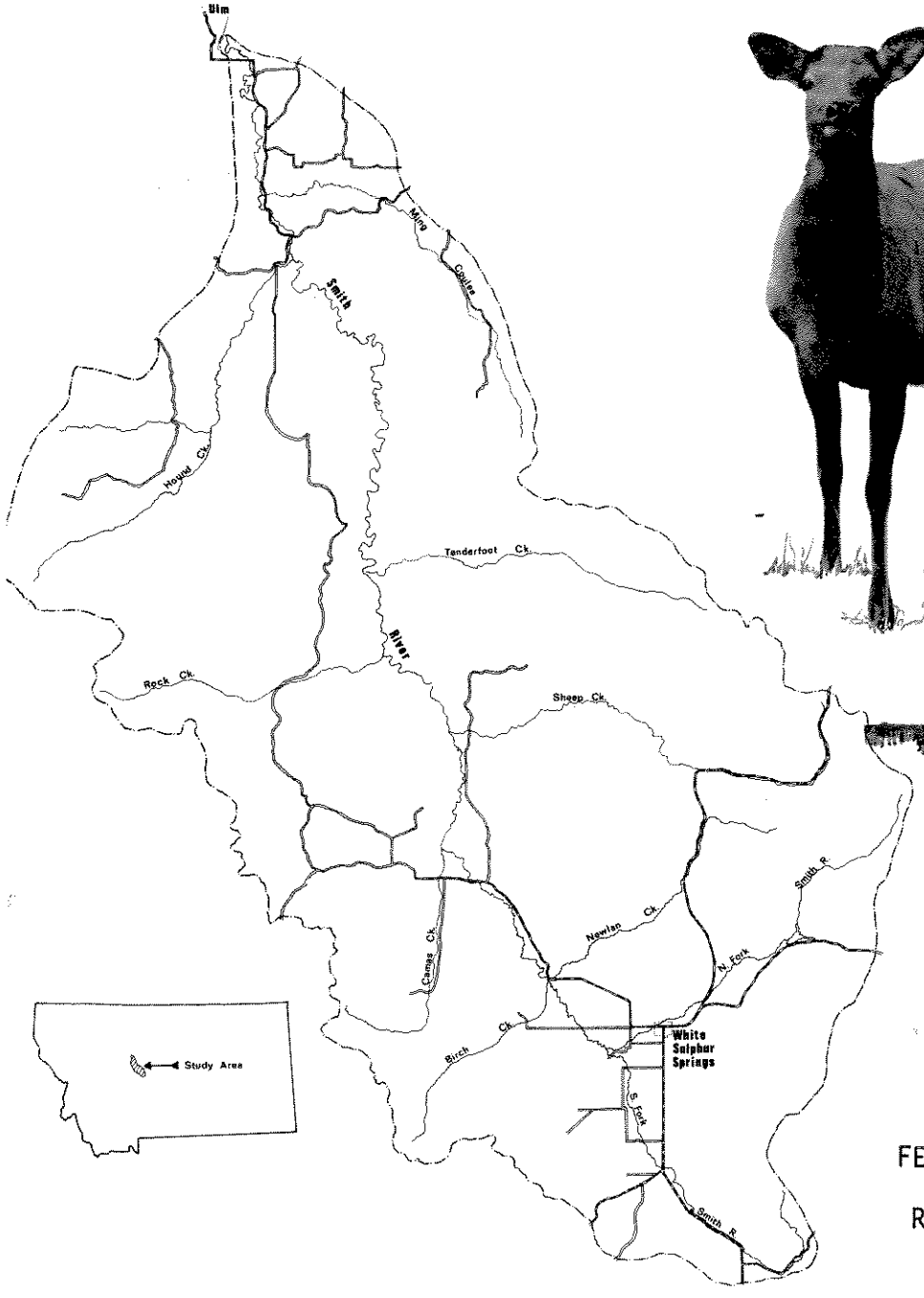
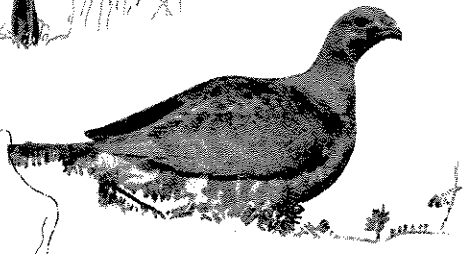
Montana Department of Fish and Game

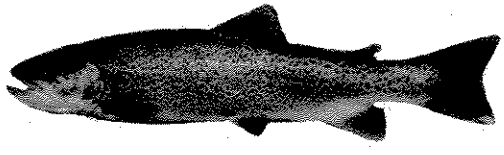
Environment and Information Division

SMITH RIVER DRAINAGE INVENTORY

ND PLANNING INVESTIGATION







FEDERAL AID TO FISH AND WILDLIFE

RESTORATION PROJECT - FW-1-R-3

June, 1973

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ABSTRACT

Smith River drainage waters contain five species of game fish. These include rainbow, cutthroat, brown and brook trout, and mountain whitefish. These fish are found in 73 streams and 21 lakes and reservoirs. The distribution, relative abundance, and management of these species are discussed. Evaluation and discussion of various habitat parameters include stream flow, water temperatures, stream channels and water quality. Other information includes access, seasons and creel limits, and fisherman use.

Data concerning the extent and condition of elk, deer, antelope and moose winter ranges and elk calving areas were obtained from continued big game observations during the winter of 1971-72. Final maps outlining these areas are presented. Elk and deer 1971-72 winter classifications are presented with the 1969-71 data. A summary and discussion of data gathered from 1969 to 1972 is presented. State and federal land parcels important to big game are identified. Major environmental changes affecting big game animals are discussed.

Principal upland game bird species found in the drainage include blue grouse, ruffed grouse, sharp-tailed grouse, gray (Hungarian) partridge, and pheasant. On the basis of game bird harvest and economic impact of bird hunters, this drainage appeared to be relatively unimportant compared to other areas in the state. Locations of newly found sage grouse and sharptail breeding areas are given. Other data presented include estimated game bird harvest, checking station results, and production data. Major problems encountered in the area were access to public and private lands and habitat destruction, i.e., the spraying and removal of sagebrush. These and other problems and possible solutions are discussed.

GENERAL INTRODUCTION

Fish and game resource planning has been, and continues to be, a phase of fish and game managers' work; however, the constant pressure of day-to-day management consumes most of their time. The intensity of individual fish and game problems also varies from place to place in a management area. Consequently, managers have not been able to develop complete inventories in a common area.

This project accomplishes a comprehensive inventory of the fish and game resources in the Smith River drainage from which plans for management of these resources are formulated. Fish and game management planning within a river drainage system has not been accomplished previously in Montana, and this project attempts to unify the department's effort to solve resource management problems.

This report consists of three sections: Section I - Fisheries, Section II - Big Game and Section III - Upland Game.

Description of the Study Area

The Smith River drainage lies in westcentral Montana, almost due south of Great Falls (Figure I), between the Big Belt Mountains on the west and the Little Belt and Castle Mountains on the east. The drainage is approximately 75 miles in length and the width varies from 3 to 45 miles. The total area is slightly over 2,000 square miles. The elevation of the floor of the drainage varies from 3,350 to 5,400 feet above sea level. The highest mountain peaks range from 8,500 to 9,500 feet above sea level.

The Smith River is formed by the junction of the North and South Forks of the Smith River about 4 miles southwest of the town of White Sulphur Springs. The North Fork drains part of the southwest slopes of the Little Belt Mountains and the northwest slopes of the Castle Mountains. The South Fork originates along the southwest flank of the Castle Mountains and from the bench lands between the Castle and Big Belt Mountains. The main stem of the Smith River then flows northwesterly through a narrow valley until it enters a deep mountain canyon about 10 miles north of Fort Logan. After emerging from the canyon, the river meanders through a relatively narrow valley flanked by rolling grasslands until it joins the Missouri River near the town of Ulm.

Numerous tributaries originate in the Big Belt and Little Belt Mountains to join the Smith River. Some of the major tributaries originating in the Big Belt Mountains are Birch, Camas, Beaver, Rock and Hound Creeks. Those from the Little Belt Mountains are Newlan, Sheep, Eagle, Tenderfoot and Deep Creeks.

Approximately 2,500 people reside within the Smith River drainage. A major highway system makes the area accessible to the surrounding urban areas which have a population of over 150,000 people.

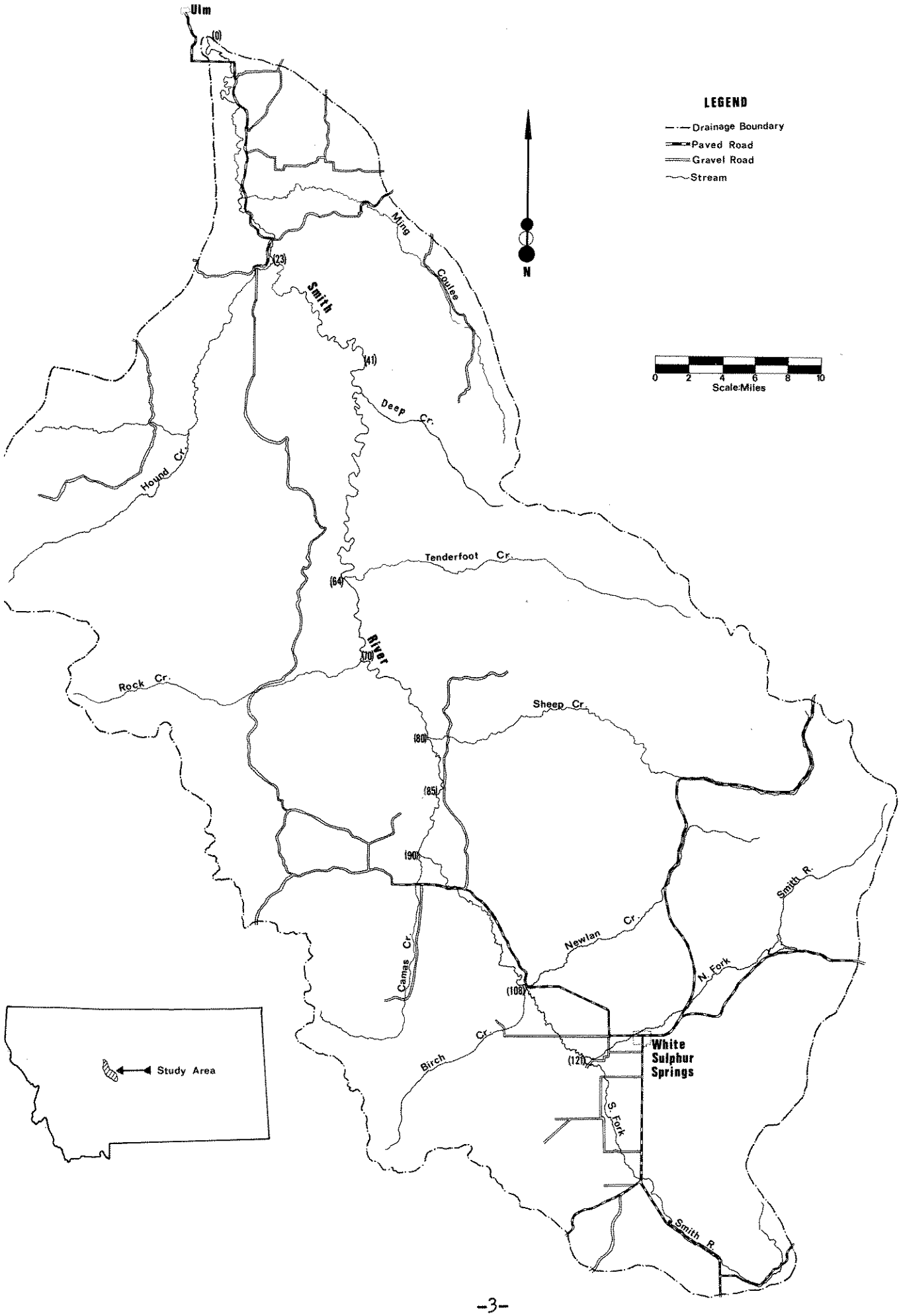

Figure 1. Smith River drainage. Approximate river miles in parenthesis.

In the early 1860's the discovery of gold in the surrounding mountains stimulated a heavy influx of miners. As gold was depleted and mining operations abandoned, farming and ranching began to take over as the predominant economy, and they remain so today.

A substantial portion of the drainage remains under public administration (Figure II). Land administration in the drainage by percent is as follows: Private - 70, Forest Service - 23, State - 6, and Bureau of Land Management - less than 1.

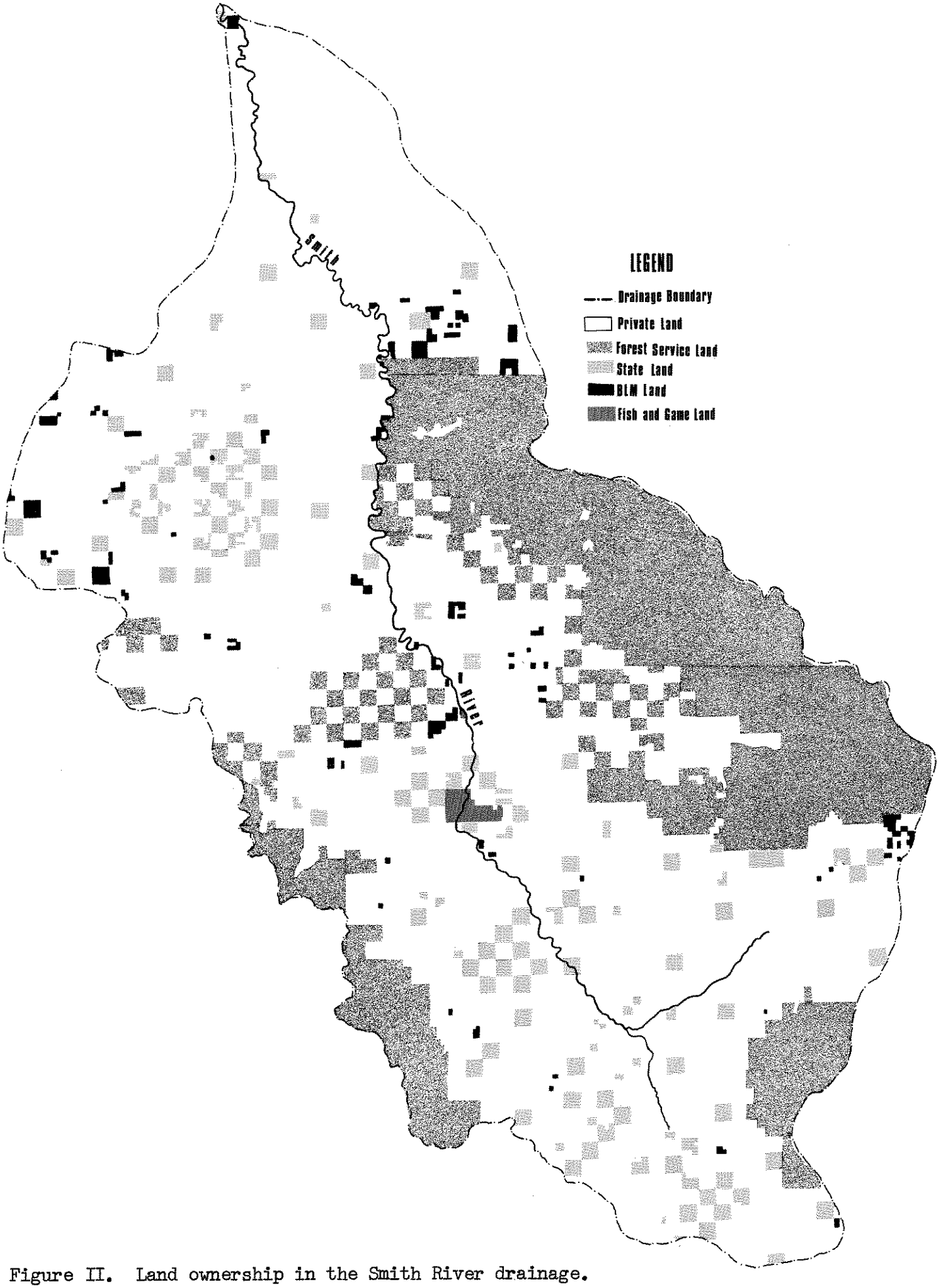

Figure II. Land ownership in the Smith River drainage.

SECTION I

FISHERIES INVENTORY AND PLAN

Job I-a

Prepared by

A. H. Wipperman
June, 1973

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INTRODUCTION

Fish management in Montana has largely been developed through the Dingell-Johnson federal aid program which began in 1951. Numerous projects, such as surveys, investigations, research, development and maintenance, have been carried out. Much information has been accumulated and reported, but it usually has not been assembled and analyzed on an area or drainage basis suitable for complete planning. More often than not, little information on the fishery resource is available to evaluate conflicting resource demands.

The overall objective of Montana's fisheries program is to preserve and develop aquatic resources by maintaining natural habitat and biota, preserving good fishing, and increasing fishing opportunities. This includes preserving, improving, restoring and enlarging Montana's aquatic habitat, conserving its fauna and flora, and managing it intelligently for all users. While the state pursues certain direct programs in the management of fishery resources, fulfillment of the objectives is dependent in large part upon the policies, plans, and projects of other public agencies and private groups.

Identifying the status, problems and needs of aquatic resources within a specific drainage area conforms well to fishery planning, because the boundaries are well defined. This approach allows a complete package of information from which management decisions can be based. Until the full potential, importance and problems in individual drainages are realized, little can be accomplished in setting priorities and policies on a statewide or river basin level.

This planning project attempts to bring together the various factors important for maintaining and utilizing the fishery resource in the Smith River drainage. The plan is based on inventory of the habitat, recreation opportunity, species of fish and fish populations, and interactions with other land uses. Some areas of influence on the fishery resource are identified and recommendations to partially fulfill the objectives of the fishery program are submitted at the end of this section.

Waters in the Smith River drainage offer sport fishing for rainbow, brown, brook and cutthroat trout and mountain whitefish. These fish are found in 73 streams that total over 643 stream miles and in 21 lakes and reservoirs totaling about 511 surface acres. Rainbow trout and brook trout form the backbone of the fishery. Rainbow trout are most abundant in the Smith River and the larger tributary streams, while brook trout are mainly found in the small, cool feeder streams.

Natural fish production in streams is presently augmented by planting about 10,000 catchable sized rainbow trout in a few accessible areas. Trout populations in several of the lakes and reservoirs are largely maintained by stocking fingerling (3-5 inch) rainbow and cutthroat trout. The total number of hatchery trout stocked in the drainage has decreased in recent years because overstocking and poor utilization of hatchery fish was observed in several of the waters.

Anglers spent an estimated 32,000 days in the Smith River drainage during the license year 1968-69. Observations of fishing pressure and random creel census during 1970 and 1971 indicate the overall use in the drainage is relatively light. Based on fishing pressure and populations of game fish, waters in the drainage could probably support three times the present use without impairing the quality of fishing now enjoyed. Angler success in all waters was estimated to be about three fish per angler day.

Planning for maintenance and enhancement of fishery resources today is insuring preservation of this resource for the future. There is a limited number of fishing streams; they cannot be made artificially, nor can they be enlarged to provide for the wants and needs of an expanding population. Therefore, most of the emphasis in this project was placed on identifying the amount and condition of stream habitat.

There are conflicts between the uses of aquatic resources and with other resource programs, but society should not be willing to accept the view that economic growth and development should always be permitted precedence over other amenities of life. Increased effort to protect aquatic resources should be required by all public and private entities whose actions involve and affect aquatic habitat.

INVENTORY AND PLAN

Techniques Used

Fish populations were estimated in streams with the aid of electric shocking gear. The shocking gear and collecting equipment were placed in a boat and fish were gathered as the crew and boat moved slowly downstream. After data were gathered, captured fish were marked and released in the stream. Recapture collections to obtain population estimate data usually followed the marking collections by 4 to 5 days. Methods involved for population estimates, age structure and confidence intervals largely followed those described by Vincent (1971). Electric shocking gear was also used to inventory fish populations in small tributary streams. The electric power source was placed on the streambank and fish were collected from stream sections varying from 125 to 710 feet in length. Hook and line survey was conducted on some remote streams to verify the species of fish present. Most of the fish caught were measured before they were released.

Reservoirs and ponds were surveyed by setting one 125-foot experimental gill net in each body of water. The nets were fished overnight. All fish captured were measured and weighed. Scale samples for age and growth analysis were obtained from trout from a few reservoirs and lakes.

A total of 10 staff gages was installed on streams throughout the drainage to aid in monitoring flow regimes and to help determine the quality of habitat available throughout the year. A discharge curve was constructed for each staff gage by periodically measuring the volume of flow with a Gurley current meter. Stream gaging methods and techniques employed are described by Corbett (1962) and Wipperman (1967). A water stage recorder was installed in the U.S. Geological Survey gage house (Eden Station) on the Smith River near the mouth of Hound Creek at river-mile 26 in the spring of 1970.

Some water chemistry was conducted on streams near the staff gage locations. Water chemistry included pH, conductivity and turbidity. Chemical tests were usually conducted during periods of low water with the exception of turbidities. These measurements were taken during high water periods. All tests were made with a Hach model DR-EL chemistry kit.

Three thermographs were installed on the main stem of the Smith River. One thermograph was installed in the U.S. Geological Survey gage house at river-mile 26 in the spring of 1970. The other two thermographs were installed in the spring of 1971 at river-mile 80 and 116. Maximum-minimum thermometers were installed on some of the larger tributary streams during the summer of 1969. These were not utilized in subsequent years.

A method of measuring and describing stream morphology was initiated to determine the quality and quantity of habitat available to the fishery resource.

The goal of this phase of the project was to develop a standard outline to aid the fishery worker in classifying stream habitat for this and future studies.

Channel morphology and physical habitat were measured in 10 stream sections where trout populations were estimated. The length of each section was measured down the center of the channel. The intervals used to measure cross sections were shortened after two sections were measured on the Smith River. The intervals were too widely spaced to adequately describe the habitat in these sections. It was felt the intervals should be spaced about equal to an estimated average width of a stream channel. Minimum cross section intervals were established at 25 feet on streams less than 25 feet wide. At each interval, the width of the stream was measured, thalweg depth recorded and shoreline characteristics were recorded within 5 feet on each side of the cross section tag line.

Streambank features were classified into one of the following five categories:

Brush - All woody vegetation within 10 feet of the shoreline. Brush was considered cover if overhanging live branches were within 5 feet of the water surface, or if living or dead branches and roots were immediately above or beneath the water surface. Brush cover was measured horizontally along the tag line from the shoreline to the extent of the vegetation over or in the water.

Grass - Herbaceous plants on immediate shoreline.

Deposition zone - Includes silt and gravel bars, rocks, and boulders deposited by action of the water.

Cliff - Parent material or bedrock within nearly vertical position to shoreline.

Boulders - Large natural immovable rock or riprap.

Other characteristics that further describe the physical features of the shoreline include the following:

Eroding bank - Banks which were unstable and erosion was evident through wave action or trampling by livestock.

Undercut - An overhanging shelf of soil or vegetation. Only grass and bedrock banks were considered undercut. Undercut associated with brush is considered brush cover.

Debris - Included driftwood, snags, and logs not permanent or rooted. If serving as cover, debris was measured the same as brush.

Creel census was performed over much of the drainage, usually on weekends. Other contacts were made during normal working periods. Creel data were also

collected by department wardens. Warden data were summarized and pooled for 1967 to 1969. The data were mainly used to determine angler success and use on the various waters in the drainage.

Aerial photographs with a scale of 4 inches per mile were obtained for the entire Smith River drainage. Stream length was measured from the photographs by a map measurer to the nearest 1/10 mile. The surface area of most of the lakes and reservoirs was also computed from photographs. Land ownership in the drainage was obtained from county records at Great Falls and White Sulphur Springs.

Classification of stream size at midsummer low flow was established on all streams supporting game fish populations. This classification was slightly modified from that presented in the Department of Fish and Game's Lake and Stream Survey Manual. Stream classifications by flow used in this report are as follows:

Size 1 - Over 1500 cubic feet per second
Size 2 - 500 to 1500 cubic feet per second
Size 3 - 100 to 500 " " " "
Size 4 - 20 to 100 " " " "
Size 5 - 5 to 20 " " " "
Size 6 - Less than 5 cubic feet per second, but a permanent flow
Size 7 - Intermittent during dry years

The size of most of the smaller streams was estimated if actual flow was not measured.

Abbreviations used in this report include the following:

Rb - Rainbow trout (Salmo gairdneri)
Ct - Cutthroat trout (Salmo clarki)
LL - Brown trout (Salmo trutta)
Eb - Brook trout (Salvelinus fontinalus)
Wf - Mountain whitefish (Prosopium williamsoni)
cfs - Cubic feet per second
JTU - Jackson turbidity units
T - Township
R - Range
S - Section
F - Fahrenheit

Supporting Data and Discussion

Species of Fish and Management

Five species of game fish are found in the Smith River drainage. Their range, relative abundance, importance, and future role in management are discussed below. Fish population estimates and survey data are presented in Appendix A and B. A list of streams inhabited by individual game fish is presented in Appendix C and C-1. A brief resume on other species found in the drainage is also presented.

Brook Trout (Salvelinus fontinalus)

Brook trout occur in the majority of streams in the drainage and are present in 464 stream miles or about 75 percent of the total miles containing game fish. They occur throughout the drainage (Figure 1) and are most abundant in the smaller streams. Brook trout are common in the upper reaches of the Smith River, but gradually become sparse near the confluence of Spring Creek at river-mile 75.6. They are occasionally found in the remainder of the river, but contribute little to the sport fishery. The lower 80 miles of the Smith River are not considered brook trout habitat.

Brook trout populations were predominant in 40 of the 53 streams in which they were found, and were considered the only game fish in 17 of these. A few other small tributaries are known to contain brook trout, but were not surveyed. Nearly all the streams supporting brook trout contained fishable populations, but specimens over 1 pound are rare.

Brook trout occur in 10 lakes and reservoirs (430 surface acres), but were considered the most abundant species in only three of the lentic environments. Three of the reservoirs were not surveyed, but stream surveys verified the presence of brook trout in tributaries above the impoundments. Brook trout were sparse or incidental in one reservoir. Again, specimens over 1 pound are rare.

A random summer creel census from 1967 to 1971 revealed brook trout were the second most abundant game fish creeled. Fishermen were contacted on 17 streams and 11 lakes. Brook trout were present in 16 of the streams and 6 of the lakes. Because of the lower number of fisherman contacts for the individual years from 1967 to 1969, the data are pooled for this time period. Composition of brook trout creeled from streams varied from 31 to 48 percent of all game fish harvested per year compared with 7 to 35 percent from lakes and reservoirs.

Brook trout provide an important part of the catch from such streams as the North and South Forks of the Smith River, Birch Creek, Sheep Creek and Newlan Creek. Nearly one-third of all game fish creeled during the 5 years of census were brook trout caught from these five streams.

Brook trout predominate in the catch from Elk Creek and Whitetail Reservoirs, even though both reservoirs were annually planted with rainbow trout. These

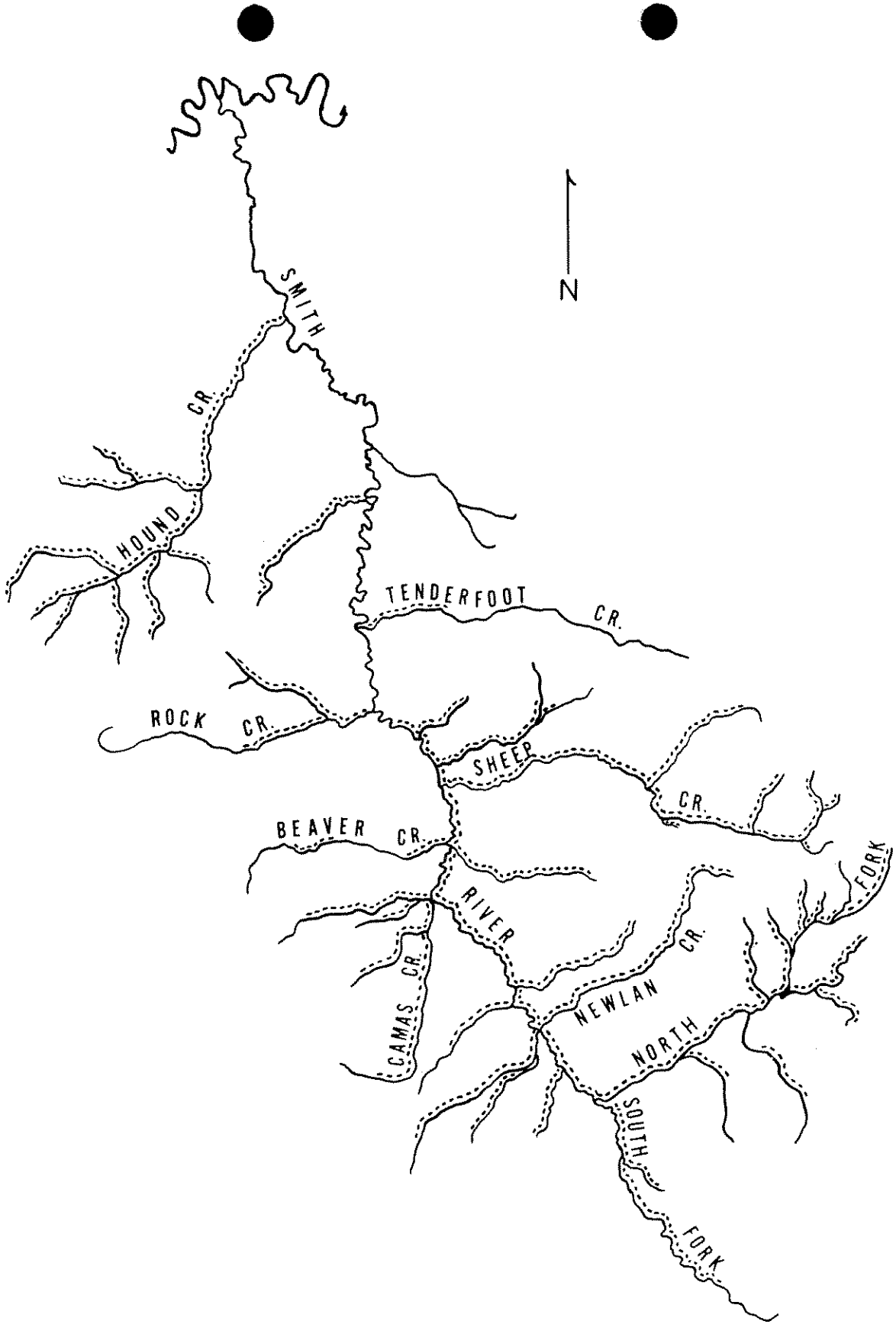


Figure 1. General distribution of brook trout in the Smith River drainage.

reservoirs are small irrigation impoundments and undergo drastic reductions in water levels each year. The only other lake contributing a number of brook trout to the creel is the North Fork Smith River Reservoir. During the 5 years of creel census, brook trout comprised about 27 percent of the catch from this reservoir.

The future of brook trout in the Smith River drainage will depend on preservation of stream habitat. While present throughout much of the drainage, they are most abundant in streams where water temperatures remain cool throughout the summer and riparian or aquatic vegetation provides abundant cover. The most notable loss of brook trout habitat has occurred on the South Fork of the Smith River, where destruction of riparian vegetation, channel and rangeland erosion, channel alterations and dewatering are evident. While brook trout are present in the upper 30 miles of the Smith River, the river is not considered good brook trout habitat because of above optimum summer water temperatures.

Brook trout have maintained themselves adequately under present fishery management programs. They have not been planted in streams since 1954, and a 10-pound, no-number limit regulation was initiated statewide for brook trout in 1966. There is no evidence the 10-pound limit is depleting brook trout populations.

Rainbow Trout (Salmo gairdneri)

Rainbow trout occur in about half the streams in the drainage and are present in 377 stream miles, or nearly 60 percent of the total miles containing game fish. They are found throughout the drainage (Figure 2) and are most abundant in the Smith River and the larger tributaries such as Hound Creek, Rock Creek, and Sheep Creek.

Rainbow trout are the predominant game fish in 15 of the 36 streams in which they were found. They were present in combination with other game fish in all 36 streams. All streams contained fishable populations of rainbow trout, but specimens weighing over 1 pound were found only in the Smith River, North Fork Smith River, Sheep Creek, Freeman Creek and Hound Creek. Rainbow trout weighing over 2 pounds were not collected from any stream in the survey.

Rainbow trout are known to occur in 11 lakes and reservoirs (446 surface acres) and are the predominant game fish in 6 of these waters. Their status is unknown in Hound Creek Reservoir and Stoyanoff Reservoir as these waters were not surveyed. Rainbow trout were exclusive in one mountain lake. Populations are largely maintained in six waters by planting fingerling trout. Reservoirs from which specimens over 1 pound were collected or observed during creel census include Elk Creek, Jackson, Keep Cool, Spring Creek and North Fork Smith River. Individuals over 1 pound were also collected from Hidden Lake, a high lake in the Big Belt Mountains. Occasionally, trophy rainbows from 5 to 10 pounds are reportedly caught from Jackson and Keep Cool Reservoirs. The North Fork Smith River Reservoir produces most of the rainbow trout creeled from lentic environments, but individuals over 1 pound are uncommon.

Creel census conducted from 1967 to 1971 reveals rainbow trout are predominant in the catch. Of the 17 streams and 11 lakes where fishermen were contacted, 13 streams and 8 lakes contained rainbow trout. Composition of rainbow trout to all other game fish creeled per census period varied from 45 to 63 percent on streams compared to 62 to 88 percent from lakes.

Rainbow trout provide the majority of the fish creeled from the Smith River, Hound Creek, the lower half of Tenderfoot Creek, Rock Creek, and Sheep Creek. About 44 percent of all game fish harvested during the 5 years of the census were rainbow trout from the above five streams. The North Fork Smith River Reservoir provides the most important lake fishery as far as supporting angler use, and rainbow trout comprise nearly 75 percent of the catch. They provide over 92 percent of the catch from Keep Cool and Jackson Reservoirs. These two small reservoirs are heavily used by local residents.

Large numbers of rainbow trout have been planted in the drainage throughout the years. Fry and fingerling plants were made in several streams, but this practice has been discontinued since 1954. At the present time, about 10,000 catchable (8- to 11-inch) rainbow trout are annually stocked in the Smith River, Hound Creek, and Sheep Creek. About 5,000 of these trout are planted at several locations in the upper Smith River and North Fork Smith River near White Sulphur Springs.

Initial plants of catchables were made in the upper Smith River in 1955. These plants were increased to 15,000 fish by 1963, but since that time, the number of planted fish has been reduced to the present level. This reduction was recommended because a reasonable wild trout fishery exists in the river and the contribution of the planted stocks to the creel is unknown. Stocking the North Fork Smith River is unsound, since population inventories revealed this stream supports the greatest biomass of wild trout per unit of stream in the drainage. This stream should be removed from the planting program.

Another 3,000 catchable trout are planted in upper Sheep Creek. Catchable rainbow trout were first planted in Sheep Creek in 1952 after a fish population survey revealed fingerling plants were yielding little to the creel, and most of the wild brook trout were relatively small. Evaluation of the first plant of 10,000 catchables in 1952 revealed a significant increase in angler catch per hour, but the total number of hatchery fish harvested was not determined. Annual plants of 1,500 to 6,000 catchable rainbow trout have been made in upper Sheep Creek since 1953. Creel data collected in 1970 and 1971 revealed hatchery rainbow trout still contribute a significant portion of the catch in the area stocked.

Another 1,500 catchable rainbow trout are stocked in the lower Smith River near the confluence of Hound Creek, in lower Hound Creek, and in Moose Creek, a tributary to Sheep Creek. The contribution of these fish to the creel is unknown.

Fingerling rainbow trout are planted in several reservoirs where public access is granted. These waters include Jackson, Keep Cool, Spring Creek, Whitetail and North Fork Smith River Reservoirs. A few other reservoirs were planted in the

past, but this was discontinued because of access problems or the loss of habitat by excessive drawdown for irrigation. The fingerlings grow well in four of the reservoirs and constitute the majority of the catch a year after planting. The one exception is Whitetail Reservoir, where a good natural population of brook trout is found. It is doubtful that planting this reservoir is improving the fishery.

Proper management of rainbow trout is vital for maintaining the sport fishery in the Smith River drainage. Preservation or improvement of stream habitat will help accomplish this goal under the current levels of fishing pressure. The present levels of stocking 4- to 5-inch rainbow trout in the reservoirs appears to be a sound practice.

Mountain Whitefish (Prosopium williamsoni)

Mountain whitefish were found in 10 streams and are present in about 237 stream miles or 34 percent of the total miles containing game fish populations. They are scattered throughout the drainage, but are most abundant in the Smith River and the lower reaches of most large tributary streams (Figure 3).

Mountain whitefish were considered the predominant game fish in only the Smith River. Whitefish population estimates were made in only one section of the Smith River; however, they were noticeably abundant in other river sections. In the one section, whitefish were estimated to comprise nearly 82 percent of the number and weight of the total yearling and older game fish population (Appendix A). They are common throughout Sheep Creek and in the lower reaches of Hound Creek, Rock Creek, Tenderfoot Creek and the North Fork Smith River. Only sparse whitefish populations are found in the remaining tributaries. Whitefish are of suitable size for sport fishing in all waters where they are found. Whitefish were not collected or observed in any lakes or reservoirs in the drainage except the North Fork Reservoir. Twelve specimens were taken during gill netting operations by Fish and Game personnel in September of 1968.

Creel census conducted from 1967 to 1971 revealed whitefish contributed less than 2 percent of all game fish harvested. Whitefish are usually sought during the winter months, but most of the creel contacts were made during the summer. However, there was little evidence that winter whitefish angling has developed much popularity in the Smith River. Nearly all the whitefish observed during the census were taken from the Smith River, and these were mostly incidentally caught by anglers fishing for trout.

As in several other rivers in Montana, the game fish season remains open the entire year on the Smith River. The daily creel and possession limit for a number of years has been 20 whitefish. Despite the liberal regulations and substantial whitefish population in the Smith River, the species is relatively unutilized. A few local residents believe whitefish have substantially increased in the Smith River over the past 20 years. If this is true, it may be a reflection of environmental changes in the river system.

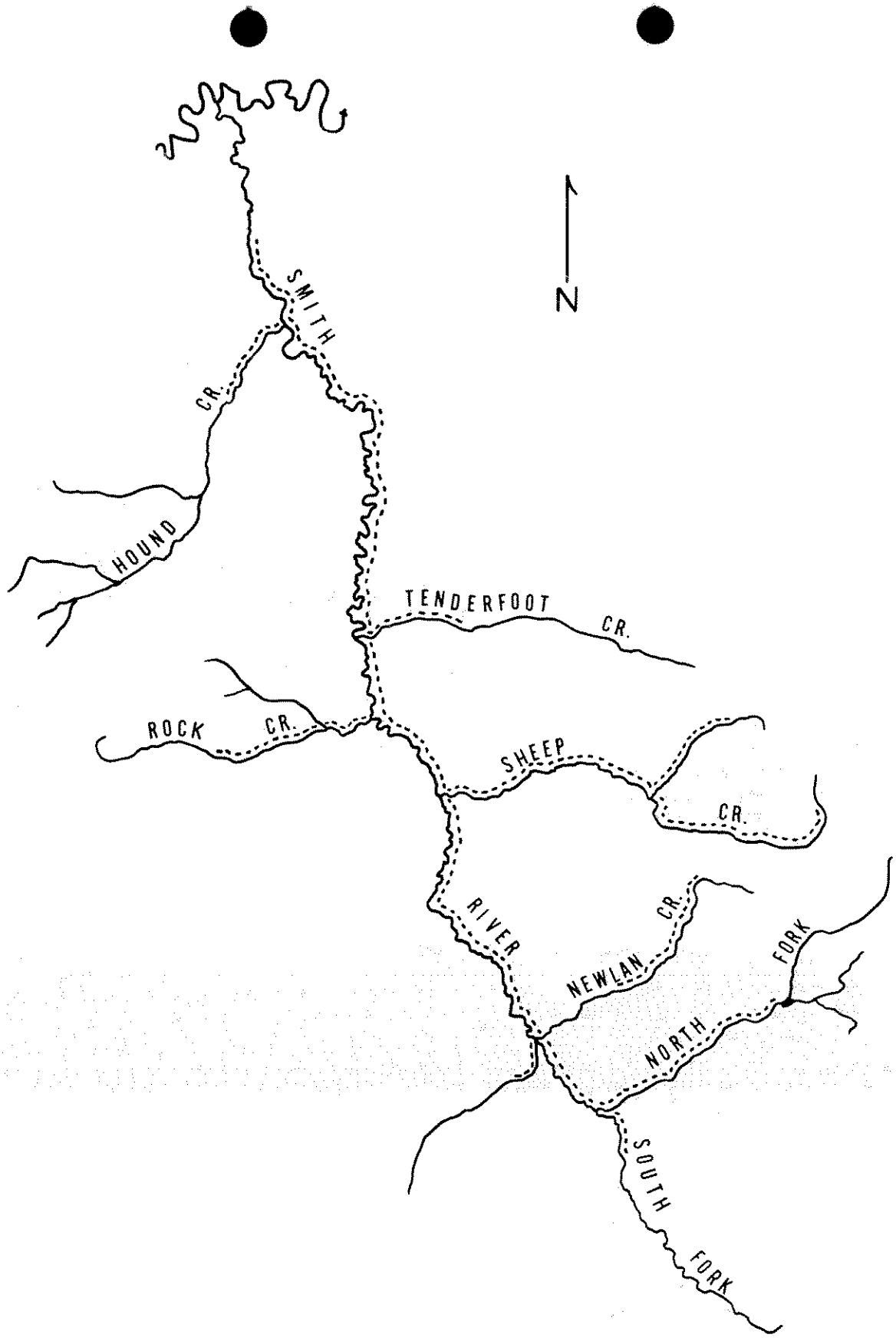


Figure 3. General distribution of whitefish in the Smith River drainage.

Brown Trout (Salmo trutta)

Brown trout are known to occur in 9 streams in the drainage and are present in about 199 stream miles or 31 percent of the total miles containing game fish populations. They are mainly confined to the Smith River and lower portions of some tributary streams (Figure 4). Brown trout are most abundant in the upper reaches of the Smith River and in lower portions of Hound Creek and North Fork of the Smith River.

While not predominant in any stream as a whole, brown trout are predominant in the lower few miles of Hound Creek and in the lower North Fork of the Smith River. In these areas they comprise slightly over 50 percent by number and up to 75 percent of the biomass of the total trout population (Appendix A). Their occurrence is incidental to rare in the lower confines of the remaining tributaries where they are found. Brown trout grow to a very desirable size in the streams where established populations are found. Specimens of 1 to 2 pounds are common throughout most of the Smith River, in the lower reaches of Hound Creek and the North Fork Smith River. A few large individuals are also found in lower Rock Creek and Sheep Creek. Brown trout were not found in any lakes or reservoirs in the drainage.

Creel census conducted from 1967 to 1971 revealed the contribution of brown trout to the creel varied from 2 to 4 percent of the total game fish harvest per census period. Brown trout were observed in creels on five streams: the Smith River, Hound Creek, Rock Creek, Sheep Creek and the North Fork Smith River. Most of the brown trout checked were taken from the Smith River. It was noted that brown trout contributed little to the creel from sections of streams where they were most abundant. This observation may have been biased by the data, because most of the census was conducted during midday. More brown trout may have been creeled during twilight hours.

Brown trout were introduced into the upper reaches of the Smith River drainage in 1950 when 9,000 fingerlings were planted in the North Fork of the Smith River near White Sulphur Springs. Another plant was believed to have been made in 1951. This species would probably thrive in a few of the other tributaries in the drainage; however, these tributaries presently carry adequate wild trout populations. Introduction of brown trout in these waters may improve the size of fish in the population and subsequently to the creel, but at the expense of the present number of successful anglers and quantity of fish creeled.

Cutthroat Trout (Salmo clarki)

Cutthroat trout are present in over half the streams in the drainage; however, they are found in only 188 stream miles or about 29 percent of the total miles containing game fish. They are mostly confined to the headwater areas of many tributaries and are occasionally found throughout some of the larger tributary streams to the Smith River (Figure 5). An occasional cutthroat trout is found in the Smith River; however, these are believed to be transients from tributaries containing cutthroat populations.

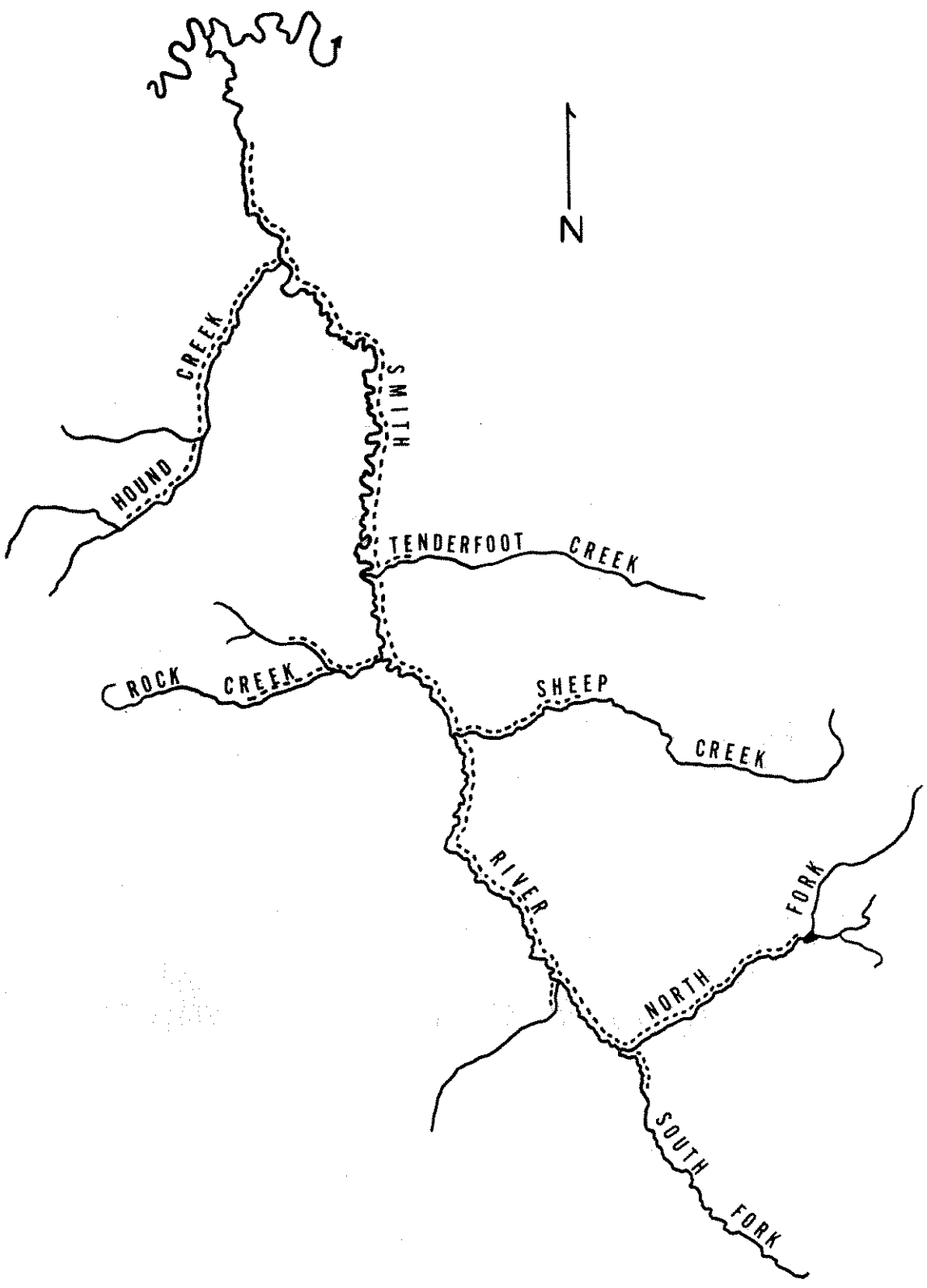


Figure 4. General distribution of brown trout in the Smith River drainage.

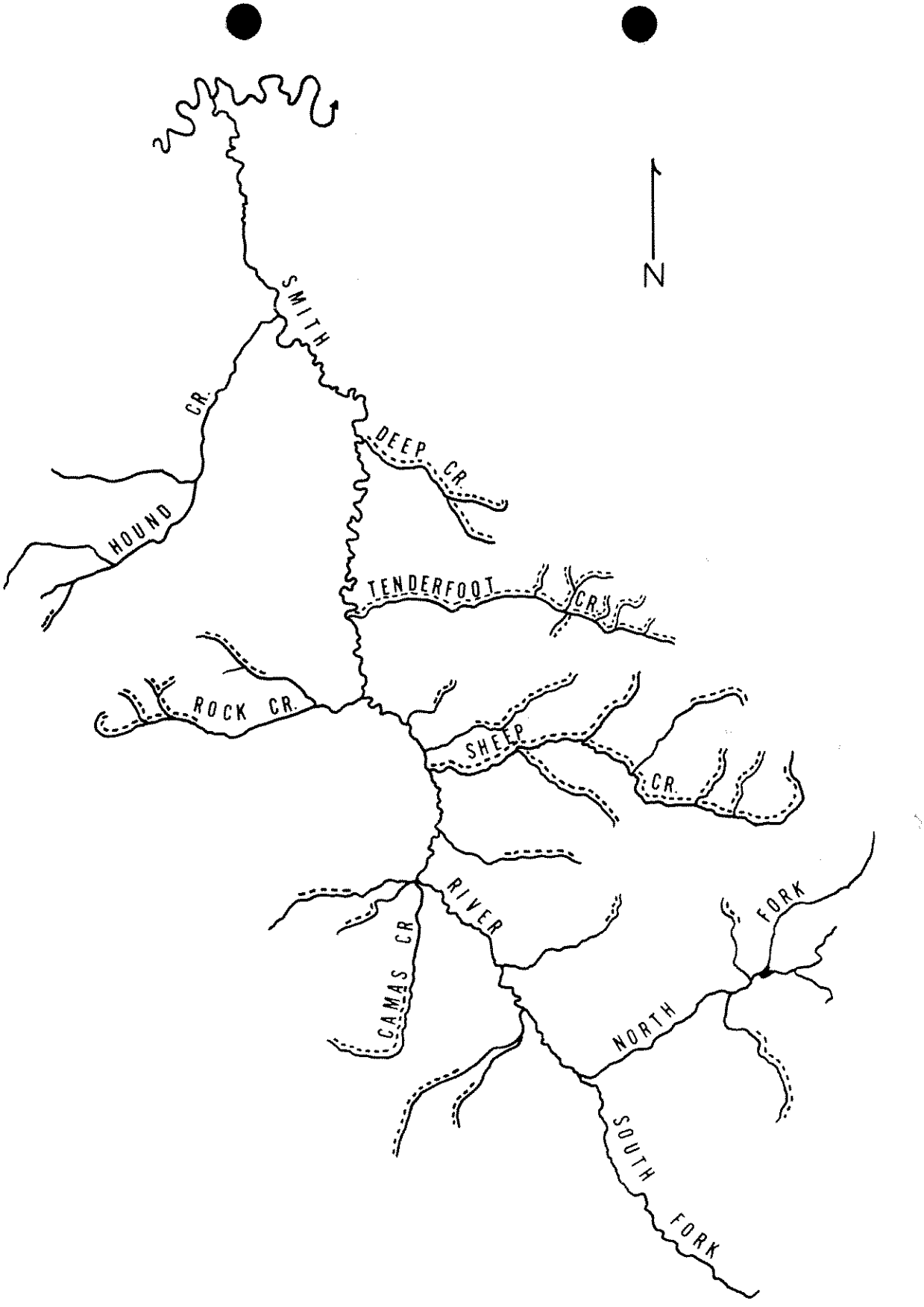


Figure 5. General distribution of cutthroat trout in the Smith River drainage.

Cutthroat trout were judged to be the predominant game fish in 20 of the 38 streams in which they were found. They were considered to be the only game fish in 14 of these 20 streams. Since most of the streams inhabited by cutthroat trout are relatively small, cool, headwater areas, specimens over 1/2 pound pound are rare. Most of these streams contain cutthroat of a desirable size for a sport fishery. Pan-sized cutthroat are abundant in upper Tenderfoot Creek drainage, the Deep Creek drainage, and Butte Creek.

Cutthroat trout populations were believed to be indigenous in a few streams. These streams are Deep Creek, North and South Forks of Deep Creek, Fisher, Rugby, Bolsinger, Urvi, Lost Stone, Iron Mines, Stringer, Wolsey, Little Sulphur, and Lake Creeks. In streams where rainbow trout are found in conjunction with cutthroat trout, hybridization was common. Yellowstone cutthroat trout have been introduced into the drainage.

Cutthroat trout are present in 14 of the 21 lakes and reservoirs known to contain game fish populations. They are the only game fish in seven of these lentic environments. Only Boundary Lake, a small impoundment on the southern slopes of the Little Belt Mountains, contains an indigenous population of cutthroat trout. All other lakes or reservoirs containing cutthroat have been stocked at one time or another.

Cutthroat trout grow to a desirable size in most of the lakes and reservoirs. Specimens over 1/2 pound were collected or observed in creels from 10 waters. Specimens over 1 pound were collected from McGuire Pond, Edith Lake, Camas Lake, and Keep Cool Reservoir.

Creel census conducted from 1967 to 1971 revealed cutthroat trout contributed less than 5 percent of the total catch from both lakes and streams. A large number of rainbow-cutthroat trout hybrids were taken from Tenderfoot Creek; however, these were included with rainbow trout. Only six streams and four lakes were censused where cutthroat provided all or part of the catch. Cutthroat trout probably contribute more to the creel than this census indicates, because most of the lakes and streams they inhabit are remote, backwoods areas where fishermen contacts are difficult to obtain.

A review of hatchery records since 1948 revealed that cutthroat trout have been planted in only two streams in the drainage, Butte and Tenderfoot Creeks. Cutthroat trout plants were discontinued in Butte Creek in 1951 and in Tenderfoot Creek in 1954. Cutthroat trout were introduced into several lakes and reservoirs, but no records are available on these plants. A few private reservoirs were planted with cutthroat, but these have been discontinued in favor of rainbow trout or because of access problems. Currently, three small lakes in the Big Belt Mountains are receiving fingerling plants to maintain a sport fishery. These lakes are Edith, Grace, and Baldy. Surveys reveal excellent growth rates in these high mountain lakes.

The future of the native cutthroat trout in the Smith River drainage is questionable because of adverse land use practices and the distribution of exotic

species such as rainbow trout and brook trout. The range of the native cutthroat is now very restricted. Pure stocks inhabit a few tributaries in the Tenderfoot Creek and Deep Creek drainages. This native cutthroat has not been identified, but strongly resembles the native cutthroat west of the continental divide in Montana. Presently, attempts are being made to identify this strain of cutthroat trout. Because of the remote areas where these cutthroat are located, angling does not appear to be an immediate threat to the natives' existence. The native appears to be well adapted to the headwater areas where they are found, since desirable sized specimens are found in nearly all populations.

A remnant population of native cutthroat trout is found in Boundary Lake. This lake was formed by a small earth-filled dam on Lake Creek, which at the present time has nearly washed out. The area of the lake is less than 1 acre, with a maximum depth of about 4 feet. Most of the lake is less than 2 feet deep. If native cutthroat are to be preserved in this area, immediate repair and enlargement of the dam is recommended.

Arctic Grayling (Thymallus arcticus)

Although now extinct in the Smith River drainage, it is proper to mention this fish because of its historical value. Grayling were named in 1872 from specimens taken from the Smith River near Camp Baker. A few reliable individuals remember grayling inhabiting waters in the upper Smith River and in Sheep Creek around 1945 to 1950. About 1,000 grayling fry were introduced into Edith Lake in 1953, but there are no records indicating success of this plant. It may be feasible to reestablish this fish in certain waters if demanded by fishermen.

Kokanee (Oncorhynchus nerka)

Kokanee salmon were introduced into the North Fork Smith River Reservoir in 1952. From 28,000 to 75,000 fry were annually planted in this reservoir until 1958. Management of kokanee was discontinued because they did not appear to grow or produce a fishery superior to rainbow trout. It is recommended that no future planning for kokanee management be initiated in the Smith River drainage.

Mottled Sculpin (Cottus bairdi)

The mottled sculpin is the most widespread, abundant fish in the Smith River drainage. It was noted to be common to abundant in nearly every stream during electrofishing operations. Only two streams were worked where sculpins were not found; however, these streams were devoid of all fish life. Because this fish is widely distributed and small in size, it is a very important forage fish for trout. It is an important and popular bait fish.

Longnose Sucker (Catostomus catostomus)

Longnose suckers are found throughout the main stem of the Smith River and in the larger tributary streams. Gill netting results indicate that they are present in only one reservoir, the North Fork Smith River Reservoir. This fish is common where present but is mainly considered a nuisance by fishermen.

White Sucker (Catostomus commersoni)

White suckers are abundant throughout the main stem of the Smith River and in a few of the larger tributary streams. They are very abundant in the North Fork Smith River Reservoir. Large numbers of spawners were observed in Eightmile Creek and the North Fork of the Smith River above the reservoir. This reservoir was rehabilitated in 1959 to remove suckers which were believed to be detrimental to the production of game fish. At the present time, white suckers are probably as abundant in this reservoir as before rehabilitation. White suckers are frequently caught by bait fishing and anglers often complain about the abundance of this sucker.

Other Species

At least six other species of fish exist in the Smith River drainage. Mountain suckers (Catostomus platyrhynchus) and longnose dace (Rhinichthys cataractae) were observed in the Smith River and a few tributary streams during electrofishing operations. One lake chub (Couesius plumbeus) was collected from Eightmile Creek above the North Fork Smith River Reservoir and one stonecat (Noturus flavus) was collected from the Smith River near Deep Creek. Burbot (Lota lota) are occasionally found throughout the lower 60 miles of the Smith River. Carp (Cyprinus carpio) were not collected, but are believed to be present in the lower few miles of the Smith River.

Habitat

Stream Flow

Stream flow is probably the greatest factor influencing game fish populations in the Smith River and several of the tributaries. Parameters important for fish habitat that are dependent on stream flow are bank cover, stream depths, water velocities, and water temperatures. Minimum stream flow must be great enough to maintain optimum food producing areas and provide hiding and resting areas for all sizes of fish.

Stream flows were monitored on the Smith River and several tributaries in 1970 and 1971. Data collected with the aid of a water stage recorder at the U.S. Geological Survey gaging station on the Smith River are presented in Appendix D. Hydrographs developed from the other monitoring stations are presented in

Appendixes E through L. They depict a pattern of high spring runoff followed by low late summer flow. Low summer flow in several of these streams is often below the minimum for optimum fishery habitat. Summer flow is dependent on annual precipitation, but other factors reducing flow in the Smith River drainage are heavily exploited rangeland and irrigation diversion. Rapid spring snow melt and runoff were noted in several of the subdrainages where overused rangeland provides sparse ground cover.

All waters in the Smith River drainage have been appropriated for irrigation and domestic use. As in other areas of the state, appropriations are several times the amount of water actually present. About 33,000 acres of land are irrigated in the Smith River drainage. Nearly 30,000 of these acres are irrigated in Meagher County, which includes all of the upper drainage. The remaining irrigated acres are in Cascade County. The North Fork Smith River Reservoir, the only state controlled irrigation project in the drainage, provides mostly supplemental irrigation to about 11,000 acres. All water stored in the reservoir is under contract for irrigation. The possibility of winter releases of carry-over storage to supplement low winter flow in the Smith River is unlikely. Review of flow data below the reservoir reveals very little surplus water is spilled during spring runoff (Appendixes K and L). This irrigation project is limited by the water supply and not the number of potential irrigable acres.

A reservoir and irrigation project proposed on Newlan Creek will provide water for about 11,000 acres of which nearly 4,000 acres will be new irrigation. Currently, most of the water used for irrigation in the Newlan Creek drainage is diverted from Sheep Creek. At the present time, late summer flows in Sheep Creek are considered minimal for maintaining fishery habitat. This flow will be further reduced under the new irrigation project. Much of the stream channel below the diversion point on Sheep Creek is relatively wide and shallow so further reduction in flow will adversely affect fish habitat. Also, it is anticipated that the additional prolonged diverted flow into Newlan Creek will create hydrologic problems in the stream channel between the confluence of the diversion ditch and the proposed reservoir. Winter flow in the Smith River may be augmented somewhat from ground water charged by additional irrigation in the Newlan Creek watershed. However, it is doubtful this additional flow in the Smith River will offset the impact on fishery resources in Sheep Creek.

An example of the effects of low flow on summer water temperatures is noted by comparing data collected at the U. S. Geological Survey gaging station located on the Smith River at river mile 26. In August of 1970, river flow dropped to slightly less than 200 cfs on only 8 days compared to flows varying from 65 to 150 cfs the entire month in 1971. Maximum water temperatures in August of 1970 did not exceed 75 F., while in 1971, maximum water temperatures of 75 to 80 F. occurred on 13 days.

Monitoring of stream flows and review of historical U.S. Geological Survey flow records from the Smith River show that while a considerable quantity of water is discharged from various streams and from the drainage, water management is needed to eliminate low flows. This can be accomplished through proper land use practices and perhaps by well planned water storage projects.

Flow data collected in 1970 and 1971 reveal Sheep Creek and the upper Smith River carry adequate flow for possible storage for maintenance flows in the Smith River. The only sites for adequate storage appear to be on these streams. One potential storage site on the Smith River near Fort Logan has been identified by the Water Resources Division of the Department of Natural Resources and Conservation. Recreation and fishing demands may eventually increase to where it will be socially and economically justifiable to develop storage facilities on either stream. Also, the success of developing storage facilities will depend on implementation of the new Montana Water Use Act which provides for reservation of flows for fish, wildlife and recreation without diversion.

Flow data were collected from Sheep Creek and from the Smith River at river-mile 80. In 1970, above average runoff occurred. Approximately 37,000 acre-feet of water could have been stored at the Fort Logan site while maintaining a flow of 200 cfs in the river immediately below. In 1971, only about 6,000 acre-feet could have been stored; however, over 16,000 acre-feet could have been stored if 150 cfs were maintained in the river below. Storage of water above a maintenance flow of 200 cfs would have been accomplished in 1970 from May 4 to July 26, while in 1971, storage above 150 cfs could have occurred from April 16 to July 22. There are no suitable contour maps available for this area to estimate the height and size of a storage facility.

While the Sheep Creek drainage is considerably smaller than that of the Smith River above Fort Logan, it yields nearly the same flow as the Smith River during runoff. Storage of water above a 50 cfs maintenance flow in Sheep Creek would have approached 52,000 acre-feet in 1970 and 32,000 acre-feet in 1971. Again, there are no contour maps available for lower Sheep Creek to determine if an adequate storage site could be developed in the drainage.

Development of both sites could supply an estimated minimum flow of 300 cfs in the Smith River based on 1970 flows and about 200 cfs based on 1971 flows. These flows would probably greatly enhance the river fishery and recreation use on the river. A feasibility study should be initiated for possible development of water storage facilities on the Smith River near Fort Logan and on lower Sheep Creek for summer flow maintenance in the Smith River.

Water Temperatures

Cool water temperatures are important for suitable trout habitat. As discussed in the previous section, summer water temperatures in the Smith River are influenced by low flow. Review of water temperature data collected from the lower river at the U. S. Geological Survey gaging station near Eden (river-mile 26) reveals a history of high summer temperatures. During the summers of 1962 through 1964, water temperatures over 70 F. occurred each year. During late July and August, 1963, daily maximum water temperatures varied from 70 to 79 F. every day over at least a 30-day period at river flows ranging from 61 to 189 cfs. These conditions are similar to flow and water temperatures recorded in 1971. Water temperature data collected from the Smith River in 1970 and 1971 are presented in Appendixes M through P.

Physical features of the Smith River downstream from river-mile 80 also contribute to warm summer water temperatures. The river is relatively wide and contains many long, slow pools that are usually separated by long, shallow riffles. Although many miles of the Smith River are shaded much of the day by high limestone cliffs, radiant energy reflected from sun-exposed cliffs also results in some warming of the river. Also, very little woody vegetation shades the river downstream from river-mile 80.

Water temperatures were also monitored at two upstream stations on the Smith River at river-miles 80 and 116 in 1971. Maximum water temperatures were generally warmer at these stations in May and June than downstream at river-mile 26. During these 2 months, the warmest temperatures were recorded at river-mile 116 which is near the headwaters of the main stem of the Smith River. Maximum water temperatures at river-mile 116 exceeded those at river-mile 26 about 80 percent of the time in May and June. Maximum water temperatures ranging from 72 to 76 F. were recorded the first 2 weeks of August at river-mile 116, while downstream at river-mile 80, maximum temperatures were 2 to 5 degrees cooler.

Water temperatures at river-mile 80 were lower than at river-mile 116 because of accretions from two cool tributary streams (Birch and Camas Creeks) and natural cooling from shade provided by riparian vegetation. Very little riparian vegetation is found along the upper 13 miles of the Smith River above the confluence of Birch Creek. Also, this portion of the river is a low gradient, meandering stream with a sinuosity factor (ratio of channel length to down valley distance) of 2.1. Probably the greatest factor contributing to warm water temperatures at river-mile 116 is irrigation water returned to the lower few miles of the North and South Forks of the Smith River and to the upper Smith River itself. Flood irrigation of forage crops usually commences in early May and continues throughout the summer.

The warm water temperatures recorded during the summer in the upper reaches of the Smith River limit brook trout habitat, especially above the confluence of Birch Creek. In April and May, brook trout fishing is excellent in the upper Smith River, but by late summer few brook trout are found in this area of the river. A population estimate conducted in September of 1970 revealed only 27 brook trout in about a 1-1/2 mile section of the river (Appendix A). Brook trout inhabiting this portion of the Smith River move to cooler waters during the summer or perish. A number of rainbow and brown trout were also found in this section; however, they were not as abundant as in other sections of the river.

Water temperatures were also monitored in a few tributary streams in the drainage. Maximum temperatures up to 73 F. were found in the lower portions of Sheep Creek and the North and South Forks of the Smith River. A thermal artesian spring near the headwaters supplies the only water to about 7 miles of the South Fork of the Smith River in the late summer. The spring is about 115 F. but cools to about 70 F. 2 miles downstream. A few small suckers were noted in the stream at this point.

Water temperatures as high as 73 F. were recorded in lower Sheep Creek, one of the largest tributaries of the Smith River. Lower Sheep Creek flows through a narrow canyon; however, the stream channel is relatively wide and shallow, which is conducive to warming. At the present time, water is diverted from Sheep Creek into the Newlan Creek watershed for supplemental irrigation water. Increased diversion of flow into the Newlan Creek drainage and increased development of irrigable lands within the Sheep Creek drainage could cause higher maximum and greater diurnal variations in water temperatures in Sheep Creek. These changes in water temperature may have a detrimental impact on the existing fish and aquatic invertebrate populations.

In summary, high water temperatures are having an adverse effect on the fishery resource in the Smith River. Water temperatures in the upper river may be reduced through proper utilization of irrigation water such as use of sprinkler systems to reduce irrigation return flows. Also, streambank fencing could be employed to protect streambank vegetation from livestock grazing, which would in turn provide shade, cooler temperatures and added cover for trout. Detrimental water temperatures in the canyon area of the Smith River appear to occur during years of low summer flow. Suitable summer water temperatures occur when flow is about 200 cfs or greater. Summer flow augmentation to reduce water temperatures in the Smith River by properly planned on- or offstream storage facilities in the upper drainage is one possible solution to improve the fishery resource.

Water Quality

The general chemical quality of the waters in the Smith River drainage is good. Several pH determinations were made on different streams and these ranged from 7.7 to 8.6. Conductivity ranged from 198 to 550 micromhos/cm. except for the South Fork of the Smith River where conductivity ranged from 675 to 995 micromhos/cm. (Table 1). The only controlled domestic discharge in the drainage is to the North Fork of the Smith River from the sewage lagoon at White Sulphur Springs. At the present time, effluent from the lagoon is considered adequately treated. Several farms and ranches are located adjacent to streams. Drainage from corrals and barnyards contributes an undetermined but possibly undesirable amount of nutrients and chemicals to nearby streams at various times of the year. One immediate threat to water quality in the Smith River is recreational homesite development. At least two subdivisions are currently being developed within the canyon area of the river.

Table 1. Some water quality characteristics of the Smith River and tributaries, 1970-71.

Water	pH	Conductivity (micromhos/cm)	Highest Turbidity (JTU) 1970	1971
Smith River				
River-mile 26	8.2-8.4	470-520	220	12
River-mile 80	8.3-8.6	430-550	123	42
Hound Creek	8.2-8.5	460-500	198	58
Rock Creek	8.0-8.5	415-475	960	20
Eagle Creek	8.4-8.5	370-425	68	-
Sheep Creek	8.3-8.4	255-275	55	40
Beaver Creek	-	-	125	5
Camas Creek	7.7-8.3	198-290	45	3
Birch Creek	7.7-8.2	210-215	5	-
No. Fk. Smith R.	8.3-8.8	270-390	88	78
So. Fk. Smith R.	8.3-8.4	675-995	230	145

It was noted that roadside weed spraying programs probably violated water quality in some streams. Sprayed streambank vegetation was evident along portions of Sheep Creek, Newlan Creek, the North Fork of the Smith River and the Smith River. In some cases, vegetation was sprayed on the opposite bank, indicating that the streams themselves were sprayed. Roadside weed spraying was continued in late summer when most vegetation was already dormant. This program should be reevaluated and conducted in a manner which is not detrimental to watershed ecology.

The Soil Conservation Service considers the annual sediment yield to the Smith River to be moderately low; however, there is unnecessary seasonal sediment pollution to the Smith River and some of the tributaries. Sediment adversely affects aquatic ecosystems in several different ways - for example, filling spaces between stones in the streambed gravels eliminates habitat for aquatic invertebrates. Sediment also interferes with trout egg incubation by restricting flow through the stream gravel, thus reducing the oxygen supply. There is some evidence of trout reproductive failure and low aquatic invertebrate populations in the upper half of the South Fork of the Smith River as a result of sediment pollution.

Obvious sources of sedimentation were observed throughout the drainage. The Sheep Creek to Newlan Creek diversion ditch is severely gullied and adds considerable sediment to Newlan Creek throughout the summer. The upper reaches of the South Fork of the Smith River contain many vertical eroding banks, some of which were created by rechanneling of the river by railroad construction. High sediment loads which could be attributed to heavy livestock use adjacent to the streambanks were noted in Benton Gulch and Freeman Creeks. Early placer mining areas on Benton Gulch also contribute considerable sedimentation from spoilbanks. High vertical eroding banks are common along the lower 20 miles of the Smith River and the lower 2 miles of Hound Creek. Very little vegetation is found on several rangelands in the upper drainage which results in land erosion and sedimentation during snow melt and rain storms.

Turbidity was monitored in several streams during spring runoff in 1970 and 1971. In most cases, turbidity was related to increases in stream discharge early in the spring. Warm periods in early April brought on flash flooding accompanied by high turbidities. The highest turbidity recorded was 970 JTU in Rock Creek in mid-May 1970 during a flood. Turbidities near 500 JTU were monitored in the lower Smith River near Truly for about 2 weeks in May 1970.

Turbidities were considerably lower in 1971 than in 1970 due to lower runoff. For example, the highest turbidity recorded on the Smith River at river-mile 80 was 42 JTU in 1971 compared to 123 JTU in 1970 (Appendixes Q and R). River flow during these measurements in 1970 was more than double the flow in 1971. This trend was similar in all the tributary streams for both years.

Increased water quality degradation from sediment has been noticed in Sheep Creek over the past 30 years. According to Nels Thoreson (personal communication)1/ Sheep Creek ran clear during runoff prior to 1940. Presently, Sheep Creek is turbid throughout most of the high water period. Land uses developed within the drainage since 1940 contributing to sediment pollution are extensive clearcut logging, construction of a ski run, road building, and cabin site development.

Proper land management and controlled conservation programs can greatly improve water quality in the drainage. These practices include grass seeding on disturbed areas, grassed waterways, deferred or rest-rotation grazing, gully control structures, properly designed irrigation and drainage systems, streambank fencing and proper use of pesticides.

Stream Channels

Physical characteristics were measured on 10 stream sections where fish population estimates were made. A summary of the measurements along with the biomass of trout is presented in Table 2. These measurements were taken in an attempt to describe physical stream habitat. This information may serve as a valuable guide for future survey work to determine physical changes that occur which affect trout populations.

Cover and bank stability play an important role for trout populations. Woody vegetation was somewhat sparse on the South Fork of the Smith River; however, considerable cover was present in the form of aquatic vegetation. The stream channel in this area of the South Fork is stable because the gradient is only about 20 feet per mile and the banks are mainly protected by dense stands of grass and other herbaceous vegetation. High gradient stream channels protected by dense growths of woody vegetation were usually found to be stable. As a result, these streams contained good trout populations.

1/Mr. Thoreson is the Fish and Game Regional Coordinator at Great Falls.

Table 2. Physical and biological characteristics in stream sections in the Smith River drainage.

	Smith River		No.Fk.Smith R.		S.Fk. Smith R.	Rock Cr.	Sheep Creek			
	Zeig Section	Loney Section	Fowlie Section	Dunkel Section	McGuire Section	Lingshire Section	Hanson Section	Moose C. Section	Thorson Section	Lamb C. Section
Channel Characteristics										
Channel length measured (ft)	9,500	6,900	3,885	1,540	2,600	5,600	3,894	4,356	4,100	3,575
Average width (ft)	84.8	44.2	27.6	15.5	15.0	19.5	34.4	33.3	21.4	16.6
Ave. thalweg depth(ft)	1.8	1.9	1.5	1.6	1.7	1.5	1.5	1.4	1.5	1.5
Volume of flow (cfs)	118	48	15	12	6	17	20	15	9	11
Sinuosity	1.2	1.6	1.9	1.3	1.8	1.8				
Gradient (ft/mile)	27	23	45	69	20	57	64	52	38	60
Shoreline Characteristics										
Brush (percent)	18.7	46.4	66.4	64.9	22.1	24.1	60.2	51.9	41.9	67.1
Cover (ft^2/1000 ft)	210	1,877	3,332	6,964	1,577	1,214	2,288	1,439	1,226	2,573
Debris (ft^2/1000 ft)	-	-	-	-	-	-	68	-	140	7
Eroding (ft/1000 ft)	11	-	-	-	-	4	-	53	43	7
Grass (percent)	60.4	33.3	22.8	24.5	76.0	49.3	15.2	23.9	24.7	9.8
Undercut (ft^2/1000 ft)	137	153	-	121	-	165	17	23	25	-
Debris (ft^2/1000 ft)	-	-	-	-	-	-	-	30	189	-
Eroding (ft/1000 ft)	231	80	26	-	39	330	102	61	122	49
Deposition zone (percent	7.6	18.1	10.8	10.6	1.9	25.7	24.6	20.4	23.5	22.7
Cliff (percent)	13.3	2.2	-	-	-	0.9	-	-	-	-
Boulders (percent)	-	-	-	-	-	-	-	3.8	2.7	0.4
Riprap (ft/1000 ft)								-	54.9	7.0
Natural (ft/1000 ft)								75.6	-	-
Trout (lbs/1000 ft)	34.9	55.2	121.3	50.4	49.3	19.0	34.4	23.8	25.6	24.3
(lbs/acre)	17.8	54.4	191.5	141.7	143.2	42.6	43.6	31.8	52.1	63.9

Deterioration of stream channels and physical stream habitat was noted on nearly every stream in the drainage. Time did not allow actual measurements of deteriorated stream channels; however, general examples on specific streams will be mentioned. In 1962, a Fish and Game survey revealed 3.8 miles of Sheep Creek had been altered for road construction. Considerable rechanneling for road systems was also noted on the upper South Fork of the Smith River and on Newlan Creek. Stream channels were degraded by logging operations on portions of the North Fork of the Smith River, Sheep Creek, Wolsey Creek and Jumping Creek. Heavy livestock use degrading the streambanks was noted on Rock Creek, Freeman Creek, Watson Gulch, South Fork of the Smith River and the Smith River. Herbicide spraying of streambank vegetation was noted on several tributaries to upper Hound Creek, Sheep Creek, Newlan Creek and Thomas Creek. Placer mining destroyed several miles of natural stream channel on Watson Gulch, Thompson Gulch, Democrat Gulch and Elk Creek. Home and ranch site development has influenced or altered stream channels on the Smith River, Sheep Creek, Camas Creek, North and South Forks of the Smith River and Hound Creek. Streambank erosion control programs have greatly altered portions of the Smith River where rechanneling or placement of various riprap materials was used as possible control measures. Although mostly an uncontrollable force, but influenced by total activities in the drainage, floods have deteriorated stream channel habitat on the lower 25 miles of the Smith River, Rock Creek and Deep Creek.

Preservation of stream channels in a natural state would undoubtedly do more for fish populations than any other management program. This fact has been recognized for many years. The Montana Department of Fish and Game gathered data concerning man-caused channel changes on several streams in 1962 and used this information to help secure one of the first real environmental acts in the country. However, this act only includes activities of state and federal governments. The policy of the state of Montana states that "... fishing waters within the state are to be protected and preserved to the end that they be available for all time, without change, in their natural existing state..." The above examples demonstrate that if stream channels and riparian habitat are to be preserved, all land administrating agencies, private corporations and individuals will need to comply with the Stream Preservation Act.

Lakes and Reservoirs

Twenty-one lakes and reservoirs with a total of about 511 surface acres contain game fish populations in the drainage. Only 5 of these bodies of water are natural, the remaining 16 were constructed for irrigation or stock watering purposes. Some physical and biological characteristics of these waters are presented in Table 3.

The most important recreational reservoir in the drainage is the North Fork Smith River Reservoir. The dam and reservoir were built in 1936 under WPA loan and grant with cooperation from the State Water Conservation Board (now the Water Resources Division of the Department of Natural Resources and Conservation). The reservoir has a maximum storage capacity of 11,550 acre-feet. The water is mostly used for supplemental irrigation to 11,000 acres of land. About 15 cfs flow is released into the North Fork of the Smith River during the nonirrigation season.

Table 3. Characteristics of Smith River drainage lakes and reservoirs.

	Location T	R	S	Area (Acres)	Administrator	Public Access	Spawning Facilities	Detrimental Drawdown	Species of Game Fish Rb	Ct	Eb	Stocked Since 1968
Reservoirs												
Boundary	11N,	7E,	25	1	Forest Service	0[1/]	+	0		a		-
Buckingham	11N,	4E,	20	20	Private	0	+	+	p	p	p	-
Catlin Springs	8N,	7E,	7	2	Private	+	+	0			p	-
Cooks Creek	8N,	5E,	13	4	Private	0	0	+	p			Rb
E. Fk. Spring Cr.	13N,	5E,	19	2	Private	0	+	0		p	p	-
Elk Creek	11N,	4E,	33	10	Private	+	+	+	b		a	Rb
Gipsy	9N,	4E,	34	6	Forest Service	+	+	0	a	c		-
Hound Creek	15N,	1W,	35	14	Private	0	+	+	p		p	-
Jackson	9N,	5E,	34	20	Private	+	0	0	a		c	Rb
Keep Cool	11N,	4E,	29	28	Private	+	+	0	a	b		Rb
McGuire #1	13N,	6E,	32	1	Private	0	0	0		a		Ct
McGuire #2	13N,	6E,	31	1	Private	0	0	+		a		Ct
Middle Creek	14N,	1W,	25	16	Private	+	+	0		a		-
Spring Creek	10N,	6E,	3	4	Private	+	+	0	a	b	b	Rb
N. Fk. Smith R.	10N,	8E,	17	322	State	+	+	+	a		b	Rb
Whitetail	11N,	5E,	10	7	Private	+	+	+	b	c	a	Rb
Lakes												
Baldy	8N,	4E,	21	9	Forest Service	+	0	0		a		Ct
Camas	9N,	3E,	12	8	Forest Service	+	+	0		a		-
Edith	8N,	4E,	22	13	Forest Service	+	0	0		a		Ct
Grace	8N,	4E,	16	9	Forest Service	+	0	0		a		Ct
Hidden	8N,	4E,	16	14	Forest Service	+	+	0	a			-

[1/] Definition of symbols: + - Yes, 0 - No, a - predominate, b - common, c - rare, p - species believed to be present from stream surveys above lakes or species verified by hook and line survey and creel census.

The reservoir is usually filled to capacity during spring runoff. Review of flow records reveals very little surplus water is spilled from the reservoir during runoff. There is not enough water in the North Fork project to satisfy irrigation demands and provide maintenance flows for recreation in the Smith River during low flow periods.

The reservoir is extensively drawn down by irrigation demands nearly every year. This adversely influences the productivity of the lake. The reservoir is annually stocked with 4- to 5-inch rainbow trout which, when harvested a year later, are 10- to 12-inch fish. Larger specimens are rarely caught. This reflects either maximum harvest or poor growth of older trout due to a depressed food supply caused by the annual drawdown. The large white sucker population in the reservoir may also compete for food and space during drawdown. It may be feasible to rehabilitate this reservoir to control the sucker population on years when abnormal drawdowns occur.

All other lentic environments in the drainage are small; the largest is 28 surface acres. The most important of these are Jackson and Keep Cool Reservoirs. These reservoirs are primarily used for irrigation but normally undergo only slight drawdown. Consequently, trout growth is excellent and individuals over 3 pounds are frequently caught. Trout are the only fish species found in these reservoirs as in all other lakes and reservoirs except the North Fork Smith River Reservoir. Several other small reservoirs provide excellent trout fishing, but most are dependent on stocking. Habitat is severely affected by irrigation drawdowns on six and access is closed or privately controlled on seven waters. Stocking has been curtailed in five reservoirs where access or drawdown is a problem.

A total of seven lakes are located on public land but all are relatively remote except for Gipsy Lake. The largest of these is 14 surface acres and all support trout populations. Four of the seven lakes have potential for natural reproduction, although these facilities are limited on Gipsy and Boundary Lakes. Boundary Lake has a surface area of less than 1 acre, and does not contain much potential for a sport fishery. This lake was formed by a small dam, which at the present time is nearly washed out. Native cutthroat trout inhabit Boundary Lake, so it may be feasible to enlarge the dam to provide adequate habitat to preserve one niche for these trout.

Gipsy Lake is a 6 acre, shallow impoundment on the Helena National Forest which was originally built for irrigation purposes. The water rights reverted to the United States in 1972 and the Forest Service tentatively plans to rebuild the dam to enlarge the lake and build a campground in the area. Recommendations submitted to the Forest Service included enlarging the lake to about 24 acres. The lake would have a maximum depth of 16 feet and about 35 percent of the area would be more than 10 feet deep. Preliminary core drilling at the dam site indicates geology in the area is adequate to support the dam. This project is feasible because very few mountain lakes are accessible by vehicle in this area of the state.

Recreational Opportunities

Access

The stream survey revealed a minimum of 642 stream miles on 73 streams supports game fish populations in the drainage. Over 72 percent of these stream miles lie on privately owned lands (Table 4).

Table 4. Land administrators controlling stream miles supporting game fish in the Smith River drainage.

Land Administrator	Stream Size					Total	Percent of Grand Total
	3	4	5	6	7		
Private	51.9	46.1	120.2	241.5	4.3	464.0	72.2
U. S. Forest Service	12.6	5.8	57.0	68.9	-	144.3	22.5
State of Montana	0.8	4.6	5.4	13.2	-	24.0	3.7
Bureau of Land Management	5.1	0.2	0.7	0.9	-	6.9	1.1
Department of Fish & Game	-	3.3	-	-	-	3.3	0.5
Grand Total	70.4	60.0	183.3	324.5	4.3	642.5	100.0

The larger important fishing streams are primarily on private lands and many miles are not accessible to the public. The majority of stream miles found on the national forest are remote, but are accessible to those individuals able to hike or pack into these areas. Nearly all the state and Bureau of Land Management lands are inaccessible without permission, since these tracts are mostly isolated by private land. The Department of Fish and Game owns two land tracts along the upper reaches of the Smith River that provide fishing and boating access.

Lands owned by the state of Montana through the Enabling Act of 1889 are leased to private operators and are managed in conjunction with the lessees' own lands. State lands contain only a small fraction of the fishing streams in the drainage; however, some important waters are found on these lands. Where state land offers high recreational value, the state of Montana should obtain access easements and adopt a diversified or multiple use concept on these lands. Under this concept, the full value of the land would be more fully realized for the well-being of the people of Montana.

The tracts of land owned by the state of Montana found along the Smith River containing fishery value are as follows: T 10N, R 5E, S 36; T 12N, R 4E, S 36; T 15N, R 3E, S 36. State tracts containing fishery value along Hound Creek are as follows: T 15N, R 1E, S 36; T 15N, R 2E, S 20 and 30. One tract is found on Birch Creek in T 9N, R 5E, S 16. Another tract of state land is found on the South Fork of the Smith River (T 8N, R 7E, S 30); however, this area of the South Fork contains low fishery value.

Public access is permitted on seven private reservoirs in the drainage. The Department of Fish and Game has agreed to stock four of these reservoirs in

return for public access. The department should also repair and maintain the grounds on these private lakes. Access is possible by permission on some of the other private reservoirs, although they are not stocked at the present time.

Seven lakes and reservoirs are present on U.S. Forest Service land (Table 3). Three mountain lakes (Edith, Grace and Hidden) are accessible by trail systems maintained by the Forest Service. No established trail is maintained to Baldy Lake, which lies above Grace Lake. Access to Camas Lake is possible by obtaining permission to cross private land adjacent to forest land. Gipsy Lake lies about 1/2 mile from a graveled road and can be driven to by most vehicles during dry weather. Boundary Lake is accessible by a 3-mile unmaintained trail.

Public access is permitted to the North Fork Smith River Reservoir. Sanitary facilities and the grounds are maintained by the state.

Fifteen private landowners who control roughly 25 percent of the land area in the Smith River drainage were interviewed to determine the compatibility of public fishing on private land. Fishing streams are present on all properties, and lakes are present on three. All but one of the landowners indicated they posted all or part of their land at least some time during the year. Only five indicated the majority of fishermen asked permission to trespass, although most stated they would grant permission to fish, at least on portions of streams.

Twelve of the landowners felt the majority of the recreationists were generally well behaved; however, 13 cited specific problems caused by fishermen. Littering was the number one complaint, followed by damage to land or crops by vehicle travel. The third most common complaint was leaving gates open or damage to fences. Nearly every landowner who posted his land stated that some of his signs were damaged or removed, but this could not be directly related to fishermen.

Most private landowners did not think there should be more publicly owned fishing access areas. They reasoned that people can fish most places now anyway. This could be interpreted that private landowners are willing to tolerate the present number of fishermen. However, this situation may change under greater fisherman use and demand as the general population increases. Public information programs need to be continued to improve landowner-sportsman relationships. The sportsman must always be aware that under the present system, using private land is a privilege and not a right.

One major area of conflict resulting from fisherman use is in the Smith River canyon between river-miles 21 and 80. Although this area of the Smith River is largely inaccessible by land, access is gained by floating the river. Some of the resultant problems stressed by landowners are cutting of cross-stream fences, littering and camping on private land. Floaters complain about the cross-stream fences, lack of public areas for camping and access to the river.

The public is able to obtain access to the Smith River if they are familiar with the area and show some courtesy to the landowners. Access to the upper river is provided by Department of Fish and Game lands. The middle portion of the river near Trout Creek can be reached over a private road. The landowner charges a

nominal fee for use of the road and campground facilities he has developed and maintains. Access to the lower river near the mouth of Hound Creek was available over private ground; however, this area has been closed to the general public. Floaters can leave the river at a secondary highway bridge about 2 miles downstream from Hound Creek.

Some of the problems along the Smith River have been alleviated, but more work and cooperation is needed between landowners and recreationists. The Forest Service has marked some of the public land in the canyon area for boat camps. Some clean-up campaigns have been conducted by the Forest Service, Department of Fish and Game and sportsmen's groups. A campaign to encourage a "pack-it-in-pack-it-out" litter program should be initiated so everyone floating or recreating on the river is aware of this responsibility. Where cross-stream fencing is a necessity, an effort should be made to mark and warn river floaters of these fences. Public access is needed near the middle and lower portions of the canyon area. This may be accomplished through equitable agreements with landowners.

The recreational floating season on the Smith River is controlled by existing flows. Floating is usually done from mid-June through July when the river flow and depth are adequate to permit easy travel. The Smith River has not been declared navigable in the courts; however, if floating is to continue, the right to float without interference must be established.

It is not intended that the canyon area of the Smith River be recreationally developed to the point where the beauty and quality of the area are impaired. This point should also apply to subdivisions and cabin site development. Cabins should be built out of the river floodplain so that streambanks are preserved in a natural condition. A natural stream has an aesthetic value out of all proportion to the small area lost to lot development.

Fishing Seasons and Creel Limits

Seasons and creel limits are traditionally established to protect fish populations from overharvest and to spread the harvest among more users. Regulations are also established in an attempt to fully utilize certain species in order to provide maximum recreational use.

In recent years, seasons and creel limits have been liberalized in Montana and in the Smith River drainage. All lakes and reservoirs and the main stem of the Smith River are open to year-round fishing. Special liberal limits have been imposed on brook trout and mountain whitefish. There is no evidence that special limits have been detrimental to these fish populations.

Assessment of the actual impact of seasons and creel limits on game fish populations requires extensive survey and study. The Smith River currently carries the heaviest angler day use of any water in the drainage. Population data reveal a fairly low standing crop of trout in the canyon area of the river;

however, this study did not determine if the trout population present is restricted by habitat conditions or fishing pressure. A fish population survey and harvest census should be conducted and evaluated before any regulation changes are proposed for trout in the Smith River.

A largely unexploited mountain whitefish population exists in the Smith River. There are indications that this fish is competitive with trout. In order to encourage greater utilization of mountain whitefish, the daily bag limit should be increased from 20 fish per day to 30 or 40 fish per day. The possibility of commercially harvesting mountain whitefish should be investigated.

Fisherman Use

In 1968, the Department of Fish and Game determined statewide fishing pressure estimates by mail survey. Results are indicative of angler-day use on certain waters in the drainage. The pressure survey covered the fishing-license year from May 1, 1968 to April 30, 1969.

Results from the survey revealed a total of 31,965 angler days were expended in the drainage. Of this total, 23,473 angler days were spent on streams while 8,492 days were spent on lakes and reservoirs. The Smith River carried the heaviest angler use with 11,217 days while Sheep Creek was a distant second with 3,272 days. The North Fork Smith River Reservoir received a pressure of 2,968 angler days, the third highest use. About 4 percent of the total angler day use was realized during the winter months. A total of 20 streams and 10 lakes and reservoirs were listed in the survey, which is less than a third of all waters supporting game fish populations. However, all of the larger and important waters in the drainage were included.

Observations of the fishing pressure during the random creel census in 1970 and 1971 indicated the overall use in the drainage is relatively light. Based on fishing pressure and populations of game fish, waters in the drainage could probably support three times the present use without impairing the quality of fishing now enjoyed. Angler success in all waters was nearly three fish per angler day.

Fishing pressure information is a valuable tool in making management decisions. This information is especially helpful for evaluating probable impact of proposed land and water development projects. Advantages of obtaining fishing pressure data by mail survey are that the entire state can be censused by few personnel and the program is economical when compared to individual field projects designed to estimate angler use on various waters. The statewide fishing pressure estimate peoject should be programmed to yield confident angler-use data and then reactivated.

Planning Recommendations

The following are recommendations submitted for maintaining and enhancing fishery resources in the state, and are applicable to the Smith River drainage:

1. Natural stream channels are necessary for optimum conditions for fish populations and aesthetic value. Legislation is needed to include all projects involving stream channels under the Montana Stream Preservation Act.

2. Siltation from logging, road building, overgrazing and irrigation practices, and pollution from industrial, urban, and agricultural activities have harmful effects on fish and other aquatic life. A state water quality and monitoring plan must be developed to adequately maintain high quality water in Montana. The Montana Water Pollution Control Act should be stringently enforced.

3. Floatable rivers should be declared navigable, or otherwise made accessible to the public, for the purpose of recreation.

4. A natural stream channel and its surrounding riparian community has great aesthetic value. Legislation for proper planning and zoning to restrict development on streambanks or floodplains should be implemented and enforced.

5. Several tracts of state land have high fishing and other recreational values. The state of Montana should adopt a diversified or multiple-use concept on these lands so the full value of the land would be more fully realized by all the people of Montana. Legislation is needed to permit the exchange of state lands with private individuals when such an exchange is in the public interest and benefit.

6. The Department of Fish and Game should increase land purchase for access along important fishing rivers and streams. A feasibility study for acquiring long-term leases or easements on private property adjacent to valuable fishing waters should be initiated.

7. Federal programs that are aimed at erosion and flood control adjacent to rivers often require large expenditure of public funds. If such projects are deemed necessary to preserve property at public expense, access and utilization of the area by the public should be allowed.

8. Research is needed to determine the interaction between mountain whitefish and trout populations. The Smith River and several other rivers in Montana support tremendous mountain whitefish populations. This resource is relatively untapped; most Montana and visiting anglers prefer trout fishing. It may be feasible to encourage commercial fishing operations for mountain whitefish.

The following are specific recommendations for the enhancement and maintenance of the fishery resource in the Smith River drainage:

1. The Smith River should be designated a State Recreational Waterway by legislation. It should be declared a navigable stream from FAS 360 bridge crossing near Fort Logan downstream to the confluence with the Missouri River.

2. Periodic monitoring of the fish populations and stream habitat should be conducted in the stream sections established in this project by the administrative region responsible for management of the fishery resource.

3. The department should increase activities relating to landowner-sportsman relationships. This includes providing leadership and encouraging groups to conduct antilitter campaigns on public and private access grounds. Greater cooperation is needed by recreationists toward respecting private property.

4. The department administers a fishing access area containing over 3,000 acres in T 11N, R 4 and 5E along the Smith River. A considerable portion of this area is rangeland which is surplus to the need for access. Negotiations with neighboring landowners should be initiated to trade this surplus land for additional access areas adjacent to the Smith River.

5. Public access is needed on the Smith River near the community of Millegan and near the mouth of Hound Creek to accommodate floating recreationists.

6. The North Fork Smith River Reservoir should be rehabilitated to control the white sucker population. This project would be feasible on years when greater than normal drawdowns occur.

7. The daily possession limit on mountain whitefish should be substantially increased.

8. The present seasons and creel limits for trout should continue in the Smith River drainage. Angler use and harvest data should be collected from the Smith River to determine the impact on the trout population before more restrictive regulations are proposed on this body of water.

9. Stocking of catchable-sized rainbow trout in the North Fork of the Smith River should be discontinued. This stream supports a substantial wild trout fishery that is relatively unharvested. The stocking program in the Smith River should be evaluated. The present levels of stocking in lakes and reservoirs appears suitable.

10. The Forest Service should be encouraged to enlarge the dam on Gipsy Lake. An attractive recreation area could be developed on this enlarged body of water.

11. Repair and enlargement of the dam on Boundary Lake is needed and would be beneficial to the preservation of native cutthroat trout in this area.

12. A feasibility study should be initiated for flow and habitat maintenance in the Smith River by means of storage facilities on the river near Fort Logan and on Sheep Creek. Future recreation and water use demands may economically justify development projects of this type, providing the specifications of recommendation number 1 are met and that the primary function of the impoundment would be to benefit the fishery resource.

13. The majority of the landowners interviewed indicated they were agreeable to development of a landownership map of the drainage. The department should formulate and publish such a map for general distribution.

APPENDIX

Appendix A. Game fish population estimates from the Smith River, Hound Creek, Sheep Creek, Rock Creek and the North and South Forks of the Smith River.

Species	Age	Length Range (in.)	Number	Weight (lbs)
		SMITH RIVER		
(Fraunhoffer Section, T16N, R4E, S18, 19, 30. Section length - 11,750 ft.)				
Rainbow trout	I	6.1 - 9.6	997	178.6
	II	8.7 -12.0	72	29.1
	III	10.1 -14.7	60	43.0
	IV	12.6 -16.5	20	21.3
			1149 (±492)	272.0
Brown trout	I	7.1 -10.4	59	15.5
	II	10.8 -15.2	112	92.9
	III	13.1 -17.8	45	72.8
	IV	18.0 -19.3	9	20.2
			225 (±134)	201.4
GRAND TOTAL			1374	473.4
Standing crop per 1000 ft.			117	40.3
(Zeig Section, T12 and 13N, R4E, S2 and 34. Section length - 10,750 ft.)				
Rainbow trout	I	6.3 - 8.9	317	57.5
	II	7.8 -11.0	302	90.0
	III	9.7 -13.3	160	85.9
	IV-V	11.5 -15.2	44	36.1
			823 (±246)	269.5
Rainbow trout (Hatchery)	-	10.4 -13.5	38 (± 36)	24.5
Brown trout	I	6.8 - 9.4	35	7.7
	II	10.5 -14.2	7	7.2
	III	14.8 -16.6	12	17.6
	IV-V	16.8 -19.9	22	48.9
			76 (± 36)	81.4
GRAND TOTAL			937	375.4
Standing crop per 1000 ft.			87	34.9
Standing crop per acre			45	17.8

Appendix A (Continued). Game fish population estimates from the Smith River, Hound Creek, Sheep Creek, Rock Creek and the North and South Forks of the Smith River.

SMITH RIVER (Continued)

Species	Age	Length Range (in.)	Number	Weight (lbs)
(Loney Section, T10N,R5E,S26. Section length - 8,435 ft.)				
Rainbow trout	I	5.5 - 9.5	285	54.7
	II	8.8 -12.8	67	33.3
	III	10.1 -14.1	67	46.9
	IV-V	13.6 -16.7	15	16.8
			434 (± 111)	151.6
Rainbow trout (Hatchery)		8.4 -12.5	14 (± 10)	7.5
Brown trout	I	6.6 -10.4	134	33.0
	II	11.2 -14.1	33	26.7
	III	13.3 -17.8	48	75.2
	IV	16.9 -19.1	41	91.1
	V-VI	18.7 -22.0	17	43.0
			273 (± 50)	269.0
Brook trout	I	6.7 - 9.1	70	14.0
	II	8.0 -11.9	50	21.5
	III	11.0 -11.9	3	1.8
			123 (± 59)	37.3
Mountain whitefish	I	4.1 - 5.7	207	7.8
	II	7.1 - 8.6	239	34.0
	III	8.1 -12.0	1172	495.2
	IV	10.2 -14.4	1867	1210.6
	V-VI	13.2 -16.3	318	304.4
			3803 (±1543)	2052.0
GRAND TOTAL			4607	2517.4
Trout - standing crop per 1000 ft.			100	55.2
standing crop per acre			99	54.4
Whitefish - standing crop per 1000 ft.			451	243.2
standing crop per acre			444	239.7

Appendix A (Continued). Game fish population estimates from the Smith River, Hound Creek, Sheep Creek, Rock Creek and the North and South Forks of the Smith River.

SMITH RIVER (Continued)

Species	Age	Length Range (in.)	Number	Weight (lbs)
(State Section, T10N,R5E,S36. Section length - 8,050 ft.)				
Rainbow trout	I	5.7 - 9.8	36	7.9
	II	8.9 -12.8	48	25.9
	III-IV	11.5 -16.7	25	24.6
			109 (± 42)	58.4
Rainbow trout (Hatchery)		10.4 -13.1	34 (± 24)	17.8
Brown trout	I-II	8.4 -13.8	119	73.0
	III-V	14.1 -20.7	31	48.2
			150 (± 93)	121.2
Brook trout	-	8.7 -12.8	27 (± 32)	12.0
GRAND TOTAL			320	209.4
Standing crop per 1000 ft.			40	26.0

HOUND CREEK

(McKammey Section, T17N,R3E, S19. Section length - 9,100 ft.)				
Rainbow trout	II	6.7 -10.7	172	34.0
	III	10.0 -11.9	185	56.0
	IV-V	11.1 -14.9	11	6.0
			368 (±368)	96.0
Rainbow trout (Hatchery)		9.7 -14.1	16 (± 13)	10.0
Brown trout	II	7.3 -11.9	211	60.6
	III	11.3 -15.4	122	96.9
	IV	14.1 -17.7	71	97.7
	V-VI	16.9 -23.3	42	97.8
			446 (±161)	353.0
Brook trout	I-III	6.1 -11.4	8 (± 10)	2.3
GRAND TOTAL			838	461.3
Standing crop per 1000 ft.			92	50.7

Appendix A (Continued). Game fish population estimates from the Smith River, Hound Creek, Sheep Creek, Rock Creek and the North and South Forks of the Smith River.

Species	Age	Length Range (in.)	Number	Weight (lbs)
		SHEEP CREEK		
(Hanson Section, T12N, R5E, S18. Section length - 3,894 ft.)				
Rainbow trout 1/	I	4.3 - 7.2	828	48.5
	II	6.9 - 9.0	109	19.6
	III	8.7 -11.5	48	15.4
	IV	10.9 -13.0	14	7.4
	V	13.2 -16.8	6	6.4
			1005 (±262)	97.3
Brown trout	I-III	5.6 -14.6	7	5.0
	IV-V	16.2 -21.3	8	23.8
			15 (± 6)	28.8
Brook trout	-	6.1 -11.8	27 (± 19)	8.0
GRAND TOTAL			1047	134.1
Standing crop per 1000 ft.			269	34.4
Standing crop per acre			340	43.6

1/ Includes 4 cutthroat trout

(Moose Creek Section, T12N, R6E, S13. Section length - 4,356 ft.)				
Rainbow trout 1/	I	4.1 - 7.2	557	31.7
	II	6.3 -10.1	117	29.2
	III	8.3 -11.6	63	18.9
	IV-V	11.9 -15.2	13	10.7
			750 (±194)	90.5
Brook trout	-	4.8 -13.3	53 (± 32)	13.3
GRAND TOTAL			803	103.8
Standing crop per 1000 ft.			184	23.8
Standing crop per acre			241	31.8

1/ Includes 8 cutthroat trout

Appendix A (Continued). Game fish population estimates from the Smith River, Hound Creek, Sheep Creek, Rock Creek and the North and South Forks of the Smith River.

SHEEP CREEK CONTINUED

Species	Age	Length Range (in.)	Number	Weight (lbs)
(Thorson Section, T12N,R7E,S27. Section length - 4,100 ft.)				
Rainbow trout[1/]	II	5.0 - 7.4	202	16.4
	III	7.1 - 9.8	117	24.2
	IV	8.8 -11.5	40	14.1
	V-VI	10.8 -13.9	11	6.3
			370 (± 96)	61.0
Brook trout	-	3.3 - 6.3	72	3.0
	-	6.4 - 8.6	101	16.0
	-	8.7 -10.9	39	14.0
	-	11.0 -13.5	17	11.0
			229 (± 62)	44.0
GRAND TOTAL			599	105.0
Standing crop per 1000 ft.			146	25.6
Standing crop per acre			298	52.2

[1/] Includes 2 cutthroat trout

(Lamb Creek Section, T12N,R8E,S34. Section length - 3,575 ft.)				
Rainbow trout[1/]	-	4.9 -13.0	6 (± 4)	2.0
Rainbow trout (Hatchery)	-	9.0 -11.8	20 (± 8)	9.0
Brook trout	I	3.1 - 6.7	513	24.3
	II	5.9 - 9.3	214	29.6
	III	7.8 -11.4	50	19.3
	IV	10.3 -12.7	4	2.8
			781 (±93)	76.0
Mountain whitefish	-	4.4 - 5.4	101	4.0
	-	5.5 - 7.4	42	4.0
	-	7.5 - 9.5	43	9.0
	-	9.6 -11.3	35	12.0
		11.4 -14.6	30	17.0
			251 (±99)	46.0
GRAND TOTAL			1058	133.0
Trout - standing crop per 1000 ft.			226	24.3
standing crop per acre			593	63.9
Whitefish - standing crop per 1000 ft.			70	12.9
standing crop per acre			184	33.8

[1/] Includes 1 cutthroat trout

Appendix A (Continued). Game fish population estimates from the Smith River, Hound Creek, Sheep Creek, Rock Creek and the North and South Forks of the Smith River.

Species	Age	Length Range (in.)	Number	Weight (lbs)
		ROCK CREEK		
(Lingshire Section, T13N,R3E,S28 & 33. Section length - 5,600 ft.)				
Rainbow trout	I	2.6 - 7.3	721	32.5
	II	6.8 -10.3	79	15.3
	III	9.3 -11.8	38	14.9
	IV	10.5 -12.5	11	4.8
			849 (±244)	67.5
Brown trout	I	5.2 - 6.5	27	2.2
	II	8.6 -12.7	30	12.5
	III-V	12.8 -21.5	10	18.2
			67 (± 32)	32.9
Brook trout	-	4.9 -10.2	20 (± 15)	5.0
Mountain whitefish	-	5.2 - 9.9	88	20.9
	-	10.0 -11.9	243	110.3
	-	12.0 -16.7	104	80.2
			435 (± 76)	211.4
GRAND TOTAL			1371	316.8
Trout - standing crop per 1000 ft			167	18.8
standing crop per acre			354	42.1
Whitefish - standing crop per 1000 ft.			77	37.7
standing crop per acre			174	84.5

Appendix A (Continued). Game fish population estimates from the Smith River, Hound Creek, Sheep Creek, Rock Creek and the North and South Forks of the Smith River.

Species	Age	Length Range (in.)	Number	Weight (lbs)
NORTH FORK SMITH RIVER				
(Fowlie Section, T9N,R6E,S13. Section length - 3,885 ft.)				
Rainbow trout	I-II	5.9 -11.1	35	9.7
	III-V	10.9 -15.5	28	23.2
			63 (± 27)	32.9
Rainbow trout (Hatchery)	-	9.9 -14.5	55 (± 25)	35.7
Brown trout	I	5.7 - 7.7	87	9.9
	II	8.7 -13.6	313	132.7
	III	11.1 -16.2	78	70.1
	IV	14.9 -18.4	32	49.6
	V	16.7 -20.6	16	33.3
			526 (±100)	295.6
Brook trout	-	5.0 - 6.9	64	7.3
	-	7.0 - 8.9	173	35.9
	-	9.0 -10.9	106	40.7
	-	11.0 -13.5	35	23.0
			378 (± 76)	106.9
GRAND TOTAL			1022	471.1
Standing crop per 1000 ft.			263	121.3
Standing crop per acre			415	191.5
(Dunkel Section, T4N,R8E,S27. Section length - 1,540 ft.)				
Rainbow trout	-	3.1 - 4.9	156	3.1
	-	5.0 - 6.9	41	3.3
	-	7.0 - 9.9	22	4.6
	-	10.0 -14.6	23	16.6
			242 (± 76)	27.6
Brook trout	-	3.8 - 5.9	262	10.5
	-	6.0 - 6.9	132	13.6
	-	7.0 - 8.9	78	14.1
	-	9.0 -13.1	24	11.8
			496 (± 90)	50.0
GRAND TOTAL			738	77.6
Standing crop per 1000 ft.			479	50.4
Standing crop per acre			1346	141.7

Appendix A (Continued). Game fish population estimates from the Smith River, Hound Creek, Sheep Creek, Rock Creek and the North and South Forks of the Smith River.

Species	Age	Length Range (in.)	Number	Weight (lbs)
SOUTH FORK SMITH RIVER				
(McGuire Section, T 9N, R6E, S27. Section length - 2,600 ft.)				
Brook trout	-	4.3 - 5.9	347	19.6
	-	6.0 - 7.9	669	70.0
	-	8.0 - 9.9	127	30.8
	-	10.0 -11.1	18	7.8
			1161 (± 92)	128.2
Brown trout	-	5.1 -13.6	7 (± 4)	2.2
GRAND TOTAL			1168	130.4
Standing crop per 1000 ft.			449	50.2
Standing crop per acre			1305	145.7
(State Section, T8N, R7E, S30. Section length - 11,630 ft.)				
Brook trout	-	3.9 - 5.9	378	16.0
	-	6.0 - 7.9	192	25.6
	-	8.0 - 9.9	71	17.1
	-	10.0 -14.3	26	14.3
GRAND TOTAL			667 (±170)	73.0
Standing crop per 1000 ft.			57	6.3

Appendix B. Smith River drainage electrofishing stream survey data.

Water	Section Length (ft)	Location T. R. S.	Estimated Flow (cfs)	Game Fish Species	Number Caught	Length Range (Inches)
Smith River[1]						
Hound Creek [1]	500	14N, 1E, 3	10	Rb	108(64)[2]	2.1 -14.8
				Eb	85(16)	3.3 -13.2
				LL	2(0)	4.5 - 4.6
W. Fk. Hound Creek	495	15N, 1E, 2	4	Rb	180(48)	1.3 -11.3
				Eb	58(14)	2.1 -11.0
Crooked Creek	505	14N, 1E, 1	2	Rb	30(14)	2.5 - 7.5
				Eb	157(6)	2.6 - 8.2
E. Fk. Hound Creek	505	15N, 1E, 32	2	Rb	135(40)	2.4 -11.1
				Eb	435(52)	3.2 -11.5
Tyrell Creek	490	15N, 1W, 35	1	Rb	146(8)	2.0 - 7.9
				Eb	76(15)	2.1 -10.6
Elk Creek	505	14N, 1E, 10	3	Rb	126(61)	1.8 -12.2
				Eb	35(11)	3.1 -12.6
Middle Creek	570	14N, 1E, 9	4	Rb	16(16)	6.2 -12.3
				Eb	46(46)	6.6 -13.1
Deep Creek	400	15N, 4E, 24	10	Ct	120(61)	3.4 -12.5
North Fk. Deep Cr.	125	15N, 5E, 20	6	Ct	54(25)	3.2 -10.0
Trout Creek	500	15N, 3E, 28	2	Eb	82(55)	3.0 -11.7

Appendix B (Continued). Smith River drainage electrofishing stream survey data.

Water	Section Length (ft)	Location T. R. S.	Estimated Flow (cfs)	Game Fish Species	Number Caught	Length Range (Inches)
Rock Creek[1] (Sec 1)	310	13N, 2E, 30	8	Rb	31(9)	2.2 -10.1
				Ct	4(1)	4.3 - 9.0
(Sec 2)	525	13N, 1E, 28	5	Ct	18(8)	3.8 - 8.9
Freeman Creek	410	13N, 3E, 15	3	Rb	14(10)	5.0 - 9.9
				Eb	8(5)	3.1 -10.8
				LL	1(0)	3.6
N. Fk. Freeman Cr.	450	13N, 2E, 2	2	Rb	14(13)	5.6 -15.7
				Ct	8(7)	5.2 -12.8
				Eb	1(1)	10.9
N. Fk. Rock Creek	335	13N, 2E, 19	5	Rb	71(16)	3.2 -10.5
				Ct	14(5)	3.3 -10.2
French Creek	470	13N, 1E, 26	4	Rb	1(1)	6.3
				Ct	34(5)	3.1 - 8.5
Eagle Creek	400	12N, 5E, 26	5	Rb	26(18)	3.4 -12.7
				Ct	4(3)	4.2 - 8.0
				Eb	3(2)	5.5 - 9.3
Sheep Creek[1]	410	12N, 8E, 15	5	Ct	7(2)	3.1 - 8.9
				Eb	11(0)	2.9 - 5.3
Butte Creek (Sec 1)	225	12N, 6E, 20	3	Ct	62(33)	4.0 -11.9
(Sec 2)	300	12N, 6E, 26	3	Ct	8(5)	4.8 -10.9
Calf Creek	450	13N, 6E, 24	3	Rb	18(7)	2.6 -10.3
				Ct	4(1)	2.6 - 8.3

Appendix B (Continued). Smith River drainage electrofishing stream survey data.

Water	Section Length (ft)	Location T. R. S.	Estimated Flow (cfs)	Game Fish Species	Number Caught	Length Range (Inches)
Moose Creek (Sec 1)	420	12N, 7E, 5	8	Rb	9(8)	4.2 - 9.4
(Sec 2)	490	13N, 7E, 23	5	Ct	2(1)	4.7 - 8.5
				Eb	16(3)	3.4 - 8.2
				Wf	3(3)	9.2 -12.8
Wolsey Creek	150	12N, 7E, 14	2	Ct	4(2)	5.1 - 8.4
Adams Creek	200	12N, 7E, 13	4	None		
Jumping Creek	480	12N, 8E, 2	2	Ct	5(2)	5.5 - 6.7
				Eb	2(1)	5.4 - 6.7
Deadman Creek						
S. Fk. Deadman C.	275	12N, 8E, 24	2	None		
Beaver Creek (Sec 1)	440	11N, 4E, 3	2	Eb	28(19)	2.7 -12.8
(Sec 2)	500	11N, 3E, 4	2	None		
Whitetail Cr. (Sec 1)	400	11N, 5E, 9	3	Eb	57(52)	1.8 -10.4
(Sec 2)	200	11N, 5E, 12	2	Eb	45(14)	2.0 - 8.3
				Ct	1(0)	4.9
Camas Creek (Sec 1)	430	11N, 4E, 26	8	Rb	35(15)	4.2 -10.4
				Eb	92(54)	1.3 -10.0
(Sec 2)	250	10N, 4E, 34	8	Ct	2(2)	7.2 -11.9
				Eb	55(25)	2.6 -10.5
(Sec 3)	480	9N, 4E, 10	8	Ct	10(4)	3.8 -12.0
				Eb	21(6)	1.9 - 9.5
Benton Cr. (Sec 1)	200	11N, 3E, 27	2	Rb	21(3)	2.1 - 6.8
				Ct	5(3)	5.0 - 6.5
				Eb	30(26)	5.1 - 9.2
(Sec 2)	540	11N, 3E, 27	2	Rb	24(4)	3.3 -10.9
				Ct	3(3)	6.0 -10.9
				Eb	4(4)	6.4 - 7.2

Water	Section Length (ft)	Location T. R. S.	Estimated Flow (cfs)	Game Fish Species	Number Caught	Length Range (Inches)
Thomas Creek	300	11N, 4E, 28	3	Eb	60(17)	2.1 - 8.7
Spring Creek	490	10N, 5E, 13	2	Eb	43(32)	4.3 -10.1
Thompson Gulch (S 1)	345	10N, 5E, 31	2	Eb	25(13)	2.7 - 8.9
(S 2)	400	9N, 4E, 12	2	Eb	1(1)	6.1
Big Birch Cr.(Sec 1)	300	9N, 5E, 10	6	Rb	24(8)	2.3 -11.9
				Eb	79(31)	3.3 -11.7
(Sec 2)	400	9N, 4E, 26	12	Ct	4(3)	5.3 - 8.0
				Eb	31(16)	2.3 - 7.6
Little Birch Creek	300	9N, 5E, 31	3	Ct	12(8)	3.6 - 8.4
				Eb	10(8)	2.8 - 8.5
Newlan Creek (Sec 1)	395	10N, 6E, 19	2	Rb	1(1)	9.4
				Eb	72(55)	2.8 -11.8
(Sec 2)	460	11N, 7E, 9	4	Rb	4(1)	3.8 - 7.7
				Eb	23(15)	2.1 -10.1
				Wf	2(2)	8.3 -10.2
Wood Creek	450	9N, 5E, 25	2	Eb	73(28)	1.8 - 9.2
N.Fk. Smith River[1/]	320	11N, 8E, 25	10	Rb	7(3)	3.6 -11.8
				Eb	100(50)	2.6 -10.1
Fourmile Creek	300	9N, 8E, 17	6	Ct	6(1)	4.8 - 7.3
				Eb	60(28)	3.6 -10.7
Eightmile Creek	480	10N, 8E, 15	3	Rb	27(0)	1.8 - 5.9
				Eb	1(1)	6.4
N.Fk. Eightmile C.	405	10N, 8E, 1	1	Eb	69(24)	3.2 - 9.6

Appendix B (Continued). Smith River drainage electrofishing stream survey data.

Water	Section Length (ft)	Location T. R. S.	Estimated Flow (cfs)	Game Fish Species	Number Caught	Length Range (Inches)
S. Fk. Eightmile C.	710	10N, 8E, 23-24	2	Rb	35(3)	2.7 - 7.3
				Eb	61(13)	3.0 - 7.5
Guise Creek	275	11N, 8E, 22	2	Eb	51(7)	1.1 - 7.8
Sawmill Creek	300	11N, 8E, 22	2	Rb	2(0)	2.2 - 2.4
				Eb	22(7)	1.7 - 8.9
Dry Creek	400	11N, 8E, 24	2	None		
S. Fk. Smith R.[1]						
Catlin Spring Cr.	400	8N, 7E, 7	3	Eb	59(16)	2.3 -11.1

[1] Population estimates presented in Appendix A.

[2] Figure in parenthesis is number of fish in sample greater than 6 inches total length.

Appendix C. Smith River drainage streams inhabited by individual game fish species.

	Miles	Size
BROOK TROUT STREAMS		
Smith River	(4.0	3
	(41.6	4
Hound Creek	(16.2	4
	(12.2	5
W. Fk. Hound Creek	9.7	6
Squaw Creek	4.3	7
Pine Creek	3.0	6
White Tail Creek	3.8	6
Crooked Creek	7.2	6
E. Fk. Hound Creek	7.2	6
Tyrell Creek	4.7	6
Elk Creek	6.1	6
Middle Creek	5.0	6
W. Fork Creek	1.6	6
Trout Creek	12.3	6
Tenderfoot Creek	8.5	5
Rock Creek	10.2	5
Freeman Creek	7.3	6
N. Fk. Freeman Cr.	2.7	6
Spring Creek	1.1	6
E. Fk. Spring Creek	3.9	6
Eagle Creek	8.3	6
North Fork	2.0	6
East Fork	2.0	6
Sheep Creek	(18.4	4
	(16.7	5
Moose Creek	9.0	5
Little Sheep Creek	1.3	6
Jumping Creek	5.4	6
Lamb Creek	1.0	6
Deadman Creek	3.4	6
Beaver Creek	6.6	6
Whitetail Deer Creek	9.5	6
Camas Creek	14.5	5
Benton Creek	9.0	6
Thomas Creek	2.5	6
Elk Creek	6.6	6
Spring Creek	10.4	6
Thompson Gulch	7.6	6
Newlan Creek	21.8	6
Birch Creek	13.5	5
Little Birch Creek	6.8	6
Wood Creek	6.2	6
N. Fk. Smith River	39.9	5
Willow Creek	3.5	6
Fourmile Creek	6.2	6
Lake Creek	5.7	6
Eightmile Creek	0.9	6
N. Fk. Eightmile	4.6	6
S. Fk. Eightmile	4.9	6
Studhorse Creek	3.5	6
Guise Creek	3.4	6
Sawmill Creek	3.4	6
Dry Creek	0.5	6
S. Fk. Smith River	30.8	6
Catlin Spring Creek	1.5	6
TOTAL (53 Streams)	464.3	
RAINBOW TROUT STREAMS		
Smith River	(71.8	3
	(30.9	4
Hound Creek	(16.2	4
	(12.2	5
W. Fk. Hound Creek	9.7	6
Pine Creek	3.0	6
Whitetail Creek	3.8	6
Crooked Creek	7.2	6
E. Fk. Hound Creek	7.2	6
Tyrell Creek	4.7	6
Elk Creek	6.1	6
Middle Creek	5.0	6
West Fork Creek	1.6	6
Tenderfoot Creek	16.6	5
Rock Creek	19.5	5
Freeman Creek	7.3	6
N. Fk. Freeman Cr.	2.7	6
N. Fk. Rock Creek	4.1	6
French Creek	1.0	6
Eagle Creek	8.3	6
North Fork	2.0	6
East Fork	2.0	6
Sheep Creek	(18.4	4
	(11.6	5

Appendix C Continued. Smith River drainage streams inhabited by individual game fish species.

RAINBOW TROUT STREAMS CONTINUED	Miles	Size
Butte Creek	2.5	6
Calf Creek	2.6	6
Indian Creek	3.4	6
Moose Creek	8.0	5
Camas Creek	8.3	5
Benton Gulch	9.0	6
Thomas Creek	1.0	6
Keep Cool Creek	1.0	6
Elk Creek	1.7	6
Newlan Creek	20.2	6
Birch Creek	5.7	5
Gipsy Creek	1.0	6
N. Fk. Smith River	36.2	5
Eightmile Creek	0.9	6
S. Fk. Eightmile	4.9	6
Sawmill Creek	0.8	6
TOTAL (37 Streams)	380.1	

BROWN TROUT STREAMS	Miles	Size
Smith River	(81.1	3
	(30.9	4
Hound Creek	(16.2	4
	(12.2	5
Tenderfoot Creek	2.0	5
Rock Creek	12.7	5
Freeman Creek	2.5	6
Sheep Creek	7.1	4
Birch Creek	2.1	5
N. Fk. Smith River	25.0	5
S. Fk. Smith River	7.0	6
TOTAL (9 Streams)	198.8	

WHITEFISH STREAMS	Miles	Size
Smith River	(81.1	3
	(30.9	4
Hound Creek	16.2	4
Tenderfoot Creek	8.5	5
Rock Creek	12.7	5
Sheep Creek	(18.4	4
	(13.6	5
Moose Creek	9.0	5
Newlan Creek	12.7	6
Birch Creek	2.1	5
N. Fk. Smith River	25.0	5
S. Fk. Smith River	7.0	6
TOTAL (10 Streams)	237.2	

CUTTHROAT TROUT STREAMS		
Smith River	-	
Hound Creek	-	
Middle Creek	1.8	6
	(4.0	6
Deep Creek	(3.3	7
North Fork	4.5	6
South Fork	4.2	6
Tenderfoot Creek	25.2	5
Fisher Creek	1.3	6
Rugby Creek	2.5	6
Bolsinger Creek	5.1	6
Urvi Creek	1.3	6
Lost Stove Creek	1.3	6
Iron Mines Creek	3.7	6
Stringer Creek	1.3	6
Rock Creek	7.8	5
Freeman Creek	-	
N. Fk. Freeman Cr.	2.7	6
N. Fk. Rock Creek	4.1	6
French Creek	2.4	6
Spring Creek	-	
E. Fk. Spring Creek	1.5	6
Eagle Creek	1.0	6
N. Fork	2.0	6
E. Fork	2.0	6

Appendix C Continued (2). Smith River drainage streams inhabited by individual game fish species.

CUTTHROAT TROUT STREAMS CONTINUED	Miles	Size
Sheep Creek	(18.4	4
	(16.7	5
Butte Creek	9.4	6
Calf Creek	2.6	6
East Fork	3.0	6
Indian Creek	3.4	6
Moose Creek	4.0	6
Wolsey Creek	4.5	6
Jumping Creek	5.4	6
Whitetail Deer Creek	2.5	6
Camas Creek	9.7	5
Benton Gulch	1.0	6
Keep Cool Creek	1.0	6
Little Sulphur Creek	3.0	6
Spring Creek	1.0	6
Birch Creek	7.5	5
Little Birch Creek	3.8	6
N. Fk. Smith River	-	
Fourmile Creek	6.2	6
Lake Creek	1.5	6
TOTAL (38 Streams)	187.6	

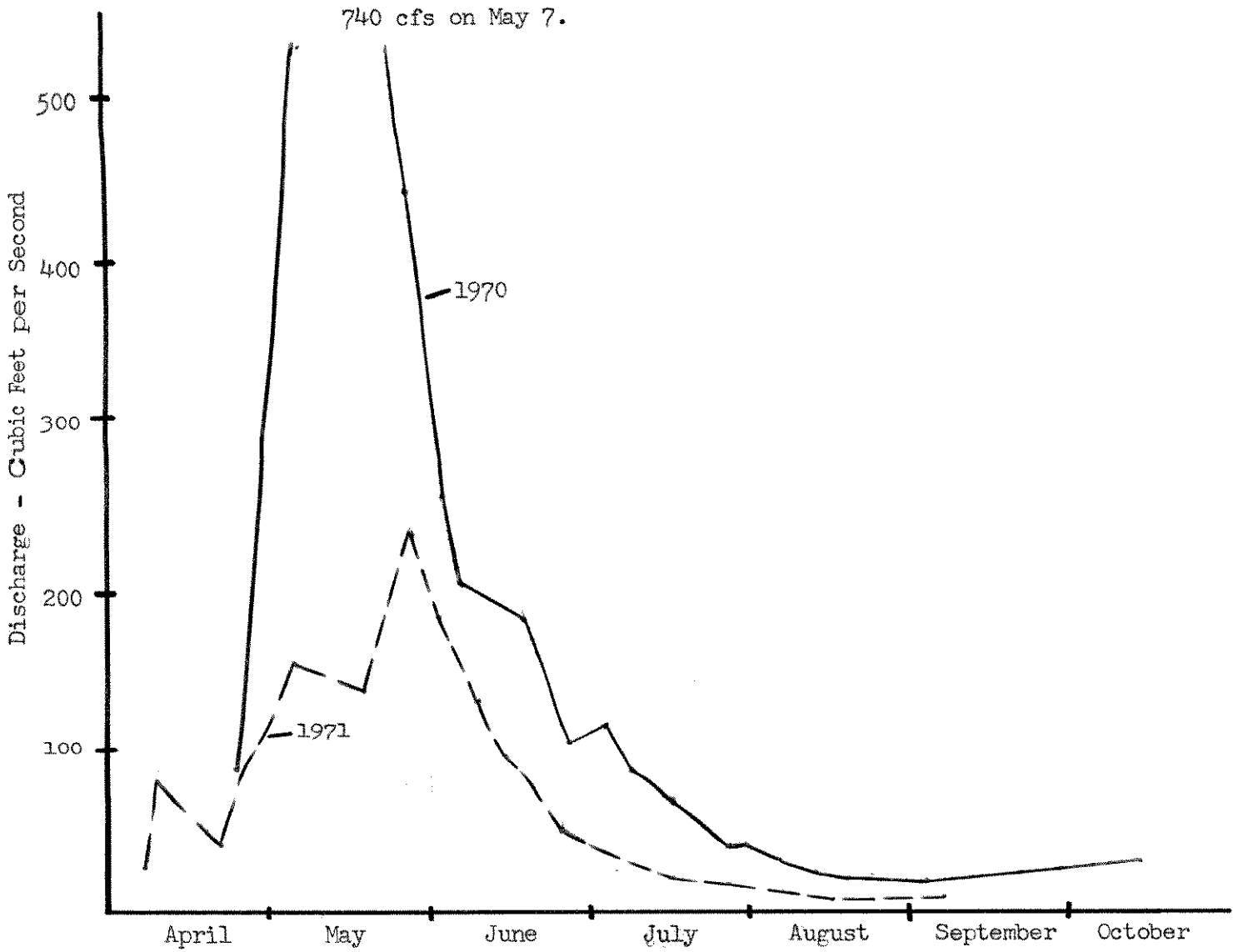
Appendix C-1. Summary of the number and miles of Smith River drainage streams supporting game fish populations.

Species	Number of Streams	Stream Size 3	4	5	6	7	Total
Brook Trout	53	4.0	76.2	124.5	254.9	4.3	463.9
Rainbow Trout	37	61.1	76.2	118.1	125.7	-	381.1
Mountain Whitefish	10	70.4	76.2	70.9	19.7	-	237.2
Brown Trout	9	70.4	64.9	54.0	9.5	-	198.8
Cutthroat Trout	38	-	18.4	66.9	100.0	3.3	188.6
All Game Fish	73 Streams						642.5 Mi.

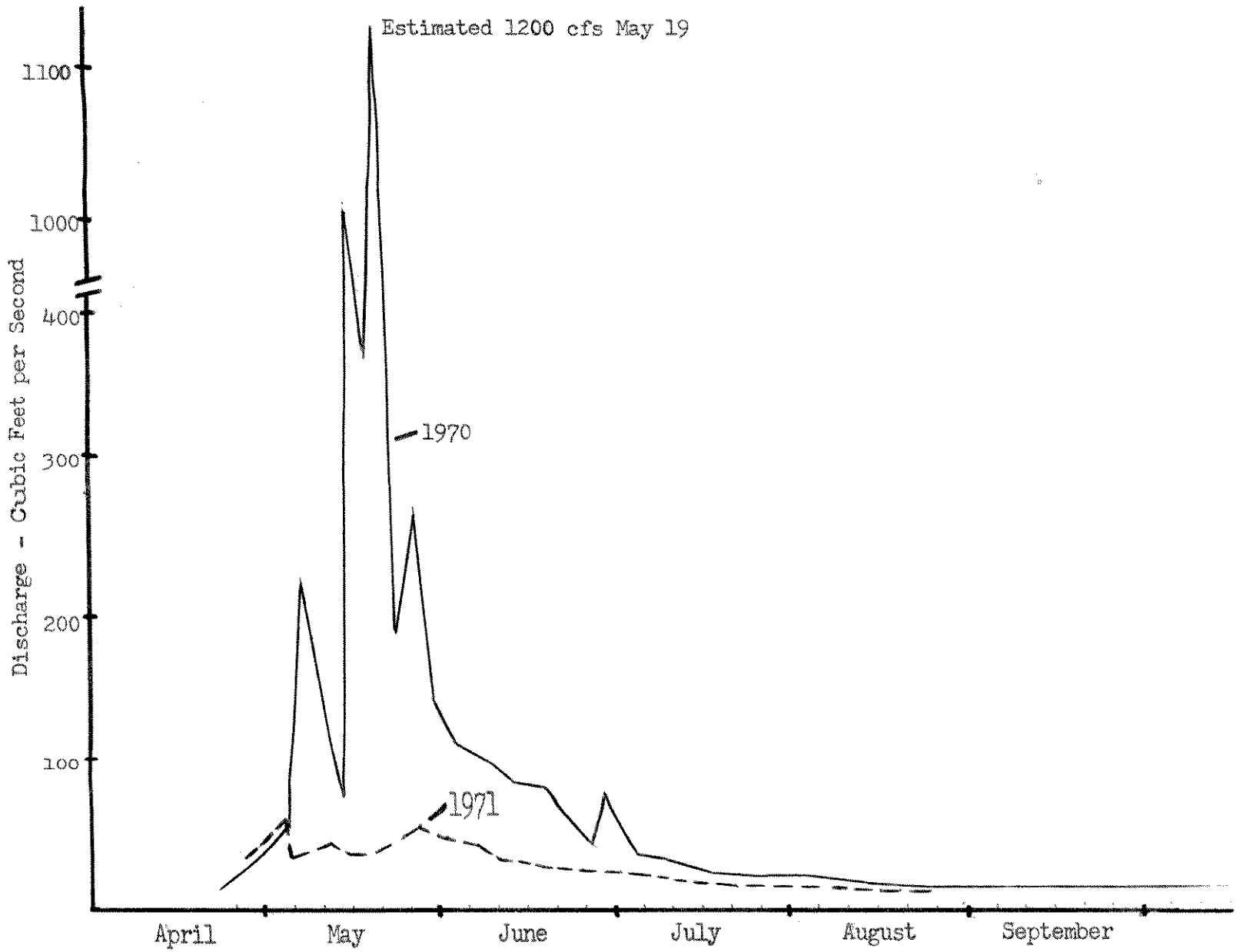
Appendix D. Daily discharge (cfs) of the Smith River near Eden, Montana, 1970 and 1971.

Day	1970 May	June	July	Aug.	Sept.	Oct.	Nov.
1		2320	927	346	187	241	238
2		2240	855	342	198	238	232
3		2454	790	346	204	238	219
4		2788	725	342	204	235	216
5		2948	677	322	201	238	222
6		3052	635	310	207	254	238
7	2410	2920	588	310	213	248	251
8	2443	2776	550	298	216	244	241
9	2240	2652	515	286	254	248	238
10	2100	2553	496	279	254	272	244
11	2010	2240	496	265	254	268	241
12	1684	1980	500	254	251	276	235
13	1450	2130	510	244	248	276	241
14	1298	2120	530	238	254	276	244
15	1282	1930	496	232	258	265	222
16	1612	1801	455	241	258	251	216
17	2432	1828	432	228	258	254	238
18	3441	1810	406	213	251	254	244
19	3337	1738	386	210	248	254	241
20	3467	1657	374	207	254	254	
21	3571	1585	366	216	268	251	
22	3272	1531	390	219	268	251	
23	3298	1450	442	207	265	248	
24	3285	1354	432	198	265	248	
25	3016	1242	394	192	261	248	
26	3028	1123	370	189	254	244	
27	3350	1088	362	189	254	235	
28	3148	1130	374	187	251	228	
29	2740	1102	406	187	248	216	
30	2553	1018	402	187	244	235	
31	2564		370	184		241	

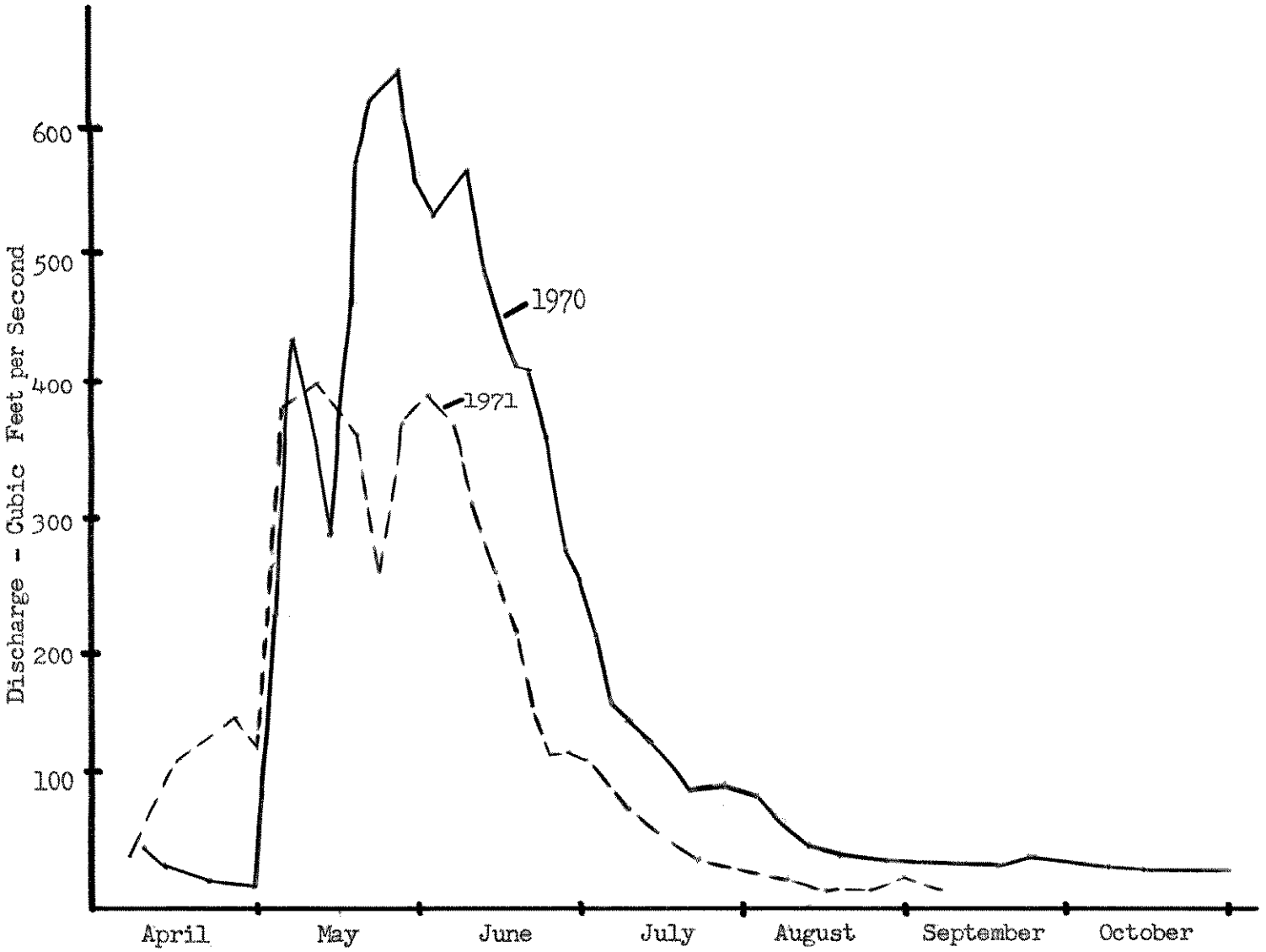
Day	1971 April	May	June	July	Aug.	Sept.
1		469	1322	522	148	143
2		540	1196	443	139	139
3		663	1110	403	134	132
4		807	1091	397	134	126
5		904	1075	382	129	126
6		1040	1028	354	124	124
7	312	1062	1055	316	121	126
8	430	1055	1028	297	129	126
9	464	1075	987	285	129	129
10	498	1068	960	278	121	126
11	450	1024	950	278	115	
12	360	1034	930	274	110	
13	316	1091	870	260	105	
14	297	1150	838	246	98	
15	373	1102	806	233	94	
16	438	1016	765	218	94	
17	400	1000	702	207	94	
18	364	987	640	198	94	
19	316	904	635	188	94	
20	310	892	607	182	92	
21	336	823	558	178	92	
22	386	765	522	166	90	
23	443	728	483	180	87	
24	528	713	479	175	82	
25	663	634	479	175	75	
26	610	798	464	166	72	
27	500	892	469	156	68	
28	450	1034	509	159	64	
29	428	1164	540	164	64	
30	450	1238	577	169	68	
31		1335		159	100	



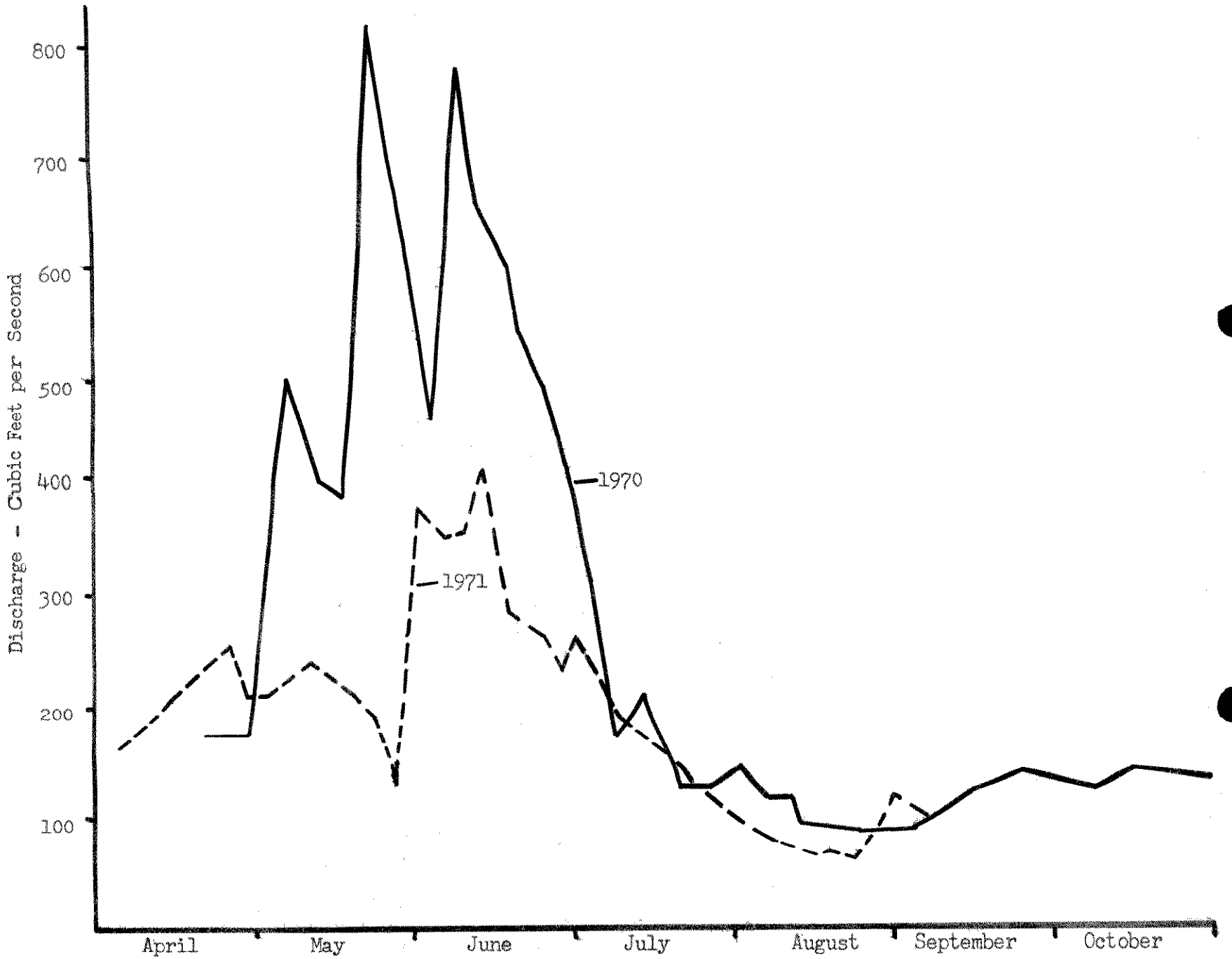
Appendix E. Discharge of Hound Creek near confluence with Smith River.



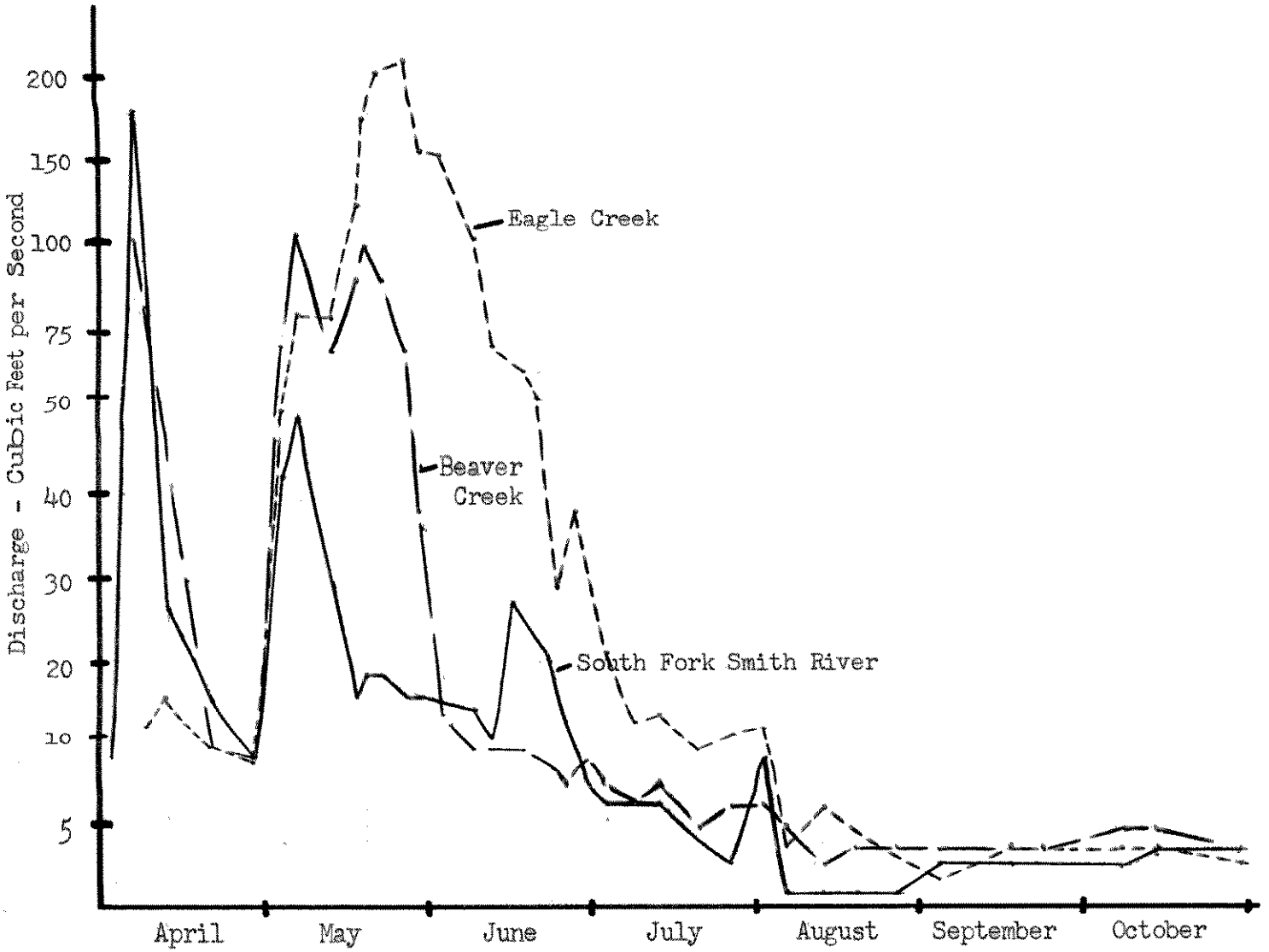
Appendix F. Discharge of Rock Creek near Lingshire.



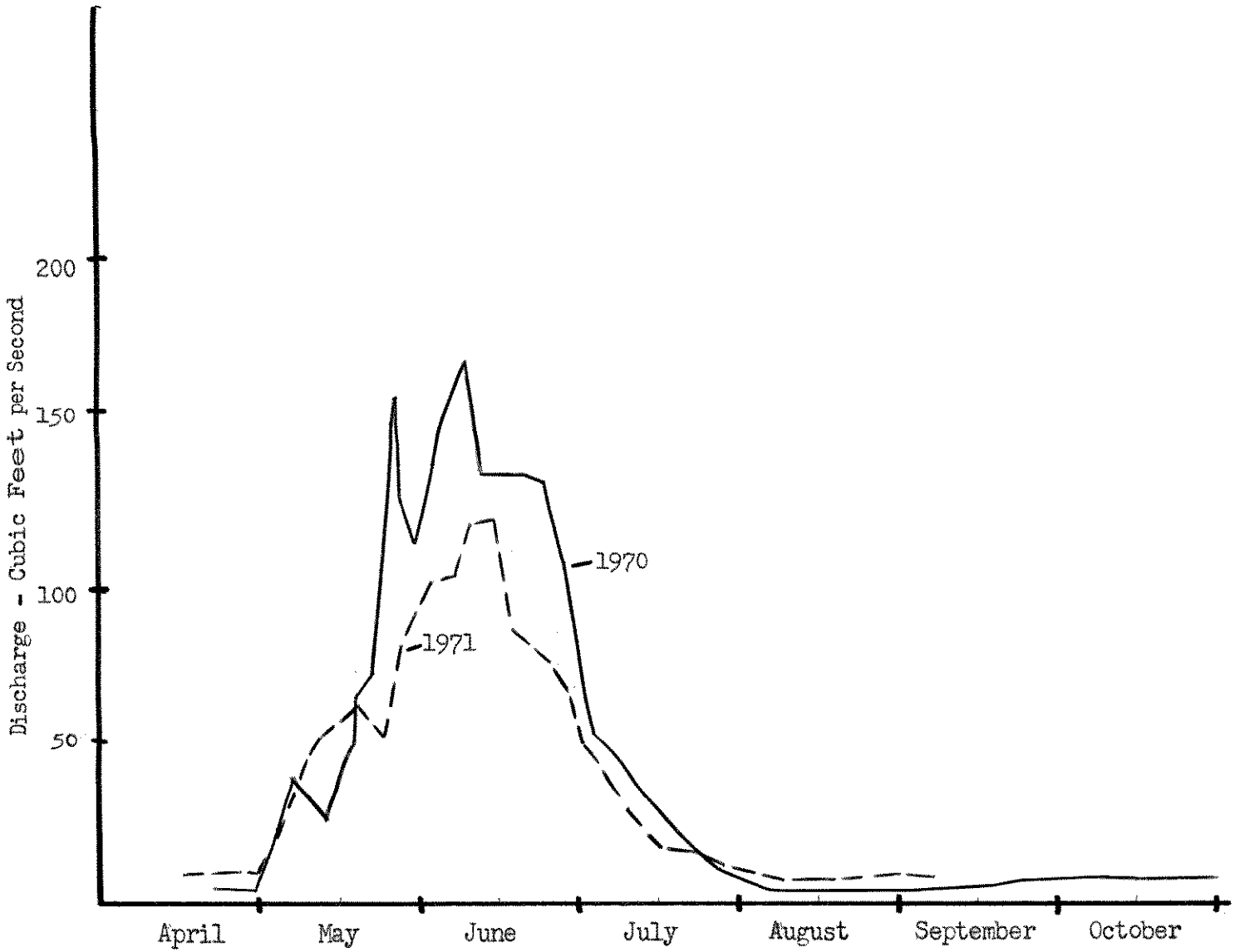
Appendix G. Discharge of Sheep Creek near confluence with Smith River.



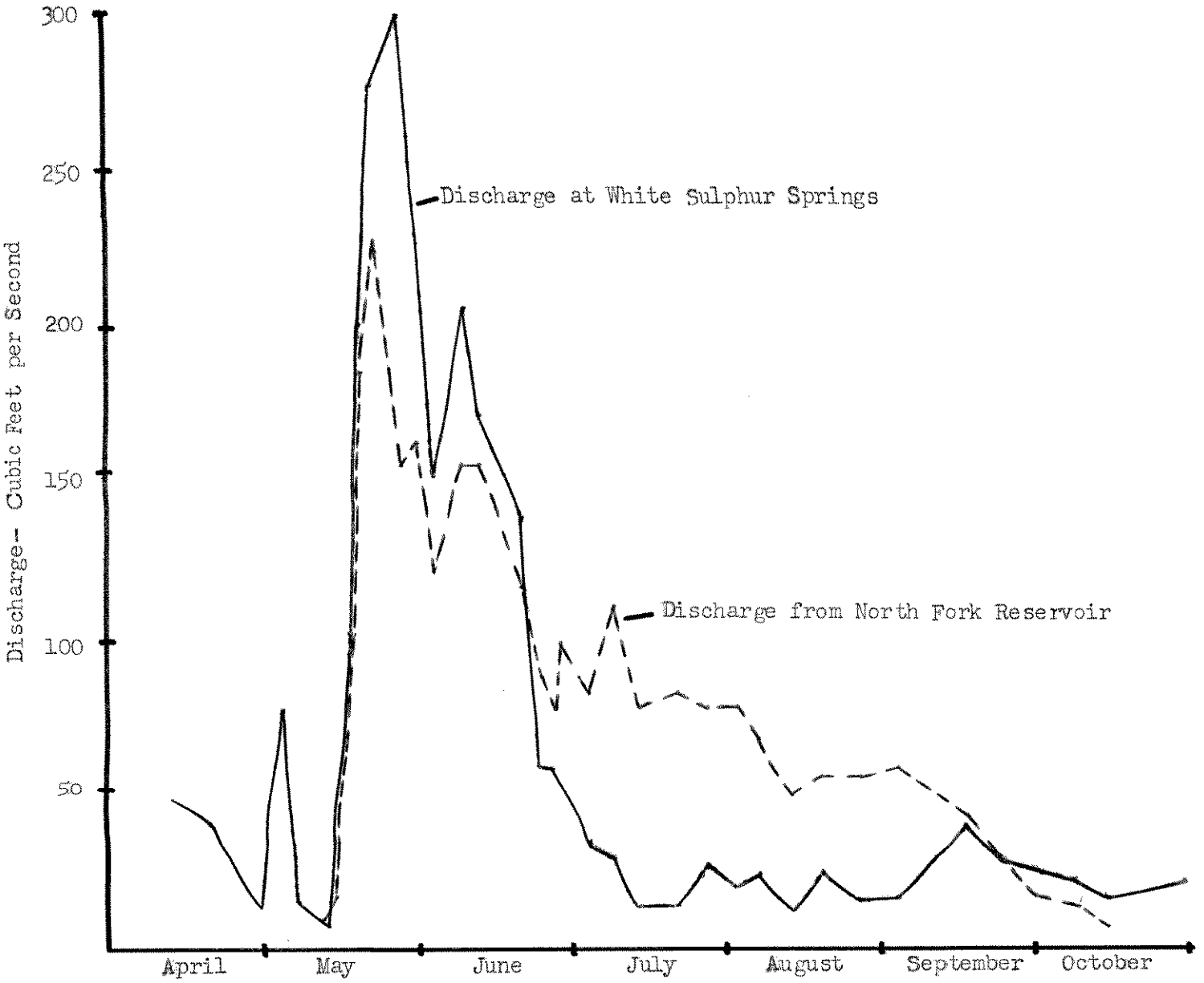
Appendix H. Discharge of Smith River near Camp Baker, river-mile 80.



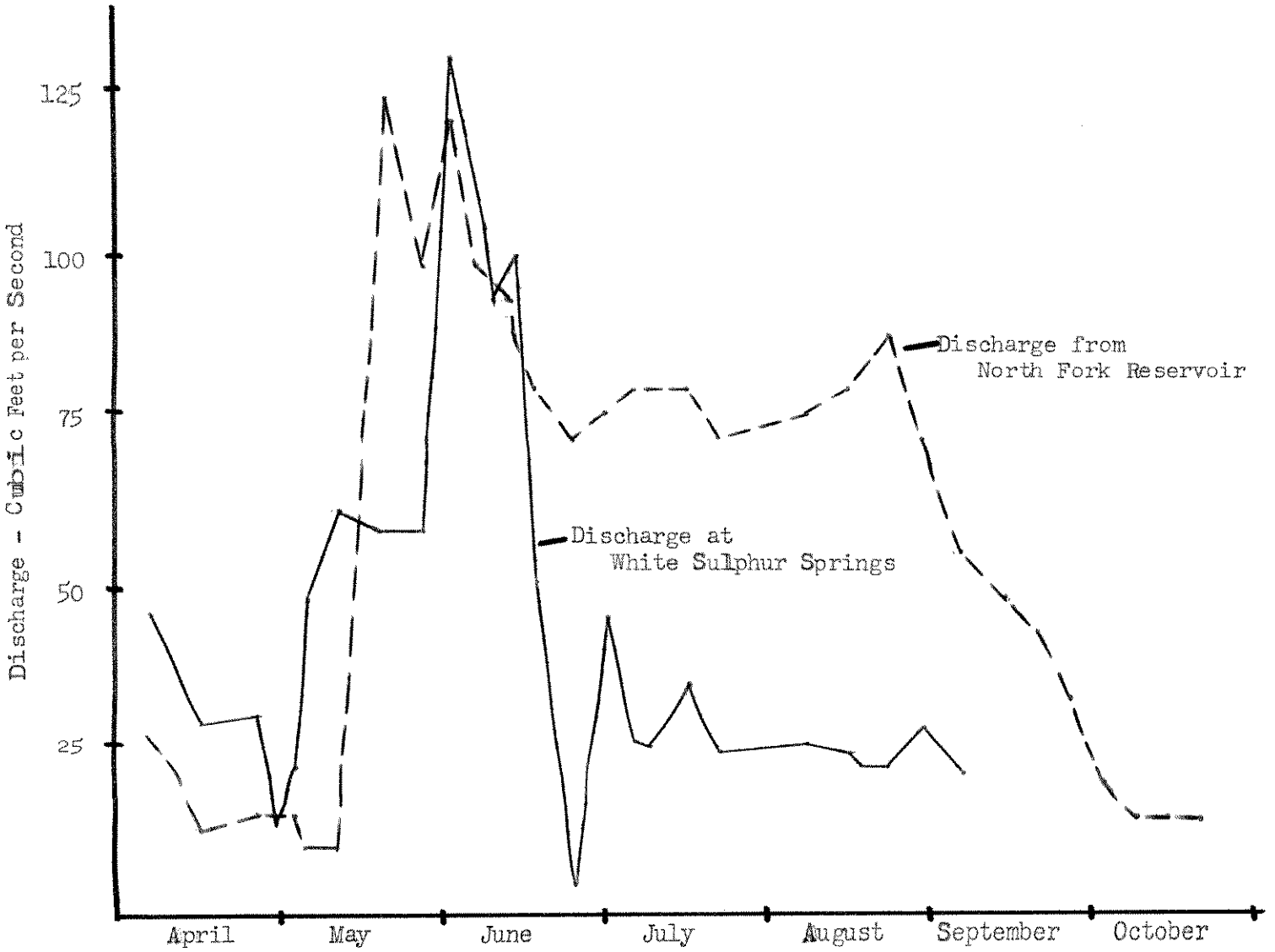
Appendix I. Discharge of three tributaries of the Smith River, 1970.



Appendix J. Discharge of Camas Creek below confluence of Garden Creek.



Appendix K. Discharge of the North Fork of the Smith River, 1970.



Appendix L. Discharge of the North Fork of the Smith River, 1971.

Appendix M. Daily maximum-minimum water temperatures from the Smith River at the U.S. Geological Survey station near the mouth of Hound Creek, river-mile 26.

1970

Day	May		June		July		Aug.		Sept.		Oct.	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1			53	47	61	51	69	59	68	62	53	46
2			56	51	64	57	68	62	66	56	53	46
3			56	53	69	59	70	61	66	56	54	47
4			56	53	71	61	72	60	60	57	54	49
5			55	53	72	64	66	64	62	55	51	42
6			55	53	72	63	72	62	61	53	42	34
7	47	40	54	52	72	62	74	64	59	55	38	33
8	42	40	56	51	72	62	69	64	55	52	43	47
9	43	40	55	49	71	62	68	59	58	50	41	38
10	44	42	49	47	68	62	69	58	57	49	40	35
11	42	39	53	47	71	60	71	59	53	40	42	39
12	40	38	51	46	71	63	71	60	46	38	42	41
13	41	37	50	45	65	61	70	61	44	38	43	39
14	47	39	53	48	68	56	69	60	47	38	41	37
15	52	43	53	50	70	59	69	57	49	40	42	36
16	53	47	51	48	72	61	70	59	50	43	43	36
17	50	48	55	48	73	64	69	62	54	47	43	37
18	49	44	59	51	73	63	67	58	58	50	41	38
19	46	45	62	55	74	63	67	55	55	52	42	38
20	46	43	63	56	76	65	63	58	54	50	45	39
21	47	45	65	58	73	66	67	55	51	47	43	39
22	48	43	66	60	67	62	69	58	48	45	40	38
23	50	48	66	60	65	58	69	58	40	45	39	35
24	48	45	68	62	66	57	70	59	48	44	42	38
25	50	45	68	61	64	59	71	61	45	40	38	34
26	52	50	67	60	69	60	71	62	49	40	36	32
27	50	46	66	62	68	62	71	60	52	43	37	33
28	47	45	65	60	70	62	70	61	53	45	37	32
29	48	46	63	55	68	61	67	58	54	46	37	32
30	47	42	57	53	68	60	67	56	54	47	39	34
31	49	43			68	58	69	60			38	33

Appendix N. Daily maximum-minimum water temperatures from the Smith River at the U. S. Geological Survey station near the mouth of Hound Creek, river-mile 26.

1971

Day	April		May		June		July		Aug.		Sept.		Oct.	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1			52	45	50	45	67	54	76	63	64	57	44	40
2			58	48	55	46	62	58	75	65	63	58	49	39
3			57	50	56	52	64	54	75	66	59	56	52	44
4			55	50	57	50	65	55	78	65	62	52	54	48
5			51	58	53	50	68	58	77	68	65	53	57	48
6			49	44	51	48	66	56	80	69	66	56	58	51
7	48	44	53	44	58	48	65	54	80	68	66	57	58	50
8	46	39	54	47	60	55	68	56	79	68	65	54	54	47
9	48	40	54	47	57	54	70	60	77	66	61	56	57	48
10	46	38	55	47	58	52	70	61	76	65	65	53	56	49
11	42	35	55	48	60	52	68	61	76	64	63	56	51	48
12	46	37	55	48	63	53	68	57	76	65	62	52	53	47
13	47	38	57	49	62	57	69	58	76	64	60	54	51	46
14	52	41	54	48	62	56	70	58	73	65	58	49	49	42
15	50	44	50	45	61	54	70	60	72	62	56	50	42	37
16	45	40	51	45	61	55	73	62	72	62	51	45	39	36
17	43	37	51	47	62	54	75	64	73	61	49	43	43	36
18	39	36	47	37	61	56	74	63	73	61	50	40	42	38
19	47	34	42	32	64	56	75	62	74	60	51	44	43	37
20	45	42	52	42	67	57	71	64	68	60	49	42	44	41
21	48	42	50	43	70	59	75	64	72	60	50	40	45	40
22	49	44	46	43	75	63	76	65	72	61	51	41	46	40
23	51	42	55	43	72	64	76	65	67	57	54	43	46	42
24	49	46	57	49	71	62	70	62	69	55	54	47	44	39
25	48	42	60	51	68	62	69	59	69	56	53	49	42	37
26	42	39	62	53	62	58	71	58	73	59	49	45	45	38
27	46	36	61	55	59	54	67	61	74	60	48	43	38	32
28	49	41	59	54	54	50	62	58	73	62	50	43	33	32
29	51	42	55	52	52	47	69	54	66	63	49	44	32	32
30	53	44	53	48	61	46	71	58	66	62	45	41	32	32
31			48	45			74	60	67	60			32	32

Appendix O. Daily maximum-minimum water temperatures from the Smith River near Camp Baker, river-mile 80.

1971

Day	April		May		June		July		Aug.		Sept.		Oct.	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1			58	46	53	49	65	53	70	58	61	56	45	44
2			58	48	59	47	61	56	68	61	60	56	45	43
3			59	49	58	52	62	51	70	61	57	54	47	44
4			57	49	57	51	61	51	71	62	57	51	49	47
5			55	50	58	51	65	55	71	63	58	52	51	48
6			55	49	53	50	63	55	73	64	58	52	51	49
7			57	46	62	49	62	50	73	65	59	55	51	49
8			60	47	60	55	64	53	73	64	58	53	51	48
9			59	50	58	52	63	56	70	62	58	54	49	47
10			57	49	58	53	64	53	70	61	58	53	49	47
11			60	48	60	52	64	53	70	61	58	54	49	47
12			62	49	63	51	66	54	69	61	57	52	48	47
13			55	52	60	56	67	55	70	60	56	52	48	47
14			54	45	60	54	66	56	68	62	54	51	48	46
15			57	45	60	50	69	59	66	60	52	49	47	45
16			53	49	60	52	69	58	67	59	50	48	45	43
17			49	41	61	52	70	58	67	58	49	47	44	43
18			49	40	58	52	70	60	66	58	49	45	45	44
19			55	44	63	52	67	58	66	57	49	46	44	42
20			55	47	65	56	67	60	63	58	49	47	45	43
21			49	46	68	56	69	58	66	56	48	45	45	44
22			50	44	70	59	68	59	64	58	48	45	46	43
23			58	43	66	59	67	58	62	58	49	45	45	43
24			59	49	66	56	68	59	63	53	50	47	45	44
25			63	51	63	57	67	58	62	55	50	49	44	42
26	49	-	66	53	57	54	67	56	65	56	49	47	44	43
27	46	38	67	56	55	52	66	58	66	58	48	46	45	43
28	50	42	65	56	52	50	59	56	67	60	47	45	43	39
29	53	43	60	56	50	46	65	52	62	60	47	45	41	39
30	55	44	56	50	60	47	66	55	61	59	46	45	40	38
31			51	47			66	56	62	58				

Appendix P. Daily maximum-minimum water temperatures from the Smith River near White Sulphur Springs, river-mile 116.

1971

Day	April		May		June		July		Aug.		Sept.		Oct.	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1			60	41	56	50	67	55	72	58	62	54	43	42
2			59	48	62	48	63	55	74	61	56	52	47	41
3			60	49	61	53	63	51	74	62	54	50	50	42
4			57	49	60	50	64	52	73	60	60	48	52	47
5			58	49	59	51	66	55	74	60	62	51	55	46
6			53	48	55	49	66	55	74	62	62	53	55	47
7			58	44	67	49	65	51	76	62	63	54	55	48
8			60	48	64	56	69	54	76	62	62	52	52	45
9			59	50	61	52	68	56	73	60	61	53	53	44
10			60	48	59	54	69	58	74	58	62	51	53	46
11			63	49	63	53	64	55	74	59	63	54	50	46
12			65	50	67	53	66	53	73	58	60	50	51	44
13			58	47	63	57	67	54	73	56	60	51	50	45
14			56	44	63	55	69	56	69	59	57	48	47	42
15			60	45	63	52	70	56	65	58	50	46	43	39
16			56	45	63	55	70	57	69	56	50	44	44	39
17			45	41	60	54	72	59	70	56	50	44	44	39
18			50	40	61	53	72	59	70	55	52	44	43	40
19			56	45	66	53	72	60	70	54	52	45	45	39
20			53	45	69	57	66	60	66	54	49	44	45	40
21			50	43	71	57	66	57	70	54	51	41	47	41
22			48	42	74	60	68	59	64	54	52	44	45	39
23			61	43	69	62	71	58	64	52	53	44	46	41
24			61	51	69	58	70	60	66	49	54	46	43	41
25			64	51	63	57	69	59	67	52	51	48	48	40
26			68	54	57	54	70	56	70	55	49	46	46	42
27	43	-	70	54	57	52	63	57	71	56	47	44		
28	49	40	67	56	53	50	61	56	70	58	48	42		
29	53	43	60	52	55	48	65	51	67	58	47	43		
30	51	44	52	49	62	47	68	55	62	57	45	42		
31			54	46			68	56	65	56				

Appendix Q. Turbidities (JTU) of some Smith River drainage streams, 1970.

Date	Hound Creek T17N,R3E, S19	Rock Creek T13N,R3E, S31	Eagle Creek T12N,R4E, S1	Sheep Creek T12N,R5E, S18	Smith River T12N,R4E, S13	Beaver Creek T11N,R4E, S3	Camas Creek T10N,R4E, S34	Birch Creek T9N,R5E, S10	No.Fk. Smith R. T9N,R6E, S12	So.Fk. Smith R. T8N,R6E, S13
	Stream and Sampling Location									
4/ 9				30		115				120
4/21		Clear	Clear	Clear	Clear	Clear	Clear	Clear	18	28
4/29			Clear	Clear	Clear	Clear	Clear	Clear	Clear	20
5/ 4		75	20	20	50	75	Clear	Clear	88	68
4/ 7	198	340	60	45	123	125	Clear	Clear	27	28
5/17		960	62	50	46	48	45	Clear	62	5
5/19			68	38	61	48	5			
5/22		163	51	36	63	30	5	Clear	15	9
5/26	13	265					5			
5/27			30	55	51	29	28	Clear	9	18
5/29		55	32	14	27			Clear		24
6/ 3	3	45			23	17	35	Clear	9	
6/ 9	4	10	18	14	24	9	4	Clear	5	18
6/12		7	15	8	25	5	4	Clear	4	2
6/18	5	6	5	7	10	4				
6/20							Clear	Clear		
6/24	4			3	4		Clear	Clear		

Appendix R. Turbidities (JTU) of some Smith River drainage streams, 1971.

Date	Hound Creek T17N,R3E, S19	Smith River T17N,R3E, S20	Rock Creek T13N,R3E, S31	Sheep Creek T12N,R5E, S18	Smith River T12N,R4E, S13	Beaver Creek T11N,R4E, S 3	Camas Creek T10N,R4E, S34	Benton Creek T11N,R3E, S25	No.Fk. Smith R. T9N,R6E, S12	So.Fk. Smith R. T8N,R6E, S13
	Stream and Sampling Location									
3/31									78	
4/ 6	Clear	Clear	Clear	Clear	Clear	Clear	Clear		53	145
4/ 8	15	7								
4/16				18	Clear		Clear		Clear	17
4/21	Clear	Clear								
4/26			8	20	10	Clear	Clear		Clear	3
4/29				5	5	Clear	Clear	40	Clear	3
5/ 3			20	37	6	Clear	3	122	Clear	3
5/ 5	45	12	14	40	42	Clear			8	3
5/11			10	10	5	Clear	Clear	65	5	3
5/18	58	5	3	3	Clear	5	Clear		7	
5/23				Clear	Clear		Clear	38		3
5/27	10	2	5	3	Clear	Clear	Clear		8	3
6/ 2	5	5	5	3	3	Clear	Clear	25		2
6/ 7			4	3	4	Clear	Clear		5	
6/10	3	2	3	Clear	5	Clear	Clear		3	2
6/14	Clear		2	Clear	6	Clear	Clear		4	2
7/ 1			2	Clear	Clear	Clear	Clear		2	2

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SECTION II

BIG GAME INVENTORY AND PLAN

Job I-b

Prepared by

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June, 1973

INTRODUCTION

The Smith River drainage, with its mosaic of vegetation types (Table 1), supports an excellent big game population. It provides yearlong habitat for large numbers of elk, mule deer, white-tailed deer and antelope. Also found there are moose, bear, mountain goats and mountain sheep.

Annual big game hunting seasons attract large numbers of hunters into the Smith River drainage, and these hunters have a substantial economic impact on the communities in or adjacent to the area. White Sulphur Springs, centrally located in the upper Smith River drainage, probably profits the most. Sportsmen pour money into this area by routine spending and by hiring residents who provide guiding services. These sources of income are very important to this low-income area.

Elk and mule deer in the Smith River drainage generally summer at high elevations, usually national forest lands, and then migrate to lower elevations at the beginning of winter. White-tailed deer generally live yearlong at lower elevations, except for the Tenderfoot Creek area, where there is a significant downward migration of summering deer from high elevations at the head of Tenderfoot Creek and the adjoining Smith River. Antelope usually remain yearlong on the lowest river bottoms and adjacent foothills; however, some antelope will range into the higher foothills during the summer.

The majority of the low country is private land; consequently, approximately 81 percent of the elk, deer and antelope winter range in the Smith River drainage is on private land (Table 2). The major federal land managers, the Forest Service and the Bureau of Land Management, control only 12 percent of the winter ranges. These federally owned winter range lands are very important when it is realized that little wildlife management can be accomplished by the Montana Department of Fish and Game on private lands, or even on state-owned lands.

State lands are public lands, and therefore must not have their wildlife resource neglected. Lessees of state lands should be required to manage these lands under a multiuse concept where the wildlife resource is definitely included in a management plan. Specific lands important to wildlife are mentioned throughout the report. The State Land Board should insure that the wildlife resource on these specifically mentioned areas will be managed properly before renewing the leases. When state lands block public access to other public lands, the State Land Board should authorize that the public be allowed to cross these state lands.

With so much critical big game winter range under private ownership, the wildlife outlook is not bright. Many of the Smith River winter ranges are being utilized to the maximum or overutilized by livestock, especially the large numbers of semiwild horses that range over several elk winter ranges, sometimes on a yearlong basis. Horses are very efficient competitors with elk, and compete directly with them in these areas. On some big game wintering areas the protective timber is being logged, the brush is being destroyed and the native grassland is being

Table 1. Descriptions, acreages and percent of total drainage acreage of 12 vegetative types found in the Smith River drainage.

1. GRASSLAND 477,660 acres 36.3 percent of total
Includes untimbered areas, other than meadow, with perennial aspect. Forbs, sedges and shrubs may occur in mixture with grasses.

2. MEADOW 35,266 acres 2.7 percent of total
Includes untimbered areas where succulent vegetation grows during most of the season. There may be sedges, rushes, grasses, or forbs, singly or in mixture. This type has above average soil moisture and depth.

3. MIXED FORB, SHRUB, GRASSLAND 78,350 acres 6.0 percent of total
Includes areas with a mixture of forbs, shrubs, and grasses without a predominant type. Usually more than 10 percent slopes with rainfall above 15 inches.

4. SAGEBRUSH-GRASSLAND 106,650 acres 8.1 percent of total
Includes untimbered areas where shrubby species of sagebrush or rabbitbrush, or both, predominate.

5. BROWSE-MOUNTAIN SHRUB 11,560 acres 0.9 percent of total
Includes untimbered lands where shrubs other than sagebrush or rabbitbrush dominate the aspect. Examples are mountain mahogany, bitterbrush, and willows.

6. DENSE CONIFER 319,890 acres 24.3 percent of total
Includes coniferous trees with greater than 50 percent canopy coverage, sometimes with an understory of grasses, forbs, and shrubs, either singly or in combination.

7. SCATTERED CONIFER 174,940 acres 13.3 percent of total
Includes coniferous areas with less than 50 percent canopy coverage with an understory of grasses, forbs, and shrubs, either singly or in combination.

8. ROCK OR BARREN Insignificant acreage
Includes rock cliffs, slides and outcrops with little or no overstory. Usually typed as reference points.

9. BROAD-LEAVED TREES 9,850 acres 0.8 percent of total
Includes all range under an overstory of deciduous trees. The understory may vary from a pure stand to mixtures of grasses, forbs, and shrubs. Cottonwood is the most common overstory in this area.

10. AGRICULTURE 55,260 acres 4.2 percent of total
Small grains, alfalfa, etc.

11. BROWSE-LOWLAND SHRUB 3,020 acres 0.2 percent of total
Chokecherry, buffaloberry, rose, snowberry, etc. May be associated with wasteland weedy aspect.

12. ASPEN-CONIFER 40,831 acres 3.1 percent of total
Areas dominated by aspen or a mixture of aspen and conifers. Usually more moist than surrounding areas.

Table 2. Land ownership of major elk, deer and antelope winter ranges in the Smith River drainage.

Species	Private		National Forest		B.L.M.		State		Total
	# of Acres	% of Total	# of Acres	% of Total	# of Acres	% of Total	# of Acres	% of Total	# of Acres
Elk	58,000	66	23,000	26	1,760	2	5,630	6	88,300
Deer	207,000	85	16,450	7	1,730	1	17,700	7	242,500
Antelope	31,100	91	-	-	-	-	3,040	9	34,140
Totals	296,100	81	39,450	11	3,490	1	26,370	7	365,000

cultivated. People are also building homes and cabins on winter ranges. Once the winter range is destroyed or reduced in size, the dependent animal population must follow suit.

The continuation of a large big game population in the Smith River drainage is dependent upon the desires of the private landowners. If they are willing to manage their lands in a manner that will accommodate wildlife, then this resource will survive.

INVENTORY AND PLAN

Supporting Data

Elk

Field observations (Table 3) were plotted to delineate wintering areas. Only a few minor changes in wintering areas were observed in 1972 when compared with 1971 and 1970 data. Final determinations of elk wintering areas are plotted in Figures 1 and 2.

Individual elk herds are discussed in the following write-ups by mountain ranges.

Table 3. Elk observations, July 1971 - July 1972.

Hunting Area	Date	Number of elk Observed	Classification	Location	
46	7/26/71	5	3 cows, 2 calves	Mule Creek	S 36, T 10N, R 3E
46	7/26/71	2	-	Beaver Creek	S 2, T 11N, R 2E
46	7/26/71	53	35 cows, 16 calves, 2 spikes	Rock Creek	S 31, T 13N, R 1E
45	7/26/71	2	adult bulls	Elk Creek	S 31, T 14N, R 1E
45	7/26/71	42	19 cows, 12 calves, 11 bulls	Beartooth Ranch, Cottonwood Creek	S 1, T 14N, R 2W
48	7/27/71	47	30 cows, 15 calves, 2 bulls	Studhorse Creek	S 30, T 11N, R 8E
48	7/27/71	7	3 cows, 2 calves, 1 bull	Sawmill Creek	S 11, T 11N, R 8E
48	7/27/71	18	Unclassified	N. Fk. Smith River	S 13, T 11N, R 8E
48	7/27/71	7	4 cows, 3 calves	Dry Creek	S 11, T 11N, R 8E
48	7/27/71	15	11 cows, 3 calves, 1 bull	N. Fk. Smith River	S 29, T 12N, R 9E
416	9/9/71	15	Unclassified	Bonine Creek	S 21, T 12N, R 8E
48	9/9/71	17	Unclassified	Dry Creek	S 1, T 11N, R 8E
49	9/10/71	4	Unclassified	Alabaugh Creek	S 21, T 8N, R 8E
49	9/10/71	5	Unclassified	Fourmile Creek	S 5, T 8N, R 8E
49	9/10/71	7	Unclassified	Fourmile Creek	S 32, T 9N, R 8E
455	9/10/71	2	Unclassified	N. Fk. Beaver Creek	S 17, T 13N, R 1E
46	9/10/71	6	Unclassified	Middle Fk. Hound Cr.	S 36, T 14N, R 1W
46	12/1/71	10	1 spike	Bridle Gulch	S 34, T 11N, R 3E
46	12/1/71	15	1 spike	Thomas Creek	S 10, T 11N, R 3E
46	12/1/71	5	1 adult bull	Benton Gulch	S 4, T 11N, R 3E
416	12/1/71	15	Unclassified	Indian Creek	N½ S 35, T13N, R 6E
416	12/1/71	10	Unclassified	Indian Creek	S½ S 35, T13N, R 6E
416	12/1/71	3	Unclassified	Kinney Creek	S 9, T 12N, R 8E
416	12/1/71	6	Unclassified	Mizpah Creek	S 9, T 12N, R 8E
48	12/1/71	4	Unclassified	Deadman Creek	S 14, T 12N, R 8E
48	12/1/71	5	Unclassified	N. Fk. Smith River	S 6, T 11N, R 9E
48	12/1/71	2	Unclassified	N. Fk. Smith River	S 31, T 12N, R 9E
46	12/2/71	6	Unclassified	Wagner Creek	S 36, T 12N, R 2E
413	12/2/71	6	Unclassified	Deep Creek Park	S 29, T 15N, R 4E
413	12/2/71	9	1 adult bull	Deep Creek Park	S 9, T 15N, R 4E
416	12/2/71	8	6 adult bulls, 2 spikes	Butte Creek	S 12, T 12N, R 5E
49	12/2/71	40	Unclassified	Fords Creek	S 10, T 8N, R 7E
49	12/2/71	5	Unclassified	Agate Creek	S 6, T 7N, R 8E
46	12/2/71	7	Unclassified	Hay Creek	S 22, T 6N, R 5E
46	12/2/71	2	Unclassified	Hay Creek	S 10, T 6N, R 5E
49	1/13/72	31	Unclassified		S 6, T 7N, R 8E
49	1/18/72	12	8 cows, 4 calves		S 1, T 9N, R 7E

Table 3 Continued. Elk observations, July 1971 - July 1972.

Hunting Area	Date	Number of elk Observed	Classification	Location	
49	1/18/72	14	Unclassified		S 2, T 8N, R 7E
49	1/18/72	8	Unclassified		S 2, T 8N, R 7E
49	1/27/72	43	Unclassified		S 36, T 8N, R 7E
49	1/27/72	58	Unclassified		S 6, T 7N, R 8E
49	1/27/72	1	Unclassified		S 7, T 9N, R 8E
49	1/27/72	34	Unclassified		S 13, T 9N, R 7E
49	1/29/72	67	50 cows, 14 calves, 3 bulls		S 6, T 7N, R 8E
49	1/29/72	45	32 cows, 11 calves, 2 bulls		S 36, T 8N, R 7E
49	1/29/72	34	27 cows, 7 calves		S 24, T 9N, R 7E
49	1/29/72	4	3 cows, 1 calf		S 7, T 9N, R 8E
46	2/1/72	56	Unclassified		S 35, T 11N, R 3E
46	2/1/72	12	Unclassified		S 26, T 11N, R 3E
49	2/1/72	21	Unclassified		S 21, T 10N, R 8E
49	2/1/72	41	Unclassified		S 13, T 9N, R 7E
46	2/2/72	141	91 cows, 34 calves, 8 bulls, 8 uncl.	Thomas Creek	S 26 & 35, T 11N, R 3E
416	2/2/72	93	Unclassified		S 11, T 12N, R 5E
416	2/2/72	70	Unclassified		S 2, T 13N, R 4E
49	2/3/72	124	99 cows, 20 calves, 5 bulls	Agate Creek	S 7, T 7N, R 8E
46	2/9/72	50	Unclassified		S 3, T 10N, R 3E
49	2/9/72	19	14 cows, 5 calves		S 13, T 9N, R 7E
46	2/10/72	44	4 adult bulls	Hay Creek	S 15, T 6N, R 5E
49	2/10/72	50	Unclassified		S 4, T 7N, R 8E
49	2/10/72	42	1 spike		S 27, T 10N, R 8E
48	2/10/72	14	Unclassified		S 34, T 11N, R 7E
46	2/15/72	27	Unclassified		S 25, T 8N, R 5E
49	2/15/72	14	Unclassified		S 36, T 8N, R 8E
46	2/22/72	7	4 cows, 3 calves	Deep Creek	S 34, T 8N, R 5E
46	3/16/72	50	Unclassified	Thomas Creek	S 3, T 10N, R 3E
413	3/16/72	17	14 cows, 3 calves	Deep Creek Park	S 23, T 15N, R 4E
413	3/16/72	20	9 cows, 11 calves	Deep Creek Park	S 22, T 15N, R 4E
413	3/16/72	36	22 cows, 14 calves	Deep Creek Park	S 21, T 15N, R 4E
413	3/16/72	4	4 cows	Deep Creek Park	S 21, T 15N, R 4E
413	3/16/72	26	16 cows, 5 calves, 5 spikes	Deep Creek Park	S 29, T 15N, R 4E
414	3/16/72	18	12 cows, 6 calves	Black Butte	S 22, T 16N, R 4E
414	3/16/72	23	13 cows, 7 calves, 3 spikes	Black Butte	S 16, T 16N, R 4E
414	3/16/72	15	7 cows, 5 calves, 3 spikes	Black Butte	S 10, T 16N, R 4E
414	3/16/72	2	2 adult bulls	Black Butte	S 3, T 16N, R 4E

Table 3 Continued. Elk observations, July 1971 - July 1972.

Hunting Area	Date	Number of elk Observed	Classification	Location	
46	3/17/72	71	Unclassified	Democrat Creek	S 11, T 10N, R 3E
416	3/17/72	66	48 cows, 18 calves	Blacktail Creek	S 4, T 12N, R 4E
416	3/17/72	17	13 cows, 4 calves	Dry Canyon	S 33, T 12N, R 4E
416	3/17/72	60	43 cows, 16 calves, 1 spike	Butte Creek	S 7 & 12, T 12N, R 5E
416	3/17/72	14	12 adult bulls, 2 spikes	Butte Creek	S 19, T 12N, R 6E
49	3/17/72	129	4 spikes	Fords Creek	S 15, T 8N, R 7E
49	3/17/72	41	30 cows, 10 calves, 1 spike	Agate Creek	S 36, T 8N, R 7E
45	3/21/72	151	8 bulls	Pine Coulee	S 9, T 11N, R 2E
46	3/21/72	81	49 cows, 27 calves, 5 bulls	Thomas Creek	S 35, T 11N, R 3E
46	3/21/72	4	3 cows, 1 calf	Keep Cool Creek	S 3, T 10N, R 3E
46/39	3/22/72	103	Unclassified	Deep Creek	S 16, T 7N, R 5E
49	3/22/72	80	3 bulls	Agate Creek	W½ S 36, T8N, R7E
49	3/22/72	68		Cottonwood Creek	E½ S 36, T8N, R7E
49	3/22/72	72	49 cows, 21 calves, 2 bulls	Fivemile Creek	S 33, T 10N, R 8E
49	3/22/72	17	11 cows, 6 calves	W. Fk. Flagstaff	S 35, T 9N, R 9E
49	3/22/72	30		W. Fk. Flagstaff	S 25, T 9N, R 9E

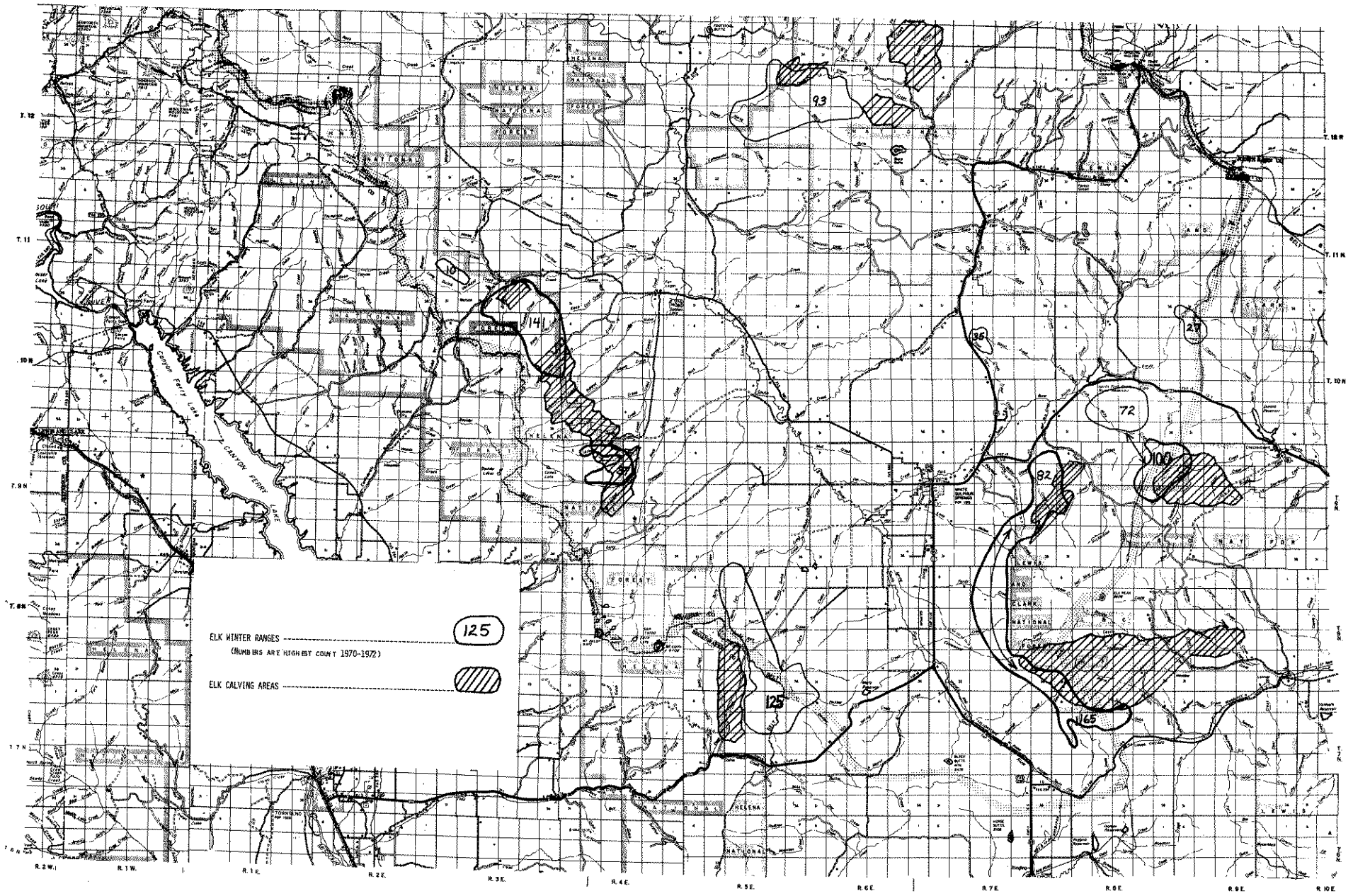


Figure 1. Elk wintering and calving areas.

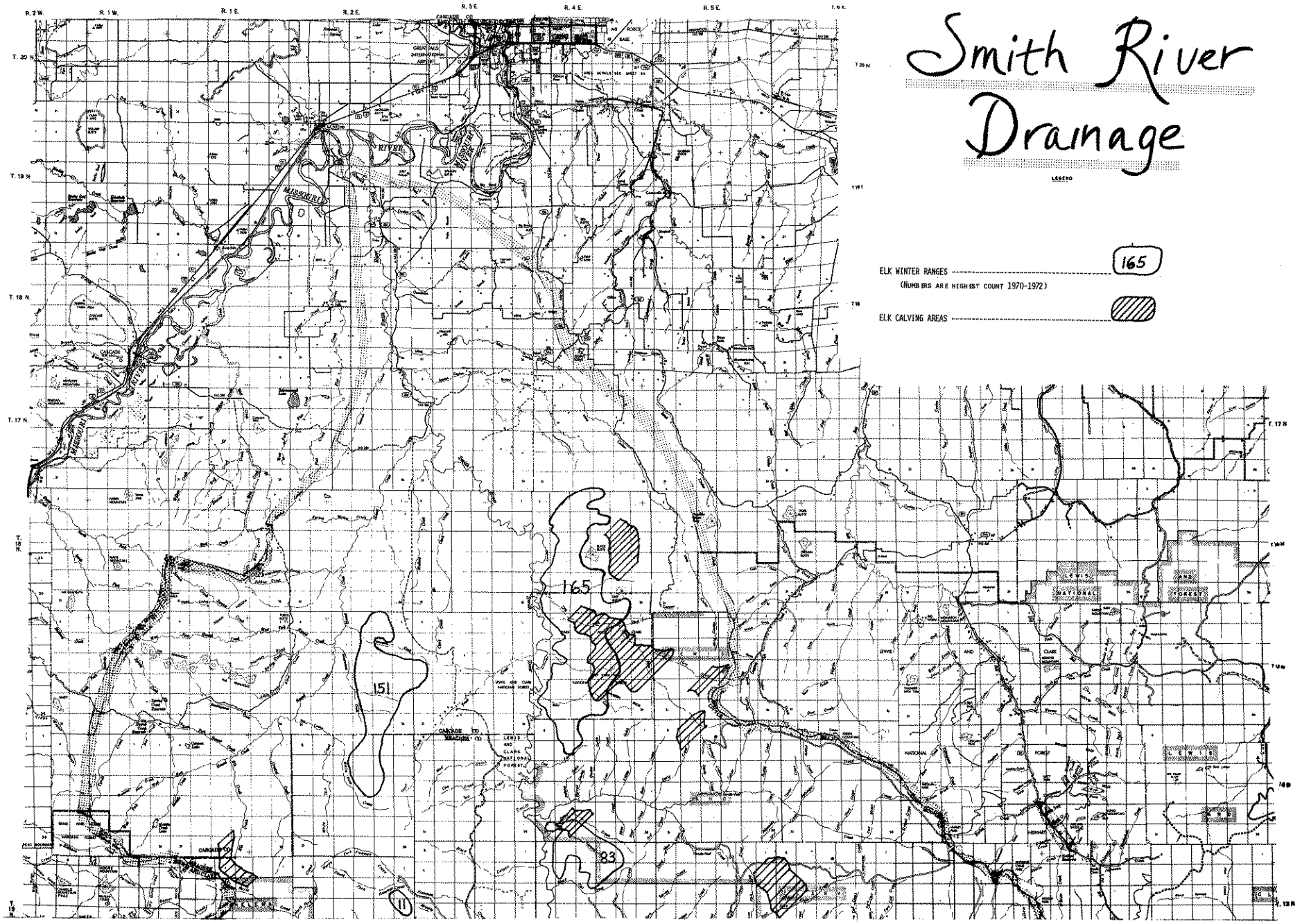


Figure 2. Elk wintering and calving areas.

Castle Mountains. The Castle Mountains (hunting unit No. 49) have about 275 elk wintering within the study area boundaries (Figure 2). Additional observations have determined that there are two major herds. There is the Fivemile-Hall Creek herd which is made up of elk wintering east of Fourmile Creek around Fivemile Creek, Hall Creek and Checkerboard Creek. These elk probably break up into several small groups and also consolidate throughout the winter. There were 72 elk counted in 1972 in this area, compared to 56 in 1971 and 100 in 1970. The other major wintering area is a narrow belt that extends from Fourmile Creek to the head of the South Fork of the Smith River (Figure 2). This herd has two fairly distinct groups, one that usually remains in the Willow Creek-Fourmile Creek area and the other group that remains around the Agate Creek area. However, these two herds move into the Fords Creek-Cottonwood Creek area and probably intermingle during mild winters. This Fourmile-South Fork herd had poor reproduction in 1972, only 20 calves per 100 cows (Table 4). The Fivemile Creek-Hall Creek herd had good reproduction, 42 calves per 100 cows (Table 4).

There is some evidence that elk may move between the north end of the Crazy Mountains and the southwest end of the Castle Mountains. The extent of movement or effect on the Castle Mountains winter range was not quantified or even verified.

Big Belt Mountains, East Side. Within the study area the Big Belt Mountains have three major wintering elk herds (Figures 1 and 2). A minimum of 417 elk was observed in these herds during the winter of 1971-72. They were distributed as follows: Government Creek - 151, Benton Gulch-Keep Cool Creek - 141, and Smith River-Deep Creek Divide - 125. Each herd increased in size from the 1971 winter census. Winter reproduction figures were only obtained for the Benton Gulch-Keep Cool Creek herd - 39 calves per 100 cows (Table 4). Poor flying conditions prevented classification of the other two herds.

In 1971-72 the Benton Gulch-Keep Cool Creek herd was again observed to have wintered together in the Benton Gulch area, as in 1970-71. Elk were observed wintering in the Atlantic Creek area, as in the winter of 1969-70.

The Smith River-Deep Creek Divide herd again increased in size, and it also wintered several miles north of its usual wintering area. This winter range was therefore enlarged (Figure 2). The mild winter may have let these elk range more freely.

Little Belt Mountains, West Side. Within the study area, the Little Belt Mountains have three major elk wintering ranges (Figures 1 and 2). In 1972 the count was: Butte Creek-Sheep Creek - 93 elk, Dry Canyon - 83, and Deep Creek Park-Black Butte - 161.

The Butte Creek-Sheep Creek herd (hunting unit No. 416) increased significantly for the second straight year to 93 elk. There were 71 in 1971 and 52 in 1970. However, reproduction in 1972 was only fair - 37 calves to 100 cows (Table 4).

Table 4. *Elk and deer classification by area, winters 1970, 1971 and 1972.

Date	Species	Classification	Total No. Class.	Reproduction Ratio
		Hunting Unit 45		
1/19/70	Mule deer	434 adults, 252 fawns	686	58 fawns/100 adults
4/ 2/70	Mule deer	454 adults, 179 fawns	633	39 fawns/100 adults
1971	Mule deer	500 adults, 292 fawns	792	58 fawns/100 adults
1972	Mule deer	111 adults, 53 fawns	164	48 fawns/100 adults
1970	White-tailed deer	19 adults, 24 fawns	43	126 fawns/100 adults
1971	White-tailed deer	17 adults, 9 fawns	26	53 fawns/100 adults
1970	Elk	17 bulls, 269 cows, 132 calves	418	49 calves/100 cows
1971	Elk	11 bulls, 396 cows, 106 calves	513	27 calves/100 cows
		Hunting Unit 46		
1970	Mule deer	289 adults, 181 fawns	470	63 fawns/100 adults
1971	Mule deer	197 adults, 119 fawns	316	60 fawns/100 adults
1972	Mule deer	142 adults, 53 fawns	195	37 fawns/100 adults
1972	White-tailed deer	31 adults, 17 fawns	48	55 fawns/100 adults
1970	Elk	18 bulls, 143 cows, 97 calves	258	68 calves/100 cows
1971	Elk	7 bulls, 103 cows, 44 calves	154	43 calves/100 cows
1972	Elk	8 bulls, 95 cows, 37 calves	140	39 calves/100 cows
		Hunting Unit 48		
1970	Mule deer	128 adults, 65 fawns	193	51 fawns/100 adults
1971	Mule deer	82 adults, 44 fawns	126	54 fawns/100 adults
1972	Mule deer	139 adults, 81 fawns	220	58 fawns/100 adults
1972	White-tailed deer	20 adults, 11 fawns	31	55 fawns/100 adults
1970	Elk	4 bulls, 25 cows, 20 calves	49	80 calves/100 cows
1971	Elk	2 bulls, 23 cows, 11 calves	36	48 calves/100 cows
1972	Elk (Summer 1971)	2 bulls, 30 cows, 15 calves	47	50 calves/100 cows
		Hunting Unit 49		
1970	Mule deer	328 adults, 101 fawns	429	31 fawns/100 adults
1971	Mule deer	34 adults, 14 fawns	48	41 fawns/100 adults
1972	Mule deer	101 adults, 50 fawns	181	50 fawns/100 adults
1970	Elk	9 bulls, 227 cows, 128 calves	364	56 calves/100 cows
1971	Elk	7 bulls, 180 cows, 47 calves	234	26 calves/100 cows
1972	Elk	10 bulls, 233 cows, 62 calves	305	27 calves/100 cows

Table 4 Continued. *Elk and deer classification by area, winters 1970, 1971 and 1972.

Date	Species	Classification	Total No. Class	Reproduction Ratio
		Hunting Unit 413		
1970	Mule deer	67 adults, 29 fawns	96	43 fawns/100 adults
1971	Mule deer	39 adults, 6 fawns	45	15 fawns/100 adults
1970	Elk	13 bulls, 36 cows, 23 calves	72	64 calves/100 cows
1971	Elk	29 bulls, 42 cows, 18 calves	89	43 calves/100 cows
1972	Elk	5 bulls, 65 cows, 33 calves	103	51 calves/100 cows
		Hunting Unit 414		
1970	Mule deer	16 adults, 10 fawns	26	63 fawns/100 adults
1971	Mule deer	51 adults, 32 fawns	83	63 fawns/100 adults
1972	Mule deer	85 adults, 48 fawns	133	56 fawns/100 adults
1972	White-tailed deer	77 adults, 16 cows	33	94 fawns/100 adults
1970	Elk	7 bulls, 45 cows, 29 calves	81	64 calves/100 cows
1971	Elk	7 bulls, 27 cows, 16 calves	50	59 calves/100 cows
1972	Elk	8 bulls, 32 cows, 18 calves	58	56 calves/100 cows
		Hunting Unit 416		
1970	Mule deer	158 adults, 95 fawns	253	60 fawns/100 adults
1971	Mule deer	165 adults, 76 fawns	241	46 fawns/100 adults
1972	Mule deer	69 adults, 35 fawns	104	51 fawns/100 adults
1970	Elk	11 bulls, 47 cows, 23 calves	81	49 calves/100 cows
1971	Elk	1 bull, 46 cows, 25 calves	72	54 calves/100 cows
1972	Elk	15 bulls,104 cows, 38 calves	157	37 calves/100 cows

*In some areas the same elk and deer were classified several times.

Reproduction in the Dry Canyon herd was 36 calves per 100 cows, down from excellent reproduction in 1971 and 1970 (Table 4). The Deep Creek Park-Black Butte wintering herd (hunting units No. 413 and 414) had a minimum number of 161 elk in 1972, 146 in 1971 and 165 in 1970. Reproduction was excellent - 53 calves per 100 cows for the combination of areas 413 and 414 (Table 4).

The small herd on Trout Creek (hunting unit No. 48) was not located during the winter of 1972. However, during the 1971 summer 47 elk - 30 cows, 15 calves and 2 bulls - were observed adjacent to the winter range. This may have been the Trout Creek herd.

Mule Deer and White-Tailed Deer

Several additional deer wintering areas were located by observations (Table 5), and were plotted on the deer winter range maps (Figures 3 and 4).

Most deer classification was done by ground observations, as poor flying weather all winter prevented a helicopter flight for classification or other aerial observations. Mule deer reproduction in 1972 (Table 4) ranged from poor to fair throughout the study area.

Moose

Considerable time was spent trying to locate moose in the Camas Creek-Birch Creek area (hunting unit No. 46). Poor flying conditions throughout most of the winter prevented constant surveillance and the only winter flight made located only three moose (Table 6). Hunters harvested only one bull out of five bull-only permits in 1971. No new additions were added to the plotted moose winter range (Figure 5).

Antelope

Continued observations (Table 6) of antelope during the 1971-72 winter added a few adjustments in antelope winter ranges or in maximum numbers of antelope observed on a given wintering area (Figures 6 and 7).

Mountain Goats

An aerial flight in July, 1971 (Table 6) failed to locate any sign of the original plant of 13 goats in June, 1970. Four goats, including one newborn kid, were observed on this flight in July, 1971 south of Duck Creek Pass. However, a second plant of five goats was made just a mile away in June, 1971, so it is highly likely that these goats were part of the second plant.

Mountain Sheep

A local rancher recently made a reliable report that he had observed three mountain sheep on Rimrock Ridge, south of Tenderfoot Creek, during the 1972 summer. This is probably a remnant of the old sheep plants in this general area, and also the only sightings of sheep reported at this time.

Table 5. Deer observations, winter 1972.

Date	Species	No. Obs.	Classification	Location	
12/19/71	Mule deer	6	3 does, 3 fawns	Smith River	S 31, T 11N, R 5E
12/20/71	White-tailed deer	6	2 does, 2 fawns, 2 bucks	N. Fk. Smith R.	S 4, T 9N, R 7E
1/13/71	Mule deer	64			S 4&5, T 7N, R 7E
1/17/71	Mule deer	4	2 does, 2 fawns	Newlan Creek	S 20, T 10N, R 6E
1/17/71	Mule deer	4	2 does, 2 fawns	Newlan Creek	S 11, T 10N, R 6E
1/17/71	Mule deer	5	2 does, 3 fawns	Newlan Creek	S 1, T 10N, R 6E
1/17/71	Mule deer	29	6 does, 4 fawns, 1 buck, 18 uncl.	Trout Creek	S 22, T 10N, R 7E
1/18/72	Mule deer	4	3 does, 1 fawn	F & G Fishing Access, Ft. Logan	
1/18/72	Mule deer	3	2 does, 1 fawn	F & G Fishing Access, Ft. Logan	
1/18/72	Mule deer	2	1 doe, 1 fawn	F & G Fishing Access, Ft. Logan	
1/18/72	Mule deer	11	6 does, 4 fawns, 1 buck		S 35, T 10N, R 7E
1/19/72	Mule deer	2	1 fawn, 1 buck		S 30, T 8N, R 7E
1/19/72	Mule deer	7	5 does, 2 fawns		S 16, T 10N, R 6E
1/19/72	Mule deer	20	14 does, 6 fawns		S 16, T 10N, R 6E
1/19/72	Mule deer	3	2 does, 1 fawn		S 11, T 10N, R 6E
1/19/72	Mule deer	7	4 does, 3 fawns		S 31, T 11N, R 7E
1/19/72	Mule deer	11	6 does, 5 fawns		S 5, T 10N, R 7E
1/19/72	Mule deer	16	10 does, 6 fawns		S 4, T 10N, R 7E
1/19/72	Mule deer	8	5 does, 3 fawns		S 15, T 10N, R 7E
1/19/72	Mule deer	63	unclassified		S 22, T 10N, R 7E
1/19/72	Mule deer	21	12 does, 8 fawns, 1 buck		S 27, T 10N, R 7E
1/19/72	White-tailed deer	5	3 does, 2 fawns		S 34, T 10N, R 7E
1/22/72	Mule deer	3	bucks		S 12, T 10N, R 6E
1/22/72	Mule deer	5	3 does, 2 fawns		S 22, T 10N, R 7E
1/22/72	White-tailed deer	3	2 does, 1 fawn		S 34, T 10N, R 7E
1/26/72	Mule deer	5	3 does, 2 fawns		S 22, T 10N, R 7E
2/1/72	Mule deer	10	5 does, 5 fawns		S 30, T 11N, R 4E
2/1/72	Mule deer	34	21 does, 9 fawns, 4 bucks		S 28, T 11N, R 4E
2/1/72	Mule deer	11	6 does, 5 fawns		S 32, T 11N, R 5E
2/1/72	White-tailed deer	10	5 does, 5 fawns		S 4, T 9N, R 7E
2/1/72	Mule deer	4	2 does, 1 fawn, 1 buck		S 16, T 11N, R 7E
2/1/72	Mule deer	25	15 does, 10 fawns		S 32, T 11N, R 7E
2/1/72	Mule deer	13	8 does, 5 fawns		S 19, T 10N, R 8E
2/2/72	White-tailed deer	3	does		S 34, T 10N, R 7E
2/2/72	Mule deer	11	9 adults, 2 fawns	Eagle Creek	S 36, T 13N, R 4E
2/2/72	Mule deer	60	49 adults, 11 fwn.	Keep Cool Creek	S 27, T 11N, R 4E
2/2/72	Mule deer	26	19 adults, 7 fawns	Keep Cool Creek	S 28, T 11N, R 4E
2/2/72	Mule deer	17	13 adults, 4 fawns	Thomas Creek	S 30, T 11N, R 4E

Table 5 Continued. Deer observations, winter 1972.

Date	Species	No. Obs.	Classification	Location	
2/2/72	Mule deer	18	14 adults, 4 fawns	Smith River	S 23, T 10N, R 5E
2/3/72	Mule deer	40	24 does, 15 fawns, 1 buck		S 32, T 11N, R 7E
2/3/72	Mule deer	10	7 does, 3 fawns		S 5, T 10N, R 7E
2/3/72	Mule deer	18	11 does, 6 fawns, 1 buck		S 27, T 10N, R 7E
2/3/72	White-tailed deer	8	5 does, 3 fawns		S 27, T 10N, R 7E
2/7/72	Mule deer	39	23 does, 11 fawns, 5 bucks		S 29, T 8N, R 7E
2/7/72	Mule deer	34	unclassified		S 32, T 8N, R 7E
2/7/72	Mule deer	4	2 does, 2 fawns		S 12, T 9N, R 5E
2/9/72	Mule deer	35	23 does, 12 fawns		S 28, T 11N, R 4E
2/9/72	Mule deer	17	9 does, 7 fawns, 1 buck		S 2, T 9N, R 7E
2/10/72	Mule deer	36	unclassified		S 4, T 7N, R 7E
2/15/72	Mule deer	80	51 does, 27 fawns, 2 bucks		S 36, T 8N, R 8E
2/24/72	White-tailed deer	44	29 adults, 15 fawns	Big Birch Cr.	S 11, T 9N, R 5E
3/2/72	Mule deer	21	16 adults, 5 fawns	Ming Coulee	S 25, T 17N, R 4E

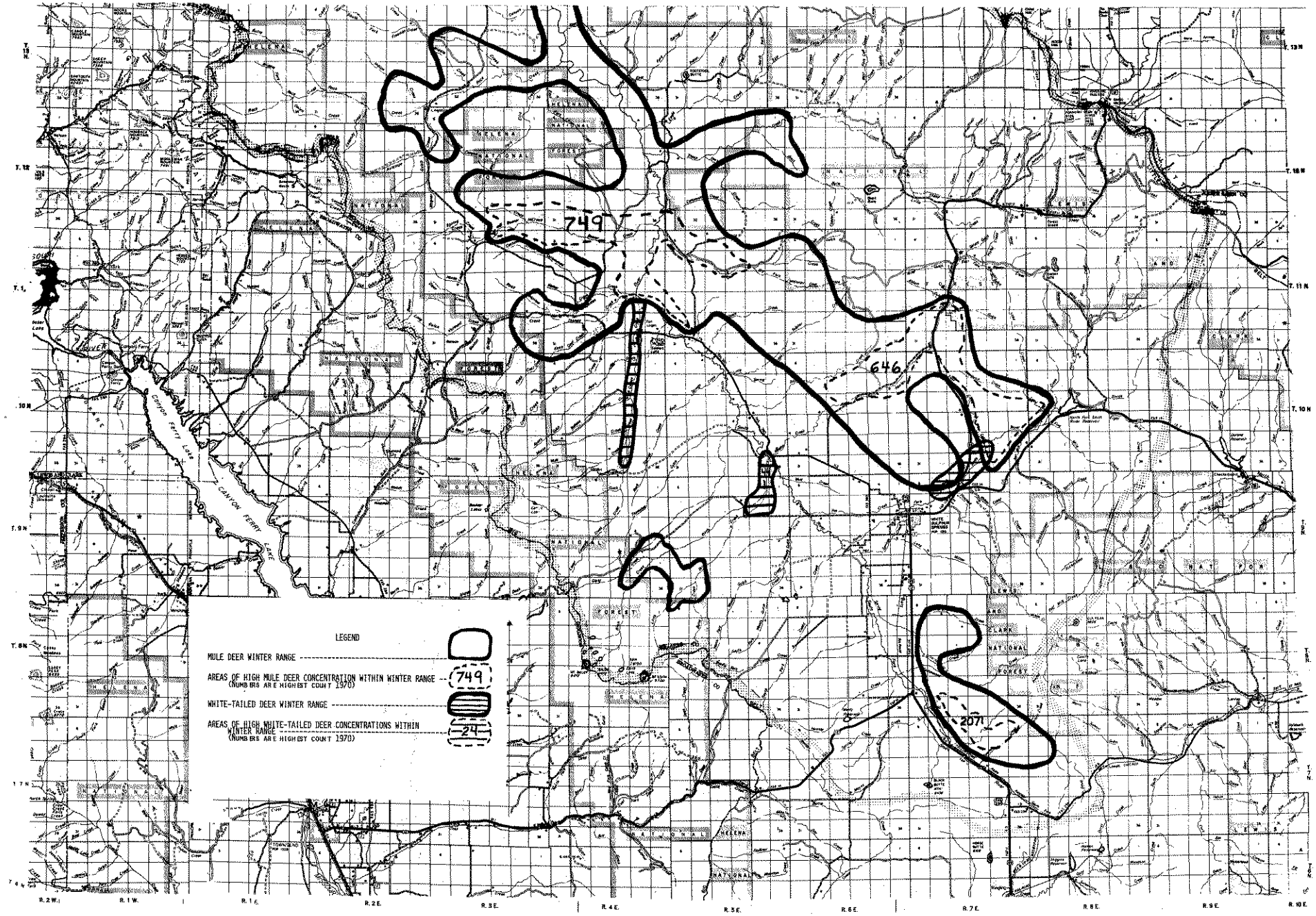


Figure 3. Mule deer and white-tailed deer wintering areas.

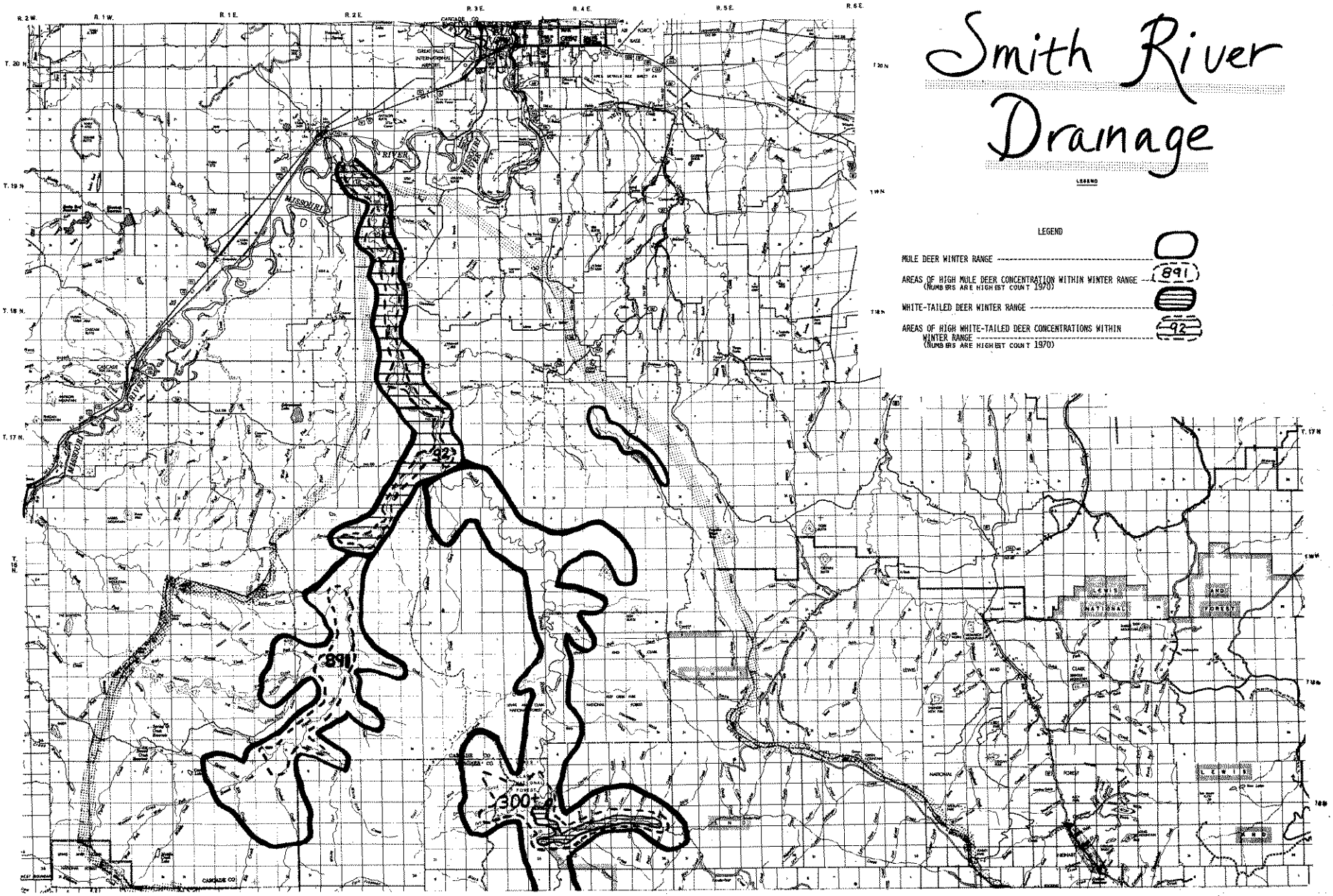


Figure 4. Mule deer and white-tailed deer wintering areas.

Table 6. Observations of mountain goats, moose, bear and antelope, July 1971 - June 1972.

Hunting Unit	Date	Species Observed	No. Obs.	Classification	Location	
46	7/26/71	Mt. goat	4	3 adults, 1 kid	Birch Creek	S 9, T 8N, R 4E
455	7/26/71	Mt. goat	2	2 adults	Willow Mountain	S10, T13N, R 2W
455	7/26/71	Mt. goat	8	5 adults, 3 kids	Slip Gulch	S11, T13N, R 2W
455	7/26/71	Mt. goat	4	2 adults, 2 kids	Candle Gulch	N½S12, T13N, R 2W
455	7/26/71	Mt. goat	10	7 adults, 3 kids	Candle Gulch	S½S12, T13N, R 2W
46	3/20/72	Moose	1	Cow	Big Birch Creek	S35, T9N, R 4E
46	3/20/72	Moose	1	Unclassified	Little Birch Cr.	S 6, T 8N, R 5E
46	3/20/72	Moose	1	Cow	Thompson Gulch	S14, T 9N, R 4E
48	9/ 9/71	Bear	1	Unclassified	Ranch Creek	S17, T12N, R 8E
48	9/ 9/71	Bear	1	Unclassified	Bonine Creek	S21, T12N, R 8E
490	12/ 2/71	Antelope	17	Unclassified	Fourmile Creek	S31, T10N, R 8E
490	12/ 2/71	Antelope	33	Unclassified	N. Fk. Smith R.	S35, T10N, R 7E
490	12/ 2/71	Antelope	98	Unclassified	Battle Creek	S33, T 7N, R 6E
490	12/20/71	Antelope	50	Unclassified		S 2, T 9N, R 6E
490	1/16/72	Antelope	67	Unclassified		S 3, T 9N, R 7E
490	1/18/72	Antelope	36	Unclassified		S23, T10N, R 5E
490	1/18/72	Antelope	53	Unclassified		S35, T10N, R 7E
490	1/19/72	Antelope	48	Unclassified		S 3, T 9N, R 7E
490	1/22/72	Antelope	77	Unclassified		S 3, T 9N, R 7E
490	1/26/72	Antelope	48	Unclassified		S31, T10N, R 8E
490	2/ 1/72	Antelope	72	Unclassified		S26, T10N, R 6E
450	2/ 3/72	Antelope	23	Unclassified		S34, T18N, R 2E
490	2/ 7/72	Antelope	75	Unclassified		S35, T10N, R 7E
490	2/ 7/72	Antelope	50	Unclassified		S 1, T 9N, R 6E
490	2/ 9/72	Antelope	28	Unclassified		S23, T10N, R 5E
490	2/ 9/72	Antelope	34	Unclassified		S14, T10N, R 5E
490	2/15/72	Antelope	27	Unclassified		S19, T 8N, R 6E
450	3/ 1/72	Antelope	31	Unclassified		S18, T15N, R 2E

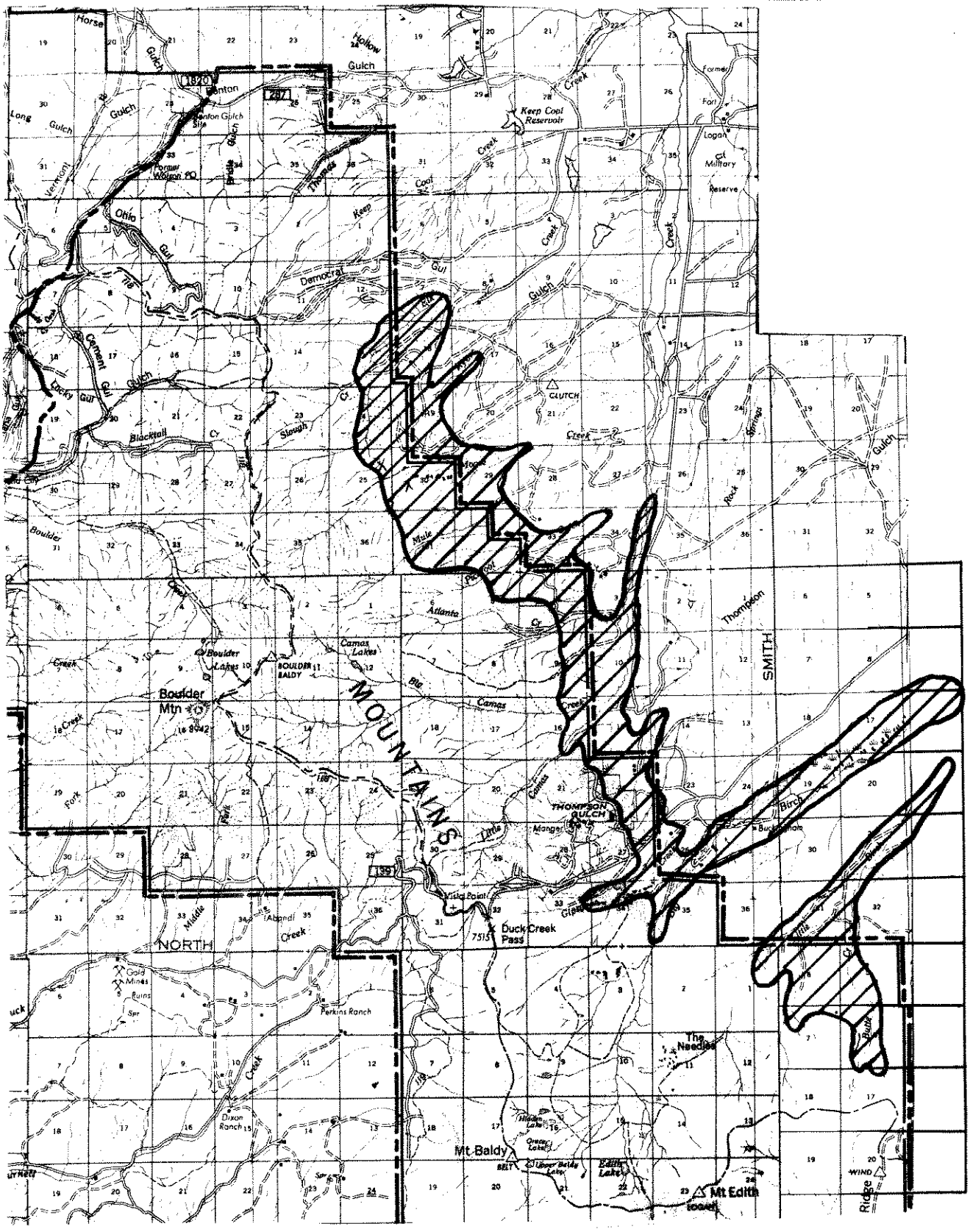


Figure 5. Moose winter range, Smith River drainage.

Moose winter range -

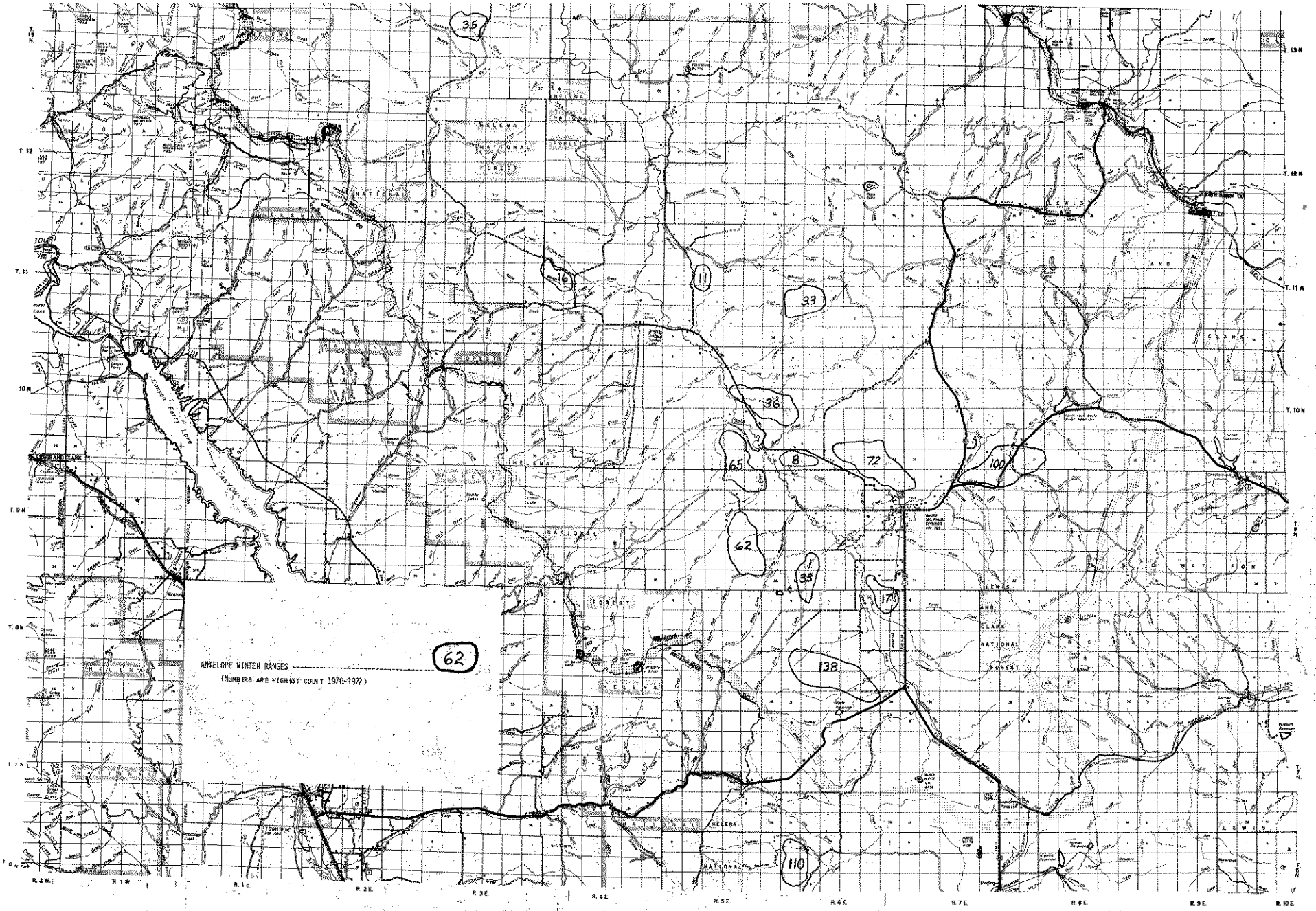


Figure 6. Antelope winter range.

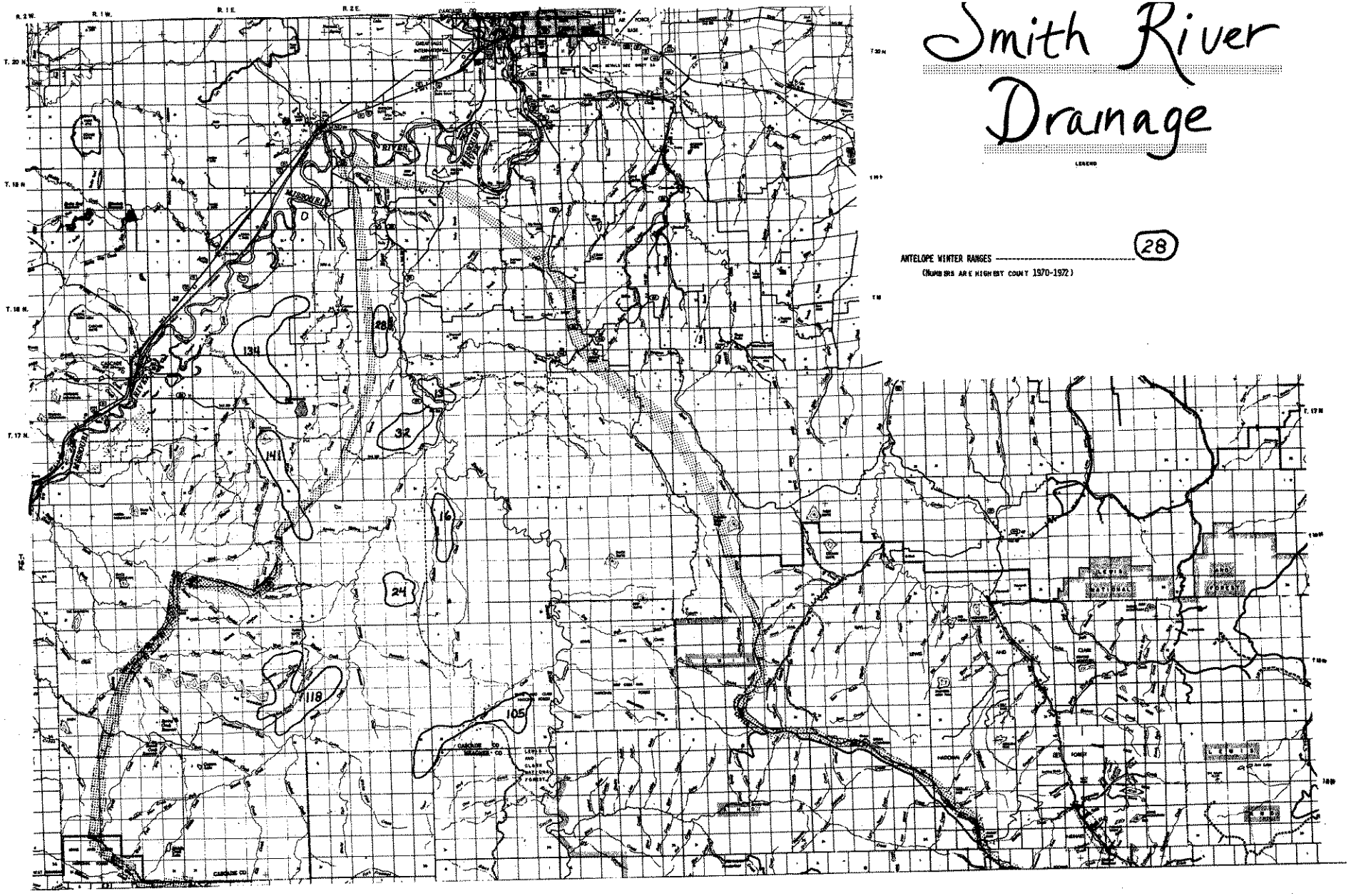


Figure 7. Antelope winter range.

Summary and Discussion

Elk

Castle Mountains. These elk are in very poor condition. Reproduction was only 26 calves per 100 cows in 1971 and 27 calves in 1972. Observations of hunter-killed elk and wintering elk reveal that some elk are of small body stature. Census figures also indicate a possible downward trend in numbers.

The Castle Mountains elk wintering areas within the study area are in poor condition. This was confirmed by observations and transects. The range is heavily overgrazed by domestic livestock and elk. There are about 100 semiwild horses throughout the winter ranges, most of them on a yearlong basis. These horses also trespass on the national forest, as the forest boundary is not completely fenced.

Approximately 85 percent of the elk winter range is private land, 10 percent is national forest and 5 percent is state land. The small amount of public land makes the public land more important. Critical land parcels are as follows: state land - Section 36, T 8N, R 7E has heavy elk use; state Section 16, T 8N, R 7E is along the lower edge of the winter range and has some use; however, use may increase if more forage were left for elk. National forest - Section 6, T 7N, R 8E has heavy elk use, as it provides both food and cover; national forest Sections 24 and 26, T 9N, R 7E and Section 18, T 9N, R 8E are used by wintering elk, especially during mild winters. The national forest and state will have to manage these lands on a multiuse program that will provide forage for the elk. The national forest should fence the part of the forest boundary not fenced, as it allows free access to free ranging semiwild horses on a yearlong basis. Other public agencies such as the Soil Conservation Service and Agricultural Stabilization and Conservation Service should be encouraged to work with the involved private land land owners to develop better grazing systems, and these public servants should remember that elk must share and benefit from any program they initiate or fund.

There is some private logging being carried out. Logging on Section 25, T 8N, R 7E will have a detrimental effect on elk, as this is partly winter range and it is elk calving range. One way to prevent adverse land practices on private lands is to purchase these lands, if available, and convert them to game management areas. Primary areas that should be purchased, should the occasion arise, are Sections 3, 10, 11, 15, 22, 26 and 36, T 8N, R 7E - Sections 4, 5, 7, N½ Sections 8 and 9, T 7N, R 8E - Sections 1, 12 and 13, T 9N, R 7E - and Sections 21, 22, 27, 28 and 29, T 10N, R 8E. At this time the Manger Ranch, which includes several of the above-named sections, is for sale.

The national forest should not select any logging projects which conflict with elk calving areas (Figure 2) without consultation with the Department of Fish and Game. The national forest should acquire right-of-way in the Castle Mountains, as large segments of the forest are unavailable to the public. There is no public right-of-way from Fourmile Creek on the north side of the Castle Mountains down the west side to Alabaugh Creek on the south side, a distance of about 37 miles by highway.

Big Belt Mountains. The Government Creek herd is the largest of the three herds associated with the Big Belt Mountains within the study area (Figure 1). This herd has a winter range which is about 75 percent private lands and 25 percent state lands. From a management standpoint this is nearly the same as 100 percent private ownership. This herd also summers in an area that is primarily private land.

The major summer range, Rock Creek drainage, is semiopen country with patches of timber. The major private landowner in this summering area has leased the timber rights on 57 sections. Operations were scheduled to start in 1972, and may last 10 years. How much timber will be removed cannot be determined, but it could be a high percentage of the total timber cover in the area. There are several isolated national forest lands in this area, and since there will be extensive logging on the adjacent private lands, the national forest should not cut any timber on their lands. These lands are Sections 14, 15, 20, 22 and 24, T 13N, R 1E. This timber may be needed for cover for this elk herd.

This elk herd is almost completely unavailable to the general public, except for some trespassing citizens that hunt the upper Rock Creek area. Unless the private landowners open this area to public use, this elk herd will contribute little to public recreation. This is an ideal area where a landowner could be compensated for allowing hunting on his ranch. The state should consider fee hunting here.

Several state-owned sections are important parts of the winter range. These are Sections 14, 26 and 34, T 15N, R 2E and Sections 2 and 10, T 14N, R 2E. These sections must be managed on a multiuse basis which includes considerations for wildlife.

Since this elk herd is almost completely dependent on private landowners, the entire herd could disappear if involved landowners were to initiate detrimental land use practices such as livestock overgrazing.

The Benton Gulch-Keep Cool Creek herd winter range is about 61 percent private lands and 39 percent national forest. This winter range is the only major one on the east side of the Big Belt Mountains that has a large percentage of public ownership. The public land comprising part of this winter range could be the only remaining elk wintering area on the east side of the Big Belts if private landowners were to initiate land use practices that eliminated the elk herds on Government Creek and the Deep Creek-Smith River divide. Therefore, the Forest Service must manage its portion of this elk winter range with elk as their primary consideration. National forest lands are in Sections 34, 35 and 36, T 11N, R 3E and Section 3, T 10N, R 3E. Parts of Section 35, T 11N, R 3E are suffering from overgrazing, and this practice must be eliminated. The above-mentioned lands provide forage and cover, and they are used for elk calving in the spring.

A major impact on this elk herd would result from large scale logging operations in the area from Elk Creek to Big Birch Creek. The original plan of the Forest Service included extensive logging and construction of a major high-quality road between Duck Creek and Blacktail Creek. This road will traverse the major

part of the relatively undisturbed summer range. At present, the Forest Service with the cooperation of the Department of Fish and Game, is carrying on a special study to reevaluate resource management in this entire area.

Fish and Game recommendations are that the through road should not be constructed. Any and all roads connected with logging operations should be closed upon completion of logging. There should not be any logging along the edge of the forest bordering the valley bottoms. There should not be any logging in calving or elk winter range areas (Figures 1 and 2). Some private landowners have logged patches of timber on their lands adjacent to the open valley floor. There is the possibility that these private lands will be more extensively logged; therefore, the Forest Service must consider this possibility when it plans logging operations adjacent to these areas.

Right-of-way is badly needed between U. S. Highway 12 and Benton Gulch. Only the Duck Creek Pass road provides access to the forest in this large block of country. This area was once the site of numerous mining operations, but now there is only one operation active. It should have little effect on elk.

The Smith River-Deep Creek Divide elk herd of 125+ animals exists on a severely overgrazed winter range which straddles the Smith River-Deep Creek (tributary of the Missouri River) Divide (Figure 2). During the mild winter of 1972 this herd moved about four or five miles north from where it usually winters.

Approximately 87 percent of this winter range is private land and 13 percent is state land. The primary state lands on this winter range are the NE$\frac{1}{4}$ of Section 26 and Section 36, T 8N, R 5E.

Livestock overgrazing is the primary problem facing the winter range of this elk herd. Cattle overgraze this area and horses are also present most of the year. The horses compete directly with the elk in the wintertime by grazing the same windblown ridges.

Another problem is that the identified calving grounds (Figure 2) are also on private land. The primary area is a long, timber-covered ridge. This ridge has been lightly logged in the past, and if logging operations were to return and remove large blocks of timber, it could destroy these calving grounds.

The future of an elk herd such as this one is doubtful. Any increase in grazing pressure or a large logging operation could have an extremely detrimental effect. The state land involved is a small area, but it must be managed with elk in mind.

Little Belt Mountains (West Slope). The Butte Creek-Sheep Creek herd has increased significantly each year of the study. This may be caused by local ranchers providing increased protection for the elk during the hunting season. They are not allowing as many hunters as they once did. Public access is very difficult, thus allowing this manipulation.

This winter range is 62 percent private lands and 37 percent national forest. The forest land is arranged in checkerboard design throughout the winter range.

National forest lands located in Sections 6, 8, 16 and 18, T 12N, R 6E and Sections 2, 12 and 14, T 12N, R 5E are very valuable as elk winter range. The Forest Service has fenced their land, and they manage it separately from the adjacent private lands over which they have no control. The above-mentioned critical sections must have a very good multiuse management program if the elk are to be provided with sufficient forage.

Access into these checkerboard national forest sections is very poor. The Forest Service should either consolidate their holdings with access to them, or formulate a management program which includes surrounding private lands and which will also provide public access. Overprotection of those elk could also lead to overgrazing by elk on national forest lands. Under present conditions these national forest lands are nothing more than grazing lands and recreational playgrounds for surrounding landowners.

Part of this herd's summering area, Moose Creek and vicinity, has had extensive logging operations since the late 1940's. A large percentage of the contracts sold in the late 1940's have not yet been cut. Thus this area will continue to be logged under the old contracts, which had few environmental protection clauses. However, the Forest Service is attempting to negotiate these old contracts to a certain extent. Somehow these contracts must be adjusted to a point where environmental guards are included. Three years of aerial and ground observations found elk using only the remaining timber and natural openings surrounding the many clearcuts in the area. The additional logging will not improve the elk habitat remaining in this area.

Deep Creek Park- Black Butte. This wintering area has two relatively stable elk herds, one herd wintering north of Deep Creek and the other herd south of Deep Creek (Figure 1). There is probably a fair amount of movement back and forth between herds. There is also some movement across the Smith River during severe winter conditions.

This winter range area is comprised of more public land than any other in the Smith River drainage; therefore, it is the primary one in terms of public agencies managing a winter range for the benefit of elk. The Forest Service controls approximately 58 percent of the winter range, the Bureau of Land Management 5 percent, state 2 percent and private landowners only 35 percent. However, the major private land parcel in the winter range, Deep Creek Park, receives heavy elk use on nearly an annual basis.

Since Forest Service lands comprise the bulk of this winter range, it is very important that the Forest Service does an excellent job of managing their resource on a strong multiuse basis. Their management program should include the private lands at Deep Creek Park.

Recently the Forest Service initiated a much better grazing management program which includes the private lands at Deep Creek Park. However, this program will not reach its potential until more fencing and water development are completed. Then a several-pasture, rest-rotation grazing system can be operated. This more intensive grazing management system should be beneficial to elk if it improves range conditions.

The Forest Service should divert wildlife funds into these range improvements, if possible, since the sooner these improvements are completed, the sooner a good grazing system which will be beneficial to wildlife can start.

Several years ago the Forest Service began studying the possibility of starting large-scale logging operations in the Upper Tenderfoot drainage, which is the summer range for many of the Deep Creek Park-Black Butte winter range elk. A controversy developed, and the Forest Service placed this area into a special study to better determine all the possible effects of a logging operation in this area.

Investigations in this area during the last three years have established that this is an important summer elk range and that the natural openings are very important to these elk. This relatively undisturbed block of timber and rugged land features also provides maximum security for these elk during hunting seasons. The results can be seen in the large number of large, mature bull elk that are found in this area.

It is recommended that only small-scale logging operations, if any, should be attempted in this area. The clearcuts should be of small size and all natural openings in any sale should be left with borders of timber surrounding them. All roads should be destroyed upon completion of logging operations. The size of clearcuts and the allowable amount of logging will be determined by the results of the Forest Service-Fish and Game Elk Logging Study.

The private lands in Deep Creek Park should be considered as a prime elk winter range parcel for purchase by the Department of Fish and Game if they should become available. These lands receive heavy elk use, and they are centered in the middle of prime winter range.

Mule Deer and White-Tailed Deer

Mule deer are found throughout the Smith River drainage. White-tailed deer are primarily found in the major river and creek bottoms and in the higher mountains of the Tenderfoot Creek drainage. In the fall deer at high elevations must migrate down to lower elevation wintering areas. Nearly all deer winter below the 6,000 foot elevation. There are approximately 242,000 acres of primary deer winter range which comprise approximately 18 percent of the entire drainage. This concentration of deer during the winter produced a detrimental impact on the range as the food supply was overgrazed. With destruction of the range came a reduction of herd size accomplished by low reproduction rates and poor winter survival.

Since deer disperse throughout the area in the summer, there doesn't seem to be a shortage of summer range. Spring surveys indicated that deer scatter throughout the drainage to have fawns; therefore, no areas of fawning concentration were located.

Within the study area there is a primary mule deer wintering area along the southwest corner and west side of the Castle Mountains (Figure 4). It is essentially private land except for state land Sections 16, T 8N, R 7E and parts of Sections 4 and 10, T 7N, R 7E. The entire winter range is severely overgrazed by livestock. Deer forage is being destroyed, since there is a trend in this area to remove sagebrush and plant grains. Deer reproduction has only been poor to fair for many years. This deer herd has a dismal future (similar to the elk herd) unless there is a change in range management.

Public access is nearly nonexistent; consequently it is difficult to harvest many of these deer.

The small private logging operations, as mentioned in the elk section, will also have a detrimental effect on deer, as much of the scattered timber stands adjacent to the national forest boundary are excellent deer habitat.

There is a small mule deer wintering area on Big Birch and Little Birch Creeks along the south end of the Big Belt Mountains (Figure 4). Because of the small amount of browse it is probably a marginal deer winter range.

The largest deer winter range (Figures 3 and 4) begins just northeast of White Sulphur Springs and extends northwesterly to the Smith River. It continues along both sides of the Smith River in a northerly direction to the mouth of the Smith River. This winter range also extends, for varying distances, up the following major Smith River tributaries: Birch, Camas, Sheep, Rock, Tenderfoot, Newlan and Hound Creeks. This winter range is the backbone of the Smith River drainage deer herd. Destruction of this winter range would drastically reduce the total deer population.

This winter range is approximately 85 percent private, 7 percent state, 7 percent national forest and 1 percent Bureau of Land Management land. Livestock grazing is a major land use on the winter range. Other uses are raising hay, alfalfa and grains. Every year landowners are putting more land into cultivation. Much of this cultivation is accompanied by the removal of willows, sagebrush and other shrubs. Part of this winter range is in a rain shadow, and consequently the Fort Logan area has an average annual precipitation of only about 10½ inches. Therefore, vegetation is very slow to recover from any abuse such as livestock and wildlife overgrazing or aborted cultivation projects.

Examination of this winter range by section will reveal the various habitats and identify various problems. Starting at the mouth, approximately the first 15 miles of the Smith's riverbottom supports primarily a white-tailed deer population. This bottom is a mosaic of grain, hay and alfalfa fields, pasture, woodlands and blocks of willows and other shrubs. The present trend is to clear the remaining woodlands, willows and other brush patches and cultivate or pasture these cleared areas. This removal of cover and food will reduce this deer population. In managing these state lands, Section 16, T 19N, R 2E; Section 36, T 18N, R 2E; and Section 36, T 17N, R 2E, the needs of wildlife must be considered. When state leases are up for renewal they should be rewritten to protect the wildlife resource and also allow public access in this area.

A very large deer population winters within the Hound Creek drainage (Figure 3). This area is all privately controlled, although a large part is state land. At times limited public deer hunting is allowed; however, it depends on permission from landowners. The land use most influential to this deer herd is probably overgrazing by livestock and deer. Therefore, the management of the large amount of state land which is primarily leased for livestock grazing in this area is critical to wildlife. The State Land Board should require lessees to manage these lands with wildlife as one of the major users, and also require the lessees to allow hunting and trespass. Where state lands are part of a critical wildlife habitat, they must be properly managed with wildlife as one of the primary users. This would provide a buffer that could prevent the possibility of total habitat destruction by some action of the private landowner. State lands that are involved are as follows: Section 16, T 16N, R 2E; Section 8, 20, 22, 28, 30, 32, T 15N, R 2E; Section 26, 36, T 15N, R 1E; Section 2, 5, 10, 12, 14, T 14N, R 1E. Also the Bureau of Land Management has some deer winter range in Section 8, 28, 30, T 16N, R 4E.

The Smith River has formed a deep, rugged canyon along most of the stretch of river between the point where Hound Creek enters the Smith River and the point where Eagle Creek enters the Smith (Figure 4). This part of the deer winter range is a rugged, isolated area of steep conifer-covered hills. Most of this canyon receives little livestock use as it is usually too rugged. However, another problem is developing in this area. Along the west side of the Smith River there is active development of cabin sites and recreational areas as the Smith River provides excellent scenery, fishing and hunting. Ranchers are subdividing their lands into lots and selling these lots as cabin sites. The associated roads and people are reducing the amount of winter range habitat. This practice will probably increase significantly in the near future.

State lands involved in this section of deer winter range are: Sections 16 and 36, T 14N, R 3E and Section 36, T 15N, R 3E - also, all of the national forest lands within the outlined deer winter range (Figures 3 and 4). The Forest Service can help deer management in this area by considering it a part of a multiuse management program and insuring that livestock do not overgraze deer winter range.

Deer winter range extends up Rock Creek, Sheep Creek, Beaver Creek and Benton Gulch. All areas appear to be heavily overgrazed by livestock and in poor condition. Also, deer have overgrazed their browse in many areas. This is a low precipitation area and recovery will be slow. There are some state lands, national forest and Bureau of Land Management lands in this segment. They are as follows: Bureau of Land Management - Sections 26 and 34, T 12N, R 3E; Section 10, T 12N, R 5E and Section 34, T 13N, R 4E. National forest - Sections 26, 35, 36, T 11N, R 3E; Sections 6 and 18, T 12N, R 6E; Sections 2, 12, 14, T 12N, R 5E; Sections 10 and 20, T 12N, R 4E and Sections 20, 22, 24 T 12N, R 3E. State lands - Sections 2, 4, 5, 10, 16, 25, T 11N, R 4E; Section 36, T 12N, R 3E; Section 36, T 12N, R 4E. These agencies should manage the above-mentioned lands with strong multiuse programs.

The last segment of the main deer winter range is the belt extending from the Smith River southeast to the North Fork of the Smith River (Figure 4). This segment has been severely overgrazed by livestock and deer. Deer winter kills have been recorded for many years on Newlan Creek as deer numbers have exceeded their available food supply. The state and national forests administer the following lands: National forest - Sections 6, 7, 8, T 11N, R 6E; Sections 20, 21, 28, T 11N, R 7E. State lands - Sections 6, 16, 20, T 11N, R 5E; Sections 20, and 36, T 11N, R 6E; Sections 28, 29, T 11N, R 7E; and Sections 16 and 36, T 10N, R 7E. This area has a large wintering deer population, but a poor winter range; thus proper management necessitates liberal deer harvests to prevent overgrazing by deer.

Camas Creek, Birch Creek and North Fork of Smith River bottoms support primarily wintering white-tailed deer. These bottoms are mainly willows and hay fields. During the winter livestock are pastured and fed on feed grounds in these bottoms. The concentrated livestock graze the brush and all other available vegetation in the winter. Ranchers continue to remove willows and other shrubs to develop more hay fields, thereby reducing deer habitat. Willow and other brush removal is not only detrimental to wildlife, but accelerates stream erosion. Local conservation agencies such as the Soil Conservation Service, Agricultural Stabilization and Conservation Service and county agents must be educated to avoid recommending these practices. Federal or state monies should not be used for cost-sharing in any program that removes brush in creek bottoms.

Mountain Goats

Thirteen goats were planted in June, 1970 in the Duck Creek Pass area, and five more were planted in the same area in June, 1971. An extensive survey in June, 1971 located only four goats including one kid. These were observed only a short distance from where the five goats were released only a few weeks previous to the observation. No goats or goat sign were observed in the planted area during the winter. Also, general observations during winter revealed little winter goat habitat on top of the Smith River-Missouri River divide from Duck Creek Pass to Windy Ridge. Surveys during the fall and hunter reports failed to reveal any goats. From all available information it seems that these goats have failed to establish themselves.

There is a large goat population approximately 40 miles to the north adjacent to this same divide. It seems probable that this established goat population would have expanded into the planted area if it were suitable.

There is a small goat population on Rock Slide Mountain at the head of the West Fork of Hound Creek. Several goats were observed in 1970, but subsequent aerial surveys failed to find any goats in this area. This population is probably small. This area appears to have only a limited amount of goat habitat; however, this area should have periodic goat surveys to determine if and when it may have a huntable population.

If goats are to be planted in the Smith River drainage, it is recommended that they be planted along the main Smith River at its junction with Rock Creek

or on the Deep Creek Fork of the Smith River. Most goat habitat is free from livestock grazing and logging because of its steep terrain.

Mountain Sheep

Eighteen mountain sheep were released on Sheep Creek in Meagher County in 1962. A reliable report of three mountain sheep on Rimrock Ridge was received during the summer of 1972. There were several mountain sheep plants just outside of the study area, but there are no other reports of mountain sheep being seen in the study area.

It is recommended that if mountain sheep are planted again in the Smith River drainage, they be planted on the Deep Creek Fork of the Smith River. This area has rugged, steep, grass-covered, south-facing slopes suitable for winter range, and it does not receive livestock use. These rugged areas may be used for summer range; however, there is higher country nearby that might provide summer range.

Bears

There have been no official sightings of grizzly bears in the study area. Black bears are scattered throughout the area. No work has been done to determine black bear populations or reproductive status. A few bears are killed by hunters and a few others are destroyed after they become marauders. Bears will probably remain at their present level unless there are large-scale land use changes on national forest lands.

Moose

Except for an occasional sighting, moose are only found in countable numbers in the southwest part of the study area from Antelope Creek south to Butte Creek (Figure 5). Poor flying conditions prevented an intensive survey of moose last winter. Only three moose were observed; however, sign indicated that others were missed. Last fall only one out of the five bull moose permit holders was successful and few moose were observed by the moose hunters. It now appears that this moose population may not be as high as first thought.

There definitely appears to be moose winter range that could be used by more moose. Nearly three quarters of the moose winter range is on private lands. Some of these private lands have been logged in recent years and more could easily be logged in the future. It is difficult to determine if the past logging in this area has been detrimental to moose, since there is little reliable past information. There is the possibility that moderate and selective logging may be beneficial to moose in this area.

The following public lands are important to moose management: national forest in Sections 4, 5, 9, 16, 26, 27, 34, T 9N, R 4E; Sections 31, 32, T 10N, R 4E; Section 4, T 10N, R 3E and state lands - Section 16, T 9N, R 5E.

At the present time there is a gold placer mining operation in Thompson Gulch. If this operation follows all regulations preventing water pollution, it will probably have little effect on the moose; however, improper mining and the resulting water pollution could destroy the downstream willow bottom which provides moose winter range.

Antelope

Most antelope work during the study was done in the winter, since regional personnel make regular summer distribution and population surveys. Antelope wintering areas are plotted in Figures 6 and 7.

Approximately 91 percent of the antelope winter range is on private lands and the remaining 9 percent is on state lands. Most of the state lands are small parcels scattered throughout the various antelope wintering areas. State Section 20, T 8N, R 6E is an important part of one antelope wintering area in the South Fork of the Smith River drainage. Since little public land is used by wintering antelope, an antelope population can quickly and drastically collapse when a private landowner enters into detrimental land use practices such as overgrazing, sagebrush removal, and/or weed spraying on any of these winter ranges.

Most of the winter range in the upper Smith River drainage is a sagebrush-grassland vegetation type, and sagebrush is being actively removed throughout this area. Extensive sagebrush removal was documented in the first annual Smith River completion report on upland birds. Sagebrush is the primary antelope winter food, and its removal can be disastrous for antelope on a sagebrush-grassland winter range. The antelope winter range on the lower drainage is primarily grassland interspersed with grain and hay fields. Overgrazing can be a detrimental practice on these areas, as would more extensive cultivation of native grasslands. The present trend is to put more lands into cultivation and to do more fencing. Sheep-tight fencing or four or more strand fences can limit antelope movement and major migrations. All fence building on public lands should be examined to determine if it will hinder antelope movement, especially in the North Fork of Smith River-Musselshell River divide area and the South Fork of the Smith River-Sixteen Mile Creek divide area.

Planning Recommendations

Elk

Castle Mountains

1. Prevent livestock overgrazing on state Section 36, T 8N, R 7E and national forest Section 6, T 7N, R 8E; Sections 24 and 26, T 9N, R 7E and Section 18, T 9N, R 8E.

2. Remove trespassing semiwild horses on national forest lands.

3. The Forest Service should purchase public right-of-way between Fourmile Creek and Alabaugh Creek.

4. Purchase winter range along west and north sides of Castle Mountains if lands are available for sale.

Big Belt Mountains (East Side)

1. The Forest Service should not log on Sections 14, 15, 20, 22 and 24, T 13N, R 1E.

2. Prevent livestock overgrazing on national forest sections 34, 35 and 36, T 11N, R 3E; Section 3, T 10N, R 3E and state Sections 36 and NE$\frac{1}{4}$ 26, T 8N, R 5E; Sections 14, 26, 34, T 15N, R 2E; Sections 2 and 10, T 14N, R 2E.

3. The Forest Service should not place a through road between Duck Creek and Benton Gulch.

4. The Forest Service should purchase more public right-of-way between U. S. Highway 12 and Benton Gulch.

Little Belt Mountains (West Side)

1. The Forest Service should prevent livestock overgrazing on Sections 6, 8, 16 and 18, T 12N, R 6E and Sections 2, 12 and 14, T 12N, R 5E and all national forest lands included in the Deep Creek Park-Black Butte elk winter range (Figure 1).

2. Deep Creek Park should be purchased for elk winter range, if available.

3. The Forest Service should get public right-of-way into the Sheep Creek checkerboard land pattern area.

4. The Forest Service should get environmental controls written into the old (1940's) unfinished logging contracts in the Moose Creek area.

5. Little or no logging should be done in the Tenderfoot Creek drainage.

Mule Deer and White-Tailed Deer

1. The following state lands should not be overgrazed by livestock and should have a strong multiuse management program: Section 16, T 8N, R 7E; Section 16, T 19N, R 2E; Section 36, T 18N, R 2E; Section 36, T 17N, R 2E; Section 16, T 16N, R 2E; Sections 8, 20, 22, 28, 30 and 32, T 15N, R 2E; Sections 26 and 36, T 15N, R 1E; Sections 2, 5, 10, 12 and 14, T 14N, R 1E; Sections 16 and 36, T 14N, R 3E; Section 36, T 15N, R 3E; Sections 2, 4, 5, 10, 16 and 25, T 11N, R 4E; Section 36, T 12N, R 3E; Section 36, T 12N, R 4E; Sections 6, 16 and 20, T 11N, R 5E; Sections 20 and 36, T 11N, R 6E; Sections 28 and 29, T 11N, R 7E; and Sections 16 and 36, T 10N, R 7E.

2. All national forest lands within the deer winter ranges (Figures 3 and 4) should not be overgrazed by livestock and should have deer as one of the primary users in a multiuse program.

3. The following Bureau of Land Management lands should have a strong multiuse program with deer as the primary user: Sections 8, 28 and 30, T 16N, R 4E; Sections 26 and 34, T 12N, R 3E; Section 10, T 12N, R 5E and Section 34, T 13N, R 4E.

Mountain Goats

1. Do not plant more goats in the Mount Edith-Duck Creek Pass area.

2. Best available unfilled goat habitat is Deep Creek Fork of the Smith River or along the main Smith River at its junction with Rock Creek.

Mountain Sheep

1. Best available unfilled mountain sheep habitat is on the Deep Creek Fork of the Smith River.

Moose

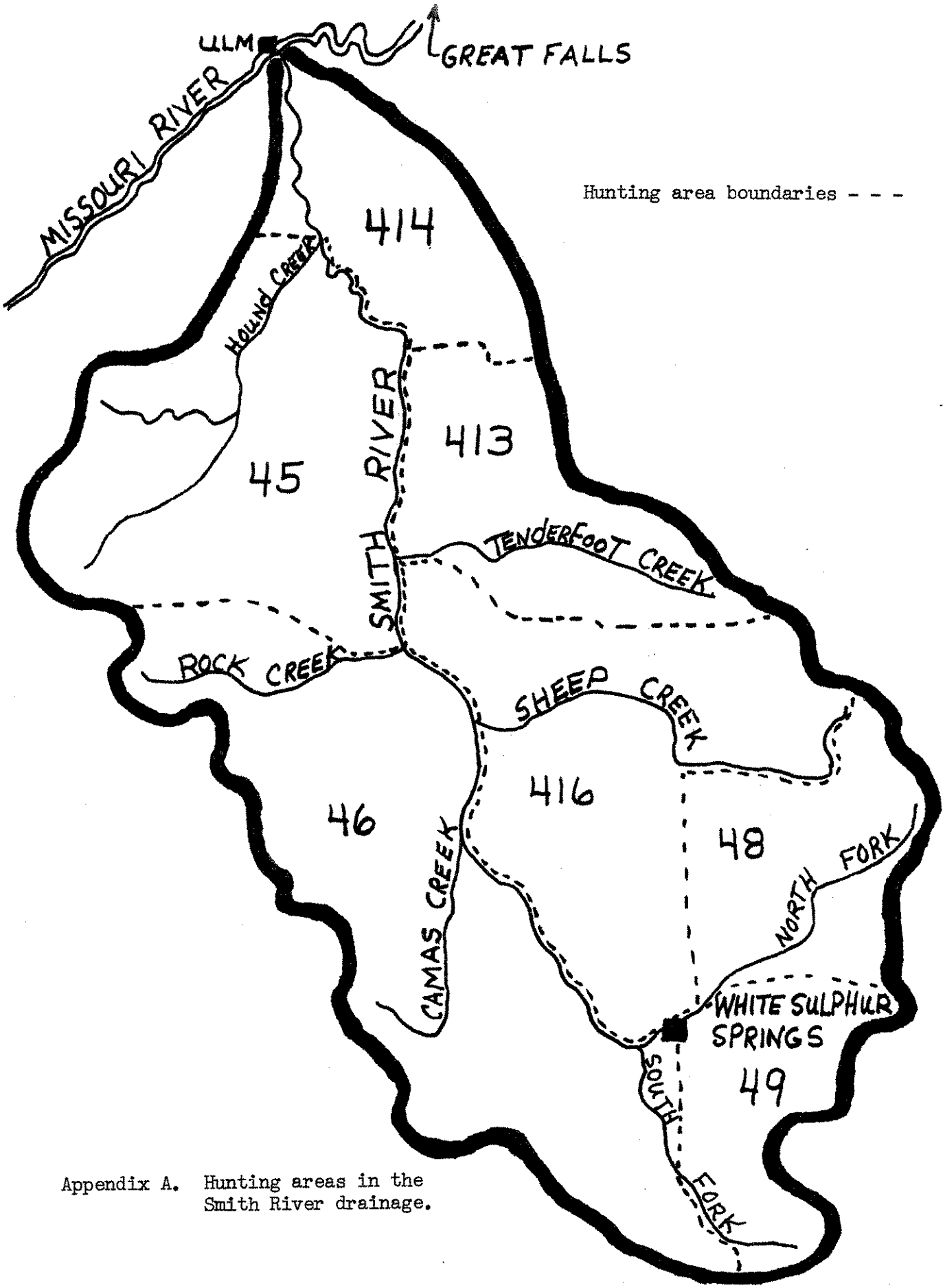
1. Prevent destruction of moose habitat on the following public lands: national forest lands in Sections 4, 5, 9, 16, 26, 27 and 34, T 9N, R 4E; Sections 31 and 32, T 10N, R 4E; and Section 4, T 10N, R 3E. State land Section 16, T 9N, R 5E.

2. Prevent gold placer mining operations in Thompson Gulch from destroying moose winter range.

Antelope

1. Prevent destruction of antelope habitat on the following state lands: many small scattered parcels, Figures 6 and 7, and Section 20, T 8N, R 6E.

2. Prevent sheep-tight fencing or four-plus strand fences that obstruct antelope movement, especially in the North Fork of Smith River-Musselshell River Divide area and the South Fork of the Smith River-Sixteenmile Creek Divide area.



Appendix A. Hunting areas in the Smith River drainage.

SECTION III

UPLAND GAME BIRD INVENTORY AND PLAN

Job 1-c

Prepared by

Robert R. Martinka

June, 1973

INTRODUCTION

Six upland game bird species are found in the Smith River drainage. Populations of blue grouse, ruffed grouse, sharp-tailed grouse and gray partridge are most likely stable, whereas pheasant and sage grouse populations are probably decreasing because of habitat destruction and changing land-use patterns. There is little that can be done to prevent changes in land-use that are detrimental to pheasant populations, but the destruction of sage grouse habitat can be slowed down if public pressure is applied in the proper places. Specific recommendations will be made in the section of this report that deals with sage grouse problems.

It appears that upland game bird hunters have very little economic impact on the only population center in the drainage, White Sulphur Springs. The town of Ulm, at the very northern edge of the drainage, might derive relatively greater economic benefits from bird hunters because of its smaller size, but the net benefit is still thought to be quite small.

The upland game bird harvest for 1969 and 1970 in Cascade and Meagher Counties is shown in Table 1. Note that the percent of the statewide game bird harvest occurring in Meagher County is quite low. The harvest from Cascade County is relatively high, but only a small portion of the county is included in the Smith River drainage. A large majority of the bird harvest in the area occurs during the first week of the bird hunting season (Table 2). The harvest of mountain grouse is distributed over a longer time period, but nearly 90 percent of the harvest occurs during the first 3 weeks of the season.

Data collected from hunters on opening day at the Townsend checking station from 1961 to 1971 are presented in Table 3. The apparent decrease in the number of opening day hunters is probably due to the change from a Sunday to a Saturday opening day in 1968. Hunter success as indicated by the number of birds per hunter and the opening day harvest of five different bird species appears to be quite variable. The harvest and hunter success undoubtedly vary as much as they do because of differences in opening day weather and variations in annual game bird production. There is no direct check on hunter harvest from the lower portion of the drainage.

Upland game bird production data as determined from wings collected at checking stations and from wing envelopes are presented in Table 4. Production data from broods sighted during the study are shown in Table 5. Other studies have shown little correlation between production data as determined from brood observations and that determined from wing analysis. In light of this fact, it is recommended that brood counts in this drainage be based only on incidental observations, and that no specific brood routes be established because of the questionable value of data derived from them.

Table 1. Upland game bird harvest as determined from hunter questionnaires for 1969 and 1970.

Species	1969		1970	
	Meagher Co.	Cascade Co.	Meagher Co.	Cascade Co.
Pheasant	0[1] -0.0[2]	11,931 -10.0	478 - 0.5	10,709 -11.0
Sharptail	215 -0.2	11,636 -12.0	278 - 0.4	8,086 -11.0
Sage Grouse	967 -1.8	1,317 - 2.4	1,296 - 3.5	1,018 - 3.0
Blue Grouse	2,472 -6.0	1,303 - 3.2	1,296 - 3.4	1,296 - 3.0
Ruffed Grouse	390 -1.0	537 - 1.4	463 - 1.3	108 - 0.3
Gray Partridge	255 -0.4	9,902 -14.0	185 - 0.4	7,684 -16.0
TOTAL	4,622 -1.1	37,245 - 8.4	4,305 - 1.2	29,210 - 8.0

[1] Number of birds
[2] Percent of statewide total

Table 2. Percent of four species of grouse shot at various time periods as determined from wings collected from envelope surveys, District 4, 1970-71.

Time Period	Sharptail	Sage Grouse	Gray Partridge	Blue Grouse
1st Day	25.5 -18.1[1]	32.4	20.7	14.3 -15.6
2nd Day	10.2 - 8.5	9.2	5.3	0.0 - 6.6
1st Week	35.1 -31.2	36.7	22.7	33.7 -23.0
2nd Week	22.2 -19.1	14.5	20.0	13.9 -15.2
3rd Week	2.6 - 9.1	6.3	0.0	17.9 -21.4
4th Week	1.7 - 7.4	0.0	3.3	0.4 - 8.6
5th Week	0.2 - 1.4	0.5	4.0	1.8 - 0.0
6th Week	1.7 - 0.4	0.0	8.7	3.3 - 1.2
7th Week	0.0 - 2.0	0.0	2.7	1.8 - 2.5
8th Week	0.0 - 0.0	0.0	6.0	1.5 - 0.0
9th Week	0.0 - 1.6	0.0	2.7	0.0 - 0.0
10th Week	0.0 - 0.0	0.0	0.0	0.0 - 1.6
Unknown	0.7 - 1.2	0.5	4.0	11.4 - 4.1

[1] First figure is for 1970 and second is for 1971.

Table 3. Opening day upland bird hunter checking station results, Townsend 1961-71.

Date	No. of Hunters	Total Birds	Sage Grouse No.	Sage Grouse %	Blue Grouse No.	Blue Grouse %	Sharp-tails No.	Sharp-tails %	Ruffed Grouse No.	Ruffed Grouse %	Gray Partridge No.	Gray Partridge %	Birds/ Hunter
9/17/61	140	163	119	73	21	13	3	2	7	4	13	8	1.2
9/16/62	118	121	90	74	11	9	16	13	4	4	0	0	1.0
9/15/63	181	242	218	90	7	3	15	6	1	0	1	0	1.3
9/20/64	165	230	189	82	15	7	12	6	0	0	14	6	1.4
9/19/65	188	206	178	86	6	3	13	6	0	0	9	4	1.1
9/18/66	154	281	170	61	61	22	37	13	0	0	13	5	1.8
9/17/67	191	213	167	78	20	9	24	11	2	1	0	0	1.1
9/15/68	85	108	84	78	6	6	14	13	0	0	4	4	1.3
9/13/69	102	168	116	69	32	19	13	8	0	0	7	4	1.7
9/12/70	141	168	133	79	23	14	9	5	0	0	3	2	1.2
9/11/71	111	172	98	57	49	28	20	12	3	1	2	1	1.6

Table 4. Upland game bird production data as determined from wings collected at checking stations and from wing envelopes.

1970

Species	Juv.	Yearl.	2-Plus	Uncl. Adult	Total Adults	Juv./ 100Ad.	Juv./100 Ad.Fem.
Sage Grouse	95	29	25	8	62	1.53	2.24
Sharptail	8	6	0	9	15	0.53	4.00
Gray Partridge	3	3	0	1	4	0.75	1.50
Blue Grouse	80	4	12	12	28	2.86	8.89
Ruffed Grouse	3	0	1	1	2	1.50	-

1971

Sage Grouse	60	19	23	10	52	1.15	1.50
Sharptail	11	2	2	1	5	2.00	-
Gray Partridge	1	2	0	0	2	-	-
Blue Grouse	78	8	8	7	23	3.40	6.10
Ruffed Grouse	2	1	1	1	3	0.67	-

Table 5. Average brood sizes for game birds in the Smith River drainage, 1970 and 1971.

	Sage Grouse	Blue Grouse	Ruffed Grouse	Sharptail	Gray Partridge
1970	15[1]/ - 5.2[2]/	6 - 3.3	2 - 6.0	3 - 6.7	3 - 8.3
1971	25 - 5.2	6 - 5.7	2 - 5.5	0 - -	1 -11.0

1/Number of broods sighted.
2/Average brood size.

Supporting Data

Sage Grouse

Sage grouse are the most heavily hunted upland game bird in the upper portion of the drainage. They are found exclusively in or near the sagebrush-grassland habitat type which occurs on about 8 percent of the drainage. Sagebrush distribution is shown in Figure 1. The general population trend of these birds appears to be downward, and it will continue in this direction until the destruction of sagebrush is halted.

During this study, 11 new sage grouse strutting grounds were located during aerial and ground surveys. Of the seven previously known strutting grounds on the area, only one remains active. The locations of all known grounds which are presently active and the maximum numbers of displaying males counted on them during the 3-year study are presented in Table 6. Locations are also plotted on Figure 1. Most of the breeding areas are located on the western and southern portions of the sagebrush range. Data collected incidental to this study and subsequently published by Peterson (1970) indicate a drastic decrease in breeding populations in areas where the greatest amount of sagebrush destruction has taken place.

Three sage grouse brood routes which were established in 1970 were later abandoned because of few brood sightings along them. Random excursions into likely looking brooding areas produced better results with less expenditure of time. In 1970 and 1971, 15 and 25 brood sightings produced averages of 5.2 and 5.2 young per brood, respectively. Production data as determined from wing collections are presented in Table 4.

Hunter harvest of sage grouse in the drainage appears to be generally decreasing according to Townsend checking station results (Table 3), but this decrease is in conjunction with a general decrease in the number of hunters, so no definite conclusions may be drawn. However, the percentage of sage grouse in the total harvest of birds appears to be decreasing, which leads one to the possible conclusion that there has been a decrease in the number of sage grouse hunters. This may be due to an increase in the amount of land posted to hunting.

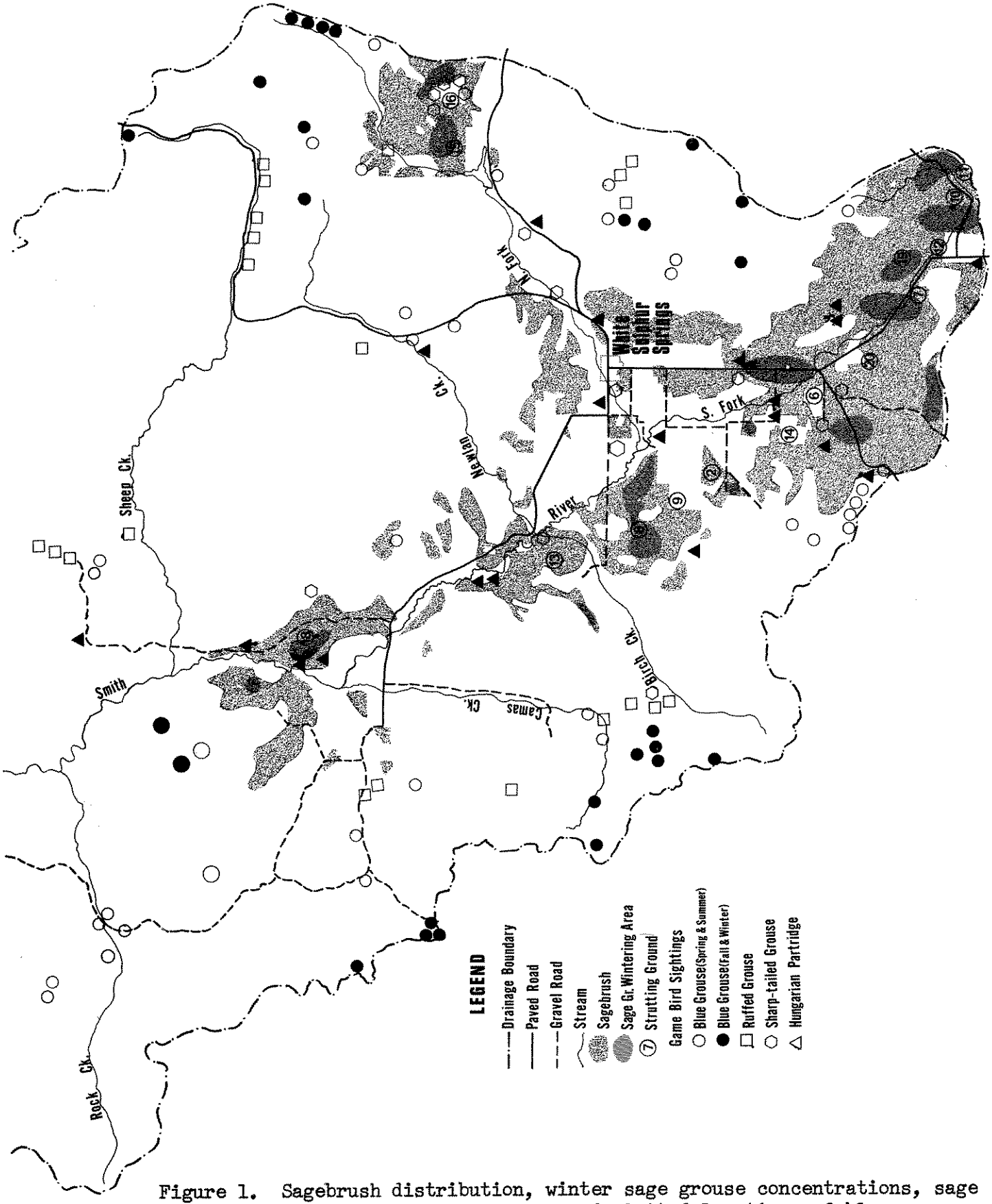


Figure 1. Sagebrush distribution, winter sage grouse concentrations, sage grouse strutting grounds, and plotted locations of blue grouse, ruffed grouse, sharp-tailed grouse and gray partridge.

Table 6. Maximum numbers of displaying male sage grouse and strutting ground locations in the Smith River drainage, 1970-1972.

Ground No.	Maximum Number of Males 1970	1971	1972	Location and Description
2	3	0	-	Sec 5, T 8N, R 6E, grassy opening east of sheepshed.
6	56	40	84	SW¼ Sec 16, T 8N, R 6E, hay meadow.
7[2/]	0	1	-	Sec 15, T 7N, R 7E, west of Moss Agate along low grassy area south of highway near river.
8	29	40	30	NW¼ Sec 25, T 9N, R 5E, grassy area 150 yards west of waterhole.
9	10	6	0*	Sec 30, T 9N, R 6E, east of fence, south of road in old hay field with scattered sage.
10	10*	52	33	NE¼ Sec 29, T 7N, R 8E, low mesic swale area north of highway.
11[2/]	8	4	-	Sec 34, T 7N, R 8E, scattered sagebrush ridge.
12	5*	28	0	Sec 24, T 7N, R 7E, grassy swale along river.
13	10	8	-	Sec 35, T 10N, R 5E, south slope of rocky ridge in scattered sage.
14	32	38	20	NE¼ Sec 21, T 8N, R 6E, grain field.
15	20	20	10	SW¼ Sec 10, T 10N, R 8E, west of road in grassy swale.
16	11*	30	31	SE¼ Sec 11, T 10N, R 8E, west edge of Bair hay meadow near fence.
18	[1/]	8*	-	NW¼ Sec 7, T 11N, R 7E, open ridge just north of road to Thorson's calving shed.
19	-	2*	-	Sec 14, T 7N, R 7E, low grassy area 1/2 mile due north of bend in highway.
20[2/]	-	7*	-	Sec 6, T 7N, R 7E, exact location unknown. Somewhere south of Dupea house in hayfield.
21	-	-	-	Sec 3, T 11N, R 3E, location unknown, reportedly near Doggett's cow camp.

*Incomplete count

[1/]No count

[2/]Located on state lands.

Checking station data do not seem to indicate a decrease in the sage grouse harvest per hunter, even though the grouse population is probably continually declining because of loss of habitat.

Table 7. Locations of sharp-tailed grouse dancing grounds located from aircraft in 1970 and 1971.

Ground No.	Location
1	Sec 23, T 18N, R 2E - on grassy bench east of agriculture.
2	Sec 10, T 17N, R 2E - east of old buildings.
3	Sec 27, T 17N, R 2E - east of fork in road, just over hill.
4	Sec 20, T 17N, R 2E - 1/2 mile SW right turn in county road, on bench.
5	Sec 29, T 17N, R 2E - one mile straight south right turn on ridge, west above coulee.
6	Sec 36, T 17N, R 1E - approximately 1 mile east of Bird Creek.
7	Sec 2, T 17N, R 2E - between Smith River and Spanish Coulee.
8	Sec 13, T 17N, R 2E - on broad bench above Hound Creek bridge.
9	Sec 6, T 15N, R 2E - east of road under power lines on ridge.
10	Sec 5, T 15N, R 2E - flat high bench north of West Fork of Hound Creek.
11	Sec 29, T 15N, R 3E - first low bench northwest Millegan, about 100 yards west of county road.
12	Sec 17, T 17N, R 3E - in grassy block between grain areas.
13	Sec 10, T 17N, R 4E - just north of waterhole.
14	Sec 13, T 18N, R 2E - east of secondary highway on Goodman Coulee road, halfway up bench, north in fenced corn.
15	Sec 32, T 16N, R 2E - southcentral part of section on grassy hill near jeep trail.
16	Sec 9, T 16N, R 2E - southwest of buildings on Spring Willow Creek, second ridge west of Hound Creek.
17	Sec 32, T 17N, R 3E - center of section on bench above Smith River, below highest bench.
18	Sec 2, T 16N, R 2E - northeast corner of section on bench above Hound Creek.
19	Sec 1, T 16N, R 2E - 200 yards west of road, flat area.
20	Sec 8, T 16N, R 3E - between Mullens and Clark Creek, on dividing ridge.
21	Sec 15, T 16N, R 2E - open area, flat land.
22	Sec 21, T 16N, R 3E - top of ridge, east of Clark Creek.
23	Sec 24, T 16N, R 2E - ridge above creek, 1/2 mile west of turn in road.

Table 8. Maximum counts of male sharp-tailed grouse on dancing grounds in lower Smith River drainage.

	Year						
Ground No.	1966	1967	1968	1969	1970	1971	1972
A-5	36	34	30	-	26	36	36
A-10	-	5	11	30	21	40	32
A-11	-	-	-	5	5	12	19

There was no hunting season on sage grouse in this area from 1942 to 1958, but as stated earlier, checking station data indicate that the harvest of birds per hunter was about the same on opening day in 1958 as it has been for the past several years.

Sage grouse are apparently the only small game species that draw a significant number of hunters from other areas into the southern portion of the drainage. Thus, sage grouse hunters may have some economic impact on the White Sulphur Springs area, but this impact is most likely an imperceptible one.

In a 1970 aerial survey of wintering sage grouse, 44 flocks totaling 1,464 birds were located. The highest density of wintering birds was found in an area just west of White Sulphur Springs. Major wintering areas are indicated on Figure 1. State sections with wintering sage grouse were: Sections 4 and 10, T 7N, R 7E; Sections 8 and 34, T 8N, R 6E; Section 2, T 10N, R 8E; and Section 36, T 11N, R 8E. The indicated areas of concentration, no doubt, represent only a minor portion of the habitat needed and used by sage grouse during the winter months. Further attempts to census wintering grouse were made in 1971 and 1972, but poor snow and flying conditions thwarted those attempts. The results of the 1970 survey are thought to have produced a minimum amount of data on distribution and numbers.

Sharp-tailed Grouse

These prairie grouse are abundant in the northern portion of the drainage where they are most often found in association with the mixed forb, shrub, grassland vegetative type. Small populations of sharptails are found in the sagebrush-grassland, grassland, and meadow vegetation types in other portions of the drainage. Primary sharp-tailed grouse distribution is indicated in Figure 2. Sightings of individuals and groups of sharptails in marginal range are shown in Figure 1.

Twenty-three sharptail dancing grounds were located from the air in the springs of 1970 and 1971 (Table 7). These grounds are quite easy to locate from the air when there is a fresh snow cover on the ground. Accurate counts of displaying males on these grounds were not made. Periodic aerial surveys (every 2-3 years) of these grounds could possibly be used to indicate sharptail population trends in this area. Population trends may also be monitored by analyzing the counts obtained along a previously existing sharptail dancing ground route, the Adel route. Maximum counts of males on three dancing grounds included in the Adel route which occur within the drainage boundary are presented in Table 8. The locations of all known dancing grounds in the drainage are included in Figure 2. No dancing grounds were located on state lands.

Data from the Townsend checking station (Table 3) indicate that the harvest of sharptails from the upper portion of the drainage is quite light, as might be expected because of poor habitat. Although there is no direct check on the sharptail harvest from the lower portion of the drainage, it is believed that

quite a number of birds are taken from this area. It receives heavy hunting pressure from Great Falls hunters, and as a result, much of the private land is closed to hunting.

In winter sharptails were observed using the brushy areas which are abundant in the lower portions of the drainage. Grain fields found in close association with this good cover appeared to be quite heavily used. Virtually all winter observations of sharptails in the upper portions of the drainage were of birds in willow bottoms.

No specific brood routes were run during the study, but incidental observations of three broods produced an average of 6.7 young per brood. Production data as determined from wing collections are presented in Table 4.

Ruffed Grouse

Ruffed grouse in the Smith River drainage were located in association with aspen, spruce-willow, and mixed aspen-conifer vegetation types. These types comprise less than 4 percent of the total acreage in the drainage, so consequently ruffed grouse are not very abundant. However, when attempts to locate these birds were confined to the above-mentioned habitat types, they were quite easily located.

An attempt was made to establish drumming routes for spring censuses in several different areas; however, limited habitat and the resulting low populations do not seem to be conducive to the use of this census technique in the Smith River drainage.

All ruffed grouse observations were recorded and are plotted on Figures 1 and 2. They were most abundant in upper and lower Sheep Creek, Eagle Creek, the South Fork of Tenderfoot Creek, and the foothill portions emanating from the Big Belt Mountains. Four broods sighted during the study averaged 5.8 young per brood (Table 5).

Data from the Townsend checking station (Table 3) indicate that few ruffed grouse are harvested from the Smith River drainage. Since they are not overly abundant, few hunters probably specifically hunt for them. The ones that are harvested are most likely the result of accidental encounters while hunters are seeking blue grouse.

Pheasant

Pheasants were found to be abundant in the lower one-third of the Smith River drainage (Figure 2). They were virtually absent from the remainder of the drainage because of a lack of suitable habitat. Only one pheasant was sighted in the southern portion of the drainage during the entire 3 years of this study.

A pheasant cock-crowing route was established along the lower Smith River from the Ulm bridge to the Hound Creek bridge, a distance of 20 miles. Results

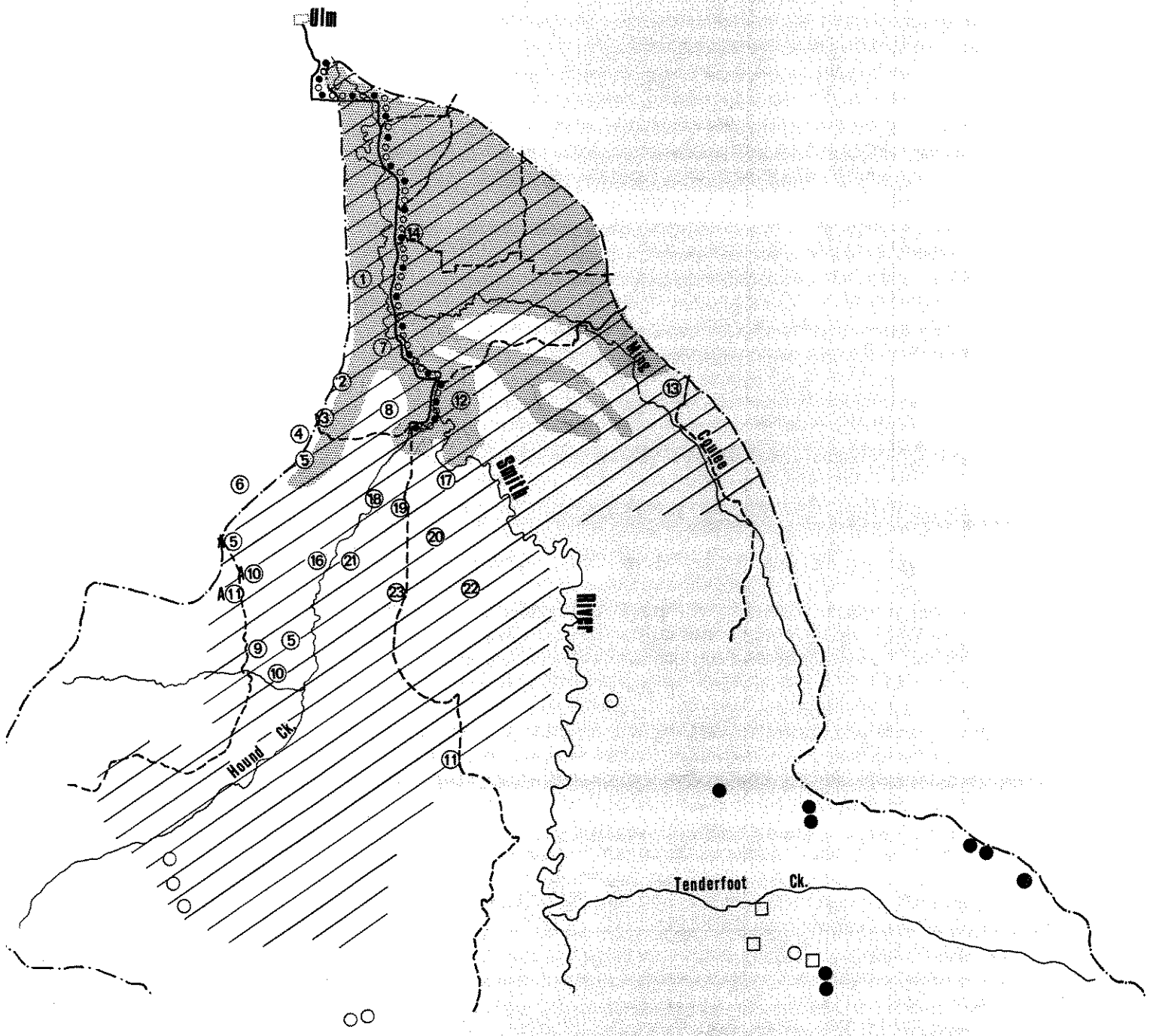


Figure 2. Pheasant distribution, sharp-tailed grouse distribution, pheasant crowing routes and plotted observations of blue grouse and ruffed grouse.

of cock-crowing counts along this route (Table 9) indicate that the highest pheasant densities occur along the first 10 miles of the route, from Ulm south. During the springs of 1970 and 1971, this section of the route produced averages of 22 and 28 calls per 2-minute stop, respectively. These counts are generally higher than those recorded from many other areas in the state.

Table 9. Smith River pheasant cock-crowing count, Ulm bridge to Hound Creek bridge.

Stop No.	5/14/70	5/10/71	5/28/71	Stop No.	5/14/70	5/10/71	5/28/71
1	17	15	5	12	7	24	18
2	23	35	21	13	15	21	19
3	12	41	41	14	5	7	6
4	19	28	20	15	17	7	6
5	30	56	28	16	1	10	7
6	30	25	34	17	3	10	6
7	25	40	21	18	3	5	4
8	18	41	37	19	1	1	0
9	26	20	21	20	1	2	2
10	19	13	12	21	5	9	0
11	15	27	15				
Average/2-minute stop					14	23	15

The last 10 miles averaged 6 and 8 calls per stop, respectively. The differences in population density are most likely due to variations in habitat. The first 10 miles of the route contain a great deal of grain in combination with good brush and grass cover. In the last 10 miles, the grain fields are replaced by hay fields.

A winter sex ratio survey in 1972 indicated 89 cocks per 100 hens. Most of these birds were found on or near grain fields in the lower 10 miles of the drainage. This high proportion of males may indicate a low hunter harvest in the area, but there are no checking station data available to confirm this conjecture. An abundance of posted private land in areas of high pheasant density may contribute to a small harvest.

Blue Grouse

Blue grouse are one of the most important upland game birds in the drainage. Their distribution and habitat use varies with the season. In spring and summer they are found in lower mountain areas with scattered conifers and open hillsides.

Breeding and brood rearing occur in these areas. This scattered conifer habitat type occurs on about 13 percent of the drainage.

The vastness of the area prevented a complete check of potential breeding areas, but breeding males were located in the lower portions of the following drainages: Hussy Creek, South Fork of Cooks Creek, Keep Cool Creek, Rock Creek, and Freeman Creek in the Big Belt Mountains; Willow Creek, Lone Willow Creek, and Sawmill Creek in the Castle Mountains; and Newlan Creek, Guise Creek, Divide Creek, Eagle Creek and Deep Creek in the Little Belt Mountains. Broods were commonly found on open, grassy hillsides in early summer, and in more moist areas in late summer. All spring and summer sightings are plotted on Figures 1 and 2. Production data as determined from wing collections are presented in Table 4.

During the fall, blue grouse migrate to higher open ridges with scattered timber where they usually remain until snow permanently covers the ground. As winter approaches, they move into more dense stands of timber where they spend the winter subsisting primarily on conifer needles. This dense conifer habitat comprises about 24 percent of the drainage. In this zone of dense conifers, wintering blue grouse were found in a wide variety of forest types, including spruce-fir, Douglas fir, limber pine, and lodgepole pine. Fall and winter sightings are plotted on Figures 1 and 2.

Hunter harvest of blue grouse in the drainage appears to be quite variable as indicated by Table 3. These large annual fluctuations in harvest are probably due to several different factors, all of which are associated with seasonal weather patterns. First of all, excessively wet and cold weather during the first several weeks of brood rearing may severely reduce production for that year. Secondly, the amount and distribution of rainfall during the summer months may strongly influence the elevational distribution of the birds during the fall hunting season. It appears as though the birds tend to migrate to the higher elevations earlier in the drier years. Last of all, if the weather is wet, windy, and cold during the opening day of hunting season, blue grouse may be very hard to find and flush, and the result will be a poor harvest.

The relative abundance of insects, notably grasshoppers, and various kinds of berries during a particular year may also influence distribution and hunter success. It is doubtful that fluctuations in hunter harvest are attributable to cyclic phenomena because other studies in Montana have indicated rather stable breeding populations and constant mortality rates.

Gray Partridge

Gray partridge were located in scattered small numbers throughout the lower portions of the drainage, with the greatest density being noted in conjunction with pheasant and sharp-tailed grouse habitat in the lower one-third of the drainage. In the upper one-third of the drainage, they were found in association with grain and hay fields and willow bottoms as is indicated on Figure 1 where all sightings were plotted.

Opening day check station data from Townsend (Table 3) indicate that very few partridge are harvested in the upper portion of the drainage. Those that are harvested are probably shot mostly by sage grouse hunters. No harvest data for the lower portion of the drainage are available, but there is probably a moderate harvest of grays by sharp-tailed grouse and pheasant hunters. Four broods sighted during the study averaged 9.0 young per brood. Production data as determined from wing collections are presented in Table 4.

Franklin's Grouse

There have been no confirmed reports of this grouse species occurring in the Smith River drainage during this study. If this bird is present in the drainage, it apparently occurs only in small numbers in isolated areas of dense lodgepole pine or spruce and fir.

Merriam's Turkey

Turkeys are apparently not found in the drainage except on rare occasions when stragglers sometimes wander into the area. They have not been planted in the area by the Department of Fish and Game because of a lack of suitable habitat. They have been introduced to areas on the west side of the Big Belt Mountains and to the east side of the Little Belt Mountains. On May 10, 1962, a hen turkey with eight young was reported sighted somewhere on the lower Smith River.

Summary and Discussion

As with many other regions in the state and nation, access to private lands for hunting is one of the primary problems encountered in the drainage, and an ever increasing amount of private land is being closed to public hunting. This problem is most often the fault of the hunter. The implementation of programs which provide monetary incentives to landowners for allowing hunter access seems to be an inevitable solution. This might be done in conjunction with one of the federal programs already in existence, or through a newly developed program, either on the federal, state or private level.

Hunting seasons are often criticized by landowners as being too long. This problem does not seem to present itself very often in this drainage because the prairie grouse season is of relatively short duration, possibly because of pressures applied by landowners in the past. Mountain grouse seasons are longer, but these birds occur mostly on public lands. For upland game birds, other than mountain grouse, that are occasionally found on public lands, seasons should be long enough that the maximum amount of recreational opportunity possible may be realized. In other words, different season lengths may have to be set for public and private lands.

It seems unfair that the hunting public in Montana does not have access rights to lands owned by its state government. There are more than 70,000 acres of state land in the drainage, much of which is good upland game bird habitat. Added recreational opportunity could be provided by these lands, and many hunters would no doubt be willing to pay a small fee to the State Land Board for the privilege or right (for which they should not have to pay) to hunt on these lands. This money could be used to post boundary lines of state lands and for habitat improvement projects--fence ladders, parking spaces, etc.

Since nonconsumptive uses of wildlife are becoming more popular, there appears to be an increasing interest by the public in watching sage grouse and sharp-tailed grouse perform their mating rituals on breeding grounds. If this use continues to increase, specific areas for the viewing of strutting and dancing grounds should be established with the consent of willing landowners. These viewing areas should be established on or near existing roads so that damage to the landscape by users is minimized. The viewers should be made aware through pamphlets or signs that the opportunity to watch these birds was made available to them through the generosity of the hunting public.

Spraying and mowing of roadside vegetation are two potentially detrimental practices which are prevalent throughout the drainage. If mowing is to take place, it should be delayed until the nesting efforts of all upland game birds have been completed. This is usually the last week in July or the first week in August. Indiscriminate roadside spraying of herbicides should be stopped. If spraying is deemed necessary for the control of noxious weeds, it should be done by personnel trained to identify and spray only the target vegetation at the proper time of year. Present spraying programs may be doing more harm than good in that they are killing vegetation necessary for the stabilization of roadside banks.

Burning of weeds and grass along ditches, roadsides, and railroad rights-of-way in spring should be discouraged. This practice may maintain seral stages which typically contain rank and noxious weed species. This burning also destroys much valuable protective and nesting cover for game birds.

Discussion by Species

Sage Grouse

As noted earlier, the principal problem involving sage grouse in this drainage is the gradual and continuing destruction of sagebrush habitat through plowing, burning, mowing, and chemical treatment. The future of sage grouse is, therefore, very bleak, as land becomes more intensively used for agriculture.

Incidental to the sage grouse inventory, Peterson (1970) conducted a historical review of sagebrush eradication and dwindling sage grouse breeding populations in a two-township area west of White Sulphur Springs. Briefly, the study showed that nearly 50 percent (12,000 acres) of the original sagebrush stand in the area had been eradicated since 1915. Five strutting grounds located in 1953 showed a total decrease of 116 males by 1958. There was no hunting season during this 5-year period. During the next 5 years, after a hunting season was opened, the count dropped by 79 males. These five strutting grounds have subsequently ceased to exist.

One of the above-mentioned strutting grounds had a maximum of 71 males in 1954 and maintained this approximate level through 1964 when 66 males were counted. In 1967 the acreage in and around that ground was treated with 2,4-D to kill the sagebrush, and it did a thorough job. In the spring of 1968 only 17 males were observed, in 1970 there were only three, and in 1971 there were none. The spray treatment appears to have put this ground out of existence.

The only way to maintain a sage grouse population in this drainage is to stop the continuing destruction of sagebrush. This may be a hopeless task, since about 85 percent of the remaining 106,000 acres of sagebrush is in private ownership. Probably one-third of the original sagebrush stand has already been destroyed. Since approximately 16,000 acres (15 percent) of the remaining sagebrush acreage occurs on state-owned land, a first step in reducing the problem of dwindling habitat should be the prevention of any further destruction of sagebrush on state lands. Secondly, since sagebrush removal may not be economically justifiable for the private landowner to initiate on his own, all federal programs which provide funds for sharing the cost of killing or removing sagebrush should be abolished. Such programs use taxpayers' money to the detriment of a resource they own. If a significant portion of the sage grouse resource is to be maintained, the private landowner must be induced to refrain from destroying any more sagebrush range. This is a difficult chore, since economics are involved. Much rangeland that was formerly covered with sagebrush is presently being used to grow grain and hay crops because the land is more valuable for these purposes than for grazing.

There appears to be no biological justification for the short duration of sage grouse seasons presently prescribed for this region. The seasons have apparently been kept short to appease the public and landowners. It is recommended that an attempt be made to lengthen the seasons somewhat so that the resource may be more thoroughly utilized while it lasts.

Annual strutting ground counts should be made in this area to monitor changes in breeding populations. Grounds that should be included in these counts are Numbers 6, 8, 10, 12, 14, 15, and 16 (see Table 6). Each ground should be counted a minimum of two times in April of each year during periods of nice weather.

Sharp-tailed Grouse

Probably the greatest potential threat to sharptails in this area is heavy livestock grazing in the grassy and weedy areas that these birds use for many of their daily and seasonal activities, including nesting. This problem can be, and has been, alleviated by educational programs which lead to better conservation and grazing management practices. One detrimental practice that may destroy many nests and has no apparent solution is the early cutting of native and alfalfa hay. This problem is most pronounced in areas of intensive agriculture lacking in nesting habitat, and in years when spring weather comes unusually early.

The chemical destruction of extensive areas of brushland, including buffalo berry, chokecherry, skunk brush, hawthorn, etc., is quite detrimental to this grouse and other wildlife species. There is no apparent advantage or rational

explanation for employing this practice, and its use should be vigorously contested and condemned.

As with all other game species, when occurring primarily on private land, the main problem encountered in managing and harvesting the resource is hunter access. The sharptail population in the lower portion of the drainage could no doubt sustain a higher harvest level than it does presently. The 2- to 3-week hunting season for sharptails in this region is unduly restrictive. A hunting season of 6 to 8 weeks in length would not harm the resource and would provide additional recreational opportunities for those who wish to take advantage of them. This extended hunting season would result in little additional hunting pressure for landowners to contend with, because few hunters take advantage of extended bird seasons and because seasons on other species would partially coincide.

Ruffed Grouse

Livestock grazing is the greatest detriment to the maintenance of ruffed grouse habitat in the Smith River drainage. The problem lies in the fact that suitable grouse habitat often remains moist and its plants succulent during the driest parts of the summer. Such areas are quite attractive to livestock that concentrate in them, especially in dry years. The result is that the vegetation is often trampled and removed to the extent that the suitability of an area for ruffed grouse habitation is virtually destroyed. In aspen groves, the destruction of aspen regeneration is particularly harmful, especially on a long-term basis.

One possible solution to this problem would be to exclude livestock from ruffed grouse habitat through fencing, but this would be rather expensive. Improved livestock grazing management would be a more acceptable solution. The initiation of a four- or five-pasture rest/rotation grazing system with each pasture containing a small but approximately equal portion of grouse habitat would probably be of benefit to both grouse and livestock. In such a system, a good portion of habitat would be unused by livestock each year and available for use by grouse. Since a large portion of the ruffed grouse habitat present in the drainage is on private land, it is essential that the U. S. Forest Service take steps to preserve and maintain that portion of the habitat that occurs on their lands, such as in the Tenderfoot drainage.

The potential for conflict between logging operations and ruffed grouse is minimal, because little logging takes place on the vegetation types required by grouse. However, if present guidelines for maintaining buffer strips along stream bottoms included in timber sales are not strictly enforced, conflict will occur. Other practices noted to be detrimental to ruffed grouse, among other wildlife on the study area, were mining operations on Benton Gulch and the removal of spruce and willow from bottomlands to increase the amount of grass available for grazing on Sheep Creek and several other drainage bottoms.

Blue Grouse

A large proportion of the blue grouse habitat in the drainage occurs on public land, so the opportunities for managing this bird may be greater than those for any other upland game bird present.

There appear to be several areas of conflict between blue grouse and current land-use practices on our public lands. Unfortunately, these conflicts seem to be greater on breeding and brood-rearing areas which are the least abundant segment of the total habitat requirement.

If logging is to take place in areas important to breeding blue grouse, all natural edges should be left unaltered and borders of a minimum of 100 yards should be maintained around all natural openings. Selective and group-selective logging methods may be employed to create breeding habitat in over-mature stands of Douglas fir and ponderosa pine. This type of logging operation opens up the tree canopy so that tree reproduction may occur in the form of scattered thickets. Care should be taken during the logging operation to prevent the destruction of young conifer thickets already in existence. The edges produced by clearcut logging apparently are not suitable for the establishment of blue grouse territories because the self-pruned trees forming the edge do not provide suitable cover.

Intensive livestock grazing on brood ranges may be quite detrimental to blue grouse production. It is important to maintain adequate residual and new herbaceous cover on the open hillsides used during the early brood-rearing period. Later in the summer, broods make more use of creek bottoms and other moist sites, and adequate cover should also be maintained in these areas. A rest-rotation grazing system similar to that suggested for the maintenance and improvement of ruffed grouse habitat would no doubt suffice for blue grouse. This system should be designed so that the maximum amount of cover possible is available during the early brood-rearing period or until the first part of August.

Livestock grazing usually presents the only conflict on areas used by grouse in the fall. Again the important consideration is to maintain adequate herbaceous and shrubby vegetation to provide food and cover for the grouse, and a good grazing management plan will accomplish this.

As noted earlier, these grouse depend almost entirely on conifers for winter food and cover. Many of these wintering areas are the target of clearcut logging. However, since grouse apparently winter in a variety of conifer types, logging is probably not too detrimental to their winter habitat unless too high a percentage of an area is logged. This percentage should probably not exceed 25 percent of the merchantable timber in the upper portion of a drainage.

The aerial application of insecticides for the control of insect infestations should be banned in this drainage. Although the chemicals presently used in such spray projects are apparently not directly detrimental to most warm blooded animals, they are not selective of the insects that they kill. The result of such spray projects could be a great reduction in the availability of insects to young

mountain grouse, with the result that these birds are denied the source of high protein food which may be necessary for their well-being during the early months of their lives.

The sagebrush control portions of all grazing allotment management plans for the U. S. Forest Service lands should be deleted. Sagebrush is most likely a climax plant species on most of the Forest Service land where it is found, and it provides excellent cover for blue grouse broods. Sagebrush densities in some areas no doubt exceed those that would exist under natural conditions, but these higher densities are most likely a result of improper grazing practices, so the chemical treatment of sagebrush in these instances would be treating a symptom and not a cause. As a result, blue grouse would suffer even more than they are presently suffering in some areas. We recognize the fact that many grazing allotments are presently being put under rotation management systems, but this process is a slow one, and is being hampered by cuts in funding and personnel.

The boundary lines of all Forest Service lands should be fenced to exclude the horses which abound in this region. These semiwild animals may be a prime cause of the deteriorated range conditions on the west slope of the Castle Mountains.

Pheasants

As is generally the case with game species found primarily on private land, attempts at proper management of pheasants may be quite unrewarding. The major problems encountered are poor hunter access, detrimental farming practices, and shifts in land use patterns.

Economics is the crux of the problem. It is most profitable, and may be necessary for landowners in the lower Smith River drainage to use their land as intensively as possible. This intense use includes clean farming, the use of all available land, and a shift to crops more profitable and suitable for their farming operations. All of these practices are detrimental to pheasant populations, especially the conversion from grain crops to hay.

As noted earlier, the highest pheasant densities occur along the lower 10 miles of the river bottom, where an abundance of grain is found in conjunction with adequate grass and brush cover. As one proceeds south, the bottomland grain fields are replaced by hayfields and consequently the pheasant densities decrease. In this portion of the drainage, grain is found mostly on the benchland areas where there is little adjacent cover.

As in many other areas, prospects for pheasants and pheasant hunting in the lower Smith River drainage are not very bright, although remnant populations will no doubt persist in isolated areas.

Two possible solutions come into view, neither of which seems to be very promising. First of all, an attempt should be made to acquire land along the

river bottom suitable for the maintenance of local pheasant populations. However, since this is quite valuable agricultural land, the cost of acquiring a significant amount of it would be prohibitive. The fact that the lower Smith River has a poor fishery resource further complicates the situation, since the land would not have added value for fisherman access.

Offering monetary incentives or technical aid to landowners might induce them to consider providing pheasant cover and hunter access. These incentives could be in the form of hunting leases, pay hunting, or agreements with landowners to set aside land and provide access in return for technical assistance or other aid. However, the fact remains that presently it is probably more profitable for the landowner to make full use of this land than to set some of it aside in the hope that he will profit by doing so. Presently in Montana there is not enough demand for pheasant hunting for the above recommendations to be useful or profitable to the landowner, particularly in light of the fact that a wide variety of other sport hunting is available.

Pheasants have all but disappeared from the White Sulphur Springs portion of the drainage, although they were once present in huntable numbers. Only one pheasant was sighted in the area during the 3-year study. Practices which probably contributed to the demise of the pheasant in this area include the change from grain to hay crops in the bottomlands, heavy use of bottoms for winter cattle feeding, and flood irrigation. This area probably never provided very good pheasant habitat, because of the general lack of suitable brushy cover. The last release of game farm birds was made in the area in 1966 and few of them were apparently ever harvested. Release of game farm birds should never again be considered for this area unless there is a drastic change for the better in land use patterns, which at present does not seem very likely.

Two parcels of land on the lower Smith River have potential for the development of pheasant cover and hunter access. These are Sections 16, T 19N, R 2E and S½ Section 36, T 18N, R 2E. It is recommended that the State Land Board look into the possibility of converting these areas or portions of them to pheasant cover and hunter access when present leases expire.

Gray Partridge

Intensive livestock grazing is undoubtedly the single land use practice most detrimental to gray partridge populations. Since these birds occur mainly on private land, little can be done to directly improve habitat conditions for them. Educating landowners to recognize and employ proper land management would probably be the best way to improve habitat conditions for this species.

All of the suggestions for maintaining and improving habitat for pheasants and sharptails would probably be beneficial to grays. Also, most land use trends and practices recognized as being detrimental to pheasants and sharptails are no doubt detrimental to grays.

Other Wildlife

Waterfowl

Waterfowl are of relatively minor importance in the Smith River drainage. Most of the many species of ducks pass through the area during spring migration, but few of them apparently remain to nest. The only nesting species encountered during the study were mallards, blue-winged teal, and baldpate. Mallard and teal broods were occasionally found along meadow streams and roadside ditches, whereas baldpate broods were sometimes found on stock dams. There are probably no Canada geese produced in the drainage.

Harvest of waterfowl in the drainage appears to be rather light. Some geese stop in the upper portion of the drainage during fall and a few of them are no doubt harvested. Cold weather duck hunting in the White Sulphur Springs area appears to have some potential. Several thousand mallards spend late fall and winter on the river and several warm springs which remain open during all but the coldest weather. Hunter use of this resource during the latter portion of the hunting season is moderate. Harvest estimates for Meagher and Cascade Counties are shown in Table 10. Probably only a very small portion of the Cascade County harvest occurs in the Smith River drainage.

Table 10. Waterfowl harvest estimate in Cascade and Meagher Counties for 1970 as determined from hunter questionnaires.

County	No. Duck Hunters	No. Ducks Taken	% State Total	No. Goose Hunters	No. Geese Taken	% State Total
Cascade Co.	1,540	11,266	5.93	656	620	5.80
Meagher Co.	73	693	0.36	27	9	0.08

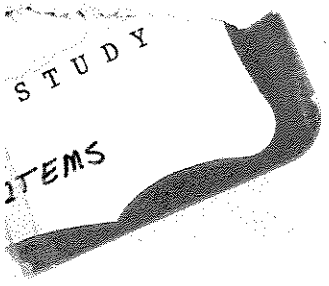
Furbearers

Records kept by fur buyers indicate that the trapping of furbearers by residents of the upper portions of the drainage may provide a moderate supplementary income to some people in the area. Mink, muskrat, and beaver appear to be the most often trapped species, with bobcat, fox, coyote, and raccoon secondary in importance. Fox and raccoon are not very abundant in the upper portion of the drainage, so they were most likely caught in the lower portion or somewhere outside the drainage.

No wolverine, marten, or otter were reported taken by trappers, so these species are probably absent or quite rare in the drainage. Twelve lynx were reportedly taken by trappers from the area in 1970, but these were most likely improperly named bobcats. As with most other regions, the annual harvest of furbearers is probably more dependent on fur prices than on abundance.

Predators

Coyotes are fairly abundant in the upper portion of the drainage, and foxes and raccoons are plentiful near the wooded river bottoms in the lower portion of the drainage. Mountain lions are occasionally sighted in the mountainous portions of the drainage, but they are apparently rather rare. Most of the avian predators common to Montana are found in the drainage at one time or another during the year. Except for occasional predation on sheep, the overall economic and biological impact of predators in the drainage is thought to be slight.



Planning Recommendations

1. Access to public and private lands is a major problem in the drainage.

2. Hunting season lengths for prairie grouse species are unduly short. In order to appease landowners, different season lengths may have to be set for public and private lands.

3. Specific areas for viewing sage grouse strutting grounds and sharptail dancing grounds should be established with the consent of willing landowners.

4. Spraying of sagebrush on public lands where sage grouse occur should be stopped along with cost-sharing for spraying sage on private lands.

5. Key sage grouse strutting grounds (Table 6) and sharptail dancing grounds (Table 7) should be monitored yearly.

6. Improved livestock grazing management on public lands would benefit mountain grouse species.

7. Timber sales should be designed to have a minimal effect on blue grouse breeding areas. These design features are described in the section dealing with blue grouse, page 125.

8. Aerial application of insecticides for the control of insect infestations should be banned unless it is proven that they will not harm wild

9. Attempts should be made to acquire or condition leases on state lands along the river bottom in the lower portion of the drainage to provide public hunting for pheasants.

10. An attempt should be made to find an economic inducement, possibly through federal subsidies, for landowners to maintain game bird habitat and allow hunter access.