	_____

27. How would you describe the area in which you are presently living? Check the one box which best describes the area in which you are currently living

- ☐ LARGE CITY (more than 500,000 people)
- ☐ MEDIUM CITY (100,000 to 500,000 people)
- ☐ SUBURB OF A MEDIUM OR LARGE CITY
- ☐ SMALL CITY (25,000 to 100,000)
- ☐ SMALL TOWN OR VILLAGE
- ☐ FARM
- ☐ RURAL AREA OTHER THAN FARM

28. What is your sex? Circle answer.

MALE

FEMALE

29. What is your age?

_____ YEARS

30 What is the **highest** level of formal education you have completed? Check **one** box.

- ☐ LESS THAN A HIGH SCHOOL DIPLOMA
- ☐ HIGH SCHOOL DIPLOMA OR EQUIVALENT
- ☐ SOME COLLEGE OR POST HIGH SCHOOL TRAINING
- ☐ ASSOCIATE'S DEGREE
- ☐ BACHELOR'S DEGREE
- ☐ GRADUATE STUDIES/MASTER'S DEGREE
- ☐ DOCTORAL DEGREE

31. Which of the following catagories best describes your <u>total</u> family income during 1986? Check **one** box

- ☐ LESS THAN $10,000
- ☐ $10,000 TO $14,999
- ☐ $15,000 TO $24,999
- ☐ $25,000 TO $34,999
- ☐ $35,000 TO $49,999
- ☐ $50,000 OR MORE

32. Which one of the following best describes your occupation? Check **one** box only

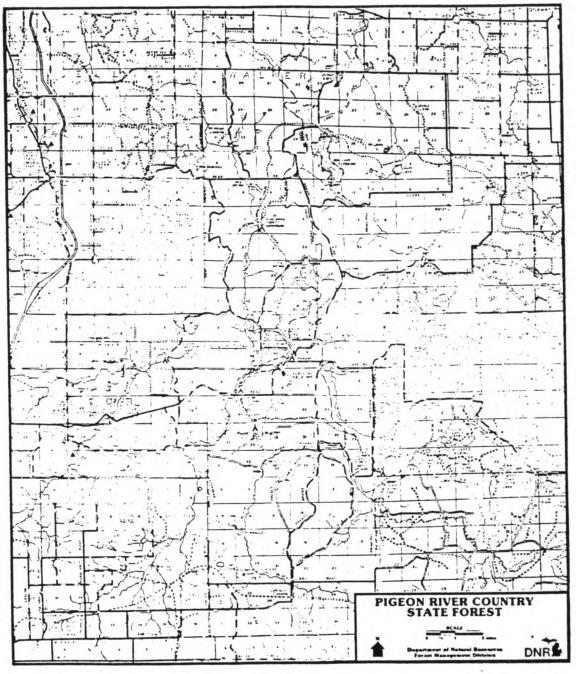
- ☐ Artist, writer, designer
- ☐ Farmer, agricultural worker
- ☐ Homemaker
- ☐ Manager, administrator, proprietor
- ☐ Professional with advanced degree
- ☐ Teacher, counselor, social worker, nurse
- ☐ Semi-skilled or apprentice craftsperson
- ☐ Skilled worker, craftsperson, technician
- ☐ Sales, clerical
- ☐ Employed by gas & oil industry (sales, extraction, refinery, management, etc.)
- ☐ Student
- ☐ Unemployed
- ☐ Retired
- ☐ Other, please specify _____

If you have anything else that you would like to tell us about how you feel about gas and oil development of the Pigeon River Country State Forest or about managment of the Forest, please use this space for that purpose.

Also, any comments you wish to make that you think may help us in future efforts to understand what Pigeon River Country State Forest visitors want from Forest management and the Department of Natural Resources will be appreciated, either here or in a separate letter.

Your contribution to this effort is greatly appreciated. Please, before you send the completed questionnaire back to us, check it over to make sure you haven't missed any pages and that all questions have been answered. As this project is a year long study, results will not be available until after September 1987. If you would like a summary of the results, please print your name and address on the back of the return envelope (NOT on this questionnaire). We will see that you get it when it becomes available.

Thank You


PIGEON RIVER COUNTRY
STATE FOREST
SCALE
Department of Natural Resources
Forest Management Division
DNR

Map

APPENDIX C
Pilot Interview

APPENDIX C

PILOT INTERVIEW
PIGEON RIVER COUNTRY STATE FOREST
RECREATION SURVEY

1. How many years have you been visiting the Forest?

2. How did you first come to know about the Pigeon River Country State Forest?

3. When did you first visit the Forest?

4. How many days are you spending in the Pigeon River Country State Forest on this trip?

5. What type of recreational activities are you doing while visiting the Forest?

6. What other types of recreational activities have you done while on the Forest? (in the past)

7. Is this the area that you usually visit when you visit the Forest? (if not, what area do you usually visit and why)

8. If you had to describe the Pigeon River Country State Forest to someone who has never been here, how would you describe it ... in ten words or less?

9. What do you feel are the most important features of the Forest?

10. Why did you chose the PRCSF to come to over any other forested area in Michigan?

11. Are you aware that there is gas and oil development in the Forest?

11a. Have you actually seen or heard anything while in the Forest that relates to the gas and oil development? What?

11b. What do you think about the gas and oil development in the Forest?

11c. Do you approve or disapprove of the development?

11c. Why?

11d. How do you think the development has affected the Forest?

We'd like to know whether people who visit the Forest are concerned about the environment and whether they are doing anything in their life that helps protect and/or conserve our natural resources.

12. Are you concerned about the environment? Why or why not?

13. Do you think that you are doing anything which helps to protect or conserve the environment? If yes, what? (Probe to get at more than one thing if possible)

14. Have you done anything politically (contributions, volunteering, etc.) to help protect the environment? What?

We're also interested in the people who visit the forest; what they are like and things they do at home so that we can better understand their needs in order for us to better meet those needs.

15. What nature related organizations do you belong to?

16. Do you live in the city or out in the country?

17. What, if any, types of things do you do that you think are considered part of living the simple life?

18. What, if any, types of things do you do that are non-consumptive? (i.e. things that do not make a big demand on the worlds' resources like riding bike to work or on errands, buying things at garage sales, etc.)

19. What has your family done to make your home more efficient in cooling and heating?

5

20. Do you fix things around the house yourself? If yes, what specifically do you do?

21. Any comments?

APPENDIX D
Pilot Questionnaire

APPENDIX D
Pilot Questionnaire

Pigeon River Country State Forest
Recreation Survey

On _____, a card was placed on the vehicle you were traveling in while visiting the Pigeon River Country State Forest. We would like to know a few things about your experiences while on the Pigeon River Country State Forest (PRCSF) and what your thoughts are regarding management of the Forest. **Please refer your answers to questions 1 through 7 only to the trip during which a card was placed on your vehicle.**

1. What do you consider is the primary activity you were engaged in while on the Pigeon River Country State Forest (PRCSF)? If you did more than one thing (example: camping and stream fishing), pick the one you consider to be the most important. If you were hunting, please list type of game (example: woodcock hunting, archery deer hunting, etc.). If you were fishing, please indicate whether it was stream fishing or lake fishing.

   PRIMARY ACTIVITY: _____

2. We would like to know how long your visit lasted. How many days did you actually spend in the PRCSF during the trip on which you were contacted?

   _____ **DAYS**

3. How would you rate your overall enjoyment of your visit to the Pigeon River Country State Forest? Check the box which indicates your answer.

   ☐ VERY POOR
   ☐ POOR
   ☐ NEITHER GOOD NOR POOR
   ☐ GOOD
   ☐ VERY GOOD

4. What kinds of wildlife did you see while visiting the Pigeon River Country State Forest? Please list.

   _____

   _____

5. Why did you choose the Pigeon River Country State Forest instead of any other forested area in Michigan? Please describe, in your own words, what your reasons were for coming to the PRCSF

6. We're also interested in people's motivations for their choice in outdoor activities. Why did you choose to do what you did (your recreational activity) while visiting the PRCSF? Circle the answer which best describes the degree of importance of each of the following motivations for your outdoor recreation while visiting the PRCSF.

	Not at all Important	Slightly Important	Moderatly Important	Very Important
To enjoy the sights, sounds and smells of nature	1	2	3	4
To see wild animals	1	2	3	4
To be in a quiet and peaceful place	1	2	3	4
To get away from the pressures of work/school	1	2	3	4
To relax	1	2	3	4
To practice your skills and abilities (fishing, hunting, hiking, etc.)	1	2	3	4
To challenge nature/wildlife	1	2	3	4
To show others you could be successful	1	2	3	4
To harvest plant or animal life (mushroom picking, hunting, cutting timber, etc.)	1	2	3	4
To do things on your own	1	2	3	4
To meet friendly people	1	2	3	4
To be with your family or friends	1	2	3	4
To share your skills and knowledge with others	1	2	3	4
To share intimacies with people you love	1	2	3	4
To learn more about yourself	1	2	3	4
To think about who you are and where your life is going	1	2	3	4
To have fun	1	2	3	4
To enjoy the excitement of a challenging experience	1	2	3	4
Physical exercise	1	2	3	4
To experience something new and different	1	2	3	4
To test and use your own equipment	1	2	3	4
To do an impressive thing	1	2	3	4
To be able to share your experiences with others at home	1	2	3	4
To breath clean air	1	2	3	4
To be in a safe environment	1	2	3	4
To get away from pollution	1	2	3	4
To get away from civilization	1	2	3	4
To be alone	1	2	3	4
To be in a place where there's no human evidence	1	2	3	4

7. Do you plan to return to the PRCSF in the near future? Circle your answer.

YES

NO

8. During the past 12 months, which of the following activities have you done while on the Pigeon River Country State Forest? Check all the boxes that apply.

- ☐ Motorized boating
- ☐ Non-motorized boating(sailing, canoeing, tubing, etc.)
- ☐ Mushroom hunting
- ☐ Horseback riding
- ☐ Firearm deer hunting
- ☐ Archery deer hunting
- ☐ Elk hunting
- ☐ Grouse or woodcock hunting
- ☐ Other small game hunting
- ☐ Scenic driving
- ☐ Hiking
- ☐ Camping
- ☐ Swimming
- ☐ Lake fishing
- ☐ Stream fishing
- ☐ Snowmobiling
- ☐ Picnicking
- ☐ Berrypicking
- ☐ Backpacking
- ☐ Work (logging or oil company)
- ☐ Motorized trailbike riding (2 wheel)
- ☐ 3 or 4 wheel ATV riding
- ☐ Non-motorized trailbike riding
- ☐ Gathering fuel wood
- ☐ Watching birds and wildlife
- ☐ Nature photography
- ☐ Cross country skiing
- ☐ Group sport such as baseball, football, volleyball, etc.
- ☐ Other, please specify _____

9. Had you visited the Pigeon River Country State Forest before the trip on which you were contacted? Circle your answer.

NO

YES ⟶ 9a. If yes, in what year did you first visit the forest?

YEAR? _____

9b. How many times in the last five years have you visited PRCSF?

_____ TIMES

10. In the past, which of the following areas of the Pigeon River Country State Forest have you visited? Please refer to the map provided. If you have visited an area, indicate whether or not it was in the last 12 months (second column) or not (third column). Check only one box for each area.

	Never been there	Have been there in past 12 months	Been there, BUT not in past 12 months
Northern Area	☐	☐	☐
Southern Area	☐	☐	☐
Green Timbers	☐	☐	☐

11. In the past five years, in what area would you say you have spent the most time? If you have a particular spot or campground that you visit often, please tell us the name of it.

☐ NORTHERN AREA

☐ SOUTHERN AREA

☐ GREEN TIMBERS

Special area? _____

12. Now, we are interested in how you view the Pigeon River Country State Forest? Please number the statements below to indicate what the PRCSF means to you. Put a 1 by the statement which, in your eyes, best describes the PRCSF, a 2 by the second best statement, and a 3 by the third best statement.

___ Wilderness

___ Backcountry

___ Forest managed for its products (such as timber, minerals, etc.)

___ A good place for outdoor recreation

___ A good place to go camping

___ A good place for people to see wildlife and enjoy nature

___ A good place to go hunting or fishing

___ A Forest for fish and wildlife to live

___ A good place for family recreation

___ A place to go for peace, quiet, and solitude

13. Please describe for us, in your own words, what you think are the most important features of the Pigeon River Country State Forest.

14. We're interested in finding out what things people prefer when they visit the PRCSF. How desirable are the following to you in regards to your outdoor recreation experience on the PRCSF? Circle the number of the answer which best describes your feelings.

	Very Undesirable	Somewhat Undesirable	Undecided	Somewhat Desirable	Very Desirable
Absence of man-made features (except trails)	1	2	3	4	5
Improved roads	1	2	3	4	5
No motorized vehicle access areas	1	2	3	4	5
Forests, flowers and wildlife much the same as before the pioneers	1	2	3	4	5
Introduction of new species of plant and wildlife to the area	1	2	3	4	5
Large geographical area	1	2	3	4	5
Remoteness from towns or cities	1	2	3	4	5
Little evidence of other visitors before you	1	2	3	4	5
Camper trailer or RV for overnight visits	1	2	3	4	5
No motorized travel by visitors except on roads	1	2	3	4	5
Restaurants nearby	1	2	3	4	5
Lodges and motels nearby	1	2	3	4	5
Advanced reservations at campsites	1	2	3	4	5
Nature interpretive trails with signs identifying plant and animal life in forest	1	2	3	4	5

15. We would like to know how you feel about management of the Pigeon River Country State Forest. Please indicate whether you would like more, the same, or less of the following. Circle one answer for each item

Backcountry/roadless areas	MORE	SAME	LESS
Timber harvesting for wildlife habitat improvement and maintanance	MORE	SAME	LESS
Hiking trails	MORE	SAME	LESS
Enforcement of Forest rules by DNR personnel	MORE	SAME	LESS
Off-road vehicle trails	MORE	SAME	LESS
Cross-country ski trails	MORE	SAME	LESS
Access to lakes and streams	MORE	SAME	LESS
Forest openings for wildlife viewing	MORE	SAME	LESS
Game-law enforcement patrols	MORE	SAME	LESS
Improved boat landings at lakes or campsites	MORE	SAME	LESS
Campsites with a view of water (lake or river)	MORE	SAME	LESS
Picnic tables at campsites or lakes	MORE	SAME	LESS
Mature virgin forest stands	MORE	SAME	LESS
Visible evidence of gas/oil development	MORE	SAME	LESS
Horseback riding trails/facilities	MORE	SAME	LESS
Timber harvesting for economic benefit	MORE	SAME	LESS

16. Please indicate how strongly you would approve or disapprove of the following future management options for the Pigeon River Country State Forest. Circle the number of the your answer for each of the items.

	Strongly Disapprove	Moderately Disapprove	Undecided	Moderately Approve	Strongly Approve
Catch and release fishing	1	2	3	4	5
Trophy fishing	1	2	3	4	5
Prohibit taking or attempting to take game with bait	1	2	3	4	5
Restrict all motorized vehicles to a designated road system	1	2	3	4	5
Prohibit low-flying aircraft	1	2	3	4	5

17. We're also interested in what people who visit the PRCSF think about environmental issues. Please tell us what you think about the following environmental concerns. Indicate whether you think the government should spend more, the same, or less money on the following issues. Circle one answer for each item.

A. Maintaining forested areas for public enjoyment	MORE	SAME	LESS
B. Saving unspoiled natural areas for the future	MORE	SAME	LESS
C. Protecting endangered species of wildlife	MORE	SAME	LESS
D. Litter control and clean up	MORE	SAME	LESS
E. Controlling air pollution	MORE	SAME	LESS
F. Preventing agricultural or industrial pollution of water	MORE	SAME	LESS
G. Preserving forests and other natural areas for wildlife	MORE	SAME	LESS
H. Preventing oil and gas exploration in wilderness areas	MORE	SAME	LESS
I. Toxic waste pollution control and clean up	MORE	SAME	LESS
J. Control damage done to natural areas from over use	MORE	SAME	LESS

18. Which of the above do you feel are the most important and, therefore, should have the highest priority? Put the letter of the concern listed above in the space provided which indicates your first, second and third priorities.

_____ FIRST PRIORITY

_____ SECOND PRIORITY

_____ THIRD PRIORITY

19. How much do you agree or disagree with the following statements about economic and environmental trade offs. Circle one answer for each item.

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
Some natural areas should be preserved despite the loss of economic benefits	1	2	3	4
Needs of local communities for jobs should come before Michigan's need for environmental quality	1	2	3	4
Too many natural areas are being managed for recreation instead of economic development	1	2	3	4
Some natural areas should be left alone for only the animals and other natural life to enjoy, not for people's recreation or economic development	1	2	3	4
Industries should be forced to shut down if they refuse to meet government pollution standards	1	2	3	4
Even if a business is causing a lot of pollution, it should not be forced to stop operations if it would put people out of work	1	2	3	4

20. What do you personally think about gas and oil development of the Pigeon River Country State Forest? Check one box only.

- ☐ STRONGLY DISAPPROVE
- ☐ DISAPPROVE
- ☐ SLIGHTLY DISAPPROVE
- ☐ UNDECIDED
- ☐ SLIGHTLY APPROVE
- ☐ APPROVE
- ☐ STRONGLY APPROVE

21. Have you ever seen any of the following while visiting the PRCSF? Circle one answer to each item.

Drilling site with drilling rig	YES	NO	Not Sure
Drilling site in operation (no drilling rig)	YES	NO	Not Sure
Facility site	YES	NO	Not Sure
Area cleared for drilling, but now seeded (dry hole)	YES	NO	Not Sure
Gas or oil pipelines	YES	NO	Not Sure
Areas cleared for gas or oil pipelines	YES	NO	Not Sure
Gas or oil trucks	YES	NO	Not Sure
Gas (yellow) or oil (orange) pipeline markers	YES	NO	Not Sure

22. How has gas and oil development of the Pigeon River Country State Forest affected your recreational enjoyment while on the forest? Circle one letter only.

- ☐ REDUCED my enjoyment A LOT
- ☐ REDUCED my enjoyment A LITTLE
- ☐ My enjoyment was NOT INFLUENCED
- ☐ INCREASED my enjoyment A LITTLE
- ☐ INCREASED my enjoyment A LOT

23. Do you think gas and oil development has changed the Pigeon River Country State Forest? Please read the statements and then rate to what degree you think it has changed and whether the change (or no change) is desirable or undesirable. Each item should be rated on the two scales by putting an X in the space along the line which best indicates what you think.

Number of recreationists ..... greatly increased ___|___|___|___|___|___|___ greatly decreased
Change is? ..... very desirable ___|___|___|___|___|___|___ very undesirable
1 2 3 4 5 6 7

Oil company traffic ..... greatly increased ___|___|___|___|___|___|___ greatly decreased
Change is? ..... very desirable ___|___|___|___|___|___|___ very undesirable
1 2 3 4 5 6 7

Number of elk ..... greatly increased ___|___|___|___|___|___|___ greatly decreased
Change is? ..... very desirable ___|___|___|___|___|___|___ very undesirable
1 2 3 4 5 6 7

Visibility of elk ..... greatly increased ___|___|___|___|___|___|___ greatly decreased
Change is? ..... very desirable ___|___|___|___|___|___|___ very undesirable
1 2 3 4 5 6 7

Numbers & visibility of other
wildlife ..... greatly increased ___|___|___|___|___|___|___ greatly decreased
Change is? ..... very desirable ___|___|___|___|___|___|___ very undesirable
1 2 3 4 5 6 7

Esthetic quality of forest ..... greatly increased ___|___|___|___|___|___|___ greatly decreased
Change is? ..... very desirable ___|___|___|___|___|___|___ very undesirable
1 2 3 4 5 6 7

Peace and solitude ..... greatly increased ___|___|___|___|___|___|___ greatly decreased
Change is? ..... very desirable ___|___|___|___|___|___|___ very undesirable
1 2 3 4 5 6 7

Employment opportunities ..... greatly increased ___|___|___|___|___|___|___ greatly decreased
Change is? ..... very desirable ___|___|___|___|___|___|___ very undesirable
1 2 3 4 5 6 7

Benefits to Michigan from
oil and gas revenues ..... greatly increased ___|___|___|___|___|___|___ greatly decreased
Change is? ..... very desirable ___|___|___|___|___|___|___ very undesirable
1 2 3 4 5 6 7

24. How strongly do you agree or disagree to the following statements regarding gas and oil development on the Pigeon River Country State Forest? Circle one answer for each item.

	Strongly Disagree	Disagree	Agree	Strongly Agree
The oil companies and the DNR have done an excellent job on the PRCSF drilling sites; the program should continue as planned	1	2	3	4
The PRCSF should not be managed solely for the elk herd, but should be managed for people's recreation, other wildlife, and economic benefits from gas, oil, and timber sales	1	2	3	4
The PRCSF isn't any different from any other state forest and therefore should be managed just like any other state lands, including gas and oil development	1	2	3	4
Oil and gas companies are fully aware of environmental impacts the industry has on the land and are not going to damage the environment any more than recreationists	1	2	3	4
The areas that are cleared for drilling, if seeded and maintained, are beneficial to and attract wildlife	1	2	3	4
Gas and oil development of the PRCSF is alright as long as the oil companies can keep the machinery quiet, limit odors, and not harm the landscape	1	2	3	4
Gas and oil development is ok as long as someone who is more interested in the land and wildlife than the money is watching over and monitoring the process	1	2	3	4
Gas and oil drilling should be allowed in all areas (north and south) of the PRCSF, not just in the area already allowed for drilling (south)	1	2	3	4
There should be no further drilling for gas and oil than what has already been allowed, regardless of how well it's been done	1	2	3	4
PRCSF is unique and any degradation or destruction of this area by gas and oil development is a crime	1	2	3	4
Oil and gas development hurts and destroys the environment and should never have been allowed to happen on the PRCSF	1	2	3	4
The oil companies have a tendency to destroy everything that gets in their way; they should not have been allowed to drill for gas and oil on the PRCSF	1	2	3	4

	Strongly Disagree	Disagree	Agree	Strongly Agree
The possible dangers and harm from oil spills, blowouts and leakages override the economic benefits from gas and oil drilling on the PRCSF, drilling should not be allowed	1	2	3	4
Gas and oil development has greatly decreased the peace, solitude and esthetic value that the PRCSF offers	1	2	3	4
Drilling for oil and gas on the PRCSF should only be done as a last resort in an economic/energy emergency	1	2	3	4

25. We're also interested in the people who visit the forest, what they are like and things they do at home so that we can better understand their needs in order for us to better meet those needs. Indicate whether you have or have not done and whether you are willing to do it in the future. Circle one answer in each column for each item.

	Have Done?		Would be Willing?	
Improve the weatherization of your home (i.e. caulking, insulation, storm windows, etc.)	YES	NO	YES	NO
Join a group or club which is concerned solely with environmental issues	YES	NO	YES	NO
Contact a community agency to find out what can be about pollution/environmental degradation	YES	NO	YES	NO
Contacting a congressperson or a Government official about environmental problems	YES	NO	YES	NO
Volunteer your time to an organization to help improve or protect the natural or city environment	YES	NO	YES	NO
Attend a meeting which focused on topics related to protecting and/or improving the natural or city environment	YES	NO	YES	NO
Switch products for environmental reasons	YES	NO	YES	NO
Subscribe to environmental/ecological publications	YES	NO	YES	NO
Make a monetary contribution to environmental causes	YES	NO	YES	NO
Grow a vegetable or fruit garden	YES	NO	YES	NO
Can and store fresh fruits or vegetables for later use	YES	NO	YES	NO
Have a home energy audit to determine types and amount of weatherization your home needs	YES	NO	YES	NO
Heat your home with wood fuel	YES	NO	YES	NO
Support a stricter bottle law	YES	NO	YES	NO

26. Please indicate how often and why you may or may not do the following. Circle number to indicate how often you do the following activities. Then put a check in the box to indicated your reasons for doing or not doing the activity. **Personal** means that it's your personal preference, **economic** means it is for economic reasons. If you check the **other** box, please specify your reasons.

	How often?				
	Never	Rarely	Sometimes	Often	Always
Make gifts instead of buying them	1	2	3	4	5
Why? ☐ Personal ☐ Economic ☐ Other					
Ride a bicycle for exercise/recreation	1	2	3	4	5
Why? ☐ Personal ☐ Economic ☐ Other					
Recycle newspapers used at home	1	2	3	4	5
Why? ☐ Personal ☐ Economic ☐ Other					
You or family member change oil in own car	1	2	3	4	5
Why? ☐ Personal ☐ Economic ☐ Other					
Buy furniture or clothing at garage sales or second hand stores	1	2	3	4	5
Why? ☐ Personal ☐ Economic ☐ Other					
Make furniture or clothing for family	1	2	3	4	5
Why? ☐ Personal ☐ Economic ☐ Other					
Participate in a carpool	1	2	3	4	5
Why? ☐ Personal ☐ Economic ☐ Other					
Limit energy usage	1	2	3	4	5
Why? ☐ Personal ☐ Economic ☐ Other					

27. To what organizations do you belong? Put a check in the box if you belong to the organization.

- ☐ Wilderness Society
- ☐ Sierra Club
- ☐ Audubon Society
- ☐ Nature Conservancy
- ☐ Trout Unlimited
- ☐ Bass Anglers Sportsmans Society
- ☐ National Rifle Association
- ☐ National Wildlife Federation
- ☐ National Bowhunters Association
- ☐ East Michigan Environmental Action Council
- ☐ West Michigan Environmental Action Council
- ☐ Pigeon River Country Association
- ☐ Chamber of Commerce
- ☐ Michigan oil and gas association
- ☐ Michigan United Conservation Clubs
- ☐ Michigan Deer Hunters Association
- ☐ National Wild Turkey Federation
- ☐ Other, please specify _____

28. In what State and county do you live?

STATE (name) _____

COUNTY (name) _____

29. How many miles (one-way from your permanent residence) did you drive to get to the Pigeon River Country State Forest?

_____ MILES

30. Do you own property within 50 miles of the Pigeon River Country State Forest? Circle answer.

NO

YES ——→ 30a. If yes, how would you classify this property and how long have you owned it? Check the box next to the type of property, then indicate the number of years you have owned it in the space provided.

Type	Years Owned
☐ Permanent residence	_____
☐ Summer residence	_____
☐ Undeveloped property	_____

31. How would you best describe the area in which you are presently living? Check the one box which best describes the area in which you are currently living.

☐ LARGE CITY (more than 500,000 people)

☐ MEDIUM CITY (100,000 to 500,000 people)

☐ SUBURB OF A MEDIUM OR LARGE CITY

☐ SMALL CITY (25,000 to 100,000)

☐ SMALL TOWN OR VILLAGE

☐ FARM

☐ RURAL AREA OTHER THAN FARM

32. What is your sex? Circle answer.

MALE

FEMALE

33. What is your age?

_____ YEARS

34. What is the highest level of formal education you have completed? Check one box.

- ☐ LESS THAN A HIGH SCHOOL DIPLOMA
- ☐ HIGH SCHOOL DIPLOMA OR EQUIVALENT
- ☐ SOME COLLEGE OR POST HIGH SCHOOL TRAINING
- ☐ ASSOCIATE'S DEGREE
- ☐ BACHELOR'S DEGREE
- ☐ GRADUATE STUDIES/MASTER'S DEGREE
- ☐ DOCTORAL DEGREE

35. Which of the following catagories best describes your total family income during 1986? Check one box.

- ☐ LESS THAN $10,000
- ☐ $10,000 TO $14,999
- ☐ $15,000 TO $24,999
- ☐ $25,000 TO $34,999
- ☐ $35,000 TO $49,000
- ☐ $50,000 OR MORE

36. Which one of the following best describes your occupation? Check one box only

- ☐ Artist, writer, designer
- ☐ Farmer, agricultural worker
- ☐ Homemaker
- ☐ Manager, administrator, proprietor
- ☐ Professional with advanced degree
- ☐ Teacher, counselor, social worker, nurse
- ☐ Semi-skilled or apprentice craftsperson
- ☐ Skilled worker, craftsperson, technician
- ☐ Sales, clerical
- ☐ Employed by gas & oil industry (sales, extraction, refinery, management, etc.)
- ☐ Student
- ☐ Unemployed
- ☐ Retired
- ☐ Other, please specify _____

37. If you have anything else that you would like to tell us, here's your chance. Use the remaining space to tell us what you think.

Thank You

APPENDIX E
Cover Letters, Postcards, and Certificate

APPENDIX E

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 1312 LANSING, MI

POSTAGE WILL BE PAID BY ADDRESSEE

Michigan Department of Natural Resources
Pigeon River Country State Forest
9966 Twin Lakes Rd.
Vanderbilt, Michigan 49795

Date _____ Car License _____ Unit _____

The DNR is studying the recreational use of the Pigeon River Country State Forest. Please help us by filling out this card and mailing it today.

1. How many people were in this car? _____
2. What kind of recreational activity are you doing on this area today? (If hunting, please include game, i.e. archery deer hunting, squirrel hunting, etc.)

   _____

3. How many hours did you spend in the Pigeon River Area today? _____
4. Please list the names and addresses of everyone in this car, starting with yourself.

Name	Address	City

UNDER AUTHORITY OF ACT 17 P.A. 1921 AS AMENDED, SUBMISSION VOLUNTARY

PR 2059
Rev. 5/86

Survey Postcard

PIGEON RIVER COUNTRY
STATE FOREST RECREATION SURVEY

9966 Twin Lakes Road, Vanderbilt, Michigan 49795 Phone: (517) 983-4101

How our Government manages our natural resources has been a major focus of debate. Increased public concern has, in recent years, motivated government officials to find out just what people think about land management policies. In Michigan, the Pigeon River Country State Forest has been a part of this debate. Sixteen years ago, oil was discovered on this Forest. In 1980 a compromise was made between oil companies and the Michigan Department of Natural Resources to allow drilling in the southern third of the Pigeon River Country State Forest. As a visitor to this Forest, your opinions about the gas and oil development and management of the Forest are very important to the future plans of the Pigeon River Country State Forest.

You are one of a small number of people being asked to give their opinion about the management of the Pigeon River Country State Forest. Your name was randomly drawn from the visitor postcards which were returned to the Forest headquarters in the last three months. Your participation in this project is voluntary. However, in order to ensure that the results will truly represent the thinking of the Pigeon River Country State Forest visitors, it is important that every questionnaire be completed and returned by the person to whom the survey was sent. The survey should only take you 15-25 minutes to complete. The time you spend now will greatly benefit yourself and other future visitors of the Pigeon River Country State Forest.

You may be assured of complete confidentiality. The questionnaire has an identification number for mailing purposes only. This is so that we may check your name off of the mailing list when your questionnaire is returned. Your name will never be placed on the questionnaire. The return of an answered questionnaire will indicate your approval and consent to participate in the project. As a token of our gratitude, please keep the Pigeon River Country State Forest Recreation Survey participant certificate.

The results of this research will be made available to officials and representatives in our state's government, Pigeon River Country State Forest planners, and all interested citizens.

We would be most happy to answer any questions you might have. Please write or call. The telephone number is (517) 983-4101. For your convenience, a larger print copy of the survey is available upon request.

Thank you for your assistance.

Sincerely,

Kelly L. Hazel
Project Co-Director
Graduate Student
MICHIGAN STATE UNIVERSITY

Jennifer M. Stanley
Project Co-Director
Graduate Student
MICHIGAN STATE UNIVERSITY

Edward W. Caveney
Area Forest Manager
Pigeon River Country State Forest
DEPARTMENT OF NATURAL RESOURCES

Cover Letter

Pigeon River Country State Forest Recreation Survey
c/o DNR Forest Management Division
PO Box 30028
Lansing, Michigan 48909

October 15, 1986

Last week a questionnaire seeking your opinion about issues related to the Pigeon River Country State Forest (PRCSF) was mailed to you. Your name was drawn from a random sample of people who have visited the PRCSF.

If you have already completed and returned it to us please accept our sincere thanks. If not, please do so today. Because it has been sent to only a small, but representative, number of Pigeon River recreationists it is extremely important that you also be included in the study if the results are to accurately represent the opinions of PRCSF visitors.

If for some reason you did not receive the questionnaire, or it got misplaced, please call us right now, (517-983-4101) and we will get another one in the mail to you today.

Sincerely,

Kelly L. Hazel
Project Co-Director
Graduate Student
MICHIGAN STATE UNIVERSITY

Jennifer M. Stanley
Project Co-Director
Graduate Student
MICHIGAN STATE UNIVERSITY

Edward W. Caveney
Area Forest Manager
Pigeon River Country State Forest
DEPARTMENT OF NATURAL RESOURCES

Follow-up Postcard

PIGEON RIVER COUNTRY
STATE FOREST RECREATION SURVEY

9966 Twin Lakes Road, Vanderbilt, Michigan 49795 Phone: (517) 983-4101

October 28, 1986

Mr. Michael Washburn
511347 C. Village
North Branch, MI 48461

Dear Mr. Washburn

About three weeks ago we wrote to you seeking your opinion on the management of the Pigeon River Country State Forest. As of today we have not yet received your completed questionnaire.

We have undertaken this study because of the belief that citizen opinions should be taken into account in the formation of future management policies for the Forest.

We are writing to you again because of the importance each questionnaire has to the usefulness of this study. Your name was drawn through a scientific sampling process using survey postcards returned to the Forest Headquarters. Only a small number of people are being asked to give their opinion about the management of the Pigeon River Country State Forest. In order for the results of this study to truly represent the opinions of all the people who use the Forest, it is essential that each person in the sample return their questionnaire.

In the event that your questionnaire has been misplaced, a replacement is enclosed.

Thank you for your assistance.

Sincerely,

Kelly L. Hazel
Project Co-Director
Graduate Student
MICHIGAN STATE UNIVERSITY

Jennifer M. Stanley
Project Co-Director
Graduate Student
MICHIGAN STATE UNIVERSITY

Edward W. Caveney
Area Forest Manager
Pigeon River Country State Forest
DEPARTMENT OF NATURAL RESOURCES

Follow-up Letter

CERTIFICATE OF PARTICIPATION
1986 - 1987

Certificate

APPENDIX F
Administrative Documents

APPENDIX F

MEMORANDUM OF UNDERSTANDING

between

Kelly L. Hazel, Jennifer M. Stanley (Michigan State University)

East Lansing, Michigan

and the

Pigeon River Country Study Committee

(Michigan Department of Natural Resources)

Lansing, Michigan

THIS MEMORANDUM OF UNDERSTANDING is made and entered into this 1st day of July, 1986, by and between Kelly L. Hazel and Jennifer M. Stanley, graduate students with the Department of Psychology, MSU *and* the Pigeon River Country Study Committee, MDNR.

PURPOSE: In order to obtain information regarding the attitudes and preferences of the people who recreate on the Pigeon River Country State Forest, the above parties agree to the following duties and responsibilities for the attitude research project as proposed (see attached proposal).

UNDERSTANDING: The parties agree as follows:

I. On the Part of Kelly L. Hazel and Jennifer M. Stanley:

A. Agree to assume responsibility for the design, implementation, analysis, and reporting of results from the mail questionnaire study as outlined in the attached document entitled "Attitudes toward gas and oil development: A study of the Pigeon River Country State Forest".

B. Agree to working with the Committee members in the design of the questionnaire and analysis of the data to ensure that the Committee's objectives are reached.

C. Agree to follow University procedures for insuring the confidentiality of information from participants in the study.

D. Agree to make available to the Committee some tabular data from the research as requested by the Committee to meet its objectives.

E. Agree to include some of the information collected from this research in master's theses at Michigan State University.

F. Agree to prepare and submit to the Pigeon River Country Study Committee an annual report of plans, progress, and findings suitable for inclusion in the Committee's Annual Report.

G. Agree to provide copies of all written and oral results from this research study to Committee members for review at least 30 days before release. Disagreements as to these publications or presentations will be decided by Professor Levine and Deputy Director Bails.

H. Agree to abide by all copyright laws that normally apply between employers and employees.

II. On the Part of the Pigeon River Country Study Committee:

A. Agree to allow Kelly L. Hazel and Jennifer M. Stanley to conduct a mail questionnaire study of the people who recreate on the Pigeon River Country State Forest as outlined in the attached document entitled, "Attitudes toward gas and oil development: A study of the Pigeon River Country State Forest", from June 1, 1986 through December 1, 1987.

B. Agree to supply names and addresses from a systematic sample generated from the 1986-87 PRCSF recreational survey.

C. Agree to furnish clerical help in the mailing of the questionnaire and the data coding and entry phases of the project.

D. Agree to assume costs resulting from the printing and mailing of the questionnaire.

E. Agree to support computer time up to $2,000 at Michigan State University for purposes of data analysis of the mail questionnaire results.

F. Agree to supply to Kelly L. Hazel and Jennifer M. Stanley a clean copy of the data along with copies of the questionnaires.

G. Agree to provide copies of all written and oral results from this research study to Kelly L. Hazel and Jennifer M. Stanley for review at least 30 days before release. Disagreements as to these publications or presentations will be decided by Professor Levine and Deputy Director Bails.

H. Agree to abide by all copyright laws that normally apply between employers and employees.

IN WITNESS WHEREOF the parties have signed their names effective the day and year above written.

DEPARTMENT OF PSYCHOLOGY
MICHIGAN STATE UNIVERSITY

By: _____
Graduate Student
Department of Psychology

Date: 11/3/86

By: _____
Graduate Student
Department of Psychology

PIGEON RIVER COUNTRY STUDY COMMITTEE
MICHIGAN DEPARTMENT OF NATURAL RESOURCES

By: _____
Chairman Pigeon River Country Study Committee

Date: 10/15/86

APPROVED:

By: _____
Professor and Faculty Advisor
Department of Psychology
Michigan State University

Date: 11/3/86

By: _____
Deputy Director
Michigan Department of Natural Resources

Date: 10/20/86

MICHIGAN STATE UNIVERSITY

UNIVERSITY COMMITTEE ON RESEARCH INVOLVING
HUMAN SUBJECTS (UCRIHS)
238 ADMINISTRATION BUILDING
(517) 355-2186

EAST LANSING • MICHIGAN • 48824-1046

August 22, 1986

Ms. Kelly L. Hazel
Ms. Jennifer M. Stanley
Ecological Psychology

Dear Ms. Hazel and Ms. Stanley:

Subject: Proposal Entitled, "Attitudes Toward Gas and Oil Development: A Study of the Pigeon River Country State Forest"

I am pleased to advise that I concur with your evaluation that this project is exempt from full UCRIHS review, and approval is herewith granted for conduct of the project.

You are reminded that UCRIHS approval is valid for one calendar year. If you plan to continue this project beyond one year, please make provisions for obtaining appropriate UCRIHS approval prior to August 22, 1987.

Any changes in procedures involving human subjects must be reviewed by the UCRIHS prior to initiation of the change. UCRIHS must also be notified promptly of any problems (unexpected side effects, complaints, etc.) involving human subjects during the course of the work.

Thank you for bringing this project to my attention. If I can be of any future help, please do not hesitate to let me know.

Sincerely,

Henry E. Bredeck
Chairman, UCRIHS

HEB/jms

cc: Dr. Ralph L. Levine

LIST OF REFERENCES

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