1964

Recreational use and the "renewable" resources Swan River State Forest Montana

Ralph Marlin Conrad

The University of Montana

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RECREATIONAL USE AND THE "RENEWABLE" RESOURCES,
SWAN RIVER STATE FOREST, MONTANA

by

RALPH MARLIN CONRAD

B.S. Montana State University, 1962

Presented in partial fulfillment of the requirements for the degree of

Master of Science

MONTANA STATE UNIVERSITY

1964

Approved by:

Chairman, Board of Examiners

Dean, Graduate School

MAR 10 1964
Date
"There is perhaps no field where rational calculation is more needed in planning than in the multiple use of forests for timber and recreation, because there is no field where it is more neglected."

Arnold W. Bolle
PREFACE

The land area of the earth is, for the most part static. Some new land can be created by draining of surface waters, by filling in of water areas or diking against the sea’s encroachment. The land which is created and the potential of creating more land is minimal when viewed in the light of existing land areas. Add to this basically stable area a highly prolific, increasingly mobile human population, which is virtually flooding every niche of available land, and problems occur.

Static land area and increasing populations are considered the enigma of statisticians, geographers, economists and social scientists. However, forest land managers are becoming increasingly aware of the problem and its effect on land use decisions. As human populations increase and technological advances in the field of transportation make most parts of the earth’s surface accessible, more and more demand is placed on our forest land for the production of timber, water, wildlife, forage and forest recreation.

Actually, the land base upon which forest resource management can be practiced is shrinking. Large areas of forest land are being diverted for urban and industrial development, highways, airports, reservoirs, parks and other facilities. This then, is the dilemma faced by resource managers. As human population increases and becomes more mobile, the demand for our resource producing forest land becomes increasingly
greater. Conversely, the demands of an increasing population and the requirements of improved transportation systems are the very things that are reducing the land base we depend upon for production of forest resources.

As the land area available for resource management shrinks, heavy demands are being made on our remaining forest land for continued production of timber, water, wildlife, forage and forest recreation. Production of these resources may be accomplished by several means. For example, a given unit of land may be set aside for the production of a given resource. This is termed single use land management. Depending upon the capability of the land, a given area may be managed for the production of two, three or more resources simultaneously. This form of land management is commonly called multiple use management. At present, this approach to land management represents the most promising solution to the problem of our diminishing forest land and increasing population and transportation needs.

In the early development of the United States sufficient land was available for single use management on a large scale. During this development period, land areas were not as accessible and population and resource demand was not as great as today. However, with the gradual infringement of civilization and population growth, many single use management areas were converted to multiple resource management through

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1Resources as used in this paper refers to those forest resources which under proper management are used and replenished in nature. These resources, timber, recreation, water, wildlife and forage are often referred to as renewable resources.
There still exist today some land areas in State, Federal and private ownership which are being managed primarily for a single resource. Some of these areas are National Parks, Wilderness Areas, Tree Farms, Irrigation Projects and State Forests.

This paper will examine one of these remaining single use land areas, the managed resource and the resources which are in demand but not under management. Special attention will be given the timber resource and recreation use of the area under study; water, forage production and wildlife, at the present, are subordinate in demand to the timber and recreation resources and will be treated in a more general manner.

The Swan River State Forest has been used as an example of single use management; in doing so, no criticism of the Montana State Forestry Department is intended. Much of the information which served as a basis for this study was obtained through a cooperative agreement between the Office of the State Forester, Missoula, Montana, and Montana State University, School of Forestry (Appendix A).

In the preparation of this thesis, information, advice and assistance were received from many persons. To them, I wish to express my thanks and acknowledge my indebtedness though their names may not be specifically mentioned.

Persons whose assistance and encouragement were especially

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1Multiple resource management as used in this thesis is synonymous with the term multiple use management, currently in vogue with many authors and land management agencies.
helpful in this study are Dr. Lawrence C. Merriam, Dr. Arnold Bolle, Dr. Thomas Payne and Mr. James Leedy of Montana State University; Mr. Don M. Drummond and Mr. Robert Arnold of the Office of the State For- ester; Mr. Bland Richardson, and my father-in-law, Mr. A. F. Martin.

Special thanks and appreciation are due my wife, Dorrien, whose work, patience and encouragement over these past five years have made all of this possible; and to my son, Dan, for an understanding far beyond his years, of a "school going" father.

R. M. C.

Missoula, Montana
1963, December
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CHAPTER I

THE PROBLEM, STUDY OBJECTIVES AND SCOPE

Management, as defined in Funk and Wagnalls Dictionary, is "the skillful use of means to accomplish a purpose" (19, p. 773). When the means of management are directed toward one of several land resources, single use land management results. At present the only specific managerial directives for management of State lands in the Swan River State Fire Protection District (Figure 1) are to harvest, protect, and continue production of timber from the land.\(^1\) To this extent, and under the definition of management as used in this thesis, management of the Swan River State Forest is single use--timber management.

Other resources such as water, wildlife, forage and recreation may be produced under single use land management. However, these resources seldom obtain their full potential when they are subordinate to a related resource which is specifically managed. They may in the case of water, grazing, and wildlife reach proportions which would be undesirable under proper management. Wildlife and domestic grazing populations can increase to such numbers that they compete with timber production by destroying forest production. Water runoff from areas which

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\(^1\)Hereafter referred to as the Swan River Forest. The District is made up of State, Federal, and private lands and is protected from fire by the Office of the State Forester, commonly known as the Montana State Forestry Department. State lands within the boundaries of the District make up the Swan River State Forest.
LEGEND

PROTECTION DISTRICT BOUNDARY
MAIN HIGHWAY
PRIMARY ACCESS ROAD
LOOKOUT TOWER
CAMPGROUND
STATE FOREST HEADQUARTERS

FIGURE 1
are managed without regard to watershed values can result in downstream flooding, stream siltation and loss of fish habitat. Recreation use on land managed for timber often occurs after logging road construction opens up new areas. Recreation sites on this land are often developed by the user—or if planned, are established as an after-thought in an effort to control recreation use and distribution. The resulting areas are often poorly conceived and developed; and, the full recreation potential of the land is seldom utilized. Single use management with its attendant under or over production of related resources has, for the most part, given way to multiple resource management.

Multiple resource management concepts may be viewed in two pure forms. In the first, each acre of land is planned to produce as much of each available resource as possible under proper management. Timber is harvested from recreation areas and cattle are allowed to graze in the forest and in recreation areas during the off season. Under this form of management each unit of land and each available resource is under intensive management (28, pp. 323-325). Multiple use, in its second form, is basically single use management on land areas within a multiple use administrative unit. Recreation areas are set aside for recreational use only. Timber is produced on other land areas and range land within the boundaries of the forest is grazed but not the forest land. Other lands may be set aside as water producing areas. Under this form of management a specific resource and land area is under intensive management (34, pp. 243-249). In practice these pure forms of management are seldom, if ever, attained. The actual form of management planned for and rarely achieved is a constantly shifting equilibrium, somewhere between the two extremes—depending on the supply of
and demand for the available resources. Management of this type is similar to a frustrated economist frantically attempting to develop a static short run supply and demand curve. The economist must attempt to balance the supply of a single commodity with the consumers' demand for that commodity. The land manager, on the other hand, attempts to foresee the public demand for the many resources available and supply them to the mutual satisfaction of the various resource users. The actual establishment of an equilibrium point is impossible. The successful land manager will, however, attempt to keep the supply curve from shifting too sharply in favor of one resource user. As viewed by Bolle:

The objective of public management is to maximize the returns to society over time. The solution involves a complicated interplay of physical, social, economic, and political forces involving different degrees of uncertainty. Therefore the answer lies not in establishing a static equilibrium position but rather in setting in motion a procedure for continued decision making. . . . (6, p. 1).

I. THE PROBLEM

Present management of the Swan River State Forest does not maximize the returns to society due to policies which favor the consumer (logging industry) contributing directly to the economy of the State School Trust Fund. Outdoor recreationists, who contribute greatly to the overall economy of the State are given little, if any, consideration in the management policies on the State Forest lands (18, p. 1). A program of active multiple resource management would provide more equity of use to the various resource consumers making demands on the State Forest lands; and, benefit the State, the State Forester, and
society with little or no loss to the State School Trust Fund.\(^1\)

The basic problem lies in the increased demand for the timber and recreation resources of the Swan River State Forest, through increased accessibility brought about by the construction (1956 to 1962) of a modern paved highway through the forest.\(^2\) Previous to 1956, the Swan River State Forest was virtually inaccessible due to primitive road conditions. Some timber was harvested from the forest but poor hauling conditions, time and distance to the market, all combined to limit the demand for timber. Recreation use on the forest was limited to local use by the more hardy persons, at time when weather and road conditions combined to permit access to the area.

As highway construction progressed from its beginning in 1956 until its completion in 1962, logging and recreation traffic in the area greatly increased (Figure 3, p. 84). The accessibility of the timber resource has increased the demand for logs in the Kalispell and Polson areas and may open up the Missoula marketing area. The route has also become popular as a scenic drive for residents of the Missoula and Kalispell areas and for tourists traveling to and from Glacier National Park. As recreation travel increases more and more emphasis is being placed on the recreation resource of the area. Some of this pressure is being relieved by the U. S. Forest Service; but part of

\(^1\)Fire danger to the economic resource (timber) is reduced when recreation use is concentrated in developed recreation areas, providing the State Forester with additional fire protection (8, p. 96).

\(^2\)Forest Highway Route No. 15 in the Flathead and Lolo National Forests, authorized under the Federal Highway Act 42, Stat. 218, Section 23. The highway is now designated as Montana Secondary Route 209 on State highway maps.
the demand is reflected in camp and picnic grounds on the Swan River State Forest lands. These recreation areas (four) were constructed by the Civilian Conservation Corps in the period 1936-38 and are no longer adequate to handle the increased use being placed on them (Plate I).

The Montana State Forester is the chief administrative and executive officer under the State Board of Land Commissioners in all matters pertaining to the State Forests (57, p. 53). In the administration of State owned forest land the State Forester has one primary obligation as defined by law:

... In the exercise of these powers, the guiding rule and principal shall be that these lands and funds are held in trust for the support of education, and for the attainment of other worthy objects helpful to the well being of the people of this state; and that it is the duty of the Board so to administer this trust as to secure the largest measure of legitimate and reasonable advantage to the State. . . . . (57, p. 53).

According to the present interpretation of the above law "the largest measure of legitimate and reasonable advantage to the State," is assumed to be the largest economic return to the State School Trust Fund from the forest, based on sound, sustained yield timber management practices (57, p. 53). This interpretation, which disregards "the attainment of other worthy objects helpful to the well being of the people of this state," has channeled the managerial efforts on State-owned forest lands in one direction—that of single use timber management (57, p. 53). Other resources, with the exception of grazing rights which can be sold at times on some state-owned forest lands, have been neglected because of their failure to bring a monetary return to the State School Trust Fund.

In summary, the problem is this—by interpretation of the law,
Typical camp-picnic unit, Goat Creek
the State Forester is committed to those forms of management which result in the greatest economic return to the State School Trust Fund.\textsuperscript{1} At present, these dictates result in single use land management on the Swan River State Forest. The public, on the other hand, is forcing the State Forester into multiple use management of the Swan River State Forest through their increasing use of the forest for outdoor recreation.

II. STUDY OBJECTIVES AND SCOPE

Solutions to multiple resource management problems are basically administrative—involving decisions on the intensity of management required and the resources available for management. The decision making process to be effective must be founded on knowledge of the forest environment. It must also be based on an understanding of the resources, the resource users, the economic implications of the supply and demand relationships of the resources and the interactions between the resource users and the resources.

\textsuperscript{1}The land management objectives of the State Forester as outlined in the Objectives and Policy Manual, p. 6, recognize the need for multiple use management of the State forest resources. However, a limited budget and present interpretation of the law are such that single use management results. Some of the objectives are:

1. "To conduct, consistent with wise land management, a planned management program on State-forest lands which will provide maximum income to the several State school funds on a sustained basis.

2. "To provide for multiple use of State-forest lands, such as the sale of forest products, recreation, watershed protection, grazing and other uses in the best interest of the people of the State."
Recognizing these conditions, multiple use management becomes the maximization of a flow of goods and services to meet changing needs of society over time from a group of interrelated resources having different time preferences. It requires a continuing process of analysis, decision making and re-analysis in order to schedule the investments needed to produce the flow of goods and services to meet changing demand and conditions over time (6, p. 189).

After the basic data have been assembled and evaluated, and decisions on the degree of management required have been made, the results may be formalized in a specific resource management plan. It is not the purpose or intent of this study to formulate a resource management plan for the Swan River State Forest, but to analyze and evaluate the available resources of the forest and make recommendations which may aid administrators of the forest in resource allocation decisions.

The scope of the investigation was such that each available resource could not be subjected to intensive research. Applying the criteria of: (1) demand for the resource, and (2) the amount of secondary information available from various sources the recreation resource was selected for investigation.

Demand for this resource is great as witnessed by the number of persons using the forest for recreation; and the rapidly increasing traffic rate which is expected to result in even greater demand in the future. Information relating to this resource was limited to personal opinions and observations by State Forest personnel working on the forest. The timber resource of the forest is in demand by the local logging industry. Abundant information on the management of this resource is available in the Office of the State Forester, Missoula, Montana. Utilization of the fish and wildlife resource is increasing due to greater hunter-fisherman accessibility brought about by the recent
highway construction. Studies of this resource, relating directly to
the Swan River State Forest, are limited to a few winter game surveys,
conducted by the Montana Fish and Game Department. This increasing
demand, though not as great at the present time as the recreation de­
mand, and the small amount of available information, indicate an area
in which future research will be needed. The water resource of the Swan
River State Forest is but a small portion of the entire Swan River water­
shed. As such, reasonable management of the timber resource on the Swan
River State Forest can have little adverse effect on the overall supply
and demand for water from the Swan River. This resource, though im­
portant to the area downstream from the forest, is not significant
enough to require a high degree of study at this time. There is, at
present, no domestic grazing permitted on the forest and no future plans
for utilization of this resource. However, some trespassing of domestic
animals occurs on the forest.¹

The preceding observations represent the resource supply and de­
mand relationships on the Swan River State Forest for the year 1963.
Events may occur in the future which will shift the demand to some other
resource. The extent that changes in resource demand affect the manage­
ment of a forest area has been aptly expressed by Bolle:

While the demand for the resources from an area of land will
be influenced by the natural endowment of the land, this demand
may be for only part or for all of the resources available. A
forest area may at one period in time be needed only for water­
shed protection. At still another time period it may be needed

¹From a discussion with State Forest personnel and observations
during investigation periods. Domestic cattle were observed on State
Forest land, near the north boundary of the forest along State Highway
209.
for the fullest possible use in recreation, grazing, forest products, and watershed protection. The relative value for these resources may change over time as the demand for different products increases or decreases (6, pp. 4-5).

At present, the timber and recreation resources are in the greatest demand—a trend that is expected to continue. However, supply and demand relationships are never static and may change markedly in any given time period. A continuing process of resource investigations, of which this study is the first, may aid in preventing future over or under utilization of the Swan River State Forest resources.
CHAPTER II

DESCRIPTION OF THE STUDY AREA

I. PHYSICAL FEATURES

Location. The Swan River Forest is located on the west slope of the Rocky Mountains in northwestern Montana. Situated in the greater Swan River valley, the study area comprises most of the land area in Townships 23 and 24 North, Ranges 17 and 18 West within Lake County. State Highway 209 bisects the forest in a north-south direction and provides the only means of access to the area. The major population centers in near proximity to the forest are Kalispell, 50 miles to the northwest, and Missoula, 100 miles to the southwest.

The summit of the Mission mountains forms the west boundary of the forest. The east boundary of the forest lies along the west slope of the Swan mountain range and is coincident with the east line of Range 17 West. The study area is bounded on the south by the south line of Township 23 North and the north boundary of the Condon Ranger District of the Flathead National Forest. The north boundary of the forest falls on the north line of Township 24 North. Federal lands, administered by the Flathead Indian Agency, bound the study area on the west; while to the north, east and south, the area is bordered by Federal lands administered by the U. S. Forest Service.

Topography. The varied terrain of the study area is the result of Pleistocene glaciation and erosive modifications in more recent times.
The spectacular ruggedness of the Mission and Swan mountain ranges and the broad U-shaped Swan River valley are the visual results of early glacial activity. Modern erosive activity is evident along the banks of the Swan River in the form of stream bank cutting and channeling activities.

The Swan River valley is oriented in an approximate north-south direction. The valley floor is five to six miles in width and has a length of 55 miles. Width of the valley from the Mission Divide to the Swan Divide is approximately 15 miles. The study area extends for about 12 miles along this valley in a north-south direction. West to east, the forest begins at about 6,500 feet elevation on the Mission Mountain Divide, follows down the east side of the Missions to an elevation of nearly 4,000 feet on the valley floor and up the west side of the Swan Mountains to an elevation of approximately 7,000 feet. The east to west dimension of the forest varies from two to 12 miles, having an average width of 10 miles.

The Swan River, which is a tributary of the Flathead River, flows northward through the valley and empties into Flathead Lake at Big Fork, Montana. Tributaries of the Swan River flow eastward from the Mission Divide and westward from the Swan Divide to their confluence with the Swan River. The drainages are from five to eight miles in length, the upper one-third of which are steep and rugged. These upper portions are from zero to one-fourth of a mile in width at the bottom, sloping upward to well defined long, rocky, steep parallel ridges which extend about three to four miles from the main divide into the valley. Width between the ridges averages one to three miles. Side slopes rise on a 50 to 80
per cent grade to the top of the ridges. The lower two-thirds of the streams are contained in poorly defined drainages which cross the relatively flat valley floor to join the Swan River.

**Geology.** In the early Paleozoic era, the study area was a part of the vast Rocky Mountain or Cordilleran geosyncline (41, p. 172). Sediments eroded from higher elevations to the east were carried into and deposited in this large down-folded area. Over geologic time, continued deposition of sediments into the geosyncline resulted in a load which the earth's crust could not support; and, as the load sank in the middle the sides of the geosyncline were thrust upward, resulting in orographic formations. Late in the Paleozoic era, the area was reduced to a low plain (near sea level) by prolonged erosion. It remained at or below sea level until the close of the Cambrian period when mild movements of the earth's mantle elevated it to a low plain. About the middle of the Devonian period the region again sank and was covered by ocean waters. At the close of this period, the land mass rose only to be submerged during the following Mississipian period, which ended when the entire region of western Montana was elevated above sea level to a low land mass. Near the end of the Mesozoic era the land area of the region was flooded for the last time.

From the end of the Mesozoic era and into the Cenozoic era, all of western North America was subjected to tremendous orographic (mountain building) disturbances. The disturbance, called the Rocky Mountain or Laramide Orgeny, was active over millions of years in both eras and resulted in the formation of the present mountain ranges on the study area (41, p. 290). Continued erosion throughout the Cenozoic era
greatly reduced the mountain elevations and carved many of the present drainages on the forest.

Approximately one million years ago, the mountains were re-elevated and the Pleistocene epoch or Ice Age began. Vast ice sheets formed over the area and receded during at least two glacial periods. The constant freezing, thawing, and movement of glaciers to lower elevations tore out large boulders and transported them to the valley floor where many were deposited during periods of glacial recession. The result of this glacial activity in the mountains is evident in the mountain lakes, cirques and knife-edged ridges leading down to the valley floor. Glacial evidence on the valley floor is preserved in many undrained depressions, low elongated ridges and irregular piles of glacial debris. The low divide south of the study area, between the Swan-Clearwater Rivers, is the result of a moraine deposited across the valley floor as these ancient glaciers receded.

From the passing of the glaciers until the present time the mountains have been moderately modified by erosive forces. The side valleys and the main valley have changed slightly as the Swan River and its tributaries began the process of cutting new channels in the glacial debris of the valley floor.

To provide insight into the time involved in the geologic processes described, a brief resume of the approximate length of the eras, periods and epochs mentioned in the above material is presented as follows:

<table>
<thead>
<tr>
<th>Era</th>
<th>Duration (Millions of years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paleozoic</td>
<td>435</td>
</tr>
<tr>
<td>Mesozoic</td>
<td>125</td>
</tr>
<tr>
<td>Cenozoic</td>
<td>60</td>
</tr>
</tbody>
</table>
Periods (within Paleozoic era) | Duration (Millions of years)
--- | ---
Cambrian | 80
Devonian | 55
Mississippian | 30

The Pleistocene epoch occurred during the Quarternary period of the Cenozoic era, approximately one million years ago. Many geologists feel that the present time falls within this epoch, in a stage of glacial recession (41, p. 120).

Soils. The soils of the valley bottom, in the study area, are typically glacial in origin. They are soils developed in glacial silt, surface clays with porous, well drained soils underneath and gravel deposits. Near the Swan River, these soils are poorly drained and have a tendency to become highly acid. Soils on the flat land just above the actual river bottom and in the foothills are well drained and of average to above average depth. On the higher mountain slopes above the foothills, shallow, stony loam soils developed over glacial till and hard sedimentary rock predominate.

Soil structure is good over most of the forest except on some areas of past burns, where thin soils and sheet erosion have contributed to sub-soil exposure. On these areas soil structure and productivity is reduced. This condition is typified by the old Napa Creek burn of the early thirties.

Soil productivity for tree growth is generally good to moderate throughout the study area. The soils are moderately erosive and require some precautionary measures when disturbed during timber harvest operations (60).
Climate. Climatological data for the Swan River Forest are not recorded on a year round basis by any agency within the Swan River valley. The nearest permanent weather station is located at Kalispell. Data from this source were used to make some assumptions on the year round temperatures prevailing on the Swan River Forest. Limitations which may affect the accuracy of this data are: (1) The Kalispell weather station is too far from the Swan River Forest to permit accurate interpolation of weather data. (2) Topographic conditions which affect weather are different between the two locations. Kalispell is situated in a broad valley whereas the Swan River valley is quite narrow, resulting in different wind and weather conditions. (3) Kalispell weather is somewhat influenced by Flathead Lake; the Mission Mountain range protects the Swan Forest from this effect. Realizing the limitations of the assumptions, the temperature data presented are solely approximations of year round weather conditions on the Swan River Forest.

The mean annual temperature on the study area is approximately 40 degrees Fahrenheit. Seasonal mean temperatures approximate 40 degrees in the fall, 20 degrees in the winter, 40 degrees in the spring and 60 degrees in the summer. All these temperatures vary widely from the mean in any given time period. Snows and killing frosts have been known to occur in every month of the growing season, during some years.

Precipitation over the study area varies with elevation. The general range of precipitation is from 20 to 50 inches per year. The higher elevations of the forest accumulate the greater amounts of moisture because of the heavy snowfall in these areas, whereas the valley floor receives the minimum of 20 inches of moisture. The wet months of
the year are generally June, September and October. The lower areas are usually covered by snow from December through April, while the higher elevations are snow-covered from November until early June. During the winter 1962-1963, snow accumulation on the valley floor, near the forest headquarters, reached a maximum depth of 31 inches.

Prevailing winds, from the southwest, are modified by the Mission Mountains. Length of the growing season on the forest extends from about the beginning of May to September first.

Vegetation. The Swan River Forest is unique from an ecological standpoint in that almost every coniferous tree species native to Montana occurs on the study area. Many of these species do not occur in commercial quantities or size and are important only as they represent a transition zone between ecologic ranges and altitudinal distribution of tree species in Montana.

Hardwood tree species on the forest are mainly confined to the river and stream bottoms and moist sites throughout the forest.

The general appearance of the forest is a many-tiered, dense complex of vegetative communities. Coniferous and hardwood species form the forest canopy; beneath this canopy the main forest understory is made up of noncommercial tree and shrub species, which are in turn underlain by lower growing shrubs. A layer of herbaceous growth occurs beneath this secondary shrub layer followed by communities of grasses, sedges, rushes and moss on the forest floor.

Coniferous tree species observed in the forest complex are as follows: Douglas-fir, *Pseudotsuga menziesii* (Mirb.) Franco; grand fir, *Abies grandis* (Dougl.) Lindl.; sub-alpine fir, *Abies lasiocarpa* (Hook)
Nutt.; Rocky Mountain juniper, Juniperous scopulorum Sarg.; western larch, Larix occidentalis Nutt.; Engelmann spruce, Picea engelmannii Parry; white bark pine, Pinus albicaulis Engelm.; lodgepole pine, Pinus contorta Dougl.; ponderosa pine, Pinus ponderosa Laws; western white pine, Pinus monticola Dougl.; western hemlock, Tsuga heterophylla (Raf.) Sarg.; and western red cedar, Thuja plicata Donn. In addition to these species, alpine larch, Larix lyallii Parl.; white spruce, Abies glauca (Moench) Voss; and limber pine, Pinus flexilis James, are suspected as occurring on the forest although they have not been definitely identified during the course of this study.

Hardwood species occurring on the study area were identified as: quaking aspen, Populus tremuloides Michx.; black cottonwood, Populus trichocarpa Torr.; paper birch, Betula papyrifera Marsh.; and willow Salix spp. L.

Noncommercial tree and shrub species which form the main understory of the forest are: Conifers--pacific yew, Taxus brevifolia Nutt.; and creeping juniper, Juniperus communis L. Hardwoods--thin leaf alder, Alnus tenuifolia Nutt.; chokecherry, Prunus virginiana L.; Rocky Mountain maple, Acer glabrum Torr.; Saskatoon serviceberry, Amelanchier alnifolia Nutt.; and mountain ash, Sorbus americana L.

Beneath the main shrub and tree understory of the forest is a layer of low growing shrubs of the following genera: Rosa L.; Rubus L.; Ceanothus L.; Rhamnus; Ribes L.; Symphoricarpus L.; Vaccinium L.; and Arctostaphylos Adams.

Herbaceous vegetation noted beneath the secondary layer of shrubs were identified to the more prominent genera of: Achillea L.; Antennaria
Gaerth.; Arnica L.; Balsamorrhiza Hook ex Nutt.; Erigeron L.; Fragaria
L.; Lupinus L.; Trifolium L.; Smilacina Desf.; Veratrum L.; and
Xerophyllum Michx.

Important grass genera on the study area are: Agropyron Gaerth.;
Festuca L.; Koleria Pers.; Calamagrostia Adans.; and Poa L. Sedges,
Cares (Rupp.) L.; and rushes, Juncus L. are found in the low, poorly-
drained sites.

The preceding list of trees, shrubs, herbs and grasses is not
botanically complete. Many diverse species not listed are present with-
in the various plant communities. Identification of these plants to
genera or species does not fall within the confines of this study. The
listing is an attempt to give a verbal description and insight into the
many-layered vegetative composition of the study area. A discussion of
the economically important timber species of the forest is given in the
section of this thesis dealing with the timber resource, page 46.

II. ADMINISTRATIVE AND HISTORICAL FEATURES

Size. The Swan River Forest (Swan River Fire Protection District)
has a total area of approximately 70,000 acres.

Landownership. The ownership of the land is retained by three
major landowners and several small, private holders (Figure 2). Most
of the high, mountainous portion, approximately 10,000 acres, is in
Federal ownership administered by the Bigfork Ranger District of the
Flathead National Forest. Montana State Forestry Department is respons-
ible for the forestry practices on approximately 39,000 acres of State
owned forest land. The Northern Pacific Railway Company's lands total
SWAN RIVER STATE FIRE PROTECTION DISTRICT

SCALE
I 2 MILES

OWNER
□ STATE FOREST
□ U.S. FOREST SERVICE
□ N.P. RAILWAY CO.
□ SMALL PRIVATE

ACRES
38,838
10,257
19,175
1,370

% OF TOTAL
56
15
27
2

TOTAL 69,640 ACRES 100%

FIGURE 2
nearly 20,000 acres. Approximately 1,000 acres of land is held in private, individual ownership.

One relatively large block of State land occurs in the northern part of the forest. The remaining State lands are in alternate sections with Northern Pacific Railway Company's lands. The State owns most of the even-numbered sections on the forest and the Northern Pacific Railway Company retains ownership of the odd-numbered sections. The result of this alternate holding is a huge checkerboard of ownership between the State and the Northern Pacific Railway Company, with occasional intermingled blocks of Federal and small private ownerships. The largest of the latter holding is 640 acres; the remaining small ownerships vary in size from 40 to 180 acres.

Management and Administration. Management of land within the Swan River Forest varies from owner to owner. The State Forestry Department provides fire protection of all land within the forest boundary; and manages State owned lands for the production of timber in keeping with the directives of the State Board of Land Commissioners.

The Land Management Division of the Northern Pacific Railway Company has the same basic management philosophy as the State Forestry Department—maximization of economic return from their land. Part of the monies realized from the sale of timber on Northern Pacific lands is distributed to stockholders in the company as opposed to the School Trust Fund which is the recipient of economic returns from State Forest lands. Management of Northern Pacific Railway Company lands differs from State management in that their land managers are not bound as closely to the principle of sustained yield as are State Forest personnel.
Northern Pacific lands, once the timber is removed, could be put up for sale by the company. State Forest lands are assigned for the support of common schools into perpetuity; at present, under legal definition, sale of these lands would be difficult, if not impossible. For this reason, continued production of timber from State lands is a primary management objective.

The U. S. Forest Service under the Multiple Use Law of 1960, is directed to manage lands under their jurisdiction for the production of the five basic resources: timber, recreation, water, wildlife and forage. Not all Forest Service land, or other land, can produce all of these resources in harmony, nor is this the purpose of the law. Its intent is to direct Federal land management to the production of as many resources from the land as possible, without undue conflict.

Due to the relative inaccessibility and scattered nature of Forest Service lands within the Swan River Forest, the resources which are produced are water, wildlife and occasional recreation use. Timber grows on Federal lands of the forest; however, until a part of the crop is harvested there is, under strict definition, no production. At present, no timber is being cut on Forest Service lands within the forest.

Small private owners of land within the Swan River Forest boundaries manage their land to satisfy their individual needs. Several owners operate small ranches; and one has a profitable peat mining business.

Two State agencies have administrative interest in the forest: the Office of the State Engineer and the Montana State Fish and Game
Department. It is the responsibility of the State Engineer to inspect the quality and quantity of water produced in the State and to prepare reports on the water resources of the State. Authority to influence land management practices, as they affect the water resource, is not within the jurisdiction of this office.

The Montana State Fish and Game Department has no direct administrative control on land within the Swan River Forest. They do, however, have the responsibility of management, control and harvest of fish and wildlife populations on all lands within the forest. As such, they can have an important influence on the production of some resources, such as timber and forage, and have complete administrative control of the fish and wildlife resource and must be considered in any proposal for multiple resource management of the forest.

Area Population. Actual human population living in the forest area is less than two dozen persons. These people have very little effect on the supply and demand relationships of the resources available on the forest because of their insignificant numbers. Resource demands on the forest are therefore generated to a large extent by populations living within short transportation and easy driving distances of the forest. Population centers, in excess of 500 persons, within 100 miles of the forest are presented in Table I.

In addition to the populations presented in Table I, there are approximately 32,000 persons living in small communities, farms and ranches within Lake, Flathead and Missoula Counties, increasing the total "local" population to about 80,000 persons.
TABLE I

POPULATION CENTERS WITHIN ONE HUNDRED MILES OF THE SWAN RIVER FOREST, IN EXCESS OF FIVE HUNDRED PEOPLE*

<table>
<thead>
<tr>
<th>Name</th>
<th>Highway distance</th>
<th>Population (1960)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big Fork</td>
<td>30</td>
<td>500</td>
</tr>
<tr>
<td>Columbia Falls</td>
<td>53</td>
<td>2,132</td>
</tr>
<tr>
<td>Hungry Horse</td>
<td>57</td>
<td>500</td>
</tr>
<tr>
<td>Kalispell</td>
<td>51</td>
<td>10,151</td>
</tr>
<tr>
<td>Milltown</td>
<td>93</td>
<td>500</td>
</tr>
<tr>
<td>Missoula</td>
<td>100</td>
<td>27,090</td>
</tr>
<tr>
<td>Polson</td>
<td>60</td>
<td>2,314</td>
</tr>
<tr>
<td>Ronan</td>
<td>78</td>
<td>1,334</td>
</tr>
<tr>
<td>Seeley Lake</td>
<td>46</td>
<td>500</td>
</tr>
<tr>
<td>Somers</td>
<td>37</td>
<td>800</td>
</tr>
<tr>
<td>Whitefish</td>
<td>63</td>
<td>2,965</td>
</tr>
<tr>
<td><strong>Total Population</strong></td>
<td><strong>18,786</strong></td>
<td></td>
</tr>
</tbody>
</table>


History. The following is a chronologic summary covering the history of the Swan River Forest and the events which have had a direct influence on the administration of State lands within the study area.

Year 1864. The Organic Act of the Territory of Montana, Act of Congress, approved May 26, 1864, provided that Sections 16 and 36 in each township, when surveyed, were reserved for the schools of the territory (57, p. 3). By Act of July 2, 1864, the Federal Government granted the Northern Pacific Railroad Company approximately twenty
million acres of Montana lands. The grant included every alternate
section in a strip 80 miles wide along its line plus lieu selection
privileges within 10 miles of the outer limit of the original grant.
The present complicated landownership pattern on the Swan River Forest
is partly the result of this early grant by the United States (12, p. 381).

Year 1866. There is a record of a fur trapper, Mr. Upton, being
in the valley during the fall of this year. He was probably the first
white man to utilize the resources of the Swan River Forest (66, p. 39).

Years of 1880's. In the early part of this period a few settlers
were beginning to move into the Swan River valley (66, p. 39). The
Enabling Act of February 22, 1889, Section 4, made provisions, upon ad-
mission to statehood, for the establishment and maintenance of public
school systems to be open to all children and free from sectarian con-
trol. Section 10 of the same Act reaffirmed the reservation of Sections
16 and 36 in every township for support of common schools and provided
for lieu selection of lands of equal value when granted lands had been
previously sold or otherwise disposed. November 8, 1889, after 25
years as a territory, Montana was admitted to the Union as the forty-
first State (12, p. 121).

Year 1897. The Swan River Forest was a part of the land area
making up the Lewis and Clark Forest Reserve, established February 22
of this year by proclamation of President Cleveland (12, p. 121).

Year 1899. H. B. Ayres of the U. S. Geological Survey while
examining lands of the Lewis and Clark Forest Reserve reported several
squatters about the head of Swan Lake and about ten unoccupied log
houses between Swan and Holland Lakes (h, p. 55).

Year 1907. Act of March 4, 1907 (34 Stat. 1269), after this date, the forest reserves were known as National Forests (57, p. 87).

Year 1909. The Swan River Forest lands, with the exception of Northern Pacific lands, became a part of the newly established Flathead National Forest. Office of the Montana State Forester was created to, "under the direction and control of the State Board of Land Commissioners, do all the field work in selection, location, examination, appraisement and reappraisement of state timber lands. . . ." (57, p. 71).

Year 1910. Large areas of timber were destroyed by fire in the Swan River valley (66, p. 140).

Year 1911. Most of the present homesteads on the Swan River Forest were established after enactment of the Homestead Act (66, p. 140).

Year 1912. December 23, 1912, an agreement was made between the U.S. Department of Agriculture and the State of Montana to settle matters relative to unsurveyed school lands within the National Forests in Montana. The agreement provided that all unsurveyed school sections within the boundaries of National Forests would be relinquished by the State, and the surrendered lands used as a basis for selection of lieu lands of equivalent value and acreage in compact units, in such a position that when eliminated from National Forest administration they would lie outside of the forest boundaries. Under the terms of this agreement one area in the Swan River valley of 37,180 acres located in Flathead County was tentatively selected in lieu of unsurveyed school sections within National Forests (55, p. 142).

Year 1915. Early settlers in the Swan River valley began pressing responsible authorities for a road through the valley linking Swan
Lake with Seeley Lake. A location survey for such a road was made under the direction of the Forest Service (63).

Year 1917. Chief Forester, Henry S. Graves, in a letter to Senator H. L. Meyers referring to the Swan valley road, dated January 17, 1917, said: "This road project has been under consideration by the Forest Service for several years and as noted, some work has already been done in the way of construction. In the opinion of the District Forester this project is one of the most important in the state . . . (63).

Year 1918. November 27, 1918, President Woodrow Wilson conforming with the agreement of December 23, 1912, between the U. S. Department of Agriculture and the State of Montana issued a proclamation excluding the Swan River lands from the National Forests. The State was granted 90 days to file selections for surveyed lands eliminated. The selection was made and the Swan River block transferred to State ownership (55, p. 42).

Year 1922. C. W. Cheatham summed up the Swan River road situation as follows:

... The present road is only a wagon track winding through the timber and is impassable for an automobile, although cars have with great difficulty reached Holland Creek from the south. This, however, was accomplished in dry weather under favorable conditions. The road is the result of trail development, largely by donations work from the settlers with a small amount of financial aid from the counties and the Forest Service.

Missoula County has attempted, at a large expense, to maintain a passable wagon road for light traffic between Selley Lake [sic] and Holland Creek. Very little grading has been done and no permanent improvements made, owing to poor location. Adverse grades and sharp turns prevail. The roadbed is narrow, sloping transversely and is not safe for a load over a ton. From Holland Creek to Goat Creek, there is little more than a circuitous wagon track cut through the timber by settlers.
Creek crossings were made by dropping logs across the streams and flooring these with poles. These are unsafe even for light loads. Grades in numerous cases exceed 20% with abrupt turns at ends.

Until 1917, no road connection was available between Lion Creek and Swan Lake. Previous to this time the Summer Lumber Co., had constructed logging roads between Swan Lake and Cilly Creek. In 1917, the settlers with the help of the Forest Service and Flathead county, cleared the timber out of the old horse trail and did sufficient grading on the steepest portions between Cilly Creek and Lion Creek to accommodate a light loaded wagon.

The entire project is now passable with a wagon although dangerous, the structures being safe for only about a ton. The grades vary from 12% to 25% and mud holes are numerous, no drainage being provided. . . . (63).

Year 1923. Lake County was created August 11, 1923, from Flathead and Missoula Counties. The Swan River Forest which was formerly in Flathead County became a part of the newly formed Lake County (42, p. 395).

Year 1925. Seven semi-consolidated blocks of State owned forest lands were designated as State Forests. The Swan River State Forest received its official name at this time. Legal description of the Swan River State Forest lists the total area of the forest as 42,000 acres. Additional lands, not within the boundaries of the Swan River Fire Protection District, north of Swan Lake, are included in this total (57, p. 68).

Year 1929. Local pressure for construction of the Swan River road was still being applied by interested persons, as witnessed by a portion of the following letter from Thomas H. MacDonald, Chief of Bureau (Public Roads) to Senator B. K. Wheeler:

This will acknowledge receipt of your letter of March 15, 1929, enclosing a letter from Mr. Fred Kaser of Swan Lake, Montana, relative to the Swan River Forest Road Project in the Flathead National Forest.
... nothing has been done on No. 15 covering the southern portion of this route, which is known as the Swan River Section, 60 miles in length.

As you know, the Forest Highway appropriations are limited and a number of important projects have been started in the State of Montana and are still uncompleted. ... I can hold out very little encouragement for the early construction of this route ... (63).

Year 1935. In the summer months of this year, and during the summers of 1937 and 1938, the Civilian Conservation Corps (Forest Camp No. S-206) constructed two public campgrounds and toilet facilities on the Swan River Forest. Ten tables and five fireplaces were built and 5.5 acres of campgrounds were developed during this same period (52, p. 44). Construction and Maintenance Reports of the Civilian Conservation Corps on file in the Office of the State Forester, Missoula, record three acres cleared for Goat Creek campground (no date) and progress and maintenance reports for 1938 on the Goat Creek Loop, Swan River road and Woodward Creek road.

Year 1936. In a memorandum to the District Engineer from B. F. Kitt, Associate Highway Engineer, the poor condition of the Swan River road, due to lack of maintenance, was reported. The memorandum stated that: "... a verbal agreement only is in effect between the Forest Service and the county to maintain Forest Highway 15-A. ... In connection with the low rating given FHP 15-A, a letter has been written to the Regional Forester, Mr. Evan Kelley, requesting that improvement be made in connection with the maintenance of the project. ..." (63).

Year 1946. A study of the economic implications, traffic analysis and construction requirements prior to highway construction reported the road conditions at that time, as follows: "... on account of the present road heavy loads cannot be transported over it ... Traffic
over the road at the present time is rather light due to the fact that there has been no construction to standard" (17, pp. 5-6).

Year 1952. Paving of the Swan River Highway began in this year at the junction of Federal Aid Primary Route 241 (Montana Route 20) west of Ovando (46, p. 131).

Year 1953. July 1, 1953, the 33rd Legislative Session abolished the State Parks Commission, and the activities of State Parks and the Office of State Park Director were transferred from the jurisdiction of the Office of State Forester to the Montana State Highway Commission (54, p. 56). April 7, 1953, a three-man Forest Advisory Commission was appointed by Governor J. Hugo Aronson, at the request of the 33rd Legislative Assembly, to make a complete study of State owned forest resources for the purpose of formulating a forest management plan. Recommendations made by this commission in 1954 (30, p. 1) led to the 1955 State-Northern Pacific Cooperative timber inventory of the Swan River Forest (60).

Year 1954. February 26, 1954, a memorandum of understanding between the State of Montana, U. S. Forest Service and Northern Pacific Railway Company was signed preserving a strip of timber 200 feet on either side of the Swan River Highway. The strip was to serve as a scenic buffer and remain in its natural state as nearly as possible (66, p. 2).

Year 1956. February 28, 1956, the State Board of Forestry in a special meeting approved the formation of the Swan River State Fire Protection District. The State Forestry Department began to provide fire protection on the State, Federal and private lands within the District, July 1, 1956 (53, p. 30). In the spring of this year construction
was begun on an office building, bunkhouse, cookhouse and bath house on the Swan River State Forest lands at Goat Creek. Construction was completed early in 1958 (60).

Year 1957. Twenty-nine miles of road were approved for surfacing in Lake County. This section of road passed through the Swan River Forest; completion date, August, 1958.

Year 1959. All paving was completed except for a 3.8 mile section from the Flathead County line north (46, p. 41).

Year 1960. A five-mile contract for construction, to include surfacing of the unpaved portion of the highway, grading and draining, was let in November of this year (43, p. 36). Residence facilities for the Swan River State Forest Supervisor were added during this year. The Supervisor is responsible for all forestry activities on State lands and provides for fire protection on all other lands within the forest (60).

CHAPTER III

LITERATURE REVIEW

Literature related specifically to the resources or management of the study area is non-existent. While there is considerable multiple use literature, only more specific literature, consisting of selected references on resource relationships useful in this study, has been selected for review.

When more than one use is introduced into the management of a forest, various relations between uses arise. These uses may be either supplementary, complementary or conflicting. Supplementary uses are those which can be carried on in the same area without conflict. Timber and wildlife management may be complementary uses in that logging in an area produces more forage for wildlife with a resulting increase in wildlife population. When wildlife populations increase to the point that they over-browse the forest and reduce timber reproduction, the use becomes conflicting rather than complementary. Recreation use and timber management are areas where complementary and conflicting use situations often arise. Bolle, in his study of the North Fork of the Flathead River, refers to these relationships as a matter of degree of resource use:

To a large extent supplementary, complementary and conflicting relationships are extensions of the same relationship changing with the degree of use. And the solution to land use problems often can be found through the understanding of these relationships ... (6, pp. 191-192).
I. TIMBER AND RECREATION RELATIONSHIPS

The Outdoor Recreation Resources Review Commission (Study Report I) surveying timber and recreation producing areas obtained the following results:

A total of 1,274 areas reported timber production as a use of recreation areas. Nearly two-thirds of them indicated that timber production improved recreation use. This relationship held for all levels of government. Timber production was reported as beneficial on slightly over half (52 per cent) of the Federal areas, on 65 per cent of the State areas, and on 71 per cent of the local government areas reporting. Respondents for 35 per cent of the areas indicated that timber production had little or no effect on recreation. This fact was reported by 44 per cent of the Federal, 34 per cent of the State, and 22 per cent of the local areas. Limitation of recreation use was reported by a small proportion of all areas, but it was largest (7 per cent) for local areas. . . (33, p. 132).

Studies of the effect of recreation on timber production have shown that these two forms of resource use are to a degree complementary. Amidon and Gould in studies of three California National Forests found that little conflict in use or reduction in timber production is encountered:

. . . By removing all areas with recreation potential from timber production that the recreation capacity of the three forests analyzed can be increased to 10 times the present total and, at the same time, sustained yield capacity from productive forest land would be reduced only 13 per cent. Thus, multiple-use management policies applied to these 3.5 million acres of National Forest land can provide about 40 million visitor-days of recreation, plus almost 240 million board feet of timber at sustained yield capacity. The public benefits of such joint production seem very large indeed, even if individual acres within each forest are devoted to only a single use. Even greater efficiency may result whenever land management practices can be devised to use some acres for more than one product (3, p. 14).

Gould in another article, "Forestry and Recreation," with reference to the former study makes the point that capital and not available land or reduction in timber production may be the limiting factor in future
recreation development:

This study of the recreation land now used or suitable for future use indicated that less than 3 per cent of the full potential was currently developed on the remote Modoc National Forest. And, even on the very heavily used San Bernardino National Forest near Los Angeles, less than 20 per cent of the full potential was currently developed. On the average, there was land enough on the three forests to accommodate at least 10 times as much recreation, without exceeding current design standards, and relaxation of these standards might greatly increase this potential without unduly increasing costs.

The amount of capital needed for improvements to make these recreational opportunities fully available far exceeds the value of the sawtimber production foregone to create the desired atmosphere. For every dollar's worth of reduced timber production, an estimated $25 worth of new capital must be invested to improve camp and picnic areas. Thus the big opportunities for saving lie in improving the efficiency of making capital improvements rather than striving to reduce the cost of timber opportunities lost on recreation and buffer areas . . . (21, pp. 12-13).

Opportunities for salvaging timber from recreation areas have been investigated and reported on by several authors. Hodges working with an overmature stand of pine in California containing a high percentage of dead and defective trees reported that:

... The fire hazard is reduced by falling snags, removing fuel and making the area more accessible for fire control. ... roads built as part of logging allow more intensive forest management--salvage of individual trees in the future, a maintenance type of insect control--and open more area for recreation use thus reducing the concentrations of people. Public safety is improved by reducing hazards from falling trees and limbs around campgrounds and in high use areas. The forest appearance is changed from a ragged half-dead look to one that is green and healthy. . . (23, p. 21).

Silvicultural treatments of forest lands where recreation and timber production are to be considered were studied by Morriss. He stresses that the attempts to retain indefinitely, overage trees to preserve recreation values must be abandoned.
Since trees are the dominant feature of the areas involved and since they are living, ever-changing plants, plans and subsequent controls should be designed to remain in tune with the man-modified natural processes involved. This requires the adoption of silvicultural systems, management practices and operating restrictions which will most nearly satisfy the needs of both timber and recreation use. An additional, and essential, requirement is that production must be assured.

It is likely that reproduction through selection cutting will have quite limited application and that group selection will be the best choice in most situations of intensive human use and intimate observation. With the exercise of care in their application other clearcutting practices should be quite appropriate in many areas of extensive human use and more remote observation.

Advancement of rotations or the top diameters in stand structures will no doubt prove to be desirable in the most heavily used areas. . . . It is doubtful that such modification will significantly affect predicted yields. . . (29, p. 879).

The reaction of recreationists to logging operations and the after effects of logging have been examined in the Lake States. The questionnaire results are as follows:

. . . One question in the interview concerned observations of logging and the reaction to it. . . . Very few groups thought they had observed logging. . . . Even when groups thought they had observed logging only about 30 per cent objected to it.

The general breakdown on all forms of recreationists (canoeists, auto campers, boat campers, resort guests, private cabin users, day users) is as follows: Not noticed 82%; Noticed, not bothered 13%; Noticed, bothered 5%. . . (27, pp. 1-2).

II. TIMBER AND WILDLIFE RELATIONSHIPS

The majority of studies and reports investigating this resource relationship have been concerned with the conflict in use which results when vertebrate fauna increase to proportions that restrict forest reproduction. The potentially destructive vertebrates with which this portion of the literature review will be concerned are elk, Cervus
canadensis nelsoni Bailey; white-tailed deer, Odocoileus virginianus Boddaert; and mule deer, Odocoileus hemionus Rafinesque.

... Several investigations of white-tailed deer and ponderosa pine in northwestern Montana have shown that browsing by deer is a primary limiting factor in pine regeneration. Heavy browsing results from an overstocking of deer on their winter range. This range roughly coincides with the best pine producing areas (31, p. 241).

Adams working on a similar problem in the same general area reported:

... It can be said that the deer showed a marked preference for ponderosa pine as compared with Douglas-fir. Pine showed an average past use intensity of 38.9 percent. That of Douglas-fir was 32.3 percent. The averages for current use of pine and Douglas-fir were 33 percent and 17.1 percent respectively. In addition to these use intensities 3.4 percent of the pines were found dead from browsing. Only 0.8 percent of the Douglas-firs were dead. In the silvicultural condition that exists on the Fisher River, where the economically superior species is being inadequately restocked, any suppressive forces which adversely affects the pine more than the Douglas-fir must be considered detrimental. The deer browsing, which is more severe on pine than on Douglas-fir, is therefore a detrimental influence. ... (1, p. 912).

Philosophies and fallacies in timber and wildlife management are defined, as each affects the other, by Hill:

... Two broad statements have been made so frequently as to be accepted without the qualification they deserve. One is that good forestry (or good land management) is good for wildlife. If that is so, what is the explanation for exceptionally productive game populations on land that has been mismanaged by standards now deemed acceptable? Some of the best deer ranges have developed as successional stages following over-cutting of timber, over-grazing of livestock or uncontrolled fires. ... .

It seems evident then that the best for timber, or the best for livestock, or the best for water, are not the best --and possibly not even good--for wildlife. ... .

The second statement common accepted is that wildlife must be a by-product of some major land use. ... (22, p. 181).

Hill takes exception to this statement and suggests that:

... The requirements of wildlife may justify the designation of areas where other uses will be so restricted as to assure that critical wildlife needs are not impaired. ... (22, p. 182).
Studies of forage production after logging in the grand fir and Douglas-fir types have been made by Pengelly. In the Douglas-fir type, he found that:

In the unlogged forest, shrubs cover about 22 percent of the ground area. At about 13 years after logging, this cover has increased nearly fourfold, to 86.9 percent. The peak of shrub abundance apparently occurred 15 years after logging.

... By an average of 20 years after logging on four sites the ground cover had declined to 73.1 percent; and to 41.0 percent on four areas logged 40 or more years ago... (35, pp. 736-737).

In the grand fir type his findings were:

One obvious feature was the more favorable composition of browse species occurring on unlogged grand fir sites than was found on unlogged Douglas-fir sites. Very little immediate change occurred after logging in grand fir except where burning also occurred... (35, p. 738).

Evaluation of cutting methods and forage production resulted in the following recommendations:

... Current large scale clearcuts at higher elevations in grand fir types, often on unfavorable exposures, are not contributing materially to vitally needed winter ranges for deer... .

Small, scattered clearcuts followed by burning may be the best practice for both timber and wildlife production in the Douglas-fir zone. Larger block cuts in grand fir types, with scattered islands of timber left for timber restocking and for game cover, also followed by burning, can be expected to provide additional winter ranges for mule deer and elk... (35, p. 739).

III. TIMBER AND WATER RELATIONSHIPS

This portion of the literature will deal only with the adverse effects of timber harvest on water producing forest areas. Investigations have shown that water quality, quantity and timing of peak run-off are all affected by logging of watersheds. In some instances, these
efforts are beneficial as in the case of increased water production in dry climates. In the study area increased production of water from the forest is not, at present, critical. The effects of logging and the relationships which may become critical are in situations where reduced water quality due to sedimentation and accelerated peak streamflows occur because of increased runoff from cut-over areas.

... A stream draining a small logged watershed in the Southwestern United States was found to contain an average sediment load of 95 parts per million, and during storms amounts ran as high as 3,500 p.p.m. An adjoining stream--draining an uncut watershed averaged only 4 p.p.m. The increase in sediment from the logged watershed was attributed to erosion from skid trails and a short section of poorly designed haul road. . . (26, p. 83).

In a related study in the same general location the increased sediment load from logged over areas was found to be extremely high in the maximum ranges. For example:

... Maximum turbidities--ranging from 56,000 p.p.m. on the clearcut watershed to 15 p.p.m. on the control. . . . Careless logging, that is unplanned and uncared-for skid roads in watersheds . . . resulted in dirty water. . . .

The U. S. Public Health Service standard for drinking water is 10 p.p.m.; water with 25 p.p.m. of soil is hardly cloudy; 200 p.p.m. makes dirty water. . . (62, p. 635).

Dunford, referring to poorly designed haul roads, skid trails and general logging practices summarizes the results as follows:

... The overall effect of these activities is a pronounced alteration of hydraulic characteristics; stream velocities are increased, pools are destroyed, and channel bottoms become alternately scoured or loaded with an unsorted mass of silt, debris and rock. Such changes are particularly harmful in fishing streams. Erosion material blankets spawning beds and deprives buried eggs of full circulation of dissolved oxygen. Plant and animal life providing fish food also suffer from the same effects. . . (16, p. 1705).
IV. HUMAN AND RESOURCE USE RELATIONSHIPS

The human attitude and the politics of pressure group maneuvering, when resource use affects "the public interest," have been examined by Behan in his thesis, "Pressure Group Politics and Multiple Use Administration."

... Lumbermen hold a shared attitude toward the lumber resource; boaters, hikers, campers and skiers hold shared attitudes toward a recreation resource; stockmen share attitudes toward a forage resource; and nearly everyone is concerned in some manner with water and wildlife.

In other words, the multiple resources have their counterparts in shared-attitude groups. Some, we will see, activate as pressure groups and some remain as potential groups, but all of them in relation to the multiple forest resources hold certain uses in higher esteem than others.

In simple terms, each group advocates its preferred use to at least the subordination, at most the exclusion, of all other uses. ... (5, p. 78).

Of all the possible resource relationships, this relationship between the resources and the resource consumers is perhaps the least understood and the most important relationship to be considered by administrators in resource planning.
CHAPTER IV

INVESTIGATION PROCEDURES

Allocation of forest land to the various possible combinations of resource uses is largely a political and economic matter. Administrative decisions on resource use and intensity of management to be provided are, at best, attempts to see into the future. The inability to predict the future with accuracy prevents the establishment of long range plans for multiple resource management. The problem is founded in the various relationships between resources and the changing tastes and wants of society. To this end, the decision-making process must constantly be altered on the basis of short planning periods.

The plan of investigation in this study was designed to assemble facts pertaining to the Swan River Forest resources and to gain insight into the complexities of resource management. No administrator can ever know all the facts upon which to base management decisions. Resource problems are not solvable in isolation from the many political and social complexities. We have, at present, no way of evaluating in a quantitative sense the vast complex of possible socio-economic influences on our resource producing forest lands. This does not mean that management decisions should not be made; they must be made now and in the future. Incomplete knowledge from available information and imperfect values from relative measurements may be extremely helpful in making better decisions. It is, however, the responsibility of administration to assemble all available information and obtain new information
whenever possible before making management decisions. Factors of time, money and available personnel will, of necessity, limit the completeness of the information which can be obtained.

With the responsibilities of administration in mind, the investigation proceeded from the available facts to an unknown quantity—the recreation user. Facts on the timber, water, wildlife and recreation resources were obtained from the following offices: State Forester, Missoula; U. S. Geologic Survey, Missoula; Pacific Power and Light, Kalispell and Bigfork; State Engineer, Helena; Montana State Fish and Game Department, Missoula; Montana State Highway Commission and U. S. Bureau of Public Roads, Helena; The State Parks Division of the Montana State Highway Commission, Helena; and U. S. Ranger District Headquarters at Condon, Bigfork and Seeley Lake. The data were then evaluated, condensed and included within this thesis to provide the basis for management proposals on the Swan River State Forest.

Virtually all of the information available on recreation use occurring on the forest was that, "lots of people" were using the areas provided and that many others were seeking information on camping areas from the forest headquarters office at Goat Creek. State personnel, contacted prior to the study, were in agreement that recreation use on the forest had been increasing each year. Basic data on origin, destination, activities and other general characteristics of the recreation user on the Swan River State Forest were unknown.

In order to secure such data, two similar questionnaires, Recreation Survey Part I and Part II (Appendix, B and C) were designed. Part I was intended to secure information from the recreation user by personal
interviews, and Part II was placed in the State Forest Headquarters. Potential recreation users seeking recreation information were asked by State Forest personnel to complete a questionnaire. Information obtained from the latter questionnaire was disregarded for the following reasons: (1) Personnel in the Forest Headquarters Office were frequently changed and the new person was not informed about the questionnaires or the purpose of such. This practice resulted in a small number (eight) being distributed to prospective recreation users. (2) Some investigators feel that data obtained from "planted" questionnaires are not as valid or reliable as interviews conducted by even the most inexperienced interviewer (68, pp. 286-288).

Interviews (Recreation Survey, Part I) were conducted in the four campgrounds on the forest (Figure 1, page 2) and in undeveloped areas of the forest being used by recreationists. Scheduling of the interviewing period was to coincide with the time of most intensive outdoor recreation use in Montana (36, p. 56). The schedule of interview days within the study period is presented in Table II.

Interviews were conducted on two successive days each week. One day interview periods were scheduled during periods of assumed high use, not covered by the originally selected interview schedule. The schedule presented in Table II, with the exception of one day periods, was derived by selecting Saturday and Sunday (June 15 and 16) as the interview period of the first week. Monday and Tuesday were selected as interviewing days for the second week and Wednesday and Thursday for the third week. This sequence was followed until each day of the week, on successive weeks, was scheduled for interviews. The sequence was
TABLE II
MONTH AND DATE OF INTERVIEW PERIODS
(JUNE TO SEPTEMBER, 1963)

<table>
<thead>
<tr>
<th>Month</th>
<th>Interview periods by dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>June</td>
<td>15-16 24-25 - - - - -</td>
</tr>
<tr>
<td>July</td>
<td>3-4 8 12-13 18 21-22 30-31</td>
</tr>
<tr>
<td>August</td>
<td>8-11 19-20 28-29 - - - -</td>
</tr>
<tr>
<td>September</td>
<td>2 7-8 14-15* - - - -</td>
</tr>
</tbody>
</table>

*Interviewing was scheduled for this period but discontinued from the actual schedule used due to the noticeable drop off of camp-picnic use on the forest on September seventh and eighth.

then repeated until the end of the interview period (September 15). A four-day interviewing period occurred (August 8, 9, 10 and 11) when Thursday and Friday ended the eighth week and Saturday and Sunday began the ninth week of the interviewing period.

The preceding schedule of interview periods was adopted to obtain interviews from a diverse group of recreation users. The assumption being that local persons would be the dominant week-end users and the more distant persons on vacation would be the predominant users during the week. No effort was made to determine the number of persons using the forest for recreation during the study period. Estimates of total population derived by statistics would only indicate the number of persons willing to use the primitive facilities available. These estimates might not give any indication of the number of persons that would use the forest for recreation purposes if adequate facilities were provided.
The general procedure, followed during study days, was to interview as many persons using the forest as possible. Each camp-picnic ground was visited at least once a day depending on the number of users. One adult member of each group was interviewed whenever possible. Occasionally, when the members of a group were dispersed, individuals from the same group were interviewed. Groups were not contacted during times when they were setting up or breaking camp, preparing or eating the meal. Adherence to this procedure resulted in some groups not being interviewed due to the time demanding nature of their activities. It was assumed that persons contacted at these times would give hurried, possibly inaccurate answers to the questions; thereby introducing bias into the study which would not occur if interviews were conducted during times of relaxation.

CHAPTER V

TIMBER, WATER AND WILDLIFE RESOURCES

I. THE TIMBER RESOURCE

Management. The timber of the Swan River State Forest is managed as a unit which contributes to the overall annual allowable cut of timber from State forest lands. Under this form of management a sustained yield of timber from the unit is not a necessary requirement of management. In theory the Swan River unit could supply the entire allowable cut for the State in some years and contribute nothing to it in other years.\(^1\) The reason behind this form of management lies in the almost virgin forest conditions prevailing on the forest. Most of the timber is over-mature, high risk stock in need of harvesting to prevent losses to fire, insects, windthrow and natural mortality. This unit can supply a heavy proportion of the State allowable cut for the next thirty or forty years. By that time, other State forest units previously cut will have matured in sufficient amounts to make up the State annual cut and allow the cut in the Swan River unit to taper off or cease. In view of the disproportion of age classes prevailing on this and other State forest units, management of State forest lands is based on State sustained yield rather than sustained yield on units such as the Swan River State Forest.

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\(^1\)Annual allowable cut recommended for all State forest lands is twenty-five million board feet.
Following the recommendations of the Forest Advisory Commission (History, p. 31) the State Forester requested an appropriation of $30,000 to begin an inventory of all State owned forest lands. This bill presented to the 34th Legislative Assembly (1955) failed to pass; however, $10,000 was added to the State Forestry Department’s budget for inventory purposes (30, p. 4).

The Northern Pacific Railway Company was at this time planning to conduct an aerial inventory of their Swan River holdings. By cooperating with the Northern Pacific Railway Company in a work agreement, the State Forestry Department was able to obtain a timber inventory of their Swan River lands at a great savings. Consequently, the first step in the inventory of State owned forest land was begun in the fall of 1955 on the Swan River State Forest.

The inventory involved the use of aerial photographs, ground sampling and I.B.M. programming of the statistical data. A private consulting forester, Mr. Paul Bruns, was employed to assist in the direction and planning of this work. The first report, made in 1956, was based on the assumption that the Swan River State Forest would be managed as a sustained yield unit. The annual allowable cut calculated at that time was approximately 7 million board feet. This report was revised upon recommendations from industry and the allowable cut recalculated and set at about 15 million board feet annually for the period 1961-1971 to liquidate an estimated 60 million board feet of high risk

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1 A cut of 7,085 M.B.F. annually for the period 1956-1966. This cut represented an over-cut of 2,578 M.B.F. per year. The report also showed that a minimum of 6,385 M.B.F. should be removed annually in order to liquidate high priority stands during the first ten year period.
old growth timber.\textsuperscript{1} Mr. Bruns, upon reviewing the report based on the above recommendations, suggested a review of the results of the cut in ten years. He also concurred with the recommendations that rather than view the Swan River State Forest as a sustained yield unit, all available information should be assembled on State forest lands to determine the timber type and age class distribution so that long-term sustained yield could be established for State forest lands in total.

Timber volumes removed from the Swan River State Forest, over the years since the above recommendations were made, have been averaging approximately ten million board feet per year, an under cut of about five million board feet annually. Much of this volume has been made up of mortality salvage and cuts in insect infested trees in an effort to prevent insect epidemics.

Under the system of State sustained yield management, the annual allowable cut is made up of high risk timber on a priority basis. The reduced volume of timber removed from the Swan River State Forest suggests that there are areas of higher priority timber on other State forest units. As these areas are harvested, the cut on the Swan River unit will increase and the old growth timber will be removed at a more rapid rate.

\textsuperscript{1}The cut as calculated in the revised report (1961) is 14,873 M.B.F. per year with the possibility of an additional cut of 1,616 M.B.F. per year in the larch and ponderosa pine types. Other revisions recommended and accepted called for: (1) A change of rotation age from 160 years to 140 years, (2) a change of cutting methods based on the silviculture needs of the species rather than salvage cuts that might encourage minor species within a more desirable timber type, (3) rapid liquidation of the timber shown in the inventory as below average vigor and dying in all stands, generally on a 20-year basis plus liquidation of all stands in the 10-year logging priority by the inventory, in the 10-year period.
The Growing Stock. According to the 1956 inventory report 78 per cent or 30,430 acres of State owned forest land in the Swan River Forest was covered with old growth, over mature, high risk timber. The larch-Douglas-fir types are the most important economic timber types in this total. On State lands within the forest, these types occupy 54 per cent of the total area stocked with sawtimber. Engelmann spruce-white fir type occupies 23 per cent of the area covered with sawtimber and is rapidly becoming an economically important timber type. Western cedar makes up 6 per cent of the sawtimber area. Western white pine 4 per cent and ponderosa pine 3 per cent are the remaining timber species in the sawtimber class of commercial importance on the State forest lands. The following table illustrates the breakdown of the combined species and the area covered.

TABLE III

TIMBER VOLUMES AND ACREAGE BY SIZE CLASS ON THE SWAN RIVER STATE FOREST, 1956 (ALL COVER TYPES)

<table>
<thead>
<tr>
<th>Size class</th>
<th>Acres</th>
<th>Volume (MMBF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawtimber 11.5&quot; to D.B.H.</td>
<td>30,430</td>
<td>420.7</td>
</tr>
<tr>
<td>Polesize 5.6&quot; to 11.4&quot; D.B.H.</td>
<td>3,185</td>
<td>22.7</td>
</tr>
<tr>
<td>Seedlings and saplings 0.1&quot; to 5.5&quot; D.B.H.</td>
<td>4,322</td>
<td>--</td>
</tr>
<tr>
<td>Non-stocked</td>
<td>290</td>
<td>--</td>
</tr>
<tr>
<td>Non-commercial</td>
<td>none</td>
<td>--</td>
</tr>
<tr>
<td>Non-forest</td>
<td>611</td>
<td>--</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>38,838</td>
<td>443.4</td>
</tr>
</tbody>
</table>
Thus in 1956, 78 per cent of the available State acreage was covered with mature or over-mature timber, having a total volume of 420.7 million board feet. Of this total, approximately 108 million board feet representing 7,812 acres were cut from the time of the inventory until 1962, leaving a net volume of roughly 312.7 million board feet (20, p. 5). The average volume per acre of all species in the old growth is 13.8 thousand board feet. The remaining 22 per cent of the forest was covered by pole, ingrowth or reproduction sized stands and a very small amount of non-productive land. The degree of stocking on both the sawtimber and immature stands varies from well to poorly stocked. The entire forest is, for the most part, medium stocked or better. Based on the following major stocking categories: (1) Poor--10 to 39 per cent stocked; (2) medium--40 to 69 per cent stocked; (3) well--70+ per cent stocked. With the exception of the spruce type, a large portion of the immature stands in the forest are the result of old burns. These burns are all well stocked and in some cases, over stocked.

Silvicultural Methods. In general, there are three major silvicultural cutting systems in use on the Swan River State Forest--clear cut, selection and the shelterwood system. These systems may be used independently or in combination, depending upon stand conditions and the timber species present in the area being cut. Use of shelterwood cutting is in an experimental stage on the forest and does not, at present, influence forest composition. In most cases the areas of high risk, old growth timber, adjacent to clear cut blocks, are selectively cut to remove timber which might be otherwise lost to windthrow,
insects or natural mortality.

The clear cut block or strip treatment is used in the following timber types:

Larch
Spruce-white fir
Douglas-fir (infrequently)

Clear cut blocks are approximately twenty acres (10 chains by 20 chains) but may vary in dimensions according to the topography. In extreme cases, where slopes exceed 30 per cent, clear cutting in contour strips is practiced. In general, the type and pattern of the clear cutting blocks are determined by the character of the stand and topography.

The remaining timber types are cut on a group or single tree selection basis usually between clear cut blocks to reduce loss from mortality and windthrow. The types are:

Mixed type (all species)
Ponderosa pine
Douglas-fir
Western white pine
Western cedar

All selective cuts are marked on the basis of vigor, risk and stand improvement. Harvesting with this silvicultural method is done under the direct supervision of a technically trained forester. The size of the selection cut area is governed by topography, and in some cases, the State cutting budget.

At present, the use of the shelterwood system is limited. The
major use of this system in the future will be on the leave blocks where over mature, old growth timber is scattered throughout the block. The larch type, to which this method will be confined, is the only species on the forest which responds to this form of silviculture.

The overall policy on the State lands within the study area is to remove the over mature and high risk timber first. These are removed on the basis of stand condition, with reference to age, general appearance, insect activity and stand composition. Regardless of the silvicultural treatment applied, every effort is being made to improve the quality of the sawtimber and to favor the propagation of the more desirable timber species. Some lodgepole pine occurs in scattered stands on the forest; however, under the present silvicultural methods this species is expected to decrease with a corresponding increase in the Engelmann spruce type. Minor forest products in the form of posts, poles and pulpwood are occasionally harvested in the younger stands to improve stand composition and increase the quality of the sawtimber. At the present time, there is little demand for these minor products but greater future demand is anticipated. More emphasis will be placed on timber stand improvement as the markets improve for minor products and as the remaining high risk old growth timber is removed.

In the event that the larch and spruce-white fir types were cut, using the prescribed clear cut system, to liquidate or salvage the mature and over mature stock, approximately 18,700 acres of State forest land within the Swan River Forest would be denuded of all timber. If this treatment becomes a necessity of management, under present management philosophies, about 9,600 acres of Northern Pacific Railway Company
land within the forest could be subjected to the same treatment. In view of the present stand condition, there is a strong possibility that 28,300 acres or 40 per cent of the total land area within the Swan River Forest could be cut over, at a rapid rate, to salvage or prevent loss of the economic resource.

In 1955, the State Board of Land Commissioners authorized the State Forester to collect 75 cents per thousand board feet on all timber cut from State lands to be used for timber stand improvement (60). The majority of the forest, as previously mentioned, is well stocked thereby eliminating the necessity for any major planting programs. Minor planting projects may be carried out in some clearcut blocks to accelerate the production of timber or to curtail any extreme watershed erosion. In other cases, undesirable species left after logging may have to be removed and the area planted. Removal of undesirable species, seed bed preparation, and planting as needed will be accomplished through the authorized timber stand improvement monies.

**Roads and Timber Sale Policies.** State Highway 209 forms the primary road system on the forest, serving all ownerships. The secondary road system branches east and west from the main highway into the forest. On the east side of the forest, the majority of these roads are "loop" roads which leave the highway and circle through the forest, joining the highway at another point. Future roads are to follow this basic "loop" design. Secondary roads, constructed by the Civilian Conservation Corps, have through many years of uncontested use become public roads. New roads constructed for timber removal are designated as State forest roads. These roads, as constructed, are designed to
consider future timber harvest, fire control, erosion, and public use of the forest. Existing roads are being improved with the same considerations in mind.

Road construction and timber sales on the Swan River State Forest lands are directly related. Primary and secondary access roads are constructed and maintained by the timber purchaser until the timber is removed, at which time they become the responsibility of the State Forestry Department. In addition, the logger pays a maintenance fee on State forest roads used as a timber removal route. This fee is based on the timber removed, and the mileage of State road used. A maintenance fee is charged to other landowners removing timber over the State road system. Fees monies are expended using State owned equipment at a time when road maintenance work can best be performed.

The Western Pine Association index is used to establish minimum stumpage values, with the selling price of lumber used as a base. Allowances are made for all costs of logging (including road construction) and lumber manufacture. Logging and road construction costs are obtained from industry and the U. S. Forest Service, with modifications added to adapt the costs to State use. Under this system of timber sale administration, the cost of road construction results in a reduction of stumpage income to the State School Trust Fund. To avoid this reduction of income, early timber sales were made close to the existing roads. High road cost sales (usually in the high country) were avoided, even though this cost may have been more than repaid in future sales, forest protection, and timber salvage. As a consequence, most road development has been confined to the valley bottom and only recently has
moved into the higher portions of the forest.

The scattered land ownership pattern on the forest is a deterrent to a well conceived forest road system. A cooperative road maintenance agreement has been made with the U. S. Forest Service which provides for maintenance of roads owned by one organization when used by timber purchasers of the other. A construction and maintenance cost-sharing agreement has been under negotiation with the Northern Pacific Railway Company for several years. This agreement, when finalized, would provide for equitable distribution of development costs on the Swan River Forest. Under this agreement much duplication of effort by both owners would be eliminated and a coordinated road development plan could be made.

Timber Market. Most of the sawlogs cut from the Swan River Forest are taken north to points of manufacture, in the Flathead Valley around Kalispell, or to the upper Mission Valley near Polson. A small percentage of the cut is manufactured at Seeley Lake sawmills. At present, none of the raw timber is transported to Missoula for manufacture; although there is a possibility of demand being generated from that area as the more accessible timber is cut and as the allowable cut from the study area is increased.

Forest Protection. As a timber stand reaches mature and over mature age, growth slows down and the forest becomes more susceptible to loss through mortality. In most average forests, the annual growth is lost or a deficit in growth results from annual mortality. One of the greatest causes of mortality, in over-age stands of timber, is bark
beetles which attack the old, less vigorous trees. Insect populations grow and radiate outward from these weakened trees, often reaching numbers which over-power and kill the healthier trees in the stand. Another hazard is forest fire; while old growth timber may be no more vulnerable to fire than younger stands, the time involved in growing the crop to its present size and the economic loss which could be incurred are greater. Tree disease causes some mortality on the forest; however, the threat of economic loss by this agent is not as great as that of insects. Windthrow is a threat to timber but is a natural catastrophic event, from which it is difficult to protect timber. Economic loss to this cause can be reduced somewhat by the selection cutting method discussed in the section on silvicultural methods, and by means of a road system which allows ready access to the areas of blow-down.

Forest protection, by the State Forestry Department, is designed to curb economic loss of timber by fire on all lands within the protection district boundary; and to reduce insect populations on State land. Under the present ownership pattern and differing management policies, protection from insect epidemics is difficult. Sales are made of timber under insect attack, in an effort to reduce epidemic outbreaks and salvage potential mortality. Often times, these outbreaks overlap onto land of other owners and State control efforts must stop at the boundary line between ownerships. This problem is greatest where State land adjoins Northern Pacific Railway Company land. Management policies of this company do not favor small sales of the type necessary to reduce insect populations because most of the economic return is consumed in
sale location and administration. As a consequence, there is always a nucleus of insect populations on land in other ownerships which can spread and attack timber on State land within the forest.

Douglas-fir bark beetle, *Dendroctonus pseudotsugae* Hopk. is the major destructive insect agent occurring in near epidemic proportions on the forest. This insect characteristically attacks small groups of trees on widely scattered locations making control and salvage extremely difficult and unprofitable (24, p. 156). Protection against this insect may be accomplished by management policies and silvicultural practices which reduce the amount of Douglas-fir in the forest and favor propagation of larch and ponderosa pine. The Engelmann spruce beetle, *D. engelmanni* Hopk. has caused extensive loss of spruce in the Swan River valley and is a constant threat on the forest (66, p. 31). Western pine beetle, *D. brevicomis* Lec. and mountain pine beetle, *D. monticolae* Hopk. attack ponderosa pine and white pine, respectively, causing steady endemic losses.

The State Forestry Department is responsible for the prevention, detection and suppression of fires on land within the fire protection boundary. Fire prevention duties include logging slash disposal on State land to reduce fire hazards and information and education programs designed to increase public awareness of the need for fire prevention. On the study area, the public information and education program utilizes "Smokey Bear" posters which are placed at strategic locations throughout the forest and a fire danger sign located at Goat Creek which is correlated with the daily burning index. Other prevention means are the axe, bucket and shovel regulation for users of the
portion of the forest off the main highway; and the power of the State Forester to close off portions of the forest to public use during periods of extreme fire danger.

The amount of slash disposal required depends upon the concentration of the slash, the terrain, rapidity of natural decay and the silvicultural needs of the stand. The State Forestry Department collects $1.50 per thousand board feet of timber cut on State land for this work. The funds are expended using State equipment and personnel for slash disposal. Methods of disposal used include "dozer" piling and burning, hand piling and burning, and lopping and scattering. The latter is limited to small areas of light slash concentrations in selectively cut areas. In general, machine piling and burning is used in clear cut blocks. Hand work is required in areas cut under the selection system.

There are two fire detection lookouts on the forest (Figure 1, p. 2). Napa tower is on the east side of the forest and Woodward tower is on the west side. Both towers, constructed by the Civilian Conservation Corps in the late 1930's, are obsolete and unsafe by present standards. Woodward tower is accessible by road and is manned from about the end of June through mid-September--the average fire season on the forest. This tower is soon to be replaced with a tower of steel construction.

Access to Napa tower is by foot or pack-string. Due to the expense of getting men and supplies to the location, this tower is manned only during times of extreme fire danger. A road is presently being constructed to the tower and when completed, the present tower will be
replaced by a portable trailer lookout which will be manned by an observer during the regular fire season.

The detection system is supplemented by air patrols and U. S. Forest Service lookouts, which help maintain surveillance of forest areas. State observers, in turn, scan areas of Forest Service land outside of the State Fire Protection District.

Fires have been small and irregular in occurrence on the forest since the late 1930's. This is probably due to climatic conditions which have not been favorable to ignition and spread of fires. Since the establishment of the Swan River State Fire Protection District in 1956 there has been an average of about five fires a year, none of which have exceeded ten acres in size. However, the constant threat of fire to a timber crop valued at approximately five million dollars (estimate on State lands only) requires that trained fire crews and fire fighting equipment are readily available (20, p. 5).

II. THE WATER RESOURCE

Production. The Swan River watershed, measured from the outlet of Swan Lake, has an area of 671 square miles. Records, maintained from 1922 to present, indicate that this area produces an average annual run-off of 815,900 acre feet. Variations from this average fluctuate from a low in 1941 of 439,300 acre feet to a record discharge of 1,350,000 acre feet in 1928. Three hundred-sixty acres of the 671 square miles of watershed above the stream gauging station have diversions for irrigation (51, p. 21).

Utilization. Values for the water resource of the study area
are less tangible than timber values. During the course of the study, no direct utilization for irrigation or other purposes were observed. At the present stage of development of the Swan River Forest resources, the most important use of the water resource is probably its function as trout habitat. To this extent watershed management of the study area should stress uses which protect water quality for the important fisheries resource.

Water quantity and regime is not an important management consideration within the forest. However, generation of hydroelectric power at the mouth of the Swan River is dependent on a near constant stream flow, without extreme peaks or lows. Fluctuations in annual kilowatt hours of power generated and distributed to Kalispell and vicinity are sensitive to annual variations in stream flow from the Swan River watershed. Water peaks during spring run-off flow over retaining dams, and do not supply means for additional power generation at this hydroelectric plant. Extreme low water conditions, conversely, reduce the amount of power which can be produced. The years 1960 and 1961 were reported as "dry" with a peak spring flow and extreme summer lows; 1959 was a "wet" year in which relatively constant stream flows were recorded. Power output at the Bigfork hydroelectric plant reflects the stream flow for these years (7).

<table>
<thead>
<tr>
<th>Year</th>
<th>Kilowatt hours generated</th>
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</thead>
<tbody>
<tr>
<td>1959</td>
<td>38,206,500</td>
</tr>
<tr>
<td>1960</td>
<td>31,189,740</td>
</tr>
<tr>
<td>1961</td>
<td>32,979,240</td>
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</table>

1Pacific Power and Light Company, Kalispell, production records.
Management. Normal logging practices on the Swan River Forest will probably have little effect in producing peak spring flows and reduction in water quantity during the summer. In the event of rapid liquidation of old growth timber on the study area by clear cut methods, prompt revegetation of clear cut areas may be vital for maximum production of hydroelectric power.

Watershed management policies on the Swan River State Forest were outlined by W. K. Gibson and S. J. Finch in 1957, as follows:

Watershed control should be considered in all phases of the management program. A good sound management program will not interfere with proper watershed control. There are areas in the working circle which will be considered watershed areas entirely. These areas will be logged only in the case of emergencies from disease, insects or fire. In most cases immediate planting will follow to keep the moisture holding qualities intact. All stream beds and water courses will be kept in good condition to insure the proper water flow (60).

Demand for the water resource, it might be argued, is exerted by the population of the entire Columbia River drainage. However, it is doubtful, in view of the supply of water available from other sources, that intense management, or mismanagement, of the Swan River Forest would have much overall effect on the total supply. Populations exerting more direct demand on the water resources of the Swan River Forest are those in Kalispell and surrounding areas depending upon the Swan River for generation of electric power from the dam at Bigfork; and persons living along the river using the water for irrigation purposes.

III. THE WILDLIFE RESOURCE

This discussion of wildlife occurring on the Swan River Forest will be limited to those species which are actively sought by hunters
and fishermen. Most of the fish, birds and mammals common to Western Montana occur on the forest to some degree or at various times. However, few of these with the possible exception of furbearing animals provide an incentive for pursuit by sportsmen with rod and gun and cannot properly be classed as an important resource.

Fish. It is difficult to separate fishing from recreation. To many persons recreation is fishing; and almost all fishermen would agree that fishing is recreation. Recognizing the non-definitive condition, fish and fishing attributes of the Swan River Forest will be discussed in this section as entities, separate from the recreation resource.

Of the sport fishes occurring in waters of the study area, only two species do not belong to the family Salmonidae. They are largemouth bass, *Micropterus salmoides* Lacepede, which is restricted within the forest to Metcalf Lake; and the mountain whitefish, *Prosopium williamsoni* Girard, occurring in the main Swan River and infrequently in its tributaries. Within the family Salmonidae, there are two species of char, one native and the other introduced, which are common to the forest's waters. Dolly Varden, *Salvelinus alpinus malma* Walbraum, is a native species limited to the Swan River and its tributaries during fall spawning runs. Eastern brook trout, *Salvelinus fontinalis* Mitchell, actually a char, has been introduced throughout Western Montana and is known to inhabit all lakes and streams within the study area. The remaining species of importance to the fish resource of the study area are: rainbow trout, *Salmo gairdneri* Richardson; cutthroat trout, *Salmo clarki* Richardson, and brown trout, *Salmo trutta* Linnaeus. The latter species is known only to inhabit Van Lake; cutthroat, and
rainbow trout to a lesser degree, are common to most of the fish-bearing waters in the forest.

Fishing Streams.¹ The Swan River flows north and parallels State Highway Route 209 for approximately nine miles, from the south to north boundary of the forest. Major access points occur near the south border of the study area, at Cedar Creek, at Point Pleasant camp-picnic area and by good trail from the State Forest Supervisor's Headquarters at Goat Creek (Figure 1, p. 2).

Fishing is good for rainbow, cutthroat and Dolly Varden and fair for whitefish and eastern brook trout. Average fish range in size from 7 to 12 inches. Rainbow trout, from 2 to 5 pounds, are not uncommon in late July and August.

Van Lake, approximately 30 acres in size (Figure 1, p. 2), is a popular winter fishing lake producing above average brown, rainbow and cutthroat trout, 15 to 18 inches in length. A fish of 7 pounds (maximum) has been reported as being taken from this lake (25, p. 173).

Shallow water, mud bottom and maximum trout sustaining water temperatures in the summer combine to produce muddy tasting fish and therefore discourage fishing at this time of the year. Access to this lake is over two miles of primary logging road, south of the Swan River Forest boundary.

Metcalf Lake, about 6 acres, is over populated with small, 6 to 10 inch, largemouth bass. Larger fish, 14 to 16 inches, may be observed

¹In the preparation of this section, I have drawn heavily on Montanan's Fishing Guide, R. L. Konizeski (editor), and from personal experiences and observations made during the study period, 1963.
infrequently. This lake has a small population of eastern brook trout. Access is by primary logging road and one-quarter mile of spur road.

Cedar Creek, a moderately sized stream readily accessible in its lower three miles, is considered fair to good fishing for whitefish, eastern brook and cutthroat trout. This stream has a fall spawning run of Dolly Vardens.

Woodward Creek, a moderately sized stream having one and one-half miles of fishing water, is accessible by spur logging road and trail. It is lightly fished but is considered fair for 9 to 12 inch eastern brook and cutthroat trout.

Goat Creek is a moderately sized stream, which receives heavy fishing in the Goat Creek camp-picnic area and light fishing pressure along three miles of stream paralleling the "loop" road. Fishing is fair to good for 6 to 8 inch rainbow, cutthroat and eastern brook trout. Fall spawning runs of Dolly Varden offer the major opportunities for catching large fish from this stream.

Soup Creek parallels the "loop" road about six miles north of Goat Creek. This is a very small stream containing several beaver dams and produces fair fishing for 6 to 8 inch cutthroat and eastern brook trout.

South Fork Lost Creek is accessible by primary access logging road throughout most of its length. This small stream contains 10 to 12 inch Dolly Vardens which come up from the main river to spawn. Fishing is fair for small eastern brook and cutthroat trout.

Small Game. Hunting of small game on the Swan River Forest is limited primarily to three species of upland game birds. Some duck
hunting may occur on the small lakes and beaver dams present in the forest; however, the Swan River valley is not on a major flyway and therefore receives limited flights of migratory ducks.

Ruffed grouse, *Bonasa umbellus* L., are found in the river and stream bottoms of the Swan River Forest. This species is in the most accessible portion of the forest and is probably hunted more actively than the other game birds. Inhabiting the moderately high ground of the forest is the Franklin grouse or "fool hen", *Canachites franklini* L. This species has very poor sporting qualities and is of little value as an important wildlife resource. The remaining species of upland game bird is the blue grouse, *Dendragapus obscurus* L. This bird frequents the high, relatively inaccessible portions of the forest and until a road system opens portions of its range, harvest of this bird will continue to be restricted.

**Big Game.** As with the small game resource, the big game resource is limited to three major species. White-tail deer is the most important species in terms of numbers present, followed by elk and mule deer, respectively. The study area lies between two of the few remaining ranges of grizzly bear, *Ursus arctos horribilis* Rausch, in the United States, and as such, this species is an infrequent transient on the forest. Mountain goat, *Oreamnos americanus missoulae* Allen, is limited to a small range of rock ledges on the north side of the South Fork of Lost Creek (Figure 1, p. 2). Black bear, *Ursus americanus* Pallus, are relatively common and many have been observed around the Goat Creek Headquarters. Moose, *Alces alces* Nelson, as a wildlife resource, is valuable only in regard to the intangible pleasures derived from the
infrequent sightings of this animal in its natural environment. There is no legal hunting season for this species on the forest.

**Big Game Populations and Harvest.** Information available on the game populations is from studies conducted in the winters of 1942-1943 and 1948-1949. Estimated white-tail deer populations on the winter game range area of the Swan River Forest during the period December through January 1942-1943, was 1,507 animals; January, 1949, estimates were 2,820; February estimates for the same year were 2,911 animals (33, pp. 62-63). Elk and mule deer census was not attempted for the winter 1942-1943. Census estimates of these animals for the same period in 1948-1949 were: elk--60, and mule deer--24 (38, p. 53). No further population studies of wildlife on the forest were found during the course of this investigation.

The Swan River Forest makes up an estimated one-fourth of the land area in Game Management Area Number 13. Wildlife harvest data (elk only) available from this area may serve to indicate hunting pressures and elk harvest on the Swan River Forest. Estimated number of hunters in Area 13 for the 1960 hunting season was 1,097; for the season 1961 this figure was estimated at 1,091, indicating a relatively stable hunting population (10, p. 12). Game harvest data from this investigation dealt with elk and mountain goat; however, it may be assumed that the hunter numbers represent persons who were hunting bear, mule deer and white-tail deer in addition to the species mentioned. Elk hunter success, 1960, was 11 per cent or a total kill of 126 animals; in 1961, hunter success was 18 per cent with a total kill of 252 elk. Mountain goat hunters, numbering 54, harvested 16 goats for a
hunter success percentage of 29.6 (10, p. 12). Previous to 1960, the Game Management Area Number 13 included what is now area Number 131, resulting in a greater land area and less meaningful data for purposes of this study. For this reason, hunter numbers and game kill previous to 1960 were not included in this discussion.

**Winter Game Range.** The most critical factor in reduced or limited deer and elk populations is winter range. Figure 2-A shows the approximate area of the forest utilized by these animals during the winter of 1948-1949 (38, pp. 128-130). This period was reported as being a "normal" winter; during more severe winter periods the areas utilized would be much more restricted and in mild periods the reverse would be expected. The ranges presented in Figure 2-A can therefore be anticipated during normal winters provided populations and browse conditions are not appreciably changed. Increased browse production on other areas of the forest and increased animal populations would effect an increase in winter range area. Conversely, decreases in browse production would confine the game range to browse producing areas and reduce animal populations through winter kill. A 1950 study of white-tail deer in the Swan River Forest reported that logging operations attracted deer and probably reduced winter mortality because of additional forage made available by felled trees (39, p. 43).

White-tail deer density in the study area was estimated at 36 per square mile of winter range, 1948-1949. At that time some over-browsed localities were beginning to appear (38, p. 87). The Goat Creek area was reported as being a favored wintering ground in 1942-1943 and again in the study period of 1948-1949. In the February,
APPROXIMATE WINTER RANGES
(1948-49)

- Elk
- White-tail Deer
- Mule Deer

LANDOWNERSHIP

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<th>OWNER</th>
<th>ACRES</th>
<th>% OF TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>STATE FOREST</td>
<td>38,838</td>
<td>56</td>
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<tr>
<td>U.S. FOREST SERVICE</td>
<td>10,257</td>
<td>15</td>
</tr>
<tr>
<td>N.P. RAILWAY CO</td>
<td>19,175</td>
<td>27</td>
</tr>
<tr>
<td>SMALL PRIVATE</td>
<td>1,370</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>69,640</td>
<td>100%</td>
</tr>
</tbody>
</table>

FIGURE 2-A
1949 count an estimated 1,800 white-tail deer were wintering in that area (38, p. 63). During the study period in 1963, a "browse line" was readily apparent on young lodgepole pine, Douglas-fir and larch in the vicinity of the Goat Creek camp-picnic area, indicating that this area still receives intense use as a winter game range.

The exact status of white-tail deer populations in the study area is apparently unknown today. This was also the case as reported in the 1948-1949 winter range study:

... It is not understood why this herd does not increase rapidly with the negligible buck harvest each fall. Natural losses must be slowing the increase of these deer in the Swan. The winter range has not received general heavy use in the past so it is possible that the early counts were large or the present counts are conservative. It has been suggested the herd has reached a maximum density at which point reproduction is slowed by an unknown physiological factor. This is doubtful because uncontrolled deer populations have "erupted" in other sections of the United States. More probably natural losses by predators, poaching and severe winters have controlled the Swan Valley whitetail [sic] deer.

... (38, p. 88).

It was previously suggested in the section on the timber resource that approximately 28,300 acres of State and Northern Pacific Railway Company land could be cut, in the near future, using the clear cut method of harvest. Annual increases in available forage brought about by current logging and browse production after logging suggest that the stage could soon be set for an eruption of white-tail deer population within the Swan River Forest.

Less frequently considered in resource studies is the cooperation of private landowners in providing land for "public" resource utilization and production. Wildlife within the study area, under Montana State Fish and Game regulation, utilizes property in private
ownership for critical winter game range. Reference to Figure 2-A will indicate the area of Northern Pacific Railway Company and other private land which furnish winter game range for the support of a public resource. As long as game populations remain "normal" on private lands there is little likelihood of conflict. However, when wildlife populations increase to the point that they conflict with the production of an economic resource, the possibility of conflicting relations between management agencies, the public and private owners becomes greater.

Increased hunter populations often follow increased big game herds. These hunters often show no concern for private property, create added maintenance costs, pose a potential threat of fire loss to the economic resource and place the private owners in a position where they are liable for suit in the event of personal injuries or damage suffered by hunters on their lands. If, on the other hand, the private owners attempt to control wildlife populations and eliminate animals from critical winter game range (fencing has been suggested, 31, p. 213) game populations are reduced through winter kill and the possibility of public resentment against the private owner becomes a reality. Attempts by game management agencies to control wildlife populations on these areas through extended seasons and increased bag limits can result in public distaste for "over kills" and lack of game in the intensely managed areas.

With the potential of increased wildlife populations and increased hunter pressure, future management policy of the wildlife resource of the Swan River Forest may have to consider setting aside areas of primary winter range for maximum browse production; and consider the possibility
of payments or concessions to private landowners for the use of their land by a public resource.
CHAPTER VI

THE RECREATION RESOURCE

I. CLASSIFICATION

With reference to the Outdoor Recreation Resources Review Commission's system for classifying recreation lands, the Swan River Forest can be categorized as Class III lands (32, pp. 95-100); that is, land that offers an attractive natural environment for outdoor recreation, having varied and interesting land forms, waters, plants and animals. They may receive other uses such as watershed protection, grazing and logging, if such uses are managed to preserve the attractiveness of the area.

They are often remote from population centers and offer sightseeing, hiking, nature study, picnicking, camping, swimming, boating, fishing and hunting as recreational activities. Development of Class III lands is usually limited to basic access roads and trails, with minimum picnic, camping and sanitary facilities.

Administration of these lands is mainly the responsibility of a State, Federal or other public agency.

II. PRESENT UTILIZATION

There are four camp-picnic grounds on the forest. All are small; three are antiquated and one has been partially rehabilitated since the inception of the study, in 1962 (Plate II). The recreation sites are
PLATE II

A Soup Creek camp-picnic unit before rehabilitation

Toilet facility remaining at Soup Creek
located on State Forest land and maintained by State Forestry Department personnel. During the study months maintenance, as observed, was not the best; garbage cans were constantly over-flowing, fireplaces were usually filled with cans, bottles and sundry litter and the toilets were often in dire need of lime to reduce odors. The primary use of the areas is for picknicking and camping during the summer months and as base camps during the fall hunting season.

A detailed description of the location of the camp-picnic areas, facilities offered and general conditions existing in the area during the study period will be discussed under specific headings.

Goat Creek. This area is located along the main Swan River Highway, opposite the Swan River State Forest Headquarters at Goat Creek. There are no signs indicating an approach to a public camp-picnic area, ownership or proper name. This area is readily visible to tourists driving on the highway; the probable source of its use. Observations by State Forest personnel indicate that this camp-picnic ground receives the highest degree of use of the camp-picnic areas on the forest. Major use of this location has been summer camping and picnicking, with infrequent fall hunter camping.

The breakdown of camp-picnic facilities is: Tables 7; fireplaces 5 (two standard, three improvised); toilets 2; and garbage cans, 3. There is no available water facility at this area; the probable water source is Goat Creek.

The layout of Goat Creek Camp is unique and highly complicated. The Swan River Highway traverses the camp-picnic ground in a north-south direction. East to west the camp-picnic ground is bisected by
Goat Creek, forming with the highway, almost equal quadrants. In the northwest quadrant there is one picnic table. Across the highway in the northeast quadrant, four tables, three fireplaces and two toilets are provided. This situation is further complicated by the fact that one of the tables is separated from the other three by a secondary forest road, the "loop", which heads east into the forest, north of Goat Creek. The southeast quadrant (across Goat Creek) contains two tables and two fireplaces. No facilities are provided in the southwest quadrant.

The general condition of the area is fair. The tables, which are the original ones constructed by the Civilian Conservation Corps, are in good condition. Toilets, except for being dirty, constantly out of paper and odorous, are in fair condition. The fireplaces are unsatisfactory; three have been improvised from loose stone by recreation users, and two of the type used by the U. S. Forest Service are badly damaged. Vegetation in the camp reflects the intensity of use by recreationists. Parking and area access off the main highway are poor, especially in the northwest and southeast quadrants. During dry periods, dust from logging vehicles and public use of the "loop" road is a problem in this area.

Two hazards to the physical well-being of recreationists exist in this camp-picnic area. About two hundred feet from the intensive use area in the northeast quadrant, there is a jagged, concrete rimmed pit about 4 feet square at the top and about 3 feet deep (Plate III). This situation can be easily remedied by breaking down the concrete and filling in the pit. The other hazard, more dangerous and less
Open pit hazard, Goat Creek

Highway and camp-picnic area relationship, Goat Creek
easily corrected is situated at the intersection of the quadrant lines (Plate III). At this point occurs the previously described stream, highway, bridge and camp-picnic ground complex. The proximity of the camp-picnic units, elevation of the highway and reduced visibility, and the high speed traffic, combine to produce a very dangerous situation. As the number of vehicles traveling the Swan River Highway increases and recreation use of the Goat Creek area increases, the probability of someone being seriously injured at this location becomes greater.

**Cedar Creek.** This area is located one-quarter mile west of the Swan River Highway near the confluence of Cedar Creek with the Swan River. The access road leaves the main highway approximately 200 yards south of the Forest Headquarters. There are no signs indicating the location of this camp-picnic area.

Camp-picnic facilities offered at this area are: Tables 3; fireplaces 2 (both improvised); toilets 1; and garbage cans 2. Nearest probable water source is either Cedar Creek or Swan River.

The camp-picnic conditions in this area are very poor. The tables, original Civilian Conservation Corps installations, are in fair condition. Fireplaces have been haphazardly reconstructed by recreationists. The one toilet is dirty, odorous and deterioration is evident. The attractiveness of the area and the general location of the site are very good. Access from the secondary road into the area is poor. Parking is a problem with regard to the proximity of the cars to the recreation units. Under adverse wind conditions (from the southwest, the direction of the prevailing wind), dust conditions in the area
could be undesirable. There are no abnormal hazards on the area although logging trucks and recreational traffic might conflict at the Swan River bridge and along the access road. Primary use of this area is camping and picnicking through the summer months.

Point Pleasant. This camp-picnic site is located on the west side of the main highway along the Swan River, approximately six miles north of the State Forest Headquarters. Access is by one-quarter mile of dirt road. No location signs are provided for this area although there is a sign intended to locate the Soup Creek camp-picnic area (to be described) which mistakenly directs persons to the Point Pleasant site. The sign, almost obscured by brush, is located at the junction of a five mile alternate route paralleling the main highway into the Point Pleasant area, the Swan River Highway, and the "loop" road from the east.

Recreational facilities provided at Point Pleasant include: Tables 1; fireplaces 1 (all improvised); toilets 2; and garbage cans 2. The Swan River is the probable water source.

The camp-picnic ground shows signs of over use. Forest floor covering, in the intensive use area, is gone leaving rocks and subsurface soil exposed (Plate IV). The condition of the tables is poor. A bench is missing from one, and another has a portion of one end broken off. The establishment of this camp-picnic area is unknown, although two of the tables are typically Civilian Conservation Corps in design. In general, access to the area is good and parking facilities are fair in normal use. Under intensive use access into the camp-picnic ground and parking could be a problem. Major use of this area is during the
Typical camp-picnic unit,
Point Pleasant

High bank hazard, Point Pleasant
spring and summer months.

There are many dead and dying "spike" top trees scattered throughout the camp-picnic area. In times of storms or strong winds the potential of one of these dead or defective trees falling onto a camping or picnicking group is increased; although trees of this type have been known to topple over or break off in a dead calm (67, p. 1).

Another hazard existing at Point Pleasant is inherent with the location of the area. The camp-picnic ground overlooks the Swan River from a high steep bank (Plate IV). During spring and early summer run-off the Swan River is swift, deep and flows at the toe of this bank. Later in the summer when the river is lower, the danger is still evident for painful injuries could be inflicted in a fall down the bank.

Soup Creek. This recreation site is located on the east side of the forest, along the "loop" road. Depending upon the point of entry, access to the area is over five or seven miles of secondary "loop" road. No signs, other than the one previously discussed in reference to the Point Pleasant area, are provided to indicate the location of this camp-picnic ground. Summer use of this area is low; the highest use on the area, based on observations by the State Forest personnel, occurs during the fall hunting season. During this time of year, the site receives intensive use as base camp location for deer and elk hunters.

Facilities provided at this location are: Tables 9 (new); fireplaces 9 (7 new and 2 old); toilets 2 (old); and garbage cans 2. Nearest potential water supply is Soup Creek.

The layout of this area is very good, access from the "loop" road and parking facilities are excellent. The two toilets, of Civilian
Conservation Corps origin, are in good condition. The two old fireplaces (actually stoves), of the same origin, will probably continue to serve the units for many years. Tree and snag hazards have been removed from the general camp-picnic area; however, there are some defective trees that could fall into this area. The new tables, of State Forestry Department design, leave something to be desired from an aesthetic viewpoint. Remoteness from the highway and lack of location signs are perhaps the biggest limitations, at present, to use of this area.

Where the primary reason for establishment of recreational facilities in an area is to reduce fire hazard by concentration and supervision of recreation users (59, p. 22), the continued use of a public camp in this remote location seems incongruous with its purpose. The site is located at the foot of the slopes leading up to the Swan Divide; forest fire originating in the camp-picnic ground would burn up these slopes at a rapid rate and be difficult to control. Other factors, in relationship to fire control or danger reduction, are the lack of close administrative supervision and the time and distance from the Forest Headquarters.

General. In the preceding review of the camp-picnic areas and the facilities offered, it was noted that no provisions were made for tap water in any of the areas. In the absence of an enclosed water system it is presumed that most persons take their drinking water from the nearest stream. Two of these sources, Cedar Creek and the Swan River can be quite readily contaminated with human and domestic pollutants. The other water sources may be polluted occasionally by animal
carcass, offal or other debris. All the listed potential water sources would be undesirable in any system of managed recreation use.

III. RECREATION POTENTIAL

The greatest potential for increased recreational demand on the Swan River Forest is not to be found in the forests, streams or pleasing land forms of the area. Future demand for recreation use of the forest will be generated by two factors: the recent construction of the Swan River Highway and the location of the forest in relation to major tourist attractions in Montana.

The Swan River Highway. Considering the increasing national demand for recreation it is reasonable to assume that recreational traffic on the Swan River Highway will increase. Some factors which will influence increased traffic flow through the forest are scenery and road quality on a local level and increasing leisure time, mobility and income on both local and national levels. Increasing use will therefore affect the demand for recreational facilities along the route. Restricting factors may be designation of the highway as a secondary route, national economy or emergencies, or the point of diminishing returns which will occur when the route becomes over-crowded. For purposes of traffic analysis, in this study, it is assumed that traffic flow on the highway will increase at least until 1970.

The problem now becomes one of estimating the future traffic flow through the forest and the percentage of the flow that is recreational traffic. It was not possible in this investigation, to determine the amount of this traffic or the rate of traffic increase from
1962 to 1963. This is an area that definitely requires further exploration, in order to permit the proper type and amount of recreational facilities which may be desirable in the study area. Figure 3 shows the average annual 24-hour traffic for several traffic stations in or near the forest. These data do not reflect the percentage of recreational vehicles or the increase of this traffic in the recreational season, June through September.

Estimates of increased traffic in the summer may be derived by several methods. English and Sargent estimate summer traffic from annual 24-hour traffic by doubling the annual figure (17, p. 11). Thus, if the daily average traffic (236 vehicles) at Station 13 (Figure 3) is doubled, the average daily summer traffic for 1962 is 472 vehicles. Multiplying this latter figure by the total days (93) in the study period, the estimated total vehicles passing through the Swan River Forest, one year prior to the actual study, is 43,896 vehicles.

Mr. Paul Devine, State Highway Planning Survey Manager, suggested that since there are no permanent traffic stations on the Swan River Highway, summer traffic estimates could be derived from similar highways that have permanent records (14). Montana Route 20, counter A-15, near Bonner, was suggested as a route having characteristics similar to the highway in the study area (15). Table IV was derived by applying the monthly percentage increase in traffic at counter A-15 to the annual 24-hour traffic at Station 13 within the Swan River Forest.

Observations during the study period in 1963 indicate that the estimate of 31,130 vehicles may be too conservative. At the beginning of the study period, traffic and recreation use were moderate, increased
### AVERAGE ANNUAL 24-HOUR TRAFFIC, 1950-62

#### MONTANA STATE HIGHWAY 209

<table>
<thead>
<tr>
<th>YEAR</th>
<th>50</th>
<th>51</th>
<th>52</th>
<th>53</th>
<th>54</th>
<th>55</th>
<th>56</th>
<th>57</th>
<th>58</th>
<th>59</th>
<th>60</th>
<th>61</th>
<th>62</th>
</tr>
</thead>
<tbody>
<tr>
<td>STA. NO.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>12</td>
<td>45</td>
<td>56</td>
<td>60</td>
<td>59</td>
<td>72</td>
<td>80</td>
<td>120</td>
<td>150</td>
<td>218</td>
<td>300</td>
<td>311</td>
<td>340</td>
<td>486</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>85</td>
<td>99</td>
<td>135</td>
<td>214</td>
<td>222</td>
<td>196</td>
<td>236</td>
</tr>
<tr>
<td>14</td>
<td>30</td>
<td>39</td>
<td>42</td>
<td>44</td>
<td>54</td>
<td>60</td>
<td>90</td>
<td>105</td>
<td>140</td>
<td>180</td>
<td>183</td>
<td>195</td>
<td>190</td>
</tr>
</tbody>
</table>

TABLE IV

ESTIMATED MONTH, DAILY AND TOTAL TRAFFIC,

<table>
<thead>
<tr>
<th>Month</th>
<th>Swan year daily avg.</th>
<th>Swan est. month daily avg.</th>
<th>Days in period</th>
<th>Traffic for period</th>
</tr>
</thead>
<tbody>
<tr>
<td>June</td>
<td>236</td>
<td>300</td>
<td>16</td>
<td>4,800</td>
</tr>
<tr>
<td>July</td>
<td>236</td>
<td>368</td>
<td>31</td>
<td>11,408</td>
</tr>
<tr>
<td>Aug.</td>
<td>236</td>
<td>342</td>
<td>31</td>
<td>10,602</td>
</tr>
<tr>
<td>Sept.</td>
<td>236</td>
<td>288</td>
<td>15</td>
<td>4,320</td>
</tr>
</tbody>
</table>

Total Estimated Traffic, Swan River Highway 31,130

rapidly during July and August, and quickly declined after Labor Day. Estimated traffic values for June and September appear to be valid; however, the modest increase during July and August does not parallel the increased traffic as observed during the study period. A more realistic value for summer traffic in 1962 appears to be the figure of 43,896 vehicles, derived by doubling the average annual 24-hour traffic through Station 13 on the Swan River Highway.

Vehicles making up the traffic count at Bonner are "Primary, Recreational and Logging," of which 58 per cent are passenger or recreational vehicles (45). Due to a large sawmill at Bonner and the proximity of a large population center, it is reasonable to assume that the per cent logging and primary traffic there would be higher than on

\(^1\)Counter A-15, Route 20, Bonner, Montana.
the Swan River Highway. A reasonable estimate of the present recreational traffic through the Swan River Forest might be 65 per cent of the total traffic. Applying this percentage to the total traffic estimates derived from counter A-15 data, and the method described by English and Sargent, 1962 recreation traffic estimates are:

<table>
<thead>
<tr>
<th>Counter A-15</th>
<th>English and Sargent</th>
</tr>
</thead>
<tbody>
<tr>
<td>31,130</td>
<td>143,896</td>
</tr>
<tr>
<td>0.65</td>
<td>0.65</td>
</tr>
<tr>
<td>20,234 vehicles</td>
<td>28,532 vehicles</td>
</tr>
</tbody>
</table>

It is difficult, if not impossible to predict traffic increases from present data although there are several methods of estimating traffic increases, there are many unknown factors which can affect increases or produce decreases throughout the prediction years. A projection of Swan River Highway traffic to 1960, made in 1946, based on 1941 traffic data illustrates this point.

... Consequently, it is believed that on the strength of the heavy recreational traffic likely to be developed, it would be reasonable to double the 1941 traffic and increase this amount by the usual secular factor of 1.3 to raise it to 1960. Estimated traffic will then be as follows.

* Swan Lake  

<table>
<thead>
<tr>
<th>1941</th>
<th>1960</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>65</td>
</tr>
</tbody>
</table>

Average maximum summer traffic will be double these figures or 130 vehicles per day. .. (17, p. 11).

*Excerpt from complete table.

Actual average annual 24-hour traffic at Swan Lake (Station 12, Figure 3, p. 84) in 1960 was 311 vehicles. If this figure is doubled, as in the preceding example the figure is 622 vehicles as opposed to the estimated 130 vehicles. Estimate error in this case is 478 per cent.

If the same method is applied to Station 13 data (Figure 3,
For 1961 to project traffic figures to 1980, the estimated maximum summer traffic through that point is 1,020 vehicles per day. Applying the 1.78 per cent error, total maximum summer traffic would be 4,875 vehicles per day.

Traffic increases at Station 13 from 1956 to 1962 averaged slightly more than 21 per cent per year. On the basis of a 10 per cent annual traffic increase until 1970, traffic volume from June 15th to September 15th, 1970, would be 86,862 vehicles for a daily average of 934 vehicles.  

A conservative projection of traffic increase to 1970 can be based on the average daily increase of vehicles per year, for Station 13. Since counts were begun at this point in 1956, traffic has increased an average of 25 vehicles a day annually. Doubling this figure to arrive at summer estimates (English and Sargent), the average daily increase is 50 vehicles. If this increase is applied annually until 1970, average daily summer traffic at that time will be 872 vehicles or a total for the 93-day period of 81,096 vehicles. Regardless of the traffic increases in the next few years, the potential for great increases in the recreational usage of the forest will depend upon the percentage of this traffic that can be influenced to stop.

Relationship to Major Tourist Attractions. Two of the major tourist attractions within the State, which will influence recreational travel through the Swan River Forest and therefore bring about increased

---

1Average maximum summer traffic of 472 vehicles per day at Station 13 (1962) was derived by doubling average annual 24-hour traffic for that year and used as a base for projecting estimates to 1970.
recreation use, are Yellowstone and Glacier National Parks. Studies, conducted for the Montana State Highway Commission, have shown that a major portion of tourist travel within the State is on a route between these parks (36, pp. 32-33). The studies also revealed that a large portion of east-west tourist traffic in the State travels U. S. Highway Route 2, north of the forest and Highway Routes 10 and 20, south of the forest (36, p. 33). Figure 4 shows the flow of traffic through major points around the Swan River Forest. East Glacier was the most traveled point in the State in 1958, followed closely by Kalispell and Missoula (36, p. 54). Many of the recreationists using these east-west and interpark routes may never visit the Swan River Forest. However, they can influence the demand for recreation facilities on the study area by filling campgrounds along the major routes, forcing other recreationists to seek accommodations on more remote locations. Other recreation users will create a direct demand on the Swan River Forest as the highway becomes known as a scenic interpark route.

Recreation attractions in near proximity to the Swan River Forest which can effect increased recreation demand on the area, are shown in Figure 5. The Bob Marshall Wilderness Area and to a lesser extent the Mission Mountain Wild Area require pack trips for extended visits. However, the proximity of these areas adds an intangible value and interest to recreational experiences on the forest.

Special Use Lease Potential. The State Forester is authorized to grant special use leases along main streams, rivers and lakes within the State Forests (56, p. 77). The leases are primarily for summer home or cabin locations. A special use fee ranging from 25 to 50 dollars
PERCENTAGE OF TOTAL TOURIST TRAVEL PASSING THROUGH VARIOUS CITIES IN WESTERN MONTANA

FIGURE 4
Relationship of the Swan River Forest to (7) Major Outdoor Recreation Areas in Northwest Montana

Figure 5
per year is assessed, depending upon location of the lot. At present, there are ten lease requests on file at the Office of the State For-
ester, Missoula, for lots on the Swan River State Forest. These date from 1951 to 1958. Two are for commercial use cabins, the other eight are for private use. A lease program has never been encouraged on this forest. This was offered, by State Forest personnel, as a possible explanation why no lease requests have been received since 1958.

Potential Development. There are three agencies, two State and one Federal which have an interest in or plans for future recreational development of the Swan River Forest. They are the State Forestry De-
partment, the States Parks Division of the Montana State Highway Com-
misson, and the U. S. Forest Service.

The State Forester in The 16th Biennial Report to the Governor recommended that three new camp-picnic areas be established; and that improvements and additional facilities be authorized for the existing camp-picnic grounds. The total number of recommended units, using table number as a unit base, was 22. This total added to the existing number of table units (21) would increase the camp-picnic units provided by the State to 43. The recommended locations of the new recreational areas were in Section 10, T 23 N, R 17 W and in Sections 14 and 18 in T 24 N, R 17 W (Figure 1, p. 2).

The State Parks Division has an interest in acquiring 1,200 acres of the Swan River Forest, valued as a potential State Park. The features recognized as having recreational value are the Swan River, forests and scenic mountains. Anticipated use is picnicking, camping and fishing. The landownership involved overlaps Federal, State and
private lands.

Acquisition of these lands is at present the limiting factor in advancing firm State Park development plans for the forest. The limitations recognized by the State Parks Division are as follows:

... The Land Board operates these lands for the prime purpose of making money for the state school fund. Under these circumstances it is not possible for the Parks Division to acquire any state lands for recreational purposes without open competitive bidding. Until such time as we have funds for land acquisition as well as development and maintenance, it is not possible for us to acquire any of these state areas. We should, however, keep such lands in mind for acquisition because there are some prime locations that would be excellent for recreational purposes. ... (49).

The authority of the State Parks Division, as defined by law, has some interesting implications:

The commission is hereby authorized and directed to make a study to determine the scenic, historic, archaeologic, scientific and recreational resources of the state, and shall have power by purchase, lease, agreement, or by acceptance of donations, or condemnation, to acquire for and in the name of the state, any such areas, sites or objects which in its opinion should be held, improved, and maintained as state parks, state recreation areas, state monuments, or state historical sites. ... The commission shall also have jurisdiction, custody and control of all state parks, recreational areas, public camping grounds, historical sites, and monuments which are now under the control and management of the state. ... (45, pp. 113-111). 1

Just how far the power of condemnation and jurisdiction, custody and control of recreational areas and public camping grounds of this agency extends into the realm of other State land administering agencies has not been examined and probably would not be determined without some legal investigation. It does raise the question as to who has the legal responsibility for the present and future recreational developments on

1Italics in this quote have been added.
the Swan River State Forest.

The U. S. Forest Service in accord with the National Forest Recreation Survey, Flathead National Forest, 1960 (Condon and Bigfork Ranger Districts) has planned and reserved recreational sites within and immediately north and south of the study area.

The Bigfork Ranger District has reserved 25 acres in Section 17, T 23 N, R 17 W, directly east of the present Goat Creek area for future development. The area is to contain a minimum of 25 units; no completion date has been set. In Section 19, T 23 N, R 17 W, approximately one-half mile south of the State Forest Headquarters, two areas—one of six acres and the other of ten acres—have been reserved for development. Based on present criteria of one camp-picnic unit per acre, these areas will contain 16 units (15). No completion date has been established for these areas.

Approximately two miles north of the forest boundary near the Swan River Highway, two areas of 25 acres each have been reserved for recreational development. One of these, the "Lost Creek Camp" located in Section 1, T 24 N, R 18 W, is scheduled for completion in 1968. The other area in Section 6, T 24 N, R 17 W has no established completion date. Figure 1, page 2, includes the Sections in which these reserved and planned sites occur.

South of the forest boundary in the Condon Ranger District, 17 potential recreational development sites have been reserved having a total area of 260 acres. Of these areas, six are located within six miles of the forest boundary and may influence the recreational use of the Swan River Forest. "Shay Lake" site in Section 6, T 22 N, R 17 W
is 25 acres in size and is scheduled for completion in 1980. This area is approximately one mile south of the forest. "Lion Creek" and "South Lion Creek," 7 and 20 acres, respectively, are reserved and have no proposed completion dates. These areas, in Section 8, T 22 N, R 17 W, are approximately two miles south of the forest boundary. Three miles south of the forest in Section 16, T 22 N, R 17 W, is the proposed "Pot Hole" camp, 24 acres in size and has no set completion date. Six miles south of the study area in Sections 32 and 34 of T 22 N, R 17 W are the proposed "Peek Lake" camp of 20 acres and "Dog Creek" camp of 16 acres. The "Dog Creek" camp in Section 34 is scheduled for completion before 1976. "Peek Lake" camp is currently a reserved site. In accord with the National Forest Recreation Survey, all reserved recreational areas are to be completed or withdrawn from reserved status by the year 2000.

Recreational development of the Swan River Forest and vicinity could attain a total number of 216 units by the year 2000; based on existing recreational units of 21, recommended 22 units and the 203 units proposed by the Forest Service. This number represents the minimum number of units which would be provided if all areas were developed. There also exists the possibility of increasing the number of units on Forest Service areas to three or five units per acre as heavier recreational demand develops (40).

IV. THE RECREATION USER

General. During the study period, 68 persons using the forest for recreational purposes were contacted for interviews. Of this total, 65 usable interview questionnaires were obtained. Three interviews were
used to pretest the questions and interviewing techniques and were not used in the analysis of data.

**Analysis of the Data.** In an area with a landownership distribution such as exists on the Swan River Forest, one of the primary considerations in recreational development is to determine the tendency for "recreational trespass." A related aspect to this problem is the trend for groups to camp and picnic in undeveloped areas even though recreational sites are provided. To supply this information the location and type of area, pertaining to development, were recorded during interviews. In the group interview, no one was found camping or picnicking in undeveloped areas nor were any persons observed in these activities in non-recreational areas. Three interviews were obtained from persons fishing at an undeveloped site; their cars were parked on private land, near Metcalf Lake, remote from any maintained camp-picnic ground. Other persons while fishing undoubtedly entered upon private lands; however, in the group samples, all cars were parked on State land in or near a developed camp-picnic area.

The number of interviews obtained in a camp-picnic ground is related to the amount of recreational use such an area receives. The number and per cent of the total interviews conducted at the various locations is presented in Table V.

The month and day of the interviews were recorded in an attempt to indicate peak use of the forest. However, many variables, including day of the week, number of days in the interview period and weather conditions, influence the amount of recreational use occurring at any given time. The greatest number of interviews completed was in the
TABLE V
INTERVIEW LOCATIONS ON SWAN RIVER FOREST

<table>
<thead>
<tr>
<th>Location</th>
<th>No. of interviews</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goat Creek</td>
<td>26</td>
<td>40.0</td>
</tr>
<tr>
<td>Point Pleasant</td>
<td>18</td>
<td>27.7</td>
</tr>
<tr>
<td>Cedar Creek</td>
<td>14</td>
<td>21.5</td>
</tr>
<tr>
<td>Soup Creek</td>
<td>4</td>
<td>6.2</td>
</tr>
<tr>
<td>Metcalf Lake</td>
<td>3</td>
<td>4.6</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>65</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Per cent of total in developed areas = 95
Per cent of total in undeveloped areas = 5

period July 4th and 5th, when 13 groups were contacted, followed by the period July 21st and 22nd with nine interviews. Three interview periods in mid-August, resulted in a total of 19 groups contacted for interviews. Total use of the forest was very low after Labor Day. During the month of June, recreational activities appeared to be limited to picnic use. In general, camping and picknicking use was observed to be highest in July and August.

Weather conditions and time of day when interviews were conducted were recorded in an effort to correlate recreation use with the Burning Index. This information has no value; the time period was too short to study such a relationship; the B.I. remained at or below average for the entire study period and there were only a few small fires reported during this span.
The majority of recreation users contacted were residents of Montana with 63 per cent living within one hundred highway miles of the Swan River Forest. Thirty-one per cent of the total respondents were from Kalispell and 12 per cent from Missoula. Out-of-State visitors represented 25 per cent of the total interview, with Californians comprising 37 per cent of this group.

The Swan River Forest was indicated as the principal destination of 55 per cent of the respondents. Twelve per cent stated that Glacier National Park was their primary destination. Of the total, only 6 per cent had no specific objective in mind. The remaining 27 per cent of those interviewed had destinations within one hundred miles of the Swan River Forest.

In view of the relative newness of the Swan River Highway, it was desirable to determine why persons selected that particular route in preference to alternative, well established routes. The results obtained from this question are shown in Table VI.

The 65 persons interviewed were in groups containing a total of 354 persons. The typical recreation group therefore contained 5.5 persons. The distribution of group size among the survey sample is tabulated in Table VII.

The respondents in the survey were questioned as to their total length of stay on the forest. Thirty-two per cent indicated a visit duration of several hours. A stay of one day, not including over-night, was planned by 17 per cent of the respondents. Twenty-nine per cent of the total group indicated that they would remain two days or less, 14 per cent planned a three to four day visit and the remaining 8 per cent
TABLE VI
FACTORS AFFECTING SELECTION OF THE SWAN RIVER HIGHWAY

<table>
<thead>
<tr>
<th>Reason</th>
<th>No. of times indicated</th>
<th>Per cent of poss. ans.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>2</td>
<td>3.1</td>
</tr>
<tr>
<td>Scenery</td>
<td>34</td>
<td>52.3</td>
</tr>
<tr>
<td>Less traffic</td>
<td>21</td>
<td>37.0</td>
</tr>
<tr>
<td>Better road</td>
<td>16</td>
<td>24.6</td>
</tr>
<tr>
<td>Adventurous curiosity</td>
<td>14</td>
<td>21.5</td>
</tr>
<tr>
<td>Friends or relative recommendations</td>
<td>18</td>
<td>27.7</td>
</tr>
<tr>
<td>Tourist guide or information service</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Service station attendant</td>
<td>7</td>
<td>10.8</td>
</tr>
<tr>
<td>Road map</td>
<td>12</td>
<td>18.5</td>
</tr>
<tr>
<td>Major oil company guide service</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Previous use</td>
<td>41</td>
<td>63.0</td>
</tr>
<tr>
<td>None of these</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

would vacation on the area from five to seven days. Of the total respondents slightly more than 50 per cent indicated a stay of at least one night on the forest.

If the average length of stay (1.7 days) is multiplied by the total number of persons (354) in the sample, the product would be 602 recreation days use on the forest; a recreation day meaning one persons use of a recreation area for one day. This could then be projected to an approximate total of 2,427 recreation days use during the study period.
TABLE VII
RECREATIONAL GROUP SIZE

<table>
<thead>
<tr>
<th>No. of persons in party</th>
<th>No. of parties this size</th>
<th>No. of persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>64</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>36</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>28</td>
</tr>
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<td>8</td>
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<td>50</td>
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<tr>
<td>9</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>11 or over</td>
<td>6</td>
<td>85</td>
</tr>
<tr>
<td>TOTAL</td>
<td>65</td>
<td>351</td>
</tr>
</tbody>
</table>

Individuals in the survey group were asked to express opinions on desirable camp-picnic distances from the main highway. The results of this question are presented in Table VIII.

From the table, it would appear that the majority of the recreation users on the Swan River State Forest are not the rugged, individualistic, backwoodsman type. Many respondents in the 0 to one mile grouping expressed preferred distances from the highway as 100 yards, 200 yards, 400 yards and 600 yards. It may be desirable in future
TABLE VIII
PREFERRED DISTANCE OF CAMP-PICNIC AREA FROM SWAN RIVER HIGHWAY

<table>
<thead>
<tr>
<th>Distance</th>
<th>No. of respondents</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 1 mile</td>
<td>37</td>
<td>57.0</td>
</tr>
<tr>
<td>1 to 2 miles</td>
<td>12</td>
<td>18.5</td>
</tr>
<tr>
<td>2 to 3 miles</td>
<td>5</td>
<td>7.7</td>
</tr>
<tr>
<td>3 to 5 miles</td>
<td>2</td>
<td>3.0</td>
</tr>
<tr>
<td>over 5 miles</td>
<td>9</td>
<td>13.8</td>
</tr>
<tr>
<td>TOTAL</td>
<td>65</td>
<td>100.0</td>
</tr>
</tbody>
</table>

studies to break the 0 to one mile class down into finer units.

A question was designed to secure information on type of recreation facilities that would be used by the group interviewed. Fifty-two per cent indicated they would be camping, 40 per cent would be using picnic facilities only and 8 per cent would use no facilities other than parking. The latter group was on the study area for fishing purposes and would not camp or picnic in any area on the forest.

The group (34) indicating use of camping facilities were equipped with the camping accommodations shown in Table IX. It is apparent that the majority of campers in the group sampled still use tents. However, when the trailer and mobile camper groups are combined into a group consisting of portable camping units, they comprise 47 per cent of the total, indicating a trend which may be worthy of future study.

All groups were asked to indicate activities in which they planned to participate during their stay on the forest. The results
TABLE IX

TYPES OF CAMPING EQUIPMENT

<table>
<thead>
<tr>
<th>Type</th>
<th>No. of respondents</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tent</td>
<td>15</td>
<td>41.2</td>
</tr>
<tr>
<td>Trailer</td>
<td>8</td>
<td>23.5</td>
</tr>
<tr>
<td>Mobile camper</td>
<td>8</td>
<td>23.5</td>
</tr>
<tr>
<td>Other (sleeping bags)</td>
<td>3</td>
<td>8.8</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>34</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

to this question are tabulated in Table X.

TABLE X

RECREATIONAL ACTIVITIES

<table>
<thead>
<tr>
<th>Activity</th>
<th>No. of times mentioned</th>
<th>Per cent of Poss. Ans.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relaxation</td>
<td>48</td>
<td>73.9</td>
</tr>
<tr>
<td>Fishing</td>
<td>46</td>
<td>70.9</td>
</tr>
<tr>
<td>Driving for sightseeing</td>
<td>21</td>
<td>32.4</td>
</tr>
<tr>
<td>Photography</td>
<td>19</td>
<td>29.2</td>
</tr>
<tr>
<td>Hiking and walking</td>
<td>13</td>
<td>20.0</td>
</tr>
<tr>
<td>Nature or wildlife study</td>
<td>13</td>
<td>20.0</td>
</tr>
<tr>
<td>Swimming</td>
<td>13</td>
<td>20.0</td>
</tr>
<tr>
<td>Boating, rafting or canoeing</td>
<td>5</td>
<td>7.7</td>
</tr>
<tr>
<td>Wilderness or wild area use</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
The majority of the recreationists interviewed would participate in fishing, relaxation or both while on the forest. None of the groups contacted expressed any desire to venture into the Bob Marshall Wilderness Area or the Mission Mountain Wild Area from their location on the Swan River Forest.

Persons fishing or expecting to fish during their stay on the area were asked to express an opinion of fishing quality. Of the total group, 23.9 per cent experienced good fishing, 41.3 per cent had fair fishing and 28.3 per cent thought that fishing was poor. A small portion of the group, 6.5 per cent, could not give an opinion because they had not fished on the study area prior to the interview.

The respondents in the survey were questioned as to how often they visited the study area. Table XI summarizes the results of this question.

<table>
<thead>
<tr>
<th>Occurrence</th>
<th>No. of respondents</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequent</td>
<td>13</td>
<td>20.0</td>
</tr>
<tr>
<td>Occasional</td>
<td>28</td>
<td>43.0</td>
</tr>
<tr>
<td>First time</td>
<td>24</td>
<td>37.0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>65</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Thus, within the group interviewed, there was a 37 per cent increase of new visitors to the forest in 1963. All respondents were asked if they would return. The vast majority, 97 per cent, expressed
a desire to return to the area. The dissenting group had plans to
visit other portions of the United States which would prevent them
from returning; unwillingness to return was never based on a dislike
for the area.

The groups in the occasional and frequent visit categories, 63
per cent, were asked if they hunted on the forest. Hunting was an ac-
tivity of 39 per cent of this group. Of this percentage, good hunting
was experienced by 18.6 per cent, 69 per cent thought it was fair and
12.4 per cent had poor hunting experiences. This question was designed
as an attempt to gain insight into hunting pressures on the area; how­
ever, it has been of no direct value to this study.

The respondents were asked to comment on the facilities in the
camp-picnic areas. A significant proportion, 63 per cent, of respon­
dents expressed concern over the existing facilities; 31 per cent
thought that they were adequate and 6 per cent had no opinions.

A question was then asked to determine the type of improvements,
if any, that campers and picnickers would like to see made in the areas.
These responses are tabulated in Table XII.

The total number of improvement comments made was 88, which is
an average of 1.4 suggested improvements per respondents contacted.
Sanitary facilities, tables and fireplaces seems to be the major con­
cern of most respondents. The need for better camp-picnic grounds,
discounting facilities, was suggested surprisingly few times.

Respondents opinions on user fees in relation to improved and
maintained basic picnic and camper areas were obtained. Responses
are summarized in Tables XIII and XIV.
### TABLE XII
**TYPES OF IMPROVEMENTS DESIRED IN CAMP-PICNIC AREAS**

<table>
<thead>
<tr>
<th>Types</th>
<th>No. of times indicated</th>
<th>Per cent of poss. ans.</th>
</tr>
</thead>
<tbody>
<tr>
<td>More and better facilities</td>
<td>22</td>
<td>33.9</td>
</tr>
<tr>
<td>Better sanitary facilities</td>
<td>15</td>
<td>23.0</td>
</tr>
<tr>
<td>Drinking water</td>
<td>13</td>
<td>20.0</td>
</tr>
<tr>
<td>Information signs</td>
<td>10</td>
<td>15.4</td>
</tr>
<tr>
<td>Area clean-up</td>
<td>9</td>
<td>13.8</td>
</tr>
<tr>
<td>Better camp-picnic grounds</td>
<td>7</td>
<td>10.8</td>
</tr>
<tr>
<td>Shower and electric facilities</td>
<td>4</td>
<td>6.2</td>
</tr>
<tr>
<td>River access</td>
<td>4</td>
<td>6.2</td>
</tr>
<tr>
<td>More firewood</td>
<td>2</td>
<td>3.1</td>
</tr>
<tr>
<td>Trails</td>
<td>2</td>
<td>3.1</td>
</tr>
<tr>
<td>Swings</td>
<td>1</td>
<td>1.5</td>
</tr>
</tbody>
</table>

### TABLE XIII
**AMOUNT WILLING TO PAY PER PICNIC GROUP**

<table>
<thead>
<tr>
<th>Amount</th>
<th>No. of times mentioned</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.00 to $0.25</td>
<td>14</td>
<td>21.6</td>
</tr>
<tr>
<td>$0.26 to $0.50</td>
<td>24</td>
<td>37.0</td>
</tr>
<tr>
<td>$0.51 to $1.00</td>
<td>16</td>
<td>24.7</td>
</tr>
<tr>
<td>$1.01 to $2.00</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Over $2.00</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Nothing</td>
<td>7</td>
<td>10.7</td>
</tr>
<tr>
<td>No opinion</td>
<td>3</td>
<td>4.5</td>
</tr>
</tbody>
</table>

**TOTAL** | **65** | **100.0** |
TABLE XIV

AMOUNT WILLING TO PAY PER NIGHT PER CAMPING GROUP

<table>
<thead>
<tr>
<th>Amount</th>
<th>No. of times mentioned</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.00 to $0.50</td>
<td>7</td>
<td>10.7</td>
</tr>
<tr>
<td>$0.51 to $1.00</td>
<td>32</td>
<td>49.2</td>
</tr>
<tr>
<td>$1.01 to $2.00</td>
<td>15</td>
<td>23.3</td>
</tr>
<tr>
<td>$2.01 to $5.00</td>
<td>2</td>
<td>3.1</td>
</tr>
<tr>
<td>Over $5.00</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Nothing</td>
<td>6</td>
<td>9.2</td>
</tr>
<tr>
<td>No opinion</td>
<td>3</td>
<td>4.5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>65</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Approximately 10 per cent of the persons contacted indicated that they would not pay for recreational privileges under any circumstance and would seek "free" facilities in other locations. It is obvious from the table that the majority of those interviewed admitted a willingness to pay for improved facilities. Fifty cents to one dollar was the most commonly mentioned acceptable picnic-use fee and one to two dollars per night received the majority of mentions for camping fees. It should be noted that these fees were expressed as a per group fee and not as an individual fee.

The effect of timber harvest operations on recreational experiences was explored in the interview series. This activity was found objectionable to 24.6 per cent of the interviewees; 35.4 per cent viewed timber harvest as favorable and 40.0 per cent of the total group
had no opinion—finding the operations neither favorable nor objectionable.

Interest in leasing a summer home or cabin site within the Swan River Forest was tested during the survey. Those not interested in a lease made up 61.5 per cent of the total group. Many persons in this group had mobile camping units and had no desire to be limited to one location. The remaining group, 38.5 per cent, having an interest in a lease, were asked to state the approximate amount that they would be willing to pay on a yearly basis. The indicated values are presented in Table XV.

TABLE XV
YEARS LEASE FEE RESPONSES

<table>
<thead>
<tr>
<th>Amount</th>
<th>No. of times mentioned</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>$20.00</td>
<td>1</td>
<td>4.0</td>
</tr>
<tr>
<td>$30.00</td>
<td>3</td>
<td>12.0</td>
</tr>
<tr>
<td>$40.00</td>
<td>5</td>
<td>20.0</td>
</tr>
<tr>
<td>$50.00</td>
<td>7</td>
<td>28.0</td>
</tr>
<tr>
<td>$60.00</td>
<td>2</td>
<td>8.0</td>
</tr>
<tr>
<td>$70.00</td>
<td>1</td>
<td>4.0</td>
</tr>
<tr>
<td>$80.00</td>
<td>3</td>
<td>12.0</td>
</tr>
<tr>
<td>Over $80.00</td>
<td>3</td>
<td>12.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>25</td>
<td>100.0</td>
</tr>
</tbody>
</table>

It is of interest to note that one respondent, from California, indicated a willingness to pay $500 to $1,000 per year for a summer home
lease in the Swan River Forest.

Features of the study area that were attractive and unattractive to the respondents are summarized in Table XVI and Table XVII, respectively.

TABLE XVI
AESTHETIC FEATURES OF THE SWAN RIVER FOREST

<table>
<thead>
<tr>
<th>Features</th>
<th>Times indicated</th>
<th>Per cent of poss. ans.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenery</td>
<td>28</td>
<td>43.0</td>
</tr>
<tr>
<td>River, streams and lakes</td>
<td>28</td>
<td>43.0</td>
</tr>
<tr>
<td>Hunting and fishing</td>
<td>21</td>
<td>32.3</td>
</tr>
<tr>
<td>Forests</td>
<td>20</td>
<td>30.1</td>
</tr>
<tr>
<td>Mountains</td>
<td>12</td>
<td>18.5</td>
</tr>
<tr>
<td>Quiet</td>
<td>10</td>
<td>15.4</td>
</tr>
<tr>
<td>Uncrowded</td>
<td>9</td>
<td>13.8</td>
</tr>
<tr>
<td>Pioneering atmosphere</td>
<td>7</td>
<td>10.8</td>
</tr>
<tr>
<td>Everything</td>
<td>6</td>
<td>9.2</td>
</tr>
<tr>
<td>Accessibility</td>
<td>6</td>
<td>9.2</td>
</tr>
<tr>
<td>Cool</td>
<td>4</td>
<td>6.2</td>
</tr>
<tr>
<td>Clean air</td>
<td>3</td>
<td>4.6</td>
</tr>
<tr>
<td>Old scenes revisited</td>
<td>3</td>
<td>4.6</td>
</tr>
<tr>
<td>Camping areas</td>
<td>3</td>
<td>4.6</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>160</strong></td>
<td></td>
</tr>
</tbody>
</table>

In the group sampled, it appears that the attractiveness of the general area vastly outweighs the limitations; aesthetic features of
TABLE XVII
FEATURES UNATTRACTIVE IN THE SWAN RIVER FOREST

<table>
<thead>
<tr>
<th>Features</th>
<th>Times indicated</th>
<th>Per cent of poss. ans.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camp-picnic conditions (general)</td>
<td>19</td>
<td>29.3</td>
</tr>
<tr>
<td>Stream and highway litter</td>
<td>10</td>
<td>15.4</td>
</tr>
<tr>
<td>Insects</td>
<td>4</td>
<td>6.2</td>
</tr>
<tr>
<td>Crowding</td>
<td>4</td>
<td>6.2</td>
</tr>
<tr>
<td>Too few view points</td>
<td>2</td>
<td>3.1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>39</strong></td>
<td></td>
</tr>
</tbody>
</table>

the Swan River Forest were mentioned four times more frequently than were the unattractive aspects of the area. Responses to the unfavorable camp-picnic conditions accounted for 48 per cent of the "unsatisfactory" comments.

A question in the survey was designed to determine how well informed respondents were to the ownership of the land upon which the recreational facilities were located. Of the total respondents, 51 per cent had no idea of the landownership. Forty-nine per cent thought they knew, although approximately 39 per cent of this group assigned ownership to the U. S. Forest Service. Within the total group sampled, only 23 respondents or a percentage of 35.4 had knowledge of State land ownership.

An attempt was made to classify the respondents in terms of income levels and occupational groupings. It would appear from the
following Table XVIII that the typical recreationists on the Swan River Forest have a relatively high income.

TABLE XVIII

ANNUAL FAMILY INCOME OF RESPONDENTS

<table>
<thead>
<tr>
<th>Income</th>
<th>No. of respondents</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than $3,000</td>
<td>4</td>
<td>6.2</td>
</tr>
<tr>
<td>$3,000 to $4,000</td>
<td>12</td>
<td>18.5</td>
</tr>
<tr>
<td>$4,000 to $5,000</td>
<td>18</td>
<td>27.7</td>
</tr>
<tr>
<td>$5,000 to $6,000</td>
<td>8</td>
<td>12.3</td>
</tr>
<tr>
<td>$6,000 to $7,000</td>
<td>9</td>
<td>13.9</td>
</tr>
<tr>
<td>$7,000 to $8,000</td>
<td>6</td>
<td>9.2</td>
</tr>
<tr>
<td>$8,000 to $9,000</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>$9,000 to $10,000</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Over $10,000</td>
<td>6</td>
<td>9.2</td>
</tr>
<tr>
<td>Refusals</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>65</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Slightly less than 48 per cent of the respondents have incomes above $5,000 per year. The largest single income grouping within the total falls in the $4,000 to $5,000 income bracket.

The occupational groupings of the survey respondents are reported in Table XIX. The two largest groups consist of skilled workers, professional and business proprietor groups. The individuals contacted, as in the case of housewives, were asked the occupation of the head of
the household.

### TABLE XIX

**OCCUPATIONS OF SWAN RIVER STATE FOREST RECREATIONISTS**

<table>
<thead>
<tr>
<th>Classification</th>
<th>No. of persons</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional &amp; technical workers, non-farm managers, officials, proprietors</td>
<td>15</td>
<td>23.0</td>
</tr>
<tr>
<td>Farmers and ranchers</td>
<td>2</td>
<td>3.1</td>
</tr>
<tr>
<td>Clerical, sales workers</td>
<td>6</td>
<td>9.2</td>
</tr>
<tr>
<td>Craftsmen, foremen, operatives, non-farm laborers</td>
<td>22</td>
<td>33.9</td>
</tr>
<tr>
<td>Service workers</td>
<td>6</td>
<td>9.2</td>
</tr>
<tr>
<td>Students</td>
<td>5</td>
<td>7.7</td>
</tr>
<tr>
<td>Retired</td>
<td>9</td>
<td>13.9</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>65</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

The group interviewed was further classified into educational levels.

### TABLE XX

**RESPONSES TO EDUCATION INQUIRY**

<table>
<thead>
<tr>
<th>Level</th>
<th>No. of persons</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade School</td>
<td>9</td>
<td>13.9</td>
</tr>
<tr>
<td>Some High School</td>
<td>7</td>
<td>10.8</td>
</tr>
<tr>
<td>High School Graduate</td>
<td>29</td>
<td>44.6</td>
</tr>
<tr>
<td>Some College</td>
<td>11</td>
<td>16.9</td>
</tr>
<tr>
<td>College Graduate</td>
<td>6</td>
<td>9.2</td>
</tr>
<tr>
<td>Advanced Degree</td>
<td>3</td>
<td>4.6</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>65</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
From these data, it appears that the typical recreation user of the Swan River State Forest is reasonably well-educated. Persons with a High School education represent the highest proportion of the group. Respondents with some college education, degrees and advanced degrees make up 30.7 per cent of the total.

Persons contacted for interviews were asked their approximate age. The age data are summarized in Table XXI.

**TABLE XXI**

**AGE GROUPING OF SURVEY RESPONDENTS**

<table>
<thead>
<tr>
<th>Age</th>
<th>No. of persons</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 21 years</td>
<td>3</td>
<td>4.6</td>
</tr>
<tr>
<td>21 to 29</td>
<td>13</td>
<td>20.0</td>
</tr>
<tr>
<td>30 to 39</td>
<td>13</td>
<td>20.0</td>
</tr>
<tr>
<td>40 to 49</td>
<td>10</td>
<td>15.5</td>
</tr>
<tr>
<td>50 to 59</td>
<td>15</td>
<td>23.0</td>
</tr>
<tr>
<td>60 and over</td>
<td>11</td>
<td>16.9</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>65</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Within the group, there appears to be no distinct age grouping. The group of under 21 years of age is in the minority; this occurred because only mature appearing individuals were asked for interviews.

The final interview question pertained to the marital status of the respondent. Slightly less than 88 per cent of the group was married, approximately 9 per cent were single and 3 per cent indicated the category of "other" denoting deceased spouses, separation or divorce.
The concluding phase of the interviewing procedure was to rate the attitude of the respondent and to record, if any, post interview comments. Rating of most interviews were within the cooperative alternatives and interviewees appeared to be sincere in their answers. Post interview comments were basically repetition of responses to the questions in the recreation survey.

Discussion of Interview Data. Recreation trespass from State lands within the study area is apparently not a serious problem. Perhaps the dense, lush vegetation is the most restrictive agent in preventing such trespass. Recreation travel within the forest may be quite easily controlled by a trail system designed to keep hiking and walking use on State land. The only major areas of recreation trespass on private lands within the forest would therefore be limited to hunting in the fall and to the more adventurous fishermen in the summer season.

From the interview data in the preceding section, a composite picture of the typical Swan River State Forest recreational couple may be assembled, having the following basic characteristics.

For recreational purposes, they would most likely be found in either the Goat Creek or Point Pleasant camp-picnic areas. Ownership or agency administering the recreational sites would be unknown to them, even though their place of residence is within one hundred miles of the areas. They would be about forty years of age, with High School educations and a total annual income of about $6,000. His occupation would most likely be in the category of craftsman, foreman or operator and she would be a housewife. Selection of the Swan River Highway
would be based on previous use, less traffic and scenery. They would be in a recreational group of either campers or picnickers, consisting of about four persons with a preference for recreating within a one mile distance of the highway. In the camping group, they have about equal opportunity to be using a tent or a mobile unit and would remain on the area for two days or less. They would be willing to pay from one to two dollars per night for camping privileges and fifty cents to one dollar for group use of picnic facilities. They would desire improvements in the camp-picnic sites. Activities in which they would participate are primarily fishing and relaxation. Being the typical fisherman he would find fishing fair and he would not have a great desire to hunt on the study area. They would find the attractiveness of the area vastly out-weighting the unattractive features, although dirty camp-picnic grounds and excessive littering are mentioned as undesirable to them. They would not be interested in obtaining a special use lease on the forest but would express a desire to return to the area, on occasion, in the future.
CHAPTER VII

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

I. SUMMARY

An evaluation of the Swan River State Forest resources was attempted by interviews of the recreational users and by study and analysis of secondary information relating to the other "renewable" resources. The basic premise of the study stated that a program of multiple resource management, in the face of increasing recreational demands on the forest, would benefit the State, the public and provide fire protection to the economic timber resource. The study area was the Swan River Fire Protection District, 70,000 acres of State, Federal and private ownerships. Administrative philosophies, land ownership area and pattern, as well as historical and physical features of the forest, were discussed to provide a background onto which resource discussions could be projected.

It has been established that the major demand for the timber resource originates in or near Kalispell. The supply of this resource has been set at approximately 312 million board feet of overmature timber which is in need of rapid liquidation. The water resource has been examined in a minor way and the immediate demand limited to Kalispell and vicinity. The fish and wildlife resource was studied and potential deer and elk population increase, following logging methods which favor browse production in winter game range areas, was suggested as an area for future intensive study.
The existing and potential recreation use of the forest was analyzed and the recreationists contacted (June 15th through September 15th, 1963) to form a basis for recommendations on recreation management. Present facilities were found to be inadequate for both recreation and forest fire protection requirements. The recently completed Swan River Highway was examined as a potential source of increased recreational demand on the forest. Some projections of traffic to 1970 and 1980 were attempted to indicate possible increases in recreational traffic and attendant recreation demands on the forest. Agencies having an interest in and plans for development of recreation within the study area were discussed to indicate possible alternatives open to the State Forester for consideration in regard to the recreational resource.

Interviews of recreationists using the facilities currently provided were successful, resulting in 65 usable interview questionnaires. Recreation trespass, from State Forest land onto land in other ownerships, was found to be insignificant. Demand for this resource is, at present, generated primarily by Montanans living within one hundred miles of the study area. Thirty-seven per cent of the respondents in the survey were first-time visitors to the forest. Recreationists, in general, found the aesthetic properties of the forest far outweighed unattractive features observed on the study area. Facilities were inadequate to meet the standards of most of the group interviewed. Improvements, suggested by respondents, were concerned primarily with sanitary facilities and better camp-picnic grounds. The majority of individuals interviewed indicated a willingness to pay for the use of
improved recreation facilities. Interest in obtaining a cabin or summer home lease was expressed by about 38 per cent of the interviewees. An overwhelming number of respondents expressed a desire to return to the area. Approximately 65 per cent of the group interviewed had no knowledge concerning land ownership of the area and therefore were unaware of the administrative agency providing the facilities for their use. Additional questions in the interview obtained background information concerning respondent's age, income, occupation and other related information.

II. CONCLUSIONS

In a study of this nature there are no absolute conclusions which can be drawn. The limitations of knowledge concerning all facets of the problem and personal bias favoring utilization of one resource over another, combine to reduce conclusions to the realm of individual judgment. Only to the degree that individual bias can be eliminated and ignorance supplemented with facts can individual judgment be valid. Recognizing these conditions the following personal findings or tentative conclusions may be drawn from the study results.

Water and Wildlife. There was not enough information available on the supply and demand relationships of these resources to permit valid recommendations for the management or utilization of these resources. Some considerations for management of related resources which may influence these resources, and suggestions for future studies will be made in the recommendations section of this chapter.
Timber. Management of this resource in the Swan River State Forest is proceeding under sound, up-to-date timber management practices. The State Forestry Department is progressive, capably administered and staffed with qualified foresters. They are, however, faced with the difficult problem of managing scattered lands for the highest possible economic return. Utilization of the timber resources on the forest is presently below the annual allowable cut established for the forest. This is a function of State sustained yield and annual allowable cut policies and not a product of management of the study area.

Recreation. The State Forester has three basic recreation use alternatives to which the Swan River State Forest may be subjected. An attempt may be made to maintain the status quo of recreation areas on the forest under the present management policies. Or it may be preferred that the present recreation facilities be removed and the public discouraged from using the forest for such purpose. Justification for this action may be based on the need to protect a valuable resource from increased fire danger brought about by recreation use. Neither of these alternatives can provide anything but temporary alleviation of difficulties arising from the increased use of the forest for recreational purposes. In the light of inadequate State recreational facilities or lack of them, the U. S. Forest Service has areas reserved for development of this use within the Swan River Forest. The State Forester would then be faced with renewed or increased recreational use of the Swan River State Fire Protection District; but have no direct authority for the regulation or administration of this resource within the Swan River Forest. The remaining alternative for consideration of
recreation appears to be the most desirable and may be presented in the form of a conclusion. Authority should be granted the State Forester to engage in an active program of recreation management coordinated with the present timber management policies on the forest. This management may offer the best solution to the problem of increasing public pressure for outdoor recreation, added fire hazard to the timber resource and provide a potential source of additional economic return to the State School Trust Fund. To this end, present recreational sites are inadequate to satisfy either the public demand or fire protection needs.

The Swan River Forest. There is a need for closer cooperation and coordination of efforts between the State, U. S. Forest Service and Northern Pacific Railway Company toward efficient management of the scattered lands within the Swan River Forest. Specific areas where this need exists are in insect control, road construction and consolidation of land into larger ownership blocks. Recreation is a future area for close "owner" cooperation, as efforts to utilize the recreational resource become a reality. This is exemplified by the current U. S. Forest Service plans for development of recreational sites near and in conflict with existing state facilities.

Resource Administration. A conclusion which was not an objective at the inception of this study became apparent as the study progressed. In the course of this study, it was shown that at least four individual agencies, under three separate commissions responsible only to the Governor, have administrative interest in State lands in the
Swan River Forest. They are the Office of the State Forester and the Office of the State Engineer under the State Board of Land Commissioners, the Montana State Fish and Game Department with responsibility to the Montana Fish and Game Commission, and the Montana State Parks Division of the Montana State Highway Commission. None of these groups answers to the same agency head and their policies are therefore very likely to be uncoordinated, to duplicate efforts or to have management policies which are opposing. Synchronization of these, and other State resource agencies, if possible, by one resource coordinating head or interagency coordinating committee may result in increased resource management efficiency and wield greater influence in dealings with Federal and private resource management groups.

III. RECOMMENDATIONS

The following are proposals for future studies and recommendations for the management of the Swan River State Forest resources in keeping with the basic objectives of this study--multiple resource management.

General. Consideration should be given to studies of the number, authority and responsibility of the many resource administrative agencies within the State with an objective of formulating recommendations for one coordinating resource committee or authority. This program may be initiated by Montana State University as studies at the Master or Doctoral level.

Coordination of management efforts by the several owners of the
Swan River Forest is desirable because of the landownership pattern and perhaps may be accomplished through adoption of the "Planning Unit" approach, as described by Bolle:

The "Planning Unit" is designed to achieve cooperative decision making among a group of inter-related agencies and other operating units which are mutually concerned with problems of resource management and development to yield a flow of products, services and satisfactions to meet present and future needs of society. Such cooperation requires that there be a mutual recognition and understanding of the problem as a related sense of awareness and not a series of discrete problems as they are faced and identified by the different agencies. This understanding leads to a coordinated point of view and the agreement on the functional relationships to be studied... (6, p. 243).

Water. The present or potential demand for water in the Swan River Forest does not suggest management of this resource beyond "normal" logging practices which are conducted with watershed protection as an obligation of the contract. Recommendations for the management of this resource would therefore be to continue with logging practices which favor preservation of water quality and trout habitat.

Wildlife. The potential demand which could be generated by road access in the forest combined with the possible increase of wildlife populations following intensive clear cutting in critical winter game range areas, suggests an area where studies of timber production, wildlife populations and human interrelations may become necessary in the near future.

Timber. In view of the possibility of extensive timber removal from the forest by clearcut methods and assumed public distaste of the after effects of such operations, a system of interpretative displays, designed to inform the public, may do much to stem potential public
resentment against professional "wood butchers." A west coast interpretative program of displays, showing forest conditions before, during logging operations and after establishment of reproduction, has met with general public acceptance of clearcut harvest methods (9, p. 56).

**Recreation.** State land in the Swan River Forest should be zoned into an area of intensive recreation use and a zone of intensive timber production. Extensive recreation use would be permitted in the timber production area but not encouraged and timber removal, on a selection basis, would be permissible within the intensive recreation zone. The recreation zone may be defined as a strip along the Swan River Highway extending one-quarter mile to the east and west to the Swan River. The remaining area of State Forest lands within the study area should be devoted solely to the production of timber and complementary water and wildlife resources.

All future development of the recreation potential of the forest should be confined to this strip of low fire risk forest. This would reduce the possibility of fire ignition, reduce rate of spread and permit greater accessibility and control of fires of recreational origin. Development of recreational facilities in this strip would satisfy the desire of most individuals to "recreate" near the main highway and facilitate administrative control and maintenance of the sites.

Plans for recreational sites in this zone should stress areas with 25 units or more and consider the possibility of offering electric hookups, water outlets and shower facilities in the event of increased recreational demand on the forest. It is from this type of development that opportunities for an economic return from the recreation use
may be realized.

A system of informative and directional signs should be erected on the forest. They should be attractive and distinct from U. S. Forest Service signs to provide recognition of the State Forestry Department administration.

A trail complex should be constructed within the recreation zone. It should be designed to keep recreational use on State Forest land and to create added access to the Swan River.

As alternative recreation areas are developed, the Goat Creek and Point Pleasant camp-picnic sites should be closed. In view of the physical dangers which exist at these locations, undesirable planning features and lack of future expansion possibilities, it is imperative that these areas should be withdrawn from further recreational use.

Special use cabins and summer home leases should only be developed in areas which do not provide the leasee with stream and highway frontage "monopolies." A 200 to 400 foot frontage strip along streams and lakes within the forest should be preserved from special lease issues to provide equal public access to these areas. Nor should any recreation area be developed, or special use lease be issued within the 400-foot buffer strip along the highway, established through the Northern Pacific Railway Company, State Forestry Department and U. S. Forest Service agreement to preserve such an area.

As a supplement to this basic forest resources study, the recreational demand, statistical highway traffic analysis, apparent trends to mobile camping units and recreationists' desires should be restudied, having, as a primary objective, the utilization of recreation
use for economic return.

**Multiple Resource Management.** In an economy of unused forest resources, management for maximum production of one resource may exert minor influences upon another; but as demand approaches or exceeds supply, the likelihood of conflict in resources and administrative relationships arises. And the multiple resource management policies of the various land management agencies become increasingly difficult to apply. As added recreation pressures complicate the management of the Swan River Forest more and more consideration must be given to land-use priority plans, recognizing that under intensive use some conflicts in use will develop. While serious conflicts may be limited to relatively small areas, priorities in use must be established. Thus, the designation of intensive recreation areas may restrict timber management in small portions of State, Federal or even private ownerships within the study area. And the requirements of timber production, water or wildlife may in future studies justify areas where other uses will be restricted or eliminated. Therefore, the major importance of this study may not be found in the basic conclusions which were drawn from the information assembled. Its value may, perhaps, be weighed in future studies and cooperative management efforts toward utilization of the Swan River Forest resources which can be built upon this initial study of the forest resources of that area. To that end, this study and assemblage of facts can be of primary importance.
BIBLIOGRAPHY
BIBLIOGRAPHY


27. Lucas, Robert C. Visitor reaction to timber harvesting in the boundary water canoe area. Lake States Forest Experiment Station (U.S.F.S.), 1963.


APPENDIX A

Supplement to Master Agreement of September 4, 1962, between the office of the Montana State Forester and the Montana Forest and Conservation Experiment Station.

Since the Station desires to make a research study of the Swan State Forest, Montana, with relation to resource use and administration, land ownership, laws and human use; and, since the State Forester will receive a copy of the study results, the State Forester agrees to provide researchers of the Station for use in this research:

1. Information regarding the Swan Forest and access to files, maps, etc., covering the Forest.
2. Transportation to and from the Forest, when possible.
3. Necessary meals, when kitchen is in operation, and lodging at Goat Creek Station.

The Station agrees to:

1. Provide the State Forester with a copy of all research reports developed as a result of this study.
2. Provide the Forester adequate notice of times and duration of trips to the Forest when transportation, meals and lodging will be needed. Names of researchers will also be provided.

This agreement shall be in force for two years from the date of approval unless cancelled by mutual agreement of Station and State Forester.

ARNOLD W. BOLLE
Director, Montana Forest and Conservation Experiment Station

Date Nov. 13, 1962

GARETH MOON
State Forester
APPENDIX B

SWAN RIVER STATE FOREST

(Recreation Survey Part I)

A. General (To be filled in by interviewer.)

Date ___________________________ Interview No. ____________
Location ____________________________
Developed recreation area _____, Undeveloped recreation area _____
Conditions: Cool _____, Warm _____, Hot _____, Raining _____,
Clear _____, Cloudy _____, Burning Index _____.
Time of day: Morning _____, Midday _____, Evening _____.
Sex of respondent: Male _____, Female _____.
Type of facilities used: Picnic _____, Tent _____, Trailer _____,
Mobile camper _____, Other ____________________________

B. Recreation Use Information (Interviewer: I would like to ask you some
questions regarding travel and your interest in outdoor recreation.)

1. Where are you from: City ___________________________, State _______.
Approximately how far from here?

_____ 0 to 50 miles  _____ 251 to 500 miles
_____ 51 to 100 miles  _____ 501 to 1000 miles
_____ 101 to 250 miles  _____ Over 1000 miles

2. What is your principal destination in Western Montana on this trip?

__________________________________________________________

3. In selecting this highway route (through the Swan River Forest)
please indicate any of the following items which may have affected
your choice. (Hand respondent card A.)

A. _____ Speed
B. _____ Scenery
C. _____ Less traffic
D. _____ Better road
E. _____ Adventurous curiosity (exploring)
F. _____ Friends or relatives recommendation
G. _____ Tourist guide or information service
H. _____ Service station attendant
I. _____ Road map
J. _____ Major oil company guide service
K. _____ Previous use
L. _____ None of these

4. How many people are in your group, including children? ________.
5. When camping or picnicking, how far off the main (Swan) highway would you prefer to be?

- 0 to 1 mile
- 1 to 2 miles
- 2 to 3 miles
- 3 to 5 miles
- Over 5 miles

6. About how long do you plan to stay this visit?

- Several hours
- One day (not including night)
- Two days or less
- Three to four days
- Five to seven days
- Eight days to two weeks
- Over two weeks

7. Which of the following outdoor activities do you plan to participate in during your stay on the forest, name as many as apply.

A. _____ Camping (indicate type): Tent ____, Trailer ____ , Mobile camper ____ , Other ____.
B. _____ Picnicking
C. _____ Fishing
D. _____ Hiking and walking
E. _____ Swimming
F. _____ Boating, rafting, canoeing
G. _____ Amateur nature or wildlife study
H. _____ Driving for sightseeing or relaxation
I. _____ Photography
J. _____ Wilderness use (Bob Marshall or Mission Mountain Wild Area)
K. _____ Relaxation (sleeping and loafing)

(If fishing is indicated activity, ask 7a)

7a. Do you consider fishing in this area to be: Good ____, Fair ____ , Poor ____.

8. Do you visit this area (Swan River Forest): Frequently ____ , Occasionally ____ , First visit ____ ? Will you return ____?

(If answer is frequently or occasionally, ask 8a.)

8a. Do you hunt the Swan River Forest? Yes ____ , No ____.

(If answer is yes ask 8b.)

8b. Do you hunt: Big game ____ , Small game ____ , or Both ____?

8c. Do you consider hunting as being: Good ____ , Fair ____ , or Poor ____.

9. Do you feel that present recreation facilities on the forest are adequate? Yes ____ , No. ____.

(If no) What type of improvements do
10. If it were necessary to charge a fee in order to provide improved and maintained recreation areas on the forest, what do you feel would be a fair charge for the following types of use? (Hand respondent Card C.)

**Picnic Facilities**, including table, stove, latrine, firewood, water, and garbage receptacle.

- A. $0.00 to $0.25/party
- B. 0.26 to 0.50/party
- C. 0.51 to 1.00/party
- D. 1.01 to 2.00/party
- E. Over $2.00/party
- F. Nothing

**Overnight Camping Facilities**, including table, stove, latrine, firewood, tent or trailer space, water, and garbage receptacle.

- G. $0.00 to $0.51/night
- H. 0.51 to 1.00/night
- I. 1.00 to 2.00/night
- J. 2.00 to 5.00/night
- K. Over $5.00/night
- L. Nothing

11. Timber must be harvested to provide wood products. From a recreational point of view do you find the harvest areas in this forest (clearcuts, etc.):

- Objectionable _____, Favorable _____, No Opinion _____

12. Would you be interested in leasing a summer home or cabin site in the Swan River Forest? Yes _____, No _____

12a. (If yes above), What would you be willing to pay for a yearly lease?

- _____ $20.00/year  _____ $60.00/year
- _____ 30.00/year  _____ 70.00/year
- _____ 40.00/year  _____ 80.00/year
- _____ 50.00/year  _____ Over $80.00/year

13. What features of this area do you find attractive? ______________

- Unattractive? ______________

14. Do you know who owns the land you are on? Yes _____, No _____

(If yes), Who owns the land? State _____, U.S.F.S. _____, N.F. Railway _____, Other ___. (Interviewer complete following)

Correct _____, Incorrect ____. Actual owner ______________
C. Background Information (Interviewer: I would now like to ask you a few questions concerning your occupation, age and income.)

15. What is your occupation? ________________________. (If not obvious head of family, ask) what is the occupation of the head of family?

16. Please look at this card and tell me which category comes closest to representing your total family income, per year. (Hand respondent card D.)

A. _____ Under $3,000/year
B. _____ $3,000 to $4,000/year
C. _____ 4,000 to 5,000/year
D. _____ 5,000 to 6,000/year
E. _____ 6,000 to 7,000/year
F. _____ 7,000 to 8,000/year
G. _____ 8,000 to 9,000/year
H. _____ 9,000 to 10,000/year
I. _____ Over $10,000/year

17. What is the highest level of education you have attained? ________________________ .

18. May I ask your approximate age please?

_____ Under 21
_____ 21 to 29
_____ 30 to 39
_____ 40 to 49
_____ 50 to 59
_____ 60 and over

19. What is your marital status?

_____ Single
_____ Married
_____ Other

D. Interview Rating (to be completed by interviewer).

20. Attitude of interview

_____ Very cooperative
_____ Cooperative
_____ Reluctant
_____ Refused
_____ Other

21. Validity of answers:

_____ Truthful
_____ Untruthful
E. Post Interview Comments: (Interviewer: Are there any brief, additional comments you would care to make?)
Dear Visitor:

Montana State University, Forestry School, in cooperation with the Montana State Department of Forestry is conducting a survey of the Swan River State Forest concerning outdoor recreation. The purpose of this survey is to determine the number of persons using the forest for recreation, their origin, background and favored outdoor activities.

You as a potential recreation user of the forest are important to the results of this study. Would you please fill out the following questionnaire (completion time approximately 5 minutes) and leave it with the ranger in charge? It is not necessary for you to sign your name.

Thank you! Have a pleasant vacation.
A. Recreation and Travel Information

1. Where are you from? City___________________, State___________________
   Approximately how far from here?
   —— 0 to 50 miles —— 251 to 500 miles
   —— 51 to 100 miles —— 501 to 1000 miles
   —— 101 to 250 miles —— over 1000 miles

2. What is your principal destination in Western Montana on this trip?

3. How many people are in your group, including children? ____________.

4. Is this your first trip through this area? Yes ____ , No ____.
   Will you return again? Yes ____ , No ____.

5. In selecting this highway route (through the Swan River Forest) indicate any of the following which may have affected your choice.
   —— Speed
   —— Scenery
   —— Less traffic
   —— Better road
   —— Adventurous curiosity (exploring)
   —— Road map
   —— Previous use
   —— Friends or relatives recommendation
   —— Tourist guide or information service
   —— Service station attendant
   —— Major oil company guide service
   —— None of these

6. How long do you plan to stay in this area?
   —— Several hours
   —— One day (not including a night)
   —— Two days or less
   —— 3 to 4 days
   —— 5 to 7 days
   —— 8 days to two weeks
   —— Over two weeks

7. Which of the following outdoor activities would you like to participate in, if you stay on the forest. (Check as many as apply).
   —— Camping (indicate type): Tent _____, Trailer _____,
       Mobile camper _____, Other (please explain) _______
   —— Picnicking
   —— Fishing
   —— Hiking or walking
   —— Swimming
   —— Boating, rafting, canoeing
Amateur nature or wildlife study
Driving for sightseeing or relaxation
Photography
Wilderness use (Bob Marshall or Mission Mountain Wild Area)
Relaxation (sleeping and loafing)

8. When camping or picnicking, how far off the main (Swan) highway would you prefer to be?
- 0 to 1 mile
- 1 to 2 miles
- 2 to 3 miles
- 3 to 5 miles
- Over 5 miles

9. If it were necessary to charge a fee, in order to provide improved and maintained recreation areas on the forest, what do you feel would be a fair charge for the following types of use?

**Picnic Facilities**, including table, stove, latrine, firewood, water, and garbage receptacle.
- $0.00 to $0.25, per party
- 0.26 to 0.50, per party
- 0.51 to 1.00, per party
- 1.01 to 2.00, per party
- Over $2.00 per party
- Nothing

**Overnight Camping Facilities**, including table, stove, latrine, firewood, tent or trailer space, water, and garbage receptacle.
- $0.00 to $0.50, per night
- 0.51 to 1.00, per night
- 1.01 to 2.00, per night
- 2.00 to 5.00, per night
- Over $5.00 per night
- Nothing

10. Would you be interested in leasing a summer home or cabin site in the Swan River Forest? Yes ________, No ________.

10a. (If yes above) What approximately would you be willing to pay for a yearly lease?
- $20.00/year
- $30.00/year
- $40.00/year
- $50.00/year
- $60.00/year
- $70.00/year
- $80.00/year
- Over $80.00/year

11. What features of this area do you find attractive? ________________

_________ Unattractive? ____________________________
B. Background Information

12. What is the occupation of the head of the family? ____________________________

13. Would you please indicate the highest level of education you have attained?

________ Grade School
________ Graduated from High School
________ Some College
________ Graduated from College

14. Please indicate the category that comes closest to representing your total family income.

________ under $3,000/year
________ $3,000 to 4,000/year
________ $4,000 to 5,000/year
________ $5,000 to 6,000/year
________ $6,000 to 7,000/year
________ $7,000 to 8,000/year
________ $8,000 to 9,000/year
________ $9,000 to 10,000/year
________ Over $10,000/year

15. What is your sex? Male ______, Female ______.

16. What is your marital status?

________ Single
________ Married
________ Other

17. Please indicate your age.

________ under 21
________ 21 to 29
________ 30 to 39
________ 40 to 49
________ 50 to 59
________ 60 and over

THANK YOU FOR YOUR COOPERATION