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EFFECTS OF BELOW-COST TIMBER SALES ON  
OUTDOOR RECREATION AND RELATED TOURISM

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**ABSTRACT:** This paper examines relationships between National Forest timber sales and outdoor recreation and related tourism. Forest values for recreation and tourism are compared to those for timber. Due to the lack of valid and reliable data, relationships are addressed at a broad level. Likely effects of timber sales on recreation activities and recreation opportunity classifications are presented using activity participation rates and acres classified according to the recreation opportunity spectrum at the national forest regional level. The major conclusion is that timber sales programs can have positive and/or negative effects on recreation and tourism.

INTRODUCTION

Timber sales, whether or not they are below cost, have potential effects on the spectrum of outdoor recreation and related tourism opportunities on or adjacent to national forest lands. To clarify these interactions, we briefly describe key elements of recreation and timber harvest as visitors relate to them. Then the "valuing" of forests for recreation and related tourism is compared to that of timber. Finally, likely effects from timber sales generally on recreation activities and recreation opportunities are presented. Relationships also are explored between timber sales and recreation in various geographic areas of the United States and Alaska. The paper closes with a discussion of six major conclusions.

RECREATION OPPORTUNITY FRAMEWORK

The concept of recreation opportunity used in this paper is based on a general framework set forth by Driver and Brown and their associates (e.g., Driver and Tocher 1970; Driver and Brown 1975, 1978; Driver 1976; Haas and others 1981; Manfredo and others 1983). This framework conceptualizes recreation opportunities as options for engaging in a particular activity (e.g., hiking, fishing, downhill skiing) at a specific setting (e.g., lake, resort village, fee campground) in order to obtain an experience. Thus opportunities are the outputs of the recreation/tourism production process that are consumed by individuals. This approach has been referred to as being experience-based (Driver and Rosenthal 1982) and is replacing the traditional activity approach which focused simply on participation in a specific activity instead of experiences that can be provided by participation in the same activity in different settings. The Forest Service's adoption of the experience-based approach suggests that concerns for effects on the setting (physical, social and managerial components) and ultimately the consumers' experience must be considered. Both the newer experience-based recreation opportunity spectrum and the traditional

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activity approach will be used to assess likely effects of timber sales on outdoor recreation and related tourism in this paper.

#### Recreation and Tourism Opportunities

Using this experience-based framework, let's think about outdoor recreation and related tourism in this paper as a system of settings, specifically national forest-based locations, where individuals engage in a series of outdoor recreation and leisure activities and as a result have an experience. In this case, the individual's sequential interaction with settings usually includes a travel corridor (e.g., trail, road, rail, air), multiple destinations (e.g., city, forest, resort, etc.), and a series of setting attractions (e.g., museum, nature trail, waterfalls, swimming pool) along the corridor or within destinations.

Attractions within the setting include a range of natural (e.g., scenery, river) and man-made features (e.g., picnic tables, nature trail, timber sale) or events (e.g., ski races, meetings) and the complementary services (e.g., visitor information, lodging, food) offered by management that allow guests to optimize their enjoyment of attractions. Services can range from minimal (e.g., brochure for a self-guided nature walk) to a package tour where the visitor is transported and housed and daily activities are programmed. This experience-based view includes not only recreation activities but also the characteristics of the settings where activities take place and the diverse services that are a part of the package that allow individuals through vicarious or actual participation to obtain their total outdoor recreation and related tourism experience.

Therefore, a timber sale ultimately must be evaluated on how it effects the multiple experiences provided through the total system of recreation/tourism opportunities. Presently this is impossible due to the fact that data on the entire recreation and tourism system associated with national forests does not exist. Therefore in this paper we will take a much narrower view and focus predominantly on recreation that takes place on locations within forests.

#### Recreation Opportunity Spectrum

This experience-based approach is just beginning to be implemented, but serves as the foundation of the Recreation Opportunity Spectrum (ROS) planning system presently used by the Forest Service (1982). This approach is used to classify the potential of forest lands to supply recreation opportunities along a continuum from primitive to urban. Much has been written about the ROS planning approach but it was felt a detailed discussion of it was beyond the scope of this paper (e.g., Clark and Stanley 1979; Driver and others In Press).

The ROS as defined by the Forest Service (1982) consists of six broad classes: (1) primitive, (2) semi-primitive nonmotorized, (3) semi-primitive motorized, (4) roaded natural, (5) rural, and (6) urban. These are delineated by their remoteness, size characteristics, evidence of humans including multiple resource management modifications, user density, and level of management and services offered. Inherent in this concept is that primitive lands include little or no evidence of humans (e.g., wilderness sites, unroaded trailless areas, unroaded trailed areas) and that urban lands (e.g., ski areas, resort complexes, paved roads or highways) are strongly dominated by human influences with the natural-appearing environment a subordinate characteristic. This approach provides a framework for considering the resource and development linkages between forest lands and commercial tourism sites. It also provides a means for looking at the likely impacts of timber sales on recreation and tourism opportunities.

#### TIMBER SALES--A RECREATIONIST'S VIEW

The primary physical effects of timber sales are roads, vegetation modification, soil disturbance, and sometimes site modifications incorporated into the sale to mitigate undesirable effects or to improve a site (e.g., trail relocation, visual quality enhancement, wildlife habitat development) or to prepare it for regeneration (e.g., burning, chipping). Roading can include permanent collector roads (arterials, collectors and local) that vary in standard and design and temporary roads used in the harvesting process but not retained afterwards. Vegetation modification can range from clearcuts to the selective taking of individual trees. The critical point is that recreation-tourism effects from harvesting, residue treatment, roading, etc. vary in their intensity based on specific conditions at a particular sale or group of sales (site). Therefore, no two timber sales are likely to have the same consequences on outdoor recreation and related tourism; rather effects are site-specific.

#### Studies of Effects on Visitors

Forest landscape research studies offer us some insights as to how forest users and visitors react to disturbances caused by timber sales. Numerous studies (e.g., Benson 1982; Daniel and Boster 1976; Brown and Daniel 1984; Cook and others 1985) show that slash detracts from scenic quality. Both Anderson and others (1982) and Benson (1982) also found that treatments that reduce volume of downed wood in a timber stand lead to improved scenic quality. Brown and Daniel (1984) in ponderosa pine forest found that moderate harvest of dense stands tends to enhance scenic quality after a stand has recovered from obvious initial impacts. Similarly, the work of Benson and Ullrich (1981) in lodgepole pine on viewer preferences of the



visual impacts of forest management activities suggests that partial harvests, minimum soil disturbance, and revegetation are preferred over clearcutting, major soil disturbance and not revegetating.

Two other research studies (Hodgson and Thayer 1979, Anderson 1981) found that when respondents are shown forest scenes with labels like "tree farm" or "commercial timber stand," such scenes are evaluated lower in scenic quality than scenes labeled "forest" or "wilderness." These findings suggest that people value forests for their symbolic meaning of the words ascribed to them.

Image of a geographic area is a very important drawing card for the travel and tourism industry (Hunt 1974). A region that is perceived as being predominantly natural has potential to attract different market segments than one known as a timber production area (Peine, 1979). Clearly we are not placing a higher value on one or the other but only suggesting that they are different. Market segments are willing to pay more for certain types of images than others. For example, consumers will and do pay more for a Snowmass at Aspen experience as opposed to a Grand Targhee experience. As consumer science research suggests, the perception of a product is related to a consumer's willingness to pay (Monroe and Krishnan 1985; Bettman 1983).

These studies and numerous others suggest that recreationists and tourists are likely to react to timber sales. Whether the reaction is positive or negative depends on the nature and intensity of disturbances resulting from the sale. Effects will also differ whether the sale modifications are experienced on-site (for example a favorite hiking trail becomes a road or a dispersed site becomes accessible to vehicles) or off-site (say, as one views a sale and the associated roads from a hotel room). This seems reasonable since the impact to the recreation opportunity being consumed is different and ultimately the effect on a person's experience also depends on their expectations and how strongly attached they are to a particular area (Schreyer and Knopf 1984). To the recreationist an environment is more than trees, rocks and a campsite; rather it is a special place that has all of the attached meaning and emotions of past or envisioned experiences.

#### Dispersed Road Recreation and Timber Harvesting

A study of recreationists using selected roaded areas in three national forests in the Pacific Northwest (Clark and others 1984) found that timber-harvesting and road-building practices can be compatible with dispersed roaded recreation opportunities. The recreation use occurring in most cases was a direct result of logging roads. Although road access was important, these users did not desire paved roads, nor were they interested in increasing

road density in the areas that they were presently using.

Results of this research indicate that visitors to these dispersed roaded areas (ROS classes in the center of the spectrum: Semi-primitive Motorized, Roaded Natural, and some Rural) did not object to logging although the size of clearcuts and their location relative to roads and campsites still remained important. As the authors conclude, this work suggests a potential compatibility between some styles of recreation and tourism and multiple-use management, particularly timber management. They also warn that "this research should not be construed as a reason or excuse to log previously unlogged areas," rather such decisions should be made in the context of overall management objectives. For example, is there demand for such recreation opportunities, and how do they fit within the context of overall forest management? In conclusion, this study documented the ways in which timber sales can facilitate recreation use, and that abundant dispersed use occurred in combination with timber harvesting on the three forests studied.

#### VALUING THE NATIONAL FOREST

Our national forest lands are valued by individuals and society for many reasons. Values of forests are associated with their existence and are the result of humans attaching value to them. Rolston (1983) defines this first type of value as intrinsic value of objects (i.e., forest). Forests have intrinsic value because of their existence and as a result of their relationships to other objects (i.e., their role in the global ecosystem). These intrinsic values are in spite of humans, yet humans can have profound effects on them.

A second broad level of forest values emerge as a result of human attachment to them. Brown (1984) suggests that these preference-related values can be classified in two categories; held values and assigned values. Held values are the basis of our preferences for objects, while assigned values are the worth we attach to these objects.

In essence, held values are an individual's data bank upon which they draw to make behavioral choices and reveal preferences (Rokeach 1968). The sum of these held values can be thought of as a person's value system (Rokeach 1973, 1979). This system of held values includes modes of conduct (e.g., loyalty, honesty) and desired end states (e.g., pleasure, world of beauty, peace). Differences in people's held values result in different perspectives which ultimately will yield different assigned values. For example, the forest through management can produce a variety of products that are viewed differently by people holding dissimilar values. The recreationist views the forest as providing primitive recreation for solitude or roaded natural recreation opportunities for using an off-road vehicle. The forester sees saw logs



and pulp logs to support local industry, and ecological diversity for maintaining a healthy stand. The hunter sees a four-point bull elk to hang on his wall and the wildlife biologist sees various kinds of wildlife habitats to maintain wildlife populations. Each of these individuals expresses different perspectives about these products and their importance based upon their particular set of held values.

Assigned values are an expression of relative value or worth of an object in a given context. Assigned value can be expressed via many approaches. The most common is our market system that results in an economically-assigned value in terms of dollars. A second way resulting in dollars of assigning value is via an accounting procedure. However, the nature of forest management complicates things. As Hof and others (1985) argue, estimating and assigning costs to the production of a particular good or service from a managed forest is difficult because often the same inputs of production are simultaneously used to produce more than one product. For example, a timber sale that produces wood fiber may also produce a road network that creates dispersed road recreation opportunities but at the same time reduces opportunities for primitive recreation. Such interrelationships or joint production aspects of forest management cloud accounting approaches to assigning value.

A third way of giving value is the expression of psychologically assigned value through self-report measures of enhanced self concept, human or spiritual growth, etc. Certainly people can attach relative importance to recreation experiences using these assigned values.

The important point is that a particular object can be given an assigned value in numerous ways. It may be expressed monetarily (e.g., dollars) or nonmonetarily (e.g., importance rating).

#### Assigning Values to Timber and Recreation

In comparing expressions of assigned value for recreation and tourism opportunities with timber harvest, there are similarities and differences. Both are products (goods and services) that can be given an assigned value in dollars. Some recreation and tourism opportunities (e.g., fee campgrounds, downhill skiing) are more market-oriented and easier to determine dollar values for than others (e.g., wilderness). Also, the ability of outfitters and guides to command substantial prices for the backcountry experiences they provide suggest it is not only possible to determine price but that the price can be a lot higher than many suggest.

A key difference between timber and recreation opportunities is that individuals tend to value recreation using a multiple set of assigned values whereas timber is valued most often only on its price (a single assigned value measured in monetary terms) in the market place. This is

not to say that multiple assigned values for timber are not possible.

Brown and Manfredo (1986) present a review of research that demonstrates visitors can obtain a diversity of values from recreation. These include social value expressed in level of family togetherness, psychological value expressed in personal satisfaction, and physiological value expressed in escape from stress. Even though we know these values exist, and even though we have not measured them in monetary terms, we still continue to exclusively rely on an economic approach to assigning value when making forest land allocation decisions. Yet increasingly these values are being used. Recently a national forest supervisor stated to me, "You know we just completed a costly economic analysis of our forest alternatives, and in the end I selected an alternative not based on economics but on other values." These included held values like beauty and naturalness as well as assigned values for fish and wildlife. We do use noneconomic values in our decisions. Such an approach is justified under the concept of "merit goods."

In the words of Krutilla and Knetsch (1974, p. 170) "The budget constraint imposed on the consumption of goods and services (timber and recreation), in general, is relaxed, in the case of satisfying merit-wants by providing for them (at least in part) at public expense." Examples of merit goods in the U.S. are public education, public supply of timber, public health programs, and outdoor recreation. Decisions to provide goods beyond their economic measured worth depends on Congressional direction. In the case of national forests, Congress has directed multiple use and wilderness preservation as a way to subsidize the well-being of members of society.

Perhaps what we are really experiencing with the below-cost/deficit sale issues is the demise of the western United States' Model City or welfare program. Many of the urban subsidy programs that have benefited the east are either under attack or have been dismantled. Could it be that the next agenda items are western programs (e.g., forests, dams, public power).

The approximately 190 million acres of national forests and grasslands provide jobs through direct federal employment, and jobs through indirect employment with the forest and range products industry, contracting for natural resource and conservation work, lessees of national forests and grasslands, and local tourism industry. One important lessee is recreation outfitters and guides for such services as fishing, hunting, photography, horsepacking, whitewater floating, and backcountry alpine and Nordic skiing. In many rural areas, especially in the West, the Forest Service is the major direct or indirect employer and an important reason for the existence of a community. Depending on the level of Forest Service involvement, some 2000 to over 6000 communities to small cities may be affected by



any actions the agency takes which effect balance and level of resource outputs (Forest Service 1981).

Maybe the loss of this forest welfare is reasonable since rural forest America is becoming more economically developed and diversified. But the real effect is likely to be social. The cherished forest related lifestyle highly dependent in many areas on national forest lands is being transformed. A major component of that lifestyle has always been free recreation benefits from national forest lands. Is this lifestyle important enough to our heritage that Americans will desire to perpetuate it via management of national forests? Such a merit good approach would not be unreasonable nor unAmerican given the importance of outdoor recreation in our society.

#### EFFECTS OF TIMBER SALES ON OUTDOOR RECREATION AND RELATED TOURISM

Determining the likely effects of timber sales on recreation/tourism activities and opportunities is no easy task. This is particularly true if you wish to aggregate the data to look at national and regional distribution issues and timber sales effects questions. There are several reasons for this. First, as we have already argued, the most meaningful level to examine non-economic recreation effects is at the sale or multiple sale level. Unfortunately, very little readily available data exists at that level that is comparable across national forests, let alone regions. Therefore such an approach was not feasible.

Second, it is impossible to define a generic timber sale. In reality each sale is different in the amount and nature of the site modification. Determining likely effects is severely constrained because of this inability to quantify the nature and intensity of specific actions associated with timber sales. We were able to define a set of broad action categories that are likely to occur in most timber sales. These include (1) roading, (2) harvesting, (3) residue treatment, (4) site preparation for regeneration and (5) other site modifications for land management purposes.

Third, if one wishes to look at impacts to outdoor recreation and related tourism, the only comprehensive data base available for national forest lands is the Recreation Information Management System (RIM). This data base has several major weaknesses. It primarily addresses recreation activities as opposed to the newer experience-based approach, although this is changing (personal comm. Welch 1986). Its accuracy has been criticized (e.g., Jameson and others 1982; Cordell and Hendee 1982) and Clawson and Van Doren (1984) concluded sampling procedures for recreation participation in general hinder reliability. Kocis (1986) examined the adequacy of statistical sampling to

determine recreation use estimates for RIM in the Pacific Northwest Region of the Forest Service (Region 6). She found that approximately 40% of the ranger districts contacted used the SWAG method (Scientific Wild Ass Guess) determine their use estimates for RIM. Saunders's (1982) research suggests similar problems in the Rocky Mountain Region (Region 2).

Finally, RIM does not contain any economic values for recreation and related tourism. Economic data, however, are compiled in the 1985-2030 RPA Program draft environmental impact statement (Forest Service 1984b). However, these data use activity categories not traditionally used by the Forest Service; reflecting available economic values for specific recreation activities compiled from the research literature (Sorg and Loomis 1984). Few economic values for the experience-based opportunity are presently available or actively being used by the Forest Service. This is most likely the result of the recent transition from the activity-based to the experience-based recreation opportunity spectrum framework for management and planning.

For these reasons it is impossible to accurately value recreation effects. As a result of these constraints, likely effects of timber sales on recreation activities and opportunities were necessarily addressed at a broad, non-economic level. This was done using timber sale roads as an indicator of the dominant, lasting, and most costly effects of timber sales and using RIM data on activity participation rates and ROS class acreages. We felt this generalized approach could offer insight as to the direction of non-economic effects.

#### Effects on Recreation/Tourism Activities

One of the difficulties encountered in examining recreation activities is the diversity of lists of activities available and used by the Forest Service (See Table 1). Not only are there many different lists of recreation activities, there are also incongruities in the types of activities on those lists. The Forest Service 1979 assessment (Forest Service 1980) and supplement (Forest Service 1984a) uses the Heritage, Conservation and Recreation Service (1979) list of recreation activities based on their 1977 nationwide survey of recreation participation. This survey of participation rates is summarized by 19 activity categories divided among three broad categories of land, water, and snow and ice-based recreation (See Table 1, List 1). In contrast, the Forest Service (1984b) activity list used in the 1985-2030 Program consists of eight activities divided among the nine national forest system regions to show total recreation visitor days in 1982 (see Table 1, List 2). In the appendices of this same document (Forest Service 1984b) a different list of nine recreation activities and five activities related to fish and wildlife use



Table 1. Different lists of recreation activities used by the Forest Service--note the differences in type of activities, names of activities, and the grouping of activities

LIST 1 Assessment of Forest and Range Lands (Forest Service 1980)	LIST 2 1985-2030 Program and Draft EIS (Forest Service 1984b)	LIST 3 1985-2030 Program and Draft EIS (Forest Service 1984b)	LIST 4 ROS User Guide (Forest Service 1982)
<b>Land Based:</b> Camping (developed) Camping (dispersed) Driving Off-road Vehicle Hiking Horseback Riding Nature Study Picnicking Pleasure Driving Sightseeing	Camping & Picnicking Mechanized Travel Hiking & Horseback Riding Fishing, Hunting, & Nature Study Classified Wilderness & Primitive Use Resort Cabin & Organizational Camping	Camping Picnicking Hiking Motorized Travel Wilderness Big Game Use Nongame Use Other Game Use	<b>Land Based:</b> Viewing Scenery Viewing Activities Viewing Works of Humankind Automobile & ORVs Motorcycle, Motor Scooter Train & Bus Touring Aircraft Use Aerial Trams & Lifts Use Hiking & Walking Bicycling Horseback Riding Camping Picnicking Resort & Commercial Service Use Resort Lodging Recreation Cabin Use Hunting Nature Studies Gathering Forest Products Interpretive Services Team Sports Participation Individual Sports Participation Games & Play Participation
<b>Water Based:</b> Canoeing Sailing Other boating Swimming outdoors Water skiing	Water Related Activities	Motorized Boating Nonmotorized Boating Water Sports Anadromous Fish Use Resident Fish Use	<b>Water Based:</b> Tour Boat & Ferry Use Powered Boating Canoeing Sailing Other Water Craft Use Swimming & Water Play Skin & Scuba Diving Water Skiing & Water Sports Fishing
<b>Snow and Ice Based:</b> Cross-country skiing Downhill Skiing Ice Skating Sledding Snowmobile	Winter Sports	Downhill Skiing	<b>Snow and Ice Based:</b> Ice & Snowcraft Use Ice Skating Sledding & Tobogganing Downhill Skiing Snow Play Cross-country skiing & Snowshoeing

are provided to show economic benefit values of recreation in 1982 (See Table 1, List 3).

Another list of activities was derived from the Forest Service ROS users guide (see Table 1, List 4). These differences in categorizing activities illustrate yet another difficulty we encountered in trying to examine effects of timber sales on recreation and tourism. The most depressing fact was the incompatibility of the activity lists for recreation participation rates and economic values. Fortunately, the Forest Service is currently developing a single list of recreation activities for future planning and management (Personal comm. Cordell 1986).

The most common activities on national forests in 1982 were camping and picnicking, and mechanized travel (see Table 2). Over one-fifth of all recreation activity occurred in Region 5, California. No doubt access to many of these recreation opportunities was obtained by forest roads. While new roads might provide more access opportunities, increased road density could also reduce the quality of these

experiences. Presently the Forest Service, like other agencies, only counts recreational use and does not measure the quality of the recreational experience the public seeks and finds.

The recreation activities which provide the greatest benefit values measured in dollars are downhill skiing, big game use, nongame use, and anadromous fish use (see Table 3). Additional timber sales roads in or about a ski area could detract from the quality of that experience or provide an entirely new cross-country ski opportunity. While roads can provide access to big game hunting areas and nongame and big game viewing areas, they have also been shown in some cases to reduce elk herd size (Thiessen 1976; Lege 1976). Roads can also provide access to anadromous fishing areas, but increased road density can permit too much fishing pressure and lead to habitat quality reduction of the riparian zone, as well as increased stream siltation (Cohen 1985).

The likely effect of timber road corridors on recreation activities was further explored by examining their effect on providing access to



Table 2. Outdoor recreation activities on national forests by Forest Service Regions during 1982, use reported in thousands of recreation visitor days (Forest Service 1984b)

ACTIVITY	USFS REGIONS									
	1	Western 2	3	4	Pacific Coast 5	Coast 6	South- ern 8	East- ern 9	Alaska 10	Total
Camping, Picnicking	3104	6800	7286	9557	15,393	9968	7911	5787	359	66,165
Mechanized Travel	3374	8837	7973	6878	16,522	8769	7398	6121	1527	67,399
Fishing, Hunting, Nature Study	2346	3676	2457	4123	4,277	4524	7065	4881	819	34,168
Hiking, Horseback Riding	1238	2387	1464	2062	3,153	2386	2092	1398	220	16,400
Winter Sports	664	4002	683	1648	3,736	2077	23	1158	178	14,169
Water Related Activities	351	234	1120	595	2,807	1029	1991	1420	94	9,641
Wilderness	1221	2023	787	1116	2,188	1449	386	1500	488	11,158
Resort Cabin and Organiza- tional Camping	581	1396	1117	1907	6,301	2279	471	687	155	14,894

Table 3. National forest system benefit values in dollars for high quality recreation resource activities during 1982 by Forest Service regions (Forest Service 1984b)

ACTIVITY	USFS REGION									
	1	2	Western 3	4	Pacific Coast 5	6	South- ern 8	East ern 9	Alaska 10	
Motorized Boating	6	8	10	7	6	4	6	12	4	
Nonmotorized Boating	11	10	12	15	9	6	5	9	6	
Motorized Travel	7	8	7	6	8	8	7	9	8	
Camping	5	6	9	5	8	6	10	11	6	
Picnicking	4	9	9	5	5	6	6	8	6	
Hiking	8	9	10	9	11	10	13	18	10	
Wilderness	12	12	14	12	14	18	16	18	18	
Downhill Skiing	30	34	31	34	35	31	29	35	31	
Water Sports	6	8	9	8	9	8	9	11	8	
Big Game Use	31	41	30	31	30	30	25	38	30	
Nongame Use	25	25	25	25	25	25	25	25	25	
Other Game Use	21	19	18	19	18	19	18	21	19	
Anadromous Fish Use	23	n/a	n/a	23	31	33	n/a	38	33	
Resident Fish Use	11	11	13	11	12	15	13	13	11	



recreation opportunities, providing a setting or opportunity, and being a detraction to a recreation setting (see Table 4).

We evaluated the level of effect by answering two questions. Would it be positive (i.e. enhance the provision of outdoor recreation and tourism) or would it be negative and detract from the existing or potential provision of recreation opportunity? The coarseness of the available data dictated this broad brush approach. Based upon our evaluation (see Table 4), we drew the following conclusions.

The construction of timber sales roads provides increased access to the national forest. Depending on the management of a road after timber harvest, use can be either mechanized or not mechanized, and can vary with season. For example, vehicle traffic could be permitted during summer and fall while only crosscountry skiing or snowshoeing would be permitted during winter. Some roads could be completely closed to mechanized traffic. The provision of access for recreation activity is judged to be a positive influence of most roading. This of course assumes there is an unmet demand for the activity.

The construction of roads provides a potential corridor in which a variety of recreation activities may occur (e.g., fishing, swimming, camping, hunting, hiking snow play). Depending on the activity, (e.g., driving for pleasure, sightseeing) it may take place only within the corridor or flow on to adjacent lands (i.e., firewood collecting). The provision of road corridors for recreation settings is also judged to be a positive recreation-related effect of more roading. This assumes that there is not an existing over supply of such settings.

The notion of road corridors being a setting detraction for activities was also examined. Three factors about the road are critical. First, the standards to which the road is constructed will determine if it is capable of carrying one or more lanes of traffic; if it will be paved, graveled, or left primitive; if it will carry light or heavy-weighting traffic; if it will carry light or heavy traffic volume; and if it will receive use during one or more seasons. Second, the design of the road will determine its intrusion on the visual landscape, the scenic amenities it will provide, and the feasibility of the user to easily access the corridor of national forest surrounding the road. Third, the layout of the timber sale will determine the density of roads within a given area, the type of habitats the roads access, and the ease of using roads for a variety of activities. To illustrate, a wide, high standard road designed for heavy traffic use that is placed midway on a steep valley wall offers a narrow corridor for recreation activities with the potential for considerable detraction as a result of heavy traffic use, high noise levels and the loss of visual amenities. A high density of roads within an area can detract from existing recreation

facilities, reduce fish and wildlife habitat and associated recreation activities, provide for a noisy experience, and in general detract from what was previously a quality recreation experience. On the other hand, a narrower road which primarily provides access, does not intrude upon the landscape, and is designed with post-harvest recreation activities in mind may not detract from the recreation setting.

In summary, it is difficult to determine one answer to the influence of more logging roads on recreation activities. The determination must be made on a local, case-by-case basis which examines the local setting, the mix of current recreation activities, the influence of roading on existing activities, and the type of activities planned after completion of the road, harvest, residue treatment, forest reestablishment and any other site modifications.

#### Effects on Recreation and Related Tourism Opportunities

In previous sections, we noted the current emphasis in national forest land management planning to use the recreation opportunity spectrum (Forest Service 1982) to define the possible range of recreation activities, settings, and experiences. Unfortunately, the latest Forest Service national planning documents on the Resources Planning Act Program to 2030 (Forest Service 1984a, 1984b), and the proposed alternative goals for the 1985 Program (Forest Service 1981) do not examine the recreational offerings of the nation or the national forests using the recreation opportunity spectrum. However, current individual national forest land management plans do describe their recreation proposals using the recreation opportunity spectrum, but these are not yet available for all national forests. The RIM data base (Forest Service 1985) was the only one available that would allow us to explore the likely effect of timber sales on recreation opportunity. Even so, we could only explore non-economic effects.

The most common recreation opportunity potential presently available on national forest lands according to 1985 RIM data are roaded ones which include the combined classes of semi-primitive motorized, roaded natural, rural and urban (see Table 5). Of the total national forest land base of 184,452,000 acres, the largest number of acres (48,800,000 or 26%) are classified roaded natural. It should be noted that 31% of the national forest lands have yet to be classified using the ROS approach.

The recreation setting characterization of the roaded natural class as defined by the Forest Service (1982) is as follows:

Area is characterized by predominantly natural-appearing environments with moderate evidences of the sights and sounds of man. Such evidences usually harmonize



Table 4. Likely effect<sup>1</sup> road corridors on recreation activities

ACTIVITY <sup>2</sup>	ROAD CORRIDOR		
	For Access	As Setting Opportunity	As Setting Detraction <sup>3</sup>
<b>Land Based:</b>			
Viewing Scenery	+	+	+/-
Viewing Activities	+	+	+/-
Viewing Works of Humankind	+	+	+/-
Automobile and ORVs	+	+	+/-
Motorcycle, Motor Scooter	+	+	+/-
Train and Bus Touring	+	+	+/-
Aircraft Use	+	+	+/-
Aerial Trams and Lifts Use	+	+	+/-
Hiking and Walking	+	+	+/-
Bicycling	+	+	+/-
Horseback Riding	+	+	+/-
Camping	+	+	+/-
Picnicking	+	+	+/-
Resort and Commercial Service Use	+	+	+/-
Resort Lodging	+	+	+/-
Recreation Cabin Use	+	+	+/-
Hunting	+	+	+/-
Nature Studies	+	+	+/-
Gathering Forest Products	+	+	+/-
Interpretive Services	+	+	+/-
Team Sports Participation	+	+	+/-
Individual Sports Participation	+	+	+/-
Games and Play Participation	+	+	+/-
<b>Water Based:</b>			
Tour Boat and Ferry Use	+	+	+/-
Powered Boating	+	+	+/-
Canoeing	+	+	+/-
Sailing	+	+	+/-
Other Water Craft Use	+	+	+/-
Swimming and Waterplay	+	+	+/-
Skin and Scuba Diving	+	+	+/-
Water Skiing and Water sports	+	+	+/-
Fishing	+	+	+/-
<b>Snow and Ice Based:</b>			
Ice and Snowcraft Use	+	+	+/-
Ice Skating	+	+	+/-
Sledding and Tobogganing	+	+	+/-
Downhill Skiing	+	+	+/-
Snow Play	+	+	+/-
Crosscountry Skiing and Snowshoeing	+	+	+/-

<sup>1</sup> A plus sign means enhancement of the provision of outdoor recreation and tourism opportunities. A minus sign means detraction from or substantial change of the existing or potential provision of recreation opportunity.

<sup>2</sup> Activity list from Forest Service (1982)

<sup>3</sup> Whether the effect is positive or negative depends upon road standards, design and layout, and in which type of recreation opportunity class the activity is occurring.



Table 5. National forest acreage distribution by region according to recreation opportunity class from Recreation Information System (RIM)--area rounded to nearest, therefore rows and columns do not add with exactness (Forest Service RIM DATA 1985).

RECREATION OPPORTUNITY CLASS	USFS REGIONS										PERCENTAGE OF TOTAL FOREST ACRES	
	Western				Pacific Coast	South- ern	East- ern	Alaska	TOTAL	Non-Roaded	Roaded	
	1	2	3	4	5	6	8	9	10			
Primitive	4,379	2,721	881	3,275	2,965	2,130	162	199	4,890	21,601	24%	
Semi-primitive Non-motorized	3,645	3,355	3,412	3,600	4,863	2,523	1,019	664	434	23,601		
Semi-primitive Motorized	4,815	5,069	5,727	4,640	2,692	1,640	1,383	712	273	26,950		
Roaded Natural	6,188	5,652	4,902	4,144	9,654	5,975	9,096	3,174	13	48,800	47%	
Rural	264	1,070	148	365	764	1,679	714	544	1	5,549		
Urban	7	52	35	14	62	16	169	22	.02	377		
Not Classified	6,399	3,925	5,005	14,868	.10	11,452	0	6,154	9,856	57,659	31%	
Total	25,697	21,843	20,110	30,908	20,999	25,413	12,543	11,470	15,468	184,452		

with the natural environment. Interaction between users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities (p.7).

The evidence of humans criteria (Forest Service 1982) for this class is as follows:

Natural or natural-appearing setting may have modifications which range from being easily noticed to strongly dominant to observers within the area. However from sensitive (sensitivity level 1 and 2 travel routes from Visual Management System USDA Handbook 461) travel routes and use areas these alterations would remain unnoticed or visually subordinate.

There is strong evidence of designed roads and/or highways.

Structures are generally scattered, remaining visually subordinate or unnoticed to the sensitive travel route observer. Structures may include power lines, micro-wave installations and so on (p. 22).

Certainly timber sales are an allowable component and represent an integral part of the overall management of the acres classified roaded natural. This is also true for the semi-primitive motorized, rural and urban

classes. In these four classes, it is extremely likely that recreation opportunity could be enhanced if planned into a timber sale. Whether or not a timber sale is the most efficient or cost-effective way to enhance recreation is a totally different question.

The two ROS classes that are most likely to be negatively affected by timber sale road corridors, our indicators of timber sale impact, are the primitive and semi-primitive nonmotorized classes. Together they make up only 24% (see Table 5) of the total national forest land base according to the 1985 RIM data. Relatively similar numbers of acres (21,601,000 for primitive and 23,601,000 for semi-primitive nonmotorized) are classified in each category.

The primitive class is defined as an essentially unmodified natural environment. Therefore, timber sales are pretty much excluded. The semi-primitive nonmotorized class allows for "...subtle modifications that would be noticed but not draw the attention of an observer wandering through the area" (Forest Service 1982, p. 22). This class also calls for little or no evidence of primitive roads and motorized use of them. Obviously, well planned and administered timber sales would not be excluded from these areas. Sales would, however, require the utmost attention and sensitivity to design, layout and implementation of forest practices if visitors are not going to notice them. Such design sensitivity will more than likely increase costs of timber sales in this particular zone.



Economic values for recreation and tourism outputs according to recreation opportunity class on national forest lands are just beginning to be developed by the recreation economics research group at the Rocky Mountain Forest and Range Experiment Station. Therefore, at present, it is impossible to look at the economic effect of timber sales on recreation opportunities across the spectrum classes in any meaningful and direct way. Thus, as in the case of recreation activities, we will explore effects of timber sales on recreation opportunity in a broad non-economic way.

The likely effects of timber road corridors on recreation opportunity according to class was examined using the same approach described for activities (see Table 6). We concluded that timber sale road corridors can have a positive effect by providing access to lands in four of the six opportunity classes. In the primitive and semi-primitive nonmotorized classes, the effect could be positive or negative. Access is certainly important to these opportunities, but if it is brought too close it can lead to human impact and crowding problems that negatively impact the setting and visitors' experience.

Timber road corridors, if designed in accordance with the character of a particular recreation opportunity setting, can provide recreation opportunities in four of the six ROS classes. The corridors could also cause negative effects to all six categories if these permanent roads are improperly designed or located. In the primitive or semi-primitive nonmotorized class we assumed the effect on the setting would be negative but by definition no roads are allowed.

In conclusion, timber sales have the greatest potential to affect primitive and semi-primitive recreation opportunities. In the four other opportunity classes, if properly planned and designed and if there is an unmet demand for a particular opportunity, timber sales can be a positive force in providing outdoor recreation and tourism.

#### Effects on Diversity and Geographic Distribution of Recreation and Related Tourism Opportunities

The evolution of the idea of preserving a diversity of recreation opportunities can be traced from 19th and 20th century writings of Fredrick L. Olmstead, Sr. to the more recent writings of recreation researchers since 1960 (Driver and others In Press). This concept is also prevalent in U.S. outdoor recreation policy and numerous laws that deal with outdoor recreation (Clark and Stankey 1979). Because American recreationists seem to expect such diversity and because national forest managers are mandated to provide for it, we decided to look at timber sales effects from this perspective. In other words, are timber sales likely to have an adverse effect on providing a diversity of recreation opportunities? Furthermore, we felt it was important to look at this effect geographically. Are likely effects in the east different from those in the west? Our findings suggest that timber sales, particularly resulting road corridors, are likely to have a greater effect on diversity in the southern and eastern U.S. and Alaska (see Table 7). In both the south and the east, very little land is available in the nonroaded recreation opportunity spectrum classes. In Alaska, the opposite is true; very little land

Table 6. Likely effect<sup>1</sup> of timber sale road corridors on recreation opportunity according to ROS category

ROS CATEGORY <sup>3</sup>	ROAD CORRIDOR		
	FOR ACCESS	AS SETTING OPPORTUNITY	AS SETTING <sup>2</sup> DETRACTION
Primitive	+/-	-	N/A <sup>1</sup>
Semi-Primitive, Nonmotorized	+/-	-	N/A
Semi-Primitive, Motorized	+	+	+/-
Roaded Natural	+	+	+/-
Rural	+	+	+/-
Urban	+	+	+/-

<sup>1</sup> A plus sign means enhancement of the provision of outdoor recreation and/or tourism opportunities. A minus sign means detracts from or substantially changes the existing or potential provision of recreation opportunity.

<sup>2</sup> Whether the effect is positive or negative depends upon road standards, design and layout.

<sup>3</sup> Recreation Opportunity Spectrum categories were taken from the ROS Users Guide (Forest Service 9182).

<sup>4</sup> N/A means not applicable. This is because in each of the two cases permanent roads are for all practical purposes excluded from these ROS classes. Therefore, their impact as a setting detraction is moot.



Table 7. Likely effects of timber sales on nonroaded and roaded type recreation opportunity acreages across regions of the U.S.--numbers in thousands of acres (Forest Service RIM Data 1985)

CATEGORY	Western (Forest Regions 1-4)	Pacific Coast (Forest Regions 5,6)	South (Forest Region 6)	East (Forest Region 9)	Alaska (Forest Region 10)
Non-Roaded (Primitive, Semi- Primitive Non- Motorized)	25,268 (26%)	12,481 (27%)	1,181 (9%)	863 (8%)	5,324 (34%)
Roaded (Semi-Primitive Motorized, Roaded Natural, Rural, Urban)	43,092 (44%)	22,482 (48%)	11,362 (91%)	4,452 (39%)	287 (2%)
Unclassified <sup>1</sup>	30,197 (31%)	11,452 (25%)	0 (0%)	6,154 (54%)	9,856 (64%)
Total <sup>2</sup>	98,558	46,412	12,543	11,470	15,468

<sup>1</sup> Lands not classified according to a Recreation Opportunity Spectrum class as of 1985.

<sup>2</sup> Column percentages may add to more than 100% due to rounding errors.

is available in the roaded recreation opportunity spectrum classes. In both the western and the Pacific coast areas, nearly twice as many acres are in the roaded recreation opportunity class as in the nonroaded classes. These data certainly suggest that future timber sales have the potential to substantially affect both the diversity and distribution of recreation opportunities.

Two additional points are important to put these findings in context. First, a large amount of the national forest lands are as of yet unclassified according to ROS, as noted in Table 7. Second, the idea of diversity and distribution of recreation opportunities must be thought of in terms of all public opportunities (National Park Service, Bureau of Land Management, Army Corps of Engineers, county parks) etc.) and relative to the private sector.

#### CONCLUSION

This paper explored the likely effects of timber sales on recreation and related tourism. Effects were not measured in economic terms due to lack of available and compatible economic data and the inability of economics to account for all the values associated with outputs from recreation and tourism opportunities. Rather, effects were analyzed by broadly looking at the physical impacts that timber sales are likely to have on recreation opportunities, their diversity and geographic distribution. Six major conclusions emerged as a result of this process and a review of related literature. Each of them needs to be interpreted within the context of the limitations detailed in the paper.

First, timber sales programs can have positive and/or negative effects on outdoor recreation and related tourism. The direction of the effect is determined by the nature (roads, vegetation treatment, etc.) and intensity of disturbance resulting from the sale, time after initial modification, whether the site modification is experienced by visitors on or off site and relative to how the individual affected assigns value to the forest.

Second, timber sales roads are probably the major site modification causing effects to recreation and tourism. Permanent road corridors affect recreation access, provide new settings for recreation, and have the potential to detract from or totally change recreation opportunities. In most cases, the accessing of previously unaccessed recreation opportunities is positive assuming there is an unmet demand and that a reasonable diversity of opportunities is maintained in a particular region. The two exceptions are primitive and semi-primitive nonmotorized recreation opportunities. Road access itself can pose a threat to maintenance of the desired character of these more primitive recreation opportunities.

Road corridors themselves can serve as a setting for recreation activities. Of course this assumes there is a demand for this style of recreation and that the diversity of opportunities is maintained. Critical problems with diversity already exist in eastern United States.

Timber sale road corridors can also be a detraction. The key to minimizing this negative aspect is for forest engineers to work with landscape architects and recreation professionals to insure that road design, standards and layout are done in such a way to



enhance recreation opportunity. Such a joint approach has been used successfully on selected national forests. It is, however, important to determine if such a joint approach is more efficient than just investing in the needed recreation developments necessary. It must also be recognized that roads are absolutely unacceptable in primitive recreation opportunities and this needs to be respected. If not, we run the risk of losing one of the world's most scarce recreation settings.

Third, non-economic effects on recreation and related tourism from timber sales can best be determined at site (single or multiple sale) levels, thus current forest planning is limited in addressing these effects. Forest plans are not sensitive to these site dependences. Impact to recreation and tourism opportunities is addressed at the forest level if it is discussed, as opposed to the site level. This finding creates a real dilemma since scarcity of certain types of recreation resources are more appropriately addressed at a regional level. Also, most presently used economic models are not designed to consider site effects. Counter-balancing these regional-oriented needs is the landscape perception and recreation behavior research which is beginning to suggest specific settings are important to recreation experiences. Perhaps the only solution is that both site and regional analysis of effects will be necessary.

Fourth, continued refinement of methods for valuing recreation and tourism is needed along with monitoring the quantity, quality and value of outputs. We conclude that the valuing of a forest is a multi-faceted concept and that the basic tenets of economic valuing need to be expanded to include other important social values. The traditional present economic approach used in forest planning has not provided an opportunity to consider intrinsic value nor the total process of assigning value used by recreationists, tourists and other consumers of forest goods and services. It is ironic that the cost of doing economic analysis may far outweigh the benefits if we realize that many decisionmakers act on "other important" values unaccounted for in the economic model. Obviously, other assigned values are real and they are important.

Therefore, methods for valuing forests need to be rethought in terms of the broader idea of assigned value. Multiple assigned values for forest products need to be developed when appropriate. A more holistic approach to conceptualizing and measuring value that includes economic as well as other assigned social values should commence. Those researchers involved need to be allowed to shed economic traditions and political pressure in order to move valuation to new levels.

Monitoring outputs and values from recreation and tourism on national forest lands is woefully inadequate. Immediate attention needs to be given to this crisis situation. There is

absolutely no justification for the lack of scientifically valid and reliable recreation information for national forest lands. We all must remember this is the garbage that went into most forest planning models. RIM needs to be evaluated and upgraded.

Fifth, care must be taken to not forego the potential to provide a diversity of recreation opportunities that are geographically distributed across the United States on our public lands. Timber sales programs can very easily upset the provision of this diversity. Additional roaded areas, especially in the southern and eastern parts of the U.S., need to be scrutinized because of the high likelihood of their precluding recreation diversity.

Finally, clarification of the private good versus social good provider role of our national forests is necessary if managers are to have some criteria for dealing with economic and social value issues they face as they implement multiple land management objectives. Whether this clarification comes from Congress or the agency matters little. At the crux of this issue are the concepts of merit good and social values. Resource allocation decisions on our national forests have been made in theory in terms of multiple use concerns, multiple benefits and most recently present net value considerations. All of these have not solved the real issue which we must address. It is one of distribution of scarce resources based upon the social values of the American people. These values have not been formally included in the resource allocation decisionmaking process. This is perhaps because we have yet to articulate all the values that can be assigned from a forest and the reasons for valuing them. This exercise of trying to analyze the effects of timber sales on recreation opportunities has served a bigger purpose. It has uncovered our primitive state of knowledge of how to value forests.

#### LITERATURE CITED

- Anderson, L.M.; Levi, P.J.; Daniel, T.C.; Dieterich, J.H. The esthetic effects of prescribed burning: a case study. Research Note RM-413. U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 1982. 5 p.
- Anderson, L.M. Land use designation affects perception of scenic quality in forest landscapes. *Forest Science*, 27:392-400; 1981.
- Benson, R.E. Management consequences of alternative harvesting and residue treatment practices-lodgepole pine. Gen. Tech. Rep. INT 132. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1982. 58 p.



- Benson, R.E.; Ullrich, J.R. Visual impacts of forest management activities: findings on public preferences. Res. Pap. INT-262. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1981. 14 p.
- Bettman, J.R. Perceived price and product perceptual variables. *Journal of Marketing* 10(1):100-102; 1983.
- Brown, T.C. The concept of value in resource allocation. *Land Economics* 68:231-346; 1984.
- Brown, T.C.; Daniel, T.C. Modeling forest scenic beauty: concepts and application to ponderosa pine. RM-256. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station; 1984. 35 p.
- Brown, P.J.; Manfredo, J.J. Social values defined. Paper presented at an International Symposium on Economic and Social Values of the Wildlife Resource, The New York Chapter of the Wildlife Society, Syracuse, NY. 1986. Proceedings forthcoming.
- Clark, R.N.; Stankey, G.H. The recreation opportunity spectrum: A framework for planning, management and research. PNW-98. Seattle, WA: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station; 1979. 32 p.
- Clark, R.N.; Koch, R.W.; Hogans, M.L.; Christensen, H.H.; Hendee, J.C. The value of roaded, multiple-use areas as recreation sites in three national forests of the Pacific Northwest. Gen. Tech. Rep. PNW-319. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station; 1984. 40 p.
- Clawson, M.; Van Doren, C.S. Statistics on outdoor recreation. Resources for the Future, Inc. Washington, DC: 1984. 368 p.
- Cohen, P.L. Stream corridor management for the Pacific Northwest and King County, Washington. Pullman, WA: Washington State University; 1985. Program in Regional Planning. 138 p.
- Cook, W.L.; Anderson, L.M.; English, D.B.K. Top-logging after thinning southern pine: Effects on visual quality. In: Watson, A.E., ed. Proceedings: Southeastern Recreation Research Conference, Myrtle Beach, SC. Department of Recreation and Leisure Sciences, Georgia Southern College, Statesboro, GA; 1985: 57-66.
- Cordell, H.K. Personal communication. U.S. Department of Agriculture, Forest Service. Athens, GA. Urban Forestry Research in the South; 1986.
- Cordell, H.K.; Hendee, J.C. Renewable resources recreation in the United States: supply, demand, and critical issues. Washington, DC: American Forestry Association; 1982. 88 p.
- Daniel, T.C.; Boster, R.S. Measuring landscape esthetics the scenic beauty estimation method. RM-167. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station; 1976. 66 p.
- Driver, B.L. Toward a better understanding of outdoor recreation participation. In: Gen. Tech. Report SE-9, Proceedings of the Southern States Applied Workshop; 1976; Asheville, NC: U.S. Department of Agriculture, Forest Service, Asheville, NC. 163-189.
- Driver, B.L.; Brown, P.J. A socio-psychological definition of recreation demand, with implications for recreation resource planning. In: Assessing Demand for Outdoor Recreation; Washington, DC; National Academy of Sciences; 1975: 64-88.
- Driver, B.L.; Brown, P.J. The opportunity spectrum concept and behavioral information in outdoor recreation resource supply inventories: a rationale. In: Proceedings, Integrated Inventories of Renewable Natural Resources Workshop. Gen. Tech. Rep. RM-55. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station; 1978: 24-31.
- Driver, B.L.; Brown, P.J.; Stankey, G.H.; Gregoire, T.G. The ROS planning system: evolution, basic concepts, and research needed; In Press.
- Driver, B.L.; Rosenthal, D.H. Measuring and improving the effectiveness of public outdoor recreation programs. Report on a recreation output resources workshop; Dec. 11-14, 1979; Harpers Ferry, WV. Washington, DC; Dept. of Human Kinetics and Leisure Studies, George Washington University; 1982. 40 p.
- Driver, B.L.; Tocher, R.S. Toward a behavioral interpretation of recreational engagements, with implications for planning. In: Driver, B.L. ed. Elements of Outdoor Recreation Planning; Ann Arbor, MI. University of Michigan Microfilms; 1970: 9-31.
- Forest Service. An assessment of the forest and range land situation in the United States. F.S.-345. Washington, DC: U.S. Department of Agriculture, Forest Service; 1980. 631 p.



- Forest Service. Alternative goals: 1985 Resources Planning Act Program. Program Aid Number 1307. Washington, DC: U.S. Department of Agriculture, Forest Service; 1980. 98 p.
- Forest Service. ROS users guide. Washington, DC: U.S. Department of Agriculture, Forest Service; 1982. 38 p.
- Forest Service. America's renewable resources: a supplement to the 1979 assessment of the forest and range land situation in the United States. FS-386. Washington, DC: U.S. Department of Agriculture, Forest Service; 1984a. 84 p.
- Forest Service. Draft environmental impact statement: 1985 - 2030 Resources Planning Act Program. Washington, DC: U.S. Department of Agriculture, Forest Service; 1984b. 370 p.
- Forest Service. RIM data, computer output; 1985.
- Haas, G.E.; Driver, B.L.; Brown, P.J. Measuring wilderness recreation experiences. In: Cannon, L. ed. Proceedings of the Wilderness Psychology Group Annual Conference; Durham, NH. Dept. of Psychology, University of New Hampshire; 1981: 25-30.
- Heritage, Conservation and Recreation Service. The third nationwide outdoor recreation plan. Washington, DC: U.S. Department of Interior; 1979.
- Hof, J.G.; Lee, R.D.; Dyer, A.A.; Kent, B.M. An analysis of joint costs in a managed forest ecosystem. *Journal of Environmental Economics and Management*; 12:338-352. 1985.
- Hodgson, R.L.; Thayer, R.L. Implied human influence reduces landscape beauty. *Landscape Planning*. 7:171-179; 1979.
- Hunt, J.D. Image: a critical influence in tourism development. Logan, UT: Institute for Outdoor Recreation and Tourism, Utah State University; 1974. 17 p.
- Jameson, D.A.; Moore, M.A.D.; Case, P.J. Principles of land and resource management planning. Washington, DC: U.S. Department of Agriculture, Forest Service, Land Management Planning Office; 1982. 214 p.
- Kocis, S. The adoption of statistical sampling in recreation use inventory. Unpublished Masters Thesis, Moscow, ID: University of Idaho; 145 p.
- Krutilla, J.V.; Knetsch, J.L. Outdoor recreation economics. In: Fischer, D.W.; Lewis, J.E.; Priddle, G.B. eds. *Land and Leisure*; Chicago: Maaroufa Press, Inc.; 1974: 167-174.
- Legge, T.A. Relationship of logging to decline of Pete King elk herd. In: Hieb, S.R., ed. *Proceedings, elk-logging roads symposium*; 1975 December 16-17; Moscow, ID: University of Idaho; 1976: 6-10.
- Manfredo, M.J.; Driver, B.L.; Brown, P.J. A test of concepts inherent in experience based setting management for outdoor recreation areas. *J. of Leisure Research* 15(3):263-283. 1983.
- Monroe, K.B.; Krishnan, R. The effect of price on subjective product evaluation. In: Jacoby, Jacob; Olson, Jerry C. eds. *Perceived Quality: How Consumers View Stores and Merchandise*. Lexington, KY: Lexington Books; 1985: 209-232.
- Peine, J.D. Does the public notice visual resource problems on the Federal Estate? In: Elsner, Gary; Smardon, Richard tech. coordinators. *Proceedings of Our National Landscape--A Conference on Applied Techniques for Analysis and Management of the Visual Resource*. General Tech. Report PSW-35. Berkeley, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station; 1974: 401-408.
- Rokeach, M. A theory of organization and change within value-attitude systems. *J. of Social Issues*. 24(1):13-33; 1968.
- Rokeach, M. *The nature of human values*. New York: The Free Press; 1973. 438 p.
- Rokeach, M. ed. *Understanding human values: Individual and societal*. New York: Free Press; 1979. 322 p.
- Rolston, H. III. Values gone wild. *Inquiry*. 16:181-207; 1983.
- Saunders, P.R. Monitoring and reporting recreation use; a case study. In: *Southeastern Recreation Research Proceedings*; Asheville, NC. Southeastern Forest Exp. Sta.; 1982: 143-163.
- Schreyer, R; Knopf, R.C. The dynamics of change in outdoor recreation environments--some equity issues. *Journal of Park and Recreation Administration*; 2(1):9-19. 1984.
- Sorg, C.F.; Loomis, J.B. Empirical estimates of amenity forest values: A comparative review. Gen. Tech. Rep. RM-107. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station; 1984. 23 p.



Thiessen, J.L. Some relations of elk to logging, roading and hunting in Idaho's game management unit 39. In: Hieb, S.R. ed. Proceedings of the elk-logging roads symposium; 1975 December 16-17; Moscow, ID. University of Idaho; 1976: 6-10.

Welch, G. Personal communication. U.S. Department of Agriculture, Forest Service, Recreation Management Staff; 1986.

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