



PROCEEDINGS

1980 National Outdoor Recreation Trends Symposium

Volume II

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FOREWORD

Volume II of these proceedings contains a wide selection of papers presented at the 1980 Outdoor Recreation Trends Symposium. It includes, in addition to papers not available for Volume I, those papers presented during the keynote session, concurrent sessions, evening sessions, and the closing session. Concurrent session papers are clustered around four topics: Trend Measurement Methodologies; Trend Data for Recreation Planning; Industry Sources of Trend Data; and Applied Trend Research.

The closing-session papers provide considerable food for thought about future directions in outdoor recreation trend research. These two papers provide a balance between the need for trend measurement for professional purposes and in the limitations of trend measurement as a means for monitoring social change.

Throughout these proceedings it has been our purpose to promote, provoke, stimulate and, we hope, encourage the establishment of new and better data systems to monitor activity effectively in all sectors of outdoor recreation. We took this approach knowing there are certain inherent risks; not having an abundance of reliable trend indicators is often a politically expedient way of conducting the public's business in outdoor recreation. During an evening session in the

course of the symposium, a small group of participants chose to speculate on just what some of the risks might be if we were suddenly faced with a world where all of the necessary trend measurement systems were in place. The consensus was that a number of undesirable reactions could be readily predicted: rejection—or challenging the data because of inconsistencies and a lack of representivity; procrastination--a paralysis of programs while decision makers await the latest in a series of data; prostitution--the use of data to justify more public programs rather than use it for better planning; sanctification--the establishment and growth of specialized elite decision makers to monitor an increasing array of potentially relevant phenomena; and routinization--the complete reliance on data resulting in the disappearance of a risk-taking attitude on the part of those who are paid to make difficult decisions.

The positive aspects, we firmly believe, of better data, better planning, and better decisions easily outweigh all of these risks. But the risks are there, and as we move inevitably in the direction of greater government accountability, we need to be constantly alert to their emergence.

WILBUR F. LaPAGE, Chairman
Program Committee

THE 1980 NATIONAL
OUTDOOR RECREATION TRENDS SYMPOSIUM

Held at the New England Center for Continuing Education
University of New Hampshire
Durham, New Hampshire
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CONTENTS

KEYNOTE SESSION		The dynamics of recreation participation: ski touring in Minnesota	
New Hampshire--an outdoor recreation trend trend leader		Timothy B. Knopp, G. Ballman, and L. C. Merriam	69
George T. Hamilton	1		
Recreation trends: Indicators of environmental quality		Trends in the temporal distribution of park use	
Roy Feuchter	7	Robert E. Manning and Paula L. Cormier	81
Converging social trends--emerging outdoor recreation issues		Network analysis: a new tool for resource managers	
Carl H. Reidel	9	Ruth H. Allen	89
TRENDS IN POLICY AND INFLUENCE		TREND DATA FOR RECREATION PLANNING	
Trends in outdoor recreation legislation		Outdoor recreation trend research: 'making the possible probable'	
George H. Siehl	15	Geoffrey Godbey	99
Trends in organizational memberships and lobbying		Trends in federal land acquisition, protection strategies, and planning	
William R. Burch (Vol. 1)		Warren Brown	103
Land management policy and program trends		Social-psychological implications for recreation resource planning	
Darrell E. Lewis	19	Hardeep S. Bhullar, Alan R. Everson, and Scout L. Gunn	109
The U.S. Army Corps of Engineers recreation resource management challenges		Automatic, time-interval traffic counts for recreation area management planning	
Gerald T. Purvis	21	D. L. Erickson, C. J. Liu, and H. K. Cordell	115
TREND MEASUREMENT METHODOLOGIES		Cross-country skiing trend data: planning for participant needs	
A methodology for the systematic collection, storage, and retrieval of trend data for the U.S. Army Engineers recreation program		Floyd L. Newby and William D. Lilley	125
Dennis B. Propst and Robert V. Abbey..	25	A possible railroad-oriented scenario in Potomac River Basin planning	
Forecasting trends in outdoor recreation activities on a multi-state basis		George H. Siehl	135
Vincent A. Scardino, Josef Schwalbe, and Marianne Beauregard	35	APPLIED TREND RESEARCH	
A simulation model for forecasting downhill ski participation		Changes in recreation-oriented travel in the northeast between 1972 and 1977	
Daniel J. Strynes and Daniel M. Spotts	55	Gerald L. Cole	139

Trends in Allagash wilderness waterway uses
in the 1970's

Thomas J. Cieslinski 147

Assessing changes in the importance
of tourism in the northeast

Tommy L. Brown 151

A method for explaining trends in river
recreation demand

George L. Peterson, David W.
Lime, and Dorothy H. Anderson 161

Trends in recreational vehicle traffic
in northeastern Minnesota

Arthur Norton, Karen Noyce, and
Thomas J. Wood 171

INDUSTRY SOURCES OF TREND DATA

Snowmobiling in the 1980's: continued
progress for a mature recreational
activity

William T. Jobe, Jr. 177

Woodall Publishing Company, an important
industry source of camping information

Curtis Fuller, Paul Foght, and Linda
Profaiser 181

Industry sources of trend data--skiing

William F. Malcolm, Jr. 193

Trends in participation sports during the
decade of the 70's

Robert J. Halstenrud 195

RECREATION TRENDS--A FUTURE LOOK

Recreation trends--a future look "So
what?--implications for the
recreation profession"

Roger A. Lancaster 203

Outdoor recreation trends in the 1980's
"So what?--implications for society"

Carlton S. Van Doren 207

REGISTRANTS 215

OUTDOOR RECREATION TREND RESEARCH: MAKING THE POSSIBLE PROBABLE¹

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Outdoor recreation research has largely ignored the fundamental requirement of science that findings be replicative. "The only way to establish replicability, of course, is to replicate."² Because of this, we know practically nothing about outdoor recreation trends. "Trends, in statistics, (is) a steady change in a variable or set of related variables in a certain direction (for example, a steadily increasing magnitude or frequency of occurrence of a variable) for a period of time."³ Any definition of trend implies the systematic observance of a phenomenon more than one time. This time period must be one that is great enough that it does not measure merely cyclical fluctuation. The Dictionary of Sociology alludes to this in defining a secular trend: "A long-term trend, that is, a trend that permits for a long enough period of time so that it is clearly not merely a phase of a cyclical movement. Cyclical fluctuation may occur in the course of a secular trend, but there is always a clear, long-range movement in a certain direction despite the short run variations."⁴ In outdoor recreation research, for example, we might find that camping in developed areas varied cyclically according to whether it was a week day or week end and according to month of the year, but no secular trend can be established unless we measure such camping in more than one year.

Trend analysis should be understood as one form of aggregation. Aggregation accomplishes two purposes: it reduces errors of measurement and it establishes a range of generalization. Perhaps the most common form of

aggregation is aggregating over individuals to reduce errors of measurement associated with individual differences.⁵ Thus, we are likely to seek to sample among subjects with reference to individual differences which may constitute variables which intervene upon the relation between the dependent and independent variable.

Another form of aggregation is aggregation over stimuli and/or situations to reduce error variance associated with the unique contribution of specific stimuli or situations and determine the class of stimuli or situations to which the results can be generalized.

Thirdly, we may aggregate over different research measures to minimize variance associated with a single method rather than true variance.

When we replicate a study we are aggregating over trials or occasions since, not only may there be high component of error of measurement, but also since otherwise there is no way of determining whether the results can be generalized over time.

Ideally, research in outdoor recreation would seek to aggregate in all four of these areas, but historically it has only usually attempted to aggregate over only individuals and occasionally over stimuli or situations or measures. The scant attention to replication (aggregating over trials or occasions) means we know little about change and the direction of change in outdoor recreation. The consequences of this situation are great. For instance, we have little idea if the satisfaction levels of users of national parks have increased or decreased in the last decade. We don't know if tennis is more popular this year or last. It is not possible to say if income is a better prediction of participation in water skiing now than it was a decade ago. Is crowding more or less a problem in the mind of state park users than it was five years ago?

A number of situations explain why so

⁵op cit, Epstein, p. 19.

¹Paper presented at the National Outdoor Recreation Trends Symposium, Durham, NH, April 20-23, 1980.

²Seymour Epstein, "The Stability of Behavior: Implications for Research," in press, 1980. American Psychologist.

³George A. Theodorson and Achilles G. Theodorson, Modern Dictionary of Sociology. New York: T.Y. Crowell, 1969, p. 442.

⁴Ibid, p. 443.

little replication of outdoor recreation research takes place. Such explanations are more in the political, financial and organizational realm than in the methodological realm.

SITUATIONS MITIGATING AGAINST LONGITUDINAL RESEARCH

While a number of methodologies exist for conducting longitudinal research, the following situations have usually meant outdoor recreation research has been largely cross-sectional.

1. Replication of studies has generally been considered low status by social scientists. Many journals won't publish replications of existing studies.

2. Funding for outdoor recreation is usually extremely tenuous. The researcher is often encouraged to "do something quick".

3. Research done in-house by government agencies concerned with outdoor recreation is politically sensitive and subject to change without notice. No state or federal agency can guarantee that a program of outdoor recreation will last for longer than four years at most, and usually for not more than one. New administrators, new researchers, new financial situations, changes in political constraints, demands of agency constituencies -- all these factors mitigate against trend research. As the Committee on Assessment of Demand for Outdoor Recreation Resources of the National Academy of Sciences put it:

"Although surveys have been a dominant form of data gathering and analysis in outdoor recreation for many years, much of the richness of the resulting information has been lost because of lack of comparability of survey questions and sampling methods over time and over geographic areas as well as the limited scope of these inquiries. The ability to detect trends and changes in perceptions, attitudes and preferences vis-a-vis outdoor recreation has been limited by the lack of comparability of sample design and questionnaire format over time."⁶

Surveys undertaken by the (then) Bureau of Outdoor Recreation in 1960, 1965, and 1972 illustrate this problem. As a recent, extensive assessment of these studies concluded:

"The biggest problem in these surveys were the biases which affected responses.

⁶Committee on Assessment of Demand for Outdoor Recreation Resources, National Academy of Sciences, Assessing Demand for Outdoor Recreation, Washington, D.C.: NAS, 1975, p. 42.

Using 1960 as a base, the 1965 survey had a somewhat positive bias, while the 1972 survey had a definite negative bias in reporting of activity participation. These biases, in large part, were due to the inconsistency of survey design over time. This inconsistency affected comparison."⁷

4. A related problem is the lack of systematic data storage, which means that it is often impossible to fully compare replicated surveys with the original data base. It should be noted that some steps are being taken to help minimize this problem. First, an attempt is being made to establish a National Leisure Archive by HCRS, U.S. Department of Interior in cooperation with the University of North Carolina Institute for Research in Social Sciences.⁸ Initially, the project will focus upon studies generated by State and Federal governments. All data archived will be available to member institutions of the University of Michigan's Institute for Social Research without charge.

A second project, the establishment of a Leisure Information Network, holds promise for data storage pertaining to leisure at an international level.⁹ At a recent conference in Brussels sponsored by the World Leisure and Recreation Association and the European Leisure and Recreation Association, the first steps toward international storage and dissemination of data were undertaken. A linking of existing centers storing leisure data is already being explored, as are other related undertakings. The success of both these projects remains to be seen.

5. Also related is the problem of incomparability of operational definitions from study to study. While attempts have been made to establish a thesaurus of outdoor recreation terms, to date, walking for pleasure, hiking and backpacking may have overlapping meanings or even be used interchangeably from study to study. The same problem exists with regard to unit of measurement. No commonly accepted interval or ordinal measures have emerged in regard to participation or other subjects of inquiry. One reason for this is a lack of aggregation of methods in such research which

⁷Kirschner Associates, Inc., Interim Report--Evaluation of Five Previous Nationwide Citizen Surveys, Washington, D.C.: unpublished, 1975, p. 111.

⁸National Leisure Archive, John Peine, Project Coordinator, HCRS, U.S. Department of Interior.

⁹Leisure Information Network Conference, Gerald Kenyon, Chairman; University of Waterloo, Waterloo, Ontario, Canada.

makes any judgements about measurement effects purely speculative. While the issue of validating such measures is important, any measure which is replicated at least has the advantage of producing a consistent error. Perhaps this is one reason why many commercial organizations concerned with outdoor recreation will pay high prices for the results of periodically replicated surveys of participation undertaken by A.C. Neilsen and other private-sector pollsters.

6. Social science changes its focus with regard to outdoor recreation, as with other subjects, and such changes often lead to discontinuity. Research concerns such as crowding, motivation and satisfaction, and life stage and life cycle ebb and flow in popularity as well as evolve and such change discourages trend analysis.

These and other situations, many of which are not unique to outdoor recreation, have discouraged research into outdoor recreation trends. It would appear, however, that many things can be done to promote such research.

PROMOTING TREND RESEARCH

Given the previously outlined problems, what can be done to promote outdoor recreation research which is more than purely cross-sectional? It appears that few of the answers involve breakthroughs in methodology.

1. One step in the right direction would be to encourage outdoor recreation researchers to alter cross-sectional research designs to include retrospective or projective aspects. "It is possible in many cross-sectional surveys to incorporate certain characteristics of a longitudinal approach by conducting a retrospective pretest in which respondents are asked to recall their attitudes or behavior at any earlier point in time as well as the present."¹⁰ Additionally, surveys can ask respondents to project future behaviors. While those steps will not, strictly speaking, produce trend data, they will give implication as to the direction of change of the phenomenon under study.

2. Those who promote, plan, fund and advise outdoor recreation research can encourage the replication of existing studies. Within colleges and universities, this may involve encouraging replication of worthwhile theses and dissertations as well as secondary analysis of two or more identical or similar data sets. In local, State and Federal Gov-

ernment, officials need to be made aware of the wastefulness of many of the cross-sectional research efforts which they undertake. There is also the need to inform officials of the benefits of replication of studies to outdoor recreation planners and managers. Among such benefits are economy and simplicity as well as the benefits of identifying trends.

At the state level, the State Comprehensive Outdoor Recreation Plans provide an opportunity for replication which could be systematically encouraged by HCRS. While standardizing SCORPS among states is neither possible nor desirable, replication, in an era of diminishing funds, could be very attractive to individual state outdoor recreation agencies.

At the federal level, it seems unlikely that research done in-house can be planned for more than four years. It may be possible, however, to give funding priority to longitudinal research and the replication of existing studies. Additionally, federal funding can be used in combination with other funds to establish a research-oriented center for the study of outdoor recreation or leisure behavior. Such an intermediate organization would potentially have advantages of stability and a minimum of political interference which could facilitate a long-term program of trend research. To date, no such center exists which is financially secure.

3. In the public, private and commercial sector, greater research efforts of a trend analysis nature can be made using data which is already being collected. Data concerning leisure monetary spending, attendance at state parks, and other subjects is often collected but never analyzed.

4. A more systematic attempt at data storage and dissemination may continue to be problematic in spite of the encouraging preliminary work concerning a National Leisure Archive and the Leisure Information Network. Underlying this problem is the continued lack of a single organization with both resources and a deep and stable commitment to recreation and leisure research. Much of the "non-cumulative effect" of recreation and leisure research reflects this situation.

5. In longitudinal research involving panels of respondents, outdoor recreation researchers can urge the inclusion of limited questions pertaining to outdoor recreation. To date, most of the valuable longitudinal data collected about recreation and leisure has come from studies whose primary concern has been some other subject. This situation is likely to continue.

¹⁰Cerald Ferman and Jack Levin, Social Science Research, New York: John Wiley and Sons, 1975, p. 42.

6. Whenever it appears intellectually legitimate, outdoor recreation researchers can utilize the same definitions, units of measurement, sampling procedures and methods of analysis of past studies. In many instances, for example, changes in activity descriptors or scaling of periods of recall have not advanced understanding since no attempt was made to validate either those measures which were discarded or those measures which replaced them. In other words, if you don't attempt to validate the measures you use, use someone else's.

In all these ways and others, outdoor recreation researchers can move closer to establishing trends in outdoor recreation. While methodological innovation may be necessary, the most important constraints appear to be a) the attitudes of outdoor recreation researchers; b) financial constraints and c) organizational and political constraints. Progress in minimizing these constraints will necessitate expanding the consciousness of both users and producers of outdoor recreation research to the benefits of and need for trend research. Only then will the possible become probable.

TRENDS IN FEDERAL LAND ACQUISITION,
PROTECTION STRATEGIES, AND PLANNING

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INTRODUCTION

In the past, Federal land acquisition has been one of the most popular ways to protect outstanding natural resources and provide recreational opportunities. Federal purchase, maintenance, and operation can help take pressure off the State or local budget. Federal involvement also can provide a way for local officials to avoid making some tough decisions about regulating private development. However, several trends are raising obstacles to proposals for establishing new Federal management units in the years ahead.

First, and most obvious is the budget crunch. Appropriations for Federal land acquisition have been reduced substantially, in spite of increasing numbers of new projects and proposals. Second, financial constraints and changing public attitudes about Federal land management have encouraged a trend toward finding and using alternatives to fee-simple purchase. These factors have led to some new directions in policies and planning procedures which will be discussed as a third trend in recreation programs.

Financial Constraints

The Land and Water Conservation Fund provides the primary source of support for Federal land acquisition. The Fund was established in 1965 with the broad purpose to: "assist in preserving, developing, and assuring accessibility . . . to such quality and quantity of outdoor recreation resources as may be available and are necessary and desirable . . . to strengthen the health and vitality of the

¹Paper presented by Warren Brown, Resource Policy Analyst, Division of Federal Lands Planning, Heritage Conservation and Recreation Service Outdoor Recreation Trends Symposium, Durham, N.H., April 23, 1980.

citizens of the United States ..."²

The LWCF Act emphasized the lead role of the States in providing recreational opportunities and established the 50/50 matching grant program of Federal assistance for land acquisition and development. The Act also recognized the important role played directly by the Federal government in acquiring land for National Parks, Wildlife Refuges, Forests, and Recreation Areas.³

The LWCF originally was authorized at \$100 million each year through 1989 with at least 40% available for Federal purposes. This level of funding may have seemed adequate in 1965, but new acquisition projects and rising land prices have continued at rates never before anticipated.

In 1970 the authorized level of the LWCF was increased to \$300 million each year. By 1980 the level had been increased to \$900 million annually. However, claims against the Federal side have increased to \$2.9 billion.

Receipts from Outer Continental Shelf oil and gas leases now provide most of the income to support the Fund. Nevertheless, price escalation is eroding the purchasing power of the funds which are available. In 1963, the average cost per acre for Federal purchases was estimated to be \$75. During the first 14 years of the LWCF program the average price per acre paid by Federal

² Land and Water Conservation Fund Act of 1965, Sec. 1 (b).

³ Bureau of Outdoor Recreation, "The Land and Water Conservation Fund: Intent and Accomplishments", National Urban Recreation Study Technical Report No. 9; July 1977.

Agencies was \$691.⁴ In 1965 - 66 the value of farm real estate was increasing at a rate of 3% each year.

In 1978 - 79 the price of farmland went up 16% on average around the nation with rates above 20% in many western states.⁵

These data show some simple trends which should come as no surprise. Prices are going up rapidly and new demands are being placed on the funds which are available. Appropriations for the Federal land acquisition program have not been able to keep up with rising prices. Assuming a modest 14% rate of land price escalation, even if Congress appropriates the full \$360 million authorized for the Federal side of the LWCF each year through 1989, there will be enough money to buy less than one half of the land already identified for purchase.

In spite of the shortage of money, there is no shortage of additional areas deserving protection or the willingness of Congress to establish new acquisition projects.

Alternatives to Fee

Money is not the only obstacle to the Federal land acquisition program. State and local governments frequently oppose Federal purchases which remove land from the tax rolls and economic base. Landowners frequently don't want to sell and are becoming well organized to voice their interests. Although the "Sagebrush Rebellion" has focused on State control over current BLM lands, it is another sign of the growing opposition to the Federal land managing presence

The General Accounting Office recently released a report entitled "The Federal Drive to Acquire Private Lands Should be Reassessed."⁶ GAO's image of the Federal "drive" and its criticism of agencies' land acquisition programs are somewhat exaggerated. For example, since 1965 Federal agencies under the LWCF program have purchased about 2.6 million acres - only about one-tenth of one percent of the nation's land. Nevertheless, the GAO report has become one of several factors

⁴Data from HCRS, Div. of Fed. Lands Planning Files.

⁵U.S. Dept. of Ag., Economics, Statistics, and Cooperatives Services, "Farm Real Estate Market Developments", March 1980. See also, Bureau of Outdoor Recreation, Recreation Land Price Escalation, Jan. 1967.

⁶U.S. General Accounting Office, The Federal Drive to Acquire Private Lands Should be Reassessed, Report CED-80-14; Dec. 14, 1979.

simulating a review of the Federal land acquisition program, encouraging more attention to alternatives to direct purchase and management.

"Alternatives" in land acquisition have usually been limited to the question, "to buy or not to buy." Different boundaries also have been considered as the only real "alternatives" for the extent of purchase. In the years ahead we can expect more serious consideration to a wide range of techniques which do not necessarily involve direct Federal acquisition or management. These alternatives include many different approaches, some well tested and others quite new, which fall into several categories.

At one end of the spectrum, there is the educational and awareness approach which attempts to promote public and landowner stewardship. State Heritage programs and the National Landmarks Program administered by HCRS provide examples of how private recognition, may be persuaded to voluntarily protect their land. Although these programs are primarily oriented toward protecting natural areas, they can help conserve a landscape, geological formation, or other resources with important recreational values as well.

Coordination and consistency requirements can provide a useful complement to programs of education and recognition. The Coastal Zone Management program provides one example of an effort to assure that Federal financial assistance and licensing activities are consistent with a comprehensive plan which includes at least some attention to recreational values. The Statewide Comprehensive Outdoor Recreation Plan may be so general that "consistency" is difficult to enforce, but in many instances improved coordination in Federal programs through the SCORP can help protect areas of special recreational value. By targeting a variety of other Federal programs of financial and technical assistance it may be possible to avoid the need for direct Federal purchase and management.

Several types of administrative arrangements or techniques are available to help implement voluntary and cooperative methods of protecting recreational resources. A Memorandum of Understanding or Agreement can provide additional support for less formal arrangements for coordination and consistency in actions by Federal or State agencies. For example, HCRS has a Memo of Understanding with the Environmental Protection Agency to help assure that recreational factors will be considered in planning for wastewater treatment.

Contracts and service agreements also provide administrative approaches to providing recreational opportunities. The cooperative

management program conducted by HCRS is one example of how an administrative agreement can open for public use some Federal lands owned by the military or other agencies not primarily concerned with recreation. At the State and local level, an agreement to pick up trash or provide minor maintenance services may be all that is needed to make an area available for public recreation.

Regulatory tools are another category of methods for achieving recreational objectives. Zoning, and building or public health codes can control development to protect open spaces and conserve natural resources. Innumerable combinations of zoning and subdivision controls are available to meet the challenges posed by most rapidly-developing areas. Creative use of clustering, planned unit development, and site plan approvals can help guide growth in a way that keeps important open spaces available for public use. By establishing mandatory dedications, set-backs, reservations, and other contributions toward public services, local governments can assure that new developments make a positive contribution toward providing recreational opportunities.

Air and water quality regulations at the Federal, State, and local levels also can in some cases provide viable alternatives to acquisition. The Corps of Engineers Section 404 Permit program provides an example of how regulatory techniques can protect wetlands which are critical to recreational values as well as important natural processes.

Regulatory, administrative, and educational techniques have their place, but in some cases the recreational objectives require a degree of control or public access that can be achieved only through acquisition. Where purchase is necessary, it may be possible to buy something less than the full fee.

Looking at property ownership as a "bundle of rights", it is possible to acquire only those interests in land necessary to achieve certain objectives. Development, timber, water, mineral, grazing, or other rights may be all that the public needs to own in order to protect important natural areas or recreational and scenic values. These rights may be obtained by purchasing an easement that restricts the owner's activities. However, easements also may be positive, for example by establishing a public right to access.

In England and Wales a network of more than 140,000 miles of footpaths and bridleways provides for public access and recreational use across private lands. These public right-of-way go back to the earliest periods of common law and history, but they have been kept open by citizen activism and

dedication.⁷ In the United States, affirmative easements have been used to provide public access for hunting and fishing, nature study, and other recreational uses on a limited scale.

Partial interests in land also can be retained when it is sold. Reserved interests in the form of life tenancy for the previous owner are not unusual when the Federal government buys land. Purchases with subsequent re-sale subject to deed restrictions provides another way to get only that interest in the property which is absolutely necessary. Purchase and lease-back arrangements also are available to most Federal agencies, but these methods have not yet been used extensively as an alternative to fee-simple purchase.

If acquisition of fee or less than fee interest is desirable, there are many ways to go about it. Because of tax benefits available, many people can be encouraged to donate all or part of their land or to sell at a bargain price. Public spirit and the tax benefits can also encourage donations of conservation easements. Land exchanges provide another way for public agencies to obtain land they want without giving up cash.

Choosing the Best Technique

In brief, there are a tremendous number of alternatives to acquisition. The problem facing the resource planner or manager is, which one should I use? Indeed, the challenge of the years ahead is to develop and enhance "craftsmanship" in formulating land protection strategies. There is no simple formula to say that easements are "better" than full fee or that regulatory approaches work when educational efforts fail. Each case must be evaluated on its own merits considering several basic factors:

First, the character of the resource must be considered. An area suitable for intense public use will require different strategies from a fragile ecosystem where recreation is a secondary and relatively minor value. Location, accessibility, and natural characteristics must be reviewed on a case by case basis.

Second, management objectives must be clearly defined with precision. The type of activity planned will usually determine what interests in land need to be acquired or protected. A scenic vista may be protected by zoning for agricultural use, at the expense of

⁷ See remarks of Robert L. Herbst, Assistant Secretary for Fish and Wildlife and Parks, U.S. Dept. of the Interior, at the Sierra Club Board of Directors Meeting, Nov. 11, 1978. San Francisco, California.

more opportunities for public access which could be available with easements or other types of development controls. Although intense public access usually requires public ownership, it may be possible to limit purchase or controls to a few trails or corridors to provide recreational opportunities.

Landowner interests and market conditions also are important in selecting appropriate tools. Where development pressure is weak, it may not be difficult for educational approaches to work. Where rising taxes and growth potential are strong, landowners are less likely to voluntarily give up any rights to the land they hope to develop.

Finally, political realities are an important consideration too often overlooked or misinterpreted in selecting an appropriate technique. Many of the most appealing ways of controlling impacts on recreational resources are simply not feasible politically. Zoning which is well accepted in many metropolitan areas may still seem to be an unthinkable intrusion on private property rights in some rural counties.

Sensitivity to political reality is important, but we cannot be too shy about proposing innovative approaches for fear of adverse reactions. Where opposition is expected to arise, it may be possible to generate the necessary popular support before a protection strategy is dropped as politically impractical. Although many alternatives to acquisition may generate political controversy, there may be even more opposition to Federal or state acquisition of private land. Sometimes politically sensitive regulatory approaches may prove to be a popular substitute for direct acquisition and displacement of current owners.

Policies and Planning Procedures

In response to the financial and political constraints on direct Federal land acquisition new trends in policies and planning procedures are developing. In the past, each Federal agency has followed its own policies and procedures in planning for new national areas and determining what protection techniques will be used. Following recommendations of the Third Nationwide Outdoor Recreation Plan, some important steps have been taken in recent months to improve the new area study process and help assure that agencies using the Land and Water Conservation Fund consider a full range of alternatives to fee-simple acquisition.

First, a Memorandum of Understanding has been adopted by the Directors of the Bureau of Land Management, Fish and Wildlife Service, Heritage Conservation and Recreation Service,

National Park Service, and the Chief of the Forest Service outlining the responsibilities of the Land and Water Conservation Fund Policy Group (LPG). The LPG recommends on how the Federal side of the fund is to be allocated each year and coordinates the studies of potential new areas. The group is composed of the agency Directors and is chaired by the Deputy Assistant Secretary for Fish and Wildlife and Parks.

The LPG has been operating in a different form since 1974 primarily to formulate budget requests. Under its new mandate, the LPG will play a more active role in recommending what areas will be studied, who will conduct the studies, and what areas should be recommended for acquisition or other types of Federal protection.

The LPG has adopted a planning and decision-making process to carry out its responsibilities concerning studies of potential new national areas or major expansions in existing areas which might draw on the LWCF. The planning process begins with an emphasis on systematic inventories to examine the entire range of valuable resources and identify the most outstanding examples of natural, cultural, and recreational areas. The process establishes two levels of study for specific sites. First, a Reconnaissance Survey is conducted to collect basis information about characteristics and resources. This data is reviewed by the LPG to determine if the area merits Federal attention. If it does appear to meet the standards, which consider resource quality, integrity, threats of adverse impacts, and other factors, a more detailed study of protection and management alternatives will be conducted.

The analysis of alternatives will consider how existing Federal, State or local planning and regulatory authorities could be used to protect the area. Zoning, permit requirements, and other police power techniques discussed above will be explored. Alternatives to acquisition of full fee including purchase of easements, and timber, mineral, water, or other rights will be considered. The study also will examine some creative acquisition methods including the use of tax incentives to encourage donations, exchanges, or bargain sales. The findings of the study will provide the basis for recommendations on appropriate Federal, State, or local assignments of responsibility for management and, if necessary, new legislative authority from Congress.

The LPG also has adopted a policy statement to guide the new area study process. The policy emphasizes identifying important resources and assuring their protection through means other than direct Federal acquisition. The policy provides general direction on what type of areas will be studied, how priorities

will be established, and what alternative protection techniques will be considered. It also addresses schedules for implementing adopted protection strategies in newly authorized areas.

The policies and planning procedures adopted by the LPG will help meet the recreation and conservation challenges of the 1980's. In the past the Federal acquisition program generally emphasized large relatively pristine areas with outstanding natural values. Looking to the future, more attention will be directed to areas closer to population concentrations. Many of the areas currently under consideration possess a variety of natural, cultural, and recreational resources on land with important economic values. For these complex landscapes, direct Federal land acquisition and management may be inappropriate as well as financially impractical.

The Area of National Concern (ANC) concept is one new approach to combining a variety of alternatives to fee-simple acquisition in an effort to protect natural resources and provide recreational opportunities. Greenline Parks, Preserves, Reserves, the "Cape Cod Formula", and other terms have been used previously to describe variations on the ANC concept. Although titles vary, the basic idea is to build a partnership where the Federal government provides a limited amount of financial and technical assistance to support State and local leadership in planning and managing an area of importance to the nation as a whole. Within the boundaries of the ANC some land would be acquired by Federal or State agencies but most of the area would be protected by a combination of zoning, easements, regulatory authorities, and other alternatives to fee simple purchase. Private ownership and compatible economic activities such as farming would continue. Grant programs, purchase lease-back or sell-back arrangements, and other incentives could encourage current residents to provide tourist facilities and other recreational services.

Several existing national areas incorporate some elements of the ANC concept. For example, the Sawtooth and Whiskeytown-Shasta-Trinity NRA's have used easements and zoning to reduce the need for outright purchase. The Wild and Scenic River System emphasizes limited purchase of access points and reliance on easements or zoning along the shoreline to protect the most important recreational values of the river. Cape Cod, Fire Island, and Sleeping Bear Dunes provide additional examples of national areas with continued private ownership subject to zoning protection. At the State level, New York's Adirondack Park provides one model of how public and private ownership can be managed within a single boundary.

The most complete example of the ANC concept at work is now unfolding in the New Jersey Pinelands. In 1978 Congress authorized the Pinelands National Reserve encompassing one million acres in the Northeast's most industrialized state. The Pinelands offer a unique combination of fascinating plants, important wildlife habitats, valuable supplies of pure water, numerous recreational opportunities, and a significant local economy based largely on compatible agricultural uses.

The Pinelands ecosystem is being threatened by encroaching residential development fueled in part by growth around Atlantic City. The protection strategy calls for a comprehensive management plan to be developed by a 15 member commission including Federal, State and local representation.

The Plan must be completed within 18 months and forwarded to the Secretary of the Interior for approval. While the plan is being developed the Act provides for "emergency" acquisition of lands with critical ecological values which are in immediate danger of being destroyed. Once the plan is approved, the Act authorizes grants for land acquisition by the State. However, the plan must require that State and local police powers be used to the maximum extent practicable to regulate the use of land and water resources. Only \$23 million of Federal money is authorized for land acquisition in the 1 million acres, supporting the point that State and local regulations will be the most important implementing tools.

The ANC approach cannot replace the Federal land acquisition program, but it can provide a workable alternative in many new areas proposed for study. Lowell, Massachusetts, the Santa Monica Mountains in California, and Jean Lafitte in Louisiana are the most recent examples of the ANC concept already being applied around a core of land to be managed as a national park, recreational area, or historical preserve.

In the years ahead, we can expect more ANC's to be established where private ownership and public interests in natural, cultural and recreational values can be managed effectively without exclusive reliance on Federal acquisition. HCRS and other members of the LPG will be continuing to support this trend toward finding more creative solutions to conservation and recreation challenges.

SOCIAL-PSYCHOLOGICAL IMPLICATIONS
FOR RECREATION RESOURCE PLANNING¹

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INTRODUCTION

Many claims have been made concerning the cause/effect relationship between recreation and leisure activity, and the acquisition of quality living. Studies have investigated the utility, quality, and quantity of recreation facilities. Studies of programs, leadership, members, and general classifications of users have also been conducted.

If leisure participation is need-fulfilling behavior that is learned, motivated by and predicated upon the individual's personality, then we need to study the relationships between this behavior and the needs fulfilled by it. Works of several individuals show that trends are developing in attempt to further understand recreative behaviors of the participant populations. Researchers such as Hendee, Driver, Brown, Moss and Gray are beginning to explore user traits and activity relatedness.

This paper is a presentation of results, and discussions, of three studies conducted to explore possible relationships between participation in selected outdoor leisure activities and fifteen personality variables in volunteer subjects. Specially designed

¹For presentation at the Outdoor Recreation Trends Symposium New England Center, Durham, New Hampshire, April 1980.

Outdoor Recreation Activity Questionnaires were used to measure the rates of participation. The Edwards Personal Preference Schedule and the Adjective Check List were used to measure personality variables.

The three studies were conducted with subjects from the Appalachian State University in North Carolina, the University of Georgia, and Mississippi State University. The studies in Georgia and Mississippi included white and black, male and female college students. These studies offer three separate opportunities to examine the effect of clustering outdoor recreation activities, and the clustering of personality traits based on the characteristics of respondents. The studies show several similarities in the needs that are being met by activities. There are also similarities in the order of activity clusters and need clusters, but different techniques were employed and the studies' results are not fully comparable.

METHODS

The study involving subjects from North Carolina used the Adjective Check List (ACL) to measure the personality traits and the Outdoor Recreation Participation Questionnaire

(QRPQ) to measure outdoor leisure participation. Volunteer subjects for the studies in Mississippi and Georgia were administered similar instruments -- the Edwards Personal Preference Schedule (EPPS) and the Outdoor Recreation Activity Questionnaire (QRAQ). In all cases, participation rates and the needs were "factor analyzed" to obtain clusters of outdoor recreation activities and personality traits; this procedure clusters entities according to their similarities. A matrix of interpersonal similarity coefficients is computed by the program, and this matrix is "searched" for patterns of similarities (Cattell, 1966).

For the Mississippi and North Carolina studies, Canonical Correlational Analysis was used to determine if a relationship existed between the two variable sets - activity clusters and trait clusters. This procedure provided an indicator of the maximum relationship that existed between the two variable sets, and also calculated the relative contribution of each variable to the relationship.

RESULTS AND DISCUSSION

A. Clusters

It is postulated that there is a measurable interrelationship between motives or need-states and leisure activities. It is suggested that a particular activity may be related to several needs, but is more likely to serve similar needs for similar people. Also several activities may be related to the same or similar needs of leisure resource users.

Activity clusters formed by Factor Analysis seemingly have much face validity, and they are correlated statistically. For example, in white males of the Georgia study (Table 1), Cluster 1 involves three walking activities -- hiking, nature walks, and walking for pleasure. Cluster 3 is water based -- boating, water skiing and sunbathing. Cluster 5 is composed of the typical "sportsman's" activities -- camping, fishing, hunting, target shooting and archery. Similarly, activity cluster results are reported for black males and white females (Table 2, 3, 4).

The North Carolina activity data divides into seven activity clusters (A1-A7) in table 5. Activity cluster one (A1) includes the following activities: sightseeing, walking for pleasure, attending outdoor social functions, automobile riding for pleasure, jogging, picnicking, and nature walks. A1 is referred to as the "Nature-Pleasure" cluster. Cluster A2 is comprised of the following activities: horseshoes, golf, touch football, softball or baseball, basketball, miniature golf, attending

TABLE 1
Activity and Need Relationship
For White Males (Georgia)

Activity Cluster	Activities	Need Cluster	Needs
1	Hiking Nature walks Walking for pleasure	1	(-) Order (+) Affiliation (+) Nurtureance
2	Picnics Horseshoe riding Tennis Bicycling Sightseeing	2	(+) Intracception
3	Boating Skiing (water) Sunbathing	3	(-) Dominance (+) Abasement (-) Heterosexuality
4	Canoeing Skiing (snow) Cave exploring Mountain climbing	4	(-) Achievement (-) Exhibition
5	Camping Fishing Hunting Target shooting Archery	5	(-) Succorance (+) Dominance (+) Change
6	Automobile riding	6	(-) Deference (+) Autonomy

TABLE 2
Activity Cluster and Need
Cluster Relationship (Mississippi)

Activity Cluster	Activities	Need Cluster	Needs
1	Boating, large reservoirs Horseshoe riding Swimming, lakes Motorbikes, street Fishing, large reservoirs	1	(+) Affiliation (+) Nurtureance (-) Aggression
2	Fishing, rivers Canoeing, rivers Hunting, small game Hunting, bird	2	(+) Achievement (+) Dominance (-) Succorance
3	Hiking Nature walks Walking for pleasure Sightseeing	3	(+) Heterosexuality (-) Abasement
4	Camping, trailer Canoeing, lakes & large reservoirs	4	(+) Order (-) Change
5	Fishing, lakes Boating, rivers Mountain climbing Sightseeing	5	(-) Nurtureance (+) Intracception (+) Dominance

TABLE 3
Activity Cluster and Need
Cluster Relationship (Mississippi)
White Females

Activity Cluster	Activities	Need Cluster	Needs
1	Swimming, rivers Sailing Scuba, sea	1	(+) Exhibition (-) Intraception
2	Boating, large reservoirs Motorbike, street Canoeing, large reservoir	2	(+) Order (+) Aggression (-) Affiliation
3	Canoeing, rivers Hunting, bow & arrow Snow skiing Scuba, lakes & reservoirs	3	(+) Exhibition (-) Intraception
4	Camping, trailer Bicycling Touch football	4	(+) Dominance (-) Abasement
5	Nature walks Walking for pleasure Sightseeing	5	(+) Succorance (-) Change (-) Autonomy

TABLE 4
Activity and Need Relationship
for White Females (Georgia)

Activity Cluster	Activities	Need Cluster	Needs
1	Horseback riding Attending outdoor sports concerts, drama	1	(+) Order (-) Affiliation (-) Endurance (+) Endurance
2	Hiking Nature walks Walking for pleasure	2	(+) Autonomy (+) Change
3	Boating Skiing (water) Sunbathing Automobile riding	3	(+) Deference (-) Autonomy (-) Aggression
4	Picnics Swimming Sightseeing	4	(-) Achievement (-) Succorance (-) Dominance (-) Abasement
5	Skiing (snow) Golf Target shooting	5	(-) Exhibition (+) Intraception (-) Heterosexuality

TABLE 5
Activity Clusters: Content and Identification

Cluster Number	Activity	Identification Factor
A1	Sightseeing Walking for pleasure Attending outdoor socials Automobile riding for pleasure Jogging Picnicing Nature walks	Nature-Pleasure
A2	Screenless Golf Touch football Softball or baseball Basketball Miniature golf Attending outdoor sporting events Tennis	Social Sports
A3	Fishing Hunting (small game) Target shooting	Predator Sports
A4	Primitive camping Hiking (with packs) Horseback riding	Nature/Conqueror-Horses
A5	Bicycling Motorbike riding Attending outdoor concerts, drama	Bike-Concerts
A6	Swimming (lake, river ocean) Swimming (pool) Motorboating Water skiing Sunbathing	Water-Oriented
A7	Slidding or Tobogganing Snow skiing	Winter Sports

outdoor sporting events, and tennis; this cluster is primarily oriented toward "Social Sports". A3 is made up of fishing, hunting (small game), and target shooting, which is identified as "Predator Sports". Primitive camping, hiking (with packs), and horseback riding comprise the fourth activity cluster, A4. This cluster is referred to as "Nature/conqueror-Horses". Bicycling, motorbike riding, and attending outdoor concerts (drama) make up the fifth activity cluster, A5, which is identified by the key words "Bike-Concerts". A6 identifies "water-oriented" activities, and includes: swimming (lake, river, ocean), swimming (pool), motor boating, water skiing, and sunbathing. Slidding or tobogganing, and snow skiing, form the last activity cluster, A7, representing "Winter Sports".

Three clusters (T1-T3) were obtained for the fifteen personality traits (Table 6). T1 contains (+) achievement, (+) dominance, (+) endurance, (+) order, (+) intraception, (-) succorance, and (-) abasement. This cluster is discussed as the "Leadership-Organization" factor. Trait cluster T2 is made up of the following traits: (-) exhibition, (-) autonomy, (-) aggression, (+) abase-

ment, (+) deference, and (-) dominance. This cluster is referred to as the "Subordination-Guilt" factor. (+) Nurturance, (+) affiliation, (+) heterosexuality, and (+) change comprise the third trait cluster, T3, and is identified as the "Socialization-Change" factor.

Results of the study on black males and females show that their needs are only a little different from those of white subjects; these differences are accounted for by such factors as culture, opportunities to participate, availability of facilities and the location of residence. With the current trends toward narrowing social and cultural gaps between various ethnic and cultural groups, it is becoming imperative that leisure facilities be planned while taking into consideration all of these groups.

TABLE 6

Trait Clusters: Content and Identification		
Cluster Number	Traits (+ or -)	Identification Factor
T1	Achievement (+)	Leadership-Organization
	Destiance (+)	
	Endurance (+)	
	Order (+)	
	Intracception (+)	
	Successence (-)	
	Abasement (-)	
T2	Exhibition (-)	Subordination-Guilt
	Autonomy (-)	
	Aggression (-)	
	Abasement (+)	
	Deference (+)	
	Dominance (-)	
T3	Nurturance (+)	Socialization-Change
	Affiliation (+)	
	Heterosexuality (+)	
	Change (+)	

Results of these studies indicate that blacks do participate in activities which were traditionally considered for whites only.

B. Correlations

For the North Carolina data a Canonical Correlation Analysis was made, in addition to clustering, to determine if a relationship existed between the two variable sets -- activity clusters and trait cluster. Analysis shows all of the activity clusters except one (A4) to be significantly correlated with the set of trait variables at the .01 level. These correlations are the major contribution of this paper to outdoor recreation trend researchers.

A1 Nature-Pleasure. The "Nature-Pleasure" oriented activities (A1) are most participated in by individuals scoring high in the "Socialization-Change" cluster (T3). These activities are enjoyed by both sexes. The point is that the desire for social contact within an outdoor setting seems to be the primary motivation for activity, rather than participation in an object-oriented skill. Lack of structure and competitiveness characterizes both the activities and the users. Lack of participation on the part of individuals scoring high in T2 is somewhat surprising, in that activities such as sightseeing, walking for pleasure, and nature walks can be isolated experiences. Perhaps the crowding effect of users upon resources has paid its toll on the participation level of introverted users. Then again, perhaps the "Subordination-Guilt" oriented individual has never been a participant.

A2 Social Sports. Participants in "Social Sports" (A2) demonstrate the same trait orientation as participants in A1. Competition is more of a factor in A2, but the socializing characteristic is still evident. Once again, introverted individuals do not participate in social sports. The lack of any correlation with extroverted individuals suggests that participation by these individuals is neither significantly present nor absent. The popularity of activities enjoyed by both sexes is of growing importance. Perhaps the current drive for "equality" is evident in the correlation of these activities and the related needs.

A3 Predator Sports. The more dominant and aggressive traits evidenced in T1 were significantly correlated to A3. This supports Moss' contention that hunters and fishermen are more traditional, dogmatic, and rigid. The "predator-prey" or "lording over" motivation is apparent in this correlation. Quite naturally, then, the negative effect of T2 and A3 is evident. Perhaps it can be concluded that these more rigid individuals do not appreciate the intrusion of other people.

A4 Nature Conqueror/Horses. The relationship between A4 and the set of trait variables was not significant at the .01 level, but in the step-wise analysis it was noted that "Subordination-Guilt" oriented individuals tended not to participate in primitive camping, hiking (with packs), and horseback riding.

A5 Bike/Concerts. Specific personality traits positively correlated with A5 were not obvious, though a negative correlation with T2 was reported. It was thus assumed that the introverted "Subordination-Guilt" oriented persons did not participate in faddish activi-

ties such as bicycling, motor bike riding, and outdoor concerts (perhaps "Rock Festivals"). The lack of a specific, positive identity of individuals participating in these activities may be due to the faddishness of the activities.

A6 Water Oriented. Water oriented activities were most participated in by those scoring high in T3 and least participated in by those scoring high in T2. Once again it becomes apparent that the introverted "Subordination-Guilt" oriented individual is not active in outdoor activities. The question of reaching these individuals is pertinent to recreology. Participation in water activities (other than fishing) seemed to be mostly inspired by the social contact involved rather than the goal of individual accomplishment. Most certainly, competition in water activities is important, but to the leisure resource planner it is not a dominant factor.

A7 Winter Sports. The correlation of all trait clusters to winter sports indicates that these activities are somehow both competitive and socializing in nature. Perhaps more detailed study concentrated on outdoor winter activities would yield a more precise measurement of activity-trait correlations.

Overview, A1-A7. An overall view of the relationship of personality traits or needs to outdoor leisure activities seemed to indicate a strong socializing motivation in most activities. Introverted personalities have little opportunity for involvement. It is becoming increasingly likely that aggressive, goal-oriented, dogmatic individuals are being crowded in their participation and forced to compromise in their activity.

IMPLICATIONS

Perhaps by now some of the practical implications of this type of research are apparent. Personality traits and activity clusters are the real units of measure of outdoor recreation. If we are to be successful in providing the best possible outdoor recreation experiences to the public, we must understand (1) which activities are similar and dissimilar, and (2) what users are actually getting out of their recreation. It is not enough to simply offer "picnicking" and count the users.

How do we use the information? Perhaps we will conclude that several related activities should be offered at the same recreation area -- cater to a given kind of user. Results suggest that some activities -- actually users -- need to be insulated from others; it is likely that where dissimilar activities are juxtaposed, a lessened recreation experience

occurs by a sort of conflict which has not been apparent. Alternately, perhaps we will want to be dollar efficient, and not offer duplicative activities. Or perhaps we should spread like activities at several locations to give users a variety of settings from which to choose for recreation. Maybe we can save money by providing an activity that costs less but meets the desired need.

Once we know what "rewards" people are seeking, managers can not only respond to current users but also to persons who are not currently recreating because what they need is not available. Planners can devise recreation settings and perhaps facilities and activities that deliver desired rewards, i.e. respond to groups with known personality traits. They can devise, emphasize, and perhaps even create improved products.

However, we make no claims at this point about whether people are consistent in what rewards they seek, or whether they seek different experiences at different stages in their life, or even from day to day. Neither do we know the effect of one member in a group on others. Do a group of teenagers exhibit needs that are the average of member's individual needs, or is a range needed at a recreation site? Does a family have a complex set of requirements, and does that set of requirements depend on which members are present, or their age, and so forth? Clearly, there are many things we do not know.

This research offers a "window" to greater understanding. Through it we can learn to respond better to our publics. Through it we can more efficiently plan, acquire, develop and even maintain and operate our outdoor recreation areas. Four problems must be overcome to "enlarge the window". First, more research of this sort needs to be conducted to expand, clarify and confirm findings. Second, we must learn how to apply this new knowledge throughout all aspects of outdoor recreation management. Third, how will this information be disseminated; how will we get recreation management to accept and apply these findings. Fourth, and finally, is there an ethical problem: does broad collection of this kind of information involve invasion of privacy? Beyond that, does it put us in a position of having power over our constituents -- of molding and shaping them to be what the managers or agency or firm wants. Let us hope these problems can be overcome.

TABLE 7
Relationship Between Activity
Clusters and Trait Clusters

Activity Clusters	Trait Clusters
A1 Nature-Pleasure	T3 Socialization-Change
A2 Social Sports	T3 Socialization-Change
A3 Predator Sports	T1 Leadership-Organization
A4 Nature/Conqueror-Horses (-)	T2 Subordination-Guilt
A5 Bike-Concerts (-)	T2 Subordination-Guilt
A6 Water-Orientation	T2 Subordination-Guilt
A7 Winter Sports	T1 Leadership-Organization
	T2 Subordination-Guilt
	T3 Socialization-Change

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AUTOMATIC, TIME-INTERVAL TRAFFIC COUNTS FOR

RECREATION AREA MANAGEMENT PLANNING¹

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Abstract.—Automatic, time-interval recorders were used to count directional vehicular traffic on a multiple entry/exit road network in the Red River Gorge Geological Area, Daniel Boone National Forest. Hourly counts of entering and exiting traffic differed according to recorder location, but an aggregated distribution showed a delayed peak in exiting traffic thought to be typical of recreation areas. The proportions of hourly entering and exiting traffic and weekend and weekday traffic varied among locations. An exceptionally high weekend use was related to occurrence of the autumn color season. Subsequently, there was a general down-trend in weekend use. Implications of traffic data for the allocation of resources to information, interpretation, and enforcement programs in the Red River Gorge area are discussed.

INTRODUCTION

Traffic counts have been used as an indicator variable for recreation use estimation in forest lands and developed recreation sites (James 1971). With few exceptions, axle counts, as opposed to vehicle counts, have been used as the indicator variable in regression models. Typically, recorders are placed on two-way, single-entry roads leading to developed or dispersed recreation areas. Usually, traffic re-

corders must be hand-read at selected time intervals by field personnel. This paper reports the use of dual-input, time-interval recorders to record hourly and daily variations in traffic flow in forest areas with multiple entry/exit points. These recorders were used in a recreation use estimation study on the Red River Gorge Geological Area on the Daniel Boone National Forest.

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Data on time variation in traffic counts have implications for the development of recreation area management plans. Recreation

planning can be viewed as a production process where management and site resources and human use are managed to produce recreation experiences and ultimately, human benefits (Driver and Brown 1975). It is important to know the total amount and the hourly and daily patterns of recreation use because of their impact on recreation experiences, the resource base, and management loading. Heavy amounts of recreation use can cause displacement of dissatisfied users in both time and space. It can also increase the probability of traffic accidents, forest fires, user conflicts, and unacceptable public behavior, as well as resource impacts such as trail and campground deterioration. Information about the distribution of recreation use is important for assigning of personnel and other management resources to road and trail patrols, interpretive activities, maintenance work loads, requests for traffic control, and justification for requests for personnel overtime. All of these are management activities which can contribute directly to enhancing recreational experiences.

METHODS

In the summer of 1979, a recreation use study was initiated in the Red River Gorge Geological Area. The Gorge is a 25,750 acre area located in the Stanton District of the Daniel Boone National Forest. Dual-input traffic recorders were located at six locations along roads near the Gorge boundary (Fig. 1). These locations are Pine Ridge, Koomer Ridge, Tunnel Ridge Road, Nada Tunnel, Road 23, and CCC Camp. At each site, inductive loops were installed to record directional traffic, and recorders were set to print and punch traffic counts at 15-minute intervals during the 4-month study period, August 1 to December 7, 1979. Data were punched onto 8-channel paper tape and translated to computer cards. Data were aggregated into hourly and daily counts and plotted.

RESULTS

Although recorders were installed at six locations, the traffic data for two locations--Koomer Ridge and Tunnel Ridge--were excluded from data analysis. These recorders were located on single-entry roads where vehicles entered and exited the same point. These data have no effect on the total traffic load of the multiple entry/exit road network.

Graphs of the number of vehicles plotted in relation to hour of the day provide information on hourly patterns of vehicular traffic at specific locations in the Gorge area. Pine Ridge, located near the Mountain Parkway, appears to be more important as an exit point for vehicular travel (Figure 2). More vehicles

are exiting than entering at this point. There are approximately equal amounts of traffic entering and exiting this point until about 2 p.m. when exiting traffic begins to exceed entering traffic. Exiting traffic peaks at 4 p.m. Also characteristic of this point is the high volume of exiting traffic occurring in a narrow time span and a lower volume of entering traffic in a wider time span.

In contrast to Pine Ridge, Nada Tunnel has more entering than exiting traffic (Figure 3). The curve of the entering traffic reaches its summit at 4 p.m. and then declines rapidly. Compared with this curve, the exiting traffic curve climbs at a slower rate. It reaches the highest point about 4 p.m. and then follows a gentle decline until 6 p.m. Thereafter, the curve drops rapidly similar to the entering traffic curve. We suspect that most of the vehicles that depart between 2 and 8 p.m. are day users of the Gorge area.

In comparison with Pine Ridge and Nada Tunnel, CCC Camp has a different traffic pattern. There are about equal amounts of entering and exiting traffic at all hours of the day (Figure 4). These curves depict traffic patterns revealing heavy local use.

To obtain an understanding of hourly traffic for the entire gorge area, data were aggregated for Pine Ridge, Nada Tunnel, CCC Camp, and Road 23 and then plotted (Figure 5). There is a more rapid increase in the entering than exiting traffic until about 2 p.m. At that time, the rate of exiting traffic begins to accelerate. Note, again, the delay in the peaking of exiting in relation to entering traffic. While we recognize that some residential traffic is included in this plot, we believe that it is typical for a multiple entry/exit forest area such as the Red River Gorge area.

Figure 6 shows the entering traffic for Pine Ridge and CCC Camp throughout the study period. At Pine Ridge, there was a great deal of difference between weekends and weekdays which suggests heavier recreational traffic entering this point in comparison to local residential traffic. CCC Camp, on the other hand, does not show such variation in weekday to weekend traffic suggesting proportionately more residential/commercial traffic.

Figure 7 shows the incoming and exiting traffic for the aggregate of Pine Ridge, Nada Tunnel, Road 23, and CCC Camp. Note the differences between weekend and weekday traffic. Weekend traffic is much heavier than weekday traffic which is not surprising. Many studies have reported such variations in traffic patterns at recreation use areas--and researchers

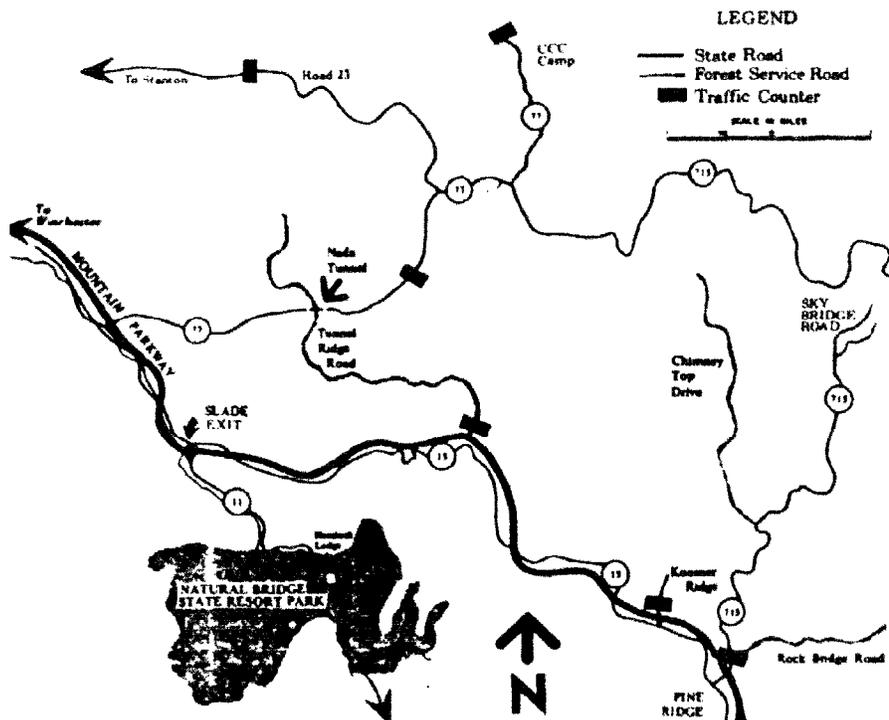


Figure 1. Locations of six dual-input traffic recorders near Gorge boundary.

have used these data to stratify the sample in recreation use studies.

Note also that some of the weekend days have considerably larger volumes of traffic. The highest one is a weekend of peak fall color. Another weekend is a holiday, labor day weekend. In Figure 7, there appears to be a downward trend in traffic after the peak fall color weekend. Although there is some variation from weekend to weekend, this variation suggests that traffic levels may be related to local weather. Hendee et. al. (1976) reported that low levels of use were associated with adverse weather.

IMPLICATIONS

This study reports daily and hourly fluctuations in traffic counts in the Red River Gorge area. To make suggestions about the implications for recreation management planning

requires three assumptions. First, there are small variations in the proportion of recreational traffic within weekend and weekday strata. To the extent that there is variation, traffic patterns will not be valid indicators of volumes of recreational traffic in the Gorge area. A second assumption is that that proportion of recreation traffic does not vary significantly at each traffic counter location over a short period of time. A third assumption is that accurate directional traffic counts can be made. Our calculations show a traffic count error of 3 percent per site per day. We believe that the major cause of this counting error was not a malfunction of traffic recorders, but rather a double count, one for each direction, resulting from vehicles traveling down the center of the road. A procedure for eliminating directional traffic counting error has been developed (Erickson, in press).

The data presented above have a number of

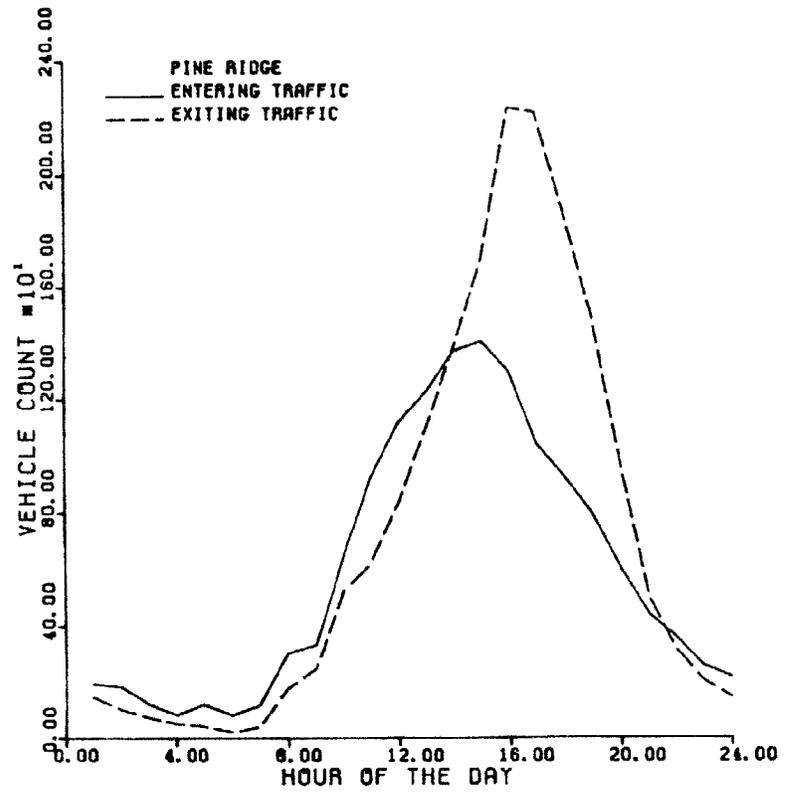


Figure 2.--Hourly entering and exiting vehicular traffic between August 1 and December 2, 1979 at Pine Ridge.

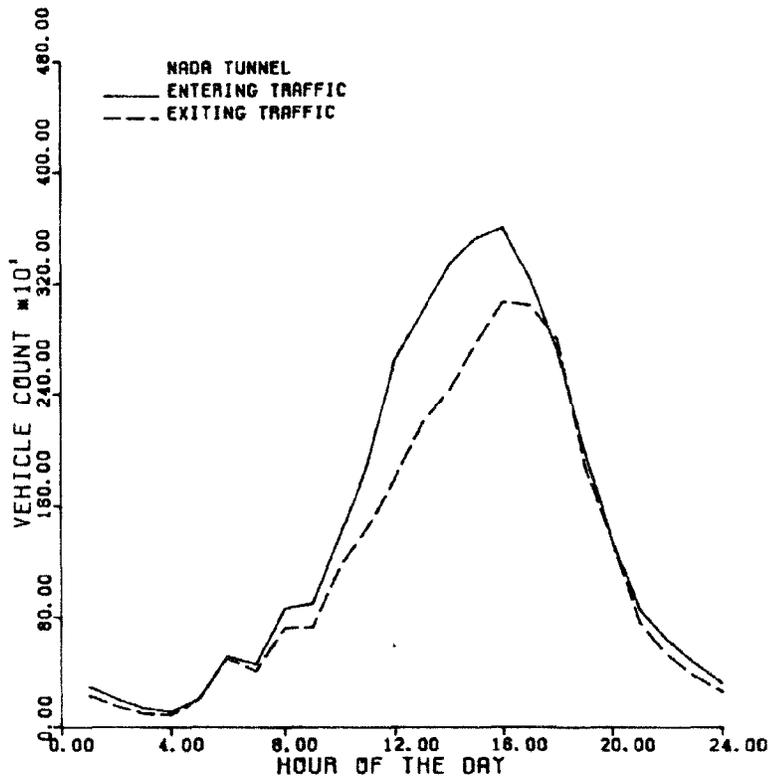


Figure 3.--Hourly entering and exiting vehicular traffic between August 1 and December 2, 1979 at Nada Tunnel.

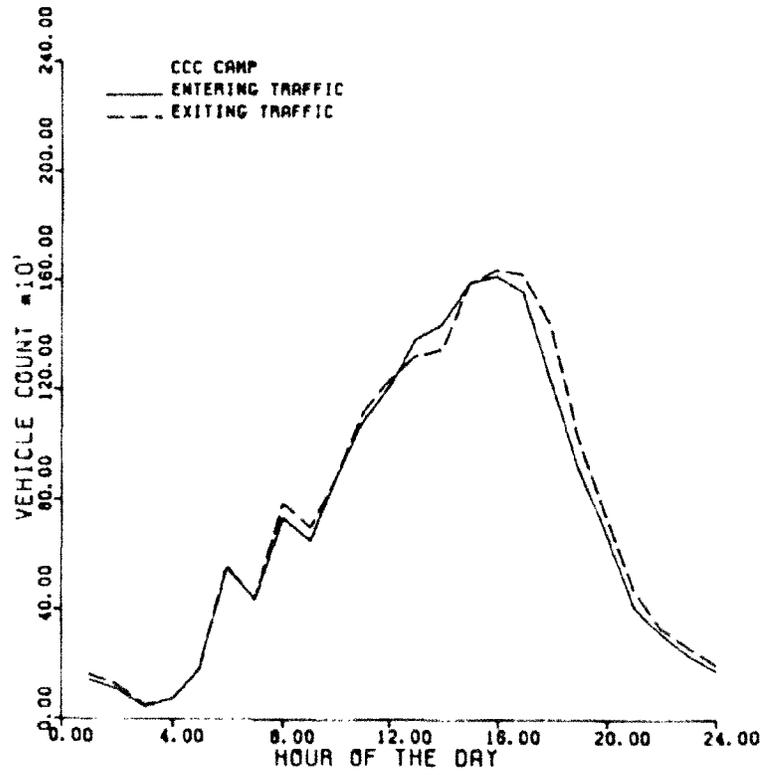


Figure 4.--Hourly entering and exiting vehicular traffic between August 1 and December 2, 1979 at CCC Camp.

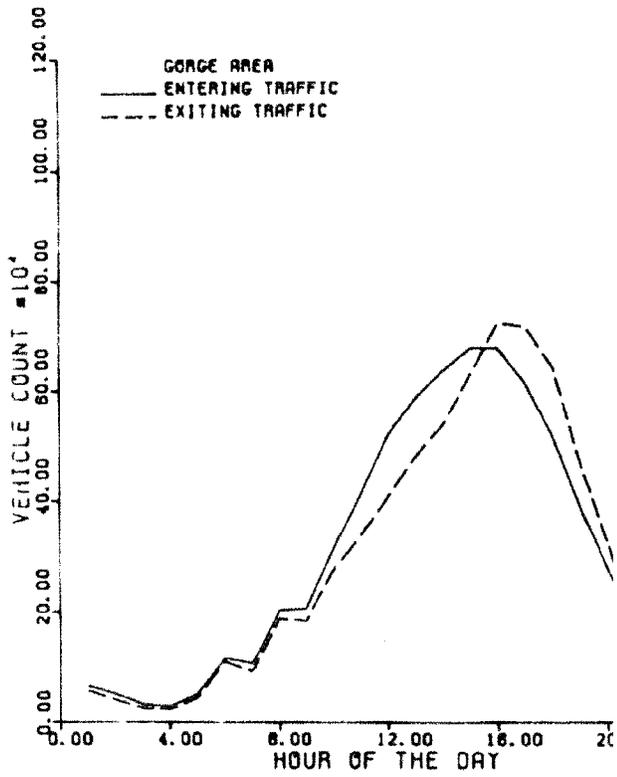


Figure 5.--Aggregated hourly entering and exiting vehicular August 1 and December 2, 1979 for four locations Gorge Area.

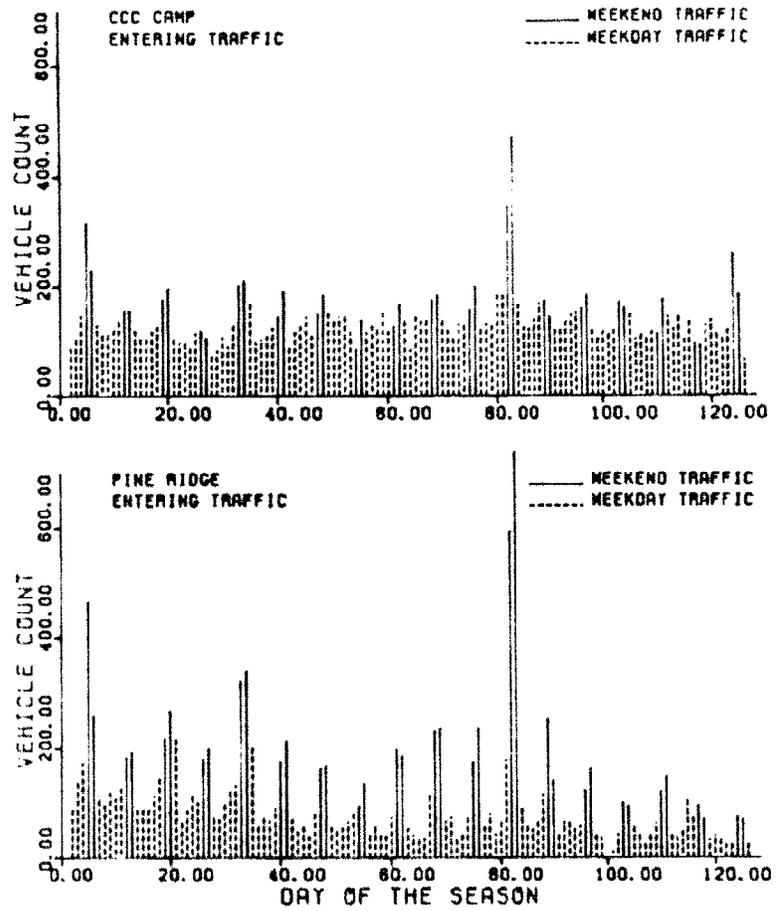


Figure 6.--Daily distribution of entering vehicular traffic between August 1 and December 2, 1979 at two Red River Gorge entry points.

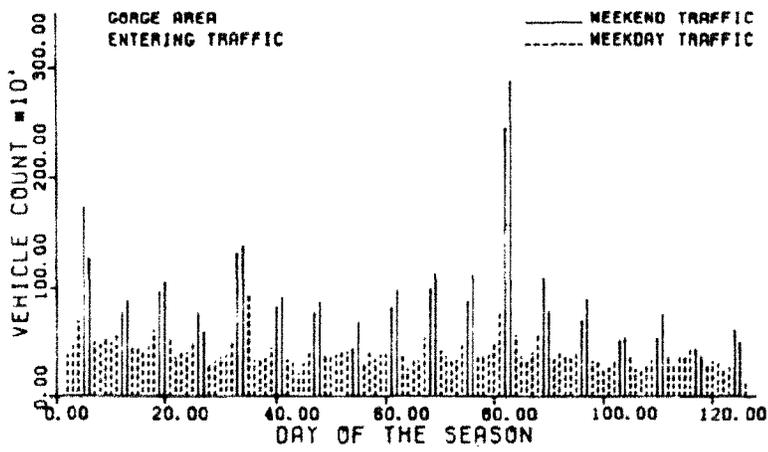
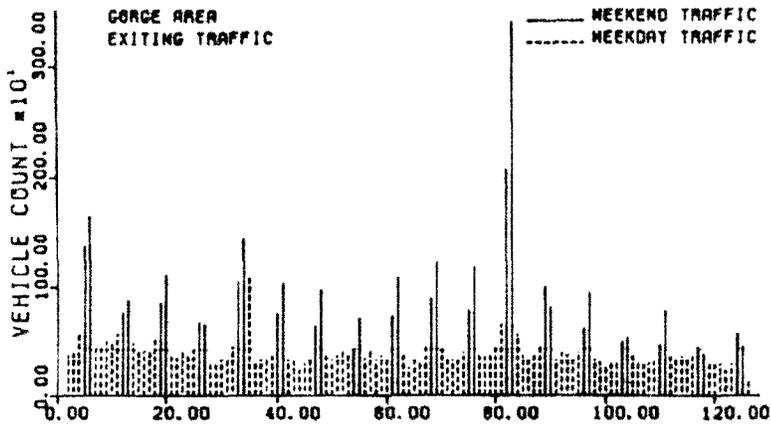


Figure 7.--Aggregated daily entering and exiting vehicular traffic between August 1 and December 2, 1979, for four locations in the Red River Gorge Area.

implications for recreation management planning. Our data suggest that certain roads are used more heavily as entry points into the Gorge area, e.g., Nada Tunnel, while others are used more heavily as exit points, e.g., Pine Ridge. Based on comments received during the study period, people are not knowledgeable about the kinds of recreational opportunities in the Gorge area, and are not informed about the geological significance of it. Given the heavier entering traffic at Nada Tunnel, it would be effective to locate information/interpretive media at this location. On weekends, it may be desirable to locate staff to both control traffic at the Tunnel and to hand out a brochure for a self-guided auto tour (Sharpe, 1976) or for stimulating use dispersal away from crowded sites. Nada Tunnel is a single vehicle passage through the mountain. As a result, traffic is slowed down considerably, particularly on weekends.

Pine Ridge had more exiting than entering traffic. At this point, it may be appropriate to locate a departure sign. In addition, it also might be desirable to locate a deposit box where people could place their suggestions for improving the area.

The greatest need for road or trail patrols would appear to be from 10 a.m. to 4 p.m. since most of the traffic is either entering or exiting from the Gorge area. After 4 p.m., entering and exiting traffic decreases at a rapid rate. This would appear to be an appropriate time to contact campers to see if they have problems. This might also be an appropriate time to conduct an interpretive program.

Many of the vandalistic acts that occur in forest areas occur at night, and traffic counts may be an indicator of these acts--even recorders are subject to tampering. Examination of traffic records for days and nights when vandalism has occurred may help identify most likely times of occurrence and from where those committing the vandalistic acts may have entered the system.

From a management planning standpoint, it is necessary to have a firm rationale for allocating management personnel and other resources. Obviously traffic in the Gorge area is higher on weekends, suggesting that more personnel should be allocated to these days. But among weekends, use is highly variable and the specific number of personnel needed must be decided on the basis of expected visitor load. An examination of vehicular loading for one year should be useful for determining personnel needs for specific weekends and other periods for several succeeding years. For weekends that are known to have high use levels, such as holidays or weekends at the peak of the

fall color season, additional temporary personnel might be hired or reassigned to assist in visitor management including interpretation and enforcement.

Traffic counts such as recorded during 1979 for the Red River Gorge Area should have use for area management planning for a few years after the study period. Perhaps equally important, however, are insights that might be gained by 3- to 4-year repeat measures of traffic periodicity and patterns. Noticeable changes in either hourly or daily pattern of use could indicate evolving changes in these patterns or in the type of users. Forest recreation management is greatly in need of such indicators of change so that evolution of use patterns can be detected rapidly.

In summary, hourly, daily and seasonal traffic flow records seem to be useful management and program scheduling tools. There is much we do not know about interpreting traffic flows, but further research and management application should teach us a great deal.

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CROSS-COUNTRY SKIING TREND DATA: PLANNING FOR PARTICIPANT NEEDS¹

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As societal and economic pressures mold and alter patterns of human behavior, the outdoor recreation planner gazes into the millage of "trend data" developed to simplify his planning efforts and

Planning without empirical data on which to base sound decisions or solutions is somewhat akin to skydiving with a businessman's umbrella -- things go well until that final moment of truth when responsiveness to need must be evaluated. Planning for cross-country skiing has not enjoyed the security of a strong research base and only recently has there begun to emerge a somewhat accurate picture of the needs being expressed by the participants in this very rapidly growing winter activity. Where are the data coming from and are some data better than others? Do we hang our planner's hats on the economic approaches suggested by Katth (1980), the behavioral tact taken by Driver and Knopf (1977), the "opportunity spectrum" analysis of Ballman (1980), the social/psychological experience attribute studies by Haas, Driver and Brown (1980), or is it possible to simply reach into each process and extract those insights which can improve the planner's ability to eclectically synergize solutions to management problems?

In a recent Michigan study (Stynes 1980), interrelationships between winter recreation activities were explored in order to extract data which could be used in planning and forecasting management and user needs peculiar to winter recreation. Studies such as this can help facilitate a greater use of existing data from multiple sources rather than reinventing the wheel everytime new information

is needed. Available data which suggest that people participate in a particular activity in a particular setting or circumstance because they expect to harvest a particular value or realize a particular and predictable recreation experience (Driver and Brown 1980), further suggest an almost mandatory analysis of multiple discipline research concepts as well as data. Such analysis will help bring trend data into focus for application to planning and management problems.

Some of the more promising research being done touches upon the imagery of certain activities and the motivational effects of common and unique images. The data of the USDA, Forest Service (1980) study of "Growth Potential of the Skier Market..." seem to add support to research conducted in the State of Maine over the past few winters. In particular, the concept of "psychological" (equates with the "experience opportunities" proposed by Driver and Tocher 1970, Hendee 1974, and Brown, et.al. 1979) is derived from specific imagery extracted through data analysis of the Maine studies (Newby and Lilley 1978, 1980; Newby and Warner 1980). It is hypothesized that much of the motivation for participation in a particular recreation activity is derived from the "images" held of that activity. This also ties in with the "experience opportunities" concept previously mentioned, but perhaps the more important aspect is that adopting the specific activity image becomes a stronger motivation than the actual participation in the activity. The attempts of the individual to adopt a specific activity image with its predictable behavior should serve as indicators of trends which can aid planners and managers in meeting participant needs.

The process of defining indicators of trends in such outdoor recreation activities as alpine skiing, nordic skiing and snow-

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mobiling involves analyzing participation data and shifts in use patterns over time. Research conducted on these activities across the United States is producing the kinds of data needed to define trends which in turn are useful to planners and managers in both public and private sectors of winter recreation management.

Trend Data For What?

To illustrate the kinds of trend data that might be useful to management, a study of cross-country skiers in Maine was conducted over a three year period. The last winter (1976-77) studied in depth provided some rather detailed data on use, preferences, and behavioral variations among cross-country skiers (a sample of 1042 skiers was obtained by questionnaire). Although only a small part of the data will be presented here, several interesting insights were developed concerning the cross-country skier.

The principal trend data to be addressed will deal first of all with cross-country skier use patterns, followed by some interactions with downhill skiing, and lastly with some trend relationship between the cross-country skier and snowmobiling. This data is presented primarily to show how trend data can be of assistance to management rather than to present it as a methodological analysis. Another methodology study is just too much of a temptation to become totally immersed in what LaPage (1971) once referred to as "research fogweed".

Cross-Country Skiing Use Trends in Maine

One measure of trends in an activity is the extent to which individuals participate or vary participation during the week and from year to year. Looking at Maine skiers we found that during the 1976-1977 cross-country skiing season, 77.4 percent of the questionnaire respondents skied on weekends and they averaged 14.1 days (Median = 12 days) of participation (Table 1). Interestingly,

TABLE 1: Days of Cross-Country Participation on Weekends (Maximum = 39 days)

Number of Days	Percent of Respondents
1-5	18.0
6-10	31.2
11-15	15.3
16-20	19.0
21-25	5.2
26-30	6.5
>30	4.8
	100.0

on weekdays, 60.6 percent of the respondents skied and they averaged 21.5 days (median = 15 days) of cross-country skiing (Table 2). These skiers averaged 2.6 hours of skiing on weekdays whereas the weekend skiers averaged 4.2 hours.

TABLE 2: Days of Cross-Country Participation on Weekdays (Maximum = 82 days)

Number of Days	Percent of Respondents
1-5	18.6
6-10	21.2
11-15	13.2
16-20	13.9
21-25	6.0
26-30	6.5
31-35	3.3
36-40	3.2
41-45	1.6
46-50	3.6
51-55	0.5
56-60	3.0
>60	5.4
	100.0

These data suggest that use patterns for cross-country skiing are somewhat different than those of downhill skiing, e.g., cross-country skiing is better distributed throughout the week, therefore, weekend peaking may be less of a problem to management.

Looking at some additional trends might also provide the manager with added insights for planning use and opportunity management. For instance, the changes in the amount of skiing from year to year has significance and demonstrates some definite trends. Among the cross-country skiers from the sample population who had skied before 1976-1977 (n=641), 55.9 percent said they skied more in 1976-1977 than previous winters, 30.6 percent said they skied the same amount, and 13.6 percent stated that they skied less (Table 3).

TABLE 3: Number of Days of Participation by Comparison with Previous Use Patterns

Current vs. Previous Use	Median Number of Weekdays	Median Number of Weekend Days
Less	10	10
More	15	15
Same	15	14

Those who now ski more and those who ski the same amount as in previous years are essentially the same whereas, those who ski less do so by about 33% fewer days. Interest-

ingly, those who were skiing less were younger and generally single (Table 4). Questions about future participation showed that more than two-thirds (68.1%) of the respondents planned to increase their next year's cross-country skiing participation over that of their 1976-1977 activity levels. Approximately

TABLE 4: Age and Marital Status of Skiers by Use Comparisons

Current vs. Previous Use	Median Age Groups	Percent Single
Less	20-24	83.3
More	30-34	38.5
Same	30-34	32.2

thirty percent planned to continue their present level of activity and only a little over two percent planned to reduce their number of skiing occasions.

If we look at the reasons for plans to ski more or less compared to the 1976-1977 levels, we see that new or increased interest accounted for the shift to more skiing, whereas, those who planned to ski less gave changed or changing opportunities as the principal reason (Table 5). These same basic reasons were given for current shifts in activity levels. Seasonal snow conditions

TABLE 5: Percentage of Respondents Indicating Specific Reasons for Planning to Cross-Country Ski More or Less

Reason for Change	% Indications Less Participation (n=22)	% Indications More Participation (n=685)
Changing Opportunities	50.0	37.3
Changing Interest or Attitude	31.8	46.8
Changed Skiing Conditions	22.7	11.3
Social Interactions	----	13.1
Other Reasons	9.1	11.1

(too little snow, poor due to warm weather, more snow, etc.) usually accounted for considerable temporary shifts and were not really a part of definable trends.

Another trend, which was noted in use patterns, surfaced as years of participation in cross-country skiing were compared with future involvement. For example, more than seventy-five percent of the respondents who had skied for more than a year planned to increase their participation in subsequent years,

at least during the early years of involvement, after which use levels tended to level off. Most changes in activity levels or frequency were most dynamic in the participation years, 2 to 5, and more particularly with regard to those who had cross-country skied for three years. Within this group, 36.7 percent planned to increase their cross-country skiing activity in subsequent years. The median years of involvement for those planning to ski less was four years, five years for those planning to ski the same amount, and four years for those planning to ski more.

Availability of opportunity is a principal motivator for change in activity levels and a variable often expressed was that of proximity to skiing opportunities.

Travel Distance Trends in Cross-Country Skiing

One of the major differences between the behavior of the cross-country skier and the downhill skier has to do with the opportunity to participate. Within this variable, the distance a skier must go to participate in his chosen winter recreation activity becomes a significant element. Many cross-country skiers state they have greater opportunity to participate because they don't have to travel very far to find a suitable area for skiing. In 1976-1977, study respondents traveled a median distance on weekdays of 1-5 miles and 6-10 miles on weekend days (Table 6). The median longest trip taken by cross-country skiers to an area for skiing was 41-60 miles.

For 64.3 percent of the respondents who had skied before 1976-1977, the areas where they skied in 1976-1977 were the same distance as previous years. (Table 7). For those who traveled closer to home, the median longest trip was between 41 and 60 miles; those who traveled further from home went from 81 to 100 miles; and the median distance traveled by those having the same travel patterns, was from 41 to 60 miles (Table 8). The comparisons of distance traveled by longest skiing trips taken, weekday travel, and weekend travel with those who declared that they had skied closer, further, or the same distance from home also provide some insight into behavioral trends (Table 9). In most instances, the cross-country skier is either skiing closer to home or at least is not going further away to ski. The high percentages of individuals who ski within a relatively close distance to home regardless of the shifts in their declared travel distances, perhaps would suggest that planners and managers should consider both proximity and basic motivations as prime criteria in evaluating what and where opportunities should be provided.

Although shifts in the distance traveled

TABLE 6: Travel Distance (one way) on Weekdays, Weekends, and Longest Trip

Miles	Longest Trip (%)	Average Weekend Travel Distance	Average Weekday Travel Distance
Less than 1	6.5	18.4	39.9
1-5	10.9	23.5	38.8
6-10	11.1	18.6	11.7
11-20	9.5	10.1	4.7
21-40	8.1	6.8	2.1
41-60	7.4	6.1	(over 40) 2.8
61-80	8.3	4.9	100.0
81-100	8.6	2.9	
101-125	6.5	2.7	
126-150	5.9 (over 125)	5.8	
151-175	3.0	100.0	
176-200	1.7		
201-300	6.4		
>300	3.9		
	100.0		

TABLE 7: Travel Distance for Cross-Country Skiing in 1976-1977 Compared to Previous Winters

Relative Distance Traveled	% of Respondents (n=626)
Closer to Home	13.7
Further from Home	22.0
Same Distance from Home	64.3

TABLE 8: Travel Distances (one way) by Percent of Skiers for Relative Travel Patterns on Weekdays, Weekends, and Longest Trip Taken.

Travel Distance (Miles)	Percent of Respondents								
	Weekday Travel			Weekend Travel			Longest Trip		
	Closer	Further	Same	Closer	Further	Same	Closer	Further	Same
less than 1	41.1	45.6	10.7	23.8	10.7	19.9	5.2	2.9	6.5
1-5	18.8	12.2	19.9	26.2	22.0	22.9	9.4	3.6	10.6
6-10	10.6	8.7	12.1	23.8	16.7	19.9	8.2	9.5	12.6
11-20	4.5	6.8	3.8	6.0	10.6	9.0	10.6	4.4	10.6
21-40	---	1.9	2.8	7.1	9.8	6.6	11.8	5.1	8.1
41-60 (over 40)	3.0	4.8	1.5	3.6	7.6	6.9	11.8	6.6	8.1
61-80	---	---	---	3.6	6.1	5.3	8.2	10.9	8.1
81-100	---	---	---	---	3.8	2.4	5.9	11.7	7.8
101-125	---	---	---	1.2	3.0	2.4	1.2	11.7	6.8
over -125	---	---	---	4.7	9.8	4.7	27.0	13.6	20.6
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 9: Skiing Activity Comparisons After Taking Up Cross-Country Skiing.

Amount of Downhill Skiing	% of Respondents Who Downhill & Cross-Country Ski
More	10.3
Same	23.8
Less	65.9

by the cross-country skier are interesting, some of the other trends seem to provide deeper insight concerning the participants in this activity. The relationships between downhill skiing, snowmobiling, and cross-country skiing are but a few of interactive trends which have been studied.

Downhill and Cross-Country Skiing Relationship Trends

In the Maine study, 74.9 percent of the cross-country skiers had participated in downhill skiing. Of these, 65.9 percent indicated that they had reduced their level of participation in downhill skiing since taking up cross-country skiing (Table 9). The reasons given for downhill skiing less were numerous and varied but high costs, crowding, and changed opportunity (time and facility proximity) were dominant (Newby and Lilley 1980). Among those who downhill ski less after taking up cross-country skiing, the high expenses of downhill skiing was indicated as a reason by 57.2 percent of the respondents. Additional reasons for the shifts in activity are given in Table 10.

TABLE 10: Principal Reasons for Decisions to Downhill Ski Less.

Reasons	% of Those Skiing Less
Downhill Expensive; X-C Cheaper	57.2
Cross-Country Skiing Less Crowded	27.2
Prefer Cross-Country Skiing	25.9
Downhill Skiing less Available	18.5
Cross-Country Safer & Within Abilities	13.4
Cross-Country More Available	11.7
Cross-Country Provides More Exercise	7.0
Dislike Downhill Social Atmosphere	6.0
Cross-Country Quieter	6.0
Dislike Downhill Skiing	5.4
Family & Friends Can Participate Better in X-C	4.3
Reason Not Related to Cross-Country	3.7
Other	8.6

For shifts in activity wherein those who had taken up cross-country but were downhill skiing more, the two principal reasons given were first, increased availability of downhill skiing opportunities (28.8% of participants) and secondly, an expressed preference for the downhill sport (23.8% of participants). Respondents who now downhill ski more expressed reasons which were less specific but do show similar kinds of criteria (Table 11).

TABLE 11: Principal Reasons for Decisions to Downhill Ski More.

Reasons	% of Those Skiing More (n=80)
Downhill Skiing More Available (Time, Proximity, etc.)	28.8
Prefer Downhill Skiing	23.8
Family Can Downhill Ski Also	3.8
Not Related to Cross-Country	5.0
Downhill More Exercise	2.5
Other	13.8

Research conducted by others has suggested that perceived high costs, crowding, and relative opportunity to participate are common concerns which shape the trends of winter recreation activities (Haas, et al. 1980; Smith 1980; USDA, Forest Service 1980; Stynes 1980). There are sufficiently large enough numbers of individuals who both downhill and cross-country ski to warrant further analysis of the interactions in order that the concepts such as the opportunity spectrum concepts proposed by Driver and Brown (1978) might become applicable in day-to-day resource management. Trend data analysis and responsive flexible management programming can be achieved to more fully satisfy participant needs.

Participation in winter recreation activities is really more broadly based than many resource managers care to admit. They also tend to dislike accepting the fact that there are many "shared" elements of winter recreation activities but perhaps more importantly they tend to dismiss the oftentimes small incompatibilities which mean the difference between an "experience" and a "quality experience". Cross-country skiers and snowmobile users are often thrown into the same area to "experience" their individual activities, but can this be done? Are the experience differences great or are they relatively miniscule yet extremely critical to need satisfaction? Trend data produce some insights which are important to both user and resource manager, particularly when confronted with such seemingly incompatible activities as cross-country skiing and snow-

mobiling.

**Cross-Country Skiing and Snowmobiling
Interaction Trends**

Of all the winter recreation activity combinations possible, cross-country skiing and snowmobiling seem to be the most polarized. Perhaps a look at some basic data may verify or refute this concept. In the Maine study of cross-country skiers, 34.8 percent of the respondents had either borrowed, owned, and/or rented a snowmobile during the 1976-1977 winter season (Table 12).

TABLE 12: Percentages of Respondents Sub-sample (n=363) who Borrowed, Owned, or Rented a Snowmobile.

Use Status	% of Respondents
Borrowed	27.4
Owned	16.0
Rented	2.5

Of those who had used a snowmobile (n=363), 72.7 percent indicated they used the snowmobile less often after they began cross-country skiing (Table 13). Interestingly, those who continued to snowmobile, generally tended to assume the role and perceived imagery of the activity in which they were participating. Where perceived conflicts surfaced, the cross-country skier (who may also snowmobile) tended to be more intolerant during participation, i.e., this individual might almost seem to be Dr. Jeckyl and Mr. Hyde, depending on which role or image he was currently adopting.

TABLE 13: Snowmobiling Activity (Percent) of Respondents After Taking Up Cross-Country Skiing.

Activity Levels	All Users	Source of Snowmobile		
		Borrowed	Owned	Rented
More	4.1	5.5	3.1	5.6
The Same	23.2	23.2	25.2	33.3
Less	72.7	71.3	71.7	61.1
	100.0	100.0	100.0	100.0

Some of the primary reasons for snowmobiling less were (a) dislike for snowmobiling, (b) more interest in cross-country skiing, and (c) reduced opportunity to snowmobile (Table 14). Such concerns as noise, smell, and environmental intrusion often were heavy contributors to dislike of snowmobiling and resultant reduced participation.

TABLE 14: Reasons For Snowmobiling Less After Taking Up Cross-Country Skiing (Percent of Respondents Where n=264)

Reason	% of Respondents
Dislike Snowmobiling	36.0
More Interested in Cross-Country	27.3
Less Opportunity to Snowmobile	21.6
Dislike Associated Environmental Impact	9.8
Cross-Country Provides More Exercise	9.5
Cost of Snowmobiling	8.3
Never Developed Taste for Snowmobiling	6.4
Family and Friends Don't Participate	3.4
Other	3.8

For those individuals who snowmobiled more after taking up cross-country skiing, the major reason for doing so was the increased opportunity, however, only 15 persons of the sample population (n=1042) had actually increased their snowmobiling activity. In most instances either availability of a snowmobile or desire to fully capitalize on machine investment were motivations behind greater or increased opportunity for snowmobiling.

The principal interaction between the cross-country skier and the snowmobiler was in the area of tolerance for each other. Snowmobilers expressed no concern with sharing an area with or encountering a skier, whereas the cross-country skier had almost unanimous intolerance for encounters with snowmobilers. When a snowmobiler also skied, he adopted basically the same attitude and expressed a strong dislike for what Newby and Warner (1980) described as the "crude bullies of field and forest". The intricacies of this role adoption are interesting and suggest perhaps that trend evaluation must address what might be termed the "psychological contracts" associated with participation in each recreation activity.

IMPLICATIONS OF TREND ANALYSIS

Researchers who develop trend data and those who interpret that data frequently lose sight of a real value associated with understanding trends, i.e., the potential to satisfy human need through better management. With the complex array of opportunities in winter recreation, it is pathetic and perplexing that the research being done has no common

focus -- no deliberate attempt to solve management problems or address human need. In a recent symposium, no less than fifteen papers were presented on cross-country skiing topics. Those in the audience who came seeking possible management solutions went away shaking their head, wondering why all the existing data were not analyzed and focused to help them. After all, isn't there a difference between applied research and pure research? Yet, from a research standpoint the symposium was a success, mainly because the data were broad and deep in scope, nonetheless, the interpretations were narrow and shallow. Why? To help answer the question, let's explore the issue of cross-country skiing and the application of current trend analysis.

Trend data for comparison between cross-country skiing participants on weekends versus weekdays shows that cross-country skiing is distributed throughout the week. This might eliminate the need to manage for peak periods on weekends -- or does it? We also see that weekday users ski fewer hours per day (2.6 hrs.) than weekend users (4.2 hrs.) but ski more days per season. In addition, weekday skiers ski closer to home but may double their travel distance for a weekend trip. Obviously this suggests potential marketing analysis -- but does it really tell managers what they want to know about providing opportunities and meeting needs? Quantification often provides results which are too abstract, too esoteric, too general, or too specific to be of use to managers and planners. Indeed, the researcher may prove his results to be reliable, but he may also prove them to be invalid and useless within the realms of practical assistance to the manager. Many managers are concerned about shifts... shifts from or among winter recreation activities. What are these shifts and what are the frequencies or relative permanencies of these shifts? Most changes are occurring during the active learning years of involvement with an activity, i.e., during the third to sixth years. These are the years most critical to supply/demand decisions, therefore, sensitivity to reasons or motivations to change, to adopt, to complement, or to drop an activity is of particular importance to managers.

Perhaps the image held of a recreation activity may be the best barometer to measure shifts. Think about it: what are the popular images today? What were they five years ago? Possibly, images and imagery may be more important to understand than the motivations for a particular behavior pattern. A tragic flaw in the analysis of trend data is that participant responses are often tailored to fit their image of what an activity is all about. Their participation is often a reflection only of the individual's desire to

adopt the image of the activity -- that's their motivation. Cross-country skiers may well be skiing more on weekdays than weekends because it is easier to assume the role or image on weekdays. The image (myth induced) of the cross-country skier most often articulated vocally and pictorially is that of a solitary figure etching fine lines in the unbroken snow -- an image that is new, unique, and wholesome -- an image as complex as the people adopting it (Newby and Warner 1980). Weekend use is often social interaction motivated and the antithesis of the imagery of the cross-country skier. The motivations (image adoption) are undoubtedly different and management action to satisfy motivated need must also be different.

The concept of image adoption is not new nor are the principles undefined or unsearched, however, the question might be asked, does image adoption reflect the inner self and result in behavior which is definitive in terms of image consciousness and image strength? Images may be the vehicles for various degrees of self-expression and may be tailored to counter the physical, psychological, social, and economic constraints imposed on the individual. The myths, images, and behavior associated with cross-country skiing are probably more important to understanding this winter activity than are all the long arrays of computer-generated data combined. The numerous statistical profiles available are informative and often impressive but not terribly enlightening.

When only the experience itself is analyzed, a great deal of confusion begins to surface. Are we perhaps leaving out the land resources? After all this is the setting or backdrop for the activity -- this is what the managers must also manage. A sense of identifiable "place" (having a specific image) is also a requirement in the image fulfillment. In short, the researchers should be acutely aware of the "psychological contract" that rests in the minds of the participants...the contract that is written in mental images and is either fulfilled or denied by the actual participation in the activity within a certain setting or place. Each image, each place, each psychological contract helps define how to meet the individual's needs, and these are all part of the trend analysis leading to management problem-solving.

To date, researchers have not programmed the image of a user and his resource into a computer terminal. That is not to say it won't be done before long, but it is important to remember that a land resource has definable attributes which create images in function as well as form. Users probably seek out particular resources (landscapes)

which meet the requirements that they have mentally created to meet their needs, motivations and preferences. If this sounds like a myth, that is exactly the point, because imagability is often associated with mental projections of myths and the desire to identify with those myths as part of the behavioral progression within the basic needs hierarchy.

The paradox of images and myths is that they are real; they are manufactured; they lead to stereotyping; they are associated with self-image; they create identity; and their adoption supports concepts of self. They are the foundation of the imagability of a recreation activity. Yet, we know so very little about them because our data collection and interpretations focus on quantification of users and participation patterns. The interaction of resource imagery with the myths and the images supporting a particular activity has been and perhaps will continue to be the most difficult variable for the researcher to isolate.

Perhaps this is the time to stop making the pretense that all qualities are quantifiable and those qualities which are not quantified are not important. The scientist clad in white coat and clutching his volumes of computer print-outs may have valuable information and he may prove his objectivity, but many managers don't seem too impressed these days. They still have their problems to solve. Perhaps the trend of trend data analysis should be to bring the interpretation of trends within a context of imagery, image adoption, image fulfillment and behavior profiles which affect not only the users but the managers' resources. Certainly this will require some innovative procedures for using quantified data within the more qualitative realms but the rewards may be more richly rewarding than the everpresent cry -- "MORE DATA IS NEEDED!" Much of these types of data are available for winter recreation activities. We just seem to lack the imperative needed to reach out beyond the secure bounds of quantification and cautious extrapolation. Perhaps now is the time to start a trend... a trend that synthesizes the existing quantitative and qualitative data into a net result which is capable of solving problems for resource management and human needs.

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A POSSIBLE RAILROAD ORIENTED SCENARIO IN POTOMAC RIVER BASIN PLANNING¹

George H. Siehl²

A trend may develop in which railroads become lifelines between rural and urban populations. For instance, the railroad along the Potomac River presently serves commuters from Washington's western suburbs. The railroad could be used to reclaim surface mined areas in the upper portion of the Potomac. These same lines can also open western Maryland as a recreation resource to Washington, D.C., residents. Multiple use of railroads is a trend recreationists would find beneficial.

My remarks are directed to one possible future for recreation in the Potomac River Basin, a future which would see the expanded use of the existing railroad system through the basin. The scenario is an extension of a report done for the Senate Committee on Governmental Affairs in 1979. A version of the report has been reproduced by the Congressional Research Service with permission of the Committee under the title Outdoor Recreation Consideration in River Basin Planning and Management. Copies are available upon request.

The purposes of the report were listed as:

1. To identify and review some of the new river relevant resource management and environmental programs that have been authorized since the early 1960's;
2. To show some of the changed public perceptions of river and other natural resource management approaches;
3. To discuss pertinent shifts in public sentiment toward the issues of economic growth and the role of government;
4. To anticipate the possible changes which may follow from the above considerations with regard to outdoor recreation and landscape preservation; and

¹Paper presented at the National Outdoor Recreation Trends Symposium, Durham, NH, April 20-23, 1980.

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5. To apply these considerations to a single river basin, the Potomac, and speculate on how these considerations, and perceptions might be incorporated in planning for the future of that basin.

It is to the last of these purposes that this paper is addressed.

TOMORROW'S POTOMAC

Tomorrow's Potomac--and Tomorrow's America--are not likely to be based upon recreation; neither is it likely, one hopes, that issues such as war and peace, energy supplies, or interpersonal relations will worsen to the point where life is reduced to a stark, continual struggle for survival. Recreation is not the most important matter before our elected leaders, but it is important enough to deserve consideration when issues of greater import are being decided. Within this framework, what are the prospects for recreation in the Potomac River Basin?

First, the Potomac Basin Planners could make use of any of the new approaches to resource management which have been developed elsewhere by the federal, state, or local governments or by the private sector. To the extent that these off-the-shelf approaches are not compatible with the specific circumstances of the Potomac River Basin, they can be adapted to specific needs and situations in the Potomac region.

Additionally, the abundant intellectual resources of the Potomac Basin could supply new approaches to managing the man-land interaction. These new approaches might best be directed to forging programs which deal with environmental

problems while providing recreational benefits, and to developing an energy/transportation system which allows for continuation of a broad range of recreational outlets. While these two concepts do not exhaust the possible new approaches to affording recreational opportunities in the Potomac River Basin, their implementation could do much to ensure that outdoor recreation options could be increased as needed.

Mined Land Reclamation

As an example of the kind of environmental problem which might be solved so as to provide recreational benefits as a byproduct, there is the matter of surface mining of coal in the upper portion of the Potomac Basin.

The mountainous reaches of the upper basin are generally under forest cover or in some kind of agricultural use. In this condition they provide economic returns through the harvesting of timber or agricultural products; wildlife habitat is undisturbed; a variety of recreational activities is possible; and any off-site environmental damage is minimal.

When surface mining takes place, the timber must be harvested on a one-time basis before mining begins, and the coal is recovered. These would be the economic benefits of mining. Negative factors involved in surface mining include elimination of the recreation potential; loss of wildlife habitat; and, in many cases, the beginning of serious off-site environmental damage such as siltation.

In the post mining phase, if there is no reclamation, the situation results in no economic costs to restore the contour and vegetation of the site, but places the land in condition to be used for other purposes and eliminates off-site environmental damage.

Imaginative programs for reclaiming surface mined mountainous areas could include use of the mined area by the coal cars which now return there empty.

Similarly, sludge from water treatment plants could be brought in to facilitate the process of revegetating the landscape or upgrading the soil for agricultural use.

While these actions would help to solve several environmental problems, recreation could benefit through use of the area for appropriate outdoor activities. Off-road vehicles could use a part of the area and the reclamation plan could lead to development of an area suitably contoured for downhill skiing. Restoration of vegetative cover which could provide food and shelter for wildlife could increase hunting opportunities. Creation of lakes or ponds on the previously mined lands could pro-

vide water-based recreational opportunities. In some cases, where chemistry of the water would permit, fishing might be possible as one of the recreational uses.

Experience elsewhere has shown each of these elements to be possible.^{3/} An all-out effort by private and public sectors working together might be able to try all of these programs and make them work in the region. There are, however, technical and temperamental obstacles to making such a comprehensive effort succeed.

Rails as Trails

A transportation program which could have multiple benefits accruing to the public and private sectors of the basin economy would be the development of recreation oriented railroad service to western Maryland.

The rail lines are in place and Amtrak passenger trains now travel the route passing through a number of small communities which are close to outdoor recreation centers. These include Maryland's Deep Creek Lake (which is in the Ohio Basin drainage, but this can be overlooked for purpose of discussion), Blackwater Falls and Canaan Valley State Parks in West Virginia, and a number of points on the Potomac River much used by hikers, campers, fishermen, and boaters. The Amtrak passenger trains make only a limited number of station stops along this route, and the schedule does not closely match what would be ideal for recreational users. This Amtrak route (Washington, D.C., to Cincinnati, Ohio) is one that the Department of Transportation had proposed to eliminate, but the route is to operate for about a year pending further evaluation.

Components of the program would include:

1. Use of existing or added railroad passenger trains to provide access to upper basin communities for outdoor recreationists;
2. Development of these communities to provide needed services and/or accommodations to the visitors;
3. Development of transportation systems to move visitors from the communities to specialized recreation areas;

^{3/} For instance, see the section on reclamation in U.S. Congress. Senate. Committee on Interior and Insular Affairs. The Issues Related to Surface Mining: A Summary Review, with Selected Readings. (Committee Print) Washington, U.S. Govt. Print. Off., 1971. 255 p.

4. Expansion or creation of specialized outdoor recreation areas, as needed.

In the case of downhill skiing, for instance, the program might work, as follows, during an assessment period. Skiers would leave the Washington area on a rescheduled Amtrak train at about 6:00 p.m. on Friday evening, reaching Oakland, Maryland, at about 11:00 p.m. They would be transported to their lodgings in vehicles provided by the lodge or motel at which they were to stay. (This transport could be something as simple as a contractor-owned school bus or, if the program justified it, a more elaborate motor coach.) Destinations could be the Wisp ski area near Deep Creek Lake in Maryland, or the previously mentioned Canaan Valley, West Virginia. Snowshoe ski area in West Virginia would be another possibility, although its distance from Oakland would make for a rather late arrival on the schedule being considered. Following a weekend of skiing, the process would be reversed, and the recreationists would be returned to the Washington area Sunday evening.

Should the program prove successful, it could possibly lead to development of a new downhill ski area in the vicinity of Cumberland, Maryland, if the mountainous terrain and snow cover there prove suitable. Much of this land is in private ownership, providing an opportunity for further involving the private sector in increasing recreational opportunities.

The benefits to be derived from this program would include expanded and more accessible recreational opportunities (many young people living in the urban area are interested in such activities, but do not own an automobile). Also, there would be expanded employment opportunities in essentially rural areas.

The rail recreational access program would function equally well in summer. In Norway, for instance, it is a common sight on the trains which cross the mountains between Oslo and Bergen to see a group of hikers step from the train, their packs upon their backs, and set off on foot for hostels or campgrounds. There would appear to be no reason why a similar situation would not prevail in the Potomac Basin. In fact, the recent popularity of biking might be accommodated through this system, as well.

Apart from Amtrak, another source of railroad rolling stock which might become available within the Potomac Basin in the next several years is the equipment used for commuter traffic into Washington, D.C., on weekdays. The state of Maryland, which provides financial support for this rail commuter service through its Department of Transportation, has recently arranged to purchase additional equipment to expand the system. Some 22 cars to be acquired will be refurbished and placed in operation,

probably not before the end of 1980 or early 1981. Once operational, however, the state might be interested in allowing them to be used, perhaps on a lease basis, for the recreational access program on weekends. In this way, a portion of the costs of acquiring the cars might be offset, and the recreational access program would be more flexible. It would be necessary to limit use of the cars in such a way that maintenance, which is done on weekends, could be performed in a timely fashion.^{4/} Other recreational train potentials: hiking, bicycling, resort living, fishing, trips, boating, C & O Canal towns, historical towns.

Whether or not these ideas come to play a part in shaping Tomorrow's Potomac, the larger concern is how that future is to be shaped. That it will be different seems certain; the means of making it so are uncertain.

^{4/} Telephone conversation Sept. 5, 1979, with J. H. Griffin, Manager of Passenger Operations, Baltimore and Ohio Railroad Company.

CHANGES IN RECREATION ORIENTED TRAVEL IN THE NORTHEAST
BETWEEN 1972 and 1977¹

Gerald L. Cole²

Abstract.--Data from the National Travel Surveys of 1972 and 1977 are utilized in a modified shift-share approach to compare Northeastern travel with other regions of the U.S. The Northeast is losing relative to other regions when travel is compared using 1972 as the base year. However, travel with camping equipment increased in the Northeast relative to the other regions.

INTRODUCTION

One of the sub-objectives of the NE-100 regional research project at Northeast Agricultural Experiment Stations has been to utilize secondary data sources as a means of detecting changes in trends in outdoor recreation participation. This paper focuses on the National Travel Surveys conducted in 1972 and 1977 by the U. S. Department of Commerce.

Data tapes for both surveys were released to research personnel at the University of Vermont, enabling a comparison between the two survey years. For the households sampled, all travel for trips of 100 miles or more from home was recorded by purpose of the trip, mode of travel and origin and destination of the trip. Also, person trips (number of trips x number of persons) and person nights (person trips x number of nights away from home) were included.

This paper was developed because of some hypothesized changes occurring in the Northeast region which could affect the recreation-tourism sector. It may be useful to outline some factors associated with travel and then elaborate on some hypotheses concerning the region. Variables which affect the demand for travel include population, income, education and family size.

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²Associate Professor, Dept. of Agricultural and Food Economics, University of DE, Newark. The valuable assistance from Malcolm I. Bevins and Jed Guertin, University of VT, is greatly appreciated. Bevins presented a preliminary analysis of some of the possible uses of the National Travel Survey Data at a NE-100 research meeting. Guertin provided computer programming assistance.

On the supply side, the natural resource base for tourist attractions, highway availability and condition, together with technological advances, will also be important.

It is hypothesized that the demand for travel in the Northeast will slow because of slower population growth compared to other regions of the U.S. Pennsylvania, New York, Rhode Island and the District of Columbia are estimated to have population decreases between 1970 and 1977. While incomes have continued to increase in the region, price increases for some consumer goods have outstripped income growth. This is especially true for gasoline prices which have risen sufficiently to cause a reduction in fuel used between 1979 and 1980. It is hypothesized that higher fuel prices will reduce the demand for travel not only for persons originating their trip in the Northeast region, but especially for those from outside the region.

Continued increases in the level of education and the trend towards smaller households (including one person households) should spur an increased demand for travel which may partially offset the negative effects of reduced population growth and higher fuel prices.

On the supply side, it is hypothesized that those natural resource attractions which are within 100-150 miles of important population centers will have an advantage over more remote areas. To illustrate, the Delaware, Maryland and New Jersey shores together with Cape Cod, will be in a better relative position than attractions in Northern New England.

New technological developments which promote more fuel efficient recreation vehicles, outboard engines, etc. can also stimulate participation in camping and boating.

OBJECTIVE

The objective of this paper is to utilize the travel data from the two survey years in order to indicate shifts in the shares of travel and other related factors by state, region - Mid-Atlantic, New York-New Jersey, and New England - and the Northeast between 1972 and 1977, compared to other regions and the U.S. Shifts in travel market shares will be compared with population growth shares for the same states, regions and the U.S.

PROCEDURE

A modification of shift-share analysis will be used to measure changes in the state and regional travel share compared to the U.S.

Shift-share analysis is a technique for measuring factors which relate to differences in growth rates among regions. The technique was developed by Dunn who states:

"Regional development takes place in a national framework and depends in part upon forces operating at the national level. As output and income grow, the demand for different commodities grows at different rates. Likewise, on the supply side, technological change leads to differential shifts. The impact of changes at the national level affects regions in different ways because of differences in the composition of their output."³

In this paper, the number of person nights of travel in 1972 and 1977 by state of destination will be used as the variable to measure shifts. It is argued that person nights provide the best available measure of economic impact because both the number of persons in the travel party and the number of nights spent on the trip are recorded.

An analysis of other state and regional travel data utilizing SPSS provides additional indicators of growth or decline in the travel market within the region.

RESULTS

Population growth and shift-share

It is well known that population growth in the Northeast has not kept pace with other

³Dunn, Edgar S., "A Statistical and Analytical Technique for Regional Analysis," *Regional Science Assoc., Papers and Proceedings*, Vol. VI (1960).

regions since 1970. While U.S. population increased 6.4 percent between 1970 and 1977, the Northeast region's population increased only by 1.4 percent, Table 1. The Northeast region in this study includes 13 states and the District of Columbia.⁴ Population grew fastest in the South and in the Northwest.

A shift-share analysis of population compares not only the percentage increase, but also the 1970 base population in each of the states and regions. In order to calculate what will be called the Population Share Index Value, the following formula is used:

$$\text{Population Share Index Value} = \frac{\text{Base population for state or region (1970)}}{\text{U.S. population (1970)}}$$

$$\left[\frac{\text{Percentage change in state or regional population from 1970-77}}{\text{Percentage change in U.S. population from 1970-77}} \right]$$

Table 1. Population growth for the United States, by region, and for Northeastern states between 1970 and 1977.^{4/}

Region	1970	1977	Percent change
U.S.	203,806	216,132	6.4
New England	11,883	12,142	3.3
ME	997	1,085	9.3
NH	742	849	15.0
VT	446	485	8.7
MA	5,704	5,782	1.6
RI	921	935	1.6
CT	3,041	3,108	2.5
NY-NJ	25,441	25,253	-0.8
NY	18,208	17,924	-1.7
NJ	7,183	7,329	2.2
Mid-Atlantic	23,448	24,190	3.1
DE	551	582	5.1
DC	756	890	18.0
MD	3,838	4,139	8.5
PA	11,813	11,785	-0.1
VA	4,658	5,135	10.4
WV	1,751	1,859	6.0
Northeast	60,812	61,885	1.4
South	37,573	41,803	11.2
North Central	46,360	47,911	2.0
Northwest	7,097	7,957	12.2
Southwest	23,555	26,254	11.4
Pacific	27,811	30,722	10.5

^{4/} Source: U. S. Department of Commerce, *Statistical Abstract of the United States - 1978*, pp. 14-15.

⁴ Some of the names of travel regions were changed in 1977 compared to the 1972 National Travel Survey. In this paper, the 1972 names will be used. See Appendix A for the definitions of travel regions.

1972 and 1977, the increase in the Northeast was only 15.9 percent and the New England states registered a smaller 5.5 percent increase. Within the Northeast, person nights of travel actually decreased by 8.3 percent in Pennsylvania.

Table 2. Person nights of travel for the United States, by region, 1972-1977. ^{a/}

Region	1972	1977	Percent change
	- (000,000) -		
United States	1,906.0	2,347.3	16.0
New England	97.0	102.3	5.3
NY-NJ	101.1	120.3	19.0
Mid-Atlantic	137.6	166.4	20.9
Northeast	333.7	389.0	15.9
South	343.2	501.5	30.2
North Central	278.7	334.0	27.0
Northwest	81.6	118.3	29.1
Southwest	207.0	290.1	40.1
Pacific	272.1	325.4	19.6

^{a/} Source: U. S. Department of Commerce, Bureau of the Census, 1972 and 1977 National Travel Surveys.

In other regions, the Southwest exhibited a 40.1 percent increase followed by the South and the Northwest.

Within the Mid-Atlantic states, increased travel to the District of Columbia and Virginia exceeded the national increase.

A shift-share analysis of person nights of travel by destination state or region is presented in Figure 2. The formula for computing what will be called the Travel Share Index Value is as follows:

$$\text{Travel Share Index Value} = \frac{\text{Base person nights of travel for state or region (1972)}}{\text{Base person nights of travel for state or region (1972)}}$$

$$\frac{\text{Percentage change in state or regional person nights of travel from 1972-77}}{\text{Percentage change in national person nights of travel from 1972-77}}$$

Again combining the magnitude of the base year travel with the percentage deviation from the National increase, the largest negative value is obtained for the Northeast region and the greatest positive value for

the Southwest. If travel had changed from the base year by region in the same relative proportion as population growth, the ranking of states and regions would be the same as in Figure 1. However, this is not the case. For the travel index, the Southwest gained relative to the South when compared to population index. The value for the Pacific region is negative, while the population value was positive.

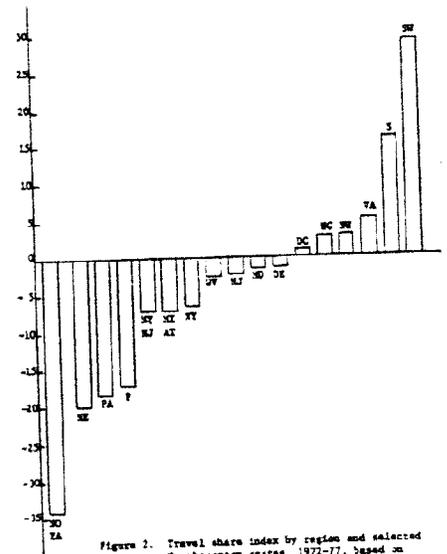


Figure 2. Travel share index by region and selected Northeastern states, 1972-77, based on person nights of travel by destination.

Within the region, only the District of Columbia and Virginia exhibit positive travel index values. Clearly the New England states, New York-New Jersey and the Mid-Atlantic states are losing relative to national growth. The North Central region is the only other region to show a negative value.

Not all states or regions have matched population growth with growth in travel. A causal relationship cannot be established from a shift-share analysis. Only a descriptive analysis of the changes is possible. The description can serve as an indicator of a need for further investigation of the reasons for variation in travel. It is clear that the Northeast is losing relative to other regions except for the Pacific region. Because the regional and state patterns of travel growth are not the same as the

patterns of population growth, it is evident that more than the population variable is affecting travel. This suggests the need for additional investigation of supply variables and other demand variables in the states or regions most affected, i.e., those which deviate from the base time. For example, are the historical-governmental attractions in the D. C.-Virginia area serving as a major attractant? Are the attractions in Pennsylvania such as Gettysburg, the Amish Country or the Poconos, losing favor? Are the natural resource attractions in Northern New England too far from population centers?

Camping travel shift-share

One indicator of the intent of travelers is whether or not they travel with camping equipment. In the National Travel Survey, trips by personal vehicle with and without camping equipment are recorded. Nationally, person nights of travel with camping equipment is a relatively small part of total travel. The proportion of travel with camping equipment varies from three percent in the New York-New Jersey region to 17 percent in the Northwest.

The increase in person nights of travel with camping equipment across the U.S. was quite modest - 3.6 percent - between 1972 and 1977, Table 3. Regionally, a much different pattern emerges than was the case with all travel. The New England and Mid-Atlantic regions showed substantial percentage increases in camper travel with smaller increases in the South and Southwest. Major declines were noted in the Pacific and New York-New Jersey regions with smaller decreases in the North Central and Northwest regions.

Table 3. Person nights of travel with personal auto/truck and camping equipment, by region, 1972-1977.^{a/}

Region	Person nights of travel		
	1972	1977	Percent change
	-- (000) --		
United States	160,244	165,990	3.6
New England	7,075	9,676	36.8
NE-MJ	4,564	3,736	-17.7
Mid-Atlantic	9,751	12,596	43.9
Northeast	20,390	26,030	27.7
South	31,871	37,674	17.8
North Central	22,134	21,170	-4.3
Northwest	20,313	19,714	-3.3
Southwest	23,570	28,581	21.3
Pacific	41,240	32,821	-20.2

^{a/} Source: U. S. Department of Commerce, Bureau of the Census, 1972 and 1977 National Travel Survey.

Using the same procedure as with population and total travel, a Camper Travel Index Value is computed as follows:

$$\text{Camper Travel Index Value} = \frac{\text{Person nights of travel with camping equipment in base year (1972)}}{\left[\frac{\text{Percentage change in state or region. person nights with camp. equip. from 1972-77}}{\text{Percentage change in national person nights of travel with camp. equip. from 1972-77}} \right]}$$

In this instance, the greatest negative value is generated for the Pacific region and the greatest positive value for the Northeast, Figure 3. The Pacific region had the largest amount of travel in the base year and the greatest percentage declines. The positive effect of the large percentage increases in New England and the Mid-Atlantic region relative to the U.S. were the major factors in generating a large positive index value. Thus, even though the Northeast has lost population relative to the U.S. and total person nights of travel have decreased compared to the National rate of change, camper travel has increased.

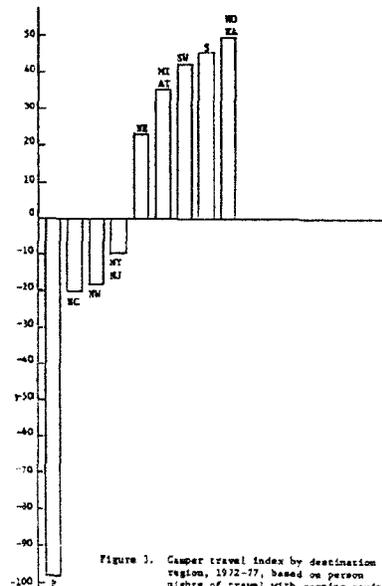


Figure 3. Camper travel index by destination region, 1972-77, based on person nights of travel with camping equipment.

Unfortunately, the lack of the data for the New England states in 1972 (except for Massachusetts) makes a comparison of individual states within the region and nation impossible. Data will be available in future census years, however.

Other comparisons from travel survey data

Numerous comparisons are possible using the National Travel Survey from 1972 and 1977. Selected comparisons follow as examples of possible analyses.

Origin - destination analysis of travelers

For marketing of recreation-tourism services it is essential to know the origin of travelers in order to better pinpoint advertising efforts and to be able to forecast possible impacts due to projected changes in population growth, fuel costs, etc..

An analysis of the origin of travelers to the Northeast (New England-New York-New Jersey and Mid-Atlantic regions) will serve as an example of the type of information that can be generated. Data for Connecticut are illustrated in Table 4.

Table 4. Origin of trips to Connecticut, by region, and selected states, 1972 and 1977.

Origin (Region or state)	Percent of trips	
	1972	1977
New England	37.4	42.2
NY-NJ	33.4	31.6
Mid-Atlantic	14.8	9.8
Sub-total	85.6	83.6
South	4.8	6.8
North Central	5.2	6.5
Northwest	.2	.2
Southwest	1.6	.7
Pacific	2.4	2.0
Total	100.0	100.0
Major States -		
VA	13.2	11.1
NY	22.8	13.3
NJ	10.6	18.3
DC	6.4	5.0
PA	5.4	5.8
MD	4.0	1.0
	71.6	74.7

In Northern New England, over 90 percent of all trips to Vermont, New Hampshire and Maine originate in the Northeast and the share from within the region increased for Vermont and New Hampshire between 1972 and 1977. As indicated earlier, the population growth in the Northeast is slower than elsewhere in the U.S. and/or is generated in states with a small population base. If higher fuel costs further deter travel from more distant regions, this has an important potential negative impact on Northern New England. Some impact is already being felt since the total number of trips to Vermont and Maine decreased between 1972 and 1977.

Southern New England (Connecticut, Massachusetts and Rhode Island) is only slightly less dependent on the Northeast for its' travelers. The share for all three states is between 80 and 90 percent. However, Massachusetts, the most populated state, suffered a 22 percent decline in the number of trips between 1972 and 1977. The fact that Southern New England draws a slightly greater share of travelers from outside the Northeast can provide a negative impact as fuel costs escalate.

In the New York-New Jersey region, New York's dependence on the Northeast region increased between 1972 and 1977 primarily due to a decline in travelers from the North Central region. Both New York and New Jersey had 80 percent of their travelers originating in the region in 1977.

New Jersey's proportion of visitors from the Southern region nearly doubled but the proportion from the North Central region was cut in half. This could be due to travel distances. One might further speculate about future impacts in New Jersey with the present and expanding availability of casino gambling in Atlantic City. This can attract travelers from greater distances, particularly by public transportation.

Among the Mid-Atlantic states in the southern part of the Northeast, only Delaware depends on the Northeast for over 90 percent of the travelers coming into the state. An increasing proportion of the travelers came from the Southern region to the Mid-Atlantic states between 1972 and 1977. This was especially true for Virginia and West Virginia. A declining share of travelers came from the North Central region. West Virginia was most dependent on the North Central states.

The Southern states in the Mid-Atlantic region, being closer to the Southern region, may expect a positive impact from increasing population provided that rising fuel costs don't completely offset the effect of population.

While the entire Northeast region will likely be adversely affected by low or zero population growth among some of the states in the region, there will likely be states in the southern part of the region that may expect to enjoy future growth in the travel market largely generated from the South. Continued monitoring of the county employment and expenditure data from other sources will better establish a causal relationship.

Purpose of trip

In the Northeast region, with the exception of Southern New England, there was a slight upward trend in the proportion of trips made for outdoor recreation, entertainment and sightseeing purposes, i.e. non-business and non-family related travel. Recreation, entertainment and sightseeing travel as a group accounted for 20-30 percent of total travel for the region with a gain of approximately two percentage points between 1972 and 1977.

Mode of transportation

There was a slight down trend in the use of private vehicles for travel. Even though New England is more dependent than the remainder of the Northeast on private transportation, the private share decreased from 85 to 82 percent between 1972 and 1977. Elsewhere in the region the private share declined from 76 to 71 percent. Thus, public transportation is making a slight gain. It will be interesting to continue to monitor the trend as fuel prices escalate.

Number of persons per trip

There was a tendency for the proportion of one person trips to increase between 1972 and 1977. This probably reflects the National trend in formation of one-person households. However, if the trend continues it has implications for the lodging and restaurant industries, among others. In 1977, slightly over 50 percent of the trips in the region were taken by individuals.

Type of lodging

There was an increase in the proportion of commercial lodging (hotels, motels and campgrounds) used as well as stays with friends and relatives. Therefore, the use of the travelers own lodging (second homes, etc.) declined.

Distance traveled

Between 1972 and 1977, there was an increased proportion of travel for round trips of 400 miles or less and conversely the share of longer trips diminished. By 1977, slightly over 50 percent of the trips taken were for the shorter distances and slightly less than half for distances over 400 miles.

Limitations

Analyses of National Travel Survey data are subject to certain limitations. The Travel Survey only includes trips which are 100 miles or more each way. Therefore, a major portion of trips by travelers in New England or individual small states, such as Delaware, may go unreported. This would be especially true for travel to resource based attractions - mountains, lakes or seashores - which are relatively close to the traveler's home. The Travel Survey reports fewer trips per capita taken by New England residents compared to those residing in other regions, Table 5. Part of the discrepancy may be due to the exclusion of shorter trips.

Table 5. Trips per capita and per traveling person, by region, and for the U.S., 1977.^{a/}

Region	Trips per Capita	Trips per traveling person
New England	1.9	3.4
NY-NJ	1.7	3.4
Mid-Atlantic	2.2	3.8
South	2.4	3.8
North Central	2.7	4.0
Northwest	3.2	4.8
Southwest	3.1	4.4
Pacific	2.8	4.1
United States	2.5	4.0

^{a/} Source: U. S. Department of Commerce, Bureau of the Census, 1977 National Travel Survey.

If there is a trend towards taking shorter trips, the under-reporting problem may increase. A lowering of the minimum trip length may be warranted in future travel surveys.

The impact of Canadian travel to the U.S., particularly Northern New England, also cannot be measured. Thus, if the

number of Canadian travelers is increasing over time this may partially offset the negative effect of fewer American travelers.

SUMMARY AND CONCLUSIONS

The major purpose of this paper was to demonstrate the use of National Travel Survey data for 1972 and 1977 in a modified shift-share analysis of travel in the Northeastern states together with population growth between 1970 and 1977. Additional comparisons of travel data also were made to detect possible trends or changes in travel patterns.

The Northeast had the greatest negative population share index compared to other regions and the U.S. Four Northeast states lost population between 1970 and 1977.

Low or negative population growth influenced person nights of travel in the region between 1972 and 1977. Consequently, the Northeast also had the greatest negative travel share index value. Other regions of the U.S. lost out as a travel destination relative to the National pattern, also. For example, the Pacific region had a negative index value as well. A camper travel index using person nights of travel with camping equipment was generated. In this instance the Northeast had the largest positive index value, because camper travel increased relative to the U.S. and other regions.

The Northeast tends to be highly dependent on persons residing within the region as the source of travelers. Continued slow or non-existent population growth in the region will have the effect of limiting the growth in demand for travel, especially when the impact of rising fuel costs is considered.

Other trends noted include a slight increase in: (1) the proportion of trips taken for entertainment purposes, (2) the use of public transportation, (3) the use of commercial lodging, and (4) the tendency to take shorter trips of less than 200 miles one way.

The analysis has developed some possible indicators of change in travel in the Northeastern U.S. It will be necessary to examine other secondary sources at the county level or to collect primary data to provide the causes of the changes noted.

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TRENDS IN ALLAGASH WILDERNESS WATERWAY USES

IN THE 1970's¹

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The Allagash Wilderness Waterway is a 92-mile long river and lake corridor through the forests of northern Maine. It begins at Telos Dam at the eastern end of Telos Lake, extends westward to Allagash Stream and Allagash Lake in T8 R14, and northward through Chamberlain Lake, Eagle Lake, and Churchill Lake to the beginning of the river itself at Churchill Dam. The northern half of the Waterway, which is essentially river, includes a fine stretch of whitewater at Chase Rapids and forty foot Allagash Falls.

Passage of the Allagash Waterway Act in 1966 established the framework for protection of the river corridor by the State Bureau of Parks and Recreation. Companion legislation led to the approval by the people of Maine in referendum, of monies for the acquisition of a land corridor in average 500 feet wide from the high water mark; the State-owned area contains 22,760 acres of shore land and approximately 30,000 acres of submerged land. The Waterway legislation also gave to the State the power to approve timber harvesting operations on all private land within one-mile from the river's edge.

Road access to the Waterway is largely over private lumber company roads; primary access routes are from Millinocket, Greenville, Ashland, and Allagash Village. The visitor can also gain access by water; most commonly into Eagle Lake via Indian Stream from Indian Pond, Allagash Lake by Johnson Pond and Stream, and Mud Pond by portage trail from the West Branch Penobscot watershed. Access by float plane is allowed at designated sites.

The Allagash has a rich and diverse history from the use of the land by native Indians, to logging operations, to the visits of Henry David Thoreau in the mid-1800's, to

use of the river for sport fishing, thru the early protection efforts of the United States government and the State of Maine. In July, 1970, the Allagash was designated as the first State administered component of the National Wild and Scenic Rivers Act of 1968.

The Allagash is now staffed by a supervisor with assistance from several year-round and seasonal rangers, who are responsible for maintaining approximately 72 campsites for summer use. The area also receives increasing snowmobiling and ice fishing use in the winter, but exact visitor counts are not available as such users are not required to register.

VISITOR USE IN THE 1970's

Presented in Table 1 is a history of public use of the Allagash from 1966 through 1977. Total use fluctuated from a low of just under 26,000 visitor days² in 1968 to a high of over 50,000 visitor days in 1973. However, the number of parties and number of persons has generally increased annually since 1966 with highs of over 2,600 parties and 9,700 persons in 1978. A decreasing average length of stay and a decreasing party size are the primary reasons for less total visitor days than might be expected. Persons per party peaked in 1972 at 5.23 while average length of stay was highest in 1968 and 1970 at 6.85 and 6.83 days respectively.

Factors Influencing Use

¹ Though the Allagash became State administered in 1966, annual visitor use remained about the same through the 1969 season. In July, 1970, the Allagash was officially designated, in a ceremony at Churchill Dam, as the

² Defined here as 24 visitor hours, which may be aggregated continuously, intermittently, or simultaneously by one or more persons. Total visitor days is the product of number of visitor times average length of stay.

¹ Paper presented at the National Outdoor Recreation Trends Symposium, Durham, NH, April 20-23, 1980.

first State administered federal wild and scenic river. This designation, with subsequent national publicity, appeared to generate a steady increase in use from 1970 through 1973. In 1974, the first gasoline shortages were felt in the United States. Subsequent spot shortages and a major shortage again in 1979, may have been factors in decreasing use from 1974 through 1976 and maintenance of a fairly constant level of use from 1977 through 1979.

Table 1
Allagash Visitation Data Summary*

Calendar Year	Number Parties	Number Persons	Persons Per Party	Average Length Year (Days)	Total Visitor Days
1964	1,011	4,241	4.20	4.12	27,000
1967	1,065	4,239	4.26	3.91	26,831
1968	988	3,764	4.38	4.45	28,931
1969	1,136	4,820	4.25	4.17	29,720
1970	1,251	5,660	4.56	4.83	37,203
1971	1,492	6,343	4.25	5.72	36,274
1972	1,379	6,260	5.23	5.20	42,931
1973	1,877	8,337	4.44	6.06	50,361
1974	1,684	7,477	4.44	6.06	43,294
1975	2,400	9,447	3.94	4.40	61,501
1976	2,220	8,419	3.86	4.74	40,834
1977	2,489	9,278	3.73	5.04	44,736
1978	2,664	9,734	3.65	4.82	49,447
1979	2,791	8,932	3.20	4.97	44,337

*No data available prior to 1966. Does not include visitor use data.

Gasoline availability is not the only factor influencing use. Summer weather patterns can cause a fluctuation in use from year to year as can the publication of feature articles in national magazines. In an effort to maintain or reduce use levels, the Bureau of Parks and Recreation requested, in the early 1970's, that use of the Allagash Waterway not be promoted by State agencies. This request has been honored, but some publicity still occurs through private sector promotion.

The Bureau has instituted two other measures that help control use. A group size restriction of no more than 12 persons per party was instituted in 1974 and a fee system of \$1.00 a night for residents and \$2.00 a night for non-residents (children under 15 free) was instituted in 1975. The fee system was also instituted to help defray operation and maintenance costs.

By instituting these measures, the Bureau hopes to avoid the necessity of a reservation system to keep visitation at acceptable levels during the peak months of July and August. Efforts will continue to spread use equally among designated sites and throughout the visitation season. Over-sized groups of 13 persons or more (commercial guides utilizing the Waterway for three consecutive years before the 1974 regulation went into effect are still allowed to guide oversized parties) are generally

required to utilize certain designated group campsites (which are off the general route of travel) to lessen impact on smaller parties.

Results of Visitor Surveys

Three surveys of visitors have been conducted in the Allagash:

- a 1966 survey by the Bureau of Forestry;
- a 1973 survey of all 1,877 parties using the Waterway in that year by the Bureau of Parks and Recreation; and
- a 1978 survey of 1,309 parties (about 50 percent of those using the Waterway) by the Bureau of Parks and Recreation.

A summary of major trends is presented in Table 2. 1966 results are not directly comparable because the questions were asked and worded differently.

Table 2
Allagash Use Trends

	1966*	1973	1978
Maine Parties - percent of total parties	63	48	51
Fishing Parties - percent of total parties	72	33	30
Canoe Parties - percent of total parties	25	25	27
Parties taking thru trip (to Allagash Village) - percent of total parties	18	30	39
Fishing Parties - percent Maine led	-	78	81
Canoe Parties - percent Maine led	-	20	28
Visitor day impact of parties of 12 or more persons - percent of total visitor days	-	30	15
Percent of parties visiting Allagash Lake	4	5	5

*1966 questions were phrased and administered differently than those asked in 1973 and in 1978.

Parties originating in Maine constitute about 50 percent of all parties visiting the Allagash. There appears to be a trend towards increasing visitation by Maine residents, despite a slight decrease in fishing and a slight increase in canoeing (canoeing parties tend to be led by out-of-state residents). However, the percent of Maine led canoeing and fishing parties are both increasing.

The primary purpose of visitation is closely correlated to the month of visitation. Fishing is by far the primary purpose of parties visiting the Allagash in May while canoeing is the primary purpose of August visitors. The majority of July visitors are there for the combined purpose of fishing and canoeing.

Parties of 13 or more accounted for 30

percent of the total visitor day impact in 1973. Today, primarily because of the group size restriction imposed, they account for only 15 percent of the impact. This percentage should decline over the years as commercial guides, excepted when the 1974 restriction was imposed, eventually cease to guide parties in the Allagash.

The primary destination of the majority of Allagash parties is Allagash Village. Fishing parties seek the large lakes, however, especially Eagle Lake, while day use parties frequent the Michaud Farm area. Canoeing parties are most likely to pursue the through trip to the Allagash Village area.

The major entry point of Waterway parties is Chamberlain Bridge, followed by Telos Landing and Indian Stream. In 1978, 2.4 percent of all parties entered the Waterway from the West Branch Penobscot watershed; the majority of these entered via the Mud Pond portage to Mud Pond. In 1973, about 1.9 percent of the parties entered from the West Branch Penobscot watershed.

THE ALLAGASH IN THE 1980's

Will concern with the potential of overuse of the Allagash continue into the 1980's? The answer to this question will probably be very dependent upon the continued availability of an adequate supply of gasoline for automobile travel, the continued popularity of wilderness oriented canoeing, and whether or not the Dickey-Lincoln reservoir is constructed. Gasoline shortage and rising prices are predicted to continue. That in itself may be enough to forstall the need for additional considerations, such as a reservation system, to control use in the Allagash.

Can the opportunities and experiences offered the Allagash user be enhanced? A general concept plan was completed for the Allagash in 1973. That document addressed and presented recommendations relating to routes of access, the control of bridges, use and location of control stations, user regulations, the location and maintenance of campsites, historical interpretation, the management of sporting camps in the Waterway, safety and rules enforcement, information and publications, staffing, and forest resource management. The 1978 user survey found, for instance, that the tramway was one of the most popular points of interest in the Waterway. The 1973 plan recommended that the tramway area and the locomotives in the area be restored, maintained, and interpreted for increased user enjoyment. The Bureau has investigated this possibility and will pursue greater interpretation. Restoration and maintenance appear to be un-

economical.

Other recommendations from the 1973 plan, and from the 1973 and 1978 surveys, which might enhance user enjoyment include continuing to limit the number of bridge crossings to no more than are now present and to locate them in such a manner as to reduce the visual impact of logging traffic; continuing to encourage the use of biodegradable containers and packaging by visitors and a carry-in, carry-out policy; continuing group size restrictions to protect both the wilderness character of the Waterway and the social impact on smaller parties; rotation of overused campsites to allow ground vegetation to recover; continued restrictions on size and use of outboard motors; continued management of Nugents Sporting Camp on Chamberlain Lake as long as it maintains its present character; management of the land bordering the Waterway in a natural state except as otherwise specified in the Waterway Act; the provision of a few additional campsites in certain overused areas to meet present demand (primarily the Churchill Lake/Dam area and Allagash Falls area); and the provision of a central camping/staging facility in the Telos Lake/Chamberlain Bridge area if present overnight use demands continue or increase.

Some of these recommendations can be implemented without increased staffing or budgeting. Others will require additional monies which are difficult to obtain at this time. If needs are pressing, these monies will be sought. It is likely, however, that in the 1980's emphasis will be on implementation of management recommendations to increase use enjoyment, rather than recommendations requiring additional funding.

A continued concern in the 1980's will be the management of Allagash Lake as a remote wilderness area. Allagash Lake has primarily been used for fishing. A special 1979 survey of Allagash Lake users indicated that almost 82 percent of the visitor days incurred at the Lake were by fishing parties. Over 52 percent of the users entered the Lake via Johnson Pond/Stream while almost 25 percent came up by Allagash Stream and almost 14 percent entered using the Allagash Carry Trail.

The Bureau of Parks and Recreation is cooperating with the Department of Inland Fisheries and Wildlife to determine fishing pressures on the Lake. These studies will continue until Fish and Wildlife can determine what measures need to be taken, if any, to maintain or enhance the fisheries of Allagash Lake. Continuation of the remote wilderness characteristics of Allagash Lake will be a major objective in the 1980's.

ASSESSING CHANGES IN THE IMPORTANCE OF TOURISM
IN THE NORTHEAST¹

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INTRODUCTION

It is widely acknowledged that tourism is a vital component of the economy of counties and states in the Northeast, as well as in other regions of the US. Nearly all states claim tourism as one of their three largest industries. Yet data which accurately measure tourism and its economic impacts are woefully lacking.

A number of data sources serve as useful indicators of tourism levels. Visits to state and national parks and other recreation areas, out of state hunting and fishing license sales, and boat registrations are examples. These data are useful indicators of levels of travel, but they provide little information on the economic impacts of tourism.

In response to the gasoline shortages and increased prices that first began in 1973-74, a federally funded regional research project of the Northeast Agricultural Experiment Stations, NE 100: "Recreation Marketing Adjustments in the Northeast", was formed. This project had as its objectives the examination of changes in recreation activity patterns by households in the Northeast, and the impacts of changes in recreation/travel patterns on subregional economies. This paper examines the indicators of economic change related to tourism that are derivable from secondary data sources.

EVALUATION OF SECONDARY DATA SOURCES

Data sources useful to this effort had two requirements: comparable economic data by states and substate units throughout the Northeast, and data for at least two time periods. Because of differences in the collection and reporting of employment and sales data by state labor and tax departments in the Northeast,

these potential data sources were not acceptable for this effort. National data sources were then examined. Three data sources, all published by Bureau of the Census, proved potentially useful to the study: The Census of Retail Trade and the Census of Selected Services, published in 1972 and 1977, and County Business Patterns, published annually.

Each of these data sources reports the number and size of firms by Standard Industrial Classification (SIC) codes. The Census of Selected Services includes lodging data and other amusement and recreation services (e.g., movies, bowling alleys, race tracks), while the Census of Retail Trade includes such sectors important to tourism as sporting goods stores and bicycle shops, eating and drinking places, and gasoline service stations. County Business Patterns reports all of the above sectors. The Censuses of Retail Trade and Selected Services are more complete in their coverage, in that they utilize Internal Revenue Service and Social Security Administration data on small firms, including those with no employees. County Business Patterns, on the other hand, restricts its coverage to employment covered by the Social Security Program, excluding the self-employed.

Censuses of Selected Services and Retail Trade provide data on the number of firms, annual sales or receipts, and number of paid employees for the week of March 12. Obviously March 12 is a poor time choice for assessing impacts of tourism. County Business Patterns has provided annual payroll data only since 1974. Number of establishments and number of employees the week of March 12 have been provided annually since 1964. However, due to changes in data collection procedures, paid employee data is not comparable prior to 1974.

The difficulty in utilizing these data sources to evaluate the changing importance of tourism is reflected in the categories in which the data are reported, and in the inherent

¹Presented at the Recreation Trends Symposium, Durham, New Hampshire, April 21-23, 1980.

difficulty in measuring tourism. With the exception of the lodging sector, the clientele of other retail firms serving tourists also serve local residents. Moreover, the proportion of sales to local residents is often in excess of that to tourists. As a result, differences in tourism-related sales by a given restaurant or sporting goods store from year to year can easily be masked by changes in sales to local residents, if the latter trends in the opposite direction from the former. The author has experienced this problem in studies of the impact of salmon fishing in New York (Brown, 1975).

Kahn (1975) correctly points out that the lodging sector is not exclusively tourism-oriented in that restaurant facilities and meeting rooms receive local as well as tourist trade. However, unlike such major tourism sectors as restaurants and service stations, the majority of the volume in the lodging sector is tourism-derived. This is particularly the case in rural areas, which is the focus of the NE-100 study.

As a result of the above problems, it is the author's conclusion that comparisons of lodging statistics provide the best indication of changes or differences in economic impacts of tourism. This is in contrast to the use of many sectors in an analysis of factors affecting regional employment in tourism by Ellerbrock and Hite (1980). It is justified, however, by the preceding discussion, plus the interrelated observations that (1) travel of any notable economic consequence to the destination community involves overnight lodging, and (2) overnight lodging is often the largest expenditure component of tourists at the travel destination. Therefore, this analysis is limited to an analysis of changes in the lodging sector in the Northeast.

Of the available lodging measures, the number of firms is the least valid trend measure. The replacement of several small firms by a few larger firms may give the erroneous impression that tourism has declined over time. The number of employees is a moderately sensitive measure, but due to the collection of data during the week of March 12, it has limited utility. Annual sales/receipts is the most sensitive measure of changes or differences in lodging-related tourism, and is therefore the primary measure used in this paper.

METHODS

In comparing the importance of tourism to several areas over a specified time period, two types of measures are useful. The first is a comparative measure of the relative importance of tourism to the economies of the areas served and an indication of whether the economies being

compared are growing more dependent, or less dependent, on tourism on a relative basis. The second useful measure is a quantitative comparison among study areas of the magnitude of the industry, the relative change in the magnitude of the industry over time, and factors which relate to differences in growth rates.

A comparative measure of the relative importance of tourism to the economies of states and counties in the Northeast was achieved by developing location quotients for all states, and for counties in which secondary data were available. Described in some detail by Isard (1976), location quotients (LQs) can be developed for employment, income, sales, or other economic parameters. LQs compare the proportion of a smaller area's economy devoted to a particular sector to the analogous proportion for a larger geographic area, of which the smaller area is a component part. In comparing a lodging receipts LQ of a county with its state, for example, an LQ of 1.0 indicates that the proportion of the county's total receipts or sales derived from lodging is the same as that for the state. If the LQ were 2.0, the proportion of all county receipts derived from lodging would be twice that of the state.

For this analysis, lodging receipts LQs were developed comparing first states in the Northeast and then counties in the Northeast to the Northeast as a region of the U.S. In developing the LQs, the broader economic measure to which the lodging sector is compared had to be chosen. The measure chosen was the total of receipts from all service sectors of the economy as represented by Bureau of the Census' Census of Selected Services. An alternative measure would have been the sum of receipts and sales for the service sector plus the retail trade sector.

The quantitative comparison between states and counties was facilitated by using shift-share analysis. This technique has been described in detail by Dunn (1960) and Ashby (1964). It has previously been applied to employment data, but is equally valid when used with sales or receipts. After examining lodging receipts for 1972 and 1977, the net relative change is calculated for states and counties in the Northeast. The large number of counties in the Northeast makes further aspects of shift-share analysis impractical. At the state level, however, further analysis is undertaken to gain indicators of the degree to which changes in lodging are attributable to regional growth, industrial mix or distribution of industries, and proportional share of total lodging receipts. These concepts are further explained in the analysis.

1972-1977 STATE LEVEL LODGING ANALYSIS

Location Quotients

From Table 1, it is apparent that the Northern New England states of Vermont, Maine, and New Hampshire are tourism-dependent states, compared to the remainder of the Northeast. The proportion of the total service receipts (lodging, personal, business, automotive, other repair, amusement/recreation, dental, legal, and engineering/architectural/surveying services) of these states derived from tourism range from 2.54 (New Hampshire) to 3.88 (Vermont) times that of the Northeast as a whole in 1977. West Virginia and the District of Columbia are also notably above the average for the Northeast. Connecticut, New York, and New Jersey, on the other hand, are least dependent on tourism on a relative basis.

The 1977/1972 LQs in Table 1 provide an indication of whether states have become more dependent or less dependent on lodging, on a relative basis, during the 1972 to 1977 period. New York and the District of Columbia have increased their relative dependence on tourism by approximately 10 percent, while at the other extreme, Maine, Vermont, Connecticut and Massachusetts have grown less dependent on tourism by approximately 12 to 14 percent. Again, these are relative measures. The fact that a state has become less dependent on lodging on a relative basis may simply mean that other sectors of the economy have expanded.

Shift-Share Analysis

To facilitate the shift-share analysis, 1977 receipts were converted to 1972 constant dollars. Since inflation rates differ for various economic sectors and in various sections of the United States, an approximation of inflation for the lodging sector in the Northeast was obtained by maintaining a constant ratio of dollar receipts per lodging employee for the two years under comparison. This resulted in a 5-year inflation estimate of 40.4 percent, compared to the national estimate of 43.7 percent for the same period.

To a large degree, the absolute magnitude of the lodging industry in the Northeastern states is a reflection of the size of those states. New York, Pennsylvania, New Jersey, and Massachusetts were the leading states in total lodging receipts in both 1972 and 1977. From Table 2, Column 8, it is apparent, however, that the greatest relative growth in lodging occurred elsewhere. The southern portion of the region (Delaware, Maryland, West Virginia, and the District of Columbia) experienced real growth in excess of 20 percent from 1972 to 1977. Maine's percentage growth of 12.6 percent was above the regional average of 6.7 percent,

Table 1. Location Quotient of States for Lodging Receipts with Respect to the Entire Service Economy of the Northeast, 1972, 1977, and 1977/1972.

STATE	1977	1972	1977/1972
Connecticut	0.72	0.83	0.87
Delaware	1.13	1.08	1.04
District of Columbia	1.65	1.52	1.09
Maine	2.96	3.45	0.86
Maryland	0.85	0.81	1.04
Massachusetts	0.96	1.08	0.88
New Hampshire	2.54	3.14	0.81
New Jersey	0.86	1.02	0.84
New York	0.83	0.76	1.10
Pennsylvania	1.16	1.29	0.90
Rhode Island	0.93	0.97	0.96
Vermont	3.88	4.48	0.87
West Virginia	1.66	1.82	0.91

Derived from Census of Selected Services, U.S. Bureau of the Census, 1972 and Census of Service Industries, U.S. Bureau of the Census, 1977.

but New Hampshire and Vermont experienced real growth of less than three percent. Real growth in lodging was positive in every state in the Northeast from 1972 to 1977, but was least in New York and New Jersey, where it was less than one percent.

Columns (3), (4), and (5) of Table 2 allow further perspectives of the growth in the lodging sector from 1972 to 1977. From 1972 to 1977, in constant dollars, the Northeast retail economy declined by 2.34 percent in the level of sales and receipts. Column 3 indicates the change in lodging receipts each state would have experienced had lodging receipts grown (in this case, declined) as the rest of the economy. Lodging thus was one of the growth industries during this five year period of slight recession.

The industrial mix component (Column 4 of Table 2) is a measure of the mix and growth of the lodging industry in the region compared to other industries in the regional economy. It is calculated by multiplying 1972 receipts of each state by the difference in percentage change of the lodging industry and the entire retail economy of the Northeast from 1972 to 1977. Since the lodging sector of the Northeast increased by 6.7 percent and the regional economy declined by 2.3 percent, each state's 1972 lodging receipts totals are multiplied by the factor 9.0 percent, yielding a positive industrial mix for each state. Column 9 of Table 2 proportions the lodging industry mix among the states.

The state shares component (Column 5 of Table 2) is sometimes referred to as the

Table 2. Shift-Share Analysis for Lodging Receipts in the Northeastern United States, 1972 to 1977.

State	1977 Receipts	1972 Receipts	Changes Related to:			Total Change	Net Relative Change
			Regional Growth	Indus- trial mix	State Shares		
(Measured in Millions of 1972 Constant Dollars)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Connecticut	87.8	81.1	-1.9	7.3	1.3	6.7	9.6
Delaware	23.9	19.4	-0.5	1.8	3.2	4.4	4.9
District of Columbia	158.1	123.2	-2.9	11.1	26.7	34.9	37.8
Maine	81.2	72.1	-1.7	6.5	4.2	9.1	10.7
Maryland	147.8	121.9	-2.9	11.0	17.8	25.9	28.7
Massachusetts	249.8	236.8	-5.5	21.3	-2.8	13.0	18.5
New Hampshire	72.2	70.3	-1.6	6.3	-2.8	1.9	3.6
New Jersey	278.3	277.6	-6.5	25.0	-17.8	0.8	7.2
New York	922.3	918.2	-21.5	82.8	-57.1	4.1	25.6
Pennsylvania	507.3	456.9	-10.7	41.1	20.0	50.5	61.1
Rhode Island	25.7	23.2	-0.5	2.1	1.0	2.5	3.1
Vermont	60.3	59.0	-1.4	5.3	-2.6	1.3	2.7
West Virginia	70.9	58.0	-1.4	5.2	9.0	12.9	14.3
Northeast Region	2,685.6	2,578.7	-58.9	226.9	0	168.0	226.9

Percentage Changes, 1972 to 1977

	Percent Real Change	Percent Industrial Shift	Percent State Share Shift
	(8)	(9)	(10)
Connecticut	8.2	3.2	1.5
Delaware	22.9	0.8	3.8
District of Columbia	28.4	4.9	32.2
Maine	12.6	2.9	5.1
Maryland	21.2	4.8	21.4
Massachusetts	5.5	9.4	-3.4
New Hampshire	2.7	2.8	-3.3
New Jersey	0.3	11.0	-21.4
New York	0.5	36.5	-68.7
Pennsylvania	11.0	18.1	24.0
Rhode Island	10.9	0.9	1.2
Vermont	2.3	2.3	-3.1
West Virginia	22.3	2.3	10.9
Northeast Region	6.7	(99.9)	(100.1)(-99.9)

regional component (in national research) or the proportionality component. It is a measure of the degree to which each state has increased or decreased its "share" of regional lodging receipts. It is calculated by multiplying each state's 1972 lodging receipts totals by the difference in percentage change of the state's increase and the region's increase in lodging receipts from 1972 to 1977. In constant dollars

the District of Columbia, Pennsylvania, and Maryland were the big gainers, while New York was the big loser. These state shifts are shown as a percentage of total positive and negative shift in Column 10 of Table 2. Three-fourths of all positive state shifts were accounted for by the three gaining states cited above, while 86 percent of the negative shifts were absorbed by New York and New Jersey.

The total change in lodging receipts from 1972 to 1977 (the sum of Columns 4 and 5) is shown in Column 6 of Table 2. This is also simply the difference between 1972 and 1977 lodging receipts, in constant dollars. Again, all states experienced positive growth, ranging from 30.8 million in New Jersey to 550.5 million in Pennsylvania (in 1972 constant dollars).

The net relative change (Column 7 of Table 2) is the difference between the total change and the regional growth (Columns 3, 4, and 5). Since the regional growth of the Northeast economy was negative from 1972 to 1977, net relative change data exceed total change data in magnitude.

1972-77 COUNTY LEVEL ANALYSIS

Based on county-level data from the 1972 and 1977 Census of Selected Services, location quotients (LQs) were calculated as previously explained for lodging receipts, comparing the proportion of counties' lodging receipts vs. total service sector receipts to that of the Northeast region. These data were then mapped.

It should be pointed out that while LQs revolve around an index base of 1.0, an average of all county lodging receipts LQs is considerably above 1.0 (it was 2.39 in 1977). This is true for several reasons. First, the lower bound on an LQ is 0, while there is no mathematically dictated upper bound. Secondly, the large cities of the Northeast, which control a large proportion of the total regional economy, consistently have LQs of considerably less than 1.0, which increases the LQs of counties with smaller economies. Finally, the counties for which lodging data are not available are primarily those which do not have a developed tourist economy; thus the average for counties having available LQs is increased somewhat.

Approximately 30 counties in the Northeast had LQs of greater than 5.0. Many of these counties are in areas of the Northeast traditionally known to be tourism areas - coastal areas of Maine, the White Mountains of New Hampshire, the Adirondacks and Catskills of New York, Cape Cod, Nantucket, and Martha's Vineyard in Massachusetts, Cape May in New Jersey, the southern Maryland coast, the Pocono Mountains of Pennsylvania, and the Allegheny Mountains of West Virginia. Scattered counties elsewhere in Pennsylvania and Vermont also have lodging receipts LQs of greater than 5.0 (Figure 1).

If we examine counties in the Northeast with lodging LQs of greater than 2.0, the dependence of the northern portion of the region on tourism becomes obvious. Virtually

all of Northern New England and Northern New York fall within this grouping. Numerous counties appear in the rest of the region as well, particularly in the lightly populated coastal areas.

Figure 2 shows the 1977/72 LQs for the Northeast. Scattered counties which had high 1977 LQs increased their relative dependence on tourism from 1972 to 1977. A number of other rural counties showed a relative increase in the lodging sector as a proportion of total services of 10 percent or more.

Indications of absolute change in lodging receipts in constant dollars from 1972 to 1977 can be obtained from Figure 3. Receipts in many traditional tourist areas increased by better than 10 percent, some by more than 25 percent. Lodging receipts also increased by greater than 10 percent in some nontraditional areas, such as the Buffalo, New York area. Lodging receipts declined in real dollars, however, for many Northeastern counties from 1972 to 1977. A disproportionate share of these counties are located in Massachusetts, but these counties are interspersed throughout the entire region.

SUMMARY

One of the great frustrations of tourism analysts has been the lack of availability of trend data. This problem still exists, although the Census of Selected Services' measure of annual lodging receipts is an important indicator of tourism at the state and county level. This data source would be greatly improved if the 1982 survey avoided the disclosure problems that resulted in so much missing data at the county level in 1972 and 1977. There are very few counties in the Northeast which have so few lodging facilities that lodging summary statistics at the county level would provide implications as to the size of a particular firm.

This study has been largely devoted to evaluating secondary data sources and methods for analyzing secondary tourism data. The delineation of states and counties in the Northeast which are highly dependent on tourism, or which have experienced changes in the levels of tourism receipts, and the quantification of those parameters have provided an initial step in improving our understanding of tourism in the Northeast. Further analysis is needed to explain the tourism patterns described in this study. A new Northeastern regional project has been proposed to State Experiment Station directors which, if funded, would continue this analysis.

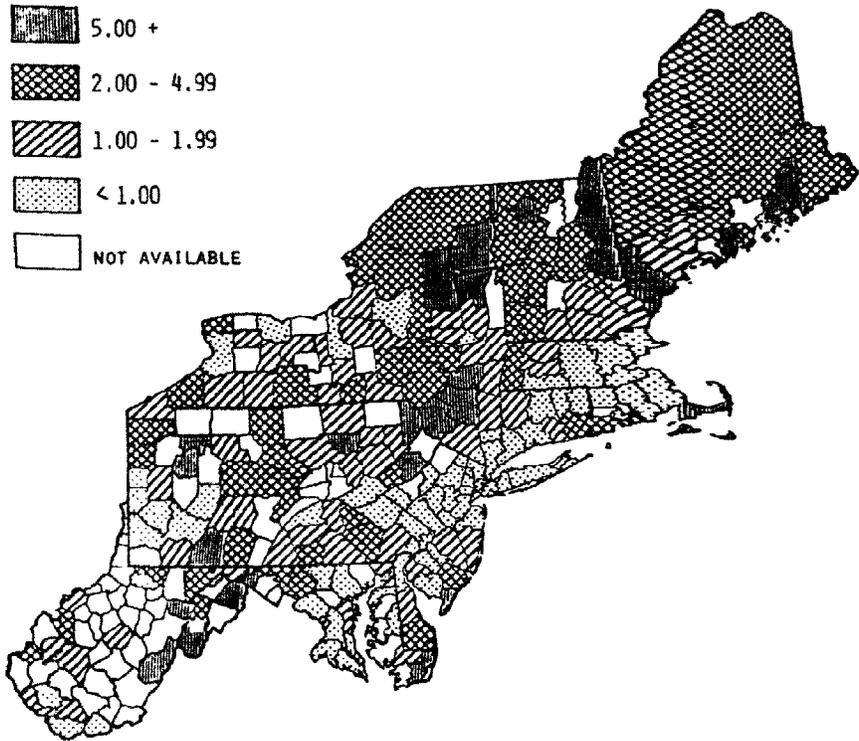


FIG. 1. 1977 LOCATION QUOTIENTS FOR LODGING RECEIPTS FOR COUNTIES IN THE NORTHEAST.

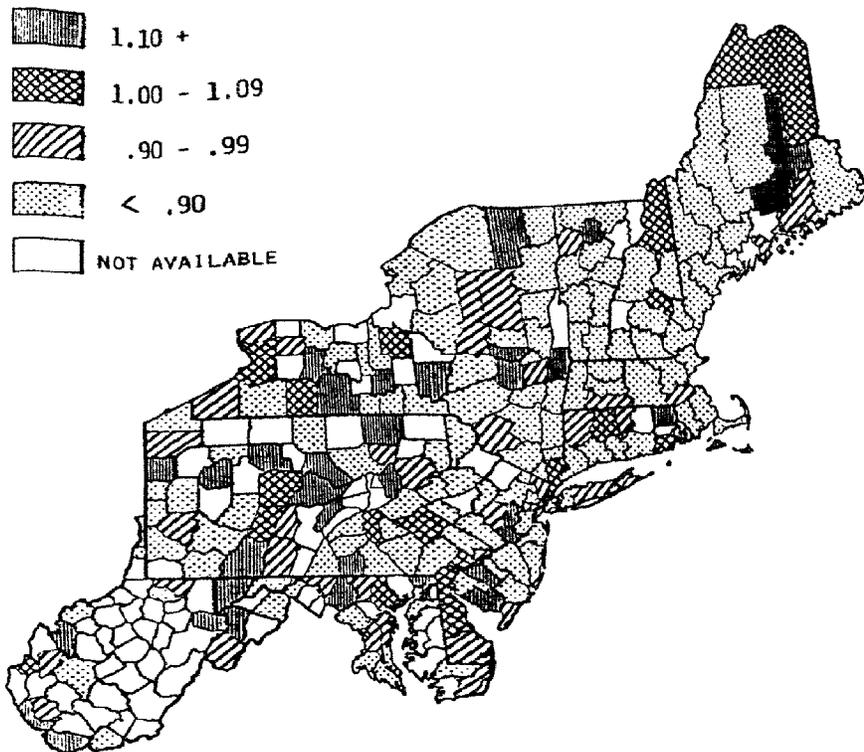


FIG. 2. 1977/1972 LOCATION QUOTIENTS FOR LODGING RECEIPTS FOR COUNTIES IN THE NORTHEAST.

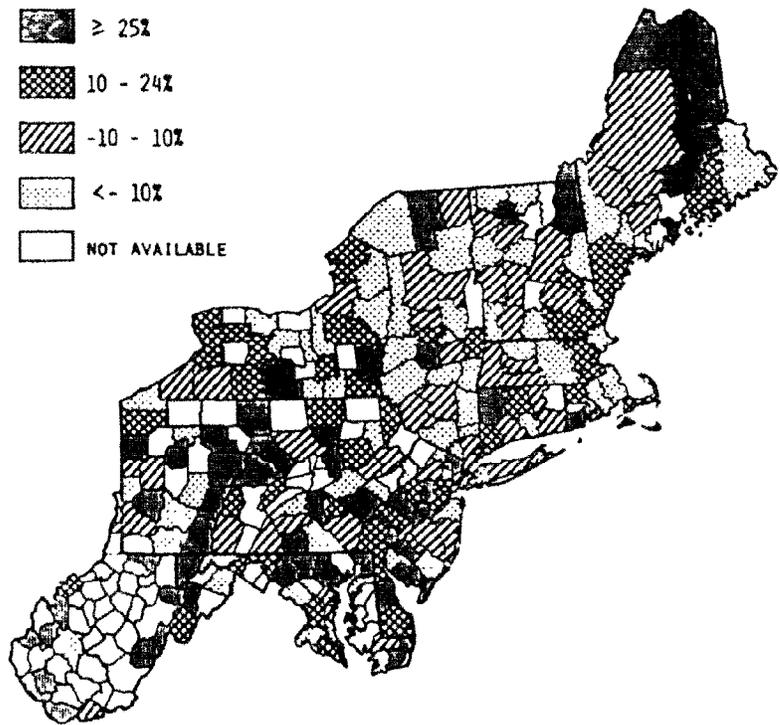


FIG. 3. NET PERCENTAGE CHANGE IN LODGING RECEIPTS FOR COUNTIES IN THE NORTHEAST, 1972 TO 1977.

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A METHOD FOR EXPLAINING TRENDS IN RIVER RECREATION DEMAND

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Abstract.--Data being collected by The National River Recreation Study (NRRS) (U.S. Forest Service, St. Paul) includes origin-destination information for recreational visits to a variety of rivers nationwide. Such data are being collected over several years during a time of rapidly changing energy costs, economic conditions and consumer attitudes. This presents an opportunity to explain trends in river recreation demand. Methods of site choice and site demand analysis may be useful for this purpose. Appropriate mathematical models are defined and explained. It is shown how these models can be used to explain demand and predict trends.

INTRODUCTION

The primary thesis of this paper is that while it is useful and necessary to describe and project recreation trends, it is more powerful and efficient if they can be explained and predicted.

To describe a trend is to observe it and draw a picture of it - How have things changed in the past and what changes are occurring now? To project a trend into the future is to assume a kind of uniformitarianism - that the future will march to the same drummer as the past - that the river of time on which we paddle our frail canoes has no surprises around the bend.

We are advised by voyageurs of old who paddled the Great Lakes in birchbark canoes, "If you do not wish to drown, stay close to the shore." This is good advice in planning and in paddling, but there are times when it is more efficient to cut across the bay. There are also gorges like that of the Churchill river as it flows toward Hudson Bay where, for miles on end,

there is little chance of rescue or escape in the event of an upset. And, sometimes we are committed to such gorges or shortcuts before the "signs of the times" warn us of possible dangers ahead.

The strategy of watching the winds and currents of now and staying close to shore has saved many a voyageur (and many a government official). But, armed with a good map of the river and a scientific forecast of the weather, we can proceed somewhat more boldly, effectively and efficiently.

In our management of recreation resources, we cannot literally scout the rapids ahead. But, we can do some kinds of research that will allow contingency scouting. To explain a trend is to explain the data of the past and present by means of theories about the processes causing changes to occur. Such theories and models can be powerful aids to judgment.

A "trend" is "the general course or prevailing tendency or drift" of something over time. In the recreation business, public and private investors are concerned about trends in recreation demand, particularly when those trends affect the consequences of lumpy capital investments or major commitments of natural resources. Failure to recognize trends in demand may cause today's "unwise" decisions to become tomorrow's foolishness. This is particularly unfortunate when such foolishness cannot easily be undone.

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It is therefore understandable that so much effort goes into the description and projection of trends. But, it is better, if the trends can be explained in terms of their underlying causes. It then becomes possible to make conditional predictions, to analyze sensitivities, and, perhaps, even to control the trend rather than to chase it. The information revealed by trend explanation often leads to a double strategy which includes both modification of underlying causes of the trends and treatment of the symptoms of the trend itself.

The purpose of this paper is to discuss methods for explaining trends in river recreation. Emphasis is on the use of rivers for recreational travel by canoe, kayak, raft, innertube, etc., including the increasingly popular whitewater float trip. The framework used is generalizable, however. This kind of recreation has been increasing remarkably in recent years to the point that rationing and allocation schemes are being considered or implemented in some places. (Shelby, 1979)

The impact of increasing demand for free-flowing rivers has been complicated by another more basic trend: increasing demand for other uses of the river and its adjacent lands. The competing demands include domestic water supply, hydroelectric power, flood water retention, irrigation, industrial and manufacturing uses of water, waste disposal, and land development. Because of difficulties in demonstrating the benefits of recreation and because these competing demands for water are clearly linked to income, employment and economic development, they tend to get higher priority. This has created a trend of contracting quantity and quality of supply.

A reactionary trend based in public sentiment and political activism emerged in the late 60's and early 70's to produce 1) legislation such as the Wilderness Act, The Wild and Scenic Rivers Act, The National Environmental Policy Act, and the Wild and Endangered Species Act, 2) numerous *ad hoc* political skirmishes aimed at legislative preservation of specific free-flowing streams, and 3) a presidential call for examination of the stream-flow requirements of recreation (Carter, J. 1978).

In the midst of this exciting and perplexing ferment of contradictory demands and trends, the 1970's introduced two profound intervening factors: energy shortage and two-digit inflation, possibly leading to shrinkage of real income. Gasoline prices have quadrupled in five years. What affects are these changes having on the quantity, geographic distribution, and social distribution of demand for river recreation? What new trends, if any, are developing, and what can be predicted for the future? Can the changes reveal useful information about the demand process so that resources can be managed more effectively and future changes anticipated?

The National River Recreation Study (NRRS) being conducted by the North Central Forest Experiment Station (Lima, et. al. 1979) may be able to help answer such questions. Beginning in 1977 data have been collected so far on the recreational use of 39 different rivers nationwide, including origin and destination data on travel to and from the rivers. Some of the rivers have been monitored for two and three years, thus providing the possibility of analysis of trends.

Theoretical Framework

A useful theoretical framework can be developed from the following assumptions:

1. The set of rivers (j=1,2,---,r) represents the nationwide spectrum of river recreation opportunities.
2. For person n residing at location i the utility or net benefit produced by a visit to river j is

$$U_n(i,j) = u_n(x_{1ij}, x_{2ij}, \dots, x_{gij}, \dots, x_{pij}) + \epsilon_{nij} \quad (1)$$

Where x_{gij} is the magnitude of variable g experienced by person n during a visit to river j. The x's may include travel cost, site use fees, river characteristics which influence the suitability of the site for the purpose in question (deBettencourt, 1979). u_n is the systematic or predictable function by which utility is sensitive to x. The residual ϵ_{nij} is random "error" and is assumed to be independently and identically distributed for all rivers according to the Weibull distribution with dispersion parameter λ . (McFadden, 1978)

3. Interpersonal and inter-situational differences in u can be captured effectively by a set of market segments or person types. To simplify the discussion, notation designating person or person type will be dropped. The utility function will be designated simply by

$$U(i,j) = u(x_{1ij}, x_{2ij}, \dots, x_{gij}, \dots, x_{pij}) + \epsilon_{ij} \quad (2)$$

with the understanding that it may vary by market segment. The utility function may vary also by activity or purpose of visit (e.g., kayaking, canoeing, rafting), but for simplicity it may be assumed only one activity is considered.

4. When a person engages in the recreational activity in question, that river is chosen which maximizes utility.

Based on these assumptions and given participation in the specified activity, the probability that a person residing at location i will choose river j is

$$\hat{P}(j|i) = \frac{e^{\lambda U(ij)}}{\sum_{k=1}^r e^{\lambda U(ik)}} \quad (3)$$

This is a logit choice model (Domencich & McFadden, 1975). It can be estimated by maximum likelihood methods if the form of the utility function is specified and data are available on individual choices and the magnitudes of the x 's experienced.

This kind of model is generally called a "site-choice" or "trip-distribution" model. It explains the proportion of total demand each site will receive, but it does not explain the magnitude of demand. The number of visits delivered by location i to river j is

$$V_{ij} = P(j|i) \sum_{k=1}^r V_{ik} = \frac{e^{\lambda U(ij)}}{\sum_{k=1}^r e^{\lambda U(ik)}} \sum_{k=1}^r V_{ik} \quad (4)$$

Where $\sum_{k=1}^r V_{ik}$ is the total number of visits from location i to all rivers. In order to explain the magnitude of site demand, it is thus necessary to explain $\sum_{k=1}^r V_{ik}$. This is a "trip-generation" problem.

There are several ways trip-generation might be approached (Stopher & Meyburg, 1975). One way is to use a simple empirical model of the type proposed by Cesario and Knetsch (1976). Assume location i is a geographic area containing a finite number of people P_i , of the type in question. Assume also that the average number of river trips per person is a function of the total supply of opportunities. The denominator of the trip distribution logit model (3) measures the condition of supply from the point of view of i . A plausible hypothesis is

\mathcal{C} (River trips per person)

$$= \frac{\sum_{k=1}^r V_{ik}}{P_i} = b_0 \left[\sum_{k=1}^r e^{\lambda U(ik)} \right]^{b_1} \quad (5)$$

$$\text{or } \sum_{k=1}^r V_{ik} = b_0 P_i \left[\sum_{k=1}^r e^{\lambda U(ik)} \right]^{b_1} \quad (6)$$

Given this relationship, the site demand function becomes

$$V_{ij} = \frac{e^{\lambda U(ij)}}{\sum_{k=1}^r e^{\lambda U(ik)}} b_0 P_i \left[\sum_{k=1}^r e^{\lambda U(ik)} \right]^{b_1} \quad (7)$$

An alternative approach which is conceptually more general is the nested choice model (McFadden, 1978). The choice process might be decomposable into several conditional demand allocation stages: 1) choice of recreation site given recreation activity, 2) choice of recreation activity given that time is allocated to recreation, and so on. If the utility function is separable by site variables, activity variables, etc., a logit model can be derived which explains $P(j, \beta, \dots)$, the probability of choosing site i and activity β and \dots etc. Activity variables might include "psychological outcomes" (Driver and Brown, 1975) as used by Peterson et al., (1978) to explain activity choice. However, for use in prediction, even a two-stage model requires knowledge of all sites for all activities. In all but very simple cases of two or three choices in each stage, the model becomes impossibly complex and data hungry. With simplifying assumptions, it might be feasible to develop a model of this type which requires specific knowledge of site attributes only for river recreation. This is a subject for another paper, however. The approach used here is based on equation (7), with the understanding that more powerful models may be possible.

The Single River Case

Equation (7) shows the demand for one river to be a function of the characteristics of all rivers with which the river competes. Consider the special case of a river with no competitors. This situation might exist, for example, when the users of a particular river include a subgroup of people whose choice set contains only that river. Some rivers, such as the Colorado River in Grand Canyon National Park and the Middle Fork of the Salmon River in Idaho may be so unique they compete with other rivers only in the sense they compete with movies or trips to Europe. A certain river may have local geographic monopoly such that virtually all the visitors use that and only that river for the activity in question. Or, we may choose to perform the analysis, given the choice of this river. In any case, the assumption of no competitors implies the parameters, models, and conclusions apply only to that river and cannot be generalized to other situations, because none comparable exist. With this understood, there are no dangers in single site analysis. For the single river case, equation (7) becomes

$$V_i = b_o P_i e^{b_1 U(i)} \quad (8)$$

In general, the parameters of a single-site model such as equation (8) should not be estimated for one site and applied to another. Equation (8) derives from the assumption the rivers in question are not competitors. This may imply different utility functions and/or mutually exclusive populations for different rivers.

It is interesting to compare (8) with (7). Equation 7 can be stated as

$$V_{ij} = \left[\sum_{k=1}^r e^{U(ik)} \right] (b_1 - 1) b_o P_i e^{U(ij)} \quad (9)$$

or

$$V_{ij} = \gamma_i b_o P_i e^{U(ij)} = b_o P_i e^{[\gamma_i \gamma_1 + \gamma_2 U(ij)]} \quad (10)$$

where γ_i is a function of the condition of total supply from the point of view of i . This comparison reveals an interesting conclusion. Even if b_o , b_1 , P_i and U are universal for all rivers, substitutes or not, the single-site model (8) multiplies the utility function by b_1 , the trip-generation exponent, while the multiple-site model (10) adds to the utility function an origin-specific supply function. Estimating equation (8) for one river and then applying the results to another river is an implicit assumption that $[\gamma_i \gamma_1 + \gamma_2 U(ij)] = b_1 U(ij)$. While this may be true under very restrictive conditions, in general the single site model clearly does not reveal generalizable information about sensitivity of demand to changes in variables in the utility function such as changes in fuel costs and site variables. While such an empirical model can explain demand and participation trends for a given river, it cannot explain or predict such trends under conditions different than those under which the data were observed. The magnitudes of the estimated "constant" parameters will change with changes in the variables.

On the other hand, using the multiple site model (7) or (10) for several non-substitutable rivers also has serious problems. As in (9) the market population from which each river draws its visitors may be different and/or the utility functions may be different. Such problems can distort the results seriously and lead to invalid conclusions if they are not recognized.

Thus, ability to predict changes in participation at specific sites requires for each river correct knowledge of a) the consumer utility function and b) the market population. If, for a given set of rivers, utility "errors" are identically and independently distributed over the market populations by the normal or Weibull distribution about a common utility

function, equation (7) is an explanatory site demand function. If a river has no substitute, equation (8) is an explanatory site demand function, but is not generalizable to other rivers.

Simple Illustrative Models

For illustrative purposes assume the predictable portion of the utility function contains only two variables,

D_{ij} = travel distance from location i to river j

A_j = a measure of the site quality at river j

The functional form most often used in logit models is the simple linear combination:

$$u = b_o + b_1 A_j + b_2 D_{ij} \quad (11)$$

This function assumes a constant marginal rate of substitution, which may be reasonable for narrow ranges of variation although it does not allow estimation of the dispersion parameter. From the point of view of economic theory, a more general form is

$$u = \alpha A_j^{\beta_1} D_{ij}^{\beta_2} \quad (12)$$

Another form with properties similar to (12) is

$$u = \zeta \alpha + \beta_1 \zeta \ln A_j + \beta_2 \zeta \ln D_{ij} \quad (13)$$

This form produces convenient algebraic simplification of the logit model. Equations (12) and (13) are appealing because they show diminishing marginal returns, but none of these forms is satisfactory when the marginal utility function is not single valued. For example, the attractiveness of a river for white-water canoeing is low for sluggish streams. As the white-water difficulty increases, attractiveness increases to a point and then begins to decrease again as the river becomes too difficult. Perhaps this is because the variable is a composite of several more basic variables, but, in general, it has proven useful to represent such relationships by a quadratic utility function (deBettencourt, 1979):

$$u = \alpha + \beta_1 A_j^2 + \beta_2 A_j D_{ij} + \beta_3 D_{ij}^2 \quad (14)$$

Apparently there has not been much research done on the problem of specifying the best utility function in logit models or site-demand models. Most logit modellers seem satisfied by the assumption of (11), perhaps because utility is difficult to measure and the models robust. In any case, more research is needed on utility functions. At least the robustness of the models over different utility

function forms needs to be studied.

Illustrative Empirical Applications

To illustrate the kinds of information revealed for trend and impact analysis, assume the utility function has the form of (13) and distance is the only variable. The multiple site-demand model (7) is

$$V_{ij} = \frac{D_{ij} \lambda^B}{\sum_{k=1}^r D_{ik} \lambda^B} b_o (\alpha \lambda^{b_1}) P_i \left[\sum_{k=1}^r D_{ik} \lambda^B \right]^{b_1} \quad (15)$$

The single-site demand model (8) becomes

$$V_i = b_o P_i \alpha^{b_1} D_i \lambda^{b_1 B} \quad (16)$$

In estimation, the parameters cannot be decomposed and the two models are

$$V_{ij} = \frac{D_{ij}^{B_1}}{\sum_{k=1}^r D_{ik}^{B_1}} B_o P_i \left[\sum_{k=1}^r D_{ik}^{B_1} \right]^{b_1} \quad (17)$$

and $V_i = B_o P_i D_i^C \quad (18)$

where $B_o, B_1, b_1,$ and c are estimated parameters.

Given the assumptions and the multiple-site case (equation 17), the parameter B_1 describes the sensitivity of demand distribution to distance. The parameter b_1 describes the sensitivity of demand to the overall condition of supply. In the single-site case, C describes demand sensitivity to distance, but it is not generalizable to other sites.

Response of demand to changes in things like site attractiveness and fuel cost cannot be analyzed in (17) or (18). Changes in fuel cost would change the meaning of distance and would cause changes in B_1 and C . The impacts of changes in fuel price and other economic conditions would be better analyzed if D_{ij} were replaced by variables describing travel time, travel mode, fuel price, etc. The resulting equations would be more general and would explain the response of demand to changes in these variables. Likewise, variables describing the specific site attributes to which site attractiveness is sensitive should be included in the utility function. This would explain the response of demand to specific changes at specific sites.

Using only distance and population, the authors used a model based on the log-linear utility function, equation (13), to do single-site analysis for the Boundary Waters Canoe Area Wilderness in Minnesota. Under the assumption of no substitutes, the purpose was to estimate

$$V_i = B_o P_i D_i^C \quad (19)$$

for several different camping types of wilderness travelers: paddle canoeing, motor canoeing, motor boating, hiking, cross-country skiing, and snowmobiling. The purpose of the study was to describe the relative uniqueness of the site for different activity purposes by describing the geographic origins of visitors.

In order to eliminate biases resulting from possible differences in sampling rates, the equation was estimated in the following form:

$$P(ni) = P(i)P(n|i) = \alpha D_i^C e^{\epsilon_i} \quad (20)$$

- where $P(i)$ = the probability that a visit randomly observed at the site is from origin i ,
- $P(n|i)$ = the probability that a visit randomly observed at the site is person n from origin i , given that the visit is from origin i and assuming all persons at origin i are equally likely to visit the site.
- $P(ni)$ = the joint probability that a visit observed randomly at the site is person n from origin i , assuming all persons from origin i are equally likely to visit the site.
- ϵ_i = an error or residual that is assumed to be independently and normally distributed with constant variance over the range of analysis.

Estimates of these probabilities are

$$\hat{P}(i) = \frac{V_i}{\sum_h V_h}$$

$$\hat{P}(n|1) = \frac{1}{P_i}$$

$$\hat{P}(ni) = \frac{V_i}{P_i \sum V_h}$$

Because equation (20) is a probability, its complete specification in the estimated form is

$$\hat{P}(ni) = \frac{D_i^c}{\sum P_h D_h^c} \quad (21)$$

This equation can be estimated by maximum likelihood methods. However, the simpler method of ordinary least squares applied to the log-linear form of equation (20) was used. The results are shown in Table 1.

Using National River Recreation Study data from 1977, Peterson, Lime, and Anderson (1979) estimated similar single-site equations for twelve rivers. The results are shown in Table 2.

With NRRS data for twelve rivers studied in 1978, (Ergün and Peterson 1980) estimated the following site choice model:

$$P(j/i) = \frac{e^{BD_{ij} + C_j D_j}}{\sum_{k=1}^r e^{BD_{ik} + C_j D_k}} \quad (22)$$

This logit model is based on the linear utility function

$$u = BD_{ij} + C_j D_j \quad (23)$$

Table 1
Single site Analysis for Six Uses of the Boundary Waters Canoe Area Wilderness
(Assuming no substitute sites for the respective activities)
(1974 - 1977)

Activity	Estimated Equation $P(ni) =$	Number of Trips in Sample	Number of Zones	Log-Linear R^2	Adjusted Log-Linear R^2
Paddle Canoeing	$(0.03)D_i^{-2.54}$	68,283	167	0.774	0.773
MOTOR Canoeing	$(0.16)D_i^{-2.86}$	10,195	119	0.745	0.743
Motor Boating	$(0.10)D_i^{-2.87}$	14,278	152	0.713	0.711
Hiking	$(0.19)D_i^{-2.93}$	2,483	62	0.813	0.810
Cross Country Skiing	$(4.13)D_i^{-3.47}$	365	14	0.816	0.801
Snowmobiling	$(64.31)D_i^{-4.13}$	422	12	0.907	0.900

Table 2
Single-Site Analysis for Twelve Rivers
(1977 Data)

River	Estimated Equation $P(n_i) =$	Number of Trips in Samples	Number of Zones (i)	R ²	Adjusted R ²
Main Salmon	$(0.00096)D_i^{-1.78}$	175	27	0.735	0.724
Middle Fk. Salmon	$(0.0014)D_i^{-1.81}$	191	28	0.702	0.691
Upper Colorado	$(0.00083)D_i^{-2.02}$	2169	52	0.795	0.791
Apple	$(0.00067)D_i^{-2.03}$	191	26	0.753	0.743
Nantahala	$(0.0011)D_i^{-2.08}$	87	26	0.697	0.684
Chattooga	$(0.0012)D_i^{-2.26}$	9877	77	0.728	0.724
Illinois	$(0.0023)D_i^{-2.27}$	226	22	0.789	0.778
DesChutes	$(0.012)D_i^{-2.48}$	456	18	0.797	0.784
Ocoee	$(0.0061)D_i^{-2.61}$	280	23	0.875	0.869
Mohican	$(0.0028)D_i^{-2.64}$	444	21	0.837	0.828
Hiwassee	$(0.035)D_i^{-2.87}$	128	12	0.858	0.844
Upper Missouri	$(1.26)D_i^{-3.03}$	497	32	0.911	0.908

where d_j is a site-specific dummy variable which takes on the value of one for river j and zero for all other rivers,

c_i is an estimated site-specific parameter capturing sampling and specification errors, including biases resulting from different sampling rates at different rivers.

β is the estimated marginal utility of distance.

The analysis was based on 4524 visits to the twelve rivers from 377 three-digit zip-code zones. The estimate of β in equation 22 is -.00167. The results clearly show distance to be an important explainer of demand distribution. A simple market share model correctly predicts 20.9% of the trips. With the addition of distance to the model, this rises to 50.7%. Assignment of equal probabilities on the basis of no information whatever gives 8.3% correctly predicted. However, Ergun also found that β varies for the twelve rivers from region to region when the model is estimated on a regional basis. He also divided the twelve rivers into two basic

types and found differences in β by river type. This indicates the presence of effects not adequately captured by equation (21).

Discussion of the Empirical Results

Results presented in the preceding section are illustrative only. The equations are estimated under very restrictive assumptions. The estimation procedure, while simple, does not satisfy the condition that the probabilities must sum to one over all cases, which may introduce slight biases in the exponents and major biases in the coefficients. The coefficients should, in any case, be regarded with skepticism because of their extreme sensitivity to errors

The most interesting bit of information is the exponent of distance. Given the hypothesized functional form (20), the exponent c is the distance elasticity of trip attraction. If the equation is constrained as in (21) the elasticity is $c[1 - P(n_i)]$. However, $P(n_i)$ is likely to be an extremely small number except in the unlikely situation where the origin is very

close to the destination, there are few nearby origins, and the population is very small. In any case the probability will always be less than the reciprocal of the population. The elasticity estimates the percent change in $P(n)$ when distance changes by one percent. Assuming that any estimation biases affect all equations in the same systematic way, comparison of the exponents between equations reveals relative differences in elasticity. It does not, however, reveal reasons for the differences.

While attempting to interpret the results, it is important to recall the assumptions under which the illustrative equations were estimated, especially:

1. The distance-decay of trip attraction is insensitive to conditions of competing supply,
2. There are no differences in site quality,
3. The population from which a site attracts its visitors is homogeneous vis-a-vis the systematic or predictable portion of the utility function, and inter-personal differences are randomly, independently, and identically distributed by the Weibull distribution, and
4. The market population is the entire population of the contiguous United States.

With these assumptions in mind, the estimated elasticities lead to the following comments and conclusions:

1. Trip attraction is very sensitive to distance and is strongly explained by distance alone.
2. On the average, the explained portion of log-linear variation among zones is about the same for the BWCAW (79%) as it is for the rivers (78%). There is little variation among all the equations in the amount of variance explained. There is apparently no cause to conclude that the model is more applicable in some cases than in others.
3. The distance elasticity varies among rivers and among different uses of the BWCA. This implies some "market areas" are more local than others, for whatever reason. Generally, the more elastic the demand, the more local the resource. It is interesting that the BWCA shows very different elasticities for different uses, which suggests that a site may be geographically more unique for some purposes than for others, i.e., it tends to reach out farther for some kinds of visitors than for others.
4. Because distance is closely related to travel cost and travel time, given travel mode,

it should be possible to estimate models which explain the sensitivity of site demand to these variables. This will allow prediction of the response of demand at specific sites to changes in fuel cost and transportation technology, other things being equal.

5. It is not clear from the empirical results what the reasons are for the differences in exponents. Plausible causes are
 - a) differences in the benefit of an activity to its participants,
 - b) differences in the quality of a site for the given activity,
 - c) differences in the quality, quantity and relative location of competing sites and activities, and
 - d) differences in participation costs.

It is clear that differences exist. Further experiments are needed to isolate the causes so that demand can be understood and predicted and resources wisely allocated.

6. Although details are not reported here, examination of the residuals shows non-random geographic patterns (Peterson, Lime & Anderson, 1979). This implies other variables may be influencing the relationships systematically and their effects may be predictable, although the magnitude of their effects is less than the effect of distance.

The distance elasticity of trip distribution in equation (23) is $\beta D_j [1 - P(j|i)]$ where $\beta = -0.00167$. This is not comparable with the trip attraction elasticity, because they are different concepts and the utility function specifications differ. It is interesting to note, however, that when $P(j|i)$ is small, the distance elasticity of trip distribution has the range of -1.78 to -4.13 when distance has the range of 1066 miles to 2473 miles.

More important, though, is that the estimate of β is not stable when rivers are segmented by type and the population is segmented by area. This could be caused by incorrect specification of the utility function and/or aggregation error.

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TRENDS IN RECREATIONAL VEHICLE TRAFFIC IN NORTHEASTERN MINNESOTA¹

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INTRODUCTION

Many northeastern Minnesota communities depend upon outdoor recreation activities and tourism for a substantial portion of their yearly cash inflow. While the recreation and tourism industry in the region has grown steady in recent years, it may prove to be less stable in the future than other industries, for at least two basic reasons: (1) while sociologists and recreation planners may dispute the assertion, outdoor recreation is considered by many a luxury or a non-essential activity and therefore subject to alteration of activity participation due to changing economic status of families and individuals. (2) the recreation and tourism industry is dependent to a large part on a highly mobile population. Because of these two characteristics, recreation and tourism patterns can be subject to rapidly changing trends as a result of inflation, increasing energy costs and gasoline availability.

To respond to data needs of program planners and decision makers within the recreation and tourism industry, a recreational vehicle traffic monitoring program was implemented to determine if an easily conducted, standardized count of traffic could adequately describe patterns of recreational oriented movement in and out of the Duluth area. The monitor was designed to identify: vehicles that were most common; movement of boats, canoes, dirt bikes, skies, snowmobiles etc; periods of high and low volumes; and changing patterns of movement.

In addition to the traffic monitor, existing supplemental data was expected to aid in determining the effect that external factors had on levels and patterns of recreational activity. While temperature, weather, season, events, and holidays were to be examined as potential impacts, the overriding concern of many people in the industry focused on spiraling gasoline prices and the potential of nonavailability of gasoline supplies.

Studies and theories concerning recreational traffic and response to gasoline restrictions both in Canada and Europe have been conducted by Dr. R. I. Wolf (1969, 1977). Unavailability of fuel is thought to be a more potent force in restraining travel than its rising cost but there is little research that can support this contention. Wolf has found that there appears to be a change in travel patterns in Europe as a result of the continuing escalation in fuel costs or in its restricted availability. Europeans are turning toward public transportation to provide for their required travel to and from work and their social obligations, but reserve their private auto for travel to their recreational second home or their favorite recreation area. Will Minnesotans and their visiting neighbors respond similarly? This is what we wanted to know.

STUDY AREA

Duluth is located at the western tip of Lake Superior in northern Minnesota. It is a center of recreation for northern Minnesota

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and Wisconsin in its own right, but virtue of its beautiful harbor, adjacent Lake Superior, long ocean-like beach, cultural and retail opportunities and transportation linkages.

Expansion and new development of recreation opportunities is evident in Duluth. The Marine Museum, one of the most visited attractions in Minnesota, was expanded in 1978-1979. Cleanup of the picturesque and largely undeveloped St. Louis River which flows through the city has already begun; a new, advanced, waste-water treatment plant located on the river started operations in the fall of 1978. Several new hiking trails planned for 1980 are in some of Duluth's 110 city parks.

The recreation-tourism industry is a very important segment of Duluth's economy. Uel Blank reported that during 1972, visitors traveling through Duluth typically made expenditures equal to 28 percent of the city's total retail sales for a summer week. A yearly projection of non-resident vehicles had Duluth-Superior as their major destination and survey data indicated a conservative estimate of 3.8 million non-resident person-trips to Duluth-Superior for vacation purposes alone each year.

Duluth also serves as a gateway for much of the popular northwoods lake country. It is the largest retail center in the upper Minnesota-Wisconsin region, and thus serves the needs of travelers passing through (and is the destination of many Canadian shopping trips). In addition, the city's geographical position at the head-of-the-lake has led to the intersection of several highways through the city. Backpackers hiking down the main street of Duluth also is a common sight.

Northern Minnesota and Wisconsin have great recreation potential year-round, from fishing in the spring to boating in summer; hunting, fishing, and "leaf-peeping" during autumn; and snowmobiling and skiing in winter. Although summer may always be the busiest tourist season of the year, activity during the other seasons is on the increase. Thompson Hill Visitor's Center had its highest 1978 daily total on September 30th, during the height of the fall foliage season!

PROCEDURES

Interstate 35 south of Duluth was chosen for the traffic counts for two main reasons: first, it brings traffic primarily from the St. Paul-Minneapolis area and further south. Most people vacationing in northern Minnesota come from that direction. Secondly, it has one of the highest volumes of traffic entering Duluth from any direction and the highest percentage of out-of-state recreational

traffic (Blank).

Friday afternoons from 1 to 5 p.m. were selected as the optimum counting period for this survey and is assumed to represent the beginning of the weekend recreational traffic period. In addition, Thompson Hill Information Center (located near the observation station) hourly counts indicate that 1-5 p.m. on Fridays is the peak flow period of the week for visitors coming into the area. Counting any later in the afternoon was not possible during the winter months, and week-end traffic counts would have been more expensive and much harder to arrange. In any case, consistency seemed to be the crucial factor in conducting counts throughout the year, since whatever time period selected for counting would only represent a portion of the total weekly recreational traffic.

The traffic count tally sheets were designed to be inclusive of all types of visible recreational traffic and as objective as possible. In some categories there were unavoidable errors, but these were felt to be relatively small and inconsequential. Recreational traffic was classified in two ways. First, counters noted the type of vehicle carrying or pulling recreational equipment, e.g. sedan, pickup, motorhome, four-wheel vehicle, van or other. Second, the type and number of recreational indicators were recorded such as boats, skis, camper-trailers, snowmobiles etc. Recreational equipment was further classified where appropriate, as either "warm-weather" or cold-weather" indicators.

Counting was begun in late July on a test basis. Official counting for this study started August 5, 1977 and ended on July 27, 1979, two complete years of data. Separate counts were kept of northbound and southbound traffic for each hour. At the end of four hours of counting, the totals for each hour in each direction were calculated.

Weather forecasts for each weekend were obtained from the National Weather Service on Friday morning. Any special tourist or recreational-related events occurring that weekend were also noted. Presence or absence of ice on Lake Superior and inland lakes was recorded, as well as the status of hunting and fishing seasons. Supplementary data obtained from other sources were tabulated at the end of the count year. Such data included Thompson Hill Visitor Information Center inquiries, Minnesota Department of Transportation traffic averages, gasoline prices, hotel/motel occupancy rates, Amtrak passenger and recreational baggage totals.

RESULTS AND DISCUSSIONS

This study was initiated in August 1977

and the first year report analyzed data collected between August 1977 and July 1978. The first year report (Norton, Hales, and Wood 1978) demonstrated that a standardized count of recreational traffic can be made that can reflect several trends in both type and volume of recreational travel. Such counts were useful in isolating those events and factors which significantly influence recreational travel patterns. The second year of data was then examined to determine trends, consistently and impacts of events such as gasoline non-availability in comparison to the first year data.

Treatment of Data

Separate hourly totals of recreational traffic were combined and the four-hour study totals of vehicles were used for most analyses. Analyses included: 1) Seasonal variations in volume of recreational traffic and types of equipment tallied, 2) Comparisons of volume and types of northbound versus southbound recreational traffic, 3) Correlation between patterns of travel revealed by collected data and by other travel indicators, such as Amtrak passenger counts, total traffic volume (as determined by the Minnesota Department of Transportation) and visitor-use data of the Thompson Hill Information Center; 4) Relationships between recreational travel patterns and factors which possibly influence travel such as holidays, special events, hunting and fishing season openings, weather conditions and gasoline price and availability.

For brevity sake, only four factors which were identified to exert significant influence upon recreational traffic will be discussed here: 1) weather, 2) holidays-special events, 3) gasoline price and 4) gasoline availability. A more detailed report on the second year data is in preparation.

Weather Conditions

Weather conditions during 1978-79 were generally similar to those during 1977-78. In both years, the beginning of November was marked by a rapid decrease in temperature, early December was marked by a warm spike, and the spring climb in temperatures was longer and more gradual than the fall decrease. Temperatures started increasing in early March and climbed steadily until early June before leveling off. Major differences between the two years were as follows: 1) There was more snow during 1978-79 than 1977-78. Snow depth climbed steadily to a peak of 30 inches in late February and early March. During 1977-78, maximum average accumulation was only 12 inches by the end of February. 2) 1978-79 was a windier year than 1977-78, particularly during the fall and winter months. 3) Road conditions were more often poor during

1978-79 than during 1977-78, especially during winter. 4) The winter of 1978-79 was colder than that of 1977-78. Temperatures dropped below 32°F two weeks earlier than 1977-78 and did not reach above 32°F again until one week later. Also, there was no January thaw as there had been in 1977-78. 5) The spring was colder and later than in 1977-78. Average temperature stayed below 40°F until mid-May when it suddenly jumped to 50°. In 1977-78, average temperatures had reached 50° by late April and stayed above that temperature from then on.

Holidays and Special Events

Holidays were, of course, the same from one year to the next, as were the openings of hunting and fishing seasons. Types of special events, however, differed somewhat during the two years. Also, they did not always fall at the same time. In some cases a holiday and special event occurred on the same weekend during one year but on different weekends during the other year. This allowed separation of the effects which those two factors had on recreational travel.

Gasoline Prices

During 1977-78, gasoline prices in both Duluth and Minneapolis averaged \$.58 to \$.62 per gallon. They varied by no more than \$.08 per gallon throughout the year. They showed neither a net increase or decrease, but ended the year at approximately the same price as they started the year.

1978-79 was quite a different story. Prices rose approximately \$.05/gallon in the first six months of the study-year. During the second six-month period, they jumped another \$.28/gallon. This represented a 50% increase in prices between July 1978 and July 1979. Between August and December, Duluth gasoline prices were roughly \$.04/gallon higher than Minneapolis prices, as they had been through 1977-78. However, during the period of rapid price increase in the winter and spring, Minneapolis and Duluth prices were similar. By June and July, Duluth gasoline averaged \$.02/gallon less than Minneapolis gasoline.

Gasoline Availability

No shortages of gasoline availability occurred or threatened to occur during 1977-78 or during the first 9 months of 1978-79. However, by May 1979, the Minnesota Energy Agency began issuing warnings of upcoming shortage and voluntary cutback in gasoline consumption was urged. During June, gasoline shortages became more and more common until the end of the month, when they were fairly severe in some places. During

July, gasoline supply stabilized somewhat and by the end of the month, threats of more shortages were not so severe.

With these considerations in mind, it is now possible to compare the two years of recreational travel monitoring, with an eye toward identifying causes of differences between the two years.

Patterns of Traffic Flow

Seasonal changes in volume and composition of recreational traffic seen in 1978-79 were very similar to those seen in 1977-78. Bimodal distribution of traffic volume was observed during both years. Fall periods of very low recreational flow began and ended one to two weeks earlier in 1978-79 than in 1977-78, possibly due to the somewhat earlier drop in fall temperatures.

Spring periods of very low flow occurred during the same weeks in the two years. Beginning and end of the cold season, as defined by types of recreational vehicles counted, differed by no more than a week between the two years of observation. The appearance of cold season recreational equipment corresponded closely with the first appearance of snow, which was similar in the two years, rather than with other weather conditions, which varied a little between the two years.

Response to holidays and special events, as indicated by recreational traffic counts, was extremely consistent between the two years. All major holidays brought about the same response in recreational traffic. Special events varied from year to year, but three main events, the Duluth Annual Folk Festival, Fall Foliage Peak and University of Minnesota-Duluth graduation occur yearly. In both years of the study, the weekends of these three events showed large increases in recreational traffic in the north direction. All but the fall foliage peak also brought about a large increase in southbound traffic. During 1978-79, the combined effects of fall foliage peak and the opening of small game hunting may be linked with a decrease in southbound traffic, regardless of the large increase in northbound traffic.

During both years, there was a noticeable trend for special events within the city of Duluth to correspond with slight decreases in southbound traffic, i.e. recreational traffic leaving Duluth. Some examples are Park Point Art Fair, major UMD hockey games during 1977-78, Duluth Days - all-city celebration in 1977-78, Duluth city ski-jumping contest in 1978-79, and the city softball tournament in 1978-79. Essentially these events kept Duluth residents home and off the highway to

other places.

Finally, response of recreational traffic volume to hunting season opening weekends was quite similar in the two years. Opening of deer season consistently caused large increases in recreational traffic in both the north and south directions. Opening of small game season corresponded with very low levels of recreational traffic. However, opening weekends of steelhead fishing, smelting and other fishing showed only slight increases in traffic in 1978-79, while in 1977-78, smelting and inland fishing opening weekends were accompanied by large increases. There are at least two possible explanations for this. 1) Since the spring of 1978-79 was much colder and slower in coming to northern Minnesota than the previous spring, the beginning of fishing season was not as desirable a time to be outdoors for many people. Also, inland lakes were frozen much later. The smelt run was slower and more spread out than the previous year, therefore smelting activity would not be likely to bring about as sharp an increase in traffic as the previous year. 2) The price of gasoline was increasing at the sharpest rate during this period of April, May and June of 1978-79. This may have discouraged people from traveling as far as they normally would have for fishing, especially when considered in combination with the cold and wet spring that northern Minnesota was experiencing.

Volume and Composition of Recreational Traffic

Although seasonal trends in relative numbers of vehicles were similar in 1977-78 and 1978-79, there were significant differences in the absolute numbers of recreational vehicles at any given time. During August, September, October and November, recreational traffic volume in the second year was equal to or somewhat lower than the first year. Between December and March, both north and southbound traffic were significantly higher than in the previous year. In April, southbound traffic was much higher, but northbound traffic was 33% lower than in 1977-78. From May on, both north and southbound recreational traffic were lower in the second year than in the first year.

Most likely, the large increase in cold-season recreation can be directly related to the continuous and deep snow cover present in 1978-79. Amtrak records of skis carried during the same time period showed an increase of greater than 200% over 1977-78, which is probably indicative of the same thing. Cold and wet spring weather may account for the increase in southbound traffic and the decrease in northbound traffic during April and perhaps early May. However, by late May, temperatures were once again seasonable and

weather cleared up. It seems likely that the net decreases in recreational traffic during May, June and July may have been due to changes in the price and availability.

A closer look at May, June and July data lends evidence to this suggestion. Table 1 presents the changes which occurred in recreational traffic between 1977-78 and 1978-79 on a weekly basis. It is apparent that early May and late June of the second year experienced the greatest reductions in recreational traffic of 20 to 55% from the previous year. As mentioned previously, low levels in early May may have been due to the unseasonable cold temperatures. However, neither temperature nor other weather factors explain the continued low levels of recreational activity after mid-May. From mid-May to mid-June, recreational travel volume recovered somewhat, however, it remained depressed approximately 10% relative to 1977-78.

TABLE 1: Weekly changes in recreational traffic volume between 1977-78 and 1978-79; May, June, and July

	Total Recreational Traffic		% Change from 1977-78 vs. 1978-79
	1977-78	1978-79	
May 1	158	73	-54 2
2	185	143	-22
3	156	148	- 8
4	306	274	-10
June 1	143	166	+17
2	285	250	-11
3	247	243	- 2
4	247	203	-18
5	342	256	-24
July 1	251	137	-45
2	362	273	-25
3	282	200	-30
4	305	275	-10
Total	3884	2845	-26 2

In late June and the first three weeks of July, volume once again fell to levels 20-50% below those of the previous year. One exception was the first weekend of July, when volume was up by 23%. This is misleading, however since the first July weekend was the 4th of July holiday weekend in 1978-79, while in 1977-78 the last week of June had been the main holiday weekend. The best way to compare this period and eliminate the holiday bias was to lump the two weekend totals. When lumped, overall net change for the two-week holiday period once again showed a substantial reduction of 27% in recreational traffic volume. During the last week of July,

traffic volume returned to only 10% below 1977-78 levels.

The factor which seems most likely responsible for the general decrease in recreational traffic between the spring of 1977-78 and the spring of 1978-79 is the high escalation rate of the price of gasoline which occurred during spring of 1978-79. By itself, this factor seemed to account for a decrease of roughly 10%. Other factors in combination with high gasoline prices were capable of further reducing recreational travel to levels 20-50% below 1977-78. These other factors were the unseasonable cold weather in early May and the gasoline shortages in late June and early July. Once gasoline shortages were somewhat ameliorated in late July, travel seemed to have increased back to 10% below 1977-78 levels.

The observed spring decrease in travel was more marked in the northbound direction than the southbound. Average percent change for May through July was -23% for northbound traffic but only -13% for southbound. In 1977-78, northbound traffic between January and July averaged 70% higher than southbound. In 1978-79, it averaged only 8% higher, before January, northbound traffic exceeded southbound by a similar amount of less than 20% in both years. January was the month during which gasoline prices first started to increase after sixteen months of stability. This differential directional effect may have been due to the fact that areas south of Duluth were hit harder by both gasoline price increases and shortages than was the Duluth area. A check with local stations verified this as supplies were available during the entire period.

In addition to the depressive effect which high gasoline prices and low availability had on travel volume, they may have been responsible for changes seen in the mode of travel which people used. Table 2 shows the

TABLE 2: Distribution of carrier types in 1977-78 and 1978-79

Carrier Type	1977-78	1978-79
SEDAN	45 2	38 2
PICKUP	28	41
FOUR WHEEL DRIVE	6	6
MOTORHOME	15	10
MOTORCYCLE	3	3
CONVERTED BUS	1	1
CHARTER BUS	1	1
OTHER	1	0
TOTAL	100 2	100 2