

## ABSTRACT

### IDENTIFICATION OF THE SELWAY-BITTERROOT WILDERNESS AIRPLANE ACCESS USERS IN COMPARISON WITH CONVENTIONAL ACCESS USERS

By

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This study dealt with identifying the visitors to the Selway-Bitterroot Wilderness who used an aircraft to gain access to the Wilderness at Moose Creek Ranger Station and airstrip. In addition, these visitors were compared with visitors who gained access to the Wilderness by more conventional means at other trailheads.

This was a secondary analysis of a U.S. Forest Service questionnaire survey conducted during the summer and fall use seasons of 1971 in the Selway-Bitterroot Wilderness.

The results of the study indicate that the Moose Creek visitors fall into two distinct groups: those who engaged the services of a professional outfitter and those who chose not to be outfitted. In addition, both Moose Creek user groups varied from users who gained access to the Selway-Bitterroot by more conventional means of travel.

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By

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## CHAPTER I

### INTRODUCTION

At this point in the evolution of the American society, it is considered prudent to protect undeveloped areas of the country. The Wilderness Act of 1964 established such areas

in order to assure that an increasing population, accompanied by expanding settlement and growing mechanization does not modify and occupy all areas within the United States . . . leaving no lands designated for preservation and protection in their natural condition.<sup>1</sup>

It was enacted by Congress "to secure for the American people of present and future generations the benefits of an enduring resource."<sup>2</sup>

However, the intent of the Act, and reality often are not in complete accord due to the political compromises common to the democratic process. Because of such compromises, provisions for certain non-wilderness uses already established in the areas being designated as wilderness were incorporated into the Act.

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<sup>1</sup>Stewart M. Brandborg, A Handbook on the Wilderness Act (Washington, D.C.: The Wilderness Society, n.d.), p. 1.

<sup>2</sup>Ibid.



The Act states

Within wilderness areas designated by this Act the use of aircraft or motorboats, where these uses have already become established, may be permitted to continue subject to such restrictions as the Secretary of Agriculture deems desirable.<sup>1</sup>

Additionally, the Act provided for mining, water resources, grazing, outfitting, and ownership of private and state lands.

The major issue raised by the presence of such uses is not one of legality, but one of appropriateness. These uses are legally allowable exceptions to the intent of wilderness legislation which the Secretary of Agriculture may allow to continue. However, these uses are also non-conforming with the basic purpose of preserving areas in a natural and unmechanized state.

One of the more conspicuous inconsistent uses is that of aircraft. The issue of aircraft in wilderness is not an easy one to deal with. The fact that the aircraft use meets legal sanctions does not necessarily justify its existence. There are many factors which affect decisions regarding aircraft and the wilderness airstrips which are available to them.

These factors affect at least three categories of people: (1) the aircraft user; (2) the other wilderness users; and (3) the vicarious user. Some basic considerations of the first group include safety and maintenance

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<sup>1</sup>Ibid., p. 5.

factors of the facilities for aircraft, the range of opportunities, and the availability of alternative opportunities for the same activity.

The importance of the effect of aircraft activity on other users in the wilderness must not be overlooked. The intrusion of mechanization in their wilderness experience, the crowding factors in an otherwise remote area, and the knowledge that aircraft users can attain the same destination often with little effort as compared to the person arriving by more conventional means of travel may negatively alter the wilderness experience. For instance, in Cooke's study of Kings Canyon National Park,

the component of accessibility was found a major perceived component of wilderness. Increasing distance into the study area enhances the quality of wilderness perceived. It is perceived as important because of the difficulty of travel, the increased degree of isolation possible, and the decreasing signs of over-use and crowding of the landscape.<sup>1</sup>

The third group of people to be considered is that of persons who derive benefits from simply knowing that the wilderness exists, but who will most likely never visit it themselves. It is quite possible that they would perceive the value of such an area differently if it is totally free of mechanization than when aircraft intrude on the solitude and naturalness of the wilderness.

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<sup>1</sup>Douglas Bryan Cooke, The Perceived Environment of Wilderness in Kings Canyon National Park (unpublished Masters Thesis, University of Cincinnati, 1971), p. 77.

It is necessary for administrators to be cognizant of these factors when determining whether to allow aircraft use to continue in its present state, to modify it, or to eliminate such use altogether. Administrators also need to consider the user characteristics, motivations and attitudes in order to arrive at a decision which most nearly satisfies the users needs and desires.

This study primarily deals with the aircraft user, his identity, and his reasons for participating in such use, as compared to persons arriving in the same wilderness by more conventional means of access.

Rising recreational demands on wilderness tend to create increased conflicts with regard to management and uses of wilderness. Some of the conflicts arise from the varying concepts of wilderness among different individuals and groups, some from economic interests incompatible with wilderness philosophy, and some due to inconsistent uses established prior to wilderness classification. The latter group of conflicts is especially important with regard to such areas as Moose Creek Ranger Station and airstrip in the Selway-Bitterroot Wilderness. For many wilderness users, the vast areas of economically undeveloped land, free from the influences of the modern mechanized civilization, serve as a refreshing change from the pressures of their work-a-day world. The intrusion of motorized

vehicles, such as airplanes at Moose Creek, can create an infringement on their wilderness experience.

As early as 1946, comments were being made regarding the effects of air use in backcountry areas. John Sieker noted

there must be places where those who desire it can still have the fun of travelling only 10 or 20 miles a day along a quiet trail,<sup>1</sup> without breathing dust, gas fumes, or jet blasts.

Coffman summed up the feelings of many wilderness users when he stated

airplanes as modes of travel within [backcountry areas] are destructive of the atmosphere of remoteness, serenity, and peace, wherein lies the value of these areas for inspiration, recreation and relaxation.<sup>2</sup>

The opposite point of view was also expressed by Sieker when he observed that

without commitment as to policy and practice, we can visualize situations where it might be less harmful to a given wilderness to have an airfield from which wilderness parties would radiate than to have pack strings bringing people in and then overgrazing the mountain meadows.<sup>3</sup>

Presently the public is reviewing the Selway-Bitterroot Management plan. Among other items, the use of Moose Creek Ranger Station and airstrip is being reviewed by the

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<sup>1</sup>John Sieker, "Aircraft and Forest Recreation," Journal of Forestry 44 (1946), p. 890.

<sup>2</sup>John D. Coffman, "The Airplane Problem as it Relates to the National Park System," Proceedings of American Foresters Meeting, 1946, p. 107.

<sup>3</sup>John Sieker, "Airplanes and National Forest Wilderness," Proceedings of American Foresters Meeting, 1948, p. 105.

Forest Service to determine the suitability of the airstrip in the wilderness and assess the options open for future administrative policy regarding the facilities. While existing prior to wilderness classification, Moose Creek fosters the conflicting use of aircraft in wilderness. In addition, it appears to be attracting heavier use in spite of or perhaps because of the primitive nature of the facilities for aircraft. Such increases in the use may be a significant factor in any decision regarding the future use of Moose Creek. Other factors, such as visitor attitudes, preferences, and characteristics; resource capabilities; wilderness values and philosophy; and public opinion also should be taken into consideration when making such a decision.

A number of management options for Moose Creek Ranger Station and airstrip are available to the Forest Service. The major options are:

1. Remove all uses of Moose Creek, destroy the existing facilities and allow the land to revert back to wildland;
2. Remove all air use from Moose Creek, allow the airstrip to revert back to wildland;
3. Limit the airstrip use to official Forest Service purposes such as administration, fire control, maintenance;
4. Limit the amount of visitor use of the airstrip;

5. Maintain the facilities in their present status;  
or
6. Update and enlarge the existing facilities,  
improve the communications system.

Because of the increases in use each year and the type and condition of the facilities, it is doubtful that the airstrip can be maintained in its present status over a long period of time. "Because of increased traffic it will be increasingly more difficult to maintain the surface at Moose Creek."<sup>1</sup> Safety problems will increase as the number of flights increase and as the number of inexperienced pilots increases."<sup>2</sup> Because of these and other reasons it simply does not seem possible for Moose Creek to remain the same. The choice then becomes one of development to handle the increased use, or limitations to preserve the wilderness character of the area. Therefore, a decision will have to be made to either increase the capability of the facility to handle visitor use, or to limit the amount and/or type of uses allowed. Essentially, the Forest Service will have to choose between accommodating the increasing recreational demands of a segment of the public (an anthropocentric approach) or managing the

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<sup>1</sup>U.S. Forest Service, "Selway-Bitterroot Wilderness Management Plan," Missoula, Montana, 1975, p. 26. (Mimeographed)

<sup>2</sup>Ibid.

wilderness as a resource of which recreation is one of many factors (a biocentric approach).<sup>1</sup>

A major question to be dealt with by administrators is "Does the airstrip serve as a wilderness entry point or as an intrusion in the heart of the wilderness?" It is hypothesized that:

Visitors who enter the Selway-Bitterroot Wilderness by flying into Moose Creek airstrip view it as a destination rather than as a wilderness access point.

That is, their reasons for flying to Moose Creek relate to the existence of the airstrip rather than to the wilderness.

It is further hypothesized that:

Moose Creek is serving a different public than are the other sampled wilderness access points.

That is, visitors entering the Selway-Bitterroot by flying into Moose Creek exhibit significant variation in their characteristics, activities, and motivations from visitors entering the wilderness at other sampled access points.

By investigating the reasons expressed by the visitors for going to Moose Creek and the activities they engage in during their visit, some insight into the attraction of Moose Creek airstrip should be gained. In addition, the factors motivating visitor use at Moose Creek will be looked at to determine if the benefits

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<sup>1</sup>For a discussion of the anthropocentric and biocentric approaches to management of wilderness, see John C. Hendee and George H. Stankey, "Biocentricity in Wilderness Management," BioScience 23 (9): September, 1973, pp. 535-538.

derived by visitors are dependent upon a wilderness location or if they can be fulfilled by facilities provided outside a wilderness.

This involves the concept of substitutability. Substitutability "refers to the interchangeability of recreation activities in satisfying participant's motives, needs, and preferences."<sup>1</sup> For example, if a beach is too crowded, a group may picnic instead. However, it appears that certain desires and needs cannot be satisfied if certain activities or facilities are not available. Hendee and Burdge propose that "activities for which there are no substitutes tend to be area based such as in wilderness and natural or historical areas."<sup>2</sup> Using this assumption, if aircraft users are motivated more by the existence of the airstrip than by the presence of the wilderness, it appears more suitable that facilities for the activity of flying to backcountry airstrips be provided outside wilderness.

The issue of such airstrips is not confined solely to Moose Creek. It is probable that information regarding the use of Moose Creek airstrip could be helpful in determining future use and administration of a number of

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<sup>1</sup>John C. Hendee and Rabel J. Burdge, "The Substitutability Concept: Implications for Recreation Research and Management," Seattle, p. 1. (Unpublished Draft) (To be published in Journal of Leisure Research)

<sup>2</sup>Ibid., p. 8.



other public airstrips located within the boundaries of wilderness and primitive areas in the Rocky Mountains.

## CHAPTER II

### METHODOLOGY

During the summer and fall of 1971 (June 20 to November 26) a U.S. Forest Service study of visitors to the Selway-Bitterroot Wilderness in Montana and Idaho was conducted by Dr. Robert C. Lucas of the Forestry Sciences Laboratory, Intermountain Forest and Range Experiment Station, Missoula Montana. Basically, this Baseline Survey was designed "to determine for wildernesses in the Northern Rocky Mountains, the nature of recreational use, major visitor characteristics, experience levels, and key attitudes."<sup>1</sup> Contact with visitors was made through the use of special registration stations or roadside check stations and supplemented by personal contact to check for non-registration. A questionnaire was mailed during the fall and winter to a cluster sample of the visitors contacted in the field.

This Baseline Survey lends itself well to secondary analysis. More information was generated than can be

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<sup>1</sup>Robert C. Lucas, "A Baseline Survey of Wilderness Visitors in the Northern Rocky Mountains" (unpublished project work plan, Missoula, Montana, March 11, 1970), p. 2.

published in the basic study report. The objectives of the Baseline Survey closely parallel those of this thesis and the data was aimed directly at some of the concerns being examined in this thesis, thus reducing the possibility of slippage. In addition, the author was involved in the Baseline Survey and so is aware of many of the intuitive factors inherent in the study.

### Sample Design

The sample design used in the study was a cluster sample with paired selection of primaries from unequal-sized clusters, chosen with probability proportional to size (PPS) and subsampled<sup>1</sup> with probabilities inversely proportional to size.

(Details of this design are included in Appendix I.) The use of a simple random sample was rejected. To draw a random sample, all visitors would have to have been contacted, which was impractical in an area such as the Selway-Bitterroot Wilderness.

Sampling with probability proportional to size was used to adjust for the unequal distribution of trail use.

This is a

standard way of maintaining both roughly equal-sized clusters and equal probability of selection for all elements (people, in this case). This is achieved by selecting clusters with probability proportional to estimates or measures of size and then subsampling clusters at a rate inversely proportional to the same size measures. The estimates of size cancel out, a

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<sup>1</sup>Lucas, "A Baseline Survey," p. 6.

constant sampling fraction results, and a self-weighting sample is produced.<sup>1</sup>

Sampling periods of two week intervals were established separately for the summer and fall seasons to allow for fluctuations in use due to the seasonal variation in visitor activities.

### Field Techniques

A combination of eight methods was used to contact the visitors. Five of the eight methods were used at locations on the perimeter of the wilderness, while the other three were used at Moose Creek airstrip. In every case, all persons 16 years and older in the party (not only the party leader) were asked to register. With one exception involving commercial outfitters, study registration cards were substituted for the regular Forest Service registration cards during the sampling period.

The primary method of contact was through the use of special portable registration stations at trailheads. These stations were placed on specific trails during sample periods of three weeks and were moved according to a pre-determined schedule.

The second method used was the roadside check station. Two roads were suitable for this method--the Darby-Elk City Road (Magruder Road) south of the Selway-Bitterroot, and the Elk Summit Road on Powell Ranger

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<sup>1</sup>Ibid., p. 7.

District at the north end of the wilderness. These roads lead to a large number of wilderness trailheads with little non-recreational use, making it very efficient to simply check all traffic using the two roads. These check stations were set up periodically at Savage Pass on the Elk Summit Road, at Watchtower Creek on the east end of the Darby-Elk City Road, and near the junction of that road with the Dixie Road at the west end of the road.

Special warning and stop signs were used to stop exiting vehicles at the check station between about 10:00 a.m. and dusk (about 7:30 p.m.). Nearly all traffic on the road earlier than 10:00 a.m. was Forest Service vehicles. Persons leaving the area from a wilderness trip were asked to fill out a special study registration card.

The third method was personal contact at the trailheads where the special registration stations were set up. Entering visitors were contacted following the opportunity to register. Those who had registered were not contacted further. Those who had not registered were asked to fill out a registration card. The field technician later indicated on the card that the visitors were non-registrants.

The principal objective of personal contact at the trailhead was to obtain a sample of non-registrants. Precautions were taken to avoid making the visitor feel spied upon, such as positioning the special registration station

so that the field technician could observe the station from a distance and contact the parties casually at a point far enough up the trail that her presence would not be obviously connected with the special registration station.

In the fourth method, visitors entering the Wilderness at Paradise Guard Station were asked to register on study registration cards by an employee from the Magruder Ranger District of the Bitterroot National Forest. This access is a major take-off point for floating the Selway River, so most of the visitors contacted at Paradise were rafters or other river users.

Persons who used the services of a commercial outfitter were handled a little differently on the Clearwater National Forest. This Forest requires the outfitters to furnish the names and addresses of all guests on special forms. Copies of these forms for the Powell and Lochsa Ranger Districts on the Clearwater were obtained so these visitors would not have to repeat the same information on study registration cards. Persons using an outfitter on other Districts on the perimeter of the Wilderness were contacted by the same methods as those not serviced by an outfitter.

Of the three interior Forest Service access points (Fish Lake, Shearer, and Moose Creek airstrips), only Moose Creek was sampled. A slight modification of the

study registration station was used as the primary method of collection at Moose Creek. The stations were erected at the beginning of the study season and remained up until November 26, rather than being set up at the beginning of a sampling period and removed at the end as was the case at other access points.

Secondly, a supply of study registration cards was on hand at the Ranger Station, where District personnel contacted visitors who had not registered at the study registration stations.

Finally, commercial outfitters based out of Moose Creek were given a supply of study registration cards and requested to register all guests.

### The Samples

Two major samples were drawn from the data collected during the field season. The first was a sample for the Selway-Bitterroot Baseline Survey. Included in this was a sample of Moose Creek visitors drawn from registration cards collected during specific Baseline Survey sampling periods.

A second sample consisting exclusively of Moose Creek visitors was drawn, since nearly a 100 percent registration rate was obtained there by leaving the registration stations in place for the entire field season. This was a quarter sample, taken to gain more understanding of that particular special-use group.

Both samples were sent a summer or fall version of the same questionnaire. This questionnaire was basically a revised form of that used in the 1969 Pilot Study and 1970 Baseline Survey conducted by Dr. Lucas. (See Appendix II for copies of the questionnaire.)

The questionnaire was sent on a delayed mailing schedule with a maximum of four follow-up mailings. These follow-up mailings went out at about 14-day intervals and resulted in an overall response rate of 91 percent.



## CHAPTER III

### THE STUDY AREA

The Selway-Bitterroot Wilderness is the largest unit in the National Wilderness Preservation System. Its 1,239,840 acres sprawl over parts of two states, Montana and Idaho, and cover large portions of the watersheds of three major rivers. Bounded on the north by the Lochsa River, the Wilderness extends about 50 miles south to the Magruder Corridor (a narrow strip of unclassified land separating the Selway-Bitterroot Wilderness from the Salmon River Breaks Primitive Area). The Montana towns of Darby, Hamilton, Stevensville, Lolo and Missoula are located in close proximity to the Wilderness, whereas the nearest Idaho towns, Kooskia, Grangeville, and Elk City are located a number of miles by road from the area (see map 1).

#### Physical Setting

The majestic Bitterroot Mountain Range dominates a large portion of the Wilderness, with high, glaciated peaks, numerous lakes, and beautiful alpine meadows. Swift creeks tumbling downward cut into the granitic base of the Idaho Batholith. Elevations range from 10,157 feet

at Trapper Peak to 1,734 at Race Creek trailhead. Although the physical setting is rugged and mountainous, "natural landslides, sheet erosion, and eroding wildlife trails all attest to the fragility of the area."<sup>1</sup>

During the summer, temperatures often exceed 100 degrees in the lower valleys. Dry lightning fires become more frequent in the high country during August, thus driving the fire danger into the extreme ranges. Winters are severe, with sub-zero temperatures and large snowfalls. Normally by mid-November much of the area is inaccessible because of the weather conditions.

Vegetation varies from the delicate alpine and subalpine plants to cathedral-like stands of western red cedar. Numerous wildflowers highlight the meadows and hillsides while brush such as alder, willows, and red osier dogwood are often found along streambeds.

Wildlife is plentiful in the area, including non-game species of bobcat, coyote, fox, marmot, and various rodents. The availability of game species such as mountain goats, bighorn sheep, mountain lion, elk, moose, deer and black bear attracts many hunters, while grouse and other game birds often provide a fall visitor with a meal. Grizzly bear inhabited the area until about the 1930s when the salmon runs apparently declined due to dam construction

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<sup>1</sup>Report of the Magruder Corridor Review Committee, April 17, 1967, p. 21.

downstream, thus cutting off one of their primary food sources. Many birds are sighted also, including osprey, eagles, swans and various smaller species.

Fishing is considered excellent in the wilderness lakes and streams. Species include rainbow, golden and cutthroat trout. The Lochsa and Selway Rivers are classified under the Wild and Scenic Rivers Act and provide numerous opportunities for fishing, scenery, and recreation. Both rivers serve as spawning grounds for the chinook salmon and steelhead trout. The Chinook salmon was reintroduced about 1964 to the Lochsa and Selway following modifications to allow fish to bypass such barriers as dams and falls.

### Access

Access to most western wildernesses is by trails originating at roads on the perimeter. The Selway-Bitterroot Wilderness is unique since not only does a large trail system with numerous trailheads provide opportunity for dispersion of visitors, but also, two alternative forms of access are available--aircraft and non-motorized boating. A number of airstrips, both public and private, exist in the wilderness. All of them offer the challenge of hazardous mountain flying.

The Selway River provides excellent floating and it is not uncommon for an entire wilderness visit to be confined to a river journey from Paradise Guard Station to

Race Creek trailhead. Boaters also utilize Moose Creek airstrip as a starting point or destination, because it is located nearly halfway between Paradise and Race Creek.

The trail system originally was developed in the 1930s and was primarily for fire control access. However, recreation demands on the system are now much greater than those of fire control. Most parts of the wilderness can be reached by trail, although a few areas still are left without improved routes. There is much variation in the quality and challenge of the trails, ranging from rugged and seldom maintained to those which offer little challenge and are well maintained.

Similarly, the trailheads vary greatly, from a mere path leading off into the woods, to those with well developed stock and parking facilities. In general, most trailheads have some space for parking and limited signs listing major trail destinations and mileage. In some places on the Lochsa River, picturesque pack bridges carry the visitors across the river from the trailhead facility to the trail.

About half of the wilderness access points are reached on highways U.S. 12 or U.S. 93. Access to the remaining trailheads is more difficult since most are remote. The seasonal roads serving these more distant trailheads generally are unimproved or graveled, receiving little or no maintenance other than some downed tree

removal and occasional grading. In addition, these trailheads are often located at a distance from the Wilderness boundary, so that entering the Wilderness from them is a major effort.

#### Moose Creek Ranger Station and Airstrip

Moose Creek Ranger Station and airstrip is located at the junction of Moose Creek and the Selway River in the heart of the Selway-Bitterroot Wilderness. Since the nearest road is approximately 25 miles downstream, nearly all the visitors gain access by aircraft. However, some visitors do arrive via float trips in the early summer or by foot or stock from one of the many trailheads on the wilderness perimeter.

Moose Creek serves two major functions: (1) as the administrative headquarters for the Moose Creek Ranger District of the Nezperce National Forest, and (2) as a wilderness access point for the public.

Being the only Forest Service District totally contained within wilderness boundaries greatly affects the administrative responsibilities and priorities. Some of the traditional functions of Districts (such as timber harvest) are not performed at Moose Creek. The primary workload of the District involves wilderness administration, fire control and recreation. The station normally is manned from March through December, although visitor

use generally is light until much later in the spring and diminishes soon after hunting season ends.

As an access point, the airstrip serves primarily three recreational functions: (1) for day use (local hiking and fishing); (2) as a wilderness entry point (wilderness rafting, hiking, and hunting); and (3) as a destination (camping at the airstrip and flying from one backcountry airstrip to another).

### The Physical Setting

The physical setting is quite picturesque. Built in the 1920s, the log buildings nestle in the trees at the east end of the short runway. The station consists of the District administrative office and attached cookhouse, two residences, a bunkhouse, a fire cache and a barn. Stock is maintained at the station for administrative purposes and grazes at night on the airfield. A tractor is used to mow the airstrip, and propane provides fuel for the cookstoves and hot water heaters. The station also has an electric generator which is seldom used (see map 2).

Construction on the airstrip was begun by the CCC's in the 1930s with subsequent improvements and enlargements. Presently there are two runways with no public air to ground communications, necessitating extra caution and safety procedures to clear the field. These factors plus the effect of the surrounding mountains and the hazardous approaches make Moose Creek a challenging airstrip.

Other developments associated with the Ranger Station and airstrip are camping areas, trails, and bridges. Moose Creek is a major trail junction, with large suspension pack bridges at the trail crossings of the Selway River and Moose Creek.

#### Development

A number of non-wilderness uses were present in the Selway-Bitterroot prior to classification under the Wilderness Act of 1964. This act provides protection of prior-existing facilities and uses, but does not guarantee their permanence. For example, the Act states

the grazing of livestock, where established prior to the effective date of this Act shall be permitted to continue subject to such reasonable regulations as are deemed necessary by the Secretary of Agriculture.<sup>1</sup>

Likewise, similar provisions are made for mining, water resources, aircraft, motor boats, and private or State lands within the boundaries. Many such inholdings and non-wilderness uses occur in the Selway-Bitterroot, including airstrips, buildings, some private lands, a few grazing permits and a number of irrigation dams.

Homesteading was undertaken around the turn of the century, but generally it was not practical because "proving up on such inaccessible land was extremely

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<sup>1</sup>Brandborg, A Handbook, p. 7.

difficult."<sup>1</sup> However, some homesteaders maintained their claim to the land and later turned to dude ranching and outfitting, which proved to be a more successful venture. The Wilderness Act provided for the continuation of such dude ranching and outfitting by stating that

commercial services may be performed within the wilderness areas designated by this Act to the extent necessary for activities which are proper for realizing the recreational or other wilderness purposes of the areas.<sup>2</sup>

Outfitting operations vary from casual outfitting for an occasional party to major hunting and fishing excursions. There are a number of options which an outfitted party can choose. They range from spot packing, where a party's gear is packed to a base camp and picked up again at a pre-arranged time, to a completely outfitted trip where all but the visitor's personal gear is supplied and the outfitter also serves as a hunting or fishing guide.

Outfitters operating on Forest Service land are required to have a special use permit which normally specifies their season of use, the campsites they may use and various rules and regulations they must follow in relation to use of the area.

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<sup>1</sup>Three-forks (unpublished historical account of the area).

<sup>2</sup>Brandborg, A Handbook, p. 7.



The Forest Service gradually has bought out some of the homesteads and ranches, destroyed the buildings, and allowed the land to revert back to natural conditions. Only five ranches still exist on private land within the Wilderness boundary. These ranches include: the Renshaw Ranch, an outfitter base; the Seminole Ranch, a private ranch; Selway Lodge, a dude operation; North Star Ranch, a private ranch with subsistence farming and outfitting; and Running Creek Ranch, a retirement place, with some outfitting. North Star Ranch and Running Creek Ranch are occupied year-round, and both have grazing permits for horses and livestock on Forest Service land adjacent to the ranch property.

All of the ranches use a certain amount of motorized equipment. Generally, these are limited to chainsaws, generators, pumps, a jeep or two and a few tractors. Running Creek Ranch, Selway Lodge, Seminole Ranch and North Star Ranch presently have private airstrips open to public use, as did Moose Creek Ranches prior to being purchased by the Forest Service in 1967.<sup>1</sup>

Some other claims on the wilderness resource still exist. In addition to the ranch grazing permits, there is a cattle grazing allotment in the Ghost Mountain area. In the northeast portion of the Wilderness, a number of alternate sections are owned by the Burlington Northern

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<sup>1</sup>Per conversation with Bill Holman.

Railroad. These sections have had no development. Primitive roads on Big Fog Mountain and at Elk Summit were closed and gradually are reverting back to natural conditions. Some abandoned cabins are scattered through the Wilderness so it still is possible to come upon the ruins of an old shack in the woods off the present trails.

Many streams on the Montana side of the Bitterroot range are regulated by irrigation dams. Most of these are earthen dams built in the 1920s and are now maintained by hand, although in a few instances, motorized equipment has been used. A few irrigation dams were also constructed on the Idaho side, but these were abandoned long ago and most traces have disappeared.

In addition to the private non-wilderness uses of the area, there are some administrative uses which are not truly wilderness oriented. Triangulation stations and State Line border markers are located at various points in the Wilderness, but generally go unnoticed by visitors.

The Forest Service maintains some lookout facilities in the Selway-Bitterroot. Of these, only a few normally are manned during fire season, with spot-manning of others during extreme fire conditions. In the past, lookouts were posted throughout the area, but air patrols have reduced this need.

Telephone wires were strung to connect most of the lookouts and Ranger Stations prior to the development of

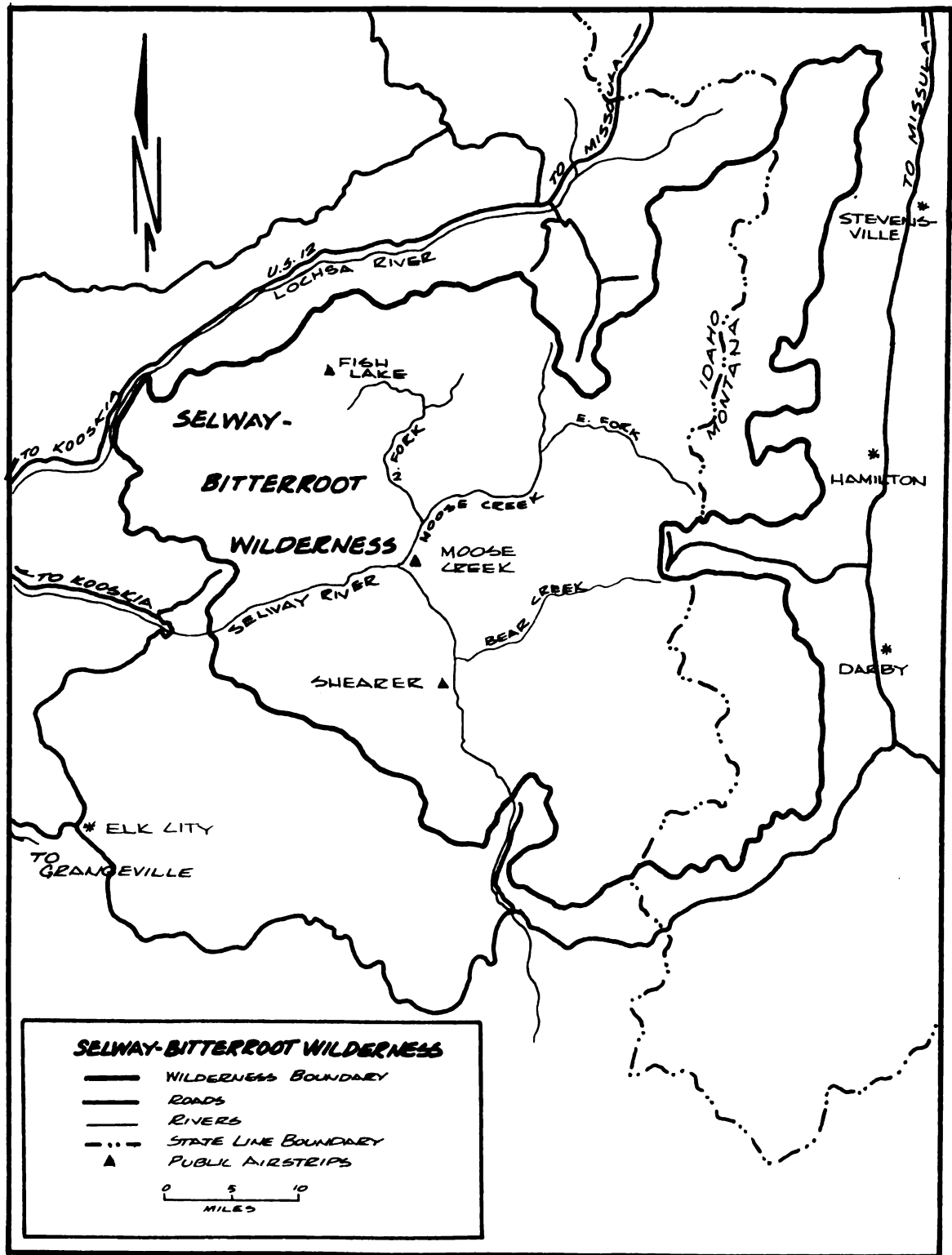
adequate communications. Presently, some of these phone lines on the Moose Creek District are maintained and used to supplement radio operations.

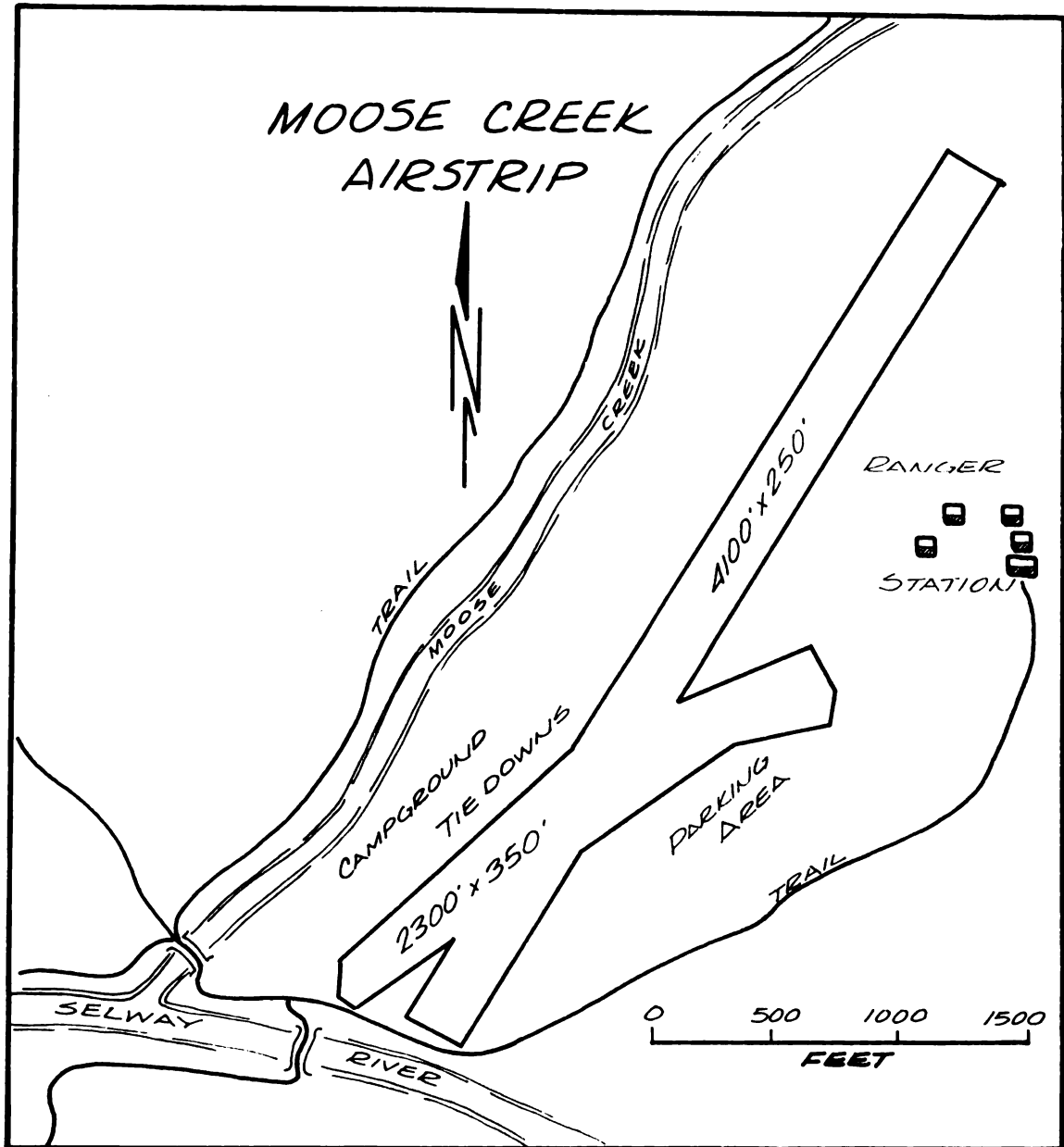
The Forest Service also maintains one Ranger Station (Moose Creek) and four guard stations (Fish Lake, Shearer, Horse Camp and Coopers Flat) within the Wilderness boundary. Airstrips are open to the public at Fish Lake, Shearer and Moose Creek. These airstrips are hazardous due to such factors as topography, weather situations, the condition of the landing surface, and effective density altitude (a combination of temperature, altitude and humidity). Of the three airstrips, Fish Lake is considered the most dangerous. At least seven accidents and a number of fatalities have occurred there, due primarily to poor pilot judgment regarding effective density altitude.

Use estimates for the three Forest Service airstrips indicate that Fish Lake receives the least use with 706 estimated landings in 1972. At Moose Creek "over 1600 flights occurred during the 1972 season."<sup>1</sup>

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<sup>1</sup>U.S. Forest Service, "Management Plan," p. 25.





## CHAPTER IV

### THE DATA

For the purposes of this study, the data from two samples was used. The first is the visitors sampled for the 1971 Baseline Survey who entered the Selway-Bitterroot Wilderness on foot, with stock, or in a boat from one of the access points on the perimeter of the Wilderness. For convenience, this population will be referred to as the "Selway-Bitterroot" users (although technically, those persons entering the Wilderness by airplane at Moose Creek are also users of the Selway-Bitterroot Wilderness).

The second population includes: (1) the visitors from the Baseline Survey who gained access to the Wilderness by flying to Moose Creek; and (2) a special quarter sample of persons using Moose Creek who were not sampled for the Baseline Survey, but whose names were drawn from the names left over after the Baseline Survey sample was drawn. (All persons sampled in this second population gained access to the Wilderness by flying into the airstrip. That is the only way one could begin a wilderness journey at Moose Creek, since one would have to travel

through the Wilderness to reach Moose Creek by any other travel method.)

It appears that Moose Creek visitors who engage the services of a commercial outfitter may represent a different public or may have different reasons for visiting the Wilderness than persons who do not use such services. For this reason, the Moose Creek users will be presented in categories of visitors who were commercially outfitted and those who were not. For convenience, these categories will be referred to as "outfitted" and "non-outfitted" visitors. The Selway-Bitterroot population will not be so divided since the sample of outfitted persons was far too small to be reliable. Instead, basic undivided tabulations will be included for that population for comparison with the Moose Creek population.

For purposes of this thesis, the 0.05 level constitutes significance. Nevertheless, the data will be included showing whatever level of significance is achieved in order to give the reader as much information as possible. The presence of statistical significance is not irrelevant, but it does not tell the whole story. It does not necessarily indicate real significance for management policy, since most tests of significance are very sensitive to sample size. In the real world situation, managers often have no control over factors which show a strong statistical significance, but rather must work with the information

available concerning the factors over which they have some control.

### Occupation

The bulk of the Moose Creek users were professional people and managers. These two occupational areas account for 56 percent of the visitors. The rest of the users were evenly spread over the remaining categories (see Table 1).

Occupational background reflected some differences between the outfitted and non-outfitted groups. The outfitted persons were primarily professional, managers, and craftsmen, while over half of the non-outfitted visitors were professionals and managers.

The Selway-Bitterroot visitors generally come from two occupational areas--professional and student. These two groups account for 61 percent of the usage. The rest of the users are evenly spread over the other occupational categories. The large student use of the Selway-Bitterroot may be explained by the fact that the University of Montana is located nearby in Missoula.

### Income

The majority of the Selway-Bitterroot and Moose Creek visitors had average to above average incomes. Table 2 shows the Selway-Bitterroot users with 75 percent in the \$7,000 or more categories and Moose Creek with an even higher count (93 percent) in those categories.



Table 1.--Distribution (in percent) of Users' Occupations.

	Professional	Farmer	Manager	Clerk	Sales Persons	Craftsmen	Operatives	Service	Laborer	Student	Retired	Housewife	Other	Total %	N
Moose Creek*															
Non-outfitted	38	5	16	1	2	6	8	2		8	8	5	1	100	89
Outfitted	31		28		7	22				6	2	4		100	51
Total	36	3	20	1	4	11	5	2		7	6	4	1	100	140
Selway-Bitterroot	28	4	3	1	4	9	6	3	3	23	9	5	2	100	330

\*Chi-square for the Moose Creek portion of this table equals 23.59 with 11 degrees of freedom. It is significant beyond the 0.025 level.

Table 2.--Distribution (in percent) of Users' Incomes.

	\$ 3,000	\$ 3,000 - \$ 5,000	\$ 5,000 - \$ 7,000	\$ 7,000 - \$ 10,000	\$ 10,000 - \$ 15,000	\$ 15,000 - \$ 25,000	\$ 25,000 +	Total %	N
Moose Creek*									
Non-outfitted	1	2	7	17	33	28	12	100	85
Outfitted				6	12	34	48	100	50
Total	1	2	4	13	25	30	25	100	135
Selway-Bitterroot	5	6	14	26	25	16	8	100	314

\*Chi-square for the Moose Creek portion of this table equals 30.27 with 6 degrees of freedom. It is significant beyond the 0.005 level.

Although the two groups are quite similar when viewed at the \$7,000 or more level, these similarities disappear rapidly towards the upper end of the scale. The Moose Creek visitors dominate the higher salary categories. Fifty five percent had salaries of \$15,000 or more, while only 24 percent of the Selway-Bitterroot visitors did. Twenty five percent of the Moose Creek users earned over \$25,000, as compared to 8 percent of the Selway-Bitterroot visitors.

The non-outfitted Moose Creek users and the Selway-Bitterroot users are very similar throughout all salary categories. The decision to be outfitted at Moose Creek appears to be closely related to income level, with over half of the outfitted visitors earning over \$25,000 per year and only 18 percent of them earning less than \$15,000.

### Residence

The Selway-Bitterroot appears to be frequented mostly by local users (see Table 3). Nearly half (40%) of these users are from Montana, with an additional 27 percent from the Mountain states of Arizona, Idaho, New Mexico, Colorado, Nevada, Utah, and Wyoming. The third largest amount of use comes from the Pacific states of California, Oregon, and Washington, with 17 percent of the visitors residing there.

Table 3.--Distribution (in percent) of Users' Residence.

	Montana	Upper Midwest	Mountain States	Pacific States	Southern Plains	East Lake States	Southeast	Northeast	Foreign	Total %	N
Moose Creek*											
Non-outfitted	10		43	45	1		1			100	96
Outfitted		34	8	30	8	8		12		100	53
Total	7	12	30	40	3	3	1	4		100	149
Selway-Bitterroot	40	4	27	18	3	3	1	3	1	100	337

\*Chi-square for the Moose Creek portion of this table equals 78.72 with 7 degrees of freedom. It is significant beyond the 0.005 level.

Eighty-two percent of the Moose Creek use comes from the Pacific states, the Mountain states, and the Upper Midwest states of Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin. However, there is some variation between the outfitted and non-outfitted groups. The non-outfitted visitors tended to reside in the Mountain and Pacific states, whereas the outfitted visitors generally come from the Pacific and the Upper Midwest states.

#### Travel Expenses

The Moose Creek user's travel expenses varied greatly. However, the number of visitors falling into each category was about the same and is spread evenly across the table. Thirty-four percent of the users spent from \$51 to \$200, while 40 percent spent less than \$30 (see Table 4).

The outfitted users and the non-outfitted users exhibit some different spending patterns. The non-outfitted visitors are evenly spread from zero expenses to \$200, with 64 percent spending less than \$30. The outfitted user's expenses were greater, with 66 percent of them spending from \$51 to \$300. It is not surprising that the outfitted persons spent more on traveling. They generally come from further away and probably used commercial transportation rather than private vehicles on much of the journey.

Table 4.--Distribution (in percent) of Travel Expenses.

	Zero	\$ 10	\$ 11 - \$ 20	\$ 21 - \$ 30	\$ 31 - \$ 40	\$ 41 - \$ 50	\$ 51 - \$ 100	\$101 - \$200	\$201 - \$300	\$301 - \$400	\$401 +	Total %	N
Moose Creek*													
Non-outfitted	4	19	23	18	10	5	14	6			1	100	79
Outfitted	2		4	2		8	20	31	15	6	12	100	53
Total	3	11	15	11	6	6	17	17	6	2	6	100	132
Selway-Bitterroot	12	47	14	6	2	4	7	4	4			100	289

\*Chi-square for the Moose Creek portion of this table equals 71.09 with 10 degrees of freedom. It is significant beyond the 0.005 level.

The majority of the Selway-Bitterroot visitors did not spend a great deal of money on traveling to the Wilderness. Fifty-nine percent of them spent \$10 or less, while 85 percent spent less than \$50. This may be explained partly in that most Selway-Bitterroot users are from Montana or the nearby mountain states.

#### Other Expenses

The other expenses incurred by wilderness users followed the same general pattern as that of travel expenses (see Table 5). The Moose Creek visitors ranged fairly evenly from zero to over \$500. However, in examining outfitted and non-outfitted users, some obvious differences arise. The non-outfitted visitors spent \$100 or less for other expenses, while only 14 percent of the outfitted visitors were able to get by on that amount. Nearly a fifth of the outfitted visitors spent from \$100 to \$200, and over half spent more than \$500. The fact that many of the outfitted persons are from out-of-state and engage in hunting may account for much of the extra expense. Hunting licenses are rather expensive in Idaho and Montana for out-of-state hunters, and in Montana it is required that such hunters be accompanied by a Montanan or a licensed outfitter or guide. As was the case for travel expenses, 59 percent of the Selway-Bitterroot visitors spent \$10 or less on expenses other than travel. Only 12 percent of them spent over \$100.

Table 5.--Distribution (in percent) of Other Expenses.

	Zero	\$ 10	\$ 11	\$ 20	\$ 21	\$ 30	\$ 40	\$ 50	\$ 51	\$ 101	\$ 201	\$ 301	\$ 401	\$ 500 +	Total %	N
Moose Creek*																
Non-outfitted	13	24	23	5	3	15	13	2	2	100	61					
Outfitted	2		2	2		8	17	2	3	9	55	100	52			
Total	8	13	13	4	2	8	10	8	2	4	26	100	113			
Selway-Bitterroot	18	41	11	5	2	4	7	4	3	2	2	1	100	267		

\*Chi-square for the Moose Creek portion of this table equals 87.59 with 11 degrees of freedom. Significant beyond the 0.005 level.



### Season of Use

The majority (80 percent) of the Selway-Bitterroot visitors are summer visitors.

Moose Creek tends to show more balance between summer and fall use, with 60 percent of the use coming during the summer months (see Table 6). However, much of this balance is gained due to the large percentage of outfitted persons using the Wilderness during the fall. This fall outfitted use is probably influenced by the local hunting seasons, whereas the non-outfitted users follow a similar pattern to the Selway-Bitterroot visitors, with 78 percent of their use coming during the summer months.

Table 7 indicates that non-outfitted visitors accounted for 64 percent of the total Moose Creek use. However, there is a major difference between the summer

Table 6.--Seasonal Use Distribution (in percent).

	% Summer	% Fall	Total %	N
<hr/>				
Moose Creek*				
Non-outfitted	78	22	100	96
Outfitted	26	74	100	53
Total	60	40	100	149
Selway-Bitterroot	80	20	100	337

\*Chi-square for the Moose Creek portion of the table equals 37.96 with 1 degree of freedom. It is significant beyond the 0.005 level.

Table 7.--Distribution (in percent) of Moose Creek Users by Season.

	Summer	Fall	Total
% Non-outfitted	84	35	64
% Outfitted	16	65	36
Total %	100	100	100
N	89	60	149

$\chi^2 = 37.96$  with 1 degree of freedom. Significant beyond .005 level.

and fall usage. Nearly all of the summer visitors are not outfitted, while only one-third of the visitors in the fall were not outfitted.

#### Party Size

Table 8 shows the average wilderness party to be composed of two to four people. Sixty-seven percent of the Selway-Bitterroot and 59 percent of the Moose Creek visitors fell into these categories. The non-outfitted Moose Creek users also followed the same pattern, with 72 percent in these categories.

Generally, the outfitted parties were larger, with only 34 percent in the two to four person categories. Sixty-six percent of the outfitted users were in groups of five or more, as compared to only 27 percent of the non-outfitted and 29 percent of the Selway-Bitterroot users. It should also be noted that better than one-fifth

Table 8.--Party Size Distribution (in percent).

	Party Size											Total %	N	
	1	2	3	4	5	6	7	8	9	10	11- 20			20+
Moose Creek*														
Non-outfitted	2	28	16	27	3	6	2	1	2	1	5	7	100	95
Outfitted		14	4	17	10	10	2	8	10	4	22		100	51
Total	1	23	12	24	5	8	2	3	4	2	11	5	100	146
Selway-Bitterroot	6	27	17	23	8	4	4	2	2	3	4	2	100	334

\*Chi-square for the Moose Creek portion of this table equals 35.29 with 11 degrees of freedom. Significant beyond the 0.005 level.

of the outfitted persons traveled in groups ranging in size from eleven to twenty people.

Few visitors were in the wilderness alone.

#### Type of Group

Forty percent of the visitors to the Selway-Bitterroot were in family groups and an additional 36 percent were in groups composed of friends and acquaintances. The pattern for the Moose Creek totals showed 24 percent of the visitors in family groups and 57 percent in groups made up of friends and acquaintances (see Table 9).

The non-outfitted visitors at Moose Creek exhibited a similar trend with 78 percent falling into the same two categories. However, the outfitted users were predominately in groups composed of friends and acquaintances (76 percent).

#### Nights Stayed

Three-fourths of the trips into the Selway-Bitterroot are two nights or less in length, with half of the visitors taking day trips (see Table 10).

Day trips accounted for about one-third of the use at Moose Creek. Only one of the outfitted persons was a day user, while half of the non-outfitted persons did not stay overnight in the wilderness.

The total overnight use at Moose Creek was spread relatively evenly over one through seven nights. However,

Table 9.--Distribution (in percent) of Types of Groups.

	Family Friends	Family & Friends	Friends & Acquaintances	Other Alone	Total &	N
Moose Creek*						
Non-outfitted	31	14	47	7	100	94
Outfitted	12	12	76		100	51
Total	24	13	57	5	100	145
Selway-Bitterroot	40	16	36	3	100	332

\*Chi-square for the Moose Creek portion of this table equals 14.52 with 4 degrees of freedom. It is significant beyond the 0.010 level.

Table 10.--Number of Nights Stayed (in percent).

	Number of Nights											Total %	N
	0	1	2	3	4	5	6	7	8	9	10	11+	
Moose Creek*													
Non-outfitted	48	14	20	7	3	4	3				1		96
Outfitted	2	2	4	13	8	13	23	25	4	2	2	2	53
Total	33	9	14	9	5	7	10	9	1	1	1	1	149
Selway-Bitterroot	50	13	12	5	4	3	4	2	3	1	2	1	337

\*Chi-square for the Moose Creek portion of this table equals 47.74 with 11 degrees of freedom. It is significant beyond the 0.005 level.

there were some major differences between the outfitted and non-outfitted groups. Generally, the outfitted users stayed from five to seven nights in the Wilderness, whereas the non-outfitted visitors averaged three or less nights there. This could be explained partially by the fact that the non-outfitted users frequent the weekends, while the outfitted visitors who go to the effort and expense of securing an outfitter stay longer.

#### Distance Traveled

Most of the Selway-Bitterroot visitors traveled less than twenty-five miles, with 39 percent of them going ten miles or less. However, all of the Selway-Bitterroot users traveled at least one mile (see Table 11).

Of the total Moose Creek users, 22 percent stayed in the area around the airstrip, thus showing zero miles traveled. An additional 24 percent traveled from one to ten miles.

Nearly all of the outfitted persons covered more than ten miles. Sixty three percent traveled in excess of 25 miles and all of the outfitted visitors traveled at least six miles.

The non-outfitted users did not indicate as much travel as did the other wilderness users. Thirty six percent of them did not travel beyond the immediate area of the airstrip, and another 20 percent hiked less than five

Table 11.--Distribution (in percent) of Distance Traveled.

	Miles Traveled																			Total %	N
	Zero	1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 50	51 - 98										
Moose Creek*																					
Non-outfitted	36	20	14	5	4	6	5	1	3	3	3	3	3	3	3	3	3	3	3		
Outfitted			7	4	17	9	20	2	13	11	17	100	46								
Total	22	13	11	5	9	7	11	1	7	6	8	100	127								
Selway-Bitterroot		19	20	16	18	10	6	2	3	3	3	3	3	3	3	3	3	3	3		

\*Chi-square for the Moose Creek portion of this table equals 59.12 with 11 degrees of freedom. It is significant beyond the 0.005 level.



miles. Fifteen of the remaining 44 percent traveled over 25 miles.

#### Reasons for the Trip

One-third of the Selway-Bitterroot visitors cited wilderness as the major reason for making their trip. In addition, aesthetic values, fishing, hunting, and hiking each accounted for about 10 percent of the reasons (see Table 12).

With the exception of hiking, Moose Creek users followed the same pattern. However, the picture changes somewhat when they are separated into outfitted and non-outfitted persons. Wilderness was an important reason for both groups, but the outfitted persons indicated hunting as an important reason for taking the trip two to one over wilderness.

Non-outfitted persons came to fish, for aesthetic reasons, because of the airstrip, and to one degree or another, use the wilderness. Twelve percent of them indicated that the airstrip was a major attraction.

#### Satisfaction with the Trip

The majority of users were well satisfied with their trip. Fifty-eight percent of the Selway-Bitterroot users rated the trip very good with an additional 28 percent rating it good. Nine percent of them felt it was

Table 12.--Frequency (in percent) of Reasons for the Trip.\*

	Fishing	Hunting	Hiking	Develop Skills	Other Activity	Relaxation	Wilderness	Aesthetics	Socialization	Health	Airstrip	Other	Total %	N
Moose Creek**														
Non-outfitted	22	1	2	3	4	6	24	13	6	2	12	9	100	169
Outfitted	8	39			5	6	20	8	11			6	100	75
Total	18	13	2	2	4	5	23	11	7	2	9	7	100	244
Selway-Bitterroot	11	8	8	1	5	8	30	14	5	2		12	100	577

\*Expressed in percentage of responses. Each visitor could give up to three responses.

\*\*Chi-square for the Moose Creek portion of this table equals 83.19 with 11 degrees of freedom. It is significant beyond the 0.005 level.

fair, 3 percent felt their trip was poor and only 2 percent rated the trip very poor (see Table 13).

Ninety percent of the Moose Creek users felt the trip was very good or good. Only 8 percent of them rated it fair and only 2 percent indicated dissatisfaction.

The primary reasons given for this high degree of satisfaction were related to the fact that the visitors encountered a wilderness environment, that they were able to experience its natural beauty and that it was a clean area (see Table 14). Outfitted persons also mentioned that good outfitters were an important reason for their satisfaction, while non-outfitted visitors cited that good fishing added to their satisfaction.

### Education

About the same percentage of users from each group fell into the various categories (see Table 15). Twenty-seven percent of the Selway-Bitterroot and of the Moose Creek visitors had a high school education, 23 percent of each attended some college, and 36 percent of the Selway-Bitterroot users and 38 percent of the Moose Creek users graduated from college, with most doing some additional coursework beyond their bachelor's degree.

It appears that people with formal educations tend to frequent the wilderness more often than do less formally educated persons. This may be due in part to the higher level of education that the general public is

Table 13.--Distribution (in percent) of User Ratings of the Trip.

	Very Good	Good	Fair	Poor	Very Poor	Total %	N
<hr/>							
Moose Creek*							
Non-outfitted	82	10	6	1	1	100	87
Outfitted	65	22	10	2	2	100	51
Total	75	15	8	1	1	100	138
Selway-Bitterroot	58	28	9	3	2	100	332

\*Chi-square for the Moose Creek portion of this table equals 5.04 with 4 degrees of freedom. It is significant beyond the 0.500 level.

Table 14.--Frequency (in percent) of Reasons Cited for Satisfaction with the Trip.\*

	Good Fishing	Good Hunting	Poor Fish or Hunt	Good Activities	Wilderness	Crowded	Beauty	Dirty Area	Clean Area	Good Company	Good Outfitter	Physical Setting	Other	Total %	N
Moose Creek**															
Non-outfitted	9		1	6	30	3	17	1	17	3		6	7	100	146
Outfitted		8	8		32		20	4	8	1	12	3	4	100	75
Total	5	3	4	5	30	2	18	2	14	2	4	5	6	100	221
Selway-Bitterroot	4		4	3	29	3	24	8	12	2		5	6	100	484

\*Users could respond with up to three different reasons for satisfaction.

\*\*Chi-square for the Moose Creek portion of this table equals 55.73 with 12 degrees of freedom. It is significant beyond the 0.005 level.

Table 15.--Distribution (in percent) of Educational Attainment.

	Years of Education Completed											Total %	N
	8	9	10	11	12	13	14	15	16	16+			
Moose Creek*													
Non-outfitted		2	3	8	26	6	12	6	12	25		100	89
Outfitted	4	2	2		29	7	12	4	12	28		100	51
Total	2	2	3	5	27	6	12	5	12	26		100	140
Selway-Bitterroot	3	2	5	4	27	10	7	6	8	28		100	328

\*Chi-square for the Moose Creek portion of this table equals 8.44 with 9 degrees of freedom. It is significant beyond the 0.500 level.

attaining and the increased amounts of time and money that this public has to spend on leisure time activities.

It does not appear that educational attainment has a noteable influence on the method of access or the choice between being outfitted or not outfitted for wilderness trips.

### Age

The Selway-Bitterroot generally drew more young people than did Moose Creek. Forty nine percent of the Selway-Bitterroot users were in the 16 to 30 year old categories, as compared to only 24 percent of the Moose Creek users (see Table 16). These figures are nearly reversed in the middle aged, or 31-45 year old categories, with the Selway-Bitterroot users at 26 percent and the Moose Creek people totaling 48 percent. The two groups are similar in the 46 and older categories, with about one-fourth of each in these older age groupings.

The non-outfitted and outfitted visitors are similar except for the fact that the outfitted visitors are represented a bit more in the 46 and older categories. Forty percent of the outfitted visitors are over 45 years old, while only 22 percent of the non-outfitted users fall into this category.

Table 16.--Age Distribution (in percent) of Users.

	Years of Age											Total %	N
	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	65+		
Moose Creek*													
Non-outfitted	8	8	12	10	15	25	11	5	4	1	1	100	89
Outfitted	4	8	6	21	10	11	8	10	12	6	4	100	51
Total	6	8	10	15	13	20	10	6	6	3	2	100	140
Selway-Bitterroot	18	16	15	12	8	6	6	7	7	2	3	100	329

\*Chi-square for the Moose Creek portion of this table equals 16.86 with 10 degrees of freedom. It is significant beyond the 0.100 level.



## Sex

The ratio of females to males in the Wilderness is slightly less than one to four. Only 27 percent of the Selway-Bitterroot and 16 percent of the Moose Creek populations were female (see Table 17).

The low percentage of females may be partly explained because

even in our contemporary view, campcraft--the art of building fires, preparing outdoor meals, providing for shelter and storage, the knowledge of woods and fields and streams necessary for safe outdoor living--is primarily associated with men and boys.<sup>1</sup>

Table 17.--Distribution (in percent) of Male and Female Users.

	% Male	% Female	Total %	N
Moose Creek*				
Non-outfitted	80	20	100	90
Outfitted	92	8	100	51
Total	84	16	100	141
Selway-Bitterroot	73	27	100	332

\*Chi-square for the Moose Creek portion of this table equals 3.65 with 1 degree of freedom. It is significant beyond the 0.100 level.

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<sup>1</sup>Margaret Mead, "Outdoor Recreation in the Context of Emerging Cultural Values: Background Considerations," Trends in American Living and Outdoor Recreation, ORRRC Study Report 22 (Washington, D.C.: U.S. Government Printing Office, 1962), p. 4.

### Importance of Wilderness

Wilderness was considered very important by nearly all of the visitors (see Table 18). The percentages run about the same for the Selway-Bitterroot and the Moose Creek users, with little difference between outfitted and non-outfitted users. A scant 2 percent of the Moose Creek users and 1 percent of the Selway-Bitterroot users felt that the area was not very important. Wilderness is definitely one of the things the visitors want or think they want.

Table 18.--Importance of Wilderness to Users (in percent).

	Importance of Wilderness				N
	Very	Fair	Not Very	Total %	
<hr/>					
Moose Creek*					
Non-outfitted	89	10	1	100	90
Outfitted	92	6	1	100	50
Total	90	9	2	100	140
Selway-Bitterroot	92	7	1	100	329

\*Chi-square for the Moose Creek portion of this table equals .81 with 2 degrees of freedom. It is significant beyond the 0.750 level.

### Activities

Respondents were asked to check the activities they participated in during their wilderness visit. The kinds and number of activities were recorded for each

respondent to see what they did and how active they were in general.

### Participation in Activities

Over half of the Selway-Bitterroot users (62 percent) participated in two to three activities while in the Wilderness, whereas one to four activities accounted for 90 percent of the respondents. Table 19 indicates that the majority of the Moose Creek users were active. Over half of the respondents involved themselves in three or more activities. The outfitted tended to be the more active, with 64 percent participating in three or more activities, as compared to the non-outfitted user group which had 85 percent of its respondents participating in three or less activities. The Selway-Bitterroot users are very similar to the Moose Creek users with respect to activeness. Moose Creek users had 57 percent in three or more activities and 73 percent in three or less. Selway-Bitterroot visitors had 54 percent in three or more activities and 66 percent in three or less.

### Fishing

Fishing appears to be more important to Moose Creek users than to the Selway-Bitterroot visitors. Less than half (43 percent) of the Selway-Bitterroot respondents indicated they fished, while 60 percent of the Moose Creek persons fished (see Table 20).

Table 19.--Frequency (in percent) of Participation in Activities.

	Number of Activities						Total %	N
	1	2	3	4	5	6		
Moose Creek*								
Non-outfitted	26	27	32	11	3	1	100	95
Outfitted	17	19	15	26	21	2	100	53
Total	23	24	26	16	10	1	100	148
Selway-Bitterroot	14	32	30	14	8	2	100	333

\*Chi-square for the Moose Creek portion of this table equals 22.51 with 5 degrees of freedom. It is significant beyond the 0.005 level.

Table 20.--Percentage of Users Who Fished.

	% Yes	% No	Total %	N
Moose Creek*				
Non-outfitted	72	28	100	96
Outfitted	40	60	100	53
Total	60	40	100	149
Selway-Bitterroot	43	57	100	337

\*Chi-square for the Moose Creek portion of this table equals 14.85 with 1 degree of freedom. It is significant beyond the 0.005 level.

Breaking the Moose Creek users into outfitted and non-outfitted categories show some variation. Seventy-two percent of the non-outfitted visitors fished, as compared to 40 percent of the outfitted users. Considering the amount of day use and the short distance hiked by most of the non-outfitted group, it appears that the tendency of non-outfitted persons to fish may be due in part to the quality of fishing near the airstrip. It is an activity one can participate in without traveling far from the plane and fishing success tends to be high. In contrast, the seasonality of outfitting may explain the lack of fishing by the outfitted group. Most of the outfitted persons are there for fall hunting seasons and must sacrifice valuable hunting time to engage in fishing.

### Riding Horses

Horseback riding does not appear to be an important activity to the Selway-Bitterroot users. Only one-fifth (19%) of the respondents indicated that they participated in this activity (see Table 21). Likewise, the majority of the Moose Creek visitors did not ride horses. Nearly all those who did ride fall into the outfitted group. This is more than likely due to the fact that horses generally are not available to non-outfitted persons. Some Selway-Bitterroot visitors do ride, probably in the fall in conjunction with the hunting season, but in general they tend to hike instead.

Table 21.--Percentage of Users Who Rode Horses.

	% Yes	% No	Total %	N
<hr/>				
Moose Creek*				
Non-outfitted	3	97	100	96
Outfitted	70	30	100	53
Total	27	73	100	149
Selway-Bitterroot	19	81	100	337

\*Chi-square for the Moose Creek portion of this table equals 77.33 with 1 degree of freedom. It is significant beyond the 0.005 level.

### Hunting

Hunting does not appear to draw many visitors to the Selway-Bitterroot when compared to the total number of users. Only 15 percent of the visitors indicated that they hunted (see Table 22).

Similarly, the majority (74 percent) of the Moose Creek visitors did not hunt. However, there is a large difference between the outfitted and non-outfitted Moose Creek users. Two percent of the non-outfitted persons indicated that they hunted, while 70 percent of the outfitted users were hunters. It is not surprising that most of the outfitted persons were hunters. The majority of the outfitting in the area is seasonal (done in the fall). Administratively, this would mean that the airstrip is serving a different public during the fall hunting season

Table 22.--Percentage of Users Who Hunted.

	% Yes	% No	Total %	N
<b>Moose Creek*</b>				
Non-outfitted	2	98	100	96
Outfitted	70	30	100	53
Total	26	74	100	149
Selway-Bitterroot	15	85	100	337

\*Chi-square for the Moose Creek portion of this table equals 81.06 with 1 degree of freedom. It is significant beyond the 0.005 level.

as compared with the summer season, and perhaps different problems and needs will be of concern during the outfitting season.

### Hiking

Hiking was one activity in which many users participated. As Table 23 indicates, 77 percent of the Selway-Bitterroot visitors hiked and 55 percent of the Moose Creek visitors also hiked.

Forty percent of the non-outfitted Moose Creek visitors did not hike. This would tend to indicate that they flew in with private planes and did not leave the airstrip area. There is little opportunity for these people to move about without hiking, as horses generally are available only through outfitters.

Table 23.--Percentage of Users Who Hiked.

	% Yes	% No	Total %	N
<hr/>				
Moose Creek*				
Non-outfitted	59	41	100	96
Outfitted	47	53	100	53
Total	55	45	100	149
Selway-Bitterroot	77	23	100	337

\*Chi-square for the Moose Creek portion of this table equals 2.06 with 1 degree of freedom. It is significant beyond the 0.25 level.



Fifty-three percent of the outfitted Moose Creek visitors also did not hike. This is probably due to the availability of riding stock provided by the outfitter.

### Taking Pictures

Taking pictures appears to be a popular activity with Moose Creek and Selway-Bitterroot visitors (see Table 24). There seems to be little relation between the method of access and picture taking, with about three-fifths of the visitors to both areas taking pictures. It is a common way of recording many of the social and aesthetic values of the wilderness trip for future enjoyment.

Table 24.--Percentage of Users Who Took Pictures.

	% Yes	% No	Total %	N
<hr/>				
Moose Creek*				
Non-outfitted	57	43	100	96
Outfitted	62	38	100	53
Total	59	41	100	149
Selway-Bitterroot	59	41	100	337

\*Chi-square for the Moose Creek portion of this table equals .35 with 1 degree of freedom. It is significant beyond the 0.75 level.

### Nature Study

It appears that the majority of wilderness users are not there to study nature (see Table 25). The Selway-Bitterroot showed the greater degree of involvement with 37 percent of its population participating in some sort of nature study, while only 12 percent of the Moose Creek people showed such interests.

Table 25.--Percentage of Users Who Studied Nature.

	% Yes	% No	Total %	N
Moose Creek*				
Non-outfitted	14	86	100	96
Outfitted	9	91	100	53
Total	12	88	100	149
Selway-Bitterroot	37	63	100	337

\*Chi-square for the Moose Creek portion of this table equals .54 with 1 degree of freedom. It is significant beyond the 0.500 level.

### Swimming

Although swimming conditions are favorable in the area for about two months during the summer, few users swam. Only 18 percent of each total participated in this activity, with little difference between outfitted and non-outfitted persons (see Table 26).

Table 26.--Percentage of Users Who Swam.

	% Yes	% No	Total %	N
<hr/>				
Moose Creek*				
Non-outfitted	19	81	100	96
Outfitted	17	83	100	53
Total	18	82	100	149
Selway-Bitterroot	18	82	100	337
<hr/>				

\*Chi-square for the Moose Creek portion of this table equals .07 with 1 degree of freedom. It is significant beyond the 0.900 level.

## CHAPTER V

### CONCLUSIONS

The study reveals that the first hypothesis is partially true. About one-third of the Moose Creek non-outfitted users were destination-oriented. They were the least active and did not leave the airstrip except perhaps to fish at the nearby river junction. An additional 20 percent of the non-outfitted visitors traveled less than five miles.

The other half of the non-outfitted visitors and all of the outfitted visitors used the airstrip as their point of access rather than as one of destination.

The study further reveals that visitors gaining access to the Selway-Bitterroot Wilderness at Moose Creek airstrip fall into two distinct categories: (1) those who are served by a commercial outfitter; and (2) those who are not. In addition, both groups are different from visitors who arrived in the same Wilderness by means other than aircraft. Therefore, the second hypothesis is true--Moose Creek users are a different public than other users of the Selway-Bitterroot.

The Moose Creek non-outfitted user is generally a 31 to 45 year old man from the Mountain or Pacific states. He is well educated and earns between \$10,000 and \$25,000 in a professional or managerial position. He primarily hikes during the summer in groups of two to four friends or acquaintances, or perhaps in a family group. He travels less than ten miles in the Wilderness and quite possibly does not leave the airstrip area. He stays one or two nights and in many cases, is a day user. His overall expenses are less than \$300 with travel accounting for about two-thirds of the total cost. He participates in no more than three wilderness activities, probably including fishing, hiking or picture taking, and was drawn to the area because of its wilderness characteristics, to fish, for aesthetic reasons, or because of the airstrip.

The Moose Creek outfitted user is generally an older man, probably between 31 and 45 years of age and in many cases, over 45. Working as a professional person, a manager, or a craftsman, he earns at least \$15,000 and often over \$25,000 per year. He lives in the Upper Midwest or the Pacific states and is well educated. He is primarily a fall visitor and is accompanied by five or more friends or acquaintances. He covers 25 miles or more on his trip and generally stays five to seven nights. He spends \$50 to \$300 on travel expenses and an additional \$400 or more on other expenses. Being very active, he

participates in three or more activities, generally including hunting, riding horses, or picture taking. His primary reasons for the trip are hunting and the fact that the area is classified as a wilderness.

The typical Selway-Bitterroot visitor is generally a well educated young man between the ages of 16 and 30, who earns over \$7,000 and probably between \$10,000 and \$25,000. He is a student or a professional person from Montana or a nearby state. He is a summer visitor accompanied by two to four persons which may be his family, or friends and acquaintances. He probably hikes over ten miles and stays less than three nights. He spends less than \$50 on travel and about the same amount on other expenses. He participates in two or three activities probably including hiking or taking pictures. His reasons for the trip include aesthetics, fishing, hunting, hiking and the wilderness.

From these composites, administrators may gain further insight to arrive at management decisions which take into consideration the needs and desires of the users. There are two primary areas of management to which this thesis may apply. The first is the management of airstrips in a similar type of situation as Moose Creek. There are two other Forest Service airstrips in the Selway-Bitterroot which quite probably will follow the same management direction as that of Moose Creek. The Idaho

Primitive area has a number of similar airstrips. That area, presently before Congress for wilderness classification, is located a short distance south of the Selway-Bitterroot and has many things in common with Moose Creek. Much of the information dealing with use at Moose Creek can be adapted to the airstrips in such areas as this. Shafer airstrip in the Middle Fork area is another similar area which could derive benefits from management information regarding Moose Creek.

The second area of management is obviously that of Moose Creek Ranger Station and airstrip. It does not appear that Moose Creek can remain the same as it is presently. Visitor use will undoubtedly rise as in most other forms of recreation. It will be very difficult to accommodate such an increase with present facilities.

It is questionable that developing the facilities to accommodate use would be the best policy. The study has indicated that both the destination-oriented and the wilderness-oriented visitors cite "wilderness" as an important reason for using Moose Creek. The quality and quantity of construction necessary to adequately accommodate the increasing air traffic at Moose Creek could have a detrimental impact on the area. The quality of wilderness in and around the airstrip could be greatly reduced. Eventually, it is quite conceivable that the present clientele will be disenfranchised and seek a different

area, undoubtedly still in a wilderness or primitive area, with opportunities similar to those lost through the modernization of Moose Creek. A new clientele could then be attracted by the quality of the facilities rather than by the existence of the Wilderness, thereby increasing the destination-orientation of the airstrip users and probably creating additional conflicts between the activities of wilderness-oriented visitors and those of aircraft users.

The logistics of providing adequate administration of the Wilderness without any use of Moose Creek could become overwhelming. It would easily take nearly a week's time for the Forest Service work crews to travel in and out of the Wilderness to maintain some of the more remote sections. Not having a central point of operations could make their work less efficient and more difficult. In addition, "the historical value of having a working Ranger Station made of logs, not located in town nor accessible by a road should not be overlooked."<sup>1</sup>

Closure of the airstrip would reduce administrative efficiency of the area even if the Ranger Station were still active. The costs of administration would increase substantially because of the additional time necessary to perform tasks presently done with the assistance of aircraft.

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<sup>1</sup>U.S. Forest Service, "Management Plan," p. 37.



As far as the public is concerned, the ramifications of an airfield closure at this time are uncertain. It is assumed that on a national scale, public opinion would be in favor of a closure, and that local opinion would be against.<sup>1</sup>

Politically, it is doubtful that the Forest Service would decide to eliminate public use of the Moose Creek airstrip at this time. There are a number of major controversial wilderness or preservation-oriented issues before the public in Montana and Idaho. In many instances, the difference between support and opposition is marginal. It would be unwise to threaten the possibility of gaining better protection of these lands by alienating the aircraft users. Many of them strongly support wilderness classification for some areas, but if that classification threatened their recreational activity, they undoubtedly would withdraw their support.

Limiting the airstrip to only Forest Service use would leave a large recreational group with fewer places to pursue their activity. Each of the individual items which draw the users to Moose Creek is substitutable. However, in combination, it would be very difficult to provide all of those items in one package outside the Wilderness. Other similar areas generally are already within wilderness or primitive area boundaries. Finding a location suitable for a new airstrip and generating the

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<sup>1</sup>Ibid.

funding necessary for its construction and maintenance would be next to impossible. The legal aspects of constructing an airstrip specifically for recreation must also be considered. In addition, intangibles such as sentimentality and tradition must be considered when deciding whether to relocate or eliminate a facility such as Moose Creek.

It is doubtful that the things the non-outfitted Moose Creek visitors are seeking could be provided outside the Wilderness. These users indicate that they go to Moose Creek because it is a wilderness, because of the airstrip, for fishing, and for aesthetic reasons. Their reasons for being satisfied with the trip include wilderness and the beauty of the area. The fact that Moose Creek is a natural area with a challenging airstrip adds to its drawing power.

The outfitted persons, in contrast, appear to be going to the Wilderness for hunting and for the wilderness experience. The existence of the airstrip does not appear to be as important to them as it is to the non-outfitted users. Perhaps for this user group, arriving at an outfitter's camp by other means of travel and being taken into the Wilderness on riding stock would provide an equally satisfying experience without the intrusion of aircraft. However, they constitute only about one-third of the Moose Creek visitors.

The option chosen in the Forest Service management plan appears to be the most suitable. "The management direction, in general, will be to limit air traffic within the Wilderness."<sup>1</sup> "Public airstrips will not be expanded or improved."<sup>2</sup> Unlimited use would have an undesirable impact on the area. Maintaining limited use would allow adequate administration of the area and provide recreational opportunity in a unique setting for some visitors, and at the same time, reduce the amount of intrusion on other wilderness visitors' experiences.

When considering options which reduce visitor use, an assumption of the management plan was that "a decrease in public aircraft use would increase stock use."<sup>3</sup> However, most of the Moose Creek users are not stock-oriented. They do not ride horses in the Wilderness. Nearly a third of the non-outfitted persons do not show that they even partake of the actual wilderness experience. Persons using the rest of the Selway-Bitterroot show little tendency to use stock. There does not seem to be much evidence to indicate that private use of stock would mushroom following the closing of a facility such as Moose Creek. The outfitted persons do not indicate that they are being outfitted at that particular place because of the airstrip. Therefore, this study does not support the assumption that

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<sup>1</sup>Ibid., p. 54.

<sup>2</sup>Ibid., p. 49.

<sup>3</sup>Ibid., p. 26.

a decrease in aircraft use would substantially increase stock use. It is questionable that visitors would choose to sacrifice the extra travel time necessary to reach Moose Creek without the use of aircraft when they could visit other areas which are closer to conventional trailheads and would leave the visitor more time to enjoy the wilderness experience.

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## APPENDICES



## APPENDIX I

### SAMPLE DESIGN

## APPENDIX I

### SAMPLE DESIGN<sup>1</sup>

The design chosen is a cluster sample, with paired selection of primaries from unequal-sized clusters, chosen with probabilities proportional to size (PPS) and subsampled with probabilities inversely proportional to size (Kish 1967, Chap. 7).

This system is explained in detail below. It seems to be the best compromise for an extremely difficult sampling situation. Basically, we have two alternatives: (1) a simple, random sample (SRS)<sup>2</sup> or (2) an unequal-sized cluster design. (The clusters consist of all people using<sup>3</sup> a given access point over some specified period of time such as a week.)

The simple random sample is appealing in terms of the simplicity of calculations of means, variances, and

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<sup>1</sup>Robert C. Lucas, A Baseline Survey of Wilderness Visitors In the Northern Rocky Mountains, unpublished Project Work Plan, Missoula, Montana, March 11, 1970.

<sup>2</sup>This could be stratified also, by season, level or type of trail use, or on any other relevant basis for which data were available.

<sup>3</sup>"Using" could be defined as entering, leaving, or both.

other measures, and would almost surely produce smaller standard errors than the cluster sample, for the same size sample. The problem is that there is no way to draw an SRS sample without a complete listing of all (or at least nearly all) visitors.

A complete listing would require a registration station on every trail all season long, and intensive or even 100 percent checking for non-registrants. This would be impossible to do without much more money and manpower than is available. Furthermore, many more people would be contacted than would be sampled--perhaps up to 100 times as many in heavily visited areas such as the Sawtooth Primitive Area or the Selway-Bitterroot Wilderness. This is inefficient, and an unreasonable imposition on visitors. Most groups who registered would not have anyone in their group sampled, which could cause disappointment and misunderstanding.

Therefore, collecting names and addresses only on sample trails during sample periods, and subsampling at a fairly high rate, is preferable. There are problems here, also, however. This method can only produce clusters, and the clusters of people on a given trail or access road (entering, exiting, or both) for a specified period of time are very unequal. Past studies have shown a single trail may account for half of all use, and a few trails usually account for almost all use. The frequency

distribution of season-long use totals by trails often approaches the log-normal distribution. When the season's use is split into weeks of other time intervals, variation almost certainly increases even more.

If all the people who registered on a sample trail-time unit were sampled, or if a constant sampling fraction was used, the sample clusters would reflect this great size variation. This is undesirable because it produces biased estimates. The ratio mean (the only type of mean that can be calculated from a cluster sample) requires that the coefficient of variation of cluster sizes be relatively small; less than 0.20 if possible is a suggested rule of thumb (Kish 1967, p. 187, 208-209, 217-220).

Sampling with probability proportional to size (PPS) is the standard way of maintaining both roughly equal-sized clusters and equal probability of selection of all elements (people, in this case). This is achieved by selecting clusters with probability proportional to estimates or measures of size (the larger clusters are more likely to be chosen) and then subsampling clusters at a rate inversely proportional to the same size measures (the subsampling rate is high for small clusters and low for large clusters). The estimates of size cancel out, a constant sampling fraction results, and a self-weighting sample is produced.

For a numerical example, imagine trail A has an estimated use of 10 people per week, and trail B has an estimated use of 100 people per week. A visitor to B is 10 times as likely to have his name and address requested as a visitor to A. Perhaps 500 names and addresses would be collected from 2,000 visitors at B (1 out of 4), and 5 names from 200 visitors at A (1 out of 40). However, a visitor to A who gives his name and address is 10 times as likely to be chosen as a respondent as is a visitor to B. At A, all 5 people might be sampled (5 out of 5, and 1 out of 40 overall, whereas at B we might sample 50 out of the 500 (1 out of 10, or 1 out of 40 overall). Thus, visitors to A and B have the same probability of receiving a questionnaire, 1 chance out of 40 in this example.

If the actual cluster sizes are the same as (or directly proportional to) the estimated cluster sizes, then, obviously, the sample clusters would be equal-sized (Kish, p. 226). This is the major flaw in this method for wilderness surveys. Accurate season-long use estimates by trails are rarely available,<sup>4</sup> and fluctuations over time are even less well-measured. (A self-registration system

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<sup>4</sup>Experience to date suggests that administrators usually can rank trails in terms of use fairly well, but that their estimates of absolute use are much less accurate. They have tended to underestimate use on heavily-used trails and to overestimate use on lightly-used trails, to overestimate horse use, and to grossly overestimate length of stay.

vigorously administered would be invaluable for this purpose.)

However, there is no apparent alternative to employing administrative use estimates as the basis for PPS sampling at this time, and no feasible alternative to some type of PPS design. A PPS design will at least reduce variation in cluster size, and probably reduce it considerably.

The selection equation (Kish, p. 224) is:

$$\frac{2 \text{ Mos } \alpha}{2 \text{ Fb}^*} \cdot \frac{\text{b}^*}{\text{Mos } \alpha} = \frac{2\text{b}^*}{2 \text{ Fb}^*} = \frac{1}{\text{F}} = \text{f},$$

where:

Mos  $\alpha$  = a measure of size (estimate use) for a trail, or group of trails covered by one roadside checkpoint, for a specified time period (defined as a number of weeks, usually two)

F = sampling interval = 1/f (the overall sampling fraction)

b\* = planned sample cluster size = 12

f = overall sampling fraction (to produce a sample of about 480 individuals per area).

If the number of trails with significant estimated use (generally, at least three visitors per week) in a particular wilderness is less than 12, two sample locations per time period will be chosen. If the number of trails meeting this criterion is 12 to 23 four locations will be sampled. If it is 24 to 35, six locations will be sampled. If 36 or more, 8 will be sampled.

The selections will be made as two paired selections per time period, taken from strata formed by subdividing the original seasonal (summer/fall) strata on the basis of the importance of horseman use. The trails (and any groups of trails served by one road to be checked on the road) will be ranked on the basis of the estimated percent horseman use, and split as near the appropriate dividing point of cumulated use as possible. Thus, the strata will be approximately equal in total estimated use.

The proportion of horseman use is thought to be the best stratification variable, because, of the few variables for which prior information is available, it is most strongly associated with the other variables being measured.

It is possible for a trail to be selected as a sample trail more than once in a time period, and if a trail has very heavy use relative to the other potential samples, this is likely. In such cases, the trail is simply sub-sampled more than once.

For each wilderness, the value of  $F$ , the sampling interval, comes from dividing total estimated use for the wilderness<sup>5</sup> by 480 (the planned size of the sample for each area).

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<sup>5</sup>The total estimated use for all trails in the pool of potential sample would be the figure used. This might exclude a few very lightly-used trails.

The number of time-period "zones" in each stratum will then be determined by dividing the total estimated use for that stratum by  $2 F_b^* = 24F$ . This number will be used to choose the closest available number of time zones using weeks as the smallest divisible unit of time. The reason for using weeks as the minimum period is to equalize representation of each of the 7 days of the week between time zones because of use variation associated with each day of the week. Alternatively, we could define time-period zones in days (for example 11 days, 16 days, 17, etc.). This would reduce the effect of rounding errors. However, given the relative magnitudes of the sources of error, and in view of the very rough measures of size, keeping days of the week equally represented in each time-period zone seems more important than eliminating small potential inequalities between strata in cluster size or  $F$ . (Two- to four-week zones are the most likely result. The longer the time-period zones, the less work and expense will be involved in moving registration stations. The total number of zones for all strata combined should usually equal about 20, which, with the planned cluster size of 12, would yield the desired total sample of about 480.)

Next, for each stratum, two primary sample trails or roadside checkpoints will be chosen for each "zone" or time period. The weekly use estimates will be multiplied



by the number of weeks per zone in the stratum. The order of possible sample locations in each stratum will be randomized, and the  $Mos \propto$  (the weekly use estimates multiplied by the number of weeks in the time-period zone) cumulated. (The total of the  $Mos \propto$  for each zone will equal  $2Fb^*$  (or  $24F$ ) approximately, but not exactly, due to rounding errors in the selection of the number of zones, as described above.)

A single random number,  $R$ , from 1 through  $Fb^*$  (adjusted due to rounding errors to equal  $\sum Mos \propto / 2$ ) will be chosen. The sample location in which this number  $R$  falls (in cumulated use figures) is the first primary selection. Then  $R + Fb^*$  is the second selection from the same zone and stratum (Kish, p. 229, sec. 7.4B 1.). Then a new  $R$  is chosen, and it and  $R + Fb^*$  are the two selections from the next zone, and so on. The same procedure is then repeated for the other stratum. The probability of  $R$  or  $R + Fb^*$  falling in a particular trail is, of course, exactly proportional to the amount of use estimated for that trail.

The primary selections are then subsampled with probability  $= \frac{b^*}{Mos \propto}$ .

This will be done with a random start and systematic interval  $k = \frac{Mos \propto}{b^*}$ .

For the roadside checkpoints, or other special situations requiring personal contact, only a few days'

traffic can be checked per zone, compared to every day in the time-period zone for the trails with special signs. This means that for the roadside checkpoints, the sub-sampling selection formula is:  $\frac{n}{d} \cdot \frac{d b^*}{n \text{ Mos } \alpha} = \frac{b^*}{\text{Mos } \alpha}$ , where  $d$  = the total number of days in the time-period zone, and  $n$  = the number of sample days per zone. The systematic interval  $k = \frac{d}{n} \cdot \frac{n \text{ Mos } \alpha}{d b^*} = \frac{\text{Mos } \alpha}{b^*}$ . Where traffic can be checked both in and out,  $n$  will be multiplied by a correction factor between 1.0 and 2.0, estimated to account for day use. If all use was day use, the factor would = 1.0, since there is no gain in contacts. If no day-use existed, the factor would = 2.0.

To avoid many sample clusters falling much below  $b^*$ , sample locations estimated to average less than 6 individuals per sample period (whether a few days or whole time-period zones) will be excluded from the sampling frame.<sup>6</sup>

Sample locations in each wilderness will have the portable registration signs set up and moved on the same day in each time-period zone, or nearly as possible.

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<sup>6</sup>This "minimum sufficient size" would yield  $b^*/2$  sample individuals with a 100 percent sub-sampling rate (Kish, p. 243). This introduces some bias due to cluster size variation, and the minimum sufficient size could be raised to 12. However, since these are only rough estimates, and since use is variable over time, this seems to be "spurious accuracy." A higher minimum sufficient size would exclude more moderately used trails, and this could introduce more serious bias than a small increase in the coefficient of variation of cluster size.

These days will need to be staggered from wilderness to wilderness to fit work schedules, but for each wilderness the signs will be in place for the same number of days, and the same days of the week, in each time period.<sup>7</sup>

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<sup>7</sup>There may be minor exceptions, usually no more than plus or minus 1 or 2 days, necessitated by practical problems of work scheduling.

## APPENDIX II

### BASELINE STUDY QUESTIONNAIRE

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BASELINE STUDY QUESTIONNAIRE

(Summer Form)

OMB No. 40-S-70057

Expires: March 31, 1973

Questionnaire No.

FOREST SERVICE WILDERNESS STUDY

All of the following questions refer to the visit you made to the Selway-Bitterroot Wilderness \_\_\_\_\_, 1971.

IMPORTANT! The term "wilderness" in this questionnaire means the roadless, undeveloped country reached only by trails or waterways. These questions refer only to the wilderness portion of your trip, not to places along the roads.

1. How many people were in your party in the roadless wilderness on this trip, including yourself? \_\_\_\_\_  
How many were under 16? \_\_\_\_\_

Were these people (skip if you were alone):

- ☐ A family or families (including husband and wife, part of a family, etc.)
- ☐ A family plus friends
- ☐ Friends and acquaintances
- ☐ From an organization (Scouts, Club, etc.)
- ☐ Other (describe \_\_\_\_\_)

2. How did you travel in the wilderness (the roadless country) on this visit? (Check all that apply, but if more than one, underline the way you traveled most.)

☐ Hiked, carrying our equipment ourselves

☐ Hiked, leading horses, mules, or burros

☐ Horseback

How many horses, mules, or burros did your party take? \_\_\_\_\_

Were these animals turned out to graze?

☐ No ☐ Yes

Was supplemental feed packed in?

☐ No ☐ Yes

If yes: What kind of feed?

☐ Hay ☐ Grain ☐ Pellets

☐ Boat, canoe, raft, etc., with motor

☐ Boat, canoe, raft, etc., no motor

☐ Other (describe \_\_\_\_\_)

3. Which of the following things did you do in the wilderness (the roadless country) on this visit? (Check only those things that you personally did.)

☐ Fish

☐ Hunt

☐ Hike

☐ Ride horses

☐ Take pictures

☐ Nature study (bird watching, identifying wild-flowers, rock study, etc.)

☐ Mountain climb (using ropes, special equipment, etc., not just hiking up)

☐ Swim

 Photography

Other (describe )

4. Which of the following wildlife did you see in the wilderness (away from the roads)? (Check all that you saw.)

☐ Grizzly bear      ☐ Elk      ☐ Moose

☐ Black bear      ☐ Deer      ☐ Coyote

☐ Bear, not sure    ☐ Mountain goats    ☐ Bald eagle  
which kind

which kind

☐ Bighorn sheep      ☐ Other

5. Did your party stay out overnight in the wilderness country beyond the road on this visit?

☐ No ☐ Yes → (Total number of nights .

Did you build a woodfire ☐;

or use a gas stove ; or

both  $\square$ ?)

6. Did an outfitter or guide go with you?

☐ No    ☐ Yes → (Was it a fully outfitted trip  
☐; or a "spot pack" or "drop  
camp" (brought in and left) ☐)

7. Did your party have maps or guidebooks for the wilderness you visited?

☐ No    ☐ Yes  $\longrightarrow$  (What kinds? \_\_\_\_\_)

8. Please estimate your share of the expenses for this wilderness trip for the two items below (whether or not you personally paid any part of the costs of the trip).

a. Traveling to and from the wilderness (including meals and lodging while traveling) \$

b. All other expenses (including outfitter's fees, licenses, film, food, and equipment bought for camping, hunting, or fishing). Do not include the cost of equipment used on previous trips

\$

\$ \_\_\_\_\_

9. Was this your first visit to a roadless wilderness?

☐ Yes    ☐ No → (At about what age did you  
first visit a wilderness?  
\_\_\_\_\_ Was this with your  
parents? ☐ Yes    ☐ No)

10. Did you ever go car camping with your parents?

☐ Yes    ☐ No

11. Have you visited the Selway-Bitterroot Wilderness before?

☐ No

☐ Yes → (About how many times? \_\_\_\_\_)

If Yes, would you say the quality of  
the area was:

<input type="checkbox"/> Getting better	} →	Any comments?
<input type="checkbox"/> About the same		_____
<input type="checkbox"/> Getting worse		_____

12. Including this visit, how many times did you visit a roadless wilderness in the past 12 months? \_\_\_\_\_

How many total days did you spend in the wilderness on all visits in the past 12 months? \_\_\_\_\_



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The following questions ask for your personal opinion or attitude about the Selway-Bitterroot Wilderness. This information will assist the Forest Service to better manage the Wilderness.

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13. What was your main reason for choosing to visit this kind of area (a roadless wilderness) for this trip?

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14. How satisfied were you, personally, with this trip into the Selway-Bitterroot Wilderness? (Just the country beyond the end of the road.) What kind of a grade would you give it? (Check one)

☐ A, very good

☐ B, good

☐ C, fair

☐ D, poor

☐ F, very poor

What was there about this trip that made you feel this way? \_\_\_\_\_

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15. When you are camped in the roadless wilderness, about how many other parties would you like camped within sight or sound of your campsite? \_\_\_\_\_

If you camped out on this trip into the Selway-Bitterroot Wilderness, were you able to find this preferred kind of campsite:

☐ Every night    ☐ Some of the time

☐ None of the time

16. How did you feel about the number of other people you saw in the roadless wilderness country on this visit? (Check one)

☐ Saw way too few

☐ Saw too few

☐ About right

☐ Saw too many

☐ Saw way too many

☐ Did not matter to me one way or the other

☐ Do not remember

About how many other parties did you see in the wilderness on this trip? \_\_\_\_\_ How many of these were large parties (say, over 10 people)? \_\_\_\_\_  
How many of the parties had horses or mules? \_\_\_\_\_

17. How did you feel about the condition of the Selway-Bitterroot Wilderness in terms of wear and tear from use, causing erosion and loss of vegetation, and in terms of littering (check one box in each column).

	<u>Wear and tear</u>	<u>Littering</u>
A. Very good	<input type="checkbox"/>	<input type="checkbox"/>
B. Good	<input type="checkbox"/>	<input type="checkbox"/>
C. Fair	<input type="checkbox"/>	<input type="checkbox"/>
D. Poor	<input type="checkbox"/>	<input type="checkbox"/>
E. Very poor	<input type="checkbox"/>	<input type="checkbox"/>
F. Do not remember	<input type="checkbox"/>	<input type="checkbox"/>

Please describe what seemed wrong, if anything:

\_\_\_\_\_

\_\_\_\_\_

18. How did the trails in the Selway-Bitterroot Wilderness compare to your idea of what wilderness trails should be like? \_\_\_\_\_

\_\_\_\_\_

19. Thinking just about the roadless wilderness country, how desirable or undesirable do you think each of the following things is? (Check one box after each item.)

	Very undesirable	Undesirable	Neutral, neither desirable nor undesirable	Desirable	Very desirable
A. High standard trails (wide, steady grades, fairly straight)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Low standard trails (somewhat like a game trail--narrow, grade varies, winding, not the shortest route)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C. Leaving some areas with no trails	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D. A few trees blown down across the trail, maybe 1 or 2 a mile	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E. Bridges over creeks where hikers would otherwise get wet feet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
F. Bridges over rivers that are dangerous for hikers to wade	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Very un- desirable	Unde- sirable	Neutral, neither desirable nor undesirable	Desir- able	Very de- sirable
G. Outhouses (pit toilets)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H. Cemented rock fireplaces with metal grates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I. Small, loose rock fireplaces	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
J. Natural forest fires started by lightning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
K. Pole corrals at campsites for horses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
L. Closing some areas to use by horse parties	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M. Prohibiting wood fires where dead wood is scarce (requiring use of gas stoves)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
N. Split log picnic tables at camp- sites	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Very undesirable	Undesirable	Neutral, neither desirable nor undesirable	Desirable	Very desirable
O. The three public airfields inside the Selway- Bitterroot Wilderness (Moose Creek, Fish Lake, and Shearer)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P. Restricting the number of visitors to an area if it is being used beyond capacity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q. Eliminating grazing by visitors' horses (requiring carry- ing horse feed)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
R. Requiring all visitors to register when entering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
S. A natural fishery-- no stocking, and barren lakes left barren	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
T. Limiting the size of parties to 12 people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Very un- desirable	Unde- sirable	Neutral, neither desirable nor undesirable	Desir- able	Very de- sirable
U. Signs along the trail explaining natural features or early history	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
V. Burying unburnable garbage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
W. Use of chain saws by the administrators to clear trails of trees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
X. A guidebook to the wilderness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Y. A detailed, accurate map	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Z. Issue trip permits so visitors could only camp each night in the area assigned to them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A.A. Packing unburnable garbage back out of the wilderness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B.B. Allow visitors to catch fish to eat in the wilderness but not to bring back out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Very un- desirable	Unde- sirable	Neutral, neither desirable nor undesirable	Desir- able	Very de- sirable
C.C. Rangers or patrolmen in the backcountry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(Did you meet a ranger in the Wilderness?	<input type="checkbox"/> Yes	<input type="checkbox"/> No)			

Any comments on the items (A through C.C.) above? \_\_\_\_\_

\_\_\_\_\_

20. How important or valuable are wilderness areas to you personally?

- ☐ Extremely important
- ☐ Very important
- ☐ Fairly important
- ☐ Not very important
- ☐ Not at all important

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We would also like some background information about you. This information is needed to predict future use and to compare different kinds of recreation areas. We respect your privacy--all this information will be kept strictly confidential.

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21. Do you belong to any conservation or outdoor recreation clubs?

- ☐ No
- ☐ Yes → (Which ones? \_\_\_\_\_ )

22. Where do you live? And where did you live most of your life before age 18? (Check one box in each column.) (If you live or used to live in a suburb, answer in terms of the whole metropolitan area.)

	<u>Where do you now live?</u>	<u>Where did you live most of your life before age 18?</u>
A. On a farm	<input type="checkbox"/>	<input type="checkbox"/>
B. Rural or small town (under 1,000 population)	<input type="checkbox"/>	<input type="checkbox"/>
C. Town (1,000-5,000 population)	<input type="checkbox"/>	<input type="checkbox"/>
D. Small city (5,000- 50,000 population)	<input type="checkbox"/>	<input type="checkbox"/>



- |  | <u>Where do you<br/>now live?</u> | <u>Where did you<br/>live most of<br/>your life<br/>before age 18?</u> |
|--|-----------------------------------|--|
| E. Medium city<br>(50,000-1 million<br>population) | <input type="checkbox"/>          | <input type="checkbox"/>   |
| F. Large city (over<br>1 million<br>population)    | <input type="checkbox"/>          | <input type="checkbox"/>   |
23. What is the highest year of school you have completed?  
(Circle)
- |                 |             |
|-----------------|-------------|
| Elementary      | High School |
| 1 2 3 4 5 6 7 8 | 9 10 11 12  |
| College         |             |
| 13 14 15 16 16+ |             |
- Are you still a student? ☐ Yes ☐ No
24. What is your occupation? (If retired, also show  
occupation before retirement)
- A. What kind of work are you doing? \_\_\_\_\_
- B. What are your most important work activities or  
duties? \_\_\_\_\_
- 
25. Please check the box that comes closest to your  
total family income, before taxes.
- |   |  |
|---|--|
| <input type="checkbox"/> less than \$3,000      | <input type="checkbox"/> \$10,000 up to \$15,000 |
| <input type="checkbox"/> \$3,000 up to \$5,000  | <input type="checkbox"/> \$15,000 up to \$25,000 |
| <input type="checkbox"/> \$5,000 up to \$7,000  | <input type="checkbox"/> \$25,000 and over       |
| <input type="checkbox"/> \$7,000 up to \$10,000 |  |
26. How many weeks of paid vacation does the head of your  
household receive each year? \_\_\_\_\_
27. Please check the box that applies to you.
- ☐ Male ☐ Female

28. Your age last birthday? \_\_\_\_\_

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