PROMOTING IN-STATE TOURISM USING TRAVEL CONSUMER PROFILES

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Abstract: This paper discusses the preliminary findings of an on-going study that attempts to develop a travel consumer profile for Greater Indianapolis households. Studying the travel behaviors of Indianapolis travel consumers could reveal if the state of Indiana has any tourism appeal to its residents. The findings of the travel consumer profile of Indianapolis households could determine if the state tourism department and Indiana attractions would benefit by spending more of their promotional dollars to market Indiana to its residents. The development of in-state travel consumer profiles could divulge meaningful information about the potential desirability of present in-state attractions, services present or lacking, and the need for additional attractions.

Introduction:

According to the Tourism Industries/International Trade Administration, Americans took 1.2 billion domestic person-trips (100+ miles, one-way, away from home) in 1997, and 52.7 million Americans traveled to international destinations. Domestic and international travelers together spent $481.5 billion in the United States, a 6.4 percent increase over 1996. This travel expenditure figure covers the following five industry categories: public transportation, auto transportation, lodging, foodservice, and amusement/recreation. Based on expenditures, travel and tourism is the nation's third largest retail sales industry after car dealers and food stores.

The economic impact of travel on a single state or county can be tremendous. Within the United States, state governments have recognized the importance of capturing their share of travel consumer expenditures, and have planned to spend $525.4 million for travel and tourism development and promotion in fiscal year 1998-99. This represents on increase of 7.5 percent from fiscal year 1997-98. According to the 1998 Report published by the *Tourism Works for America Council*, domestic travel expenditures for the state of Indiana were around $4.97 billion, and international travel consumer expenditures added up to $206 million (both 1996 figures). Total 1996 travel expenditures in the state represented an increase of almost 7 percent over 1995 figures. Dollars spent by travel consumers produced a ripple effect that was felt within every aspect of Indiana communities, as well as the overall economy of the state. For example, as a result of these travel expenditures, travel-generated employment for Indiana reached a new high of around 90,100 jobs in 1996.

The continuing goal for Indiana's tourism promotion efforts is to increase the overall economic impact of tourism by attracting additional out-of-state visitors and increasing the frequency and/or length of visitors' trips. The Indiana Department of Commerce's Tourism and Film Development Division has as its mission to stimulate travel consumer spending and economic growth by developing and promoting quality travel experiences in Indiana. Accomplishing this mission, attracting out-of-state visitors who would increase their spending, is a challenge because of two important reasons. First, Indiana does not have a strong competitive position as a tourist destination so visitors need to be continuously educated as to the many tourist attractions within the state. In addition, the state's tourism budget is lower than that of the surrounding states. According to the Travel Industry Association of America, Indiana allocated $4.8 million for promoting tourism in the fiscal year 1997-98, as compared to $35.3 million by Illinois, $14 million by Michigan, $6.5 million by Ohio, and $6.4 million by Kentucky. In fact, Indiana ranks 35th in the country in money allocated for tourism promotion even though it ranks 16th in population size. In addition, Indiana's projected tourism budget for the 1998-99 fiscal year is expected to decrease by 5 percent, as opposed to projected increases in state tourism budgets for three surrounding states: Illinois, Kentucky, and Michigan.

These two concerns would not be as critical if Indiana would direct its promotional efforts toward encouraging its residents to visit state attractions. Studying the travel behaviors of Indianapolis travel consumers could reveal if the state of Indiana has any tourism appeal to its residents. The findings of the travel consumer profile of Indianapolis households could determine if the state tourism department and Indiana attractions would benefit by spending more of their promotional dollars to market Indiana to its residents. The development of in-state travel consumer profiles could divulge meaningful information about the potential desirability of present in-state attractions, services present or lacking, and the need for additional attractions.

Methodology

Tourism has been traditionally more concerned with consumption and not with consumers. In this study, the researchers are attempting to improve knowledge about Indianapolis households engaged in travel. An established questionnaire is sent to a mail panel of Indianapolis households (0.25% of total Indianapolis households) randomly selected from the Greater Indianapolis White Pages telephone directory. Indianapolis households represent approximately twenty-five percent of the state's population. Prior permission to use this established questionnaire developed by the Travel Industry Association of America (TIA) was obtained by the researchers.

Study participants are asked to record details of up to three pleasure or business trips taken in each month where they and/or other members of their household traveled fifty

miles or more, one-way, away from home or spent one or more overnights. Travel details will be collected for twelve months beginning August of 1998. Participants are advised not to include trips associated with commuting to/from work or school or trips taken as a flight attendant or vehicle operator. If study participants did not travel for business or pleasure in one month, they are still asked to return the questionnaire to the researcher.

The survey details include: a) primary and secondary purpose of trip, b) primary and secondary mode of transportation, c) number of household members traveling (adults and children), d) whether it was a group tour, e) up to three states or countries visited, f) key cities/places visited in each state/country, g) number of nights in each type of accommodation, h) trip expenditures, i) tourism-related activities, and j) number of trips taken per month.

The number of households who responded to the survey the first eight months appears in Table 1. For the months of August, September and October the 1997-1998 Indianapolis Local White Pages directory was used. The total sample was 1097 households. For the remaining nine months, the 1998-1999 Indianapolis Local White Pages directory is being used. The main reason behind the switch to the newest edition was to reduce the number of returned questionnaires due to address changes and errors. Table 1 also shows the distribution between those households involved in travel and those households who did not travel for each month.

Table 1. Monthly response and distribution rates.

MONTH	Number of responses	Sample size	Return rate %	Travel	Percent	No travel	Percent
August	185	1097	16.8	107	57.8	78	42.1
September	206	1097	18.7	124	60.1	82	39.8
October	199	1097	18.1	118	59.2	81	40.7
November	126	1117	11.2	72	57.1	54	42.8
December	161	1117	14.4	86	53.4	75	46.5
January	143	1117	12.8	65	45.5	78	54.5
February	140	1117	12.5	73	52.1	67	47.9
March	123	1117	11.0	58	47.2	65	52.8

Preliminary Findings

At the conclusion of the year-long study, the researchers will profile the trip characteristics and demographic characteristics of the Indianapolis travel consumer group. The findings will be used to recommend promotional activities in assisting the state to encourage and promote in-state tourism. The developed travel consumer profile will provide a means of examining changes within the Indianapolis travel market and could be vital to the process of adapting state tourism marketing to travel consumer changes.

This report profiles the trip characteristics and demographic characteristics of the Indianapolis travel consumer group for the first eight months of the study.

Trip characteristics

a) To Travel or not to travel

Over the eight months period, the percentage of households who participated in travel fluctuated monthly. The peak month for travel was September when around 60% of households were involved in travel. January saw the least amount of household travel, only about 45%. Figure 1 summarizes overall household travel patterns.

a) Frequency of travel

Figure 2 summarizes the travel frequency of the group over the eight months. The line graph compares the average number of trips per household for those households that took at least one trip per month with the average number of trips taken by the total household population who participated in the study over the eight month period.

The month of January saw the highest number of trips per household, 2.2 trips, among those households involved in travel. In March, each household who participated in the study, whether it reported one or more trips or no trips, took on average 0.7 trips, the lowest number of trips for all months.

Figure 1: To travel or not to travel

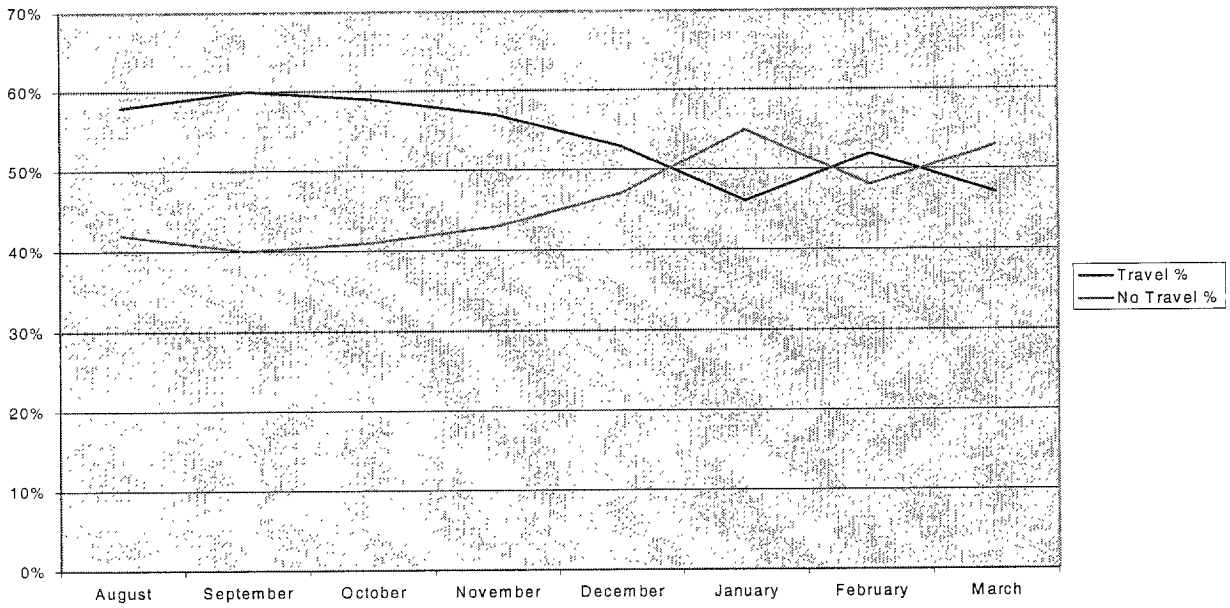
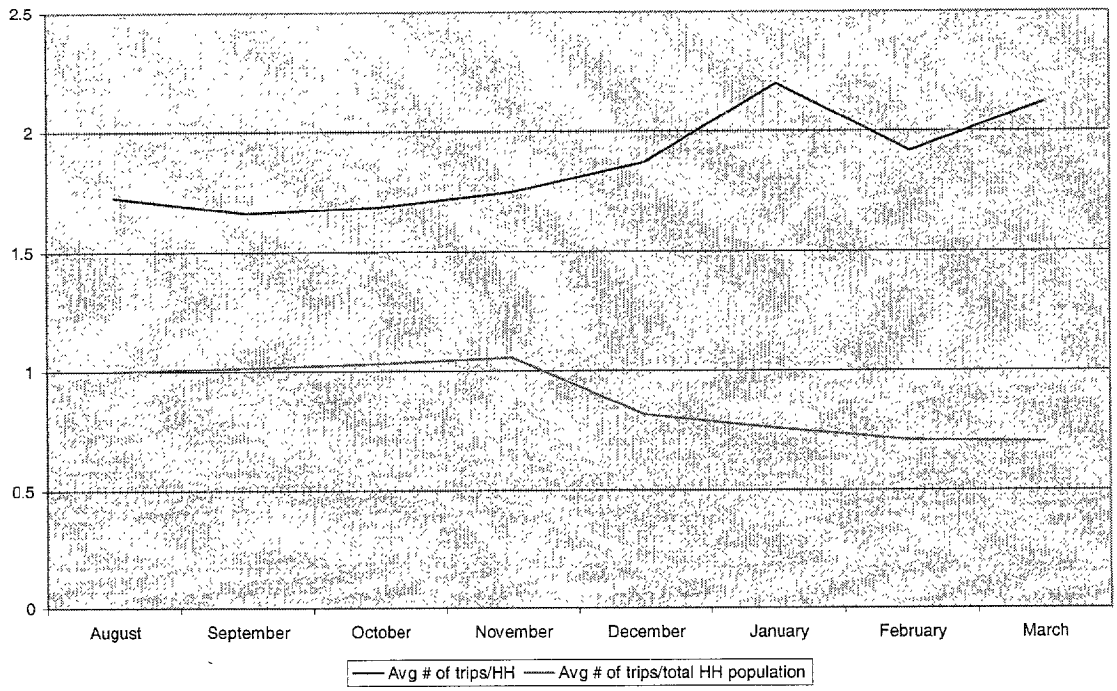


Figure 2: Travel frequency

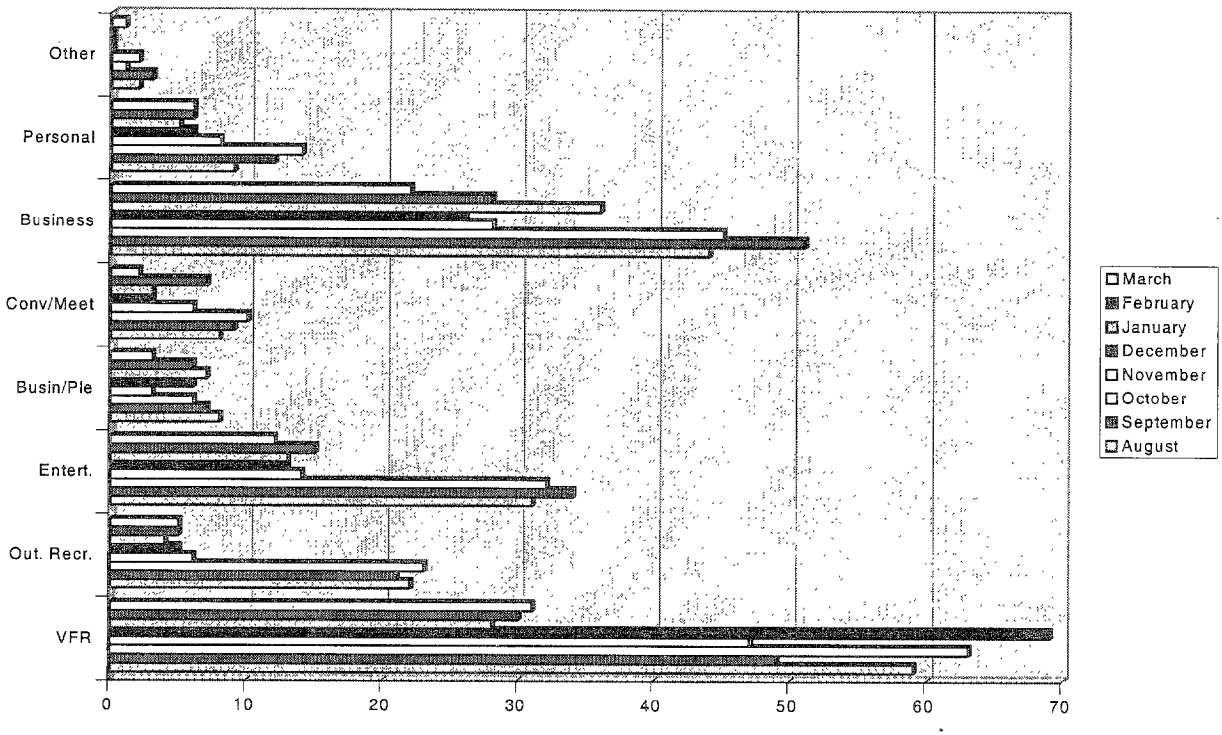


Demographic characteristics

a) Primary trip purpose

Study participants were asked to report the primary purpose of their trip. They were given eight choices: visit friends and relatives, outdoor recreation, entertainment, combined business and pleasure, conventions/seminars, business, personal and other. The two most popular choices were visiting friends and relatives and business. In September and January, business was selected as the primary trip purpose. In the remaining six months the overwhelming choice was visiting friends and relatives. Figure 3 summarizes the primary trip purpose selections for the entire period.

Figure 3: Primary trip purpose



b) Primary transportation

The majority of households used their own automobile for transportation. The second choice was travel by air. Figure 4 shows the transportation selections for the eight-month period. The choice of travel by car over air was much more significant in late summer and early fall months. For January, February, and March travel by car was still the number one mode of transportation even though travel by air was close behind.

c) Age of HH members involved in travel

Greater Indianapolis households do not include their children (under 17 years of age) in their travel plans. The vast majority of travelers were over 17 years old. Only in two months, August and December, young travelers accounted for at least twenty percent of household travelers. Figure 5 describes the age distribution for the entire eight-month period.

d) Group tour demand

The overwhelming majority of Greater Indianapolis households involved in travel does not rely on group tours for their travel plans. On the average, only four percent of households travel as part of a group tour. Figure 6 shows the demand, or lack of demand, for group tours.

Figure 4: Primary transportation

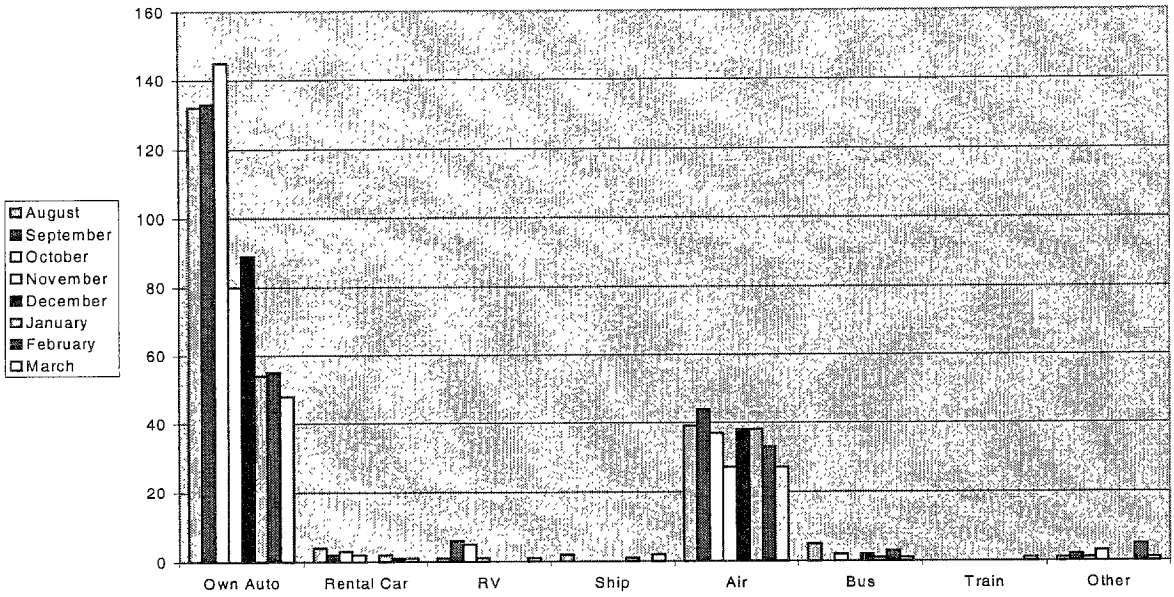


Figure 5: Age distribution

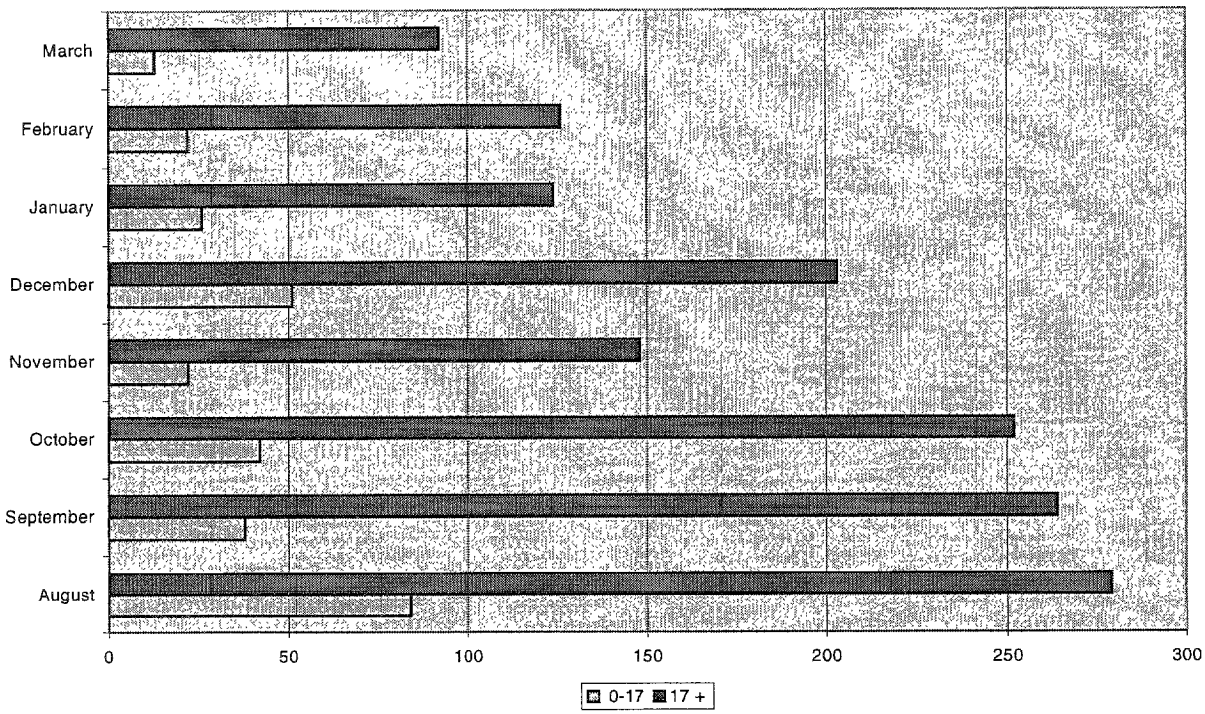
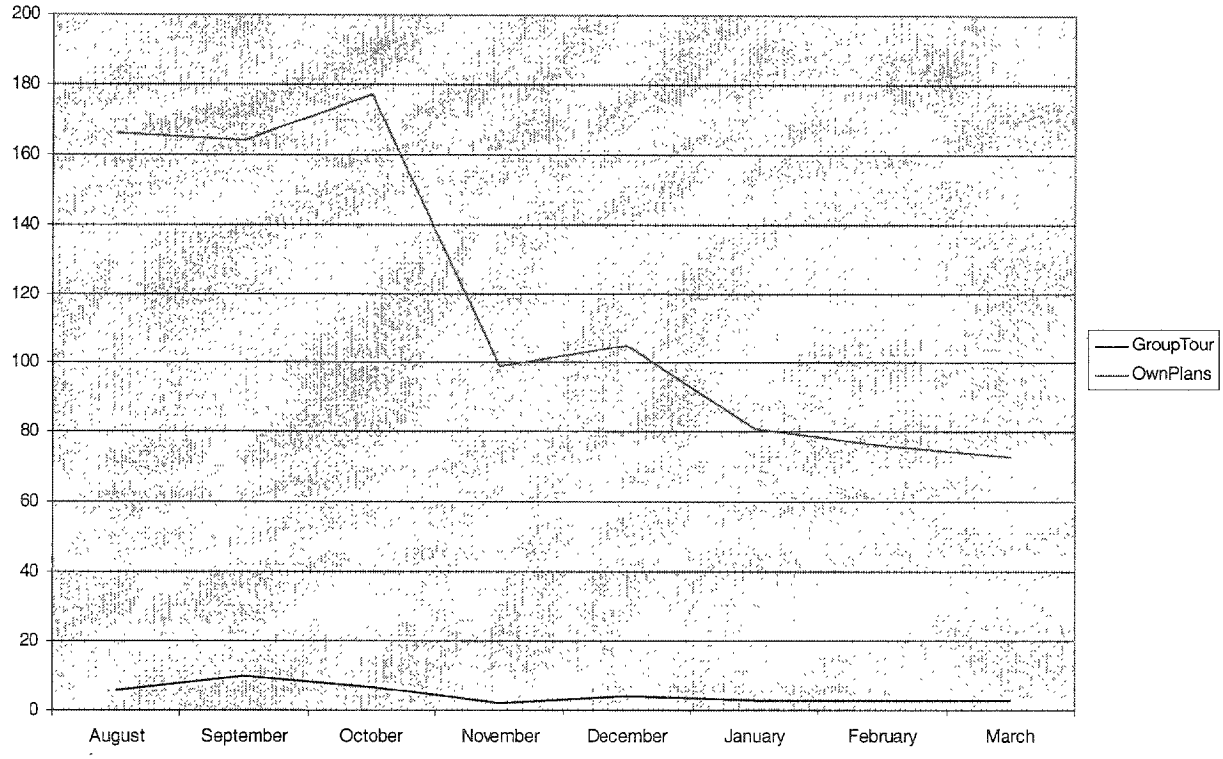


Figure 6: Group tour demand



e) Choice of accommodations

The most popular choice for each month was hotel/motel/bed and breakfast. Right behind was the choice for private homes. In two, two-month periods, November/December and February/March, private homes were almost as popular a choice as hotels/motels/bed and breakfasts. Figure 7 displays all accommodation choices graphically.

e) Demand for activities

The choices in this category were not as one-sided as in previous categories. One activity that was chosen as the most popular activity for each month was shopping. Historical and outdoor activities were more popular in late summer and early fall months The same was true for golf/tennis/skiing and sports events. Figure 8 shows the activity demand distribution for the eight-month period.

The study questionnaire asked for the total dollar amount spent per state or country visited. In addition, participants were asked to list both the states and/or countries visited and the specific cities and or places. Table 2 summarized total travel expenditure per month. Over the eight-month period, and beginning with the month of August, there was a steady decline in total travel expenditure figures. The only exception was the month of December where a small increase occurred from the previous month.

Table 3 looks at the travel expenditure for Indiana and the four surrounding states, Illinois, Kentucky, Michigan and Ohio. Indiana received more travel expenditure amounts than the four surrounding states in four out of the eight months. Illinois received more that Indiana in August, December, and February. Ohio was ranked first in November.

Figure 7: Accommodations Demand

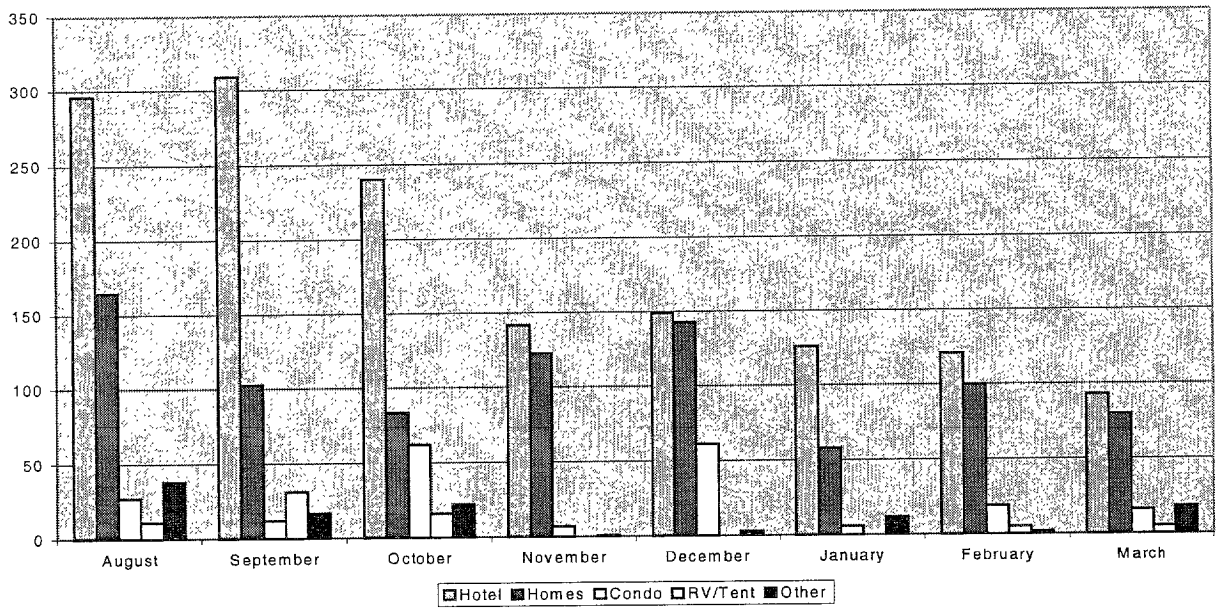


Figure 8: Demand for activities

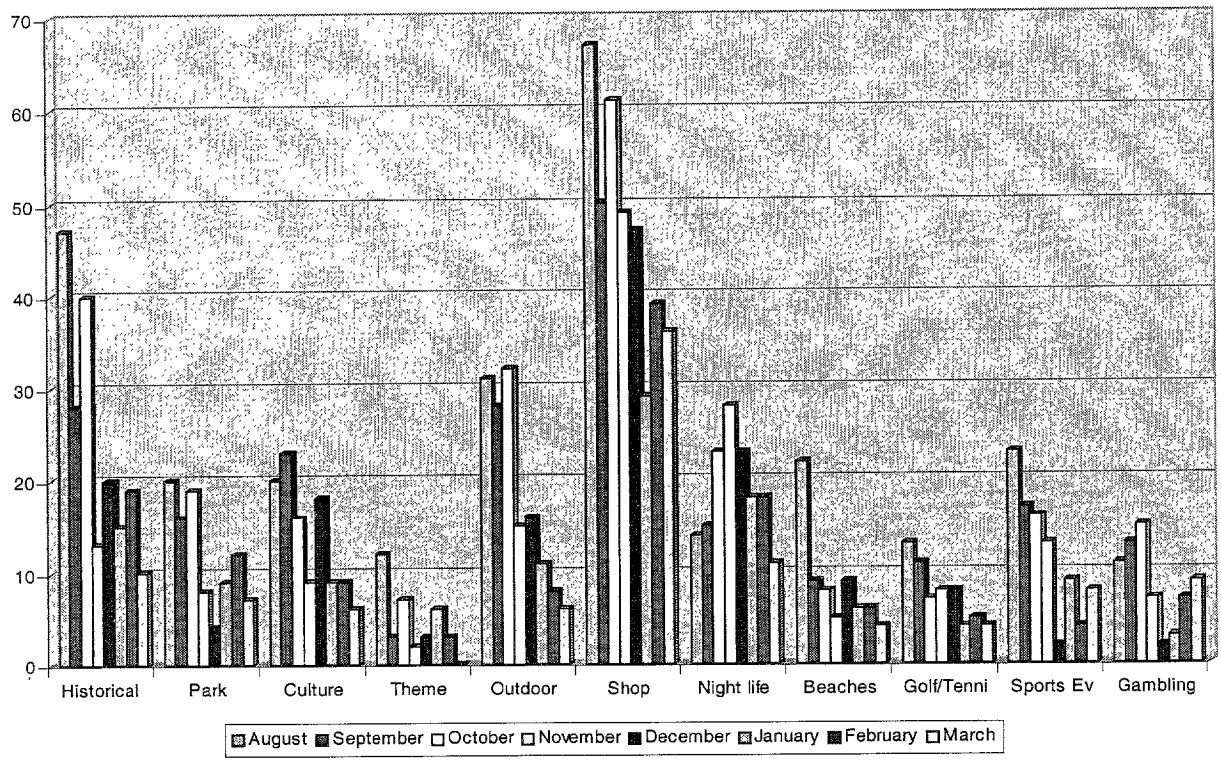


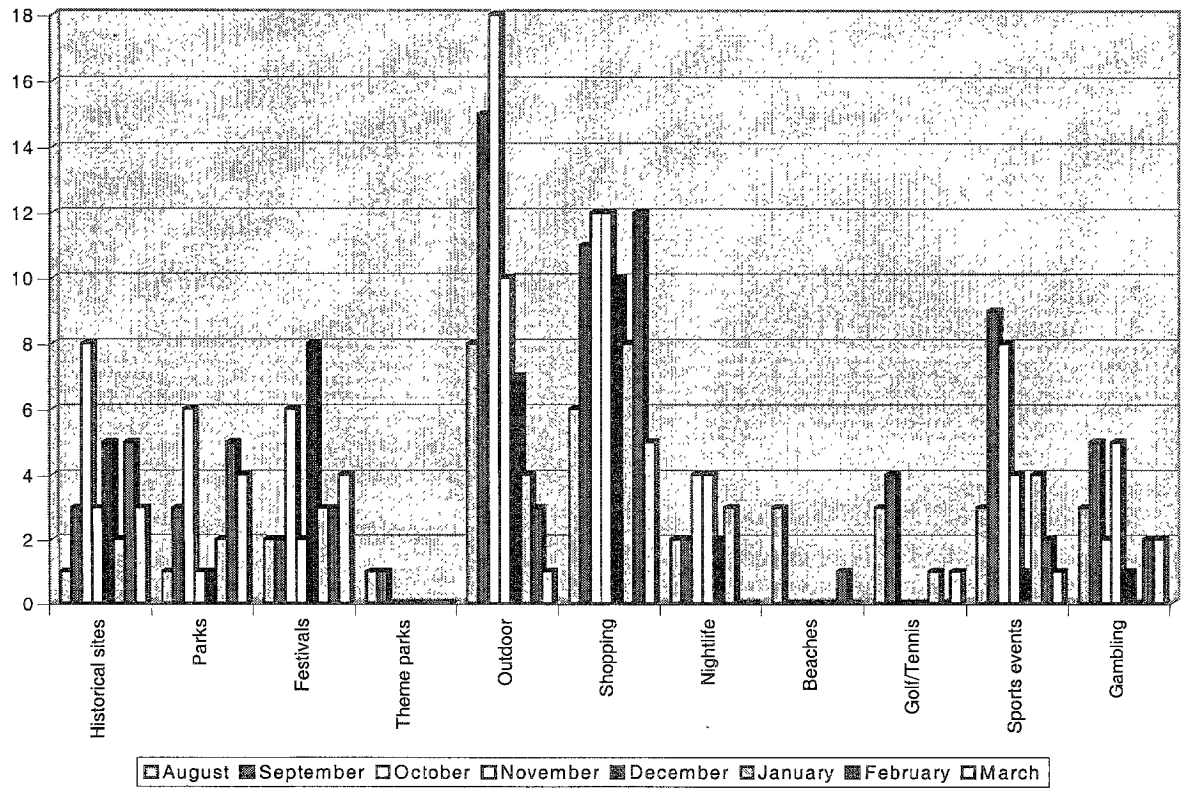
Table 2: Total travel expenditure

Month	Total $ expenditure	Percent of total expenditure
August	96,890	20.77
September	82,397	17.66
October	66,407	14.23
November	43,680	9.36
December	58,829	12.61
January	42,802	9.17
February	40,085	8.59
March	35,496	7.60
TOTAL	466,586	100.00

Table 3: Travel expenditure in $ by surrounding state

Moth	Illinois	Kentucky	Michigan	Ohio	Indiana
August	8,160	1,340	6,655	4,940	6,130
September	5,285	3,040	3,305	5,310	8,714
October	4,250	3,040	990	2,230	7,313
November	3,135	270	1,425	3,790	2,885
December	4,985	320	970	615	3,929
January	1,655	340	800	195	2,082
February	2,760	1,320	850	2,530	2,140
March	2,610	750	1,550	480	4,151

Figure 9: Demand for activities



In the four months that Indiana ranked first in travel expenditures among surrounding states it received at least one third of travel expenditure that was distributed among the five states. The actual distribution for the eight months is as follows:

Indiana

- September 33.97%
- October 41.03%
- January 41.04%
- March 43.51%

Illinois

- August 22.52%
- December 36.32%
- February 22.29%

Ohio

- November 25.08%

Conclusion

The preliminary findings of the eight-month survey indicate a strong demand by Greater Indianapolis households for in-state travel. As stated above, in-state travel was ranked higher than travel to the four surrounding states in September, October, January, and March. Figure 9 elaborates on the demand for activities by Greater Indianapolis households when involved in in-state travel. Outdoor activities, such as hunting, fishing and hiking, ranked higher than any other activities in the first three months of the survey. Shopping was ranked first in the next five consecutive months.

Bibliography:

Tourism Works For America, 1997 Report, Washington, DC: Travel Industry Association of America.

Tourism Works For America, 1998 Report, Washington, DC: Travel Industry Association of America.

THE RELATIONSHIP BETWEEN THE EXPERIENCES OF ORGANIZED SPORTS LEAGUE AND LEISURE ATTITUDE

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Abstract: This study purposed to examine the relationship between the experiences of organized sports league and leisure attitude. Organized sport league for children is one of the most dominant leisure activities that influence their future leisure attitude. To achieve the purpose of the study, 200 students at the University of Connecticut were selected as sample of this study. Logistic regression analysis was also used for analyzing data. Most of subjects (78.5%) experienced the organized sports league under aged 14. However, there was no relationship between the experience of the participation in the sports league and leisure attitude. There was significant relationship between the preference, and frequency of the participation and leisure attitude. The higher preference one feels with respect to organized sports league participation, the more positive attitude one has with leisure. And the more frequent participation one has in organized sports league, the more positive attitude one has with leisure. Therefore, the experiences of the participation in organized sports league during childhood influence the development of leisure attitude in future.

Introduction

Millions of children have participated in organized sports league each year such as Little League, or Pop Warner Football (Weiss, 1989). Participation in organized sports league has become a main leisure activity for children in contemporary society. Along with development of the sports league as a leisure activity, many studies have been conducted for investigating the functions of the league (Gould, 1984; Scanlan & Lewthwaite, 1986; Humphries, 1991; Bar-Or, 1993; Weiss 1993; McEwin & Dickinson, 1996). Those studies were mainly deal with the functions of the children's organized sports league in terms of how the sports league affects the children's physical, psychological, and social development. Bar-Or (1993), Weiss (1993), and McEwin & Dickinson (1996) indicated that physical activities were very important to children because they provided opportunities to improve motor skill, fitness, self-esteem, and establish their own identity. For children, therefore, winning is not an important reason to participate in the sports league. Instead, they tend to focus on developing physical competency, being with group, enjoying excitement, and improving fitness (Gould & Horn, 1984; Weiss, 1989).

However, because of dramatic changes in the nature of children's organized sports league, many negative aspects of the sports league have been issued in current academic research. For example, Findlay (1987), and McEwin & Dickinson (1996) studied about risk in interscholastic sports programs that one-third of all sports injuries now occurred in children aged five to fourteen. They also indicated that many of those injuries were "overuse" injuries caused by factors such as over-training, long playing season, and specialty sports camps. Since children's sports league has become concentrating on winning rather than children's wise use of their leisure, the sports league has created many negative effects to children. Therefore, many children have dropped out the sports league each year due to negative experience in the sports league. Weiss (1993) discussed reasons for both continued and discontinued the participation that "children are likely to cite multiple motives, such as skill development, friendship, and competition aspects, as important reasons for staying involved in a particular sports." He also indicated reasons for discountinuing of sports participation such as lack of playing time, over-emphasis on wining, dislike the coach, and lack of fun and win. Weiss (1988) suggested that negative impacts of children sports had a detrimental effect on future motivation and performance. It suggests that negative experiences in sports participation also negatively affect overall preference of sports participation that should relate to children's attitude toward sports participation in future.

As one of the dominant leisure activities in contemporary society, sports league for children would influence the development of leisure attitude in future. Iso-Ahola (1980) defined leisure attitude as " the expressed amount of affect toward a given leisure related object." He suggested that leisure attitude could be constructed based antecedents, mainly past experiences, and beliefs on leisure activity. According to his framework for leisure attitude, the quality of leisure attitude could be determined by a personal belief toward a certain leisure activity. There are two major sources of belief formation such as situational/social influences, and personal past experiences. He emphasized on the early childhood leisure experiences as important stage for one's basic orientation toward leisure. He mentioned that "how a person evaluates the consequences of leisure involvement and what one expects from leisure participation are notably affected by early recreation experiences." The quality of leisure attitude therefore could be determined by experiences of past leisure activity, especially during childhood. Since sports league for children become one of the dominant leisure activities in contemporary society, the experience of sports league in childhood should contribute the quality of leisure attitude in future.

Purpose of the Study

Purpose of this study was to examine relationship between the experiences of the participation on organized sports league in childhood and leisure attitude.

Research Questions

1. Was there significant relationship between the participation of organized sports league in childhood and leisure attitude?
2. Was there significant relationship between the preference of the participation in organized sports league and leisure?
3. Was there significant relationship between the frequency of the participation in organized sports league and leisure attitude?

The Sample and Data Analysis

211 freshmen who were attending at the University of Connecticut selected as the sample of this study. Subjects contacted at their class and informed about the purpose of the study. After agreeing to participate in this study, they filled out the self-report questionnaire. After screening the data, 200 subjects were used for the data analysis.

Logistic regression tested to examine the relationship between the experiences of organized sports league and leisure attitude. SPSS PC 8.0 version used for data analysis, and set the alpha (α) level with .05 ($P<.05$).

Instruments

To identify the experience of organized sports league participation, the instrument included questions about the sports league in which subjects mostly participated under aged 14. Duration, frequency, and preference of the participation were also asked to find out the descriptive information of the participation.

Leisure Attitude Scale (LAS) developed by Benard and Ragheb (1982) was used to measure leisure attitude. The scale consisted of three sub-domains such as affective, cognitive, and behavioral leisure attitude. Affective leisure attitude indicates individual's feeling toward his/her own leisure, the degree of liking or disliking of leisure activities and experiences. Cognitive leisure attitude refers to individual's general knowledge and belief about leisure, its general characteristics, virtues, and hoe it relate to the quality of one's life. Behavioral leisure attitude concerns with individual's past, present, and intended action with regard to leisure activities and experiences (Benard and Ragheb, 1982). The overall reliability of the scale was .94, which indicated the usefulness of this scale for measuring leisure attitude.

Results

Table 1 shows that the sample consisted of 96 males (48%) and 101 females (50.5%). 157 (78.5%) of subjects had experiences of the participation in organized sports league under aged 14, while 43 (21.5%) of subjects did not have the experiences. The average duration of the participation was 5.13 years with 6.13 times a month for the average frequency of the participation. The average preference of the participation was 4.39 of 5 point Likert scale.

Table1. Descriptive Statistics of Sample

Variables	
Participation of the sports league	Yes : 154 (78.5%) No : 43 (21.5%)
Preference of the participation	4.39 with 5Likert scale
Frequency of the participation	6.31 times a month
Duration of the participation	5.13 years

Since there were only 43 non-participants of the sports league among the subjects, 43 participants were randomly selected among the participants for data analysis. After conducting logistic regression, however, there was no significant difference between two groups (Table 2). Therefore, whether people participated in organized sports league under aged 14 or not, leisure attitude would be positively developed throughout adolescence.

Table 2. Leisure Attitude Between Participants and Non-Participants

Variables	Participants (means)	Non-participants (means)
Affective attitude	4.25	4.26
Cognitive attitude	4.27	4.33
Behavioral attitude	3.67	3.66
Overall attitude	4.08	4.04

The means of the preference (4.39) as cutoff with respect to the preference of the participation were used to divide subjects into two groups such as high and low preference group. There was a significant difference between high and

low preference group (Table 3). 86% of high preference group was correctly classified by leisure attitude, while 42.2 % for low preference group. It indicates that the higher preference one feels with respect to organized sports league participation, the more positive attitude one has with leisure.

Table 3. Relationship between leisure attitude and the preference of the participation

Variable	Coefficient (B)	Significant
Leisure Attitude	1.37	0.01
-2 Log Likelihood	196.90	
Goodness of fit	166.32	
Model Chi-Square	15.36	$p < 0.01$

Classification Rate : Low Preference42.19% High Preference 86.02%

Table 4 shows the relationship between leisure attitude and the frequency of the participation. The means of the frequency (6.31 times a month) were used as cutoff to divide subjects into two groups such as high and low frequency group. There was significant difference between high frequency and low frequency group. 46% of high frequency group was correctly classified by leisure attitude, while 72% for low frequency group. It means that the more frequent participation one has in organized sports league, the more positive attitude one has with leisure.

Table 4. Relationship between leisure attitude and the frequency of the participation

Variable	Coefficient(B)	Significant
Leisure Attitude	.70	0.03
-2 Log Likelihood	211.23	
Goodness of fit	155.78	
Model Chi-Square	4.56	$p < 0.05$

Classification Rate : Low frequency 72% High frequency 46%

Discussion and Conclusion

The results of this study showed the descriptive information about trend of the participation in organized sports league in contemporary society. First, majority of the subjects had experiences of the participation in organized sports league when they were under aged 14. Second, they tended to participate in organized sports league for relatively longer periods. Third, most of the participants were likely prefer to participate in organized sports league. Only three of subjects indicated their negative feeling toward the participation in the sports league. These results implicated that children not only tend to spend large amount of time on the sports league but also the sports league served as a main leisure activity that provides positive feeling to the participants.

There was no significant relationship between participants and non-participants with respect to leisure attitude. It could be explained that non-participants in organized sports league could participate in other leisure activities that contributed developing positive leisure attitude like organized sports league. Since leisure attitude is mainly affected by past leisure experiences (Iso-Ahola, 1980), there is a possibility that other leisure activities also provide equal opportunities to develop positive leisure attitude.

The result that showed positive relationship between the preference of the participation and leisure attitude could indicate the importance of consequence of leisure activities. Iso-Ahola (1980) suggested that "perceived positive consequences are salient belief which are building blocks of leisure attitude. Therefore, high preference that could be generated by the positive consequences of the sports league participation could develop participants' intrinsic motivation toward leisure participation that affects positive leisure attitude.

Overall, the experiences of the participation in organized sports league during childhood positively affect the development of leisure attitude in future.

References

Brustad, R.J. (1988). Affective Outcomes in Competitive Youth Sport: The Influence of Intrapersonal and Socialization Factors. *Journal of Sport & Exercise Psychology*. 10: 307-321.

Humphries, C.A. (1991). Opinions of Participants and Nonparticipants Toward Youth Sport. *Journal of Sport Psychology*. 13: 44-48.

Iso-Ahola, S.E. (1980). Leisure Attitude. In *The Social Psychology of Leisure and Recreation* (pp. 250-271). Dubuque, IW: Wm. C. Brown Company Publishers.

McEwin, C.K., and Dickinson, T.S. (1996). Placing Young Adolescents at Risk in Interscholastic Sports Program. *The Cleaning House*, 69(4): 217-221.

Pittenger, J.E., and Hunt, S.L. (1984). Effects of Race upon the Meanings of Leisure among University Students. *Journal of Negro Education*. 53(1): 41-49.

Ragheb, M.G., and Beard, J.G. (1982). Measuring Leisure Attitude. *Journal of Leisure Research.* 14(2):155-167.

Scanlan, T.K., and Lewthwaite, R. (1986). Social Psychological Aspects of Competition for Male Youth Sport Participants: IV. Predictors of Enjoyment. *Journal of Sport Psychology.* 8: 25-35.

Weiss, M.R. (1989). Youth Sports: Is Winning Everything? *Childhood Education.* Summer: 195-196.

Weiss, M.R. (1993). Psychological Effects of Intensive Sport Participation on Children and Youth: Self-Esteem and Motivation. In B.R. Cahill & A.J. Pearl (Eds.), *Intensive Participation in Children's Sports* (39-64). Champaign, IL: Human Kinetics Publishers.

RECREATION PLANNING AND MANAGEMENT

PARK PARTNERSHIPS: A CASE STUDY OF YOSEMITE INSTITUTE AND YOSEMITE NATIONAL PARK SERVICE

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Abstract: This exploratory case study seeks to develop a better understanding of park partnerships. As partnerships continue to become popular park management solutions, in an era of federal agencies stricken with budgetary and staff constraints, it is essential to develop a clear understanding of what a partnership means. Exploration of the well-established partnership between Yosemite Institute and Yosemite National Park Service facilitated such a study. Since both organizations have worked to maintain a partnership for over twenty-eight years, their partnership was ideal for studying the meaning attached to the arrangement. A qualitative methodology was incorporated using grounded theory and in-depth interviews to reveal the meaning of the term "partnership".

Introduction

Yosemite National Park hosts a unique partnership between Yosemite Institute (YI), an environmental education organization, and Yosemite National Park Service (YNPS), a federal land management agency. In 1971, under financial constraints, YNPS developed a cooperative agreement with YI to support the mission of environmental interpretation. After twenty-eight years, the Yosemite Institute continues to support the interpretive mission and the mandates of the YNPS. Consequently, this partnership is ideal for a case study concerned with developing an understanding of the meanings and values associated with the concept of a partnership.

Currently, National Parks around the country have increasing numbers of visitors seeking the park experience. Over the past century, advancements in transportation and technology have transformed remote National Parks into increasingly viable recreation opportunities. Transportation by stagecoach, horseback and train were traditionally slow and expensive, making vacations in the National Parks a luxury for a small percentage of the population. With the introduction of the automobile, paved highways, and bus tours, our treasured parks became increasingly accessible. Improvements in technical equipment such as tents, backpacks and clothing associated with outdoor activities have influenced and added to the increasing number of visitors seeking recreation in the National Parks. As a result, National Parks like Yosemite and Yellowstone host millions of visitors annually.

Partnerships are a potential answer for once independent parks, now faced with increases in visitation rates coupled with budgetary constraints. As resource managers begin to look to partnerships in the attempt to meet mandated goals and missions, it is important to understand what a partnership means. Consequently, this case study helps to develop an understanding of partnerships, ultimately serving as a role model for parks faced with similar constraints and demands. It is only through increased understanding of these fragile relationships that we will be better able to facilitate partnerships.

The objectives of this qualitative case study of the partnership between YI and YNPS are: (1) to identify the meaning that informants attach to the conditions essential to facilitating partnerships, and (2) to discover the connections between those conditions. Aware of the increasing demand for partnerships, we must begin to develop an understanding of what a partnership means and how to best facilitate such relationships.

Partner Organizations

Yosemite National Park Service

One of the primary goals of Yosemite National Park, as mandated in the Park Service's 1916 Organic Act, is to assist visitors in understanding, enjoying and contributing to the protection of the resources within the park. Dedicated to this mission, YNPS's interpretive division provides park programs that assist park visitors in these three major activities.

Interpretive rangers implement a variety of programs to develop visitors' understanding of the natural, cultural and scenic resources in Yosemite National Park. These interpretive programs incorporate core themes from geology and ecosystems to Native American culture and history. The programs are delivered through activities such as interpretive walks, ranger led campfires and presentations. Park programs seek to develop the visitor's understanding of the resources, and their connection to the resource. Essential to these programs is the ability of the ranger to strike a cord in the visitor and enable them to see their relationship and interconnection with the resource.

Interpretive personnel have a responsibility to assist visitors in their enjoyment of the park. Through the provision of information on where and how to utilize the park's resources (e.g., backpacking, hiking and rock climbing), the interpretive division aids in visitor enjoyment.

The interpretive division's final mandate is to assist visitors in contributing to the protection of the park's resources. The most effective way that the interpretive division meets

this goal is through their information and education programming. Whether presenting visitors with new information or altering their perspective on the park through a new experience, they can reinforce preservation attitudes and encourage environmental stewardship.

Yosemite Institute

When the interpretive division of YNPS was faced with shrinking budgets, reductions in interpretive staff and an ever-increasing visitation rate, the agency was forced to turn to an outside organization for some support. Unable to meet their mandated goals and missions, the YNPS embarked in a cooperative agreement with Yosemite Institute. The agreement stated that the Park Service did not have all the resources needed to provide park programs and desired the Institute, under the supervision and regulation of the park superintendent, to establish and operate such programs (Cooperative Agreement 1971).

YI is a private non-profit organization, which provides week-long residential field science programs. Using Yosemite National Park as a classroom, instructors work to develop a sense of place, interconnectedness and stewardship in their students. Annually, the organization facilitates 13,000 students, predominantly from the state of California. Through their work, the organization provides 400,000 hours of interpretation and educational services that serve the mission of YNPS. For the past twenty-eight years, Yosemite Institute has supported the mission of the YNPS's interpretive division through the provision of educational programs.

Literature Review

Partnerships

Concerned with the meaning of partnership, we reviewed previously published research. However, the focus has been predominately on the evolutionary process inherent in partnership development not the meaning of partnership. Research, conducted by Waddock (1989), points to three distinct stages in partnership development: initiation, establishment and maturity. Waddock refers to initiation as the most critical stage in partnership development. Crucial to initiation is issue crystallization, when partner organizations clearly establish a salient issue around which the organizations can unite. Next, the partner organizations must realize their interdependence and the mutual stakes and benefits which tie them together during coalition building. Direction setting is the final component in initiation, as partners finalize the direction that their relationship will take.

While Waddock's research reveals the importance of the initiation stage in partnership development, it unfortunately does not contribute to our understanding of the meaning of partnerships or how to facilitate such relationships. Consequently, our exploration of previous research reinforced the need for developing an understanding of what a partnership means.

A review of research conducted by Selin and Chavez (1994) and Waddock (1991) served as useful tools in developing a greater understanding of what partnership means. Their research presented conditions essential for facilitating a healthy partnership. Since we were concerned with the meaning attached to partnerships, we found these conditions to be a good framework to organize our research. Consequently, we adopted a list of conditions from Selin, Chavez and Waddock that are essential for facilitating partnerships: interdependence, communication, shared vision, strong leadership, power equilibrium, understanding, salient issue, trust, sense of benefits, clear and well defined objectives, and feed back.

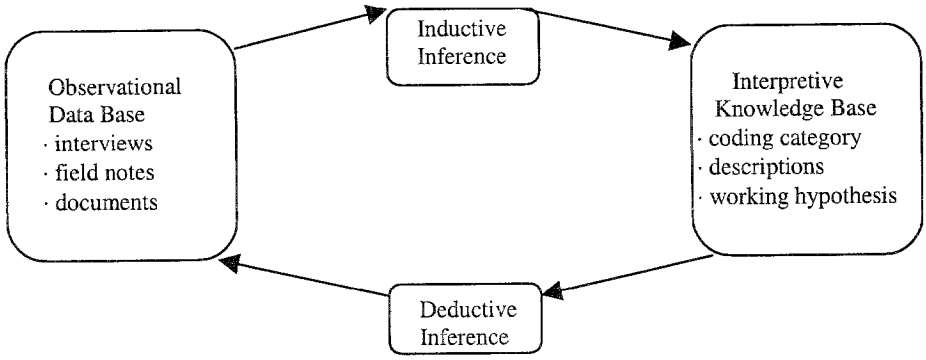
Qualitative Analysis

The qualitative approach used in this study, grounded theory, was introduced in 1967 by Glasser and Strauss and is based on the inductive conceptual process. The inductive reasoning process fundamental to grounded theory is structurally different from the traditional deductive process associated with most data analysis. Deductive analysis is working to test developed theories or hypothesis using data to either accept or reject the original hypothesis. However, in grounded theory, the researcher does not assume he or she knows what is most relevant and important to the study. Qualitative researchers implementing grounded theory, "do not search out data or evidence to prove or disprove hypotheses they hold before entering the study; rather, the abstractions are built as the particulars that have been gathered are grouped together (Bogden and Bicklen 1998)." Consequently, this type of analysis seeks to generate concepts, theories and generalizations. "Generating theory from data means that most hypotheses and concepts not only come from the data, but are systematically worked out in relation to the data during the course of the research (Glasser and Strauss 1967)." Theory is developed from the bottom up as pieces of data are connected to provide a descriptive representation of the interconnections.

While deduction is not the primary research process involved in grounded theory, it can play a role in the overall research design. Deductive reasoning is useful in the later stages of grounded theory during which inferences are measured against the data. As theories develop out of the data, the deduction process can assist in verification of the theory. Through the combination of induction and deduction processes, grounded theory both develops and tests theory. Dewey (1938) notes, "induction and deduction must be so interpreted that they will be seen to be cooperative phases of the same ultimate operations." Shelly and Sibert (1992) suggest this complementary relationship between deduction and induction process (figure 1).

This approach to qualitative research is especially useful in studies exploring subjects where no previous research has been conducted. The inductive reasoning process allows the researcher to explore phenomena and relationships between phenomena that they might not have been aware of previously. Consequently, unknown relationships and meanings attributed to phenomenon emerge as the research process generates theory through descriptive data. As a result, these exploratory projects can bolster the foundation from which future studies develop.

Figure 1. The induction-deduction process used in qualitative research (after Shelly and Sibert 1992).



The inductive-deductive inference model displayed in figure 1 (Shelly and Sibert 1992) is essential to the analysis of qualitative data acquired from in-depth interviews. Central to this model is the analysis process of generating coding categories, descriptions and inferences from the data. The researcher must look for illustrations, which help to define categories and the meaning that informants attach to them. Those definitions are then used to code the remaining data set. Codes are assigned by interpreting and reading the interview transcripts to identify responses that meet the defining characteristics of the categories. The iterative nature of the inductive-deductive process allows for the evolution of categories and concept expansion. Shelly and Sibert (1992) note, "the movement within any stage is the basic induction cycle; the movement across stages is a spiral." The inductive cycle inevitably leads the researcher upward to a more generalized and abstract explanation of the phenomena.

Research Design

In order to discover the meaning of partnerships, we employed a qualitative methodology using grounded theory. The goal of qualitative research is to improve the researcher's ability to know and discover; therefore, qualitative procedures should be used that work to these ends (Henderson 1991). Consequently, the case study approach was supported by data collected through ethnographic in-depth interviews and in combination they helped to explore the partnership between YI and YNPS.

Data collection is particularly important to developing an understanding of the phenomenon, partnership, as defined by key informants. Interviews are central to data collection to capture the informant's voice, preserving the perspective and meaning attached to the phenomenon. Ethnographic interviews allow the meaning that informants attribute to partnership to emerge. This data collection method is essential to the qualitative researcher vested in discovering what informants are experiencing, how they interpret their experiences, and how they structure the social world in which they live (Bogden and Bicklen 1998). The researcher conducting interviews can use both informal and formal techniques to reach the goals of the study.

Study Methods

Data were collected through ethnographic in-depth interviews with employees from both Yosemite Institute and Yosemite National Park Service. The executive director of YI provided an initial list of informants to contact for interviews. The list represented employees from both Yosemite Institute and Yosemite National Park Service and various positions within the two organizations. A network sampling technique was used to gain access to members of both organizations outside the first list of employees. An effort was made throughout the study to maintain the balance between the number of informants from both organizations.

NPS employees in the sample represented a variety of divisions from interpretation and resource management to law enforcement and research. Within each division, the informants held various positions within the NPS hierarchy from employees in the field to administrators and division chiefs. Since we were searching for the meaning of partnership, we chose interviewees who had some knowledge of Yosemite Institute. The sample from YI represented administrators, executive management staff and field instructors. We chose informants who had been associated with YI for at least one year.

After acquiring the initial list of informants, interviews were conducted during the month of July. We sent out a letter of introduction to all potential interviewees explaining the purpose of the study and the reason for speaking with them about the partnership. The mailing included an interview schedule to familiarize the informants with the material to be covered during the interview.

A combination of informal and formal interview styles enabled the collection of a consistent set of data. A predetermined interview schedule was applied to all informants maintaining consistency across the interviews.

The predetermined questions presented to informants were broad open-ended questions from which the interviewer followed the lead of the informant. Through simultaneous implementation of both formal and informal techniques, interviews captured the meaning of partnership to the informants.

The interview sessions lasted anywhere from twenty minutes to an hour and a half. At the conclusion of each interview, informants were asked for any suggestions that might improve the interview schedule or the process in general. Informant's suggestions and comments were assets as they helped to shape the interview sessions that followed. Network sampling was implemented as each informant suggested members of the organizations who might contribute to the research project. Data saturation, the point at which the information collected becomes redundant (Bogden and Bicklen 1998), was achieved after interviewing twenty-nine informants. The total sample population consisted of fifteen informants from YI and fourteen from YNPS.

Results and Discussion

This paper presents preliminary results from the first stage of analysis. In this first stage, we defined the conditions essential to partnerships based on informant's testimony and discovered preliminary connections between the partnership conditions. This paper presents three of the conditions essential to partnerships. First, we explain how informants defined the conditions and then follow with illustrations and quotes from the interviews. The voices of informants emerge through the quotes, presenting their perspectives on the partnership. The informants' quotes suggest the meaning attributed to each condition and the relative importance of these conditions to the partnership. Consequently, the illustrations of the partnership aid in the development of our understanding of what is essential for partnerships.

The quotes presented here illustrate the necessity of partnerships while revealing the importance of working together towards a shared vision with common goals and missions. A constant effort to maintain a working relationship is fundamental to the success of the partnership. Communication and interaction at multiple levels are central to meet the potential of the partnership.

Shared vision

The first condition defined by informants, as essential to partnerships, was shared vision. Informants defined this condition by four general requirements: goals, opportunity, philosophical framework and the recognition of partner organization's goals, and opportunity and philosophical framework. The construct, shared vision, is dependent on its ability to encompass these four principals.

Goals help to define shared vision since informants believe that shared goals are essential to a shared vision. Informants referred to their shared goals such as: preservation, developing an educated constituency, and providing a great first time experience. Opportunity means that there is an opportunity to provide educational or recreational programs for students or visitors. Some interviewees mentioned philosophical framework as central to their definition of shared vision, such as: vision, mission or philosophy. Finally, shared vision is the recognition of how the partner organization defines these principals. Specifically, what are the partner organization's goals, opportunity and philosophical framework?

The quotes selected to illustrate shared vision from both YI and YNPS employees refer to the goals that the two organizations share and the educational opportunities that allow them to meet their goals. An employee at YNPS stated the goals as, "To preserve and protect the resources, [and] the natural and historical objects therein. You can't do that if you don't educate the young kids and that is what it comes down to." An employee at YI stated that, "I see the Institute in building stewardship and support for parks particularly with kids, the future constituency, and support for the whole idea of National Parks. I think the Institute helps build connections between people and the park and makes people realize why a National Park is important and what goes on in a National Park that is special."

Communication

The construct communication was defined by informants as an interaction. Interaction at both the social and professional levels was essential to their definition of communication. Characteristic interactions ranged from an informal game of ultimate frisbee or a potluck dinner to a formal gathering at an interpretive management team meeting. Another key component of communication is the medium used, such as verbal, contractual, written documents, or visually just acknowledging each other in the field.

The selected quotes, which illustrate communication, display the importance of interactions on both a social and professional level. They show the connection between social interaction and its role in developing an opportunity for professional interaction. An employee with Yosemite National Park Service stated, "I really feel there needs to be more interaction. And I feel like that with our own interpretation group, so it is not just YI. It is not that YI is being kept out. It is that somehow or another the information about ongoing research and ongoing management strategies is not being dispersed." An employee from YI expresses the need for communication at both the personal and professional level stating, "Starting from a personal level is where I think the connection between the Park Service and YI has to start. I think we are very content with who we are and who we are hanging out with and who we get to talk with throughout the week and we don't need anybody else. Then when we get into the field, we realize god it would be really cool if I felt more comfortable to go up to that person."

Interdependence

The definition of interdependence dealt with three requirements: function, resource, and finance. Function was the concept that YI or YNPS was providing some function which their partner organization was dependent

on. Resource refers to YI's dependence on the natural and cultural resources within the park. Finance is at the root of interdependence since under funding constrains the park staff and requires outside organizations to assist them as they try to meet mandated goals and missions.

The selected quotes from the interviews exemplify the necessity of interdependence for both partner organizations. The mutual dependence of these two partner organizations is obvious when informants discuss the partnership. An employee from YNPS states, "Yosemite Institute is filling a niche that we can't fill in Park Service. We don't have the staff and we don't have the money to do educational programs for school groups or for groups like elder hostel or groups that want to have a more in-depth experience in the park. There is no way through federal procurement and the level of support we get that the Park Service can provide those programs." Similarly an employee from YI explains the interdependence which bind the two organizations together: "I think it is a really terrific two way street. That the service that YI provides for the Park is huge and I think our being able to operate in the park is likewise gigantic. If you look at this organization's asset, our presence of where we are is the number one thing far and away that makes us any good. So it is a thriving partnership and our agendas are healthily intermingled in a mutualistic symbiosis."

Conclusion

From these definitions and illustrations we can begin to understand what partnership means for these two organizations, realize how the conditions interrelate, and ultimately discover the influence of these conditions on the tone of the partnership. Consequently, this research provides information on how to maintain successful partnerships by developing our understanding of the relationship between the conditions essential for partnerships. Partnerships might be better managed and maintained once an understanding of what partnerships mean and how various conditions influence the partnership is reported.

Literature Cited

Bogden, R.C.; Biklen, S.K. 1998. Qualitative Research for Education an Introduction to Theory and Methods. Allyn and Bacon. Boston.

Glasser, B.G.; Strauss, A.L. 1967. The Discovery of Grounded Theory: Strategies for Qualitative Research. Aldine Publishing Company. Chicago.

Henderson, K. A. 1991. Dimensions of Choice A Qualitative Approach to Recreation, Parks and Leisure Research. Venture Publishing. Pensylvania.

Shelly, A; Sibert, E. 1992.Qualitative Analysis: A Cyclical Process Assisted By Computer. In: Hueber, G.L. (ed.), Qualitative Analyse:Computereinsatz in der Sozialoforschung, pp. 71-114. Munich: R. Oldenbourg Verlag.

Strauss, A.L.; Corbin, J. 1990.Basics of Qualitative Research: Grounded Theory Procedures and Techniques. Sage Publication. California.

Waddock, S.A. 1989. Understanding Social Partnerships: An Evolutionary Model of Partnership Organizations. Administration and Society, 21(1) 78-100.

Waddock, S.A; Bannister, B.D. 1991.Correlations of Effectiveness and Partner Satisfaction in Social Partnerships. Journal of Organizational Change Management, 4(2) 64-79.

Yosemite National Park Service, Department of the Interior. 1971. Cooperative Agreement.

THE IMPORTANCE OF ENVIRONMENTAL HISTORY IN NATURAL RESOURCES MANAGEMENT AND PLANNING

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Abstract: The field of study known as "Environmental History" provides the opportunity for humans to, once again, see ourselves as part of nature rather than separate from it. Many current perceptions of nature omit the fact that all natural environments have a human history. Thus seemingly "pristine" parts of nature actually have been shaped by human actions, some dating back as far as 12,000 years. Environmental histories may provide the factual and defensible data we require to understand natural environments today and to develop planning efforts for the future. History isn't simply about the past. More often than not it is about the future.

Introduction:

As land managers, planners, and researchers, we are finding it more difficult to balance the multiple-use approach on public lands with public desires to increase and broaden leisure activities. In the last decade of the twentieth century increasing numbers of people work indoors and seek release from stress and pressures by visiting and recreating in the outdoors. Nature or natural settings have taken on a role as primary stress relievers in our busy lives. Recreation has evolved into much more than a pastime. It is an activity many of us consider necessary as we nurture our physical and mental health. Not only is this a heavy burden on the land, but also upon land managers whose job it is to manage public land with a view toward the future. How can managers defend their actions in the face of polarized interest groups and legal challenges? One way is through the use of environmental history.

The history of an environment, or managed parcel of land, includes actions which we commonly group under the headings of "natural disturbance" and "human disturbance". Such things as tornadoes, hurricanes, floods, fire, and beaver activity fall into what most people call natural disturbances to the land. Human disturbance include things like logging, mining, grazing, farming, floods, fire, trail and road construction, and recreation site development. It is interesting that natural disturbances can cause some of the greatest impacts to a specific piece of land. Examples include the 1938 hurricane and the 1998 ice storm in New England.

Until fairly recently in recorded history, humans were more associated with the natural setting. It has really only been in the last three generations or so that we have increased the relocation of human beings from the natural environment. The result is that many of us view and understand nature as a place to imagine, visit, preserve, and protect. It is not viewed as a home but as a destination. Today we work hard to safeguard our ability to visit natural areas and we worry about whether or not our children and their children will have the same opportunity. Since the majority of us no longer live and work in the outdoors, the separation seems to contribute to a limited understanding of the land and perhaps to unrealistic expectations. Sometimes we even put forth the belief that areas set aside as "Wilderness" by Congress are some of the last remaining areas untouched or unspoiled by human beings. We embrace the mistaken assumption that these areas have insignificant histories when each actually has a vibrant one. Rather than taking away from the natural history of these areas, the dynamic human histories contribute to them and actually help explain why the land appears as it does today and how it will appear in the future.

We seem to focus on disturbances in environmental history which were human caused or assisted. Perhaps it's time to take a more comprehensive view of the environmental histories of the lands we manage. Prehistory and history of the land contain the facts which allow managers to plan for the future. Without this information it is very difficult to document how the land has recovered from past disturbances, what actions led to the vegetative types present, and why our proposed actions are acceptable and may even enhance the setting. If our management proposals are impacting, or are perceived to be, environmental history can provide information about the environments past response to similar disturbance. It is not far fetched for us to view the land as an informant. The story it tells through conditions present today indicate its methods of response and can point to informed land management approaches for our future. Environmental history is a tool which can provide the foundation for project planning.

Many current land management initiatives are dedicated to the "restoration" of natural settings. Environmental history can guide this effort because its focus is describing and understanding those conditions at any period within circa the last 12,000 years.

As land managers, I believe, we have erred by separating human history from natural history. They are both integral

parts of environmental history. The environment responds to disturbances of any kind and the results of those responses are what we see on and in the landscapes of our world. We have an opportunity to use this information as we plan for today and for our future.

> "What we remember, what we stress as significant, and what we omit of our past defines our present. And since the boundaries of our self-definition also delimit our hopes and aspirations, this personal history affects our future."
>
> *(Lerner 1997:199)*

> "To plan for the future without a sense of history is like planting cut flowers."
>
> *(McCullough 1998)*

References:

Brown, Dona. 1995. Inventing New England Regional Tourism in the Nineteenth Century. Smithsonian Institution Press. Washington and London.

Buso, Donald; Scott W. Bailey; S. Fay Baird; James W. Hornbeck; and C. Wayne Martin. 1985. Watershed Interactions Affecting Pond Acidification. Research Report No. 62. New Hampshire Water Resource Research Center. University of New Hampshire, Durham.

Cogbill, Charles V. 1989. Hubbard Brook Revisited: Land Use History of the Hubbard Brook Valley, NH. Written as part of "Integration of an Historical Perspective into Ecological Research." Supported by the Andrew W. Mellon Foundation. June 1989. Paper on file at Hubbard Brook Experimental Forest, Campton, NH.

Cronon, William (editor). 1996. Uncommon Ground: Rethinking the Human Place in Nature. W. W. Norton and Company. New York and London.

Dombeck, Mike. 1998. "A Gradual Unfolding of a National Purpose: A Natural Resource Agenda for the 21st Century." Speech by USFS Chief Mike Dombeck, March 2, 1998. USDA, USFS. 8 pages.

Dombeck, Mike. 1999. "Protecting and Restoring a Nation's Land Health Legacy." Paper presented in Missoula, MT, February 3, 1999. USDA, USFS.

Fernandez, Josie. 1998. "Practicing History in the Public Interest." In CRM, No. 11, pg. 3. USDI, NPS. Washington, DC.

Frink, Douglas S. 1996. "Asking More Than Where: Developing a Site Contextual Model Based on Reconstructing Past Environments." In North American Archaeologist, vol. 17, no. 4, pp. 307-336.

Kay, Charles E. 1994. Aboriginal Overkill and Native Burning: Implications for Modern Ecosystem Management. Institute for Political Economy. Utah State University. Logan, UT. December 1994. 15 pages.

Larson, Gary. 1998. There's a Hair in My Dirt: A Worm's Story. Harper Collins Publishers. New York.

Lerner, Gerda. 1997. Why History Matters: Life and Thought. Oxford University Press. New York, Oxford. 249 pages.

Lorimer, Craig G. 1977. "The Presettlement Forest and Natural Disturbance Cycle of Northeastern Maine." In Ecology, Vol. 58, Pages 139-148.

McCullough, David. 1998. Address at the dedication of The Gerald Ford Presidential Library. On C-SPAN, Sunday, January 4, 1998.

Roenke, Karl and Dave Lacy. 1998. "Our Wilderness Heritage: A Study of the Compatibility of Cultural and Natural Resource Management." In Proceedings of the 1997 Northeastern Recreation Research Symposium (NERR), April 6-8, 1997. Bolton Landing, NY. USDA, USFS, Northeastern Forest Experimental Station, Radner, PA. General Technical Report NE-241. Pages 199-200.

Roenke, Karl. 1999. "The Importance of History in Recreation Research." In Proceedings of the 1998 Northeastern Recreation Research Symposium (NERR), April 5-7, 1998. Bolton Landing, NY. USDA, USFS, Northeastern Research Station, Radner, PA. General Technical Report NE-255. Pages 77-78.

Rosenzweig, Roy and David Thelen. 1998. The Presence of the Past: Popular Uses of History in American Life. Columbia University Press. New York.

Von Oech, Roger. 1990. A Whack on the Side of the Head: How You Can be More Creative. Warner Books, New York.

Wessels, Tom. 1997. Reading the Forested Landscape: A Natural History of New England. The Countryman Press. Woodstock, VT.

White, Richard, 1996. "Are You an Environmentalist or Do You Work for a Living?: Work and Nature." In Uncommon Ground: Rethinking the Human Place in Nature. William Cronon (editor). W. W. Norton & Company, New York. Pages 171-186.

THE EFFECT OF FEES ON RECREATION SITE CHOICE: MANAGEMENT/AGENCY IMPLICATIONS

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Abstract: A personal interview survey focusing on day use was conducted on selected sites in northwestern South Carolina. The purpose of this study was to investigate the effect of fees on recreation site choice. This paper reports on the first phase of the study, and focuses on the management implications of entrance fees. Managing agencies were not well recognized by respondents at the sites surveyed and some sites were poorly recognized by name. Crowding, maintenance, and fees were the most frequently cited reasons affecting patterns of activity and site switching. There is some evidence that respondents surveyed at uncrowded sites and sites without fees may have switched to these sites because of crowding and fees at other sites. Most respondents consider time to be the most important factor limiting site choice.

Introduction

Access fees on public lands are a controversial issue both within and outside management agencies. Fees can be used to reduce use as well as to generate revenue. Public reaction to fees on public lands is of great interest to public land managers as well as managers of recreation sites supplied by private firms. The U.S.D.A. Forest Service started its Recreation Fee Demonstration Program in 1996. This is a test project in which an entrance or parking fee is charged on selected recreation sites. Although numerous studies document entrance and use fees from many perspectives, the initiation of this practice on federal lands raises many questions concerning equity and site use.

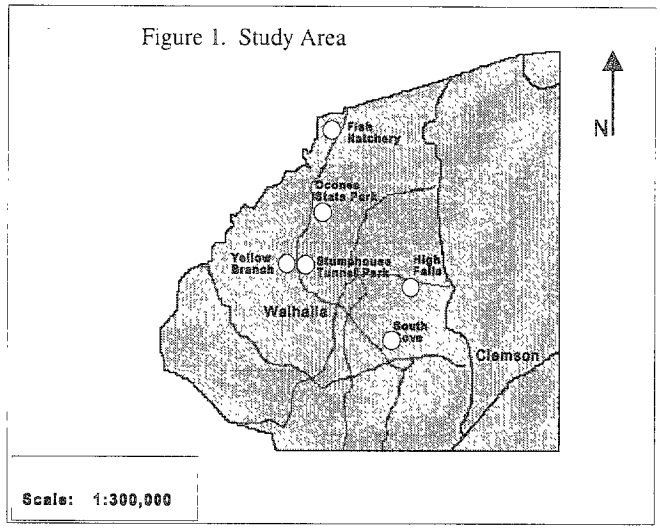
The purpose of this study was to investigate the effect of fees on recreation site choice. Of particular concern is site switching in response to fees and the role of substitute sites. This paper reports on the first phase of the study, and focuses on the management implications of entrance fees. The following subjects will be discussed:

- Management recognition
- Site recognition
- Cost factors considered by respondents
- Most important factors in site switching
- Inconsistencies and confusion regarding fees

Study Area

The primary study area is the Andrew Pickens District of the Sumter National Forest in the mountains of northwestern South Carolina (Figure 1). Recreation sites in this part of the state are operated by the Forest Service; the South Carolina Department of Parks, Recreation, and Tourism; the Pendleton District Historical, Recreational, and Tourism Commission; the county (primarily Oconee County); the U.S. Army Corps of Engineers; and local municipalities such as the city of Walhalla. The South Carolina Department of Natural Resources operates a fish hatchery in the study area adjacent to one of the study sites. Clemson University maintains a locally popular site on the university forest and another at its botanical garden. Duke Energy Corporation operates a picnic area nearby at the site of a power plant and education center. The South Carolina Forestry Commission has a limited involvement in recreation use, but not primarily in the study area.

Figure 1. Study Area



To access the Andrew Pickens District from South Carolina, most traffic flows through the gateway town of Walhalla. The first site encountered after passing through Walhalla is the Yellow Branch picnic area (Figure 1), which is at the southeastern entrance to the National Forest. This is a well maintained Forest Service picnic area with several picnic tables, drinking water, a hiking trail, a picnic shelter, a waterfall, and an outhouse. This was scheduled for a fee in 1998 but, due to problems with the drinking water supply, the fee was not implemented. Almost directly across the highway is Stumphouse Tunnel Park, which would appear to be the best substitute for Yellow Branch. This site, operated in 1998 by the Pendleton District Historical, Recreational, and Tourism Commission, contains picnic facilities including a shelter, a trail created by the Boy Scouts, a waterfall, and an outhouse. The site does not have drinking water and the waterfall is not visible from the picnic area. In the past, the site had a campground, drinking water, a rail car, and access to the Stumphouse Tunnel. These amenities no longer exist, including access to the tunnel which was closed due to a cave-in. The area has sentimental significance to some local residents who picnicked at the tunnel before the park was established. The area is maintained and patrolled by a ranger working part time for the historical commission and is, not maintained as well as Yellow Branch. The picnic tables in the park are not of the same quality as those in Yellow Branch and many are in need of repair. Although both sites have paved access, some of the parking at

Stumphouse Tunnel park is considerably more primitive than that at Yellow Branch. Preliminary data collected at these sites indicated that some users do not know who operates these sites and assume the Forest Service operates both, partly because the ranger station is less than one half mile up the road. As of 1998, the Pendleton District Historical, Recreational, and Tourism Commission did not plan to charge fees at Stumphouse Tunnel. Both sites do have a rental fee for the picnic shelter .

Oconee state park, operated by the South Carolina Department of Parks, Recreation, and Tourism, is approximately 5.5 miles from Yellow Branch and Stumphouse Tunnel. It is a highly developed park with picnic facilities, a lake, a campground, cabins, and a miniature golf facility. At one time, it also had a restaurant. Parking fees of $2 per car have been charged for the past few years. In addition, there are fees for camping, swimming, golf, picnic shelter (rental), and cabin (rental). The state park system is self supporting under an experiment began several years ago, but the effect of this experiment is currently under scrutiny (Associated Press 1998).

The Chattooga Picnic area and Fishing Pier, known to most local recreationists as the Fish Hatchery is about 15 miles one way from Yellow Branch and Stumphouse Tunnel Park. This site is near the North Carolina border and is the study site farthest from Walhalla. This site has picnic facilities, including a shelter (no rental fee), fishing facilities, a trail, and a fish hatchery (which is operated by the South Carolina Department of Natural Resources). This site is unique in this area as it contains some of the states oldest and largest white pine and hemlock trees. Currently, the Forest Service does not plan to charge fees on this area due, in part, to problems resulting from a shared parking facility.

Three roadside picnic areas lie between the Oconee State Park and the fish hatchery. These are possible substitutes for the sites discussed above and two were surveyed as the research assistants made their rounds to the other areas.

Other sites suggested as substitutes include High Falls and South Cove, both of which are highly developed Oconee County parks situated on Lake Keowee. Depot Park, a municipal picnic area operated by the city of Walhalla, is also a potential substitute, but most likely only for Walhalla residents. Twelve Mile and Twin Lakes are boat launching, swimming, and picnic areas operated by the Corp of Engineers. A campground is adjacent to the Twin Lake park. These areas are on Lake Hartwell and close to Clemson, SC. In addition, Clemson University operates the Botanical Gardens, a popular local picnic area with some walking trails, and the Lake Issaqueena Recreation area which is another popular local picnic area. With the exception of High Falls, none of these sites would normally be considered to be "in the mountains". High Falls, although not in the mountains, is quite close to them, and is considered by many to be a mountain location. There are also other sites on Lakes Hartwell, Keowee, and Jocassee as well as some municipal sites which are not on the lake. High Falls and South Cove County Parks were selected for the study because of their locations and amenities. Similar in facilities to Oconee State Park, these county parks have a more complex fee schedule. In addition to camping and picnic shelter rental fees, these parks charge an entrance fee on weekends only between Memorial Day and Labor Day. High Falls does not have a waterfall, although many visitors look for one.

Methods

A personal interview survey was conducted on the six primary sites (Yellow Branch, Stumphouse Tunnel Park, Oconee State Park, the Fish Hatchery, High Falls and South Cove County Parks) and two roadside picnic areas in northwestern South Carolina on weekends during the period July through October 1998. The focus was on day use, primarily picnicking and walking/hiking, activities that were common to all sites. Four of the sites and the two roadside picnic areas were along the same road (Fig. 1) and were thought to be substitutes for each other because of their proximity and opportunities for similar activities. These sites were selected at the beginning of the study. When the project was initiated, it was hypothesized that most users of these facilities would come from the nearby town of Walhalla or would come from areas east of Walhalla such as Seneca, Clemson, and Greenville, SC. During the first two weeks of the study, it was apparent that this hypothesis was correct. At this time, two additional sites east of Walhalla were selected as possible substitutes, bringing the total study areas to six primary sites and two roadside picnic areas.

During the first year of the study, 679 interviews were attempted and 588 were completed. Of those that were not completed, 16 had been surveyed previously, 6 did not speak English, 14 were just leaving, and 54 refused for various reasons. We did not intend to resurvey respondents and were unable to survey the 6 who did not speak English. The response rate was 87% calculated with all observations and 90% calculated without the 16 who were previously surveyed and the 6 who did not speak English. Using the second criteria, the response rate varied by site from 84% to 95%.

Results

Respondents were asked who (what agency) they thought was responsible for managing the site at which they were surveyed. The question was worded so it referred to the site as "this place" rather than by name. This approach was used primarily because the Chattooga Picnic Area is known as the Fish Hatchery and because one of the roadside picnic areas, Burrell's Place, is also the name of a local bar. In general, few respondents were able to correctly identify the managing agency for the site. Yellow Branch was clearly marked with the typical large Forest Service sign, but only 23% of the respondents correctly identified the U. S. Forest Service as the managing agency. The Fish Hatchery fared even worse at 15% correctly identifying the managing agency, largely because of confusing signs and the fact that the U. S. Forest Service operates the picnic area and the

state Department of Natural Resources operates the adjacent fish hatchery. One sign at the entrance listed the names of both sites but only the name of the state agency. The best recognized agencies were the State (78%), and the County (57% South Cove and 42% High Falls), both of which have large clearly marked signs and personnel present on site. The worst level of managing agency recognition by far was Stumphouse Tunnel Park at 2%. There were no signs identifying the managing agency at this site.

When respondents did not know who managed an area, they were likely to say the area was managed by the State (Table 1). It is likely that some of the 78% who correctly identified the State as managing the state park were making this common mistake. Most thought they knew who managed these sites as indicated by the few who responded by saying they didn't know. Only 6% of the respondents said they did not know who managed the Fish Hatchery. This was likely due to the highly visible presence of the state Department of Natural Resources trucks and personnel combined with a sign crediting several groups with building a walkway at the site. It is apparent from Table 1 that the State is likely to get much of the credit and blame for sites managed by other agencies. Table 1 contains only a small selection of the answers given. Perhaps the most unusual response was from an individual who thought the U.S. Postal Service managed one of the sites.

Table 1. Respondents' perception of agency responsible for managing the site.

Site Where Interview Took Place	----------Management Recognition (percent identifying as) ----------					
	State	County	Federal	Corps of Engineers	Department of Natural Resources (State Agency)	Don't Know
Yellow Branch (USFS)	39	5	23	0	5	11
Fish Hatchery (USFS)	42	3	15	2	15	6
Oconee State Park	78	2	5	0	2	7
South Cove County Park	26	57	2	0	0	8
High Falls County Park	28	42	1	6	1	15
Stumphouse Tunnel Park	43	8	14	0	2	12
Total	45	17	9	1	4	10

Knowledge or awareness of substitute sites was assessed by questions administered at each site asking if the respondents were familiar with the other study sites. For example, respondents at Oconee State Park were asked where else they go for this type of outing. If they did not mention a study site such as Yellow Branch, they were asked if they were familiar with Yellow Branch. Those surveyed at Yellow Branch tended to have the greatest awareness of the other study sites (Table 2). As would be expected, those surveyed at Yellow Branch were highly likely to be familiar with Stumphouse Tunnel Park (91%), which is almost directly across the road. Yellow Branch, on the other hand, was least likely to be recognized by those surveyed at the other study sites. Only 35% of all respondents surveyed at other sites were familiar with Yellow Branch. Surprisingly, while 91% of those surveyed at Yellow Branch were familiar with Stumphouse Tunnel Park, only 27% of those surveyed at Stumphouse Tunnel Park were familiar with Yellow Branch. The sign at Yellow Branch was considerably larger and more conspicuous than that at Stumphouse Tunnel Park. The Fish Hatchery, Oconee State Park, and Stumphouse Tunnel Park were all recognized by about three fourths of the respondents and these are all along the same road as Yellow Branch. High Falls and South Cove were farther away and were recognized by fewer respondents.

Table 2. Recognition of study sites by respondents surveyed at other sites.

---------- Surveyed at Site ----------

Site Recognition - Percent Familiar with	Yellow Branch	Fish Hatchery	Oconee State Park *	South Cove County Park *	High Falls County Park *	Stumphouse Tunnel Park	Roadside Picnic Areas	Total
Yellow Branch (USFS)		32	37	26	18	27	59	35
Fish Hatchery (USFS)	86		74	60	49	69	77	73
Oconee State Park	88	82		67	60	68	73	77
South Cove County Park	69	34	39		53	29	41	47
High Falls County Park	71	48	44	72		32	50	58
Stumphouse Tunnel Park	91	75	70	64	47		77	75

* Asterisks indicate sites with entrance or parking fees.

Respondents were asked what types of costs they considered when they went on this type of outing. The question was open ended in an effort to reduce bias. As expected, food, gas, and lodging were common responses (Table 3). It is interesting, particularly to those who work with travel cost models and expenditures, that many people did not cite food and gas. We did not ask why but respondents repeatedly volunteered the same reasons. Food cost was often not considered because respondents "had to eat if they stayed home". The cost of gas was not considered because it was below some threshold set by respondents. Thus, many respondents evaluated these costs and made a decision not to include them.

One of the purposes of the cost question was to identify how many respondents would consider fees as costs associated with the trip. Overall, 28% cited entrance fees and 8% cited parking fees (Table 3). Respondents were more likely to consider fees than food. Activity fees were more likely to be considered at sites that had these fees. Other than at Stumphouse Tunnel Park, the same is true for facility rental fees. All sites except the Fish Hatchery and roadside picnic areas rented shelters. Few respondents used the shelter at Stumphouse Tunnel Park and there were no prominent signs indicating that it could be rented. Unlike activity and facility rental fees, entrance and parking fees were likely to be considered by respondents interviewed at all sites, regardless of whether the sites had entrance or parking fees.

When asked what limits their choice of locations (an open ended question), most cited time or time-related reasons such as work or distance (Table 4). Children were also a common limiting factor. Few cited cost and very few cited health. Some said that nothing limited their choice and some, particularly at High Falls County Park, said they liked to stick to a good place when they find one. Time was the limit cited more frequently by those surveyed at the mountain sites.

Respondents were then asked several questions about the effect of cost on site choice (Table 5). First, they were asked whether cost or time was the more important factor limiting site choice. The majority cited time, which is consistent with the open ended question discussed earlier. A few (8%), said cost and time were equally important. There was no clear relationship between the response to this question and whether the survey was conducted at a site with an entrance or parking fee. However, those with lower household incomes were more likely to cite cost. If respondents did not cite cost, they were asked if cost affects their choice of sites. A slight majority said no, except at Yellow Branch where the majority said yes. Again, there was no clear difference in responses between sites with and without entrance or parking fees.

Table 3. Types of costs considered by respondents.

Types of Costs Considered (percent)	Surveyed at Site: Yellow Branch	Fish Hatchery	Oconee State Park *	South Cove County Park *	High Falls County Park *	Stumphouse Tunnel Park	Roadside Picnic Areas	Total
Activity fee	9	6	17	5	17	10	0	11
Camping fee	6	1	9	8	19	6	0	8
Entry fee	20	27	25	23	30	31	27	27
Fee	6	1	6	0	6	10	0	5
Parking fee	9	10	9	21	3	4	0	8
Facility rental	11	1	16	26	10	0	0	9
Food	26	30	15	21	27	22	13	23
Gas	40	33	23	21	29	36	40	30
Lodging	9	24	18	3	8	20	13	16
Travel cost	0	5	2	8	2	0	7	3
Travel time	3	5	3	0	5	7	7	4

* Asterisks indicate sites with entrance or parking fees

Table 4. Respondent-selected factors limiting site choice, by site where interviewed.

Factors Limiting Site Choice (percent)	Surveyed at Site: Yellow Branch	Fish Hatchery	Oconee State Park *	South Cove County Park *	High Falls County Park *	Stumphouse Tunnel Park	Roadside Picnic Areas	Total
Cost	7	8	6	3	10	7	5	7
Time	49	43	43	27	28	52	50	41
Work	9	4	6	13	6	4	0	6
Distance	5	11	11	10	13	6	5	10
Kids	5	7	10	7	14	13	9	10
Health	0	3	3	2	0	4	9	2
Stick to good place	2	3	5	5	10	2	0	4
None	2	4	3	2	2	3	14	3

* Asterisks indicate sites with entrance or parking fees

Table 5. Cost as a factor affecting site choice.

Factors Affecting Site Choice (percent)	Yellow Branch	Fish Hatchery	Oconee State Park *	South Cove County Park *	High Falls County Park *	Stumphouse Tunnel Park	Roadside Picnic Areas	Total
	---------- Surveyed at Site ----------							
Most Important Factor Limiting Choice of Sites								
Cost	14	14	11	23	21	19	23	17
Time	77	71	75	70	62	71	64	70
Both	5	9	11	2	9	6	5	8
Does Cost Affect Your Choice of Sites?								
No	44	60	60	50	54	63	52	57
Yes	56	40	40	50	46	37	48	43
Do You Consider the Cost of Travel Time?								
No	79	61	64	81	66	70	85	69
Yes	21	39	36	19	33	30	15	31
Did You Consider the Cost of Coming Here Today?								
No	88	87	74	67	77	87	86	81
Yes	12	13	26	33	23	13	14	19

* Asterisks indicate sites with entrance or parking fees

Most respondents do not consider the cost of their time when traveling to these sites. To some extent, this appears to be related to distance traveled. When asked if they consider the cost of their time when traveling to these sites, respondents were more likely to say no at Yellow Branch and South Cove County Park, the two sites closest to the population using them. They were more likely to consider the cost of their time at Oconee State Park and the Fish Hatchery, two sites farthest from the population using them. This is consistent with comments made by many respondents who said they do not consider the cost of their time but that they would if they had to drive farther.

Finally, respondents were asked if they considered the cost of their trip on the day surveyed. Most (81%) did not (Table 5). Those who were at sites with entrance or parking fees were more likely to have considered cost.

About three fourths of the respondents had not seen any changes occur that caused them to change their patterns of activity (i.e. to go to a site more or less frequently). Respondents surveyed at sites that did not charge entrance or parking fees were more likely to report that they had changed their patterns of activity (Table 6). Those who said they had reacted to changes were asked for details. Most of the changes were negative and resulted in respondents going less frequently. Crowding was cited by people surveyed at the less crowded sites, possibly indicating that they had switched to these sites due to crowding at other sites. Crowding was not cited at High Falls County Park, one of the most heavily used sites during the survey, possibly indicating that people who are sensitive to crowding do not visit the site while it is heavily used. Other than at South Cove County Park, fees were cited more frequently at sites without entrance or parking fees, possibly indicating that those most sensitive to fees

have switched to sites without fees. South Cove is the farthest from the other sites and the closest site to a town. It is likely that some respondents do not view the other sites as substitutes but choose to go to South Cove County Park less frequently or at times when the fee is not being charged.

Table 6. Factors that have caused respondents to change their patterns of activity.

Have You Seen Any Changes that Have Caused You to Change Your Patterns of Activity? (percent)	Yellow Branch	Fish Hatchery	Oconee State Park *	South Cove County Park *	High Falls County Park *	Stumphouse Tunnel Park	Roadside Picnic Areas	Total
	---------- Surveyed at Site ----------							
No	63	75	86	81	81	64	71	75
Yes	37	25	14	19	18	36	29	24
Please Describe								
Crowding	2	5	5	3	0	3	5	4
Rowdy Behavior	0	0	0	0	4	0	0	1
Maintenance	5	5	2	3	5	4	0	4
Fees	7	4	1	8	2	4	14	4

* Asterisks indicate sites with entrance or parking fees

When asked what would cause them to go to a different site, respondents were most likely to cite crowding (Table 7). They were least likely to cite crowding at High Falls County Park which supports the previous argument that those who are sensitive to crowding do not visit that site when it is likely to be crowded. Fees and fee increases were more likely to be considered as a reason for switching at sites that had entrance or parking fees, indicating that these respondents probably are comfortable with the current fee levels but are ready to switch sites if fees are increased.

Table 7. Factors that would cause respondents to go to a different site.

What Would Cause You to go to a Different Location? (Percent)	Yellow Branch	Fish Hatchery	Oconee State Park *	South Cove County Park *	High Falls County Park *	Stumphouse Tunnel Park	Roadside Picnic Areas	Total
	---------- Surveyed at Site ----------							
Crowding	37	16	20	20	12	23	33	20
Rowdy	7	1	4	11	11	3	5	5
Maintenance	7	6	6	2	8	7	14	7
Fees/Increase	5	2	7	7	9	3	0	5
Trees Cut	2	6	1	2	3	2	0	3
Nothing	7	16	8	15	8	15	19	12

* Asterisks indicate sites with entrance or parking fees

Conclusions and Recommendations

In general, managing agencies were not well recognized by respondents at the sites surveyed. Some might argue that this is a good thing or that it does not matter. From the viewpoint of the user, it probably does not matter who manages the site if the user does not have complaints about the site. Watson and Vogt (1998) state that public reaction to fees are influenced by the beliefs, attitudes and knowledge the public have of the managing agency. This becomes relevant when users know who the managing agency is. In this study, the state of South Carolina was most likely to be given credit for sites it does not manage. Other agencies put effort into their sites but hand over the credit to the State. If agencies are interested in raising their profile, it will take more than large signs such as the sign at the entrance to Yellow Branch. The most well recognized managing agencies had a large sign identifying the site and agency at the entrance to the site and personnel living and working at the site. The presence of workers and vehicles with agency logos raised the profile of the agency. During almost every visit, our interviewers saw vehicles and personnel working at the state and county parks. Agency personnel and vehicles were not usually observed at the other sites during these visits.

Some sites were poorly recognized by name. Large signs at the sites were not always helpful. Yellow Branch, with its large sign was the least recognized site, even by respondents surveyed at Stumphouse Tunnel Park, which is across the road from Yellow Branch.

Crowding, maintenance, and fees were the most frequently cited reasons affecting patterns of activity and site switching. There is some evidence that respondents surveyed at uncrowded sites and sites without fees may have switched to these sites because of crowding and fees at other sites. Most respondents consider time to be the most important factor limiting site choice, but few reported that they consider the cost of their time to be part of the cost of visiting the sites.

Sites in the area are managed by the U.S. Forest Service, Corps of Engineers, State, County, City, and private groups. The administration of fees differs between and within agencies and sites. Fees at state parks are administered differently from fees at other agencies and from fees at state parks located on Corps of Engineers property. Fees at county parks are charged on weekends only from Memorial Day to Labor Day. This is confusing to many users of multiple sites. Also confusing to users is combinations of fees at one site. Those who rent shelters often do not know whether they should also pay the entrance fee. Clear, consistent fee structures would help alleviate this confusion.

Although the question was not asked, some respondents volunteered they felt strongly that they should not have to pay fees on county or state parks if they were county or state residents and paid taxes, which is a common argument against fees on public lands (Harris and Driver 1987). Some felt that fees were more aggravation than expense. They were against paying but felt the expense was trivial. Managers who are thinking of instituting a fee sometimes believe that users of the site will be receptive to the fee if certain improvements are made to the site. In many cases, managers would do well to survey their customers to determine how important the improvements are to them. This would aid in the allocation of resources when it comes to making improvements to a site. One improvement thought by a manager to be important to users of a site was important to fewer than 10% of the respondents to this survey.

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Literature Cited:

Associated Press. 1998. Deficit may end Parks department's experiment in self-sufficiency. In The Greenville News April 25, 1998.

Harris, C. C. and B. L. Driver. 1987. Recreation user fees I. Pros and cons. J. Forestry. 85(5):25-29 ill.

Watson, A. E. and C. Vogt. 1998. Wilderness visitor perceptions of obtrusiveness and their attitudes toward the agency in predicting recreation fee level support. Societal response to recreation fees on public lands. A research session at the Seventh International Symposium on Society and Resource Management. May 27-31, 1998. Univ. of Missouri, Columbia. Posted at http://www.fs.fed.us/research/rvur/wilderness/recreation_fees.htm

BOOSTING CONFIDENCE IN IMPORTANCE-PERFORMANCE ANALYSIS: AN EXPLANATION AND APPLICATION OF AN I/P MODIFICATION

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Abstract: A common evaluative measure in recreation resource management is the Importance-Performance (I/P) analysis. It is favored for its visual display, clear outcome strategies, and ability to negotiate responses to multiple attributes in one framework. Recent studies have raised concerns with I/P analysis, including its lack of statistical analysis and insensitivity toward user differences. This paper modifies the visual display through the addition of a confidence interval. This modification offers more information on which to base decisions while maintaining the valued characteristics of I/P. Applications of the modification, as well as issues surrounding the use of I/P, will be discussed.

Introduction

Future trends in recreation resource management indicate that the decisions facing a manager will become increasingly more challenging. First, recreation settings are being asked to improve its present level of performance in significant areas such as customer service (Gore, 1993). Second, a forecasted increase in the recreating population combined with the expected decrease in available resources for recreation is leading to a greater demand for our recreation resources (English, Betz, Young, Bergstrom, & Cordell, 1993). Finally, funding from major sources such as the federal government will likely continue to be unstable and subject to the political climate, resulting in a movement by management agencies to a 'user-pays' system.

The shift toward a service orientation in public resource management brings with it an increased concern for facets of management that had been much less necessary in years past, including agency marketing and customer satisfaction. Managers are now being increasingly asked to find ways to better meet the needs and desires of present or potential visitors. Thus, in a similar vein to private recreation providers, public agencies are asking the question, 'how can we best serve our customers?'

While there exists numerous evaluative and marketing tools to help managers answer this question, a commonly used tool in resource management has been the Importance-Performance (I/P) analysis. I/P is designed to measure customer satisfaction with products or services comprised of many dimensions, or multiple attributes. First developed in the field of marketing by Martilla & James (1977), it has since been applied to a number of park and recreation management issues, including satisfaction with visitor centers (Mengak, Dottavio, & O'Leary, 1986), state park cabins (Hollenhorst, Olson, & Fortney, 1992), and acceptable wilderness conditions (Hollenhorst & Gardner, 1994).

Importance-Performance Analysis

The I/P framework measures customer satisfaction by combining two essential elements of satisfaction into one model: importance, or what one deems to be essential in order to have a satisfying experience; and performance, which is what one actually does get from the experience. As mentioned previously, the model investigates satisfaction on an attribute-specific basis, rather than on a global level. Visitors are asked, generally on a 5-point scale, the importance and performance of certain aspects of their experience, such as 'well-maintained trails' or 'information on conditions or hazards.' Thus, by inquiring about the importance and performance of specific aspects of the recreation experience, the investigator is able to take into account how much visitors value certain aspects of the experience when making marketing or resource allocation decisions. Clearly, an attribute which a visitor rates highly for importance yet poorly for actual performance should be given more attention than the ones the visitor feels are not important to the enjoyment of their recreation experience.

The Importance-Performance framework plots visitor responses (generally in the form of mean values) on a four-quadrant grid, with importance on the vertical axis and performance on the horizontal axis (Figure 1). Four quadrants are created, and each is given a corresponding outcome strategy. The four quadrants and their resulting strategies are the following: Quadrant I, titled "Concentrate Here," recommends developing new outcome strategies for the attributes in this quadrant. Quadrant II, titled 'Low Priority,' suggests that little effort should be focused toward the attributes in this quadrant as the visitor has little concern for these attributes. Quadrant III, titled 'Possible Overkill,' suggests that efforts toward these attributes can be reduced. Finally, Quadrant IV, called "Keep up the Good Work," recommends keeping whatever strategy is already in place for these attributes. The strategies provided in I/P reflect its foundation in marketing, however alternative strategies that reflect other desired outcomes, such as a more suitable resource allocation, are easily applied to I/P.

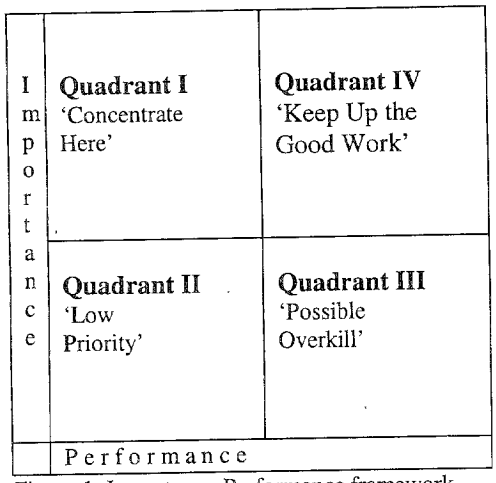

Figure 1. Importance-Performance framework (Martilla & James, 1977).

The main advantages to the I/P framework are its clear presentation and ease of interpretation. (1) Its grid format makes it easy for managers to interpret data to make decisions. (2) The framework appears to measure the accepted components of a marketing definition of satisfaction; that satisfaction is a state felt by a person who has experienced a performance that has fulfilled his or her expectations (Kotler, 1982). Taking this definition one step further, an experience that has met expectations that are considered highly important should correspondingly be highly satisfying. (3) The I/P framework is a useful way to interpret information collected from the users rather than from the managers for decision making. As Washburne and Cole (1985) have discussed, customers and managers often have different perceptions of recreation setting needs and preferences. Therefore, when making decisions regarding customer satisfaction, the customers themselves are the best group to indicate their own needs and preferences.

Limitations of I/P Model

While the aforementioned reasons make I/P a popular tool among managers, concerns have been raised surrounding the validity of the I/P framework. One concern in particular will be focused on in this paper: the lack of statistical analysis in the current I/P approach (Hammitt, Bixler, & Noe, 1996). Many previous studies in park and recreation have followed the I/P method with little attention given to the statistical power of the technique. For example, I/P analysis with sample sizes as small as thirteen or fourteen subjects has been reported (i.e. Gillespie, Kennedy, & Soble, 1989). In general, this is too small a sample to support the findings with statistical analysis. Also, while correlation techniques have been applied to I/P with success (i.e. Crompton & Duray, 1985), the majority of applications of I/P use only the information provided by the mean ratings of the participants for analysis (i.e. Havitz, Twynam, & DeLorenzo, 1991).

The apparent simplicity of the four-quadrant model has some potentially dangerous drawbacks. For instance, the analysis tends to remove any quantitative differences between attributes falling within a particular quadrant. Attributes that fall a large distance (such as a value of +1.00 on a 5-point scale) from an axis are interpreted in the same manner as attributes that land extremely close to an axis (such as +0.05 on a 5-point scale). We need to be concerned about our practice of doing this because we may be reporting findings for differences of attributes falling close to the axes that do not truly exist. For example, if our axis is set at a value of 3.5 and our attribute has a value of 3.51, we really are categorizing this attribute with little confidence that it truly fits the category. The problem is, because the I/P model assigns a marketing strategy to every attribute, these borderline attributes may be given resources that they either do not need, or cannot be afforded to give. Clearly, to improve interpretation of attributes falling close to the axes, a method to identify significant differences between attribute mean values and the assigned value for the I/P axes is needed.

A second limitation of the use of mean values in I/P is that information is collapsed into and displayed as 'points' on the I/P chart. This is an adequate strategy to evaluate customer satisfaction in situations involving similar groups of visitors seeking the same benefits, as the group mean is a useful measure of central tendency when the variance of responses is low. However, in outdoor recreation, the assumption of homogeneity among users is up for debate. Indeed, similarities between users has given way to a more diversified customer based on demographics, activity interests, and benefits being sought (Ewert, 1998). As a result, use of the mean value may lead to our planning for Shafer's (1969) average camper who doesn't exist. With respect to I/P, recognition of user diversity is essential, as Vaske, Beaman, Stanley, and Grenier (1996) clearly demonstrated how ignoring user differences can lead to the application of inappropriate outcome strategies.

A Modified I/P Model

The modifications made to I/P in this paper attempt to respond to the two concerns discussed above by providing a way to compare values statistically, thus allowing for a valid comparison between attributes and axis values and between heterogeneous and homogeneous samples. This is accomplished through the incorporation of a confidence interval (C.I.) into the visual display. This modification thus alters the display of information from being a point to being a range of potential values for an attribute. Two statistical equations are worth discussing at this point. The first is the equation for the creation of a confidence interval:

C.I. = mean +/- t (Standard Error).

In the process of creating a confidence interval, a confidence level must be selected. While typically a 95% confidence level is used in social science statistics, the level chosen should be established based on the research objectives. In some situations, a 95% C.I. may in fact be too much confidence. Possibly managers would be pleased

to satisfy less than 95% of visitors, and may find that a lower C.I. such as 75% is more appropriate. The important point to make here is that the selection of the confidence level is arbitrary and justifications for a wide range of C.I.'s are possible. However, for this demonstration, a C.I. of 95% will be used. For a 95% C.I., the t value is 1.96; thus, our equation becomes:

95% C.I. = mean +/- 1.96 (Standard Error of the Mean).

The second equation to discuss, that of Standard Error of the Mean (S.E.), is the following:

S.E. = standard deviation (s.d.) / $\sqrt{N}$.

The incorporation of a measure of standard error adds two more pieces of information to the analysis for each attribute; the model now becomes sensitive to the amount of variance in responses (s.d.) and the number of respondents (N) in the sample. For example, a sample of 25 people with a mean value of 3.4 and a standard deviation of 2.0 will have an S.E. of 0.40. However, a sample with the same mean value (3.4) but with 100 respondents and a standard deviation of 1.5 will have an S.E. of 0.15.

For each attribute, the standard error can be calculated for both the importance and the performance value. When the S.E. is incorporated into the confidence interval and added to the data points on the I/P graph, the outcome is a 'crosspoint' in which the mean value is the center and two confidence intervals extend for both the importance and the performance axes (Figure 2). The ends of the crosspoints are joined to form an ellipse.

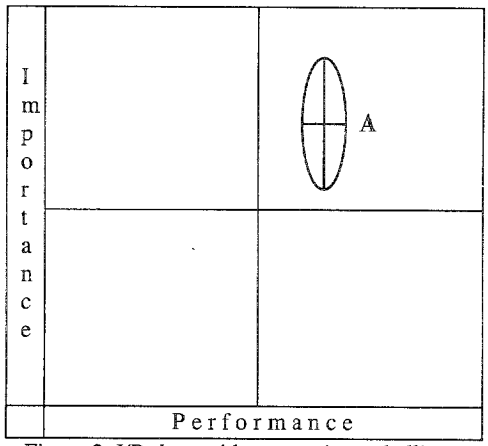

Figure 2. I/P chart with crosspoint and ellipse.

Interpretation of I/P

Two factors are worth discussing with respect to interpretation of the ellipse: its location and its size. With respect to location, significant and nonsignificant differences for attributes falling adjacent to the axes can be distinguished by whether or not the ellipse falls fully into an I/P quadrant. The assumption of the modification is that if the ellipse falls fully into one quadrant, such as for attribute A in Figure 2, it can be applied to the outcome strategies with confidence. In cases where the ellipse overlaps with the axes, interpretation becomes more difficult. Which management strategy should be applied to it, or should it possibly be ignored? As with all decisions based on I/P analysis, the management objectives should guide the application of the results.

The following are three possible options for interpretation of the results: (1) Apply overlapping item to one of the four existing outcome strategies. As the main factor in decision making is often the availability of resources to carry out the decision, the concern then becomes one of whether or not to include the attribute in a resource-demanding quadrant such as "Concentrate Here." In situations (although rare!) where resources are plentiful, possibly all attributes that overlap into the "Concentrate Here" quadrant, even if the mean value falls in a different quadrant, could be assigned the "Concentrate Here" strategy. Conversely, occasions in which resources are scarce, attributes can be excluded from the "Concentrate Here" quadrant if they overlap an axis, and relocated to a different management strategy. (2) Exclude overlapping attributes from analysis. This option assumes that no strategy is better than a strategy that doesn't fit. This approach was first suggested by Hammit et al. (1996) as it removes an element of the risk associated with making a bad decision. It is also more conservative with respect to resource allocation, and may be a wise approach in a time of resource constraint. However, as one reviewer mentioned, the idea of exclusion to overlap seems dangerous due to the high level of subjectivity involved in the establishment of I/P objectives and visual display, including the choice of location of axes and the selection of the C.I. values. (3) Develop a new outcome strategy for overlapping items. It seems appropriate that if an attribute is unable to be clearly categorized into a quadrant, that the reasons behind the lack of clarity could be explored. Alternatives could include objectives such as 'explore further' with different methodological techniques or 'reexamine I/P framework,' in which weaknesses in the approach could be looked for, such as poor wording of questions.

The size of the ellipse provides important information to the manager, as it reflects a sample with a high range of possible responses to the survey item. As mentioned previously, with a diverse visiting population, it would be no surprise that certain items may reflect the different needs and desires of various user groups. Therefore, a large ellipse may hint at bimodality or other overlapping ranges of responses for an attribute. However, large variance may also be an indicator of lack of understanding of the questions presented to the visitor. In either case, further exploration of the attribute responses is needed.

I/P Issues

While not the specific intent of this paper, it is worth discussing briefly three issues surrounding the application of I/P that have a major effect on the ability of I/P to contribute to good decision making: axes placement, exclusion of visitor responses, and orientation of I/P surveys. The first issue, axis placement, has long been in the I/P discourse. Axis placement is crucial in I/P as

decisions are made concerning where attributes fall in the chart relative to the location of the axes. For example, an attribute may fall in one quadrant if the axes are placed at the middle of the scale (i.e. 3 on a 5-point Likert scale), a different quadrant if the axes are placed at the grand mean of the means for all responses, and even a third quadrant if the axes are placed at a selected 'cut-off' level for acceptability. Again, the decision to place an axes at a certain value is dependent on management objectives. Hollenhorst and Gardner (1994) suggested that use of a grand mean is appropriate when attributes are being examined for relative attribute relationships, and that set values such as middle of scales or 'cut-offs' are appropriate for criterion-based interpretation of responses.

Another issue worth considering is that of whether to include or exclude performance ratings for attributes by visitors who give low ratings for its importance. Similar to Hammit et al.'s (1996) exclusion of performance ratings from visitors who did not observe an attribute, should we also limit our interpretation of performance ratings to only those visitors who consider the attribute to be important? It seems intuitively logical that visitors who give low importance ratings to an attribute are likely not going to be the best judges of the its performance, and that possibly we should consider developing outcome strategies geared toward those visitors who do see the attribute as important to their experience. This is clearly an issue that needs further exploration.

A final issue worth discussing with respect to interpretation of I/P information is the inherent orientation of I/P toward development - of attributes and of the recreation setting as a whole. The I/P format does not provide a place for respondents who are more satisfied with the absence than the presence of an attribute. For example, if an attribute such as 'well-maintained trails' falls into the "Concentrate Here" quadrant, the management objective becomes one of providing additional resources to upgrade trails and walkways. However, how does the visitor who considers the absence of well-maintained trails to be important respond to an I/P survey? Due to the skew toward development and improvement in I/P, a negative response is mapped into Quadrant II, where it is forced into a false proximity with observations that belong in that quadrant (Beaman, Vaske, & Stanley, 1999). However, the effects of these issues may be minimized through careful design of the I/P instrument. The provision of opportunities for visitors to express a desire for the absence as well as presence of an attribute, such as through the use of negative and positive endpoints for scales, will help us make better decisions when using I/P models (Schwarz, Knauper, Hippler, Noelle-Neumann, & Clark 1991).

Summary

In recreation resource management, our underlying goal when we collect information is to use it to make decisions that will contribute to the positive experience of our visitors. However, the processes of information collection and decision-making are fraught with trade-offs; we trade time and expense for practicality of application and we trade complexity of interpretation for clarity of presentation. One of the reasons that I/P methods have been favored in research and practice is because in the trade-off equations, I/P seems to do fairly well. While it is apparent that there are multiple techniques that are able to interpret information in ways that possibly bring us closer to the truth, I/P has in its favor the element of presentation of information that makes it accessible for real decision-making.

The modification to I/P is an attempt to increase our chances of getting a little closer to the truth when using I/P without sacrificing its unique characteristics. The shift from the use of a point to an ellipse is to remind us that data points are often not true representations of visitor satisfactions, but that satisfactions vary based on visitor values, interests, and needs. As we work toward meeting our goal of customer satisfaction, we will be assisted through the use of methods that recognize diversity among our visitors.

References

Beaman, J., Vaske, J., & Stanley, D. (1999). Are Invalid Assumptions about Scales and Behaviour Causing Confusion in Leisure Planning and Management Decisions? Unpublished Manuscript.

Crompton, J. & Duray, N. (1985). An Investigation of the Relative Efficacy of Four Alternative Approaches to Importance-Performance Analysis. Journal of the Academy of Marketing Science, 13(4), 69-80.

English, D.B., Betz, C., Young, M., Bergstrom, J., & Cordell, H.K. (1993). Regional Demand and Supply Projections for Outdoor Recreation. General Technical Report RM-230. USDA Forest Service Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

Ewert, A. (1999). Managing for the New Forest Visitor: The impact of changing demographic variables. In J. Aley, W.R. Burch, B. Conover, & D. Field (Eds.), Ecsystem Management: Adaptive strategies for natural resources organization in the 21st century (pp. 25-32). Philadelphia, PA: Taylor & Francis.

Gillespie, K., Kennedy, D., & Soble, K. (1989). Utilizing Importance-Performance Analysis in the Evaluation and Marketing of Activity Programs in Geriatric Settings. Activities, Adaptation, and Aging, 13(1/2), 77-89.

Gore, A. (1993). Creating a Government that Works Better and Costs Less: Report of the National Performance Review. New York: Times Books, Random House.

Hammitt, W., Bixler, R., & Noe, F. (1996). Going Beyond Importance-Performance Analysis to Analyze the Observance-Influence of Park Impacts. Journal of Park and Recreation Administration, 14(1), 45-62.

Havitz, M., Twynam, G., & DeLorenzo, J. (1991). Importance-Performance Analysis as a Staff Evaluation Tool. Journal of Park and Recreation Administration, 9(1), 43-54.

Hollenhorst, S. & Gardner, L. (1994). The Indicator Performance Estimate Approach to Determining Acceptable Wilderness Conditions. Environmental Management, 18(6), 901-906.

Hollenhorst, S., Olson, D., & Fortney, R. (1992). Use of Importance-Performance Analysis to Evaluate State Park Cabins: The case of the West Virginia State Park System. Journal of Park and Recreation Administration, 10(1), 1-11.

Kotler, P. (1982). Marketing for Nonprofit Organizations. Englewood Cliffs, NJ: Prentice-Hall.

Martilla, J. & James, J. (1977). Importance-Performance Analysis. Journal of Marketing, 41, 77-79.

Mengak, K., Dottavio, F., & O'Leary, J. (1986). Use of Importance-Performance Analysis to Evaluate a Visitor Center. Journal of Interpretation, 11(2), 1-13.

Schwarz, N., Knauper, B., Hippler, H., Noelle-Neumann, E., & Clark, L. (1991). Rating Scales: Numeric Values May Change the Meaning of Scale Labels. Public Opinion Quarterly, 55, 274-288.

Shafer, E. (1969). The Average Camper Who Doesn't Exist. USDA Forest Service Research Paper NE-142. Northeast Forest Experimental Station, Upper Darby, PA.

Vaske, J., Beaman, J., Stanley, R. & Grenier, M. (1996). Importance-Performance and Segmentation: Where do we go from here? Journal of Travel and Tourism Marketing, 5(3), 225-240.

Washburne, R. & Cole, D. (1985). Problems and Practices in Wilderness Management: A survey of managers. USDA Forest Service Research Paper INT-304.

THE DESTRUCTION OF WILDLIFE HABITAT BY SUBURBAN SPRAWL AND THE MITIGATING EFFECTS OF LAND USE PLANNING

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Abstract: Throughout history, mankind has encroached on and destroyed wildlife habitat. The European settlers of the New World and succeeding generations have carried on the practice and have caused tremendous destruction of wildlife habitat. Sprawl and suburbanization are now responsible for the current decline. This kind of settlement causes fragmentation and creates patches of residual habitat, each with increased amount of edge, barriers, and corridors. Nuisance animals increase and preferred species decrease. To mitigate these effects, planning must be done on an ecosystem/regional basis, GIS must be utilized to provide up to date information and finally, public policy must be implemented based on the best possible information.

Introduction

Because mankind and wildlife share the environment, conflicts arise. Usually the wildlife is either driven off, killed or its habitat is destroyed. Now, sprawl, or the uncontrolled movement of mankind into the countryside is the principle cause of the destruction of wildlife habitat. This paper attempts to investigate sprawls' different effects on wildlife habitat and the mitigating efforts of land use planning. It is not designed to provide hard and fast answers to the problem of sprawl, but rather to cause the reader to recognize the dangers of sprawl and to raise questions. In order to understand why wildlife is thought of as 'inferior' to mankind, it is necessary to look back in history.

History of Human Land Use

Historically, mankind has set out to dominate the earth at the expense of all else and has done a good job of it. Since the development of agriculture, the natural vegetation cover of every continent except Antarctica has been extensively modified (Saunders et al 1991). This desire to dominate the earth can be traced to Biblical times. Genesis 1:26 states that man "...have dominion...over all the earth, and over every creeping thing that creepeth upon the earth." Also in Genesis 1:28 "...subdue it: and have dominion over...every living thing that moveth upon the earth" (Hill and Cheadle 1996). The beliefs that sprang from these passages created the mindset that everything on earth was provided for mankind to use. In the Middle ages, mankind imposed itself upon the European landscape with as much force as necessary to satisfy human needs (Sale 1991).

Medieval Europe (1200-1600 AD) was a wooden society using 60 to 80 million tons of wood a year (Sale 1991). Wood provided all the basic needs of the people from fuel, to plows, houses, ships and all else in between. This woodcutting decimated the local forests and the wildlife habitats that were in those forests. Unlimited hunting was also a norm, there were no seasons or bag limits; it was kill as much as you could. In fact, mankind's treatment of animals was in the least cruel and harsh. The conquerors of the New World brought this attitude with them starting with Christopher Columbus in the Fifteenth Century (Sale 1991).

When Columbus arrived in the New World, the native Americans were hunting and changing the environment but they only impacted on a local level, using wildlife for subsistence (Worster 1993). Essentially, they were Stone Age people without the industrialized tools and weapons of the Europeans and were not able to exterminate wildlife to the same wholesale extent as the industrialized Europeans were (Worster 1993). Columbus and the Europeans who followed quickly changed all that. The attitude about wildlife that was formed in Europe was now forcefully brought into the New World and continues today (Sale 1991). Nature by itself is thought to be a wasteland and something to be conquered and used so that man can live in peace. "Humankind improved upon nature as *wasteland* was transformed into a *garden*" (emphasis mine, Whitney 1994). As human population has risen exponentially, animal extinctions have kept pace. This extinction curve is not linear; it matches the exponential curve of the human population growth (Stiling 1996).

Settlements and towns in the New World were built on the same principles as those in the Old World, with well-defined centers and farming rings around them (Sale 1991). The village center was encircled with houses where people lived leaving large tracts of wild land that surrounded the farm belts and each village. This wild land and the open farmland were prime wildlife habitat but the wildlife was hunted mercilessly (the transplanted European mindset), and cutting the forests continued to decimate the habitat (Whitney 1994).

The European population in the New World was not large enough at this time to cause the rapid spread we now know as urbanization (Weeks 1996). However, populations started to grow and the demand for food (both wild and domestic meat and agricultural products) also grew. Land was required to sustain the increased agricultural effort and the surrounding forests began to be cut down destroying the wildlife habitat. Due to their high visibility, mobility and economic importance, large mammals were among the first species to be affected by civilized man's penetration of the continent. "We live in an zoologically impoverished world, from which all the hugest, and fiercest, and strangest forms have recently disappeared" (Alfred Wallace 1876, cited in Whitney 1994). Losses of these large mammals such as grizzly bears (*Ursus horrobilis*) and mountain lions (*Felix concolor*) were due in a small way to hunting, but in the most part to the loss of their habitat. The plow did what the gun could not (Whitney 1994).

As the population of the United States grew in the East and

expanded westward, more wildlife habitats were destroyed and fragmented with no consideration of the wildlife except as a source of food. The massive reduction in the American bison (*Bison bison*) populations as well as the extermination of the passenger pigeon (*Ectopistes migratorius*) are both examples of the original Old World mindset that was successfully transplanted to the New World (Worster 1993). Continued population growth caused urbanization and industrialization of the Eastern Seaboard, resulting in the destruction of most of the pre-colonial habitat. What was not destroyed was fragmented into smaller and smaller pieces (Whitney 1994).

The Current Conditions

Biophobia is a relatively new concept defined as "the culturally acquired urge to affiliate with technology, human artifacts and solely with human interests regarding the natural world" (Orr 1994). This is the attitude that looks at nature as something outside his or her personal realm that is to be enjoyed and then left behind when one returns to the comfortable home. In other words, to look (nature is permitted as a decoration) but not really touch or be touched. Our current urban environment that leads to suburbanization is the accepted way of life that has caused so much fragmentation of the landscape. It is widely recognized that fragmentation of the environment and particularly that of wildlife habitat leads to reduced species richness, one component of what we now call biodiversity (Primack 1993).

Sprawl And Suburbanization, Definition, Causes And Effects On Wildlife Habitat

Industrialization causes urbanization, which is the rapid and continuing redistribution of people from the countryside to the city and is the process by which urban areas expand (Weeks 1996). The industrialized urban areas create more jobs that in turn attract the people from the country. The city already has the necessary support services; it has workers and attracts more; it has good lines of communications; and it has technology. As technology develops, the number of people required to operate farms dramatically. The people who are no longer needed to produce food move to the cities. After time, the cities begin to deteriorate and the part of the population that can move now attempts to retreat into the countryside (Weeks 1996).

The trend over the past 30 years has been a movement out of the cities to the suburbs. As the suburbs become urban (strip malls, supermarkets), the exodus occurs once again from the suburbs to the country which in turn become suburbanized, then urbanized. The vicious sequence repeats itself until there is no country left (Weeks 1996). Homes are now located at a distance from services. Therefore, the customers are forced to drive to where the services are, requiring more and more use of the automobile (Cox 1997). The desire to get out of the cities to live in the countryside is the major culprit that causes fragmentation of our wildlife habitat. However, many of these people that move have a biophobic outlook on nature where they want to *look but not touch or be touched* (emphasis mine, Orr 1994). For example, white-tailed deer (*Odocoileus virginianus*) are beautiful creatures to look at, but when one eats a prize yew (*Taxus canadensis*) that was lovingly planted and nurtured, the attitude towards those deer often becomes negative.

Sprawl, and the fragmentation and destruction of the landscape that results from it, is now the largest threat to wildlife habitat (Urquhart 1997). Sprawl fragments wildlife habitat into different patches, each containing new edges, and possibly leaving corridors that connect some of these patches together, or even barriers that prevent movement. The fragmentation of habitat into patches too small for adequate survival and reproduction can result in the extinction of some wildlife species. Fragmentation tends to reduce diversity and increase extinction rates (MacAurthur and Wilson 1967).

An unintended consequence of sprawl is the anthropocentric creation of so-called "nuisance" animals, that is, wildlife that have readily adapted to human effects and fragmentation. They have been successful and multiplied at a much greater rate than if left in an unfragmented landscape and have created new habitat dynamics. There is higher predation on other less well adapted animals and a greater interaction with humans. The anthropocentric viewpoint of a nuisance occurs when the adapted animal causes a decline of a human favored species or when the numbers are such that they conflict or interfere with human values. Examples of this are deer/automobile collisions, consumption of planted ornamentals and the spread of disease from animals to humans such as rabies and Lyme disease. Paradoxically though, humans are the direct cause of all this through fragmentation of the landscape.

Fragmentation of the Landscape and The Creation of Patches

Fragmentation is a reduction in the overall size of a habitat along with a simultaneous reduction in the contiguous size leaving a series of remnant vegetation patches surrounded by a matrix of different vegetation, open areas and/or land use (Andren 1994). Some characteristics of fragmented ecosystems are; reduction of the total habitat available (Saunders et al. 1991, Rolstad 1991); loss of habitat heterogeneity (Wilcove 1985); barriers (spaces between the patches) to dispersal (Wilcove 1985, Andren 1994); greater overall edge effect (Primack 1993). Fragmented landscapes or patches can be thought of as an 'island' of habitat surrounded by a hostile barrier, which is the area between the patches. The number of species in each fragment or island is positively correlated to the size of the island/fragment (Island-Biogeography theory) (MacAurthur and Wilson 1967). Fragmentation of habitat is the most serious threat to biodiversity and is the primary cause of the present extinction crisis (Noss 1987).

As landscape becomes more and more fragmented, a minimum viable threshold of survival may be reached (With and Crist 1995). Small changes in habitat size can trigger a response that is drastically out of proportion to the change. The critical minimum threshold depends on the

amount of connectivity (i.e. the ability of a species to successfully move between the patches). This ability depends on the species, interactions between other species, and the characteristics of the corridor that connects the habitat islands. Before the minimum viable threshold is met, the primary effect of fragmentation is the loss of habitat along with a generally linear loss of species richness and/or population size. Habitat specialists (animals with a small niche) with a limited dispersal capability have a lower threshold than highly mobile species who may still perceive the fragmented landscape as connected and they are still able to move between patches (With and Crist 1995). The decline in population size of a species is linear in relation to habitat loss, but when the minimum viable threshold of remaining habitat is reached, the loss will no longer be linear, it will be an exponential loss of population (Andren 1994).

The extinction rate also depends on patch size and increases as the area gets smaller. Area alone accounts for most of the variation in species numbers and is correlated with environmental diversity (MacAurthur and Wilson 1967). As fragmentation continues and habitats get smaller, generally the time to extinction decreases (Quinn and Hastings 1987, Kareiva and Wennerger 1995). The species that survive are those that can adapt to the new edges and smaller habitats. Genetic consequences of fragmentation may be inbreeding and decreased genetic variation of local populations, leading to eventual extinction (Noss 1987).

After a patch is isolated, four factors govern the decline or rise in species in those patches as identified in Saunders et al. (1991). 1.) Time since the patch was isolated. When the patch is first isolated, all the original species remain. However, as time goes on, those species requiring the original vegetation, large ranges and low densities will disappear (species relaxation). On the other hand, the number of species can also increase by the invasion of edge tolerant species (anthropocentrically classified as nuisance animals). 2.) The distance from other patches, which affect dispersal rates. 3.) The connectiveness of the patches or whether or not corridors between the patches exist. Corridors enhance biotic movement, and provide extra forage. 4.) How the surrounding landscape has been changed. If there are many fragments, there will be more edge and thus more edge species (generalist predators) and therefore more predation on the original inhabitants.

The fragmentation impact of one new home is surprising. One house with its driveway, grassy area, well and septic system doesn't physically cover that much of the land. However, it will affect up to three acres because of new edges, new drainage patterns and new barriers. If the house is on a 6-acre lot, three of the 6 acres will be influenced. A large minimum residential size lot (1 – 10 acres) will cause this effect to be dispersed over wide areas. For example, in a 60-acre landscape that is fragmented into 6-acre lots, fully 30 of those acres will be affected (R Bryan in Moore 1997).

Fragmentation and The Creation of Edge

Perhaps the most detrimental effect of fragmentation is the creation of edges. An edge is a junction, either a well-defined boundary or a transition zone where plant and animal communities can blend into each other (Yahner 1988). There are two types of edges; an inherent transitional edge based on geology and geography such as the timberline at high elevations, and an abrupt induced or man-made edge that is a result of land use. Living in the edge are abundant generalist predators and competitors that affect songbirds and mammals negatively.

The amount of edge and the residual undisturbed interior that is created when a forest landscape is fragmented is surprising. The actual shape of the patches dictates the amount of edge created. For example, long and narrow patches have more edge area than do those of a square or circular patch. Assuming square patches and an edge effect of 300 meters, a patch size of 75 acres is all edge. A patch size of 150 acres has only 13 acres of remaining interior and a patch size of 300 acres has only 76 acres of interior habitat (Brindle and Baker undated). This edge effect can be devastating in terms of increased predation. Interior bird species might hesitate to even enter an edge (Van Dorp and Opdam 1987).

Fragmentation and The Creation of Barriers

Barriers prevent or inhibit movement between patches. They include roads, open areas, driveways, urban or suburban developments and can lead to reduced immigration and differential dispersal mechanisms to mammals and birds (MacAurthur and Wilson 1967, Van Dorp and Opdam 1987).

Roads are the most common and create an ever-finer mesh of barriers to dispersal. Habitat is destroyed during construction, they cause edge effects in the resulting patches and edge species displace the original species (Mader 1984). There is an increase of roadside emissions such as noise, dust, headlighting effects, exhaust, and increased salinity by salt treatments in the winter, which attracts large herbivores to the road edge for salt licks where they may become road kill. A divided highway that is 90 meters wide may pose a barrier to movement equal to a water barrier that is 180 meters wide. Roads interfere with the natural exchange and dynamics of species by migration (Mader 1984). Roads can also be used by edge species (who can adapt to the roadsides) as corridors for their movements and subsequent dispersal. Most importantly though, the roads provide an avenue for automobiles to be used in order to promote sprawl starting the vicious circle again (Box and Forbes 1992, Weeks 1996).

Fragmentation Sometimes Leaves Corridors That Connect Patches

The destruction caused by edges may be mitigated somewhat by creating or leaving natural movement corridors that connect patches together. When patches are connected in some way, the connecting entity is called a corridor and to be effective, it should be the same type of habitat as the patches it connects (Simberloff et al 1992).

Connectivity is vital. Corridors can facilitate unimpeded movement of species between patches, but if there is not enough connectivity, movement may be inhibited (Forman and Godron 1981, Taylor et al 1993). The width of a corridor is quite important. Small mammals require corridors 200 ft wide and large animals require them to be at least 300 ft wide (Brindle and Baker undated). Corridors can be either natural (intrinsic) because of incomplete fragmentation or manmade (extrinsic) corridors to connect patches that were previously isolated (Tiebout and Anderson 1997). They prevent the isolation of species, and therefore, forestall inbreeding depression and the eventual extinction that would indirectly result from inbreeding (Simberloff and Cox 1987).

However, there are six major disadvantages to corridors in an otherwise fragmented landscape: 1. They can provide direct routes for catastrophes such as fire or diseases. 2. They facilitate the spread of nuisance or edge species. 3. They enable introduced species to move from patch to patch. 4. They can increase wildlife exposure to man that may lead to increased poaching. 5. There is more contact with domestic animals that could spread disease. 6. There is more exposure to both domestic and wild predators such as cats (*Felis domestica*) and raccoons (*Procyon lotor*) (Simberloff and Cox 1987).

Effect of Fragmentation on Wildlife Species

These physical changes in the landscape affect wildlife populations, habitat and human values. Two basic things happen; there is an increase in wildlife adapted to the new landscape and who may become, from a human value standpoint, nuisances. Secondly, there is a corresponding decrease in the number of wildlife species that need large areas of interior habitat to survive. These species are generally the anthropocentrically preferred species such as songbirds and mammals like the moose (*Alces alces*) and bobcat (*Lynx rufus*).

Increase of Nuisance Animals

Fragmentation leads to an increase in nuisance animals such as white-tailed deer, raccoons, blue jays (*Cyanocitta crista*), crows (*Corvus brachyrhynchos*), skunks (*Mephitis mephitis*), common grackle (*Quiscalus quiscula*), cowbirds (*Molothrus bonariensis*), gray squirrels (*Sciurus carolinesis*) and red squirrels (*Tamis ciurini*), to name a few. These nuisance animals can transmit diseases such as Lyme disease and rabies to humans and have caused the populations of anthropocentrically desirable species to decline.

The increased edge area in patches may increase the carrying capacity for generalist predators, open field competitors or nest parasites that interact with forest interior birds in the form of elevated nest predation, brood parasitism or hole-nesting competition with edge species (Rolstad 1991). High predation rates on songbirds are found in small patches with large amounts of edge. Predators such as the blue jay, American crow and the common grackle are all edge species (Wilcove 1985). Therefore, there is more predation pressure on anthropocentrically desirable species such as songbirds (Wilcove 1985, Yahner 1988). Also, in newly developed (read sprawl) areas household pets, especially cats, which are extremely efficient and fearsome predators, eliminate resident birds and small mammals (Moore 1997).

The crow and the blue jay have adapted so well to edges that their numbers have dramatically increased throughout the US. These generalist predators seek out any eggs they can find and decimate egg populations. The predation rates on eggs increase as distance from the edge decreases (Andren and Angelstam 1988). The predation by the crow is confined to the edge itself, but ravens (*Corvus corax*) and jays, which live in the edge, tended to rob nests in the interior of the patch (Angelstam 1986). Because of these higher predation rates, there is lower reproduction success in small habitats. Songbirds that nest near or on the ground suffer higher predation rates that those that nest in bushes or trees. As fragmentation continues into ever-smaller pieces in suburban areas, even higher predation pressure occurs (Andren and Angelstam 1988, Wilcove 1985). In these areas the crow, blue jay, grackle, raccoon and gray squirrel have adapted extremely well and can decimate songbird populations (Wilcove 1985).

Raccoons are omnivorous and are adaptable to a variety of habitats. The destruction of traditional denning sites in old growth forests by land development caused the raccoon to become semi-domesticated and scavenge for food in garbage cans, landfills and dumps near humans (Rupprecht and Smith 1994). Since 1930, the US raccoon population has grown 15 to 20 fold and they are the most frequently reported nuisance animals. The concentrations of these animals around large, regularly replenished food sources along with an abundance of nearby denning sites probably has contributed most to the spread of rabies through increased raccoon to raccoon contact (Rupprecht and Smith 1994).

The white-tailed deer has adapted so well to fragmentation of the landscape that the size of deer herds is actually larger in the area between patches than in dense (non-fragmented) terrain thus creating an abnormally high population, which turn leads to the deer becoming a nuisance animal (Hirth 1977). Their favorite winter browse is Canada yew, Eastern hemlock (*Tsuga canadensis*) and white cedar (*Thuja occidentalis*), ornamentals that are planted around houses. The deer will continue to browse on them year after year until the trees and shrubs cannot survive any longer because of their slow growth (Hirth 1977, Alverson 1988). In addition to consuming planted yard ornamentals, the deer also carry the deer tick (*Ixodes scapularis*), which in turn carries the spirochete *Borrelia burgdorferi*, which causes Lyme disease in humans (Brandt 1997). The threat of Lyme disease is very real. Deer can have hundreds of ticks on each ear and anywhere between 25% and 50% of them are infected with the spirochete (Brandt, 1997). If left untreated in humans long enough, Lyme disease can damage the central nervous system. After suffering nausea, fever, night sweats and arthritis like pain in the joints with the accompanying treatment of heavy doses of antibiotics for long periods, humans tend to change their thinking and classify the deer as nuisances. It's estimated that there are

over 16,000 cases of Lyme disease reported nationwide each year (Brandt 1997). Other nuisance effects of white-tailed deer are the million car/deer collisions that cost millions of dollars in automobile repair and have been the cause of the more than 200 human fatalities that occur each year (Brandt 1997). Ironically though, most people consider the white-tailed deer as an attractive species. Only when the true cost in human suffering and the dollar cost in replacing ornamentals and automobiles is added up does the deer become a nuisance.

Decrease of Preferred Species

Fragmentation of the forest creates non-forest habitat. It may cause a local songbird population to become extinct if fragment size is less than a threshold value set by the minimum size territory requirements of the species (Angelstam 1986, Rolstad 1991). In a study done in Illinois, 80% of the observed songbird pairs lost eggs to predators while 66% of the remainder raised cowbird eggs rather than their own. Overall, only 7% of the songbirds observed successfully reproduced (Primack 1993). In another study, the number of nests that suffered predation in large undivided tracts was only 2%, in rural areas it was 47.5% and in suburban areas 70.5% (Brindle and Baker undated). Nest construction is also a factor with cavity type nests that are hidden in holes in trees suffering less predation while the open cup type nests sustain higher predation (Wilcove 1985). However, these trees are the very ones removed during landscaping, leading to a reduction of adequate 'holes' in which to nest (Rolstad 1991).

As a result of fragmentation, song sparrows (*Melospiza georgiana*), wood thrush (*Hylocichla mustelina*), veery (*Catharus fuscescens*), and the pileated woodpecker (*Dryocupus pileatus*) typically are driven from what used to be the interior forest. Grassland birds such as the eastern meadowlark (*Sturnella magna*), upland sandpiper (*Bartramia longicauda*), and bobolink (*Dolichonyx oryzivorus*) are, in turn driven from their type of habitat that will be cleared for house lots (Moore 1997).

A good example of a species impacted by fragmentation is the piping plover (*Charadrius melodus*), which is both a Federal and State of Maine Endangered species. They nest in the open beach dune systems on the Maine seacoast (Moore 1997, Calhoun 1997). At most, the State of Maine originally had only about 30 miles of open beach dune systems suitable for nesting. Due to human encroachment and fragmentation, there are now only 6 miles of suitable nesting dune systems left. Protective measures have not been adequate to protect the nesting sites and the species continues to decline (Moore 1997).

Habitat fragmentation is a major factor that reduces distribution and abundance of wildlife species on broad geographic areas. Some songbird species have shown a long-term decline in numbers. Large mobile carnivores such as the mountain lion, Black bears (*Ursus americanus*) and others have been drastically reduced because of the fragmentation of their habitat (Yahner 1988). The ever-increasing fragmentation of the northern landscape has apparently set the southern distribution limits of the snowshoe hare (*Lepus americanus*) (Andren and Angelstam 1988).

Mitigating Fragmentation by Rural Development Through Land Use Planning

The indiscriminant growth of sprawl will cause a decline in species richness, a decline in songbirds, a decline in animals that require a large unbroken tract for their range such as bears, bobcats and moose. It also means that there will be a corresponding increase in the numbers of nuisance animals such as raccoons, skunks, jays, crows and deer. These "new" animals now prey on the original inhabitants, eat gardens, destroy planted ornamentals and spread disease to humans such as rabies and Lyme disease. This is an enormous impact on both the wildlife and the humans that jointly share the biosphere. The previous discussion of some of the problems associated with fragmentation of the landscape by humans and the subsequent destruction of wildlife habitat has painted a gloomy picture, but all is not lost. There are ways to lessen the impact of humans on animal habitat through wise land use planning and still allow human expansion.

There are three steps in this process. The first is to change land use planning to a regional or ecosystem level instead of being based on political borders. Secondly, we must make use of the technological tools that are now available such as satellite imagery, digital demographic information, vegetative and wildlife inventories and geological studies. These can be combined into a single computerized digital system known as the Geographic Information System (GIS). Finally, the analyses from regional planning ideas and output from any technical assets must be synthesized into public policy decisions. These political decisions will determine the fate of sprawl and at the same time, the fate of wildlife.

Regional/Ecosystem Approach

Because humans have created a matrix of patches that knows no political boundaries, an integrated approach is needed to look at things as an ecosystem as a whole (organism to species and communities to ecosystems) instead of a collection of separate biotic and legal entities (Saunders et al. 1991, Primack 1995). The significant advantages of regional assessments are the ability to monitor the major processes occurring in the region such as fragmentation and isolation of the habitat patches and to be able to integrate corridors and/or areas where the fragment islands are close enough together so that wildlife movement can take place between them (Franklin 1993). Other factors in regional assessments are species distribution and behavior, abundance, habitat quality and size, cover, and water quality (Ludwig 1995, Jurgens 1993). By looking at the whole rather than at separate pieces, the rigid policies and practices that now govern local land use planning would change (Primack 1995). Most importantly though, regional evaluations recognizes that *humans are a part of the ecosystem and human values shape management goals* (Emphasis mine, Primack 1995).

Regional land use planning provides an opportunity to unite landowners, resource managers, policy makers, and the public to distinguish the maximum amount of habitat fragmentation that can safely occur without significant harm to that habitat while at the same time maintaining biodiversity. It combines the study of ecological theory, hierarchy theory, landscape planning and problem solving integration (Barrett and Peles 1994). However, there will be controversy. To effectively plan at the regional level, the power of the municipalities must be reduced (Scott 1997). We must look at the region as a whole to get the big picture. The only way this will work is to guide development through incentives and as a last resort, regulations. Plans must be made and hard choices taken (Scott 1997).

Geographic Information Systems

Geographic Information Systems (GIS) visually portray the landscape through computer imagery and mapping. It is able to combine satellite input of vegetation types, species distribution (from ground analysis), protected areas and demographic information into a digital overlay system that can be projected on topographic maps of the actual landscape (Scott et al. 1993, Weeks 1996). The resulting map integrates and clearly indicates the importance and influence of fragmentation. It will show any decreased amount of habitat areas, the re-dispersal of any remaining wildlife and any gaps in protection in relation to the habitat and wildlife distribution within the landscape (Jurgens 1993, Primack 1995). Information may be manipulated to present few or many combined overlays on one output map. Using combined overlays, GIS mapping is able to indicate the human manipulation of the landscape (O'Neill et al. 1988).

Mathematical models using GIS input can be used to rank the landscape habitats based on value both to humans and wildlife and are able to identify the most valuable and critical habitats (Rossi and Kuitunen 1996). These models can assesses potential risk to future landscapes poised by man and can be used to predict a species decline, increase or stabilization due to habitat loss or fragmentation (Schumaker 1996, White et al. 1997). They can also be useful to develop and engage local support in land use planning based on the need to retain wildlife habitat and ultimately biodiversity (White et al. 1997). Gap analysis projects future land use patterns (fragmentation) and compares them to the present wildlife habitat and specific species characteristics. The result is a product that analyses the impact of future land use on the wildlife habitat and wildlife (Primack 1995, Scott et al. 1993, White et al. 1997).

Public Policy

There are voluntary methods and incentives to preserve wildlife habitat along with the enactment of regulations or town ordinances. Through the combination of these two factors, hard choices must be made and then public policy decisions taken and implemented (Scott 1977). The only way to accomplish this process is to educate the public of the consequences of sprawl (Cook 1997). I believe that this can happen by publicizing fragmentation's detrimental effects on wildlife which is the reduction of favored species and the corresponding increase of the nuisance species and the spread of disease to man.

Voluntary Solutions

The voluntary approach to land management is much more palatable than rules and ordinances because people are part of the process and fully involved from the start. The following are some of the things that can easily be done without resorting to new ordinances. Private citizens may give legal easements to permanently protect habitat. Direct purchases of land by conservation organizations or towns can also occur. Property tax valuation should be set at the current use of the land, not potential uses (Patterns of Development Task Force 1997). Because it is easier to coax and convince through the pocket book than it is to persuade aesthetically and for the need to retain biodiversity, incentives (tax structures) and cooperative agreements are far more effective than regulations (Moore 1997, Cook 1997).

Road construction can be accomplished with minimal impact on wildlife by planning roads to go around instead of through sensitive wildlife habitats. Where it is necessary to go through habitats, install bridges over and tunnels under the habitat, rather than cuts and fills to leave necessary movement corridors that enhance connectivity between patches.

Revival of the downtown shopping districts will need tax incentives to keep the businesses from moving to the suburbs and creating strip malls (Cook 1997). Changes in state tax structure on schools and roads are also important. School funding must allow for easier renovations of existing in-town schools rather than to allow the building of new schools out of town. In Maine, paradoxically, it's easier to get state funding for new schools rather than renovating the existing school (Maine Policy Review 1997). Out of town schools creates the need for bussing, using more resources. Road funding must emphasize improvements and enhancements to existing roads instead of new construction. Other innovative methods are to create green spaces in the form of parks and trails within the urban areas. Some towns have created low impact non-motorized solutions such as bike trails, walking paths and cross-country ski paths that lead from the center of the town to the undeveloped areas outside of town (Cook 1997). Investment should be towards making cities more livable to keep the people there, i.e. making them not want to move (Scott 1997).

Regulations

If voluntary solutions do not work, then the governing bodies must take the hard decisions and change zoning ordinances to restrict the use or even deny access to sensitive habitat. Land use must directed towards the best possible land for that particular use (Patterns of Development Task Force 1997, Primack 1995). Above all, communities must be designed for people, not automobiles (Cox 1997).

"Open space" developments are housing developments or projects whose houses are on small lots clustered closely together, all surrounded by a network of aesthetic and functional unfragmented open spaces (Arendt 1989). Access to and views of permanently protected open space, farmland, forest and wildlife habitat offset the smaller sized lot. By doing this, cluster housing will have much less impact on the habitat and will sustain much more habitat than a single house on a large lot does (Condon 1997, Arendt 1989). The idea of low density created by large (1 – 10 acre) minimum sized lot zoning is a fallacy because it consumes huge amounts of habitat.

Other regulatory methods encourage growth in reasonably sized and shaped growth areas. In these designated growth areas, minimum lot size must be reduced to less than one acre making it more attractive to build there rather than in the countryside (Brindle and Baker undated). Sewer and water should be provided by the municipality rather than having separate wells and septic systems in those areas. Integrate multi-use in the growth areas so that low impact industry is allowed in residential districts and does not have to consume open space (Brindle and Baker undated).

Discouraging incompatible development in rural areas is the other side of the regulatory coin. Create farm and forestry zones with a minimum lot size much larger than 10 acres (Condon 1997). Require that the property tax valuations reflect actual use, not the highest potential use. Allocate and limit the numbers of building permits in rural zones or establish growth rate caps. If subdivisions are allowed, require extremely large (10 – 40 acre) minimum lot size, cluster housing and a large percentage of the developed area to be declared permanent open space (Condon 1997, Brindle and Baker undated).

To insure that growth does not occur in strips along roads, restrict development on major roads; i.e. have a large road frontage requirement in order to reduce the access to the numbered highway system. Limit town capitol improvements in rural areas; i.e. do not pave dirt roads as paving makes automobile access easier, inviting sprawl.

If all else fails, make the new rural owners pay for all of the increased cost in services and do not pass on any increases to those already there (Cook 1997). This means that the cost of all of the new services (utility poles, power lines, roads, road maintenance) needed to service the new residents would be borne only by those new residents and not the taxpayer pool at large (Cook 1997).

Conclusion

The United States has the most ecologically diverse landscape in the world (Mangun 1995). However, because of the current rate of human population growth (expansion is inevitable but sprawl is not), these diverse systems are now severely threatened. Until this threat is recognized, destruction of the habitat will continue. Ultimately *human values* will decide the fate of wildlife habitat and therefore biodiversity. Some of the hard choices may be based on a triage system; save only what can be saved and accept the loss of a few (Mangun 1995). When the landscape is fragmented, it forever changes the face of the landscape and its wild inhabitants. New, less desirable species (to the human point of view) displace the old and can become nuisances to the humans; the larger animals and those that require large amounts of space will disappear. The general biodiversity of the area will be vastly diminished. The larger the unfragmented area is, the more diversity there is. If we don't recognize this and plan intelligently keeping wildlife in mind all the bears and moose will be replaced by squirrels, skunks and raccoons.

New inhabitants in a housing area may think the sight of an occasional raccoon or deer is cute. When these same animals spread disease to humans and eat the planted ornamentals, they have become a nuisance that we inadvertently created. Where did all the songbirds go? Those cute little blue jays at the back yard bird feeder ate their eggs. Only when the total costs to wildlife and humans are itemized and analyzed in layman's terms, will the true impact be recognized.

I believe that there is an immediate need to recognize what happens to the wildlife because of human encroachment. It is generally known that large animals 'go away' or 'disappear' when we build in an area. The need is to educate people that these large animals may not really have a place to 'go away' to, so they die or the local population disappears or the species goes extinct.

In order to rouse the population to enact ordinances to control sprawl, a common rally point must be used and popularized. It must be one that will get attention, and regrettably, my experience has shown that the fastest way to get attention is in a way that negatively affects human values. In my opinion, the nuisance animal concept would be one to capitalize on. This principle of nuisance animals can be exploited in two ways to show the true effects; that sprawl created those nuisance animals and they are detrimental to human values. Townspeople would have to be educated about the hazards of the nuisance animals, realize they destroy other valued wildlife, spread disease to humans and, most importantly, are in fact caused by the fragmentation of wildlife habitat by humans.

"Sprawl is urgent. It's probably the issue that's going to determine the fate of wildlife in the next century" (K Elowe cited in Moore 1997).

Literature Cited

Alverson, WS. 1988. *Edge effects in northern Wisconsin.* Conservation Biology 2(4): 348-358.

Andren, H and P Angelstam. 1988. *Elevated predation rates as an edge effect in habitat islands.* Ecology 69: 544-547.

Andren, H. 1994. *Effects of habitat fragmentation on birds and mammals in landscapes with different proportions of suitable habitat: a review.* Oikos 7(3): 355-366.

Angelstam, P. 1986. *Predation in ground-nesting*

birds nests in relation to predator densities and habitat edge. Oikos 47: 366-373.

Arendt, R. 1989. *Patterns in the rural landscape.* Orion 8(4): 22-27.

Barrett, GW and JD Peles. 1994. *Optimizing habitat fragmentation: an agrolandscape perspective.* Landscape Urban Planning 28(1): 99-105.

Box, J and J Forbes. 1992. *Ecological considerations in the environmental assessment of road proposals.* Highways and Transportation, April 1992, pp. 16-22.

Brandt, A. 1997. *Not in my backyard.* Audubon, September-October 1997.

Brindle, B and M Baker. Undated. *Working landscapes.* Natural Resources Council of Maine.

Calhoun, A. 1997. *Maine citizen's guide to locating and describing vernal pools.* Maine Audubon Society.

Condon, M. 1997. *Constructing new villages.* Habitat, Journal of the Maine Audubon Society 14(4): 25.

Cook, M. 1997. *The livable city.* Habitat, Journal of the Maine Audubon Society 14(4): 29-32

Cox, P. 1997. *A compact lifestyle.* Habitat, Journal of the Maine Audubon Society 14(4): 33-37.

Forman, RTT and M Godron. 1981. *Patches and structural components for a landscape ecology.* Bioscience 31(10): 733-740.

Franklin, JF. 1993. *Preserving biodiversity: species, ecosystems or landscapes?* Ecol Appl, 3: 202-205.

Hill, J and R Cheadle. 1996. *The bible tells me so: uses and abuses of Holy Scriptures.* Doubleday, New York, NY.

Hirth, DH. 1977. *Social behavior of white-tailed deer in relation to habitat.* Wildlife Monographs 53: 1-55.

Jurgens, CR. 1993. *Strategic planning for sustainable rural development.* Landscape Urban Planning 27(2-4): 253-258.

Kareiva, P and U Wennerger. 1995. *Connecting landscape patterns to ecosystem and population process.* Nature 373: 299-302.

Ludwig, DR. 1995. *Assessment and management of wildlife diversity in urban settings.* Natural Areas Journal 15(4): 353-361.

MacAurthur, R and EO Wilson. 1967. *The theory of island biogeography.* Princeton University Press, Princeton, NJ.

Mader, HJ. 1984. *Animal habitat isolation by roads and agricultural fields.* Biological Conservation 29(1): 81-96.

Maine Policy Review. 1997. *Why sprawl is a problem, an interview with Evan Richert, Director, Maine State Planning Office.* Maine Policy Review 6(2): 44-49.

Mangun, WR. 1995. *Wildlife habitat: issue of choice.* Forum for Applied Research and Public Policy 10(1): 84-87.

Moore, B. 1997. *Disturbing developments.* Habitat, Journal of the Maine Audubon Society 4(4): 26-28.

Noss, RF. 1987. *Corridors in real landscapes.* Conservation Biology 1(2): 159-169.

O'Neill, RV, JR Kummel, RH Gardner, G Sugihara, B Jackson, DL DeAngelis, BT Milne, MG Turner, B Zygmut, SW Christensen, VH Dale and RL Graham. 1988. *Indices of landscape pattern.* Landscape Ecology 1: 153-162.

Orr, D. 1994. *Love it or lose it: The coming biophilia revolution.* Orion 13(1,): 8-15.

Patterns of Development Task Force, Maine Environmental Priorities Project. 1997. *A response to sprawl: designing communities to protect wildlife habitat and accommodate development.* Report of the Patterns of Development Task Force, Maine Environmental Priorities Project.

Primack, RB. 1993. *Essentials of conservation biology.* Sinauer Associates Inc. Sunderland, MA.

Primack, RB. 1995. *A primer of conservation biology.* Sinauer Associates Inc. Sunderland, MA.

Quinn, JF and A Hastings. 1987. *Extinction in subdivided habitats.* Conservation Biology 1: 198-208.

Rolstad, J. 1991. *Consequences of forest fragmentation for the dynamics of bird populations: conceptual issues and the evidence.* Biological Journal of the Linneaus Society 42: 149-163.

Rossi, E and M Kuitunen. 1996. *Ranking of habitats for the assessment of ecological impact in land use planning.* Biological Conservation 77(2-3): 227-234.

Rupprecht, CE and JS Smith. 1994. *Raccoon rabies: the re-emergence of an epizootic in a densely populated area.* Seminars in Virology 5(2): 155-164.

Sale, Kirkpatrick. 1991. *The conquest of paradise: Christopher Columbus and the columbian legacy.* Plume, Penguin Books USA Inc. New York, NY pp. 74-91.

Saunders, DA, RJ Hobbs, CR Margules. 1991. *Biological consequences of ecosystem fragmentation: a review.* Conservation Biology 5: 18-32.

Schumaker, NH. 1996. *Using landscape indices to predict habitat connectivity.* Ecology 77(4): 1210-1225.

Scott, JM; F Davis, B Csuti, R Noss, B Butterfield, C Groves, H Anderson, S Caicco, F D'Erchia, TC Edwards Jr., J Ulliman, and RG Wright. 1993. *Gap analysis, a geographical approach to the protection of biological diversity.* Wildlife Monographs 123: 1-41.

Scott, P. 1997. *Trouble on the new frontiers.* Habitat, Journal of the Maine Audubon Society 14(4): 21-24.

Simberloff, D and J Cox. 1987. *Consequences and costs of conservation corridors.* Conservation Biology 1: 63-71.

Simberloff, D; JA Farr, J Cox and DW Mehlman. 1992. *Movement corridors: conservation bargains or poor investments?* Conservation Biology 6: 493-504.

Stiling, P. 1996. *Ecology, theories and applications 2nd edition.* Prentice-Hall, Inc. Upper Saddle River NJ.

Taylor, PD; L Fahrig, K Henein and G Merriam. 1993. *Connectivity is a vital element of landscape structure.* Oikos 68: 571-573.

Tiebout, HM and RA Anderson. 1997. *A comparison of corridors and intrinsic connectivity to promote dispersal in transient successional landscapes.* Conservation Biology 1(3): 620-627.

Urquhart, TA. 1997. *Saving wildlife habitat.* Habitat, Journal of the Maine Audubon Society 14(4): 3-4.

Van Dorp, D and PFM Opdam. 1987. *Effects of patch size, isolation and regional abundance on forest bird communities.* Landscape Ecology 1: 59-73.

Weeks, JR. 1996. *Population: an introduction to concepts and issues.* Wadsworth Publishing Company, Belmont, CA.

White, D; PG Minotti, MJ Barczak, JC Sifneos, KE Freemark, MV Santelmann, CF Steinitz, AR Kiester and EM Preston. 1997. *Assessing risks to biodiversity from future landscape changes.* Conservation Biology 11(2): 349-360.

Whitney, GG. 1994. *From coastal wilderness to fruited plain.* Cambridge University Press, New York, NY.

Wilcove, DS. 1985. *Nest predation in forest tracts and the decline of migratory songbirds.* Ecology 66: 1211-1214.

With, KA and TO Crist. 1995. *Critical thresholds in species responses to landscape structure.* Ecology 76(8): 2446-2459.

Worster, D. 1993. *The wealth of nature: environmental history and the ecological revolution.* Oxford University Press, New York, NY.

Yahner, RH. 1988. *Changes in wildlife communities near edges,* Conservation Biology 2(4): 333-339.

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