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SWAN RIVER STATE FOREST

MANAGEMENT PLAN

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Swan River State forest management plan



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DRAFT ENVIRONMENTAL IMPACT STATEMENT

SWAN RIVER STATE FOREST MANAGEMENT PLAN

MAY, 1977



Forestry Division
MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

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I. Introduction

BACKGROUND

The Swan River State Forest, which is located in the Swan Valley approximately 50 miles southeast of Kalispell, Montana, is the second largest of seven designated State Forests (see maps following). The Swan Forest's 38,912 state-owned acres are held in trust by the state for the benefit of public schools.

Like all state forest land, the Swan River Forest is managed by the Forestry Division of the Montana Department of Natural Resources and Conservation (DNRC). Management guidance is provided by a variety of state laws; principal among these are laws calling for (1) monetary return to the state school trust fund, (2) watershed protection, and (3) management under the multiple-use concept. Overall management direction and approval of individual actions are provided by the Montana Board of Land Commissioners (hereinafter called the State Land Board).¹ A more thorough

discussion of the legal framework is presented in Section III.

On October 27, 1975, the State Land Board asked DNRC to evaluate policy alternatives concerning road right-of-way agreements and easement exchanges on the Swan River State Forest. After further discussion, it became apparent that a study of such policy alternatives hinged on a larger need for an overall management direction encompassing the entire forest. What was required was a coordinated management plan, which would assess all forest uses as they relate to each other and set forth planned and coordinated land use and timber management policy. This plan would then serve to guide DNRC in carrying out its management responsibilities on the forest — consistent with the directives of the State Land Board, state and federal law, and other legal constraints.

GOAL OF THE PLAN

The Goal of this plan is to provide an updated land use and resource management directive for the Swan Forest. Its aim, in one document, is to provide enough information and policy to enable fully coordinated land

management decisions made on the forest. At the same time the plan must ensure the wisest possible use of the forest resources, both for present citizens and future generations.

LEVEL OF PLANNING

Initial plan formulation presented several immediate problems. Principal among them was the question: "To what level should the plan be taken?" That is to say, a decision was needed as to how specific the plan should be, in terms of actual, "on-the-ground" management actions (such as timber stand improvement projects, roads, timber sales, etc.) be carried out in the long-range future.

DNRC decided to make its planning effort as specific as possible. However, although many specific actions can be planned at this point, certain planning constraints work against the possibility of detailed project plans.

One of these planning constraints is represented by limitations in current resource data. For example, no up-to-date timber inventory exists for the Swan Forest.

¹The State Land Board is composed of the Governor, Superintendent of Public Instruction, Attorney General, Secretary of State, and Auditor; it is the governing board of the Montana Department of State Lands (DSL). Although DSL has general administrative responsibility of school trust lands, areas classified as state forest lands are administered by DNRC (except for administration of sub-surface resources, which is retained by DSL).

Estimated amounts of timber presently in the forest have been extrapolated from timber data twenty years old. The level of planning can not "go beyond" these limitations in data.

Another planning constraint arises from the land ownership pattern within the valley. Due to historical events (See Section III), state forest ownership in general is scattered; some contiguous ownership blocks have been created in the Swan Forest, but much of the state forest land is still separated by areas of forest under other management. Although a great deal of cooperation has been forthcoming from these landowners, to some extent DNRC is nevertheless constrained in planning efforts. Private and federal owners will inevitably make management decisions in the future indirectly affecting Swan Forest lands and resources. For this reason, a measure of flexibility must be written into the plan.

Yet another planning constraint arises from the unpredictable nature of the future itself. Certain events simply cannot be definitively planned. Among these events are administrative actions such as levels of funding and new legislation, as well as acts of nature, such as major floods, forest fires, or insect and disease outbreaks. Although specific projects would of necessity

arise to meet these needs, they cannot be adequately planned except on a contingency basis.

Due to the planning constraints, then, the plan as presented herein should be viewed as a "framework" document. It serves as a policy guide closing many options considered to be unwise at this time, yet retaining enough flexibility to meet contingent needs. As such, the plan acts as a necessary bridge between the overall management direction for the Swan Forest and the actual scheduling and implementation of individual management actions such as timber sales, timber stand improvement activities, creation of special use areas, etc.

Because future needs and conditions cannot be predicted with certainty, the Swan River State Forest Plan is purposely designed to provide management flexibility as forest conditions change, advanced technology becomes available, additional resource data become known, funding levels are set, and management decisions by other landowners are made. The plan will be modified to meet future needs as they occur, by decisions of the State Land Board. At present it is anticipated that this plan will be reviewed and revised as needed at intervals of approximately ten years.

IMPLEMENTING THE PLAN

The plan, when adopted, would be implemented by DNRC's Division of Forestry over a period of years. Significant management resources exist at the Divisional level, including planning staff, field personnel, equipment development and procurement, tree seedling supply, and environmental review capabilities. Emergency or contingent resources are also readily available at the Divisional level, and can be transferred from other areas of the state as need and priorities arise.

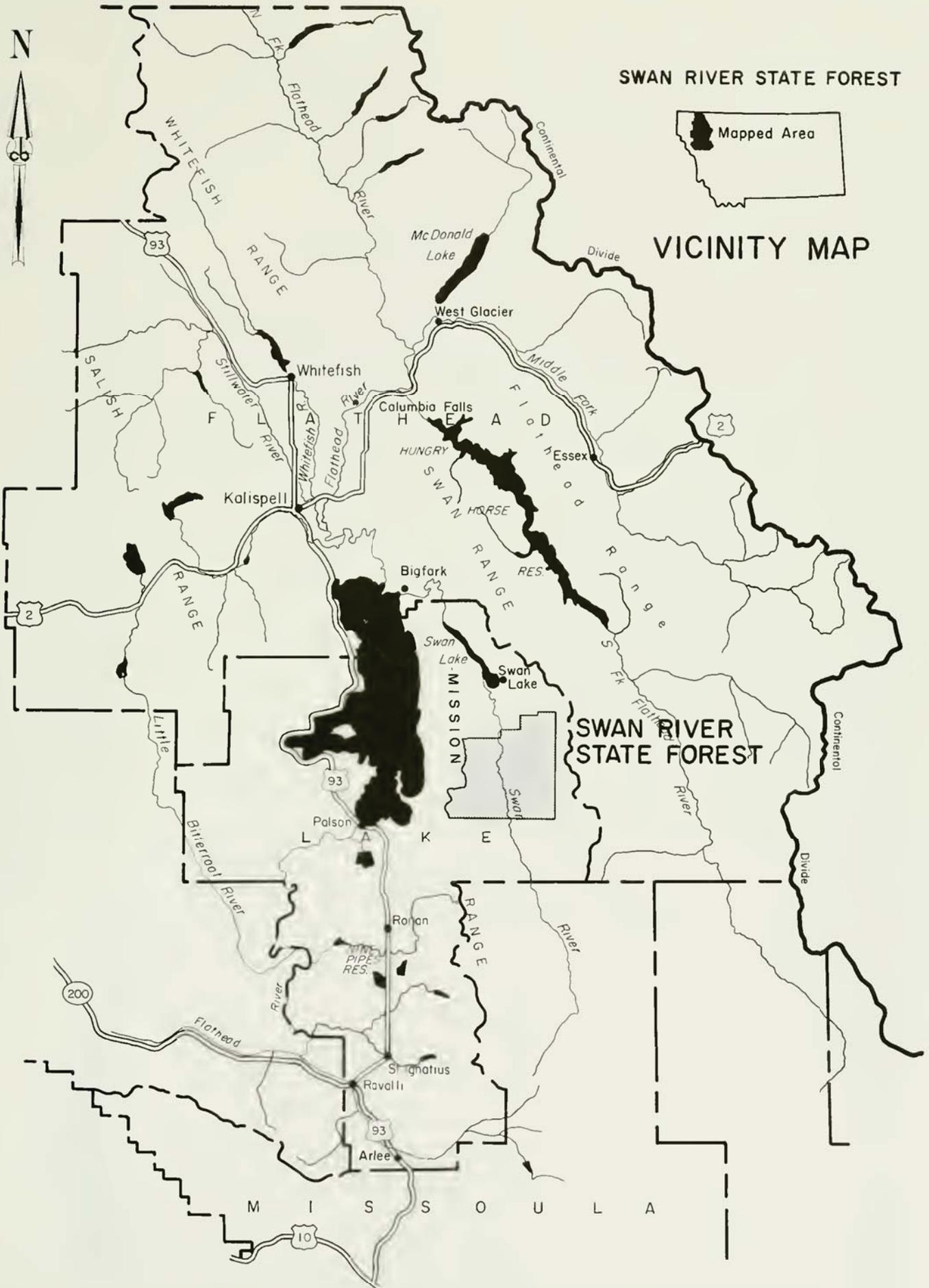
In addition, the Division of Forestry maintains work quarters within the Swan Forest itself. Equipment and facilities are located centrally on Highway 209 at Goat Creek. A full-time forester and staff live and work year-round on the forest.

One unique feature of the Swan Forest has been the establishment of the Swan River Youth Forest Camp — a camp cooperatively administered by DNRC, the Montana Department of Institutions and the Department of Social and Rehabilitation Services. Facilities designed for 50 residents and a work-training program aimed at rehabilitation, vocational training and safety instruction have been beneficial not only to the individuals residing at the camp, but also to the state through completed work projects. Many of the work projects envisioned in this plan would not be possible without the human resources provided by the Youth Camp.

SWAN RIVER STATE FOREST



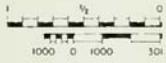
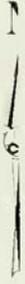
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SWAN RIVER STATE FOREST

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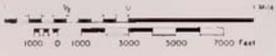
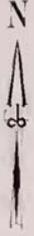
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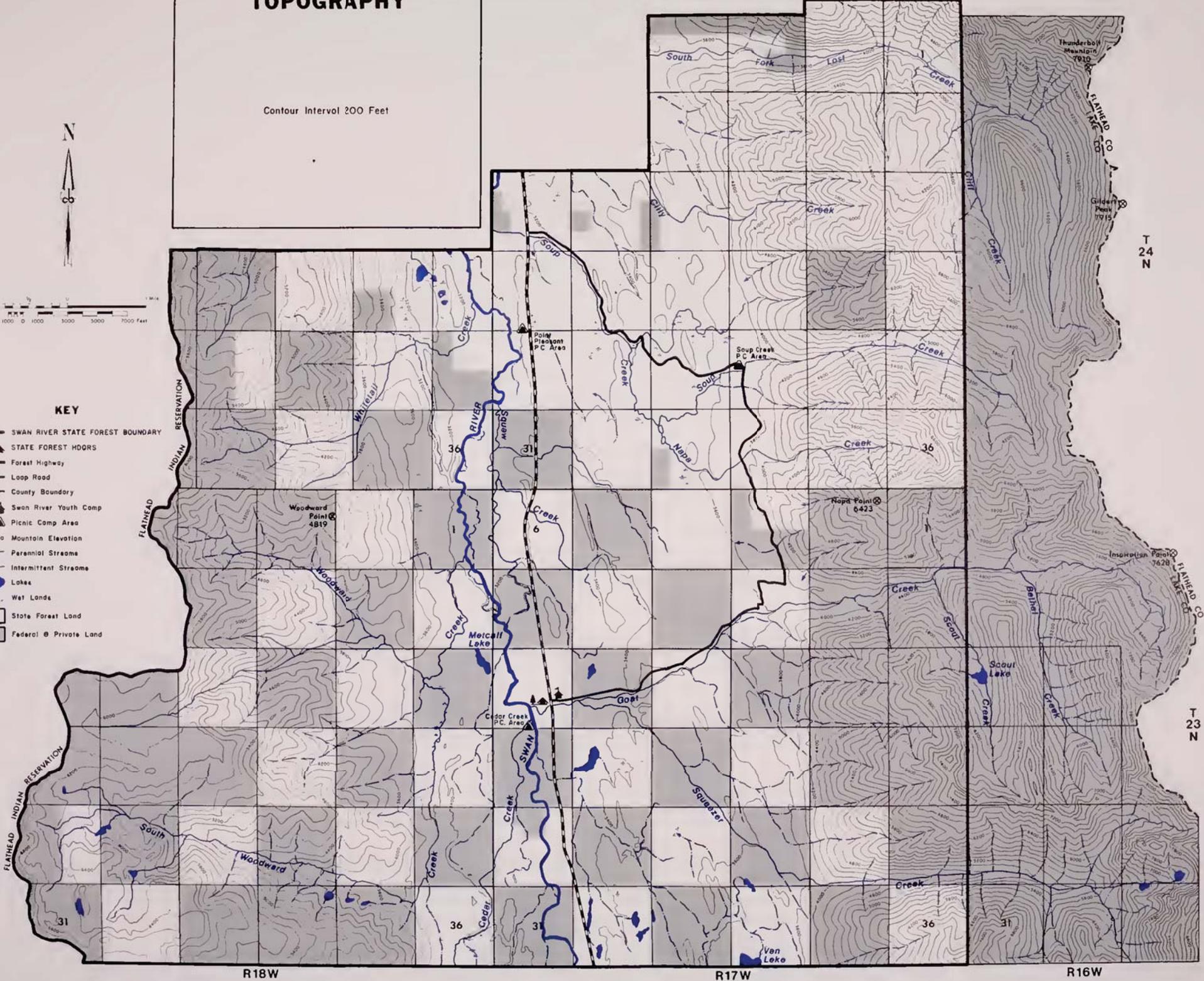
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KEY

- SWAN RIVER STATE FOREST BOUNDARY
- STATE FOREST HQRS
- Forest Highway
- Loop Road
- County Boundary
- Swan River Youth Camp
- Picnic Camp Area
- No Mountain Elevation
- Perennial Streams
- Intermittent Streams
- Lakes
- Wet Lands
- State Forest Land
- Federal & Private Land



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II. Summary

OVERVIEW OF THE PLAN

The Swan River State Forest, due to its soil, climate and terrain, offers an excellent timber production area. In addition, it offers a full range of other resource values usually associated with the multiple-use concept: clean water in abundant quantities, a wide variety of fish and game species living in a natural habitat, valuable and unique outdoor recreational opportunities, striking, and aesthetics. These are complemented by a good transportation system and provide a livelihood for the majority of the small human population living there.

If wise use is to be made of the forest, both now and by future generations, all the above values must be enhanced and maintained. No resource plan would be complete without an examination and fixed management direction for all the resource uses offered by the forest.

This plan as recommended does examine each resource use by category, setting fixed course of action and management direction (consistent with current technology and legal mandates) for each. Many of the forest resources, such as outdoor recreation, wildlife, and aesthetic values would be preserved and maintained as close to their present condition as possible. Other forest resources, primarily timber, would be altered to a state regarded as more beneficial both to the forest and to man.

Historically, the two most significant forces for change on the forest have been fire and timber harvest. For a variety of reasons, principally technological and economic, these are still the two main agents of change available to man.

FIRE AS AN AGENT OF CHANGE

Under the plan as recommended, the environmental impacts of wildfire are regarded as unacceptable. Uncontrolled wildfire, although it can have some beneficial impacts in certain situations, threatens life and property, destroys valuable timber, and degrades water resources. Therefore, under the plan, wildfire will be prevented and controlled to the maximum extent possible.

However, under the plan, controlled burning may be employed in certain situations. These activities would be primarily utilized in the reduction of forest fuels

created by timber harvest, as well as in controlling certain kinds of forest insects and diseases. All controlled burning would be conducted in such a way as to mitigate adverse environmental impacts.

TIMBER HARVEST AS AN AGENT OF CHANGE

Timber harvest, the other major force for change available to man, has a number of advantages. First, it provides a product, wood and wood fiber, highly useful to man in other activities. Second, it provides monetary return to the state school trust fund, as mandated by state law. Third, it offers a method by which the character of the forest can be altered to a more healthy, productive state. This latter factor would result in the beneficial use of all the forest resources over a long time period and timber harvests could be conducted on a sustained basis.

Therefore, the focus of the plan is of necessity concentrated on timber management options, although other forest values are considered. It is important to note that timber harvest, while important to Montana's economy, is not done solely for economic gain. Timber harvest presently offers the only economically viable silvicultural tool for the improvement of most other forest values.

At present, most of the timber on the Swan Forest is in a mature or overmature condition. As such, a large volume of wood is available and it represents a resource inventory that can be tapped at any time. This can be seen as a positive value of overmature timber.

On the other hand, there are many negative values. In comparison to younger trees, mature and overmature timber is growing very slowly. In addition, because this old-growth timber represents a near forest climax condition, the development of seedlings and young trees is significantly retarded — thus endangering the availability of forest products in future generations. But most importantly, mature and overmature timber stands are in a state of decline. They are susceptible to disease, fire and natural mortality. This in turn threatens all other resource values of the forest.

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From a silvicultural standpoint, it is wise to remove

this overmature timber. A healthy, diversified forest is at its most productive when full age-class distribution exists throughout the forest; that is, when an approximately equal number of trees of every age, from seedling to mature, are statistically distributed. This situation is the goal of the plan as recommended for the majority of the forest.¹

The removal of mature and overmature timber can be conducted in a variety of ways. In terms of short-term economic gain, the best method would be to liquidate all overmature timber as quickly as possible, replacing it with new growth. However, because most of the timber in the entire forest is in this age class, such liquidation would create a variety of significant adverse impacts to other forest values. These adverse impacts, which would affect wildlife, aesthetics, recreation, and water quality, have been judged to be unacceptable, in light of the broad legal mandates for multiple-use and watershed protection.

On the other hand, the mature and overmature timber could be removed very slowly or not at all. While this would preserve certain values such as aesthetics and wildlife, it would not solve the problem of eventual decline of the forest in general. Moreover, it would

severely limit man's use of products grown and removed from the forest.

Clearly, a balance is needed between the two extremes. The plan as recommended provides this balance, advocating an approximate seedling-to-harvest rotation of 100 years. Overmature forest stands would be harvested at the rate of approximately 240 acres per year through the first 78 years of the regulatory rotation, at which time the overmature age class will have been removed. As these stands are removed, regeneration will be established through plantation or natural seeding. The ultimate result will be an equal age distribution throughout the forest.

In order to administer the plan, the Swan Forest has been divided into three major management zones (see map, Timber Management portion of Section V). The Commercial Forest Management Zone, comprising 28,437 acres is made up of areas of significant timber potential using existing technology. The 9,562-acre Commercial Forest Management Deferred Zone offers areas of significant timber potential, but where economic/technical constraints presently exist. The 1,026-acre Non-commercial Forest Management Zone offers areas of very low timber management potential.

SUMMARY BY RESOURCE CATEGORY

The following is a summary of the plan as recommended for each resource category considered. Planned management direction has been set forth for the categories of timber management, fire, fisheries, insects and disease, livestock use, natural areas, recreation, special uses, transportation, watershed, and wildlife. A discussion of how the planned management directions would affect each management zone, as well as a discussion of the impacts in each category, can be found in Section V.

TIMBER MANAGEMENT

Management actions would:

1. Fully regulate stand age-classes during the first 105 year regulatory rotation (create an even distribution of age classes from 1 to 100 years throughout the forest, assuming a 5-year period for the regenerating of harvested areas).
2. Harvest approximately 240 acres of overmature forest stands each year, using proper silvicultural methods. The projected average annual volume of forest products produced from these acres, based on available data, is approximately 3.6 million board-feet.
3. Apply intermediate thinning to approximately 210 acres annually to stands which are overstocked and in need of thinning.

4. Manage the Swan Highway corridor to maintain a general mature-stand appearance.
5. Favor a diversity of tree species, including the full range of commercial species now present in the forest.
6. Defer timber harvesting in the Commercial Forest Management Deferred Zone until such time as the existing constraints are solved.
7. Exclude timber harvesting in the Non-commercial Forest Management Zone.

FIRE MANAGEMENT

Management actions would:

1. Provide direct and immediate suppression on all wildfires, consistent with the physical and economic capabilities of the state.
2. Continue a fire hazard reduction program, directed at effectively treating logging slash and dead timber.
3. Plan and execute prescribed burning efforts in a manner consistent with the Montana Clean Air Act.
4. Continue to administer an aggressive program of wildfire prevention, through both the cooperative public education program and other ongoing forest management activities.

¹The goal of full age-class distribution is relegated to the Commercial Forest Zone (Zone I) only. For a discussion of the three planning zones, see Section V.

FISHERIES MANAGEMENT

Management actions would:

1. Maintain the current very high level of water quality, through sound streambank management and silvicultural programs.
2. Maintain the existing diversity of fishery habitat, through a coordinated management program between responsible agencies, forest landowners, and the public.
3. Plan, coordinate, and execute actions that influence fishery habitat in such a manner as to improve or to cause minimal adverse impact on fish populations.
4. Actively cooperate with other agencies and landowners in the Swan Forest, as well as Montana's universities, to develop needed fishery management information.

INSECTS AND DISEASE MANAGEMENT

Management actions would:

1. Continue the annual assessment of insect and disease activity.
2. Continue to take immediate action to prevent or check the buildup of tree-killing insect populations and/or disease to epidemic levels.
3. Actively work with other agencies and landowners to develop new and improved insect and disease control techniques.
4. Give preference to silvicultural and biological control measures to control insect and disease problems where such measures are feasible.

LIVESTOCK USE MANAGEMENT

Management actions would:

1. Identify and inventory areas of grazing potential.
2. Consider applications for grazing permits, as they are received.
3. Consider cooperative grazing arrangements with adjacent landowners.

NATURAL AREAS MANAGEMENT

Management actions would:

1. Examine all state land ownership within the Swan Forest possessing significant scenic, educational, scientific, biological and/or geologic values, to identify areas for possible inclusion under the Montana Natural Areas Act.
2. Prior to any individual management action which would preclude or significantly modify the possibility of designation examine potential area and make specific recommendations concerning natural area designation.

RECREATION MANAGEMENT

Management actions would:

1. Continue to provide various forms of dispersed recreational activities. New and expanded trails and trail heads may be added when needs and opportunities become apparent.
2. Continue to provide and expand picnic areas and campgrounds, based on needs and opportunities.
3. Maintain and manage the Swan Highway Corridor with primary emphasis on its visual resource.
4. Carefully plan all management actions which may affect aesthetic values to incorporate sound landscape management techniques.
5. Minimize recreation-user conflicts, especially between motorized and non-motorized forms.
6. Inform the public of the dangers of boating on the Swan River.
7. Where possible, undertake timber harvest and fire control activities and related road and trail development to complement or to protect recreational values.

SPECIAL USE MANAGEMENT

Management actions would:

1. Authorize special uses and the continuation of permits which are compatible with other existing uses of adjacent state, federal and private land.
2. Evaluate each application for a special use authorization on a case-by-case basis and to grant such authorization when in the best long-term interest of the state school trust fund, the state and the people of Montana.

TRANSPORTATION MANAGEMENT

Management actions would:

1. Continue the high level of cooperative road construction, maintenance and use necessary for maintaining an efficient transportation system.
2. Carefully plan all construction of new forest access roads to meet the multiple-use access needs while minimizing any adverse environmental impacts.
3. Continue maintenance of state-owned roadways, based on the annual maintenance survey, available state maintenance funds, and cooperator use.
4. Continue to provide proportionate share of maintenance to cooperator-owned roadway in accordance with the best interests of the state.
5. Provide for temporary or permanent road closures on any state-owned forest access roads, based on sound environmental and/or economic justification, and in light of other users' needs.

6. Continue to maintain, mark, and expand (if possible) the existing trail system.
7. Continue to maintain the two emergency heliports currently in the forest.

WATERSHED MANAGEMENT

Management actions would:

1. Be planned, coordinated and executed in such a manner as to improve or to cause minimal adverse impact to existing stream conditions.
2. Continue to limit the man-made increases in average annual runoff volumes to the normal peak capacity of the channels.
3. Attempt to stagger the timing of snowmelt runoff from watersheds by controlling the accumulation and melt rates of snow through cutting method variety.
4. Actively participate with other landowners in

- cooperative watershed management practices.
5. Provide a sound streambank management program.

WILDLIFE MANAGEMENT

Management actions would:

1. Plan, coordinate, and execute all management actions that influence wildlife habitat in such a manner as to improve habitat or to cause minimal adverse impact on wildlife.
2. Actively participate with other agencies, landowners, and Montana universities to develop needed wildlife management information.
3. Maintain the existing diversity of wildlife habitat present on the forest, through a coordinated management program between responsible agencies, forest landowners, and the public.



III. Legal Framework

OWNERSHIP PATTERNS

It is essential to the reader's understanding of the plan to have a basic understanding of the laws and administrative rulings mandating the general direction of forest management decisions on state forest lands. It is also helpful to have a general knowledge of the valley's ownership patterns and how they came to be.

All lands within the boundaries of the Swan Forest are not owned or controlled by the State of Montana (see ownership map, following page). The state owns 56 percent of the total land area, Burlington Northern Corporation retains 27 percent, the U.S. Forest Service administers 15 percent, and small private landowners hold the remaining 2 percent.

HISTORY

In 1864 the Organic Act of the Territory of Montana was passed by Act of Congress. It provided that Sections 16 and 36 in each township, when surveyed, were reserved for the schools of the territory. That same year, the federal government granted the Northern Pacific Railroad Company (precursors of the Burlington Northern Corporation) approximately 20 million acres of Montana lands. The grant included every alternate section in a strip 80 miles wide along the railroad line, plus "in-lieu" selection privileges. This ultimately created the "checkerboard" pattern of land ownership found on the southern half of the Swan Forest.

The state-owned lands in the state forests are school trust lands granted by the Enabling Act of 1889 and accepted by the Montana Constitution when statehood was granted. Significant provisions of the Enabling Act and the Montana Constitution as they relate to the original grant are presented below:

Portions of Section 11 of the Enabling Act, with emphasis supplied by underlining:

The state may also, upon such terms as it may prescribe grant such easements or rights in any of the lands granted by this act, as may be acquired in privately owned lands through proceedings in eminent domain; provided, however, that none of such lands nor any estate or interest therein, shall ever be disposed of except in pursuance of general laws providing for such disposition, nor unless the full market value of the estate or interest disposed of, to be

ascertained in such manner as may be provided by law has been paid or safely secured to the state.

With the exception of the lands granted for public buildings, the proceeds from the sale and other permanent disposition of any of the said lands and from every part thereof, shall constitute permanent funds for the support and maintenance of the public schools and the various state institutions for which the lands have been granted. Rentals on leases lands, interest on deferred payments on lands sold, interest on funds arising from these lands, and all other actual income, shall be available for the maintenance and support of such schools and institutions. Any state may, however, in its discretion, add a portion of the annual income to the permanent funds.

The lands hereby granted shall not be subject to preemption, homestead entry, or any other entry under the lands laws of the United States, whether surveyed or unsurveyed, but shall be reserved for the purposes for which they have been granted.

By proclamation of President Cleveland in 1897, the lands of today's Swan River State Forest were included as part of the Lewis and Clark Forest Reserve. Twelve years later however, these lands, with the exception of the Northern Pacific lands, became a part of the newly established Flathead National Forest. An agreement between the U.S. Department of Agriculture and the State of Montana in 1912 provided the basis for selection of lieu lands of equivalent value and acreage in compact units outside of National Forest boundaries. Under the terms of the agreement, one such area in the Swan River Valley was selected and excluded from the Flathead Forest. This block of land was formally designated and received its official name, the Swan River State Forest, in 1925.

Prior to the formal designation of these lands as a State Forest in 1925, the Office of the Montana State Forester had been made responsible for the daily management of state timber lands, under the direction and control of the State Land Board. In 1958 the Board directed the State Forester to prepare a management

plan for the Swan River State Forest. In 1972, under the Executive Reorganization Act, the duties of the Office of State Forester were transferred to DNRC.

In a continuing effort to evaluate the resource

capabilities of the land and to refine current management techniques, planning for short and long-range land use commitments was re-emphasized by the State Land Board in 1975.

LEGAL MANDATES

A rather large body of state law exists concerning management of State Forest lands. Significant portions of this statutory direction are presented below, with emphasis supplied by underlining.

Portions of Article 10 of the Constitution of the State of Montana:

Section 4. Board of land commissioners. The governor, superintendent of public instruction, auditor, secretary of state, and attorney general constitute the board of land commissioners. It has the authority to direct, control, lease, exchange, and sell school lands and lands which have been or may be granted for the support and benefit of the various state educational institutions, under such regulations and restrictions as may be provided by law.

Section 11. Public lands trust, disposition (1) All lands of the state that have been or may be granted by congress, or acquired by gift or grant or devise from any person or corporation, shall be public lands of the state. They shall be held in trust for the people, to be disposed of as hereafter provided, for the respective purposes for which they have been or may be granted, donated, or devised.

(2) No such land or any estate or interest therein shall ever be disposed of except in pursuance of general laws providing for such disposition, or until the full market value of the estate or interest disposed of, to be ascertained in such manner as may be provided by law, has been paid or safely secured to the state.

(3) No land which the state holds by grant from the United States which prescribes the manner of disposal and minimum price shall be disposed of except in the manner and for at least the price prescribed without the consent of the United States.

(4) All public land shall be classified by the board of land commissioners in a manner provided by law. Any public land may be exchanged for other land, public or private, which is equal in value and, as closely as possible, equal in area.

Portion of 81-1401, R.C.M. 1947:

All lands at present owned by the state, and all that may hereafter be acquired by the state

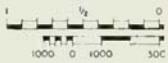
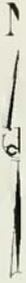
through escheat, exchange, purchase, grant or devise, which are principally valuable for timber that is on them, or for the growing of timber or for watershed protection, are hereby classified and designated "state forest" and reserved for forest production and watershed protection.

Portions of 81-103, R.C.M. 1947:

The board shall exercise general authority, direction, and control over the care, management, and disposition of state lands, and subject to the investment authority of the board of investments, the funds arising from the leasing, use, sale, and disposition of those lands or otherwise coming under its administration. In the exercise of these powers, the guiding rule and principle is 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 the board shall administer this trust to secure the largest measure of legitimate and reasonable advantage to the state. The board shall manage these lands under the multiple-use management concept defined as: The management of all the various resources of the state lands so that they are utilized in that combination best meeting the needs of the people and the beneficiaries of the trust, making the most judicious use of the land for some or all of those resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions, that some land will be used for less than all of the resources, and harmonious and co-ordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources.

From the above it can be seen that state school trust lands are not public lands in the same sense as federal lands. Because the beneficiaries of the trust are the schools, the people of Montana benefit only indirectly.

Recent court rulings have interpreted the term "Support of Common Schools" as meaning that the trust



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-  SWAN RIVER ST
-  STATE FOREST
-  Forest Highway
-  Loop Road
-  County Boundary
-  Swan River Yaut
-  Picnic Camp Area
-  No Mountain Elevati
-  Perennial Stream
-  Intermittent Stre
-  Lakes
-  Wet Lands



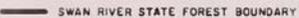
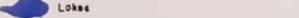
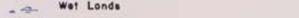
SWAN RIVER STATE FOREST

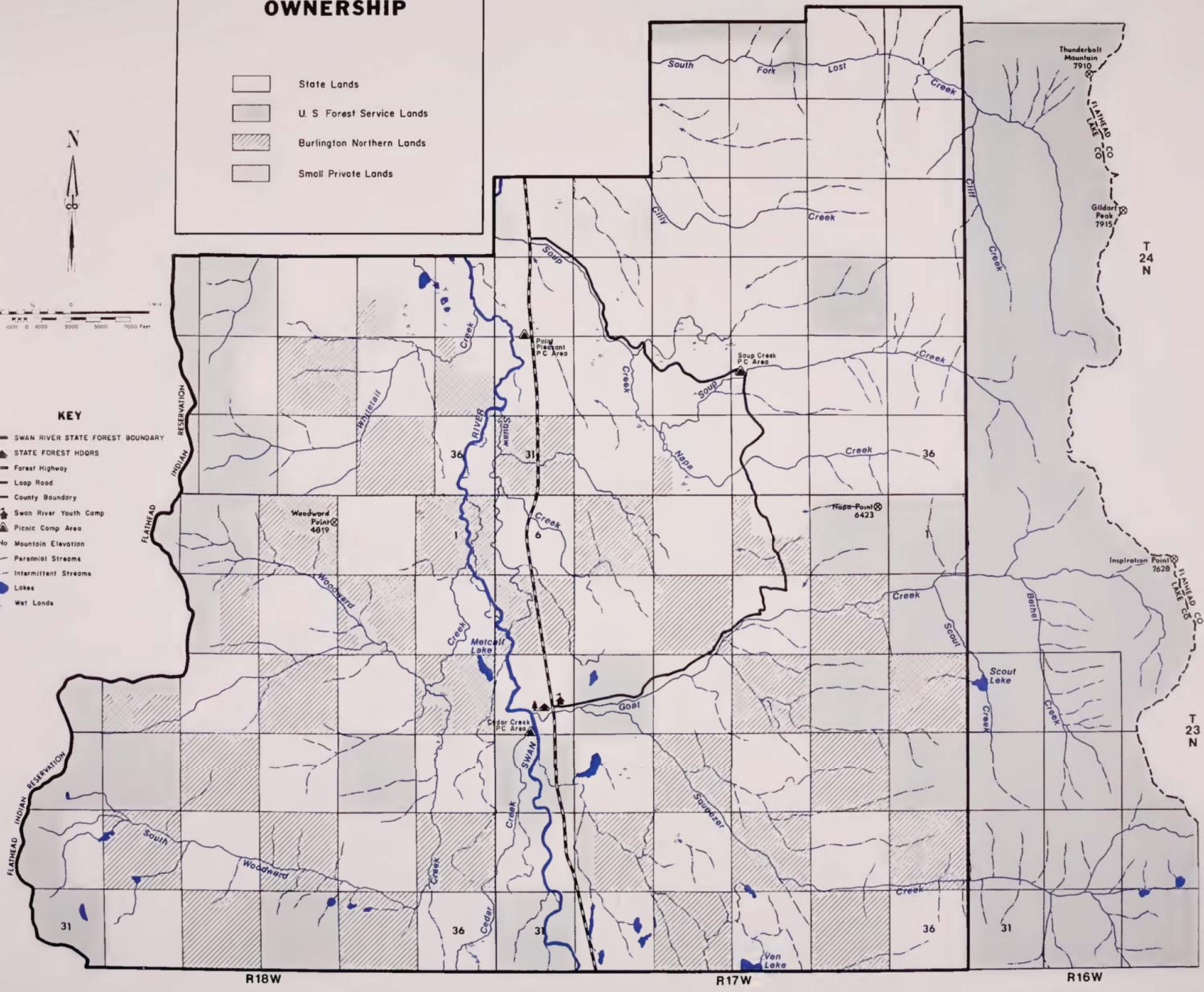
OWNERSHIP

-  State Lands
-  U. S. Forest Service Lands
-  Burlington Northern Lands
-  Small Private Lands



KEY

-  SWAN RIVER STATE FOREST BOUNDARY
-  STATE FOREST HDQRS
-  Forest Highway
-  Loop Road
-  County Boundary
-  Swan River Youth Camp
-  Picnic Comp Area
-  Mountain Elevation
-  Perennial Stream
-  Intermittent Stream
-  Lakes
-  Wet Lands



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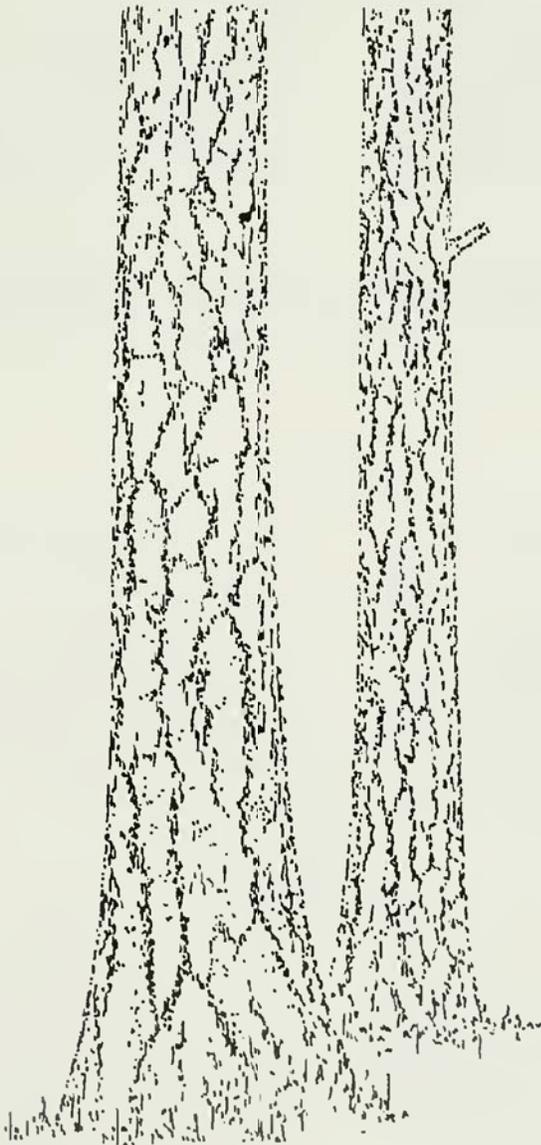
must be compensated in monetary terms for use of trust lands, and that trust lands may not be diverted from their income-producing function. Further, it is the duty of the trustees (State Land Board) to attempt to improve and maximize this income to the extent that any trust funds

expended are substantially free from the risk of loss. The practice of road construction and maintenance cost-sharing with other agencies is an example of an attempt to help maximize this income and jointly satisfy land management needs.

MEPA

Furthermore, the Montana Environmental Policy Act (MEPA) mandates that the adverse environmental consequences and alternatives to a planned action be considered prior to committing the state to a particular

course of action. The overall planning perspective required by MEPA mandates that all actions be approached from the viewpoint of minimizing adverse environmental consequences.



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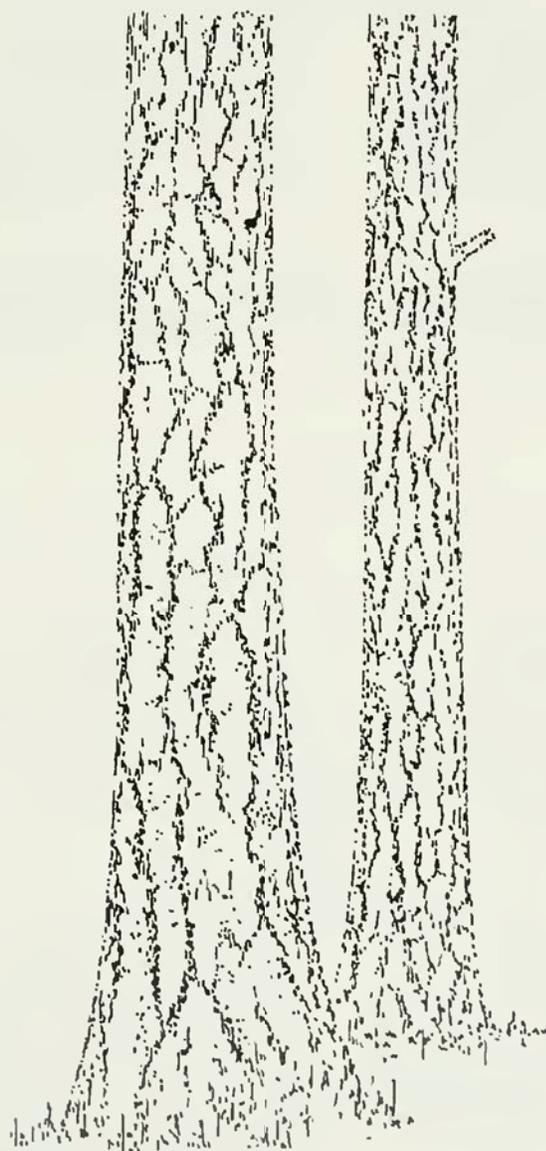
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IV. Existing Environment

INTRODUCTION

Generalized baseline information, the essential data on which future management direction is based, is included, in part, in this section. Information on the existing environment specific to the various manage-

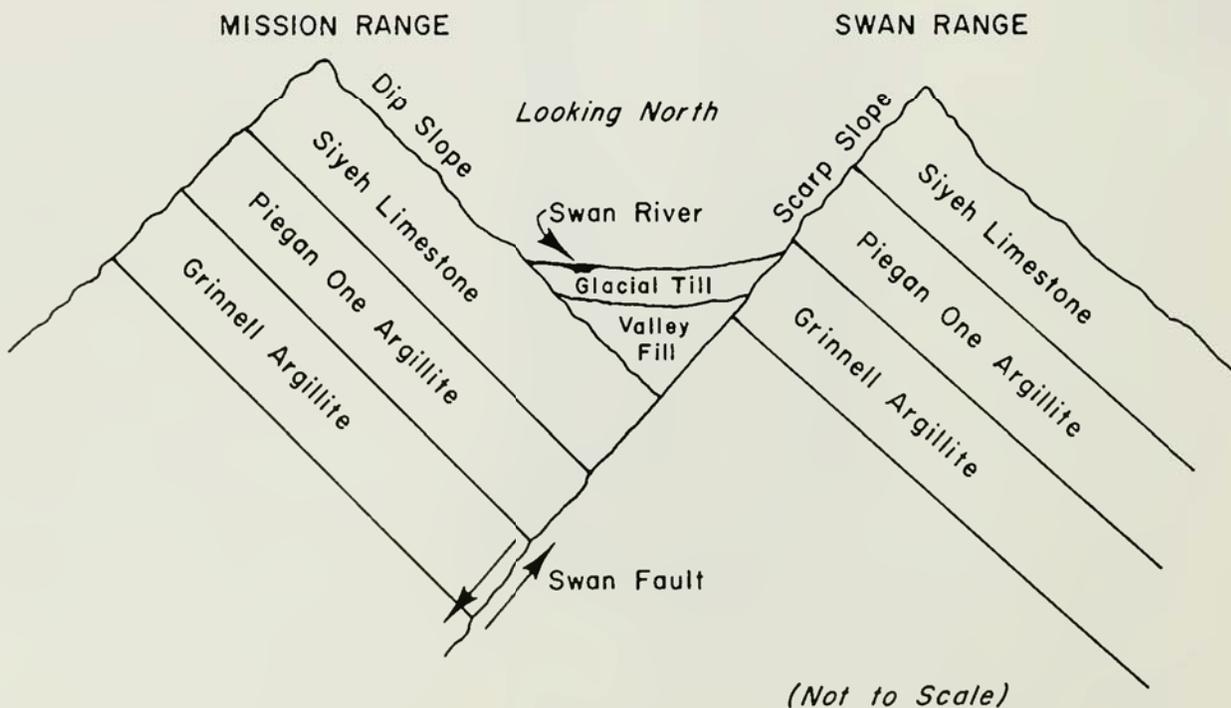
ment parameters is detailed within appropriate categories of the proposed management plan. This section deals only with the baseline information not fully discussed in the proposed plan.

AREA DESCRIPTION

The Swan River State Forest, composed of 69,714 acres of primarily state, Burlington Northern, and federal lands, is situated in Lake County between the Mission and Swan mountain ranges of northwestern Montana. As shown on page 3, Flathead Lake lies to the west across the Mission range, Glacier National Park is about 70 miles

to the north, and the main population and trade centers of Kalispell and Missoula are about 50 miles to the northwest and 100 miles to the southwest, respectively. Elevations within the state forest vary from 3,100 feet in the valley bottom at the northern boundary to just over 7,000 feet on the Swan and Mission ranges.

Figure 1 **GENERALIZED EAST-WEST GEOLOGICAL CROSS-SECTION OF THE SWAN VALLEY**



CLIMATE

The Swan Forest is a relatively wet area, with annual precipitation ranging from 25 inches on the valley floor to 70 inches at its higher elevations. Snow accounts for 60 to 75 percent of the annual precipitation, accumulating from two to three feet deep on the valley floor to snow-packs of 10 feet and more at higher elevations. Mean

annual temperatures are about 40°F in the spring and fall, 20°F in the winter, and 60°F in the summer, with snows and killing frosts possible every month of the year. Unlike many of the hotter and drier areas of western Montana, the Swan Forest is typically wet and cloud-covered, resulting in forested south and west slopes.

GEOLOGY

Dominant rock in the area is slightly metamorphosed Precambrian (over 600 million years old) sedimentary rocks of the Belt Supergroup, consisting of argillite, quartzite, and impure limestone. Although no outcrops were observed, fragments of igneous material are present in glacial deposits in the Swan Valley as well as in the South Woodward Creek drainage. No major mineral deposits are known to exist on the Swan Forest, however, minor commercially valuable deposits of calcite, sand, gravel, and peat have been identified.

Structurally, both the Mission and Swan Ranges are fault block mountains. The Swan Forest occupies the valley, as well as part of the dip slope of the Mission and the scarp slope of the Swan ranges, as shown in Figure 1. Uplift and displacement along the Swan fault during the late Tertiary and Quaternary geologic periods are

responsible for the two mountain ranges; valley fill sediments eroded from these higher elevations have created the five-to-six mile wide Swan Valley.

Glacial ice occupied the area numerous times in the past two million years. Many facets of the landscape (truncated spurs, cirques, hanging valleys, kettle ponds, and ground moraine or till) reflect this glacial influence. Surface geology consists primarily of glacial till (ice-deposited) and glacio-fluvial (meltwater-deposited) sediments, covering the entire valley floor and mantling most areas of the steeper side-slopes.

Compaction of glacial till, due to the great weight of the glacial ice, creates a special management problem. Compacted glacial till is less permeable, less biologically productive, and less conducive to vegetation re-establishment than other surface deposits.

SOILS

Soils present on the Swan River State Forest include glacial (both tills and glacial-fluvial), residual, alluvial, colluvial, organic and volcanic ash dominated soils.

Most soils of the Swan Forest have medium textures (loams and silt loams). Where fluvial action has occurred, sandy loams and loamy sands sometimes occur. Only a few sites have sufficient clay present to produce heavier textures (silty clay loams).

Soils are generally acidic in the surface horizons, due to the relatively high precipitation received and acidic coniferous forest litter. Soils derived from limestone will usually be less acidic with depth. Those residual soils derived from argillites and quartzites are often moderately acidic through the entire profile. Most soils have a 6-12 inch thick ash layer immediately below the organic litter, resulting from volcanic ash deposition following the recession of the glacial ice.

WATER RESOURCES

Within the planning area, Porcupine, Whitetail, Woodward, and Cedar Creek flow eastward from the Mission Range into the Swan River, which flows northward. Flowing westward from the Swan Range, South Lost, Cilly, Soup, Goat, and Squeezer Creeks are the tributary streams. Dozens of small lakes and many intermittent streams are found throughout the valley bottom. Water levels here depend upon seasonal ground water fluctuations.

Typical watershed gradients are shown in Figure 2 following page. Additional water resource information is contained in the watershed management section of the proposed plan (Section V). Sediment-discharge relationships, hydrographs, and watershed physical characteristics are included in Appendix D.

HUMAN ENVIRONMENT

ECONOMIC FACTORS

Population and Employment

No figures are available to determine the exact regional population. Estimated population of the Swan Valley above Swan Lake is 500-600 permanent residents. Most of the labor force is employed in forest-related activities, although several small local service establishments exist at Condon and Swan Lake. Government employment at the Condon Work Center (USFS) and the Swan Forest Youth Camp (state) is a major economic stimulus to the Swan region.

Personal Income

Per capita personal income for Lake County (in which the Swan Forest is located) averaged only about one-half that of Montana for the period 1950-1968.¹ This

relationship probably holds for the Swan Valley as well, due to high seasonal unemployment in forest-related jobs.

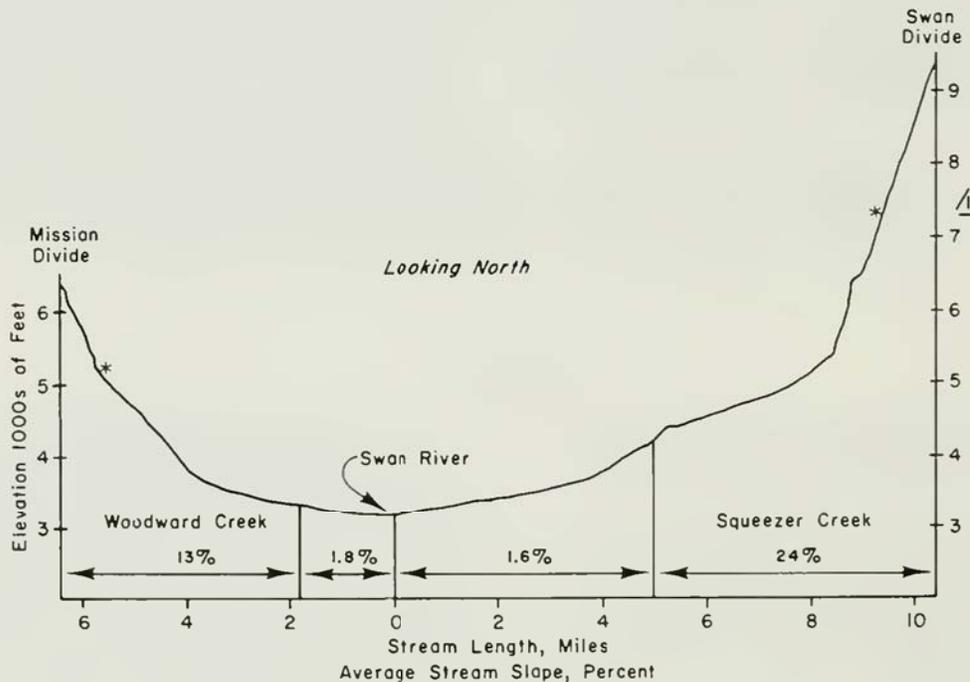
Agricultural and Industrial Production

Virtually no agricultural land exists in the Swan Forest or adjacent areas in the Swan Valley. Small-scale manufacturing includes several post and pole operations, a house-log manufacturer, a potting-soil processor, and a canoe fabrication establishment.

Local Tax Base and Revenues

The tax base is extremely narrow, consisting primarily of personal income and property taxes. Some revenue is generated in the Swan Valley for the county, through the return of 25 percent of the gross timber receipts on federal timberlands.

Figure 2 A COMPARISON OF WATERSHED GRADIENTS ON OPPOSITE SIDES OF THE SWAN VALLEY



* Start of Perennial Channel.

¹ Although parts of the Swan Range extend above 9,000 feet, areas in the Swan Forest only reach slightly above 7,000 feet.

SOCIAL FACTORS

Local Government Services

Several elementary schools are located in the Swan Valley; however, the nearest high schools are at Seeley Lake and Bigfork. Law enforcement is accomplished by one official, employed part-time.

Social Structure

The area in and around the Swan Forest is rather isolated and is rural-community oriented. Community functions center around activities requiring citizen involvement in the local schools and local government. The Swan Forest Youth Camp, discussed in the Introduction, has an important role in the social structure of the Swan area.

¹Montana Data Book.

V. Description of the Proposed Action

INTRODUCTION

The proposed action is the formal adoption of a management plan for the Swan River State Forest, which would generally set and coordinate both the type and level of uses of the forest.

To accomplish this, past management practices, direction and historical use of the forest have been comprehensively reviewed by a multi-disciplinary management team. These past management practices provide a preliminary basis for the proposed manage-

ment plan in its final form.

The plan, as set forth below, examines the existing situation and proposed future management direction for fire, fisheries, insects and diseases, domestic livestock, natural areas, recreation, special use management, timber management, transportation, watershed management and wildlife. Included within each category is a discussion of potential impacts the plan as recommended would have on the environment.

THE SWAN LAND USE PLANNING PROCESS

The land use planning process that has culminated in the proposed Swan Land Use Management Plan took place over three years of directed planning effort within the Division of Forestry. The purpose in undertaking this special planning effort was to systematically upgrade resource knowledge of the Swan River State Forest, to evaluate management practices and opportunities in light of existing management direction, and to set future management direction. In addition, the planning process attempted to identify deficiencies in resource knowledge so that these deficiencies could be remedied as opportunities arise.

A land-use plan can be only as good as the information on which it is based. This information must include the full spectrum of social, economic, and natural resource information, as well as a clearly conveyed management direction. To provide the needed natural resource information, existing resource data was used, as well as a variety of special inventory efforts. Examples of specific inventories completed to provide this needed information were hydrology, soils, geology, recreation, transportation systems, and vegetation.

Two of the inventories were integrated inventories, tying together several resources to assess the land management potential. These integrated inventories included the land-type inventory and the forest habitat-type inventory.

The land-type inventory combined soils and geology information and defined land types based on similar soils, geologic processes, and climax vegetation.

A complete description of the Swan land types, along with a map showing their location, is presented in Appendix A.

The habitat-type inventory, using the classification and techniques of Pfister et al. (1974), identified the productive potential of the land and the differing environmental situations found on the forest. A summary of the habitat types, their productivity, location, and management implications can be found in Appendix B.

The information obtained from the above inventories, as well as the experience gained over the years in managing the Swan Forest, were then used to develop Resource Potential Units (RPU) for state ownership on the forest. The RPU classification, as developed by Division of Forestry personnel, groups land into units which respond similarly to environmental influences. It then rates them in terms of their relative management potential.

Basically, the classification was developed by combining a consideration of the land-type constraints developed by the land-type survey, relative productivity as indicated by the habitat-type survey, and review of other inventoried resource information and existing technological limitations (on a site-by-site basis). A more detailed description of the RPU classification and map is presented in Appendix C.

Finally, with this information, the land use planning team was able to designate specific forest management zones. These zones will be used to guide forest develop-

ment activities, by setting general management direction for each zone.

Because timber management-related activities have been the principal activity changing the character of the Swan Forest, and will be the major force for change under the proposed management plan, these forest

management zones have been described in relation to timber harvesting activities. As a result, a detailed description of these forest management zones, along with a map showing their location, is presented in the section entitled "Timber Management".

TIMBER MANAGEMENT

PLANNED MANAGEMENT DIRECTION

Commercial Forest Management Zone — Areas of significant forest management potential and manageable through existing technology. This zone comprises 28,437 acres. Management actions will:

- Fully regulate stand age-classes during the first 105-year regulatory rotation (create an even distribution of age classes from 1 to 100 years throughout the forest, assuming a 5-year period for the regenerating of harvested areas).
- Harvest approximately 240 acres of overmature forest stands each year, using proper silvicultural methods. (The projected average annual volume of forest products produced from these acres, based on available data, is approximately 3.6 million board feet — Scribner Rule).¹
- Apply intermediate thinning to approximately 210 acres annually to stands which are overstocked and in need of thinning.
- Favor a diversity of tree species, including the full range of predominant commercial species now present in the forest.
- Manage the Swan Highway Corridor on State Lands to maintain a general mature-stand appearance. (For purposes of this plan, the corridor is defined as generally occupying a strip of land 150 feet on both sides of the highway center line).

Commercial Forest Management Deferred Zone — Areas of significant forest management potential, but where economic/technical constraints presently exist. The Deferred Zone totals 9,562 acres. Management actions will:

- Defer timber harvesting activities until such time as the existing economic/technical constraints can be satisfactorily overcome.

Non-commercial Forest Management Zone — Areas of very low forest management potential. This zone totals 1,026 acres, and is found entirely on the eastern side of

the Swan Forest. Management action will:

- Exclude timber harvesting from the zone.

EXISTING SITUATION AS IT RELATES TO THE PLAN

Management Zones

State-owned land within the Swan Forest has been classified according to its management potential, as indicated by the Resource Potential Unit definition. This classification, in turn, has been expressed as three broad management zones.

These zones are briefly described in Table 1 in terms of area, respective percentage of total area, and estimates of timber volume. A map of the management zones appears on the following page.

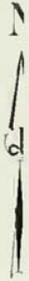
The Commercial Forest Management Zone consists largely of land classified as Resource Potential Unit 1A, lands of the highest productivity and manageability. The remainder of the zone was classified as 17 percent to 3A, 2 percent to 2A, and 1 percent to 4A.

The deferred management zone was classified in the Resource Potential Unit 1-4B range, with the majority in the 3 and 4B units. The non-commercial zone is located entirely on the Swan face and is classified as Resource Potential Unit 5.

Calculation Of Annual Harvest

The planned annual harvest acreage (240 acres/year) was calculated by using information regarding areas of existing stand conditions, as delineated on the Forest Condition Class Map. Although this information is appropriate for many purposes, it lacks much data critical to good management planning — including reliable forest volume information, age-class data, and growth-mortality information. As such, due to practical necessity, estimates of desirable cutting rotations were made solely on forest condition data, without reliable measurements of age classes and volume. These latter items were estimated from the forest condition information.

¹The annual harvest projection of 3.6 million board feet is only an accurate projection through the first 78 years of the regulatory rotation, or until the overmature age class has been completely harvested. At that point, harvesting will begin in the present 40-60 year age group and will probably yield a higher annual harvest.



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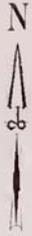
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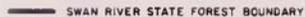
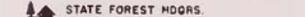
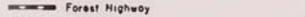
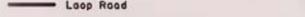
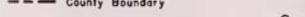
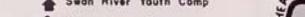
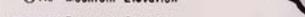
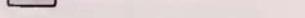
SWAN RIVER STATE FOREST

MANAGEMENT ZONES

-  Commercial Forest Management Zones
-  Commercial Forest Management Deferred Zones
-  Non-Commercial Forest Management Zones
-  Special Management Units



KEY

-  SWAN RIVER STATE FOREST BOUNDARY
-  STATE FOREST HQRS.
-  Forest Highway
-  Loop Road
-  County Boundary
-  Swan River Youth Camp
-  Picnic Camp Area
-  Mountain Elevation
-  Perennial Streams
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-  State Forest Land
-  Federal B Private Land

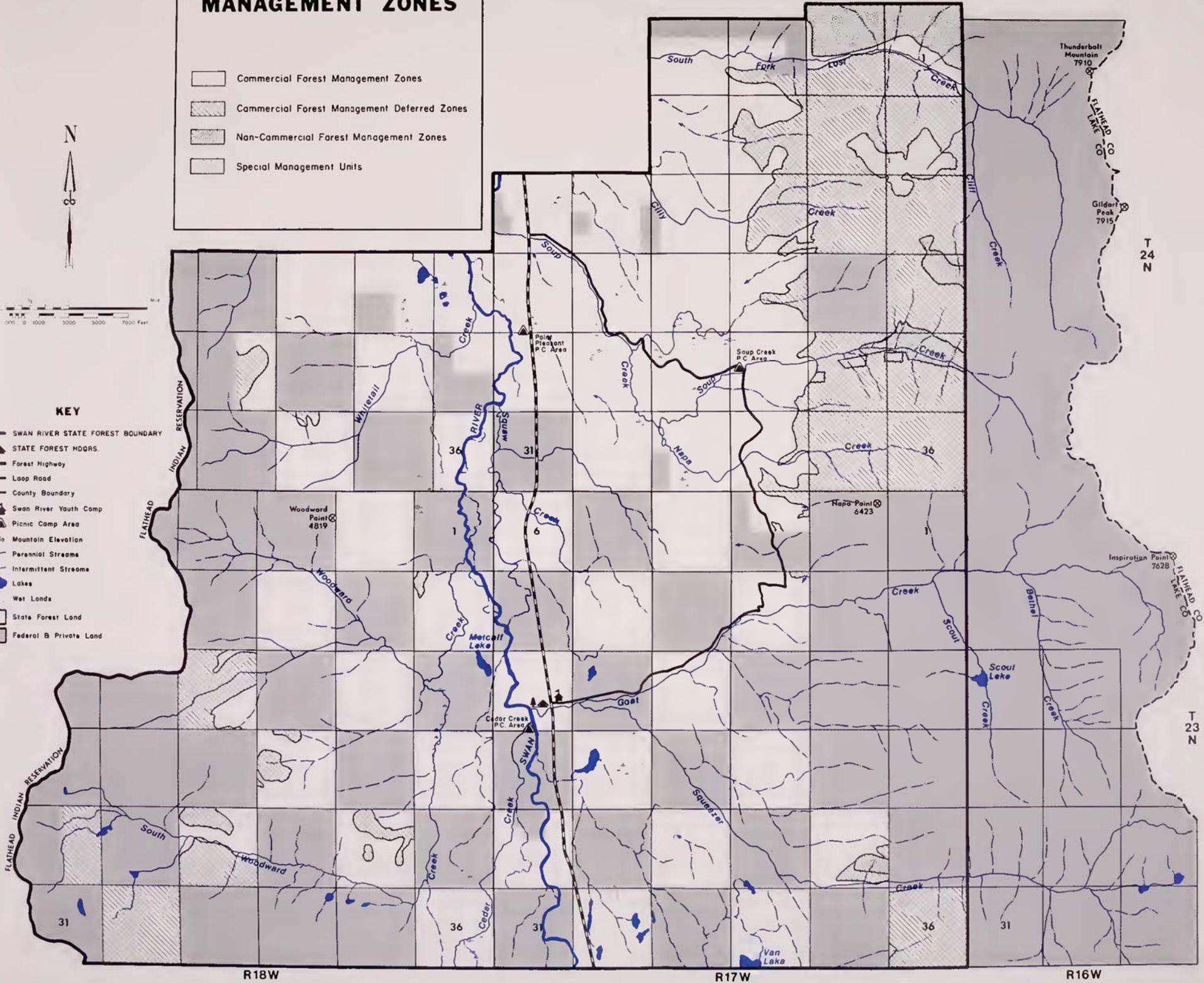


TABLE 1. DESCRIPTION OF FOREST MANAGEMENT ZONES BY TOTAL AREA & TIMBER VOLUME

	Acreage	Area% of Total	Merchantable Volume* M Bd. Ft.	Merchantable Volume* M Cu. Ft.
Commercial Forest Management Zone	28,437.10	73.0	311,768.60	16,977.54
Commercial Forest Management Deferred Zone	9,449.34	24.4	75,133.75	5,503.44
Non-Commercial Fores Management Zone	1,026.34	2.6	2,880.15	443.50
TOTALS	38,912.78	100.00	389,782.50	22,924.48

*The board-feet Scribner scale represents volume of those trees 11 inches in diameter at breast height and over, down to a 5-inch merchantable top. The cubic-foot scale represents the volumes of those trees from 5 inches up to, but not including, 11 inches at breast height.

For purposes of obtaining an estimate of age-class distribution, stand-size class ranges (as included in the Stand Condition Classification Map) were assigned corresponding age-class ranges, based on professional experience of DNRC foresters. This information was then used to produce estimated stand data (Table 2, as well as estimated area of each age class (Figure 3).

As can be seen in Figure 3, the vast majority of timber presently existing on the forest is in the mature and overmature age class. These stands represent a "high risk" category. They are in a state of decline, are growing relatively slowly, and are highly susceptible to disease, fire, and natural mortality.

Under the plan as recommended, this primarily

mature-and-overmature forest would be gradually altered, becoming a forest having an equal distribution of age classes. Although the trees generally reach maturity at 60 years of age, a 100-year rotation was chosen because it meets the goal of an equal distribution of age classes, while at the same time it balances the tradeoffs between costs and benefits to other resource values. As can be seen in Figure 5, the eventual goal is a straight linear age-class distribution.

The data in Table 2 apply to the Commercial Forest Management Zone, minus the area and volumes in the Swan Highway Corridor and planned streambank management strips. Because it was assumed that it may take up to five-years to regenerate a harvested stand,

TABLE 2. STAND DATA

Age Classes, Years	Acreage	Percentage Age Class is of Total Area	Percentage Adjusted to a 105-year period	Vol. Million Bd. Ft.	Vol. Million* Cu. Ft.
Over 60 (Mature & Overmature)	18,916.50	74.2	77.9	281.56	14,380
40-60	1,545.31	6.1	6.4	1.50	1,085
1-40	2,694.59	10.6	11.1	---	---
-5	2,325.04**	9.1	9.6	---	---
Total	25,481.44	100.0	105.0	283.06	15,465

*Refer to Table 1.

**Acreage that will probably be regenerated within 5 years (see text).

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*Refer to Table 1.

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the two-year rotation was extended by a five-year period. Column four, then, represents the age-class percentages after they have been adjusted to a 105-year period.

Using straight area control (ignoring stand volume and net growth) a regulatory period of approximately 95 years would be established, using column 4 of Table 2 ($77.9 + 6.4 + 11.1 = 95.4$ years). During those years, approximately 240 acres would be harvested annually (25,481 acres divided by 105 years regulatory rotation = 242 acres). Unfortunately, in the absence of an updated timber inventory, this annual harvest figure is probably accurate for 10 years at the most.

Timber Stand Improvement

Precommercial and commercial thinning in the pole and seedling-sapling size classes would be based on an approximate 20-year cutting cycle.¹ Annual thinning acreage for commercial pole size class would be approximately 77 acres (1,545 acres divided by 20 years = 77 acres/year) (see Table 2, Column 2). Seedling-sapling size classes (precommercial) represent 135 acres (2,694 acres divided by 20 years). The total acreage thinned annually therefore would be approximately 210 acres. Again, the thinning figures, in the absence of an inventory, represent an estimate only.

Timber stand improvement needs have in the past been aided by the issuance of Christmas tree and wood cutting permits. Activities allowed by these permits are designed to complement other ongoing and planned forest management measures; these activities would continue under the plan as recommended.

ENVIRONMENTAL IMPACTS

Forest products involving 3.6 million board feet of merchantable timber will be removed annually from existing stands in the Commercial Forest Zone. In this process, natural plant succession will be altered by selectively manipulating forest stands to earlier and more productive successional stages. The predominance of overmature and decadent forest stands will be significantly reduced over time, and replaced by healthy, vigorous trees and forest stands. Animal and plant species benefited by earlier successional stages are anticipated to increase at the expense of those species favored by later successional stages.

In addition, each year an estimated 210 acres of existing overstocked stands will be commercially or

precommercially thinned. When thinning or logging slash buildup requires piling and burning, some air pollution will result. This pollution will be minimized by burning when weather conditions permit good smoke dispersal.

Construction of permanent and temporary roads and skid trails in the Commercial Forest Zone, as well as general surface disruption by logging site preparation for regeneration, will result in disruption of the soil. With the exception of permanent roads, most of which are already in place, the soil disruption is usually temporary and tends to aid natural regeneration by simulating natural regenerative ecological agents (fire, windthrow, etc.).

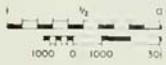
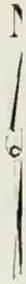
While impacts on the physical environment directly related to timber management are not expected in the commercial deferred and non-commercial zones, impacts similar to those experienced in the commercial zone can be expected if unusual circumstances warrant harvest in these zones. Normally, timber harvest in those zones would be salvage operations after extensive fire, insect and disease outbreaks, or wind damage.

The local economy is heavily dependent on logging and other forest-related employment. Stabilization of the annual harvest on the Swan Forest will have a partial effect on economic and employment stability, although harvest activities on non-state lands within the Swan region will also significantly influence the local economy. No significant increases in population, the local tax base, social services, or other socio-economic factors are expected solely as a result of timber management activities on the Swan Forest.

It should be pointed out that using the rate of age-class regulation stated above (242 acres/year) will probably result in some economic losses to the state during the late stages of the 95-year regulatory period. This will be caused by the eventual death of some of the mature and overmature stands.²

An alternative might be to harvest the mature and overmature stand at a faster rate. This alternative would possibly prevent economic losses to the state in the form of wood fiber; however, it may carry adverse environmental cost such as watershed degradation and damage to other important values (see Section VI). A forest inventory is badly needed to provide base data concerning present forest growth and death rates, species composition and stand volumes.

¹The forest is actually managed on a continued re-entry basis, however, every 20 years all stands in the above-stated size classes will be entered at least on time for stand improvement work.



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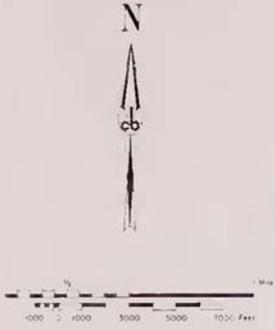
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SWAN RIVER STATE FOREST

STAND CONDITION CLASSIFICATION

COVER TYPE	
WP	Western White Pine
P	Ponderosa Pine
L	Western Larch
D	Douglas Fir
DL	Douglas Fir and Western Larch
S	Engelmann Spruce and White Spruce
LP	Lodgepole Pine
WH	Western Hemlock
TF	Grand Fir, Alpine Fir, White Fir (True Fir)
C	Western Red Cedar
WLP	White Bark Pine, Lumber Pine
Co	Cottonwoods
Oh	Willow, Aspen, Birch and Other Hardwoods
Stand Size	
9	Sawtimber Stand 12" DBH & Larger
8	Pole Timber Stand 5" to 11" DBH
7	Seedling - Sapling Stand 0" to 5" DBH
6	Non-stocked Stand
STOCKING - (Open density or Number of Trees)	
W	Well Stocked 70%
M	Medium Stocked 40-69%
P	Poorly Stocked 10-39%
NC	Non-commercial Forest Land
NP	Non-forest Land



KEY

- SWAN RIVER STATE FOREST BOUNDARY
- STATE FOREST DOORS
- Forest Highway
- Loop Road
- County Boundary
- Swan River Youth Camp
- Picnic Camp Area
- Mountain Elevation
- Perennial Streams
- Intermittent Streams
- Lakes
- Wet Lands
- State Forest Land
- Federal & Private Land

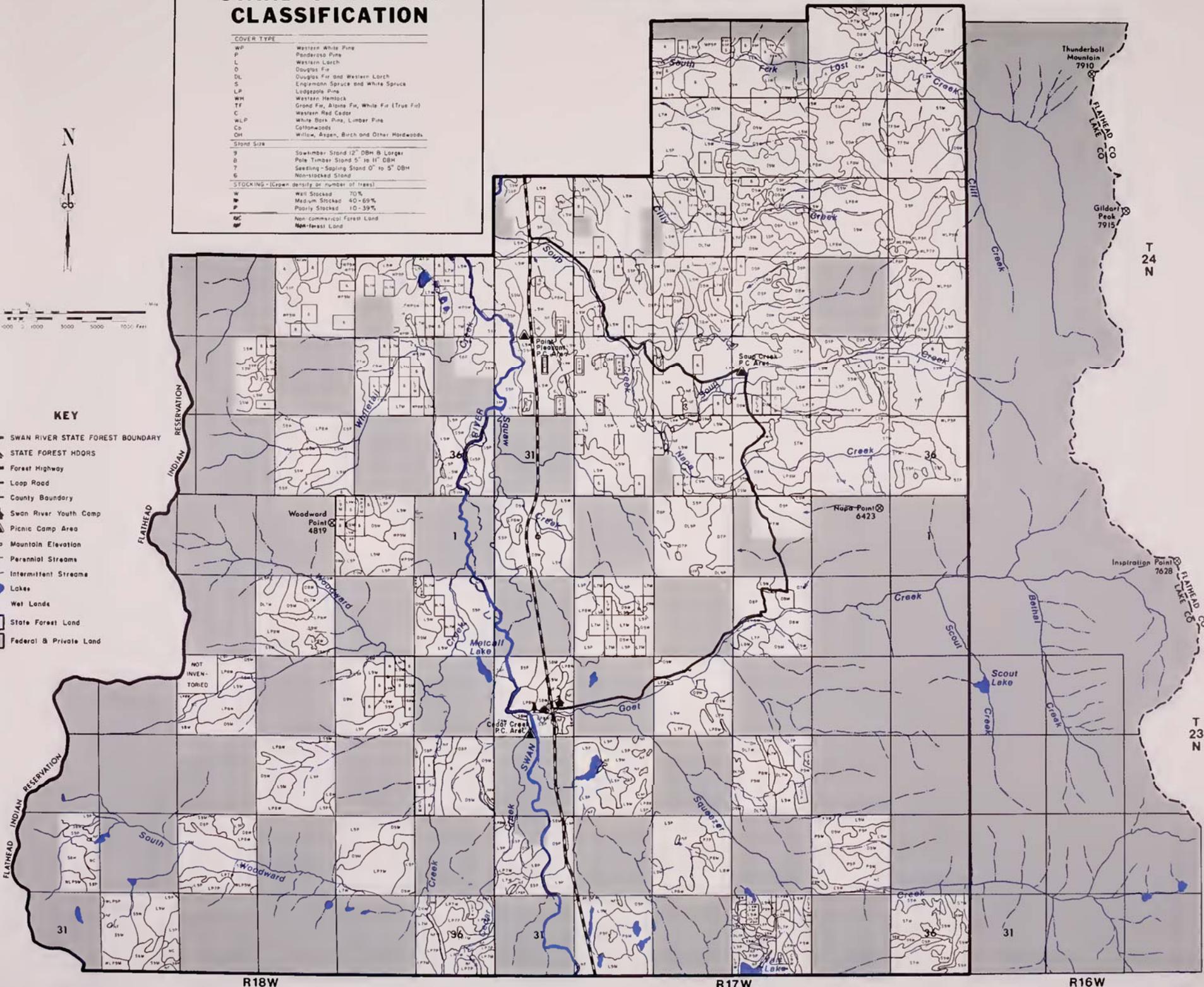


Figure 3 AGE CLASSES AND AREA OF PRESENT FOREST

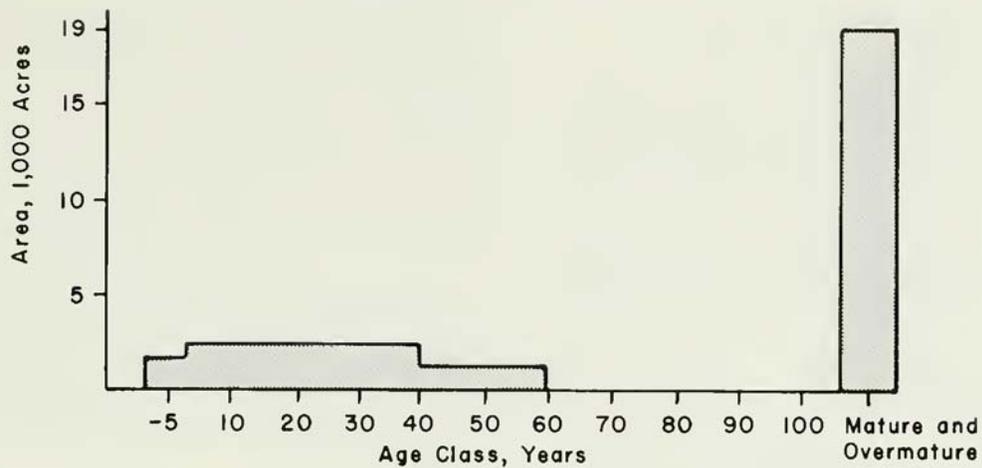


Figure 4 PRESENT FOREST IN RELATION TO DESIRED ROTATION

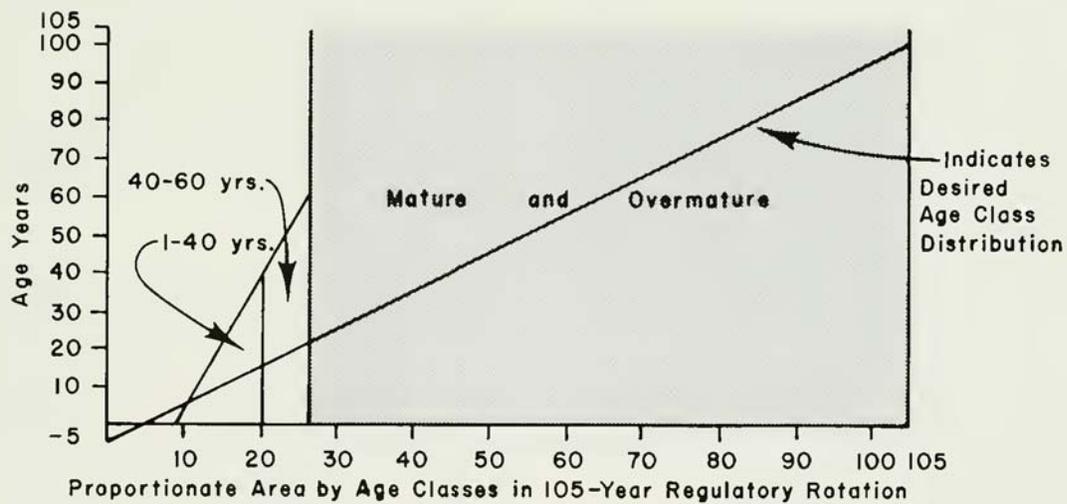


Figure 5 FOREST AFTER 95.4 YEAR REGULATORY ROTATION

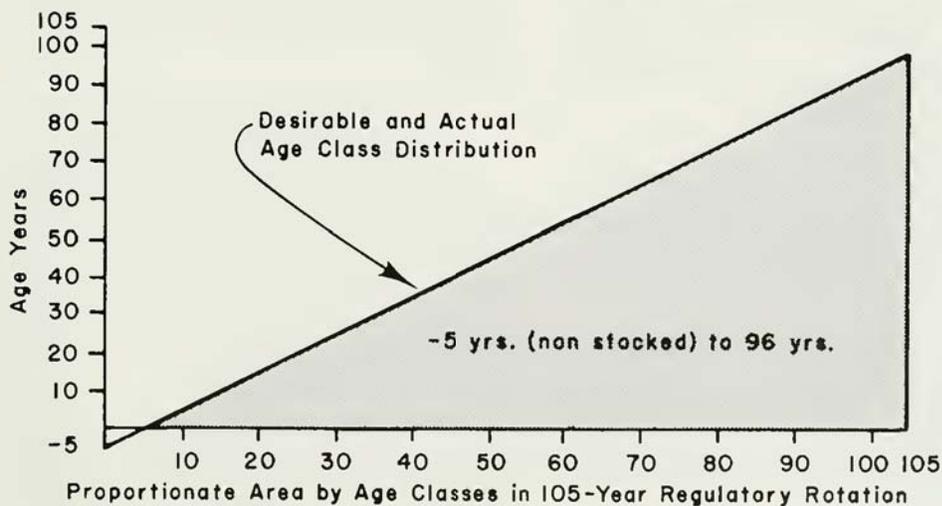


Figure 3 AGE CLASSES AND AREA OF PRESENT FOREST

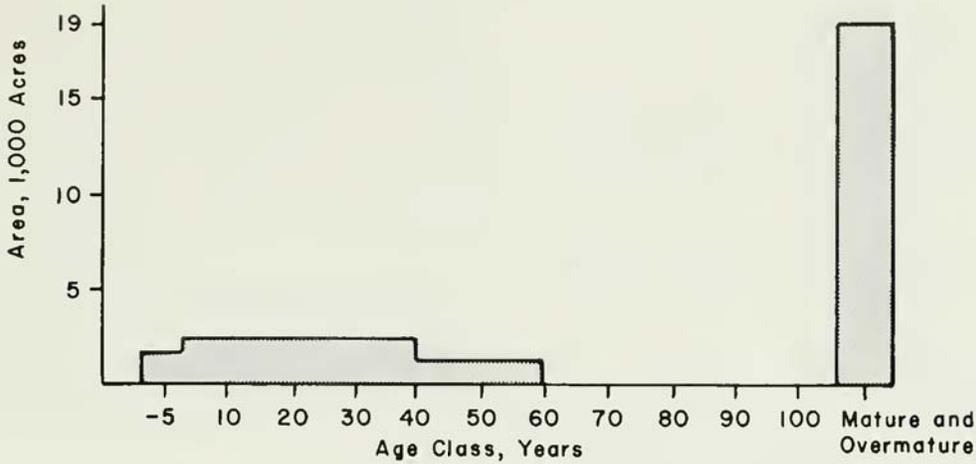


Figure 4 PRESENT FOREST IN RELATION TO DESIRED ROTATION

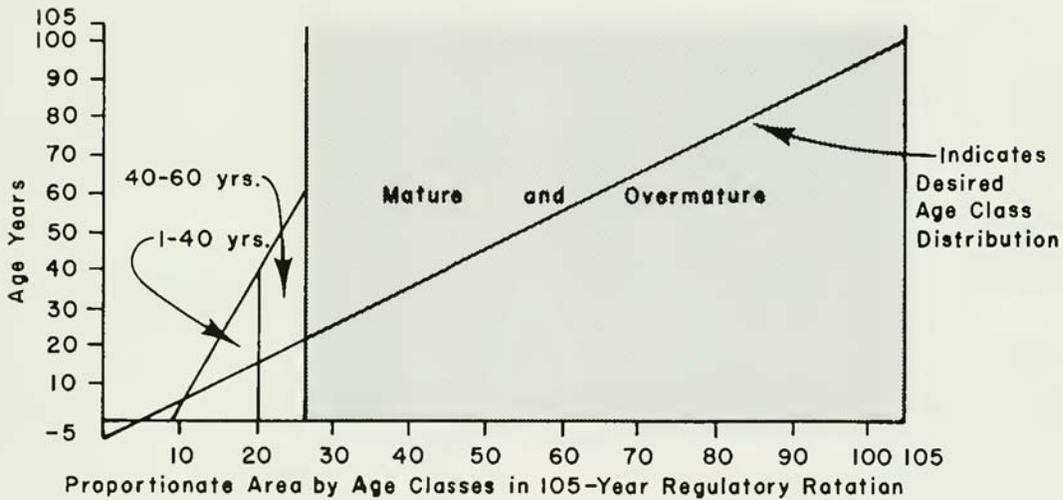
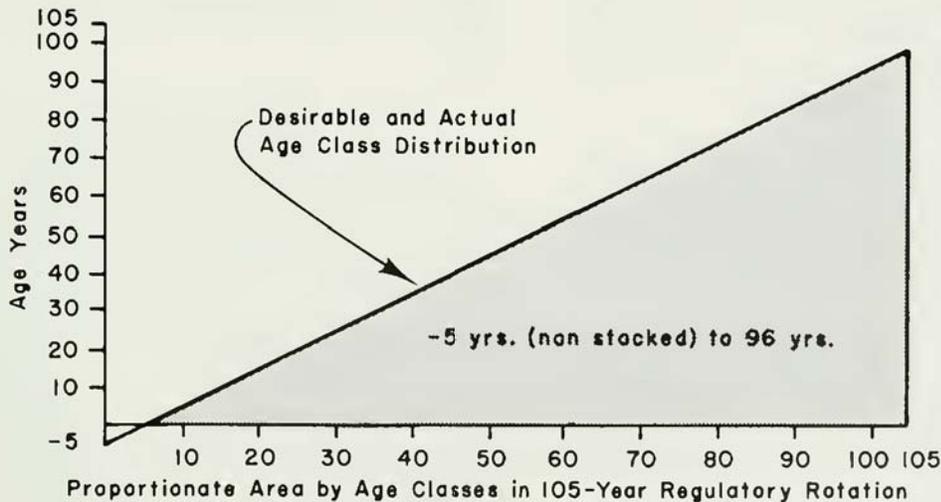


Figure 5 FOREST AFTER 95.4 YEAR REGULATORY ROTATION



FIRE MANAGEMENT

PLANNED MANAGEMENT DIRECTION

Management actions will:

- Provide direct and immediate suppression on all wildfires occurring within the boundaries of the Swan River State Forest, consistent with the physical and economic capabilities of the State of Montana.
- Continue a fire hazard reduction program, directed at effectively treating logging slash and dead timber.
- Plan and execute prescribed burning efforts in a manner consistent with the Clean Air Act of Montana.
- Continue to administer an aggressive program of wildfire prevention, through both the cooperative public education program and other ongoing forest management activities.

MANAGEMENT ZONES

In situations where more than one fire is burning simultaneously on state-owned lands within the forest boundary, the fire(s) burning in the Commercial Forest Management Zone will normally receive the highest priority for suppression action. (Exceptions to this may include the potential loss of life or unusually high property values associated with a fire(s) burning in one of the other management zones or on intermingled ownership).

The second highest priority will normally be given to fire(s) burning within the Commercial Forest Management-Deferred Zone. The lowest priority for suppression action will be given to fire(s) burning in the Non-Commercial Forest Management Zone.

The fire hazard reduction program will be applied throughout the Forest; however, activities within the Commercial Forest Management-Deferred and the Non-Commercial Forest Management Zones will be restricted to hazards created by insect-and-disease-killed or wind-damaged timber.

Prescribed burning may be used in any of the three zones, depending on management needs and conditions.

Fire prevention activities through signs, fire danger announcements, and other on-going management activities will be most intense in the Commercial Forest Management Zone; however, they will be carried out as needed throughout the forest.

EXISTING SITUATION AS IT RELATES TO THE PLAN

The potential for a major wildfire in the Swan Forest is very real. The predominantly overmature forest stands provide an excellent fuel source during any year in which usual moisture patterns do not prevail.

During the period from 1965 to 1975, the Swan Forest experienced a total of 45 wildfires. Thirty-five of these were caused by lightning and the remaining 10 were man-caused. During this period, the Goat Creek Fire (1973) was the only major burn, reaching 600 acres before it was controlled (see Fire History Map). This fire provides a good example of the degree of explosiveness reached during a dry year in the forest.

A cache of assorted firefighting equipment is maintained by the Division of Forestry in the forest at strategic locations. One fire lookout tower (Napa Point) is maintained and manned as needed throughout the fire season. The Department also patrols the forest by air during the fire season, in conjunction with its other fire protection areas.

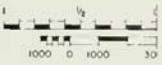
The Department's fire suppression forces in the Swan Forest are aided by a highly trained "Hot Shot" fire crew. The crew, which is maintained by the Swan River Youth Forest Camp, represents an important part of the youth development program. The crew is trained and equipped by the Division of Forestry, and is available to other areas of the state on an emergency basis when local fire conditions allow. The Youth Forest Camp also plays important roles in other fire management activities in the Swan Forest, such as fire prevention and fire suppression.

Fire prevention in the Swan Forest, as in all Montana forest lands, is an important and continuous job. The Smokey Bear and Keep Montana Green fire prevention programs are carried out in cooperation with the area schools, other agencies, and landowners. Primary travel routes are posted with the current fire danger rating throughout the fire season, to keep visitors alert to existing conditions. Fire prevention considerations are incorporated into every planned resource management action within the Swan Forest.

The three State-owned picnic areas located in the forest were developed primarily as fire prevention tools. These areas serve to concentrate visitors in the forest, and have thus been a factor in preventing man-caused fires.

The treatment of debris from harvesting operations, wind-killed, or insect-and-disease-killed timber stands is a critical feature of the fire prevention program. Debris from these sources can become dry and produce an extremely combustible fuel supply. Specifications for slash (logging debris) treatment are included in all timber sales and salvage contracts. In addition, the Division of Forestry does a considerable amount of hazard reduction work each year with the help of the Youth Forest Camp.

Prescribed burning represents an important part of the fire hazard reduction efforts in the Swan Forest. This management tool is applied either by burning piled slash



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SWAN RIVER STATE FOREST

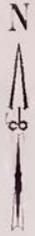
FIRE HISTORY

MAJOR FIRES 1923 TO 1975

- ***** Napa 1923
- Napa 1936
- ▲▲▲▲ Woodward 1934
- ◆◆◆◆ Goat Creek 1973

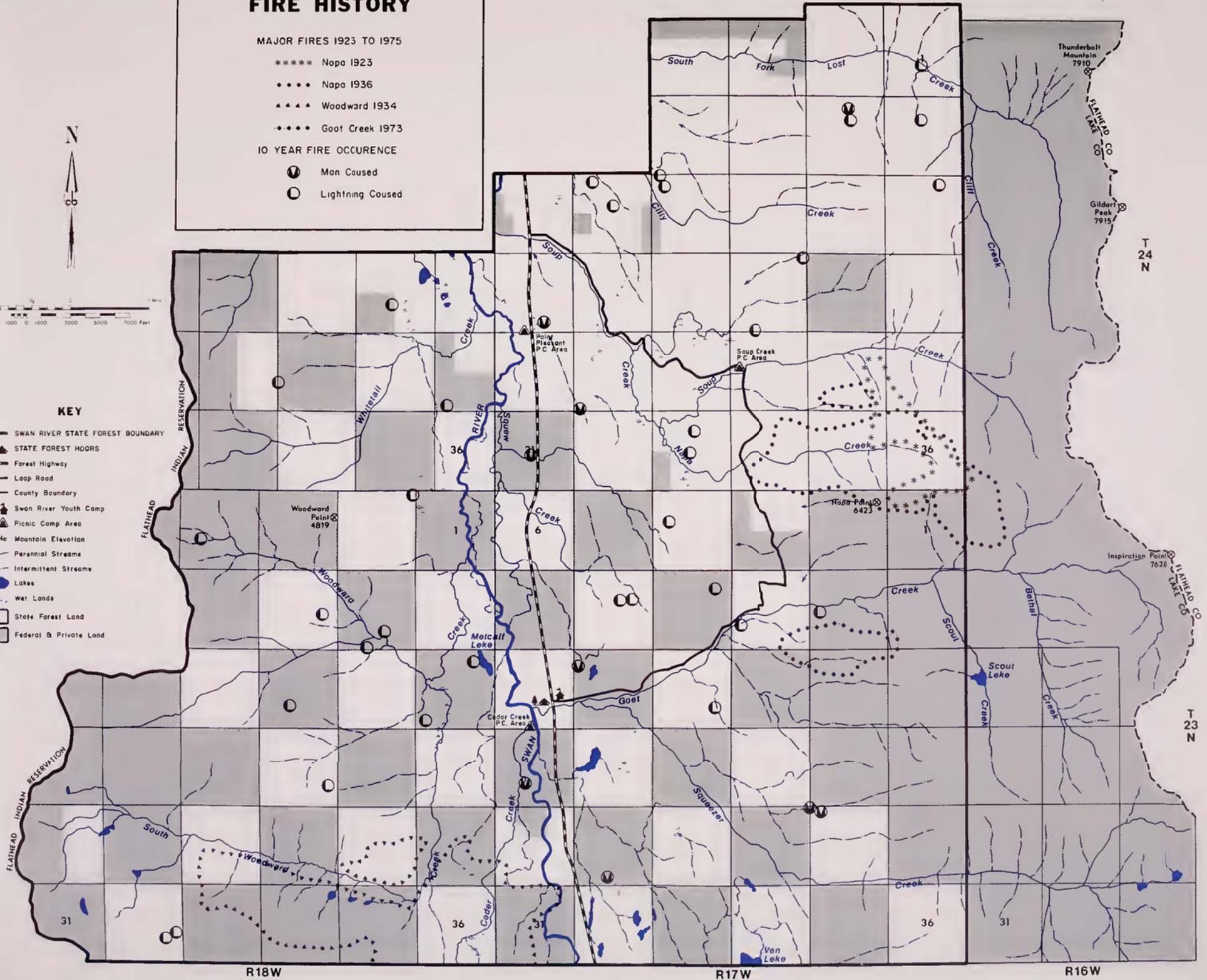
10 YEAR FIRE OCCURENCE

- ⊙ Man Caused
- Lightning Couased



KEY

- SWAN RIVER STATE FOREST BOUNDARY
- ▲ STATE FOREST HQRS
- Forest Highway
- Loop Road
- - - County Boundary
- ⚡ Swan River Youth Camp
- ▲ Picnic Camp Area
- ⊙ Mountain Elevation
- Perennial Stream
- - - Intermittent Stream
- Lakes
- Wet Lands
- State Forest Land
- Federal & Private Land



or by broadcast burning (the burning of a relatively large area of scattered slash). The Division of Forestry attempts to conduct all of its controlled burning activities under environmentally and atmospherically favorable conditions, and in accordance with the Clean Air Act of Montana.¹ Detailed burning plans may be prepared for relatively complex jobs, and informal plans serve the more routine situations.

ENVIRONMENTAL IMPACTS

Wildfire, by recycling overmature forest stands, has been a natural ecological force for change in the Swan Forest. An aggressive fire prevention and suppression program decreases this natural role of fire, and creates a need to deal with the resultant buildup of forest fuels. In the Commercial Forest Management and Commercial

Forest Management Deferred Zones, timber management activities can be substituted in some degree to reduce this buildup of forest fuels, as well as prepare forest sites to allow the initiation of new stands.

The adverse impacts of controlling wildfire include a loss of the historical benefits associated with fire (natural regeneration), as well as the irreversible and irretrievable commitment of resources (machines, fuel, etc.) actually used to fight the fires. However, the beneficial impacts of controlling wildfire include the minimization of life and property loss, as well as the loss of valuable timber stands. As such, the impacts of controlling wildfire are considered here to be far out-weighted by the social and economic advantages of prescribed burning and controlled wildfire.

FISHERIES MANAGEMENT

PLANNED MANAGEMENT DIRECTION

- Management actions will:
- Maintain the current very high level of water quality, through sound streambank management and silvicultural programs.
 - Maintain the existing diversity of fishery habitat, through a coordinated management program between responsible agencies, forest landowners, and the general public.
 - Plan, coordinate, and execute actions that influence fishery habitat in such a manner as to improve or to cause minimal adverse impact on fish populations.
 - Actively cooperate with other agencies and landowners in the Swan Forest, as well as Montana’s universities, to develop needed fishery management information prior to specific actions.

MANAGEMENT ZONES

Maintenance of aquatic habitats will be specifically addressed in assessing individual and cumulative actions within the commercial timber management zone. Until management actions in the Commercial Forest-Deferred and Non-Commercial Forest Zones are proposed which would jeopardize the quality of existing aquatic habitats, natural maintenance of aquatic systems will be continued.

EXISTING SITUATION AS IT RELATES TO THE PLAN

Most of the tributaries of the Swan River flowing through the Swan Forest support populations of game fish. The most important fishery waters are South Fork

Lost, Soup, Goat, Squeezer, Woodward, and Cedar Creeks.

Populations are composed of both native and introduced species, including rainbow trout and eastern brook trout (introduced), as well as westslope cutthroat, Dolly Varden, and whitefish (native). Several varieties of non-game fish, including squaw fish, peamouth, and various suckers, are found in the river itself.

Brook trout were the first of the introduced species, being planted prior to 1938. Rainbow trout were introduced into the upper Swan River in 1938, and plants continued into the 1960’s. During the 1960’s, plants averaged 40,000 catchable fish. However, these plants were discontinued in 1966, after a Montana Department of Fish and Game study showed that the program was detrimental to the native cutthroat population, through hybridization. Brook trout have become well-established in the lower portions of the tributaries, where the stream gradient is not as steep as in the upper portions. In 1967, imprint plants (initial plantings) of several thousand westslope cutthroat trout fry were begun in an attempt to replenish spawning runs of that species. Success of this program has not yet been evaluated.

Streams in the Swan Forest are generally in good condition and they provide beneficial habitat features such as undercut banks, log debris, and overhanging brush. Food supply is provided basically by aquatic insects, including the caddis fly, stone fly, and mayfly, as well as by some terrestrial insects, such as ants.

Squeezer, Woodward, Goat, and South Fork Lost Creeks are important spawning grounds for Dolly Varden migrating up the river from Swan Lake. They are

¹The Open Burning Restrictions of the Montana Administrative Codes 16-2.14(1)-S1490.



or by broadcast burning (the burning of a relatively large area of scattered slash). The Division of Forestry attempts to conduct all of its controlled burning activities under environmentally and atmospherically favorable conditions, and in accordance with the Clean Air Act of Montana.¹ Detailed burning plans may be prepared for relatively complex jobs, and informal plans serve the more routine situations.

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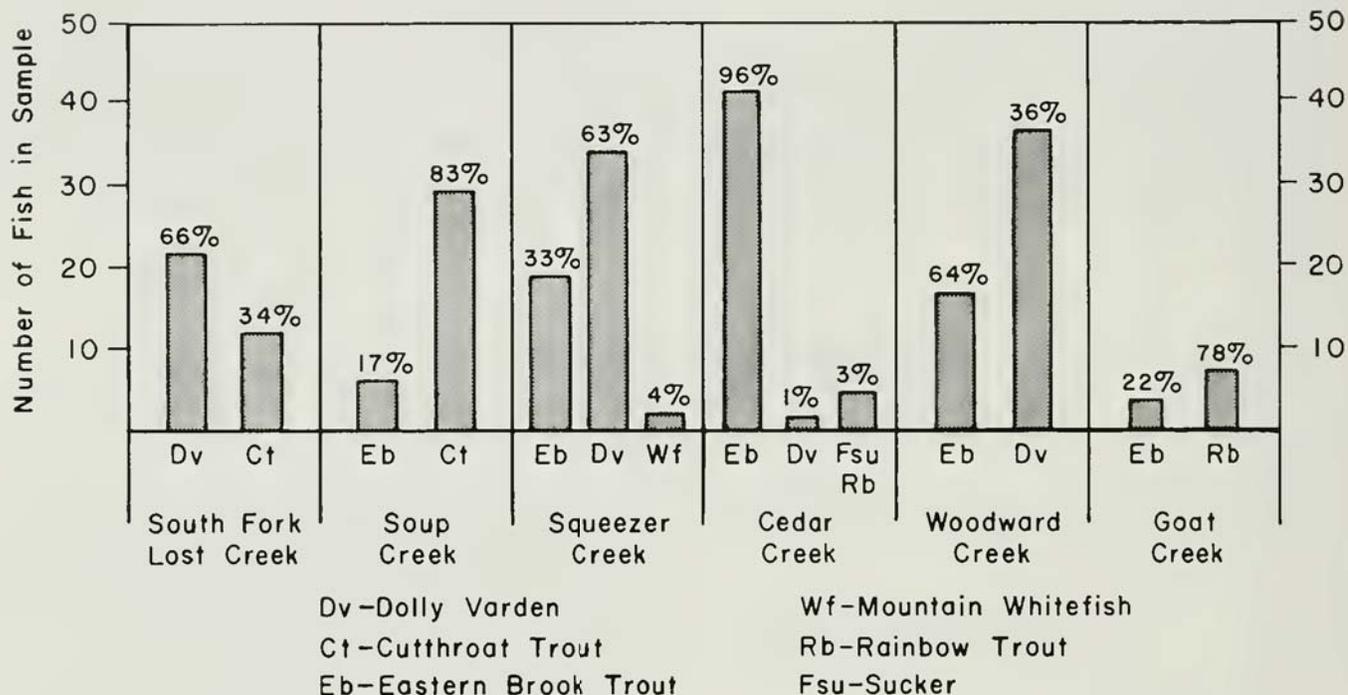
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¹The Open Burning Restrictions of the Montana Administrative Codes 16-2.14(1)-S1490.

Figure 6 SPECIES COMPOSITION OF FISH POPULATIONS* FROM SWAN RIVER TRIBUTARY STREAMS

1971



*Electrofishing gear was used to sample 600 foot sections of the streams.

present in the tributaries from May or June until fall. In addition to the Dolly Varden, a portion of the cutthroat population also migrates to and from Swan Lake, spawning in the streams.

Figure 6 illustrates data from a fish population survey of Swan River tributaries conducted by the Montana Department of Fish and Game in 1971.

The bars in Figure 6 correspond directly to the number of fish sampled for that species. The figure at the top of the bar represents the percentage of each species within its respective total sample. For example, the sample in South Fork Lost Creek produced 23 Dolly Varden and 12 cutthroat trout, for a total sample of 35 fish. The Dolly Varden represented 66 percent and the cutthroat 34 percent of the total.

ENVIRONMENTAL IMPACTS

Under the planned management direction, very few adverse environmental impacts would be expected to occur on the fisheries resource. Only minor changes in water quality, quantity, and streambed conditions can be expected to occur.

Favorable impacts resulting from the plan include maintenance of existing fisheries, together with removal of physical barriers where this can be accomplished in connection with other ongoing management actions. Adverse impacts resulting from such activities would be minimized in accordance with prior consultation with and recommendations of the Department of Fish and Game.

INSECTS AND DISEASE MANAGEMENT

PLANNED MANAGEMENT DIRECTION

Management actions will:

- Continue the annual assessment of insect and disease activity within the Swan Forest.
- Continue to take immediate action to prevent or check the buildup of tree-killing insect and/or disease populations before epidemic levels are reached — within the physical and economic capability of the Department of Natural Resources and Conservation.
- Actively work with other agencies and land-owners to develop new and improved insect and disease control techniques.
- Give preference to silvicultural and biological control measures to control insect and disease problems where such measures are feasible.

MANAGEMENT ZONES

The annual insect and disease assessment program will be conducted in all three management zones of the forest.

The highest priority for control measures will be given to insect or disease conditions occurring within the Commercial Forest Management Zone. Second and third priority will be given to the Commercial Forest Management-Deferred and Non-Commercial Management Zones respectively.

EXISTING SITUATION AS IT RELATES TO THE PLAN

The potential for insect or disease outbreaks in the Swan Forest has become serious, especially in light of the predominantly overmature forest stands which are in generally weakened condition and highly susceptible to attack.

The past 15 years have seen the threats of three potentially serious insect outbreaks checked by immediate control action (the infected trees were harvested) taken by DNRC, the U.S. Forest Service and Burlington Northern, Inc. These outbreaks involved the mountain pine beetle, (*Dendroctonus ponderosae*), the spruce bark beetle (*Dendroctonus engelmannii*), and the most serious of the three, the Douglas fir bark beetle (*Dendroctonus pseudotsugae*).

The present insect and disease situation is described as endemic (population levels are normal). However, damage levels can change significantly from year to year, especially in the case of insects. Annual aerial detection surveys, in conjunction with field surveillance, should give sufficient warning for future outbreaks to be managed with minimal losses to all resource values.

Light-to-moderate defoliation by western spruce budworm (*Choristoneura fumiferona*) occurred on approximately 23,000 acres of Douglas fir, true firs, and spruce on the Swan Forest in 1975. Budworm feeding at

these levels has an impact on the growth of defoliated trees, with some minimal top-kill and branch dieback. Historically, in Montana, the most severe budworm damage has been in the drier Douglas fir stands on or near the Continental Divide. However, if budworm populations increase on the Swan Forest to levels capable of causing heavy defoliation, which would result in significant mortality, top-kill, branch dieback, and growth reduction, effective control programs would be initiated to prevent these losses.

About 1,900 acres of western larch on the Swan Forest suffered light-to-moderate defoliation by larch casebearer (*Coleophora laricella* Hbn.). Some growth loss is undoubtedly associated with such infestation levels, and research studies are currently underway by the U.S. Forest Service to determine these impacts. Almost all the western larch type on the Swan Forest is infested to some degree with larch casebearer, but only these stands at the lowest elevations along the northern boundary of the forest have been significantly affected. Because of the higher altitudes of most larch stands on the Swan Forest, larch casebearer will probably not become a serious problem.

There is presently little activity by tree-killing bark beetles on the Swan Forest. Shorter growing rotation would probably eliminate most of the impact of Douglas fir beetle, which is a problem predominantly in mature and overmature Douglas fir stands. Ponderosa pine losses to mountain pine beetle will be kept minimal by thinning procedures. The spruce bark beetle has been fairly inactive in recent years on the forest.

Douglas fir tussock moth (*Orgyia pseudotsugata*) populations have reached outbreak proportions in small spot infestations in a number of past occasions in north-western Montana. The most recent of these consisted of approximately 10,000 acres of defoliation with some mortality in the Rocky Point area north of Polson, as well as near Ravalli and St. Ignatius. A 1975 survey indicated a potential for infestation of Douglas fir tussock moth on the Swan Forest at some future time.

White pine blister rust (*Cronartium ribicola*) currently infects scattered trees throughout the western white pine type on the Swan Forest. These scattered losses can be expected to continue although increasing rust resistance has been noted in seedlings from infected stands. Consideration is being given to converting the small remaining areas of western white pine to other species or to future restocking of these areas with genetically resistant seedlings that are currently being developed and tested.

The larch type on the Swan Forest is infected to some degree by larch dwarf mistletoe (*Arceuthobium laricis*). Some areas of Douglas fir are also infected with Douglas fir mistletoe (*Arceuthobium douglasii*). Dwarf mistletoe

causes a significant reduction in diameter and height growth, and some mortality. Preventing the spread of dwarf mistletoe infection is possible through silvicultural procedures involving the removal of infected trees and by prescribed burning. As stands on the Swan Forest come under more intensive management, damage by dwarf mistletoe will probably be reduced to acceptable levels.

ENVIRONMENTAL IMPACTS

Control measures for insect or disease conditions occurring within any of the three management zones will be prescribed on the basis of thorough individual evaluations. Such evaluations will work systematically to favor beneficial environmental impacts (primarily the

prevention of healthy timber from becoming infested), while reducing adverse impacts from the control actions themselves.

Because preference will be given to silvicultural and biological control measures in dealing with insect and disease problems, environmental impacts associated with chemical control measures should be limited under the proposed management plan.

Silvicultural treatments to control insects and disease generally will have some impacts. These treatments may range from selective removal of affected trees, to clearcuts, to prescribed burning. For this reason, and due to the unpredictable nature of insect and disease outbreaks, impacts of treatment methods must be individually assessed and mitigated.

LIVESTOCK USE MANAGEMENT

PLANNED MANAGEMENT DIRECTION

Management actions will:

- Identify and inventory areas of grazing potential.
- Consider applications for grazing permits, as they are received.
- Consider cooperative grazing arrangements with adjacent landowners, where grazing potential exists and where management can be enhanced by such arrangements, giving due consideration to other resource values.

MANAGEMENT ZONES

Inventory of lands having grazing potential will proceed in conjunction with ongoing forest inventories. This is a practical necessity due to a lack of funding allocations for forest uses not concerned with timber production or watershed management. Since most timber management efforts will be concentrated in the Commercial Forest Zone, evaluation of grazing potential will therefore also be centered on this zone. Grazing potential in the other management zones will be assessed if and when timber inventories or harvest activities proceed, or by a separate evaluation to rule on an application for a grazing permit.

EXISTING SITUATION AS IT RELATES TO THE PLAN

An insignificant amount of natural grazing land occurs within the Swan Forest. Most grazing opportunities are transitory, resulting from such disturbances as timber harvest or fire. Usable forage normally increases dramatically during the first few years following disturbance, and then begins a gradual decline as the forest canopy closes in and dominates the site. Production of forbs and grasses decreases, while livestock movement is restricted by trees, blowdown and brush.

The life expectancy of range created in this manner is usually no more than 20 years. Considering the usual small increase during the first one or two years as well as the decline towards the end, the period of effectively good grazing may be only 10-12 years. Thus, forest grazing opportunities, which tend to vary directly with disturbance activity, periodically change location.

Although a quantitative study of grazing potential on the Swan Forest is not presently available, preliminary surveys indicate the existence of a moderate amount of usable forage, almost wholly confined to areas of recent timber harvest, with a small amount in stream bottoms and a few scattered natural meadows.

Historically, grazing potential on the Swan Forest has not been utilized because of:

1. **Accessibility and Location** — Much of the forage potential has been either too scattered or too inaccessible to be effectively utilized.
2. **Demand** — There are presently no major livestock operators in the vicinity of the Swan Forest. However, based on the recent population trend from large urban areas to rural areas, it is reasonable to assume that this situation may change in the not-too-distant future. Interest in grazing may develop.
3. **Investment** — The cost of improvements (such as fencing) sometimes necessary for herd management may be prohibitive, considering the transitory nature of the range and the limited carrying capacity in each area.
4. **Terrain** — Some of the forage potential is located on topography not suited for livestock or where natural barriers limit access to water.

Small-scale hay cutting on a few of the more accessible meadows constitutes the only use on the forest for livestock interests at this time. However, if interest in grazing develops at some future time each application will be evaluated and considered under such criteria as revenue, administrative costs, effects on other resource values, and feasibility.

The best opportunity for use of the forage resource appears to be in those areas where a cooperative grazing arrangement can be effectively negotiated between adjacent landowners. Such an agreement may allow for a good return on investment costs, if the areas selected contain a relatively constant and stable grazing potential. In addition, such agreements could serve to reduce or eliminate trespass problems and would tend to simplify administration.

Although it would be useful to obtain an accurate inventory of the present grazing potential, the dynamic

nature of the forest could very well render it obsolete in 5-10 years. A reasonable alternative would be to assess and evaluate each request for use on an independent basis.

ENVIRONMENTAL IMPACTS

Very few adverse environmental impacts are expected to result from the rather limited grazing opportunities which presently exist on the forest. Conflicts with wildlife over use of available browse, trampling damage in reforested areas and increasing weed-control problems on the forest are possible adverse environmental impacts of the proposed plan. However, these problems are generally considered to be insignificant, as they are correctable by good range management techniques. Possible beneficial impacts of grazing would include income to the school trust as well as possible thinning of seedlings in overstocked natural regeneration areas.

NATURAL AREAS MANAGEMENT

PLANNED MANAGEMENT DIRECTION

Management activities will:

- Examine all state land ownership within the Swan Forest possessing significant scenic, educational, scientific, biological and/or geologic values, for possible inclusion under the Montana Natural Areas Act.
- Prior to any individual management action on state lands which will preclude or significantly modify the possibility of designation of a Natural Area, make a recommendation as to whether the area possesses qualifying natural values.
- Until more specific guidelines for the identification of Natural Areas are presented, guide natural area activities by sites formally nominated by the public as natural areas, and by the general natural area guidance established by the Montana Natural Areas Committee.

MANAGEMENT ZONES

Within the Commercial Forest Zone, potential natural areas will be withheld from development until their qualities can be thoroughly assessed and a decision made regarding formal designation. Consequently no degradation of the natural qualities within these areas should occur, and future management options will remain open. Management of the other zones consists essentially of protection of existing resource values. Therefore, assessment of natural area potential in these zones is not critical at this time, and will generally not proceed without specific, formal natural area nominations.

EXISTING SITUATION AS IT RELATES TO THE PLAN

Under the Natural Areas Act of 1974, undisturbed areas of significant scientific, educational, or cultural value may be set aside and protected from human development. The Natural Areas Act is administered by the Montana Department of State Lands, with advisory powers given to DNRC and a special natural areas advisory council. The Montana Natural Area Committee is a technical advisory committee set up to advise on the suitability of areas for their inclusion in a Natural Area System for Montana. Natural Areas are formally examined by the DSL after nomination by any person or agency in Montana, and the State Land Board has the responsibility of final approval. To date no natural areas have been created on state or private lands under this act.

At the present time, only one area on the Swan Forest has been formally nominated by the public for natural area designation. This area, which also includes the area encompassed by the East Point Pleasant Timber Sale, was reviewed by the Department prior to the May 27, 1975, sale for possible natural area designation. The rationale for this decision relied on the fact that a large area of this forest habitat-type is included in the Coram Natural Area (federal), and the low priority (third priority in a three-priority classification system) set on this forest habitat-type by the Montana Natural Area Committee.

At the present time, a systematic formal inventory for possible natural areas has not been conducted on the forest; however, in the course of the inventories carried out in connection with the plan, several natural area possibilities became apparent. Although these areas

have not been formally nominated for possible designation, no actions contemplated under this plan will change their present status. At any time proposed action would significantly alter their natural qualities, the areas affected will be formally evaluated by DNRC and possibly proposed as natural areas.

An Attorney General's Opinion of July 7, 1976, will have a serious detrimental effect on the establishment of qualified natural areas. This opinion held that the state must compensate the school trust in money for the full appraised market value of any school trust lands designated as, or exchanged for, natural areas. At the present time, no funding exists to compensate the trust if the designation of natural areas is to occur. Unless sources of funding through the Legislature, through public subscription, or some other means are made available, the formal establishment of natural areas on the Swan Forest appears to be considerably slowed. Until

such time as this question is resolved, DNRC plans to identify and protect possible natural areas, while investigating possible methods to reimburse the school trust.

ENVIRONMENTAL IMPACTS

Because the establishment of natural areas results in very little change in natural conditions, and is considered an action having a beneficial impact on man's environment, no significant adverse environmental impacts are anticipated. Prior to the designation of a natural area all possible environmental impacts (biological, social, economic, etc.) are considered. In addition, the proposed area is publicly reviewed on the basis of the actual need for the area and its possible impact on adjacent areas. If a natural area is created, it is managed under a plan specifically designed to maximize beneficial environmental impacts while minimizing adverse ones.

RECREATION MANAGEMENT

PLANNED MANAGEMENT DIRECTION

Management action will:

- Continue to provide various forms of dispersed recreational activities. New and expanded trails and trail heads may be added to the trail system when needs and opportunities become apparent.
- Continued to provide and expand picnic areas and campgrounds, based on needs and opportunities.
- Maintain and manage that portion of the Swan Highway Corridor on state property within the forest, with primary emphasis on its visual resource. Excellent background viewing opportunities exist along the Swan Highway Corridor, and viewing facilities will be provided where possible and appropriate.
- Carefully plan all management actions which may affect aesthetic values to incorporate sound landscape management techniques.
- Inform the public of the dangers of boating on the Swan River.
- Where possible, undertake timber harvest and fire control activities and related road and trail development to complement or to protect recreation values.

MANAGEMENT ZONES

Because the majority of the recreational use on the forest occurs in the Commercial Forest Management Zone, including a large portion of the major travel routes and all three of the picnic areas, this zone will receive recreational management priority.

The Commercial Forest Management Deferred Zone is also accessed by the road and trail system, and it receives dispersed recreational use. The non-commercial Management Zone receives some hiking activity and other dispersed uses. Planned management of these two zones contemplates no action which would jeopardize existing recreational use.

EXISTING SITUATION AS IT RELATES TO THE PLAN

Popular recreational activities in the forest include hunting, fishing, skiing, snowmobiling, and picnicking. In recent years, there has been a tremendous increase in big game hunting in the forest. This increased hunting pressure can be attributed, at least in part, to improved road access accompanying the intensified management of the forest.

Fishing activity has increased steadily over the years, and is expected to continue along the same trend. The Swan River, Van Lake, and Metcalf Lake have been the favorite fishing spots. Smaller creeks such as Goat, Soup, Whitetail, and Woodward have received considerably less activity, as have most of the unnamed pothole lakes — probably due to the dense brush and other understory brush along their banks.

Snowmobiling grew rapidly in popularity in the Swan Valley between 1967 and 1973. The last several years, however, have witnessed a gradual stabilization. Snowmobiling has been voluntarily confined largely to meadows and unplowed secondary roads, and has resulted in no known significant resource management problems.

Picnicking has always been a popular activity on the

forest, with facilities provided at three locations. These are: Cedar Creek, 7 units; Point Pleasant, 4 units; and Soup Creek, 7 units (refer to any of the foldout maps for location of picnic areas). The latter two areas were originally built by the Civilian Conservation Corps in the middle 1930's. All three are designed primarily to accommodate picnickers, although they are used heavily by hunters each fall for camping purposes. Facilities available at these areas include tables, fireplaces, out-houses, and litter barrels. The areas are regularly maintained by Youth Forest Camp crews under Division of Forestry supervision. All of the picnic area equipment is provided by the Youth Forest Camp's carpentry program.

Recreation activities currently ranked as receiving moderate use include berry-picking, boating, cross-country skiing, and trail biking.

Boating has become popular in several of the larger lakes of the forest. Boating on the Swan River, however, is dangerous due to numerous debris barriers. Cross-country skiing has taken on a new interest in recent years. The topography and snowfall of the valley is very conducive to the sport. Trail biking is another activity that has taken on new interest in recent years. The motorbikers have voluntarily restricted most of their activity to the primary and secondary road system of the forest.

Activities ranked as receiving low recreational use include bicycling, trapping, swimming and hiking.

Auto touring has long been recognized as one of the heaviest recreational uses of the Swan Forest and the entire Swan Valley, and is often done in conjunction with other recreational pursuits. The valley displays a

spectacular array of beautiful sights during any season of the year. The heaviest travelled route of the valley is the Swan Highway (State Highway 209), which has been acclaimed by many as one of the most scenic drives in the state.

Other activities currently low in popularity include mushroom hunting, photography and nature studies. Certain areas of the forest produce numerous mushrooms and attract a number of mushroom pickers. The Swan Forest is a natural studio for the amateur or professional photographer — and the diversity of plant and animal life in the forest provide extremely good potential for nature studies.

ENVIRONMENTAL IMPACTS

Both beneficial and adverse environmental impacts are expected to result from the many varied forms of recreation pursued on the forest. Vandalism, an increased incidence of man-caused fires, and some damage to forest improvements (roads, camping facilities, etc.) and vegetation is expected under the proposed plan. Due to the nature of these actions, quantification of the possible adverse impacts is not possible.

The major beneficial environmental impact of the plan is the provision for the recreationist to experience and appreciate a wide variety of forest values. Hopefully, this experience will create respect for the forest and understanding of man's relationship to it, ultimately resulting in favorable environmental impacts on it.

As roadbuilding occurs in the commercial forest zone, vehicle access and recreation use will increase. Hunting pressure will increase, and conflicts between various users are likely to occur.

SPECIAL USE MANAGEMENT

PLANNED MANAGEMENT DIRECTION

Management actions will:

- Authorize special uses and the continuation of permits which are compatible with other existing uses of adjacent state, federal, or private land.
- Evaluate each application for a special use authorization on a case-by-case basis and to grant such authorization when in the best long-term interest of the school trust, the state and the people of Montana.

MANAGEMENT ZONES

The planned management direction stated for special uses will apply equally to all three management zones.

EXISTING SITUATION AS IT RELATES TO THE PLAN

Permits, licenses and easements are granted by the Division of Forestry, upon State Land Board approval, to regulate special uses on state forest lands. Permits are normally used to regulate land-use activities such as removal of peat, sand and gravel. Licenses are normally issued for 5-to-10 year periods for cabin sites, grazing, or special developments providing a public service such as stores, ski areas, or other commercial developments. Permanent or temporary easements are normally issued for roads, communication or electric transmission lines, and pipelines.

Special uses presently occurring on the Swan Forest are peat permits, sand and gravel permits, and road, telephone, and powerline easements. For the most part,

these special use authorizations are short-term and temporary in nature. No cabin site leases exist on the forest.

During the past few years, with the increasing development and use of intermingled and adjacent forest lands, the number of requests for special use authorizations has increased. Under a policy established in 1958, the State Land Board has not permitted the issuance of permanent easements on roads or easement exchanges with owners of intermingled land. However, at the present time DNRC is studying, at the request of the State Land Board, the question of granting

permanent road easements on the forest. DNRC has been specifically directed to evaluate policy alternatives, assess the environmental impacts of these alternatives, and report to the Board by October 1, 1977.

ENVIRONMENTAL IMPACTS

Environmental impacts of special use authorizations must be evaluated on a case-by-case basis. Prior to the approval of these individual actions the biological, social, and economic impacts are considered; this assessment then serves as the basis for authorizing the use.

TRANSPORTATION MANAGEMENT

PLANNED MANAGEMENT DIRECTION

Management actions will:

- Continue the high level of cooperative road construction, maintenance and use necessary for maintaining an efficient transportation system.
- Carefully plan all construction of new forest access roads to meet the multiple-use access needs while minimizing any adverse environmental impacts.
- Continue maintenance of state-owned roadways, based on the annual maintenance survey, available state maintenance funds, and cooperator use (use of state roadway by cooperating landowners).
- Continue to provide proportionate share of maintenance to cooperator-owned roadway for management purposes.
- Provide for temporary or permanent road closures. These may be employed on any state-owned forest access road, based on sound environmental and/or economic justification. On cooperatively used roads, concurrence of the other landowners would first be obtained.
- Continue to maintain, mark, and expand (if the need becomes apparent and opportunities are present) the existing state-owned recreational and fire trail system.
- Continue to maintain the two emergency heliports currently in the Swan Forest.

MANAGEMENT ZONES

Until the commercial-differed and non-commercial zones require further road or trail systems either for management or access to commercial timberlands, transportation system additions and improvements will be concentrated in the Commercial Zone.

EXISTING SITUATION AS IT RELATES TO THE PLAN

The transportation system of the Swan Forest is an excellent example of the level of cooperation necessary to provide critical access to the productive, multi-owned forests. The existing transportation system consists of 271 miles of road, approximately 30 bridges, two major trail heads, and two heliports. Although they are used for a variety of different activities, all of the state-owned access roads (excluding the Swan Highway) were constructed and maintained primarily through timber sale operations. They are (refer to the Transportation map, following page) classified into the following four categories:

Forest Highway — These roads, either oil or gravel, are designed, built, and maintained by either the State Highway Commission, county, or other agency.

Primary Road — The purpose of the primary roads is to give permanent access to extensive compartments of timberlands, as well as access for recreation, fire protection and other resource management activities. These roads are designed to materially reduce maintenance costs.

Surfacing may be applied to some of these roads at some future date. Therefore, provision is made in the roadbed width to allow for a 14-foot surfaced tread. Even if this surfacing is never accomplished, the designed subgrade width of 16 feet after settlement will provide safer travel.

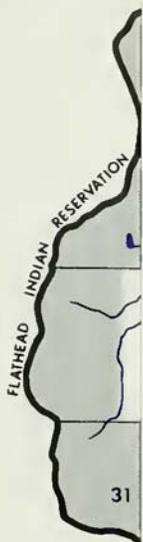
Secondary Road — The purpose of a secondary road is to provide access to portions of a management unit or drainage for the purposes of harvesting timber, as well as protection, recreation, and other resource management activities. Grades generally do not exceed 6 percent.

Temporary Spur Road — The purpose of the temporary spur road is to provide temporary access to timber harvest areas or for other management activities.



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-  SWAN RIVER S
-  STATE FOREST
-  Forest Highway
-  Loop Road
-  County Bounda
-  Swan River Yo
-  Picnic Camp A
-  Mountain Elevc
-  Perennial Strai
-  Intermittent St
-  Lakes
-  Wet Lands
-  State Forest L
-  Federal & Priv



Forty-two percent of the existing road system is classed as temporary spur road; secondary and primary roads comprise 35 and 19 percent respectively. The Swan Highway (State Highway 209) comprises 4 percent of the road system.

The Division of Forestry has found it advantageous elsewhere in the state, in many cases, to enter into cooperative cost-share agreements for road construction and maintenance repairs, as well as reciprocal easement agreements for jointly used roads. The primary purpose of the cooperative agreements is to ensure reciprocal access to lands for management purposes. Some cost-sharing of maintenance work is also provided in the agreements. Although in the planning stages, no such agreement exists on the Swan Forest as yet.

The primary source of maintenance to state-owned roads, including bridge maintenance and replacement, has been through timber sale contracts. In areas with no active timber sales, road and bridge maintenance has been a problem, although a few critical bridges have been maintained through fire-control funds.

Bridges represent a major investment in the transportation system of the Swan Forest. Some of these bridges do not meet current weight standards, and some are presently impassible or even completely washed out. Only a limited survey of bridge location and condition is available at this time, and information concerning structural condition and capacity is not available. The limited survey, completed in early 1976, included all ownerships and is presented in Appendix E. It revealed that 70 percent of the bridges were in from fair to very poor condition; 27 percent were in good-to-excellent condition and 3 percent was unknown.

The general spring road maintenance program has been critically limited by funding in recent years, although the Youth Forest Camp has been an assistance in the maintenance and construction of both roads and bridges.

Road closures, either of a temporary or permanent nature, have been and may continue to be necessary

under certain situations. The most common form of temporary road closure is the fire prevention closure used during extreme fire hazard conditions. Road closures may also be applied during the spring thaw, to prevent severe surface damage and erosion problems.

Permanent closures may be used in cases where roads have become unnecessary and are uneconomical to maintain. This type of closure almost always applies to the temporary spur roads. In all situations involving other landowners, closures would have to be cooperative — except for the temporary fire prevention closure, which is established by order of the Governor.

Trails in the Swan Forest are maintained for recreation and protection purposes. Although many of the old trails have been bisected by road systems, they are generally still in usable condition. Two major trail heads (Soup Creek and Napa Creek), which serve U.S. Forest Service trails into the Bob Marshall Wilderness Area, are in turn partially served by state forest roads.

Two heliports are maintained for emergency use in the forest. One is located at Napa Point and the other is near the headquarters station on Goat Creek. These heliports will be kept in a safe operational condition.

ENVIRONMENTAL IMPACTS

The forest road system will be used and maintained for a variety of purposes. In addition, extension of the existing forest road system will occur. These road development activities and uses are expected to result in minor changes in air quality, due to dust and smoke, etc., and minor changes in water quality, principally due to sedimentation. Only negligible effects on forest esthetics and native fisheries are expected to result from road-related activities.

Additional road and trail systems will significantly impact wildlife, especially big-game species during hunting season. Extension of roads across existing trail systems and timber harvest activities in trailed areas may disrupt recreational trail use or obliterate sections of trail, however, non-trail recreational access would be improved.

WATERSHED MANAGEMENT

PLANNED MANAGEMENT DIRECTION

Management actions will:

- Be planned, coordinated and executed in such a manner as to improve or to cause minimal adverse impact to existing stream conditions.
- Continue to limit the man-made increases in average annual runoff volumes to the normal peak capacity of the channels.

- Attempt to stagger the timing of snowmelt runoff from watersheds by controlling the accumulation and melt rates of snow through cutting method variety.
- Actively participate with other landowners in cooperative watershed management practices, to maintain or improve stream conditions.
- Provide a sound streambank management program, aimed at maintaining the high water quality of the Swan River and its tributaries.

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- Actively participate with other landowners in cooperative watershed management practices, to maintain or improve stream conditions.
- Provide a sound streambank management program, aimed at maintaining the high water quality of the Swan River and its tributaries.

MANAGEMENT ZONES

Generally, the planned direction for watershed management will be applied to all three management zones. However, because the commercial forest zone will be intensively managed for timber production, more active watershed management measures must be considered in that zone. Stream buffer strips, planned location and design of bridge and culvert crossings, and Fish and Game Department involvement are but a few of the concerns that will be addressed in individual management applications.

In the other management zones, intensive management for timber production is not proposed at this time; therefore, watershed management within these zones will be passive, geared to maintaining existing watershed quality by natural means.

EXISTING SITUATION AS IT RELATES TO THE PLAN

A watershed boundary map is provided on the following page. High quality water presently exists in abundance in the Swan Forest. Data taken during recent years indicate there are no physical or chemical pollution problems. Sedimentation rates and water temperatures are low, and the values for the chemical parameters are well within the guidelines set by the Montana Department of Health and Environmental Sciences.

Sixty to seventy percent of the annual precipitation in the Swan Forest occurs as snow, and 75 percent of the annual runoff is snowmelt. Therefore, the control and manipulation of snow accumulation and melt rates are critical to sound watershed management.

Approximately three-quarters of the annual runoff occurs in April, May, and June. Peak flows usually occur during early June. The normally heavy rain in June, combined with the high snowmelt rate, can cause flooding in the low areas during this time. Hydrographs for the streams on the Swan Forest are presented in Appendix D.

Sedimentation is the most common problem affecting the watersheds of the Swan Forest. Increased sediment rates adversely affect many water uses within a river system. Fisheries production, domestic water supplies, recreation, and irrigation and reservoir storage are a few of the resource uses in the Swan drainage that could be damaged by an increase in sediment production.

Sediment production is closely tied to stream discharge. In mountainous watersheds such as the Swan Forest, both the discharge and sediment peaks are reached during the snowmelt season. Much of the sediment is produced from bank and channel erosion, and, when the higher velocities and high water conditions are present, sediment rates increase. Channel stability ratings are a good indicator of sedimentation

rates. The streams that rank as the least stable are those that produce the most sediment.

Streams typical of the east side of the valley have a steep gradient and rugged profile. This results from the variety of bedrock exposed on the west slope of the Swan Range. These bedrocks have different rates of erosion than the generally less-resistant limestone on the Mission side. Sediment loads measured in 1974 were much higher in the east side of the valley than the west, reaching a high of 153 milligrams per liter on Squeezer Creek.

Drainage density (or the length of stream channels per square mile) is somewhat higher on the east side. This probably is due to the shallower soils on the west aspects. The water cannot percolate well because of the thin soil mantle and is forced to the surface; this results in the greater number of streams per square mile.

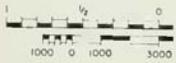
Average runoff is almost twice as high on the east side, due to a combination of factors — mainly elevation and soil depth. More precipitation is received by the Swan Range because of its higher elevation, and the shallower soils allow for more of that precipitation to appear in the streams as runoff.

Stream gradient (rate of descent) is also a very important consideration, because it is one of the major determinants of velocity and hence is directly related to the amount of sediment that a particular stream is capable of transporting. The streams within the Swan Forest have two distinct gradients: (1) from the headwaters to the base of the mountain range, and (2) from the base of the mountain range to the Swan River (See Figure 2, Section IV).

Streams on the west side of the Swan Valley are typified by smooth, flat gradients, characteristic of a stream that is near equilibrium. This is due to the limestone bedrock that makes up the east slope of the Mission Mountains (Mission dip slope). This limestone is easily eroded, and allows the stream to downcut to a state of equilibrium. The stable profile is reflected by the comparatively low concentration of sediment loads measured on the west side — the highest measure in 1974 was 30 milligrams per liter in Woodward Creek.

Other key factors influencing the natural water cycle of a watershed are topographic aspects (direction of flow of a major stream), prevailing storm direction, soil type, geology, and vegetative cover. Table D-1 of Appendix D summarizes some of these factors for the watershed of the Swan Forest.

The relative stability of the stream channels within the Swan Forest can be compared in Table 3. This table shows an estimate of relative stability in terms of the total amount of forest cover that can be removed through harvest, forest fire, etc., without causing degradation of the stream channels.



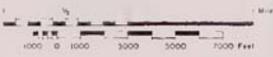
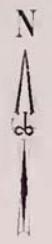
KEY

-  SWAN RIVER STA
-  STATE FOREST
-  Forest Highway
-  Loop Road
-  County Boundary
-  Swan River Youtl
-  Picnic Camp Area
-  Mountain Elevatio
-  Perennial Stream
-  Intermittent Stre
-  Lake
-  Wet Lands
-  State Forest Lan
-  Federal & Privat



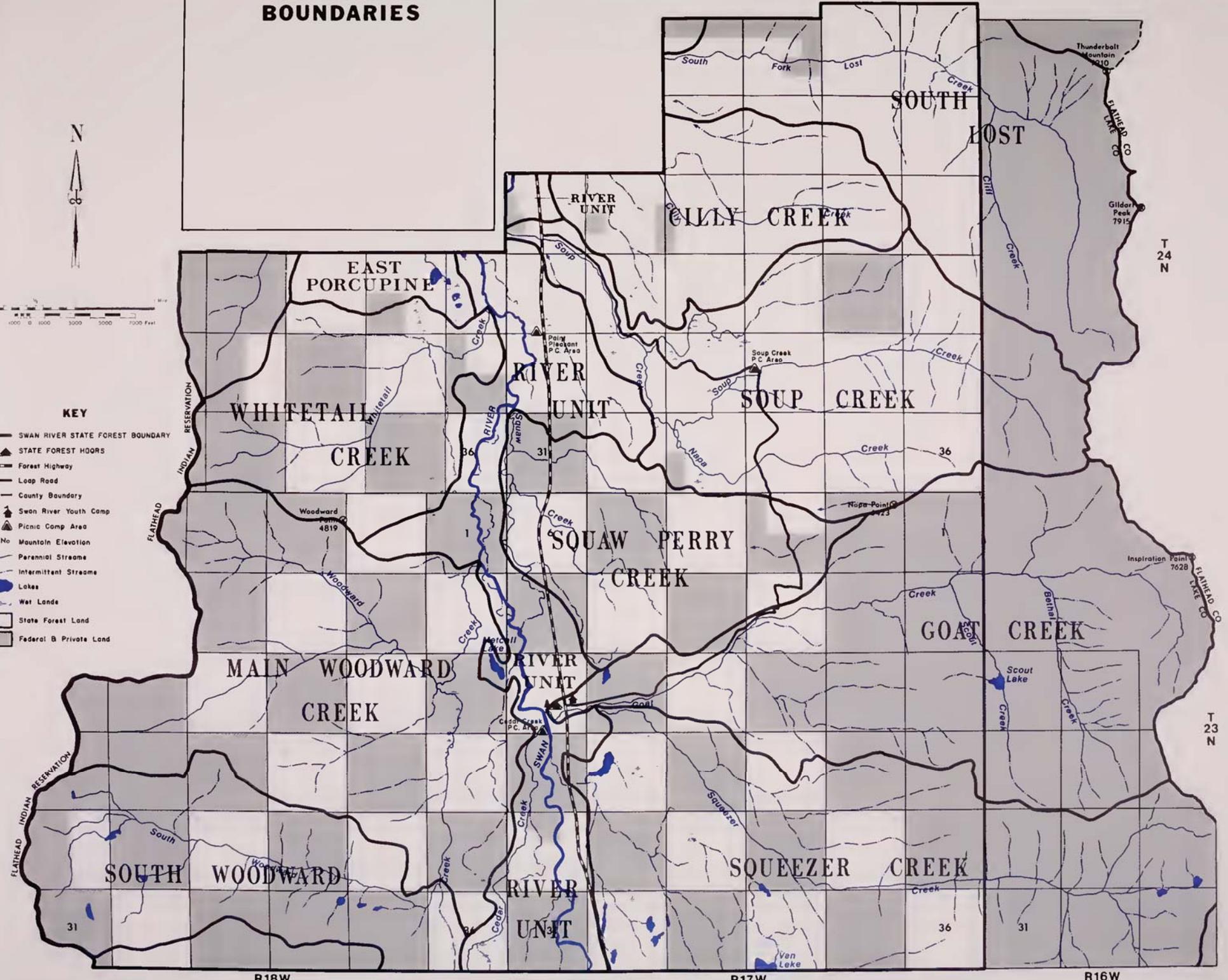
SWAN RIVER STATE FOREST

WATERSHED BOUNDARIES



KEY

- SWAN RIVER STATE FOREST BOUNDARY
- STATE FOREST HQRS
- Forest Highway
- Loop Road
- County Boundary
- Swan River Youth Camp
- Picnic Camp Area
- No Mountain Elevation
- Perennial Stream
- Intermittent Stream
- Lakes
- Wet Lands
- State Forest Land
- Federal & Private Land



R18W

R17W

R16W

T 24 N

T 23 N

The removal of forest cover is expressed as amounts of equivalent clearcut area (ECA), and water yields are presented as the percentage of increase allowable overall versus the percentage of increase at present. The calculations for allowable ECA and percentage of increase of water yield are based solely on hydrologic considerations, and are by no means intended to be a final answer for management operations within any particular drainage. Because no attempt has been made to incorporate soil and vegetative considerations into these recommendations, they do not suggest that the allowable ECA's should be used as a target. Slope stability and regeneration of desirable species may well prove to be the limiting factors in management activities.

ENVIRONMENTAL IMPACTS

The plan as proposed will probably result in a net beneficial effect on state-owned lands within watersheds of the Swan Forest. These beneficial environmental impacts are due principally to the intensity and scheduling of management actions, the review of each action as to its watershed effects, and the watershed inventory program.

One adverse environmental impact that may increase under the plan is sediment produced from roads and timber sales, resulting in minor changes of water quantity and quality. However, the magnitude of these generally temporary changes is considered to be well within that of natural changes which have occurred in the past on the forest.

TABLE 3.

ALLOWABLE WATER YIELD INCREASES, EXPRESSED IN EQUIVALENT CLEARCUT AREA (ECA) AND PERCENTAGE OF INCREASE

	Allowable ECA (Acres)	Present ECA (Acres)	Allowable Increase ECA (Acres)	Water Yield	
				Percentage Increase Allowable Overall	Percentage Increase at Present
Goat Creek	3,700	1,245	2,454	10	3.4
Squeezer Creek	2,266	709	1,557	10	3.1
Soup Creek	2,753	595	2,158	10	2.2
South Fork Lost Creek	2,853	613	2,239	10	2.2
Cilly Creek	1,417	879	538	10	6.2
Squaw-Perry Creek	1,270	1,038	232	20	16.4
Whitetail Creek	1,888	1,193	696	15	9.6
Woodward Creek	6,205	1,067	5,183	15	2.6
East Porcupine Creek	615	282	333	15	7.0

WILDLIFE MANAGEMENT

PLANNED MANAGEMENT DIRECTION

Management actions will:

- Plan, coordinate, and execute all management activities that influence wildlife habitat in such a manner as to improve or to cause minimal adverse impact on wildlife.
- Actively participate with other agencies, landowners in the Swan Forest, and Montana universities to develop needed wildlife management information.

—Maintain the existing diversity of wildlife habitat present on the forest, through a coordinated management program between responsible agencies, forest landowners, and the general public.

MANAGEMENT ZONES

Wildlife distribution and numbers will be changed to varying degrees by habitat alterations induced through intensive management of the commercial forest



The removal of forest cover is expressed as amounts of equivalent clearcut area (ECA), and water yields are presented as the percentage of increase allowable overall versus the percentage of increase at present. The calculations for allowable ECA and percentage of increase of water yield are based solely on hydrologic considerations, and are by no means intended to be a final answer for management operations within any particular drainage. Because no attempt has been made to incorporate soil and vegetative considerations into these recommendations, they do not suggest that the allowable ECA's should be used as a target. Slope stability and regeneration of desirable species may well prove to be the limiting factors in management activities.

ENVIRONMENTAL IMPACTS

The plan as proposed will probably result in a net beneficial effect on state-owned lands within watersheds of the Swan Forest. These beneficial environmental impacts are due principally to the intensity and scheduling of management actions, the review of each action as to its watershed effects, and the watershed inventory program.

One adverse environmental impact that may increase under the plan is sediment produced from roads and timber sales, resulting in minor changes of water quantity and quality. However, the magnitude of these generally temporary changes is considered to be well within that of natural changes which have occurred in the past on the forest.

TABLE 3.

ALLOWABLE WATER YIELD INCREASES, EXPRESSED IN EQUIVALENT CLEARCUT AREA (ECA) AND PERCENTAGE OF INCREASE

	Allowable ECA (Acres)	Present ECA (Acres)	Allowable Increase ECA (Acres)	Water Yield	
				Percentage Increase Allowable Overall	Percentage Increase at Present
Goat Creek	3,700	1,245	2,454	10	3.4
Squeezer Creek	2,266	709	1,557	10	3.1
Soup Creek	2,753	595	2,158	10	2.2
South Fork Lost Creek	2,853	613	2,239	10	2.2
Cilly Creek	1,417	879	538	10	6.2
Squaw-Perry Creek	1,270	1,038	232	20	16.4
Whitetail Creek	1,888	1,193	696	15	9.6
Woodward Creek	6,205	1,067	5,183	15	2.6
East Porcupine Creek	615	282	333	15	7.0

WILDLIFE MANAGEMENT

PLANNED MANAGEMENT DIRECTION

Management actions will:

- Plan, coordinate, and execute all management activities that influence wildlife habitat in such a manner as to improve or to cause minimal adverse impact on wildlife.
- Actively participate with other agencies, landowners in the Swan Forest, and Montana universities to develop needed wildlife management information.

- Maintain the existing diversity of wildlife habitat present on the forest, through a coordinated management program between responsible agencies, forest landowners, and the general public.

MANAGEMENT ZONES

Wildlife distribution and numbers will be changed to varying degrees by habitat alterations induced through intensive management of the commercial forest

zone. With regard to individual actions in this zone, wildlife impacts will be minimized by consulting with and obtaining recommendations from qualified personnel of the Fish and Game Department.

Alteration of habitat by timber management activities will generally not occur in the commercial-deferred and noncommercial zones, therefore, wildlife in these zones will be affected mainly by existing dynamic forest changes.

EXISTING WILDLIFE SITUATION AS IT RELATES TO THE PLAN

At present, a comprehensive assessment of the wildlife in the Swan Forest is not available. However, several major studies relating to grizzly bear and white-tailed deer within, or adjacent to, the forest are presently in progress and should yield valuable wildlife management information.

The Swan Forest and adjacent areas are in the process of transition from an extensively managed, undeveloped condition to that of an intensively managed forest. This process, which has greatly increased man's presence and activities within the forest, is bringing about major changes in wildlife habitat. Because wildlife populations are dynamic (they respond to changes in their environment), basic changes in wildlife populations are presently occurring on the forest in response to man's management activities. Due to the present lack of detailed study of wildlife populations and specific wildlife needs within the area, the following discussion is based principally on information from agencies with wildlife expertise, as well as the local experience of Division of Forestry personnel and residents of the area.

Wildlife species of most interest to the general public found within or adjacent to the forest are the following big game species: elk (*Cervus canadensis*), white-tailed deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), mountain goat (*Oreamnus americanus*), mountain lion (*Felis concolor*), grizzly bear (*Ursus arctos*), and black bear (*Ursus americanus*). At the present time, huntable populations of the above species are believed to exist on the forest.

Other wildlife species found within or adjacent to the forest are beaver (*Castor canadensis*), mink (*Mustela vison*), muskrat (*Ondatra zibethica*), fisher (*Martes pennanti*), wolverine (*Gulo luscus*), bobcat (*Lynx rufus*), lynx (*Lynx canadensis*), coyote (*Canis latrans*), river otter (*Lutra canadensis*), raccoon (*Procyon lotor*), porcupine (*Erethizon dorsatum*), moose (*Alces alces*), short-tailed weasel (*Mustela erminea*), long-tailed weasel (*Mustela frenata*), Bald Eagle (*Haliaeetus leucocephalus*), ruffed grouse (*Bonasa umbellus*), and spruce grouse (*Canachites canadensis*). No comprehensive listing of birds, rodents, and reptiles occurring in the forest is available.

From the many species present in the forest, it can be seen that a diversity of habitats is required to maintain these species. Under the management plan as proposed, some readjustments of available wildlife habitat will occur. However, the basic habitat diversity will be maintained. Some wildlife habitats will be expanded, due to an increase in the early stages of forest succession.

Although it is hindered by lack of specific information, special management is required for the following species:

GRIZZLY BEAR — The grizzly bear, which has been listed as threatened by the U.S. Fish and Wildlife Service, principally utilizes the higher elevation areas on the eastern and western boundaries of the forest. However, specific areas of critical habitat have yet to be defined for this species on the forest. Increasing recreational use of high-elevation areas on the forest is a source of concern, due to the possibility of loss of human life and/or killing of bears.

WHITE-TAILED DEER — Maintenance of a tree canopy which holds snow in tree crowns in critical winter range areas is an extremely important factor in maintaining the resident white-tailed deer population. This factor has been considered in past management actions on state lands within the forest and will be considered in future management actions.

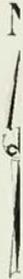
MOUNTAIN GOAT — Existing road accesses to mountain goat ranges, particularly in the South Fork Lost Creek, may have an impact on this species.

Known big game winter ranges in the forest, as determined by the Montana Department of Fish and Game, are presented on the following page.

ENVIRONMENTAL IMPACTS

Under the proposed plan both beneficial and adverse environmental changes in wildlife habitat will occur. Old-growth forest stands will be systematically replaced by vigorously growing stands of young trees, thus creating earlier successional stages of vegetation. The result of this action will benefit those wildlife species that are favored by these conditions, and be adverse to those wildlife species which require old-growth forest conditions. However, the rate of forest change proposed is believed to be slow enough to permit dynamic wildlife population adjustments, as well as to provide time for evaluating the effects on the particular species concerned.

Increased roading and access, accompanied by increased human use, will lead to more wildlife contact with humans. Some displacement of wildlife into areas offering escape cover is likely. This displacement may result in localized wildlife habitat deterioration if animal concentrations in "safe" areas exceed the carrying capacity of these areas.



KE

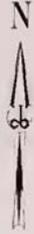
-  SWAN RIVER ST.
-  STATE FOREST
-  Forest Highway
-  Loop Road
-  County Boundary
-  Swan River Yout
-  Picnic Camp Are
-  Mountain Elevati
-  Perennial Stream
-  Intermittent Stre
-  Lakes
-  Wet Lande
-  State Forest Lai
-  Federal & Privat



WILDLIFE WINTER RANGES

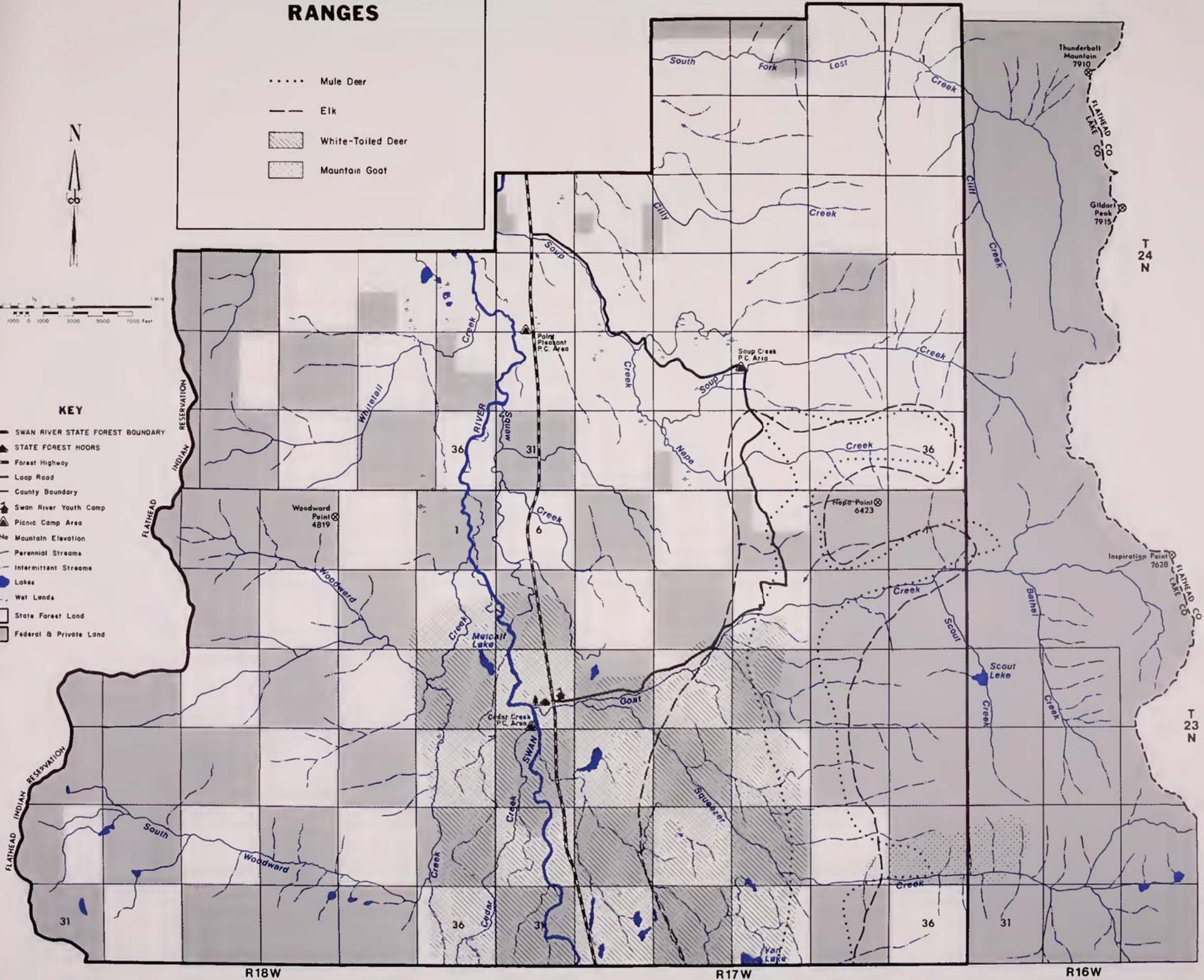
SWAN RIVER STATE FOREST

- Mule Deer
- Elk
- ▨ White-Tailed Deer
- ▤ Mountain Goat



KEY

- SWAN RIVER STATE FOREST BOUNDARY
- ▲ STATE FOREST HOORS
- Forest Highway
- Loop Road
- - - County Boundary
- ▲ Swan River Youth Camp
- ▲ Picnic Camp Area
- ⊙ Mountain Elevation
- ~ Perennial Streams
- - - Intermittent Streams
- Lakes
- Wet Lands
- State Forest Land
- ▨ Federal & Private Land



R18W

R17W

R16W

VI. Alternative Actions

ALTERNATIVES WITHIN THE PLAN

In order to provide for future exigencies, it has been recognized that the plan as presented herein must provide a relatively high degree of flexibility (see Introduction). Therefore, a number of alternative levels of management exist that could still be regarded as being within the plan. These levels relate to established forest land uses which are already occurring or which are possible under certain circumstances on the forest.

Generally stated, these forest uses are: production of forest products, mining, wildlife and fisheries, domestic grazing, water production, recreation, natural

areas and special uses. DNRC, in formulating this plan, attempted on the basis of present knowledge to consider all foreseeable uses of the forest and to evaluate these possible uses against existing physical, biological, social, economic, legal, and administrative constraints.

The plan, as presented herein, sets what DNRC believes to be a reasonable level of utilization for each of these forest uses, consistent with historical management direction of the State Land Board, state law, and conditions attached to these lands when granted to the state under the Enabling Act.

CONCEPTUAL ALTERNATIVES

In addition to the alternatives presented within the plan, several broader conceptual alternatives have been examined.

The Montana Environmental Policy Act requires that any action significantly affecting the environment be accompanied not only by an examination of impacts, but also of alternatives. In addition, guidelines adopted under MEPA suggest that one of these alternatives be the "no action" alternative.

Due to MEPA considerations, then, four conceptual alternatives have been examined: the no-action alternative, a forest amenities enhancement alternative, a forest production enhancement alternative, and an economic enhancement alternative. These four alternatives, in a very general way, represent a continuum of actions, ranging from relatively few to an intensified series of "on the ground" management activities.

THE NO ACTION ALTERNATIVE

The no action alternative comprises what would happen if the plan as presented herein were not adopted.

In this case current management direction, as described in the *Goals and Objectives Policy Manual*, would be pursued. Management direction would proceed as it has in the past, reflecting relevant state laws and Land Board directives. Solutions to problem areas would be pursued as the problems arise, and management intensity would be defined by levels of funding.

In the no action alternative the goal of the Land Board mandate, to evaluate policy alternatives concerning road right-of-way agreements and easement exchanges, for the plan would not be met.

THE FOREST AMENITIES ENHANCEMENT ALTERNATIVE

This alternative would emphasize and enhance various forest amenities not necessarily associated with the production of traditional forest products. Such amenities might include recreation, aesthetics, and fish and wildlife.

This alternative would largely restrict timber cutting as a harvest procedure, relegating the use of cutting to such activities as clearing areas for recreational facilities or the creation of scenic vistas. Recreation enhancement would be emphasized, including the potential creation of facilities such as campgrounds, fishing access sites, nature trails, snowmobile routes, boat ramps, and downhill and cross-country ski areas.

Many timber stands and areas ecologically valuable from the aesthetic viewpoint would be preserved in their natural state, and fish and wildlife habitat would remain high in quality, and at about the same level in quantity. Many sites would be nominated as formal Natural Areas or other protected areas.

This alternative may be at variance with the present legislative mandate naming the Montana Department of Fish and Game as lead agency in outdoor recreational matters. Moreover, additional specific funding would be required to accomplish most of the goals of the



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This alternative may be at variance with the present legislative mandate naming the Montana Department of Fish and Game as lead agency in outdoor recreational matters. Moreover, additional specific funding would be required to accomplish most of the goals of the

alternative. Most importantly, however, this alternative would not achieve the goal of enhancing monetary return to the school trust fund (see section III).

FOREST PRODUCTION ENHANCEMENT ALTERNATIVE

The emphasis of this alternative would be to enhance the availability of actual forest products. Most of these products are renewable, but would permanently leave the forest upon harvest. Such products include sawlogs (and their ultimate derivatives, such as lumber, plywood, cut stock, chips, wood pulp, etc.) Christmas trees, post and poles, and fire wood. Although other forest "products" such as those outlined in the amenities enhancement alternative would be considered, emphasis would be given to these wood-fiber items.

This alternative would seek to sustain a continuous flow over time of all these various wood products. As such, high-yield sites would be managed for maximum growth rates, probably reflecting a shorter seedling-to-harvest rotation schedule. Areas to be used for purposes other than production of wood fiber would be relegated to low-yield sites. In addition, selected silvicultural treatments would be used to enhance the quality of the forest products; such treatments could include pruning, thinning, or fertilization.

This alternative would be tailored in such a way as to ensure a continuous flow of products, and would give less weight to short-term economic considerations. It would result in a healthy, productive forest from a timber standpoint, with trees in a variety of age classes and many rapidly growing stands. Surface stream hydrology would remain approximately as it is now, although there would be some limited tendency toward an increase of water quantity and a decrease of water quality. In areas of timber harvest, wildlife habitat would be altered to the benefit of some species and the detriment of others (principally those requiring undisturbed forest conditions).

Of the four conceptual alternatives considered, this one is the closest to the final recommended plan as presented herein. However, the recommended plan is in slight variance with this alternative in many ways. For example, the recommended plan gives more weight to forest amenities such as recreation and wildlife. On the

other hand, the recommended plan also gives slightly less consideration to a sustained flow of every product, favoring products most beneficial to the school trust fund.

THE ECONOMIC ENHANCEMENT ALTERNATIVE

This alternative would maximize monetary return to the school trust fund by relatively rapid liquidation of all merchantable timber. The controlling factor in harvest decisions would be market considerations; stumpage would be sold when market conditions are favorable and withheld when market conditions are depressed.

Also within this alternative would be the establishment of recreational user fees, fee campgrounds, and the like. Lands not feasible for use in raising maximum-growth timber would be available for other uses engendering economic return, such as lease, rental, or outright subdivision and sale. Premium recreational lands such as lakefronts would be utilized for commercial facilities and/or second homes, wherever these uses would return more money than timber production would.

This alternative, by definition, would result in maximum economic return to the school trust fund. It would also result in full utilization of the productive capacity of the forest and maximum growth rates. This would primarily be accomplished through the rapid liquidation of poor stands, replacing them with very young but vigorously growing stands. The seedling-to-harvest rotation would therefore be relatively short, and stands would be managed on the basis of the optimal financial rotation. This alternative would also probably enhance those portions of the forest suitable for live-stock range.

However, this alternative would also result in substantial impacts to other forest resources. The rapid timber liquidation would have serious adverse effects on wildlife, aesthetics, and recreation. In addition, surface runoff would substantially increase, resulting in a marked increase in water quantity during certain times of the year, as well as a possible significant decrease in water quality. This in turn may adversely affect the area fisheries. Finally, the economic enhancement alternative would require substantial changes in both legislation and policy direction by the State Land Board, as well as greatly increased appropriations.

VII. Relationship Between Short-Term Uses of Man's Environment and Maintenance and Enhancement of Long-Term Productivity

As indicated in section III, state forest lands are held in trust for the benefit of public schools. It is implicit in the trustee relationship that the resources of the trust be sustained and managed over a long-term basis.

The major purpose of this plan is to assure maintenance and enhancement of productivity of state lands within the Swan Forest, through management practices designed to yield forest products and other values on a sustained basis. The proposed plan is directed at maintaining existing animal and plant communities in a healthy and productive condition and, therefore, should generally lead to the maintenance and enhancement of long-term productivity of these communities.

A relatively short-term liquidation of standing merchantable timber would enhance new growth. This in turn could be seen as enhancing long-term productivity. However, as explained under the economic enhancement alternative, several other environmental problems may result.

Similarly, a relatively long-term liquidation of merchantable timber would preclude the establishment of young vigorously growing stands. However, under this option a larger timber inventory would be available as needed over the short-term.

Clearly, what is needed is a balance between the two. This balance is reflected in the plan as recommended.

Under the proposed management plan, most overmature stands within units of the commercial forest zone will be replaced over time by new forest stands. A variety of stocking control and stand improvement measures, such as planting and thinning, where necessary, will be taken to assure that these stands grow at or near their potential. As a result of these actions, as well as forest protection (from fire, insects, and disease etc.) measures losses presently occurring in overmature stands due to

slow or net negative growth (i.e., annual volume loss exceeding annual growth) will be significantly reduced.

However, areas within this zone identified in the future as Natural Areas, as well as areas of critical animal or plant habitat, will be managed in accordance with the needs of these areas or species. Management practices will therefore be adjusted and specifically tailored to meet each situation.

Predictions relating to the impact of this plan on wildlife and fisheries in both the short- and long-term are complicated by the fact that only habitat manipulations (primarily timber harvest or non-harvest) are controlled within the framework of the plan. Policies relating to hunting seasons, bag limits, protected species, etc., will, over time, have a significant impact on the actual productivities achieved during the plan's lifetime. This situation points out the need for a close working relationship between forest managers and wildlife biologists to assure that healthy, productive, and diverse wildlife populations continue to exist on the forest.

In contrast to the Commercial Forest Zone, the Commercial Forest Deferred Zone will not be managed intensively to increase existing forest productivity, due to the constraints which have been identified (see Section V). As a result, management opportunities to enhance productivity within this zone await additional technological and biological knowledge. Specific evaluations of opportunities to enhance long-term productivity within the Commercial Forest Management Deferred Zone will, therefore, have to be carried out at a later date.

No significant change in the long-term productivity of those areas identified as part of the non-commercial zone is expected under this plan.

VIII. Irreversible and Irretrievable Commitment of Resources

Resources committed to the implementation of this plan would include the manpower, equipment, and consumable resources (gasoline, oil, food, etc.) needed to do the work. For all practical purposes these resources would be irreversibly and irretrievably committed when used to carry out actions described in the plan.

Within the commercial forest zone and within those areas of the commercial forest deferred zone which may become harvested for forest products during the life of the plan, overmature forest stands will be systematically replaced by new stands. Many of these overmature stands are considerably in excess of 200 years of age, but it is unlikely that under intensive forest management future stands will be allowed to reach this age (growth rates significantly slow after approximately 70 years of age, depending upon site). As such, harvesting of these

stands constitutes an irreversible and irretrievable commitment during the period needed to replace them.

However, the fact that many of these overmature stands are in an accelerating state of decline, and the fact that stand deterioration can only be slowed by management actions assure that, without replacement and continued management, the forest product resource in these stands will not be effectively utilized.

Although the majority of roads envisioned within the plan are already in place, any additional extension and upgrading of the main road system represents a long-term commitment of the land comprising the new road bed to that single use. Although relatively small, this constitutes a nearly irreversible commitment of land area.



IX. Appendices

APPENDIX A — LAND-TYPES

Sixteen separate land-types were delineated and mapped on the Swan River State Forest. Table A-1 summarizes management interpretations for these land-types.

Number designators used for land-types are the same as those delineated by the U.S. Forest Service on adjacent federal lands; this was done to provide uniform

base data information for different ownerships. Table A-2 provides a summary of hazard ratings for some factors considered in management planning for the Swan Forest.

A more detailed description of each land-type is available upon request.

TABLE A-1
LAND-TYPE MANAGEMENT INTERPRETATIONS

Land-Type	Potential Mass Failure		Erosion Potential Land Surface	Erosion Potential Cut and Fills	General Comments on Management Potential, Operability, and Hazards
	Mantle	Bedrock			
10	Low	Low	Slight (low)	Slight (low)	These severe limitations preclude nearly all uses but recreation and wildlife. Severe windthrow, severe flooding, high water table, low bearing capacity.
11	Low	Low	Low	Low	Land-type is especially suited for timber production and white-tailed deer habitat. Severe frost heave, moderate to severe compaction, severe windthrow, seasonal water table, logging should be done during dry season or on snow, small knolls in micro-relief should not be destroyed.
16	Moderate to severe depending on slope	Low	Low	Low	This land-type is of relatively minor extent and principally suited for timber production. Moderate erosion potential where cohesionless sand is exposed; the Soup Creek failure may be an ancient alluvial fan.
21A-7	Low	Low	Low	Moderate due to seeps	Principally suited for high elevation watershed use. High elevation, short growing season, snow persistence, cool temperatures.
21A-8	Low	Low	Low to Moderate	Moderate due to seeps in substratum	In general, this land-type has few limitations for timber and watershed uses because of lower elevation and gentler slopes.
21A-9	Low	Low	Moderate	Moderate	Principally suited for timber production and watershed use. Moderate to severe potential for revegetation problems on dispersed compacted till cut slopes; 40 to 60% slopes, slight to moderate windthrow hazard.

TABLE A-1
LAND-TYPE MANAGEMENT INTERPRETATIONS (Cont.)

25A-9	Low to Moderate	Low	Low	Moderate	Suited for timber production, watershed, and wildlife uses, 40 to 60% slopes, a few dispersed natural mass failure have occurred. A few inclusions of silty clay loam soils present in the bottom west of South Woodward Creek. These soils have a high potential for restricted internal drainage and erosion.
26-7	Low	Low	Low	Low	Presently used for timber production, recreation, campground, transportation corridors and wildlife. Moderate to severe potential for windthrow; severe revegetation problems on dispersed compacted till cut-slopes, requires special techniques.
26-8	Low	Low	Moderate	Moderate	Used for timber production, transportation corridors and wildlife. Moderate to severe potential for windthrow; severe revegetation problems on dispersed compacted till cut-slopes; kames have sandy layers which, if exposed, have moderate erosion potential.
27-7	Low	Low	Low	Low	Well-suited for timber production and wildlife use. Sandy inclusions have reduced water holding capacity and increased erosion potential, silty clay loam inclusions could have restricted internal drainage as well as erosion potential.
27-8	Low	Low	Moderate	Moderate	Used for timber production and wildlife habitat. The variability of substratum material can increase the potential for erosion.
57/21-9	Low	Low	Low	Low to Moderate	Used for timber and water production. Shallow soils, outcrops and talus on 57; 21 has moderate potential for revegetation problems on dispersed compacted till; 40 to 60% slopes.
72-9	Moderate to Severe	Low	Moderate	Moderate	Used for timber production, watershed, recreation and wildlife. Slopes 60%+ some high elevation, short growing season, snow persistence, cool temperatures, shallow soils, outcrops, talus, some plastered till and some high precipitation.
73-9	Moderate to Severe	Low	Moderate	Severe	Used for timber production and wildlife habitat. Slopes 60%+ some shallow soils, outcrop, talus, natural mass failures caused by oversteepening of slopes by glacial ice and removal of support.
73/26	Low to Moderate	Low	Moderate	Severe	Suited primarily for timber production and watershed. Trough wall portion 60%+ slopes severe potential for revegetation problems on dispersed compacted till cut-slopes.
74	Low	Low to Moderate	Moderate	Moderate	Principally suited for watershed use. Slopes 60%+ small unit, rugged topography, nickle point may have increase potential for bed-rock failure because of removal of support.

N



KEY

-  SWAN RIVER STA
-  STATE FOREST
-  Forest Highway
-  Loop Road
-  County Boundary
-  Swan River Youth
-  Picnic Camp Area
-  No Mountain Elevations
-  Perennial Stream
-  Intermittent Stream
-  Lakes
-  Wet Lands
-  State Forest Land
-  Federal & Private



TABLE A-2
LAND-TYPE HAZARD RATING

Land-Type	Mass Failure Hazard ¹	Mass Erosion Hazard ²	Soil Compaction Hazard ³	Road Construction Hazard ⁴	Cut-Slope Vegetative Recovery Rate ⁵
10	Slight	Slight	Moderate	Severe	Rapid
11	Slight	Slight	Mod-Severe	Moderate	Rapid
16	Moderate	Moderate	Slight	Moderate	Moderate
21-A-7	Slight	Slight	Moderate	Moderate	Moderate
21-A-8	Slight	Moderate	Moderate	Slight	Moderate
21-A-9	Slight	Moderate	Moderate	Moderate	Moderate
25-A-9	Moderate	Moderate	Moderate	Moderate	Moderate
26-A-7	Slight	Slight	Moderate	Slight	Slow
26-8	Slight	Moderate	Moderate	Moderate	Slow
27-7	Slight	Slight	Slight	Slight	Slow
27-8	Slight	Moderate	Slight	Slight	Slow
57/21/-9	Slight	Moderate	Slight	Moderate	Slow
72-A	Mod-Severe	Mod-Severe	Moderate	Mod-Severe	Slow
73-A	Severe	Mod-Severe	Moderate	Severe	Slow
73-26	Moderate	Mod-Severe	Moderate	Mod-Severe	Slow
74-A	Slight	Mod-Severe	Slight	Severe	Slow

¹**Mass Failure** — A downhill movement of soil or fractured rock under the force of gravity.

²**Water Erosion** — The process by which soil and rock are transported downhill by water.

³**Soil Compaction** — The increase in soil density as a result of an applied pressure.

⁴**Road Construction** — The ease of which a forest road can be built on the site — taking topography, geology, and building materials into consideration.

⁵**Cut-slope Vegetative Recovery Rate** — The rate at which natural vegetation returns to a road cut-slope surface.

Rating Definitions:

Slight — The hazard does not exist or can easily be overcome with normal management practices.

Moderate — A hazard does exist, but can be overcome with special measures which are commonly available and economically feasible.

Severe — The hazard is difficult or impossible to overcome, or is economically unfeasible.



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11	Slight	Slight	Mod-Severe	Moderate	Rapid
16	Moderate	Moderate	Slight	Moderate	Moderate
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21-A-8	Slight	Moderate	Moderate	Slight	Moderate
21-A-9	Slight	Moderate	Moderate	Moderate	Moderate
25-A-9	Moderate	Moderate	Moderate	Moderate	Moderate
26-A-7	Slight	Slight	Moderate	Slight	Slow
26-8	Slight	Moderate	Moderate	Moderate	Slow
27-7	Slight	Slight	Slight	Slight	Slow
27-8	Slight	Moderate	Slight	Slight	Slow
57/21/-9	Slight	Moderate	Slight	Moderate	Slow
72-A	Mod-Severe	Mod-Severe	Moderate	Mod-Severe	Slow
73-A	Severe	Mod-Severe	Moderate	Severe	Slow
73-26	Moderate	Mod-Severe	Moderate	Mod-Severe	Slow
74-A	Slight	Mod-Severe	Slight	Severe	Slow

¹**Mass Failure** — A downhill movement of soil or fractured rock under the force of gravity.

²**Water Erosion** — The process by which soil and rock are transported downhill by water.

³**Soil Compaction** — The increase in soil density as a result of an applied pressure.

⁴**Road Construction** — The ease of which a forest road can be built on the site — taking topography, geology, and building materials into consideration.

⁵**Cut-slope Vegetative Recovery Rate** — The rate at which natural vegetation returns to a road cut-slope surface.

Rating Definitions:

Slight — The hazard does not exist or can easily be overcome with normal management practices.

Moderate — A hazard does exist, but can be overcome with special measures which are commonly available and economically feasible.

Severe — The hazard is difficult or impossible to overcome, or is economically unfeasible.

APPENDIX B — HABITAT-TYPES

The entire Swan River State Forest was habitat-typed using the classification of Pfister et al. in connection with the preparation of the plan. During the period 1973-1975, nine major habitat-types were identified and mapped within the Swan Forest. The Forest Habitat Types map shows the location of these habitat-types on the forest, while Table B-1 summarizes the extent and productive potential of these habitat-types. Because the yield capabilities for each habitat-type are given as ranges (low, high, and average) estimates of potential productivity for each habitat-type are also given.

As can be seen from this Table, 33,888 acres (86.9 percent) of the total state ownership, comprising four habitat-types, falls within the high-to-very-high yield capability classes (85-120 cu.ft./year and 120+ cu.ft./year respectively). The remaining five major habitat-types fall within the moderate yield capability class (50-85 cu.ft./year), and constitute 3,566 acres (9.2 percent) of the state ownership. Wet areas, meadows, rocks, and scree make up the remaining 1,530 acres (3.9 percent).

MANAGEMENT IMPLICATION OF THE HABITAT-TYPE FOUND ON THE SWAN RIVER STATE FOREST

For an overall description of the habitat-types described below the reader is referred to Pfister, et al. (1974)

DOUGLAS FIR/BEARGRASS h.t.

(*Pseudotsuga menziesii/xerophyllum tenax*; DG/XETE)

Approximately 287 acres of this habitat-type occur on state land within the forest, principally at mid-elevation southerly slopes along both the Swan and Mission Ranges. Only the (*Vaccinium globulare*) phase of this habitat-type appears to be present on the forest. No discernible management problems from the standpoint of timber production were apparent on those stands observed on this habitat-type, but the southerly aspect may cause special regeneration problems under the clearcut and seed tree reproduction methods unless adequate site preparation is achieved.

DOUGLAS FIR/SNOWBERRY h.t.

(*Pseudotsuga menziesii/Symphoricarpos albus*; DF/SYAL)

Approximately 1,124 acres of this habitat-type occur on state lands within the forest, principally on well-

drained, gentle southern exposures on the valley floor and on the lower southerly facing slopes along the east side of the forest. Both the Pine grass (*Calamagrostis rubescens* and *Symphoricarpos albus*) phases of this habitat type are present, with the S. albus phase most commonly encountered.

No special management problems were observed that are peculiar to this habitat-type. Achieving adequate site preparation appears to be less of a problem than in the generally adjacent DF/Caru habitat-type. Overall, the summary statements by Pfister, et al. adequately describe management considerations for this habitat-type on the Swan Forest.

DOUGLAS FIR/PINEGRASS h.t.

(*Pseudotsuga menziesii/Calamagrostis rubescens*; DF/CARU)

Approximately 440 acres of DF/Caru occur on state land within the Swan Forest. Like DF/Syal, this habitat-type is found primarily in well drained landforms within the valley bottom and extending up southerly facing foothill slopes on the east side of the valley. On valley-bottom landforms, DF/Caru generally is found on the steeper southerly slopes, while DF/Syal is found on more gentle hilltops. Within this habitat-type the kinkkink (*Arctostaphylos uva-ursi*) phase was the phase most commonly observed, particularly in the Squeezer and Cedar Creek areas.

Reproductive cuttings should be carefully planned within this habitat-type to assure adequate seedbed preparation, if managed for seral species.

SPRUCE/QUEENCUP BEADLILY h.t.

(*Picea sp./Clintonia uniflora*; S/CLUN)

Approximately 4,421 acres of this habitat-type are found on state owned land within the forest, principally along valley-bottom stream courses and flats; occasionally it covers more extensive areas, particularly in the vicinity of Squeezer Meadows. This habitat-type was troublesome to identify, especially within the Squeezer Meadows area; this area exhibited small irregularly distributed pockets of the Subalpine fir (*Abies lasiocarpa*), dwarf huckleberry (*Vaccinium caespitosum*) and Spruce (*Picea sp./Vaccinium Caespitosum*) habitat-types. Their occurrence should be further defined in connection with future intensive forest management actions.

Wildlife use and values (particularly spring and summer use) appear to be considerably greater than reported by Pfister, et al. Special care should be taken to assess wildlife uses in connection with all management actions.

GRAND FIR/QUEENCUP BEADLILY h.t.

(*Abies grandis/Clintonia uniflora*; GR/CLUN)

Approximately 7,812 acres of this habitat-type are found on state lands within the forest, principally on westerly lower foothills to mid-elevation slopes on the east side of the forest, and on easterly mid-elevation slopes on the west side of the forest. Special note should be taken in planning management actions on steep, dry southerly exposures within this habitat-type, due to sharply reduced timber productivity observed on these sites. With this exception, timber productivity of this habitat-type favors intensive timber management of western larch, Douglas fir and ponderosa pine at elevations below 5,000 feet, and western larch and Douglas fir above 5,000 feet. Indian paint fungus (*Echinocontium tinctorum*) infections are extremely variable from stand to stand within this habitat-type, and must be carefully evaluated in silvicultural decisions regarding management species.

WESTERN RED CEDAR/QUEENCUP BEADLILY h.t.

(*Thuja plicata/Clintonia uniflora*; WAR/CLUN)

Approximately 6,500 acres of this habitat-type are found on the forest, representing the most potentially productive areas for intensive timber management activities. No special management needs or problems were identified in connection with this habitat-type, with the possible exception of abnormally high water tables and springs. Future road construction and silvicultural practices should take this factor into account in the design and timing of specific management actions.

SUBALPINE FIR/QUEENCUP BEADLILY h.t.

(*Abies lasiocarpa/Clintonia uniflora*; AR/CLUN)

The AR/CLUN habitat-type is the most extensive in the Swan Forest, covering approximately 11,178 acres it is found principally on west or north facing mid-elevations on both the Mission and Swan Ranges, and covering extensive areas of the valley floor. The *Clintonia uniflora* and the *Vaccinium caespitosum* phases were principally confined to lowland valley sites with the *Xerophyllum*

tenax and *C. uniflora* phases dominated mid-elevation ridge situations. No specific management problems unique or characteristic to this habitat-type were discovered. Opportunities for intensive timber management activities appear to be generally very good throughout. However, several field observations indicate that the clearcut and seedtree reproduction methods may be unsatisfactory on the *X. tenax* phases on south and west exposures.

SUBALPINE FIR/MENZIESIA h.t.

(*Abies lasiocarpa/Menziesii ferruginea*; AR/MEFE)

Approximately 3,917 acres of this habitat-type are found on state lands within the Swan Forest, principally on north or west facing slopes, on ridgetops, or in sheltered basins above 5,300 feet.

Timber management practices (particularly regeneration cuttings and site preparation) should be very carefully designed on this habitat-type, to avoid creation of brushfield situations and regeneration failure. Numerous soil stability and regeneration problems have been created in the past when intensive timber management practices were carried out within this habitat-type (i.e., South Fork Lost Creek). These considerations require careful site-specific review of all timber management practices within this habitat-type.

SUBALPINE FIR/BEARGRASS h.t.

(*Abies lasiocarpa/Xerophyllum tenax*; AF/XETE)

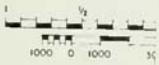
Approximately 1,684 acres of AF/Xete are found on state lands within the Swan Forest, principally located on broad, dry ridgetops and south exposures between 5,400 and 6,400 feet. Observations and experience on the Swan indicate that management implications (Pfister, et al., 1974) concerning difficulty in re-establishing *Picea sp.* and *Larix occidentalis* apply directly to the habitat-type. In addition, slow re-establishment of trees after intensive site preparation activities can be expected, due to unfavorable site conditions created — particularly on steeper south exposures. Where feasible, the shelterwood reproduction method appears to be an extremely desirable system on the habitat-type.

A more detailed report entitled "Habitat Types of the Swan River State Forest", prepared by Anthony J. Lukes, Jr., describes the habitat-types and mapping techniques. It is available for review at the Division of Forestry Office in Missoula.

TABLE B-1
HABITAT-TYPES AND THEIR POTENTIAL ANNUAL YIELD OF WOOD FIBER
FOR STATE LANDS WITHIN THE SWAN RIVER STATE FOREST

	Acres*	Yield Capability Class Cu. ft./acre/yr.			Estimated Potential Annual Yield Cu. ft./yr.		
		Low	High	Avg.	Low	High	Avg.
a. Douglas fir/ beargrass	287	43	86	64.5	12,341	24,682	18,512
b. Douglas fir/ snowberry	1,124	47	102	74.5	52,828	114,648	83,738
c. Douglas fir/ pinegrass	440	46	102	74	20,240	44,880	32,560
d. Spruce/queencup beadlily	4,421	88	140	114	389,048	618,940	503,994
e. Grand fir/ queencup beadlily	7,812	88	162	125	687,456	1,265,544	976,500
f. Western red cedar/ queencup beadlily	6,560	88	166	127	577,280	1,088,960	833,120
g. Subalpine fir/ queencup beadlily	11,178	80	150	115	894,240	1,676,700	1,285,470
h. Subalpine fir/ menziesii	3,917	68	124	96	266,356	485,708	376,032
i. Subalpine fir/ beargrass	1,684	38	89	63.5	63,992	149,876	106,934
Other H.T.S. ¹	31	46	102	74	1,426	3,162	2,294
Scree	704	---	---	---	-----	-----	-----
Non-Forest	826	---	---	---	-----	-----	-----
Totals	38,984				2,965,207	5,473,100	4,209,154
Av. acre/yr. Potential annual yield					79.38	146.52	112.95

¹Douglas fir/kinnikinick, Douglas fir/twinflower, Unclassified alpine forb community.



KI

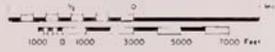
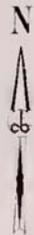
-  SWAN RIVER S
-  STATE FOREST
-  Forest Highway
-  Loop Road
-  County Bounda
-  Swan River Yo
-  Picnic Camp A
-  No Mountain Elevc
-  Perennial Strac
-  Intermittent St
-  Lakes
-  Wet Lands
-  State Forest L
-  Federal & Priv



SWAN RIVER STATE FOREST

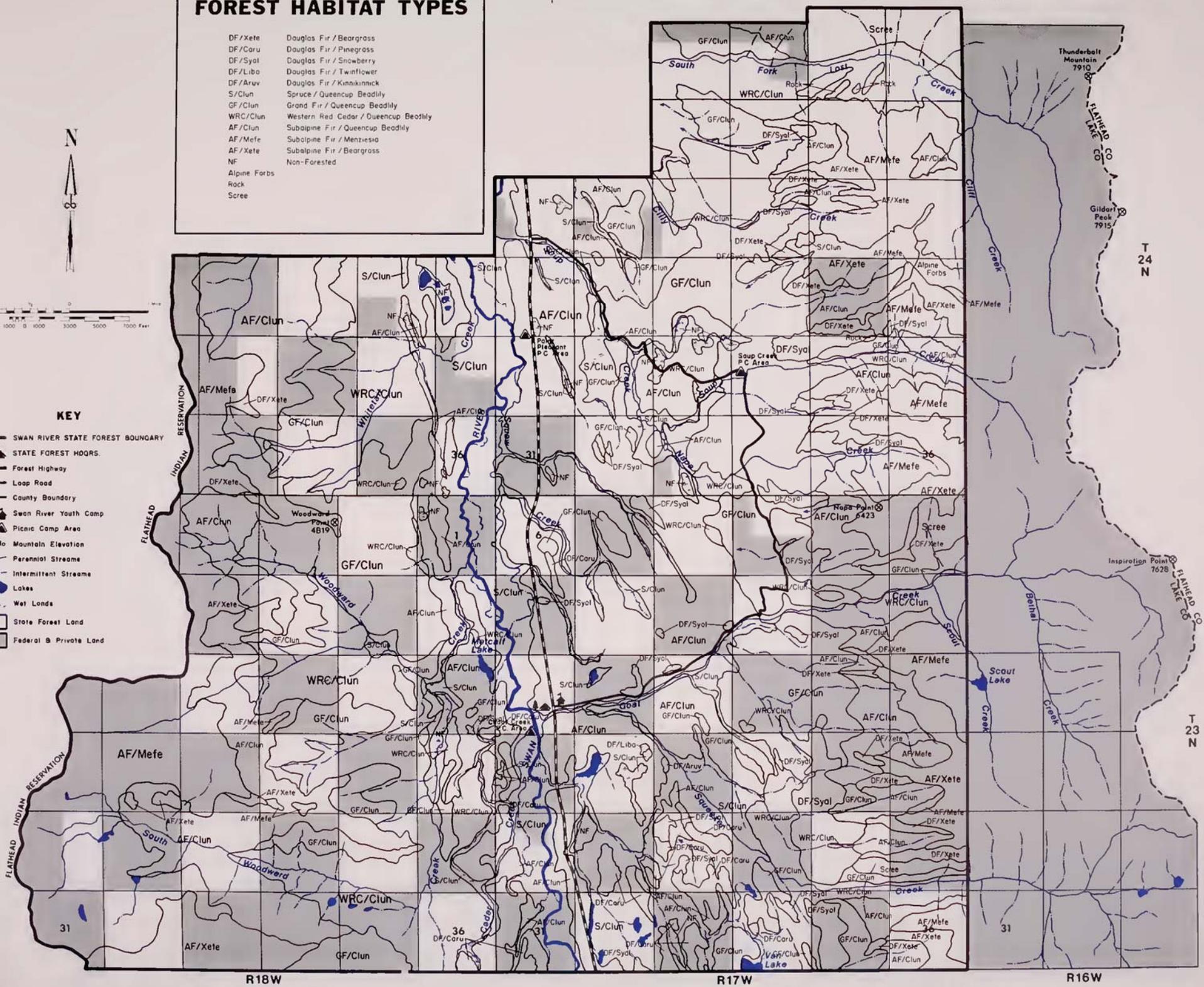
FOREST HABITAT TYPES

DF/Xete	Douglas Fir / Beargrass
DF/Caru	Douglas Fir / Pinegrass
DF/Syal	Douglas Fir / Snowberry
DF/Liba	Douglas Fir / Twainflower
DF/Aruv	Douglas Fir / Kinnikinnick
S/Clun	Spruce / Queencup Beadly
GF/Clun	Grand Fir / Queencup Beadly
WRC/Clun	Western Red Cedar / Queencup Beadly
AF/Clun	Subalpine Fir / Queencup Beadly
AF/Mefe	Subalpine Fir / Menziesia
AF/Xete	Subalpine Fir / Beargrass
NF	Non-Forested
Alpine Forbs	
Rock	
Scree	



KEY

- SWAN RIVER STATE FOREST BOUNDARY
- STATE FOREST HOORS.
- Forest Highway
- Loop Road
- County Boundary
- Swan River Youth Camp
- Picnic Camp Area
- No Mountain Elevation
- Perennial Stream
- Intermittent Stream
- Lakes
- Wet Lands
- State Forest Land
- Federal & Private Land



R18W

R17W

R16W

T 24 N

T 23 N

Thunderbolt Mountain 7910

Gillard Peak 7915

Inspiration Point 7628

Napa Point 6423

Woodward Point 4819

36

31

31

FLATHEAD INDIAN RESERVATION

FLATHEAD CO.

FLATHEAD CO.

FLATHEAD INDIAN RESERVATION

APPENDIX C — RESOURCE POTENTIAL UNITS

Resource Potential Units, (RPU) for the Swan River State Forest were constructed by assigning each land-type a hazard rating, in five categories, of natural limitations normally associated with management activities. These categories were: mass failure potential, erosion potential, vegetative recovery, road construction potential, and soil compaction.

The forest habitat-types previously described were used in developing the resource potential units to give an indication of potential forest productivity in terms of yield capability. The yield capability estimates used for individual habitat-types were those developed by Pfister, et al. and are expressed in cubic feet/acre/year. For the purpose of the RPU analysis, only three general levels of productivity were used. These levels were:

- Low — 20-49 cubic feet/acre/year
- Moderate — 50-92 cubic feet/acre/year
- High — 93+ cubic feet/acre/year

The base data, including the habitat-type map, as well as Pfister's yield capability classification was used to determine basic land productivity.

The land-type hazard ratings were then combined with the land productivity ranges to delineate the five basic Resource Potential Units. When these five basic units were established, constraints imposed by slope, elevation, and present technology were incorporated into the system and RPU boundaries adjusted accordingly.

The slope restriction was based on the safe and ecologically sound operability limits of crawler tractor equipment, established as slopes less than 50 percent.

The elevation limit was based on reproduction problems associated with alpine fir habitats at elevations above 5,600 feet. To differentiate Resource Potential Units which fell into an area of slope greater than 50 percent, or elevations higher than 5,600 feet, these units were assigned as "B" modifier. An "A" modifier was assigned to Resource Potential Units that did not fall into areas with these technological limits.

The following general description of the five basic RPUs is presented, along with the map showing their location on the Swan River State Forest. A specific example is provided for each RPU designation.

RPU 1 — Areas of very high productivity and the least amount of natural limitations, having the highest potential for forest management. This Unit is exemplified by land type 25A-9, with a Grand fir/*Clintonia uniflora* habitat-type.

RPU 2 — Areas that are not as productive as Unit 1, but having the same natural constraints. An example of Unit 2 is a land type 25A-9, with a Douglas fir/*Symphoricarpus albus*.

RPU 3 — Areas of the same general productivity as Unit 1, but having more natural constraints. Unit 3 is typified by a land type 72 and a grand fir/*Clintonia uniflora* habitat-type.

RPU 4 — Areas of lower productivity than Unit 3, but having the same natural constraints. An example of Unit 4 is a land type 72, with a Douglas fir/*Symphoricarpus albus* habitat-type.

RPU 5 — Areas of low productivity, having little potential for forest management.



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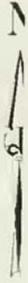
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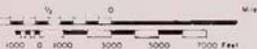


KE

-  SWAN RIVER S'
-  STATE FOREST
-  Forest Highway
-  Loop Road
-  County Boundar
-  Swan River Yoi
-  Picnic Camp A
-  Mountain Eleva
-  Perennial Strea
-  Intermittent St
-  Lakes
-  Wet Lande
-  State Forest L
-  Federal & Priv

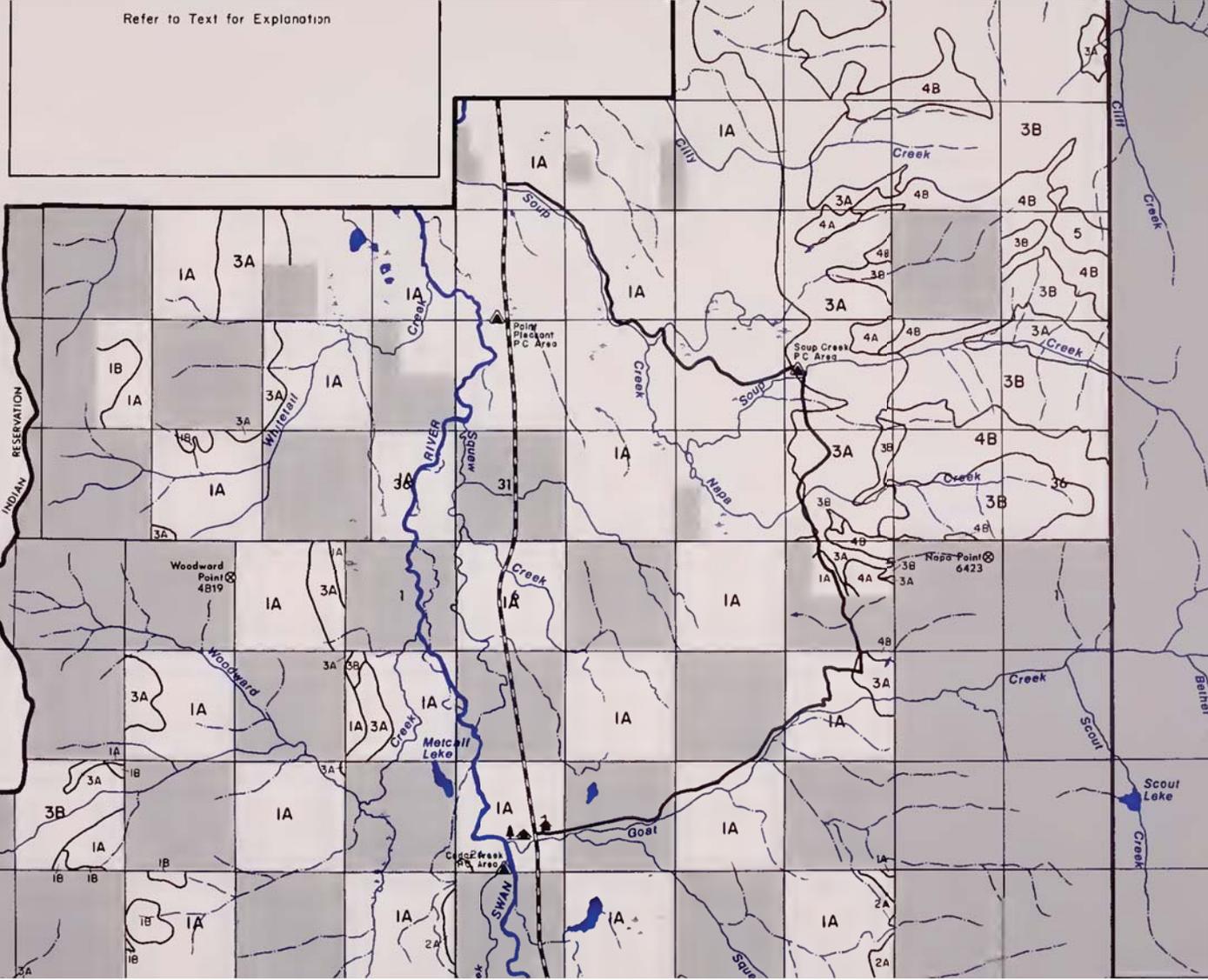


Refer to Text for Explanation



KEY

- SWAN RIVER STATE FOREST BOUNDARY
- STATE FOREST HOGRS
- Forest Highway
- Loop Road
- County Boundary
- Swan River Youth Camp
- Picnic Camp Area
- Mountain Elevation
- Perennial Streams
- Intermittent Streams
- Lakes
- Wet Lands
- State Forest Land
- Federal B Private Land



APPENDIX D — HYDROGRAPHIC INFORMATION

The following figures and table present additional information on the hydrography of the Swan Forest. Figure D-1 presents the sediment-discharge relationships for streams in the forest. Figure D-2 presents a hydrograph for the Swan River, and Figures D-3 to D-8

present hydrographs for Cedar, Goat, Lost, Soup, South Woodward, and Squeezer Creeks.

Table D-1 presents some physical characteristics of the Swan Forest watersheds.





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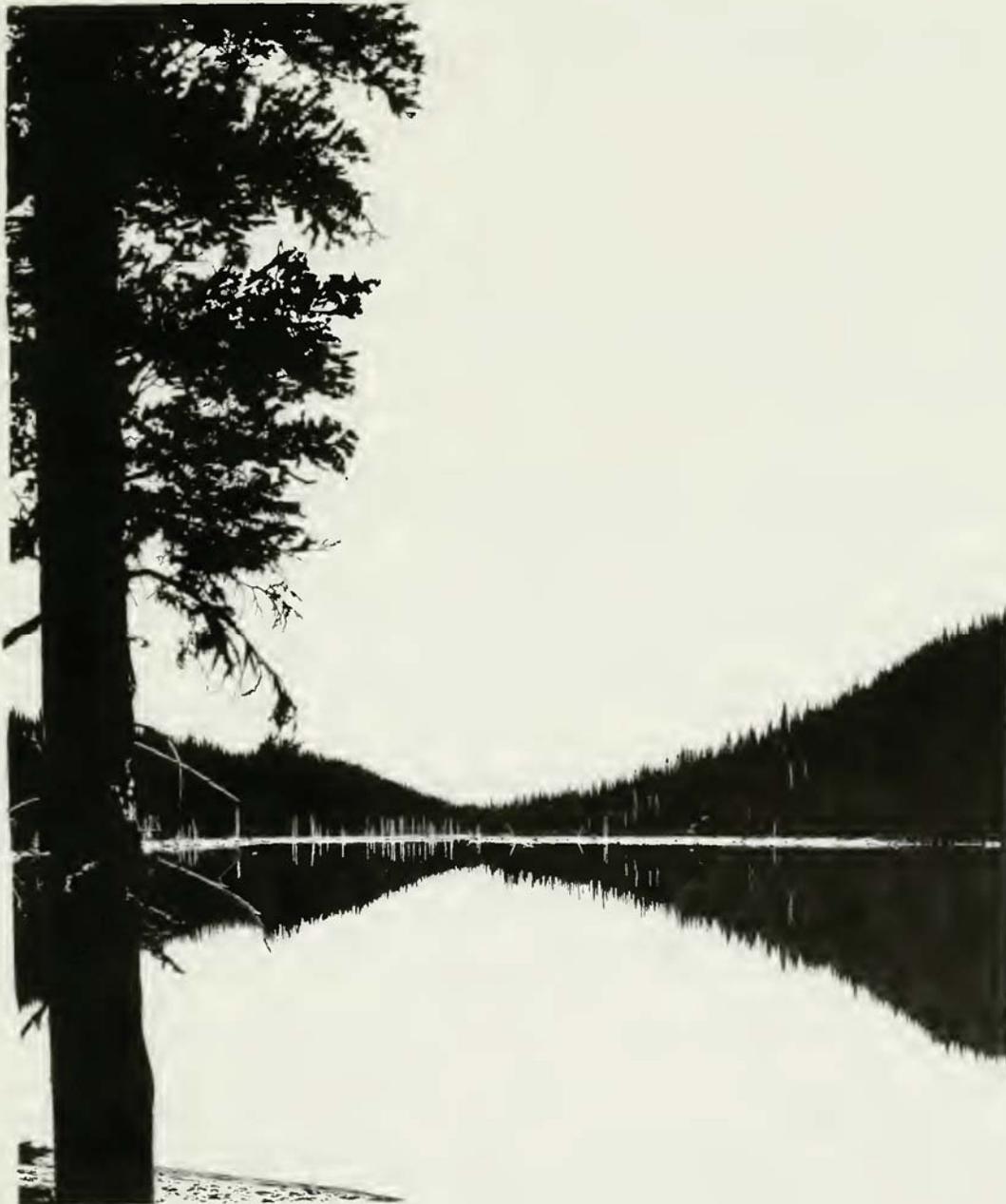
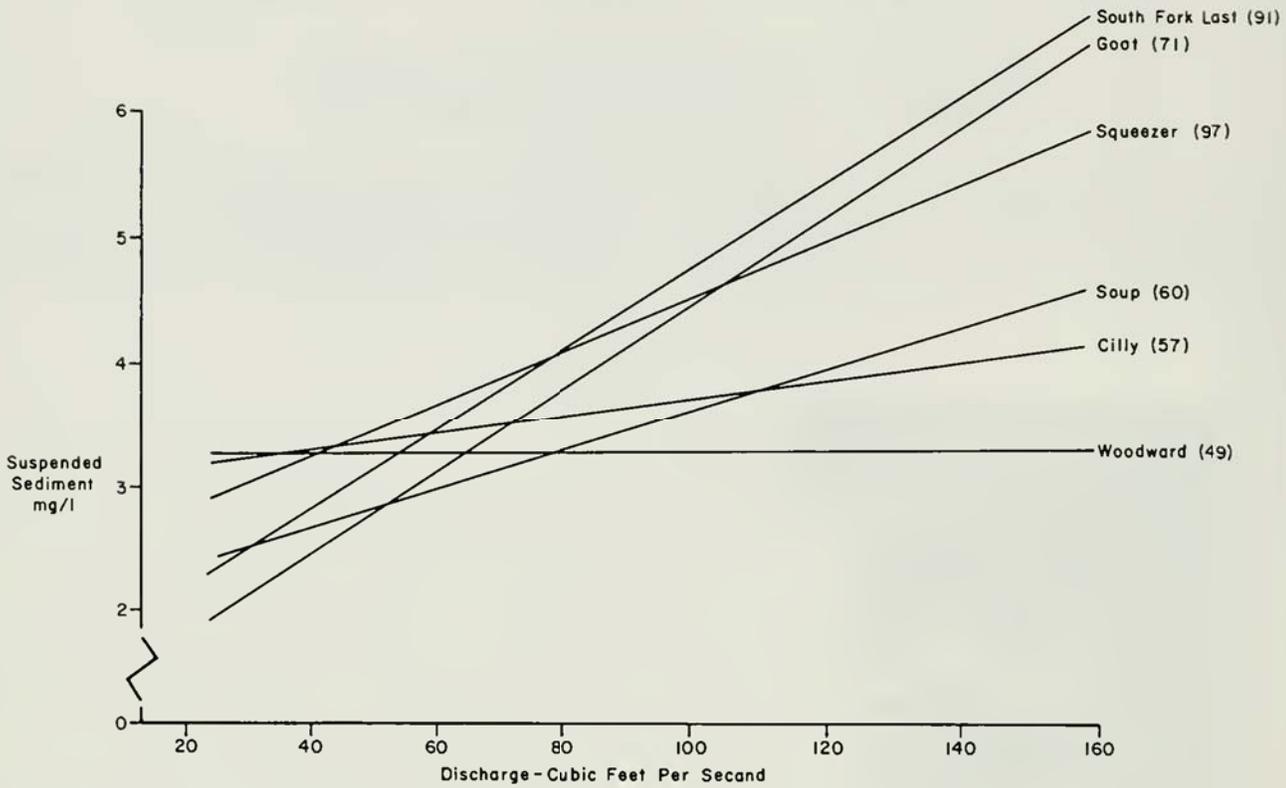
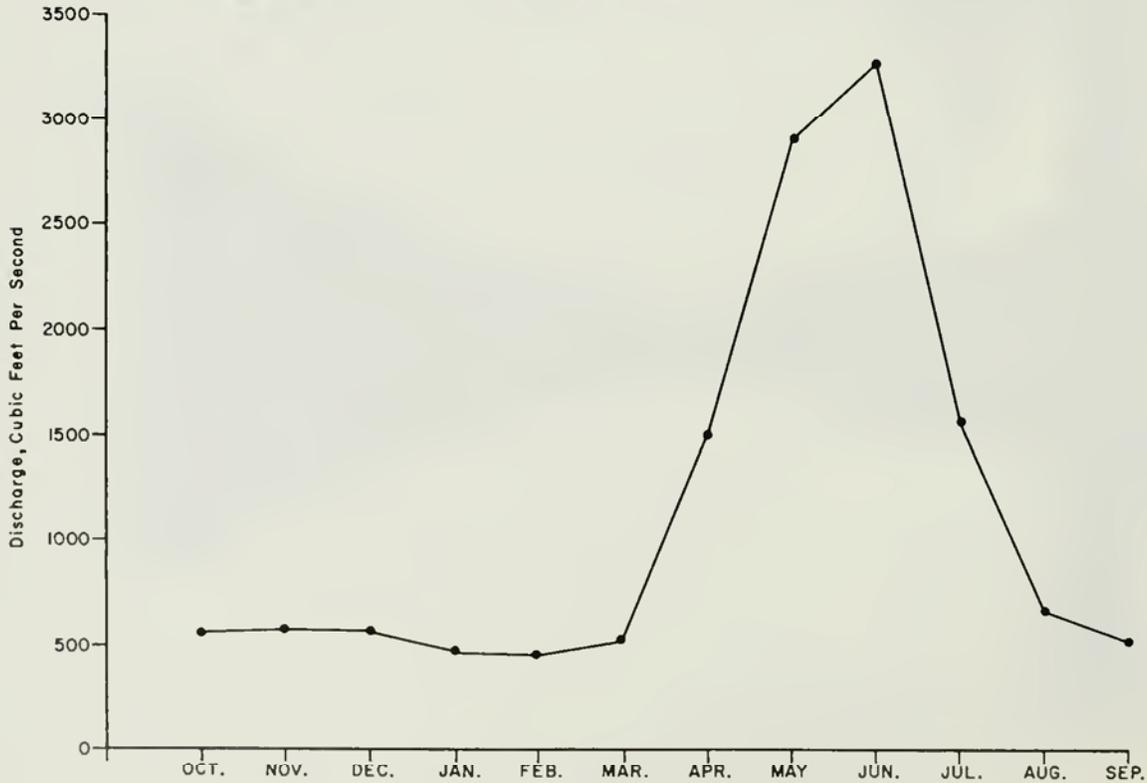


Figure D-1
-SEDIMENT-
DISCHARGE RELATIONSHIPS FOR
STREAMS IN THE SWAN RIVER STATE FOREST

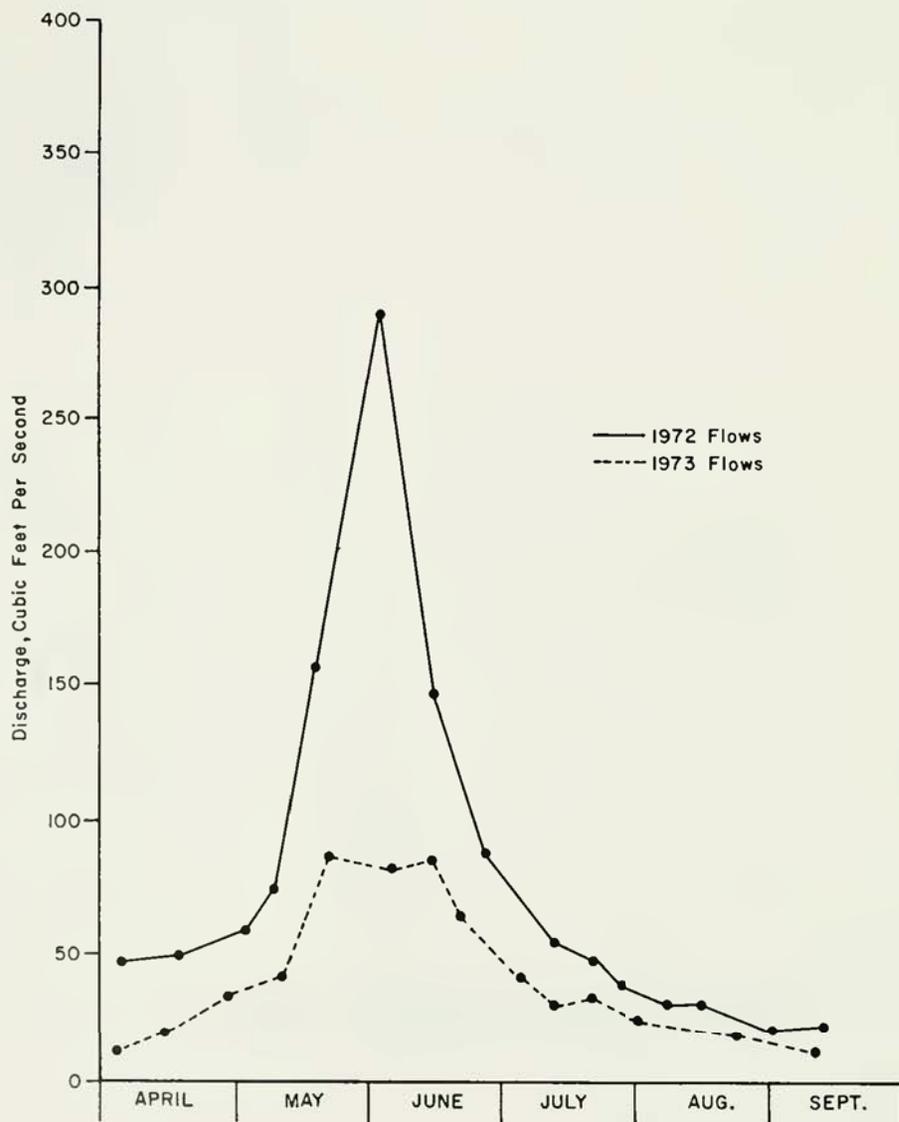


Note: Numbers in parenthesis indicate channel stability ratings.

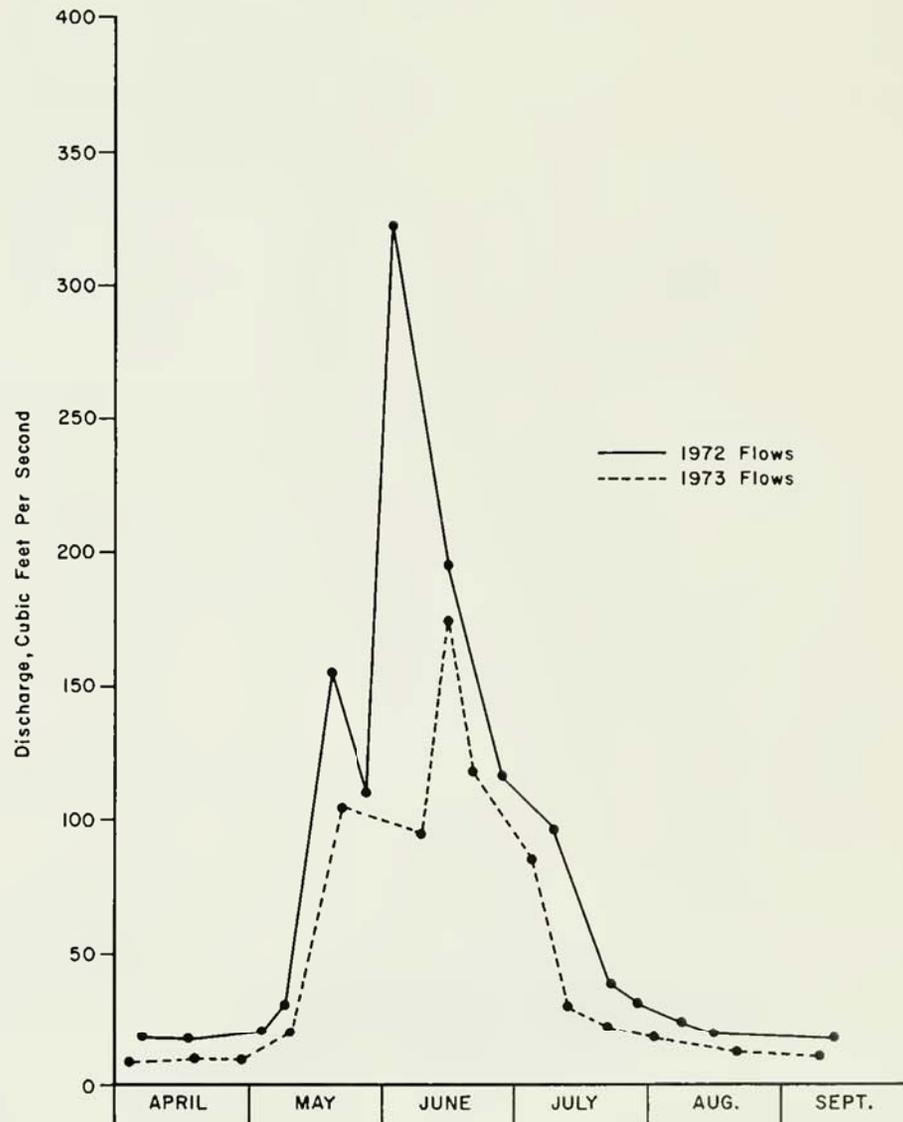
Figure D-2 SWAN RIVER HYDROGRAPH



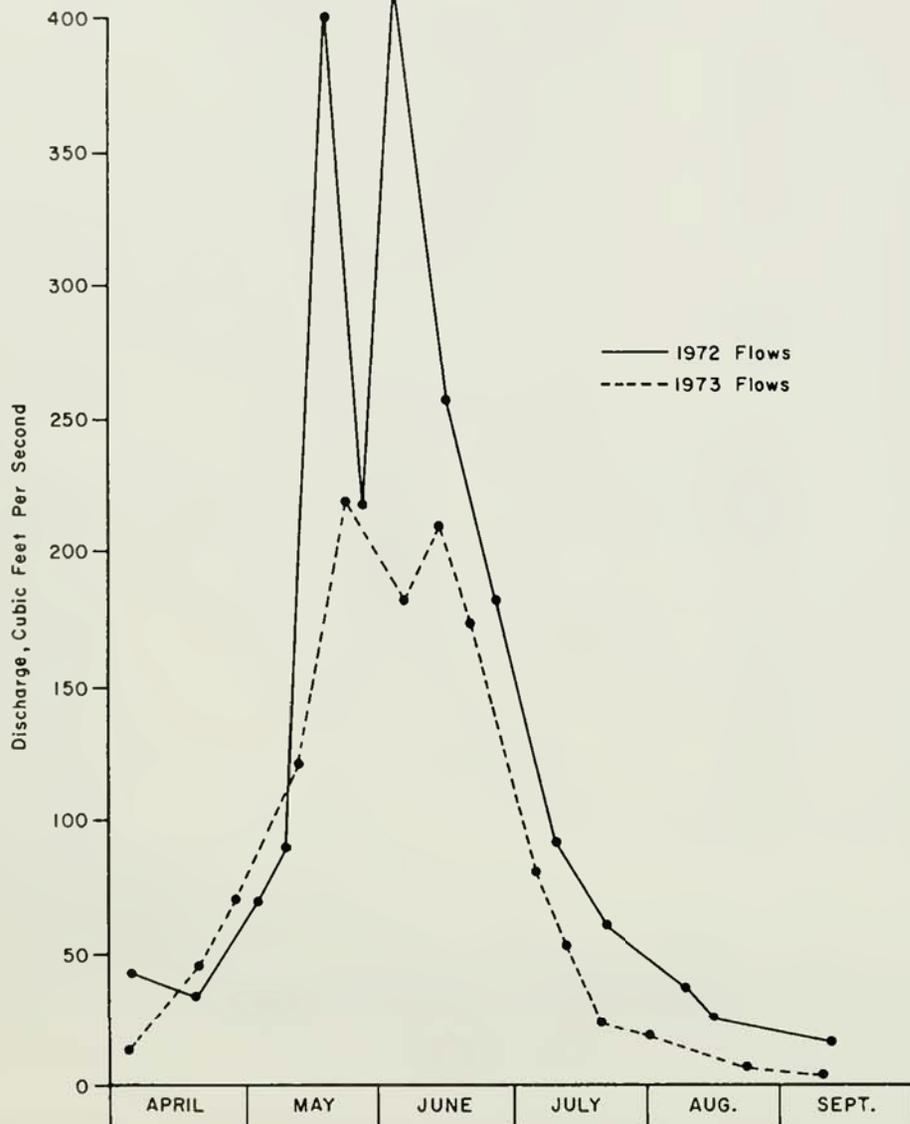
**Figure D-3
CEDAR CREEK HYDROGRAPH**



**Figure D-4
GOAT CREEK HYDROGRAPH**



**Figure D-5
LOST CREEK HYDROGRAPH**



**Figure D-6
SOUP CREEK HYDROGRAPH**

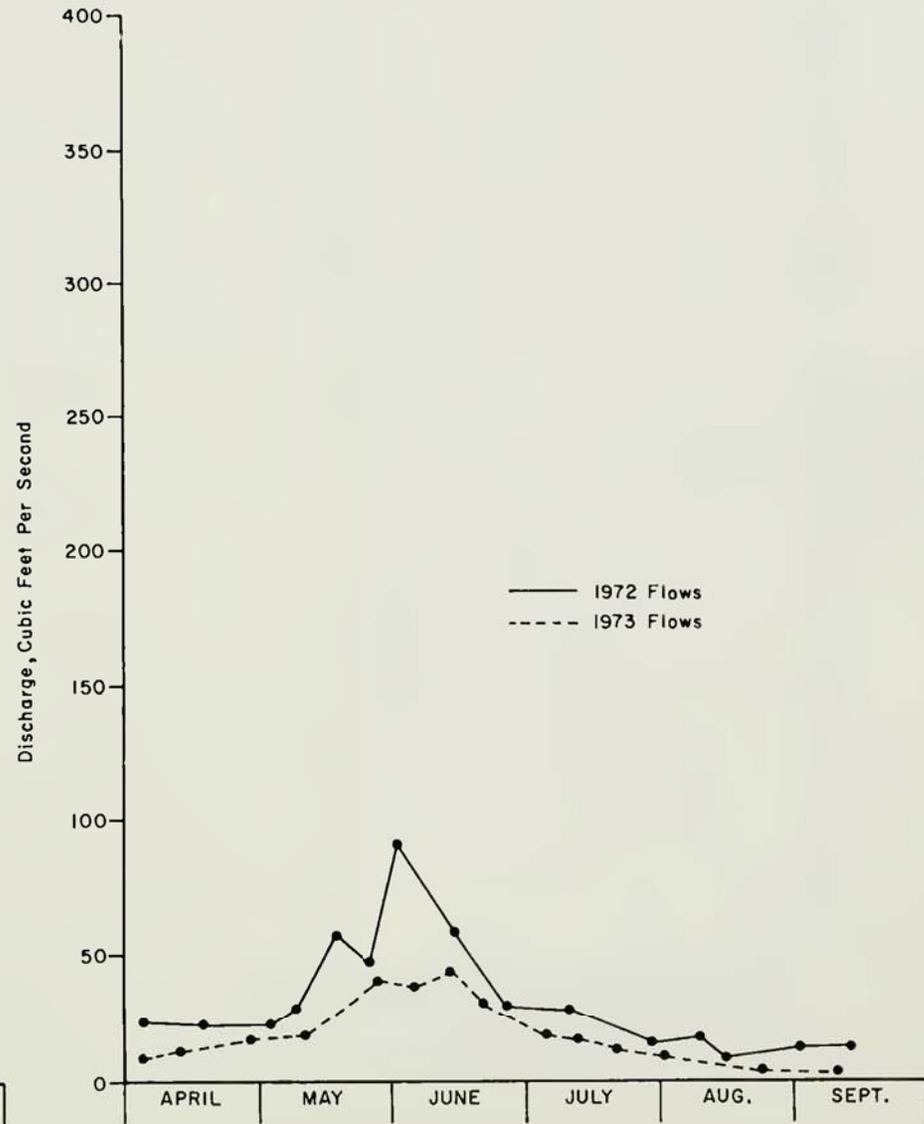


Figure D-7
WOODWARD CREEK HYDROGRAPH

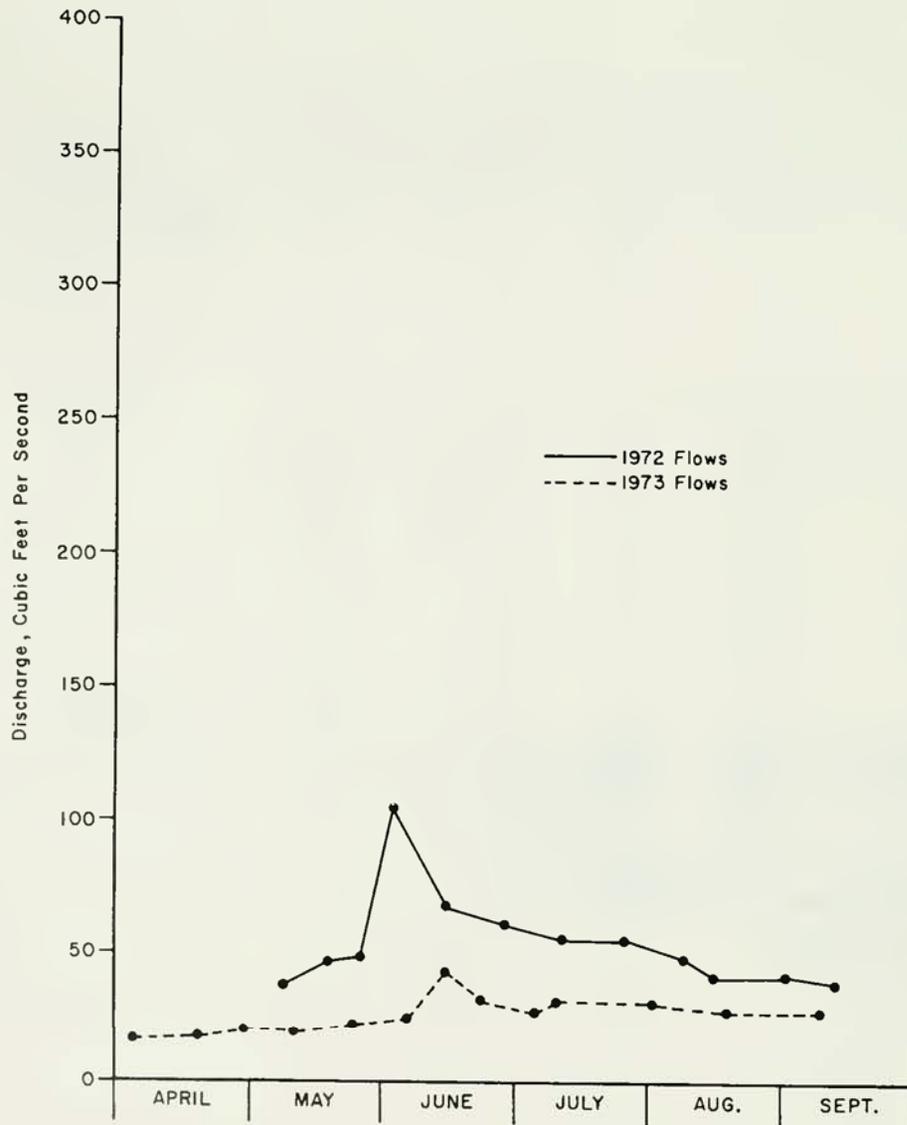


Figure D-8
SQUEEZER CREEK HYDROGRAPH

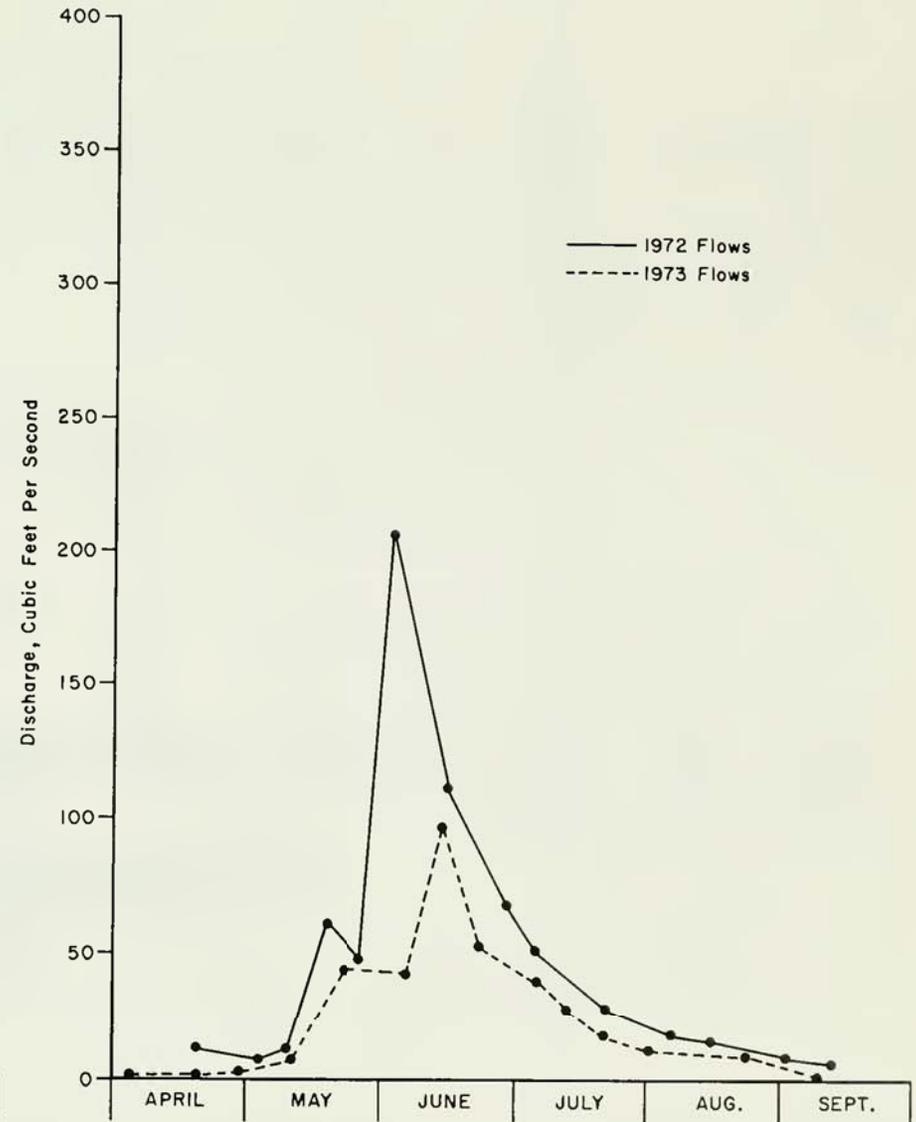


TABLE D-1
PHYSICAL CHARACTERISTICS OF
SWAN RIVER STATE FOREST WATERSHEDS

Watershed	Aspect	Drainage Area (sq. mi.)	% in Lakes, Ponds, or Meadows	Miles of Stream Channel	Drainage Density	Compactness Coefficient	Gradient %		Average Elevation ft.	Average Runoff c.f.s.	25 Year Peak R.O. c.f.s.
							Upper	Lower			
South Lost	W	16.2	0.0	39.7	2.4	0.39	6.4	1.6	5532	39	599
Cilly	W	8.6	0.7	16.1	1.9	0.48	24.0	2.4	5050	9	146
Soup	W	15.9	1.3	28.5	1.8	0.39	9.8	2.2	5076	27	413
Squaw Perry	W	8.1	1.9	24.5	3.0	0.48			4835	5	73
Goat	W	20.7	0.2	44.3	2.1	0.31	10.6	1.9	5828	46	704
Squeezer	W	14.2	0.5	36.3	2.5	0.43	16.0	1.6	6284	31	483
Van Lake	W	8.4	2.9	22.9	2.7	0.56			5488	7	101
Average for West Aspect		13.15		30.33	2.3	0.43	13.4	1.94	5441	23.4	
East Porcupine	E	4.1	1.5	6.0	1.4	0.38			4192	3	45
Whitetail	E	7.8	1.6	12.0	1.5	0.47	17.5	2.1	4734	8	133
Main Woodward	E	14.7	1.0	22.3	1.5	0.37	10.6	1.8	4764	21	368
South Woodward	E	10.4	0.7	24.6	2.4	0.44	10.25	1.5	5343	19	260
Average for East Aspect		9.25		16.22	1.7	0.41	12.8	1.8	4758	12.8	

APPENDIX E — BRIDGE SURVEY

Table E-1 presents the results of the bridge survey taken in the Swan Forest. Because bridges under all ownerships were surveyed some of the bridges within this table are not state-owned.

**TABLE E-1
BRIDGE SURVEY — ALL OWNERSHIPS**

Map No.	Type	Conditions	Remarks
1	Native Log	Fair	Washed out on north end
2	Native Log	Good	
3	Native Log	Good	Needs running plank
4	Gone — washed out		
5	Native Log	Very Poor	Both ends washed out
6	Treated Plank	Excellent	
7	Treated Plank	Excellent	
8	Native Log	Good	New running plank
9	Native Log	Poor	Rotted deck — unsafe
10	Native Log	Poor	Rotted deck — unsafe
11	Native Log	Fair	New deck — washed on NE end
12	Native Log	Poor	Rotted and washed — unsafe
13	Native Log	Fair	
14	Native Log	Fair	New deck, 1972
15	Native Log	Good	New, 1971
16	Native Log	Fair	
17	Native Log	Fair	
18	Native Log	Good	New deck
19	Native Log	Poor	Needs deck and repairs
20	Concrete & Steel	Fair	30 ton limit
21	Native Log	Fair	New deck
22	Plank	Poor	Light vehicle only
23	Unknown	Fair	
24	Unknown	Very Poor	Emergency light traffic only
25	Treated Plank	Very Good	
26	Unknown	Poor	
27	Native Log	Fair	Rebuilt, 1975
28	Native Log	Very Poor	
29	Ford	Very Poor	
30	Unknown	Unknown	

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